

**THE  
PS280  
&  
PS283**  
LABORATORY DC  
POWER SUPPLY

**WARNING**

The following servicing instructions are for use by qualified service personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the Safety Summary prior to performing any service.

*Please check for CHANGE INFORMATION at the rear of this manual.*

**Service Reference**

Copyright © 1991 Tektronix, Inc. All rights reserved. Contents of this publication may not be reproduced in any form without the written permission of Tektronix, Inc.

Products of Tektronix, Inc., and its subsidiaries are covered by U.S. and foreign patents issued and pending.

TEKTRONIX, TEK, SCOPE-MOBILE, and  are registered trademarks of Tektronix, Inc.

Printed in U.S.A. Specification and price change privileges are reserved.

## **INSTRUMENT SERIAL NUMBERS**

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first two digits designate the country of manufacture. The last five digits of the serial number are unique to each instrument. The country of manufacture is identified as follows:

- B000000 Tektronix, Inc., Beaverton, Oregon, U.S.A.
- E200000 Tektronix United Kingdom, Ltd., Marlow
- G100000 Tektronix Guemsey, Ltd., Channel Islands
- HK00000 Hong Kong
- H700000 Tektronix Holland, NV, Heerenveen,  
The Netherlands
- JP00000 Sony/Tektronix, Japan
- TW00000 Taiwan

<b>Operators and Service Safety Summary</b> .....	<b>xi</b>
Symbols and Terms .....	xi
Specific Precautions .....	xii

---

## Specifications

<b>Product Description</b> .....	<b>1-1</b>
General .....	1-1
Specifications .....	1-2

---

## Operating Information

<b>General Operating Instructions</b> .....	<b>2-1</b>
Front Panel .....	2-1
The Variable Power Supplies .....	2-2
The Fixed Voltage Power Supply .....	2-3
Rear Panel .....	2-4

---

## Theory of Operation

<b>Theory of Operation</b> .....	<b>3-1</b>
General .....	3-1
Circuit Description .....	3-1
Master Voltage Output .....	3-1
Slave Voltage Output .....	3-2
5 V Fixed Voltage Output .....	3-4

---

## Performance Verification

<b>Preparation</b> .....	<b>4-1</b>
Requirements for Performance .....	4-1
Warm-up Period .....	4-1
Access .....	4-1
Test Equipment .....	4-1
Equipment Required .....	4-2
<b>Performance Tests</b> .....	<b>4-3</b>
Constant Current Load Regulation .....	4-3
Constant Current Ripple and Noise .....	4-5
Constant Voltage Regulation .....	4-7

---

## Adjustment

<b>Preparation</b> .....	<b>5-1</b>
Requirements for Performance .....	5-1
Personnel .....	5-1
Warm-up Period .....	5-1
Access .....	5-1
Test Equipment .....	5-1
<b>Adjustment Procedures</b> .....	<b>5-3</b>
Independent Mode .....	5-3
Series Tracking Mode .....	5-5
Parallel Tracking Mode .....	5-6
5 V Fixed .....	5-7

---

## Maintenance

<b>Information</b> .....	<b>6-1</b>
Helpful Procedures .....	6-1
Preventing ESD .....	6-1
<b>Inspection and Cleaning</b> .....	<b>6-5</b>
General Care .....	6-5
Inspection and Cleaning Procedures .....	6-5
Inspect Exterior .....	6-5
Cleaning Procedure — Exterior .....	6-6
Inspect Interior .....	6-6
Cleaning Procedure — Interior .....	6-7
Lubrication .....	6-8

<b>Removal and Installation Procedures</b> .....	<b>6-9</b>
Preparation — Please Read .....	6-9
List of Modules .....	6-9
General Instructions .....	6-10
Top Cover Removal .....	6-10
Slave Circuit Board Removal .....	6-12
Fuse Circuit Board Removal .....	6-13
AC Selector Circuit Board Removal .....	6-14
Master Circuit Board Removal .....	6-16
Front Panel Display Circuit Boards Assembly Removal .....	6-17
Front Panel Controls Circuit Board Removal .....	6-19
Output Connectors Circuit Board Removal .....	6-21
Power Transistor Circuit Boards Removal .....	6-23

---

## Options

<b>Options and Accessories</b> .....	<b>7-1</b>
Power Cord Options .....	7-1
Standard Accessories .....	7-1
Optional Accessories .....	7-1

---

## Parts List

<b>Parts List</b> .....	<b>8-1</b>
Parts Ordering Information .....	8-1
Module Replacement .....	8-1
Using the Parts List .....	8-2
Item Names .....	8-2
Indentation System .....	8-2
Abbreviations .....	8-2

---

## Diagrams

<b>Diagrams and Circuit Board Illustrations</b> .....	<b>9-1</b>
Component Values .....	9-1

---

## Index

<b>Index</b> .....	<b>I-1</b>
--------------------	------------



# List of Illustrations

Figure 2-1: PS280 or PS283 Front Panel .....	2-1
Figure 2-2: Variable Power Supply Controls .....	2-2
Figure 2-3: Fixed Power Supply Controls .....	2-3
Figure 2-4: PS280 or PS283 Rear Panel .....	2-4
Figure 3-1: PS280 or PS283 Variable Outputs Block Diagram .....	3-3
Figure 3-2: PS280 or PS283 5 V Block Diagram .....	3-4
Figure 4-1: Constant Current Test Setup .....	4-3
Figure 4-2: Constant Current Ripple and Noise Test Setup .....	4-5
Figure 4-3: Constant Voltage Test Setup .....	4-7
Figure 5-1: Master Circuit Board Adjustment Locations .....	5-8
Figure 5-2: Display Assembly Circuit Board Adjustment Locations ...	5-9
Figure 5-3: Front Panel Controls Circuit Board Adjustment Locations .	5-9
Figure 6-1: Top Cover Removal .....	6-11
Figure 6-2: Slave and Fuse Circuit Board Removal .....	6-13
Figure 6-3: AC Selector and Master Circuit Board Removal .....	6-15
Figure 6-4: Front Panel Display Assembly Removal .....	6-18
Figure 6-5: Front Panel Controls Assembly .....	6-20
Figure 6-6: Output Connectors Circuit Board and Power Switch Location .....	6-22
Figure 6-7: Power Transistor Circuit Boards Location .....	6-23
Figure 8-1: Exploded View A .....	8-8
Figure 8-2: Exploded View B .....	8-16



# List of Tables

Table 1-1: Operational Characteristics .....	1-2
Table 1-2: Physical Characteristics .....	1-3
Table 1-3: Environmental Characteristics .....	1-3
Table 1-4: Electrical Characteristics .....	1-3
Table 4-1: Test Equipment .....	4-2
Table 4-2: Load Resistor Values for Current Checks .....	4-4
Table 4-3: Load Resistor Values for Ripple Checks .....	4-6
Table 4-4: Load Resistor Values for Voltage Checks .....	4-8
Table 6-1: Relative Susceptibility to Static-Discharge Damage .....	6-3
Table 6-2: External Inspection Check List .....	6-6
Table 6-3: Internal Inspection Check List .....	6-7
Table 6-4: Tools Required for Module Removal .....	6-10

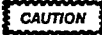

# Operators and Service Safety Summary

Please take a moment to review these safety precautions. They are provided for your protection and to prevent damage to the power supply. This safety information applies to all operators and service personnel.

---

## Symbols and Terms

These two terms appear in manuals:

-  statements identify conditions or practices that could result in damage to the equipment or other property.
-  statements identify conditions or practices that could result in personal injury or loss of life.

These two terms appear 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.

This symbol appears in manuals:



Static-Sensitive Devices

These symbols appear on equipment:



DANGER  
High Voltage



Protective  
ground (earth)  
terminal



ATTENTION  
Refer to  
manual



---

## **Specific Precautions**

Observe all of the following precautions to ensure your personal safety and to prevent damage to either the PS280 or PS283 Laboratory DC Power Supply or equipment connected to it.

### **Do Not Perform Service While 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 exist at several points in this product. To avoid personal injury, do not touch exposed connections or components while power is on. Disconnect power before removing protective panels, soldering, or replacing components.

### **Power Source**

The PS280 or PS283 Laboratory DC Power Supply is intended to operate from a power source that will not apply more than 250 V rms between the supply conductors or between either supply conductor and ground. A protective ground connection, through the grounding conductor in the power cord, is essential for safe system operation.

### **Grounding the power supply**

The PS280 or PS283 Laboratory DC Power Supply is grounded through the power cord. To avoid electric shock, plug the power cord into a properly wired receptacle where earth ground has been verified by a qualified service person. Do this before making connections to the output terminals of the Laboratory DC Power Supply.

Without the protective ground connection, all parts of the PS280 or PS283 Laboratory DC Power Supply are potential shock hazards. This includes knobs and controls that may appear to be insulators.

### **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.

### **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.

### **Do Not Remove Covers or Panels**

To avoid personal injury, do not operate the PS280 or PS283 Laboratory DC Power Supply without the panels or covers.

### **Do Not Operate in Explosive Atmospheres**

The PS280 or PS283 Laboratory DC Power Supply provides no explosion protection from static discharges or arcing components. Do not operate in an atmosphere of explosive gasses.



# Specifications



# Product Description

This subsection begins with a general description of the PS280 or PS283 Power Supply. The Specifications subsection immediately follows.

---

## General

The Tektronix PS280 or PS283 Laboratory DC Power Supply is a multifunction bench or portable instrument. This regulated power supply provides a fixed 5 V output for powering logic circuits and two variable outputs for a wide variety of test and experimental uses. The PS280 or PS283 can be used in any application where three independent power supplies housed in a single package represent a convenience.

The PS280 or PS283 contains two identical, independently adjustable DC power supplies that you can vary from 0 to 30 V. The current on the PS280 variable power supplies varies from 0 to 2 A. The current on the PS283 variable power supplies varies from 0 to 1 A. In all other respects the instruments are identical. Unless otherwise noted, descriptions and procedures in this manual apply to both instruments.

Front panel switches select one of three modes of operation: independent, series, or parallel. In the independent mode, the output voltage and current of each supply can be controlled independently. In the two tracking modes, the variable outputs are connected either in series or in parallel. Under these circumstances, the controls of the master power supply adjust the voltages or current of both power supplies. Series mode allows the power supplies to be varied from 0 to 60 V at 0 to 2 A for the PS280, or 0 to 1 A for the PS283. Parallel mode allows the power supplies to be varied from 0 to 4 A for the PS280 at 0 to 30 V, or from 0 to 2 A at 0 to 30 V for the PS283.

## Specifications

Table 1-1: Operational Characteristics

Characteristic	Measurement
Outputs	Two 0 to 30 VDC, one 5 VDC
Voltage (5 V)	$5.0 \pm 0.25$ VDC at 3.0 A maximum foldback current limited
Voltage (0–30 V)	0–30 constant VDC at 2.0 constant A maximum (PS280) or 1.0 constant A maximum (PS283)
Line regulation (5 V)	$\leq 5$ mV
Line regulation (CV)	$\leq 0.01\% + 3$ mV PS280 $\leq 0.01\% + 5$ mV PS283
Line regulation (CC)	$\leq 0.2\% + 3$ mA
Load regulation (5 V)	$\leq 0.2\%$
Load regulation (CV)	$\leq 0.01\% + 3$ mV (rating current $\leq 3$ A) $\leq 0.01\% + 5$ mV (rating current $> 3$ A) PS280 $\leq 300$ mV (0–60 V single series tracking supply)
Load regulation (CC)	$\leq 0.2\% + 3$ mA
Ripple/noise (5 V)	$\leq 2$ mV rms
Ripple/noise (CV)	$\leq 1$ mV rms, 5 Hz–1 MHz
Ripple (CC)	$\leq 3$ mA rms
Temperature coefficient (CV)	$\leq 300$ ppm/ °C
Recovery time (CV)	$\leq 100$ $\mu$ s (time to recover after a 50% load change with 0.5 A minimum)
Tracking error (slave)	$\leq 0.5\% + 10$ mV of the master supply
Indicator	Two $3\frac{1}{2}$ digits 0.5 in. LED panel display meter
Meter indicators	0–30 VDC $\pm$ (0.5% of RDG + 2 digits) 0–2 A $\pm$ (0.5% of RDG + 2 digits)
Insulation (chassis to terminals)	$\geq 20$ M $\Omega$ at DC 500 V
Insulation (chassis to AC cord)	$\geq 30$ M $\Omega$ at DC 500 V

Table 1-2: Physical Characteristics

Dimension	Measurement
Width	255 mm (10.0 in)
Height	145 mm (5.7 in)
Depth	335 mm (13.2 in)
Weight	11.5 kg (25.4 lb) PS280 9.0 kg (19.9 lb) PS283

Table 1-3: Environmental Characteristics

Characteristic	Temperature	Relative Humidity
Storage	-10°C to +70°C	70%
Operating	0°C to 40°C	80%

Table 1-4: Electrical Characteristics

Characteristic	Measurement
Line voltage	90 to 110 108 to 132 198 to 242 216 to 250, all VAC at 50-60 Hz
Power consumption	348 VA, 250 W maximum (PS280) 254 VA, 172 W maximum (PS283)



# Operating Information



# General Operating Instructions

This section describes the controls on the front and rear panels of the PS280 or PS283 Laboratory DC Power Supply.

## Front Panel

Figure 2-1 shows the front panel of the instrument.

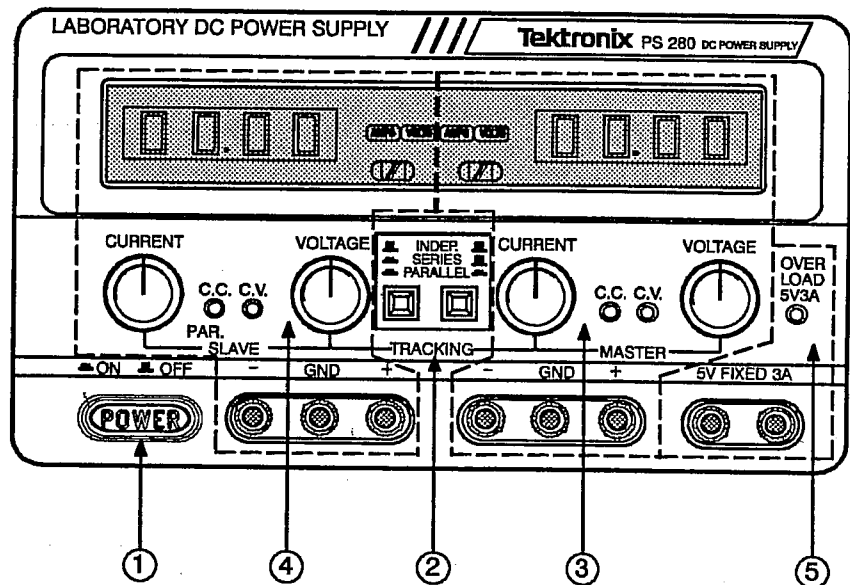


Figure 2-1: PS280 or PS283 Front Panel

1. The power switch turns on the instrument when pressed. When you press it again, the instrument is turned off.
2. The switches labeled TRACKING determine the test mode of the instrument. The PS280 or PS283 features two tracking modes: series and parallel. If both push-button switches are disengaged (out), the two variable power supplies operate independently. If the left switch is pushed in, the instrument operates in series mode. If both switches are pushed in, the instrument operates in parallel mode.

In series mode, the master power supply controls the voltage for both power supplies, which can then range from 0 to 60 V.

In parallel mode, the master power supply controls both the voltage and the current for both power supplies. The current can then range from 0 to 4 A (0 to 2 A for the PS283).



3. These controls affect the right variable power supply. If the instrument is in a tracking mode, the right power supply is the master. In a tracking mode, either or both of the control knobs can affect both variable power supplies.
4. These controls affect the left variable power supply. If the instrument is in a tracking mode, the left power supply is the slave. In a tracking mode, either or both of the control knobs have no effect.
5. These controls affect the fixed 5 V power supply.

### The Variable Power Supplies

Figure 2-2 shows the controls for the master variable power supply.

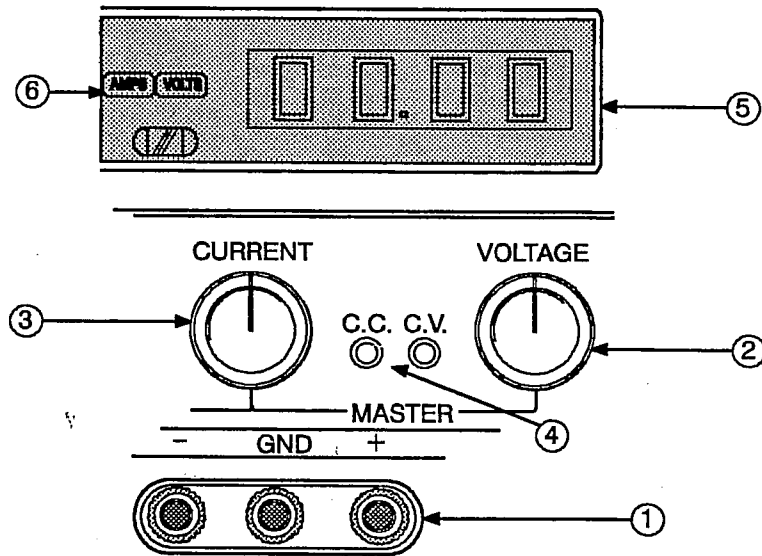


Figure 2-2: Variable Power Supply Controls

1. The output terminals for the power supply allow you to plug in the test leads. The red one on the right is the positive polarity output terminal. It is indicated by a + sign above it.  
The black one on the left is the negative polarity output terminal. It is indicated by a - sign above it.  
The green one in the middle is the earth and chassis ground.
2. The voltage control knob allows you to set the output voltage for the power supply.
3. The current control knob allows you to set the output current for the power supply.
4. If the C.V. light is lighted, the power supply is producing a constant voltage. If the C.C. light is lighted, the power supply is producing a constant current.

5. The LED display lights when the instrument is turned on. The numbers indicate the voltage or current produced by the variable power supply.
6. The AMPS/VOLTS meter selection switch determines whether the LED display shows the current or the voltage. If the switch is pushed to the left, the display shows the current. If the switch is pushed to the right, the display shows the voltage.

The meter selection switch is to the right of the corresponding display for the slave variable power supply. All other controls are the same for both variable power supplies.

### The Fixed Voltage Power Supply

Figure 2-3 shows the controls for the fixed voltage power supply.

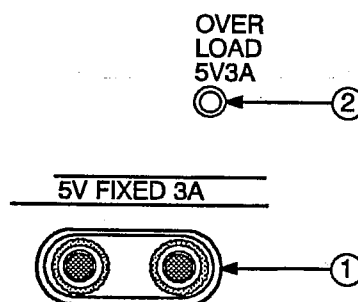
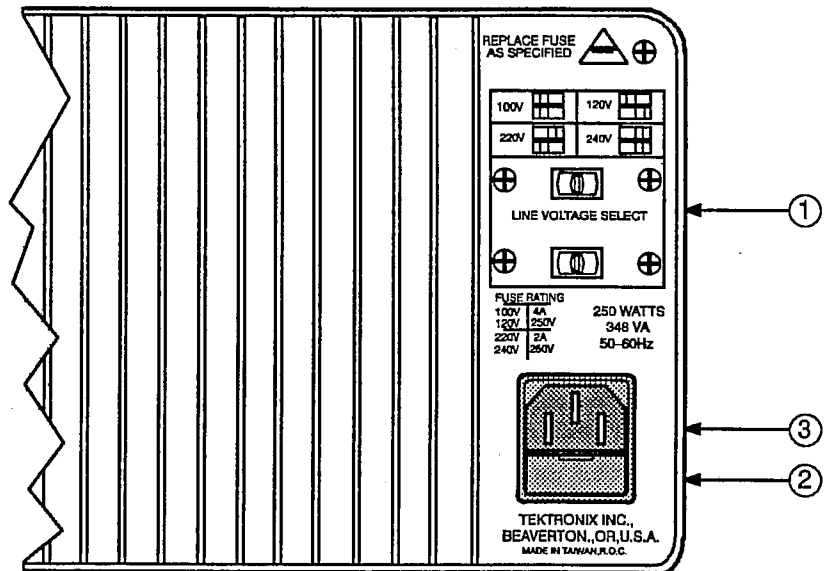


Figure 2-3: Fixed Power Supply Controls

1. The output terminals for the power supply allow you to plug in the test leads. The red one on the right is the positive polarity output terminal. The black one on the left is the negative polarity output terminal.
2. The overload indicator lights when the current on the 5 V power supply becomes too large.

## Rear Panel

Figure 2-4 shows the rear panel of the instrument.



**Figure 2-4: PS280 or PS283 Rear Panel**

1. These two switches allow you to set the instrument for the correct line voltage. Push the top switch to the left if the line voltage is in the range of 100 to 120 V; push it to the right if the line voltage is in the range of 220 to 240 V.

The bottom switch determines whether the line voltage is in the low or the high end of the voltage range. Push it to the left if your line voltage is at the low end of the range—100 or 220 V; push it to the right if your line voltage is at the high end of the range—120 or 240 V.

2. This is the fuse holder. Pull the middle tab down and out to open the fuse holder to ensure that you are using the correct fuse. This is also how you change the fuse.
3. This is the receptacle for the power cord.



# Theory of Operation



# Theory of Operation

---

## General

The PS280 or PS283 Laboratory DC Power Supply consists of two variable output supplies and one 5 V fixed output. The circuit elements and their functions are described in the Circuit Description, using the Block Diagram as an aid in following the circuit description.

---

## Circuit Description

The detailed circuit description uses the block diagram, Figure 3-1 as a guide for the circuit description. The Block Diagram contains both the circuit component reference designators and lists the appropriate schematic on which they can be found.

### Master Voltage Output

Single phase input power is applied to transformer TS101 through the AC input circuit.

The outputs from transformer TS101 are applied to the Main Rectifier circuit by relays RL101 and RL102. The relay control circuit limits the power dissipation required from the Series Regulator by providing varying voltages to the Main Rectifier circuit, depending on the output requirements.

The Main Rectifier circuit consists of diodes D1011 through D1014 that form a full wave bridge rectifier. The output from the bridge rectifier is filtered by capacitor C102. The filtered output voltage is applied to the Series Regulator circuit.

The Series Regulator circuit consists mainly of Q1071 and R1261, that deliver a regulated voltage to the Laboratory DC Power Supply Master output.

The Auxiliary Rectifier circuit consists of diodes D1021 through D1024 that form a full wave bridge rectifier. The bias voltage from the bridge rectifier is filtered by capacitors C103 and C104. This bias voltage is then applied to the Reference Voltage circuit.

The Reference Voltage circuit consists of U101, Q101, and Q102. This Reference circuit provides a regulated +15 V and -15 V to be used by the Current Comparator circuit and the Reference Voltage Amplifier circuit.

The Current Comparator circuit, consisting of U105, limits the output current of the Series Regulator circuit through OR gate and Amplifier circuit consisting of D107, and Q103 and Q104. Master CURRENT control, VR105, sets the maximum output current level.

The Reference Voltage Amplifier circuit consists mainly of U103, and the Voltage Comparator circuit consists mainly of U104. U104 compares the voltage from the Reference Voltage Amplifier with feedback from the output voltage and, through diode D105 and the amplifier circuit of Q103 and Q104, provides a calibrated output voltage.

The Tracking Selector switches (S501A and S501B), along with the Tracking Delay circuit (U501 and U502), Relay Control circuit (Q501, Q502, and Q503), and the Tracking Relays (RL501, RL502, and RL503) set the configuration of the Master and Slave outputs.

The TRACKING Mode Switches set the Laboratory DC Power Supply in one of three modes: INDEPENDENT Mode, SERIES tracking mode, or PARALLEL mode. The on/off conditions of relays RL501, RL502, and RL503 are shown below, according to the operating mode selected.

Tracking Operation	RL501	RL502	RL503
Series Tracking	Off	On	Off
Parallel Tracking	On	On	On
Independent O/P	Off	Off	Off

When in the SERIES Tracking mode, The Master negative output is shorted to the Slave positive output. Also, the Master output voltage provides the voltage reference for the Reference Voltage Amplifier circuit, U303.

When in the PARALLEL Tracking mode, both the negative and positive outputs from the Master outputs are shorted to the negative and positive outputs of the Slave outputs. A reference voltage for Current Comparator U305 is provided through R1261 from the Master supply circuit.

U501 and U502 are used to protect the Laboratory DC Power Supply from instant high voltage/current during the switching time of the relay contacts.

### Slave Voltage Output

The Slave output circuitry performs the same as described for the Master Voltage output. The circuits are the same except for the component names. Refer to the block diagram for appropriate component names of the Slave output circuit.

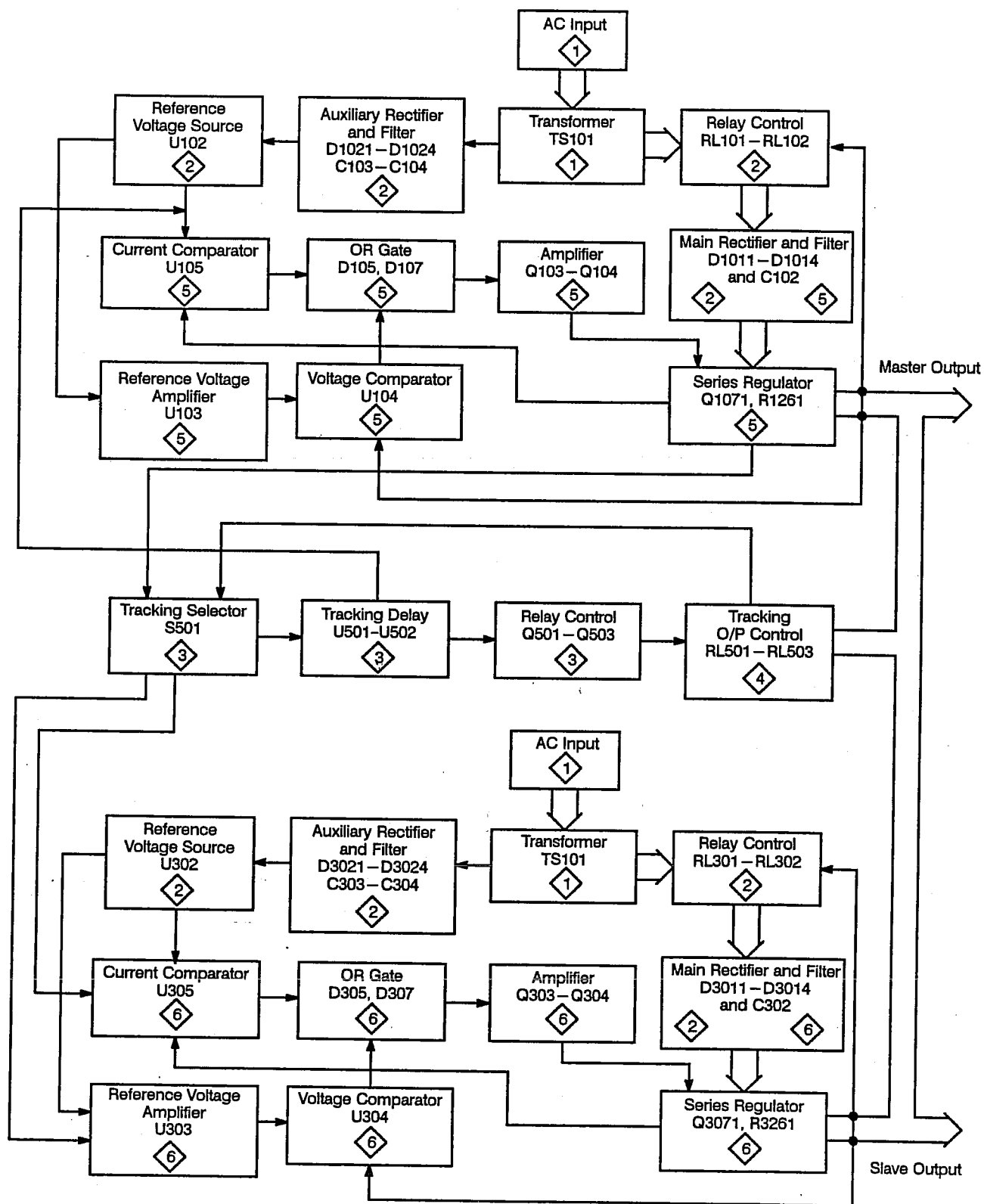


Figure 3-1: PS280 or PS283 Variable Outputs Block Diagram

## 5 V Fixed Voltage Output

The 12 V output from transformer TS101 is applied to the Rectifier circuit.

The Rectifier circuit consists of diodes D4011 through D4014 that form a full wave bridge rectifier. The output from the bridge rectifier is filtered by capacitor C401. The filtered output voltage is applied to the Series Regulator circuit.

The Series Regulator circuit consists mainly of Q402 and R407, that deliver a regulated voltage to the Laboratory DC Power Supply 5 V Fixed output.

The Current Comparator circuit, consisting of U401, limits the output current of the Series Regulator circuit through Q401.

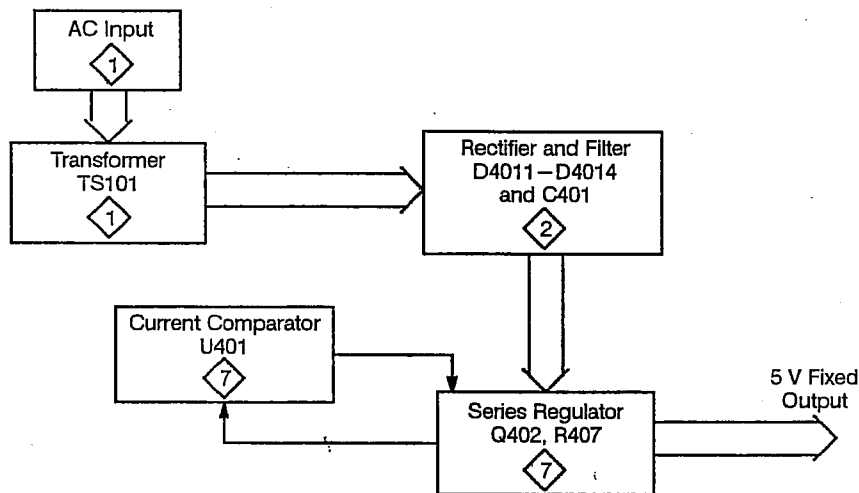


Figure 3-2: PS280 or PS283 5 V Block Diagram





# Performance Verification



# Preparation

**Purpose** — Use this procedure to verify that the Laboratory DC Power Supply is in conformance with its specifications as listed in Section 1, *Specifications*. It can also be used for incoming inspection of the Laboratory DC Power Supply.

**Performance Verification Interval** — A performance verification should be performed whenever the accuracy or functions of the power supply are in question. A performance verification should be used to verify the need for performing the adjustments in Section 5, *Adjustments*.

---

## Requirements for Performance

Before you perform these performance verification procedures, you need to address the following requirements.

### Warm-up Period

The Laboratory DC Power Supply requires a 20 minute warm-up time in a 20°C to 30°C environment before a performance verification is made.

### Access

Cabinet removal is not required to perform any of these procedures

### Test Equipment

Table 4-1 lists all the test equipment required to perform both the Performance Verification procedures and the Adjustment Procedures for the PS280 or PS283 Laboratory DC Power Supply.

**Equipment Required**

The test equipment required for both the performance verification procedures and the adjustment procedures for the Laboratory DC Power Supply are listed here.

