AT&T
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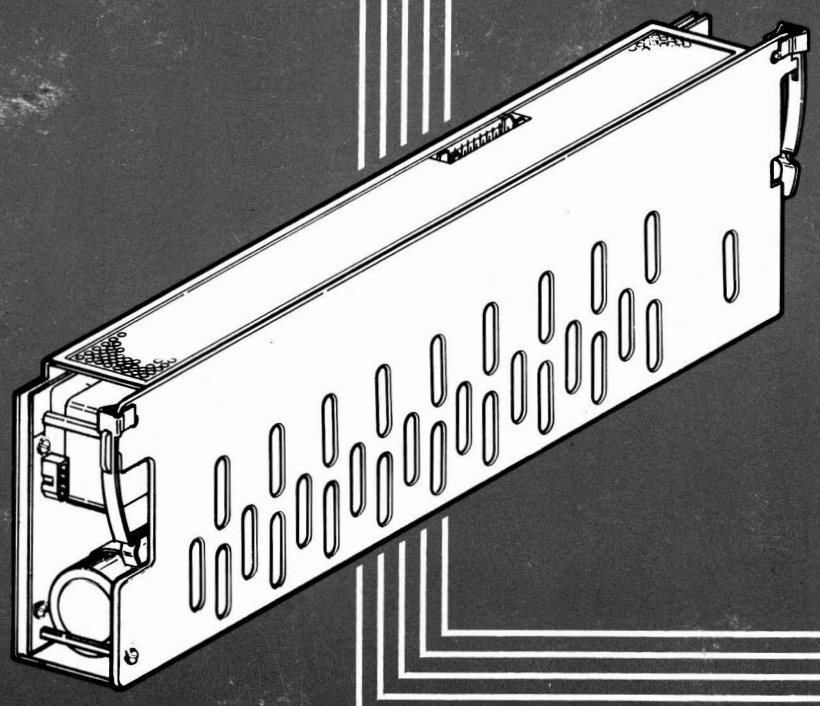
REPAIR MANUAL 523 for POWER SUPPLIES



Used with
42, 43 and 45
30CPS Character Printers

POWER SUPPLIES USED WITH 42, 43 AND 45-30 CPS CHARACTER PRINTERS

REPAIR MANUAL

INTRODUCTION

This manual provides complete repair information for power supplies used with 42, 43 and 45-30 CPS Character Printers. The manual is intended for field or shop use and is arranged into various parts that include testing, troubleshooting, circuit descriptions and diagrams, parts and packing and marking.

Waveforms are included on circuit diagrams and charts are provided for additional trouble isolation using an oscilloscope or volt-ohmmeter.

Circuit Diagram Manual 385 provides circuit information extracted from this manual. The component layouts, lead designations and circuit diagrams for each circuit are combined into single foldout sheets for the convenience of field or shop personnel when repairing circuit cards.

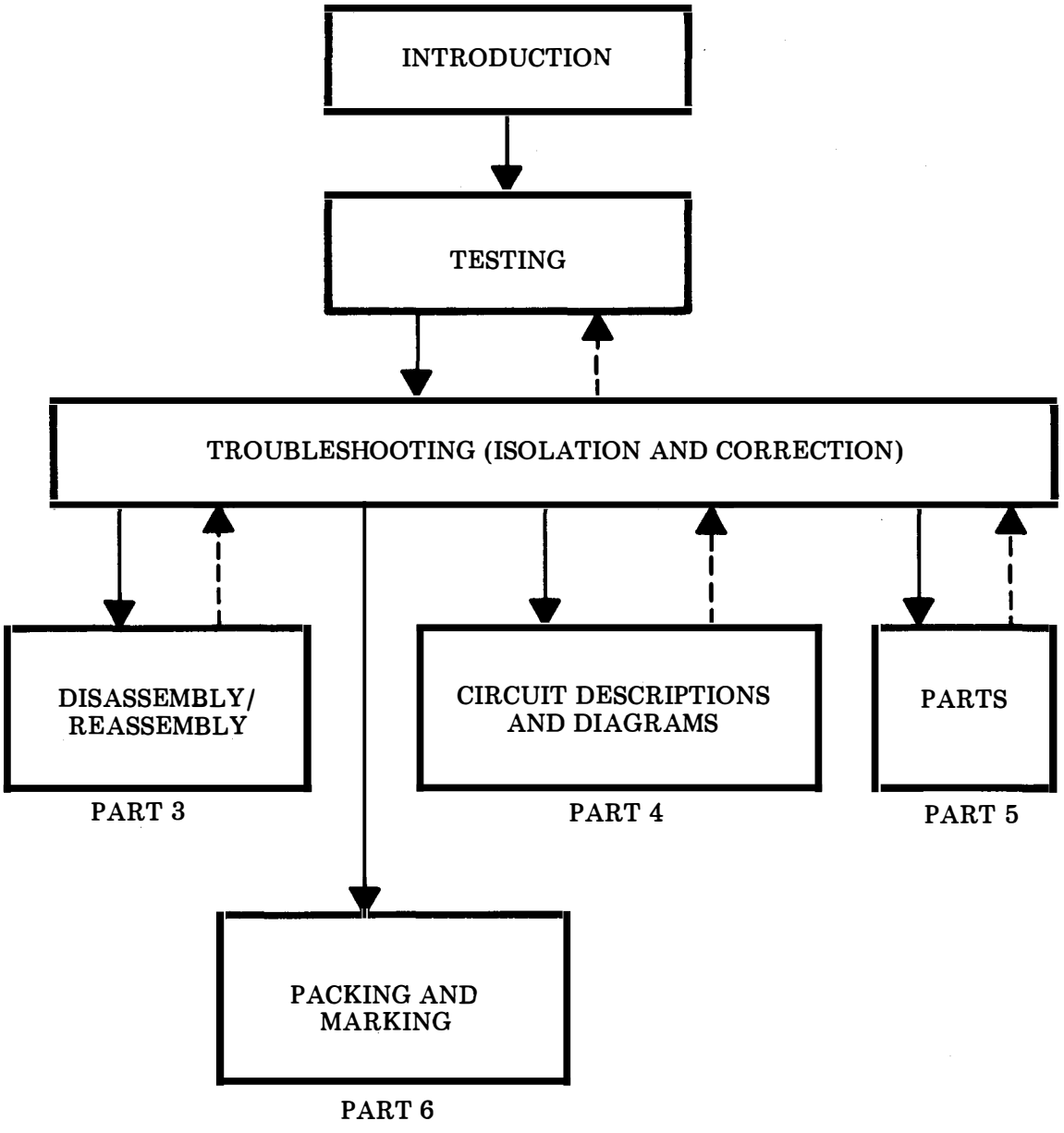
The task flow chart on the next page illustrates the intended repair activities and the associated manual parts.

Spare parts for repair are available from Teletype Corporation. Service personnel should be properly trained and have access to these spares before attempting repair of circuit cards.

This manual is intended to be used with the following supplemental repair documentation for the 42/43 and 45-30 CPS Character Printers.

MANUAL NO.	DESCRIPTION
385	— Circuit Diagrams for Components used in 42/43 and 45-30 CPS Character Printer Terminals and Associated Units
416	— Product Support Manual
442	— 42/43 Paper Tape Unit
522	— TTL and SSI Logic Cards used in 42/43 and 45-30 CPS Character Printers
525	— Keyboards used in 42/43 Basic Terminals
530	— SSI Keyboards used in 42/43 Buffered Terminals
533	— Parts — Enclosures, Paper Handling and Miscellaneous Accessories used with 42/43 and 45-30 CPS Character Printers
534	— Interfaces, Controllers and Modification Kit Circuit Cards associated with 42/43 Terminals (includes AB, SCU and brief repair of non-pedestal controllers)
539	— 42/43 and 45-30 CPS Character Printer Mechanisms
568	— Internal Modems used in 42 Basic Terminals

TASK FLOW CHART



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For 24 hour information concerning service call toll free:

U.S. 800/323-4226 IL 800/942-4192

EDUCATION SERVICES

Customers are also provided technical training on the installation, maintenance and repair of Teletype Corporation products

or

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Skokie, Illinois 60077
Department 3221
Information: 312/982-2538
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Teletype Corporation

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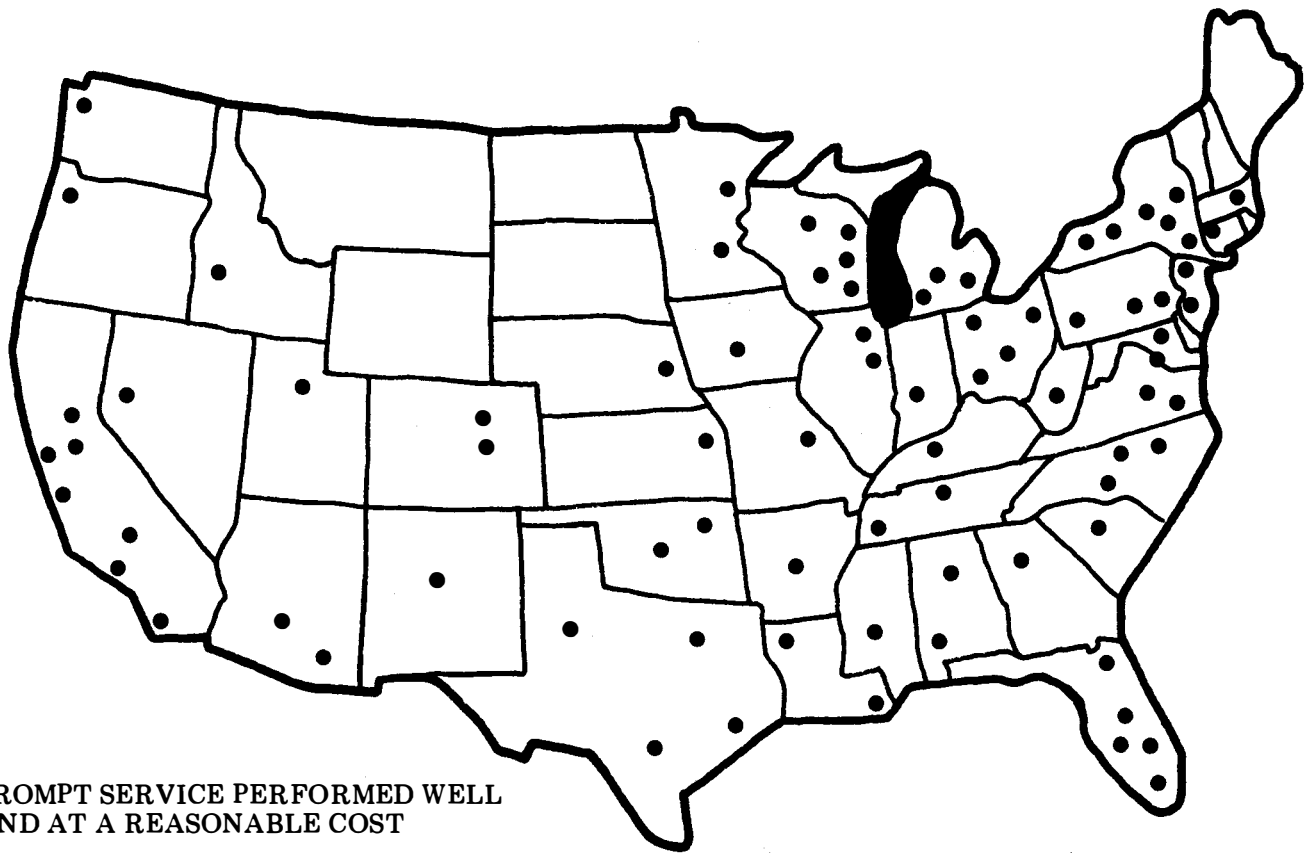

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A TOTAL SUPPORT EFFORT

Our service representatives are professional, employed and trained by Teletype Corporation. They know our equipment inside out, and can locate and repair problems quickly and effectively. These skilled technicians are backed by an array of sophisticated test equipment, a multi-million dollar parts inventory, and full engineering support. Only the manufacturer of equipment being serviced can offer this total support effort . . . Teletype Corporation Product Service . . . the complete resource.

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Albuquerque	Harrisburg	Orlando
Appleton	Hartford	Philadelphia
Atlanta	Houston	Phoenix
Baltimore	Indianapolis	Pittsburgh
Birmingham	Jackson	Portland
Boise	Jacksonville	Reno
Boston	Kalamazoo	Richmond
Buffalo	Kansas City	Rochester
Charleston	Lansing	Sacramento
Charlotte	Little Rock	Salt Lake City
Chicago	Long Island	San Antonio
Cincinnati	Los Angeles	San Diego
Cleveland	Louisville	Santa Clara
Colorado Springs	Lubbock	Seattle
Columbia	Madison	Shreveport
Columbus	Memphis	St. Louis
Dallas	Miami	Syracuse
Decatur	Milwaukee	Tampa
Denver	Minneapolis	Toledo
Des Moines	Mobile	Toronto
Detroit	Nashville	Tucson
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Durham	New York	Ventura
Eau Claire	Norfolk	Washington
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REPAIR MANUAL FOR POWER SUPPLIES

USED WITH 42, 43 and 45-30 CPS CHARACTER PRINTERS

TABLE OF CONTENTS

PART 1 — TESTING

CONTENTS

A. GENERAL

This part provides testing requirements and procedures for the power supplies used with 42, 43 and 45-30 CPS Character Printers. The 430700, 430760, 430770 and 430780 power supply assemblies are included in this part.

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

The information in this part is intended to determine if the power supply is operating properly and will continue to operate for extended periods under normal operating conditions.

Endurance, environmental extreme or electrical parameter testing information is not provided in this part.

The testing information provided herein should normally be used to determine if:

(1) A repaired power supply is operating properly before being returned to a customer or placed in service.

(2) A questionable power supply is operating properly or requires repair.

Warning: Repair or troubleshooting of these power supplies should not be attempted unless a power isolation transformer is connected between the ac input power and the supply.

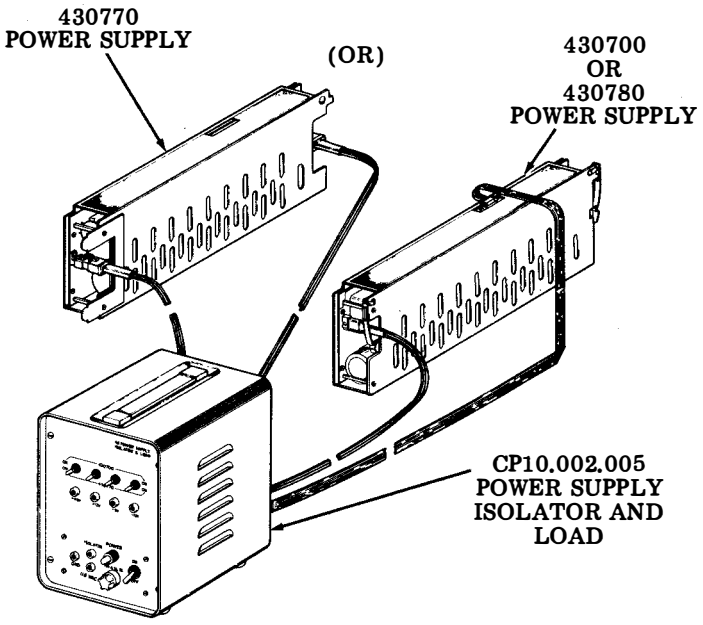
Following any repairs of the 430700 and 430780 power supply assemblies the following high voltage breakdown test must be performed:

With Pins 1 and 3 tied together at input connector (J202), a 1500 Vac (RMS) potential between these pins and Pin 2 (G) shall be applied with 30 second rise, 60 second hold time with no evidence of breakdown, and the peak current shall not exceed 10 mA. This requirement may be met at the set level.

B. TEST EQUIPMENT

The 430700, 430770 and 430780 power supplies may be tested as a loose component using the CP10.002.005 power supply isolator and load which provides an isolated nominal 117 Vac input voltage and resistive loads for power supply output voltages. Refer to Users Guide Manual 419 for theory of operation.

Contact Teletype Corporation, Custom Systems Division, 312-982-2000 for test equipment ordering information.



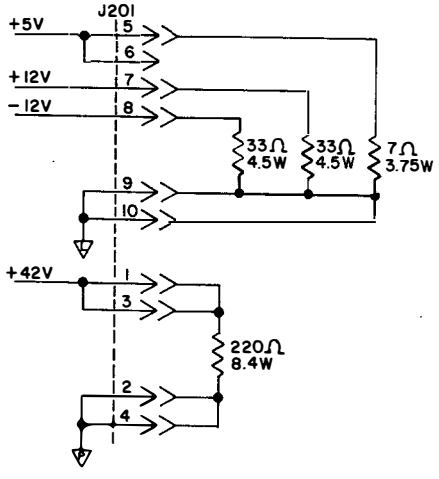
C. TESTING PROCEDURES

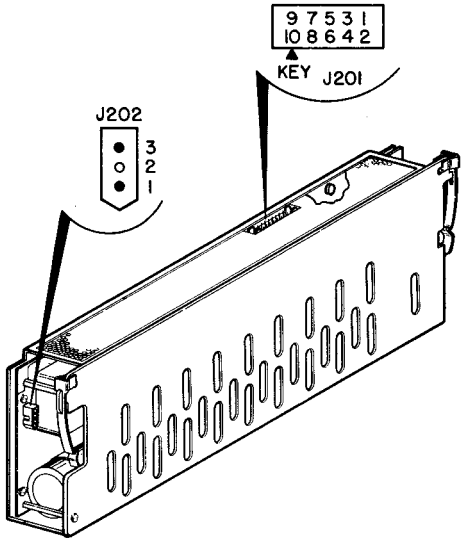
Loose power supplies may be tested as part of a teleprinter terminal. If a loose power supply is installed into a teleprinter terminal and the teleprinter passes the appropriate service manual tests and the test on Page 1-1 (430700 and 430780), the power supply may be considered good.

Power supplies may be tested as loose components using the following test procedures. The test on Page 1-1 must also be performed (430700 and 430780).

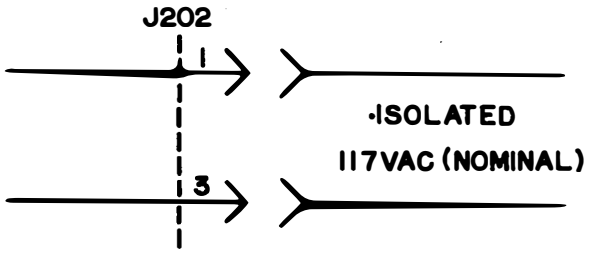
430700 and 430780 Power Supply

Connect load resistors to the J201 connector as shown below:





Connect any isolated voltage between 103 and 127 Vac and between 48 and 62 Hz to the J202 connector as follows:



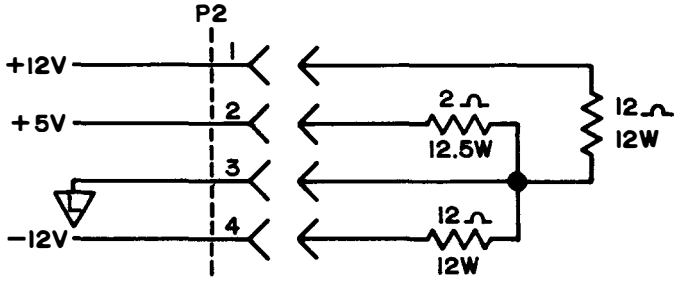
Verify the voltages shown below are present at the J201 connector and meet the voltage limits and maximum ripple requirements.

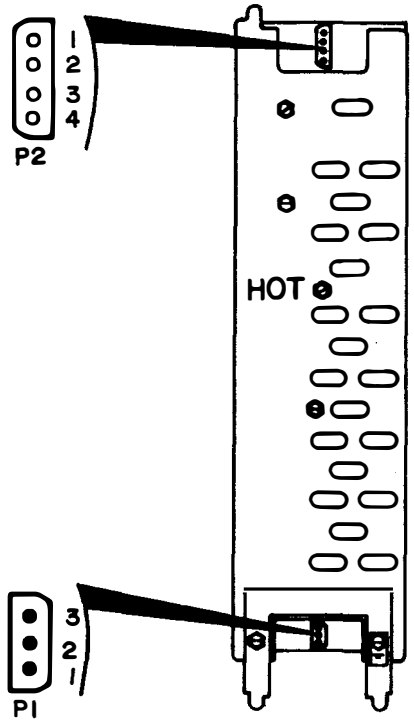
Nominal Voltage	Voltage Limits	Maximum Ripple (Peak to Peak)	J201 Connector No.
Logic Ground			9 and 10
-12 Vdc	-11.0 V to -13.0 V	100 MV	8
+12 Vdc	11.0 V to 13.0 V	100 MV	7
+5 Vdc	4.6 V to 5.4 V	50 MV	5 and 6
Power Ground			2 and 4
+42 Vdc	38.6 V to 45.4 V	500 MV	1 and 3

Verify LED (Light Emitting Diode) is ON.

430770 Power Supply

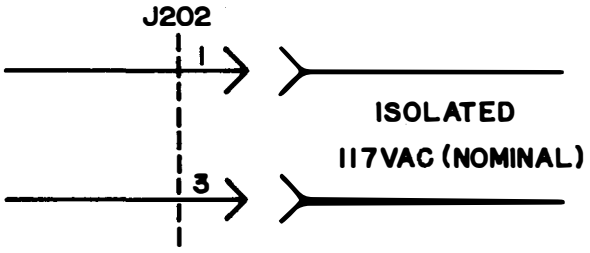
Connect load resistors to the P2 connector as shown below:





C. TESTING PROCEDURES

Connect any isolated voltage between 103 and 127 Vac and between 48 and 62 Hz to the P1 connector as follows:



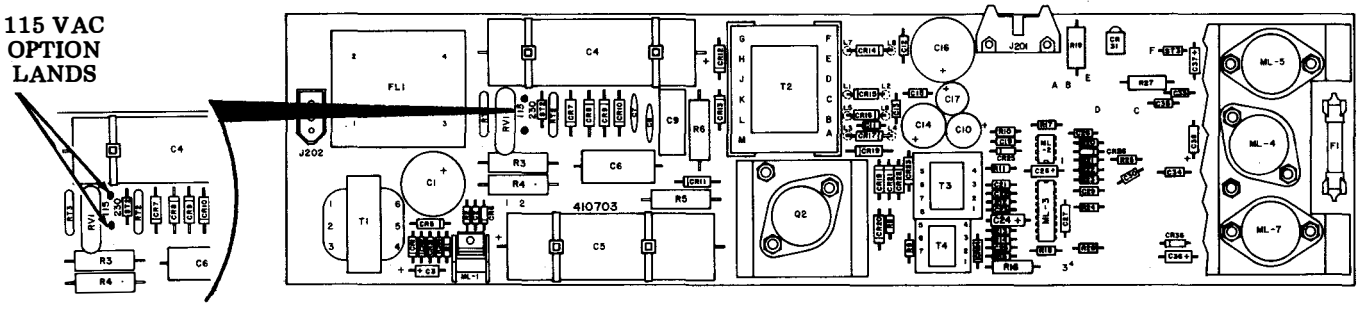
Verify the voltages shown below are present at the P2 connector and meet the voltage limits and maximum ripple requirements.

Nominal Voltage	Voltage Limits (Including Ripple)	Maximum Ripple (Peak to Peak)	J201 Connector No.
Logic Ground			3
+5 Vdc	4.75 V to 5.25 V	200 MV	2
+12 Vdc	11.40 V to 12.60 V	240 MV	1
-12 Vdc	-11.40 V to -12.50 V	240 MV	4

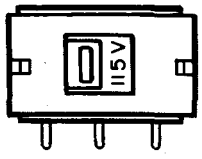
430760 Power Supply

The 430760 power supply may be optioned for 230 Vac or 117 Vac operation. Note the position of strap ST2 on the 410703 circuit card.

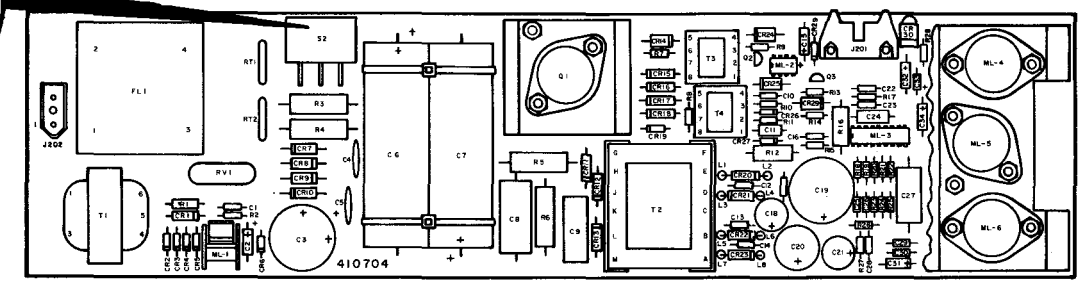
The 410703 circuit card is shown optioned for 230 Vac. To option the 410703 circuit card for 115 Vac, remove strap ST2 from its 230 Vac location and solder it into the 115 Vac position.



410703 CIRCUIT CARD

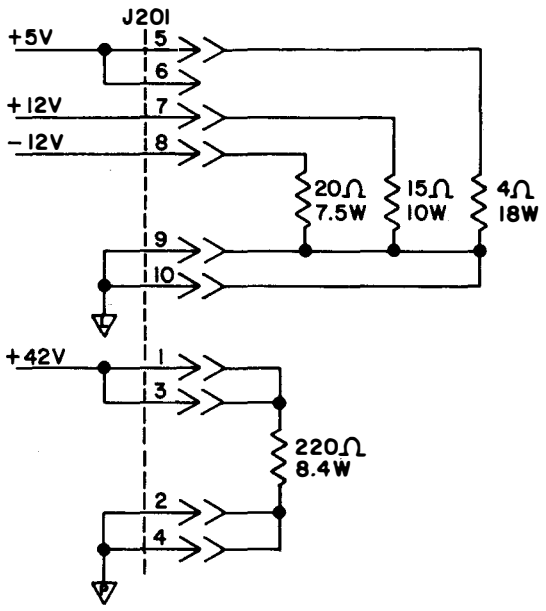


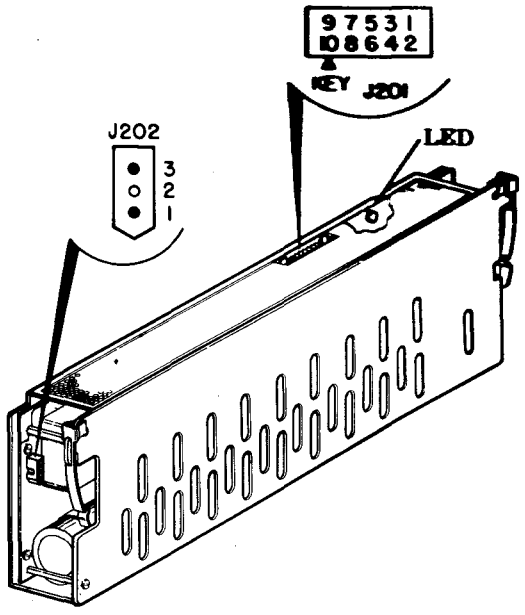
To change the option from 230 Vac to 115 Vac on the 410704 circuit card, operate the slide switch on top of the card to the 115 V position.



410704 CIRCUIT CARD

Connect load resistors to the J201 connector as shown below:

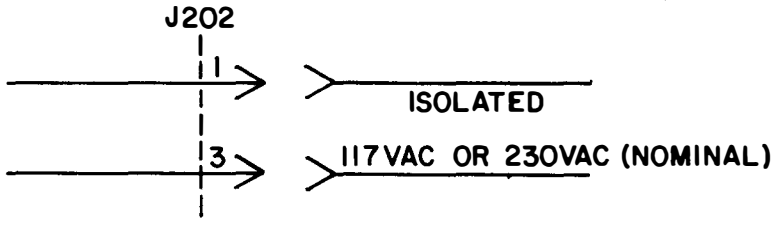




If ST2 is in the 230 position, connect any isolated voltage between 196 Vac and 264 Vac and between 48 and 62 Hz to the J202 connector.

If ST2 is in the 115 position connect any isolated voltage between 103 Vac and 127 Vac and between 48 and 62 Hz to the J202 connector.

Connect the proper voltage to the J202 connector as follows:



Verify the voltages shown below are present at the J201 connector and meet the voltage limits and maximum ripple requirements.

Nominal Voltage	Voltage Limits	Maximum Ripple (Peak to Peak)	J201 Connector No.
Logic Ground			9 and 10
-12 Vdc	-11.28 V to 12.72 V	250 MV	8
+12 Vdc	11.28 V to 12.72 V	250 MV	7
+5 Vdc	4.75 V to 5.25 V	250 MV	5 and 6
Power Ground			2 and 4
+42 Vdc	38.6 V to 42.0 V	850 MV	1 and 3

Verify LED (Light Emitting Diode) is ON.

PART 2 — TROUBLESHOOTING

CONTENTS

A. GENERAL

This part provides troubleshooting information for power supplies used with 42, 43 and 45-30 CPS Character Printers. The 430700, 430760, 430770 and 430780 power supply assemblies are included in this part. No Troubleshooting Guide for the 430770 power supply is provided in this part.

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

Check and verify proper static circuit resistance of defective power supply assemblies before connecting them to the teleprinter or power source, to prevent overloading and blowing the fuse when power is turned on.

When replacing the power supply fuse, wait 10 seconds after turning off power before removing fuse.

Use meter RX1 scale when making resistance readings. Resistance readings shown are approximate and may be higher or lower than those specified, depending on the meter used.

Before applying power to 430700 power supply assemblies with cover or heat sink removed, or attempting repair of the power supply, refer to Part 3 — DISASSEMBLY/REASSEMBLY, and check for vented capacitors.

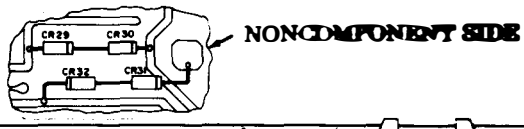
The voltage regulator circuitry, oscillator circuitry, and pulse width modulator circuitry of the 430700, 430760 and 430780 power supply assemblies may be checked by applying external dc voltages with no ac power applied. (Refer to the respective circuit diagram for specific voltages and points of application.)

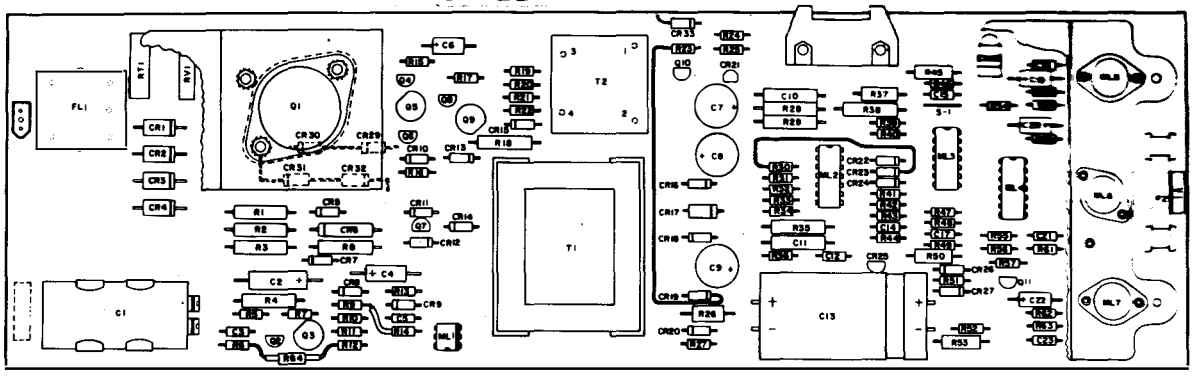
B. 430700 AND 430780 POWER SUPPLY

Troubleshooting Guide

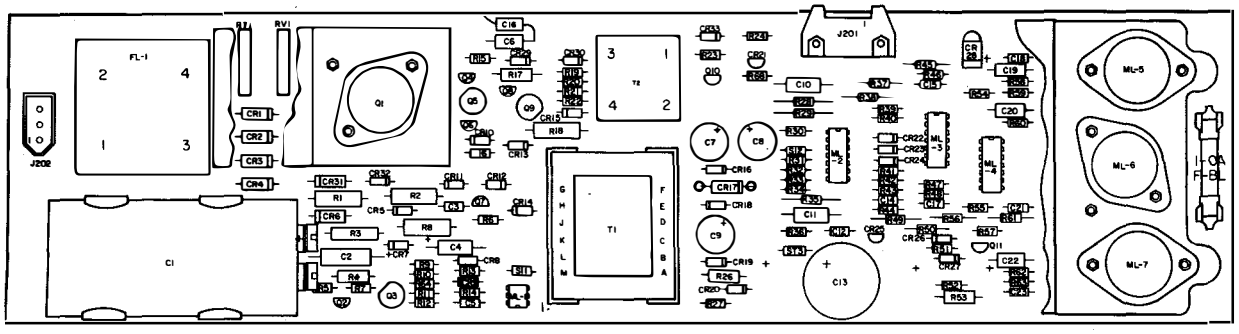
QUESTION	YES	NO
1. Is the red indicator ON (power applied and on)?	Go to 1c.	Go to 1a.
1a. Is +16 V present at the anode of CR28?	Replace CR28.	Go to 1b.
1b. Are any voltages present on J201? Pins 5, 6 +5 V Pin 8 -12 V Pin 7 +12 V Pins 1, 3 +42 V	Go to 1c.	Check oscillator and control circuit (see Note 202 on circuit diagram in Part 4). Check components in ac-dc circuit. Check components in overvoltage circuit if present. Check components in primary circuit
1c. Is +5 V present and within range on J201 Pin 5?	Go to 1d.	Check CR16. Check ML5. Check ML3. Check T1 (F-M).
1d. Is -12 V present and within range of J201 Pin 8?	Go to 1e.	Check CR18. Check ML6. Check ML3. Check T1 (C-D).
1e. Is +12 V present and within range on J201 Pin 7?	Go to 1f.	Check CR19. Check ML7. Check ML3. Check T1 (B-C).
1f. Is +42 V present and within range on J201 Pins 1 and 3?	Go to 2.	Check fuse F2. Check CR17. Check ML3. Check T1 (E-A).
2. Are all voltages present and within range on J201?	If LED is OFF check ML4. If LED is ON go to 3.	Review initial indication of trouble.
3. Did the power supply meet the requirements of the high voltage breakdown test on Page 1-1?	Undefined problem. Refer to Circuit Descriptions and Circuit Diagrams.	Check FL1. Check C16. Check for arc under Q1. Check for arc through plastic tubing on C1 to the capacitor clamp. Check ML1. Check T2. Check T1.

Circuit Card Component Layout

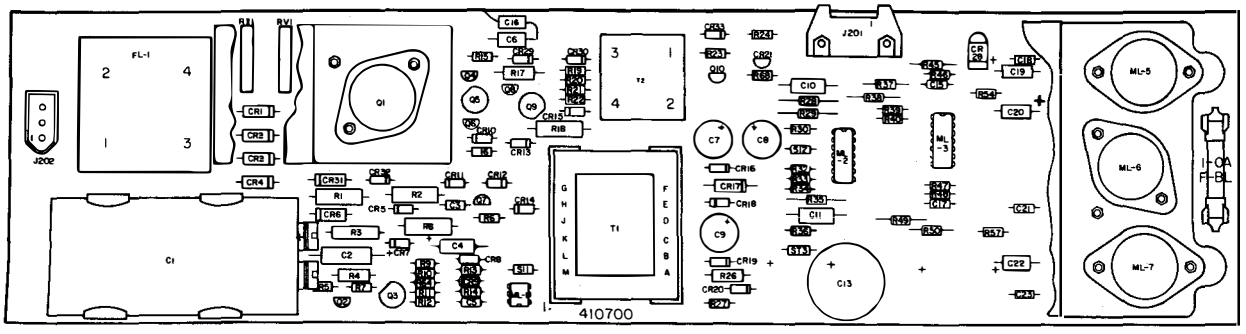




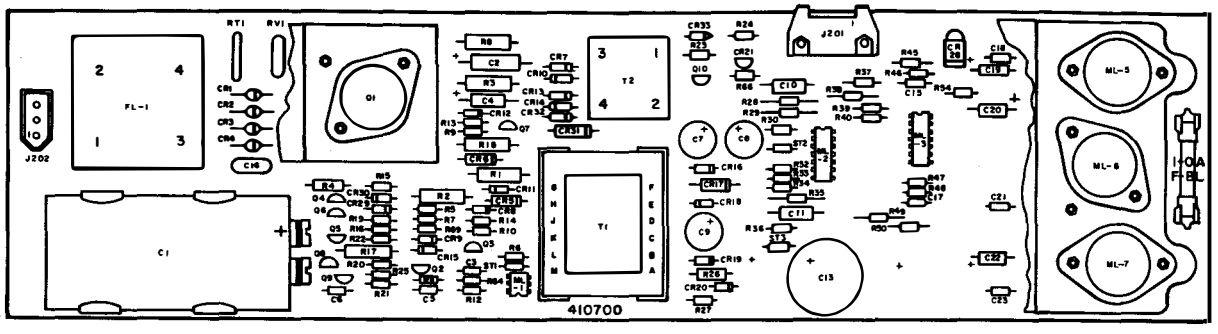
410700 Circuit Card Issues 1 through 4



410700 Circuit Card Issues 5 through 8B

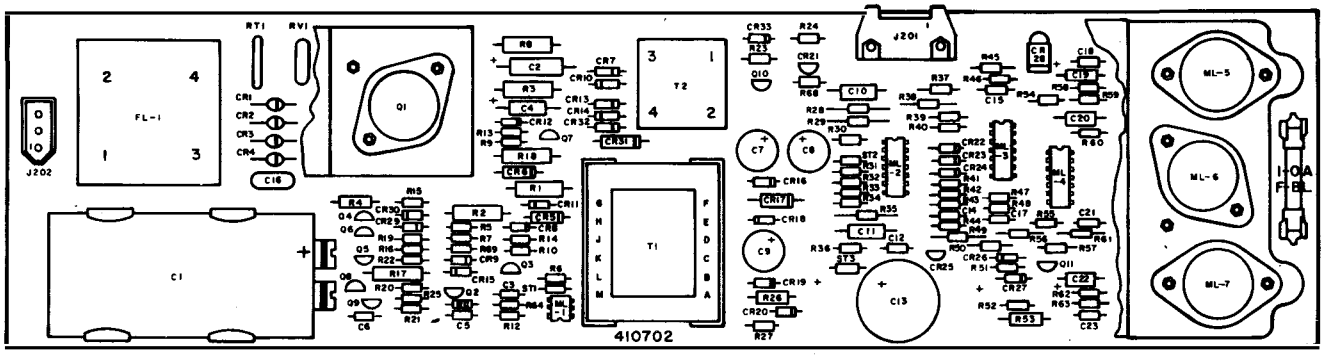


410700 Circuit Card Issue 9

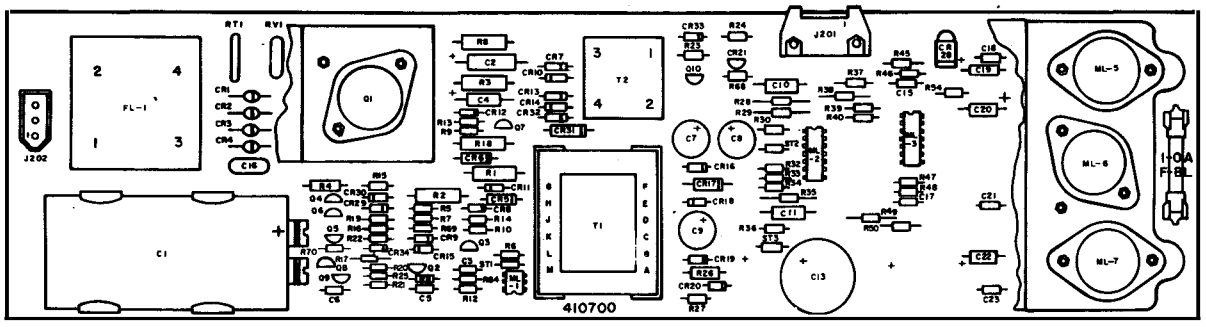


410700 Circuit Card Issue 10

B. 430700 and 430780 POWER SUPPLY (Contd)



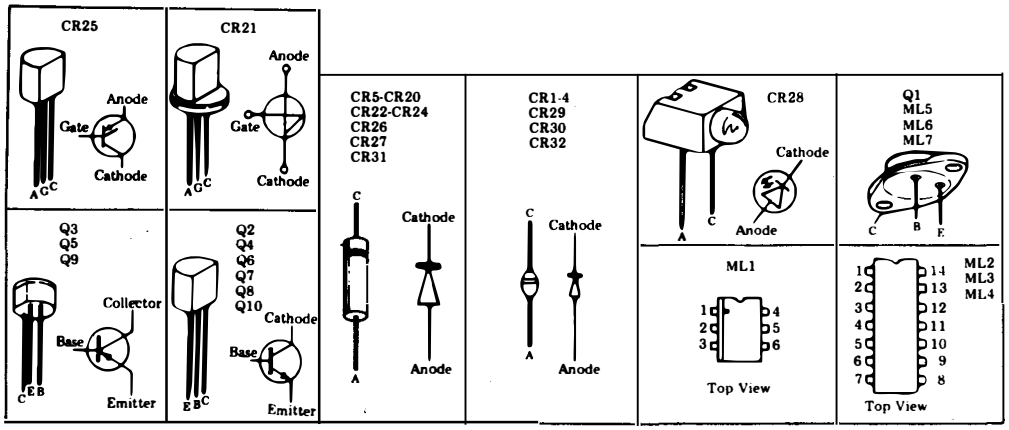
410702 Circuit Card Issues 1A through 2B



410702 Circuit Card Issue 3

Some parts shown are not present on later issue circuit cards (refer to PART 5—PARTS).

Semiconductors and Integrated Circuits Identification and Lead Designation.



Semiconductor — In Circuit Static Forward Resistance

COMPONENT		RESISTANCE (Approx)
CR1		28 ohms
CR2		28 ohms
CR3		28 ohms
CR4		28 ohms
CR5		30 ohms
CR6		28 ohms
CR7		24 ohms
CR8		95 ohms
CR9		24 ohms
CR10		24 ohms
CR11		24 ohms
CR12		24 ohms
CR13		24 ohms
CR14		24 ohms
CR15		26 ohms
CR16		24 ohms
CR17		22 ohms
CR18		26 ohms
CR19		24 ohms
CR20		32 ohms
CR21	G-C	48 ohms
	G-A	42 ohms
CR22		32 ohms
CR23		34 ohms
CR24		32 ohms
CR25	G-C	110 ohms
	G-A	38 ohms
CR26		34 ohms
CR27		34 ohms
CR28		110 ohms (LED on)
CR29		28 ohms
CR30		28 ohms
CR31		28 ohms
CR32		28 ohms
CR33		24 ohms

COMPONENT		RESISTANCE (Approx)
Q1	B-E	24 ohms
	B-C	22 ohms
Q2	B-E	30 ohms
	B-C	30 ohms
Q3	B-E	32 ohms
	B-C	32 ohms
Q4	B-E	30 ohms
	B-C	30 ohms
Q5	B-E	30 ohms
	B-C	30 ohms
Q6	B-E	30 ohms
	B-C	30 ohms
Q7	B-E	30 ohms
	B-C	30 ohms
Q8	B-E	30 ohms
	B-C	30 ohms
Q9	B-E	30 ohms
	B-C	30 ohms
Q10	B-E	30 ohms
	B-C	30 ohms
Q11	B-E	30 ohms
	B-C	30 ohms
ML1	1-2	60 ohms
	4-6	48 ohms
	5-6	48 ohms
ML5	B-E	40 ohms
	B-C	25 ohms
ML6	B-E	70 ohms
	B-C	25 ohms
ML7	B-E	38 ohms
	B-C	25 ohms

Static Circuit Resistance (See Note)

CONNECTOR TERMINAL	REFERENCE POINT	RESISTANCE (Approx)	
		LO	HI
J201 — 6 (+5 V)	J201 — 9 (logic gnd)	38 ohms	2K ohms
J201 — 7 (+12 V)	J201 — 9 (logic gnd)	32 ohms	400 ohms
J201 — 8 (-12 V)	J201 — 9 (logic gnd)	70 ohms	8K ohms
J201 — 1 (+42 V)	J201 — 2 (power gnd)	24 ohms	5K ohms

Note: Take resistance reading, reverse meter leads and take second resistance reading.

