

"DATASPEED\*" 40 POWER SUPPLY UNITS  
TESTING AND TROUBLESHOOTING

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*Note:* When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP129920).

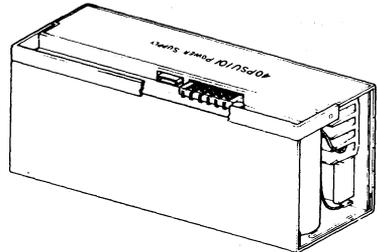


Fig. 1—40PSU101 Power Supply

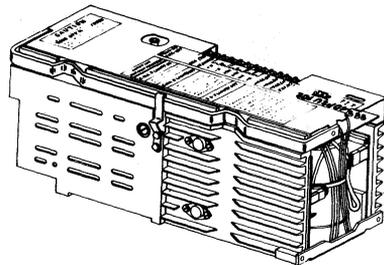


Fig. 2—40PSU102 Power Supply

1. GENERAL

1.01 This section provides testing and troubleshooting information for the major components of the DATASPEED 40PSU101 (Fig. 1) and the DATASPEED 40PSU102 (Fig. 2) power supply units.

1.02 This section was reissued to include the 40PSU102 power supply as well as the 40PSU101 power supply. Wiring diagrams are given in Section 582-214-400.

1.03 Functional testing of the power supplies is accomplished with an oscilloscope or multimeter via an operational set or station (for the 40PSU101) or a 40C400 controller (for the 40PSU102).

1.04 If at any time the power supply fails a particular test, refer to the appropriate Troubleshooting Guide to correct the operational failure.

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- 1.05 Perform each test procedure from start to finish — do not omit individual steps.
- 1.06 When using the Troubleshooting Guide always begin with Analysis Question 1 and proceed in the numerical order indicated.
- 1.07 Perform all corrective steps for each trouble encountered before proceeding to the next question. After the trouble has been corrected, test the unit again.

2. FUNCTIONAL TESTING (40PSU101)

EQUIPMENT PREPARATION

- 2.01 Install the power supply in a working set or station (Fig. 3 through 6).

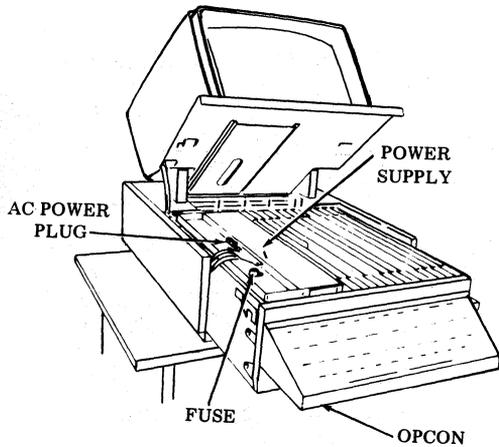


Fig. 3—KD or KDP Power Supply Placement

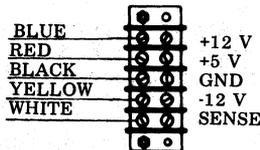


Fig. 4—Terminal Block Wiring

Note: Make sure the 129920 main power fuse is installed.

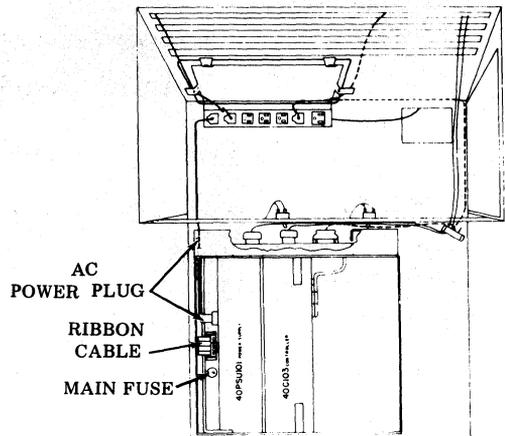


Fig. 5—Receive-Only Power Supply Placement

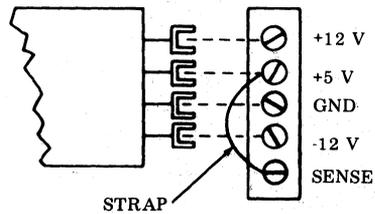


Fig. 6—Terminal Block Wiring

Note: Make sure the 129920 main power fuse is installed and that the strap from the “+5 V” terminal to the “sense” terminal is present on the power supply terminal block.