**Table 4-1: Test Equipment**

<b>Item Number and Description</b>	<b>Minimum Requirements</b>	<b>Example</b>	<b>Purpose</b>
1 Adjustment Tool	Less than $\frac{1}{8}$ inch diameter and over 2 inches long	Tektronix part number 003-0675-00	Adjustments
2 Multimeter, Digital	35 V, 4 A, $\pm 0.1\%$ Accuracy	TEKTRONIX DM252	Adjustments
3 Resistive Load, Variable	0 to 2 $\Omega$ , 30 Watts	Tektronix part number 311-2494-00	Adjustments
4 Oscilloscope	50 MHz, 3% vertical deflection accuracy	TEKTRONIX 2225	Performance Verification
5 Fixed Resistive Loads Set	20 $\Omega$ , 30 Watts 10 $\Omega$ , 30 Watts 2 $\Omega$ , 5 Watts 1 $\Omega$ , 30 Watts 7 $\Omega$ , 140 Watts 0.5 $\Omega$ , 5 Watts 15 $\Omega$ , 70 Watts 30 $\Omega$ , 140 Watts 7.5 $\Omega$ , 140 Watts 1.7 $\Omega$ , 20 Watts 30 $\Omega$ , 40 Watts 60 $\Omega$ , 70 Watts	Tektronix part number 118-8751-00	Performance Verification
6 Mechanical Switch	60 Watts	Tektronix part number 260-2570-00	Performance Verification

# Performance Tests

## Constant Current Load Regulation

Equipment Required: Digital multimeter and load resistors

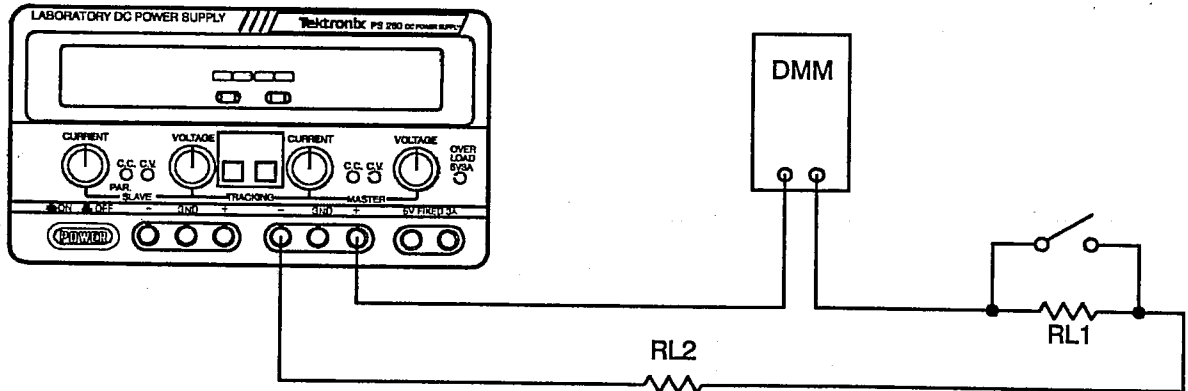


Figure 4-1: Constant Current Test Setup

1. *Check the Master current regulation (INDEPENDent mode):*
  - a. *Set up the equipment:*
    - Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDent operating mode.
    - Set the Master AMPS/VOLTS meter selection switch to AMPS.
    - Set the digital multimeter to measure a DC voltage of +25 volts.
    - Connect the digital multimeter to the + and - terminals of the MASTER output.
    - Set the Laboratory DC Power Supply MASTER VOLTAGE control until the multimeter reads +25 V.
    - Disconnect the multimeter from the power supply.
    - Set the digital multimeter to measure a DC current of at least 1 amp (PS280) or 0.5 amps (PS283).
    - Connect the multimeter, load resistors, and test switch to the + and - terminals of the Master output as indicated in Figure 4-1. See Table 4-2 for the appropriate values of the load resistors.

b. *Verify the current regulation:*

- Check that the output current level changes less than 0.2%  $\pm 3$  mA while switching load resistor RL1 in and out of the circuit path.

**Table 4-2: Load Resistor Values for Current Checks**

Mode	PS280		PS283	
	RL1	RL2	RL1	RL2
INDEP	20 $\Omega$ , 30 W	2 $\Omega$ , 5 W	20 $\Omega$ , 30 W	2 $\Omega$ , 5 W
PARALLEL	10 $\Omega$ , 30 W	1 $\Omega$ , 30 W	10 $\Omega$ , 30 W	1 $\Omega$ , 30 W

2. *Check the Slave current regulation (INDEPENDent mode):*a. *Set up the equipment:*

- Set the Slave AMPS/VOLTS meter selection switch to AMPS.
- Set the digital multimeter to measure a DC voltage of +25 volts.
- Connect the digital multimeter to the + and - terminals of the Slave output.
- Set the Laboratory DC Power Supply SLAVE VOLTAGE control until the multimeter reads +25 V.
- Disconnect the multimeter from the power supply.
- Set the digital multimeter to measure a DC current of at least 1 amp (PS280) or 0.5 amps (PS283).
- Connect the multimeter, load resistors, and test switch to the + and - terminals of the Slave output as indicated in Figure 4-1. See Table 4-2 for the appropriate values of the load resistors.

b. *Verify the current regulation:*

- Check that the output current level changes less than 0.2%  $\pm 3$  mA while switching load resistor RL1 in and out of the circuit path.

3. *Check the Master current regulation (PARALLEL mode):*a. *Set up the equipment:*

- Engage both TRACKING mode switches (both switches in) so that the power supply is in the PARALLEL operating mode.
- Set the digital multimeter to measure a DC voltage of +25 volts.
- Connect the digital multimeter to the + and - terminals of the MASTER output.
- Set the Laboratory DC Power Supply MASTER VOLTAGE control until the multimeter reads +25 V.
- Disconnect the multimeter from the power supply.

- Set the digital multimeter to measure a DC current of at least 1 amp (PS280) or 0.5 amps (PS283).
  - Connect the multimeter, load resistors, and test switch to the + and - terminals of the Master output as indicated in Figure 4-1. See Table 4-2 for the appropriate values of the load resistors.
- b. *Verify the current regulation:*
- Check that the output current level changes less than 0.2%  $\pm$  5 mA while switching load resistor RL1 in and out of the circuit path.

## Constant Current Ripple and Noise

Equipment Required: Oscilloscope and load resistors

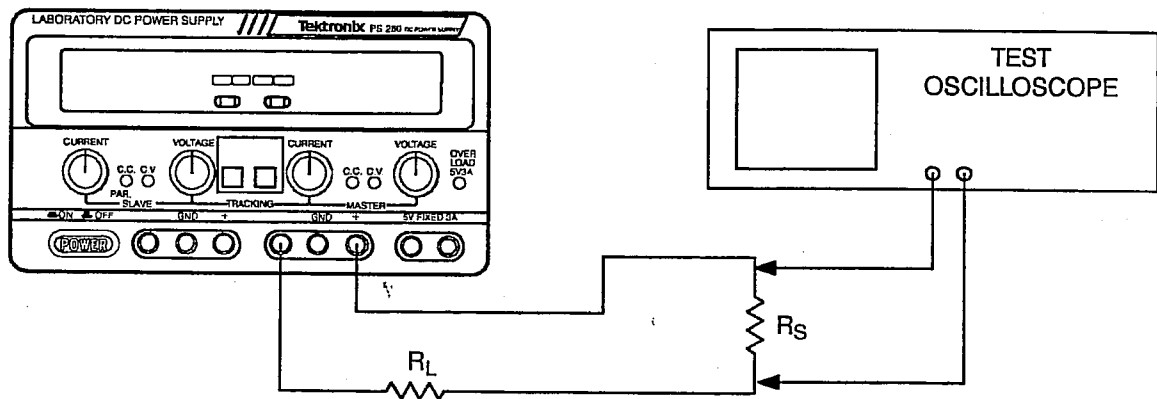


Figure 4-2: Constant Current Ripple and Noise Test Setup

1. *Check the Master current ripple:*
  - a. *Set up the equipment:*
    - Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDENT operating mode.
    - Set the Master AMPS/VOLTS meter selection switch to VOLTS.
    - Set the Laboratory DC Power Supply to +25 volts (using the digital display).
    - Connect the test oscilloscope and load resistors to the + and - terminals of the Master output as indicated in Figure 4-2. See Table 4-3 for the appropriate values of the load resistors.
  - b. *Verify the current ripple:*
    - Check that the peak-to-peak ripple viewed with the test oscilloscope is less than 2.5 mV.

- c. *Set up the equipment:*
  - Engage both TRACKING mode switches (both switches in) so that the power supply is in the PARALLEL operating mode.
- d. *Verify the current ripple:*
  - Check that the peak-to-peak ripple viewed with the test oscilloscope is less than 2.5 mV.
- e. *Set up the equipment:*
  - Disengage the right TRACKING mode switch (switch out) so that the power supply is in the SERIES operating mode.
- f. *Verify the current ripple:*
  - Check that the peak-to-peak ripple viewed with the test oscilloscope is less than 5 mV.

**Table 4-3: Load Resistor Values for Ripple Checks**

Mode	PS280		PS283	
	R <sub>L</sub>	R <sub>S</sub>	R <sub>L</sub>	R <sub>S</sub>
INDEP	15 Ω, 70 W	0.5 Ω, 5 W	30 Ω, 40 W	0.5 Ω, 5 W
PARALLEL	7 Ω, 140 W	10 Ω, 30 W	15 Ω, 70 W	0.5 Ω, 5 W

- 2. *Check the Slave current ripple:*
  - a. *Set up the equipment:*
    - Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDENT operating mode.
    - Set the Slave AMPS/VOLTS meter selection switch to VOLTS.
    - Set the Laboratory DC Power Supply to +25 volts (using the digital display).
    - Connect the test oscilloscope and load resistors to the + and - terminals of the Slave output as indicated in Figure 4-2. See Table 4-3 for the appropriate values of the load resistors.
  - b. *Verify the current ripple:*
    - Check that the peak-to-peak ripple viewed with the test oscilloscope is less than 2.5 mV.

## Constant Voltage Regulation

Equipment Required: Digital multimeter and load resistors

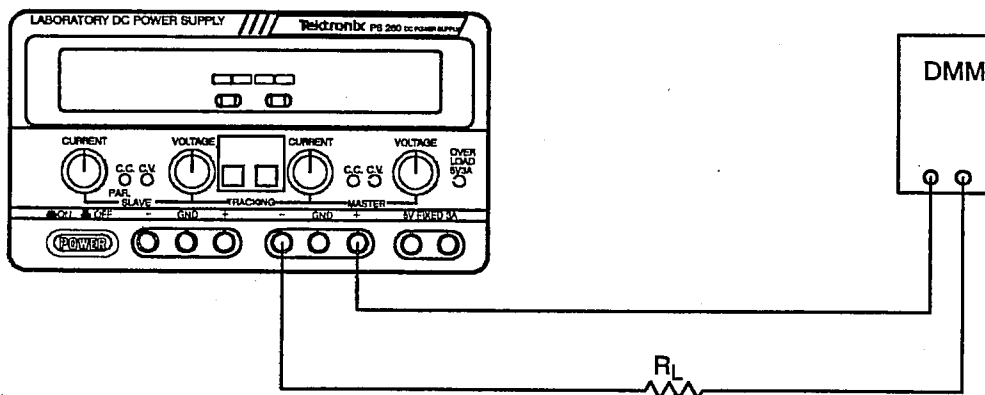


Figure 4-3: Constant Voltage Test Setup

1. *Check the Master voltage regulation:*
  - a. *Set up the equipment:*
    - Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDENT operating mode.
    - Set the digital multimeter to measure a DC voltage of +60 volts.
    - Connect the digital multimeter and load resistors to the + and - terminals of the Master output as indicated in Figure 4-3. See Table 4-4 for the appropriate values of the load resistor.
  - b. *Verify the voltage output range:*
    - Check that the Laboratory DC Power Supply can be adjusted from 0 to 30 V.
  - c. *Set up the equipment:*
    - Engage the left TRACKING mode switch (switch in) and disengage the right TRACKING mode switch (switch out) so that the power supply is in the SERIES operating mode.
  - d. *Verify the voltage output range:*
    - Check that the Laboratory DC Power Supply can be adjusted from 0 to 60 V.
  - e. *Set up the equipment:*
    - Engage both TRACKING mode switches (both switches in) so that the power supply is in the PARALLEL operating mode.

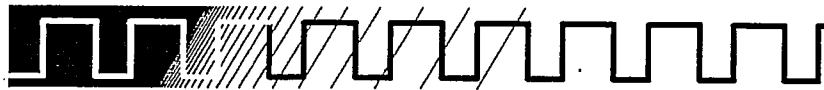


- f. *Verify the voltage output range:*
- Check that the Laboratory DC Power Supply can be adjusted from 0 to 30 V.

**Table 4-4: Load Resistor Values for Voltage Checks**

Mode	PS280	PS283
	$R_L$	$R_L$
INDEP	15 $\Omega$ , 70 W	30 $\Omega$ , 40 W
SERIES	30 $\Omega$ , 140 W	60 $\Omega$ , 70 W
PARALLEL	7.5 $\Omega$ , 140 W	15 $\Omega$ , 70 W
5 V Fixed	1.7 $\Omega$ , 20 W	1.7 $\Omega$ , 20 W

2. *Check the Slave voltage regulation:*
- a. *Set up the equipment:*
- Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDent operating mode.
  - Set the digital multimeter to measure a DC voltage of +30 volts.
  - Connect the digital multimeter and load resistors to the + and – terminals of the Slave output as indicated in Figure 4-3. See Table 4-4 for the appropriate values of the load resistor.
- b. *Verify the voltage output range:*
- Check that the Laboratory DC Power Supply can be adjusted from 0 to 30 V.
3. *Check the 5 V Fixed voltage regulation:*
- a. *Set up the equipment:*
- Set the digital multimeter to measure a DC voltage of +5 volts.
  - Connect the digital multimeter and load resistors to the 5 V FIXED terminals. Use the test setup illustrated in Figure 4-3 and see Table 4-4 for the appropriate values of the load resistor.
- b. *Verify the voltage output range:*
- Check that the Laboratory DC Power Supply maintains an output of 5 V,  $\pm 0.25$  V.



# Adjustment



# Preparation

This section contains information needed to adjust your Laboratory DC Power Supply.

**Description** — The *Adjustment Procedures* are divided into two parts:

- This general information about adjusting the power supply.
- Written procedures for manually adjusting the power supply.

**Purpose** — This procedure is used to return the power supply to conformance with its specifications as listed in Section 1, *Specifications*. It can also be used to optimize the performance of the power supply.

**Adjustment Interval** — As a general rule, these adjustments should be performed every 2000 hours of operation or once a year if used infrequently.

---

## Requirements for Performance

Before you perform this procedure, you need to address the following requirements.

### Personnel

This procedure is only to be performed by trained service technicians.

### Warm-up Period

This power supply requires a 20 minute warm-up time in a 20°C to 30°C environment before performing this adjustment procedure. Adjustments performed before the operating temperature has stabilized may cause errors in adjustment.

### Access

Removal of the cover is required to adjust this power supply. Refer to the Maintenance Section for instructions on how to remove the cover.

### Test Equipment

The test equipment required to adjust the PS280 or PS283 Laboratory DC Power Supply is listed in Table 4-1 on page 4-2.



# Adjustment Procedures

---

## Independent Mode

**Equipment Required:** Digital multimeter

See Figures 5-1 and 5-2 on pages 5-8 and 5-9 for adjustment locations used in this procedure.

1. *Adjust the master voltage output:*

a. *Set up the equipment:*

- Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDent operating mode.
- Set the Master AMPS/VOLTS meter selection switch to VOLTS.
- Set the digital multimeter to measure a DC voltage of  $\pm 16$  mV.
- Set the Laboratory DC Power Supply MASTER VOLTAGE control to minimum (fully counterclockwise).
- Connect the digital multimeter to the + and - terminals of the Master output.

b. *Make the zero volts adjustment:*

- Adjust VR102 for a reading of  $-15$  mV, within  $\pm 15$  mV on the multimeter.

c. *Set up the equipment:*

- Set the digital multimeter to measure a DC voltage of  $\pm 35$  V.
- Set the MASTER VOLTAGE control to maximum (fully clockwise).

d. *Make the maximum volts adjustments:*

- Adjust VR101 for a reading of  $31.5$  V on the multimeter.
- Adjust VR201 until the Laboratory DC Power Supply meter displays  $31.5$  V.

2. *Adjust the slave voltage output:*

a. *Set up the equipment:*

- Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDent operating mode.
- Set the Slave AMPS/VOLTS meter selection switch to VOLTS.
- Set the digital multimeter to measure a DC voltage of  $\pm 16$  mV.
- Set the Laboratory DC Power Supply SLAVE VOLTAGE control to minimum (fully counterclockwise).

- Connect the digital multimeter to the + and - terminals of the Slave output.
  - b. *Make the zero volts adjustment:*
    - Adjust VR302 for a reading of -15 mV, within  $\pm 15$  mV on the multimeter.
  - c. *Set up the equipment:*
    - Set the digital multimeter to measure a DC voltage of  $\pm 35$  V.
    - Set the SLAVE VOLTAGE control to maximum (fully clockwise).
  - d. *Make the maximum volts adjustments:*
    - Adjust VR301 for a reading of 31.5 V on the multimeter.
    - Adjust VR601 until the Laboratory DC Power Supply meter displays 31.5 V.
3. *Adjust the master current output:*
- a. *Set up the equipment:*
    - Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDENT operating mode.
    - Set the Master AMPS/VOLTS meter selection switch to AMPS.
    - Set the digital multimeter to measure a DC current of 2 A.
    - Connect the digital multimeter to the + and - terminals of the Master output.
    - Set the MASTER CURRENT control to maximum (fully clockwise).
  - b. *Make the current adjustments:*
    - Adjust VR103 for a reading of 1.05 A (PS283) or 2.1 A (PS280) on the multimeter.
    - Adjust VR202 until the Laboratory DC Power Supply meter displays 1.05 A (PS283) or 2.1 A (PS280).
4. *Adjust the slave current output:*
- a. *Set up the equipment:*
    - Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDENT operating mode.
    - Set the Slave AMPS/VOLTS meter selection switch to AMPS.
    - Set the digital multimeter to measure a DC current of 2 A.
    - Connect the digital multimeter to the + and - terminals of the Slave output.
    - Set the SLAVE CURRENT control to maximum (fully clockwise).

b. *Make the current adjustments:*

- Adjust VR303 for a reading of 1.05 A (PS283) or 2.1 A (PS280) on the multimeter.
- Adjust VR602 until the Laboratory DC Power Supply meter displays 1.05 A (PS283) or 2.1 A (PS280).

Disconnect the test setup.

---

## Series Tracking Mode

**Equipment Required:** Digital multimeter

See Figures 5-1 and 5-3 on pages 5-8 and 5-9 for adjustment locations used in this procedure.

1. *Adjust the series tracking Mode:*a. *Set up the equipment:*

- Engage the left TRACKING mode switch (switch in) and disengage the right TRACKING mode switch (switch out) so that the power supply is in the SERIES operating mode.
- Set the SLAVE CURRENT control to midrange.
- Set the MASTER VOLTAGE control to minimum (fully counterclockwise).
- Set the digital multimeter to measure a DC voltage of  $\pm 16$  mV.
- Connect the digital multimeter to the + and - terminals of the Master output and note the reading obtained.
- Connect the digital multimeter to the + and - terminals of the Slave output.

b. *Make the zero voltage tracking adjustment:*

- Adjust VR306 until the voltage output of the SLAVE output matches the reading obtained from the MASTER output.

c. *Set up the equipment:*

- Set the MASTER VOLTAGE control to maximum (fully clockwise).
- Set the digital multimeter to measure a DC voltage of  $\pm 35$  V.
- Connect the digital multimeter to the + and - terminals of the Master output and note the reading obtained.
- Connect the digital multimeter to the + and - terminals of the Slave output.

d. *Make the maximum voltage tracking adjustment:*

- Adjust VR501 until the voltage output of the Slave output matches the reading obtained from the Master output.

**NOTE**

*Recheck the value of the Master output compared to the value of the Slave output. Readjust VR501 if the outputs do not match.*

Disconnect the test setup.

---

## Parallel Tracking Mode

**Equipment Required:** Digital multimeter

See Figure 5-1 on page 5-8 for adjustment locations used in this procedure.

1. *Adjust the parallel tracking Mode:*

a. *Set up the equipment:*

- Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPENDENT operating mode.
- Set the MASTER VOLTAGE and CURRENT controls to minimum (fully counterclockwise).
- Set the digital multimeter to measure a DC current of 4 A.
- Connect the digital multimeter to the + and - terminals of the Master output.
- Set the MASTER VOLTAGE control to midrange and adjust the MASTER CURRENT control until a reading of 1 A (PS283) or 2 A (PS280) is displayed on the multimeter.

**NOTE**

*Do not readjust the CURRENT control setting through the remainder of this procedure.*

- Engage both TRACKING switches (both switches in) so that the power supply is in the PARALLEL operating mode.
- Set the SLAVE CURRENT control to maximum (fully clockwise) and set the SLAVE VOLTAGE control to midrange.

b. *Make the parallel tracking adjustment:*

- Adjust VR502 until a reading of 2 A (PS283) or 4 A (PS280) is displayed on the multimeter.

Disconnect the test setup.

## 5 V Fixed

**Equipment Required:** Digital multimeter and variable resistive load

See Figure 5-1 on page 5-8 for adjustment locations used in this procedure.

1. *Adjust the 5 V fixed output:*
  - a. *Set up the equipment:*
    - Set the digital multimeter to measure a DC voltage of +5.25 V.
    - Connect the digital multimeter to the terminals of the 5 V Fixed output.
  - b. *Make the 5 V adjustment:*
    - Adjust VR401 until the multimeter displays 5.00 V ( $\pm 0.25$  V).
  - c. *Set up the equipment:*
    - Disconnect the multimeter from the Laboratory DC Power Supply.
    - Set the digital multimeter to measure a DC current of 3.25 A.
    - Adjust VR403 fully counterclockwise.
    - Connect a variable load and the multimeter in series to the terminals of the 5 V Fixed output.
    - Adjust the variable load until the multimeter displays 3.25 A.
    - Disconnect the multimeter from the power supply and reconnect the variable load (without changing the setting) to the terminals of the 5 V Fixed output.
    - Set the digital multimeter to measure a DC voltage of +5.25 V.
    - Connect the digital multimeter to the terminals of the 5 V Fixed output.
  - d. *Make the current limit adjustment:*
    - Slowly adjust VR403 clockwise until the multimeter display shows a voltage drop of 5 to 6 mV.
  - e. *Set up the equipment:*
    - Disconnect the digital multimeter and the variable load from the power supply.
    - Set the digital multimeter to measure a DC current of 3.25 A.
    - Connect a variable load and the multimeter in series to the terminals of the 5 V Fixed output.
    - Adjust the variable load until the multimeter displays 3.10 A.
  - f. *Make the overload adjustment:*
    - Adjust VR402 until the OVERLOAD 5V3A indicator starts to light on the Laboratory DC Power Supply.

Disconnect the test setup.



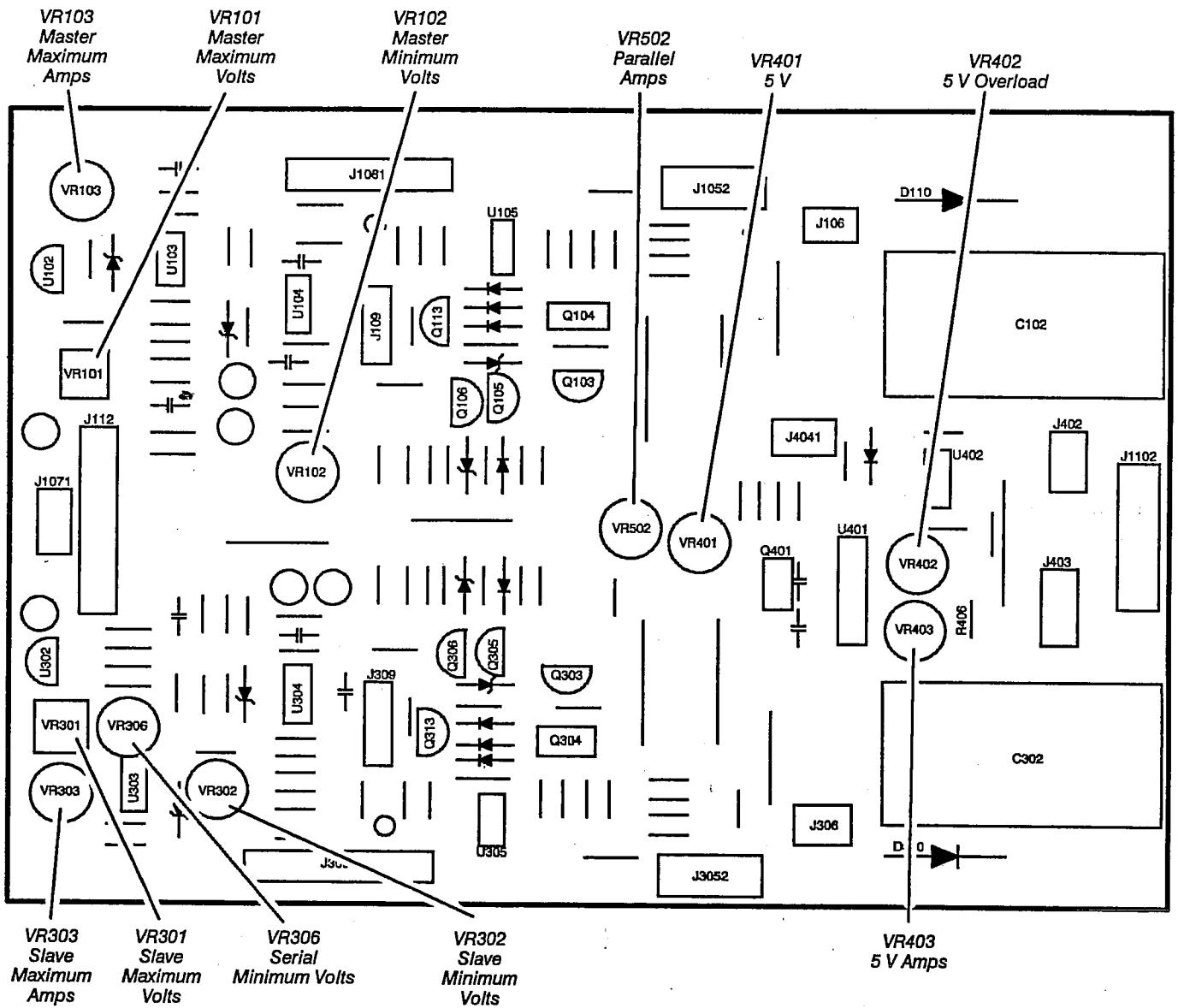


Figure 5-1: Master Circuit Board Adjustment Locations

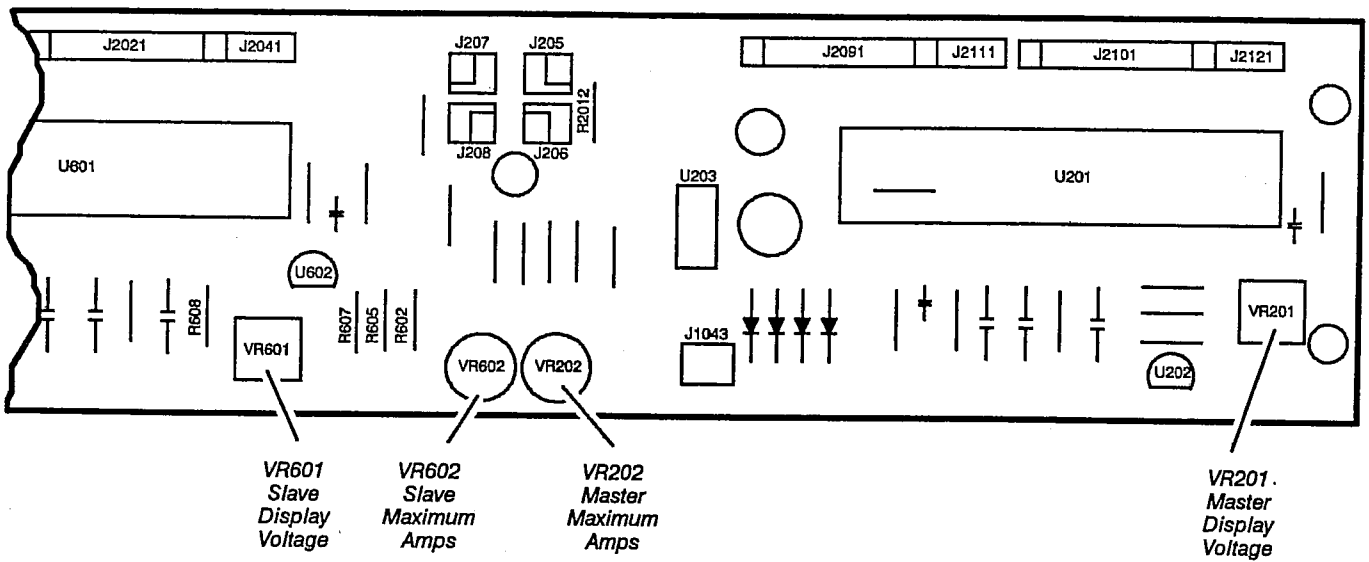


Figure 5-2: Display Assembly Circuit Board Adjustment Locations

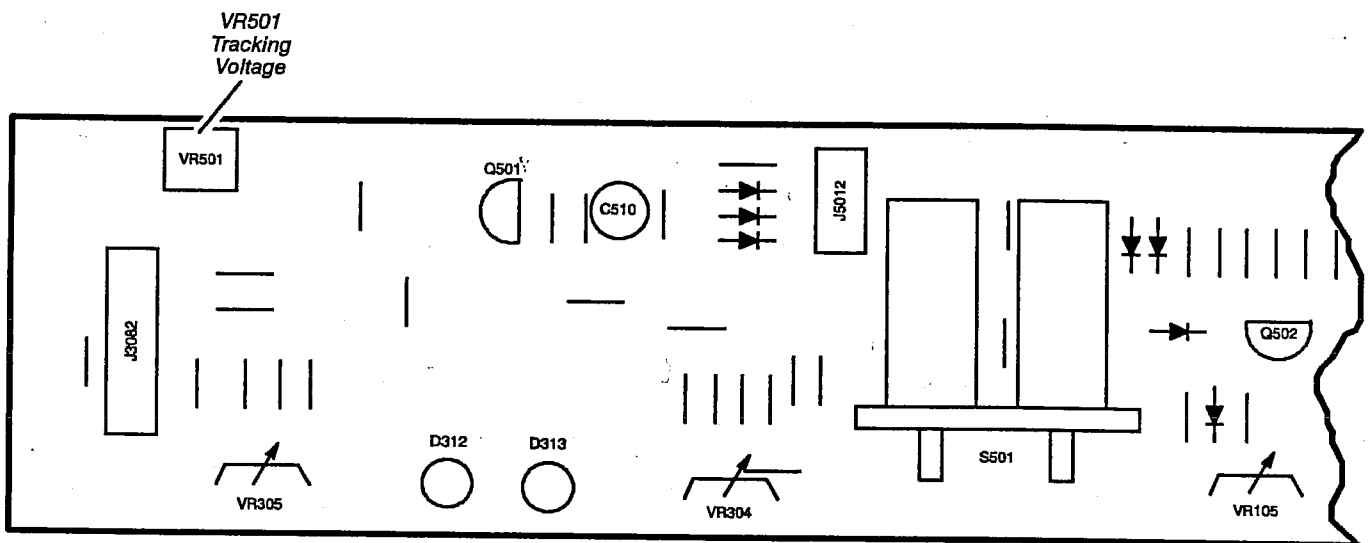


Figure 5-3: Front Panel Controls Circuit Board Adjustment Locations



# Maintenance

This section contains the information to do periodic and corrective maintenance on the Laboratory DC Power Supply. This section of the manual contains information on static-sensitive components, preventive maintenance, and removal and installation procedures.

---

## Helpful Procedures

The following sections contain information/procedures that may be related to doing maintenance.