C. 430760 POWER SUPPLY

410703 Circuit Card Troubleshooting Guide

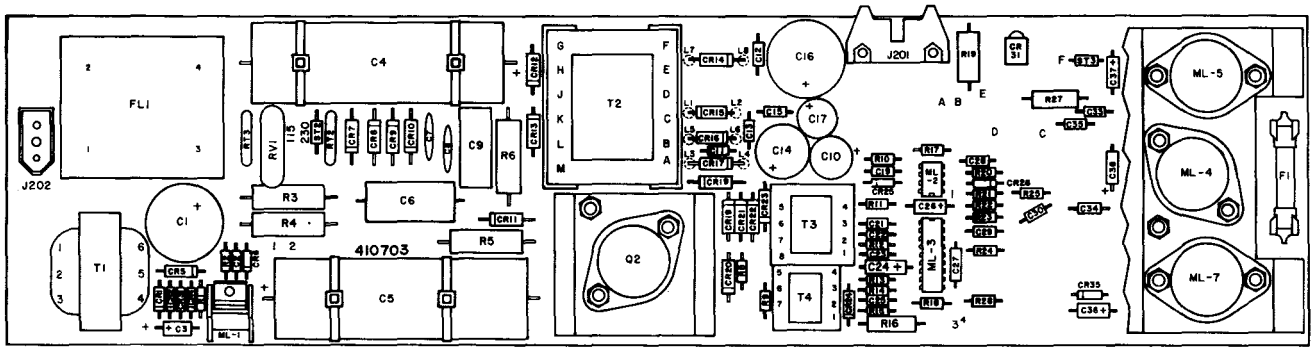
QUESTION	YES	NO
1. Is the red indicator ON (power applied and on)?	Go to 1b.	Go to 1a.
1a. Is +42 V present and within range on J201 Pins 1 and 3?	Replace CR31.	Check fuse F1. Go to 1b.
1b. Are any voltages present on J201? Pins 5, 6 +5 V Pin 8 -12 V Pin 7 +12 V Pins 1, 3 +42 V	Go to 2.	Go to 1c.
1c. Is voltage present and correct across V+ and VIN?	Go to 1d.	Check filter FL1. Check VIN Bridge Rectifier.
1d. Is V Start voltage present and correct?	Check ML2 and ML3 Check components in primary circuit.	Check ML1, CR6. Check V Start Bridge Rectifier.
2. Is +42 V present and within range on J201 Pins 1 and 3?	Go to 2a.	Check fuse F1, CR14, ML3. Check T1 (E-F).
2a. Is +5 V present and within range on J201 Pins 5 and 6?	Go to 2b.	Check CR17, ML5, ML3. Check T1 (A-C).
2b. Is +12 V present and within range on J201 Pin 7?	Go to 2c.	Check CR16, ML7, ML3. Check T1 (B-C).
2c. Is -12 V present and within range on J201 Pin 8?	Go to 3.	Check CR15, ML6, ML3. Check T1 (C-D).
3. Are all voltages present and correct on J201?	Undefined Problem-Refer to Circuit Descriptions and Circuit Diagrams.	Review initial indication of trouble.

410704 Circuit Card Troubleshooting Guide

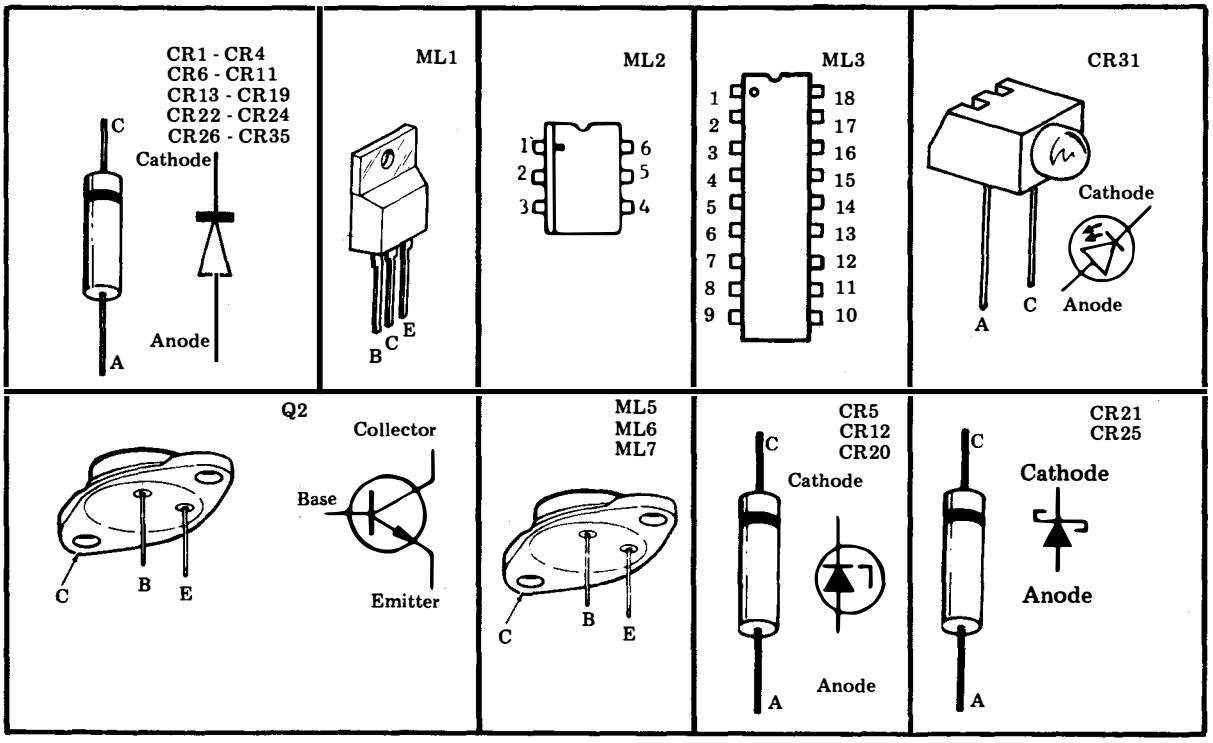
QUESTION	YES	NO
1. Is the red indicator ON (power applied and on)?	Go to 1b.	Go to 1a.
1a. Is +5 V present and within range on J201 Pins 5 and 6?	Replace CR30.	Go to 1b.
1b. Are any voltages present on J201? Pins 5, 6 +5 V Pin 8 -12 V Pin 7 +12 V Pins 1, 3 +42 V	Go to 2.	Go to 1c.
1c. Is voltage present and correct across V+ and VIN?	Go to 1d.	Check filter FL1. Check VIN Bridge Rectifier.
1d. Is V Start voltage present and correct?	Check ML2, ML3, Q2, and Q3. Check components in primary circuit.	Check ML1, CR6. Check V Start Bridge Rectifier.
2. Is +42 V present and within range on J201 Pins 1 and 3?	Go to 2a.	Check CR22 and ML3. Check T1 (E-F).
2a. Is +5 V present and within range on J201 Pins 5 and 6?	Go to 2b.	Check CR23, ML6, ML3. Check T1 (A-C).
2b. Is +12 V present and within range on J201 Pin 7?	Go to 2c.	Check CR22, ML4, ML3. Check T1 (B-C).
2c. Is -12 V present and within range on J201 Pin 8?	Go to 3.	Check CR21, ML5, ML3. Check T1 (C-D).
3. Are all voltages present and correct on J201?	Undefined Problem-Refer to Circuit Descriptions and Circuit Diagrams.	Review initial indication of trouble.

C. 430760 POWER SUPPLY (Contd)

410703 Circuit Card Component Layout



Semiconductors and Integrated Circuits Identification and Lead Designation



Semiconductor — In Circuit Static Forward Resistance

COMPONENT		RESISTANCE (Approx)
CR1		28 ohms
CR2		28 ohms
CR3		28 ohms
CR4		28 ohms
CR5		30 ohms
CR6		28 ohms
CR7		26 ohms
CR8		26 ohms
CR9		26 ohms
CR10		26 ohms
CR11		24 ohms
CR12		24 ohms
CR13		24 ohms
CR14		22 ohms
CR15		22 ohms
CR16		22 ohms
CR17		22 ohms
CR18		28 ohms
CR19		26 ohms
CR20		32 ohms
CR21		8 ohms
CR22		30 ohms
CR23		28 ohms
CR24		10 ohms
CR25		10 ohms
CR26		28 ohms
CR35		28 ohms
Q2	B-E	8 ohms
	B-C	22 ohms
	E-C	28 ohms
ML1	B-E	36 ohms
	B-C	30 ohms
ML5	B-E	22 ohms
	B-C	34 ohms
ML6	B-E	22 ohms
	B-C	110 ohms
ML7	B-E	22 ohms
	B-C	38 ohms

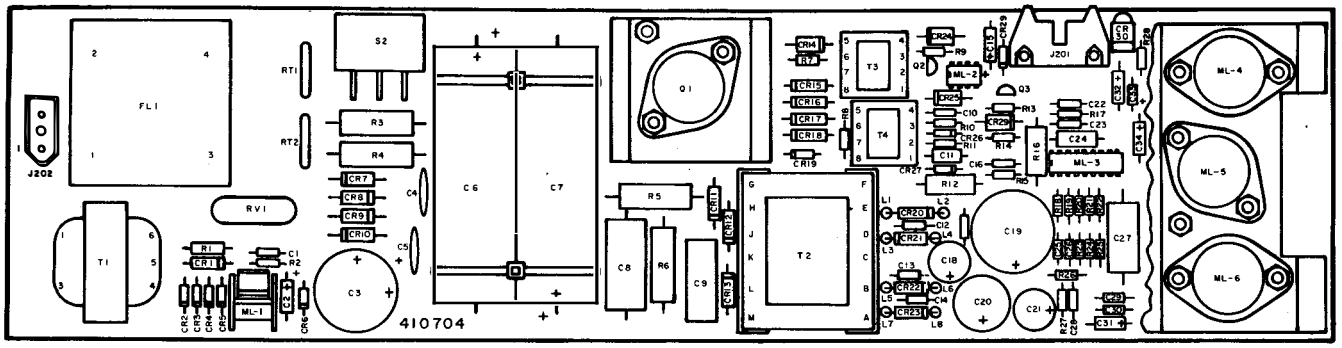
Static Circuit Resistance (See Note)

CONNECTOR TERMINAL	REFERENCE POINT	RESISTANCE (Approx)	
		LO	HI
J201 — 6 (+5 V)	J201 — 9 (logic gnd)	28 ohms	500 ohms
J201 — 7 (+12 V)	J201 — 9 (logic gnd)	40 ohms	1K ohms
J201 — 8 (-12 V)	J201 — 9 (logic gnd)	115 ohms	Infinity
J201 — 1 (+42 V)	J201 — 2 (power gnd)	22 ohms	750 ohms

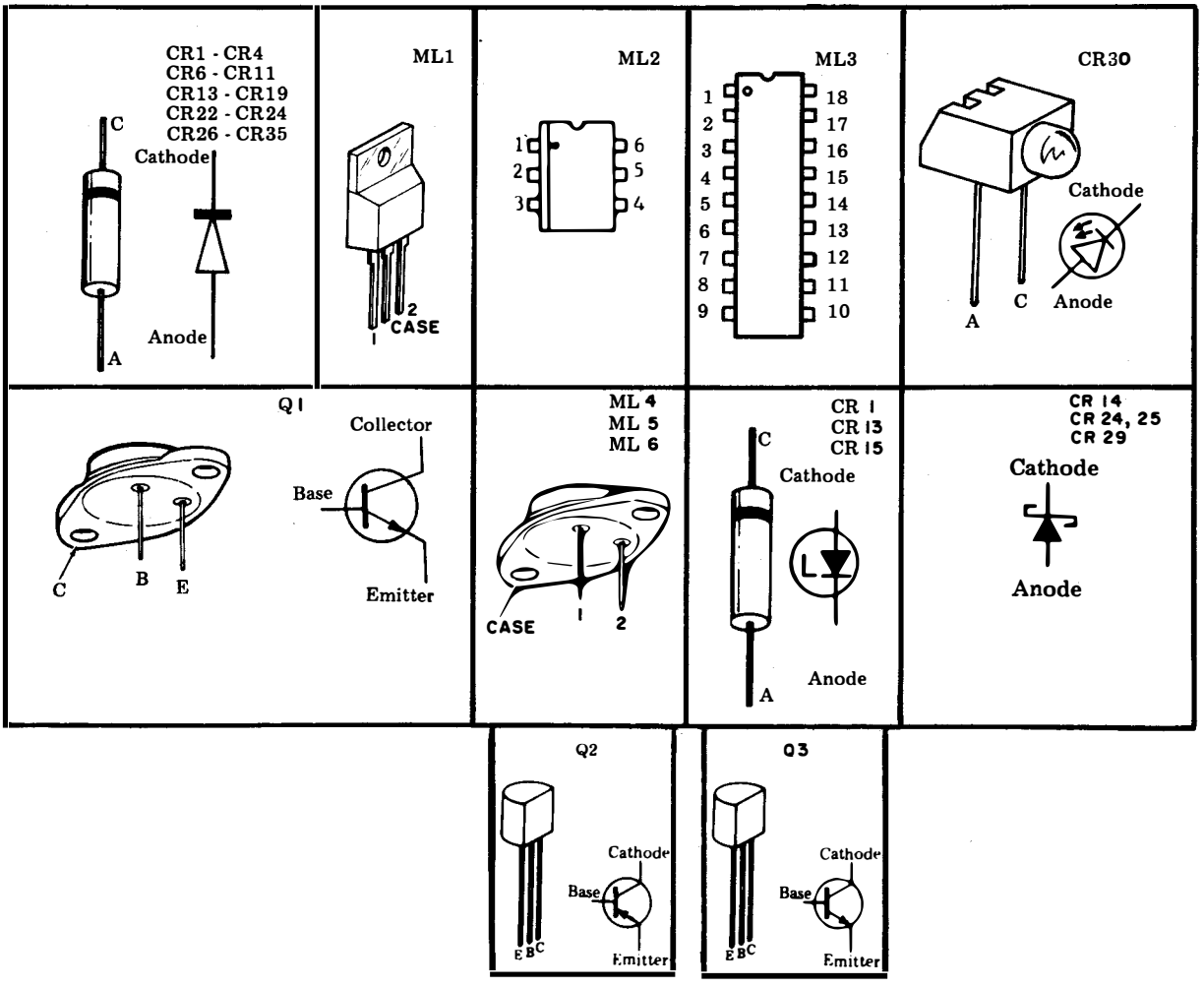
Note: Take resistance reading, reverse meter leads and take second resistance reading.

C. 430760 POWER SUPPLY (Contd)

410704 Circuit Card Component Layout



SEMICONDUCTORS AND INTEGRATED CIRCUITS IDENTIFICATION AND LEAD DESIGNATION



Semiconductor — In Circuit Static Forward Resistance

COMPONENT	RESISTANCE (Approx)	COMPONENT	RESISTANCE (Approx)
CR1	30 ohms	CR23	22 ohms
CR2	28 ohms	CR24	10 ohms
CR3	28 ohms	CR25	10 ohms
CR4	28 ohms	CR26	28 ohms
CR5	28 ohms	CR27	10 ohms
CR6	28 ohms	CR28	28 ohms
CR7	26 ohms	Q1 B-E	8 ohms
CR8	26 ohms	B-C	28 ohms
CR9	26 ohms	Q2 B-E	30 ohms
CR10	26 ohms	B-C	30 ohms
CR11	24 ohms	E-C	40 ohms
CR12	24 ohms	Q3 B-E	30 ohms
CR13	24 ohms	B-C	30 ohms
CR14	8 ohms	E-C	40 ohms
CR15	32 ohms	ML1 B-E	36 ohms
CR16	26 ohms	B-C	30 ohms
CR17	28 ohms	ML4 B-E	22 ohms
CR18	30 ohms	B-C	38 ohms
CR19	28 ohms	ML5 B-E	22 ohms
CR20	22 ohms	B-C	110 ohms
CR21	22 ohms	ML6 B-E	22 ohms
CR22	22 ohms	B-C	34 ohms

Static Circuit Resistance

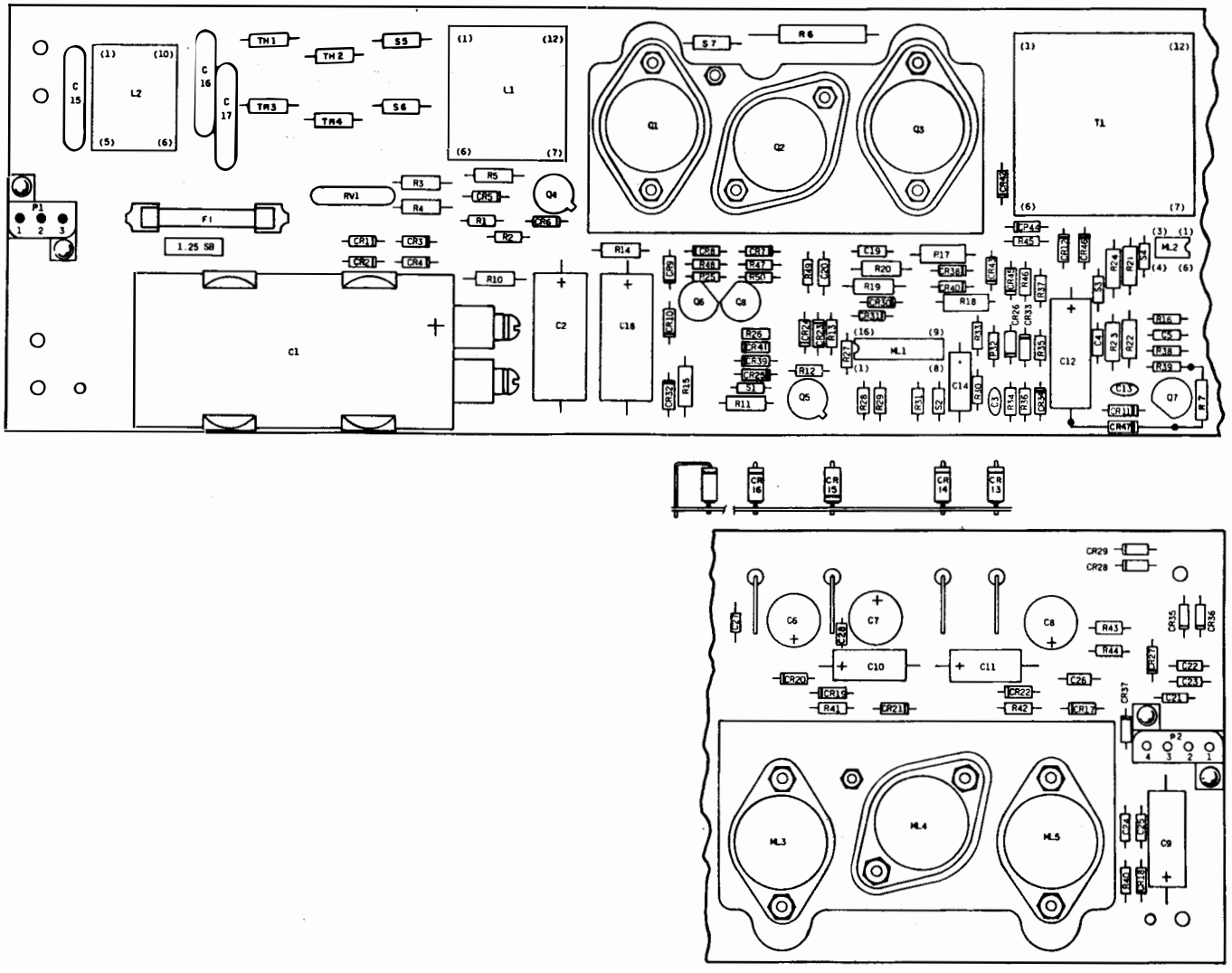
(See Note.)

CONNECTOR TERMINAL	REFERENCE POINT	RESISTANCE (Approx)	
		LO	HI
J201 — 6 (+5 V)	J201 — 9 (logic gnd)	28 ohms	500 ohms
J201 — 7 (+12 V)	J201 — 9 (logic gnd)	40 ohms	1 K ohms
J201 — 8 (-12 V)	J201 — 9 (logic gnd)	115 ohms	Infinity
J201 — 1 (+42 V)	J201 — 2 (power gnd)	22 ohms	750 ohms

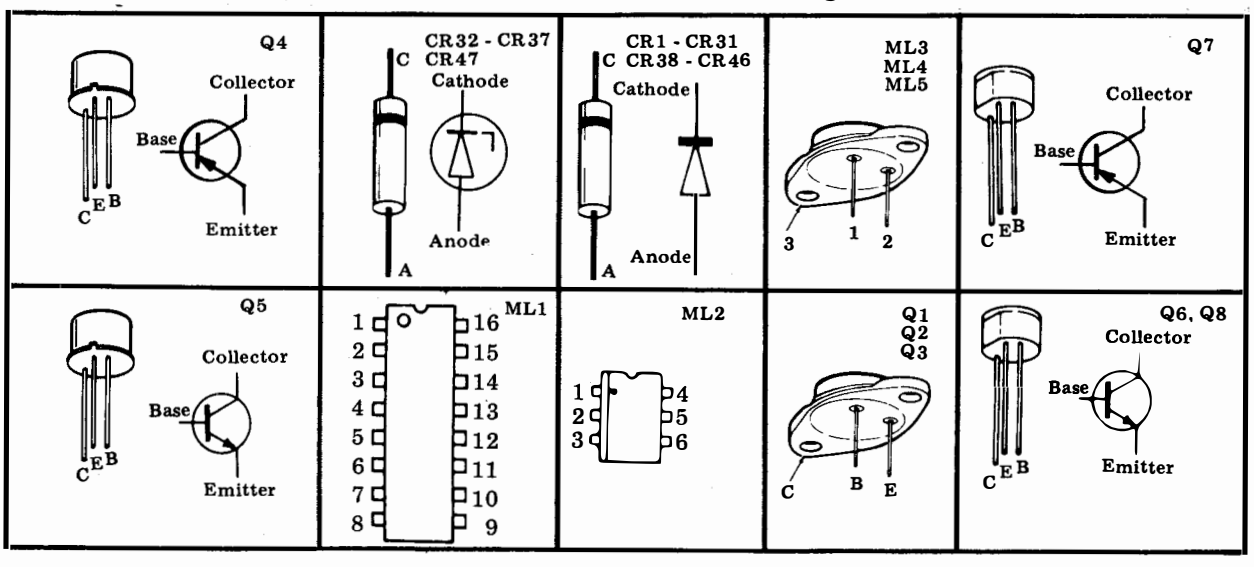
Note: Take resistance reading, reverse meter leads and take second resistance reading.

D. 430770 POWER SUPPLY

Circuit Card Component Layout



Semiconductors and Integrated Circuits Identification and Lead Designation



Semiconductor — In Circuit Static Forward Resistance

COMPONENT	RESISTANCE (Approx)	COMPONENT	RESISTANCE (Approx)
CR1	30 ohms	CR26	32 ohms
CR2	30 ohms	CR27	34 ohms
CR3	30 ohms	CR28	34 ohms
CR4	30 ohms	CR29	34 ohms
CR5	24 ohms	CR30	34 ohms
CR6	26 ohms	CR31	34 ohms
CR7	24 ohms	CR32	34 ohms
CR8	24 ohms	CR33	34 ohms
CR9	30 ohms	CR34	33 ohms
CR10	30 ohms	CR35	32 ohms
CR11	35 ohms	CR36	35 ohms
CR12	30 ohms	CR37	35 ohms
CR13	22 ohms	CR38	28 ohms
CR14	22 ohms	CR39	25 ohms
CR15	24 ohms	CR40	34 ohms
CR16	24 ohms	CR41	34 ohms
CR17	32 ohms	CR42	32 ohms
CR18	30 ohms	CR43	32 ohms
CR19	30 ohms	CR44	32 ohms
CR20	28 ohms	CR45	32 ohms
CR21	28 ohms	CR46	32 ohms
CR22	32 ohms	CR47	32 ohms
CR23	34 ohms		
CR24	34 ohms		
CR25	34 ohms		

D. 430770 POWER SUPPLY (Contd)

COMPONENT	RESISTANCE (Approx)	COMPONENT	RESISTANCE (Approx)
Q1 B-E	25 ohms	ML2 1-2	60 ohms
Q1 B-C	25 ohms	4-6	48 ohms
Q2 B-E	28 ohms	5-6	40 ohms
Q2 B-C	28 ohms	ML3 3-1	24 ohms
Q3 B-E	28 ohms	3-2	32 ohms
Q3 B-C	28 ohms	ML4 1-3	24 ohms
Q4 B-E	35 ohms	1-2	32 ohms
Q4 B-C	32 ohms	ML5 3-1	24 ohms
Q5 B-E	32 ohms	3-2	32 ohms
Q5 B-C	32 ohms		
Q6 B-E	34 ohms		
Q6 B-C	34 ohms		
Q7 B-E	34 ohms		
Q7 B-C	34 ohms		
Q8 B-E	34 ohms		
Q8 B-C	34 ohms		

Static Circuit Resistance (See Note)

CONNECTOR TERMINAL	REFERENCE POINT	RESISTANCE (Approx) LO	HI
P1-2 (+5 V)	P1-3 (logic gnd)	30 ohms	400 ohms
P1-1 (+12 V)	P1-3 (logic gnd)	32 ohms	1.5K ohms
P1-4 (-12 V)	P1-3 (logic gnd)	32 ohms	1.5K ohms

Note: Take resistance reading, reverse meter leads and take second resistance reading.

PART 3 — DISASSEMBLY/REASSEMBLY

CONTENTS

A. GENERAL

This part provides disassembly/reassembly procedures for power supplies used with 42, 43 and 45-30 CPS Character Printers. The 430700, 430760, 430770 and 430780 power supply assemblies are included in this part. When disassembly/reassembly information is not shown, the illustrations in PART 5 — PARTS provide sufficient information.

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

Caution: Remove all power from the power supply before performing any disassembly/reassembly procedures.

When removing a part, do not pry or force parts to provide the necessary clearance for removal. Follow the removal procedure and note how each part is removed and the sequence of its removal so that proper reassembly can be accomplished. For reassembly, reverse the removal procedures except where different instructions are given.

B. TOOLS REQUIRED

The following tools may be required when performing the power supply disassembly/reassembly procedures. Most of these items should normally be present in standard maintenance tool kits.

Part No.	Description
75765	Hook, Pull Spring
94646	Stick, Orange
95368	Screwdriver, 1/8 Inch, 2 Inch Blade
100982	Screwdriver/Clip, 1/4 Inch, 6 Inch Blade
108285	Pliers, Long-Nose
151392	Tweezers
348097	Driver, Nut, 1/4 Inch
348098	Driver, Nut, 5/16 Inch
407326	Extractor, IC
408071	Pliers, Cutting

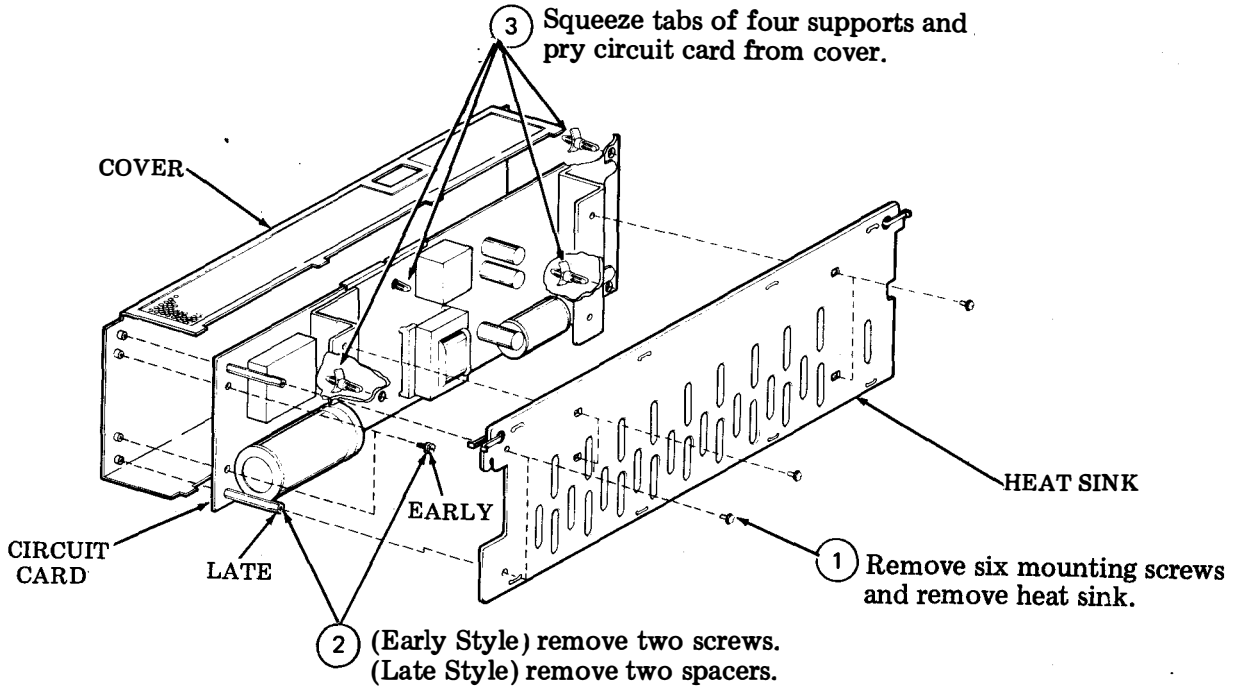
Customer Provided Tools

Soldering Iron (Low Wattage, Grounded)
Desoldering Tool

C. DISASSEMBLY/REASSEMBLY

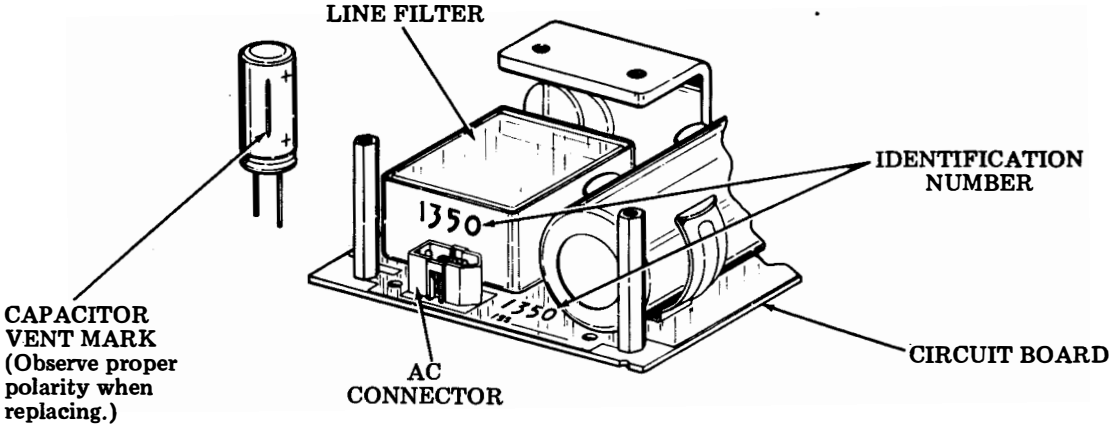
1. 430700 and 430780 Power Supply

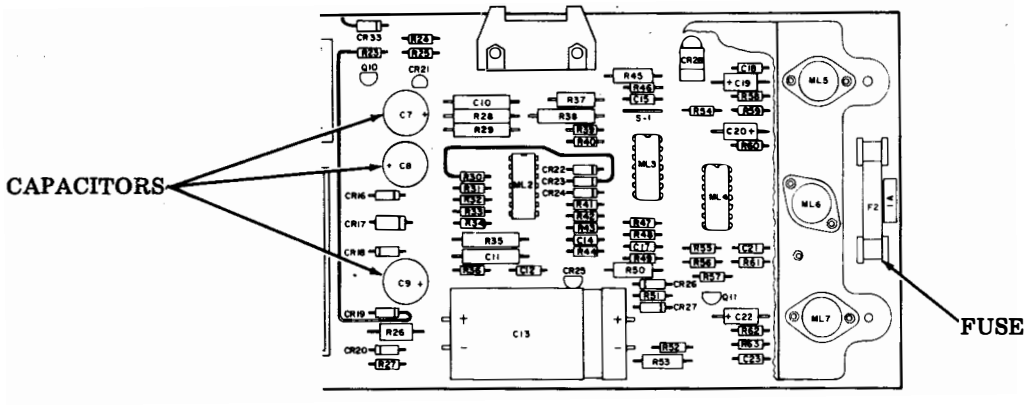
   (a) 410700 and 410702 Circuit Card Removal



(b) Vented Capacitors (410700 Circuit Card, Issue 4D or earlier).

Check the identification number if present, located on the circuit board next to the ac connector or on the end of the line filter.





If the number is 9300 or less, check for either of the following identification marks:

(a) Red line under fuse.

(b) Red dot on top of capacitors C7, C8 and C9.

If the ID number is 9300 or greater or if the mark is present under the fuse or on each of the three capacitors, proceed with the troubleshooting or repair procedures.

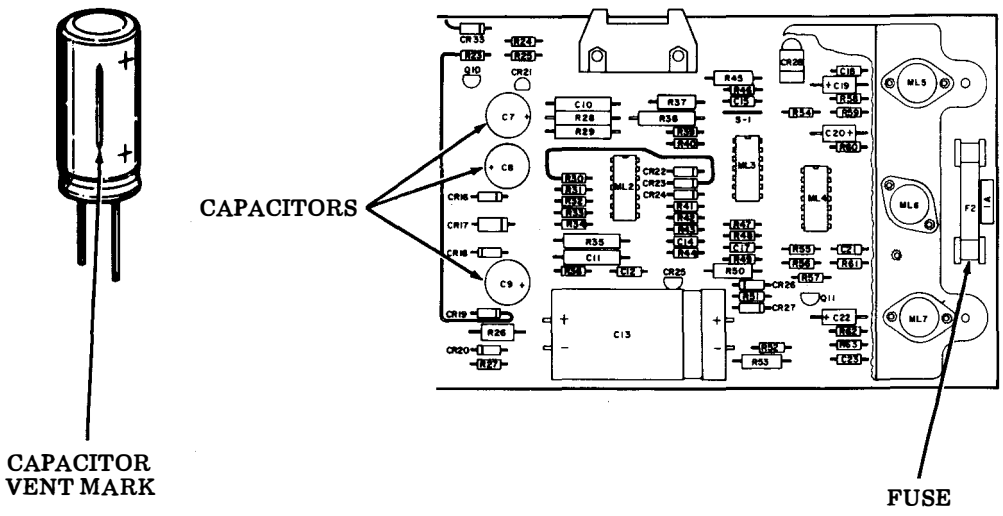
If one of the marks is not present remove the heat sink and check capacitors C7, C8 and C9 for vent mark.

C. DISASSEMBLY/REASSEMBLY (Contd)

1. 430700 and 430780 Power Supply (Contd)

(b) Vented Capacitors (410700 Circuit Card, Issue 4D or earlier) (Contd)

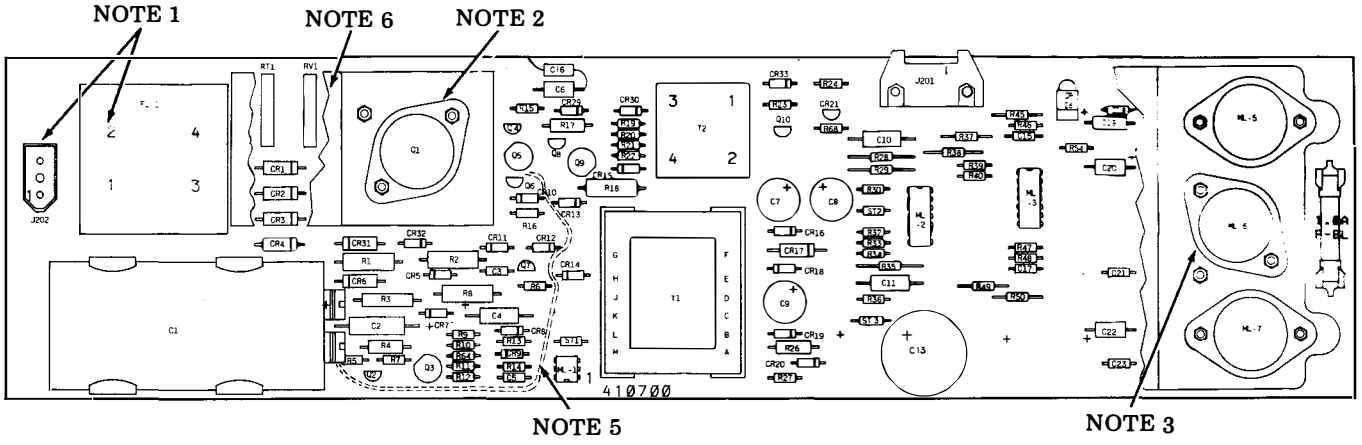
Replace C7, C8 and C9 capacitors if vent mark is not present. Observe proper polarity when replacing.



Mark top of vented capacitors with red dot and draw a red line under fuse (use indelible felt tip marker).

Replacement vented capacitors for this purpose can be obtained at no charge from Teletype Corporation by indicating "No charge per Manual 391" on the order for the 430704 capacitor.

(c) 410700 and 410702 Circuit Card Assembly Notes



Note 1: Mount FL1 with two-pin side adjacent to connector and bend side tabs on underside toward each other. A minimum of 0.20 inch clearance must be maintained between circuit board and case of filter. Use 131228 insulating washers over mounting tabs, if required.

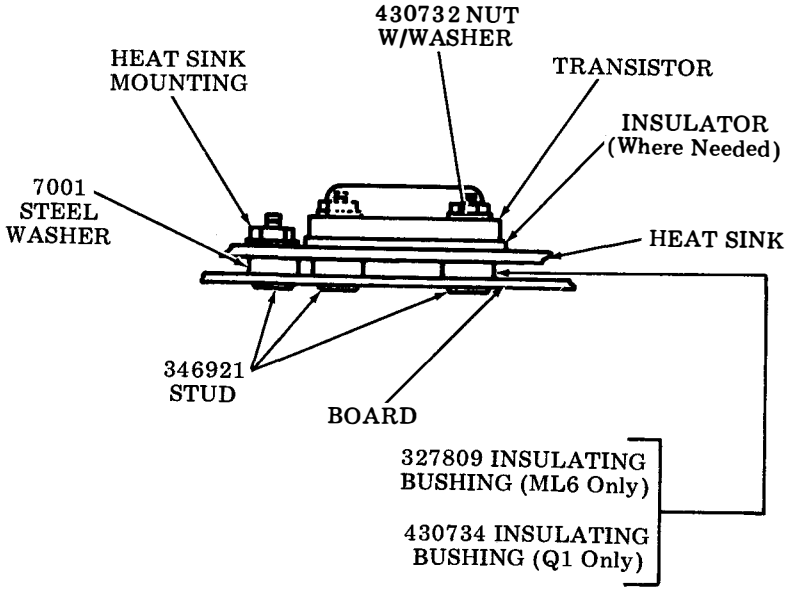
Note 2: Mount the 430710 insulating washer between heat sink and transistor Q1.

Note 3: Use suitable heat sink compound under Q1, ML5, ML6 and ML7. Compound to be applied between insulator and heat sink of Q1 and ML6.

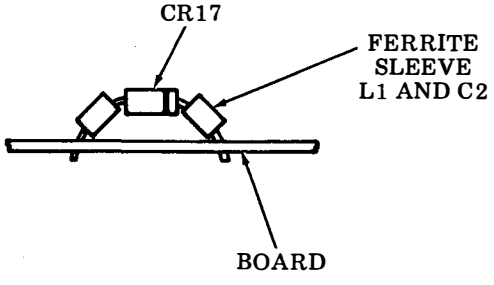
Note 4: Typical diode-sleeve assembly (410702 card assembly).

Note 5: (410700 card assembly) Customer I.D. 9A and earlier: if repair requires replacement of Q1, a grounding path improvement should be provided, on the compo-ment side of the card assembly, by cutting the circuit path between the emitter of Q6 and the anode of CR12 at a point 1/4" to 3/8" from Q6. An insulated 20 AWG stranded strap must then be connected between the emitter of Q6 and the negative terminal of C1. Add the strap approximately as shown.

Note 6: Install 430739 insulator to cover RV1 and RT1. Align holes with weld nuts on underside of 430723 heatsink bracket.



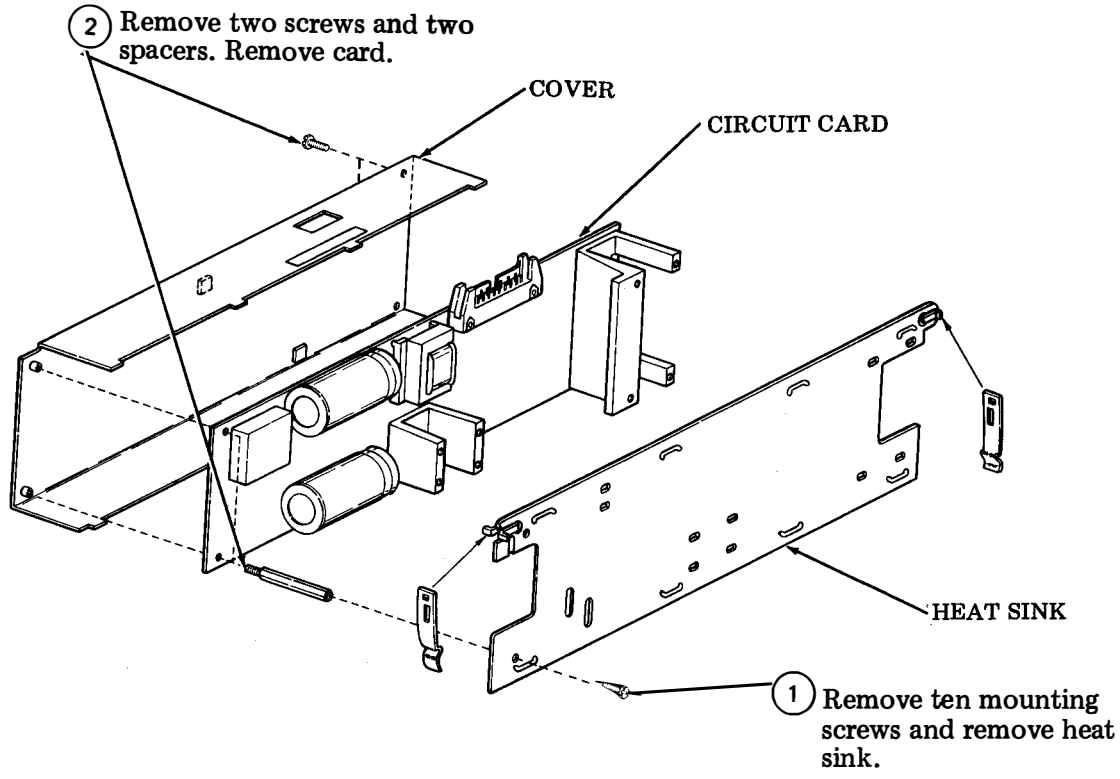
Typical Heat Sink Assembly



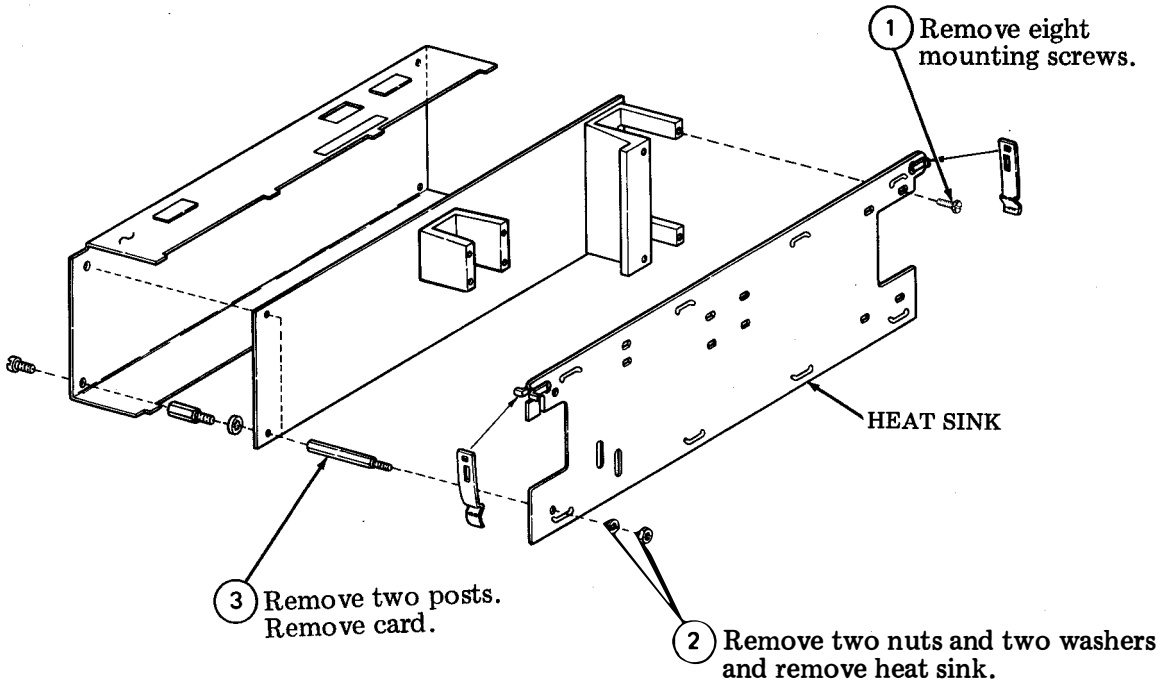
C. DISASSEMBLY/REASSEMBLY (Contd)

2. 430760 Power Supply

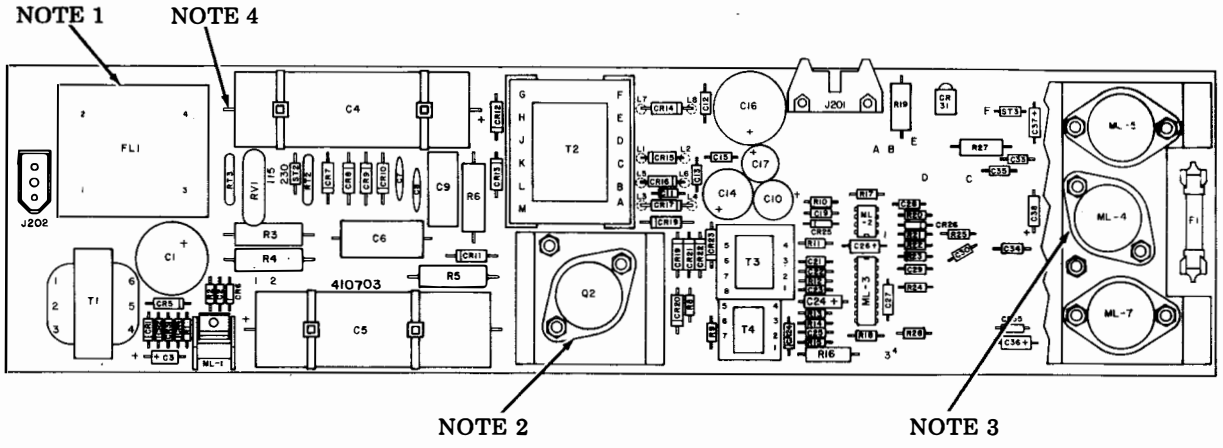
(a) 410703 Circuit Card Removal



(b) 410704 Circuit Removal



(c) 410703 Circuit Card Assembly Notes

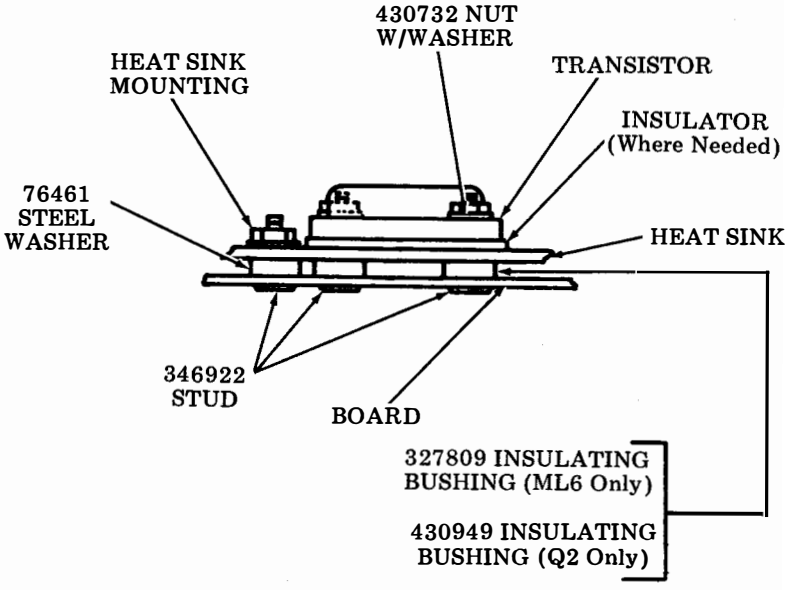


Note 1: Mount FL1 with no-pin side adjacent to connector and bend side tabs on underside toward each other. A minimum of 0.20 inch clearance must be maintained between circuit board and case of filter. Use 131228 insulating washers over mounting tabs, if required.