TESTING PROCEDURE

- 2.02 The following are voltage limits for Functional Testing of Test No. 1 through No. 4.

TERMINAL	VOLTAGE LIMITS
+12 V	+11.64 to +12.36 V DC
+5 V	+4.9 to 5.1 V DC
GND	
-12 V	-11.64 to -12.36 V DC
SENSE	+4.9 to +5.1 V DC

(a) For dc voltage measurements (Chart 1), the orientation of the 0.22 microfarad electrolytic capacitor (Fig. 8 and 9) dc at 35 V dc must be observed.

(b) For Tests No. 2 through No. 4, (Chart 1) voltage measurements are made with a multimeter set to the appropriate range. Attach common lead of meter to ground terminal of terminal block.

CHART 1

TEST NO.	PROCEDURE	RESPONSE
1.	Turn on the ac power to the power supply.	LED indicators for the +5 V, +12 V, and -12 V dc voltages should be lit (Fig. 7).
2.	Measure the +12 V dc voltage on the +12 V terminal of the terminal block.	Correct voltage must be present.
3.	Measure the +5 V dc voltage on the +5 V terminal of the terminal block.	Correct voltage must be present.
4.	Measure the -12 V dc voltage on the -12 V terminal of the terminal block.	Correct voltage must be present.

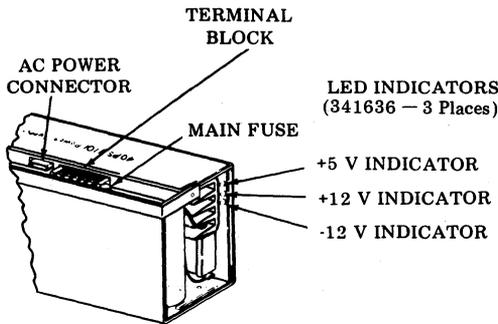


Fig. 7—Power Supply Voltage Indicators

Note: Be sure the capacitor is orientated for proper polarity.

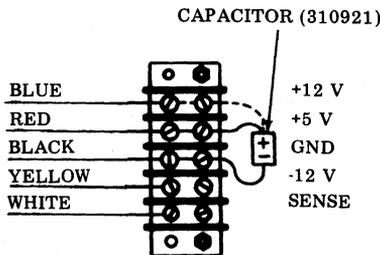


Fig. 8—+12 Volt and +5 Volt Measurements

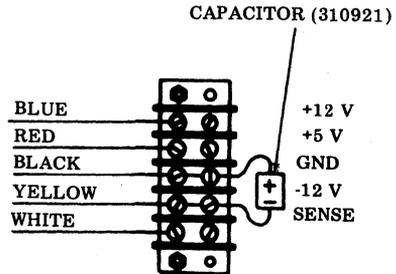


Fig. 9—-12 Volt Measurement

(c) The following are the requirements for tests to be performed next (Chart 1).

TERMINAL	MAXIMUM RIPPLE AS MEASURED ON AN OSCILLOSCOPE
+12 V	0.3 V PEAK-TO-PEAK
+5 V	0.3 V PEAK-TO-PEAK
GND	
-12 V SENSE	0.3 V PEAK-TO-PEAK

(d) Using an oscilloscope measure the ripple (Chart 1) on each of the dc voltages. Ground the oscilloscope to ground terminal of the terminal block.

CHART 1 (Cont)

TEST NO.	PROCEDURE	RESPONSE
5.	Measure ripple present on +12 V terminal of terminal block.	Ripple less than 0.3 V peak-to-peak.
6.	Measure ripple present on +5 V terminal of terminal block.	Ripple less than 0.3 V peak-to-peak.
7.	Measure ripple present on -12 V terminal of terminal block.	Ripple less than 0.3 V peak-to-peak.

### 3. TROUBLESHOOTING (40PSU101)

3.01 This section deals with methods used for correction of operational problems encountered in testing the 40PSU101 power supply.

(a) To use the Troubleshooting Guide always start with Question 1 and follow indicated procedure to the directive which specifies proceeding to a new step or replacement of a component. Where more than one component is specified for replacement, they should be replaced in the order specified. The original component shall be replaced if the trouble is not corrected before making the next indicated replacement.