- Section 2, *Operating Information*, covers instructions useful when operating the oscilloscope in order to troubleshoot it. It also details the service strategy and lists options for obtaining maintenance service and for replacing failed modules.
- Section 3, *Theory of Operation*, contains a circuit description at the module, or block level.
- Section 4, *Performance Verification*, contains procedures that may be useful in isolating problems to modules by testing power supply performance.
- Section 5, *Adjustment Procedures*, addresses after repair adjustment and the interval between periodic adjustments. It contains a procedure for adjusting the internal circuits of this power supply.
- Section 9, *Diagrams*, contains the schematics of the individual circuit boards.
- Section 8, *Replaceable Parts*, lists all field replaceable modules by part number and contains the exploded views of the power supply.

---

## Preventing ESD

The following precautions apply when performing any maintenance involving internal access to the instrument.



*Static discharge can damage any semiconductor component in this instrument.*

This instrument contains electrical components that are susceptible to damage from static discharge. Table 6-1 lists the relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

When performing maintenance, observe the following precautions to avoid component damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers or on a metal rail. Label any package that contains static-sensitive components or modules.
3. Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these components. Servicing static-sensitive components or assemblies should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge off the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components or modules by their bodies, never by their leads.
7. Do not slide the components or modules over any surface.
8. Avoid handling components or modules in areas that have a floor or work-surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only approved antistatic, vacuum-type desoldering tools for component removal.

Table 6-1: Relative Susceptibility to Static-discharge Damage

Semiconductor Classes	Relative Susceptibility Levels <sup>1</sup>
MOS or CMOS microcircuits or discretes, or linear microcircuits with MOS inputs (Most Sensitive)	1
ECL	2
Schottky signal diodes	3
Schottky TTL	4
High-frequency bipolar transistors	5
JFET	6
Linear microcircuits	7
Low-power Schottky TTL	8
TTL (Least Sensitive)	9

<sup>1</sup>Voltage equivalent for levels (voltage discharged from a 100 pF capacitor through resistance of 100  $\Omega$ ):

1 = 100 to 500 V

2 = 200 to 500 V

3 = 250 V

4 = 500 V

5 = 400 to 600 V

6 = 600 to 800 V

7 = 400 to 1000 V (est.)

8 = 900 V

9 = 1200 V



# Inspection and Cleaning

*Inspection and Cleaning* describes how to inspect for dirt and damage on, and how to clean the exterior and interior of, the Laboratory DC Power Supply. Such inspection and cleaning are performed as preventative maintenance. Preventive maintenance, when performed regularly, may prevent instrument malfunction and enhance reliability.

Preventive maintenance consists of visually inspecting and cleaning the power supply and using general care when operating it.

The severity of the environment in which the power supply is used determines the required frequency of maintenance. An appropriate time to perform preventive maintenance is just before power supply adjustment.

---

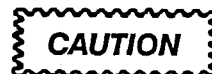
## General Care

The cabinet minimizes accumulation of dust inside the Laboratory DC Power Supply and should normally be in place when operating the power supply.

---

## Inspection and Cleaning Procedures

The Laboratory DC Power Supply should be visually inspected and cleaned as often as operating conditions require. Accumulation of dirt in the power supply can cause overheating and component breakdown. Dirt on components acts as an insulating blanket, preventing efficient heat dissipation. It also provides an electrical conduction path that could result in instrument failure, especially under high-humidity conditions.



*Avoid the use of chemical cleaning agents which might damage the plastics used in this power supply. Use only deionized water when cleaning the front panel. Use a 75% Isopropyl alcohol solution as a cleaner and rinse with deionized water. Before using any other type of cleaner, consult your Tektronix Service Center or representative.*

## Inspect Exterior

**Inspection** — Inspect the outside of the power supply for damage, wear, and missing parts, using Table 6-2 as a guide. Instruments that appear to have been dropped or otherwise abused should be checked thoroughly to verify correct operation and performance. Immediately repair deficiencies that could cause personal injury or lead to further damage to the power supply.



*To prevent getting moisture inside the power supply during external cleaning, use only enough liquid to dampen the cloth or applicator.*

**Table 6-2: External Inspection Check List**

<b>Item</b>	<b>Inspect For</b>	<b>Repair Action</b>
Cabinet and Front Panel	Cracks, scratches, deformations, damaged hardware.	Replace defective module.
Front-panel Knobs	Missing, damaged, or loose knobs.	Repair or replace missing or defective knobs.
Connectors	Broken shells, cracked insulation, and deformed contacts. Dirt in connectors.	Replace defective modules. Clear or wash out dirt.
Accessories	Missing items or parts of items, broken or frayed cables, and damaged connectors.	Replace damaged or missing items, frayed cables, and defective modules.

**Cleaning Procedure – Exterior**

1. Remove loose dust on the outside of the power supply with a lint free cloth.
2. Remove remaining dirt with a lint free cloth dampened in a general purpose detergent-and-water solution. Do not use abrasive cleaners.
3. Clean the digital display with a lint-free cloth dampened with either isopropyl alcohol or, preferably, a gentle, general purpose detergent-and-water solution.

**Inspect Interior**

To access the inside of the power supply for inspection and cleaning, refer to the *Removal and Installation Procedures* in this section.

Inspect the internal portions of the power supply for damage and wear, using Table 6-3 as a guide. Deficiencies found should be repaired immediately.

If any electrical module is replaced, the performance verification procedures should be used to see if it is necessary to adjust the power supply.



*To prevent damage from electrical arcing, ensure that circuit boards and components are dry before applying power to the power supply.*



Table 6-3: Internal Inspection Check List

Item	Inspect For	Repair Action
Circuit Boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Remove failed module and replace with a fresh module.
Resistors	Burned, cracked, broken, blistered.	Replace failed module and replace with a fresh module.
Solder Connections	Cold solder or rosin joints.	Resolder joint and clean with isopropyl alcohol.
Capacitors	Damaged or leaking cases. Corroded solder on leads or terminals.	Remove damaged module and replace with a fresh module from the factory.
Semiconductors	Loosely inserted in sockets. Distorted pins.	Firmly seat loose semiconductors. Remove devices having distorted pins. Carefully straighten pins (as required to fit the socket), using long-nose pliers, and reinsert firmly. Ensure that straightening action does not crack pins, causing them to break off.
Wiring and Cables	Loose plugs or connectors. Burned, broken, or frayed wiring.	Firmly seat connectors. Repair or replace modules with defective wires or cables.
Chassis	Dents, deformations, and damaged hardware.	Straighten, repair, or replace defective hardware.

### Cleaning Procedure – Interior



If, after doing steps 1 and 2, a module is clean upon inspection, skip the remaining steps.

1. Blow off dust with dry, low-pressure, deionized air (approximately 9 psi).
2. Remove any remaining dust with a lint free cloth dampened in a 75% isopropyl alcohol solution and rinse with a warm deionized water. (A cotton-tipped applicator is useful for cleaning in narrow spaces and on circuit boards.)
3. If steps 1 and 2 do not remove all the dust or dirt, the power supply may be spray washed using a solution of 75% isopropyl alcohol by doing steps 4 through 8.
4. Gain access to the parts to be cleaned by removing easily accessible shields and panels (see *Removal and Installation Procedure*).

5. Spray wash dirty parts with the isopropyl alcohol and wait 60 seconds for the majority of the alcohol to evaporate.
6. Use hot (120°F to 140°F) deionized water to thoroughly rinse them.
7. Dry all parts with low-pressure, deionized air.
8. Dry all components and assemblies in an oven or drying compartment using low-temperature (125°F to 150°F) circulating air.

## Lubrication

There is no periodic lubrication required for this power supply.



# Removal and Installation Procedures

The procedures in this subsection provide instructions on how to remove the replaceable circuit board modules in the PS280 or PS283 Laboratory DC Power Supply for either cleaning or replacement of a failed module. Replacement part numbers of each circuit board module can be found in the section 8, *Parts List*.

---

## Preparation – Please Read

### **WARNING**

*Before performing this or any other procedure in this manual, read the Safety Summary found at the beginning of this manual. Also, to prevent possible injury to service personnel or damage to this power supplies's components, read Preventing ESD in this section.*

This subsection contains the following:

- This preparatory information that you need to properly perform the procedures that follow.
- List of Equipment required to remove and disassemble all modules.
- Disassembly procedures for removal of all the major modules from the power supply at one time and for reassembly of those modules into the power supply. Such a complete disassembly is normally only done when completely cleaning the power supply. (Instructions for doing the actual cleaning are found under *Inspection and Cleaning* at the beginning of this section.)
- Module locator diagrams for finding all the modules in this power supply.

### **WARNING**

*Before performing any procedure in this subsection, disconnect the power cord from the line voltage source. Failure to do so could cause serious injury or death.*

## List of Modules

Section 8 lists all modules.

### General Instructions



**READ THESE GENERAL INSTRUCTIONS BEFORE REMOVING A MODULE.**

The removal of any internal module first requires the removal of the top cover. Instructions for the removal of the top cover can be found on page 6-10.

When unplugging connectors from any circuit board, always label each one as you unplug them. This will ensure that each connector is returned to its proper location and avoid damage to the Laboratory DC Power Supply.

**Equipment Required** – The modules in this power supply can be removed with a standard Phillips-head screwdriver. This and other items that are needed for complete disassembly of the instrument are listed in Table 6-4.

**Table 6-4: Tools Required for Module Removal**

Item No.	Name	Description
1	Phillips-head screwdriver	Standard tool
2	Flat-blade screwdriver	Standard tool
3	Soldering Iron	Standard tool
4	Solder Wick	Standard tool

---

### Top Cover Removal

The top cover needs to be removed to gain access to all replaceable modules in the PS280 or PS283 Laboratory DC Power Supply. See Figure 6-1 illustrating the removal of the top cover.

1. Remove the two screws attaching the handle to the cover and remove the handle.
2. Remove the two screws on the left side and the three screws on the right side of the power supply.
3. Slide the cover slightly back from the front panel and lift off.

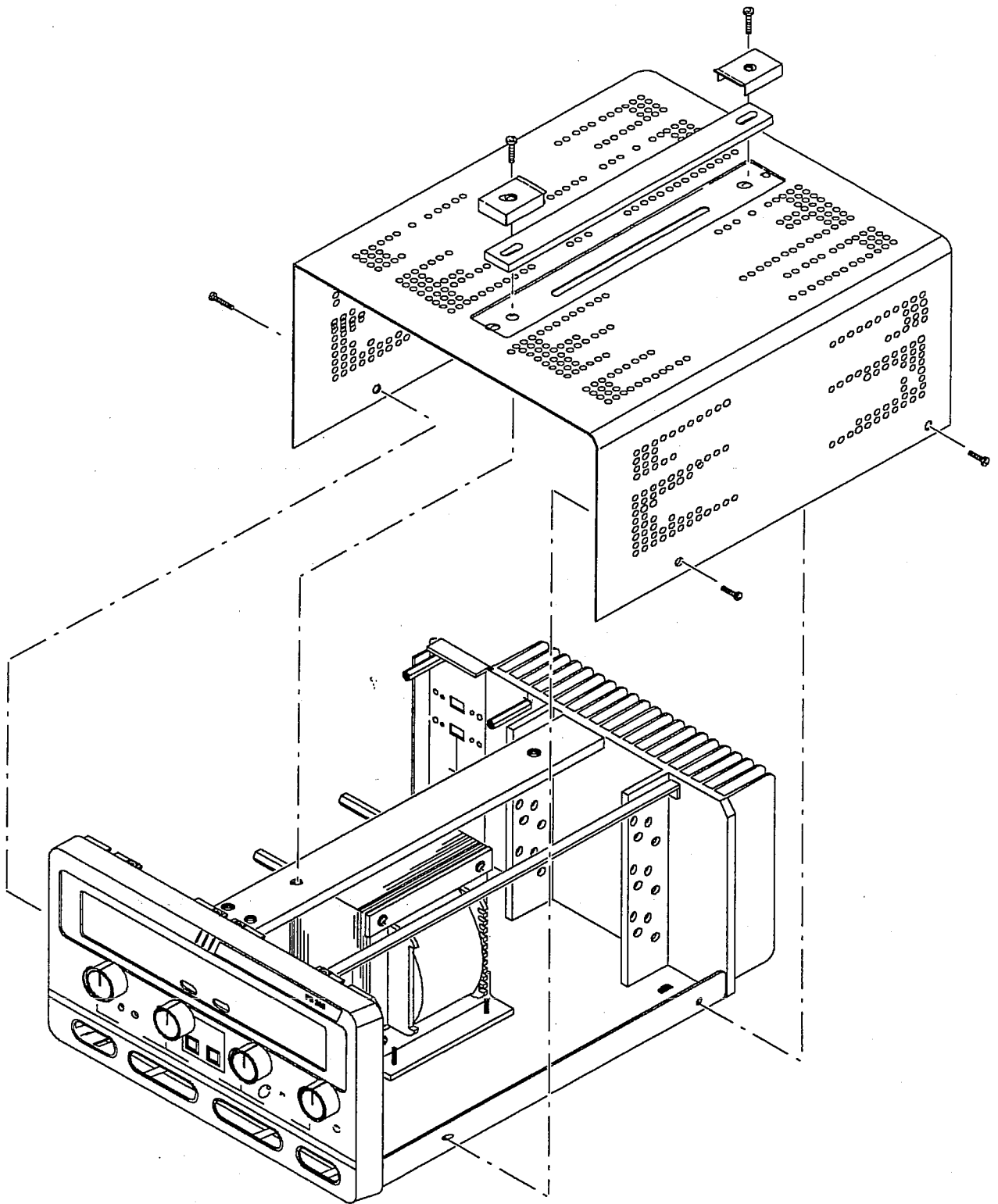


Figure 6-1: Top Cover Removal

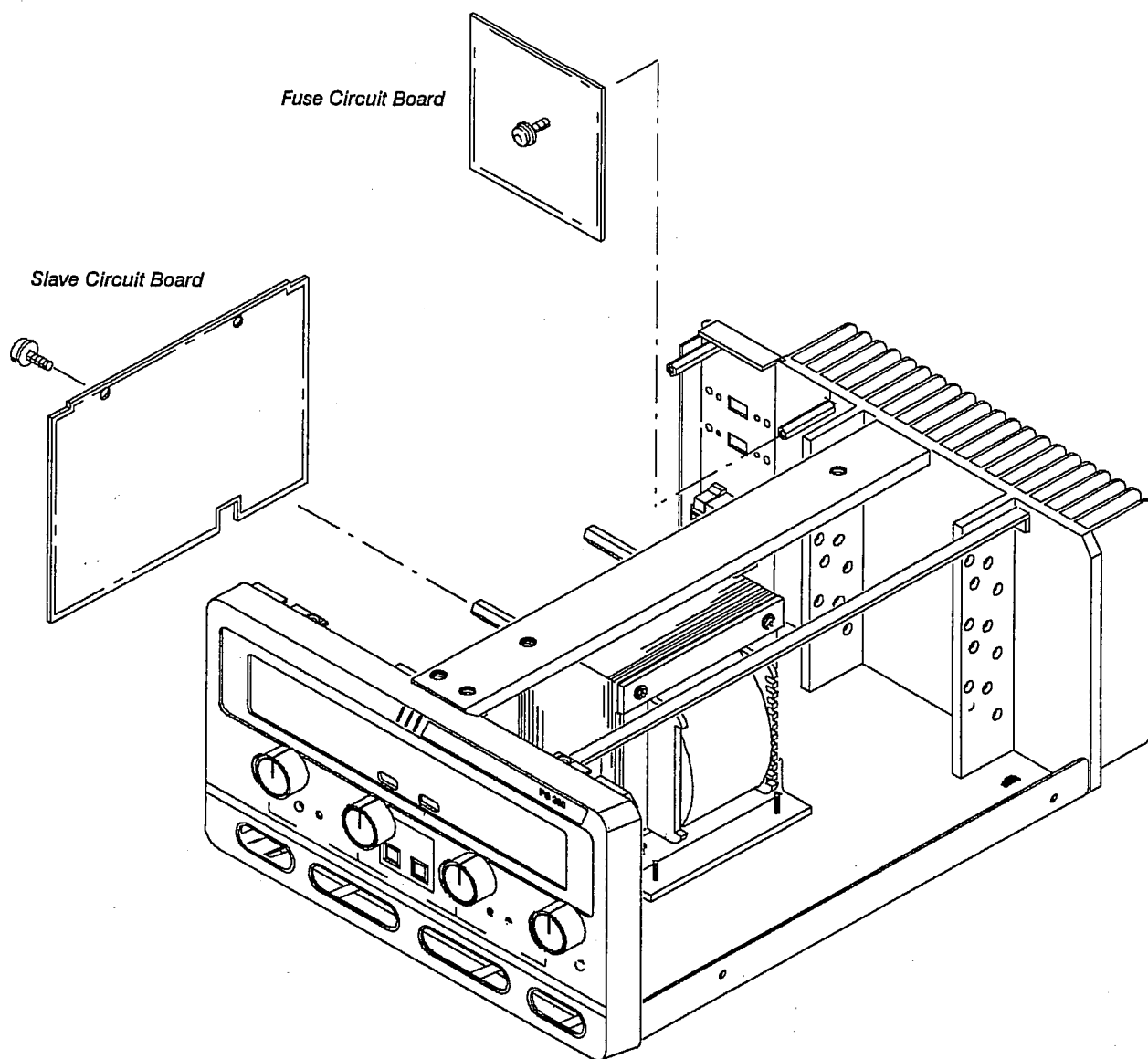
## Slave Circuit Board Removal

The Slave Circuit board is located on the left side of the power supply when viewed from the front. See Figure 6-2 for the location of the Slave circuit board. To aid in locating the connectors referred to in this procedure, see Figure 9-2 in the *Diagrams* section. The removal of other circuit boards is not necessary to perform this procedure.

### **NOTE**

*Remember to label each connector as you disconnect them.*

1. Unplug J301 from the Slave circuit board.
2. Unplug J3023 and J1023 from the Slave circuit board.
3. Unplug J1111 from the Slave circuit board.
4. Unplug J1033 from the Slave circuit board.
5. Unplug J101 from the Slave circuit board.
6. Unplug J1101 from the Slave circuit board.
7. Remove the two screws, lock washers, and flat washers securing the circuit board.
8. Tilt the Slave circuit board out slightly and unsolder the two individual wires at locations S1 and S2.
9. Tilt the Slave circuit board further out and unsolder the two individual wires at locations M1 and M2.
10. Remove the circuit board by lifting it up and out of the bottom chassis board slots.
11. Installation of the Slave circuit board is done in the reverse order noting the following items:
  - a. Make certain not to pinch any wires underneath the circuit board.
  - b. The wires from J101 at the bottom of the circuit board should pass through the cut-out in the bottom of the board.
  - c. Make certain that the circuit board is sitting in the circuit board slots in the bottom chassis.



**Figure 6-2: Slave and Fuse Circuit Board Removal**

## Fuse Circuit Board Removal

The Fuse circuit board is located at the left rear of the power supply. See Figure 6-2 for the location of the Fuse circuit board. To aid in locating the connectors referred to in this procedure, see Figure 9-7 in the *Diagrams* section. The removal of other circuit boards is not necessary to perform this procedure.

### NOTE

*Remember to label each connector as you disconnect them.*

1. Unplug all connectors from the Fuse circuit board.
2. Remove the two screws, lock washers, and flat washers securing the top of the circuit board.
3. Remove the screw, lock washer, and flat washer securing the right bottom corner of the circuit board. See note below.

**NOTE**

*Removal of the screw in step 3 may be difficult. Removing the appropriate screw from the rear of the power supply, securing the stand-off post between the circuit board and heatsink, is easier.*

4. With a pair of pliers, pinch the board retainer, located at the bottom left, so that the circuit board can be pulled loose.



*Returning the connectors to improper locations may damage the Laboratory DC Power Supply when power is applied.*

5. Installation of the Fuse circuit board is done in the reverse order.

---

## AC Selector Circuit Board Removal

The AC Selector circuit board is located at the left rear of the power supply behind the Fuse circuit board. See Figure 6-3 for the location of the AC Selector circuit board. To aid in locating the connectors referred to in this procedure, see Figure 9-8 in the *Diagrams* section. The removal of the Fuse circuit board is necessary before proceeding with this procedure.

**NOTE**

*Remember to label each wire as you disconnect them.*

1. Remove the four self-tapping screws from the rear panel securing the AC selector circuit board.

**NOTE**

*The next two steps involve unsoldering eight wires. Some of the colors of the wires are duplicated but are NOT interchangeable. Make certain that each wire is returned to its proper location. The colors of the wires mentioned in this procedure are subject to change due to vendor component manufacturing.*



2. Unsolder the four wires located at the top of the circuit board.
  - The black wire is soldered to "0"
  - The gray wire is soldered to "100"
  - The orange wire is soldered to "120"
  - The white wire is soldered to "N"
3. Unsolder the four wires located at the bottom of the circuit board.
  - The black wire is soldered to "0"
  - The gray wire is soldered to "100"
  - The orange wire is soldered to "120"
  - The black wire from the power switch is soldered to "TO J601"
4. Installation of the AC Selector circuit board is done in the reverse order.

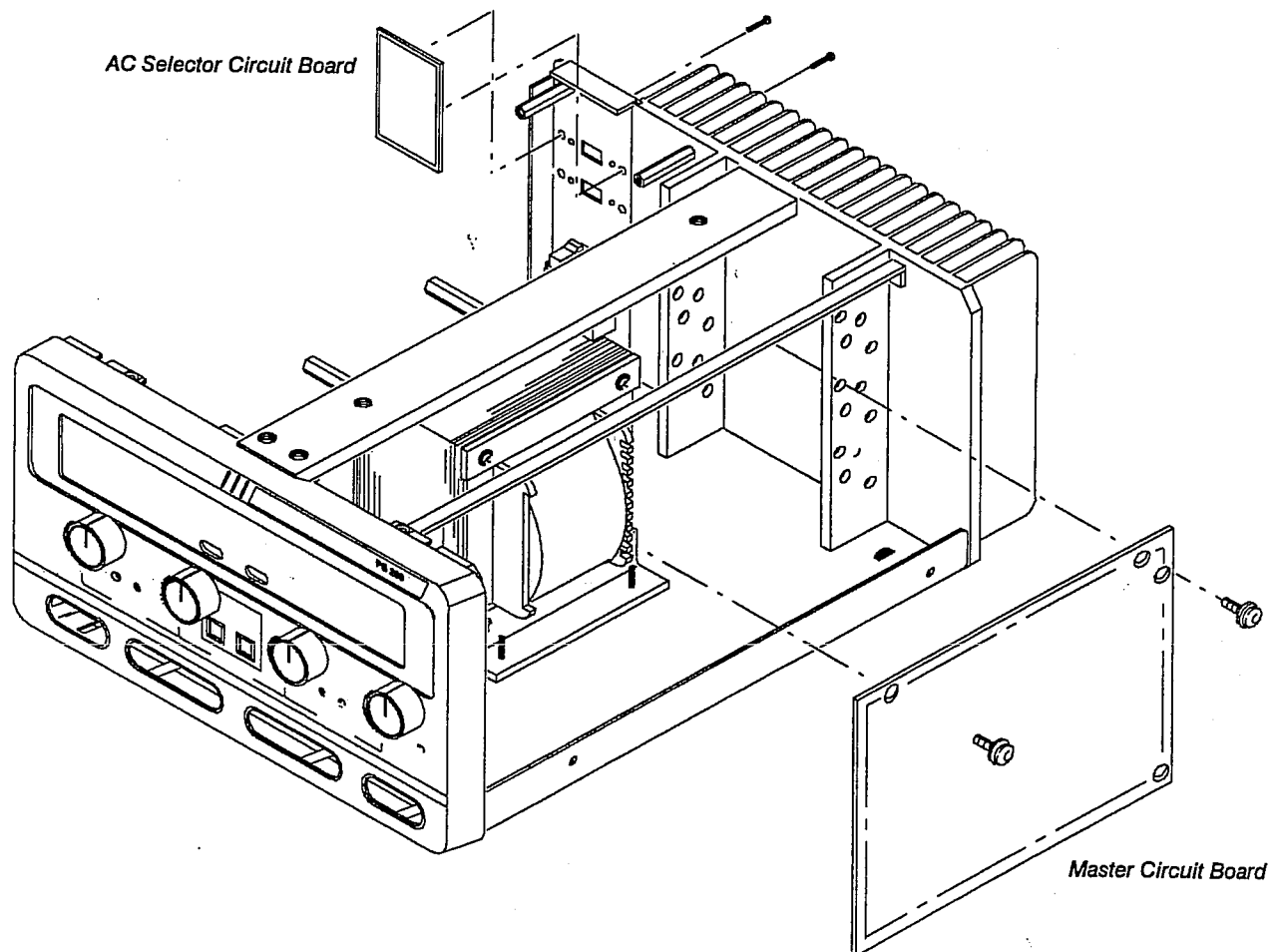


Figure 6-3: AC Selector and Master Circuit Board Removal

---

## Master Circuit Board Removal

The Master circuit board is located on the right side of the power supply. See Figure 6-3 for the location of the Master circuit board. To aid in locating the connectors referred to in this procedure, see Figures 9-1, 9-2, and 9-5 in the *Diagrams* section. The removal of other circuit boards is not necessary to perform this procedure.

### **NOTE**

*Remember to label each connector as you disconnect them.*

1. Unplug J1082 and J3082 from the Front Panel Controls circuit board.
2. Unplug J3052 and J1102 from the Master circuit board.
3. Unplug J1071, J1052, J4041, and J306 from the Master circuit board.
4. Unplug J106 and J402 from the Master circuit board.
5. Unplug J403 from the Master circuit board.
6. Unplug J1111 from the Slave circuit board.
7. Unplug J206 and J208 from the Front Panel Display circuit board.
8. Cut the cable ties attached to the wires from J1081 and J3081 on the Master circuit board.
9. Remove the two screws, lock washers, and flat washers securing the top of the circuit board.
10. Remove the circuit board by lifting it up and out of the bottom chassis board slots.
11. Installation of the Master circuit board is done in the reverse order noting the following items:
  - a. Make certain not to pinch any wires underneath the circuit board.
  - b. Make certain that the circuit board is sitting in the circuit board slots in the bottom chassis.

---

## Front Panel Display Circuit Boards Assembly Removal

The Front Panel Display circuit boards assembly consists of two boards removed as a unit. These are located at the front of the power supply, just behind the digital display. See Figure 6-4 for the location of the Front Panel Display circuit boards. To aid in locating the connectors referred to in this procedure, see Figure 9-5 in the *Diagrams* section. The removal of the Master circuit board and the Slave circuit boards make for easier access to the Front Panel assembly but is not required. Removal of the top center and top right chassis rails also make for easier access to the Front Panel Display assembly but is not required.

### **NOTE**

*Remember to label each connector as you unplug them.*

1. Unplug J1044 and J1043 from the Front Panel assembly.
2. Unplug J207, J205, J208, and J206 from the Front Panel assembly.
3. With a pair of pliers, squeeze the tabs on the 5 plastic circuit board fasteners to release the outer circuit board.
4. Remove the six thread forming screws securing the inner circuit board to the front panel of the power supply.
5. Lift out the two circuit boards as a unit.
6. Install the Front Panel Display assembly in the reverse order.

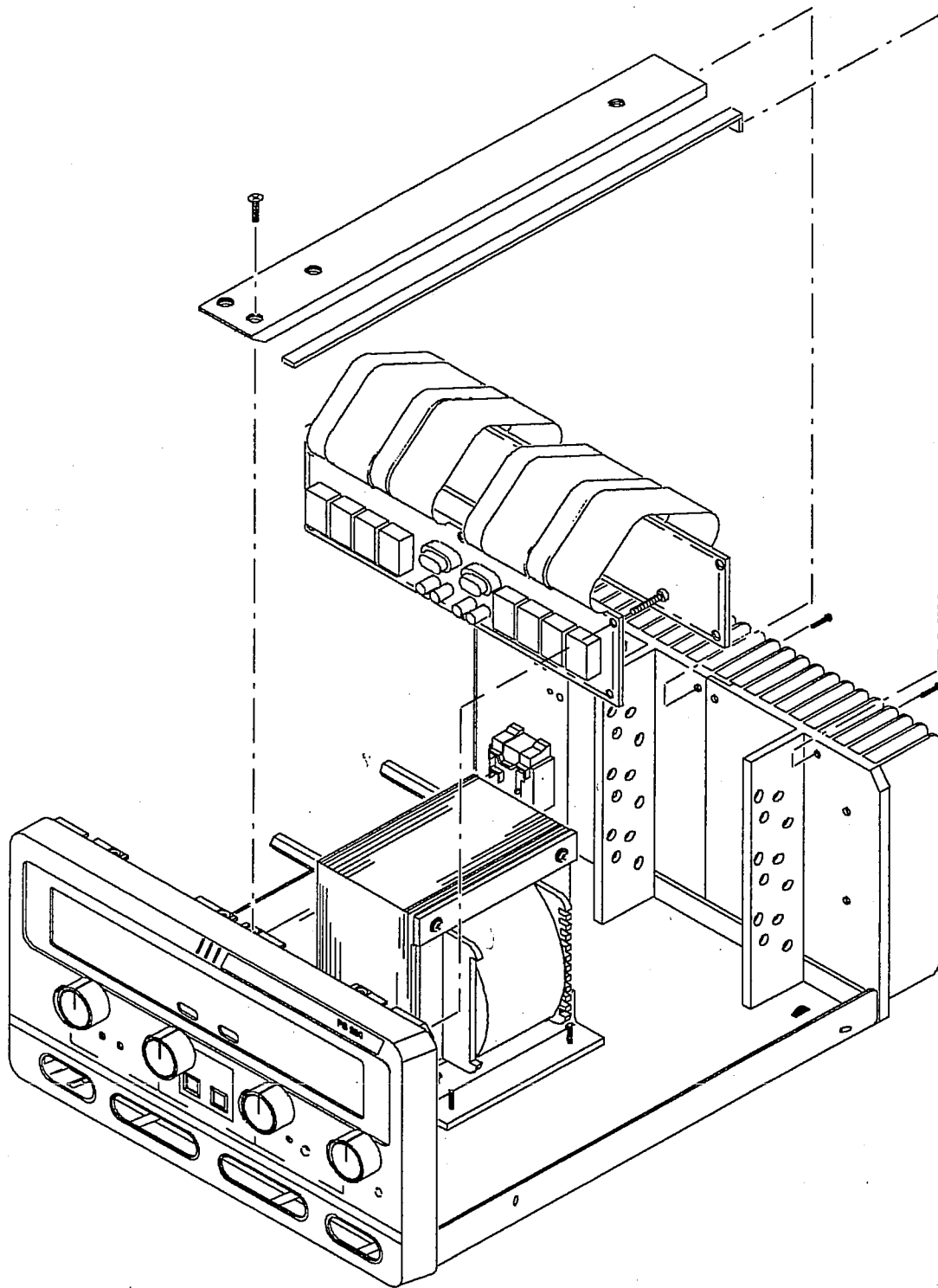


Figure 6-4: Front Panel Display Assembly Removal

---

## Front Panel Controls Circuit Board Removal

The Front Panel Controls circuit board is located at the front of the power supply. See Figure 6-5 for the location of the Front Panel Controls circuit board. To aid in locating the connectors referred to in this procedure, see Figure 9-5 in the *Diagrams* section. The removal of other circuit boards is not necessary to perform this procedure.

### **NOTE**

*Remember to label each connector as you disconnect them.*

1. Unplug connectors J3082, J5012, J1082, and J4043 from the Front Panel Controls circuit board.
2. Remove the CURRENT and VOLTAGE control knobs of both the MASTER and SLAVE outputs by pulling them straight out.
3. Remove the nuts and washers from each of the four shafts.
4. Slide the circuit board back, and lift out of the power supply.
5. Installation of the Front Panel Controls circuit board is done in the reverse order.

