CHAPTER 7

THE 0.10.0354 POWER SUPPLY

7.1 INTRODUCTION

The 0.10.0354 Power Supply (Figure 7.1) provides the operating and reference voltages necessary for operation of the EAI 580 Analog Computer. Dc voltages include +30 volts, -20 volts, ±15 volts, ±10 volts and +5 volts. Ac line voltage, both unswitched and switched, is available at connectors AC2 and AC3 respectively. A 6.5 volt winding is provided on T1 for chopper drive.

Each of the operating voltages (+30, ±15, +5 volts) are produced by a regulator circuit consisting of an input network, a series regulator circuit and a sensing circuit to control the drive and series regulator. The output levels of the operating voltages are remotely sensed at the distribution point, allowing the regulators to compensate for voltage drops in the distribution wiring.

The ±10 volt output is used as computer reference voltage. This voltage is developed from the ±15 volt sources and utilizes a chopper stabilized operational amplifier for regulation and stability.

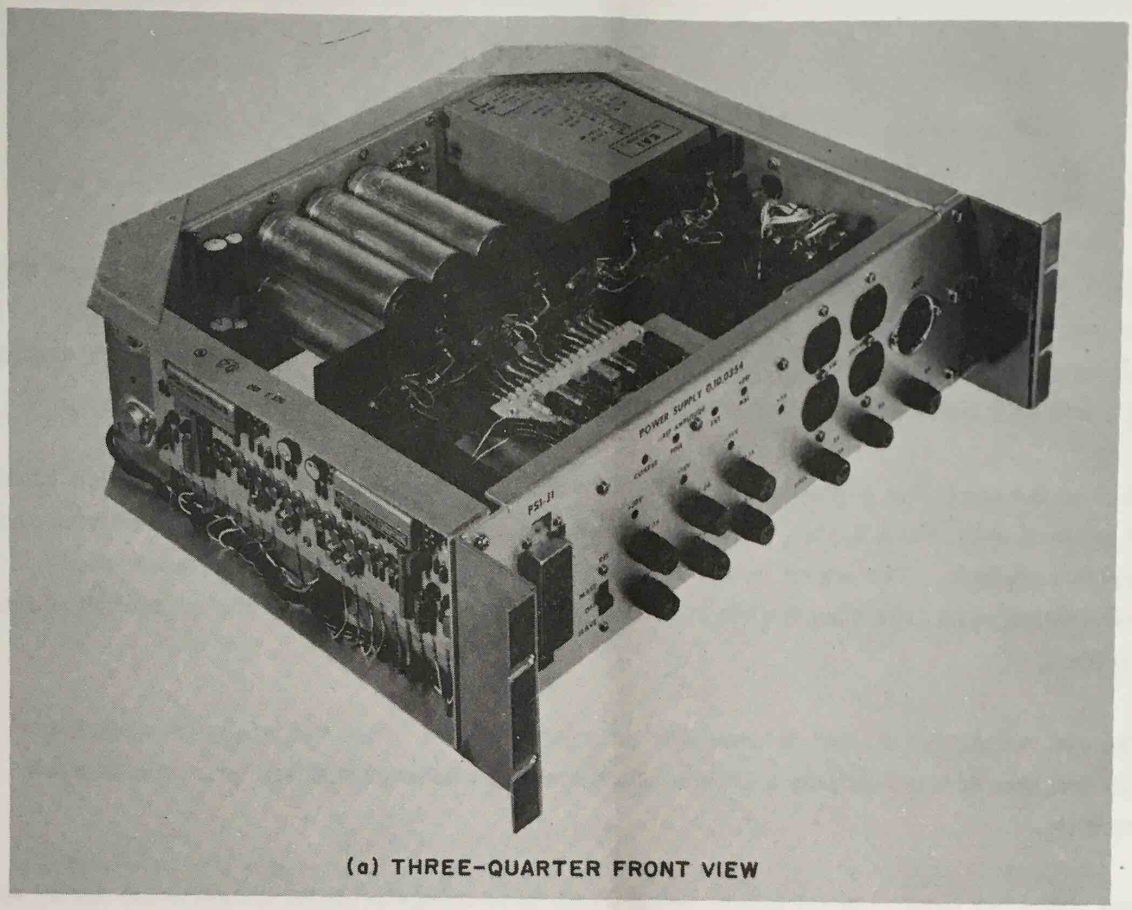
The -20 relay volts is developed by using a full-wave bridge rectifier connected to the 20 volt winding on T1.

The input networks, regulators and operational amplifier components are located on printed circuit cards. Series regulators Q1, Q2, Q3 and Q4 are mounted on a heat sink.

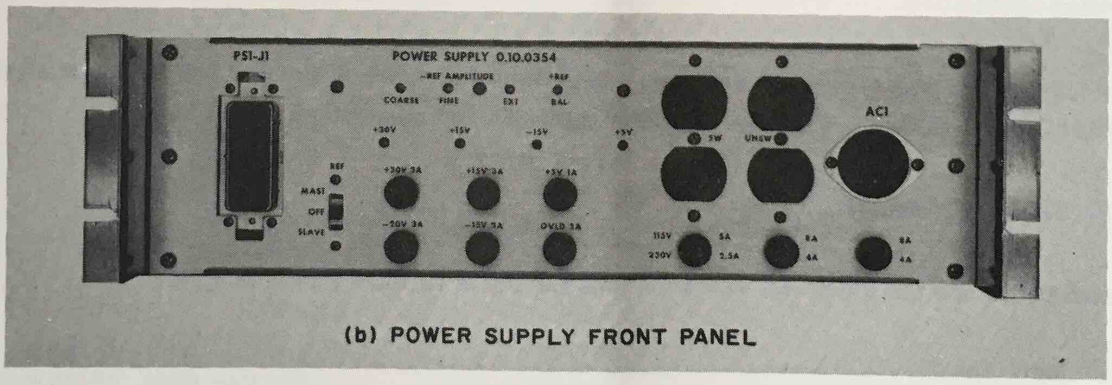
7.2 SPECIFICATIONS

Listed below are the electrical specifications for the 0.10.0254 Power Supply.

