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DOCUMENT NO. 74929

MAINTENANCE INSTRUCTIONS

POWER SUPPLY (AC INPUT)

MODEL 72050

BENTLY NEVADA

REV	DATE

FOREWORD

This manual is for maintenance personnel who install or maintain the 72050 Power Supply in a 7200 Series Instrument Rack. The information presented includes description, component removal, performance testing, recommended spare parts, and specifications. The procedures are presented in step-by-step graphic format. Refer to the table of contents for a list of these procedures, and to the index at the end of the manual for a listing of related subjects in alphabetical order.

NOTE

ANY MAINTENANCE BY THE USER TO A LEVEL OTHER THAN THAT RECOMMENDED COULD VOID THE GUARANTEE

WARNING

HAZARDOUS VOLTAGES EXIST INSIDE THE POWER SUPPLY CHASSIS WHEN THE AC POWER IS CONNECTED AND FOR AT LEAST ONE MINUTE UNTIL THE FILTER CAPACITORS DISCHARGE AFTER THE AC POWER IS DISCONNECTED

SYMBOLS

Special symbols are used in the manual to illustrate specifics in the step-by-step process. For example:



CONNECT



DISCONNECT



OBSERVE

TEST EQUIPMENT (Recommended)

Digital Multimeter

Hewlett Packard HP3465 with HP97002A Current Shunt or equivalent	3 1/2 Digit Display 0 to 1000 V ac or dc 0 to 1000 mA ac or dc 0 to 10 megohms

Oscilloscope

Tektronix 212 modification
7L5 U oscilloscope



RELATED DOCUMENTS

• 7200 Series Instrument Rack Assembly	74927
• 7200 Rack Data Manager System	74928
• 7200 Series Power Supply (DC Input)	74930

NOTICE

READ BEFORE INSTALLING OR OPERATING

Bently Nevada Corporation has attempted to identify areas of risk created by the improper installation and/or operation of this product. These areas of information are noted as CAUTION and WARNING for your protection and the safe and effective operation of this equipment. Read all instructions before beginning installation and/or operation of this product, with particular attention to the following:

Foreword	—	WARNING	Hazardous Voltage
Page 8	—	CAUTION	Turn Off Power
Page 10	—	WARNING	Hazardous Voltage
Page 12	—	CAUTION	Turn Off Power
Page 13	—	CAUTION	Turn off Power

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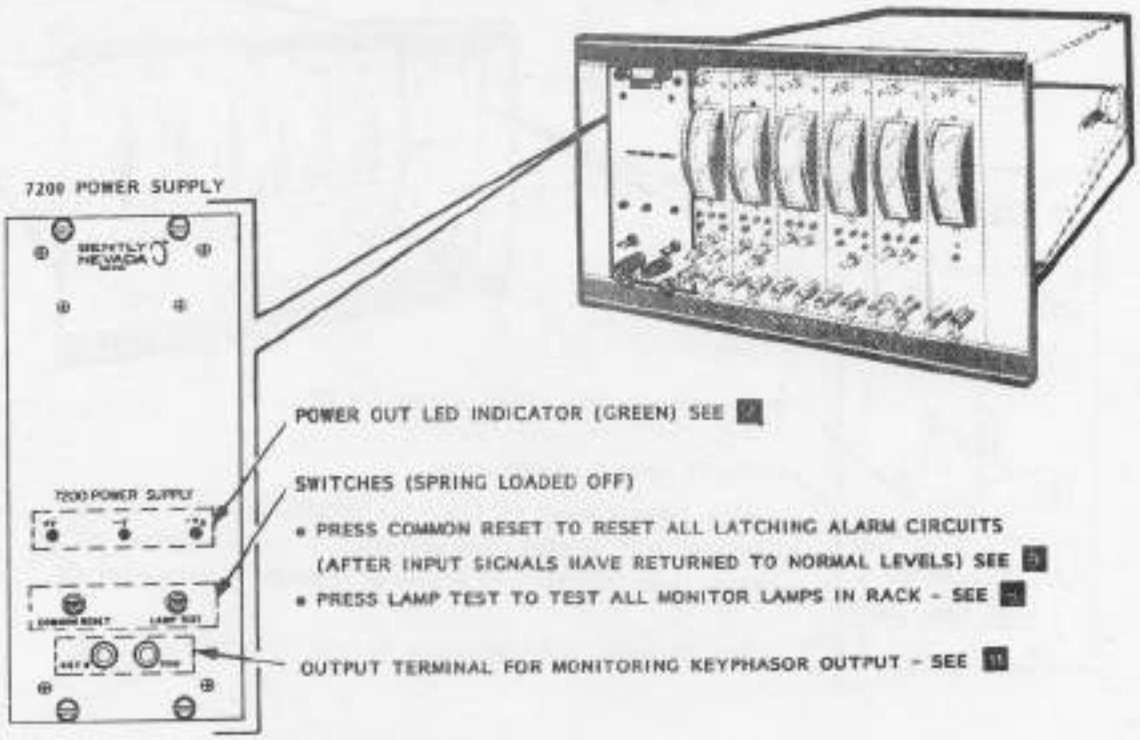
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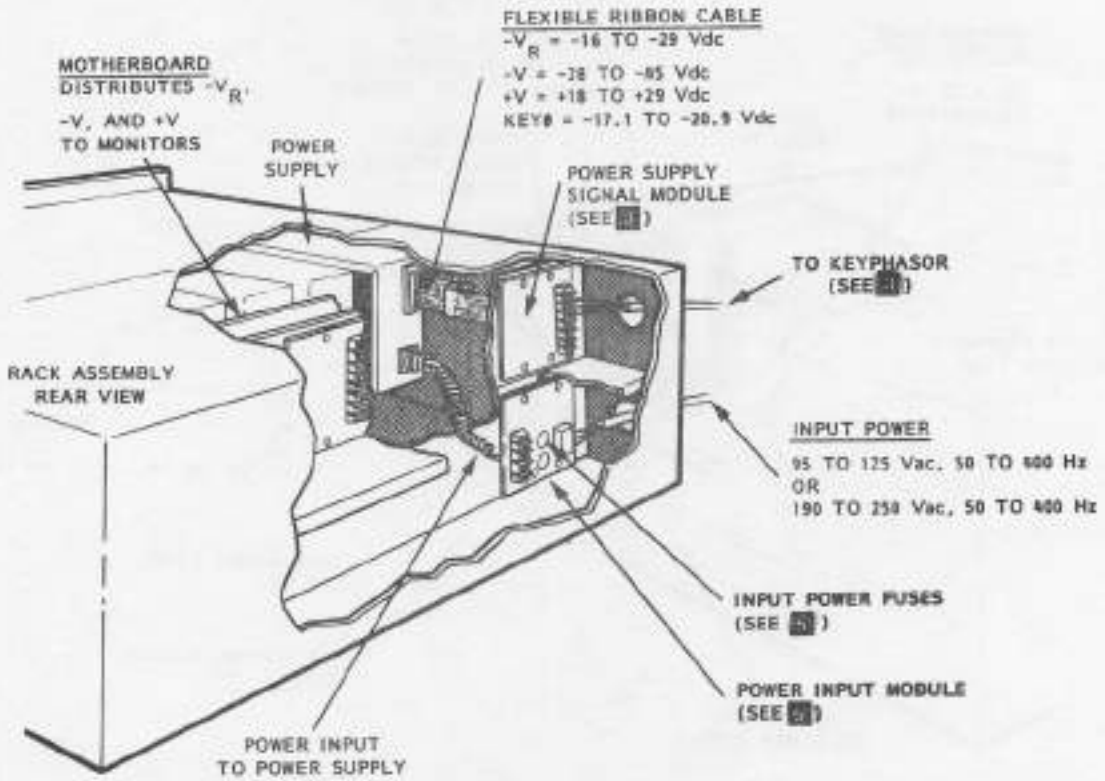
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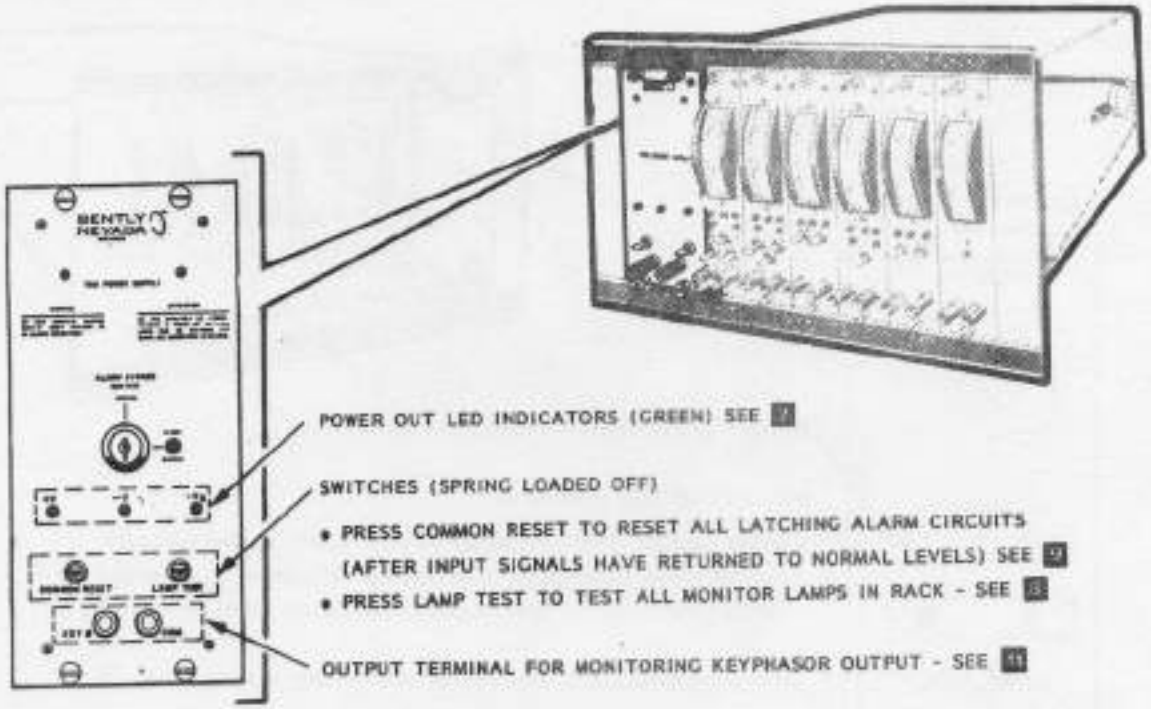
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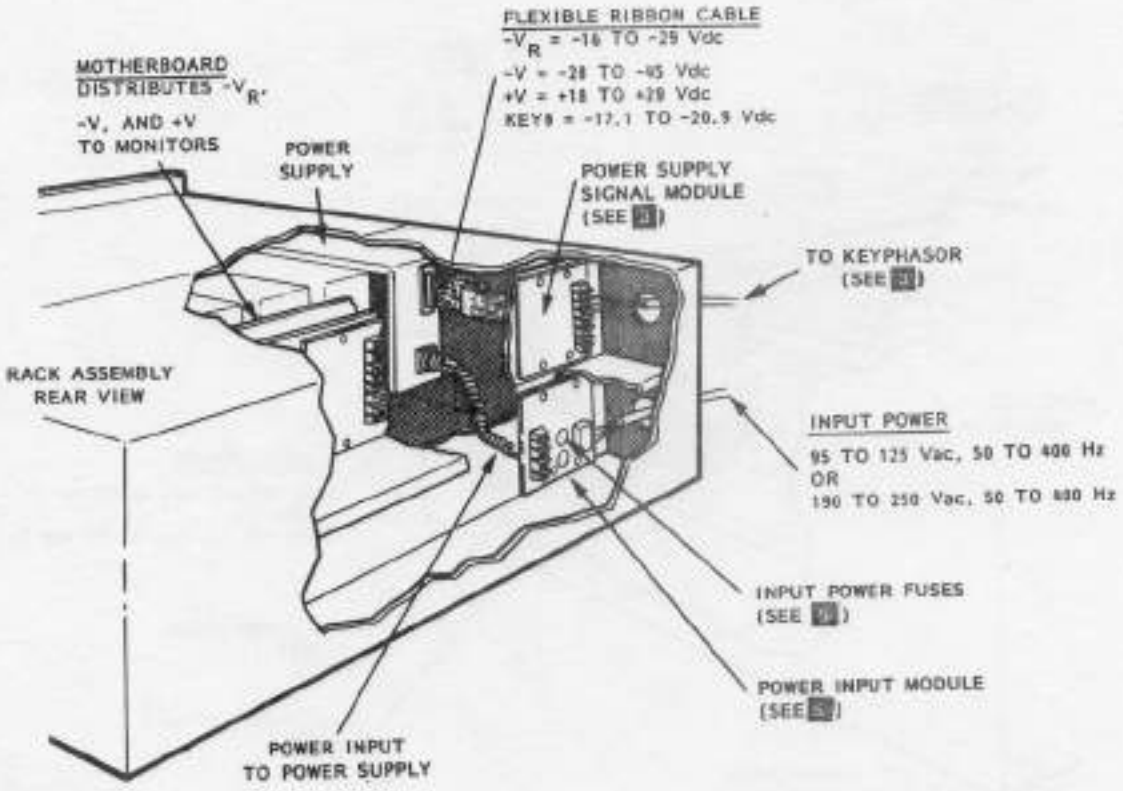
1 STANDARD POWER SUPPLY