Note 2: Mount the 430710 insulating washer between heat sink and transistor Q2.

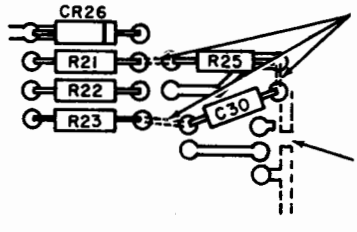
Note 3: Use suitable heat sink compound under Q2, ML5, ML6 and ML7. Compound to be applied between insulator and heat sink of Q2 and ML6.

Note 4: Suitable tubing to cover exposed leads on C4 and C5 (4 places).

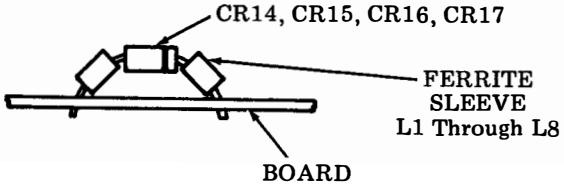


Typical Heat Sink Assembly

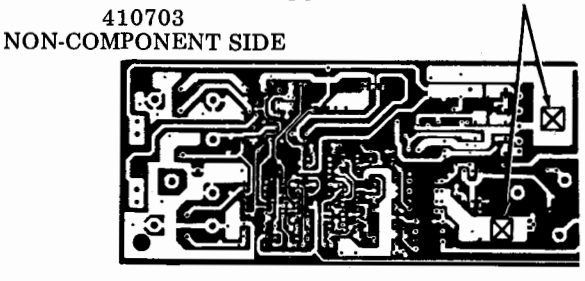
Mounting Procedure for R25 and C30:



Note 5: Typical diode - sleeves assembly.



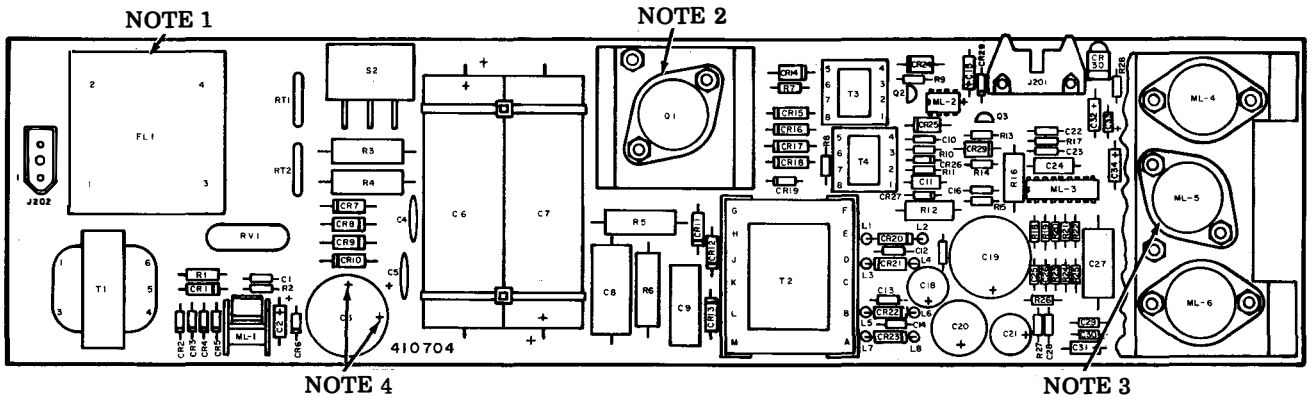
Clean circuit card mounting surface with Trichloroethane and adhere 454134 bumpers in approx. area shown.



C. DISASSEMBLY/REASSEMBLY (Contd)

2. **430760** Power Supply (Contd)

(d) 410704 Circuit Card Assembly Notes



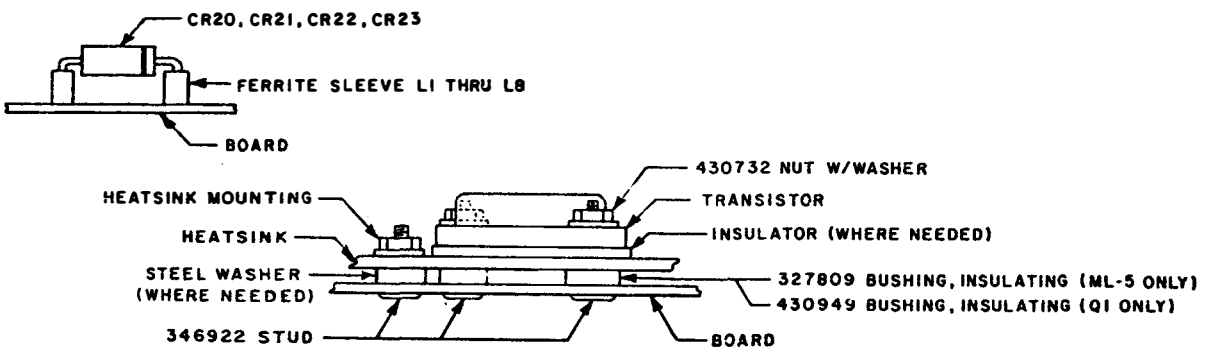
Note 1: Mount FL-1 with two pin sides adjacent to 341964 connector and bend side tabs on underside toward each other. A minimum of .020 clearance must be maintained between circuit board and case of filter.

Note 2: Mount 430710 insulating washer between heat sink and transistor Q1.

Note 3: Suitable heat sink compound under Q1, ML-4, ML-5 and ML-6. Compound to be applied between insulator and heat sink of Q1 and ML-5.

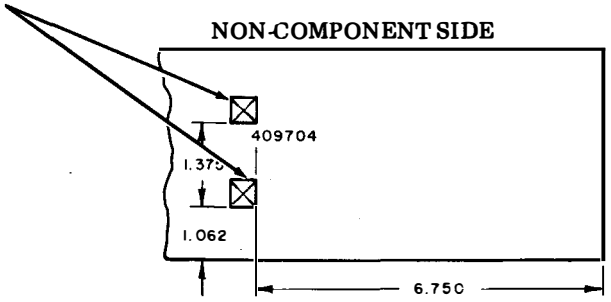
Note 4: Location of positive lead may vary with manufacturer.

Note 5:



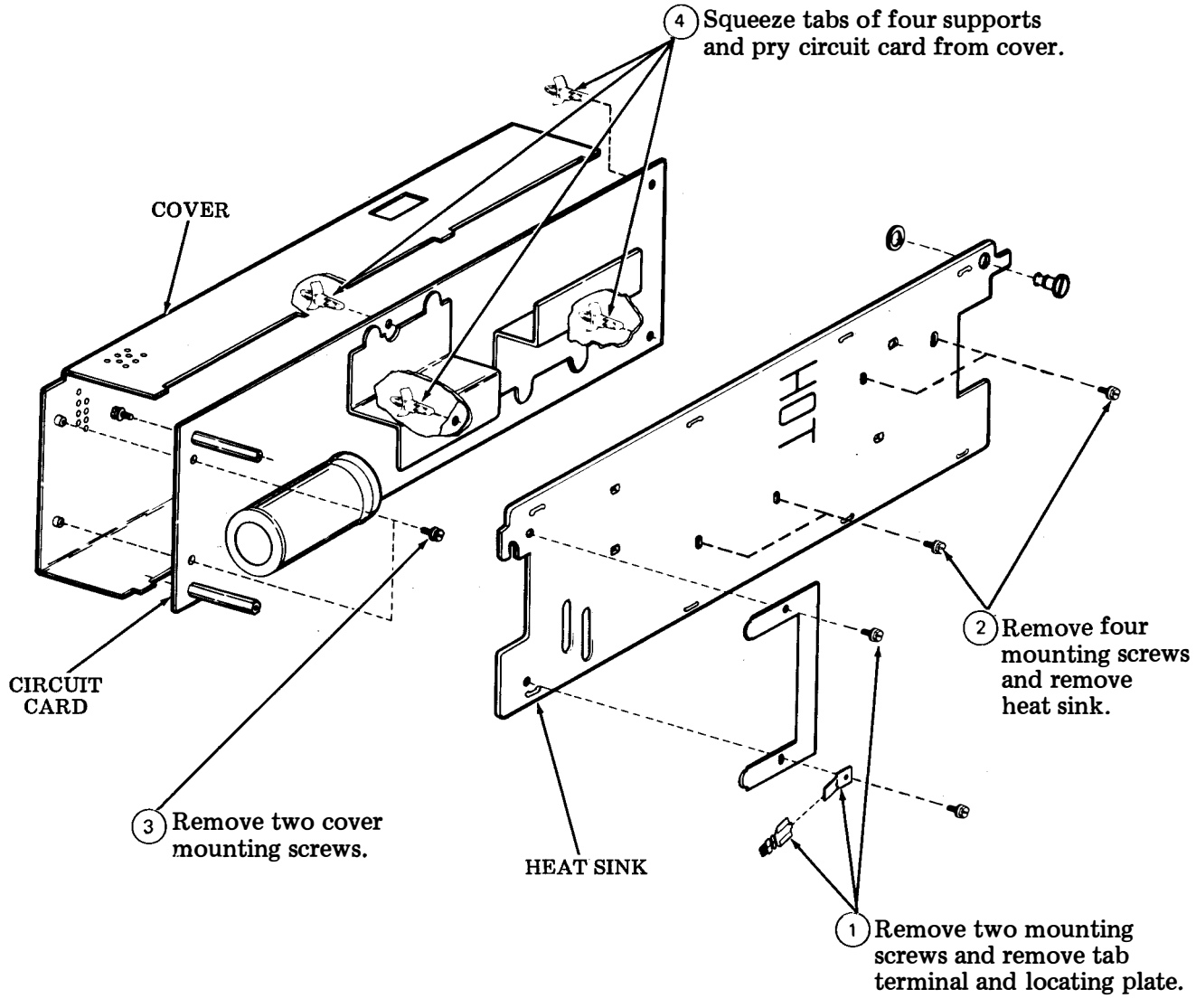
Typical Heat Sink Assembly

Note 6: Clean circuit card mounting surface with trichloroethane and adhere 454134 bumpers in approximate area shown.



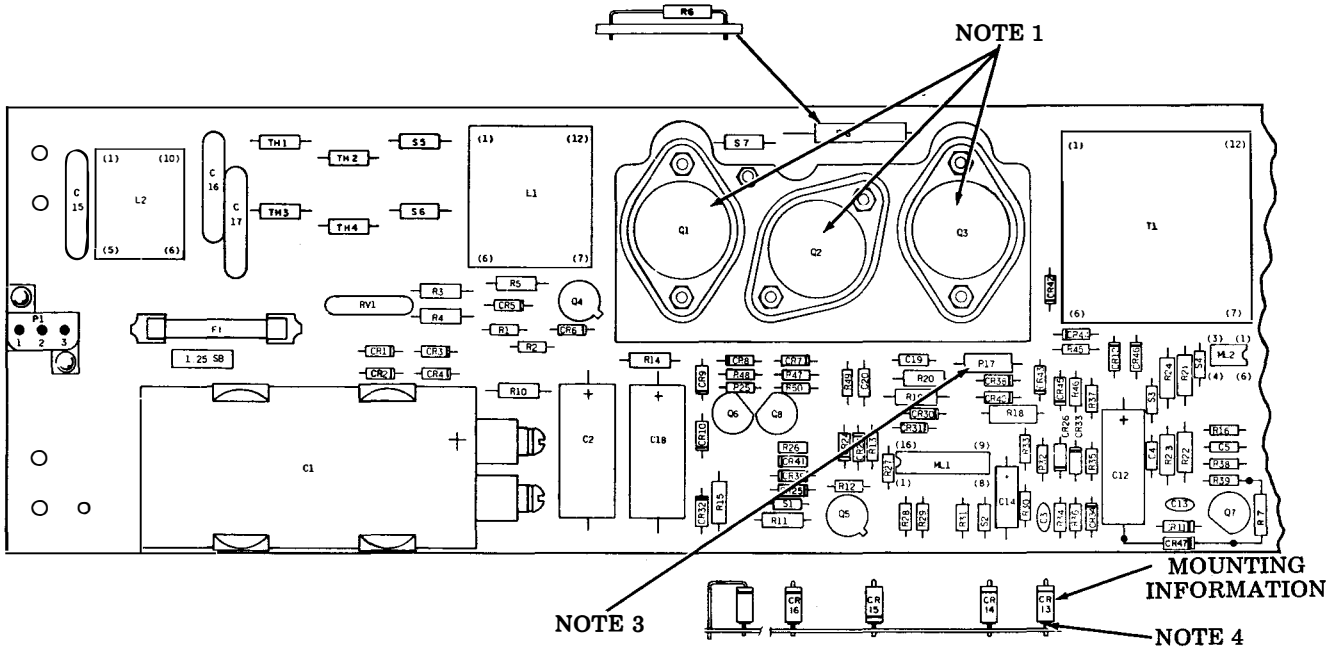
3. 430770 Power Supply

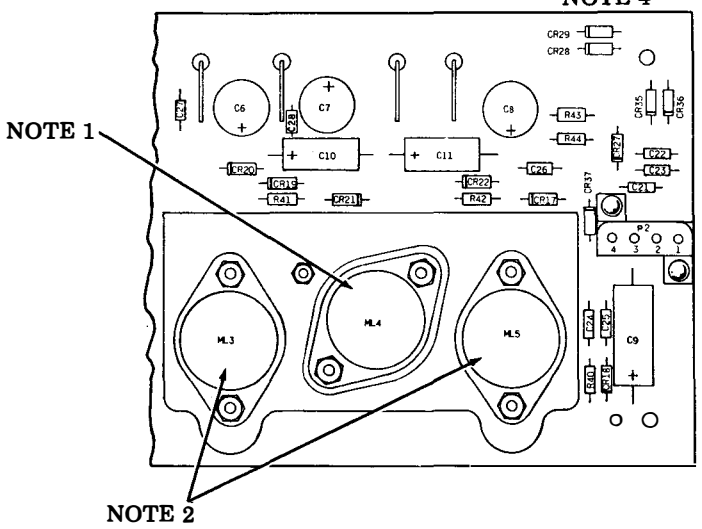
(a) 410701 Circuit Card Removal



C. DISASSEMBLY/REASSEMBLY (Contd)

(b) 410701 Circuit Card Assembly Notes



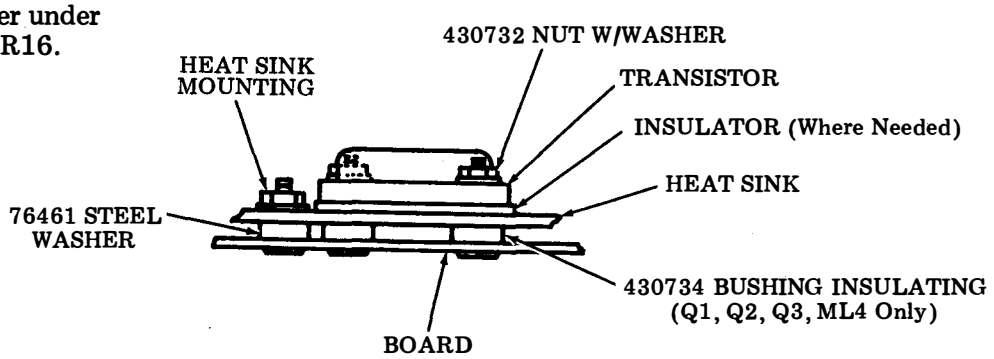


Note 1: Mount 177113 insulator under Q1, Q2, Q3 and ML4.

Note 2: Apply suitable heat sink compound to both sides of insulators and bottom of ML3 and ML5.

Note 3: R17 to be formed away from heat sink.

Note 4: Place 2401 spacer under CR13, CR14, CR15 and CR16.



Typical Heat Sink Assembly

PART 4 — CIRCUIT DESCRIPTIONS AND DIAGRAMS

CONTENTS

CONTENTS (Contd) PAGE

A. GENERAL

This part provides circuit descriptions and combined schematic and troubleshooting circuit diagrams for power supplies used with 42, 43 and 45-30 CPS Character Printers.

This part includes the circuit descriptions and circuit diagrams for the 430700, 430760, 430770 and 430780 power supply assemblies.

Waveforms and voltage levels are shown on the diagrams whenever possible to aid in troubleshooting and understanding the circuit theory. Circuit descriptions refer to coordinates on the schematic, ie, (C2) to locate the circuit being described.

For additional troubleshooting information associated with these circuit drawings, refer to PART 2 — TROUBLESHOOTING which includes:

Troubleshooting Charts (430700, 430760 and 430780).
Tables for dynamic and static VOM measurements.
Illustrated layouts of circuits and physical location of component and connector leads.

For part number identification of components shown on circuit diagrams refer to PART 5 — PARTS.

Most numbers shown on various leads, components, and connectors on the circuit diagrams are not actually marked on the equipment. They are required for identification purposes when referring to other parts of the manual.

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

B. CIRCUIT DESCRIPTIONS

430700 and 430780 POWER SUPPLIES
410700 and 410702 CIRCUIT CARDS

OPERATION

The 430700 and 430780 power supplies are of the "Off-the-Line" switching regulator type utilizing a "Ringing Choke" design to accomplish power conversion at a nominal frequency of 20 KHz. This design provides a relatively high power conversion efficiency, and minimizes the size and weight of the supply.

The ac line voltage is directly converted to dc by a bridge rectifier connected directly to the ac input and filtered by a capacitor on the output side of the bridge rectifier. The primary of a power transformer is connected to the dc source in series with a primary switching transistor. In operation, the transistor is driven into conduction for a controlled period of each cycle during which the current in the primary increases. During the remainder of the cycle, the transistor is nonconducting, but the energy stored in the primary inductance is transferred to four secondary windings. The secondaries each contain a semiconductor diode which provides half-wave rectification.

The +5 V, +12 V and -12 V outputs are derived from three separate windings which drive integrated circuit voltage regulators. These regulators are of the linear type.

The +42 V output is derived from the fourth secondary winding. This output is sensed by a feedback circuit which controls the conduction period of the primary switching transistor so that the output is regulated to the correct voltage in response to line and load variations.

B. CIRCUIT DESCRIPTIONS (Contd)

430700 and 430780 POWER SUPPLIES
410700 and 410702 CIRCUIT CARDS (Contd)

OPERATION (Contd)

The protective ground is not connected to the primary circuit ground. Care must be exercised during troubleshooting to prevent direct connection of these grounds because this will effectively bypass one of the bridge rectifier diodes and cause full line voltage to be directly applied to another diode in the forward direction. This rectifier and other line components will fail under this condition.

The secondary voltage returns are tied together and directly connected to the protective ground. However, isolation is maintained between the ac line and the secondary circuits.

GENERAL

1. Operating Modes

During normal operation, the 430700 and 430780 power supplies function as a fixed frequency, pulse width modulated switching regulator. However, whenever power is initially applied, the oscillator and control circuitry which are on the secondary side of the main power transformer T1 are not operational. An auxiliary mode of operation is provided which is operational only during start-up while the oscillator and control circuitry are nonoperating. In this auxiliary mode, the primary switching transistor is driven by an extra winding on transformer T1 which is connected such that positive feedback is provided to its base. This results in a blocking oscillator like mode of operation during start-up.

Operation of the power supply in the power-up mode results in energy transfer to the secondary windings so that the oscillator and control circuitry, which are powered from the unregulated voltage which drives the +12 V regulator, will commence operation. With a low secondary voltage, the control circuitry provides a maximum pulse width which is constrained to be slightly less than 50 percent of a cycle. Whenever the oscillator drive has gained sufficient amplitude to reliably drive the primary switching transistor, the blocking oscillator action is automatically terminated and operation continues under oscillator driven control.

2. AC Line Rectifier

The ac to dc rectification occurs through the full-wave bridge consisting of the four diodes CR1, CR2, CR3 and CR4. Capacitor C1 filters the dc.

The anodes of CR3 and CR4 and the negative end of C1 are connected to a common bus for all primary circuits. This bus is not to be confused or connected with any ground bus on the secondary circuits unless the power supply is floated through an isolation transformer. Grounding of the primary bus might cause destruction of diode CR3, as well as thermistor RT1.

3. Blocking Oscillator

Upon initial application of dc voltage to R3 (A6), current flows to charge C2 (B6). The time constant of R3 and C2 delays the start-up until capacitor C1 (G8), is fully charged.

The voltage across C2 biases the base of Q1 (D7), into the active region by applying dc potential through R8 (B7), terminal (J, H) of P2 and diode CR11. This causes current to flow into the base of Q1 tending to turn it on. As Q1 turns on, terminal L of P1 is forced toward primary bus common. Since coil P1 is tightly coupled to P2 an equivalent potential is applied across P2 according to the dot notation shown. R15 (D7), is a base bias resistor for Q1.

A portion of P2 is tapped at J to act as a source to further drive the base of Q1 toward saturation. Regenerative action occurs because of positive feedback driving Q1 into saturation.

Base drive into Q1 is limited by resistor R8. The Q1 collector current ramps up due to the magnetizing inductance of T1. This current is limited by the gain hFE of Q1. For constant current base drive, Q1 remains in saturation until IC exceeds hFE times I_B.

As Q1 comes out of saturation voltage across J-H is reduced, lowering the base drive to Q1. Regenerative action occurs forcing Q1 off. Q1 remains off until the energy in T1 collapses via dumping energy into the secondaries (S1, S2, S3, S4). The cycle then repeats itself until the pulse width modulator mode takes over.

4. Snubbing Circuit

The snubbing network consisting of coil P2 and diodes CR14 (B7) and CR12, clamp the collector of transistor Q1 during turn off to twice the dc supply voltage. During turn off terminal L of P1 exceeds the potential at terminal G due to the inductive kick of the transformer T1. The potential across terminals L-G is mirrored on terminals K-H by observing the dot notation polarity.

Upon turn off terminal K becomes more positive than +Vdc in and is clamped by CR14. Terminal H becomes more negative than the -Vdc bus common. This forces a clamping of coil P2 which reflects to coil P1 due to tight coupling. The voltage on the collector of Q1 is limited to that across P2 or twice V_{IN}. Diode CR7 prevents capacitor C2 from being reversed biased.

OSCILLATOR DRIVEN MODE

1. 20 KHz Square Wave Oscillator

During start-up, the secondaries of T1 receive a limited amount of power which results in an increasing rectified voltage. The oscillator is fabricated from one of the comparitors in ML2 which derives its power from the regulated +12 V supply. As the voltage increases to approximately 4 V, oscillation commences.

If the oscillator output (Pin 2) (H12), has just switched to ground, the voltage at the noninverting input (Pin 5) will be determined by the divider of R35 and R28 in parallel with R32. This voltage is 31 percent of the +12 V supply. The voltage on the inverting input (Pin 4) discharges toward ground at a rate determined by R38 and C11. As this voltage drops to 31 percent of the +12 V supply, the comparator output switches to the high state. Now, the voltage on (Pin 5) is essentially determined by the divider of R28 in parallel with R35 and R32. This voltage is 62 percent of the +12 V supply. The voltage on (Pin 4) charges toward the +12 V supply at a rate determined by R30 and R38 in series, and C11. As this voltage now reaches 62 percent of the +12 V supply, the comparator output (Pin 2) switches to the low state.

Since the comparator switch points are a fixed ratio of the +12 V supply, the frequency will be virtually independent of the actual voltage of the +12 V supply. In fact, from approximately +4 V to +20 V, the frequency and duty cycle are essentially constant.

The ramp generator is fabricated from a second comparator of ML2. The inverting input (Pin 8) of ML2 (H13) is biased to approximately 50 percent of the +12 V supply by a divider composed of R33 and R36. The output of the 20 KHz square wave oscillator is connected to the noninverting input (Pin 9). Whenever the oscillator output is low, the output (Pin 14) is held in the low state. The voltage on capacitor C10 is held low during this time.

Whenever the oscillator output goes to the high state, the output of the ramp generator is unclamped. The voltage on C10 begins to charge toward the +12 V supply by means of resistor R29. The voltage reaches approximately 3.5 V during the time that the oscillator output is high. Whenever the oscillator output goes to the low state, C10 is discharged and the ramp voltage goes to a few tenths of a volt above ground.

B. CIRCUIT DESCRIPTIONS (Contd)

OSCILLATOR DRIVEN MODE (Contd)

2. Pulse Width Modulator

A third section of ML2 is used for a pulse width modulator. The output of the ramp generator is connected to the noninverting input (Pin 11) (H14) by means of resistor R39. The inverting input (Pin 10) is connected to a divider network consisting of R47 and R48 which derives a bias of approximately 0.6 V from the +12 V supply.

In the absence of any output from (Pin 9) of ML3 (F12), the bias voltage of 0.6 V appears on (Pin 10) of ML2. Consequently, whenever the ramp generator output is low, the pulse width modulator output (Pin 13) will be low shunting any current flowing through R25. Whenever the ramp generator output exceeds the bias voltage, the pulse width modulator will go to a high state. Any current flowing through R25 (early versions) R68 (late versions) will now be available to drive the base of transistor Q10 (D3).

Resistor R25 (R68) is connected in series with 4-layer diode CR21 (G15). This diode is nonconducting until the +12 V supply exceeds approximately 8 V, at which point the diode triggers into conduction with a drop of approximately 1 V. During start-up, even though the oscillator is running and the pulse width modulator is producing drive pluses, transistor Q10 will not receive drive pulses until CR21 becomes conducting.

Whenever an output is produced on (Pin 9) of ML3 that exceeds the 0.6 V bias, the pulse width of the output on (Pin 13) of ML2 will be reduced. The pulse width modulator output will be in the high state for the time that the ramp generator output exceeds the voltage produced on (Pin 9) of ML3.

Resistor R40 is connected between the ramp generator output and the noninverting input to provide hysteresis and snap action switching. Resistor R24 provides a base leakage path for transistor Q10.

3. Voltage Reference and Error Amplifier

The voltage reference and error amplifier is contained in ML3 (G11), a type 723 precision regulator. The voltage reference, V_{REF} (Pin 6), is nominally 7.15 V with a 5 percent tolerance. This voltage is applied to a precision divider consisting of R37 and R45 to provide a 3.57 V reference which is applied to the inverting input (Pin 4) of the error amplifier.

The +42 V rectified dc output is connected to a precision divider consisting of R49 and R50 (G10). The resulting voltage is applied to the noninverting input (Pin 5) of the error amplifier. In operation, the voltage at (Pin 5) is very close to that at (Pin 4). Frequency compensation of the error amplifier is accomplished by connection of capacitor C15 (G12), between the compensation terminal (Pin 13) and the inverting input (Pin 4).

The dc gain of the error amplifier, ML3, is utilized to produce the control signal at (Pin 9). Gain of the error amplifier is reduced by use of negative feedback from the direct output at (Pin 10) through resistor R46. Capacitor C17 (F13), is used to bypass any high frequency noise in proximity to the error amplifier.

4. Primary Power Conversion

As previously noted, the 20 KHz oscillator will commence operation and produce drive pulses to the base of transistor Q10 whenever the +12 V supply exceeds approximately 8 V. At this point, the pulse transformer T2 (C3), in the collector of Q10 will be driven so as to produce a positive pulse of similar duration on its secondary. This pulse is connected through resistor R18 (C7), and diode CR10 to the base of the primary switching transistor, Q1.

The positive drive on the base of Q1 causes current to flow in the collector of Q1 and the primary winding (P1) of transformer T1. The current increases, linearly during the duration of the pulse, from its initial value to its final value which is dependent upon the pulse width as well as the dc supply voltage. Diode CR13 (C7), effectively prevents Q1 from reaching full saturation, reducing the storage time for Q1.

The positive pulses are also connected through diode CR9 (D4), which rectifies the signal to produce a dc signal on capacitor C4 and bleeder resistor R13. When the power supply begins operating in the oscillator driven mode, the dc signal is connected through diode CR8 and resistor R9, to the base of transistor Q7 (B7). The collector of Q7 is connected to the feedback winding used to provide the blocking oscillator action. Turning Q7 on will short the signal produced by the feedback winding and effectively inhibit blocking oscillator action. This control is automatically transferred from the start-up mode to the oscillator driven mode.

Whenever the drive to the base of Q10 is shunted by the pulse width modulator, the drive pulse is terminated. The collector of Q10 rises from the saturated value of Q10 to a voltage above the +16 V supply. This results in a negative pulse on the secondary of T2. This pulse is connected through resistor R22 (D6), to the base of transistor Q5. Transistor Q5 is turned on which effectively grounds the base of Q1. The stored base charge in Q1 is discharged through Q5 resulting in rapid turnoff of Q1.

When Q1 turns off, the energy which was stored in the magnetic core of T1, is transferred to the secondary windings. Each winding is driven in proportion to its relative turns ratio.

5. Feedback Regulation

As dc line power is transferred to the secondary circuits, the rectified secondary voltages increase. The +42 V supply is sensed by means of divider R49 and R50 (G10), and compared in the error amplifier with the voltage reference established by divider R37 and R45. Whenever the sensed voltage exceeds the reference voltage, the error amplifier output (Pin 9) is increased which has the effect of reducing the pulse width supplied to drive Q1. As a result, the net energy transferred to the secondary is reduced. This also causes the rectified secondary voltages to decrease. Consequently, the +42 V supply is regulated against line and load changes. In addition, the remaining three secondaries are also regulated against line changes and to some extent, load changes, to the degree that they are reflected in the +42 V supply voltage.

The +42 V supply is derived from a secondary winding of T1. The voltage on winding A-E is half-wave rectified by diode CR17 (C10), and filtered by capacitor C13. A bleeder resistor R26 is provided to discharge C13.

The purpose of the optical coupler is to deactivate the blocking oscillator mode of operation following a normal start-up sequence, or upon detection of a +42 V overvoltage condition. Overvoltage is detected by diode CR20 (C12), resistor R27, and ML1 optical isolator diode. Under light loads, the secondary voltages may substantially exceed their ratings during this condition. The overvoltage protective circuitry which functions by inhibiting the clock is not capable of inhibiting the blocking oscillator action.

Whenever the +42 V supply voltage exceeds approximately 47 V, zener diode, CR20 will conduct and drive the LED in optical isolator ML1. Resistor R27 limits the current through the diode.

B. CIRCUIT DESCRIPTIONS (Contd)

OSCILLATOR DRIVEN MODE (Contd)

5. Feedback Regulation (Contd)

The phototransistor in ML1 (B4), in conjunction with transistor Q3 forms a latch on the ac line side of the power supply. Whenever the latch is off, a voltage appears on the emitter of Q3 which is the result of a fixed drop across the zener diode CR5 (B4), and a divider consisting of R1 and R6. Capacitor C3 filters noise appearing on the emitter. As secondary voltages are developed by blocking oscillator action, a transition to the oscillator driven mode generates positive pulses at T2 transformer terminal 4, which are coupled to Q1 base and to the phototransistor (Pin 6), through CR9, R10 and R11. The phototransistor conducts current through resistor R12 which is connected to the base of Q3. This base current causes collector current to flow through Q3 which, in turn, drives the base of the phototransistor by means of resistor R11. Transistor Q3 becomes latched so that in the event of a failure in the oscillator control circuit, transistor Q7 will continue to be driven, which prevents the blocking oscillator from restarting. Resistor R14 provides base stabilization for the phototransistor, and capacitor C5 filters noise transients to prevent spurious triggering of the latch.

Zener diode CR5 is provided to permit the latch to clear whenever the rectified primary dc voltage drops below approximately 50 V. This allows the power supply to automatically restart under the blocking oscillator mode of operation if the oscillator driven mode has also become inoperative.

6. Primary Circuit Overcurrent Protection

A resistor, R4 (D7), in the emitter of the primary switching transistor, Q1, senses the current conducted during each pulse drive period. If this current should exceed a safe level, the base drive current is shunted for the remainder of the drive pulse.

The voltage developed on R4 is applied through resistor R19 (D3), to capacitor C6 which acts to filter spurious transients, to R17 which is in series with the base of transistor Q8, and to the base of transistor Q4. Whenever the voltage developed is high enough to cause Q8 to conduct sufficient current through the collector resistor, R20, which is connected through diode CR15 to the drive pulse transformer T2, to bias transistor Q9 into conduction, a regenerative action is initiated. This allows current to flow through the emitter resistor, R21, of Q9. The current drives both the base of Q8 and the base of Q4. Whenever Q4 conducts, the base drive current to Q1 is shunted to the primary common, effectively terminating the primary switching transistor current pulse for the cycle. Whenever the drive pulse from transformer T2 terminates, transistors Q8, Q9 and Q4 are returned to their nonconducting state.

7. Primary Circuit Overvoltage Protection

In the event that a transient spike occurs on the ac line that exceeds the normal voltage range, circuitry has been provided which will maintain the primary switching transistor in the nonconducting state even through base drive pulses are being generated. This protection is accomplished by shunting the oscillator drive pulses during the transient.

Zener diode CR6 (B6), cathode is connected to the primary dc power, and anode to resistor R2. Whenever the dc voltage is high enough to exceed the zener diode voltage, current flows to the base of transistor Q2 by means of resistor R7, and the base of Q6 by means of resistor R16. Base bias resistor R5 serves to bypass leakage current for both Q2 and Q6.

LOGIC VOLTAGES

1. +5 V Supply

The +5 V supply is derived from a secondary winding of T1. The voltage on winding F-M is half-wave rectified by diode CR16 (A10), and filtered by capacitors C7 and C18. This unregulated voltage, +9 V, is applied to the base connection (B) of a linear regulator, ML5, which is a self-contained three terminal integrated circuit located on a common heat sink with ML6 and ML7. A capacitor, C19, on the output (E) of the regulator filters high frequency load transients.

2. +12 V Supply

The +12 V supply is derived from a secondary winding of T1. The voltage on winding S2 is half-wave rectified by diode CR19 (E10), and filtered by capacitors C9 and C23. This unregulated voltage, +16 V, is applied to the base connection (B) of a linear regulator, ML7, which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML6. A capacitor, C22, on the output (E) of the regulator filters high frequency load transients. The +16 V supply is also used to drive the error amplifier.

3. -12 V Supply

The -12 V supply is derived from a secondary winding of T1. The voltage on winding S3 is half-wave rectified by diode CR18 (B10), and filtered by capacitors C8 and C21. This unregulated voltage, -16 V, is applied to the collector connection (C) of a linear regulator, ML6, which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML7. A capacitor, C20, on the output (E) of the regulator, filters high frequency load transients.

4. Output Voltage Indicator

Early Design

Each dc output voltage has a divider network which senses the output level. The sensed output level is compared with a voltage reference derived by a divider network composed of R56 and R61 from the 7.15 V reference voltage, V_{REF}, available from ML3. The comparison is performed using four comparators in ML4 (B15).

The +5 V output voltage sense divider is composed of R58 and R59. The +12 V output divider is composed of R62 and R63. The +42 V supply is sensed by a divider composed of R52 and R53. The -12 V supply is sensed by a divider composed of R55 and R60. These sense voltages are connected to (Pins 11, 7, 5 and 8) respectively of ML4. The voltage reference is connected to (Pins 4, 6, 9 and 10).

The outputs of each comparator (Pins 1, 2, 13 and 14) are connected together. Each comparator will go to a high state on the output whenever its sensed input exceeds the reference voltage. If all four comparator outputs are in the high state, then the current which flows through resistor R54 from the +16 V supply will be available to drive the LED indicator, CR28. If any output voltage should fail, its associated comparator will go to a low state, shunting the current drive to CR28. Note that the sense divider for the +42 V supply is located on the load side of the fuse.

Late Design

A LED indicator will be on whenever +16 V from the output transformer T1, B-C is present.

B. CIRCUIT DESCRIPTIONS (Contd)

FAULT PROTECTION ON SECONDARY

1. Short Circuit Protection

The +5 V, +12 V and -12 V supply outputs are protected against short circuits to ground by means of the current limiting characteristics inherent in the integrated circuit voltage regulator which is in each of these outputs. Fault currents are limited to approximately 1.5 amperes. Whenever the fault is removed, the output voltage will either recover or shut off.

These regulators are also thermally protected so that in the event that their power dissipation in conjunction with the ambient temperature exceeds their limit, automatic shutdown occurs. Whenever the internal temperature decreases to a safe level, the device will reset and restore the output voltage.

The +42 V supply is protected against overloads on the output by means on a 1 ampere fast blow fuse, F1.

2. Overvoltage Protection (Early Design Only)

Each secondary output voltage has an overvoltage sense circuit which will cause the power supply to shut down whenever an overvoltage is detected on an output. This is accomplished by means of a voltage comparator in integrated circuit ML2 which clamps the 20 KHz square wave oscillator output to the low state, preventing the generation of drive pulses to the primary switching transistor, Q1.

The inverting input (Pin 6) (J12), of the comparator is biased by the divider network consisting of R33 and R36 to approximately one-half the voltage of the +12 V supply. The noninverting input (Pin 7) is normally biased to the voltage of the +12 V supply by means of R34. An SCR, CR25 (J11), is also connected to (Pin 7).

A zener diode, CR22 (J10), is connected to the +5 V supply in series with current limiting resistor, R43, and to the SCR gate bias resistor R44. Whenever the +5 V supply voltage reaches a level sufficient for the gate voltage to turn on the SCR, (Pin 7) of the comparator is driven below the bias voltage on (Pin 6) resulting in a low state on the output, (Pin 1). This condition is maintained until the +12 V supply drops so low that the oscillator is no longer operational. Capacitor C14 acts as a filter for high frequency transients. Capacitor C12 provides a short time delay on oscillator operation during start-up as well as enhances triggering of the SCR. Resistor R31 is intended to provide snap action during start-up.

The +12 V supply is sensed in a similar manner by zener diode CR23 and resistor R42.

The +42 V supply is detected in the same manner by zener diode CR24 and resistor R41.

The -12 V supply is also sensed, but in a slightly different manner. A zener diode CR27 is connected directly to the base of transistor Q11. Normally, Q11 is biased into saturation conduction by resistor R51 which is directing connected to the +16 V supply. Whenever the zener diode voltage is substantially exceeded, the base bias current is shunted so that Q11 becomes nonconducting. While Q11 is saturated, its collector voltage is held low. However, whenever the transistor becomes unsatureated, the collector pull-up resistor, R57, connected to +16 V will raise the collector voltage. This voltage is applied through diode CR26 to the gate of CR25, causing the SCR to conduct.

430760 POWER SUPPLY

OPERATION

The 430760 PSU is of the "Off-the-Line" switching regulator type, utilizing a "Flyback" design to accomplish power conversion at a nominal switching frequency of 40 KHz.

When strapped for 230 Vac input, the ac line voltage is directly converted to dc by the bridge rectifier connected to the ac input and filtered by a capacitor arrangement on the output side of the bridge rectifier.

When strapped for 115 Vac input, the ac line voltage is converted to a FWR (Full-Wave-Rectified) dc voltage via a voltage doubler circuit, and filtered. This input dc voltage has about the same amplitude (320 Vdc) whether the PSU is strapped for 115 Vac or 230 Vac; from this point on, the operation does not depend on whether the unit is strapped for 115 Vac or 230 Vac.

The primary side of a switching power transformer is connected in series with the dc input voltage and the collector of the switching power transistor. In operation, the transistor is driven into conduction for a controlled period of each cycle, during which time the current in the primary winding increases. During the remainder of the cycle the transistor is nonconducting, but the energy stored in the inductance of the primary winding is transferred to the secondary windings. The secondaries contain diodes which provide half-wave rectification.

Three rectified secondary winding taps develop unregulated dc voltages of about +9 V, +17 V and -17 V. These unregulated voltages are the inputs to three linear voltage regulators.

The +42 V output is derived from the other secondary winding. This output is sensed by a feedback circuit which controls the conduction time of the switching power transistor so that the output is regulated to the correct voltage.

Caution: The protective ground is not connected to the primary circuit common. Care must be exercised during trouble shooting to prevent direct connection of the ground and the common, since this would effectively short one of the rectifier diodes during one half cycle. This rectifier and other components will fail under this condition.

The secondary output voltage grounds are tied together and are directly connected to the protective ground.

GENERAL

Operating Modes

During normal operation, the 430760 power supply functions as a fixed frequency, pulse width modulated switching regulator. However, when ac power is initially applied, the pulse width modulator and the proportional drive receive their power from a "Start-Transformer". This is a small linear step-down transformer, which provides about 21 Vdc (after bridge rectification and filtering) to the input of a three terminal 5 V regulator. The 5 V regulator is "Offset" to provide about 10.3 Vdc to the V Start connection. Once all logic voltages and the +42 V is within tolerance, the +12 V logic output will provide power to the control circuitry. The start power circuitry is in an idle state during normal operation.

The "Start Transformer" is connected in a unique manner in the voltage doubler circuit. When the PSU is strapped for 115 Vac, the primary side of the "Start Transformer" is connected directly across the ac input lines. In the 230 Vac operating mode the "Start Transformer" is connected to the lower half of the "Voltage-Doubler-Circuit", and therefore has 115 Vac across the primary side.

B. CIRCUIT DESCRIPTIONS (Contd)

410703 CIRCUIT CARD POWER-UP MODE

1. AC Line Rectifier

230 Vac strap: AC to dc rectification occurs through the full-wave bridge consisting of four diodes CR7, CR8, CR9 and CR10. Capacitors C4 and C5 (series connection) filter the rectified voltage, and resistors R3 and R4 serve as voltage equalizers (across C4 and C5), and bleeder resistors. Capacitors C7 and C8 are high frequency filters.

115 Vac strap: AC to dc rectification is through a full-wave rectified voltage doubler circuit. In this option CR7 and CR8 are always reversed biased. During a positive half-cycle, current flows through RT1 and CR9, and charges filter capacitor C5; CR10 is reverse biased. During a negative half-cycle, CR9 is reverse biased, and current through CR10 charges filter capacitor C4. The dc voltages across C4 and C5 are in series, therefore doubling and rectified line voltage.

2. Start Voltage

230 Vac option: The function of transformer T1 is to provide the start-up power needed to drive the pulse width modulator IC (ML3) and the clock driver IC (ML2). One side of the primary is connected to the junction of C4 and C5, the other side is connected to the junction of CR9 and CR10. The alternating voltage across the primary side of T1 is not sinusoidal, and is a symmetrial voltage of about 320 V peak-to-peak.

115 Vac option: With the 115 Vac strap option, the ac input line voltage is directly applied to the primary of T1.

V Start Developing: The secondary voltage of T1 is converted to dc by a bridge circuit (CR1, CR2, CR3, CR4), and filtered by an electrolytic filter capacitor (C1). This unregulated dc voltage is used as the input to a +5 V regulator IC (ML1), which is offset-biased to provide about +11 V at the output terminal. The offset-biased is accomplished by R2 and R1. Blocking diode CR6 prevents the +12 V logic voltage from being applied to the ML1 output terminal during normal operation.

Zener diode CR5 protects ML1 against high input voltage transients.

3. dV/dt Circuit Snubber

The snubber network consisting of R5, C6 and CR11 prevents the collector voltage of Q2 from rising too rapidly while collector current is still present. When Q2 is being turned off and the collector voltage rises, diode CR11 becomes forward biased, and capacitor C6 begins to charge. When the collector voltage of Q2 decreases, C6 discharges through R5.

4. dI/dt Circuit Snubber

The function of CR13, C9, R6 and CR12 is to limit the reverse voltage developed across M and G of T2 during "kickback". Reverse kickback voltages below 190 V are dampened by the R6, C9 network which is in parallel with the zener diode CR12.

5. Current Limiting Circuit

Current sensing is accomplished through the use of current transformer T4. The voltage developed across the primary side of T4 is reflected to the secondary side at 5 times its primary amplitude. Cycle by cycle current limiting is initiated when the rectified filtered waveform at the junction of R15 and C25 is about 4.5 V. This corresponds to a Q2 collector current of about 3A.

6. Proportional Drive Circuit

The base-drive circuit to control the power switching transistor Q2, is of the active turnon/turnoff type. The "Set" current pulse is applied to terminals (1 through 4) of T3. When reflected to the primary side, the stepped up current pulse from terminals (5 through 6) of T3 initially drives the base of Q2, which then latches to a base current of (6 turns/22 turns) times IE(Q2). The negative "Reset" current pulse, rapidly "Unlatches" the base of Q2, and "Resets" the core of transformer T3.