(b) Once a component has been replaced, the unit shall again be tested to insure its proper operation.

#### EQUIPMENT PREPARATION AND LAYOUTS

3.02 Arrange the power supply, with the cover removed (Fig. 10), next to set or station as shown. Leave power turned off and circuit card fully mounted for now.

(a) Connect a ground strap from the power supply base to the power supply hold-down clamp of the cabinet. The ground strap should be at least 14 AWG insulated stranded copper wire having an alligator clip at each end.

(b) Attach the ac power cable and ribbon cable from the set or station to the power supply in question.

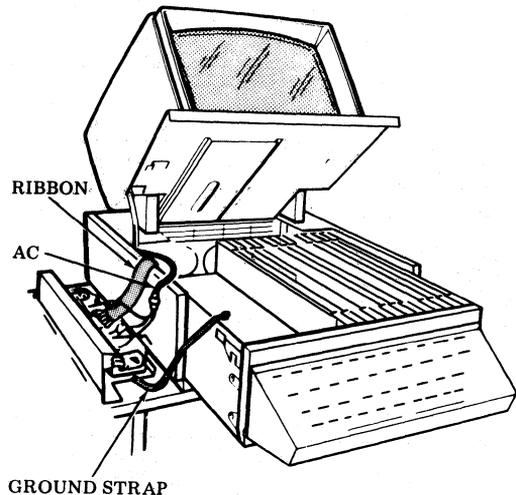


Fig. 10—Equipment Layout

(c) Make sure the exposed circuit lands of the 410600 circuit card do not short to anything.

(d) For component identification and removal instructions, refer to Section 582-214-700, Disassembly/Reassembly and Parts.

(e) Functional schematic diagrams are given in Section 582-214-400, Wiring.

**CHART 2**  
**TROUBLESHOOTING GUIDE**

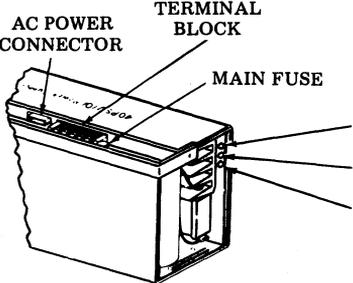
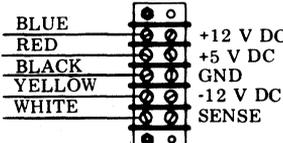
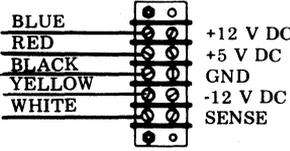
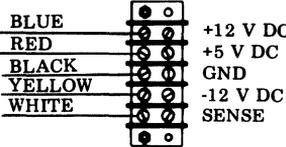
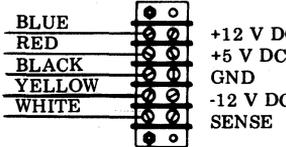
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
<p>1. With the set plugged in and power ON, are all LED indicators ON?</p>  <p>AC POWER CONNECTOR TERMINAL BLOCK MAIN FUSE</p> <p>LED INDICATORS (341636 - 3 Places)</p> <p>+5 V INDICATOR +12 V INDICATOR -12 V INDICATOR</p>	Go to 2.	Go to 4.
<p>2. Are all voltages correct at the output terminal block?</p>  <p>BLUE +12 V DC RED +5 V DC BLACK GND YELLOW -12 V DC WHITE SENSE</p> <p>Output Terminal Block</p>	Put power supply in service.	Check for +24 V dc at + V in terminal and -24 V dc at -V in terminal of 410600 circuit card. Measure both voltages with respect to circuit ground at terminal 3 of the output terminal block.
<p>3. Are the <math>\pm 24</math> V dc inputs to 410600 circuit card correct?</p>	Check for +5 V dc at output terminal block and adjust R45 potentiometer on 410600 circuit card, if necessary.  If +5 V dc cannot be adjusted replace 410600 circuit card.	Check and/or replace rectifier bridge (401002).  Check and/or replace capacitors C101 (401004) and/or C102 (401009).
<p>4. Are the ventilation fans in the electronics module moving air?</p>	Go to 5.	Check ac power input, power switch(es), cabinet wiring and connectors, etc.
<p>5. Is main fuse on the power supply blown?</p>	Replace fuse and go to 6. (129920 Fuse, 5 Amp SLO-BLO).	Go to 7.