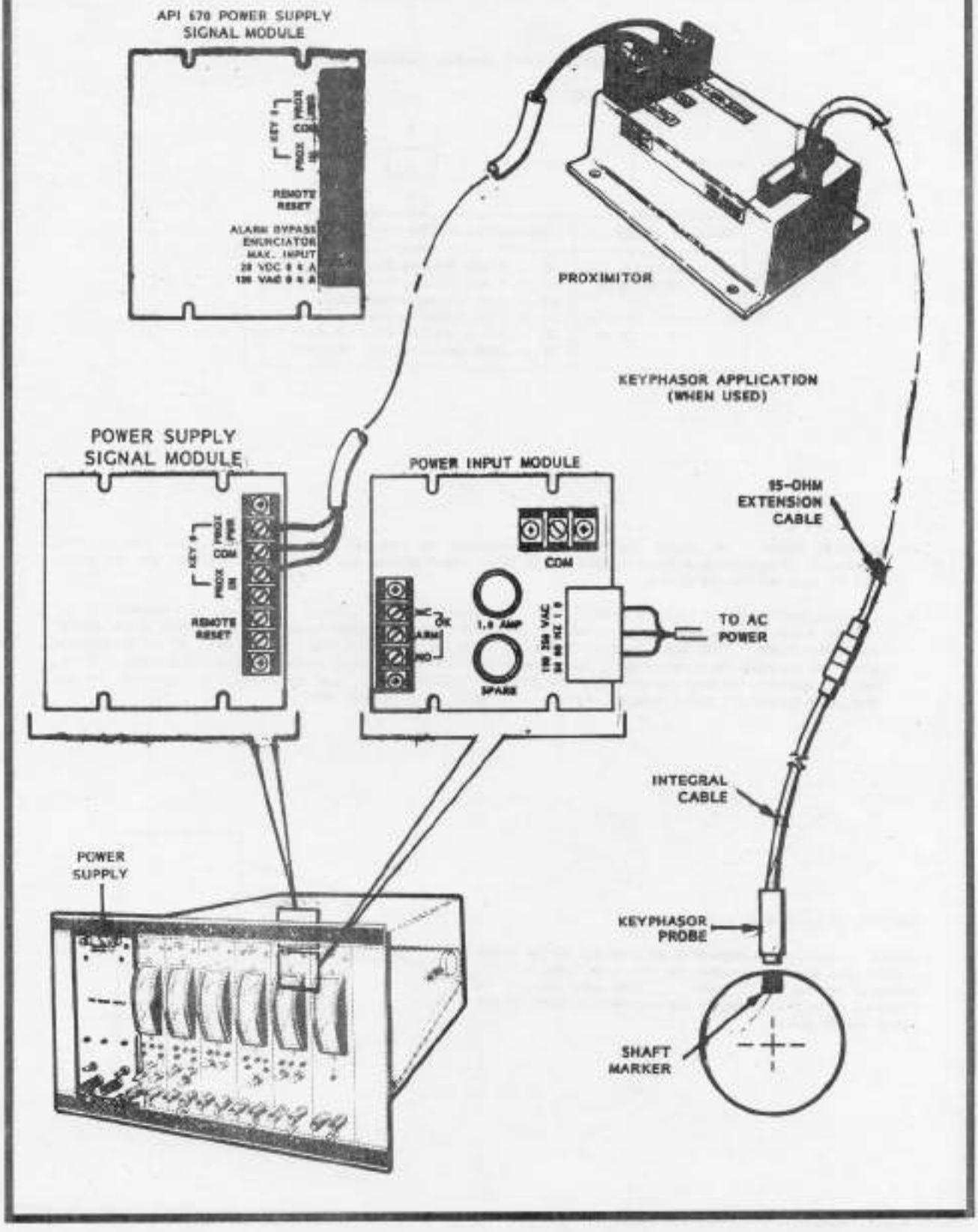


2 API 670 POWER SUPPLY





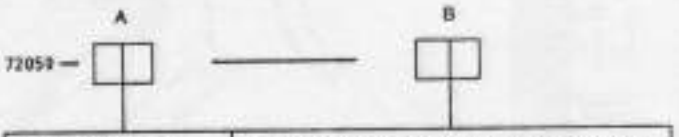
3 POWER SUPPLY SYSTEM



4 OPTIONS

POWER SUPPLY PART NUMBER INFORMATION

BNC CATALOG NUMBER



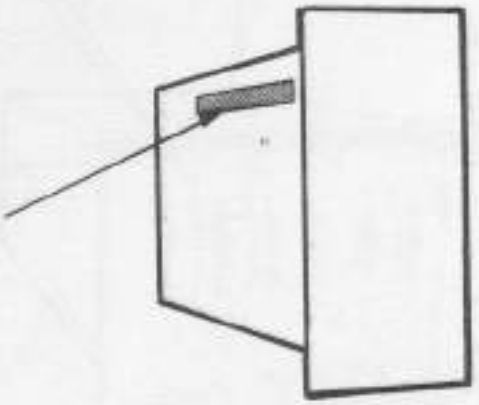
PRIMARY POWER	CONNECTOR/POWER-UP-INHIBIT (PUI)
01 = 95 to 125 Vac, 50 to 400 Hz	00 = 5 way Binding Post/No PUI
	01 = 5 way Binding Post/PUI
	02 = BNC Connector/No PUI
02 = 190 to 250 Vac, 50 to 400 Hz	03 = BNC Connector/PUI
	04 = 5 way Binding Post/PUI (API 670)
	05 = BNC Connector/PUI (API 670)

A. PRIMARY POWER: AC input power for the system is received at the power input module line terminals. Slow-blow line fuses located in the power input module are rated at 2.5 amps for the -01 option and 1.0 amp for the -02 option.