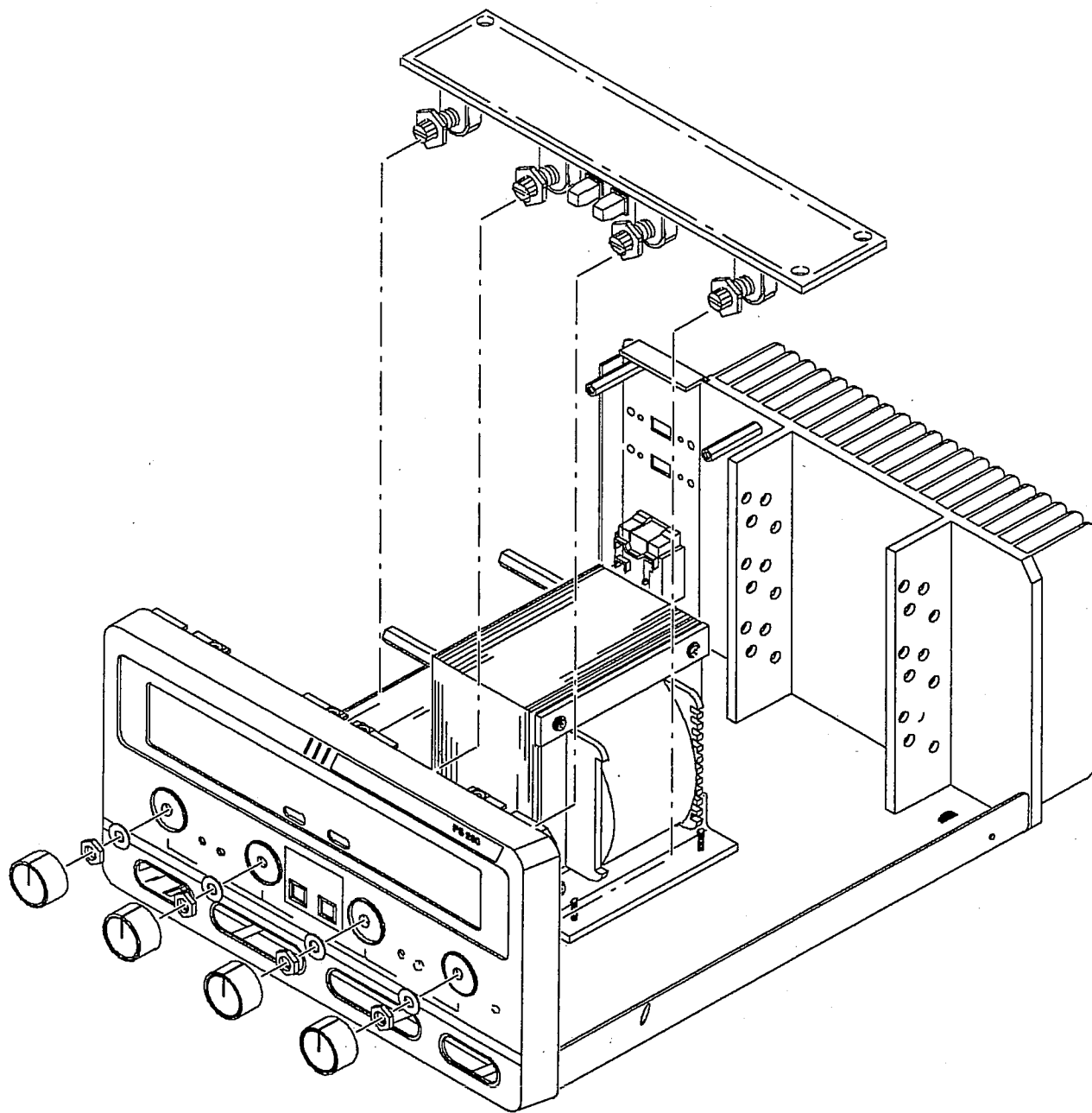


Figure 6-5: Front Panel Controls Assembly

---

## Output Connectors Circuit Board Removal

The Output Connectors circuit board is located at the front of the power supply. See Figure 6-6 for the location of the Output Connectors circuit board. To aid in locating the connectors referred to in this procedure, see Figure 9-1 in the *Diagrams* section. The removal of other circuit boards is not necessary to perform this procedure.

### NOTE

*Remember to label each connector as you disconnect them.*

1. Unplug connectors J106, J4041, J402, and J306 from the Master circuit board.
2. Pull off the plastic cover over the power switch, located at the bottom left of the front panel. This can be done by carefully prying the power switch cover off with a small flat-blade screwdriver.
3. Remove the two screws securing the power switch.
4. Remove the two screws that secure the entire front panel to the bottom chassis of the power supply.
5. Slide the front panel forward, away from the bottom chassis.
6. Unplug the green ground wire from the chassis connector.
7. Remove the six tread forming screws securing the circuit board to the front panel.
8. Installation of the Output Connectors circuit board is done in the reverse order.

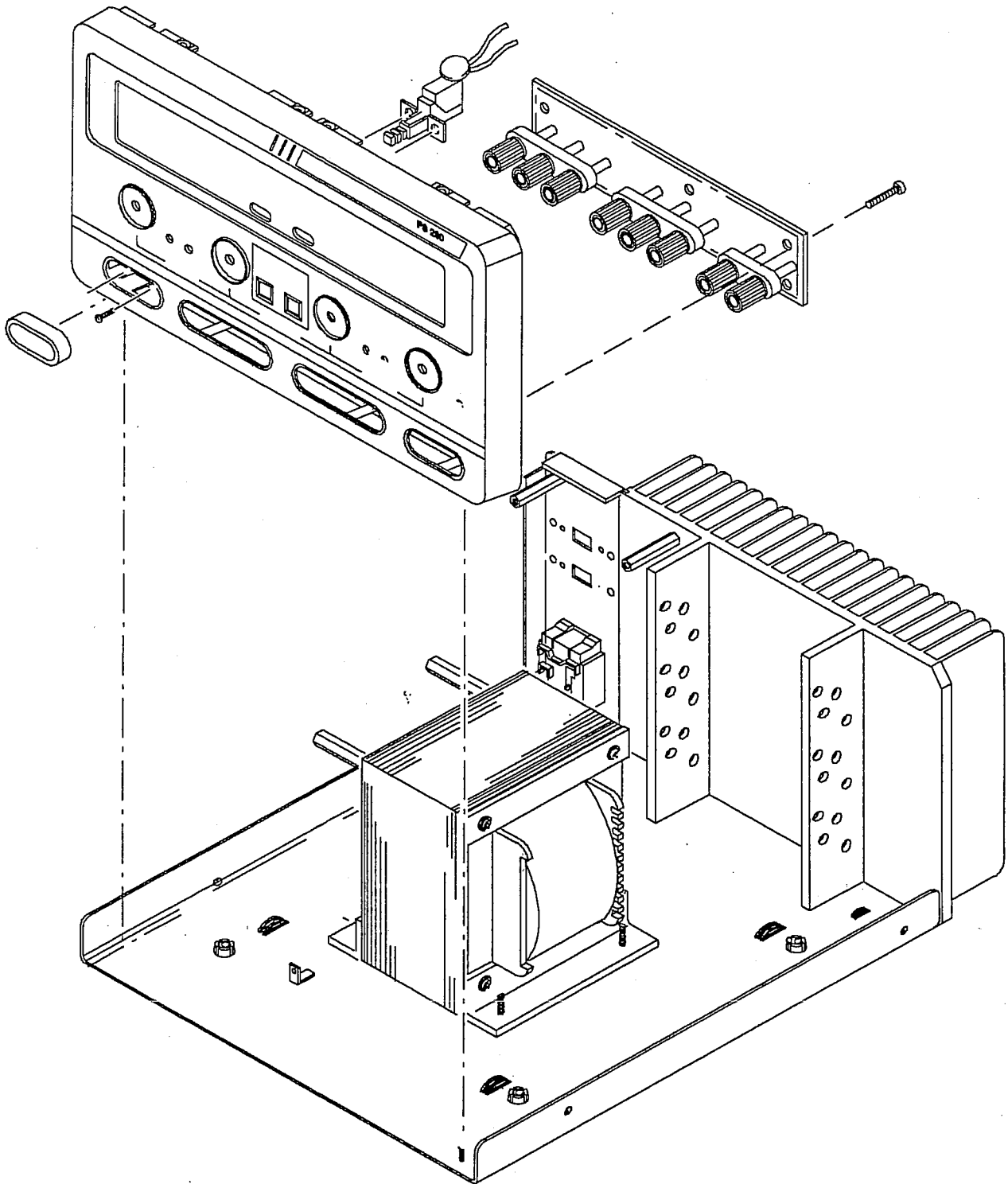


Figure 6-6: Output Connectors Circuit Board and Power Switch Location



## Power Transistor Circuit Boards Removal

The Power Transistor circuit boards are attached to the heat sink at the rear of the instrument. See Figure 6-7 for the location of the Power Transistor circuit boards. To aid in locating the connectors referred to in this procedure, see Figure 9-6 in the *Diagrams* section. The removal of other circuit boards is not necessary to perform this procedure.

1. Unplug connector J1051 or J3051, depending on which Power Transistor circuit board you are removing.
2. Remove the two screws securing each power transistor to the heat sink and circuit board.
3. Unsolder the leads of the power transistors from the circuit board.
4. Remove the power transistors from the power supply.
5. Remove the circuit board from the power supply.
6. Installation of the Power Transistor circuit board is done in the reverse order.

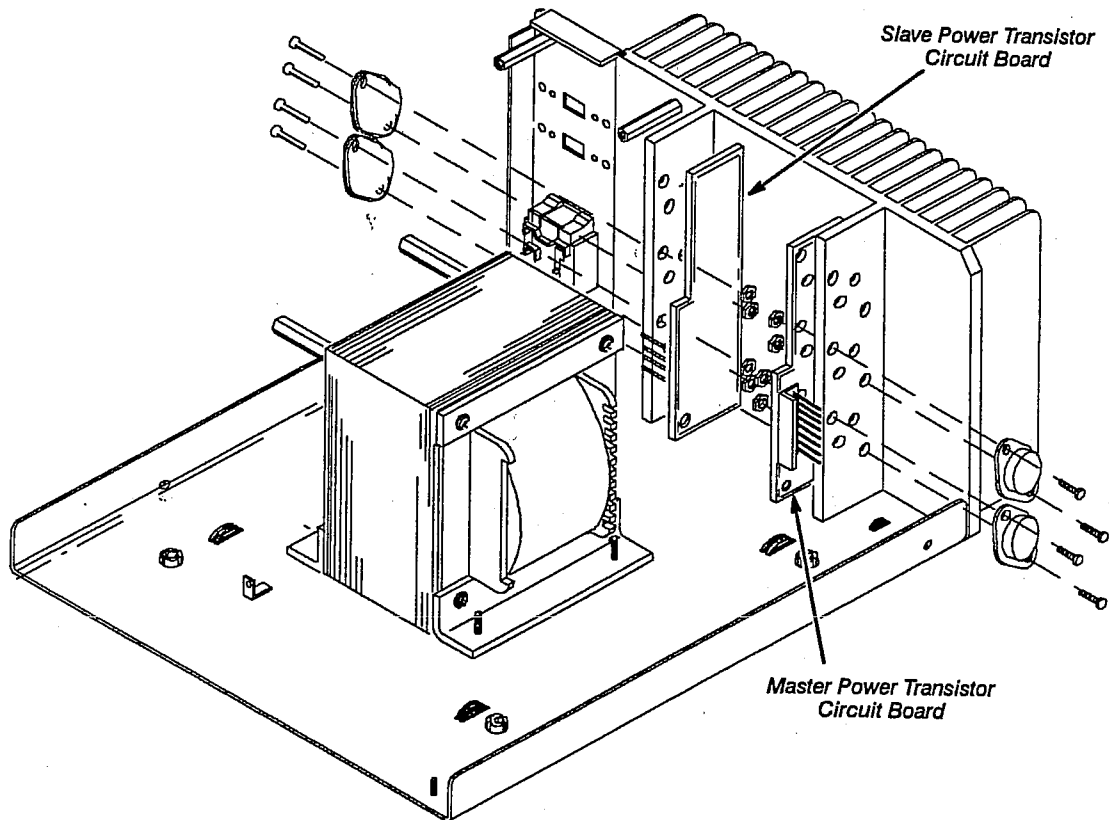


Figure 6-7: Power Transistor Circuit Boards Location



# Options



# Options and Accessories

Some accessories are included with the PS280 or PS283. If you wish to purchase additional accessories, either optional or standard, see a Tektronix products catalog, contact your local Tektronix field representative, or, in the U. S., call the Tektronix National Marketing Center toll-free at 1-800-426-2200.

---

## Power Cord Options

- Option A0 North American 120 V/6 A, 60 Hz, Tektronix part number 161-0248-00.
- Option A1 universal European 220 V/6 A, 50 Hz, Tektronix part number 161-0104-06.
- Option A2 United Kingdom 240 V/6 A, 50 Hz, Tektronix part number 161-0104-07.
- Option A3 Australian 120 V/6 A, 50 Hz, Tektronix part number 161-0104-05.
- Option A4 North American 220 V/10 A, 60 Hz, Tektronix part number 161-0104-08.
- Option A5 Switzerland 240 V/6 A, 50 Hz, Tektronix part number 161-0167-00.

---

## Standard Accessories

- The *PS280 or PS283 Laboratory DC Power Supply Operator Manual* (Tektronix part number 070-8355-00) is this manual.
- Power cord Option A0 North American 120 V/6 A, 60 Hz (Tektronix part number 161-0248-00). See the section below for other power cords, which can be ordered optionally.
- Three pairs of black and red test leads (Tektronix part number 196-3201-00).

---

## Optional Accessories

- The *PS280 or PS283 Laboratory DC Power Supply Service Manual* (Tektronix part number 070-8356-00) provides service information for maintenance and repair of the PS280 or PS283 Laboratory DC Power Supply.
- Any additional power cords for other countries.



# Parts List



# Parts List

This section contains the list of replaceable modules that make up the PS280 or PS283 Laboratory DC Power Supply. These modules are often a combination of mechanical and electrical subparts. As described below, use this list to identify and order replacement parts. Figures 8-1 and 8-2 provides an exploded view of all replaceable components.

---

## Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., service center 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. Therefore, when ordering parts, it is important to include the following information in your order:

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If a part you order has been replaced with a different or improved part, your local Tektronix service center or representative will contact you concerning any change in the part number.

## Module Replacement

The PS280 or PS283 is serviced by module replacement. You may purchase new, replacement modules in the same way as other replacement parts.

---

## Using the Parts List

The tabular information in the Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find the all the information you need for ordering replacement parts.

### Item Names

Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, use the U.S. Federal Cataloging Handbook H6-1, where available.

### Indentation System

Indentation in this parts list shows the relationship between items. The following is an example of the indentation system used in the Description column:

1	2	3	4	5	Name & Description
					<i>Assembly and/or Component</i>
					<i>Attaching parts for Assembly and/or Component</i>
					<i>(END ATTACHING PARTS)</i>
					<i>Detail Part of Assembly and/or Component</i>
					<i>Attaching parts for Detail Part</i>
					<i>(END ATTACHING PARTS)</i>
					<i>Parts of Detail Part</i>
					<i>Attaching parts for Parts of Detail Part</i>
					<i>(END ATTACHING PARTS)</i>

Attaching parts always appear at 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. Attaching parts must be purchased separately, unless otherwise specified.

### Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1.

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
8-1-1	200-3999-00			1	COVER, TOP		200-3999-00
-2	367-0441-00			1	HANDLE W/END CAPS		367-0441-00
-3	211-0452-00			5	SCREW, MACHINE, M3 X 0.5 X 6 MM L		211-0452-00
-4	211-0428-00			2	SCREW, ASSEM WSHR, M3 X 0.5 X 6 MM L		211-0428-00
-5	213-0717-00			6	SCREW, 4-20, 0.312, PNH THREAD FORMING		213-0717-00
-6	118-8707-00			1	OUTPUT CIRCUIT BOARD (PS280)		118-8707-00
	118-8749-00				OUTPUT CIRCUIT BOARD (PS283)		118-8749-00
					(ATTACHING PARTS)		
					.C405 CSE1 25V, 100UF		2241-25107Z0
					.C1151 CSE1 50V, 100UF		2241-50107Z0
					.C1152 CSE1 50V, 100UF (PS280)		2241-50107Z0
					.C3151 CSE1 50V, 100UF		2241-50107Z0
					.C3152 CSE1 50V, 100UF (PS280)		2241-50107Z0
					.D111 Diode 1N5402, G.I. (PS280)		2501-N540200
					Diode 1N4004, G.I. (PS283)		2501-N400400
					.D311 Diode 1N5402, G.I. (PS280)		2501-N540200
					Diode 1N4004, G.I. (PS283)		2501-N400400
					.D404 Diode 1N5402, G.I.		2501-N540200
					.JP59 JUMP WIRE 0.6		4270-06D0000
					.JP60 JUMP WIRE 0.6		4270-06D0000
					.J113 WIRE C. JD-0104-0016		40WCJ1040016
					.J1072 WIRE C. JD-0104-0014		40WCJ1040014
					.J4042 WIRE C. JD-0104-0015		40WCJ1040015
					.J5011 WIRE C. JD-0105-5338		40WCJ1055338
	148-0251-00				.RL501 RELAY DC24V, 10A		3312-2410140
	148-0251-00				.RL502 RELAY DC24V, 10A		3312-2410140
	148-0251-00				.RL503 RELAY DC24V, 10A		3312-2410140
					(END ATTACHING PARTS)		
-7	210-1025-00			4	WASHER, FLAT, 0.312 ID X 0.469 OD X 0.031		210-1025-00
-8	210-0577-00			4	NUT, PLAIN, HEX, 0.281-32 X 0.375		210-0577-00
-9	366-2172-00			4	CURRENT/VOLTAGE KNOB		366-2172-00
-10	211-0452-00			2	SCREW, MACHINE, M3 X 0.5 X 6 MM L		211-0452-00
-11	213-0119-00			4	SCREW, PNH, THREAD FORMING		213-0119-00
-12	118-8708-00			1	FRONT PANEL CONTROL CIRCUIT BOARD (ATTACHING PARTS)		118-8708-00
					.C501 CSC 50V, 22UF		2201-50226Z0
					.C502 CSC 50V, 1000PF		2201-50102Z0
					.C503 CSC 50V, 0.01UF		2201-50103Z0
					.C504 CSM 50V, 0.22UF		2221-50224J0
					.C505 CSC 50V, 0.1UF		2201-50104Z0
	150-0154-00				.D112 LED RED, LT6411G, 6*6M/M, LEDTECH		3110-12D2060
	150-0155-00				.D113 LED GREEN LT6421, 6*6M/M, LEDTECH		3110-15D2070
	150-0154-00				.D312 LED RED, LT6411G, 6*6M/M, LEDTECH		3110-12D2060
	150-0155-00				.D313 LED GREEN LT6421, 6*6M/M, LEDTECH		3110-15D2070
	150-0154-00				.D403 LED RED, LT6411G, 6*6M/M, LEDTECH		3110-12D2060
					.D501 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D502 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D503 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D504 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D505 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D506 Diode 1N4148, TOSH, HT		2502-N4148T0

Parts List

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
					.D507 Diode 1N4148, TOSH,HT		2502-N4148T0
					.D508 Diode 1N4148, TOSH,HT		2502-N4148T0
					.D509 Diode 1N4148, TOSH,HT		2502-N4148T0
					.D510 Zener ½W, 14.5V, HZ15-2, HITACHI		2503-1500051
					.JP40 JUMP WIRE 0.6		4270-06D0000
					.JP41 JUMP WIRE 0.6		4270-06D0000
					.JP42 JUMP WIRE 0.6		4270-06D0000
					.JP43 JUMP WIRE 0.6		4270-06D0000
					.JP44 JUMP WIRE 0.6		4270-06D0000
					.JP45 JUMP WIRE 0.6		4270-06D0000
					.JP46 JUMP WIRE 0.6		4270-06D0000
					.JP47 JUMP WIRE 0.6		4270-06D0000
					.JP48 JUMP WIRE 0.6		4270-06D0000
					.JP49 JUMP WIRE 0.6		4270-06D0000
					.JP50 JUMP WIRE 0.6		4270-06D0000
					.JP51 JUMP WIRE 0.6		4270-06D0000
					.JP52 JUMP WIRE 0.6		4270-06D0000
					.JP53 JUMP WIRE 0.6		4270-06D0000
					.JP54 JUMP WIRE 0.6		4270-06D0000
					.JP55 JUMP WIRE 0.6		4270-06D0000
					.JP56 JUMP WIRE 0.6		4270-06D0000
					.JP57 JUMP WIRE 0.6		4270-06D0000
					.JP58 JUMP WIRE 0.6		4270-06D0000
					.J1082 WAFER B8B-XH-A		40WA-B8BXHAA
					.J3082 WAFER B0B-XH-A		40WA-B9BXHAA
					.J4043 WAFER B2B-XH-A		40WA-B2BXHAA
					.J5012 WAFER B5B-XH-A		40WA-B5BXHAA
					.Q501 TR 2SC 1815GR, TOSH		2602-1815GR0
					.Q502 TR 2SA 1015GR, TOSH		2600-1015GR0
					.Q503 TR 2SC 1815GR, TOSH		2602-1815GR0
					.R110 RC¼W, 47RJ, HT		2002-47B0JTO
					.R310 RC¼W, 47RJ, HT		2002-47B0JTO
					.R344 RC¼W, 22MJ, HT		2002-22B6JTO
					.R501 RC¼W, 20KJ, HT		2002-20B3JTO
					.R502 RC¼W, 20KJ, HT		2002-20B3JTO
					.R503 RC¼W, 20KJ, HT		2002-20B3JTO
					.R504 RC¼W, 20KJ, HT		2002-20B3JTO
					.R505 RC¼W, 82KJ, HT		2002-82B3JTO
					.R506 RC¼W, 12KJ, HT		2002-12B3JTO
					.R507 RC¼W, 4.7KJ, HT		2002-47B2JTO
					.R508 RC¼W, 82KJ, HT		2002-82B3JTO
					.R509 RC¼W, 33KJ, HT		2002-33B3JTO
					.R510 RC¼W, 100RJ, HT		2002-10B1JTO
					.R511 RC¼W, 30KJ, HT		2002-30B3JTO
					.R514 RC¼W, 2.2MJ, HT		2002-22B5JTO
					.R515 RC¼W, 220KJ, HT		2002-22B4JTO
					.R516 RC¼W, 10KJ, HT		2002-10B3JTO
					.R517 RC¼W, 20KJ, HT		2002-20B3JTO
					.R518 RM¼W, 30.1KF, HT		2012-3012FT0
					.S501 SW PUSH, SPUE22AE30		3202-1240610
					.U501 IC NE555P, TEXAS		2711-555P-00
					.U502 IC MC4N33, MOTO, (4N33, TFK) (4N33, GE)		2703-4N33-00
	311-2404-00				.VR104 VR 10KB, 16A, RK163111R691 (RKDA10R691)		2110-103BC04
	311-2493-00				.VR105 VR, 1KB, 16A, RK163111R717 (RK16110R19D)		2110-102BC06



Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
	311-2404-00				.VR304 VR 10KB, 16A, RK163111R691 (RKDA10R691)		2110-103BC04
	311-2493-00				.VR305 VR, 1KB, 16A, RK163111R717 (RK16110R19D)		2110-102BC06
					.VR501 SVR 10-M, 2KB, H, $\pm$ 100PM (END ATTACHING PARTS)		2100-202BM00
-13	260-2567-00			1	S101 POWER SWITCH, 4A, 250 VAC		3202-1120710
-14	118-8711-00			1	DISPLAY CIRCUIT BOARDS ASSEMBLY (PS280)		118-8711-00
	118-8747-00			1	DISPLAY CIRCUIT BOARDS ASSEMBLY (PS283) (ATTACHING PARTS)		118-8747-00
					.C201 CSD 630V, 0.01UJ		2271-6A103J0
					.C202 CSD 100V, 0.1UJ		2271-1A104J0
					.C203 CSN 50V, 100PJ		2211-50101J0
					.C204 CSD 100V, 0.22UJ		2271-1A224J0
					.C205 CSK 100V, 0.47UJ		2291-1A474J0
					.C206 CSE1 16V, 1000UZ		2241-16108Z0
					.C207 CSE1 16V, 100UZ		2241-16107Z0
					.C601 CSD 630V, 0.01UJ		2271-6A103J0
					.C602 CSD 100V, 0.1UJ		2271-1A104J0
					.C603 CSN 50V, 100PJ		2211-50101J0
					.C604 CSD 100V, 0.11UJ		2271-1A224J0
					.C605 CSK 100V, 0.47UJ		2291-1A474J0
					.C606 CSE1 16V, 1000UZ		2241-16108Z0
					.C607 CSE1 16V, 100UZ		2241-16107Z0
					.D201 Diode 1N4004, G.I. HT		2501-N4004T0
					.D202 Diode 1N4004, G.I. HT		2501-N4004T0
					.D203 Diode 1N4004, G.I. HT		2501-N4004T0
					.D204 Diode 1N4004, G.I. HT		2501-N4004T0
					.D205 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D206 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D207 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D208 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D601 Diode 1N4004, G.I. HT		2501-N4004T0
					.D602 Diode 1N4004, G.I. HT		2501-N4004T0
					.D603 Diode 1N4004, G.I. HT		2501-N4004T0
					.D604 Diode 1N4004, G.I. HT		2501-N4004T0
					.D605 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D606 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D607 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
					.D608 DISPLAY RED GAP LTS546A1-NB, 0.5" LITEON		3131-12A5020
	150-0161-00				.D609 LED RED GAP, LT9511G, 5, LEDTECH		3111-02D0130
	150-0161-00				.D610 LED RED GAP, LT9511G, 5, LEDTECH		3111-02D0130
	150-0161-00				.D611 LED RED GAP, LT9511G, 5, LEDTECH		3111-02D0130
	150-0161-00				.D612 LED RED GAP, LT9511G, 5, LEDTECH		3111-02D0130
					.JP1 JUMP WIRE 0.6		4270-06D0000
					.JP2 JUMP WIRE 0.6		4270-06D0000
					.JP3 JUMP WIRE 0.6		4270-06D0000
					.JP4 JUMP WIRE 0.6 (PS283 ONLY)		4270-06D0000

Parts List

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
					.JP5	JUMP WIRE 0.6	4270-06D0000
					.JP6	JUMP WIRE 0.6	4270-06D0000
					.JP7	JUMP WIRE 0.6	4270-06D0000
					.JP8	JUMP WIRE 0.6 (PS283 ONLY)	4270-06D0000
					.JP9	JUMP WIRE 0.6	4270-06D0000
					.JP10	JUMP WIRE 0.6	4270-06D0000
					.JP11	JUMP WIRE 0.6	4270-06D0000
					.JP13	JUMP WIRE 0.6	4270-06D0000
					.JP14	JUMP WIRE 0.6	4270-06D0000
					.JP15	JUMP WIRE 0.6	4270-06D0000
					.JP16	JUMP WIRE 0.6	4270-06D0000
					.JP17	JUMP WIRE 0.6	4270-06D0000
					.JP18	JUMP WIRE 0.6	4270-06D0000
					.JP19	JUMP WIRE 0.6	4270-06D0000
					.JP20	JUMP WIRE 0.6	4270-06D0000
					.JP21	JUMP WIRE 0.6	4270-06D0000
					.JP22	JUMP WIRE 0.6	4270-06D0000
					.JP23	JUMP WIRE 0.6	4270-06D0000
					.JP26	JUMP WIRE 0.6	4270-06D0000
					.JP27	JUMP WIRE 0.6	4270-06D0000
					.JP28	JUMP WIRE 0.6	4270-06D0000
					.JP29	JUMP WIRE 0.6	4270-06D0000
					.JP31	JUMP WIRE 0.6	4270-06D0000
					.JP32	JUMP WIRE 0.6	4270-06D0000
					.JP33	JUMP WIRE 0.6	4270-06D0000
					.JP34	JUMP WIRE 0.6	4270-06D0000
					.JP35	JUMP WIRE 0.6	4270-06D0000
					.JP36	JUMP WIRE 0.6	4270-06D0000
					.JP37	JUMP WIRE 0.6	4270-06D0000
					.JP38	JUMP WIRE 0.6	4270-06D0000
					.JP39	JUMP WIRE 0.6	4270-06D0000
					.JP40	JUMP WIRE 0.6	4270-06D0000
					.JP41	JUMP WIRE 0.6	4270-06D0000
					.JP42	JUMP WIRE 0.6	4270-06D0000
					.JP43	JUMP WIRE 0.6 (PS283 ONLY)	4270-06D0000
					.JP44	JUMP WIRE 0.6	4270-06D0000
					.J205	WAFER B2B-XH-A	40WA-B2BXHA0
					.J206	WAFER B2B-XH-A	40WA-B2BXHA0
					.J207	WAFER B2B-XH-A	40WA-B2BXHA0
					.J208	WAFER B2B-XH-A	40WA-B2BXHA0
					.R202	RM $\frac{1}{4}$ W, 1KF, HT	2012-1001FT0
					.R203	RM $\frac{1}{2}$ W, 1MF	2013-1004F00
					.R205	RM $\frac{1}{4}$ W, 267RF, HT	2012-2670FT0
					.R207	RM $\frac{1}{4}$ W, 4.99KF, HT	2012-4991FT0
					.R208	RM $\frac{1}{4}$ W, 267RF, HT	2012-2670FT0
					.R209	RC $\frac{1}{4}$ W, 47KJ, HT	2002-47B3JT0
					.R210	RM $\frac{1}{4}$ W, 100KF, HT	2012-1003FT0
					.R211	RC $\frac{1}{4}$ W, 470RJ, HT	2002-47B1JT0
					.R212	RC $\frac{1}{4}$ W, 470RJ, HT	2002-47B1JT0
					.R213	RM $\frac{1}{4}$ W, 27 KF, HT (TEST SELECTED)	2012-2702FT0
					.R214	RM $\frac{1}{4}$ W, 27 KF, HT	2012-2702FT0
					.R602	RM $\frac{1}{4}$ W, 1KF, HT	2012-1001FT0
					.R603	RM $\frac{1}{2}$ W, 1MF	2013-1004F00
					.R605	RM $\frac{1}{4}$ W, 267RF, HT	2012-2670FT0
					.R607	RM $\frac{1}{4}$ W, 4.99KF, HT	2012-4991FT0

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
					.R608 RM 1/4W, 267RF, HT		2012-2670FT0
					.R609 RC 1/4W, 47KJ, HT		2002-47B3JT0
					.R610 RM 1/4W, 100KF, HT		2012-1003FT0
					.R611 RC 1/4W, 47ORJ, HT		2002-47B1JT0
					.R612 RC 1/4W, 47ORJ, HT		2002-47B1JT0
					.R613 RM 1/4W, 27 KF, HT (TEST SELECTED)		2012-2702FT0
					.R614 RM 1/4W, 27 KF, HT		2012-2702FT0
					.R2011 RM 1/2W, 500KF		2013-5003F00
					.R2012 RM 1/2W, 500KF		2013-5003F00
					.R6011 RM 1/2W, 500KF		2013-5003F00
					.R6012 RM 1/2W, 500KF		2013-5003F00
260-2568-00					.S201 SW SILDE SSS342NB4-GW, 0.1A		3204-0240170
260-2568-00					.S202 SW SILDE SSS342NB4-GW, 0.1A		3204-0240170
156-1435-00					.U201 IC ICL7107CPL (ICL7107SCPL), INTERSIL (TSC7107CPL)		2712-7107CPL
					.U202 IC UA431AWC, FAIR, NS		2711-431CPLZ
					.U203 IC UA7805UC, FAIRCHILD (LM7805CT, NS) (AN7805 MATS)		2701-7805UCZ
					.U601 IC ICL7107CPL (ICL7107SCPL), INTERSIL (TSC7107CPL)		2712-7107CPL
					.U602 IC UA431AWC, FAIR, NS		2711-431CPLZ
					.U603 IC UA7805UC, FAIRCHILD (LM7805CT, NS) (AN7805 MATS)		2701-7805UCZ
					.VR201 SVR 10-M, 2KB, ±100PPM		2100-202BM01
					.VR202 SVR 10-C, 10KB, H (PS280)		2100-103BC01
					SVR 10-C, 470RB, H (PS283)		2100-471BC01
					.VR601 SVR 10-M, 2KB, ±100PPM		2100-202BM01
					.VR602 SVR 10-C, 10KB, H (PS280)		2100-103BC01
					SVR 10-C, 470RB, H (PS283)		2100-471BC01
					.XU201 IS 40P, D, N		3612-40D000N
					.XU203 HS HS-GSP-13A, MB-210		5207-AF000210
					.XU601 IS 40P, D, N		3612-40D000N
					.XU603 HS HS-GSP-13A, MB-210		2701-7805UCZ
					(END ATTACHING PARTS)		
-15	213-0717-00			6	SCREW,4-20 X 0.312,PNH,THREAD FORMING		213-0717-00
-16	211-0785-00			2	SCREW,MACHINE,M3 X 6 MM		211-0785-00
-17	211-0785-00			1	SCREW,MACHINE,M3 X 6 MM		211-0785-00