CHART 2 (Cont)  
TROUBLESHOOTING GUIDE

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
<p>6. Did main fuse blow again?</p>	<p>Disconnect cable(s) from output terminal block (to controller and, if present, to display logic). Replace fuse and check output voltages.</p> <p>If no output voltages and fuse blows again, check for short circuit condition in power supply.</p> <p>If output voltages are present (power supply OK), check for short elsewhere in set.</p>	<p>Go to 7.</p>
<p>7. Is the +5 Volt LED off?</p>	<p>Go to 8.</p>	<p>Go to 9.</p>
<p>8. Is +5 V dc present at the output?</p>  <p>Output Terminal Block</p>	<p>Replace 410600 circuit card.</p>	<p>Check continuity of fuses F1 and F2 on 410600 circuit card.</p> <p>Check for +24 V dc at +V in terminal and -24 V dc at -V in terminal of 410600 circuit card. Measure with respect to circuit ground (terminal 3 of the output terminal block).</p> <p>Check for broken wire on 410600 circuit card.</p> <p>Go to 11.</p>
<p>9. Is the +12 Volt LED off?</p>	<p>Go to 10.</p>	<p>Go to 12.</p>

## CHART 2 (Cont)

## TROUBLESHOOTING GUIDE

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
<p>10. Is +12 V dc present at the output?</p>  <p>Output Terminal Block</p>	<p>Replace 410600 circuit card.</p>	<p>Check continuity of fuses F1 and F2 on 410600 circuit card.</p> <p>Check for +24 V dc at +V in terminal and -24 V dc at -V in terminal to 410600 circuit card.</p> <p>Check for broken wire on 410600 circuit card.</p> <p>Go to 11.</p>
<p>11. Are fuses F1 and F2 good, and are <math>\pm 24</math> V dc inputs presented to 410600 circuit card?</p>	<p>Replace 410600 circuit card.</p>	<p>Check and/or replace rectifier bridge (401002).</p> <p>Check and/or replace transformer (401007).</p>
<p>12. Is the -12 Volt LED off?</p>	<p>Go to 13.</p>	<p>Go to 1.</p>
<p>13. Is -12 V dc present at the output?</p>  <p>Output Terminal Block</p>	<p>Replace 410600 circuit card.</p>	<p>Check continuity of fuses F1 and F2 on 410600 circuit card.</p> <p>Check for +24 V dc at +V in terminal and -24 V dc at -V in terminal of 410600 circuit card.</p> <p>Check for broken wires on 410600 circuit card.</p> <p>Go to 14.</p>
<p>14. Are fuses F1 and F2 good, and are <math>\pm 24</math> V dc inputs presented to 410600 circuit card?</p>	<p>Replace 410600 circuit card.</p>	<p>Check and/or replace rectifier bridge (401002).</p>

4. FUNCTIONAL TESTING (40PSU102)

EQUIPMENT PREPARATION

4.01 Install the power supply in a working 40C400 controller (Fig. 11 and 12). (Refer to Section 582-200-700 for removal and installation of 40PSU102.)