Input Power	115 Vac ±10V, 50/60 Hz 230 Vac ±20V, 50/60 Hz
Regulated Power	+30 Vdc at 2.5 A +15 Vdc at 0-2.5 A -15 Vdc at 0-2.5 A +5 Vdc at 0-10 A
Reference	±10 Vdc at 0-0.5 A Each
Overload Indicator Power	8.0 Vdc at 0-3 A
Relay Power	-20 Vdc at 0-3 A
Chopper Drive	6.3 Vac at 2 A



(a) THREE-QUARTER FRONT VIEW



(b) POWER SUPPLY FRONT PANEL

Figure 7.1. Power Supply, Model 0.10.0354

7.3 CIRCUIT DESCRIPTION

The circuits in the 0.12.1648 Rectifier Filter Network use standard full-wave rectifiers, together with capacitive filter networks. Power Sources of this type are described in basic texts; therefore, detailed theory of operation is not given.

7.3.1 Operating Voltages

The regulator circuits for the +30, ±15 and +5 volt power supplies are similar in operation although certain component values may differ due to the different output voltages. For this reason only the +30 volt regulator is described in this paragraph.

Refer to Figure 7.2 for the following description. The output of the +30 volt rectifying network is connected through fuse F4 to the collector of the series regulator Q1. The +30 volt output is taken from the emitter of Q1. The conduction of the series regulator (Q1) is controlled by the regulator circuit (enclosed in dotted lines). The regulator consists of a differential amplifier stage (Q2 and Q3) and a driver stage (Q1).

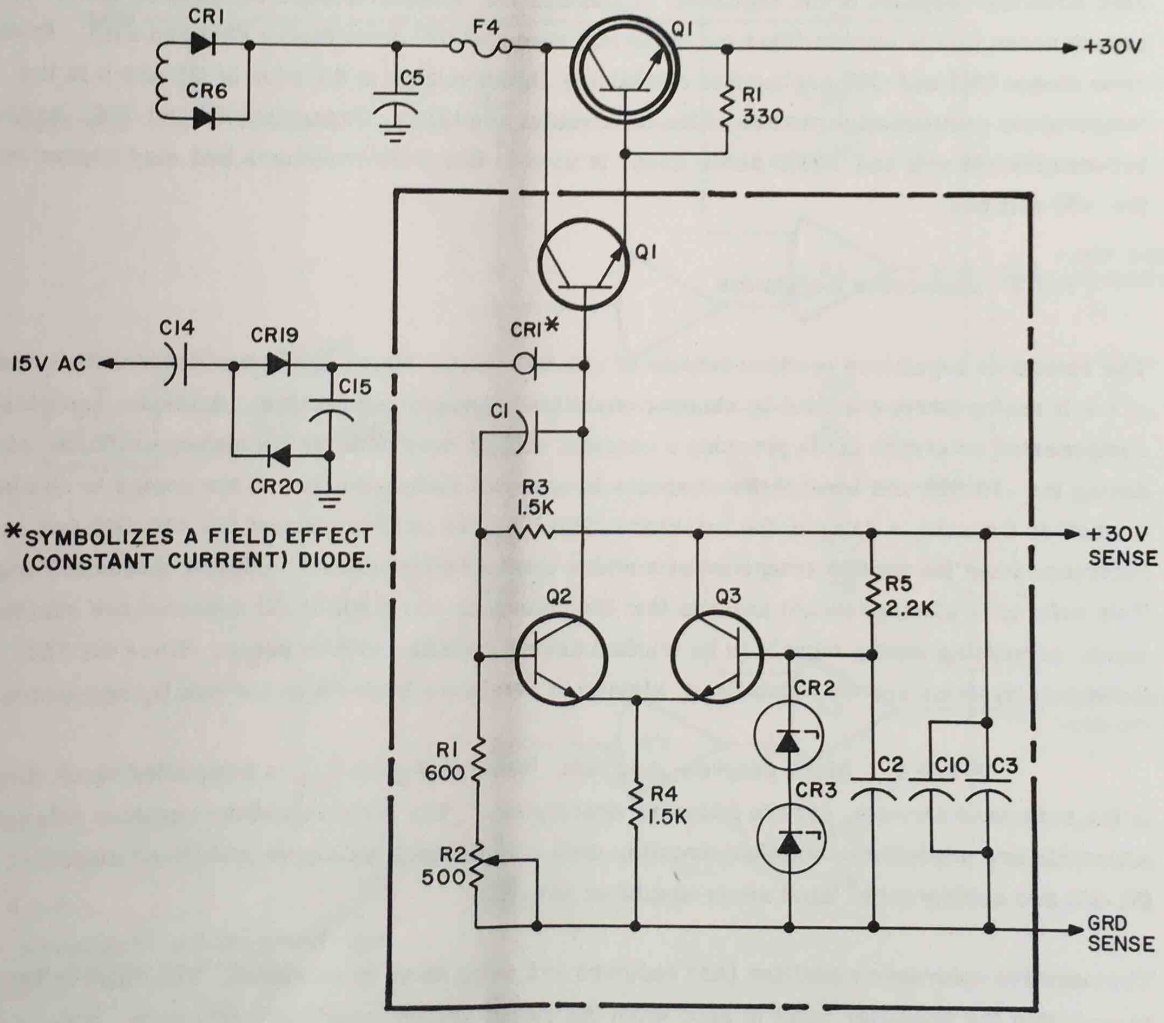


Figure 7.2. +30 Volt Regulator

One end of the sense line is connected to the +30 volt bus. The other end of the sense line is connected to resistor R3 which along with resistor R1 and potentiometer R2 constitute a voltage divider. The potential developed across the divider is used to establish a base voltage for transistor Q2. Any change on the +30 volt bus is reflected in base circuit of Q2 causing it to conduct less or harder depending on the direction of change. The basic voltage of emitter follower Q1 is supplied from a 15 volt tap on T1, and voltage doubler CR19 and CR20, and applied to the base of Q1 through field effect diode CR1 used as a constant current source. As the conduction of Q1 changes with any load changes, the base of Q2 similarly changes and the drive to the series regulator is increased or decreased raising or lowering +30 volt line.