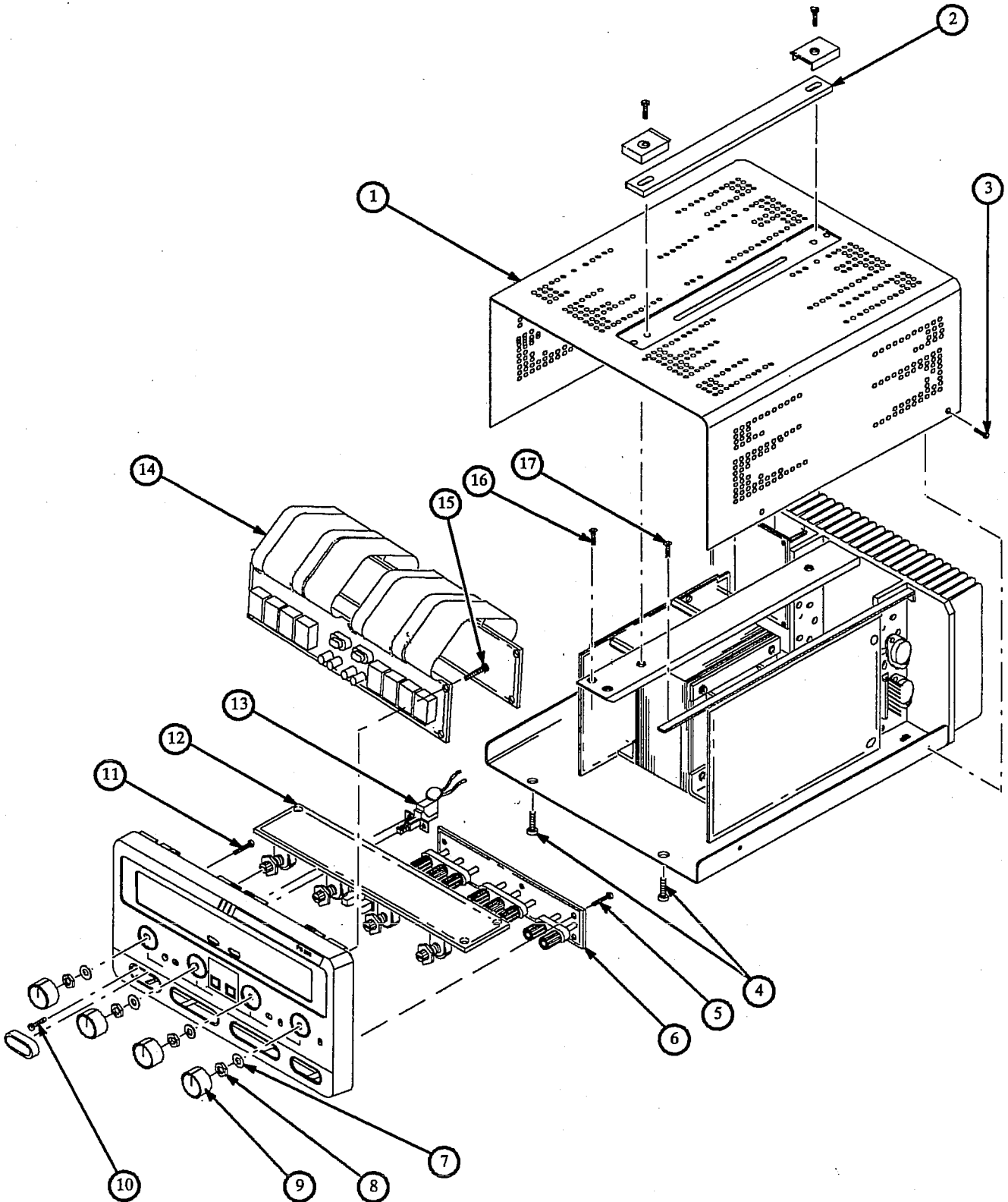


Figure 8-1: Exploded View A

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
8-2-1	118-8706-00			FUSE CIRCUIT BOARD (PS280)		118-8706-00
	118-8748-00			FUSE CIRCUIT BOARD (PS283)		118-8748-00
				(ATTACHING PARTS)		
	159-0339-00		.F102	FUSE,5 X 20 MM,5A,250V (PS280)		37FT-1124502
	159-0191-00		.F102	FUSE,5 X 20 MM,2A,250V (PS283)		37FT-1124502
	159-0338-00		.F103	FUSE,5 X 20 MM,0.315A,250V		37FT-1124311
	159-0338-00		.F104	FUSE,5 X 20 MM,0.315A,250V		37FT-1124311
	159-0339-00		.F105	FUSE,5 X 20 MM,5A,250V (PS280)		37FT-1124502
	159-0191-00		.F105	FUSE,5 X 20 MM,2A,250V (PS283)		37FT-1124502
	159-0338-00		.F106	FUSE,5 X 20 MM,0.315A,250V		37FT-1124311
	159-0338-00		.F107	FUSE,5 X 20 MM,0.315A,250V		37FT-1124311
	159-0339-00		.F108	FUSE,5 X 20 MM,5A,250V		37FT-1124311
	159-0312-00		.F109	FUSE,5 X 20 MM,0.25A,250V		37FT-1124251
	159-0312-00		.F110	FUSE,5 X 20 MM,0.25A,250V		37FT-1124251
			.J113	WIRE C. JD-0104-0016		40WCJ1040016
			.J313	WIRE C. JD-0104-0016		40WCJ1040016
			.J1041	WAFER B2B-XH-A		40WA-B2BXHA0
			.J1042	WAFER B2B-XH-A		40WA-B2BXHA0
				(END ATTACHING PARTS)		
-2	118-8709-00			AC SELECTOR CIRCUIT BOARD (ATTACHING PARTS)		118-8709-00
			.S102	SW SLIDE SDKGA4, F7422070M (SDKGA4274A)		3204-0220180
			.S103	SW SLIDE SDKGA4, F7422070M (SDKGA4274A)		3204-0220180
				(END ATTACHING PARTS)		
-3	129-1414-00		1	SPACER,POST,32.5 MM L		129-1414-00
-4	129-1412-00		2	SPACER,POST,30 MM L		129-1412-00
-5	211-0784-00		1	SCREW,MACHINE,M3 X 8 MM		211-0784-00
-6	213-0717-00		4	SCREW,SELF TAPPING,4-20 X 0.312		213-0717-00
-7	118-8712-00			TRANSISTOR CIRCUIT BOARD,SLAVE (ATTACHING PARTS)		118-8712-00
			.J1051	WAFER B4P-VH		40WA-B4PVH00
			.Q3071	TR 2N 3055, TOSH (2N 3055, ST)		2610-3055-00
			.Q3072	TR 2N 3055, TOSH (2N 3055, ST)		2610-3055-00
				(END ATTACHING PARTS)		
-8	220-0085-00		6	NUT,PLAIN,HEX,M3 X5.5 MM		220-0085-00
-9	118-8710-00			TRANSISTOR CIRCUIT BOARD,MASTER (ATTACHING PARTS)		118-8710-00
			.J3051	WAFER B8P-VH		40WA-B8PVH00
			.Q402	TR 2N 3055, TOSH (2N 3055, ST)		2610-3055-00
			.Q1071	TR 2N 3055, TOSH (2N 3055, ST)		2610-3055-00
			.Q1072	TR 2N 3055, TOSH (2N 3055, ST)		2610-3055-00
				(END ATTACHING PARTS)		
-10	211-0498-00		8	SCREW,MACHINE,M3 X 12 MM		211-0498-00
-11	211-0728-00		6	SCREW,MACHINE,M3 X 0.5 X 16 MM		211-0728-00

Parts List

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
-12	118-8705-00				MASTER CIRCUIT BOARD (PS280)		118-8705-00
	118-8746-00				MASTER CIRCUIT BOARD (PS283)		118-8746-00
					(ATTACHING PARTS)		
				.C102	CSE1 4700UF,63V (PS280)		2241-63478Z0
					CSE1 2200UF,63V (PS283)		2241-63228Z0
				.C109	CSE1 25V, 47UZ, 8@		2241-25476Z0
				.C110	CSD 630V, 0.01UJ, 13*4*9		2271-6A103J0
				.C111	CSD 100V, 0.1UJ, 13*9*4		2271-1A104J0
				.C112	CSC 50V, 500PJ		2201-50501J0
				.C113	CSN 50V, 33PJ, 6@		2211-50330J0
				.C302	CSE1 4700UF,63V (PS280)		2241-63478Z0
					CSE1 2200UF,63V (PS283)		2241-63228Z0
				.C309	CSE1 25V, 47UZ, 8@		2241-25476Z0
				.C310	CSD 630V, 0.01UJ, 13*4*9		2271-6A103J0
				.C311	CSD 100V,0.1UJ, 13*9*4		2271-1A104J0
				.C312	CSC 50V, 500PJ		2201-50501J0
				.C313	CSN 50V,33PJ, 6@		2211-50330J0
				.C403	CSC 50V, 1000PK		2201-50102K0
				.C404	CSC 50V, 1000PK		2201-50102K0
				.C1141	CSE1 50V, 4.7UZ		2241-50475Z0
				.C1142	CSE1 50V, 4.7UZ		2241-50475Z0
				.C3141	CSE1 50V, 4.7UZ		2241-50475Z0
				.C3142	CSE1 50V, 4.7UZ		2241-50475Z0
				.DL1	Wire C. JD-2101-2564		40WCJ7012564
				.DL2	Wire C. JD-2101-2564		40WCJ7012564
				.D103	Zener 1/2W, 5.0V-5.2V, HZ5C2, Hitachi Only		2503-0510050
				.D104	Zener 1/2W,11.9V-12.4V, HZ12A2, Hitachi Only		2503-1200050
				.D105	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N4148T0
				.D106	Zener 1/2W, 8.89V-9.29V, RD9.1EB3, NEC Only		2503-0910050
				.D107	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N148T0
				.D108	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N148T0
				.D109	Zener 1/2W, 8.89V-9.29V, RD9.1EB3, NEC Only		2503-0910050
				.D110	Diode 1N5402, G.I.		2501-N540200
				.D116	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N4148T0
				.D303	Zener 1/2W, 5.0V-5.2V, HZ5C2, Hitachi Only		2503-0510050
				.D304	Zener 1/2W,11.9V-12.4V, HZ12A2, Hitachi Only		2503-1200050
				.D305	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N4148T0
				.D306	Zener 1/2W, 8.89V-9.29V, RD9.1EB3, NEC Only		2503-0910050
				.D307	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N4148T0
				.D308	Diode 1N4148, TOSH(TFK, PHIL, FAIR),HT		2502-N4148T0
				.D309	Zener 1/2W, 8.89V-9.29V, RD9.1EB3, NEC Only		2503-0910050
				.D310	Diode 1N5402, G.I.		2501-N540200
				.D316	Diode 1N4148, TOSH		2502-N4148T0
				.D402	Diode 1N4148, TOSH		2502-N4148T0
				.JP1	JUMP WIRE 0.6		4270-06D0000

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
				.JP2	JUMP WIRE 0.6	4270-06D0000
				.JP3	JUMP WIRE 0.6	4270-06D0000
				.JP4	JUMP WIRE 0.6	4270-06D0000
				.JP5	JUMP WIRE 0.6	4270-06D0000
				.JP6	JUMP WIRE 0.6	4270-06D0000
				.JP7	JUMP WIRE 0.6	4270-06D0000
				.JP8	JUMP WIRE 0.6	4270-06D0000
				.JP9	JUMP WIRE 0.6	4270-06D0000
				.JP10	JUMP WIRE 0.6	4270-06D0000
				.JP11	JUMP WIRE 0.6	4270-06D0000
				.JP12	JUMP WIRE 0.6	4270-06D0000
				.JP13	JUMP WIRE 0.6	4270-06D0000
				.JP14	JUMP WIRE 0.6	4270-06D0000
				.JP15	JUMP WIRE 0.6	4270-06D0000
				.JP16	JUMP WIRE 0.6	4270-06D0000
				.JP17	JUMP WIRE 0.6	4270-06D0000
				.JP18	JUMP WIRE 0.6	4270-06D0000
				.JP19	JUMP WIRE 0.6	4270-06D0000
				.JP20	JUMP WIRE 0.6	4270-06D0000
				.JP21	JUMP WIRE 0.6	4270-06D0000
				.JP22	JUMP WIRE 0.6	4270-06D0000
				.JP24	JUMP WIRE 0.6	4270-06D0000
				.JP25	JUMP WIRE 0.6	4270-06D0000
				.J106	WAFER B2P-VH	40WA-B2PVH00
				.J109	WAFER JD-PI-5002	40WAJ500P020
				.J306	WAFER B2P-VH	40WA-B2PVH00
				.J309	WAFER JD-PI-5002	40WAJ500P020
				.J402	WAFER B2P-VH	40WA-B2PVH00
				.J403	WAFER B3P-VH	40WA-B3PVH00
				.J1051	WAFER B8P-VH	40WA-B8PVH00
				.J1052	WAFER B4P-VH	40WA-B4PVH00
				.J1071	WAFER B4B-XH-A	40WA-B4BXH00
				.J1081	WIRE C. JD-0110-0017	40WCJ1100017
				.J1102	WAFER B6P-VH	40WA-B6PVH00
				.J3052	WAFER B4P-VH	40WA-B4PVH00
				.J3081	WIRE C. JD-0111-0001	40WCJ1110001
				.J4041	WAFER B4B-XH-A	40WA-B4BXH00
				.Q103	TR 2SC 1815GR, TOSH	2602-1815GR0
				.Q104	TR 2SD 880Y, TOSH	2603-880Y-00
				.Q105	TR 2SC 1815GR, TOSH	2602-1815GR0
				.Q106	TR 2SA 1015GR, TOSH	2600-1015GR0
				.Q303	TR 2SC 1815GR, TOSH	2602-1815GR0
				.Q304	TR 2SD 880Y, TOSH	2603-880Y-00
				.Q305	TR 2SC 1815GR, TOSH	2602-1815GR0
				.Q306	TR 2SA 1015GR, TOSH	2600-1015GR0
				.Q401	TR 2SD 880Y, TOSH	2603-880Y-00
				.R106	RM $\frac{1}{4}$ W, 2KF, HT	2012-2001FT0
				.R107	RM $\frac{1}{4}$ W, 10K, HT	2012-1002FT0
				.R108	RC $\frac{1}{4}$ W, 150KJ, HT	2002-15B4JT0
				.R109	RC $\frac{1}{4}$ W, 68RJ, HT	2002-68B0JT0
				.R111	RC $\frac{1}{4}$ W, 1.5KJ, HT	2002-15B2JT0
				.R112	RC $\frac{1}{4}$ W, 1KJ, HT	2002-10B2JT0
				.R113	RC $\frac{1}{4}$ W, 1.5KJ, HT	2002-15B2JT0
				.R114	RC $\frac{1}{4}$ W, 13KF, HT	2012-1302FT0
				.R115	RM $\frac{1}{4}$ W, 30.1KF, HT	2012-3012FT0
				.R116	RC $\frac{1}{4}$ W, 4.7MJ, HT	2002-47B5JT0
				.R117	RC $\frac{1}{4}$ W, 10MJ, HT	2002-10B6JT0

Parts List

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
				.R118 RC¼W, 2.7KJ, HT		2002-27B2JTO
				.R119 RC¼W, 1KJ, HT		2002-10B2JTO
				.R120 RC¼W, 180RJ, HT		2002-18B1JYO
				.R121 RC¼W, 10KJ, HT		2002-10B3JTO
				.R122 RC¼W, 510RJ, HT		2002-51B1JTO
				.R123 JUMP WIRE 0.6@, HT		4270-06D0000
				.R124 RC¼W, 510RJ, HT		2002-51B1JTO
				.R125 RO 2W, 1KJ		2075-10B2J00
				.R129 RC¼W, 3.3KJ, HT		2002-33B2JTO
				.R130 RC¼W, 150KJ, HT		2002-15B4JTO
				.R149 RR2W, 150RJ		2035-1500J00
				.R306 RM¼W, 2KF, HT		2012-2001FTO
				.R307 RM¼W, 10KF, HT		2012-1002FTO
				.R308 RC¼W, 150KJ, HT		2002-15B4JTO
				.R309 RC¼W, 68RJ, HT		2002-68B0JTO
				.R311 RC¼W, 1.5KJ, HT		2002-15B2JTO
				.R312 RC¼W, 1KJ, HT		2002-10B2JTO
				.R313 RC¼W, 1.5KJ, HT		2002-15B2JTO
				.R314 RM¼W, 13KF, HT		2012-1302FTO
				.R315 RM¼W, 30.1KF, HT		2012-3012FTO
				.R316 RC¼W, 4.7MJ, HT		2002-47B5JTO
				.R317 RC¼W, 10MJ, HT		2002-10B6JTO
				.R318 RC¼W, 2.7KJ, HT		2002-27B2JTO
				.R319 RC¼W, 1KJ, HT		2002-10B2JTO
				.R320 RC¼W, 180RJ, HT		2002-18B1JTO
				.R321 RC¼W, 19KJ, HT		2002-10B3JTO
				.R322 RC¼W, 510RJ, HT		2002-51B1JTO
				.R323 JUMP WIRE 0.6@, HT		4270-06D0000
				.R324 RC¼W, 510RJ, HT		2002-51B1JTO
				.R325 RO 2W, 1KJ		2075-10B2J00
				.R329 RC¼W, 3.3KJ, HT		2002-33B2JTO
				.R330 RC¼W, 150KJ, HT		2002-15B4JTO
				.R343 RC¼W, 4.7MJ, HT		2002-47B5JTO
				.R349 RR 2W, 150RJ		2035-1500J00
				.R402 RC¼W, 3.6KJ, HT		2002-36B2JTO
				.R403 RC¼W, 3KJ, HT		2002-30B2JTO
				.R404 RC¼W, 1.2KJ, HT		2002-12B2JTO
				.R405 RC¼W, 2.7KJ, HT		2002-27B2JTO
				.R406 RC¼W, 1KJ, HT		2002-10B2JTO
				.R407 RR 5W, 0.3RJ, ±100PPM		2037-3BBDJ00
				.R408 RC¼W, 19KJ, HT		2002-10B3JTO
				.R409 RC¼W, 19KJ, HT		2002-10B3JTO
				.R410 RC¼W, 1.2KJ, HT		2002-12B2JTO
				.R519 RC¼W, 1.5KJ, HT		2002-15B2JTO
				.R1051 RC¼W, 2.4KJ, HT		2002-24B2JTO
				.R1052 RC¼W, 2.4KJ, HT		2002-24B2JTO
				.R1261 RR 5W, 0.3RJ, ±100PPM (PS280)		2037-3BBDJ00
				RR 5W, 0.5RJ, ±100PPM (PS283)		2037-5BBDJ00
				.R1271 RC¼W, 1KJ, HT		2002-10B2JTO
				.R1272 RC¼W, 1KJ, HT		2002-10B2JTO
				.R1281 RC¼W, 47RJ, HT		2002-47B0JTO
				.R1282 RC¼W, 47RJ, HT		2002-47B0JTO
				.R1311 RC¼W, 4.7KJ, HT		2002-47B2JTO
				.R1312 RC¼W, 4.7KJ, HT		2002-47B2JTO
				.R1321 RC¼W, 4.7KJ, HT		2002-47B2JTO



Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
					.R1322 RC¼W, 4.7KJ, HT		2002-47B2JT0
					.R3051 RC¼W, 2.4KJ, HT		2002-24B2JT0
					.R3052 RC¼W, 2.4KJ, HT		2002-24B2JT0
					.R3271 RC¼W, 1KJ, HT		2002-10B2JT0
					.R3272 RC¼W, 1KJ, HT		2002-10B2JT0
					.R3281 RC¼W, 47RJ, HT		2002-47B0JT0
					.R3282 RC¼W, 47RJ, HT		2002-47B0JT0
					.R3311 RC¼W, 4.7KJ, HT		2002-47B2JT0
					.R3312 RC¼W, 4.7KJ, HT		2002-47B2JT0
					.R3321 RC¼W, 4.7KJ, HT		2002-47B2JT0
					.R3322 RC¼W, 4.7KJ, HT		2002-47B2JT0
					.R3261 RR 5W, 0.3RJ, ±100PPM (PS280)		2037-3BBDJ00
					RR 5W, 0.5RJ, ±100PPM (PS283)		2037-5BBDJ00
					.U102 IC UA431AWC, FAIR, NS		2711-431CLPZ
					.U103 IC UA741CP, TEXAS (UA741TC, FAIR)		2711-741CP-0
					.U104 IC LM301AP, TEXAS		2711-301AP-0
					.U105 IC UA741CP, TEXAS (UA741TC, FAIR)		2711-741CP-0
					.U302 IC UA431AWC, FAIR, NS		2711-431CLPZ
					.U303 IC UA741CP, TEXAS (UA741TC, FAIR)		2711-741CP-0
					.U304 IC LM301AP, TEXAS		2711-301AP-0
					.U305 IC UA741CP, TEXAS (UA741TC, FAIR)		2711-301AP-0
					.U401 IC UA723CN, TEXAS (SIGNETICS)		2711-723CN-0
					.U402 IC UA741CP, TEXAS (UA741TC, FAIR)		2711-301AP-0
					.VR101 SVR 10-M, 2KB, H, ±100PM		2100-202BM00
					.VR102 SVR 10-C, 2.2KB, H		2100-222BC01
					.VR103 SVR 10-C, 3.3KB, H		2100-332BC00
					.VR301 SVR 10-M, 2KB, H, ±100PM		2100-202BM00
					.VR302 SVR 10-C, 2.2KB, H		2100-222BC01
					.VR303 SVR 10-C, 3.3KB, H		2100-332BC00
					.VR306 SVR 10-C, 22KB, H		2100-223BC00
					.VR401 SVR 10-C, 1KB, H		2100-102BC00
					.VR402 SVR 10-C, 1KB, H		2100-102BC00
					.VR403 SVR 10-C, 1KB, H		2100-102BC00
					.VR502 SVR 10-C, 10KB, H		2100-103BC01
					(END ATTACHING PARTS)		
-13	211-0428-00			2	SCREW,ASSEM WSHR,M3 X 0.5 X 6 MM L		211-0428-00
-14	213-1037-00			4	SCREW,MACHINE,M5 X 12		213-1037-00
-15	210-0011-00			4	WASHER,LOCK,0.25 ID,0.025 THK		211-0011-00
-16	200-3998-00			1	COVER,BOTTOM		200-3998-00
-17	120-5007-00				TS101 TRANSFORMER (PS280)		120-5007-00
	120-5006-00				TS101 TRANSFORMER (PS283)		120-5006-00
-18	211-0751-00			2	SCREW,ASSEM WSHR,M3 X 8		211-0751-00
-19	118-8704-00				SLAVE CIRCUIT BOARD (PS280)		118-8704-00
	118-8750-00				SLAVE CIRCUIT BOARD (PS283)		118-8750-00
					(ATTACHING PARTS)		
					.C103 CSE1 35V, 470UZ		2241-35477Z0
					.C104 CSE1 35V, 470UZ		2241-35477Z0
					.C105 CSE1 25V, 100UZ		2241-25107Z0
					.C106 CSE1 25V, 100UZ		2241-25107Z0
					.C107 CSM 50V, 0.01UJ		2221-50103J0

Parts List

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
					.C108 CSM 50V,0.01UJ (PS280 ONLY)		2221-50103J0
					.C303 CSE1 35V, 470UZ		2241-35477Z0
					.C304 CSE1 35V, 470UZ		2241-35477Z0
					.C305 CSE1 25V, 100UZ		2241-25107Z0
					.C306 CSE1 25V, 100UZ		2241-25107Z0
					.C307 CSM 50V,0.01UJ		2221-50103J0
					.C308 CSM 50V,0.01UJ (PS280 ONLY)		2221-50103J0
					.C401 CSE1 25V, 6800UZ		2241-25688Z0
					.D115 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D314 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D315 Diode 1N4148, TOSH, HT		2502-N4148T0
					.D1011 Diode 1N5402, G.I.		2501-N540200
					.D1012 Diode 1N5402, G.I.		2501-N540200
					.D1013 Diode 1N5402, G.I.		2501-N540200
					.D1014 Diode 1N5402, G.I.		2501-N540200
					.D1021 Diode 1N4004, G.I. HT		2501-N4004T0
					.D1022 Diode 1N4004, G.I. HT		2501-N4004T0
					.D1023 Diode 1N4004, G.I. HT		2501-N4004T0
					.D1024 Diode 1N4004, G.I. HT		2501-N4004T0
					.D3011 DIODE 1N5402, G.I.		2501-N540200
					.D3012 DIODE 1N5402, G.I.		2501-N540200
					.D3013 DIODE 1N5402, G.I.		2501-N540200
					.D3014 DIODE 1N5402, G.I.		2501-N540200
					.D4011 DIODE 1N5402, G. I.		2501-N54D200
					.D4012 DIODE 1N5402, G. I.		2501-N54D200
					.D4013 DIODE 1N5402, G. I.		2501-N54D200
					.D4014 DIODE 1N5402		2501-N54D200
					.JP26 JUMP WIRE		4270-06D0000
					.JP27 JUMP WIRE		4270-06D0000
					.JP28 JUMP WIRE		4270-06D0000
					.JP29 JUMP WIRE		4270-06D0000
					.JP30 JUMP WIRE		4270-06D0000
					.JP31 JUMP WIRE		4270-06D0000
					.JP32 JUMP WIRE		4270-06D0000
					.JP33 JUMP WIRE		4270-06D0000
					.JP35 JUMP WIRE		4270-06D0000
					.JP36 JUMP WIRE		4270-06D0000
					.JP37 JUMP WIRE		4270-06D0000
					.JP38 JUMP WIRE		4270-06D0000
					.JP39 JUMP WIRE		4270-06D0000
					.JP61 JUMP WIRE		4270-06D0000
					.JP62 JUMP WIRE		4270-06D0000
					.JP63 JUMP WIRE		4270-06D0000
					.JP64 JUMP WIRE		4270-06D0000
					.J101 WAFER JD-PI-5004		40WAJ500P040
					.J301 WAFER JD-PI-5004		40WAJ500P040
					.J1033 WAFER B2P-VH		40WA-B2PVH00
					.J1101 WAFER B6P-VH		40WA-B6PVH00
					.J1111 WAFER B12B-XH-A		40WAB1BXHA0
					.Q101 TR 2SA 1015GR, TOSH		2600-1015GR0
					.Q102 TR 2SA715C, HITACHI		2600-715C-00
					.Q108 TR 2SC 1815GR, TOSH (PS280 ONLY)		2602-1815GR0
					.Q109 TR 2SC 1815GR, TOSH (PS280 ONLY)		2602-1815GR0

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
					.Q110 TR 2SA 1015GR, TOSH (PS280 ONLY)		2600-1015GR0
					.Q111 TR 2SC 1815GR, TOSH		2602-1815GR0
					.Q112 TR 2SC 1815GR, TOSH		2602-1815GR0
					.Q301 TR 2SA 1015GR, TOSH		2600-1015GR0
					.Q302 TR 2SA715C, TOSH		2600-715C-00
					.Q308 TR 2SC 1815GR, TOSH (PS280 ONLY)		2602-1815GR0
					.Q309 TR 2SC 1815GR, TOSH (PS280 ONLY)		2602-1815GR0
					.Q310 TR 2SA 1015GR, TOSH (PS280 ONLY)		2600-1015GR0
					.Q311 TR 2SC 1815GR, TOSH		2602-1815GR0
					.Q312 TR 2SC 1815GR, TOSH		2602-1815GR0
	148-0251-00				.RL101 RELAY DC24V, 10A (PS280 ONLY)		3312-2410140
	148-0251-00				.RL102 RELAY DC24V, 10A		3312-2410140
	148-0251-00				.RL301 RELAY DC24V, 10A (PS280 ONLY)		3312-2410140
	148-0251-00				.RL302 RELAY DC24V, 10A		3312-2410140
					.R102 RC $\frac{1}{4}$ W, 10KJ, HT		2002-10B3JTO
					.R103 RM $\frac{1}{4}$ W, 11.3KF, HT		2012-1132FTO
					.R104 RM $\frac{1}{4}$ W, 10.5KF, HT		2012-1052FTO
					.R133 RC $\frac{1}{4}$ W, 4.7KJ, HT		2002-47B2JTO
					.R134 RC $\frac{1}{4}$ W, 15KJ, HT		2002-15B3JTO
					.R135 RC $\frac{1}{4}$ W, 10KJ, HT		2002-10B3JTO
					.R136 RC $\frac{1}{4}$ W, 4.7KJ, HT		2002-47B2JTO
					.R137 RC $\frac{1}{4}$ W, 27KJ, HT		2002-27B3JTO
					.R138 RC $\frac{1}{4}$ W, 15RJ, HT		2002-15B0JTO
					.R139 RC $\frac{1}{4}$ W, 15KJ, HT		2002-15B3JTO
					.R140 RC $\frac{1}{4}$ W, 15RJ, HT		2002-15B0JTO
					.R141 RC $\frac{1}{4}$ W, 30KJ, HT		2002-30B3JTO
					.R142 RC $\frac{1}{4}$ W, 9.1KJ, HT		2002-91B2JTO
					.R301 R0 3W, 4.7KJ		2076-47B2J00
					.R302 RC $\frac{1}{4}$ W, 10KJ, HT		2002-10B3JTO
					.R303 RM $\frac{1}{4}$ W, 11.3KF, HT		2012-1132FTO
					.R304 RM $\frac{1}{4}$ W, 10.5KF, HT		2012-1052FTO
					.R333 RC $\frac{1}{4}$ W, 4.7KJ, HT		2002-47B2JTO
					.R334 RC $\frac{1}{4}$ W, 15KJ, HT		2002-15B3JTO
					.R335 RC $\frac{1}{4}$ W, 19KJ, HT		2002-10B3JTO
					.R336 RC $\frac{1}{4}$ W, 4.7KJ, HT		2002-47B2JTO
					.R337 RC $\frac{1}{4}$ W, 27KJ, HT		2002-27B3JTO
					.R338 RC $\frac{1}{4}$ W, 15RJ, HT		2002-15B0JTO
					.R339 RC $\frac{1}{4}$ W, 15KJ, HT		2002-15B3JTO
					.R340 RC $\frac{1}{4}$ W, 15RJ, HT		2002-15B0JTO
					.R341 RC $\frac{1}{4}$ W, 30KJ, HT		2002-30B3JTO
					.R342 RC $\frac{1}{4}$ W, 9.1KJ, HT		2002-91B2JTO
					.R401 RC 1W, 470RJ		2004-47B1J00
					.U101 IC UA7815UC, FAIR (AN7815, MATS) (L7815CV ST)		2701-7815UCZ
					.U301 IC UA7815UC, FAIR (AN7815, MATS) (L7815CV ST) (END ATTACHING PARTS)		2701-7815UCZ
-20	211-0751-00			3	SCREW, ASSEM WSHR, M3 X 8		211-0751-00
	159-0233-00			1	F101 POWER SOCKET RECEPTACLE		3610-0060030
	159-0226-00			1	F101 FUSE, 4A, 250V, FAST (PS280)		159-0233-00
				1	F101 FUSE, 2.5A, 250V, FAST (PS283)		159-0226-00