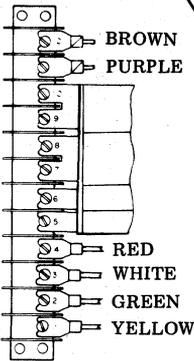


Fig. 11—Terminal Block Wiring

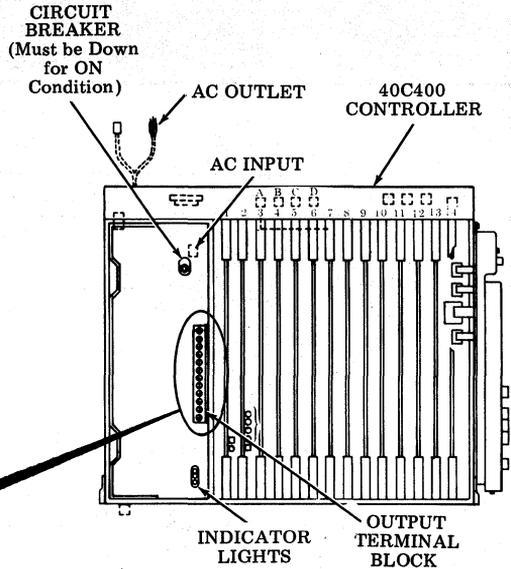


Fig. 12—Power Supply Installed in 40C400 Controller

TESTING PROCEDURE

4.02 The following are voltage limits for functional testing of Tests No. 1 through No. 4 (Chart 3).

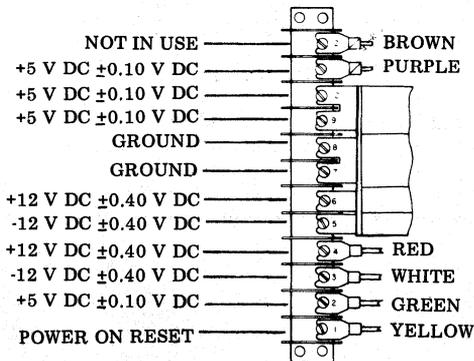


Fig. 13—Voltage Limits

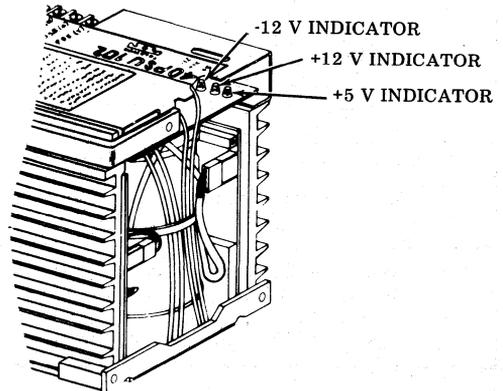


Fig. 14—40PSU102 Voltage Indicators

4.03 For Tests No. 2 through No. 4, (Chart 3) voltage measurements are made with a multimeter set to the appropriate range. Attach common lead of meter to ground terminal of terminal block.

CHART 3

TEST NO.	PROCEDURE	RESPONSE
1.	Turn on the ac power to the power supply.	LED indicators for the +5 V, +12 V, and -12 V dc voltages should be lit (Fig. 13 and 14).
2.	Measure the +12 V dc voltage on the +12 V and +12 V SL-BL terminals of the terminal block.	Correct voltage must be present (+11.58 V dc to +12.42 V dc).
3.	Measure the +5 V dc voltage on the +5 V and +5 V SL-BL terminals of the terminal block.	Correct voltage must be present (+4.9 V dc to +5.1 V dc).
4.	Measure the -12 V dc voltage on the -12 V and -12 V SL-BL terminals of the terminal block.	Correct voltage must be present (-11.58 V dc to -12.42 V dc).

- 4.04 Ground an oscilloscope to the ground terminal of the terminal block and use to measure the ripple on the dc voltages as follows:

TERMINAL	MAXIMUM RIPPLE AS MEASURED ON AN OSCILLOSCOPE
+12 V	0.24 V PEAK-TO-PEAK
+5 V	0.25 V PEAK-TO-PEAK
-12 V	0.24 V PEAK-TO-PEAK

*Note:* Use a RX1 scope lead and externally trigger on terminal 1 of output terminal block.

5.	Measure ripple present on +12 V terminal of terminal block.	Ripple less than 0.24 V peak-to-peak.
6.	Measure ripple present on +5 V terminal of terminal block.	Ripple less than 0.25 V peak-to-peak.
7.	Measure ripple present on -12 V terminal of terminal block.	Ripple less than 0.24 V peak-to-peak.
8.	With the scope lead on terminal 1 of the terminal block, turn power supply off, then on. (Refer to Note.)	Observe a negative pulse approximately 50 ms long. 

## 5. TROUBLESHOOTING (40PSU102)

5.01 This section deals with methods used for correction of operational problems encountered in testing the 40PSU102 power supply.

(a) To use the Troubleshooting Guide always start with Analysis Question 1 and follow indicated procedure to the directive which specifies proceeding to a new step or replacement of a component. Where more than one component is specified for replacement, they should be replaced in the order specified. The original component shall be replaced if the trouble is not corrected before making the next indicated replacement.

(b) Once a component has been replaced, the unit shall again be tested to insure its proper operation.

## EQUIPMENT PREPARATION AND LAYOUTS

5.02 Arrange the power supply, with the cover removed (Fig. 15), as shown. Leave power turned off. See Section 582-214-700 for removal of cover and location and removal of mentioned components.