Capacitor C1, connected between the base circuits of Q1 and Q2, is a feedback element used to slow down the response of the regulator. Capacitor C2, located between the base of Q3 and the ground sense line is used to filter out noise that may emanate from diodes CR2 and CR3. Breakdown diodes CR2 and CR3 are used to establish a stable voltage at the base of Q3 which is the temperature compensation portion of the differential amplifier. Capacitors C3 and C10, located between the +30 volt and ±GRD sense lines, is used to filter any transients that may appear on the +30 volt bus.

7.3.2 ±Reference Regulators

The reference regulators produce outputs of ±10.000 volts. These levels are derived from the ±15 volt analog power supplied by chopper-stabilized high-gain amplifiers. A stable, temperature compensated reference diode provides a constant voltage source to the regulating amplifier producing the -10.000 volt level if the computer is operated independently. If the computer is slaved to another Console, a relay in the reference circuit can be used to connect the +10.000 volt reference from the master computer as a stable source for the slaved computer reference supplies. This reference slaving feature assures that the reference potentials in all consoles are exactly the same, permitting analog signals to be trunked among consoles without error. Since the 580 Reference Systems are well stabilized, slaving of reference systems is not usually necessary.

7.3.2.1 *Block Diagram Analysis.* Refer to Figure 7.3, a simplified block diagram of the reference circuits, for the following description. The positive and the negative reference potentials are produced by similar circuits, each consisting of a chopper stabilized amplifier (S1-S2) and a differential input error amplifier (A1-A2).

The negative reference amplifier (A1) receives +15 volts as an input signal. The ratio of R1:R2 is such that the amplifier input is zero when the output voltage equals -10.000 volts. The stabilizer for the negative reference supply (S1) receives a precise reference potential as an input. This

level is provided by a special Zener diode network through R6a, R6b, and part of R7 to the stabilizer when the computer is operated independently. Adjustable resistor R6a is set as required by the characteristics of the reference diode. Resistor R8 provides feedback around both the main amplifier and the stabilizer, and R7 provides a fine adjustment of the output voltage. If two computers are slaved together, the relay contact at the input to the stabilizer moves to the opposite position, and the positive reference voltage from the master computer (through R3 and part of R4) serves as the precision reference source. Resistor R4 is adjusted (when the computer is slaved) so that the reference levels in master and slaved computers are equal.