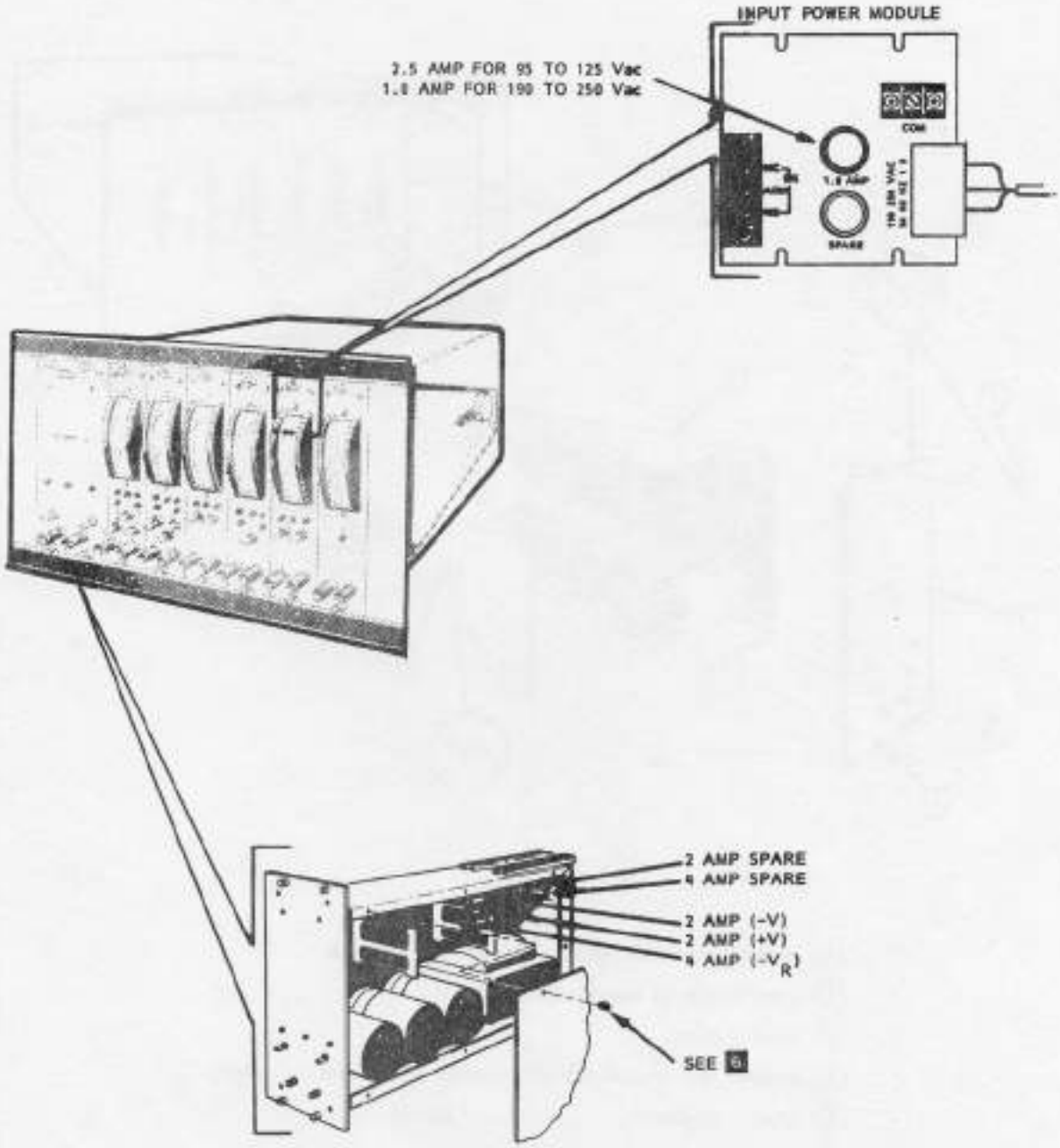
B. CONNECTOR/POWER-UP-INHIBIT (PUI): The power-up-inhibit option automatically disables the monitor alarm circuits and signals a Not-OK condition when the power supply voltages drop below normal operating levels. The alarm relays, OK relay, and OK indicators are disabled until 30 to 45 seconds after the voltages have returned to normal and then are automatically restored to full operation. If the monitor contains latching OK circuits, the COMMON RESET switch must be pressed to illuminate the OK indicators following a power outage. API 670 includes an alarm bypass switch.

SPECIAL OPTIONS AND MODIFICATIONS

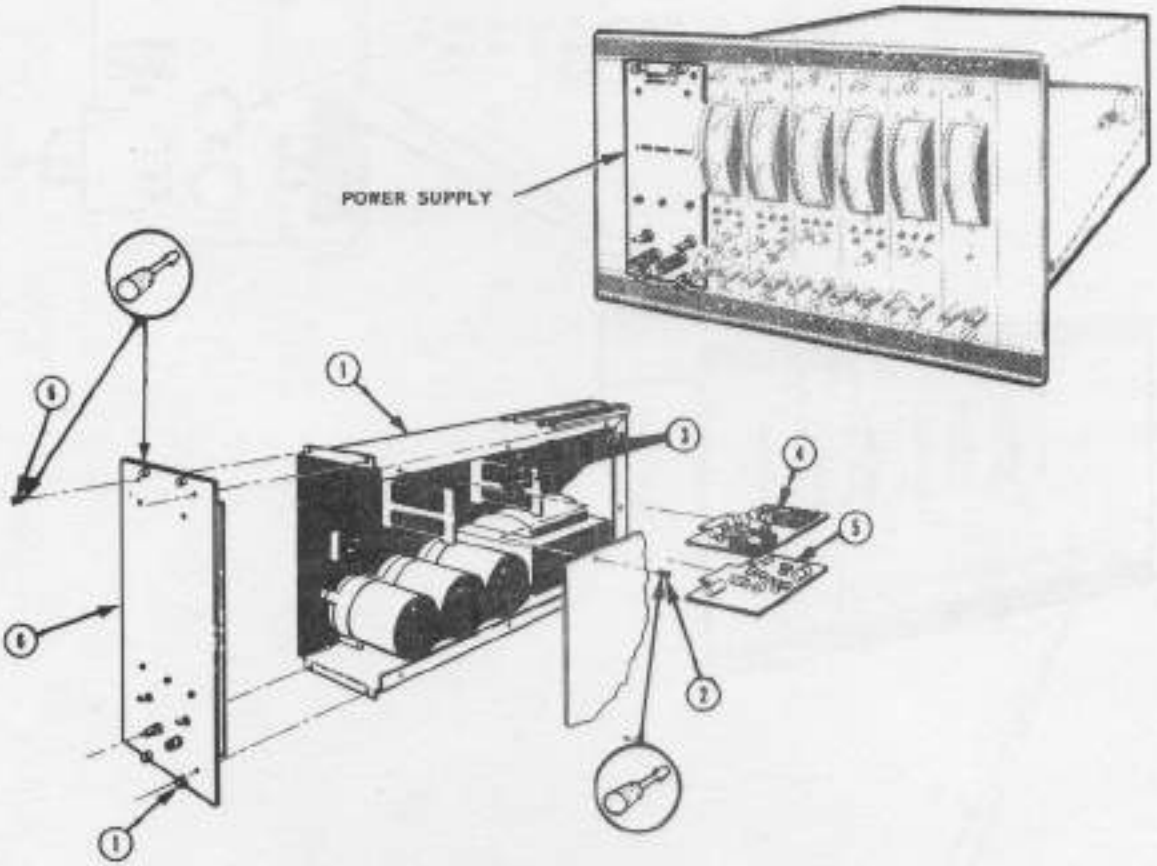
Special options and modifications are changes to the power supply that are not covered by the basic unit and the standard options listed above. These changes will be noted on a decal attached to the outside left panel of the power supply chassis.



5 FUSES


INPUT POWER MODULE
2.5 AMP FOR 95 TO 125 Vac
1.0 AMP FOR 190 TO 250 Vac
COM
SPARE
2 AMP SPARE
4 AMP SPARE
2 AMP (-V)
2 AMP (+V)
4 AMP (-V_R)
SEE 6

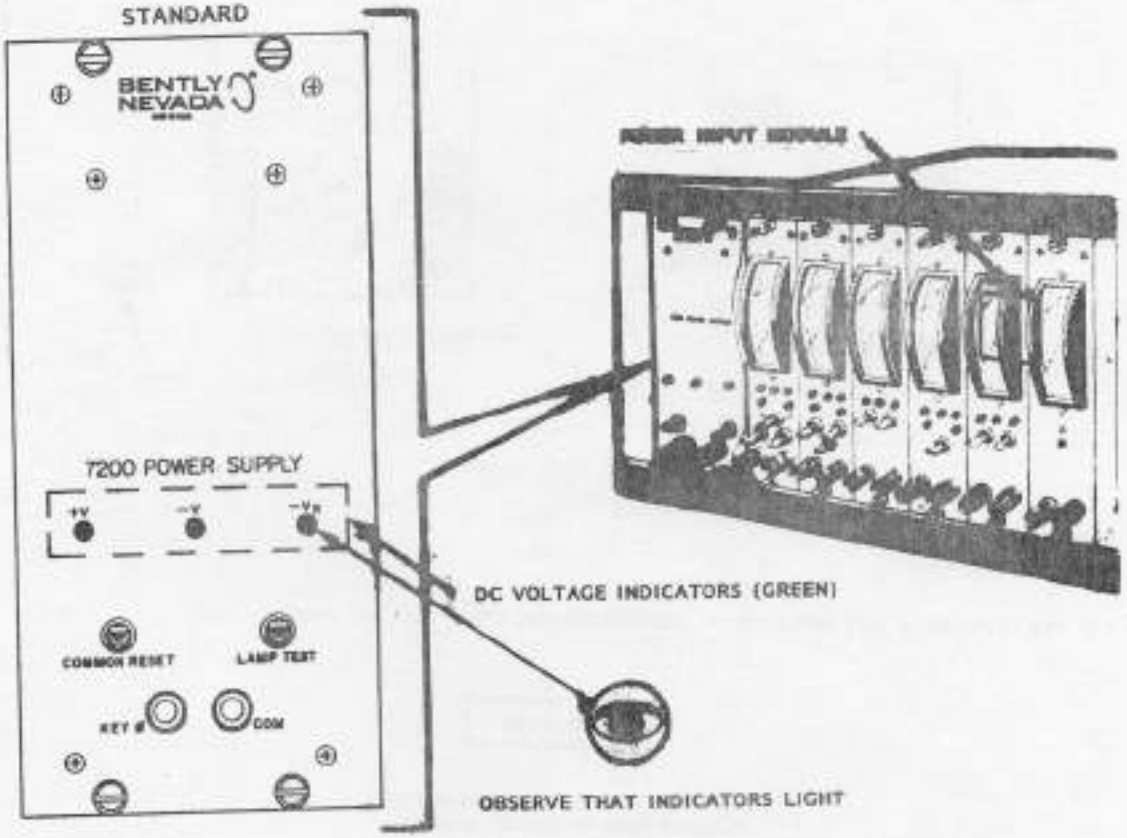
6 COMPONENT REMOVAL



1. REMOVE RETAINING SCREWS AND EXTEND CHASSIS
2. REMOVE SCREWS AND REMOVE SIDE PANEL
3. REMOVE FUSES
4. REMOVE RESET/LAMP TEST/KEYPHASOR POWER CIRCUIT BOARD
5. REMOVE POWER-UP-INHIBIT CIRCUIT BOARD
6. REMOVE RETAINING SCREWS AND REMOVE FRONT PANEL