- (a) Unfold both sides of power supply as shown in Fig. 15.
- (b) Attach an ac power cable to the power supply in question.
- (c) Connect a lead between terminals 10 and 11 of output terminal block.
- (d) Tighten all screws on output terminal block.
- (e) Refer to functional schematic in Section 582-214-400, Wiring for additional aid in troubleshooting.

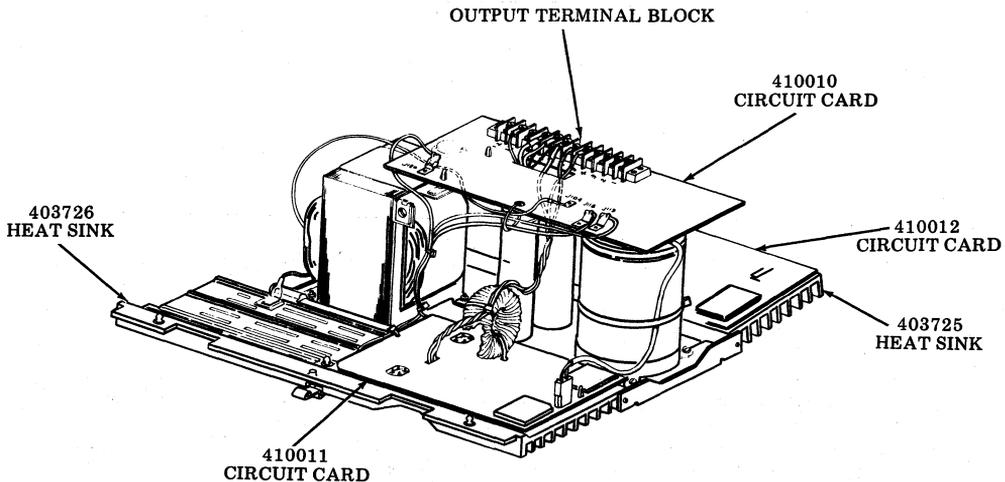


Fig. 15—Layout of 40PSU102 Power Supply for Testing

CHART 4  
TROUBLESHOOTING GUIDE

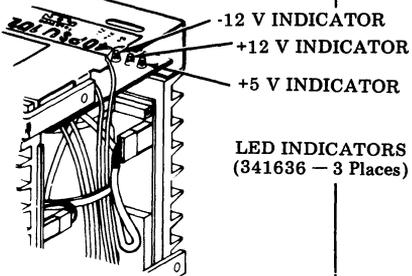
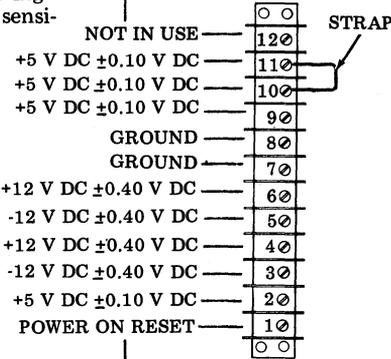
ANALYSIS QUESTION	“YES” RESPONSE DIRECTIVE	“NO” RESPONSE DIRECTIVE								
<p>1. With the set plugged in and power ON, are all LED indicators ON?</p> 	Go to 2.	Go to 5.								
<p>2. Are all voltages correct at the output terminal block? Check voltage using voltmeter having 20,000 ohms/volt sensitivity.</p>	<p>Go to 3.</p> 	Go to 6.								
<p>3. Are all ripple requirements met?</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">TERMINAL</th> <th style="padding: 5px;">MAXIMUM RIPPLE AS MEASURED ON AN OSCILLOSCOPE</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">+12 V</td> <td style="padding: 5px;">0.24 V PEAK-TO-PEAK</td> </tr> <tr> <td style="padding: 5px;">+5 V</td> <td style="padding: 5px;">0.25 V PEAK-TO-PEAK</td> </tr> <tr> <td style="padding: 5px;">-12 V</td> <td style="padding: 5px;">0.24 V PEAK-TO-PEAK</td> </tr> </tbody> </table>	TERMINAL	MAXIMUM RIPPLE AS MEASURED ON AN OSCILLOSCOPE	+12 V	0.24 V PEAK-TO-PEAK	+5 V	0.25 V PEAK-TO-PEAK	-12 V	0.24 V PEAK-TO-PEAK	Go to 4.	Go to 24.
TERMINAL	MAXIMUM RIPPLE AS MEASURED ON AN OSCILLOSCOPE									
+12 V	0.24 V PEAK-TO-PEAK									
+5 V	0.25 V PEAK-TO-PEAK									
-12 V	0.24 V PEAK-TO-PEAK									
<p>4. Did POR circuit fail when tested in 40C400 controller? <i>Note:</i> POR circuit can only be tested with power supply installed in controller.</p>	Replace 410010 circuit card.	Put power supply in service.								