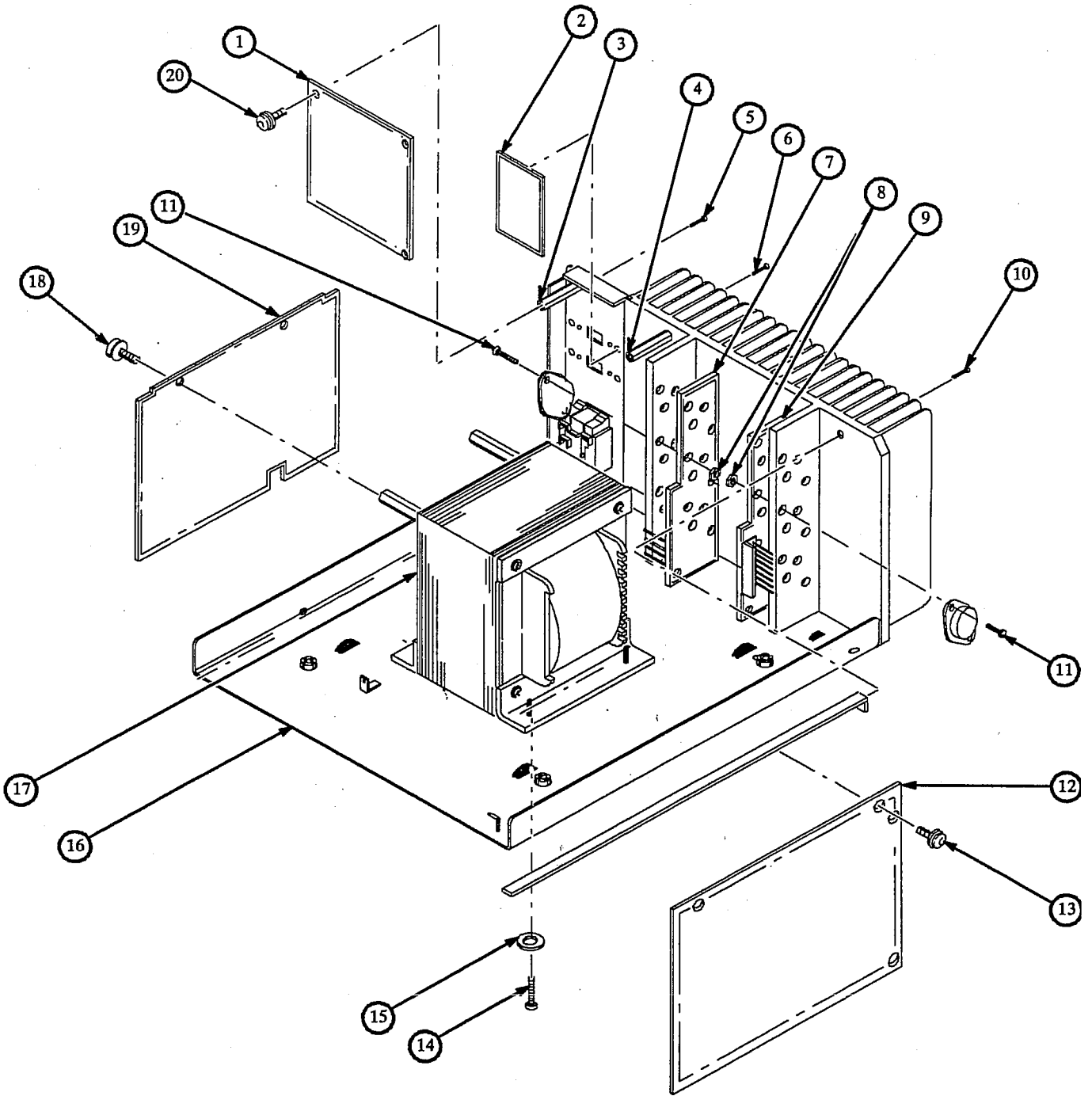


Figure 8-2: Exploded View B

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty.	Name & Description	Mfr. Code	Mfr. Part No.
<b>Standard Accessories</b>							
	070-8355-00			1	PS280 & PS283 Operators Manual		070-8355-00
	161-0248-00			1	Power Cord, Option A0, North American, 120 V/6 A, 60Hz		161-0248-00
	196-3201-00			1	Test Lead, Set of 3 Pairs		196-3201-00
<b>Optional Accessories</b>							
	070-8356-00				PS280 & PS283 Service Manual		070-8356-00
	161-0104-06				Power Cord, Option A1, Universal European, 220 V/6 A, 50Hz		161-0104-06
	161-0104-07				Power Cord, Option A2, United Kingdom, 240 V/6 A, 50Hz		161-0104-07
	161-0104-05				Power Cord, Option A3, Australian, 120 V/6 A, 50Hz		161-0104-05
	161-0104-08				Power Cord, Option A4, North American, 220 V/10 A, 60Hz		161-0104-08
	161-0167-00				Power Cord, Option A5, Switzerland, 240 V/6 A, 50Hz		161-0167-00



# Diagrams



# Diagrams and Circuit Board Illustrations

This section contains the circuit board illustrations and schematic diagrams for this power supply.

---

## Component Values

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 ( $\mu$ F).

Resistors: Values are in Ohms ( $\Omega$ ).

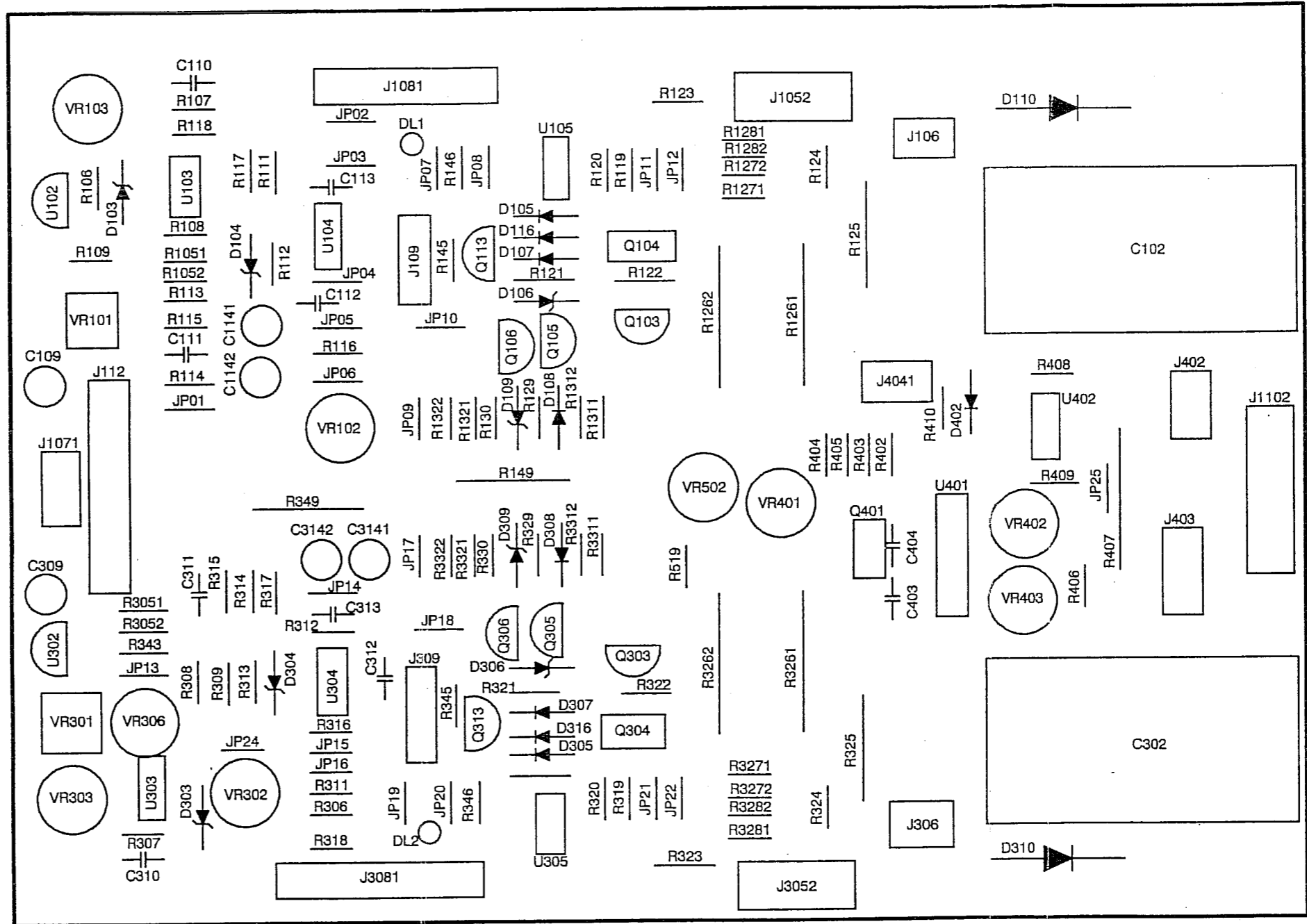


Figure 9-1: Master Circuit Board



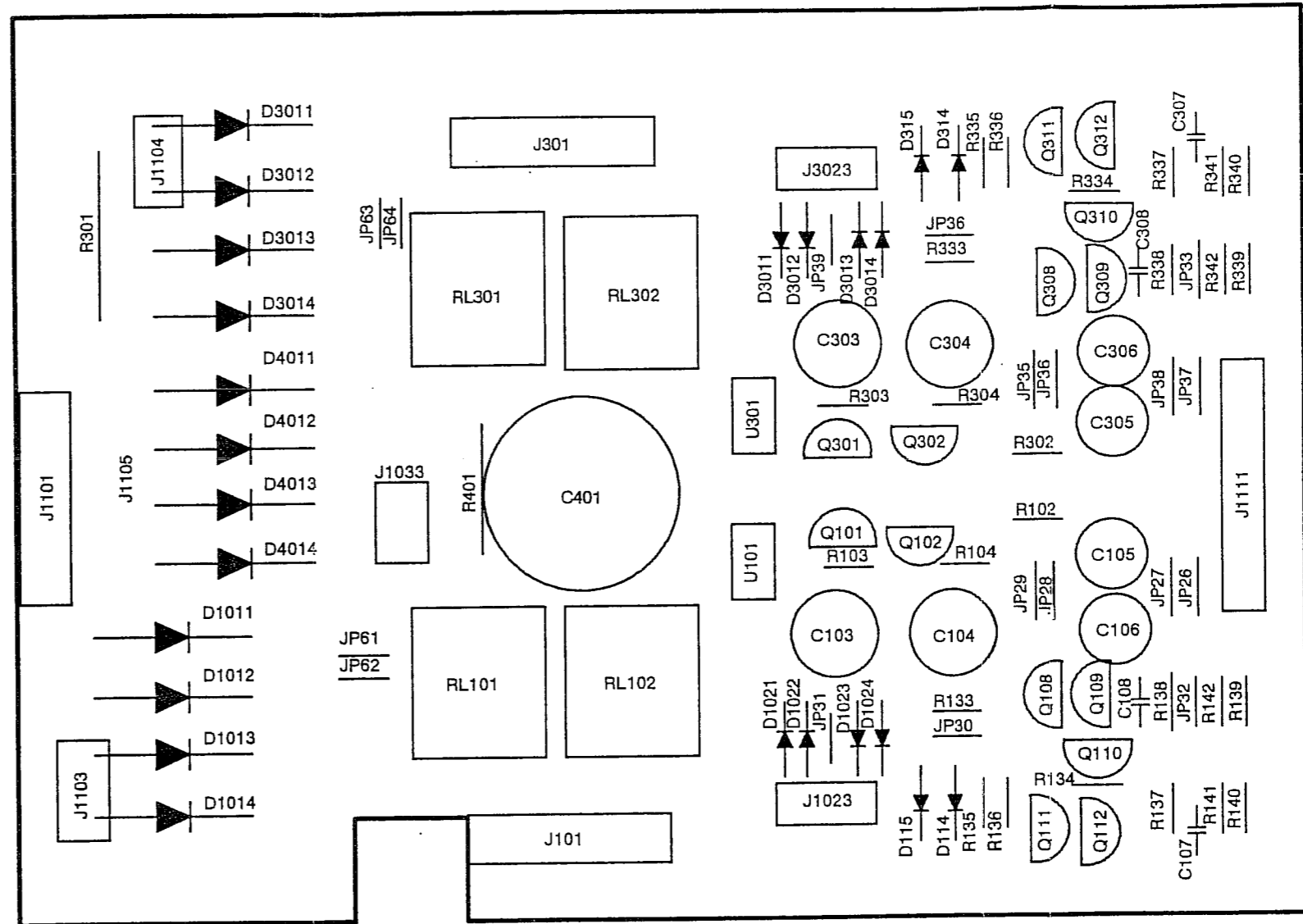


Figure 9-2: Slave Circuit Board

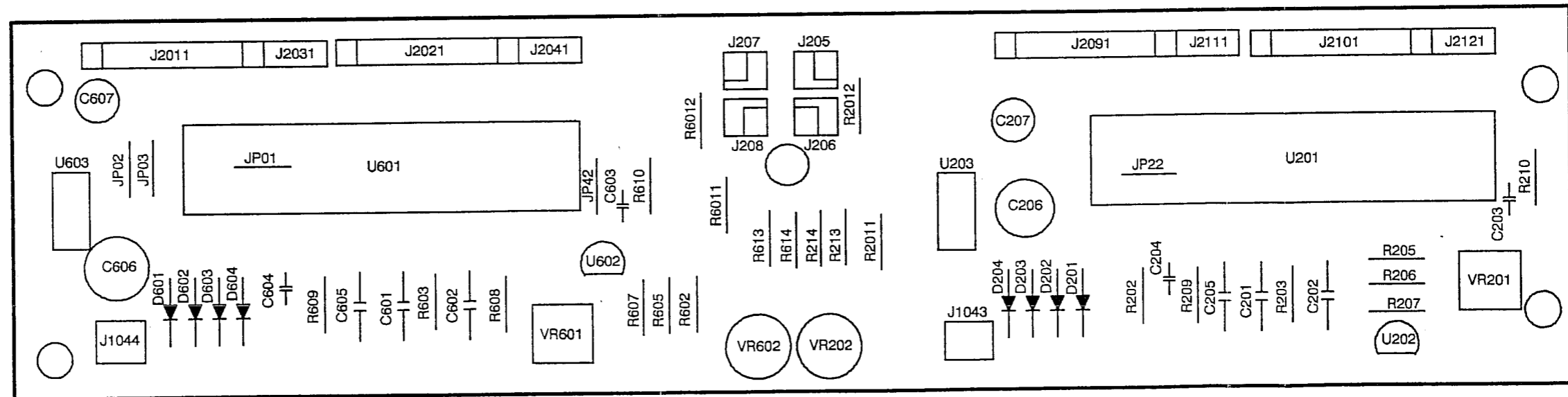
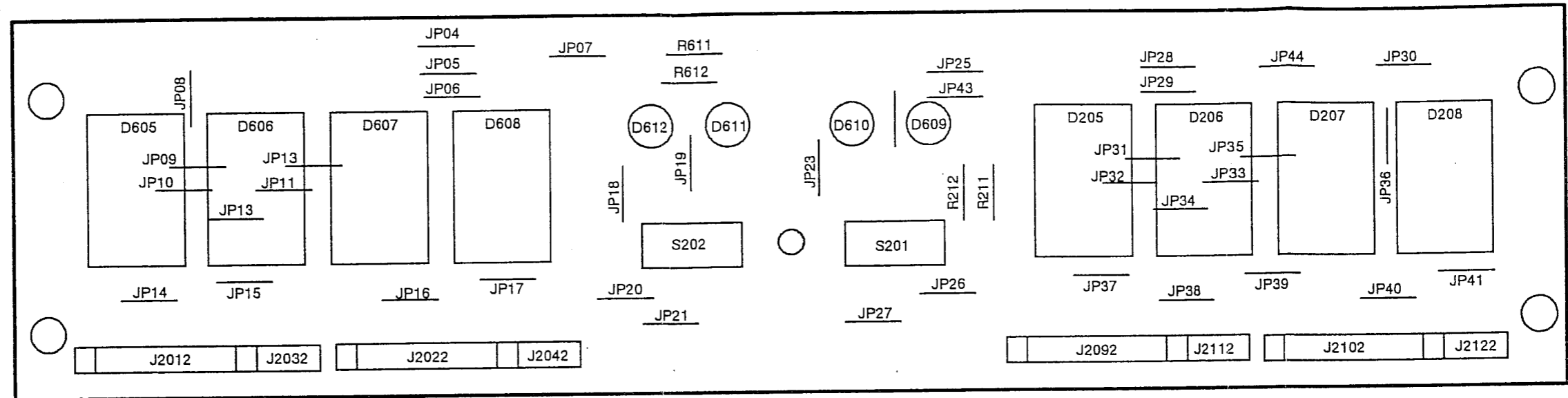


Figure 9-3: Display Assembly Circuit Boards

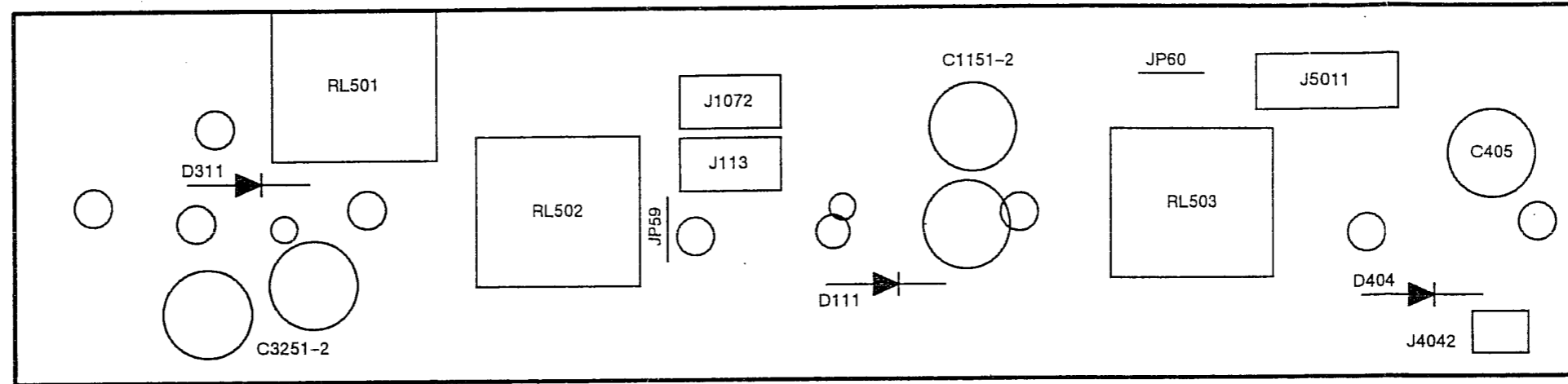


Figure 9-4: Output Connectors Circuit Board

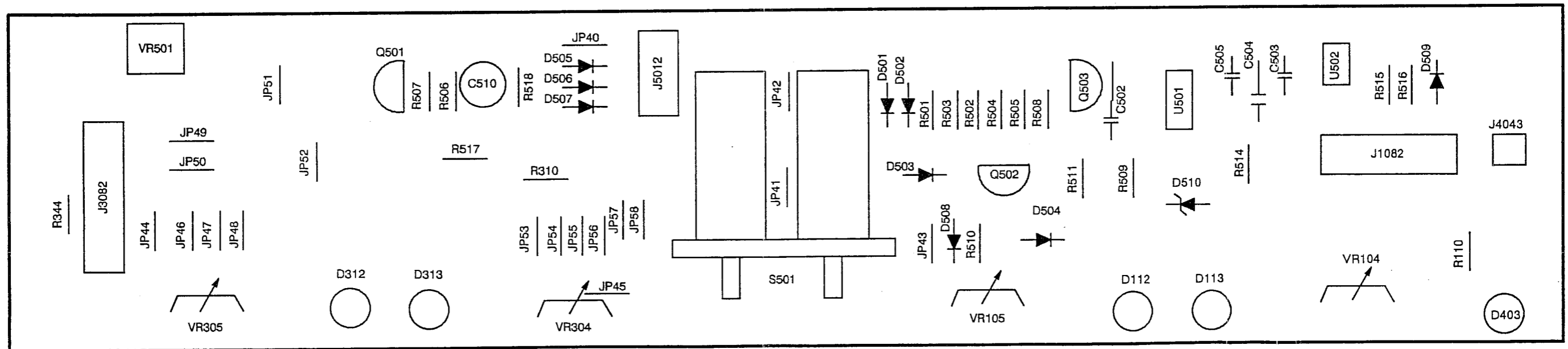


Figure 9-5: Front Panel Controls Circuit Board

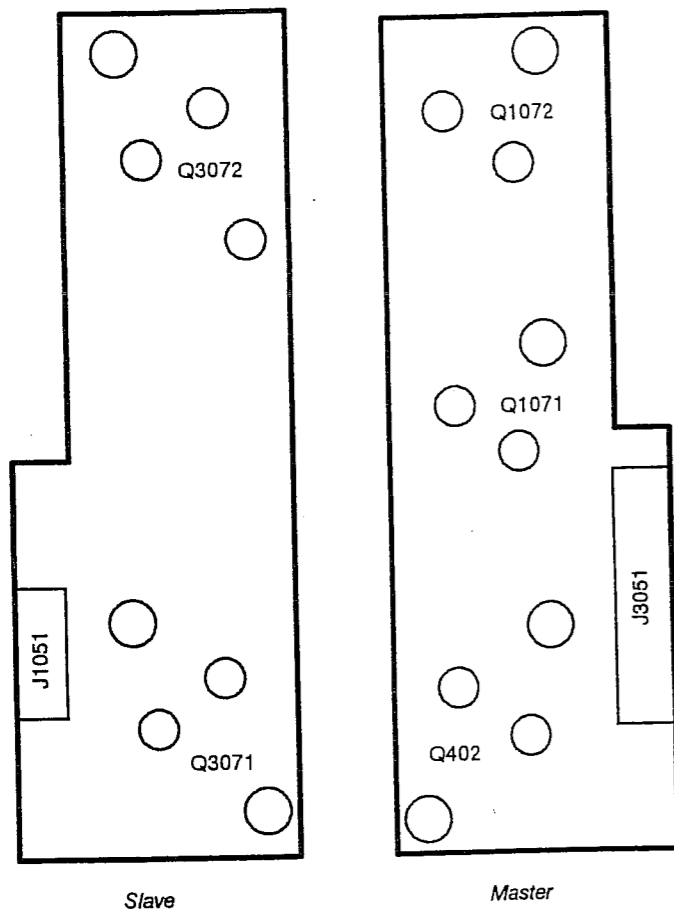


Figure 9-6: Power Transistors Circuit Boards

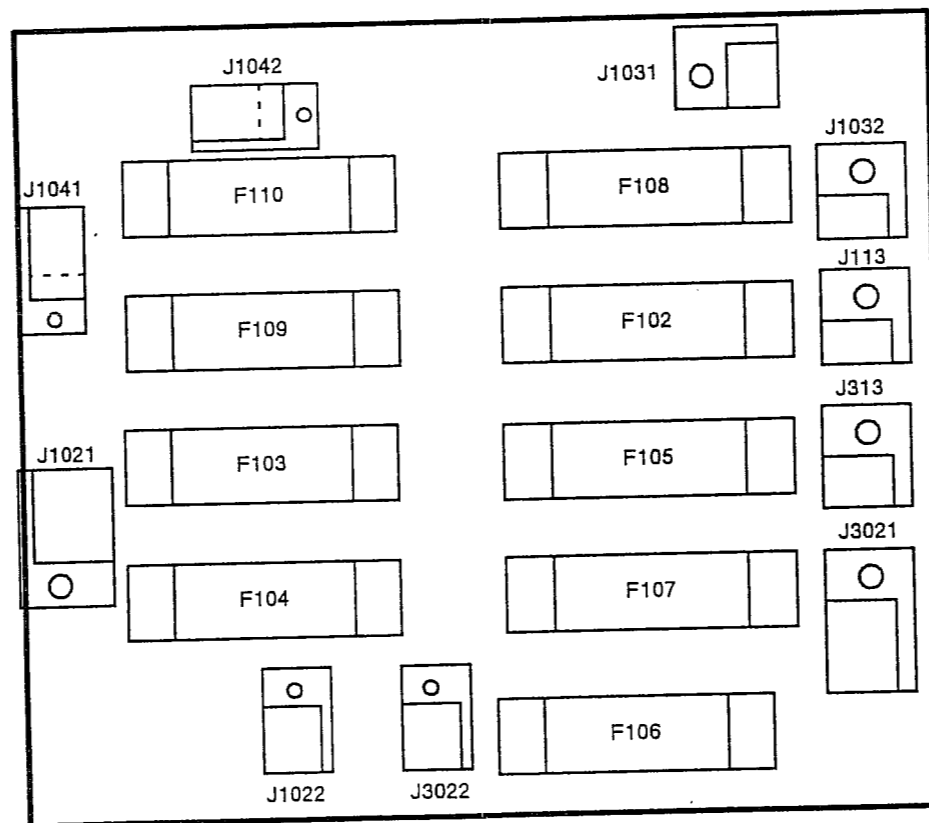


Figure 9-7: Fuse Circuit Board

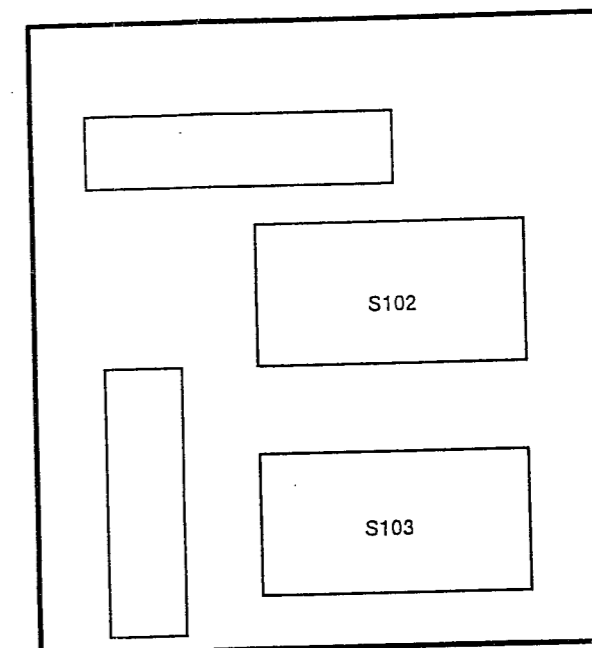
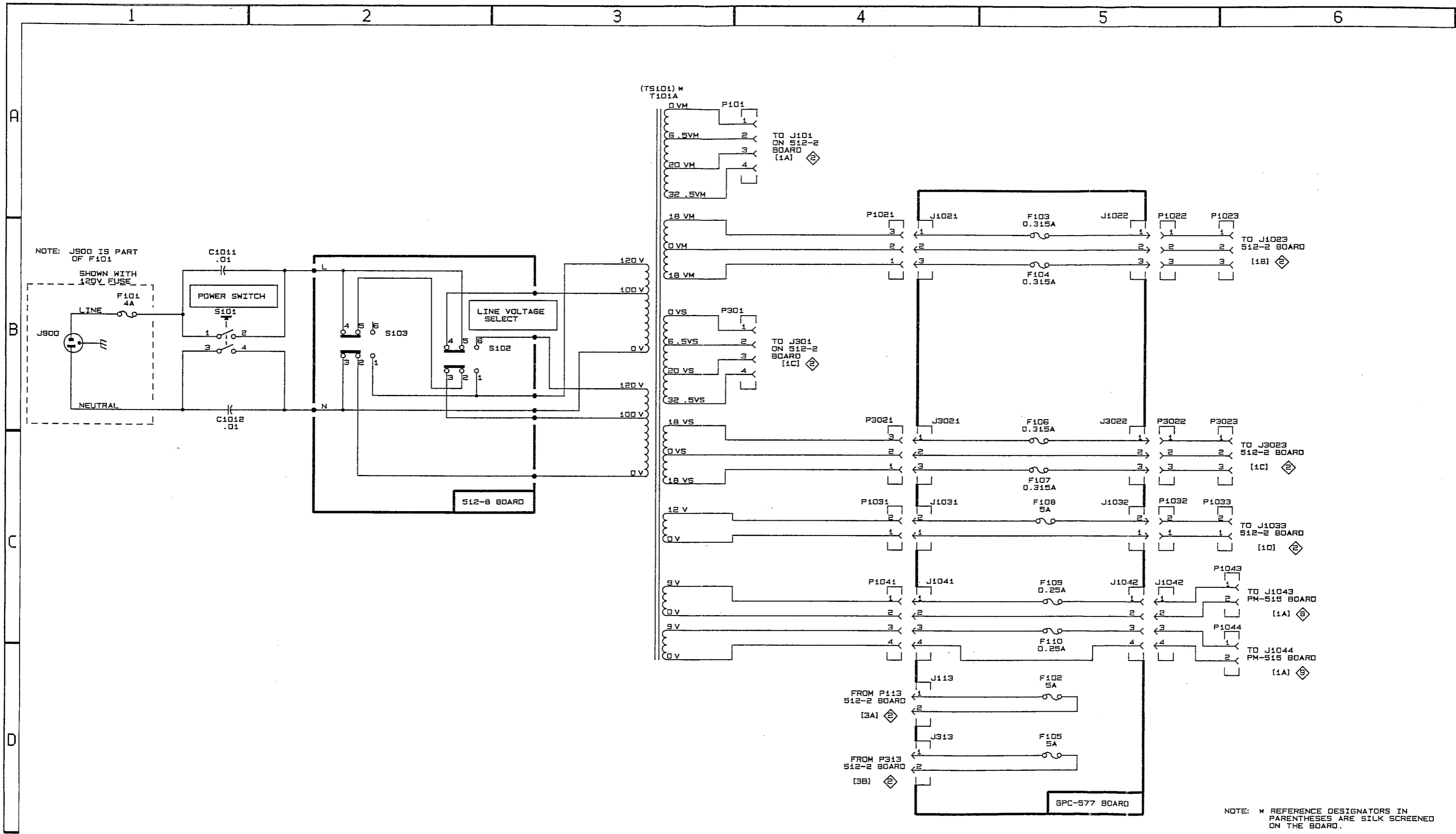
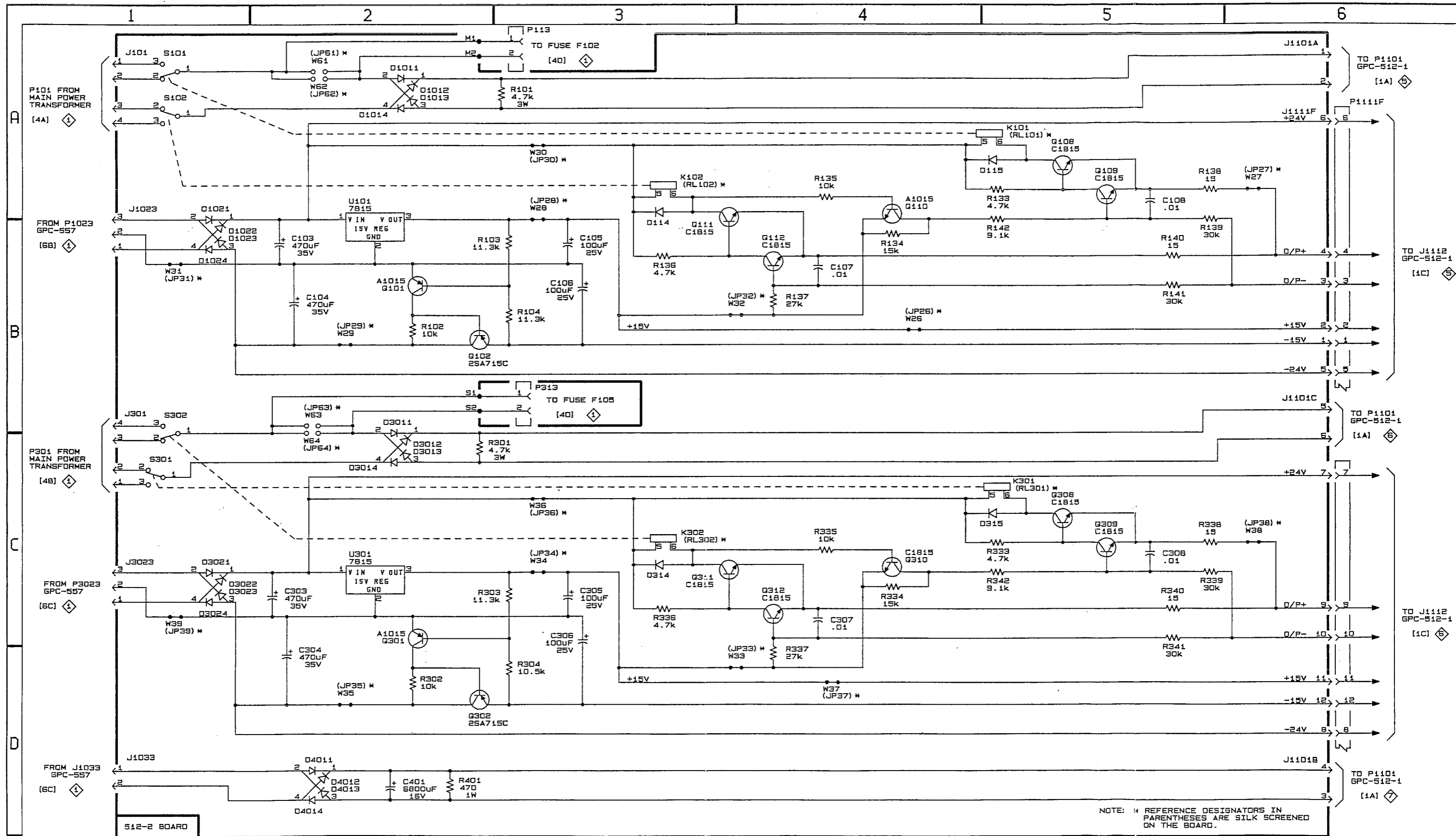
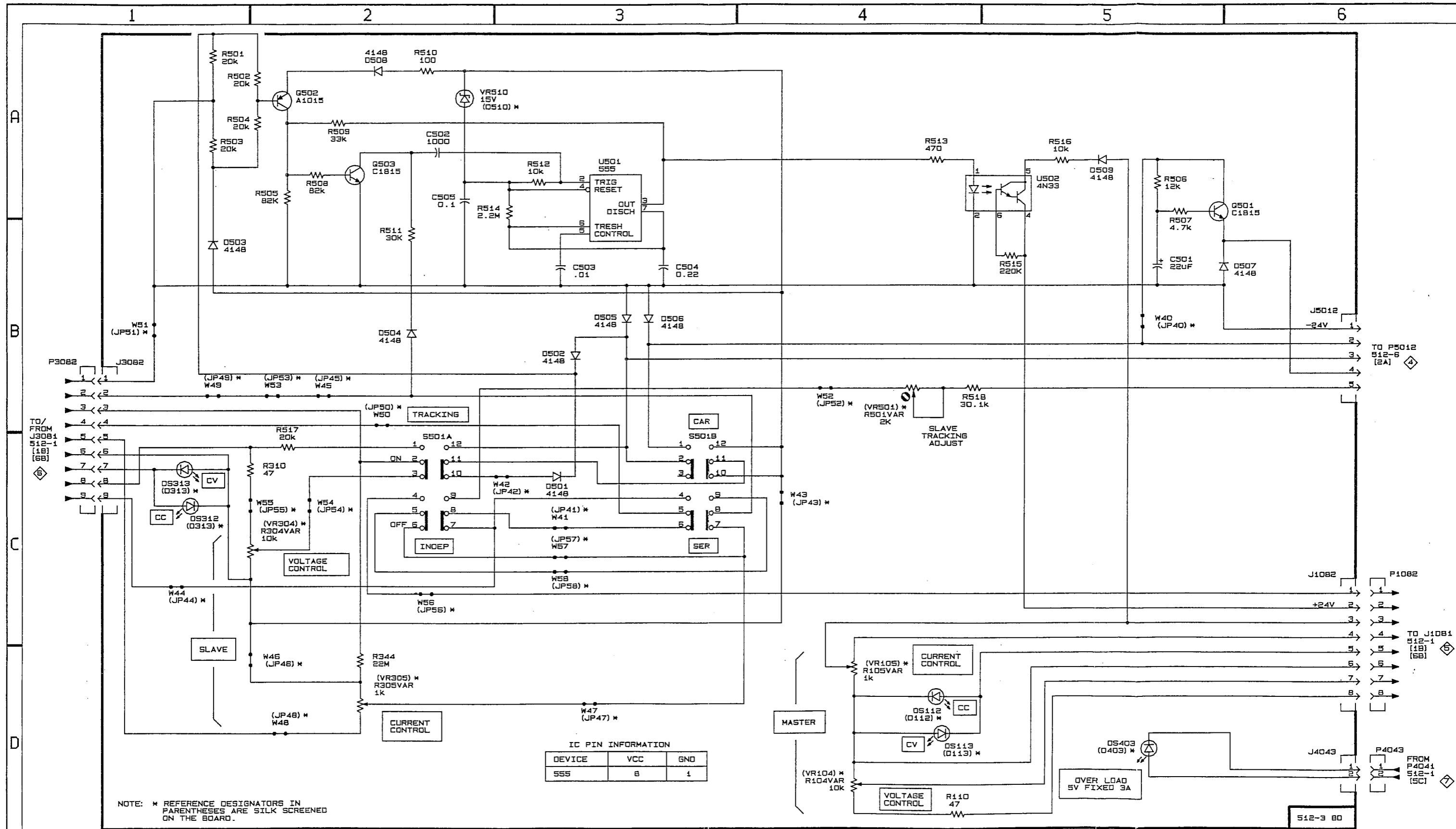