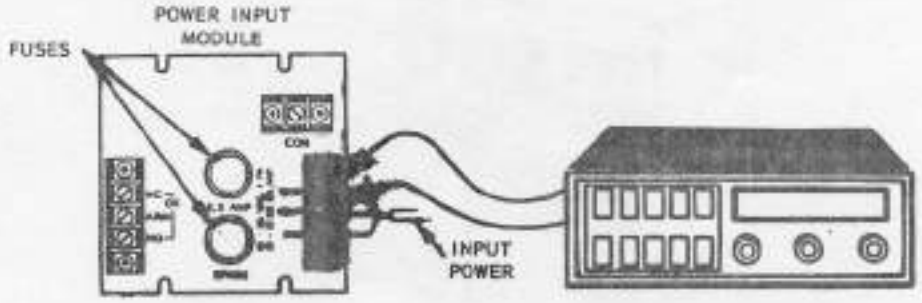
7 PERFORMANCE TESTING

1. APPLY POWER TO 7200 SYSTEM



2. IF ONE OR TWO INDICATORS LIGHT, PROCEED TO STEP 4.
IF NONE OF THE INDICATORS LIGHT, CHECK THE FOLLOWING:

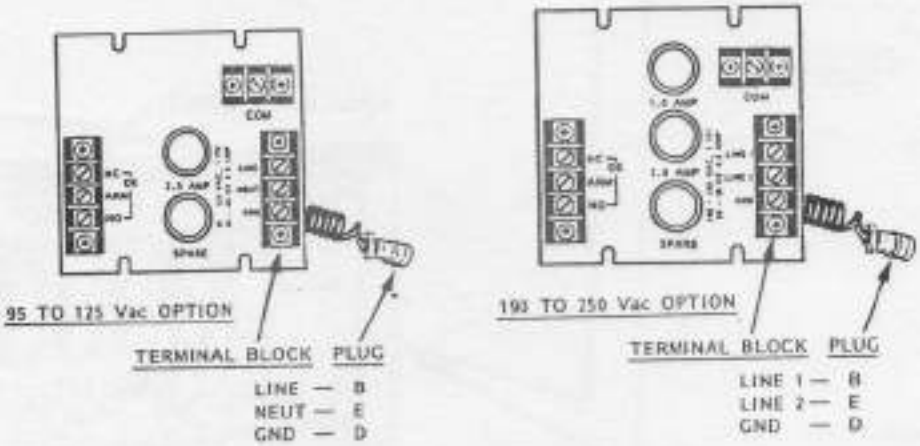
- FUSES AT POWER INPUT MODULE
- INPUT POWER AT POWER INPUT MODULE



7 continued

2. continued

- PROPER CONNECTION OF POWER PLUG AT POWER SUPPLY
- TURN OFF POWER AND CHECK WIRING CONTINUITY BETWEEN POWER PLUG AND TERMINAL BLOCK ON POWER INPUT MODULE

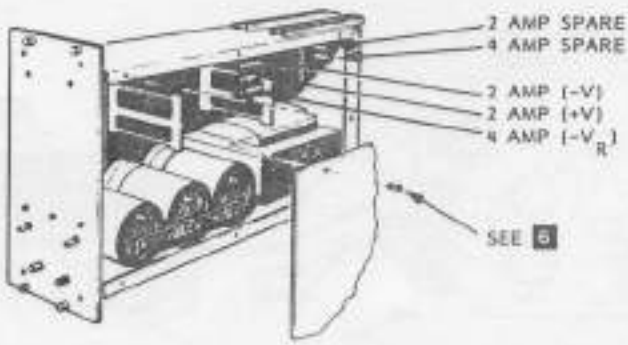


3. IF THE PROBLEM IS NOT ISOLATED IN THE PRECEEDING STEP, REPLACE POWER SUPPLY.

CAUTION

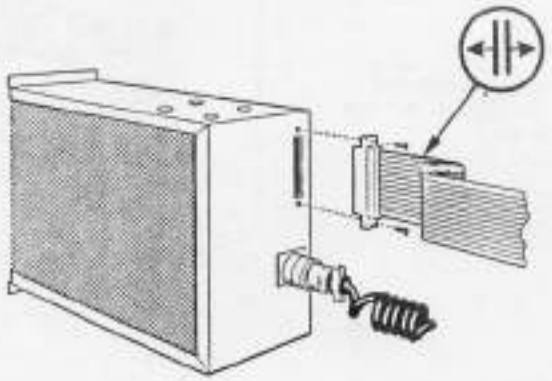
TURN OFF SYSTEM POWER WHEN REPLACING FUSE OR CIRCUIT BOARDS

4. IF ONE OR TWO INDICATORS DO NOT LIGHT, CHECK THE CORRESPONDING FUSE AND REPLACE IF NECESSARY. SEE 5



7 continued

5. IF THE FUSE BLOWS AGAIN, DISCONNECT THE FLEXIBLE RIBBON CABLE CONNECTOR. SEE 3

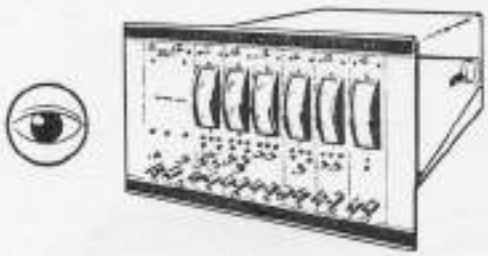


6. REPLACE THE FUSE

FUSE DOES NOT BLOW

OVERLOAD OR SHORT CIRCUIT IS IN A MONITOR UNIT OR IN RACK ASSEMBLY

VISUALLY INSPECT THE RACK AND MONITORS FOR ANY OBVIOUS SHORT CIRCUITS OR COMPONENT FAILURES



PROCEED TO STEP 9

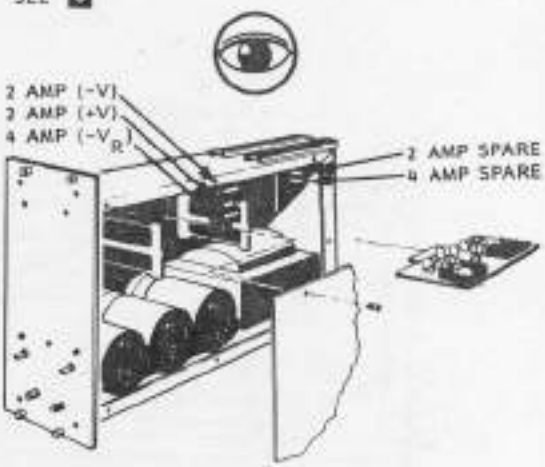
FUSE BLOWS AGAIN

OVERLOAD OR SHORT CIRCUIT IN POWER SUPPLY

VISUALLY INSPECT POWER SUPPLY FOR OBVIOUS COMPONENT FAILURE

SUBSTITUTE RESET/LAMP TEST/KEY8 POWER CIRCUIT BOARD AND REPLACE FUSE

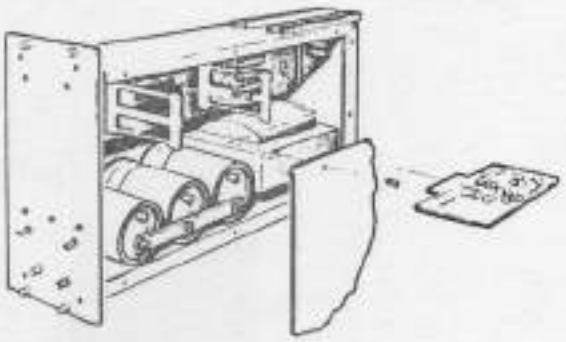
SEE 8



PROCEED TO STEP 7

7 continued

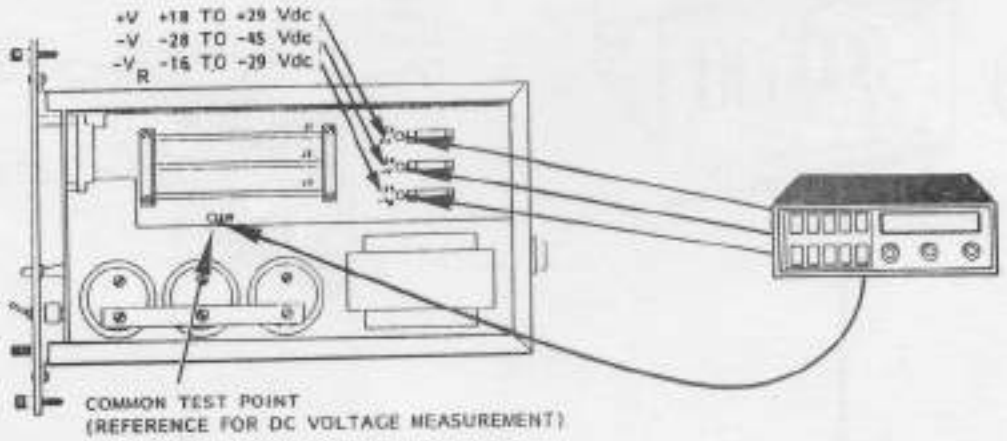
7. IF THE FUSE BLOWS AGAIN, SUBSTITUTE THE PUI CIRCUIT BOARD, IF USED - SEE [G]. IF PUI NOT USED, REPLACE THE POWER SUPPLY.



8. IF FUSE DOES NOT BLOW, MEASURE DC VOLTAGES AT TEST POINTS SHOWN. REPLACE POWER SUPPLY IF ANY VOLTAGES ARE OUT OF LIMITS.