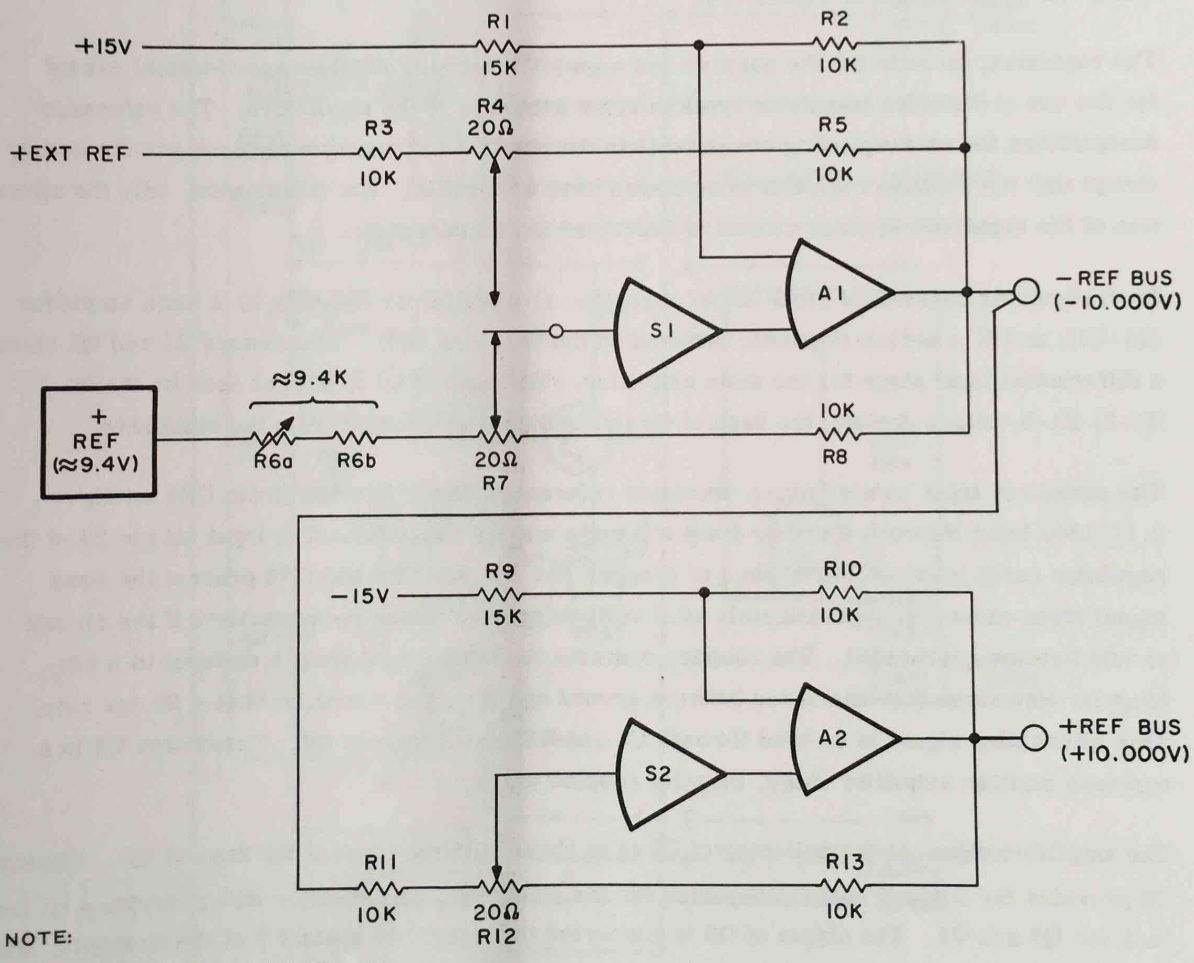


Figure 7.3. ±Reference Supplies, Simplified Block Diagram

The positive reference regulator functions in the same way, except that the stabilizer input is provided by the negative reference supply. Resistor R12 is set so that the absolute values of the positive and negative reference sources are equal. Therefore, should the negative reference level increase slightly, the positive reference level will increase by the same amount and the reference voltages will remain balanced.

7.3.2.2 *Simplified Schematic Analysis.* Refer to Figure 7.4, a simplified schematic of the positive and negative reference regulators. The stabilizer and error amplifiers are on the 0.43.0152 Regulator Card. The series regulator transistors (effectively the output stages of the error amplifiers), Q1 and Q2, are on the heat sink. The precision reference Zener and the input/feedback networks for the regulator are on the 0.12.1240 Input Network Card, shown at the left of Figure 7.4.

The regulating circuits for the positive and negative reference supplies are identical except for the use of different transistor types in some sections, of the regulators. The reference designations for corresponding components in the positive and negative sections are the same, except that the positive regulator components have a -1 suffix. For this reason, only the operation of the negative regulator circuit is described in this paragraph.

Each regulator consists of three major circuits: 1) a stabilizer (Q8-Q9); 2) a main amplifier (Q1-Q7); and 3) a series regulator mounted on the heat sink (Q5). Transistors Q1 and Q2 form a differential input stage for the main amplifier. The base of Q1 is held at zero by the R1-1, R1-2, R1-3 voltage divider; the base of Q2 is supplied with an input from the stabilizer.

The stabilizer input comes from a precision reference, either internal (from CR1 on the 0.12.1240 Input Network Card) or from a remote master computer. The input (at pin 22 of the regulator card) is connected to pin 1 of chopper D1. Diodes CR5 and CR6 prevent the input signal from exceeding approximately ±0.3 volt, to provide faster recovery time if the circuit should become overloaded. The chopper converts the input signal from a dc level to a rectangular waveform that alternates between ground and the input signal level at a 60 cps rate. This alternating signal is coupled through C5 and R15 to the base of Q8. Transistor Q8 is a common-emitter amplifier stage, directly coupled to Q9.

The amplifier signal at the collector of Q9 is in phase with the input at the base of Q8. Capacitor C6 provides the correct rolloff frequency for the stabilizer, and resistor R17 provides a dc feedback for Q8 and Q9. The output of Q9 is connected through C3 to contact 3 of the chopper. Contacts 3 and 2 of the chopper provide overall phase inversion of the signal. The alternating output signal is filtered by R14 and C4, providing an amplified dc level, opposite in polarity to the level at pin 22 of the card, to C5. The signal at this point is proportional to the regulator output deviation from -10.000 volts.