Figure 9-8: AC Selector Circuit Board



NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

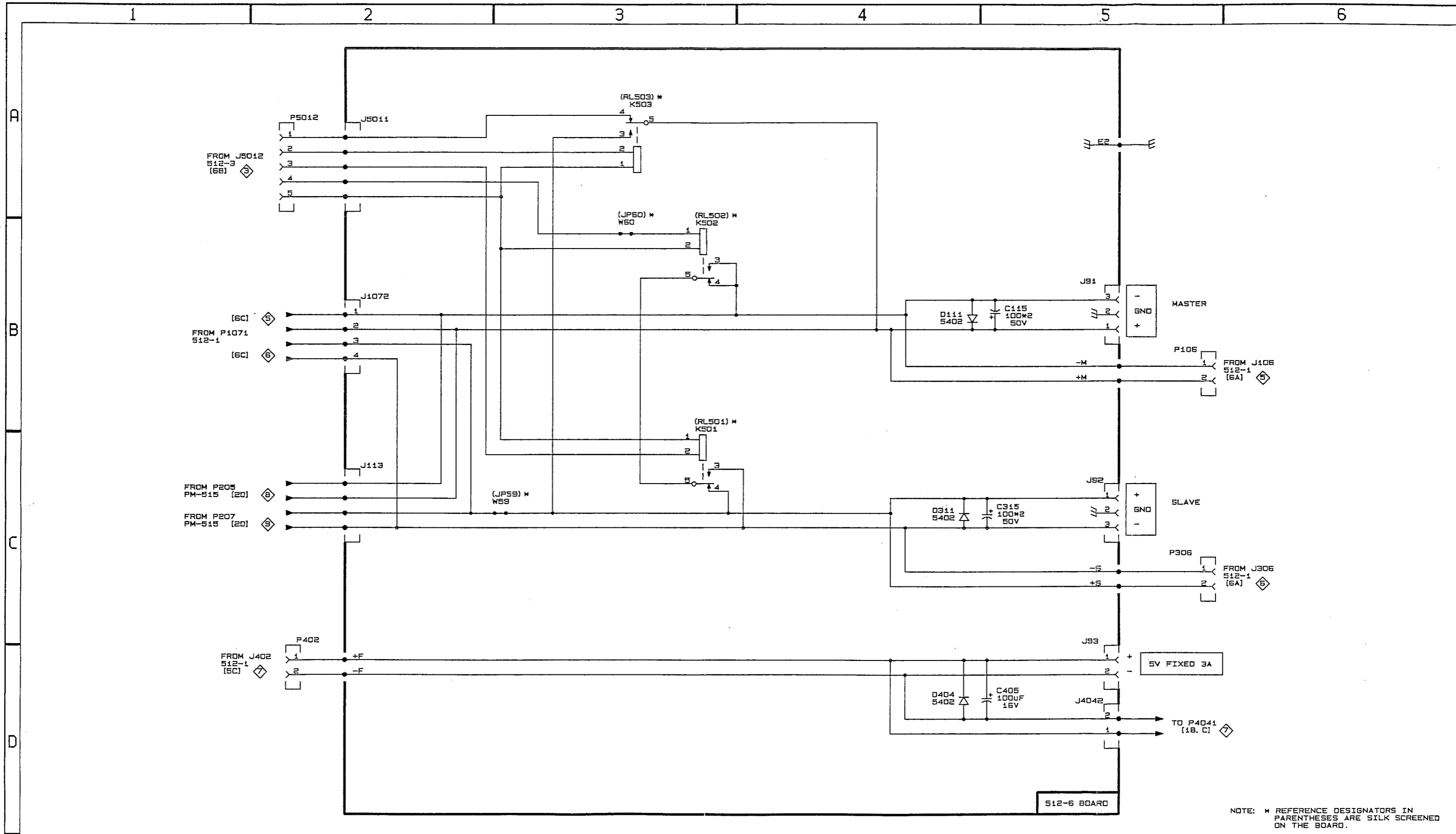




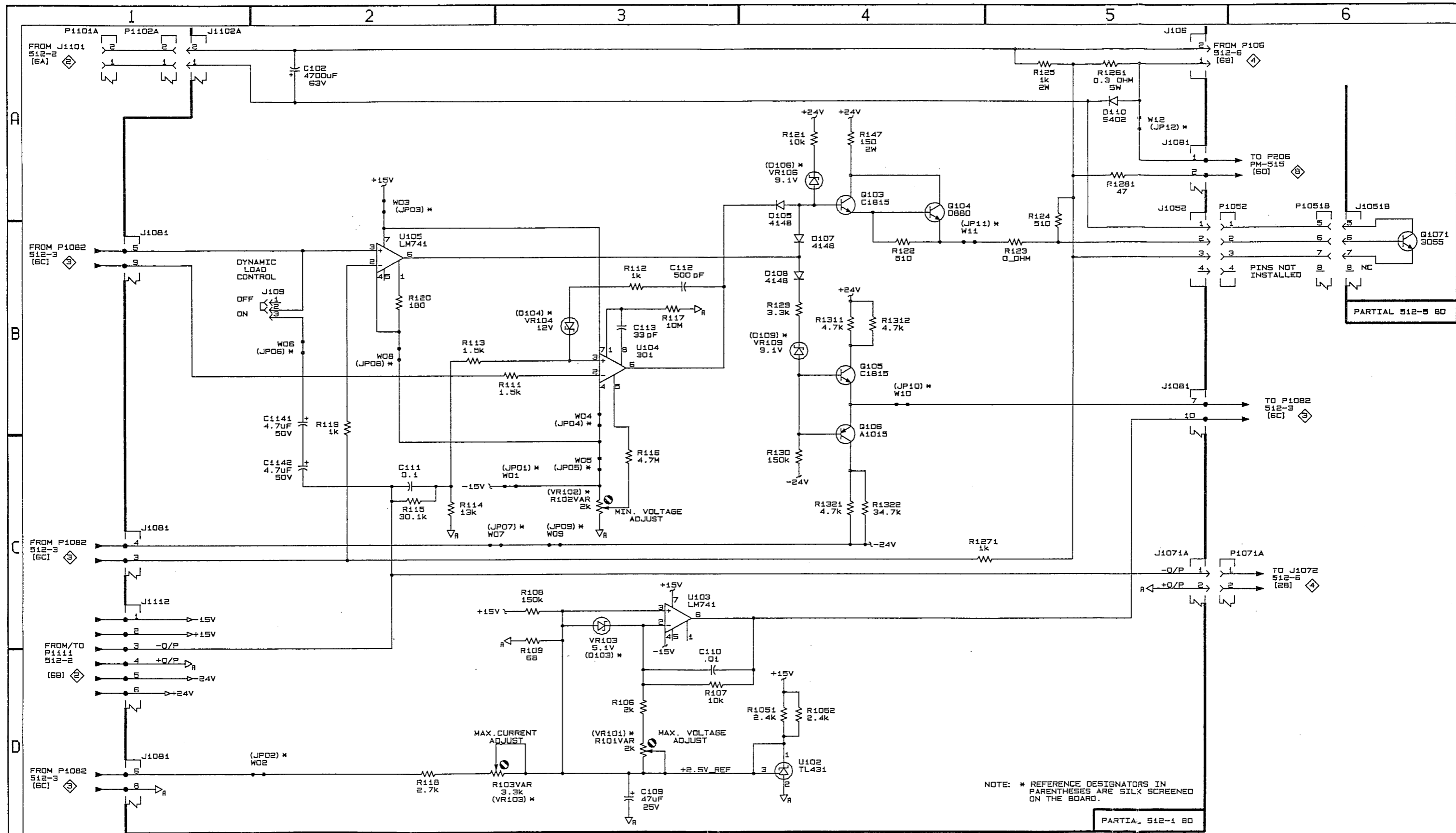
IC PIN INFORMATION

DEVICE	VCC	GND
555	8	1

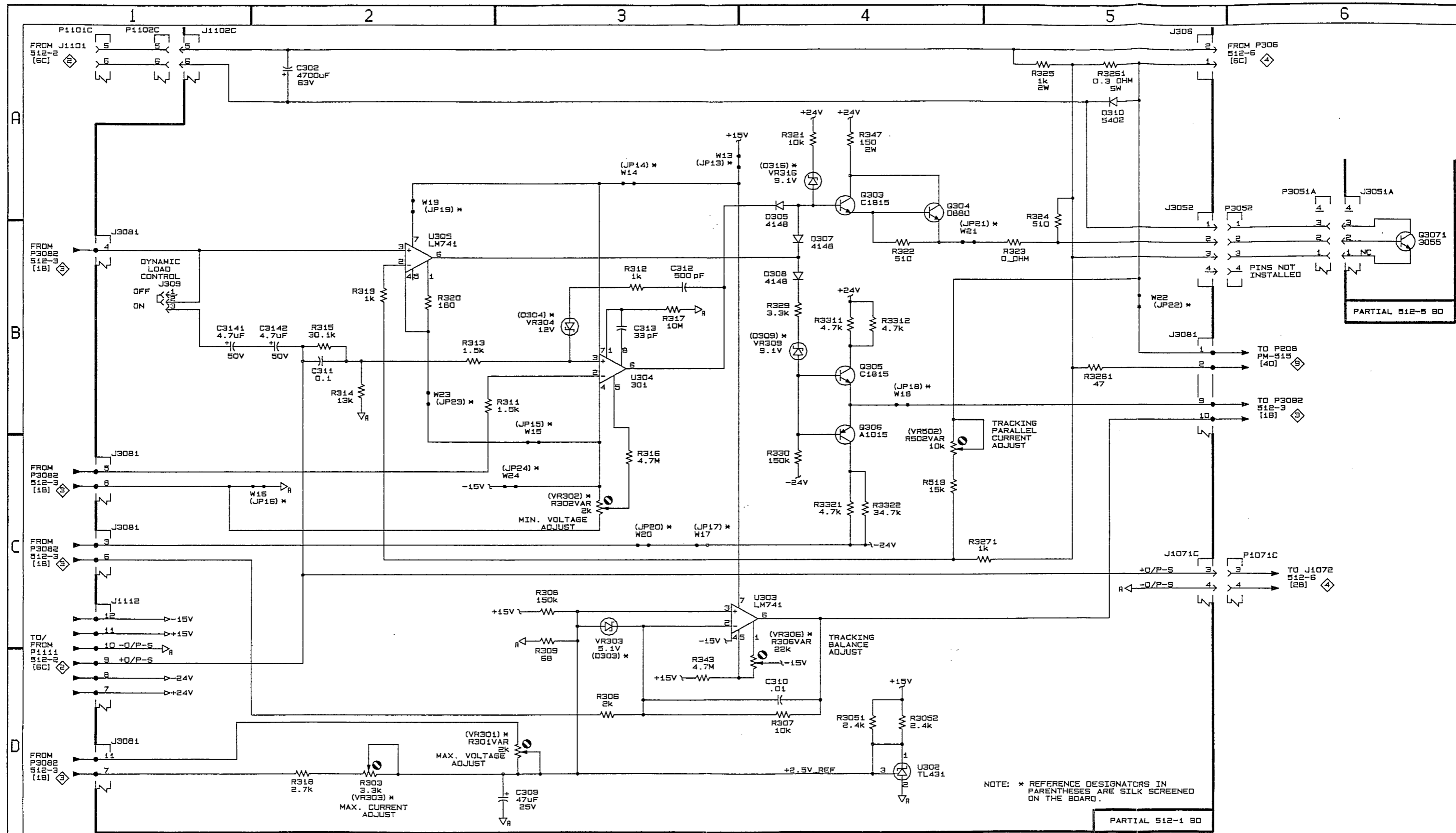
NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

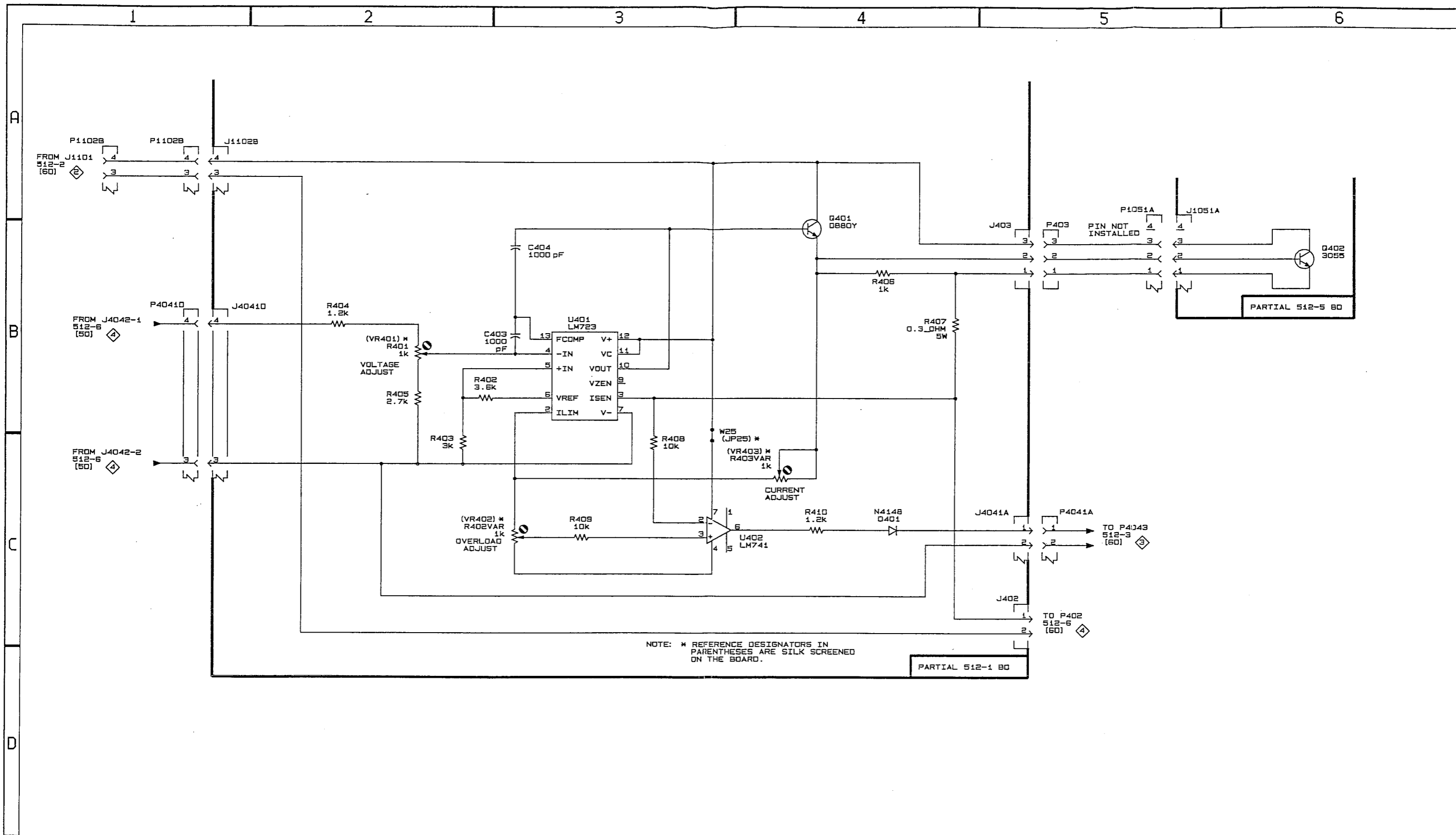






NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

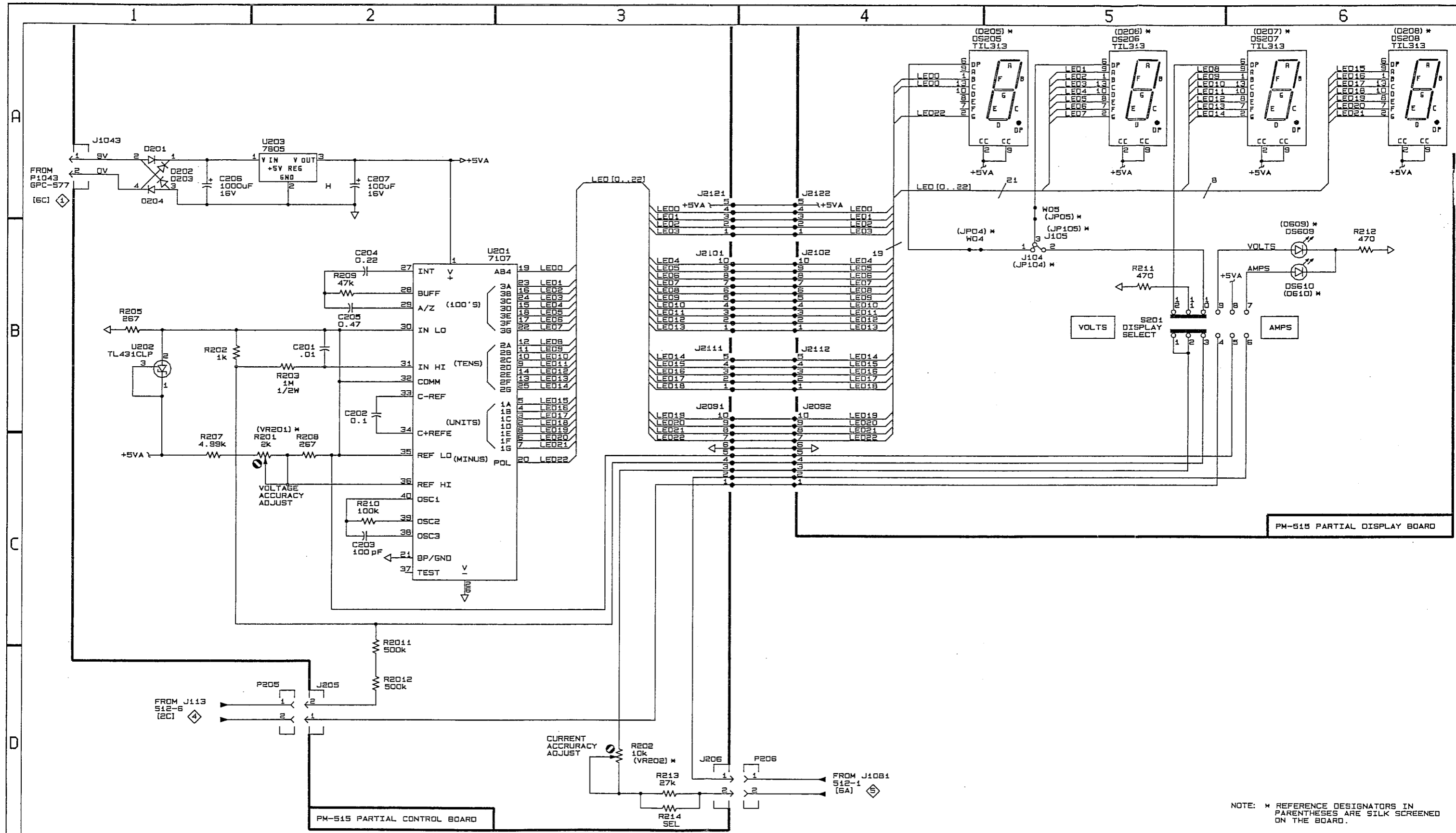




NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

PARTIAL 512-1 BO

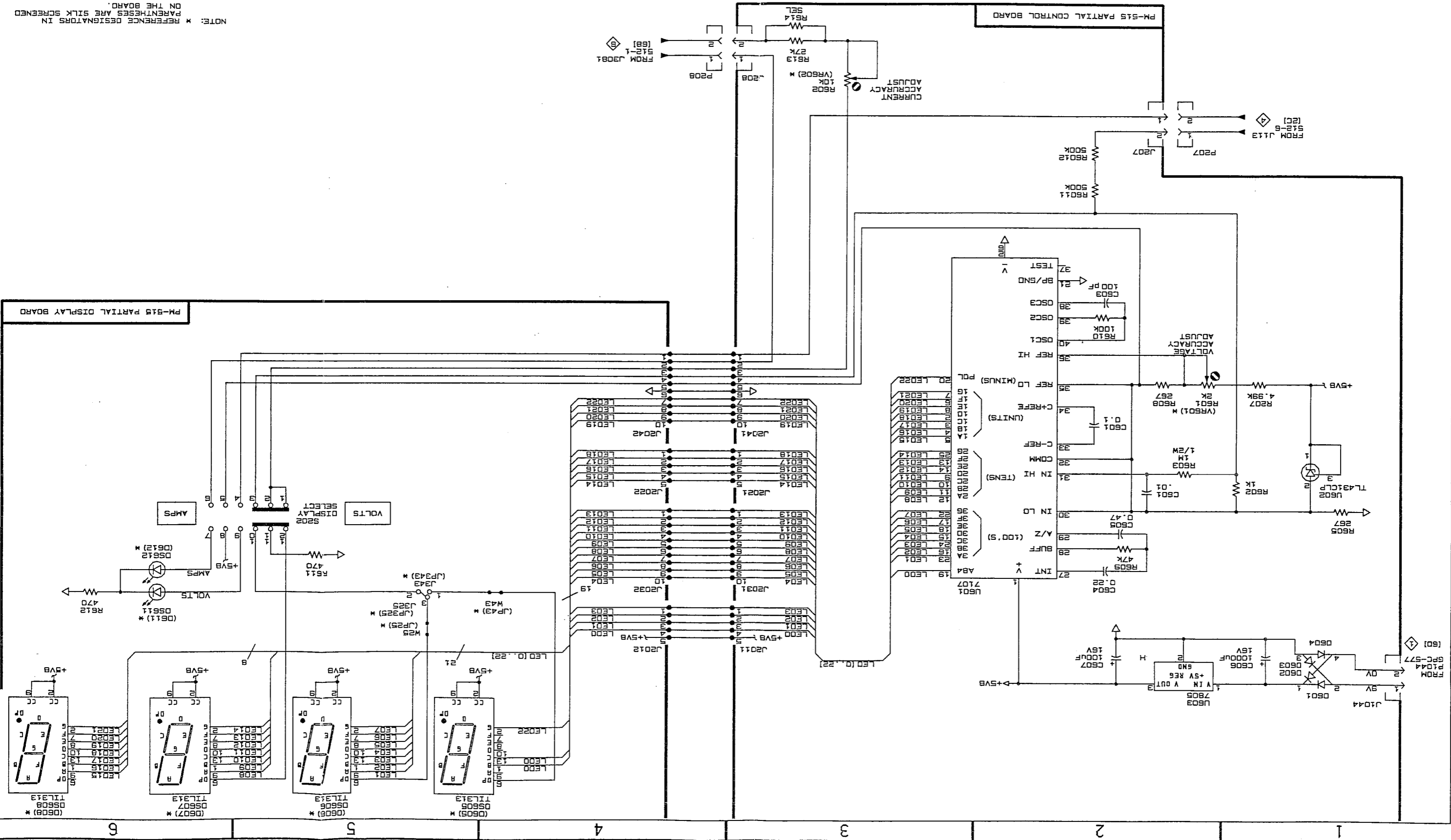
PARTIAL 512-5 BO

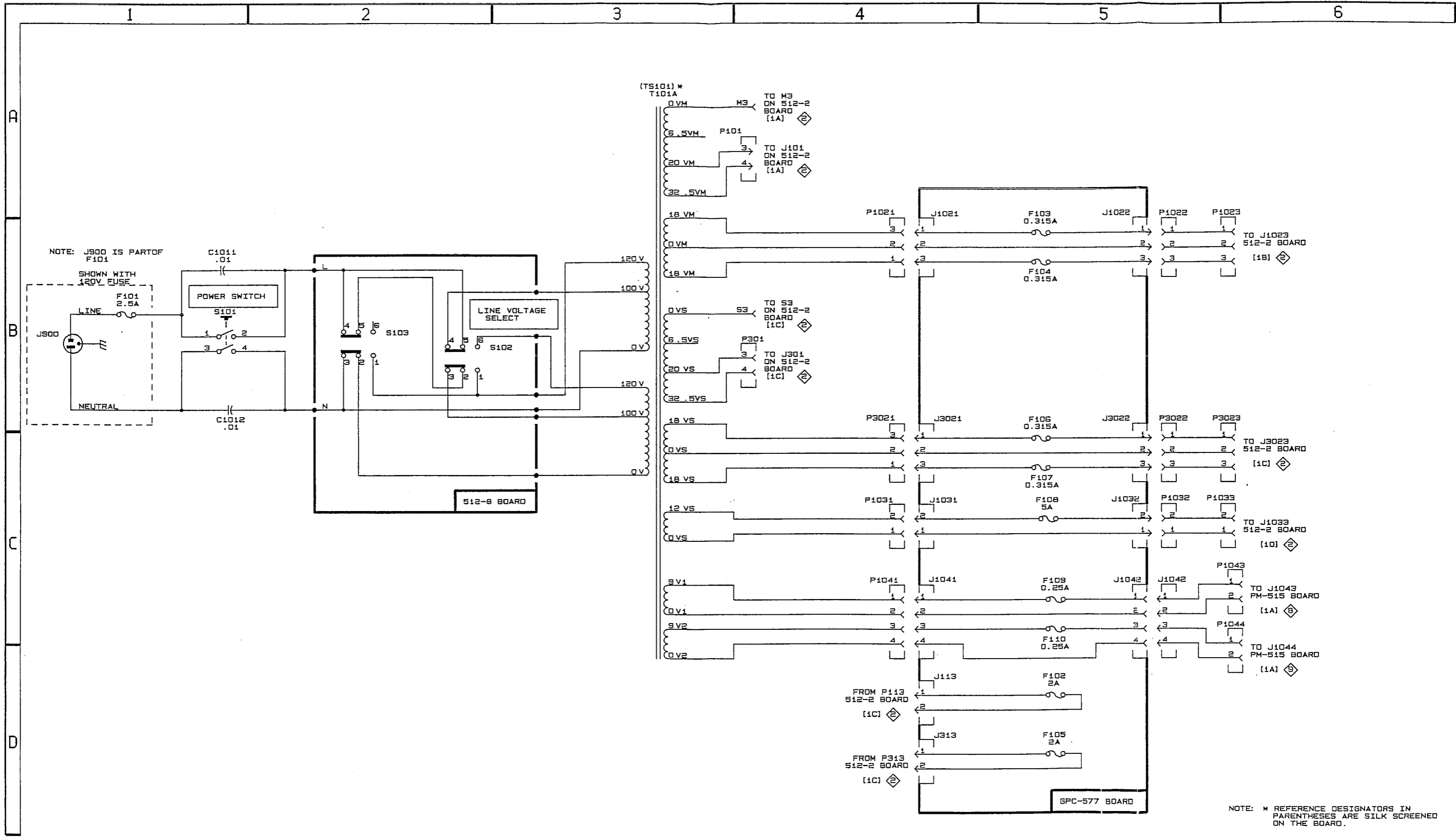


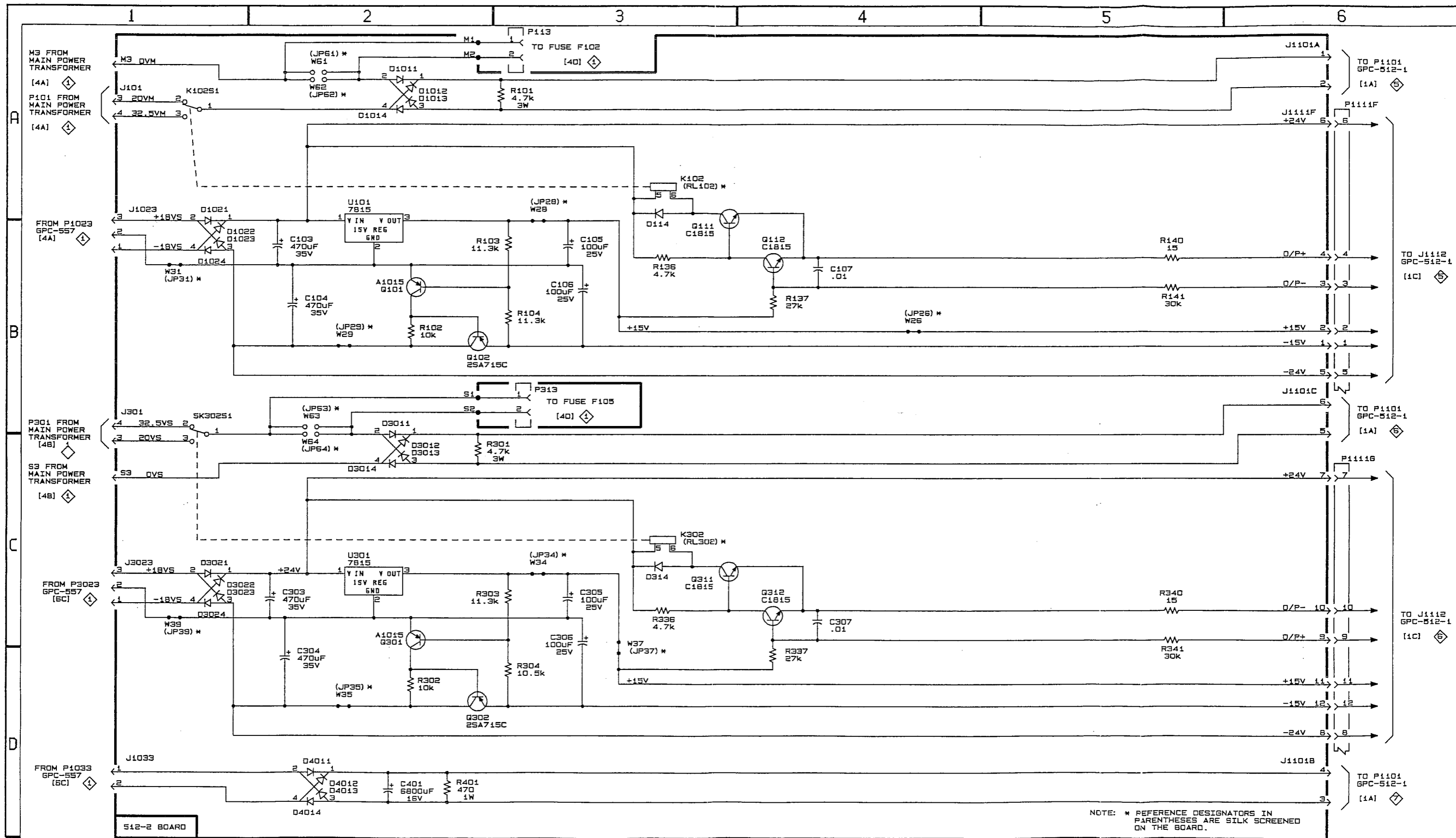
NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