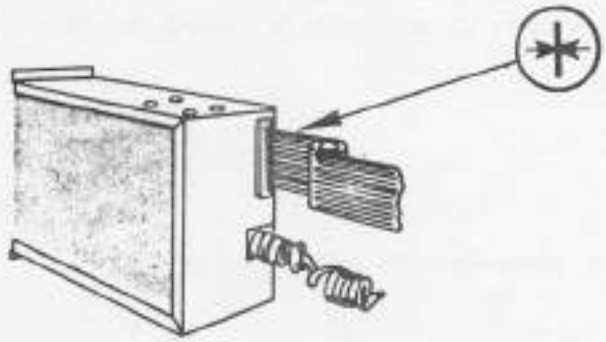
WARNING

HAZARDOUS VOLTAGES EXIST INSIDE THE POWER SUPPLY CHASSIS

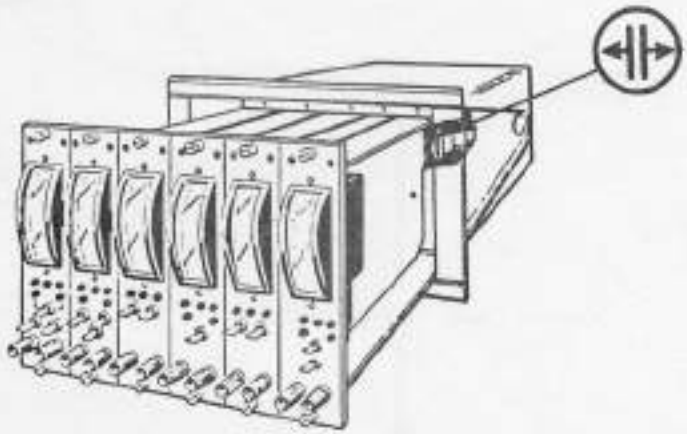


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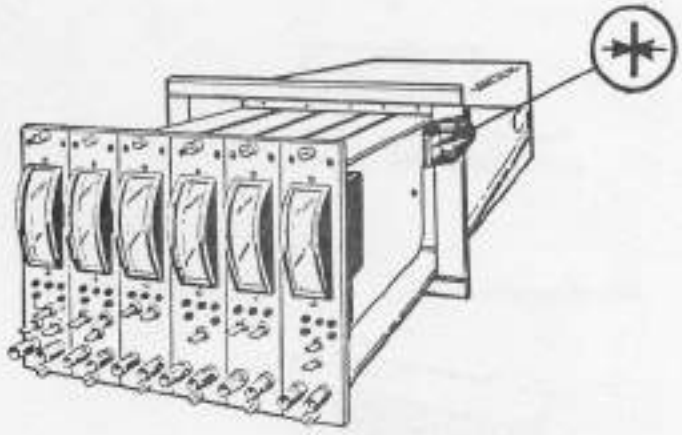
9. RECONNECT FLEXIBLE RIBBON CONNECTOR TO POWER SUPPLY



10. SLIDE ALL MONITORS OUT FROM RACK AND DISENGAGE FLEXIBLE RIBBON CONNECTORS



11. RECONNECT CONNECTORS TO MONITORS ONE AT A TIME, UNTIL FUSE BLOWS.

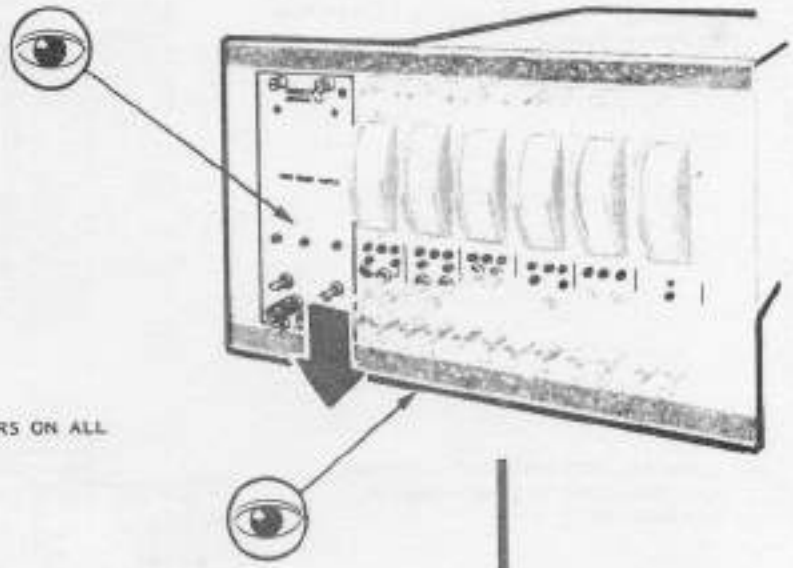


12. MONITOR THAT CAUSES FUSE TO BLOW IS DEFECTIVE. REPLACE MONITOR OR REFER TO APPLICABLE MONITOR MAINTENANCE MANUAL.



8 LAMP TEST

ALL GREEN LED INDICATORS ON POWER SUPPLY FRONT PANEL MUST BE ON



1. PRESS LAMP TEST SWITCH

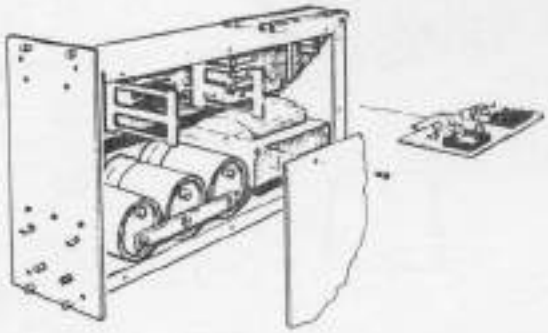
2. OBSERVE THAT ALL LED INDICATORS ON ALL MONITOR FRONT PANELS LIGHT

NO LED INDICATORS LIGHT

CAUTION

TURN OFF SYSTEM POWER BEFORE REMOVING CIRCUIT BOARDS

REPLACE RESET/LAMP TEST/KEY# CIRCUIT BOARD (SEE 6)



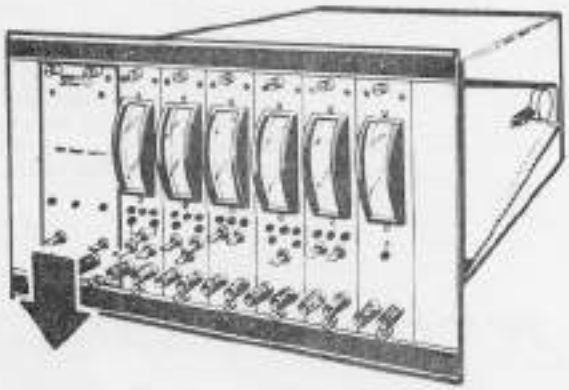
SOME LED INDICATORS LIGHT BUT NOT ALL

SEE APPLICABLE MONITOR MANUAL



9 COMMON RESET TEST

1. PRESS COMMON RESET SWITCH



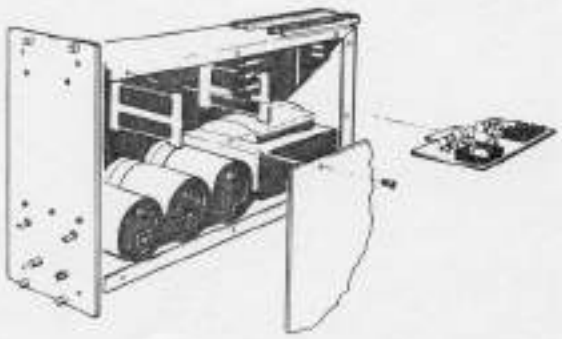
2. ALL MONITOR OK AND ALARM FUNCTIONS WHICH ARE WITHIN NORMAL LEVELS SHOULD RESET

NONE OF THE MONITOR FUNCTIONS RESET

CAUTION

TURN OFF SYSTEM POWER BEFORE REMOVING CIRCUIT BOARDS

REPLACE THE RESET/LAMP TEST/KEYS CIRCUIT BOARD SEE 6



SOME MONITOR FUNCTIONS DO NOT RESET

SEE APPLICABLE MONITOR MANUAL



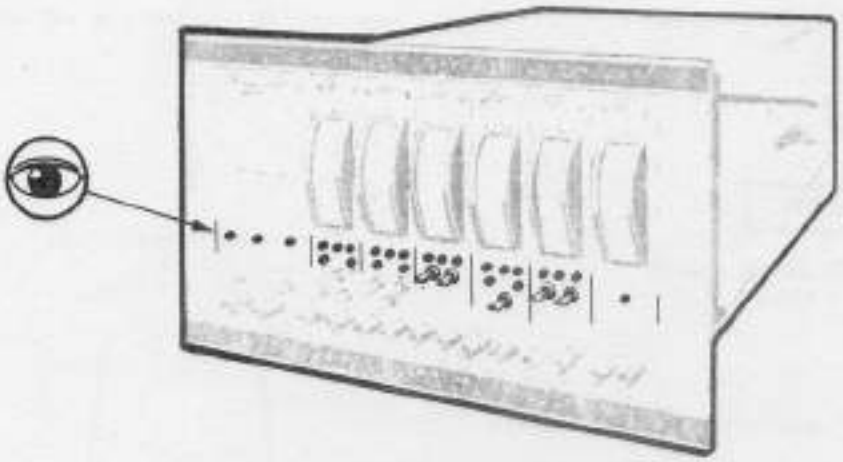
10 POWER-UP-INHIBITED (PUI) TEST

NOTE

IF THE PUI CIRCUIT HAS NOT BEEN ENERGIZED FOR A PERIOD EXCEEDING 30 DAYS, MONITOR ALARMS COULD BE INHIBITED FOR SEVERAL MINUTES. CONDITION THE ELECTROLYTIC CAPACITOR BY TURNING ON POWER FOR A MINIMUM OF 30 MINUTES. THEN PROCEED WITH THE TEST.