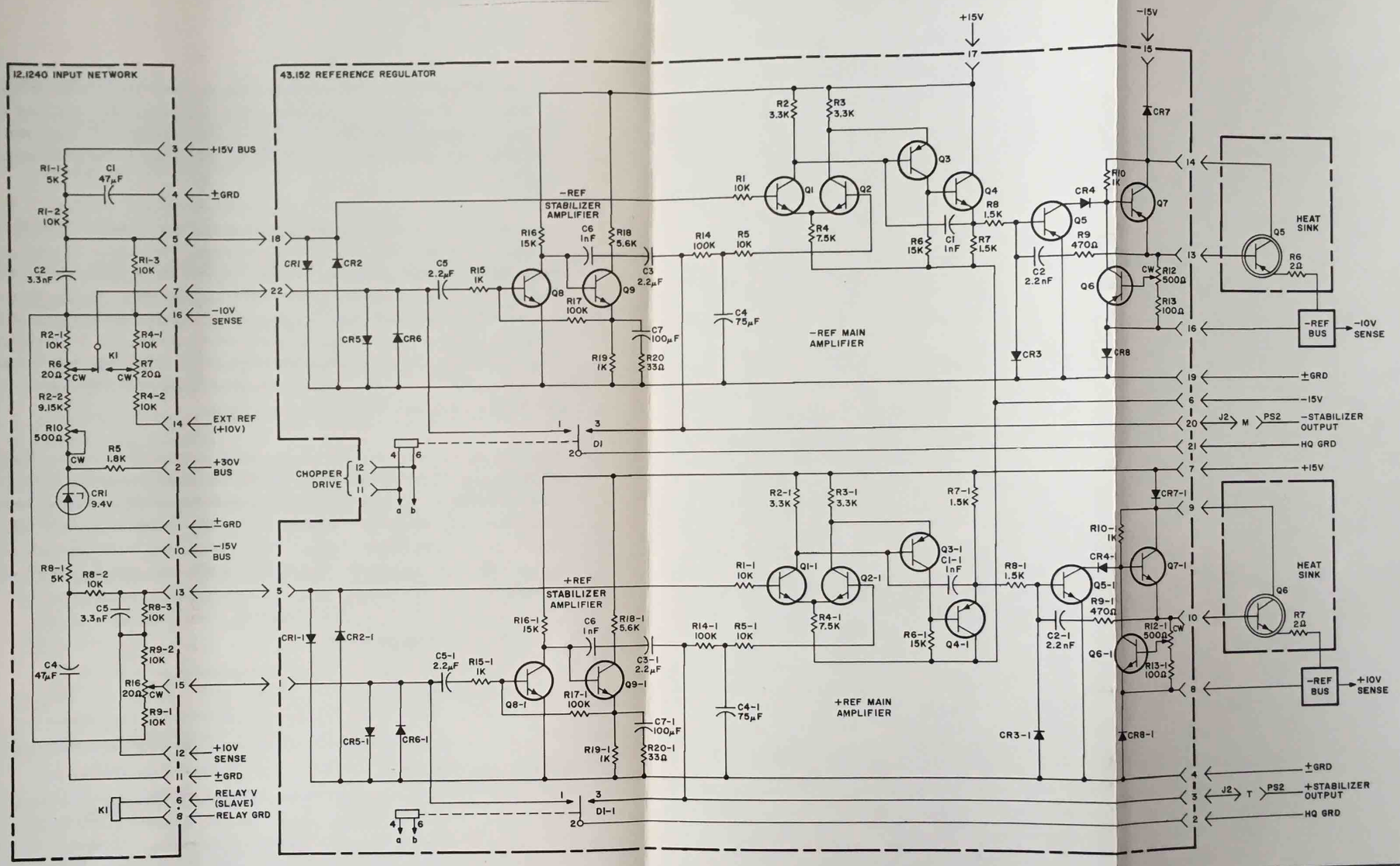


Figure 7.4.
±10 Volt Reference Regulator, Simplified Schematic

The signals at the collectors of Q1 and Q2 are connected to the base and emitter respectively of Q3. Transistor Q3 amplifies any differential signals appearing at Q1 and Q2, and the collector of Q3 provides a single-ended signal to the base of emitter-follower Q4. Capacitor C1 provides a high frequency feedback signal around Q3 and Q4, determining the rolloff characteristic for the Q1-Q4 stages.

The emitter of Q4 is connected through R8 to the base of Q5. Diode CR3 limits the positive level of the signal at the base of Q5 under overload conditions. The signal at the collector of Q5 is coupled through diode CR4 to the base of emitter-follower Q7. A feedback network consisting of R9 and C2 is connected from the emitter of Q7 to the base of Q5, providing the correct rolloff and phase shift characteristics for this section of the regulator. The emitter of Q7 is directly coupled to the base of series regulator transistor Q5 on the heat sink. The series regulator transistor, together with R6 on the heat sink, reduces the -15 volt input level (coupled through CR7) to a level of -10.000 volts. Diode CR7 protects the regulator components from damage if the -15 volt supply should go positive for some reason.

Transistor Q6 on the regulator card provides current limiting for the supply. The voltage drop from the base of the series regulator to the -REF bus appears across resistors R12 and R13. The wiper of R12 is adjusted so that Q6 conducts when the current drawn from the regulator exceeds a predetermined value. When Q6 conducts, the forward bias on Q7 is reduced and the series regulator forward bias is reduced. Diode CR8 prevents the voltage on the -REF bus from going positive during transient conditions or if the + and - reference buses are shorted together.

7.4 ADJUSTMENT PROCEDURES

7.4.1 Required Equipment

1. Digital voltmeter (DVM), accurately calibrated and having a resolution of 1 millivolt.
2. Equipment capable of measuring ±10.000 volts with a maximum absolute error of 500 microvolts or less. This may consist of a differential null voltmeter (such as the Fluke, Model 825 or the Keithley, Model 662); a precision ratio bridge, galvanometer, and standard cell; or a precision power supply and comparison circuit.
3. Ammeter, 0-5 amp, accurate within ±5%.

7.4.2 Adjustment Steps

1. Assure that primary ac power is within the specified limits, and that the line voltage selector switch is in the appropriate position. Apply power and allow the equipment to warm up for one half hour.

2. Connect the DVM between the ±30 volt bus and central ground (Figure 7.5). See Figure 7.6 for location of adjustment potentiometers.

3. Set the +30 volt level control for an output of +30.000 volts within ±10 millivolts.

4. Connect the DVM input to the +15 volt bus. Set the +15 volt level control for an output of +15.000 volts ±10 millivolts.

5. Connect the DVM to the -15 volt bus. Set the -15 volt level control for an output of -15.000 volts ±10 millivolts.

6. Connect the DVM to the +5 volt bus. Set the +5 volt level control for an output of +5.00 volts ±10 millivolts.

7. The adjustment procedure for the ±reference regulators depends on the equipment available. In no case should adjustment be attempted unless sufficiently accurate, carefully calibrated test equipment is available (see Paragraph 7.4.1, Step 2).

   If a differential null voltmeter is available, connect the instrument between the - reference bus (following the manufacturer's instructions) and central ground. Set the - reference coarse and fine level controls for an output of -10.000 volts ±1 millivolt.

   If a voltage divider-galvanometer-standard cell circuit is used, patch the circuit of Figure 7.7a. Set the voltage divider or ratio bridge controls as required by the standard cell potential, then adjust the - reference coarse and fine level controls until the galvanometer indicates a null.