SLAVE DIGITAL METER

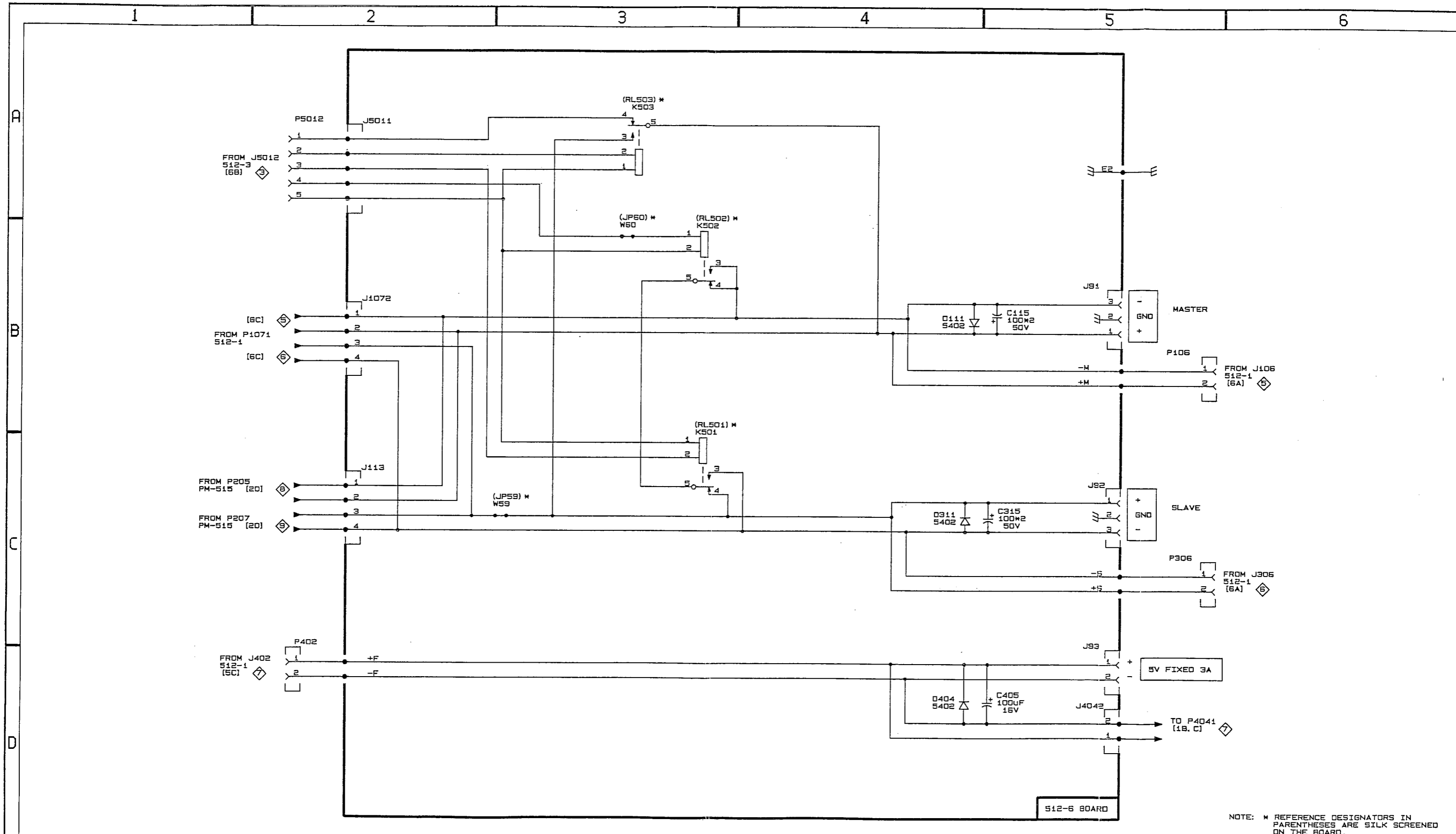
NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.





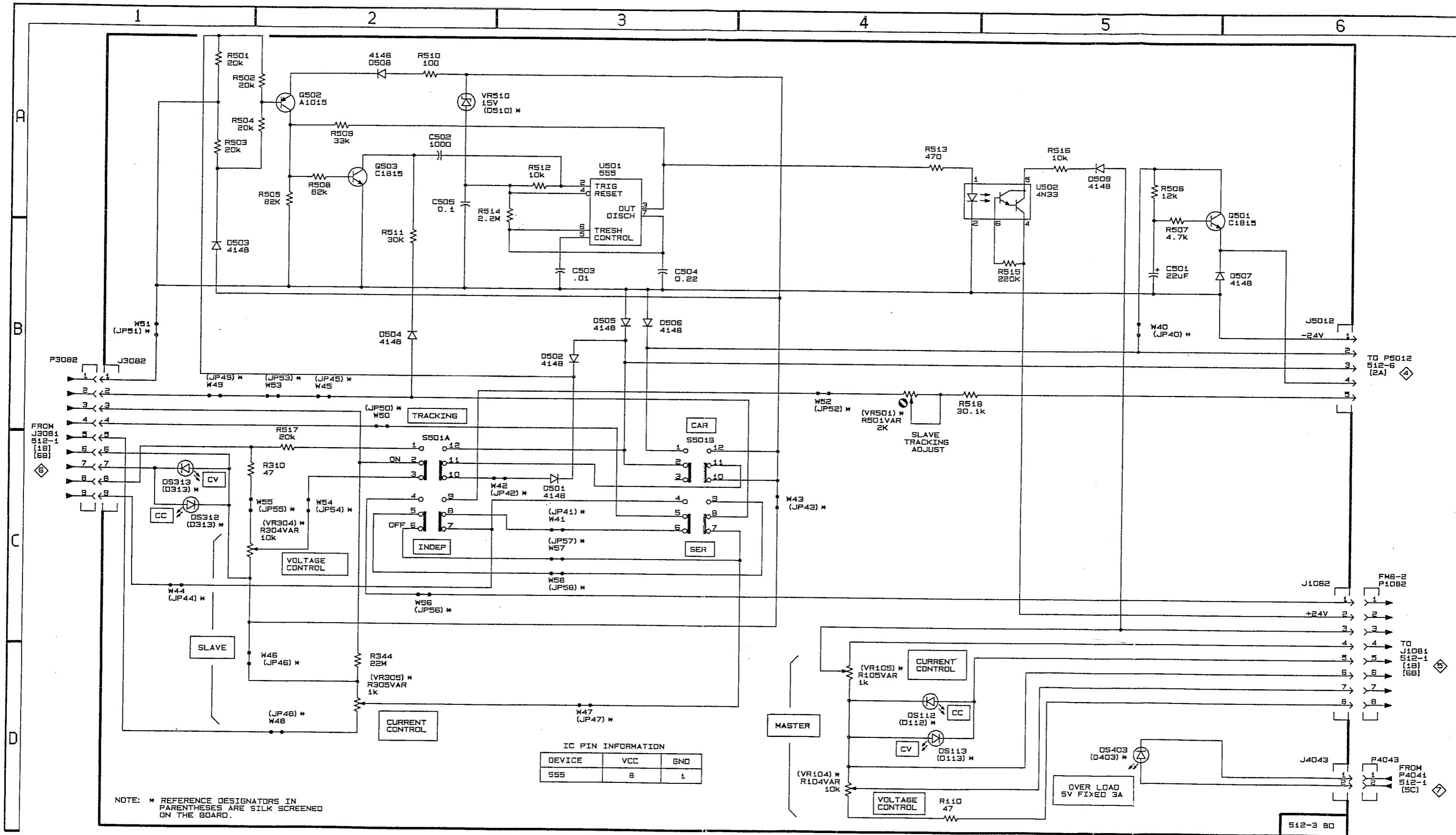


NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.



NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

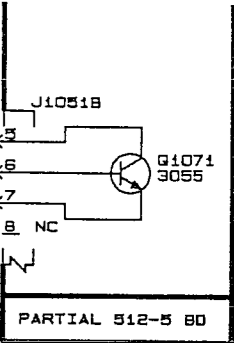
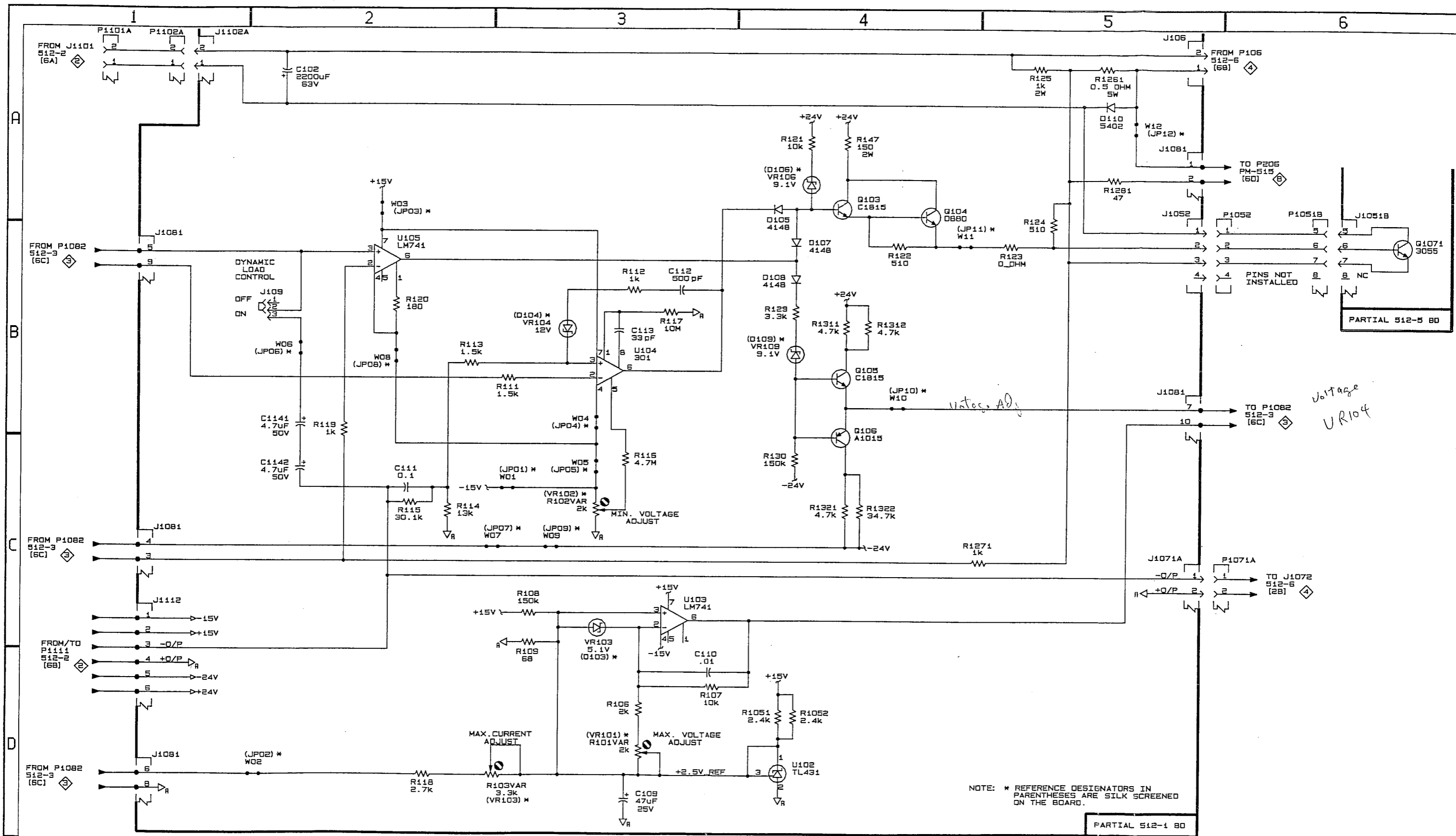




NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

IC PIN INFORMATION

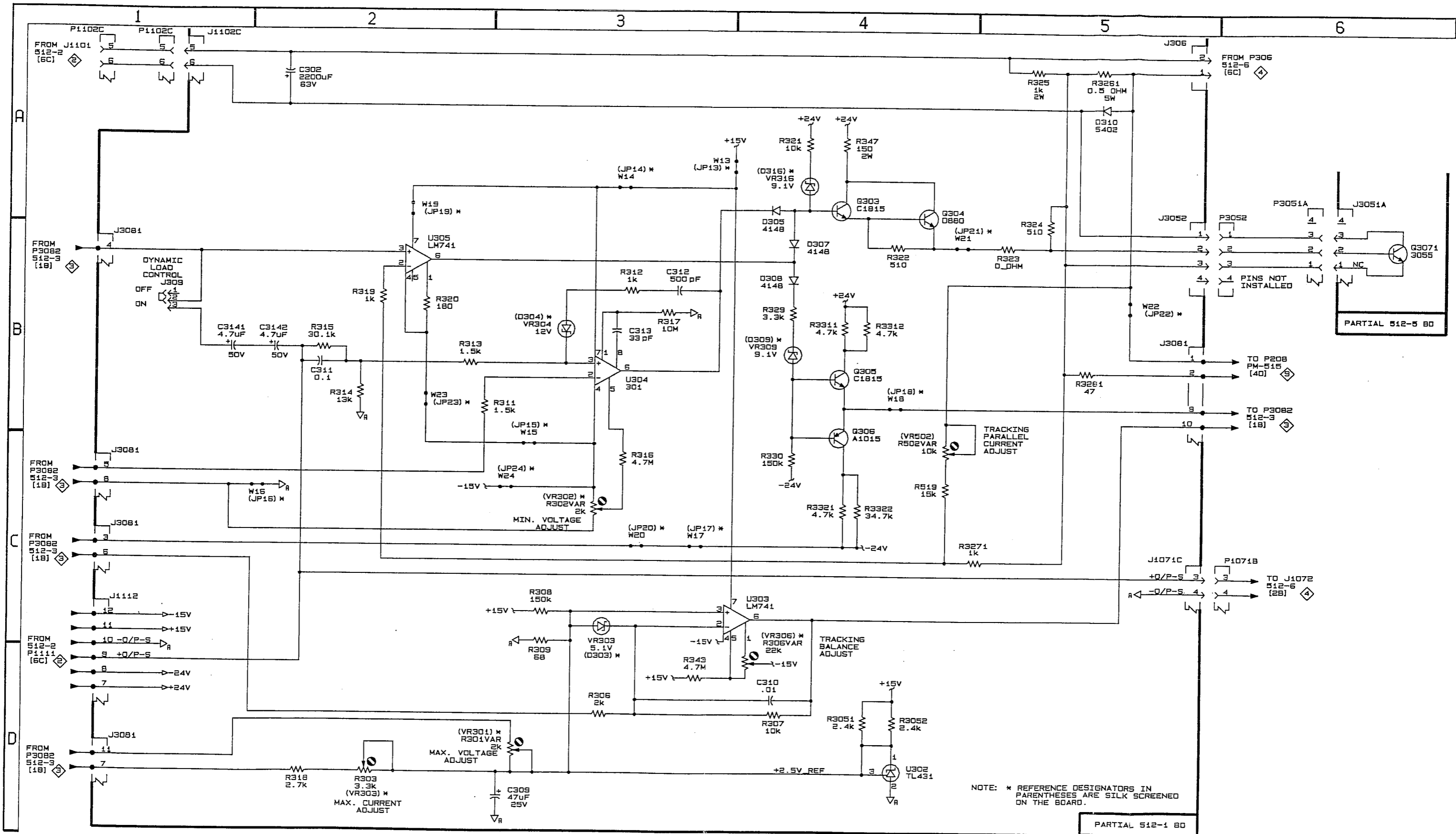
DEVICE	VCC	GND
555	8	1



*Voltage VR104*

NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.

PARTIAL 512-1 80

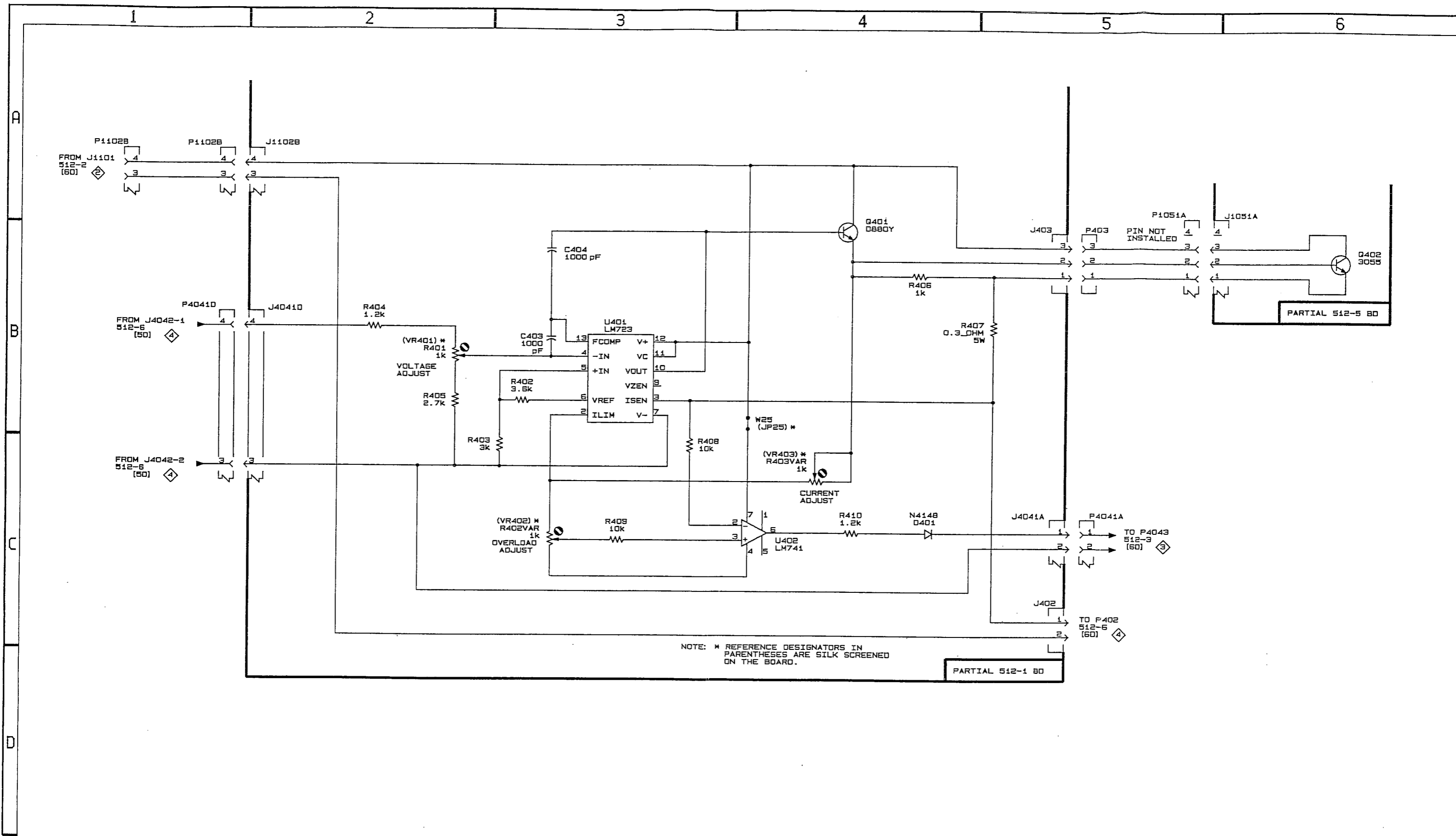


PS283

REV AUG 1991

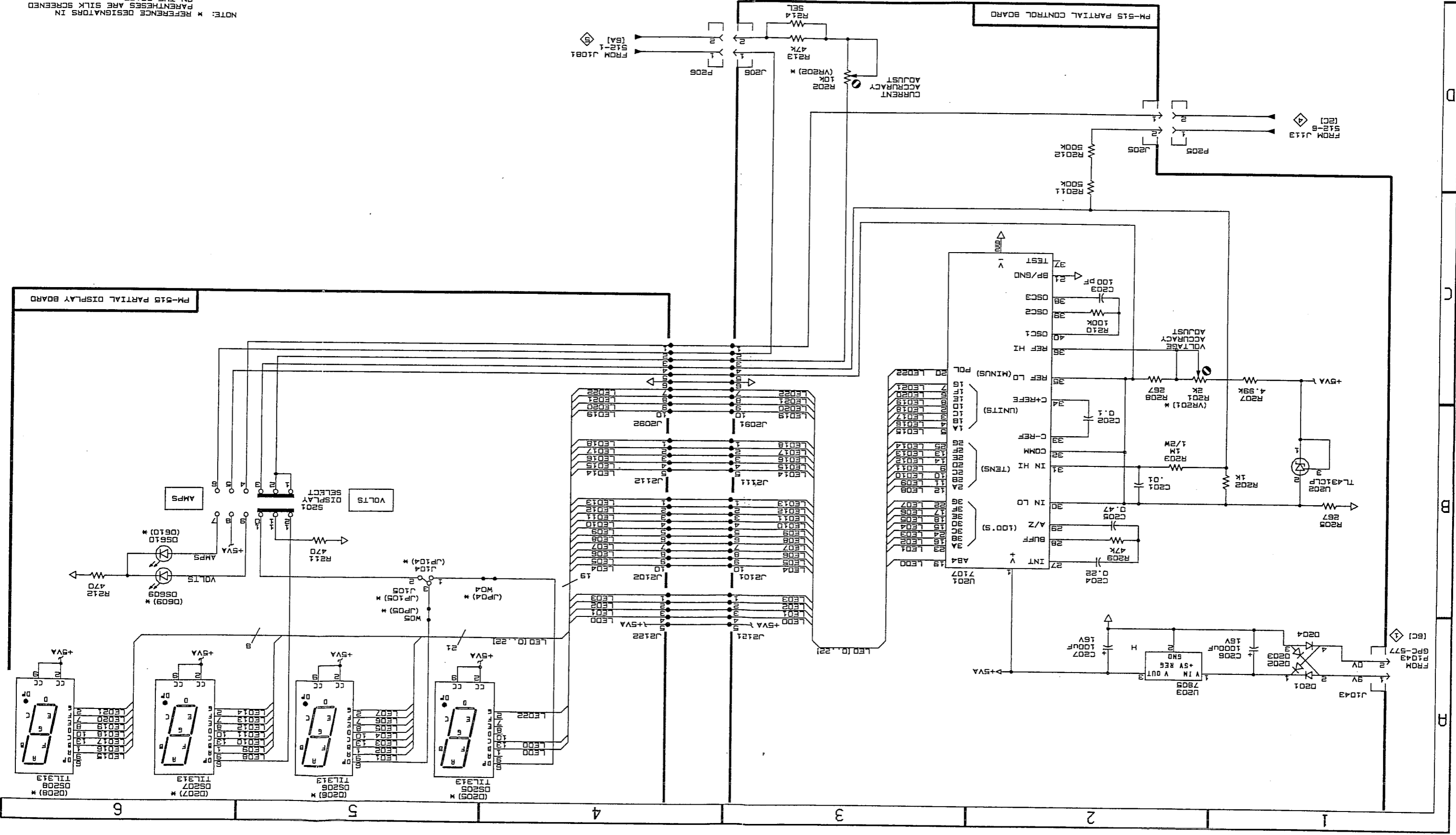
SLAVE VOLTAGE/CURRENT







NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.



D

C

B

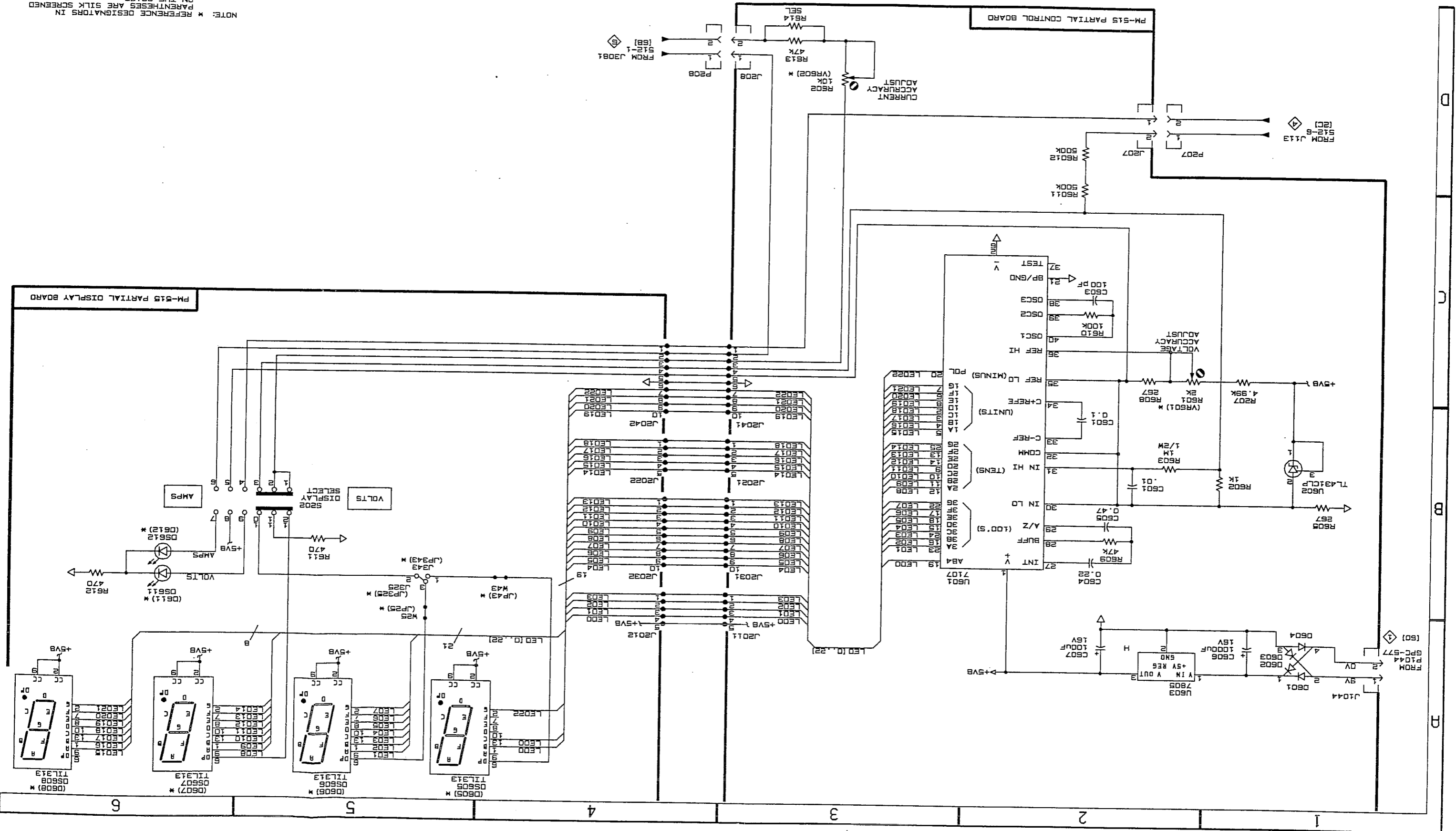
A

FROM P1043 GPC-577

FROM J113 S12-B (2C)

FROM J1081 S12-1 (5A)

NOTE: \* REFERENCE DESIGNATORS IN PARENTHESES ARE SILK SCREENED ON THE BOARD.



A vertical column of letters 'D', 'C', 'B', 'A' on the right side of the diagram, likely indicating board layout or section markers.

6

5

4

3

2

1