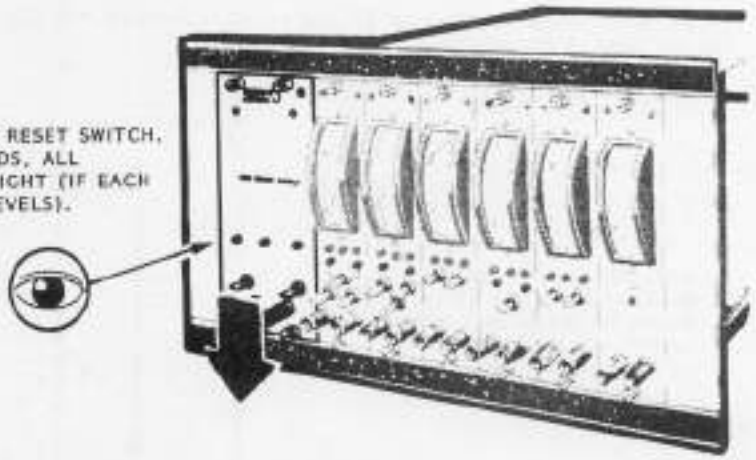
1. TURN OFF THE AC INPUT POWER TO THE SYSTEM AND AFTER A FEW SECONDS, RESTORE POWER.

2. VERIFY ALL MONITOR OK AND ALARM INDICATORS ARE OFF. THE NORMALLY-ENERGIZED OK RELAY SHOULD BE DE-ENERGIZED AND ALL ALARM RELAYS SHOULD BE RESET (WHETHER THE SIGNAL LEVELS ARE ABOVE OR BELOW THE SET POINTS).

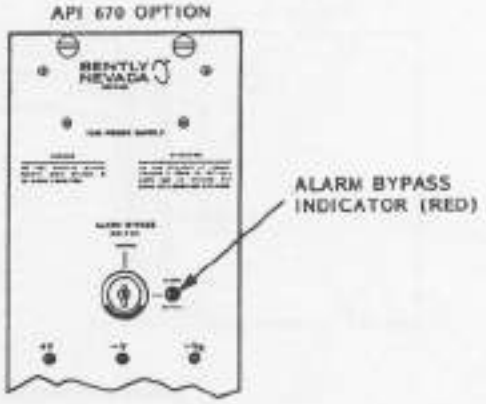


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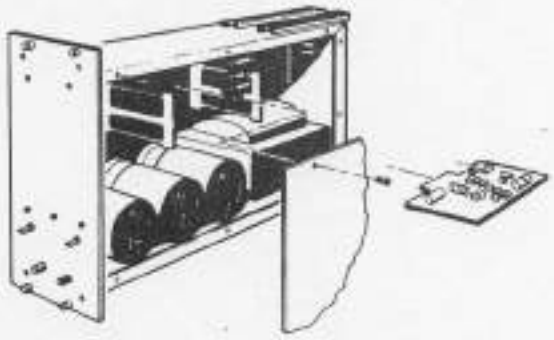
3. PRESS (AND RELEASE) THE COMMON RESET SWITCH. AFTER A DELAY OF 30 TO 45 SECONDS, ALL MONITOR OK INDICATORS SHOULD LIGHT (IF EACH INPUT SIGNAL IS WITHIN NORMAL LEVELS).



IF THE UNIT IS EQUIPPED FOR API 670 ALARM BYPASS, THE RED LED SHOULD LIGHT FOR THE PERIOD THAT THE ALARMS ARE INHIBITED (30 TO 45 SECONDS); THEN TURN OFF WHEN THE MONITOR OK INDICATORS LIGHT.

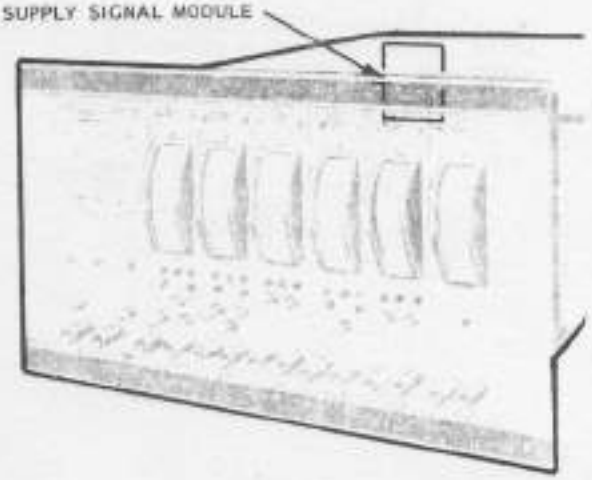


4. IF ALL INDICATORS REMAIN OFF, TURN OFF POWER AND REPLACE THE PUI CIRCUIT BOARD. SEE 6

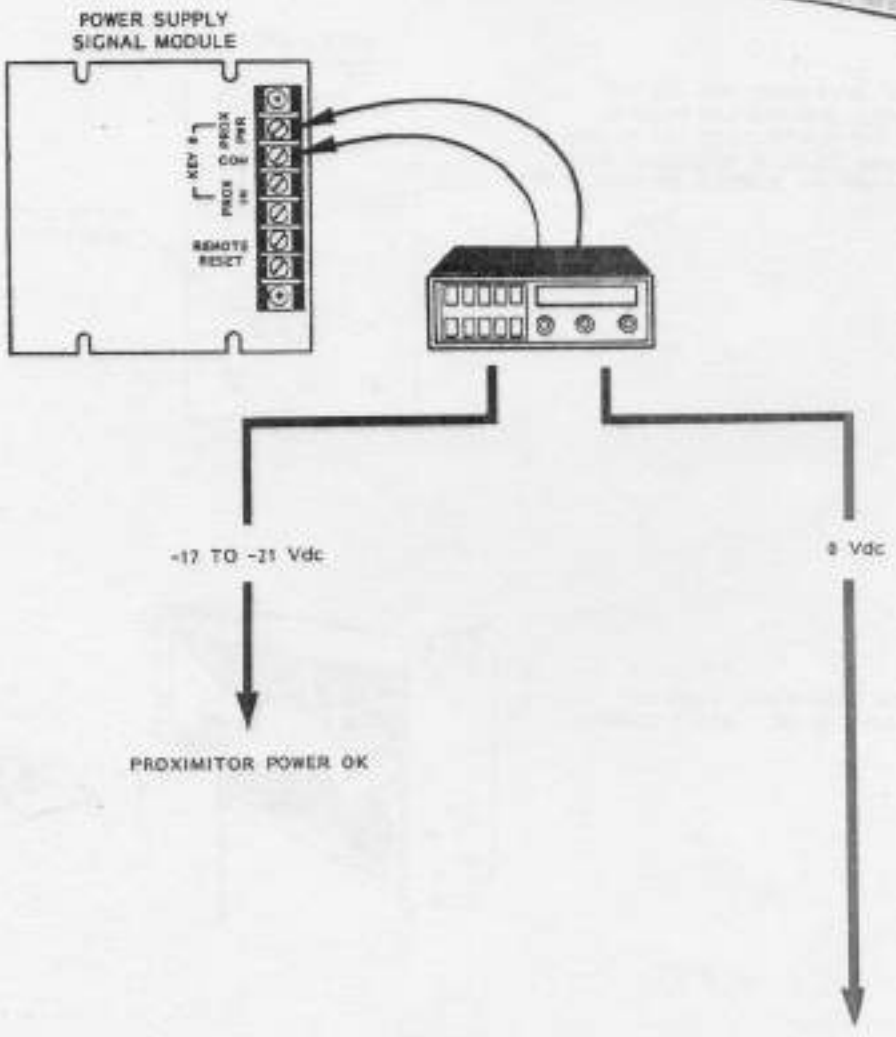


11 KEYPHASOR PERFORMANCE TESTING

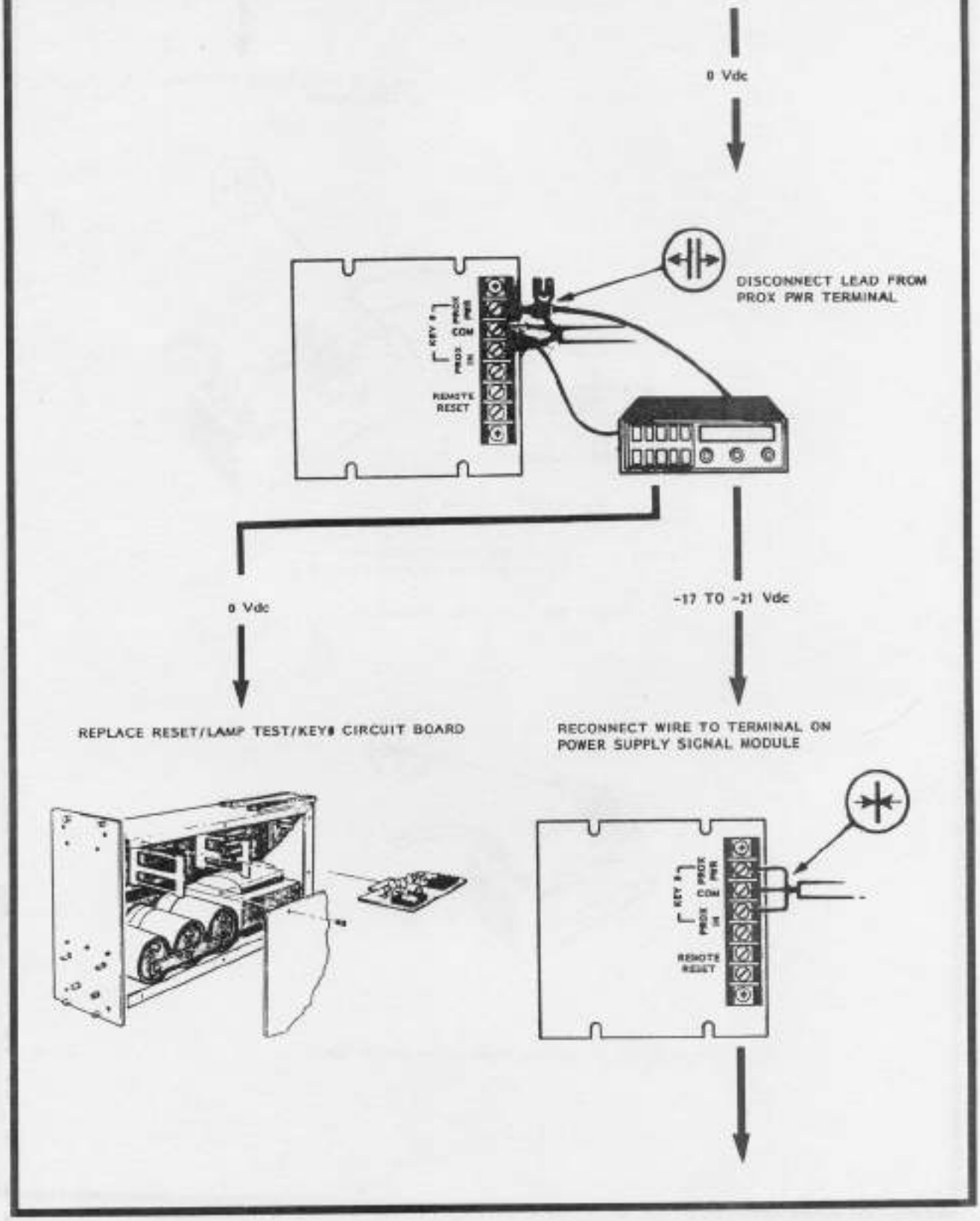
THESE TESTS VERIFY OPERATION OF THE KEYPHASOR OUTPUT POWER AND THE KEYPHASOR INPUT SIGNAL. THE MACHINE IS RUNNING FOR THIS PROCEDURE.