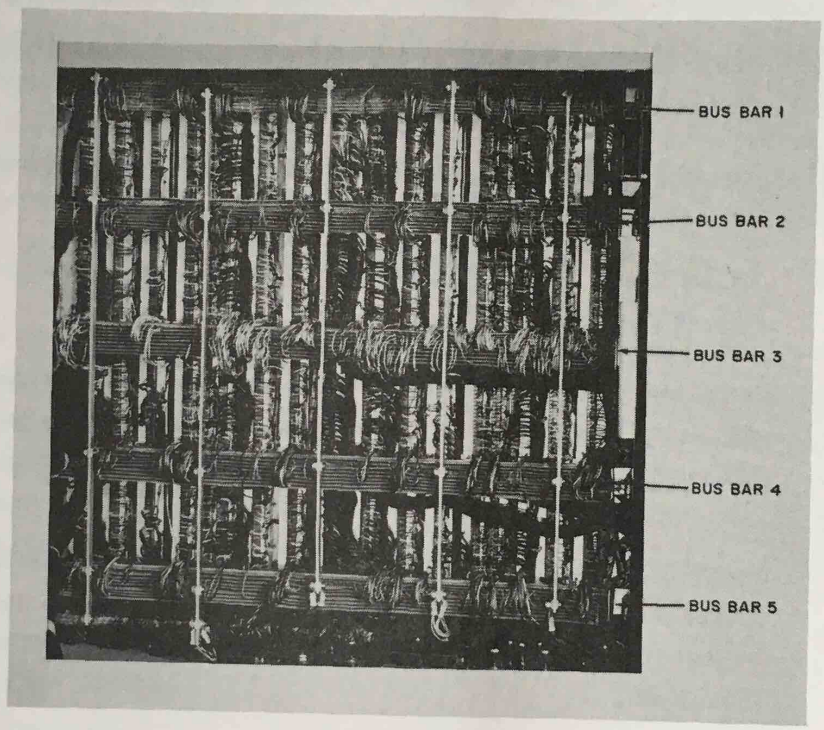
   If a precision power supply is used, patch the circuit of Figure 7.7b, and adjust the coarse and fine - reference level controls for an indicated output of zero volt.

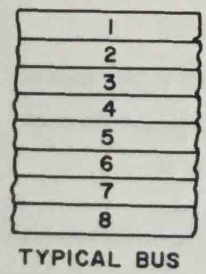
8. When the - reference level has been set, the + reference is balanced against this potential so that the absolute values of both reference potentials are equal. Patch the circuit of Figure 7.8 and adjust the + reference level control (the balance control) until the meter indicates an output of zero volt.

9. When the ±reference levels have been set, the current limiters can be adjusted. This step is normally necessary only if a series regulator or other components in the output stage is replaced.

   Connect the ammeter between the + reference bus and central ground. Rotate the + current limiter adjustment clockwise until the ammeter indicates 1.6 amps.

   Connect the ammeter between the - reference bus and central ground, observing meter polarity. Set the - current limiter adjustment until the ammeter indicates 1.6 amps.





TYPICAL BUS

BUS BAR VOLTAGES AND SIGNALS

	BUS BARS				
	1	2	3	4	5
1	HQ. GRD.	HQ. GRD.	+10V	HQ. GRD.	HQ. GRD.
2	−15V	−15V	−10V	−15V	−15V
3	+15V	+15V	−20V	+15V	+15V
4	+30V	+30V	+5V	+30V	+30V
5	±GRD	±GRD	DIG GRD	±GRD	±GRD
6	SP	SP	OP	SP	SP
7	6.3V AC	6.3V AC	IC	6.3V AC	6.3V AC
8	6.3V AC	6.3V AC	TS	6.3V AC	6.3V AC

Figure 7.5. Bus Bar Layout

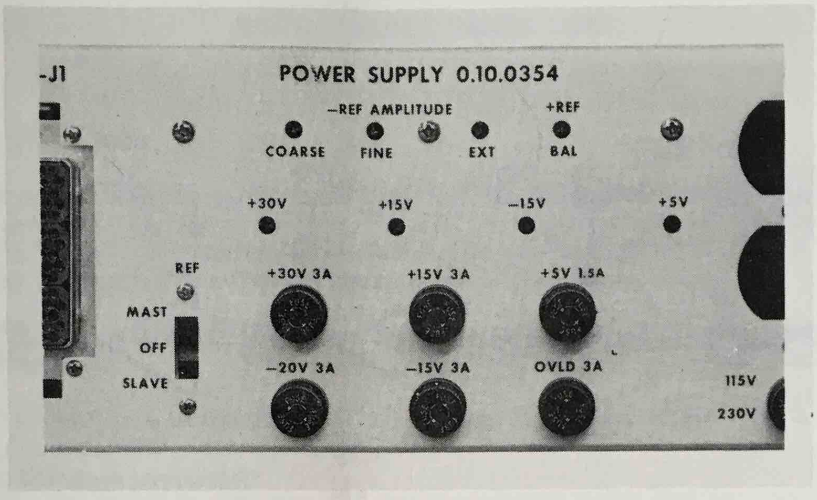
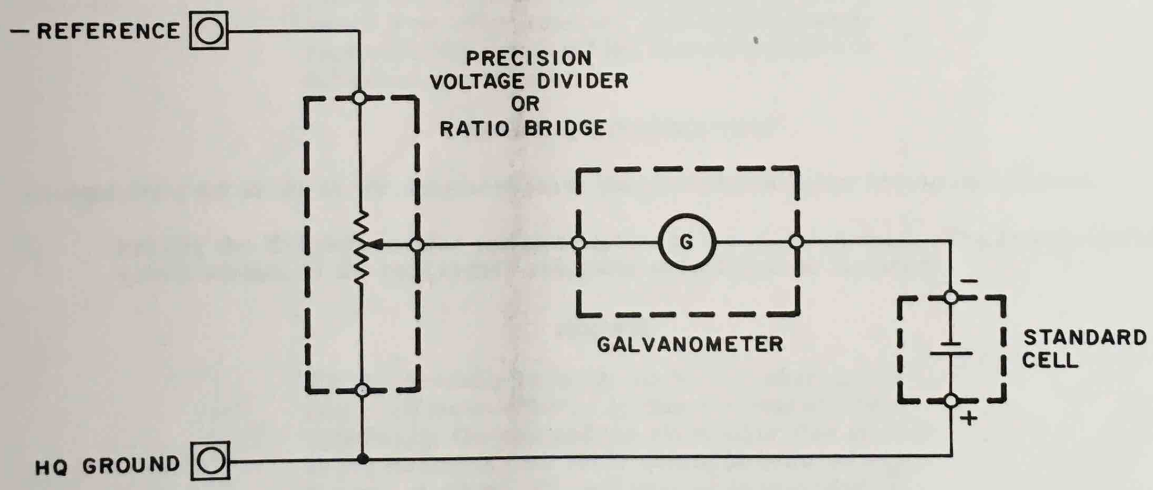
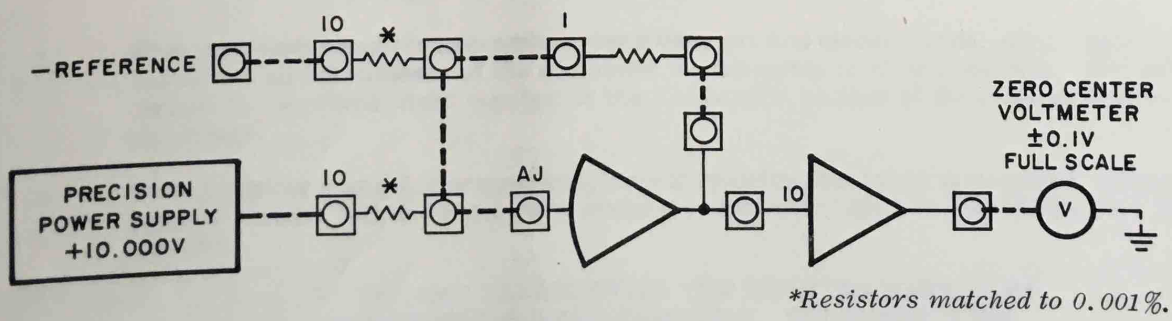