The base drive circuit uses a modified baker clamp (CR18, CR21, CR22, CR23, R8) to prevent the collector of transistor Q2 from going into saturation, thereby keeping the switching time of Q2 to a minimum.

Diode CR19 and zener diode CR20 prevent the base of transistor Q2 from going more than 7 V negative with respect to the emitter.

The width and the amplitude of the "Set" current pulse is determined by CR25, C19 and R10. The values of R17 and C28 determine the width and the magnitude of the "Reset" current pulse.

Diode CR26 prevents the input of the clock driver from going more than 0.7 V negative. Resistor R20 "swamps" the input of the clock driver, and provides a bleeder path for C28.

PULSE WIDTH MODULATOR IC

1. Reference Regulator

An on-chip regulator, trimmed to within ± 1 percent, is the stabilized power source for all the internal circuitry, with the exception of the current limit comparator, and the output driver.

2. Error Amplifier

The reference regulator output, V_{REF}, is externally connected to the + input (noninverting) of the error amplifier (Pin 1).

The +42 V rectified dc output is connected to a precision divider consisting of R21 and R22. The resulting voltage is applied through R23 to the - input (inverting) (Pin 2) of the error amplifier.

During normal operation, the voltage at (Pin 2) of the PWM IC is very close to that at (Pin 1). Frequency compensation of the error amplifier is accomplished by a feedback network consisting of R23, R11, C20, R12, C23 and C22.

3. Sawtooth Oscillator

The sawtooth oscillator is programmed for a frequency of about 80 KHz by resistor R18 and capacitor C27. Since no "dead time" is allowed, the RD (R dead time) connection (Pin 11) is to ground. The switching frequency is one-half the oscillator frequency.

4. Current Sensing

The invert input (-) of the current limit comparator is biased by a percision divider comprised of R13 and R14. The noninvert input (+) is connected to the junction of R15 and C25. Pulse processing logic, inherent in the PWM permits pulse-by-pulse current limiting, and prevents double pulsing.

5. Undervoltage Lockout

The pulse width modulator IC is prevented from operating (0 percent duty cycle) by the undervoltage lockout circuitry when the $+V_{IN}$ voltage (Pin 17) is below 8.0 V.

B. CIRCUIT DESCRIPTIONS (Contd)

PULSE WIDTH MODULATOR IC (Contd)

6. Primary Power Conversion

After power has been applied, the pulse width modulator IC will increase the pulse width (duty-cycle) from a minimum value as part of its slow-start feature.

When output B (Pin 16) of the pulse width modulator goes from low to high, the ML2-7 clock driver output goes low. This low going transient is coupled through R10, C19 to (Pin 1) of transformer T3 and setting the voltage at (Pin 1) to around +2 V. Since the output of the other clock driver (Pin 7) has not felt any change, the instantaneous voltage across terminals 1 and 4 of T3 is about 8 V with (Pin 4) being more positive. Observing the dot notation, the reflected voltage across terminal (5 through 6) is about 2.7 V. This voltage will forward bias diodes CR23, CR22, and CR18, and will drive a large base current into transistor Q2, rapidly turning it on.

When output B (Pin 16) of the pulse width modulator goes from high to low, the clock driver output (Pin 7) goes to about +11 V, applying instantly about +10.5 V to (Pin 1) of T3, and a high to (Pin 4) of the other clock driver. The output of this clock driver (Pin 5) is driven low and pulls (Pin 4) to T3 low. This voltage across (1 through 4) of T3 is reflected across (5 through 6) of T3 with terminal 5 being more negative. This negative voltage pulse forward biases diode CR21 and rapidly removes the base current from Q2, turning it off.

Zener diode CR20 and diode CR19 limit the base-emitter voltage from becoming more than 7 V negative.

LOGIC VOLTAGES

1. +5 V Supply

The +5 V supply is derived from a tap on the secondary winding of power transformer T2. The voltage on winding S1 is half-wave rectified by diode CR17 and filtered by capacitors C14 and C11. This unregulated voltage, +9 V, is applied to the base connection (B) of a linear regulator, ML5, which is a self-contained three terminal integrated circuit located on a common heat sink with ML6 and ML7.

Capacitors C33 and C37 are connected as close as possible across the input (B) and the output (E) terminals of the regulator to filter high frequency load transients.

2. +12 V Supply

The +12 V supply is derived from a secondary winding of T2. The voltage on winding S2 is half-wave rectified by diode CR16, and filtered by capacitors C18 and C13. This unregulated voltage, +17 V, is applied to the base connection (B) of a linear regulator, ML7, which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML6.

Capacitors C34 and C36 are connected as close as possible across the input (B) and the output (E) terminals of the regulator to filter high frequency load transients.

Diode CR35 prevents the start voltage V-start from being applied to the output of ML7 during start-up.

3. -12 V Supply

The -12 V supply is derived from a secondary winding of T2. The voltage on winding S3 is half-wave rectified by diode CR15 and filtered by capacitors C15 and C17. This unregulated voltage, -17 V, is applied to the collector connection (C) of a linear regulator, ML6 which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML7, but electrically isolated from the heat sink.

Capacitors C35 and C38 are connected as close as possible to the input (C) and the output (E) of the regulator to filter high frequency load transients. Note the ground polarity connection of C17 and C38.

4. +42 V Supply

The +42 V supply is derived from a separate secondary winding of T2. The voltage on winding S4 is half-wave rectified by diode CR14 and filtered by capacitors C16 and C12.

Resistor R19 establishes the minimum load for the +42 V output.

The 1.0A slow blow fuse prevents printer head damage, if a printer head driver transistor shorts on the logic board.

The LED indicator (CR31) is "ON", whenever the fused +42 V output is present. Resistor R27 limits the current through the diode.

Additional filtering of the +42 V output is provided by a 1500uf or 2400uf capacitor on the logic board.

5. Voltage Sense

Feedback to the input of the error amplifier of the pulse width modulator is provided by a precision resistor divider consisting of R21 and R22. This voltage is fed through R23 to the negative error input of the pulse width modulator, and is then compared to the V_{REF} voltage at the positive error input.

An internally derived correction voltage adjusts the pulse width of the output signal, such that the compared voltage difference is minimum.

410704 CIRCUIT CARD

POWER-UP MODE

1. AC Line Rectifier

230 Vac selected: AC to dc rectification occurs through the full-wave bridge consisting of four diodes CR7, CR8, CR9 and CR10. Capacitors C7 and C6 (series connection) filter the rectified voltage, and resistors R3 and R4 serve as voltage equalizers (across C7 and C6), and bleeder resistors. Capacitors C4 and C5 are high frequency filters.

115 Vac selected: AC to dc rectification is through a full-wave rectified voltage doubler circuit. In this option CR7 and CR8 are always reversed biased. During a positive half-cycle, current flows through RT1 and CR10, and charges filter capacitor C6; CR9 is reverse biased. During a negative half-cycle, CR10 is reverse biased, and current through CR9 charges filter capacitor C7. The dc voltages across C6 and C7 are in series, therefore doubling and rectifying line voltage.

2. Start Voltage

230 Vac selected: The function of transformer T1 is to provide the start-up power needed to drive the pulse width modulator (ML3) and the clock driver IC (ML2). One side of the primary is connected to the junction of C6 and C7, the other side is connected to the junction of CR9 and CR10. The alternating voltage across the primary side of T1 is not sinusoidal, and is a symmetrical voltage of about 320 V peak-to-peak.

B. CIRCUIT DESCRIPTIONS (Contd)

410704 CIRCUIT CARD (Contd)

POWER-UP MODE (Contd)

2. Start Voltage (Contd)

115 Vac selected: With the 115 Vac strap option, the ac input line voltage is directly applied to the primary of T1.

V Start Developing: The secondary voltage of T1 is converted to dc by a bridge circuit (CR5, CR2, CR3, CR4), and filtered by an electrolytic filter capacitor (C3). This unregulated dc voltage is used as the input to a +5 V regulator IC (ML1), which is offset-biased to provide about +11 V at the output terminal. The offset-biased is accomplished by R2 and R1. Blocking diode CR6 prevents the +12 V logic voltage from being applied to the ML1 output terminal during normal operation.

Zener diode CR1 protects ML1 against high input voltage transients.

3. dV/dt Circuit Snubber

The snubber network consisting of R5, C8 and CR11 prevents the collector voltage of Q1 from rising too rapidly while collector current is still present. When Q1 is being turned off and the collector voltage rises, diode CR11 becomes forward biased, and capacitor C8 begins to charge. When the collector voltage of Q1 decreases, C8 discharges through R5.

4. dI/dt Circuit Snubber

The function of CR13, C9, R6 and CR12 is to limit the reverse voltage developed across M and G of T2 during "kickback". Reverse kickback voltages below 190 V are dampened by the R6, C9 network which is parallel with the zener diode CR13.

5. Current Limiting Circuit

Current sensing is accomplished through the use of current transformer T4. The voltage developed across the primary side of T4 is reflected to the secondary side at 5 times its primary amplitude. Cycle by cycle current limiting is initiated when the rectified filtered waveform at the junction of R15 and CR16 is about 4.5 V. This corresponds to a Q1 collector current of about 3A.

6. Proportional Drive Circuit

The base-drive circuit to control the power switching transistor Q1 is of the active turnon/turnoff type. The "Set" current pulse is applied to terminals (1 through 4) of T3. When reflected to the primary side, the stepped up current pulse from terminals (5 through 6) of T3 initially drives the base of Q1, which then latches to a base current of (6 turns/22 turns) times IE(Q1). The negative "Reset" current pulse rapidly "Unlatches" the base of Q1 and "Resets" the core of transformer T3.

The base-drive circuit uses a modified baker clamp (CR14, CR17, CR18, CR19, R7) to prevent the collector of transistor Q1 from going into saturation, thereby keeping the switching time of Q1 to a minimum.

Diode CR16 and zener diode CR15 prevent the base of transistor Q1 from going more than 7 V negative with respect to the emitter.

The width and the amplitude of the "Set" current pulse is determined by CR25, C10 and R10. The values of R14 and C11 determine the width and the magnitude of the "Reset" current pulse.

Transistor Q3, Schottky diode CR29 and resistor R13 improve the "turnoff" characteristic of the directly driven (from the PWM) clock driver.

Transistor Q2, Schottky diode CR24 and resistor R9 improve the "turnoff" characteristic of the other clock driver.

PULSE WIDTH MODULATOR IC

1. Reference Regulator

An on-chip regulator, trimmed to within ±1 percent, is the stabilized power source for all the internal circuitry, with the exception of the current limit comparator, and the output driver.

2. Error Amplifier

The reference regulator output, V_{REF}, is externally connected to the + input (noninverting) of the error amplifier (Pin 1).

The +42 V rectified dc output is connected to a precision divider consisting of R26 and R23. The resulting voltage is applied through R24 to the - input (inverting) (Pin 2) of the error amplifier.

During normal operation, the voltage at (Pin 2) of the PWM IC is very close to that at (Pin 1). Frequency compensation of the error amplifier is accomplished by a feedback network consisting of R24, R18, C25, R19, C26, C28 and R27.

3. Sawtooth Oscillator

The sawtooth oscillator is programmed for a frequency of about 80 KHz by resistor R25 and capacitor C24. Since no "dead time" is allowed, the RD (R dead time) connection (Pin 11) is to ground. The switching frequency is one-half the oscillator frequency.

4. Current Sensing

The invert input (-) of the current limit comparator is biased by a precision divider comprised of R20 and R21. The noninvert input (+) is connected to the junction of R15 and C16. Pulse processing logic, inherent in the PWM, permits pulse-by-pulse current limiting, and prevents double pulsing.

5. Undervoltage Lockout

The pulse width modulator IC is prevented from operating (0 percent duty cycle) by the undervoltage lockout circuitry when the $+V_{IN}$ voltage (Pin 17) is below 8.0 V.

6. Primary Power Conversion

After power has been applied, the pulse width modulator IC will increase the pulse width (duty-cycle) from a minimum value as part of its slow-start feature.

When output B (Pin 16) of the pulse width modulator goes from low to high, the ML2-5 clock driver output goes low. This low going transient is coupled through CR29, R10, C10 to (Pin 1) of transformer T3 and setting the voltage at (Pin 1) to around +2 V. Since the output of the other clock driver (Pin 7) has not felt any change, the instantaneous voltage across terminals 1 and 4 of T3 is about 8 V with (Pin 4) being more positive. Observing the dot notation, the reflected voltage across terminal (5 through 6) is about 2.7 V. This voltage will forward bias diodes CR17, CR18 and CR19, and will drive a large base current into transistor Q1 rapidly turning it on.

B. CIRCUIT DESCRIPTIONS (Contd)

410704 CIRCUIT CARD (Contd)

PULSE WIDTH MODULATOR IC (Contd)

6. Primary Power Conversion (Contd)

When output B (Pin 16) of the pulse width modulator goes from high to low, the clock driver output (Pin 5) goes to about +11 V, applying instantly about +10.5 V to (Pin 1) of T3, and a high to (Pin 2) of the other clock driver. The output of this clock driver (Pin 7) is driven low and pulls (Pin 4) to T3 low. This voltage across (1 through 4) of T3 is reflected across (5 through 6) of T3 with terminal 5 being more negative. This negative voltage pulse forward biases diode CR21 and rapidly removes the base current from Q1 turning it off.

Zener diode CR15 and diode CR16 limit the base-emitter voltage from becoming more than 7 V negative.

LOGIC VOLTAGES

1. +5 V Supply

The +5 V supply is derived from a tap on the secondary winding of power transformer T2. The voltage on winding S1 is half-wave rectified by diode CR23 and filtered by capacitors C14 and C20. This unregulated voltage, +9 V, is applied to the base connection (B) of a linear regulator, ML6, which is a self-contained three terminal integrated circuit located on a common heat sink with ML4 and ML5.

Capacitors C30 and C31 are connected as close as possible across the input (1) and the output (2) terminals of the regulator to filter high frequency load transients.

2. +12 V Supply

The +12 V supply is derived from a secondary winding of T2. The voltage on winding S2 is half-wave rectified by diode CR22 and filtered by capacitors C13 and C21. This unregulated voltage, +17 V, is applied to the input connection (1) of a linear regulator, ML4, which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML6.

Capacitors C32 and C33 are connected as close as possible across the input (1) and the output (2) terminals of the regulator to filter high frequency load transients.

Diode CR28 prevents the start voltage V-start from being applied to the output of ML4 during start-up.

3. -12 V Supply

The -12 V supply is derived from a secondary winding of T2. The voltage on winding S3 is half-wave rectified by diode CR21 and filtered by capacitors C12 and C18. This unregulated voltage, -17 V, is applied to the case connection (case) of a linear regulator, ML5 which is a self-contained three terminal integrated circuit located on a common heat sink with ML4 and ML6, but electrically isolated from the heat sink.

Capacitors C29 and C34 are connected as close as possible to the input (case) and the output (2) of the regulator to filter high frequency load transients. Note the ground polarity connection of C18 and C34.

4. +42 V Supply

The +42 V supply is derived from a separate secondary winding of T2. The voltage on winding S4 is half-wave rectified by diode CR20 and filtered by capacitors C17 and C19.

Resistor R16 establishes the minimum load for the +42 V output.

The 1.0A slow blow fuse prevents printer head damage, if a printer head driver transistor shorts on the logic board.

The LED indicator (CR31) is "ON" whenever the +5 V output is present. Resistor R28 limits the current through the diode.

Additional filtering of the +42 V output is provided by a 1500uf or 2400uf capacitor on the logic board.

5. Voltage Sense

Feedback to the input of the error amplifier of the pulse width modulator is provided by a precision resistor divider consisting of R26 and R23. This voltage is fed through R24 to the negative error input of the pulse width modulator, and is then compared to the V_{REF} voltage at the positive error input.

An internally derived correction voltage adjusts the pulse width of the output signal, such that the compared voltage difference is minimum.

430770 POWER SUPPLY
410701 CIRCUIT CARD

1. Operation

The ac line voltage is directly converted to dc by a bridge rectifier connected directly to the ac input and filtered by a capacitor on the output side of the bridge rectifier. The dc output is connected to a switching regulator which provides a regulated output of a nominal 90 V. This output is connected to a double-ended inverter transformer which provides line isolation and transformer power to three low voltage secondary circuits where rectification is performed.

The +5 V, +12 V and -12 V outputs are derived from three separate windings which drive integrated circuit voltage regulators. These regulators are of the linear type.

The protective ground is not connected to the primary circuit ground. Care must be exercised during troubleshooting to prevent direct connection of these grounds because this will effectively bypass one of the bridge rectifier diodes and cause full line voltage to be directly applied to another diode in the forward direction. This rectifier and other line components will fail under this condition.

The secondary voltage returns are tied together and directly connected to the protective ground. However, isolation is maintained between the ac line and the secondary circuits.

B. CIRCUIT DESCRIPTIONS (Contd)

430770 POWER SUPPLY
410701 CIRCUIT CARD (Contd)

2. AC Line Rectifier

The ac to dc rectification occurs through the full-wave bridge consisting of the four diodes CR1, CR2, CR3 and CR4 (B5). Capacitor C1 filters the dc.

The anodes of CR1 and CR2 and the negative end of C1 are connected to a common bus for all primary circuits. This bus is not to be confused or connected with any ground bus on the secondary circuits unless the power supply is floated through an isolation transformer. Grounding of the primary bus might cause destruction of diode CR1, as well as thermistor RT1.

3. Start Circuits

Upon initial application of ac power, capacitor C1 charges to peak line voltage. Resistor R1 (B6), supplies bias current through steering diode CR25 (C7), to the base of the switcher driver transistor Q5. The emitter of Q5 is connected through diode CR23 to the control voltage bus and Q5 remains "ON" until the control voltage becomes greater than 20 V which is determined by zener diode CR32 (C6).

When Q5 is "ON" the main switcher transistor, Q1 (B6), is "ON" and supplies current from C1 to charge the switching regulator output capacitor C2 (B8). The output capacitor is connected to the inverter transformer center-tap and also to the control voltage bus through current limiting resistor R6 (C9).

The switching regulator and inverter transformer drive control functions are performed by integrated circuit ML1 (F9). This circuit requires about 12 mA. The inverter drive base current is supplied by the control bus and limited to about 50 mA by resistor R19 and R20 (D8).

During start-up, the inverter base drive is inhibited by grounding (Pin 9) of ML1 through diode CR26 (E11), and R36. When the control bus voltage reaches 15 V, zener diode CR33 (C11), starts to conduct which removes the inhibit signal from (Pin 9) and enables ML1 to begin generating drive pulses at a low duty cycle.

To keep power loss to a minimum, the control bus voltage supply resistor R6, supplies about 20 mA. This is not sufficient to supply ML1 and full inverter drive transistor base currents. Therefore the control bus voltage will rise only to a point necessary to give about 20 percent duty cycle base drive pulses as controlled by zener diode CR33. However, when these pulses are generated, the voltage induced in transformer T1 feedback winding is applied to the control voltage bus through full-wave rectifier diodes CR12 (J10), and CR46 to raise the control voltage immediately to about 25 V. This removes the ML1 (Pin 9) inhibit signal and enables ML1 to operate in the full control mode.

4. Switching Regulator

The switching regulator section contains the switching transistor Q1 (B6), catch diode CR5, inductor L1, and capacitor C2. Control of the regulator is performed by integrated circuit ML1 which contains the oscillator, voltage reference, error amplifier, pulse width modulator, pulse steering flip-flop, dual alternating output switches, current limiting and shutdown circuitry. The oscillator is set at a nominal 35 KHz, controlled by C14 and R31 (F9).

The switcher transistor, Q1, is driven by a current amplifier, Q4, and a constant current configured transistor, Q5, which is turned on and off by ML1. Since Q5 is connected to both output switches of ML1 through diodes CR30 and CR31 (D8), the main switching transistor, Q1, is turned on each time either inverter driver transistor is turned on.

The output of the switching regulator section is connected to inverter transformer T1. Feedback voltage is supplied by the T1 feedback winding, (Pins 4, 5 and 6) and is full-wave rectified by diodes CR12 and CR46 (J10), filtered by capacitor C4, and connected to the inverting input of the ML1 error amplifier, (Pin 1) through the voltage divider R30 and R28 (E10). The reference voltage, (Pin 16) of ML1, is divided by resistors R27 and R29 and applied to the noninverting input of the ML1 error amplifier, (Pin 2).

During normal operation, the start-up function of Q5 is inhibited by the reverse bias on diode CR25 (C7).

5. Inverter Drive Circuit

Power is transferred from the primary to the secondary circuits through the inverter transformer, T1. The transformer primary is double ended, bifilar wound with the center tap connected to the output of the switching regulator. In normal operation the center tap voltage is a nominal 90 Vdc.

Each side of the transformer primary is alternately switched to ground by transistors Q2 and Q3. These transistors are driven by the switch outputs of integrated circuit ML1 through diodes CR40 (H10), and CR41 (I10). Base current to Q2 and Q3 is controlled by resistors R19 and R20 (D8), respectively. The inverter drive frequency is one-half of the switching regulator frequency. The base drive pulse duty cycle supplied by ML1 varies in the same proportion as the switching regulator drive duty cycle to compensate for variation in line voltage, ripple and load.

To prevent inverter drive duty cycle fold back and to supply additional base current, the feedback winding of T1 is connected to the bases of Q2 and Q3 through resistor diode networks R17 (J12), CR42 and R18, CR43 respectively. This arrangement supplies about 50 mA of base current to the conducting drive transistor.

Inverter drive transistor turnoff for Q2 and Q3 is performed by transistors Q6 and Q8 (H10) respectively. These commutating transistors shunt the feedback base drive to ground and remove the stored charge from the inverter drive transistors. Q6 and Q8 are driven by the switch outputs of ML1 through R-C networks, R26 (E8), C19 and R49, C20 respectively. They are alternately turned on when the respective output of ML1 removes base drive to the particular inverter drive transistor, Q2 or Q3. They will remain on for 3 to 5 microseconds, which is sufficient to insure that the transformer T1 has switched state.

B. CIRCUIT DESCRIPTIONS (Contd)

LOGIC VOLTAGES

1. +5 V Supply

The +5 V supply is derived fro n a secondary winding of T1. The voltage on winding S1 is full-wave rectified by diodes CR13 and CR14 (H13), and filtered by capacitors C8 and C26. This semiregulated voltage, +8.5, is applied to the input of a linear regulator, ML5, which is a self-contained three terminal integrated circuit located on a common heat sink with ML3 and ML4. Capacitors C9 and C21 on the output of the regulator filters high frequency load transients.

2. +12 V Supply

The +12 V supply is derived from a secondary winding of T1. The voltage on winding S2 is half-wave rectified by diode CR16 (F13), and filtered by capacitors C6 and C27. This semiregulated voltage, +15 V, is applied to the input of a linear regulator, ML3, which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML4. Capacitors C10, C22 and C23 on the output of the regulator filter high frequency load transients.

3. -12 V Supply

The -12 V supply is derived from a secondary winding of T1. The voltage on winding S3 is half-wave rectified by diode CR15 (G13), and filtered by capacitors C7 and C28. This semiregulated voltage, -15 V, is applied to the input connection of a linear regulator, ML4, which is a self-contained three terminal integrated circuit located on a common heat sink with ML5 and ML3. Capacitors C11, C24 and C25 on the output of the regulator, filter high frequency load transients.

FAULT PROTECTION ON SECONDARY

1. Short Circuit Protection

The +5 V, +12 V and -12 V supply out puts are protected against short circuits to ground by means of the current limiting characteristics inherent in the integrated circuit voltage regulator which is in each of these outputs. The +5 V fault current is limited to approximately 4 amperes, the +12 V and -12 V fault currents are limited to approximately 1.5 amperes. Whenever the fault is removed, the output voltage automatically recovers.

These regulators are also thermally protected so that in the event that their power dissipation in conjunction with the ambient temperature exceeds their limit, automatic shutdown occurs. Whenever the internal temperature decreases to a safe level, the device will reset and restore the output voltage.

2. Output Regulator Protection Circuits

Diodes CR17, CR20 and CR21, placed across the input/output terminals of output linear regulators, ML5, ML3 and ML4 respectively, protect the linear regulators from potential reverse bias conditions when an overvoltage shutdown condition occurs.

Diodes CR18, CR19 and CR22, placed from output to ground on the output terminals of linear regulators ML5, ML3 and ML4 respectively, protect the linear regulators from a load connected from an output to a voltage of an opposite polarity.

3. Overvoltage Protection

Each secondary output voltage has an overvoltage sense circuit which will cause the power supply to shut down whenever an overvoltage is detected on an output.

Zener diode CR35 (H16), connected to the +5 V supply and zener diode CR36 (D16), connected to the +12 V supply are diode coupled by CR28 and CR29 to the base of transistor Q9. Resistor R44 limits the current through the photo-diode. An overvoltage condition on either the +5 V or +12 V supplies will break down the corresponding zener diode, thus supplying base current to the transistor Q9 causing the photo-diode to conduct.

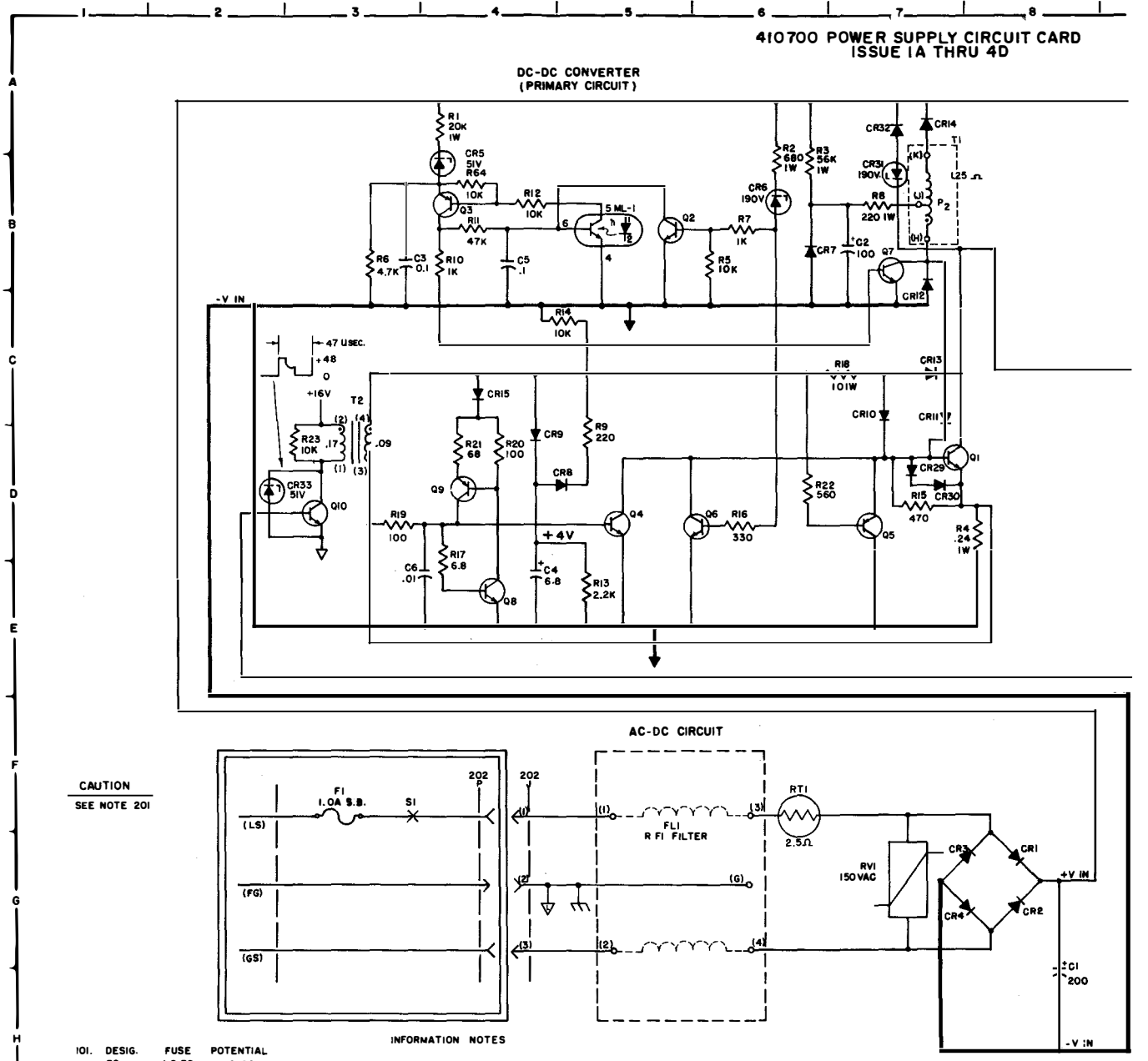
Zener diode CR37 (G16), connected to the -12 V supply, is diode coupled by CR27 to the cathode of the Q10 (E16) transistor. Resistor R52 limits the base current through the base of Q10. An overvoltage condition on the -12 V qupply will break down the zener diode, thus supplying current to transistor Q10, which will turn on the photodiode in ML2.

The associated ML2 phototransistor will turn "ON" when the ML2 photo-diode conducts. Transistor Q7 (C11) turns "ON" when the phototransistor turns "ON" and the resulting latch maintains a bias on ML1 shutdown (Pin 10). Commutation transistors Q6 (H10) and Q8 are also turned "ON". This action inhibits operation of the switching regulator and inverter drive circuits. The semiregulated secondary voltages from T1 are removed. In order for the supply to recover, the input line voltage must be removed for approximately 20 to 30 seconds.

Zener diode CR47 (E11) and transistor Q7 forms a overvoltage protection circuit on the feedback voltage. If transistor Q1 shorts or turns full-on, the full input voltage (140 Vdc) will be applied to the dc-dc converter resulting in higher secondary voltages. To prevent excess heat or damage to components, zener diode CR47 will sense the rise in voltage, transistor Q7 will turn-on, causing the dc-dc connector to latch off. Zener diode CR34 (C20) in conjunction with CR33, limit the voltage applied to ML1 during over-voltage conditions.

C. CIRCUIT DIAGRAMS

1. 410700 Circuit Card, Issue 1A Through 4D



INFORMATION NOTES

101. DESIG. FUSE POTENTIAL
F2 1.0 FB 42VDC

102. BATTERY SYMBOL VOLTAGE RANGE

VREF		6.80 TO 7.50
+16V	DC	15.4 TO 19.5
-16	DC	-15.4 TO -19.5
+9V	DC	8.2 TO 10.4
+5V	DC	4.6 TO 5.4
+12V	DC	11.1 TO 12.8
-12V	DC	-11.1 TO 12.8
+42	DC	39 TO 45
115V	AC	103 TO 127

EQUIPMENT NOTES

201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT GROUND. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE GROUNDS UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER. DIRECT CONNECTION TO THESE GROUNDS WITHOUT ISOLATION WILL CAUSE COMPONENTS TO FAIL.

202. THE OSCILLATOR AND CONTROL CIRCUIT CAN BE CHECKED BY APPLYING AN EXTERNAL +16V 200MA. SOURCE VOLTAGE TO THE CATHODE OF CR19. THE WAVEFORMS SHOWN ARE WITH +16V APPLIED TO CR19.

203. THE +5V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9V AND -16V 200MA SOURCE VOLTAGE ACROSS C7 AND C8 RESPECTIVELY

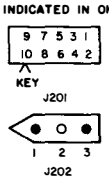
301. TERMINALS DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

302. ALL RESISTORS ARE 1/4 W, ±5% AND ALL IN OHMS UNLESS OTHERWISE SPECIFIED.

303. ALL CAPACITORS VALUES IN MICRO FARADS UNLESS OTHERWISE SPECIFIED

304. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

305. CONNECTORS (PIN NUMBERS) (TOP VIEW)



306. R34, 1K - ISSUE 4C OR LOWER.

307. INDICATES +42V DC GROUND

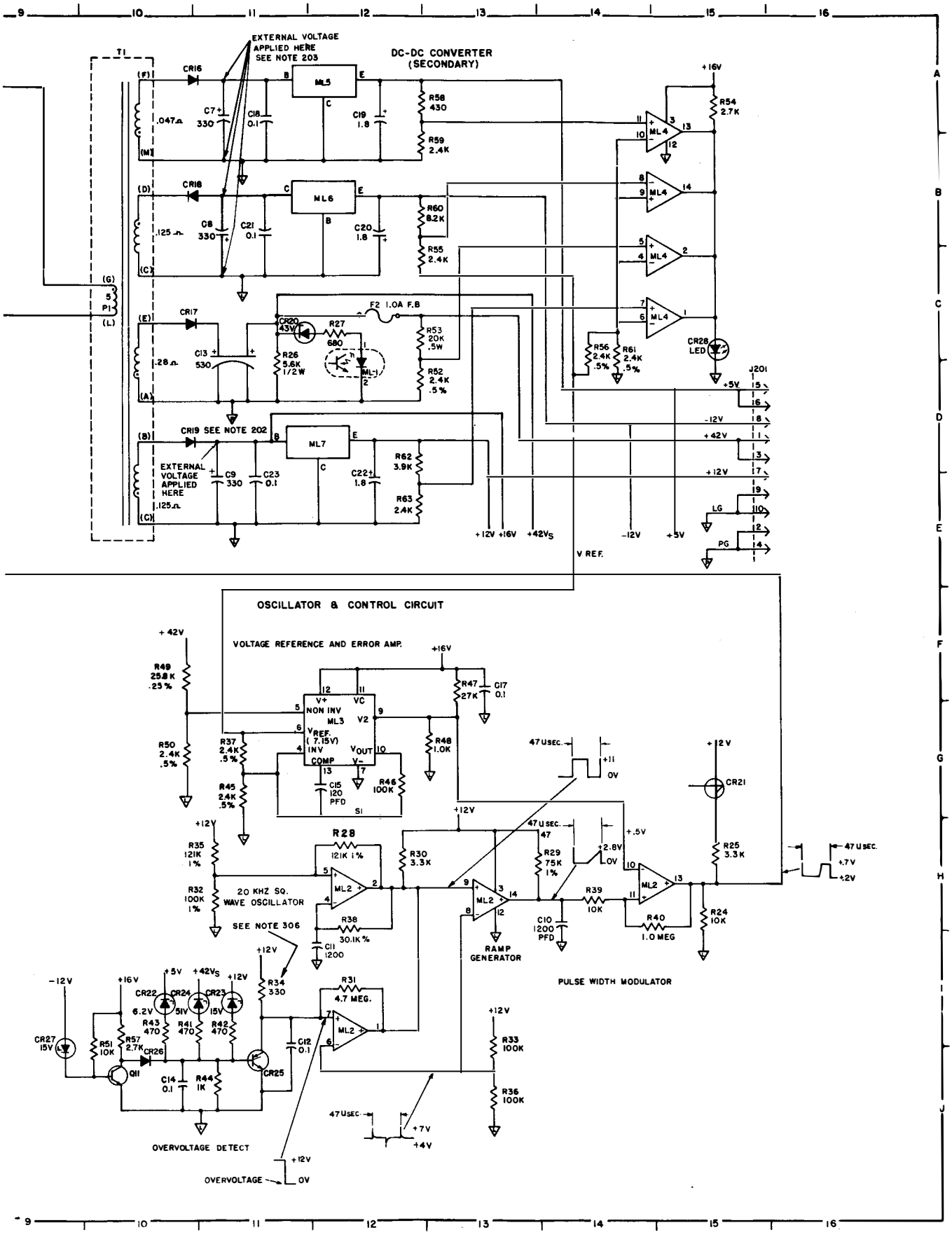
INDICATES ±12V, AND +5DC GROUND

INDICATES FRAME GROUND (PROTECTIVE)

INDICATES FULL WAVE BRIDGE COMMON (NOT GROUND)

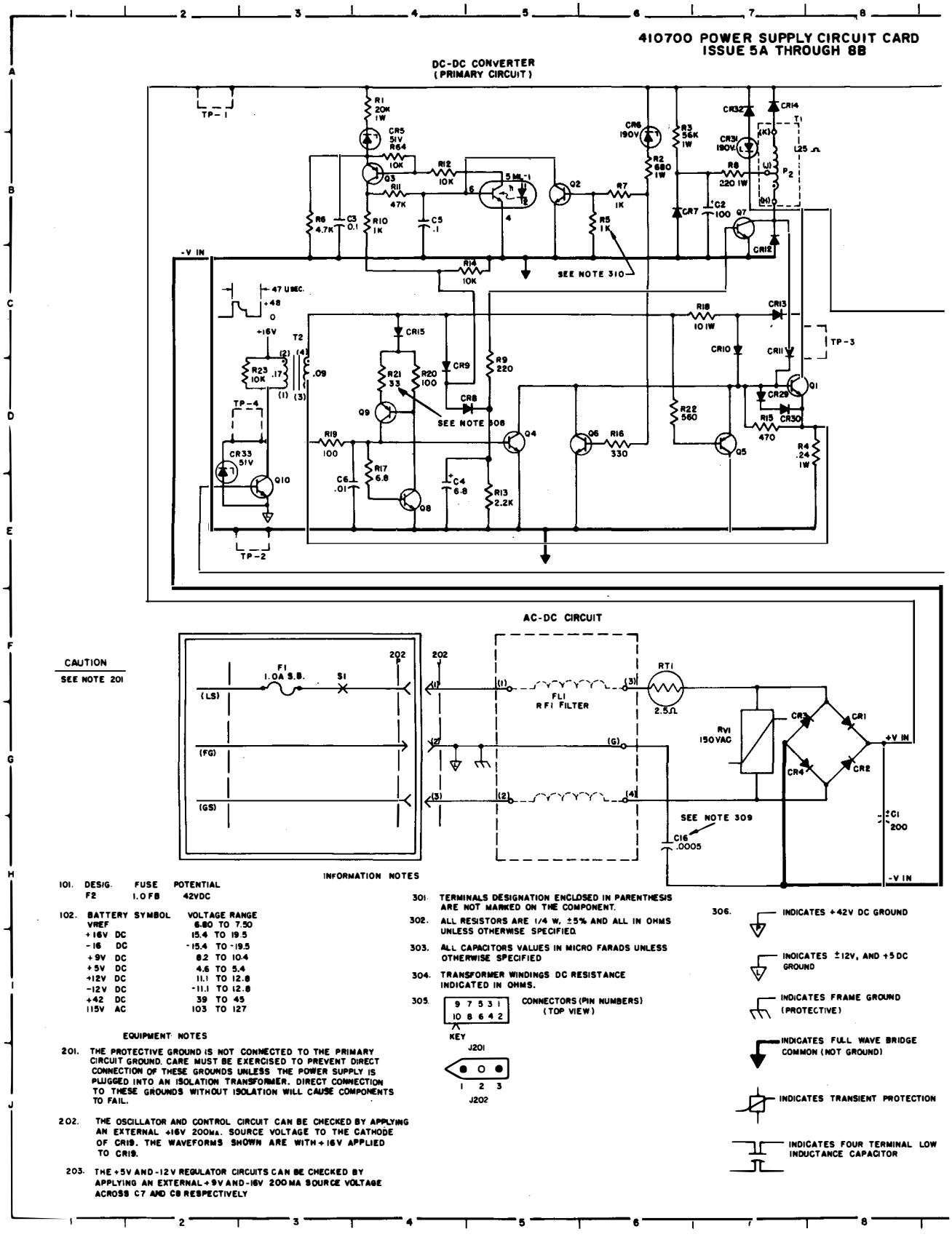
INDICATES TRANSIENT PROTECTION

INDICATES FOUR TERMINAL LOW INDUCTANCE CAPACITOR


DC-DC CONVERTER (SECONDARY)
EXTERNAL VOLTAGE APPLIED HERE SEE NOTE 203
T1
CR16
CR18
CR17
CR19 SEE NOTE 202
EXTERNAL VOLTAGE APPLIED HERE
ML5
ML6
ML7
ML4
C7 330
C8 330
C9 330
C13 530
C16 0.1
C21 0.1
C23 0.1
C19 1.8
C20 1.8
C22 1.8
R58 430
R59 2.4K
R60 8.2K
R55 2.4K
R53 20K .5W
R52 2.4K .5%
R62 3.9K
R63 2.4K
R54 2.7K
R56 2.4K .5%
R61 2.4K .5%
CR20 43V
R27 680
R26 5.6K 1/2W
ML-1
F2 1.0A F.B
CR28 LED
+16V
+5V
-12V
+42V
+12V
LG
PG
J201
+12V +16V +42Vs
-12V +5V
V REF.
OSCILLATOR & CONTROL CIRCUIT
VOLTAGE REFERENCE AND ERROR AMP.
+42V
+16V
R49 25.8K .25%
R50 2.4K .5%
R37 2.4K .5%
R45 2.4K .5%
R47 27K
C17 0.1
R48 1.0K
ML3
NON INV
INV
COMP
VC
V2
VOUT
V-
VREF. (7.15V)
C15 120 PFD
R46 100K
S1
47 USEC.
+11
0V
+12V
CR21
R28 121K 1%
R35 121K 1%
R32 100K 1%
20 KHZ SQ. WAVE OSCILLATOR
SEE NOTE 306
R38 30.1K%
C11 1200
R30 3.3K
R29 75K 1%
+2.8V
0V
+.5V
R39 10K
C10 1200 PFD
R40 1.0 MEG
R25 3.3K
R24 10K
RAMP GENERATOR
PULSE WIDTH MODULATOR
+.7V
+2V
R34 330
R31 4.7 MEG.
R33 100K
R36 100K
CR22 6.2V
CR24 5V
CR23 15V
CR27 15V
R43 470
R41 470
R42 470
R51 10K
R57 2.7K
CR26
CR25
Q11
C14 0.1
R44 1K
C12 0.1
OVERVOLTAGE DETECT
OVERVOLTAGE
+7V
+4V

C. CIRCUIT DIAGRAMS (Contd)

2. 410700 Circuit Card, Issue 5A Through 8B



INFORMATION NOTES

101. DESIG. FUSE POTENTIAL
F2 1.0 FB 42VDC

102. BATTERY SYMBOL VOLTAGE RANGE

	VREF	6.80 TO 7.50
+16V	DC	15.4 TO 19.5
-16	DC	-15.4 TO -19.5
+9V	DC	8.2 TO 10.4
+5V	DC	4.6 TO 5.4
+12V	DC	11.1 TO 12.8
-12V	DC	-11.1 TO 12.8
+42	DC	39 TO 45
115V	AC	103 TO 127

EQUIPMENT NOTES

201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT GROUND. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE GROUNDS UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER. DIRECT CONNECTION TO THESE GROUNDS WITHOUT ISOLATION WILL CAUSE COMPONENTS TO FAIL.

202. THE OSCILLATOR AND CONTROL CIRCUIT CAN BE CHECKED BY APPLYING AN EXTERNAL +16V 200ma. SOURCE VOLTAGE TO THE CATHODE OF CR19. THE WAVEFORMS SHOWN ARE WITH +16V APPLIED TO CR19.