1. CONNECT MULTIMETER AND MEASURE PROX PWR AT POWER SUPPLY SIGNAL MODULE. VERIFY ALL FRONT PANEL INDICATORS ARE ON.

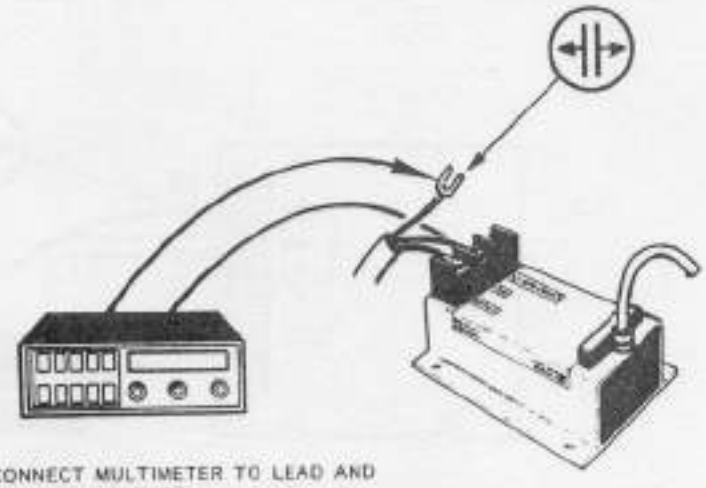


11 continued



11 continued

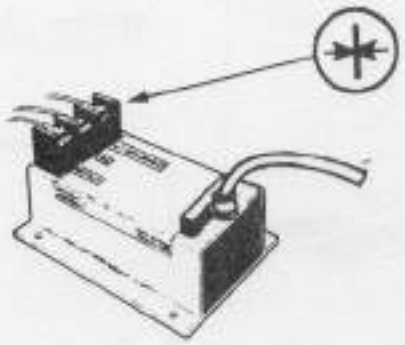
LIFT WIRE FROM POWER TERMINAL ($-V_T$) AT PROXIMITOR



CONNECT MULTIMETER TO LEAD AND MEASURE VOLTAGE

0 VOLTS = DEFECTIVE WIRING BETWEEN SIGNAL MODULE AND PROXIMITOR

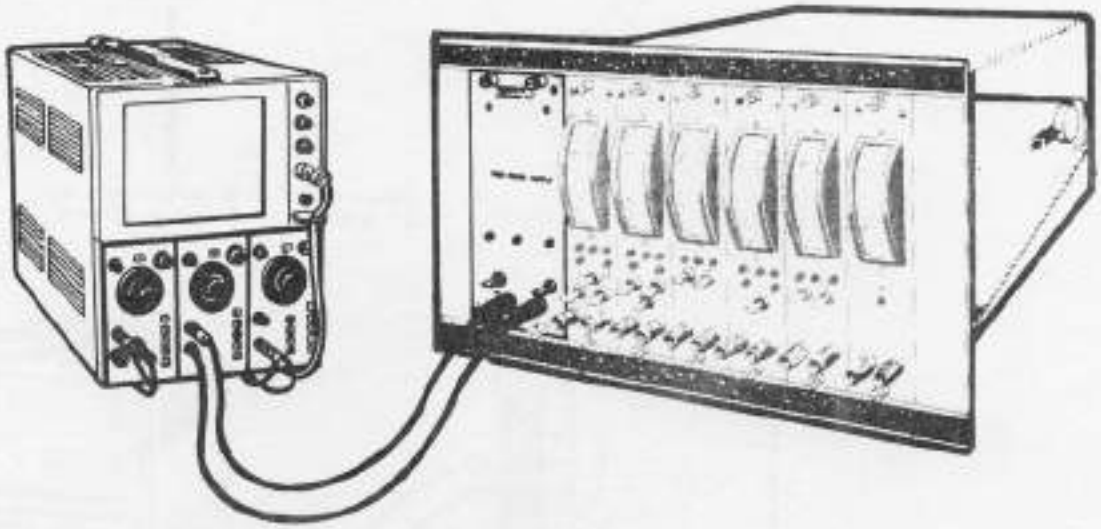
-17 TO -21 VOLTS = DEFECTIVE PROXIMITOR



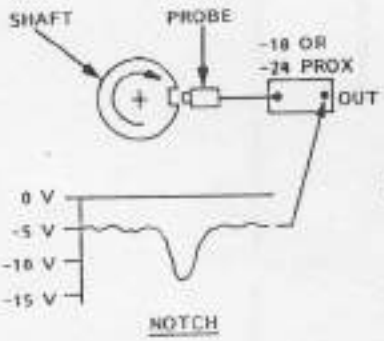
RECONNECT LEAD TO PROXIMITOR POWER TERMINAL

11 continued

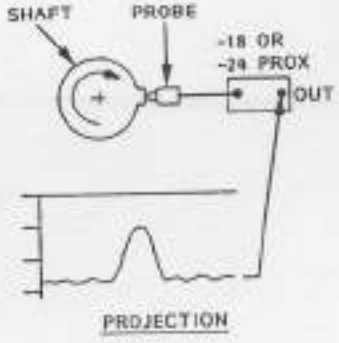
2. WITH MACHINE RUNNING, CHECK KEYPHASOR OUTPUT SIGNAL AT POWER SUPPLY FRONT PANEL OUTPUT TERMINALS.