Figure 7.6. Adjustment Potentiometers Layout

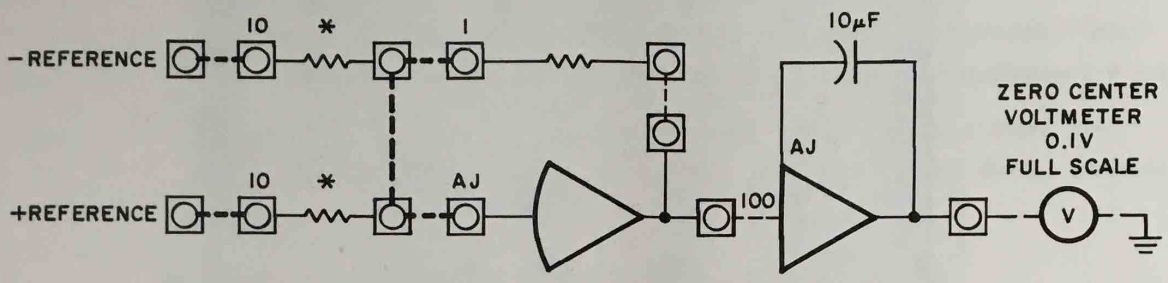


(a) Galvanometer Circuit



(b) Precision Power Supply Circuit

Figure 7.7. -Reference Adjustment Circuits



**Resistors matched to 0.001%.*

Figure 7.8. Reference Balance Adjustment Circuit

APPENDIX 1

REPLACEABLE PARTS LISTS

This appendix contains Replaceable Parts Lists for the equipment described in this chapter. In each case, a brief description of the part, the EAI part number and, where applicable, a reference symbol (schematic designation) is included. To enable a particular sheet to be readily located, an index precedes the individual replaceable parts lists.

The category column indicates the availability of each part so that a replacement can be obtained as quickly as possible.

Category "A" - The parts in category "A" are standard electronic items that are usually available from any commercial electronic supplier.

Category "B" - The parts in category "B" are proprietary items that are available only from EAI.

CAUTION

If proprietary items are replaced with items obtained from other sources, EAI cannot assume responsibility for a unit not operating within its published specifications.

ORDERING INFORMATION

To expedite your order for replacement parts the procedures below should be followed:

1. Specify the EAI part number and description of the part required. The model number and serial number of the next higher assembly should also be included.

NOTE

EAI is currently revising the part numbering system. All parts effected by this revision are identified using the new and the old number (the number in parenthesis). All parts should be ordered using the new number. The old number is provided to cross reference parts that may still be identified physically, or in other publications by that number.

2. When ordering complete assemblies (networks, printed circuit cards, etc.), specify the model and serial numbers of the equipment the assembly is to be used with. If possible, include the purchase order number or the EAI project number of the original equipment purchased.

3. When ordering expansion components, note if mounting hardware is required. If hardware is needed, add to the purchase order the statement "INCLUDING MOUNTING HARDWARE".

NOTE THAT EAI RESERVES THE RIGHT TO MAKE PART SUBSTITUTIONS WHEN REQUIRED. EAI GUARANTEES THAT THESE SUBSTITUTIONS ARE ELECTRICALLY AND PHYSICALLY COMPATIBLE WITH THE ORIGINAL COMPONENT.