CHART 4 (Cont)  
TROUBLESHOOTING GUIDE

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. Are all voltages correct at output terminal block? (See Question 2 for procedures.)	Replace 410010 circuit card.	Go to 6.
6. Are all three (3) voltages (+12, -12 and +5) missing?	Go to 7.	Go to 16.
7. Is +12 V dc present at terminal 116 on 410010 circuit card?	Check all wiring from 410010 circuit card to 410011 and 410012 circuit card.	Go to 8.
8. Is +24 V dc present at terminal 115 of 410010 circuit card?	Replace 410010 circuit card.	Go to 9.
9. Is +24 V dc present at terminal 111 of 410010 circuit card?	Replace 403707 fuse (F1) on 410010 circuit card. Go to 13.	Go to 10.
10. Is 22 V ac present between terminals 106 and 107 (W-G wires) of CR101 full-wave bridge rectifier located on 403725 heat sink?	Replace 401002 bridge rectifier on 403725 heat sink.	Go to 11.
11. Is 115 V ac present between terminals 1 and 3 of ac input connector?	Go to 12.	Problem is not in power supply.
12. Is 115 V ac present between terminal 3 of ac input connector and both terminals of circuit breaker?	Replace power supply.	Replace 403700 circuit breaker (CB-1).
13. Did new F1 fuse blow?	Go to 14.	Retest power supply.
14. Is -15 V dc present at terminal 121 of 410010 circuit card?	Replace on 403725 heat sink — 403712 transistor (Q1), 403713 transistor (Q2), 403716 SCR (Q8) and 410012 circuit card. Check 403750 diode assembly for short and replace if defective. Replace 403707 fuse.	Go to 15.
15. Is 41 V ac present between terminals 104 and 105 on 410010 circuit card?	Replace 410010 circuit card.	Replace power supply.

CHART 4 (Cont)  
TROUBLESHOOTING GUIDE

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
16. Is +5 V dc missing or incorrect at output terminal block?	Replace on 403725 heat sink — 403712 transistor (Q1), 403713 transistor (Q2) and 410012 circuit card.	Go to 17.
17. Is +12 V dc missing or incorrect at output terminal block?	Go to 18.	Go to 22.
18. Is +48 V dc present at terminal 118 of 410010 circuit card?	Replace on 403726 heat sink — 403725 transistor (Q1) and 410011 circuit card.	Go to 19.
19. Is +48 V dc present at one side of the 403707 fuse (F2)?	Replace 403707 fuse (F2).	Go to 21.
20. Did new 403707 fuse (F2) blow?	Replace on 403726 heat sink — 403727 transistor (Q1) and 410011 circuit card. Replace 403707 fuse (F2).	Test power supply.
21. Is 40 V ac present between terminals 103 and 104 of 410010 circuit card?	Replace 410010 circuit card.	Replace power supply.
22. Is -48 V dc present at terminal 120 of 410010 circuit card?	Replace on 403726 heat sink — 403730 transistor (Q6) and 410011 circuit card.	Replace 403707 fuse (F3) on 410010 circuit card. Go to 23.
23. Did new 403703 (F3) fuse blow?	Replace on 403726 heat sink — 403730 transistor (Q6) and 410011 circuit card. Replace 403707 fuse (F3).	Test power supply.
24. Is there excessive ripple on the +5 V dc circuit?	Go to 25.	Go to 26.
25. Is there excessive ripple at terminal 115 (+24 V dc) of the 410010 circuit card?	Replace power supply.	Replace 410012 circuit card.
26. Is there excessive ripple on the +12 V dc circuit?	Go to 27.	Go to 28.
27. Is there excessive ripple at terminal 118 (+48 V dc) of the 410010 circuit card?	Replace power supply.	Replace 410011 circuit card.
28. Is there excessive ripple at terminal 120 (-48 V dc) of the 410010 circuit card?	Replace power supply.	Replace 410011 circuit card.