203. THE +5V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9V AND -16V 200 MA SOURCE VOLTAGE ACROSS C7 AND C8 RESPECTIVELY

301. TERMINALS DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

302. ALL RESISTORS ARE 1/4 W, ±5% AND ALL IN OHMS UNLESS OTHERWISE SPECIFIED.

303. ALL CAPACITORS VALUES IN MICRO FARADS UNLESS OTHERWISE SPECIFIED

304. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

305. CONNECTORS (PIN NUMBERS) (TOP VIEW)

306. INDICATES +42V DC GROUND

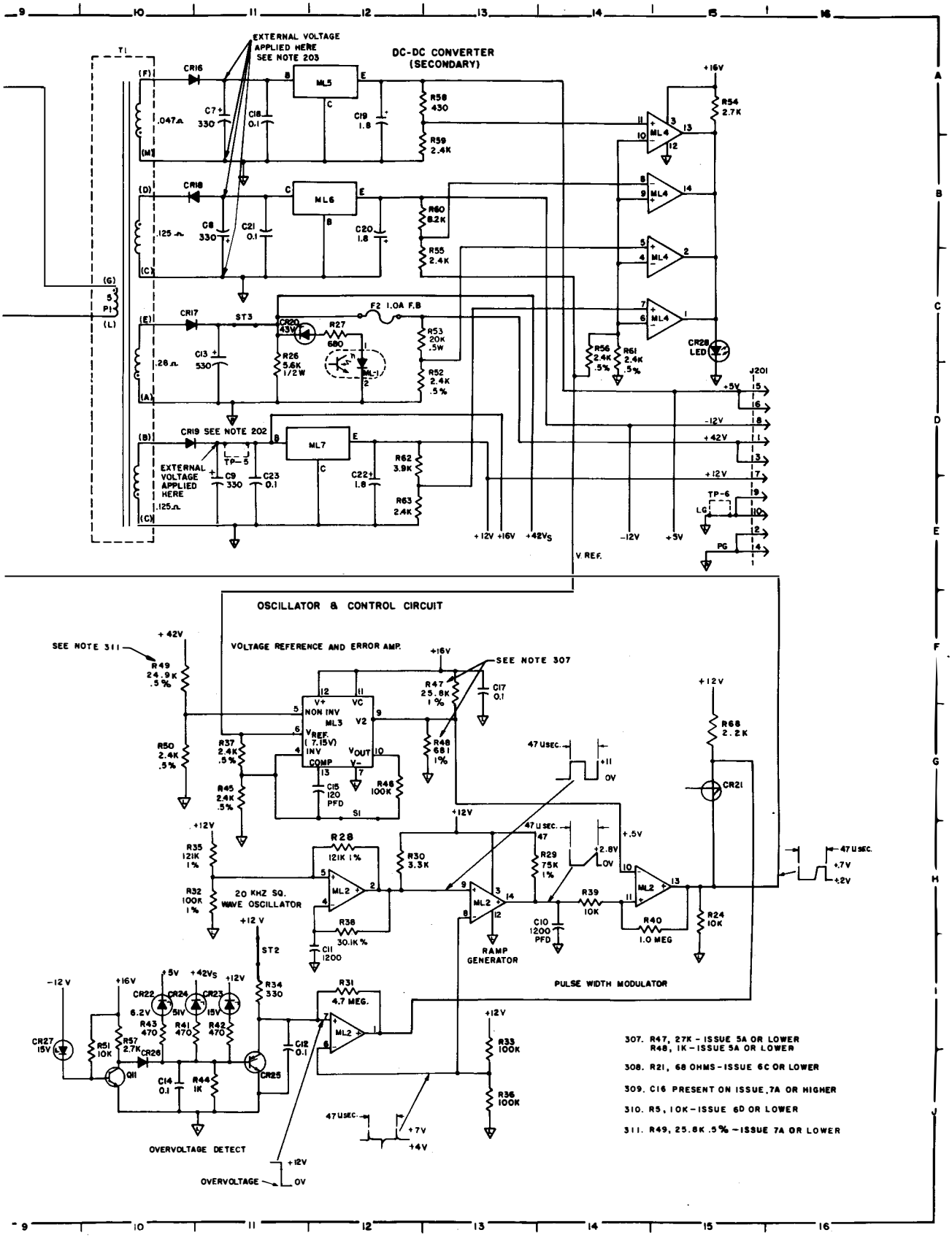
INDICATES ±12V, AND +5 DC GROUND

INDICATES FRAME GROUND (PROTECTIVE)

INDICATES FULL WAVE BRIDGE COMMON (NOT GROUND)

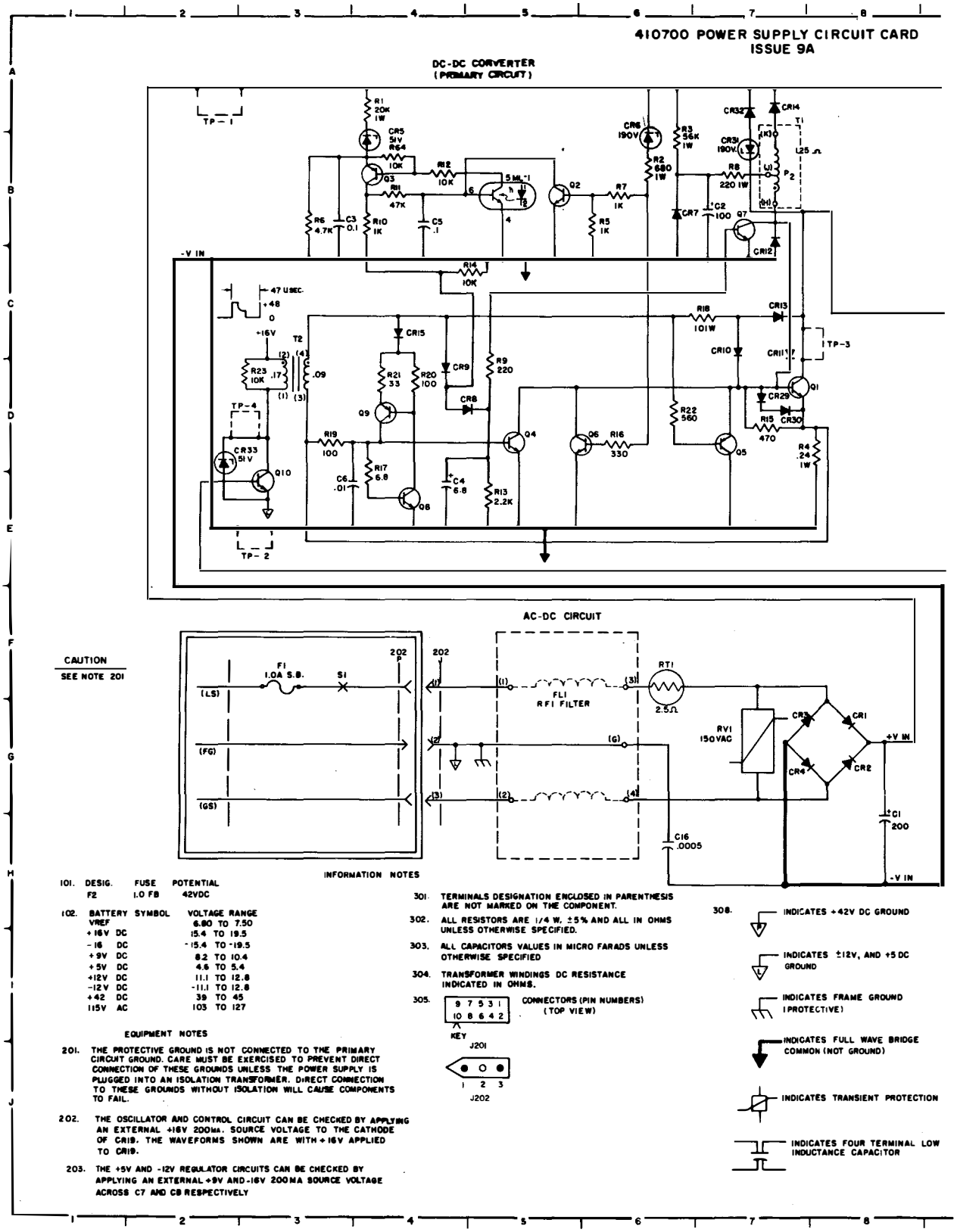
INDICATES TRANSIENT PROTECTION

INDICATES FOUR TERMINAL LOW INDUCTANCE CAPACITOR


DC-DC CONVERTER (SECONDARY)
EXTERNAL VOLTAGE APPLIED HERE SEE NOTE 203
T1
CR16
ML5
R58 430
R59 2.4K
C7 330
C18 0.1
C19 1.8
.047Ω
CR18
ML6
R60 8.2K
R55 2.4K
C8 330
C21 0.1
C20 1.8
.125Ω
CR17
ST3
F2 1.0A F.B
CR20 43V
R27 680
R53 20K .5W
R52 2.4K .5%
R26 5.6K 1/2W
C13 530
.26Ω
CR19 SEE NOTE 202
ML7
R62 3.9K
R63 2.4K
C22 1.8
C23 0.1
C9 330
TP-5
EXTERNAL VOLTAGE APPLIED HERE
.125Ω
+16V
R54 2.7K
ML4
R56 2.4K .5%
R61 2.4K .5%
CR28 LED
J201
+5V
-12V
+42V
+12V
TP-6
LG
PG
+12V +16V +42VS
-12V
+5V
V REF.
OSCILLATOR & CONTROL CIRCUIT
VOLTAGE REFERENCE AND ERROR AMP.
SEE NOTE 311
+42V
R49 24.9K .5%
+16V
SEE NOTE 307
R47 25.8K 1%
C17 0.1
ML3
NON INV
INV
COMP
VREF. (7.15V)
R50 2.4K .5%
R37 2.4K .5%
R45 2.4K .5%
C15 120 PFD
R48 100K
R48 681 1%
47 USEC.
+11
0V
+12V
R68 2.2K
CR21
R28 121K 1%
R35 121K 1%
R32 100K 1%
20 KHZ SQ. WAVE OSCILLATOR
ML2
R38 30.1K 1%
C11 1200
R30 3.3K
R29 75K 1%
+2.8V
0V
+.5V
R39 10K
C10 1200 PFD
R40 1.0 MEG
R24 10K
RAMP GENERATOR
PULSE WIDTH MODULATOR
47 USEC.
+.7V
+2V
ST2
R34 330
R31 4.7 MEG.
C12 0.1
-12V
+16V
+5V
+42VS
+12V
CR22 6.2V
CR24 5V
CR23 15V
CR27 15V
R51 10K
R57 2.7K
CR26
R43 470
R41 470
R42 470
Q1
C14 0.1
R44 1K
CR25
R33 100K
R36 100K
47 USEC.
+7V
+4V
OVERVOLTAGE DETECT
+12V
OVERVOLTAGE
0V
307. R47, 27K - ISSUE 5A OR LOWER
R48, 1K - ISSUE 5A OR LOWER
308. R21, 68 OHMS - ISSUE 6C OR LOWER
309. C16 PRESENT ON ISSUE 7A OR HIGHER
310. R5, 10K - ISSUE 6D OR LOWER
311. R49, 25.8K .5% - ISSUE 7A OR LOWER

C. CIRCUIT DIAGRAMS (Contd)

3. 410700 Circuit Card, Issue 9A



INFORMATION NOTES

101. DESIG. FUSE POTENTIAL
F2 1.0 FB 42VDC

102.

BATTERY SYMBOL	VOLTAGE RANGE
VREF	6.80 TO 7.50
+16V DC	15.4 TO 19.5
-16 DC	-15.4 TO -19.5
+9V DC	8.2 TO 10.4
+5V DC	4.6 TO 5.4
+12V DC	11.1 TO 12.8
-12V DC	-11.1 TO 12.8
+42 DC	39 TO 45
115V AC	103 TO 127

EQUIPMENT NOTES

201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT GROUND. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE GROUNDS UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER. DIRECT CONNECTION TO THESE GROUNDS WITHOUT ISOLATION WILL CAUSE COMPONENTS TO FAIL.

202. THE OSCILLATOR AND CONTROL CIRCUIT CAN BE CHECKED BY APPLYING AN EXTERNAL +16V 200MA. SOURCE VOLTAGE TO THE CATHODE OF CR18. THE WAVEFORMS SHOWN ARE WITH +16V APPLIED TO CR19.

203. THE +5V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9V AND -16V 200 MA SOURCE VOLTAGE ACROSS C7 AND C8 RESPECTIVELY

301. TERMINALS DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

302. ALL RESISTORS ARE 1/4 W, ±5% AND ALL IN OHMS UNLESS OTHERWISE SPECIFIED.

303. ALL CAPACITORS VALUES IN MICRO FARADS UNLESS OTHERWISE SPECIFIED

304. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

305. CONNECTORS (PIN NUMBERS) (TOP VIEW)

308. INDICATES +42V DC GROUND

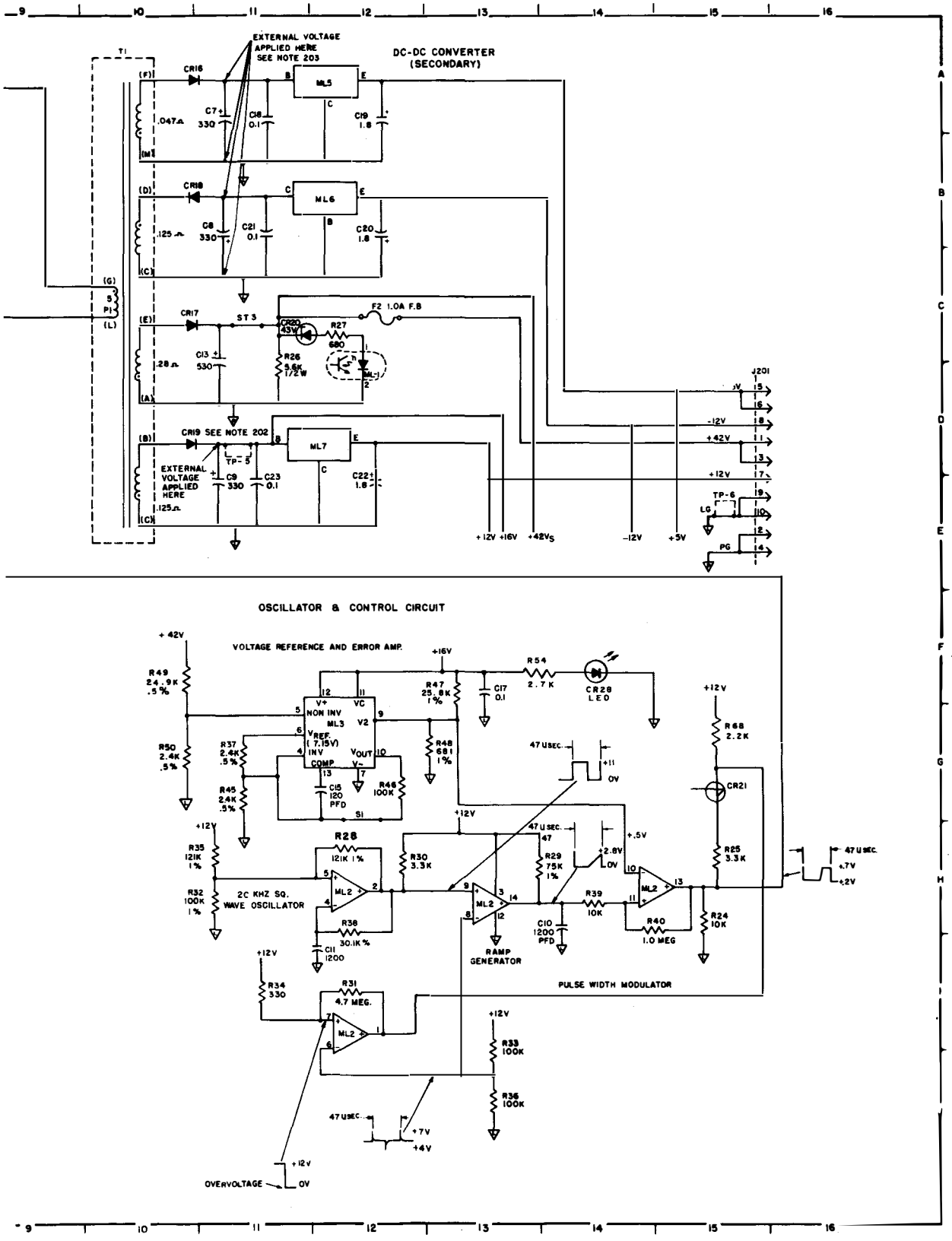
INDICATES ±12V, AND +5 DC GROUND

INDICATES FRAME GROUND (PROTECTIVE)

INDICATES FULL WAVE BRIDGE COMMON (NOT GROUND)

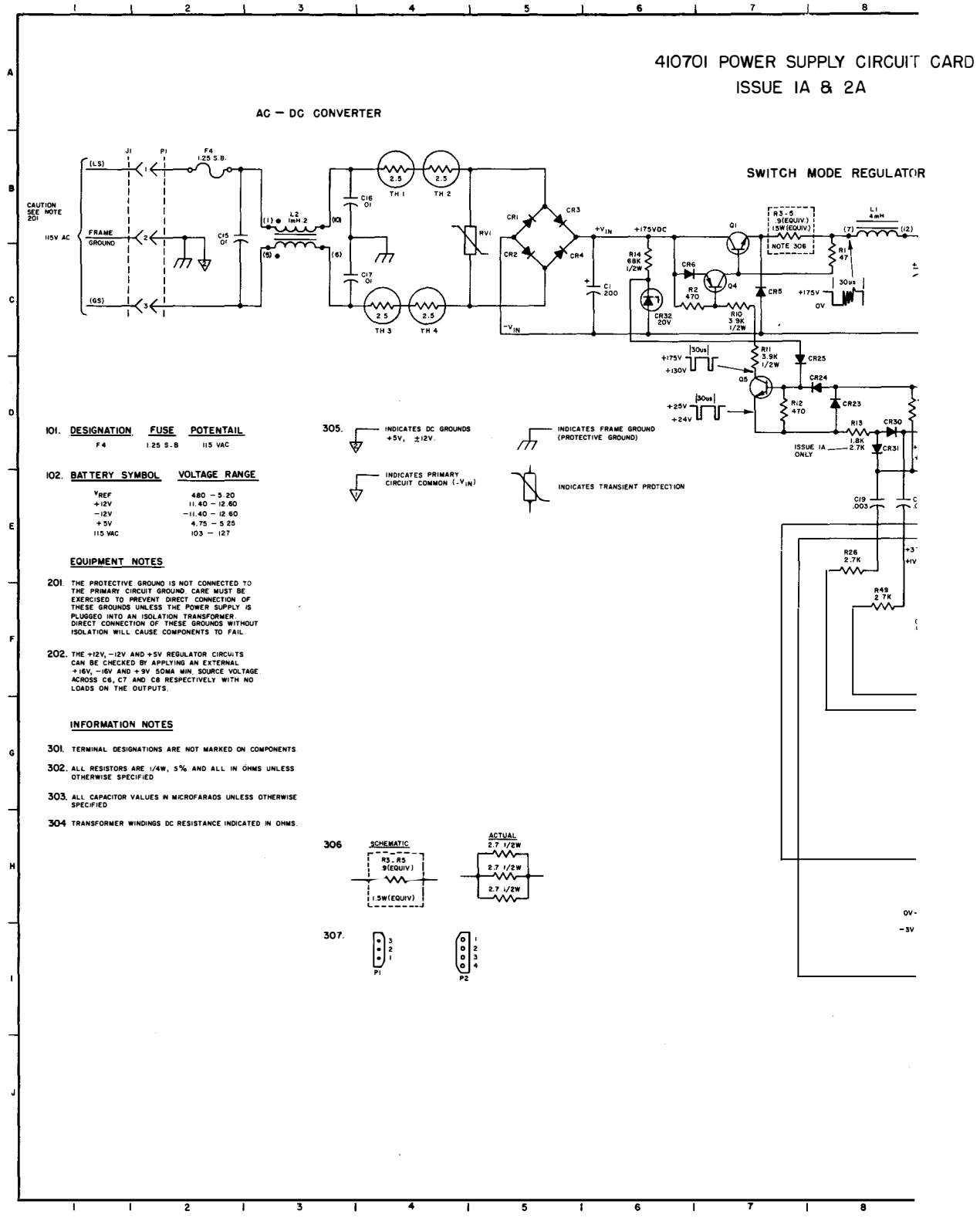
INDICATES TRANSIENT PROTECTION

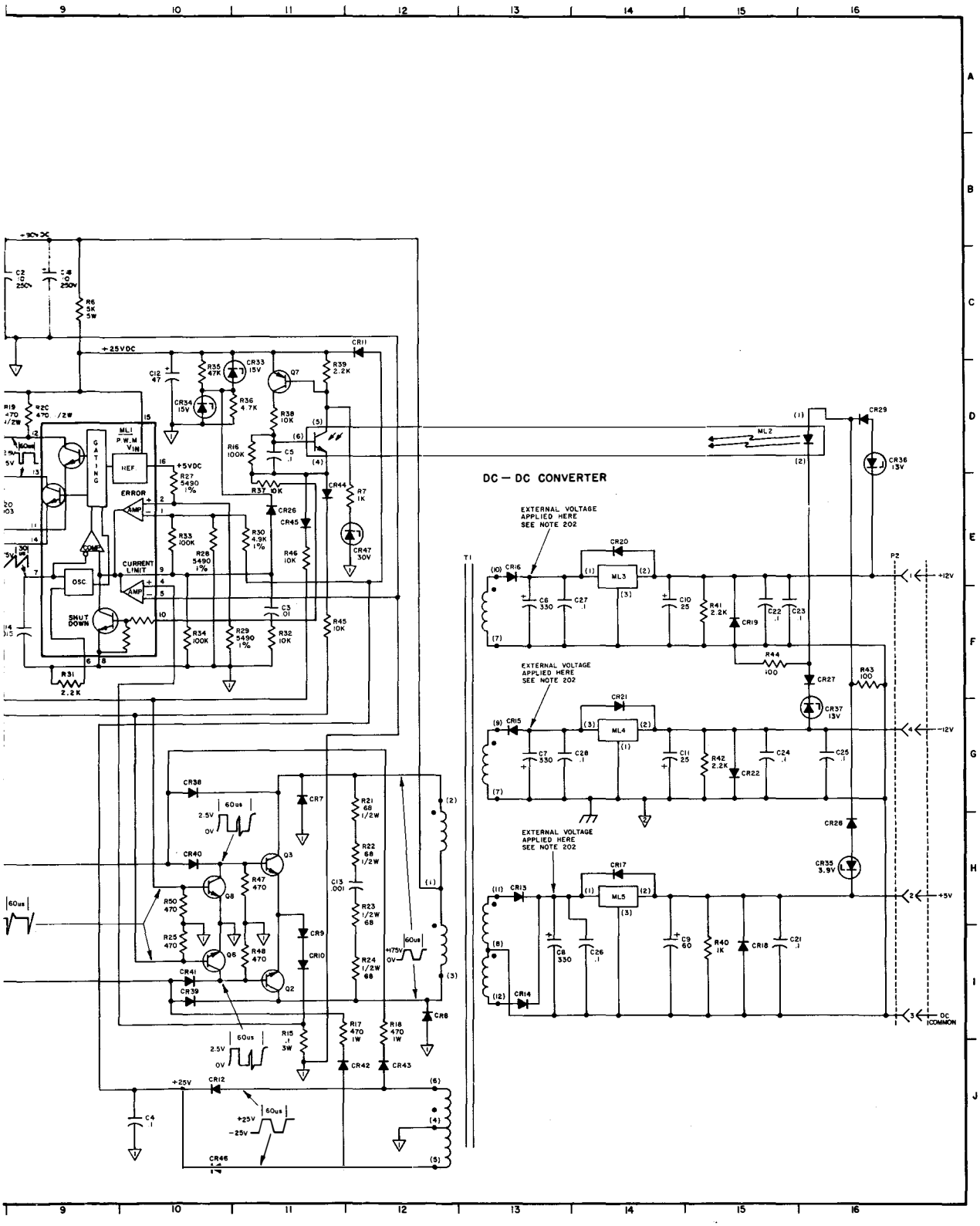
INDICATES FOUR TERMINAL LOW INDUCTANCE CAPACITOR


DC-DC CONVERTER (SECONDARY)
EXTERNAL VOLTAGE APPLIED HERE SEE NOTE 203
T1
CR16
ML5
C7 330
C18 0.1
C19 1.8
.047Ω
CR18
ML6
C8 330
C21 0.1
C20 1.8
.125Ω
CR17
ST 3
CR20 43V
R27 680
F2 1.0A F.8
C13 530
R26 9.6K 1/2W
ML-1
.28Ω
CR19 SEE NOTE 202
ML7
TP-5
EXTERNAL VOLTAGE APPLIED HERE
C9 330
C23 0.1
C22 1.8
.125Ω
J201
+12V +16V +42Vs
-12V
+5V
-12V
+42V
+12V
TP-6
LG
PG
OSCILLATOR & CONTROL CIRCUIT
VOLTAGE REFERENCE AND ERROR AMP.
+42V
+16V
R49 24.9K .5%
R50 2.4K .5%
R37 2.4K .5%
R45 2.4K .5%
R47 25.8K 1%
R48 681 1%
R54 2.7 K
CR28 LED
C17 0.1
ML3
V+
NON INV
VC
V2
VREF (7.15V)
INV
COMP
VOUT
V-
C15 120 PFD
R46 100K
47 USEC.
+11
0V
+12V
R68 2.2K
CR21
R28
121K 1%
R35 121K 1%
R52 100K 1%
2C KHZ SQ. WAVE OSCILLATOR
ML2
R38 30.1K %
C11 1200
R30 3.3K
R29 75K 1%
+2.8V
0V
+.5V
R39 10K
R40 1.0 MEG
C10 1200 PFD
RAMP GENERATOR
R25 3.3K
R24 10K
47 USEC.
+7V
+2V
PULSE WIDTH MODULATOR
R34 330
R31 4.7 MEG.
R33 100K
R36 100K
47 USEC.
+7V
+4V
OVERVOLTAGE
+12V
0V

C. CIRCUIT DIAGRAMS (Contd)

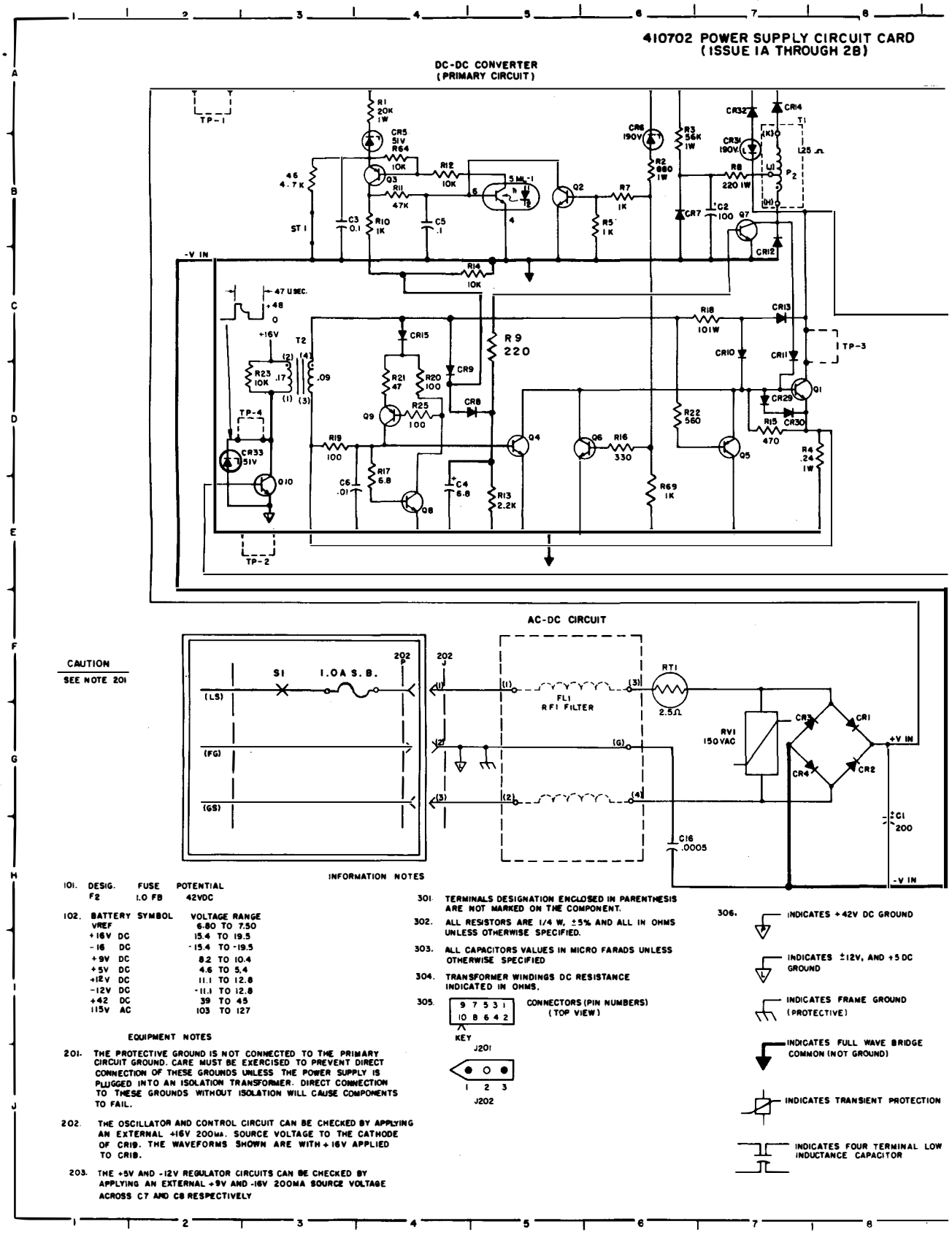
4. 410701 Circuit Card, Issues 1A and 2A




DC — DC CONVERTER
+25VDC
+5VDC
ML1
P.W.M
VIN
GATING
REF
ERROR
AMP
COMP
OSC
CURRENT LIMIT
SHUT DOWN
ML2
ML3
ML4
ML5
T1
P2
EXTERNAL VOLTAGE APPLIED HERE SEE NOTE 202
+12V
+5V
DC COMMON
60us
2.5V
0V
+25V
-25V
+175V

C. CIRCUIT DIAGRAMS (Contd)

5. 410702 Circuit Card, Issue 1A Through 2B



INFORMATION NOTES

101. DESIG. FUSE POTENTIAL
F2 1.0 FB 42VDC

102.

BATTERY SYMBOL	VOLTAGE RANGE
VREF	6.80 TO 7.50
+16V DC	15.4 TO 19.5
-16 DC	-15.4 TO -19.5
+9V DC	8.2 TO 10.4
+5V DC	4.6 TO 5.4
+12V DC	11.1 TO 12.8
-12V DC	-11.1 TO 12.8
+42 DC	39 TO 45
115V AC	103 TO 127

EQUIPMENT NOTES

201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT GROUND. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE GROUNDS UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER. DIRECT CONNECTION TO THESE GROUNDS WITHOUT ISOLATION WILL CAUSE COMPONENTS TO FAIL.

202. THE OSCILLATOR AND CONTROL CIRCUIT CAN BE CHECKED BY APPLYING AN EXTERNAL +16V 200ma. SOURCE VOLTAGE TO THE CATHODE OF CR19. THE WAVEFORMS SHOWN ARE WITH +16V APPLIED TO CR19.

203. THE +5V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9V AND -16V 200MA SOURCE VOLTAGE ACROSS C7 AND C8 RESPECTIVELY

301. TERMINALS DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

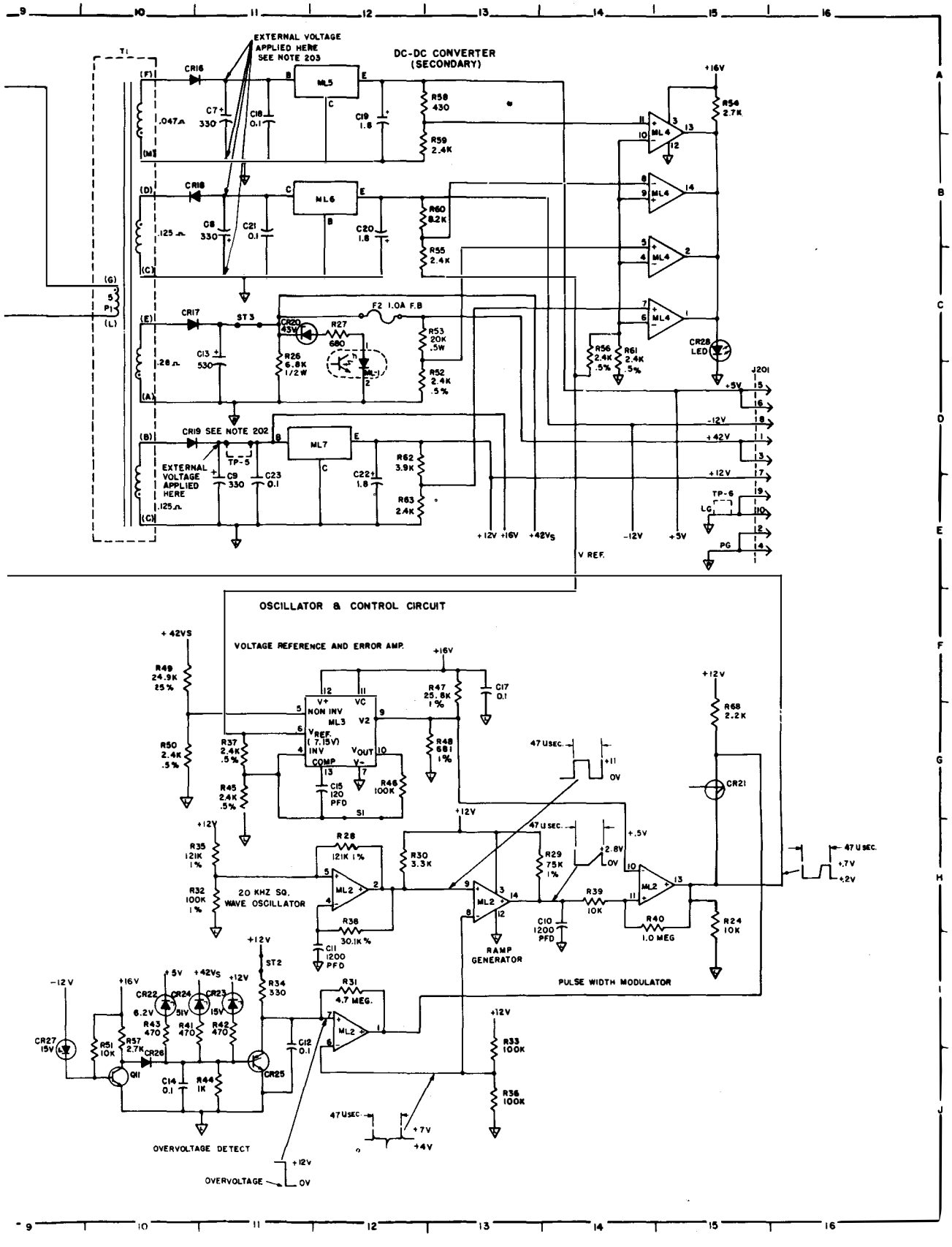
302. ALL RESISTORS ARE 1/4 W, ±5% AND ALL IN OHMS UNLESS OTHERWISE SPECIFIED.

303. ALL CAPACITORS VALUES IN MICRO FARADS UNLESS OTHERWISE SPECIFIED

304. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

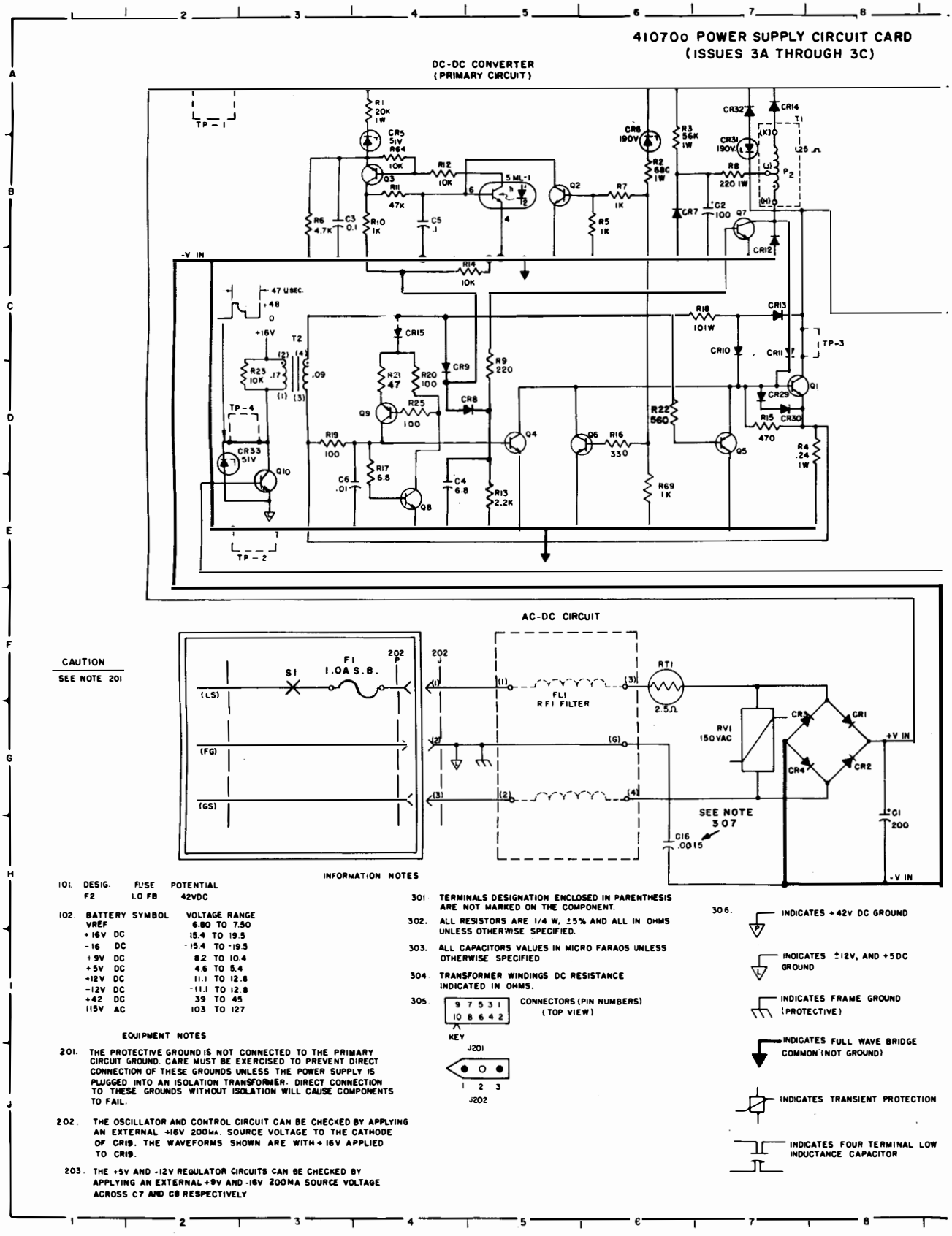
305. CONNECTORS (PIN NUMBERS) (TOP VIEW)

306.
- INDICATES +42V DC GROUND
- INDICATES ±12V, AND +5 DC GROUND
- INDICATES FRAME GROUND (PROTECTIVE)
- INDICATES FULL WAVE BRIDGE COMMON (NOT GROUND)
- INDICATES TRANSIENT PROTECTION
- INDICATES FOUR TERMINAL LOW INDUCTANCE CAPACITOR


DC-DC CONVERTER (SECONDARY)
EXTERNAL VOLTAGE APPLIED HERE SEE NOTE 203
CR16
ML5
C7 330
C18 0.1
C19 1.8
R58 430
R59 2.4K
CR18
ML6
C8 330
C21 0.1
C20 1.8
R60 8.2K
R55 2.4K
CR17
ST3
CR20 43V
R27 680
F2 1.0A F.B
R53 20K .5W
R26 6.8K 1/2W
C13 530
R52 2.4K .5%
CR19 SEE NOTE 202
TP-5
EXTERNAL VOLTAGE APPLIED HERE
C9 330
C23 0.1
ML7
C22 1.8
R62 3.9K
R63 2.4K
+16V
R54 2.7K
ML4
R56 2.4K .5%
R61 2.4K .5%
CR28 LED
J201
+5V
-12V
+42V
+12V
TP-6
LG
PG
+12V +16V +42Vs
-12V
+5V
V REF.
OSCILLATOR & CONTROL CIRCUIT
VOLTAGE REFERENCE AND ERROR AMP.
+42VS
R49 24.9K .5%
R50 2.4K .5%
R37 2.4K .5%
R45 2.4K .5%
ML3
NON INV
INV
COMP
VREF (7.15V)
V+
VC
V2
VOUT
V-
C15 120 PFD
R46 100K
R47 25.8K 1%
C17 0.1
R48 681 1%
R35 121K 1%
R32 100K 1%
20 KHZ SQ. WAVE OSCILLATOR
R28 121K 1%
R38 30.1K %
C11 1200 PFD
R30 3.3K
ML2
RAMP GENERATOR
R29 75K 1%
R39 10K
C10 1200 PFD
R40 1.0 MEG
R24 10K
R68 2.2K
CR21
47 USEC.
+11
0V
+2.8V
+.5V
+7.7V
+2.2V
PULSE WIDTH MODULATOR
-12V
+16V
+5V
+42Vs
+12V
CR22 6.2V
CR24 5V
CR23 15V
CR27 15V
R51 10K
R57 2.7K
R43 470
R41 470
R42 470
CR26
Q11
C14 0.1
R44 1K
CR25
ST2
R34 330
C12 0.1
R31 4.7 MEG.
R33 100K
R36 100K
+7V
+4V
OVERVOLTAGE DETECT
OVERVOLTAGE
+12V
0V

C. CIRCUIT DIAGRAMS (Contd)

6. 410702 Circuit Card, Issue 3A Through 3C



INFORMATION NOTES

101. DESIG. FUSE POTENTIAL
F2 1.0 FB 42VDC

102. BATTERY SYMBOL VOLTAGE RANGE

VREF		6.80 TO 7.50
+16V	DC	15.4 TO 19.5
-16	DC	-15.4 TO -19.5
+9V	DC	8.2 TO 10.4
+5V	DC	4.6 TO 5.4
+12V	DC	11.1 TO 12.8
-12V	DC	-11.1 TO 12.8
+42	DC	39 TO 45
115V	AC	103 TO 127

EQUIPMENT NOTES

201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT GROUND. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE GROUNDS UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER. DIRECT CONNECTION TO THESE GROUNDS WITHOUT ISOLATION WILL CAUSE COMPONENTS TO FAIL.

202. THE OSCILLATOR AND CONTROL CIRCUIT CAN BE CHECKED BY APPLYING AN EXTERNAL +16V 200MA. SOURCE VOLTAGE TO THE CATHODE OF CR19. THE WAVEFORMS SHOWN ARE WITH +16V APPLIED TO CR19.

203. THE +5V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9V AND -16V 200MA SOURCE VOLTAGE ACROSS C7 AND C8 RESPECTIVELY

301. TERMINALS DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

302. ALL RESISTORS ARE 1/4 W, ±5% AND ALL IN OHMS UNLESS OTHERWISE SPECIFIED.

303. ALL CAPACITORS VALUES IN MICRO FARAOS UNLESS OTHERWISE SPECIFIED

304. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

305. CONNECTORS (PIN NUMBERS) (TOP VIEW)

306. INDICATES +42V DC GROUND

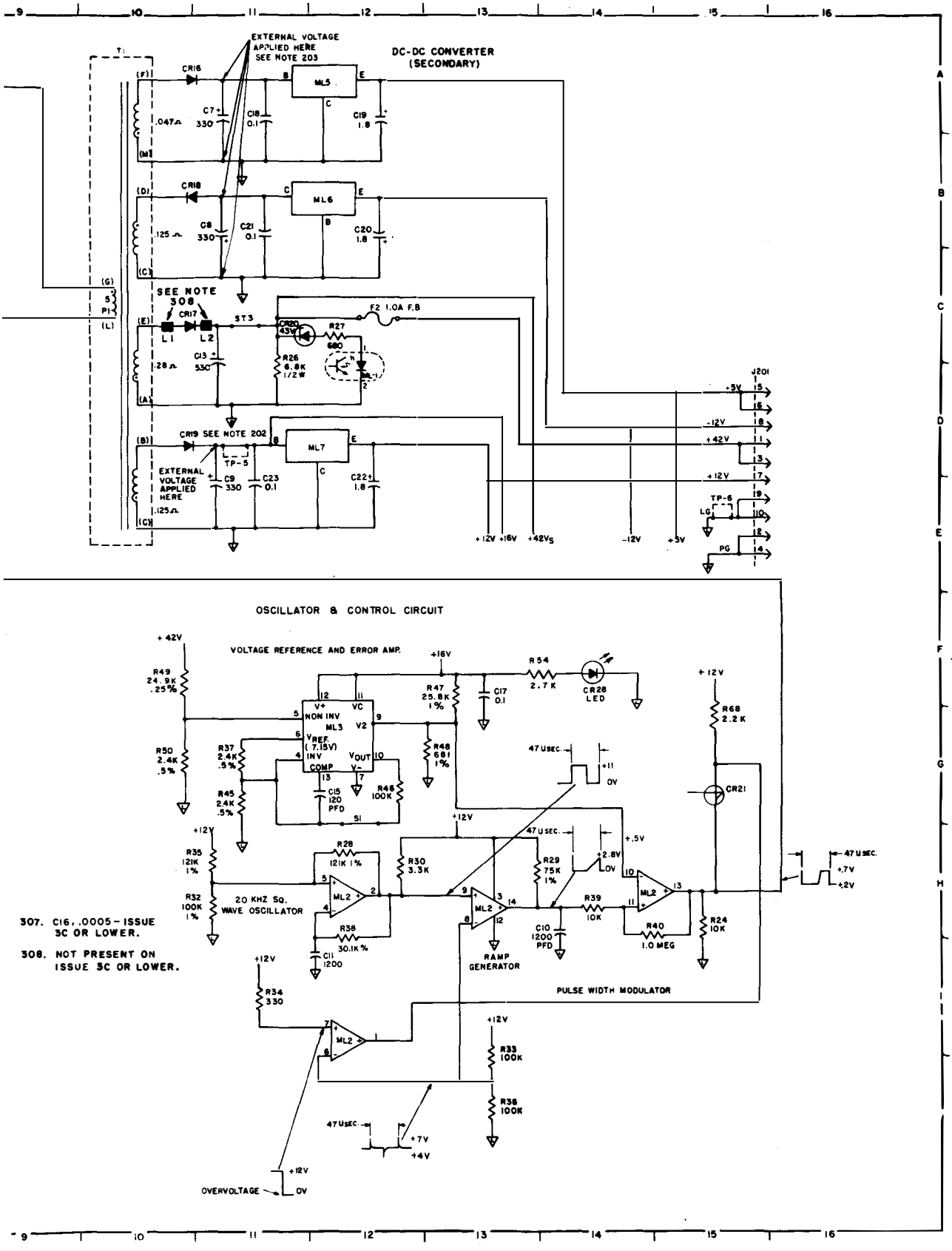
INDICATES ±12V, AND +5DC GROUND

INDICATES FRAME GROUND (PROTECTIVE)

INDICATES FULL WAVE BRIDGE COMMON (NOT GROUND)

INDICATES TRANSIENT PROTECTION

INDICATES FOUR TERMINAL LOW INDUCTANCE CAPACITOR


DC-DC CONVERTER (SECONDARY)
EXTERNAL VOLTAGE APPLIED HERE SEE NOTE 203
CR16
CR18
CR17
CR19 SEE NOTE 202
SEE NOTE 308
F2 1.0A F.B
CR20 43V
R27 680
R26 6.8K 1/2W
ML-1
ML5
ML6
ML7
C7 330
C8 330
C9 330
C18 0.1
C21 0.1
C23 0.1
C19 1.8
C20 1.8
C22 1.8
C13 530
TP-5
TP-6
J201
+5V
-12V
+42V
+12V
LG
PG
+12V +16V +42Vs -12V +5V
OSCILLATOR & CONTROL CIRCUIT
VOLTAGE REFERENCE AND ERROR AMP.
+42V
+16V
+12V
R49 24.9K .25%
R50 2.4K .5%
R37 2.4K .5%
R45 2.4K .5%
R47 25.8K 1%
R48 681 1%
R54 2.7K
CR28 LED
C17 0.1
R68 2.2K
CR21
ML3
V+
VC
NON INV
V2
VREF (7.15V)
INV
VOUT
COMP
V-
C15 120 PFD
R46 100K
47 USEC.
+11
0V
+.5V
+2.8V
R35 121K 1%
R32 100K 1%
R28 121K 1%
R30 3.3K
R29 75K 1%
R39 10K
R40 1.0 MEG
R24 10K
ML2
20 KHZ SQ. WAVE OSCILLATOR
R38 30.1K %
C11 1200
C10 1200 PFD
RAMP GENERATOR
PULSE WIDTH MODULATOR
+.7V
+2V
R34 330
R33 100K
R36 100K
+7V
+4V
OVERVOLTAGE
307. C16, .0005 - ISSUE 3C OR LOWER.
308. NOT PRESENT ON ISSUE 3C OR LOWER.