KEYPHASOR OUTPUT



OR

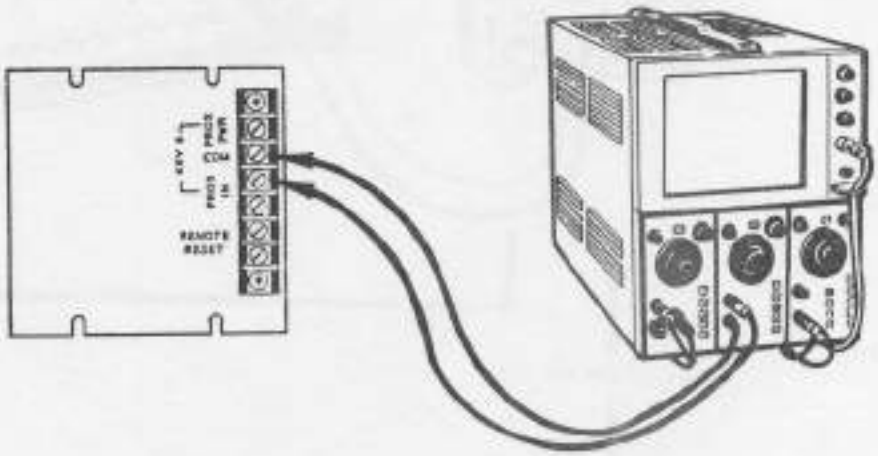


NO OUTPUT

11 continued

NO OUTPUT

CHECK KEYPHASOR OUTPUT SIGNAL
AT POWER SUPPLY SIGNAL MODULE



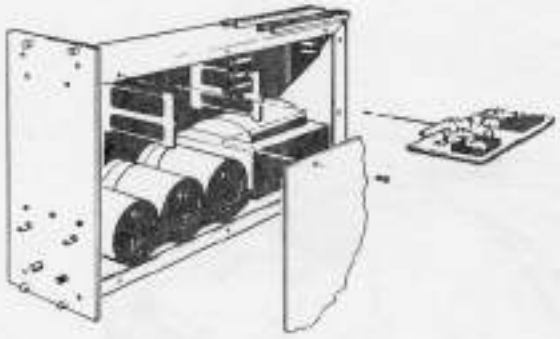
PROPER KEYPHASOR OUTPUT

NO OUTPUT

11 continued

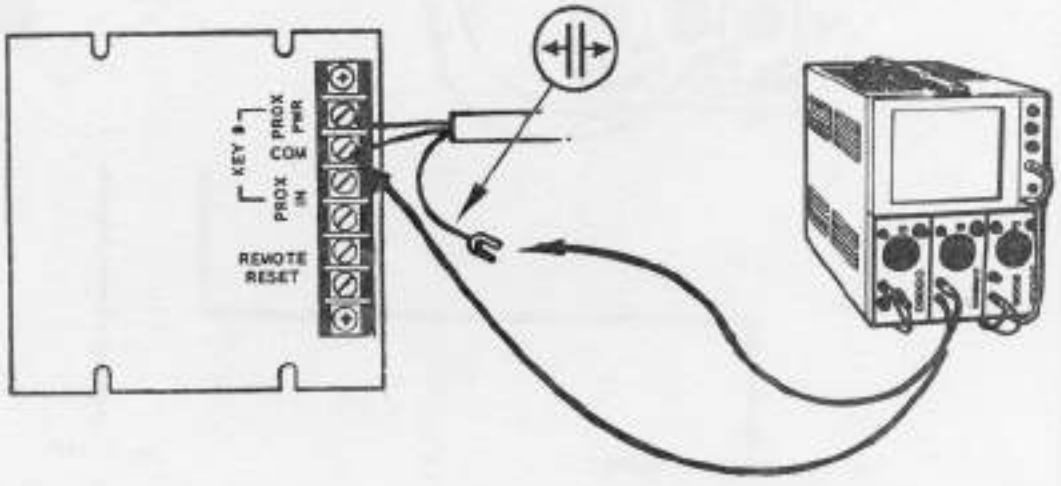
PROPER KEYPHASOR OUTPUT

REPLACE RESET/LAMP TEST/KEY∅ CIRCUIT BOARD
SEE 5



NO OUTPUT

DISCONNECT PROX IN WIRE FROM SIGNAL MODULE
AND CHECK FOR KEYPHASOR SIGNAL AT WIRE



PROPER KEYPHASOR OUTPUT

NO OUTPUT

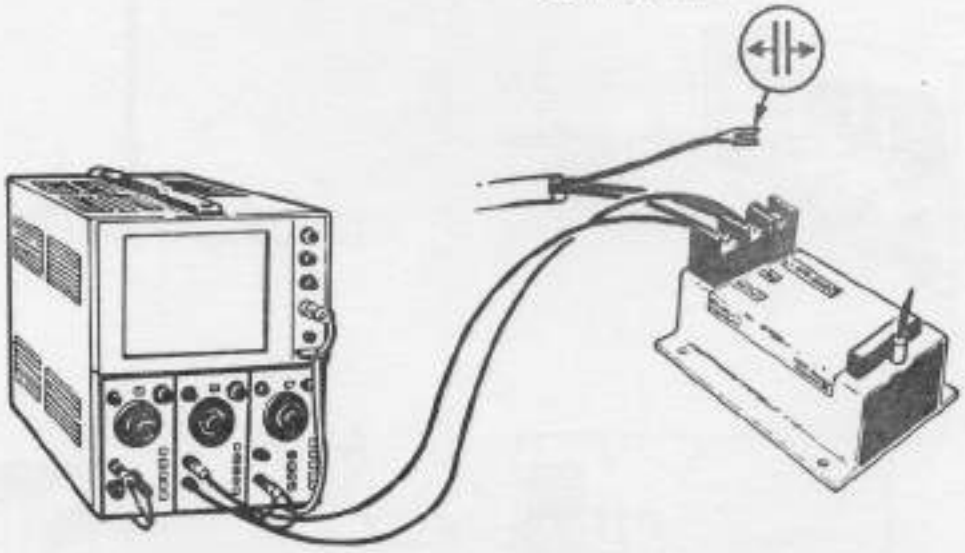
11 continued

PROPER KEYPHASOR OUTPUT

REPLACE POWER SUPPLY

NO OUTPUT

DISCONNECT PROXIMITOR OUTPUT WIRE AND CHECK FOR KEYPHASOR SIGNAL AT PROX OUTPUT TERMINAL



PROPER KEYPHASOR OUTPUT

PROBLEM IN WIRING BETWEEN PROXIMITOR AND SIGNAL MODULE

NO OUTPUT

11 continued

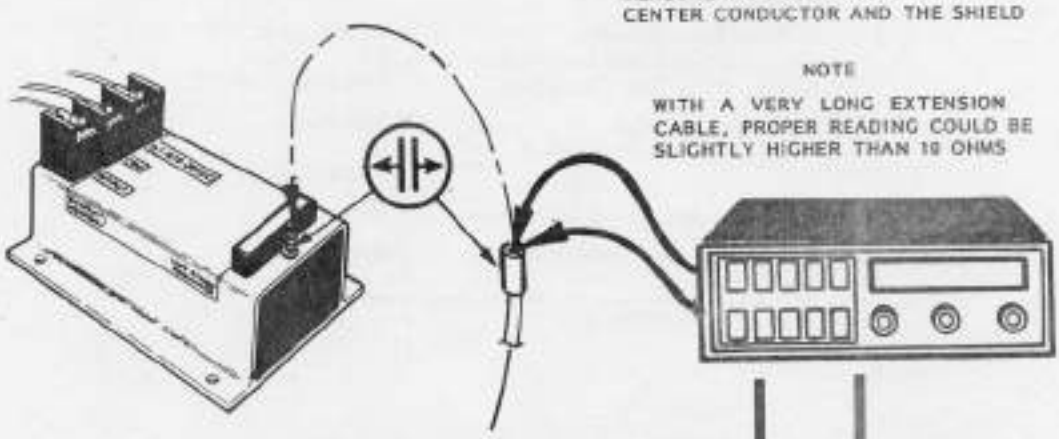
NO OUTPUT

DISCONNECT THE 95 OHM EXTENSION CABLE FROM THE PROXIMITOR

MEASURE 4 TO 10 OHMS BETWEEN THE CENTER CONDUCTOR AND THE SHIELD

NOTE

WITH A VERY LONG EXTENSION CABLE, PROPER READING COULD BE SLIGHTLY HIGHER THAN 10 OHMS

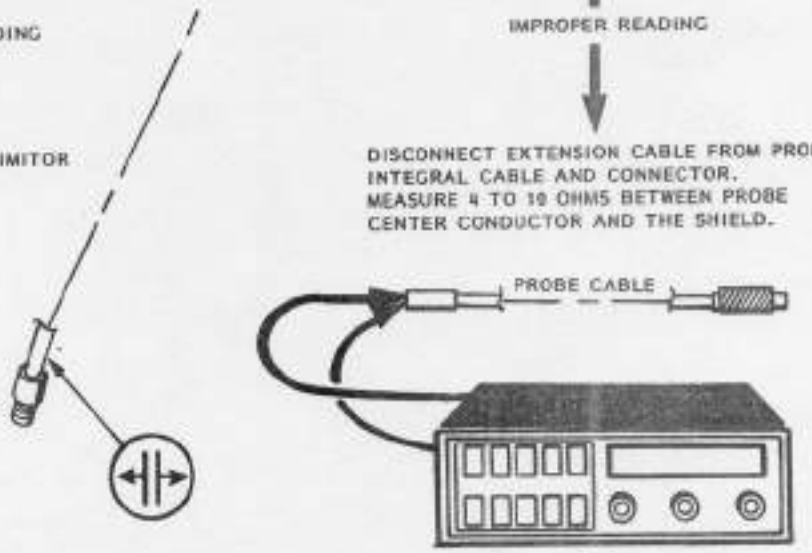


PROPER READING

REPLACE PROXIMITOR

IMPROPER READING

DISCONNECT EXTENSION CABLE FROM PROBE INTEGRAL CABLE AND CONNECTOR. MEASURE 4 TO 10 OHMS BETWEEN PROBE CENTER CONDUCTOR AND THE SHIELD.



4 TO 10 OHMS

REPLACE EXTENSION CABLE

IMPROPER READING

REPLACE PROBE

12 RECOMMENDED SPARE PARTS

QTY	DESCRIPTION	PART NUMBER
1	Reset/Lamp Test/Keyphasor Power Circuit Board	72059-01
1	Front Panel Assembly -01 = 5 way Binding Post -02 = BNC Connector	72060-01 or -02 OR *46229-01 or -02
1	Power-Up-Inhibit Circuit Board (if included)	72065-01 OR *46253-01
1 Box	Fuse, 4 Amp, 3 AG Slow Blow	None
1 Box	Fuse, 2 Amp, 3 AG Slow Blow	None

*For API 670 ALARM BYPASS

13 SPECIFICATIONS

INPUT

Primary Power
95 to 125 Vac, 1 phase, 50 to 400 Hz @ 1.5 amp max
or 190 to 250 Vac, 1 phase, 50 to 400 Hz @ 0.75 amp max

Primary Power Surge at Start-Up
15 amp max for 1 cycle

Primary Power Fusing

115 Vac	Single fuse, line side fused
220 Vac	Dual fuse, line 1 and 2 fused

Operator Commands
Remote contact closure enters common reset. Front panel switch actuation enters system reset and lamp test.

For API 670 Alarm Bypass: 28 Vdc or 125 Vac @ 4A must be externally current limitted and/or fused.

OUTPUTS

Unregulated DC Voltages

$-V_n$	−16 to −29 Vdc @ 3.5 amp. Used to power monitor lamps and system relays.
−V	−28 to −45 Vdc @ 1.5 amp max. −V regulated at each monitor.
+V	+18 to +29 Vdc @ 1 amp max. +V regulated at each monitor.

Unregulated Voltage Fusing
Each unregulated voltage is fused within the power supply.

Keyphasor Proximitor Supply
−19 Vdc ± 10% @ 20 mA, 30 mA maximum.

Operator Commands
With remote contact closure, or front panel switch actuation, the power supply generates system compatible common reset or lamp test.

Automatic Command
With a power up or power outage, the power supply automatically generates a system compatible power up inhibit. The power-up-inhibit signal will inhibit all monitor alarms for a minimum of 30 seconds.

Binding Post
System Keyphasor signal connected to front panel binding post.

DISPLAY

Lamps
Three green LEDs indicate operation of all unregulated dc voltages. For power supplies equipped for API 670 ALARM BYPASS, one red LED indicating alarm bypass function and inhibit condition.

CONTROLS

Two front panel toggle switches enter operator commands, i.e., reset, lamp test. For power supplies equipped for API 670 ALARM BYPASS, one keyswitch to operate alarm bypass function.

ENVIRONMENTAL LIMITS

Rated Performance	0 °C to 65 °C (32 °F to 149 °F)
Operational Range	−29 °C to 75 °C (−20 °F to 167 °F)
Long Term Storage	−40 °C to 85 °C (−40 °F to 185 °F)
Relative Humidity	To 95% noncondensing

DIMENSIONS

Panel Width	4.02 inches (10.21 cm)
Panel Height	8.48 inches (21.54 cm)
Power Supply Depth	13.30 inches (33.78 cm)

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