C. CIRCUIT DIAGRAMS (Contd)

7. 410703 Circuit Card, Issue 1A

CIRCUIT NOTES

101. VOLTAGE SYMBOL AND RANGE:

SYMBOL		VOLTAGE RANGE		
VREF	DC	4.95	TO	5.05
VSTART	DC	11.4	TO	12.6
+42Vs	DC	38.6	TO	42.0
+VIN	DC	275	TO	375 WITH RESPECT TO PRIMARY COMMON
-VIN	DC	PRIMARY COMMON		
+42V	DC	38.6	TO	42.0
+12V	DC	11.4	TO	12.6
+5V	DC	4.75	TO	5.25
-12V	DC	-11.4	TO	-12.6
115V	AC	103	TO	127
230V	AC	195	TO	265

102. STRAP NOTES:

WITH ST-2 IN THE 230V POSITION, THE FUSE F1 SHALL BE A 1.0A SLOW BLOW.

ON THE CIRCUIT BOARD PROVISIONS HAVE BEEN MADE TO MOVE THE ST-2 STRAP TO THE 115V POSITION, THE FUSE F1 SHALL THEN BE A 1.5A SLOW BLOW.

EQUIPMENT NOTES

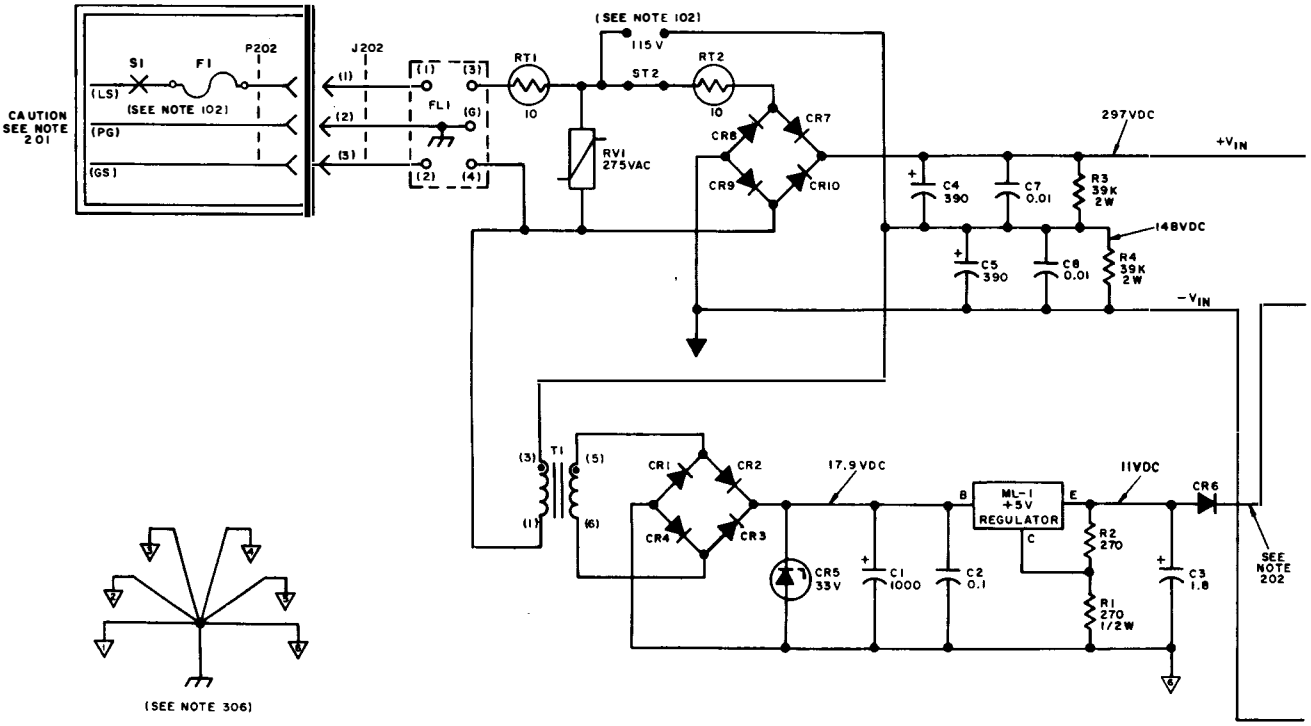
201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT COMMON. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE POINTS, UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER. DIRECT CONNECTION OF THESE POINTS WITHOUT THE USE OF AN ISOLATION TRANSFORMER WILL CAUSE COMPONENTS TO FAIL.

202. THE PULSE WIDTH MODULATOR ML-3 CAN BE CHECKED BY APPLYING AN EXTERNAL +12 VDC 200 MA SOURCE VOLTAGE TO THE CATHODE OF CR6 WITH NO AC POWER APPLIED.

203. THE +5V, +12V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9VDC, +16VDC AND -16VDC 200MA. SOURCE VOLTAGE ACROSS C33, C34 AND C35 RESPECTIVELY.

410703 POWER SUPPLY CIRCUIT CARD (ISSUE 1A)

AC-DC CIRCUIT



INFORMATION NOTES

301. SHEET COORDINATE LOCATION LEGEND:
2 C 5 — SHEET NUMBER, ROW, COLUMN

302. TERMINAL DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

303. ALL RESISTORS ARE 1/4W, ±5%; VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.

304. ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

305. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

306. INDICATES +42VDC FILTER CAPACITOR GROUND.
INDICATES LOGIC VOLTAGES FILTER CAPACITOR GROUND.
INDICATES LOGIC VOLTAGES CONNECTOR GROUND.
INDICATES +42VDC CONNECTOR GROUND.

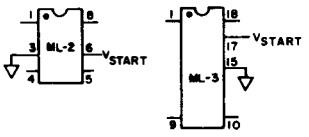
306. CONTINUED:
INDICATES CONTROL CIRCUITRY GROUND.
INDICATES START CIRCUIT GROUND.
INDICATES FRAME GROUND (PROTECTIVE).
INDICATES FULL WAVE BRIDGE PRIMARY COMMON (NOT GROUND).
INDICATES TRANSIENT PROTECTION

97531 — PC BOARD CONNECTOR PIN NUMBERS (FRONT VIEW)
108642
KEY J201

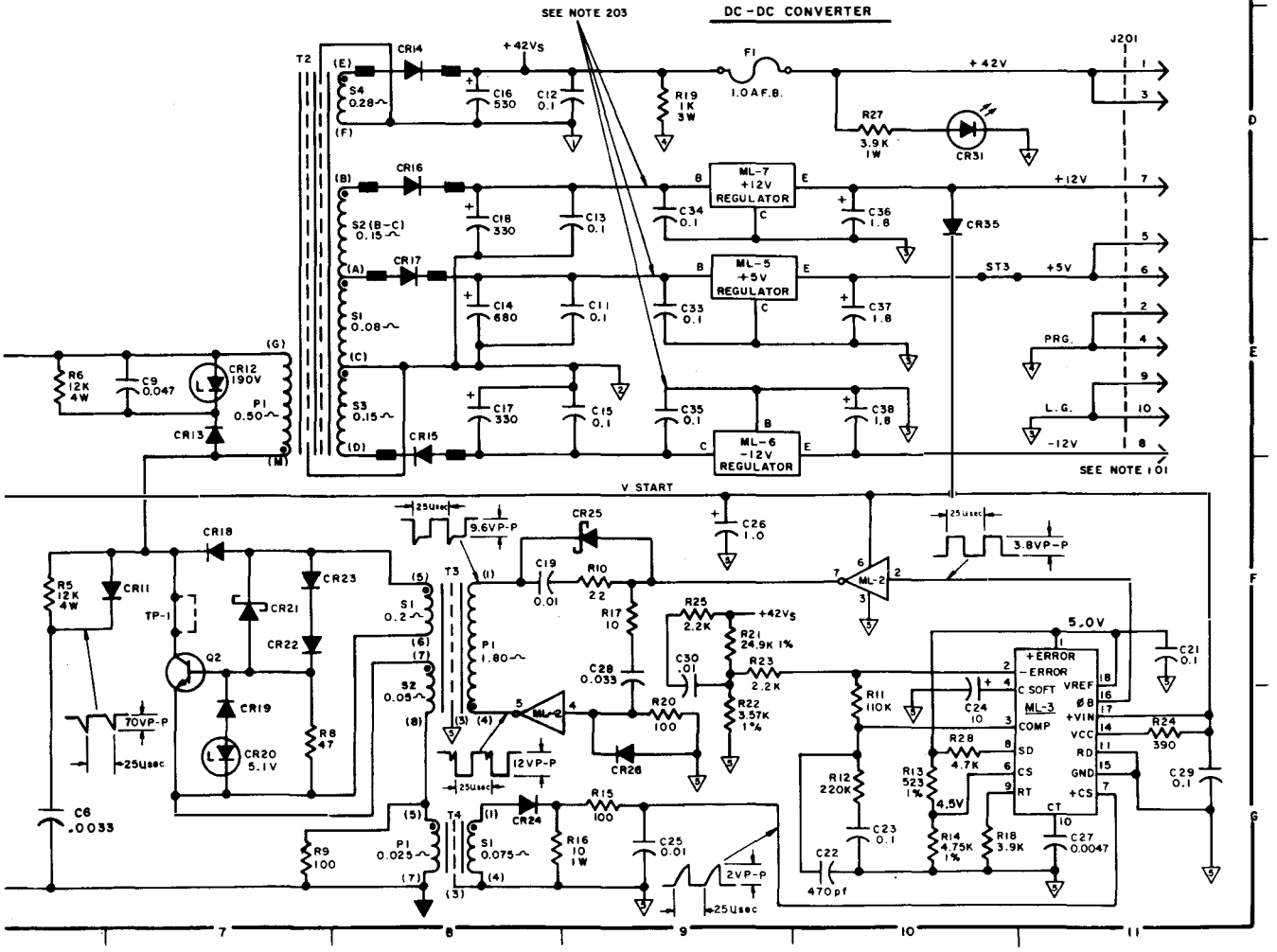
AC POWER CONNECTOR PIN NUMBERS (TOP VIEW)
1 2 3
J202

INFORMATION NOTES CONT'D.

307. SUPPLY VOLTAGES FOR DUAL-IN-LINE INTEGRATED CIRCUIT PACKAGES UNLESS OTHERWISE SPECIFIED:



308. SYMBOL DEFINITION:
SCHOTTKY DIODE
ZENER DIODE



C. CIRCUIT DIAGRAMS (Contd)

8. 410704 Circuit Card, Issue 1A

CIRCUIT NOTES

101. VOLTAGE SYMBOL AND RANGE:

SYMBOL		VOLTAGE RANGE		
VREF	DC	4.95	TO	5.05
VSTART	DC	11.4	TO	12.6
+42Vs	DC	38.6	TO	42.0
$+V_{IN}$	DC	275	TO	375 WITH RESPECT TO PRIMARY COMMON
-VIN	DC	PRIMARY COMMON		
+42V	DC	38.6	TO	42.0
+12V	DC	11.4	TO	12.6
+5V	DC	4.75	TO	5.25
-12V	DC	-11.4	TO	-12.6
115V	AC	103	TO	127
230V	AC	195	TO	265

102. OPTION SWITCH NOTES:

WITH S2 IN THE 230V POSITION, THE FUSE F1 SHALL BE A 1.0A SLOW BLOW.

WITH S2 IN THE 115V POSITION, THE FUSE F1 SHALL BE 1.5A SLOW BLOW.

EQUIPMENT NOTES

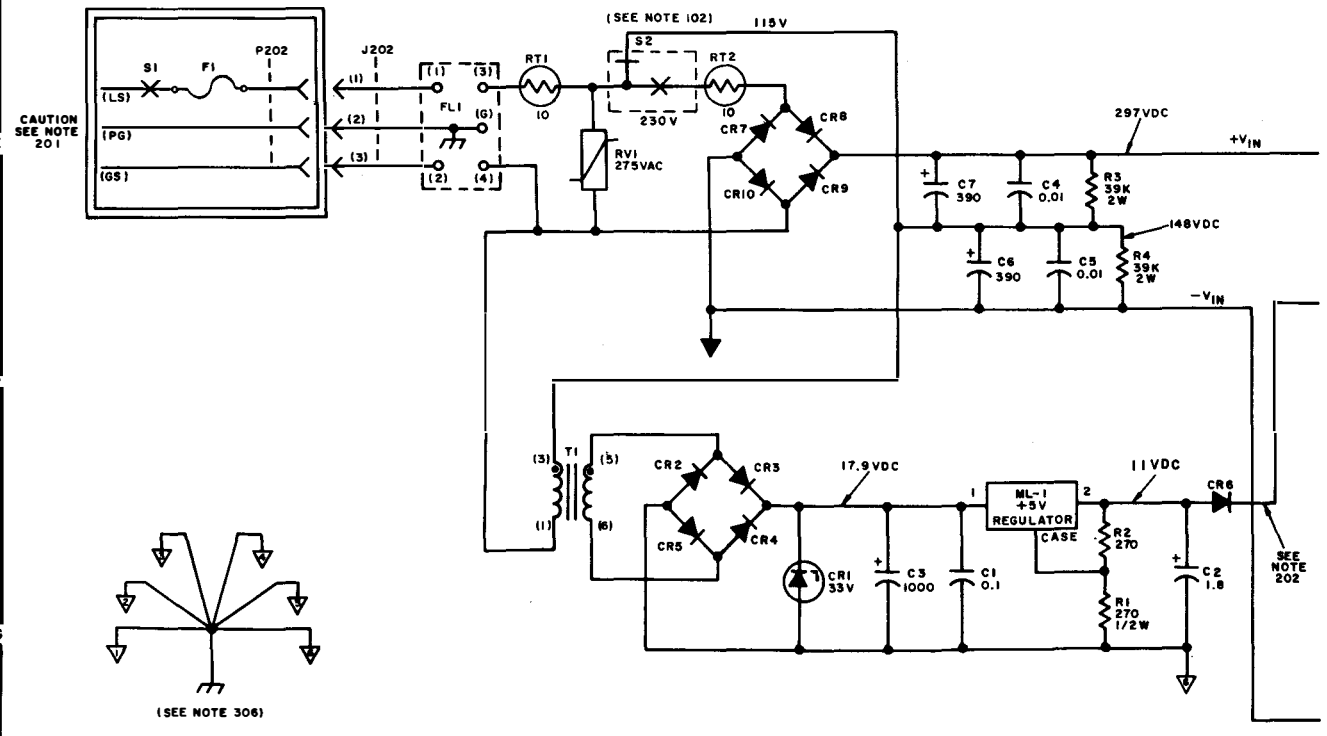
201. THE PROTECTIVE GROUND IS NOT CONNECTED TO THE PRIMARY CIRCUIT COMMON. CARE MUST BE EXERCISED TO PREVENT DIRECT CONNECTION OF THESE POINTS, UNLESS THE POWER SUPPLY IS PLUGGED INTO AN ISOLATION TRANSFORMER, DIRECT CONNECTION OF THESE POINTS WITHOUT THE USE OF AN ISOLATION TRANSFORMER WILL CAUSE COMPONENTS TO FAIL.

202. THE PULSE WIDTH MODULATOR ML-3 CAN BE CHECKED BY APPLYING AN EXTERNAL +12 VDC 200 MA SOURCE VOLTAGE TO THE CATHODE OF CR6 WITH NO AC POWER APPLIED.

203. THE +5V, +12V AND -12V REGULATOR CIRCUITS CAN BE CHECKED BY APPLYING AN EXTERNAL +9VDC, +18VDC AND -18VDC 200MA SOURCE VOLTAGE ACROSS C30, C33 AND C29 RESPECTIVELY.

410704 POWER SUPPLY CIRCUIT CARD (ISSUE 1A)

AC-DC CIRCUIT



INFORMATION NOTES

301. SHEET COORDINATE LOCATION LEGEND:
2 C 5 — COLUMN, ROW, SHEET NUMBER

302. TERMINAL DESIGNATION ENCLOSED IN PARENTHESIS ARE NOT MARKED ON THE COMPONENT.

303. ALL RESISTORS ARE 1/4W, ±5%; VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.

304. ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

305. TRANSFORMER WINDINGS DC RESISTANCE INDICATED IN OHMS.

306. INDICATES +42VDC FILTER CAPACITOR GROUND.
INDICATES LOGIC VOLTAGES FILTER CAPACITOR GROUND.
INDICATES LOGIC AND POWER GROUND.
INDICATES PROPORTIONAL DRIVE GROUND.

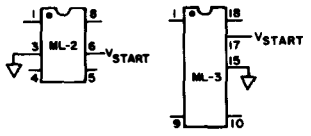
306. CONTINUED:
INDICATES CONTROL CIRCUITRY GROUND.
INDICATES START CIRCUIT GROUND.
INDICATES FRAME GROUND (PROTECTIVE).
INDICATES FULL WAVE BRIDGE PRIMARY COMMON (NOT GROUND).
INDICATES TRANSIENT PROTECTION

97531 — PC BOARD CONNECTOR PIN NUMBERS (FRONT VIEW)
108642
KEY J201

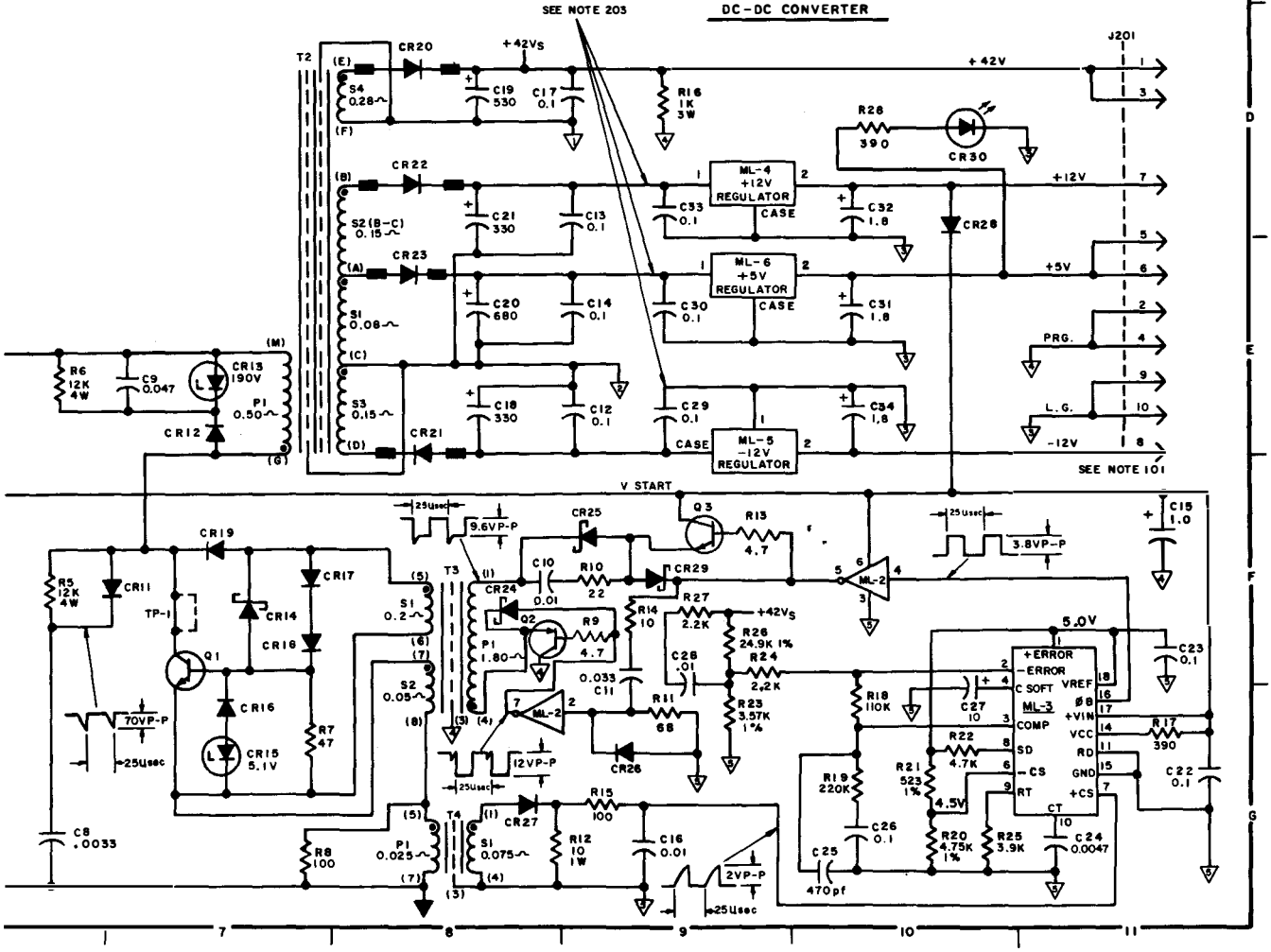
AC POWER CONNECTOR PIN NUMBERS (TOP VIEW)
1 2 3
J202

INFORMATION NOTES CONT'D.

307. SUPPLY VOLTAGES FOR DUAL-IN-LINE INTEGRATED CIRCUIT PACKAGES UNLESS OTHERWISE SPECIFIED:



308. SYMBOL DEFINITION
SCHOTTKY DIODE
ZENER DIODE



PART 5 — PARTS

CONTENTS

A. GENERAL

Parts, identification and numbering information for the 430700, 430760, 430770 and 430780 power supply assemblies is provided in this part.

All replaceable parts are included. Examples of nonreplaceable parts not shown but included in higher order assemblies are as follows:

1. Part as supplied would not fit if installed.
2. May require manufacturing or shop methods not provided in this manual.
3. Part of crimped, riveted, pressed or welded assembly.
4. Serial number or registration plates.

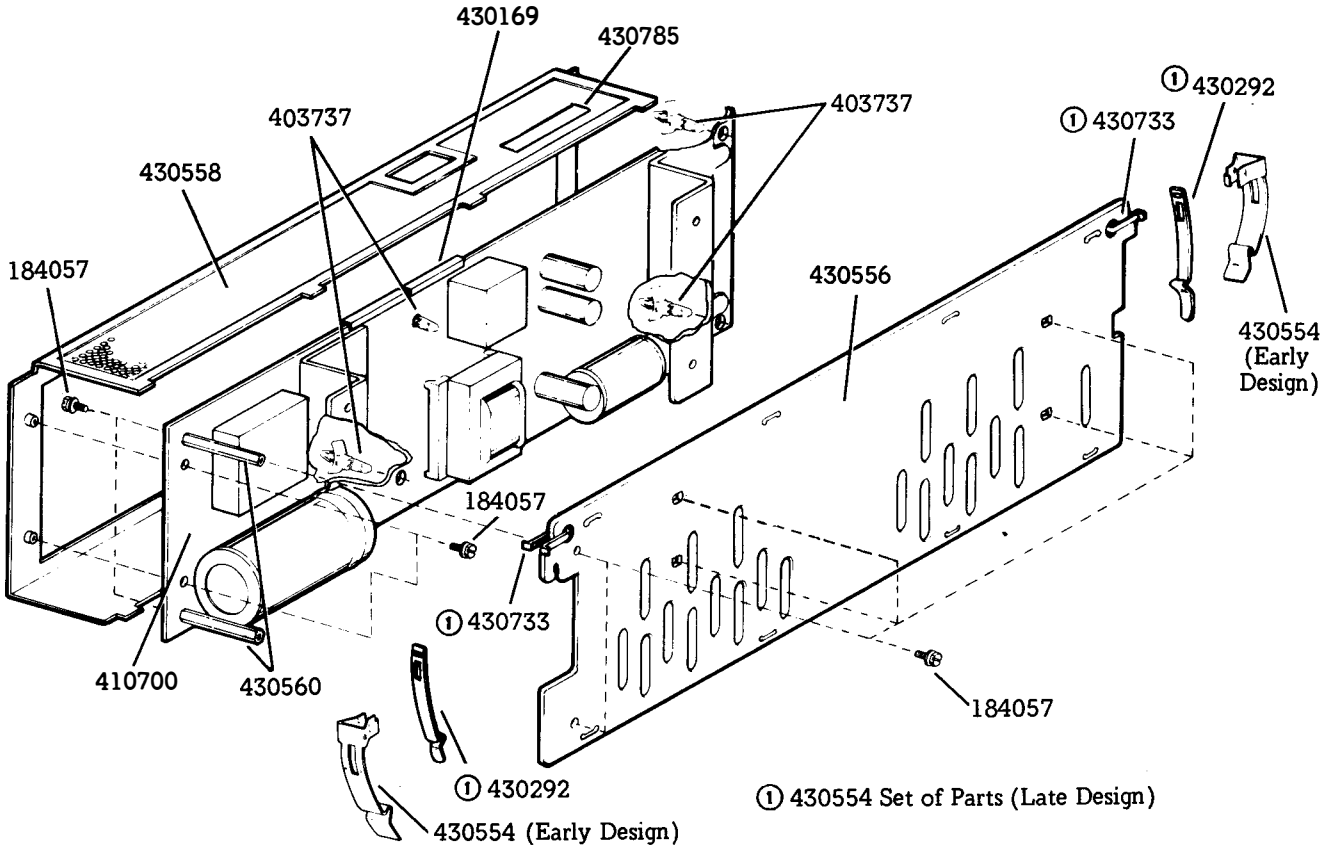
Parts are listed in the index in numerical order and indicate the page on which the parts appear.

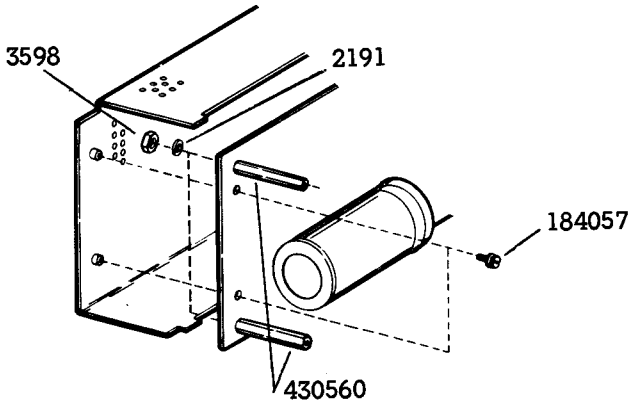
When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (ie, 430019).

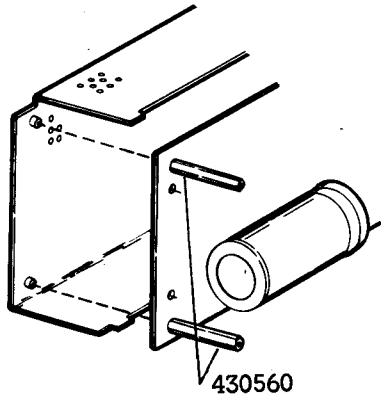
Troubleshooting and disassembly/reassembly information for these parts is provided in PARTS 2 an 3, respectively.

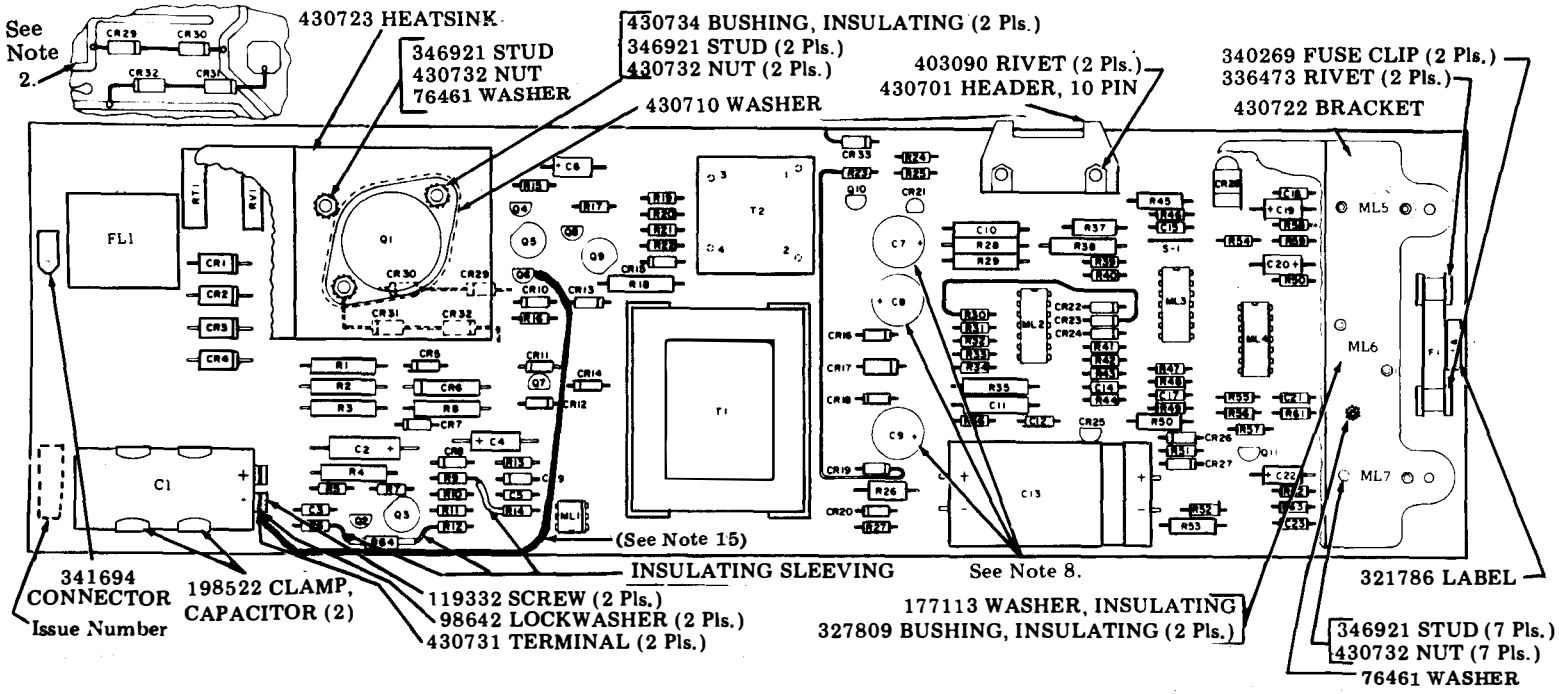
When disassembly/reassembly information is not shown, the illustrations in this part provide sufficient information.

B. 430700 POWER SUPPLY ASSEMBLY









REF. DESIG.	PART NO. REQ.	NOTE	DESCRIPTION	REF. DESIG.	PART NO. REQ.	NOTE	DESCRIPTION	REF. DESIG.	PART NO. REQ.	NOTE	DESCRIPTION
C1	430706		CAPACITOR, 200 MFD	CR1	408037		DIODE, 400 V	CR24	430725		DIODE, ZENER 51 V
C2	310930		CAPACITOR, 100 MFD	CR2	408037		DIODE, 400 V	CR25	336694		THYRISTOR, SCR 8A
C3	405324		CAPACITOR, .1 MFD	CR3	408037		DIODE, 400 V	CR26	197464		DIODE, IN4148
C4	333727		CAPACITOR, 6.8 MFD	CR4	408037		DIODE, 400 V	CR27	430724		DIODE, ZENER 15 V
C5	405324		CAPACITOR, .1 MFD	CR5	430725		DIODE, ZENER 51 V	CR28	405029		LED, PCB MOUNTABLE
C6	300057		CAPACITOR, .01 MFD	CR6	430713		DIODE, ZENER 190 V	CR29	430605		DIODE, IN4936
C7	430704		CAPACITOR, 330 MFD	CR7	430605		DIODE, 1N4936	CR30	430605		DIODE, IN4936
C8	430704		CAPACITOR, 330 MFD	CR8	300102		DIODE, 1N4156	CR31	430713	2	DIODE, ZENER 190 V
C9	430704		CAPACITOR, 330 MFD	CR9	430605		DIODE, 1N4936	CR32	430605	2	DIODE, IN4936
C10	430721		CAPACITOR, 1200 PFD	CR10	430605		DIODE, 1N4936	CR33	430725	2	DIODE, ZENER 51 V
C11	430721		CAPACITOR, 1200 PFD	CR11	430605		DIODE, 1N4936	FL1	430709		FILTER, RFI
C12	405324		CAPACITOR, .1 MFD	CR12	430605		DIODE, 1N4936	F2	120139		FUSE, 1A
C13	430738		CAPACITOR, 530 MFD	CR13	430605		DIODE, 1N4936				
C14	405324		CAPACITOR, .1 MFD	CR14	430605		DIODE, 1N4936	ML1	335522	5	IC, OPTICAL COUPLER
C15	325034		CAPACITOR, 120 PFD	CR15	430605		DIODE, 1N4936	ML2	404239		QUAD VOLT COMPARATOR
				CR16	430605		DIODE, 1N4936	ML3	326823		REGULATOR, VOLTAGE
C17	405324		CAPACITOR, .1 MFD	CR17	430715		DIODE, 200 V 3A FR	ML4	404239		QUAD VOLT COMPARATOR
C18	405324		CAPACITOR, .1 MFD	CR18	430605		DIODE, 1N4936	ML5	402202		REGULATOR, +5 V
C19	310929	2	CAPACITOR, 1.8 MFD	CR19	403752		DIODE, 1N4936	ML6	402204		REGULATOR, -12 V
C20	310929	2	CAPACITOR, 1.8 MFD	CR20	312401	3	DIODE, ZENER 1N4755A	ML7	402201		REGULATOR, +12 V
C21	405324		CAPACITOR, .1 MFD	CR21	430729		DIODE, 4 LAYER				
C22	310929	2	CAPACITOR, 1.8 MFD	CR22	321135		DIODE, ZENER 1N4735A				
C23	405324		CAPACITOR, .1 MFD	CR23	430724		DIODE, ZENER 15 V				

REF. DESIG.	PART NO. REQ.	NOTE	DESCRIPTION
Q1	430711	15	TRANSISTOR, 450 V
Q2	400909		TRANSISTOR, 60 V NPN
Q3	325077		TRANSISTOR, 2N4355
Q4	400909		TRANSISTOR, 60 V NPN
Q5	325077		TRANSISTOR, 2N4355
Q6	400909		TRANSISTOR, 60 V NPN
Q7	400909		TRANSISTOR, 60 V NPN
Q8	400909		TRANSISTOR, 60 V NPN
Q9	325077		TRANSISTOR, 2N4355
Q10	400909		TRANSISTOR, 60 V NPN
Q11	400909		TRANSISTOR, 60 V NPN
R1	120211		RESISTOR 20 K 1 W
R2	182763		RESISTOR, 680 1 W
R3	118198		RESISTOR, 56 K 1 W
R4	430714		RESISTOR, .24 K 1 W
R5	320275		RESISTOR, 10 K 1/4 W
R6	315959		RESISTOR, 4700 1/4 W
R7	321213		RESISTOR, 1 K 1/4 W
R8	144464		RESISTOR, 220 1 W
R9	318802		RESISTOR, 220 1/4 W
R10	321213		RESISTOR, 1 K 1/4 W
R11	318801	3	RESISTOR, 47 K 1/4 W
R12	320275		RESISTOR, 10 K 1/4 W
R13	315955		RESISTOR, 2200 1/4 W
R14	320275		RESISTOR, 10 K 1/4 W
R15	320276		RESISTOR, 470 1/4 W
R16	328785		RESISTOR, 330 1/4 W
R17	177101		RESISTOR, 6.8 1/2 W
R18	178862		RESISTOR, 10 1 W
R19	315948		RESISTOR, 100 1/4 W
R20	315948		RESISTOR, 100 1/4 W
R21	335622		RESISTOR, 68 1/4 W
R22	315951		RESISTOR, 560 1/4 W
R23	320275		RESISTOR, 10 K 1/4 W
R24	320275	2	RESISTOR, 10 K 1/4 W
R25	315957		RESISTOR, 3300 1/4 W
R26	118186		RESISTOR, 5600 1/2 W
R27	315971	3	RESISTOR, 680 1/4 W
R28	341596		RESISTOR, 121 K 1%
R29	341592		RESISTOR, 75 K 1%
R30	315957		RESISTOR, 3300 1/4 W
R31	327721		RESISTOR, 4.7 MEG. 1/4 W
R32	324902		RESISTOR, 100 K 1%
R33	321508		RESISTOR, 100 K 1/4 W
R34	328785	7	RESISTOR, 330 1/4 W
R35	341596		RESISTOR, 121 K 1%
R36	321508		RESISTOR, 100 K 1/4 W
R37	401067		RESISTOR, 2400 .5%
R38	324908		RESISTOR, 30.1 K 1%
R39	320275		RESISTOR, 10 K 1/4 W
R40	330641		RESISTOR, 1 MEG. 1/4 W
R41	320276		RESISTOR, 470 1/4 W
R42	320276		RESISTOR, 470 1/4 W
R43	320276		RESISTOR, 470 1/4 W
R44	321213	2	RESISTOR, 1 K 1/4 W
R45	401067		RESISTOR, 2400 .5%
R46	321508		RESISTOR, 100 K 1/4 W
R47	315988		RESISTOR, 27 K 1/4 W
R48	321213		RESISTOR, 1 K 1/4 W
R49	430719		RESISTOR, 25.8 K .5%
R50	401067		RESISTOR, 2400 .5%
R51	320275		RESISTOR, 10 K 1/4 W
R52	318803		RESISTOR, 2400 1/4 W
R53	321258		RESISTOR, 20 K 1/2 W
R54	315956		RESISTOR, 2700 1/4 W
R55	318803		RESISTOR, 2400 1/4 W
R56	401067		RESISTOR, 2400 .5%
R57	315956		RESISTOR, 2700 1/4 W
R58	336697		RESISTOR, 430 1/4 W
R59	318803		RESISTOR, 2400 1/4 W
R60	315961		RESISTOR, 8200 1/4 W
R61	401067		RESISTOR, 2400 .5%
R62	320026		RESISTOR, 3900 1/4 W
R63	318803		RESISTOR, 2400 1/4 W
R64	320275	3	RESISTOR, 10 K 1/4 W
RT1	430707		THERMISTOR
RV1	430708		VARISTOR
T1	430702		TRANSFORMER, POWER
T2	430703		TRANSFORMER, PULSE
S1	336470	4	STRAP

Note 1: Typical heat sink assembly.

Note 2: At customer identification Issue 2A, C19, C20, C22 was changed from 1 MFD, R23 was changed from 3.3K, R44 was changed from 10K, CR31, CR32 and CR33 were added.

Note 3: At customer identification Issue 3A, the following changes were made, CR20 was changed from 328696, R11 changed from 320275, R27 changed from 321213, R64 was added, and one lead of R14 was moved from ML-1 to base of Q7.

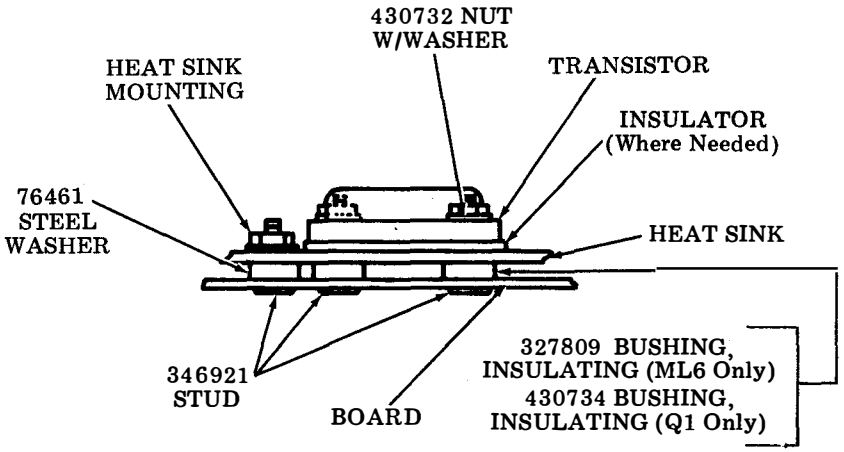
Note 4: At customer identification Issue 4A, conductor on noncomponent side from CR21 to R23 and pin 2 of 430703 transformer was cut at CR21. Conductor from R29 to C9 was cut on component side, strap added from left side of R23 to cathode of CR19 and strap added from left side of R30 to cathode of CR22. S1 replaced C16.

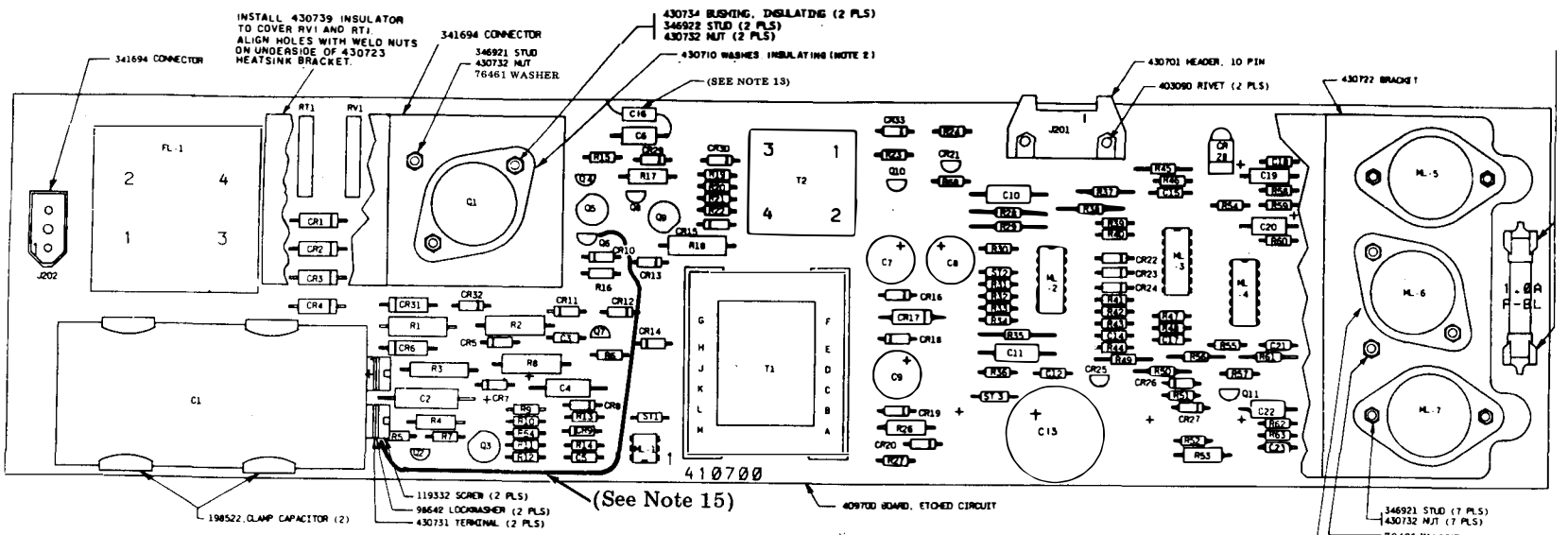
Note 5: At customer identification Issue 4B, ML1 was changed from 404325.

Note 6: At customer identification Issue 4C, the following change was made: bushing under Q1 changed from 327809 to 430734.

Note 7: At customer identification Issue 4D, R34 was changed from 321213.

See Note 1.





REF. DESIG.	PART NO	NOTE	DESCRIPTION
C1	430706		CAPACITOR, 200 MFD
C2	310930		CAPACITOR, 100 MFD
C3	405324		CAPACITOR, 0.1 MFD
C4	333727		CAPACITOR, 6.8 MFD
C5	405324		SAME AS C3
C6	300057		CAPACITOR, 0.01 MFD
C7	430704		CAPACITOR, 330 MFD
C8	430704		SAME AS C7
C9	430704		SAME AS C7
C10	430721		CAPACITOR, 1200 PFD
C11	430721		SAME AS C10
C12	405324		SAME AS C3
C13	430738	8	CAPACITOR, 530 MFD
C14	405324		SAME AS C3
C15	325034		CAPACITOR, 120 PFD
C16	335715	13	CAPACITOR, 500 PFD 6KV
C17	405324		SAME AS C3
C18	405324		SAME AS C3
C19	310929		CAPACITOR, 1.8 MFD
C20	310929		SAME AS C19
C21	405324		SAME AS C3
C22	310929		SAME AS C19
C23	405324		SAME AS C3
CR1	408037		DIODE, 400V 1N5060
CR2	408037		SAME AS CR1
CR3	408037		SAME AS CR1
CR4	408037		SAME AS CR1
CR5	430725		DIODE ZENER 5iV 1N4757
CR6	430713		DIODE ZENER 190V 1N5387
CR7	430605		DIODE, 1N4936
CR8	430605		SAME AS CR7
CR9	430605		SAME AS CR7
CR10	430605		SAME AS CR7
CR11	430605		SAME AS CR7
CR12	430605		SAME AS CR7
CR13	430605		SAME AS CR7
CR14	430605		SAME AS CR7
CR15	430605		SAME AS CR7
CR16	430605		SAME ASCR7

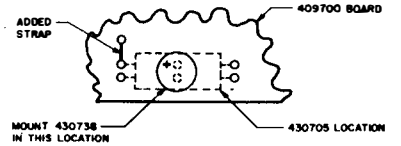
REF. DESIG.	PART NO	NOTE	DESCRIPTION
CR17	430715		SAME AS CR16
CR18	430605		SAME AS CR7
CR19	430605		SAME AS CR16
CR20	430605		SAME AS CR7
CR21	430729		DIODE, 4 LAYER
CR22	321135		DIODE, 1N4735A
CR23	430724		DIODE, ZENER 15V
CR24	430725		SAME AS CR5
CR25	336694	11	THYRISTOR, SCR 0.8A
CR26	197464		DIODE, 1N4140
CR27	430724		SAME AS CR23
CR28	405029		LED, PCB MOUNTABLE
CR29	430605		SAME AS CR7
CR30	430605		SAME AS CR7
CR31	430713		SAME AS CR6
CR32	430605		SAME AS CR7
CR33	430725		SAME AS CR5
FL1	430709		FILTER, RFI
F2	120139		FUSE, 1A
ML1	335522		IC, OPTICAL COUPLER
ML2	404239		QUAD VOLT COMPARATOR
ML3	326824	14	REGULATOR, VOLTAGE
ML4	404239		SAME AS ML2
ML5	402202		REGULATOR, +5V
ML6	402204		REGULATOR, -12V
ML7	402201		REGULATOR, +12V
Q1	430711	15	TRANSISTOR, 450V
Q2	400909		TRANSISTOR, 60V NPN
Q3	325077		TRANSISTOR, 2N4355
Q4	400909		SAME AS Q2
Q5	325077		SAME AS Q3
Q6	400909		SAME AS Q2
Q7	400909		SAME AS Q2
Q8	400909		SAME AS Q2
Q9	325077		SAME AS Q3
Q10	400909		SAME AS Q2
Q11	325077		SAME AS Q3

REF. DESIG.	PART NO	NOTE	DESCRIPTION
R1	120211		RESISTOR, 20K 1W
R2	182763		RESISTOR, 680 1W
R3	118198		RESISTOR, 56K 1W
R4	430714		RESISTOR, .24 1W
R5	321213		RESISTOR, 1K 1/4W
R6	315959		RESISTOR, 4700 1/4W
R7	321213		SAME AS R5
R8	144464		RESISTOR, 220 1W
R9	318802		RESISTOR, 220 1/4W
R10	321218		SAME AS R5
R11	318801		RESISTOR, 47K 1/4W
R12	320275		RESISTOR, 10K 1/4W
R13	315955		RESISTOR, 2.2K 1/4W
R14	320275		SAME AS R12
R15	320276		RESISTOR, 470 1/4W
R16	328705		RESISTOR, 330 1/4W
R17	177101		RESISTOR, 6.8 1/2W
R18	178862		RESISTOR, 10 1W
R19	315948		RESISTOR, 100 1/4W
R20	315948		SAME AS R19
R21	320782		RESISTOR, 47 1/4W
R22	315951		RESISTOR, 560 1/4W
R23	320275		SAME AS R12
R24	320275		SAME AS R12
R26	118186		RESISTOR, 6800 1/2W
R27	315971		RESISTOR, 680 1/4W
R28	341596		RESISTOR, 121K 1%
R29	341592		RESISTOR, 75K 1%
R30	315957		RESISTOR, 3300 1/4W
R31	327721		RESISTOR, 4.7 MEG 1/4W
R32	324902		RESISTOR, 100K 1%
R33	321508		RESISTOR, 100K 1/4W
R34	328785		SAME AS R16
R35	341596		SAME AS R28
R36	321508		SAME AS R33
R37	401067		RESISTOR, 2400 0.5%
R38	324908		RESISTOR, 30.1K 1%
R39	320275		SAME AS R12
R40	330641		RESISTOR, 1MEG 1/4W

REF. DESIG.	PART NO	NOTE	DESCRIPTION
R41	320276		SAME AS R15
R42	320276		SAME AS R15
R43	320276		SAME AS R15
R44	321213		SAME AS R5
R45	401067		SAME AS R37
R46	321508		SAME AS R33
R47	430596	9	RESISTOR, 25.0K
R48	430595	9	RESISTOR, 681 1%
R49	430759	14	RESISTOR, 24.9K .25%
R50	401067		SAME AS R37
R51	320275		SAME AS R12
R52	318803		RESISTOR, 2400 1/4V
R53	321259		RESISTOR, 20K 1/2V
R54	315956		RESISTOR, 2700 1/4W
R55	318803		SAME AS R52
R56	401067		SAME AS R37
R57	315956		SAME AS R54
R58	336697		RESISTOR, 430 1/4V
R59	318803		SAME AS R52
R60	315961		RESISTOR, 8200 1/4V
R61	401067		SAME AS R37
R62	320024		RESISTOR, 3900 1/4V
R63	320275		SAME AS R12
R64	320275		SAME AS R12
R65	315955		SAME AS R13
RT1	430707		THERMISTOR
ST1	336470		STRAP
ST2	336470		SAME AS ST1
ST3	336470		SAME AS ST1
T1	430773		TRANSFORMER, POWER
T2	430703		TRANSFORMER, PULSE

NOTES:

8. THROUGH CUSTOMER IDENTIFICATION ISSUE 5A CAPACITOR C13 USED PART NO. 430705. IF REPAIR REQUIRES REPLACEMENT OF C13 USE PART NO. 430738 PLUS A WIRE STRAP, AND INSTALL AS FOLLOWS (USING EXISTING HOLES IN BOARD):



9. CUSTOMER ISSUE 6A RESISTOR R47 CHANGED FROM 315988 (27K 1/4W) TO 430596. RESISTOR R48 CHANGED FROM 321213 (1K 1/4W) TO 430595.

10.

11. IF DIFFICULTY IS EXPERIENCED WITH THE OVERVOLTAGE PROTECTION CIRCUIT CR25/R34 REFER TO NOTE 7: G.E. SCR REQUIRES R34 TO BE 330 OHMS.

12. CUSTOMER IDENTIFICATION 6D RESISITOR R21 CHANGED FROM 335622 (68 1/4W) TO 430758 (33 1/4W) TO REDUCE STRESS ON Q1 DURING POWER TURN ON.

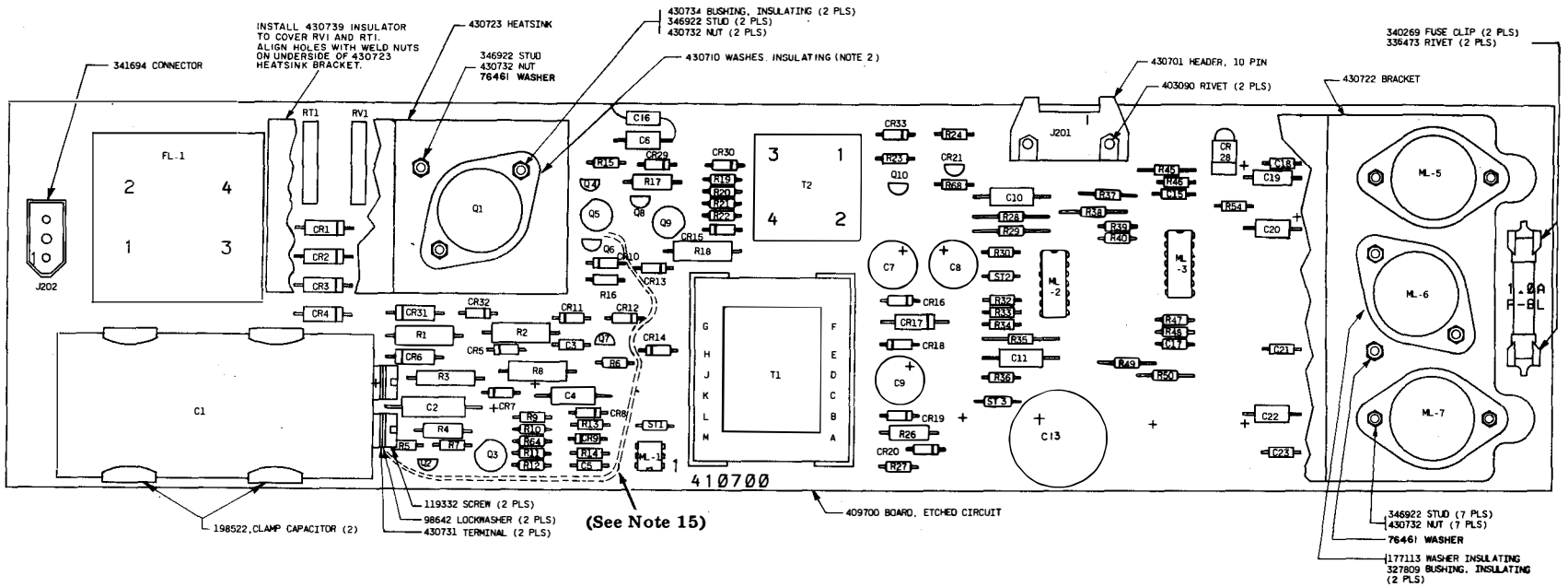
13. CUSTOMER IDENTIFICATION ISSUE 7A: CAPACITOR C16 500 PFD (P/N 335715) ADDED, AND RESISTOR R5 (P/N 320275) 10K 1/4W WAS REPLACED BY (P/N 321213) 1K 1/4W.

14. CUSTOMER IDENTIFICATION ISSUE 8A: ML3 CHANGED FROM P/N 326823 TO P/N 326824 AND R49 CHANGED FROM P/N 430719, 25.8K .5% TO P/N 430759, 24.9K .25% TO TIGHTEN 42 V OUTPUT VOLTAGE NOT TO EXCEED UL REQUIREMENTS.

15. IF REPAIR REQUIRES REPLACEMENT OF Q1, A GROUNDING PATH IMPROVEMENT SHOULD BE PROVIDED, ON THE COMPONEMENT SIDE OF THE CARD ASSEMBLY, BY CUTTING THE CIRCUIT PATH BETWEEN THE EMITTER OF Q6 AND THE ANODE OF CR12 AT A POINT 1/4" TO 3/8" FROM Q6. AN INSULATED 20 AWG STRANDED STRAP MUST THEN BE CONNECTED BETWEEN THE EMITTER OF Q6 AND THE NEGATIVE TERMINAL OF C1. ADD THE STRAP APPROXIMATELY AS SHOWN

B. 430700 POWER SUPPLY ASSEMBLY (Contd)

410700 Circuit Card (Issue 9A)

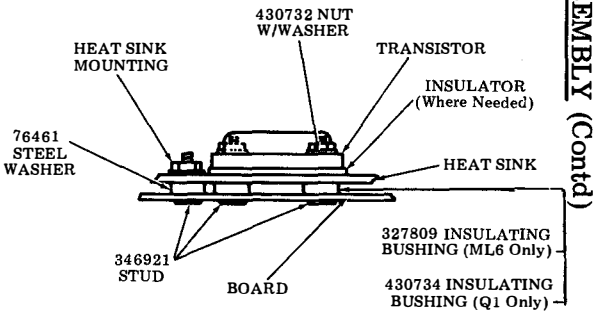


REF DESIG.	PART NO. REQ	NOTE	DESCRIPTION
C1	430706		CAPACITOR, 200 MFD
C2	310930		CAPACITOR, 100 MFD
C3	405324		CAPACITOR, .1 MFD
C4	333727		CAPACITOR, 6.8 MFD
C5	405324		SAME AS C3
C6	300057		CAPACITOR, .01 MFD
C7	430704		CAPACITOR, 330 MFD
C8	430704		SAME AS C7
C9	430704		SAME AS C7
C10	430721		CAPACITOR, 1200 PFD
C11	430721		SAME AS C10
C13	430738		CAPACITOR, 530 MFD
C15	325034		CAPACITOR, 120 PFD
C16	335715		CAPACITOR 500 PFD. 6KV
C17	405324		SAME AS C3
C18	405324		SAME AS C3
C19	310929		CAPACITOR, 1.8 MFD
C20	310929		SAME AS C19
C21	405324		SAME AS C3
C22	310929		SAME AS C19
C23	405324		SAME AS C3
CR1	408037		DIODE, 400V IN5060
CR2	408037		SAME AS CR1
CR3	408037		SAME AS CR1
CR4	408037		SAME AS CR1
CR5	430725		DIODE, ZENER 51V IN4757
CR6	430713		DIODE, ZENER 190V IN5383
CR7	430605		DIODE, IN4936
CR8	430605		DIODE, SAME AS CR7
CR9	430605		SAME AS CR7
CR10	430605		SAME AS CR7
CR11	430605		SAME AS CR7
CR12	430605		SAME AS CR7
CR13	430605		SAME AS CR7
CR14	430605		SAME AS CR7
CR15	430605		SAME AS CR7
CR16	430605		SAME AS CR7

REF DESIG.	PART NO. REQ	NOTE	DESCRIPTION
CR17	430715		DIODE
CR18	430605		SAME AS CR7
CR19	430605		SAME AS CR7
CR20	312401		DIODE, ZENER IN4755A
CR21	430729		DIODE, 4 LAYER
CR28	405029		LED, PCB MOUNTABLE
CR29	430605		SAME AS CR7
CR30	430605		SAME AS CR7
CR31	430713		SAME AS CR6
CR32	430605		SAME AS CR7
CR33	430725		SAME AS CR5
FL1	430709		FILTER, RFI
F1	120139		FUSE, 1A
ML1	335522		IC, OPTICAL COUPLER
ML2	404239		QUAD VOLT COMPARATOR
ML3	326824		REGULATOR, VOLTAGE
ML5	402202		REGULATOR, +5V
ML6	402204		REGULATOR, -12V
ML7	402201		REGULATOR, +12V
Q1	430711	15	TRANSISTOR, 450V
Q2	400909		TRANSISTOR, 60V NPN
Q3	325077		TRANSISTOR, 2N4355
Q4	400909		SAME AS Q2
Q5	325077		SAME AS Q3
Q6	400909		SAME AS Q2
Q7	400909		SAME AS Q2
Q8	400909		SAME AS Q2
Q9	325077		SAME AS Q3
Q10	400909		SAME AS Q2

REF DESIG	PART NO. REQ	NOTE	DESCRIPTION
R1	120211		RESISTOR, 20K 1W
R2	182763		RESISTOR, 680 1W
R3	118198		RESISTOR, 56K 1W
R4	430714		RESISTOR, .24 1W
R5	321213		RESISTOR, 1K 1/4W
R6	315959		RESISTOR, 4700 1/4W
R7	321213		SAME AS R5
R8	144464		RESISTOR, 220 1W
R9	318802		RESISTOR, 220 1/4W
R10	321213		SAME AS R5
R11	318801		RESISTOR, 47K 1/4W
R12	320275		RESISTOR, 10K 1/4W
R13	315955		RESISTOR, 2.2K 1/4W
R14	320275		SAME AS R12
R15	320276		RESISTOR, 470 1/4W
R16	328785		RESISTOR, 330 1/4W
R17	177101		RESISTOR, 6.8 1/2W
R18	178862		RESISTOR, 10 1W
R19	315948		RESISTOR, 100 1/4W
R20	315948		SAME AS R19
R21	430758		RESISTOR, 33 1/4W
R22	315951		RESISTOR, 560 1/4W
R23	320275		SAME AS R12
R24	320275		SAME AS R12
R26	118186		RESISTOR, 5600 1/2W
R27	315971		RESISTOR, 680 1/4W
R28	341596		RESISTOR, 121K 1%
R29	341592		RESISTOR, 75K 1%
R30	315957		RESISTOR, 3300 1/4W
R32	324902		RESISTOR, 100K 1%
R33	321508		RESISTOR, 100K 1/4W
R34	328785		SAME AS R16
R35	341596		SAME AS R28
R36	321508		SAME AS R33
R37	401067		RESISTOR, 2400 5%
R38	324908		RESISTOR, 30.1K 1%
R39	320275		SAME AS R12
R40	330641		RESISTOR, 1 MEG, 1/4W

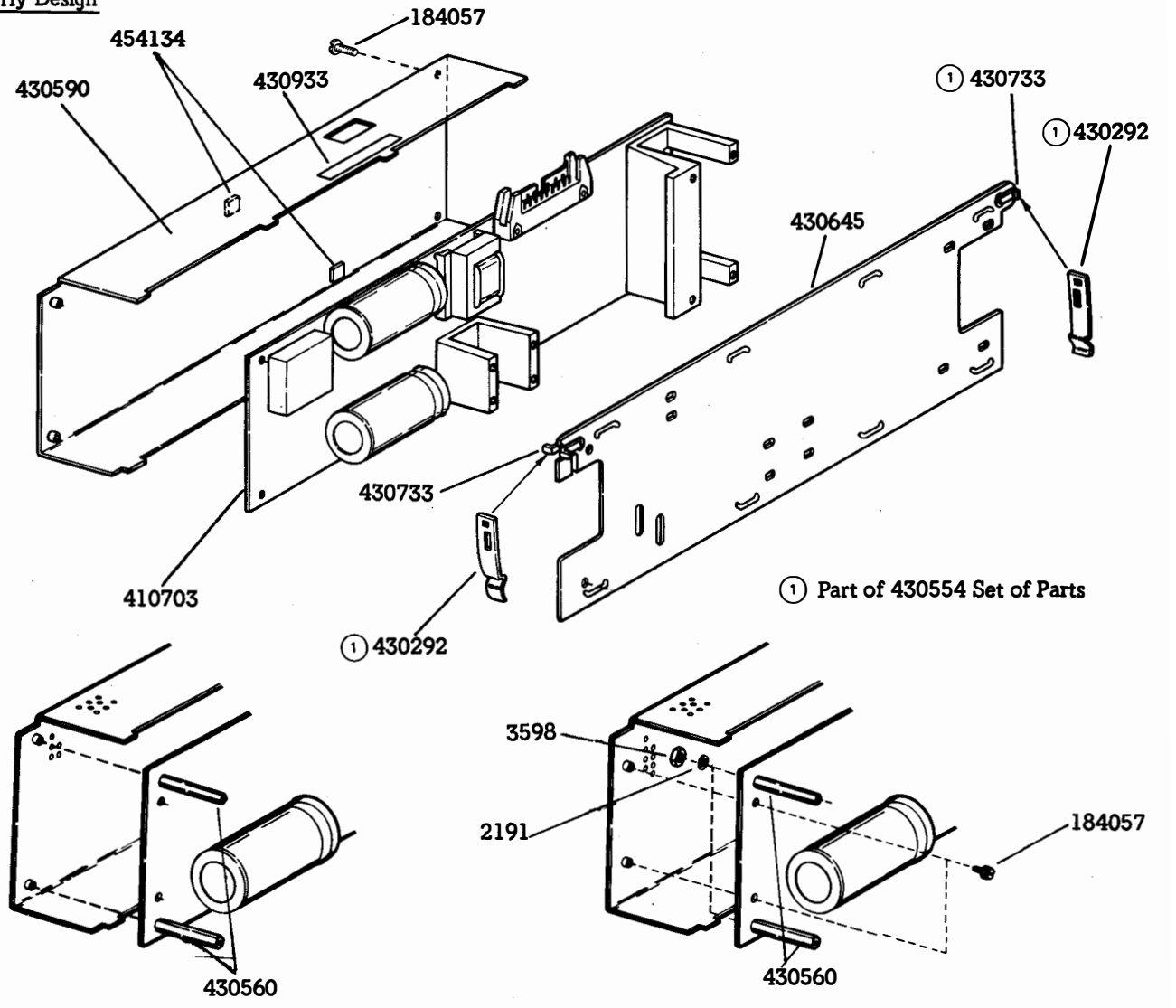
REF DESIG	PART NO. REQ	NOTE	DESCRIPTION
R45	401067		SAME AS R37
R46	321508		SAME AS R33
R47	430596		RESISTOR, 25.8K
R48	430595		RESISTOR, 681 1%
R49	430759		RESISTOR 24.9K, 25%
R50	401067		SAME AS R37
R54	315956		RESISTOR 2700 1/4W
R64	320275		SAME AS R12
R68	315955		SAME AS R13
RT1	430707		THERMISTOR
RV1	430708		VARISTOR
ST1	336470		STRAP
ST2	336470		STRAP
ST3	336470		STRAP
T1	430702		TRANSFORMER, POWER
T2	430703		TRANSFORMER, PULSE



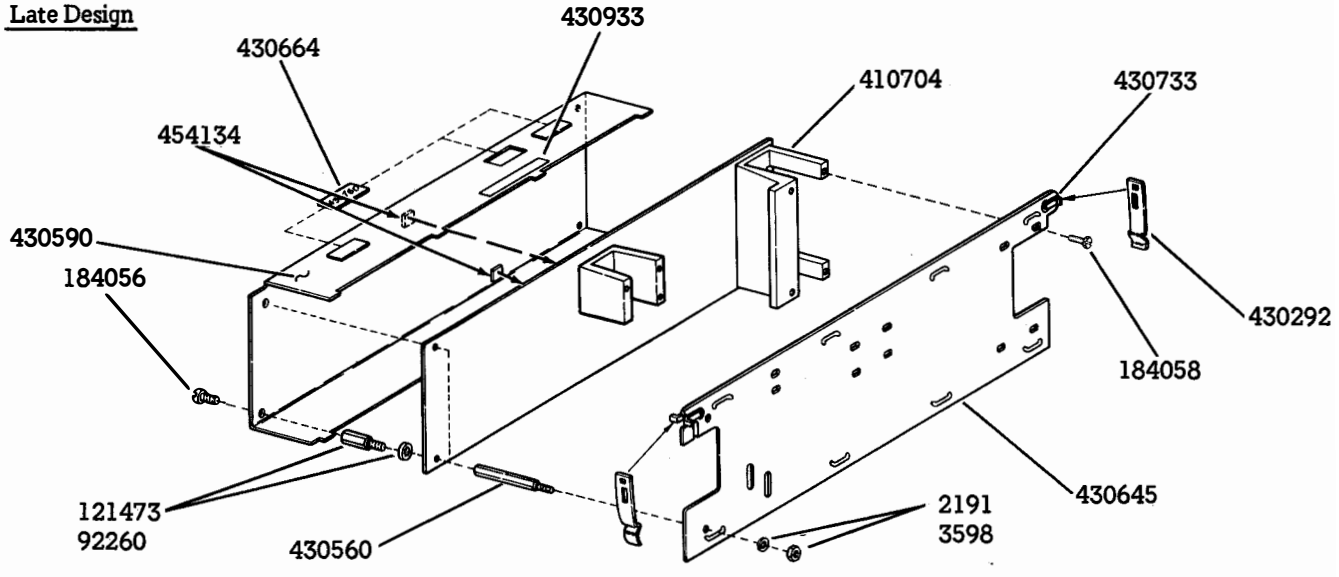
Typical Heat Sink Assembly

C. 430760 POWER SUPPLY ASSEMBLY

Early Design

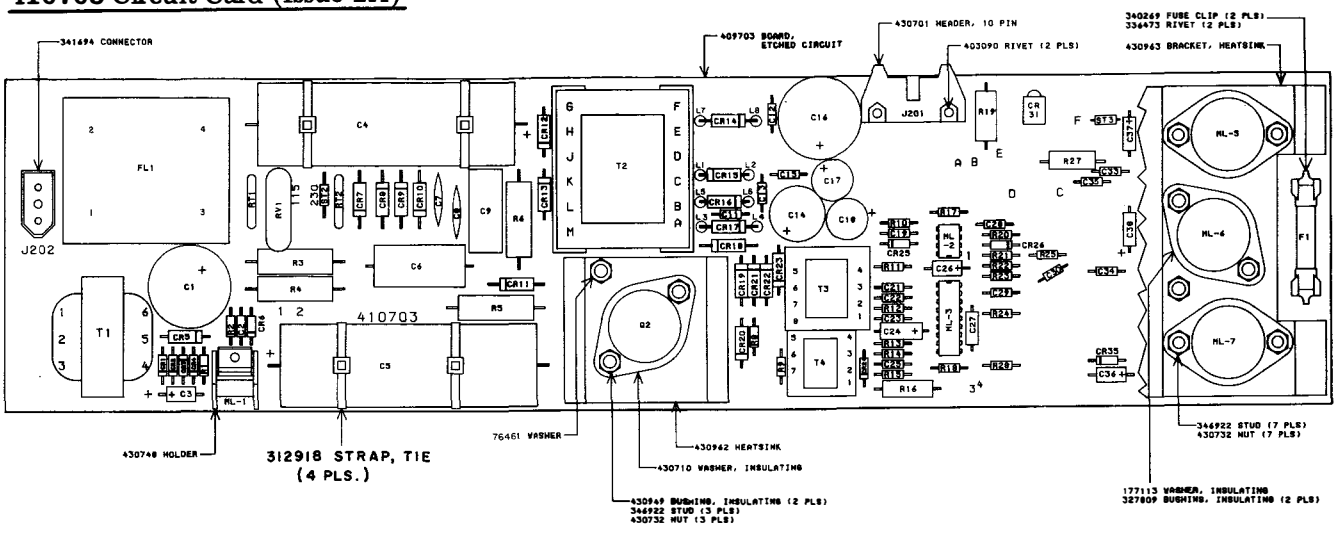


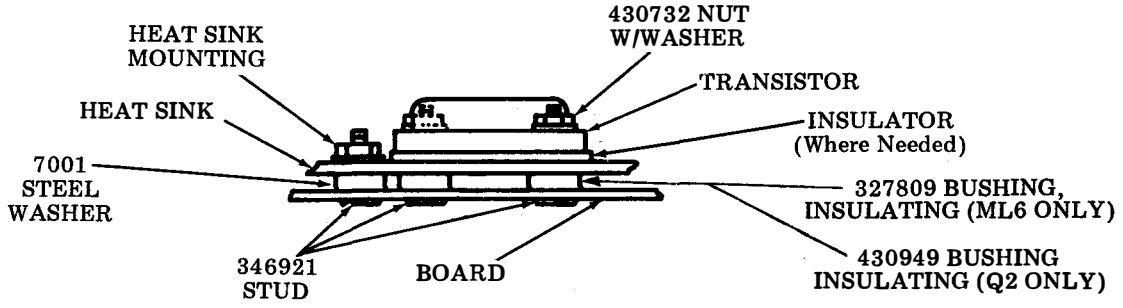
Late Design



C. 430760 POWER SUPPLY ASSEMBLY (Contd)

410703 Circuit Card (Issue 1A)





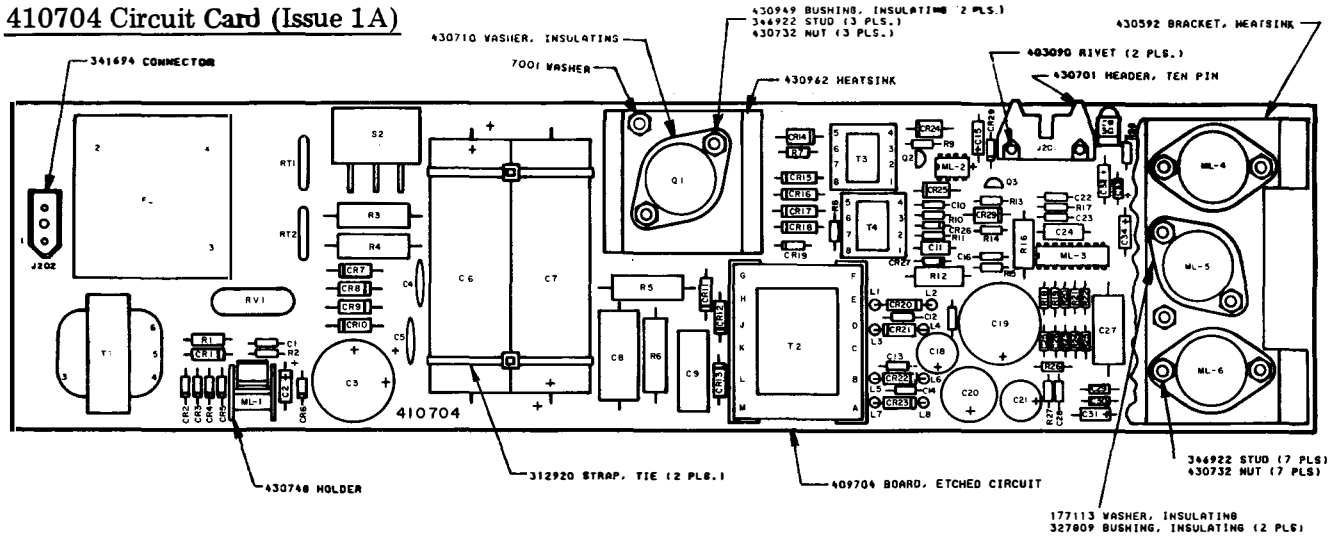
REF. DESIG.	PART NO REQ	DESCRIPTION
C1	430921	CAPACITOR, 1000 MFD 35V
C2	405324	CAPACITOR, 0.1 MFD
C3	310929	CAPACITOR, 1.0 MFD
C4	430910	CAPACITOR, 390 MFD
C5		SAME AS C4
C6	341625	CAPACITOR, 0.0033 MFD
C7	341550	CAPACITOR, 0.01 MFD
C8		SAME AS C7
C9	430914	CAPACITOR 0.047 MFD
C11		SAME AS C2
C12		SAME AS C2
C13		SAME AS C2
C14	430919	CAPACITOR, 680 MFD
C15		SAME AS C2
C16	430738	CAPACITOR, 530 MFD
C17	430704	CAPACITOR, 330 MFD
C18		SAME AS C17
C19	300057	CAPACITOR, 0.01 MFD
C21		SAME AS C2
C22	315976	CAP. 470PFD
C23		SAME AS C2
C24	182628	CAPACITOR, 10 MFD
C25		SAME AS C19
C26	336948	CAPACITOR, 1 MFD
C27	430915	CAPACITOR, 0.0047 MFD
C28	430964	CAPACITOR, 0.033 MFD
C29		SAME AS C2
C30		SAME AS C19
C33		SAME AS C2
C34		SAME AS C2
C35		SAME AS C2
C36		SAME AS C3
C37		SAME AS C3
C38		SAME AS C3

REF. DESIG.	PART NO REQ	DESCRIPTION
CR1	171541	DIODE, 1A 200V
CR2		SAME AS CR1
CR3		SAME AS CR1
CR4		SAME AS CR1
CR5	430932	DIODE, ZENER 33V 5W
CR6		SAME AS CR1
CR7	430927	DIODE, 3A 1000V
CR8		SAME AS CR7
CR9		SAME AS CR7
CR10		SAME AS CR7
CR11	430926	DIODE, 3A 800V FR
CR12	430713	DIODE, ZENER 190V 5W
CR13		SAME AS CR11
CR14	430913	DIODE, 3A 400V FR
CR15	403752	DIODE, 3A 200V FR
CR16		SAME AS CR15
CR17		SAME AS CR15
CR18	430925	DIODE, 1A 800V FR
CR19	430605	DIODE, 1A 400V FR
CR20	312922	DIODE, ZENER 5.1V 1W
CR21	430924	DIODE, SCHOTTKY
CR22		SAME AS CR1
CR23		SAME AS CR19
CR24		SAME AS CR19
CR25		SAME AS CR21
CR26		SAME AS CR1
CR35		SAME AS CR1
CR31	405029	LED, PC BOARD MOUNTABLE
R1	118725	RESISTOR, 270 1/2W
R2	411228	RESISTOR, 270 1/4W
R3	341572	RESISTOR, 39K 2W
R4		SAME AS R3
R5	183082	RESISTOR, 12K 4W
R6		SAME AS R5
R8	411210	RESISTOR, 47 1/4W
R9	411218	RESISTOR, 100 1/4W

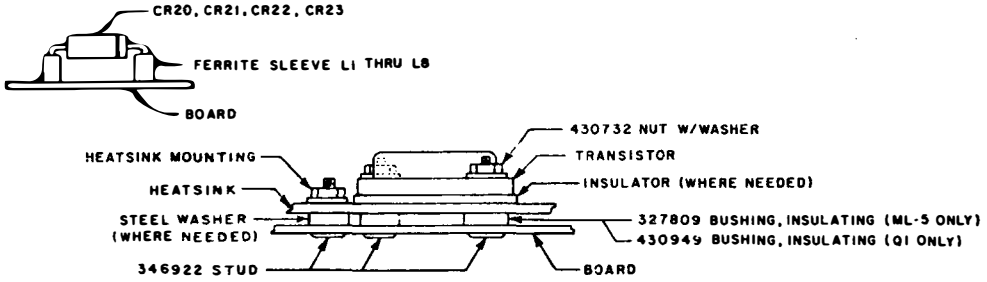
REF. DESIG.	PART NO REQ	DESCRIPTION
R10	411202	RESISTOR, 22 1/4W
R11	411291	RESISTOR, 110K 1/4W
R12	411298	RESISTOR, 220K 1/4W
R13	430952	RESISTOR, 523 1%
R14	430954	RESISTOR, 4.75K 1%
R15		SAME AS R9
R16	178862	RESISTOR, 10 1W
R17	411194	RESISTOR, 10 1/4W
R18	411256	RESISTOR, 3.9K 1/4W
R19	147225	RESISTOR, 1K 3W
R20		SAME AS R9
R21	430957	RESISTOR, 24.9K 1%
R22	430953	RESISTOR, 3.57K 1%
R23	411250	RESISTOR, 2.2K 1/4W
R24	411232	RESISTOR, 390 1/4W
R25		SAME AS R23
R26	411258	RESISTOR, 4.7K 1/4W
R27	178864	RESISTOR, 3.9K 1W
Q2	430935	TRANSISTOR, NPN 1400V
ML1	402260	REGULATOR, +5V
ML2	404026	IC, CLOCK DRIVER
ML3	404526	IC, PULSE WIDTH MOD.
ML5	404323	REGULATOR, +5V 3A
ML6	402204	REGULATOR, -12V
ML7	402201	REGULATOR, +12V
F1	120139	FUSE, 1A FAST BLOW
T1	430937	TRANSFORMER, LINEAR
T2	430938	TRANSFORMER, POWER
T3	430939	TRANSFORMER, PULSE
T4	430942	TRANSFORMER, PULSE
FL1	430591	FILTER, R.F.I.
RT1	430947	THERMISTOR, 10 OHM
RT2		SAME AS RT1
RV1	430917	VARISTOR, 275V
ST2	336470	STRAP,WIRE
ST3		SAME AS ST2

REF. DESIG.	PART NO REQ	DESCRIPTION
L1	430968	SLEEVE FERRITE
L2		SAME AS L1
L3		SAME AS L1
L4		SAME AS L1
L5		SAME AS L1
L6		SAME AS L1
L7		SAME AS L1
L8		SAME AS L1

410704 Circuit Card (Issue 1A)

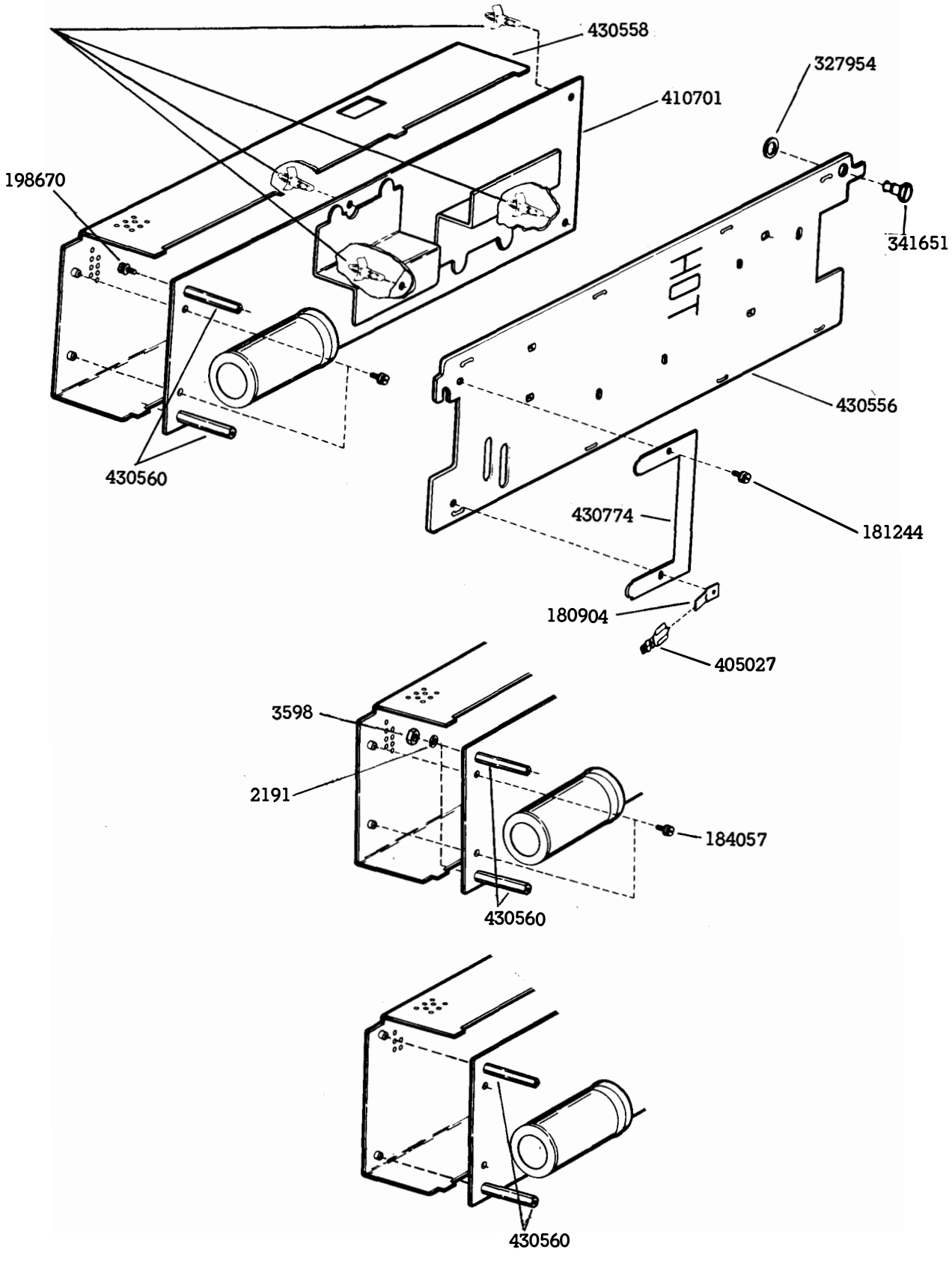


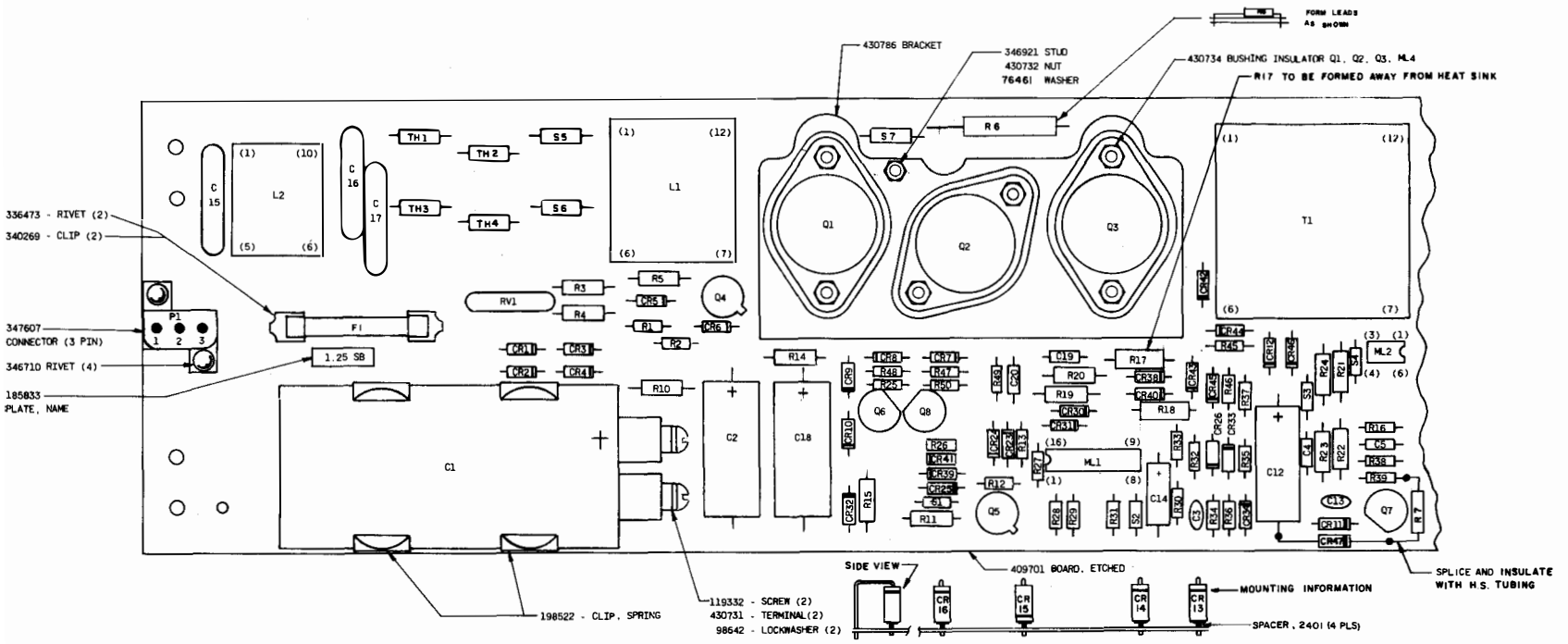
TYPICAL DIODE - SLEEVES ASSEMBLY



REF. DESIG.	PART NO REQ	DESCRIPTION	REF. DESIG.	PART NO REQ	DESCRIPTION	REF. DESIG.	PART NO REQ	DESCRIPTION	REF. DESIG.	PART NO REQ	DESCRIPTION
C1	405324	CAPACITOR, 0.1 MFD	CR1	430932	DIODE, ZENER 33V 5W	R6		SAME AS R5	L1	430960	SLEEVE FERRITE
C2	310929	CAPACITOR, 1.0 MFD	CR2	171541	DIODE, 1A 200V	R7	411210	RESISTOR, 47 1/4W	L2		SAME AS L1
C3	430921	CAPACITOR, 1000 MFD 35V	CR3		SAME AS CR2	R8	411218	RESISTOR, 100 1/4W	L3		SAME AS L1
C4	341550	CAPACITOR, 0.01 MFD	CR4		SAME AS CR2	R9	411186	RESISTOR, 4.7 1/4W	L4		SAME AS L1
C5		SAME AS C4	CR5		SAME AS CR2	R10	411202	RESISTOR, 22 1/4W	L5		SAME AS L1
C6	430918	CAPACITOR, 390 MFD	CR6		SAME AS CR2	R11	411214	RESISTOR, 68 1/4W	L6		SAME AS L1
C7		SAME AS C6	CR7	430927	DIODE, 3A 1000V	R12	170862	RESISTOR, 10 1W	L7		SAME AS L1
C8	341625	CAPACITOR, 0.0033 MFD	CR8		SAME AS CR7	R13		SAME AS R9	L8		SAME AS L1
C9	430914	CAPACITOR, 0.047 MFD	CR9		SAME AS CR7	R14	411194	RESISTOR, 10 1/4W			
C10	300057	CAPACITOR, 0.01 MFD	CR10		SAME AS CR7	R15		SAME AS R8			
C11	430964	CAPACITOR, 0.033 MFD	CR11	430926	DIODE, 3A 800V FR	R16	147225	RESISTOR, 1K 3W	T1	430937	TRANSFORMER, LINEAR
C12		SAME AS C1	CR12		SAME AS CR11	R17	411232	RESISTOR, 390 1/4W	T2	430775	TRANSFORMER, POWER
C13		SAME AS C1	CR13	430713	DIODE, ZENER 190V 5W	R18	411291	RESISTOR, 110K 1/4W	T3	430939	TRANSFORMER, PULSE
C14		SAME AS C1	CR14	430924	DIODE, SCHOTTKY	R19	411298	RESISTOR, 220K 1/4W	T4	430942	TRANSFORMER, PULSE
C15	336948	CAPACITOR, 1 MFD	CR15	312922	DIODE, ZENER 5.1V 1W	R20	430954	RESISTOR, 4.75K 1%			
C16		SAME AS C10	CR16	430605	DIODE, 1A 400V FR	R21	430952	RESISTOR, 523 1%			
C17		SAME AS C1	CR17		SAME AS CR16	R22	411258	RESISTOR, 4.7K 1/4W	FL1	430591	FILTER, R.F.I.
C18	430704	CAPACITOR, 330 MFD	CR18		SAME AS CR16	R23	430953	RESISTOR, 3.57K 1%			
C19	430738	CAPACITOR, 530 MFD	CR19	430925	DIODE, 1A 800V FR	R24	411250	RESISTOR, 2.2K 1/4W	RT1	430947	THERMISTOR, 10 OHM
C20	430919	CAPACITOR, 680 MFD	CR20	430913	DIODE, 3A 400V FR	R25	411256	RESISTOR, 3.9K 1/4W	RT2		SAME AS RT1
C21		SAME AS C18	CR21	403752	DIODE, 3A 200V FR	R26	430957	RESISTOR, 24.9K 1%			
C22		SAME AS C1	CR22		SAME AS CR21	R27		SAME AS R24	RV1	430917	VARISTOR, 275V
C23		SAME AS C1	CR23		SAME AS CR21	R28		SAME AS R17			
C24	430915	CAPACITOR, 0.0047 MFD	CR24		SAME AS CR14				S2	430655	SWITCH
C25	315976	CAPACITOR, 470 PFD	CR25		SAME AS CR14						
C26		SAME AS C1	CR26		SAME AS CR2						
C27	182628	CAPACITOR, 10 MFD	CR27		SAME AS CR16						
C28		SAME AS C10	CR28		SAME AS CR2						
C29		SAME AS C1	CR29		SAME AS CR14	Q1	430935	TRANSISTOR, NPN 1400V			
C30		SAME AS C1	CR30	405029	LED, PC BRD. MOUNTABLE	Q2	325077	TRANSISTOR, PNP			
C31		SAME AS C2				Q3	333241	TRANSISTOR, NPN			
C32		SAME AS C2									
C33		SAME AS C1									
C34		SAME AS C2				ML-1	402260	REGULATOR, +5V			
			R1	110725	RESISTOR, 270 1/2W	ML-2	404026	IC, CLOCK DRIVER			
			R2	411228	RESISTOR, 270 1/4W	ML-3	404526	IC, PULSE WIDTH MOD.			
			R3	341572	RESISTOR, 39K 2W	ML-4	402201	REGULATOR, +12V			
			R4		SAME AS R3	ML-5	402204	REGULATOR, -12V			
			R5	103002	RESISTOR, 12K 4W	ML-6	404323	REGULATOR, +5V 3A			

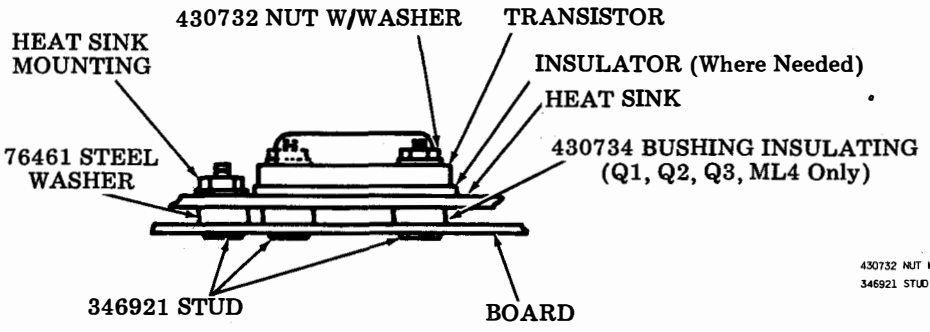
D. 430770 POWER SUPPLY ASSEMBLY

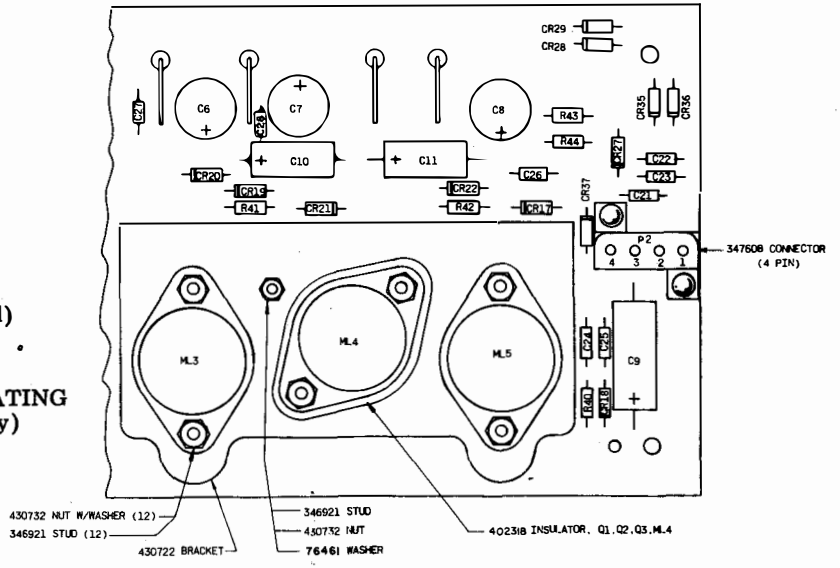




Note 1: Customer ID2A resistor R13 was changed from 2.2K to 1.8K and transistors Q6, Q8 changed from 321517 to 324656.

Mount 177113 insulator under Q1, Q2, Q3 and ML4. Apply heat sink compound to both sides of insulators and bottom of ML3 and ML5.

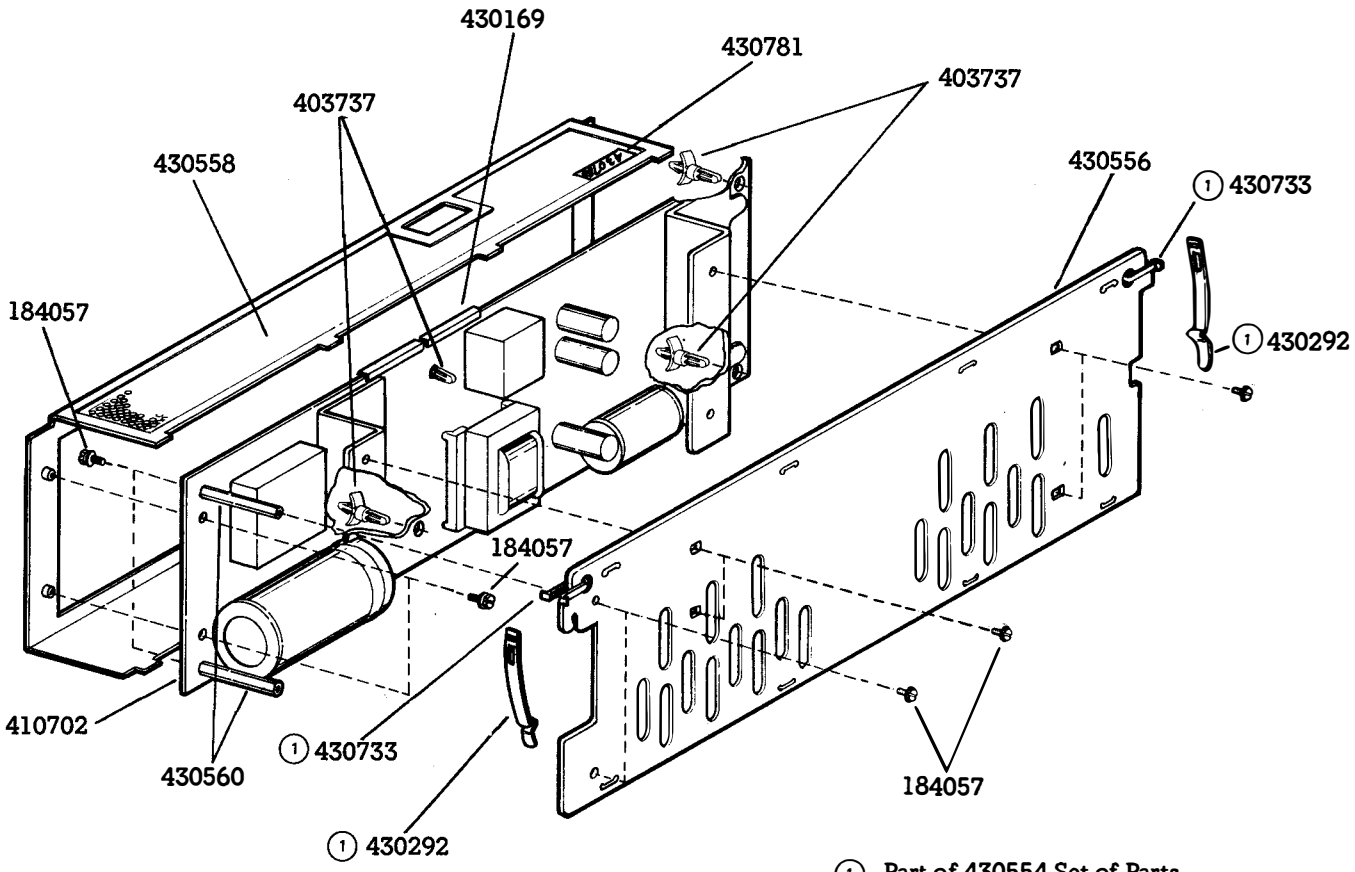




D. 430770 POWER SUPPLY ASSEMBLY (Contd)

REF. DESIG.	PART NO. REQ.	NOTE	DESCRIPTION	REF. DESIG.	PART NO. REQ.	NOTE	DESCRIPTION	REF. DESIG.	PART NO. REQ	NOTE	DESCRIPTION
C1	430706		CAPACITOR, 200 MFD	R15	311044		RESISTOR .1 3W		198522		CLIP, SPRING
C2	341601		CAPACITOR, 10 MFD	R16	321508		RESISTOR 100K 1/4W		430731		TERMINAL, CAPACITOR
C3	300057		CAPACITOR, 01 MFD	R17	171580		RESISTOR 470 1W		336473		RIVET
C4	405324		CAPACITOR, 1 MFD	R18			SAME AS R17		346710		RIVET
C5			SAME AS C4	R19	137602		RESISTOR 47C 1/2W		346921		STUD
C6	430704		CAPACITOR, 330 MFD	R20			SAME AS R19		76461		WASHER
C7			SAME AS C6	R21	137601		RESISTOR 68Ω 1/2W		402318		WASHER, INSULATOR
C8			SAME AS C6	R22-24			SAME AS R21		430734		BUSHING, INSULATOR
C9	182747		CAPACITOR, 60 MFD	R25			SAME AS R2		430732		NUT W/LOCKWASHER
C10	148837		CAPACITOR, 25 MFD	R26	315956		RESISTOR 2.7K 1/4 W		340269		CLIP FUSE
C11			SAME AS C10	R27	324901		RESISTOR 5.49K 1/8W		119332		SCREW, ROUND HEAD
C12	192711		CAPACITOR 50 MFD	R28-29			SAME AS R27		98642		WASHER, LOCK
C13	328793		CAPACITOR .001 MFD	R30	324909		RESISTOR 49.9K 1/4W		430722		BRACKET
C14	343698		CAPACITOR .015 MFD	R31	315955		RESISTOR 2.2K 1/4W		430786		BRACKET W/STUDS
C15	405043		CAPACITOR.01 MFD	R32	320275		RESISTOR 10K 1/4W		2401		STUD
C16			SAME AS C15	R33-34			SAME AS R16				
C17			SAME AS C15	R35	318801		RESISTOR 47K 1/4W				
C18			SAME AS C2	R36	315959		RESISTOR 4.7K 1/4W				
C19	430792		CAPACITOR, .0033 MFD	R37-38			SAME AS R32		409701		BOARD, ETCHED
C20			SAME AS C19	R39			SAME AS R31		185833		PLATE, NAME
C21			SAME AS C4	R40			SAME AS R7				
C22			SAME AS C4	R41-42			SAME AS R31				
C23			SAME AS C4	R43	315948		RESISTOR 100 1/4W				
C24			SAME AS C4	R44			SAME AS R43				
C25			SAME AS C4	R45-46			SAME AS R32	TH1	430707		THERMISTOR 2.5Ω COLD
C26			SAME AS C4	R47-48			SAME AS R2	TH2			SAME AS TH1
C27			SAME AS C4	R49			SAME AS R26	TH3			SAME AS TH1
C28			SAME AS C4	R50			SAME AS R2	TH4			SAME AS TH1
				Q1	430771		TRANSISTOR 500V NPN				
CR1	312341		DIODE, 1N4004	Q2-Q3			SAME AS Q1				
CR2-4			SAME AS CR1	Q4	430782		TRANSISTOR 2N 5416				
CR5	430605		DIODE, 1N4936	Q5	430783		TRANSISTOR 2N 3439				
CR6-8			SAME AS CR5	Q6	324656	1	TRANSISTOR 2N 3569				
CR9-10			SAME AS CR1	Q7	315931		TRANSISTOR 2N 3638				
CR11	197464		DIODE, 1N4148	Q8		1	SAME AS Q6				
CR12			SAME AS CR11								
CR13	430715		DIODE, 200V 3A								
CR14-16			SAME AS CR13								
CR17-22			SAME AS CR1								
CR23-31			SAME AS CR11	F1	307218		FUSE 1.25A SL BL				
CR32	323606		DIODE, ZENER 20V								
CR33	177404		DIODE, ZENER 15V								
CR34			SAME AS CR33								
CR35	321161		DIODE, ZENER 3.9V								
CR36	302844		DIODE, ZENER 13V	L1	430784		INDUCTOR 4MH				
CR37			SAME AS CR36	L2	430791		INDUCTOR 1MH				
CR38			SAME AS CR5								
CR39			SAME AS CR5								
CR40-46			SAME AS CR11								
CR47	328696		DIODE, ZENER 30V, 1W								
				T1	430772		TRANSFORMER 20 KHZ				
				P1	347607		CONN. PRINTED CKT				
ML1	404524		PULSE WIDTH MODULATOR	P2	347608		CONN. PRINTED CKT				
ML2	335522		ISOLATOR, OPTICAL								
ML3	402201		REGULATOR, 12V								
ML4	402204		REGULATOR, 12V								
ML5	404323		REGULATOR, 5V 3A								
				RV1	430708		VARISTOR				
R1	328782		RESISTOR, 47 1/4W	S1	336470		STRAP, ELECTRICAL				
R2	320276		RESISTOR, 470 1/4W	S2-S7			SAME AS S1				
R3	182547		RESISTOR, 2.7 1/2W								
R4-5			SAME AS R3								
R6	161873		RESISTOR, 5K, 5W								
R7,9	321213		RESISTOR, 1K 1/4W								
R10	143667		RESISTOR, 3.9K 1/2W								
R11			SAME AS R10								
R12			SAME AS R2								
R13	321507	1	RESISTOR, 1.8 K 1/4W								
R14	118157		RESISTOR, 68K 1/2W								

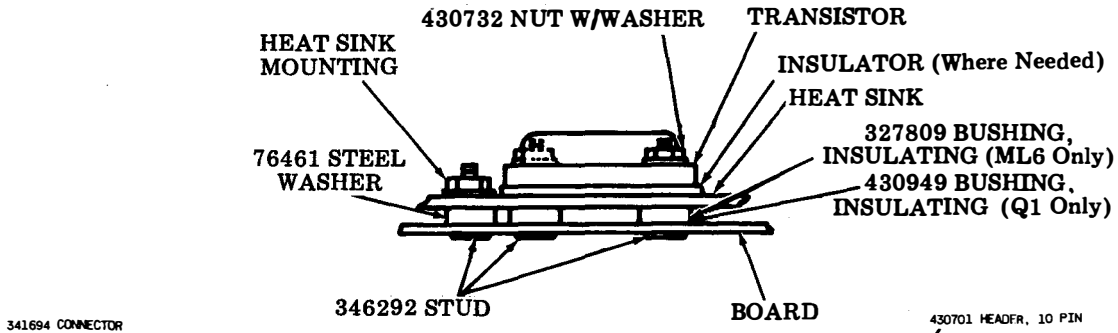
E. 430780 POWER SUPPLY ASSEMBLY

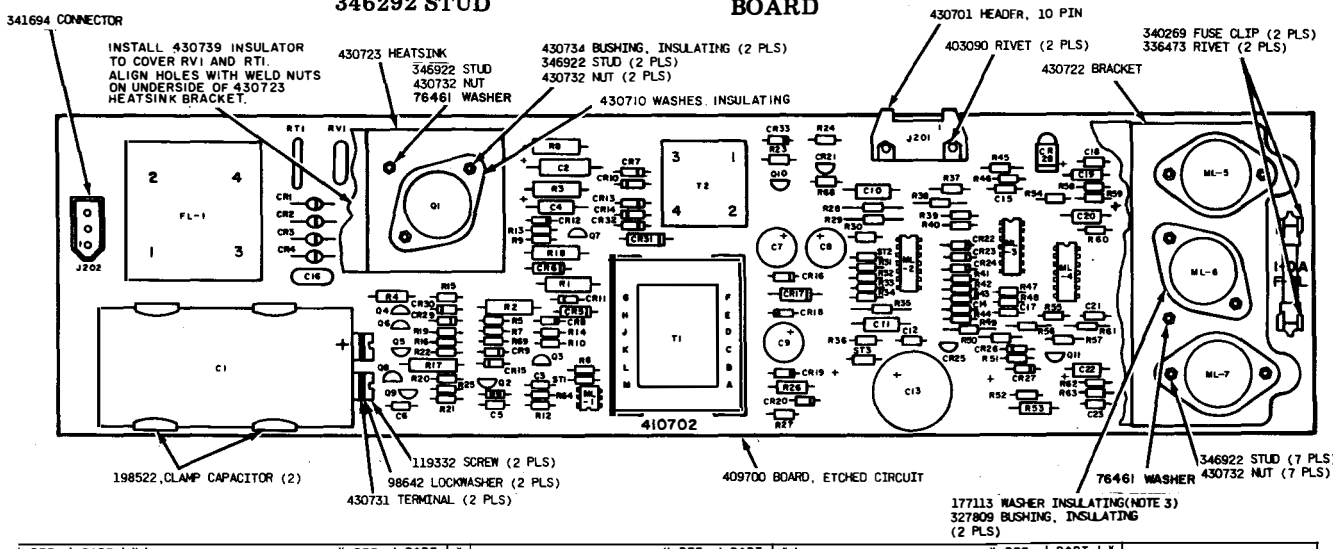


① Part of 430554 Set of Parts

E. 430780 POWER SUPPLY ASSEMBLY (Contd)

410702 Circuit Card (Issue 1A Through 2B)

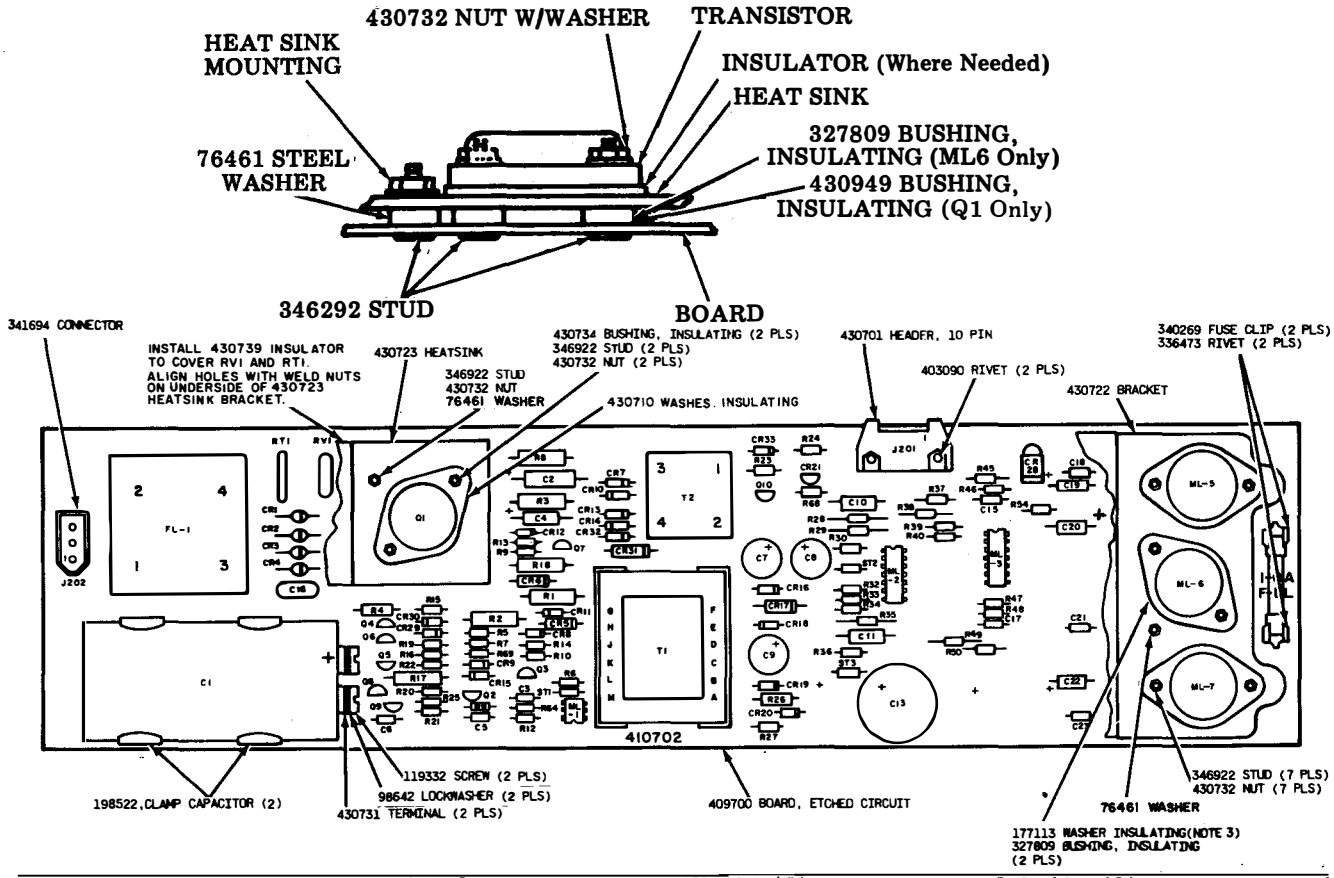




REF. DESIG.	PART NO REQ	DESCRIPTION	REF. DESIG.	PART NO REQ	DESCRIPTION	REF. DESIG.	PART NO REQ	DESCRIPTION	REF. DESIG.	PART NO REQ	DESCRIPTION
C1	430706	CAPACITOR, 200 MFD	CR17	430715	DIODE	R1	120211	RESISTOR, 20K 1W	R41		SAME AS R15
C2	310930	CAPACITOR, 100 MFD	CR18		SAME AS CR7	R2	102763	RESISTOR, 680 1W	R42		SAME AS R15
C3	405324	CAPACITOR, 0.1 MFD	CR19		SAME AS CR16	R3	110190	RESISTOR, 56K 1W	R43		SAME AS R15
C4	333727	CAPACITOR, 6.8 MFD	CR20	312401	DIODE, ZENER 1N4755A	R4	430714	RESISTOR, .24 1W	R44		SAME AS R5
C5		SAME AS C3	CR21	430729	DIODE, 4 LAYER	R5	321213	RESISTOR, 1K 1/4W	R45		SAME AS R37
C6	300057	CAPACITOR, 0.01 MFD	CR22	321135	DIODE, 1N4735A	R6	315959	RESISTOR, 4700 1/4W	R46		SAME AS R33
C7	430704	CAPACITOR, 330 MFD	CR23	430724	DIODE, ZENER 15V	R7		SAME AS R5	R47	430596	RESISTOR, 25.0K
C8		SAME AS C7	CR24		SAME AS CR5	R8	144464	RESISTOR, 220 1W	R48	430595	RESISTOR, 681 1%
C9		SAME AS C7	CR25	336694	THYRISTOR, SCR 0.8A	R9	310802	RESISTOR, 220 1/4W	R49	430759	RESISTOR, 24.9K .25%
C10	430721	CAPACITOR, 1200 PFD	CR26	197464	DIODE, 1N4140	R10		SAME AS R5	R50		SAME AS R37
C11		SAME AS C10	CR27		SAME AS CR23	R11	310801	RESISTOR, 47K 1/4W	R51		SAME AS R12
C12		SAME AS C3	CR28	405029	LED, PCB MOUNTABLE	R12	320275	RESISTOR, 10K 1/4W	R52	318803	RESISTOR, 2400 1/4V
C13	430738	CAPACITOR, 530 MFD	CR29		SAME AS CR7	R13	315955	RESISTOR, 2.2K 1/4W	R53	321259	RESISTOR, 20K 1/2V
C14		SAME AS C3	CR30		SAME AS CR7	R14		SAME AS R12	R54	315956	RESISTOR, 2700 1/4W
C15	325034	CAPACITOR, 120 PFD	CR31		SAME AS CR6	R15	320276	RESISTOR, 470 1/4W	R55		SAME AS R52
C16	335715	CAPACITOR, 500 PFD 6KV	CR32		SAME AS CR7	R16	320705	RESISTOR, 330 1/4W	R56		SAME AS R37
C17		SAME AS C3	CR33		SAME AS CR5	R17	177101	RESISTOR, 6.8 1/2W	R57		SAME AS R54
C18		SAME AS C3				R18	170862	RESISTOR, 10 1W	R58	336697	RESISTOR, 430 1/4V
C19	310929	CAPACITOR, 1.0 MFD	FL1	430709	FILTER, RFI	R19	315948	RESISTOR, 100 1/4W	R59		SAME AS R52
C20		SAME AS C19				R20		SAME AS R19	R60	315961	RESISTOR, 8200 1/4V
C21		SAME AS C3	F1	120139	FUSE, 1A	R21	320702	RESISTOR, 47 1/4W	R61		SAME AS R37
C22		SAME AS C19				R22	315951	RESISTOR, 560 1/4W	R62	320024	RESISTOR, 3900 1/4V
C23		SAME AS C3	ML1	335522	IC, OPTICAL COUPLER	R23		SAME AS R12	R63		SAME AS R52
			ML2	404239	QUAD VOLT COMPARATOR	R24		SAME AS R12	R64		SAME AS R12
CR1	400037	DIODE, 400V 1N5060	ML3	326824	REGULATOR, VOLTAGE	R25		SAME AS R19	R68		SAME AS R13
CR2		SAME AS CR1	ML4		SAME AS ML2	R26	118147	RESISTOR, 6800 1/2W	R69		SAME AS R5
CR3		SAME AS CR1	ML5	404323	1 REGULATOR, +5V	R27	315971	RESISTOR, 680 1/4W			
CR4		SAME AS CR1	ML6	402204	REGULATOR, -12V	R28	341596	RESISTOR, 121K 1%	RT1	430707	THERMISTOR
CR5	430725	DIODE ZENER 51V 1N4757	ML7	402201	REGULATOR, +12V	R29	341592	RESISTOR, 75K 1%			
CR6	430713	DIODE ZENER 190V 1N5367	Q1	430711	TRANSISTOR, 450V	R30	315957	RESISTOR, 3300 1/4W			
CR7	430605	DIODE, 1N4936	Q2	400909	TRANSISTOR, 60V NPN				RV1	430708	VARISTOR
CR8		SAME AS CR7	Q3	325077	TRANSISTOR, 2N4355	R32	324902	RESISTOR, 100K 1%			
CR9		SAME AS CR7	Q4		SAME AS Q2	R33	321508	RESISTOR, 100K 1/4W	ST1	336470	STRAP
CR10		SAME AS CR7	Q5		SAME AS Q3	R34		SAME AS R16	ST2		SAME AS ST1
CR11		SAME AS CR7	Q6		SAME AS Q2	R35		SAME AS R20	ST3		SAME AS ST1
CR12		SAME AS CR7	Q7		SAME AS Q2	R36		SAME AS R33			
CR13		SAME AS CR7	Q8		SAME AS Q2	R37	401067	RESISTOR, 2400 0.5%	T1	430773	TRANSFORMER, POWER
CR14		SAME AS CR7	Q9		SAME AS Q3	R38	324908	RESISTOR, 30.1K 1%	T2	430703	TRANSFORMER, PULSE
CR15		SAME AS CR7	Q10		SAME AS Q2	R39		SAME AS R12			
CR16	403752	DIODE, 200V 3A FR				R40	330641	RESISTOR, 1MEG 1/4W			

Note 1: At customer identification Issue 2A, ML5 was changed from 402202.

410702 Circuit Card (Issue 3A Through 3C)



REF. DESIG.	PART NO	REQ	NOTE	DESCRIPTION	REF. DESIG.	PART NO	REQ	NOTE	DESCRIPTION	REF. DESIG.	PART NO	REQ	NOTE	DESCRIPTION	REF. DESIG.	PART NO	REQ	NOTE	DESCRIPTION
C1	430706			CAPACITOR, 200 MFD	CR17				SAME AS CR16	R1	120211			RESISTOR, 20K 1W					
C2	310930			CAPACITOR, 100 MFD	CR18				SAME AS CR7	R2	102763			RESISTOR, 600 1W					
C3	405324			CAPACITOR, 0.1 MFD	CR19				SAME AS CR16	R3	110190			RESISTOR, 56K 1W					
C4	333727			CAPACITOR, 6.8 MFD	CR20	312401			DIODE, ZENER 1N4755A	R4	430714			RESISTOR, .24 1W					
C5				SAME AS C3	CR21	430729			DIODE, 4 LAYER	R5	321213			RESISTOR, 1K 1/4W	R45				SAME AS R37
C6	300057			CAPACITOR, 0.01 MFD						R6	315959			RESISTOR, 4700 1/4W	R46				SAME AS R33
C7	430704			CAPACITOR, 330 MFD						R7				SAME AS R5	R47	430596			RESISTOR, 25.0K
C8				SAME AS C7						R8	144464			RESISTOR, 220 1W	R48	430595			RESISTOR, 681 1%
C9				SAME AS C7						R9	310802			RESISTOR, 220 1/4W	R49	430759			RESISTOR, 24.9K .25%
C10	430721			CAPACITOR, 1200 PFD						R10				SAME AS R5	R50				SAME AS R37
C11				SAME AS C10						R11	310801			RESISTOR, 47K 1/4W					
					CR20	405029			LED, PCB MOUNTABLE	R12	320275			RESISTOR, 10K 1/4W					
C13	430730			CAPACITOR, 530 MFD	CR29				SAME AS CR7	R13	315955			RESISTOR, 2.2K 1/4W					
					CR30				SAME AS CR7	R14				SAME AS R12	R54	315956			RESISTOR, 2700 1/4W
C15	325034			CAPACITOR, 120 PFD	CR31				SAME AS CR6	R15	320276			RESISTOR, 470 1/4W					
C16	335715			CAPACITOR, 500 PFD 6KV	CR32				SAME AS CR7	R16	320705			RESISTOR, 330 1/4W					
C17				SAME AS C3	CR33				SAME AS CR5	R17	177101			RESISTOR, 6.8 1/2W					
C18				SAME AS C3						R18	170862			RESISTOR, 10 1W					
C19	310929			CAPACITOR, 1.8 MFD	FL1	430709			FILTER, RFI	R19	315940			RESISTOR, 100 1/4W					
C20				SAME AS C19						R20				SAME AS R19					
C21				SAME AS C3	F1	120139			FUSE, 1A	R21	320702			RESISTOR, 47 1/4W					
C22				SAME AS C19						R22	315951			RESISTOR, 560 1/4W	R64				SAME AS R12
C23				SAME AS C3	ML1	335522			IC, OPTICAL COUPLER	R23				SAME AS R12	R68				SAME AS R13
					ML2	404239			QUAD VOLT COMPARATOR	R24				SAME AS R12	R69				SAME AS R5
CR1	400037			DIODE, 400V 1N5060	ML3	326924			REGULATOR, VOLTAGE	R25				SAME AS R19					
CR2				SAME AS CR1						R26	118147			RESISTOR, 6800 1/2W	RT1	430707			THERMISTOR
CR3				SAME AS CR1	ML5	404323			REGULATOR, +5V	R27	315971			RESISTOR, 680 1/4W					
CR4				SAME AS CR1	ML6	402204			REGULATOR, -12V	R28	341596			RESISTOR, 121K 1%					
CR5	430725			DIODE ZENER 51V 1N4757	ML7	402201			REGULATOR, +12V	R29	341592			RESISTOR, 75K 1%	RV1	430708			VARISTOR
CR6	430713			DIODE ZENER 190V 1N5387	Q1	430711			TRANSISTOR, 450V	R30	315957			RESISTOR, 3300 1/4W					
CR7	430605			DIODE, 1N4936	Q2	400909			TRANSISTOR, 60V NPN						ST1	336470			STRAP
CR8				SAME AS CR7	Q3	325077			TRANSISTOR, 2N4355	R32	324902			RESISTOR, 100K 1%	ST2				SAME AS ST1
CR9				SAME AS CR7	Q4				SAME AS Q2	R33	321500			RESISTOR, 100K 1/4W	ST3				SAME AS ST1
CR10				SAME AS CR7	Q5				SAME AS Q3	R34				SAME AS R16					
CR11				SAME AS CR7	Q6				SAME AS Q2	R35				SAME AS R20	T1	430773			TRANSFORMER, POWER
CR12				SAME AS CR7	Q7				SAME AS Q2	R36				SAME AS R33	T2	430703	1		TRANSFORMER, PULSE
CR13				SAME AS CR7	Q8				SAME AS Q2	R37	401067			RESISTOR, 2400 0.5%					
CR14				SAME AS CR7	Q9				SAME AS Q3	R38	324908			RESISTOR, 30.1K 1%	L1	430868	2		SLEEVE, BEAD
CR15				SAME AS CR7	Q10				SAME AS Q2	R39				SAME AS R12	L2				SAME AS L1
CR16	403752			DIODE, 200V 3A FR						R40	330641			RESISTOR, 1MEG 1/4W					

Note 1: Customer ID Issue 3B, T2 P/N 430703 was replaced by 430773.

Note 2: Customer ID Issue 3C, L1 and L2 added.

F. NUMERICAL INDEX

Part Number	Description and Page Number
341625	Capacitor, 0.0033 MFD 8, 9
341651	Stud 10
341694	Connector 3,5,6,8,9,14,15
343698	Capacitor, .015 MFD 12
346292	Stud 14,15
346710	Rivet 11,12
346921	Stud 3,5,6,8,11,12
346922	Stud 5,6,8,9,14,15
347607	Connector 11,12
347608	Connector 11,12
400909	Transistor 4,5,6,14,15
401067	Resistor, 24,000 Ohm 4,5, 6,14,15
402201	Regulator 3,5,6,8,9,12,14, 15
402202	Regulator 3,5,6
402204	Regulator 3,5,6,8,9,12,14, 15
402260	Regulator 8,9
402318	Insulator 11,12
403090	Rivet 3,5,6,8,9,14,15
403737	Support 2,10,13
403752	Diode 3,8,9,14,15
404026	Driver, Clock 8,9
404239	Circuit, Integrated 3,5,6, 14,15
404323	Regulator 8,9,12,14,15
404325	Isolator 4
404524	Circuit, Integrated 12
404526	IC, Pulse Width Modulator 8,9
405027	Lead w/Terminal 10
405029	Led 3,5,6,8,9,14,15
405043	Capacitor, .01 MFD 12
405324	Capacitor, .1 MFD 3,5,6, 8,9,12,14,15
408037	Diode 3,5,6,14,15
409700	Card, Circuit 5,6,14,15
409701	Board, Circuit 11,12
409703	Board, Circuit 8
409704	Board, Circuit 9
410700	Card, Power Supply 2,3, 4,5,6
410701	Card, Circuit 10,11
410702	Card, Circuit 13,14,15
410703	Card, Circuit 7,8
410704	Card, Circuit 7,9
411186	Resistor 9
411194	Resistor, 10 1/4 W 8,9
411202	Resistor, 22 1/4 W 8,9
411210	Resistor, 47 Ohm 8,9
411214	Resistor 9
411218	Resistor, 100 1/4 W 8,9
411228	Resistor, 270 1/4 W 8,9
411232	Resistor, 390 1/4 W 8,9
411250	Resistor, 2.2K 1/4 W 8,9
411256	Resistor, 3.9K 1/4 W 8,9
411258	Resistor, 4.7K 1/4 W 8,9
411291	Resistor, 110K 1/4 W 8,9
411298	Resistor, 220K 1/4 W 8,9
430169	Strip, Insulator 2,13
430292	Clamp 2,7,13
430554	Clip 2,7,13
430556	Sink, Heat 2,10,13
430558	Cover 2,10,13
430560	Post 2,7,10,13
430590	Cover 7
430591	Filter 8,9
430592	Bracket 9
430595	Resistor 5,6,14,15
430596	Resistor 5,6,14,15
430605	Diode 3,5,6,8,9,12,14,15
430645	Sink, Heat 7
430655	Switch 9
430664	Plug, Hole 7
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PART 6 — PACKING AND MARKING

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A. GENERAL

This part provides packing information for the 430700, 430760, 430770 and 430780 power supply assemblies.

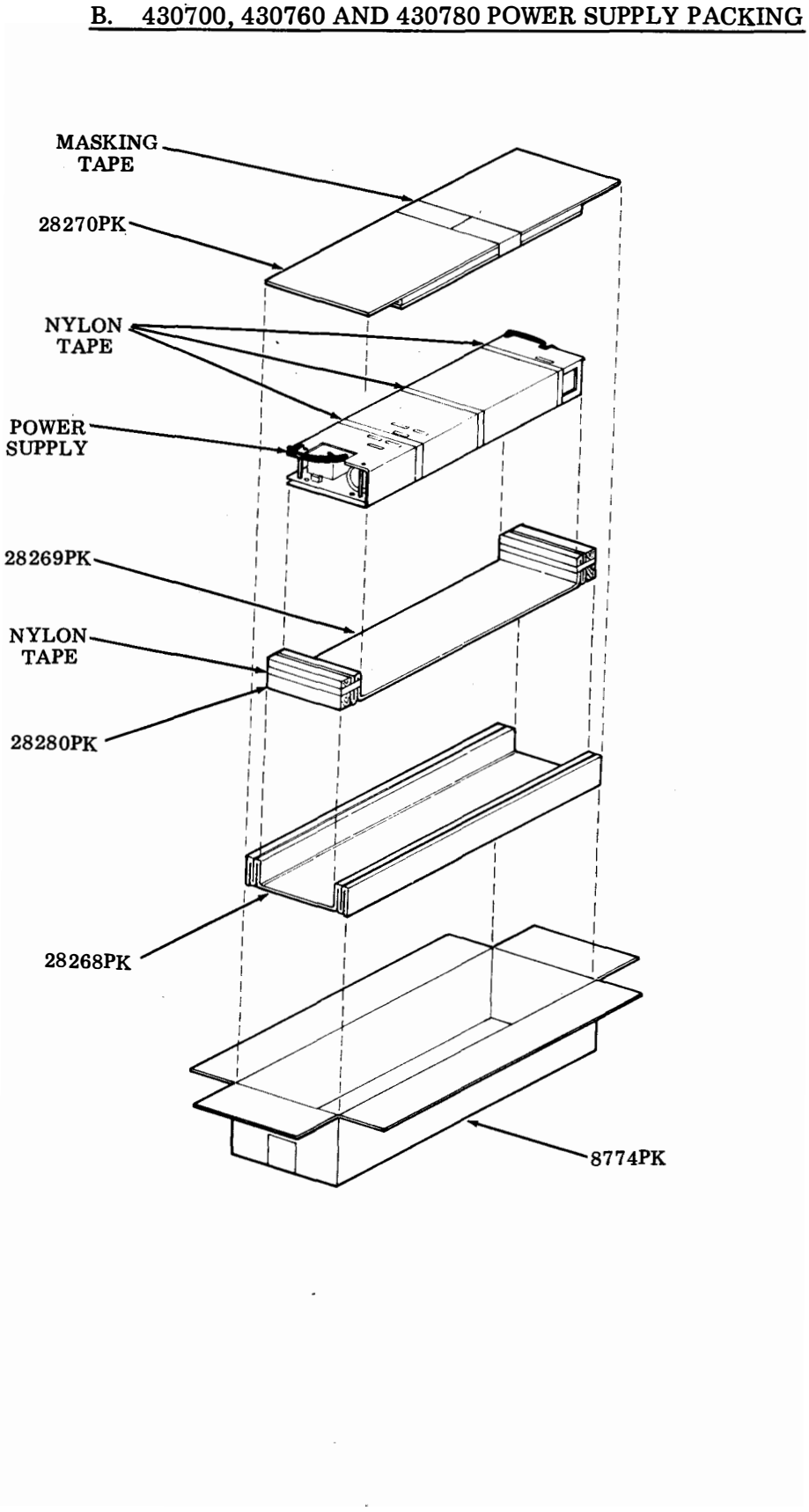
The loose power supply assemblies should be properly packed for storage or transportation between service and customer locations. Packing provides protection against damage or contamination and facilitates storage, stock selection and handling.

The PK packing materials may be obtained from Teletype Corporation.

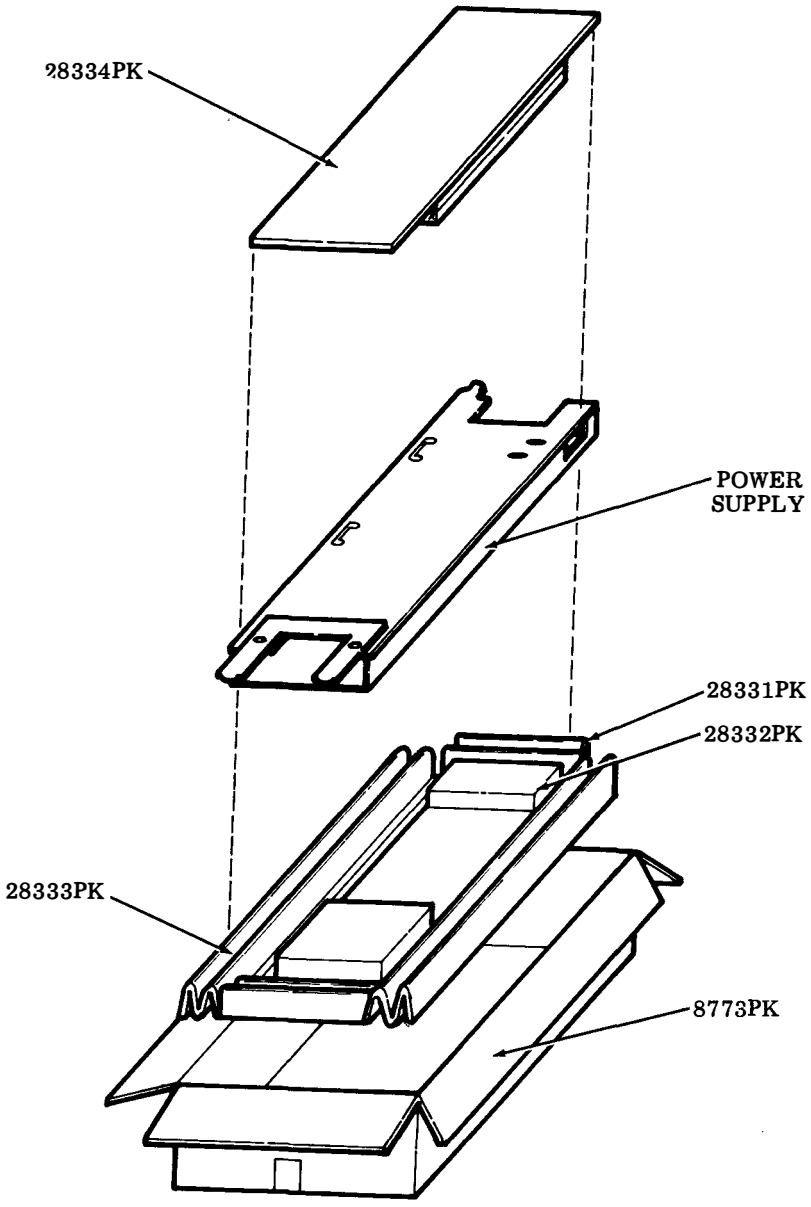
Identify the contents on the outside of each carton after packing, with the code or part number and quantity using idelible markers or premarked adhesive labels.

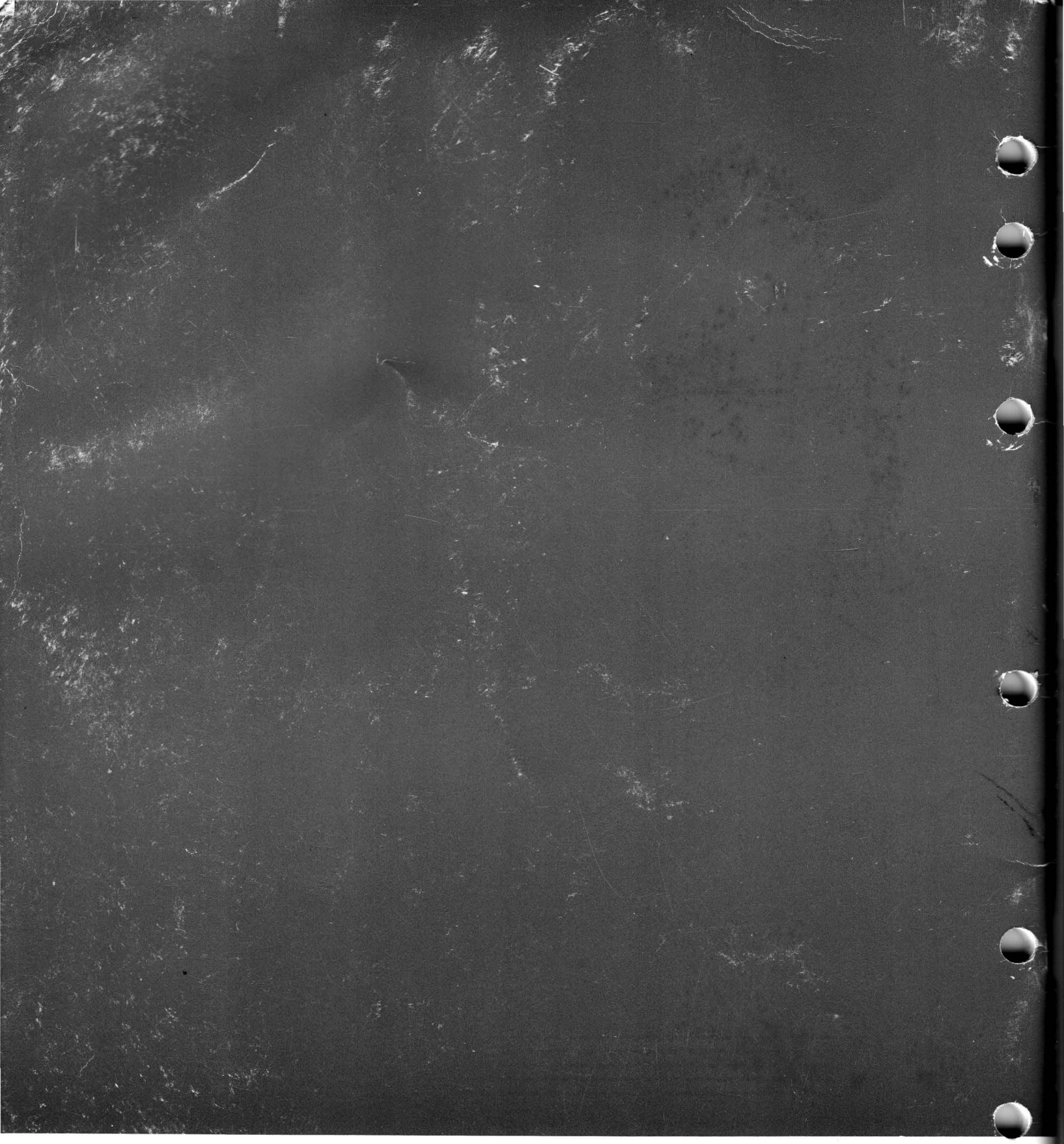
Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

B. 430700, 430760 AND 430780 POWER SUPPLY PACKING



C. 430770 POWER SUPPLY PACKING





AT&T
Teletype Corporation

5555 Touhy Avenue
Skokie, IL 60077
Phone (312) 982-2000

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