PARTS LIST INDEX

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
1	AC1	Connector, Receptacle (Amphenol 160-S or equal)	00 542.1559-0	A
2	AC2,3	Connector, Receptacle, Outlet: 3 Wire; Female (Hubbell 5262 or equal)	00 542.0926-0	A
3	C1 thru 4	Capacitor, Fixed, Plastic: 47 nf ±10%, 200V (Sprague 192P47392 or equal)	00 521.0854-0	A
4	C5	Capacitor, Fixed, Film: 0.1 ±20%, 600V (Sprague 160P10406 or equal)	00 521.1675-0	A
5	CB1,2	Circuit Breaker: 3A, 125V (Sylvania MB317 or equal)	00 534.0064-0	A
6	CR1 thru 4	Rectifier (Motorola MR1032A or equal)	00 614.0255-0	A
7	F1,2	Fuse, Cartridge, Medium Acting: 8A, 250V (Littelfuse 314008 or equal)	00 570.0120-0	A
8	F3	Fuse, Cartridge, Fast Acting: 5A, 250V (Littelfuse 312005 or equal)	00 570.0090-0	A
9	F4,7	Fuse, Cartridge, Fast Acting: 1A, 250V (Littelfuse 312001 or equal)	00 570.0085-0	A
10	F5,6,8,9	Fuse, Cartridge, Fast Acting: 3A, 250V (Littelfuse 312003 or equal)	00 570.0088-0	A
11	K1	Relay: 115 VAC, 267 ohms Coil, 3 Form A, 15A Contact (Rowan Control FE-30 or equal)	00 618.0318-0	A
12	Q1,2,4,6	Transistor	00 686.0243-0	B
13	Q3	Transistor: 2N3791	00 686.0307-0	A
14	Q5	Transistor: 2N3789	00 686.0254-0	A
15	R1 thru 4	Resistor, Fixed, Composition: 330 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0331-0	A

*NOTE: THE CATEGORY COLUMN IS DESIGNED TO INDICATE AVAILABILITY OF PARTS.
A - INDICATES PARTS THAT SHOULD BE PURCHASED LOCALLY.
B - INDICATES PARTS THAT SHOULD BE PURCHASED FROM EAI.

UNIT TITLE

POWER SUPPLY

MODEL NO.

0.10.0354 Sh. 1 of 8 Sh.

DATE 4 / 26 / 68

5

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
16	R5	Resistor, Fixed, Wirewound: 1K ohms ±5%, 10W (Ward-Leonard 10S or equal)	00 636.0502-0	A
17	R6,7	Resistor, Fixed, Wirewound: 2 ohms ±5%, 10W (Ward-Leonard 10XM2 or equal)	00 636.0340-0	A
18	R8,9	Resistor, Fixed, Composition: 100 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0101-0	A
19	R10	Resistor, Fixed, Wirewound: 200 ohms ±5%, 3W (Ward-Leonard 3X200 or equal)	00 636.0275-0	A
20	R11	Resistor, Fixed, Composition: 47 ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0470-0	A
21	T1	Transformer	00 684.0259-0	B
22	S1	Switch, Slide: DPTT (Muter 5608 or equal)	00 664.0046-0	A
23	S2	Switch, Thermostat: SPST (Elmwood Sensors 3001-7 or equal)	00 662.0051-0	A
24		Connector Module: 22 Contacts; Female	00 542.1244-0	B
		0.12.1240 INPUT NETWORK CARD		
1	C1,4	Capacitor, Fixed, Electrolytic: 47 uf ±20%, 35V (Sprague 150D or equal)	00 517.1476-4 (00 516.0269-0)	A
2	C2,5	Capacitor, Fixed, Plastic: 3.3 nf ±10%, 200V (Sprague 192P33292 or equal)	00 521.0856-0	A
3	C3	Capacitor	00 516.0264-0	B
4	CR1	Diode: Zener (US Semcor SREA4-05 or equal)	00 614.0282-0	A
5	CR2	Diode	00 614.0034-0	B
6	K1	Relay	00 618.0206-0	B

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UNIT TITLE

POWER SUPPLY

MODEL NO.

0.10.0354 Sh. 2 of Sh.

DATE 4/ 26 / 68

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
7	R1-1,1-2, 1-3,R8-1, 8-2,8-3	Resistor, Precision (Matched Set)	00 640.0129-0	B
8	R2-1,2-2	Resistor, Precision (Matched Pair)	00 640.0131-0	B
9	R4-1,4-2, R9-1,9-2	Resistor, Precision (Matched Pair)	00 640.0130-0	B
10	R5	Resistor, Fixed, Wirewound: 1.8K ohms ±0.1%, 3W (Sprague 223E or equal)	00 636.0493-0	A
11	R6,7,16	Resistor, Variable, Film: 200 ohms ±20%, 0.75W (Bourns 3019P or equal)	00 642.0662-1	A
12	R10	Resistor, Variable, Film: 500 ohms ±10%, 1W (Helipot 55 or equal)	00 642.0615-0	A
13		Socket, Relay: 8 Contacts	00 650.0138-0	B
		0.12.1648 RECTIFIER FILTER NETWORK CARD		
1	C1 thru 8	Capacitor, Fixed, Electrolytic: 4600 uf +75% -10%, 50V (Sprague 36D462G050AD2B or equal)	00 516.0491-0	A
2	C14,16	Capacitor, Fixed, Electrolytic: 100 uf +75% -10%, 50V (Sprague 31D172 or equal)	00 516.0476-0	A
3	C15	Capacitor, Fixed, Electrolytic: 180 uf +50% -10%, 100V (Sprague 39D187F100HJ0 or equal)	00 516.0507-0	A
4	C17	Capacitor, Fixed, Electrolytic: 250 uf +75% -10%, 50V (Sprague 31D176 or equal)	00 516.0475-0	A
5	CR1 thru 14	Rectifier (Motorola MR1032A or equal)	00 614.0255-0	A
6	CR19 thru 22	Rectifier (Solitron Devices, Inc. CER-68 or equal)	00 614.0110-0	A
7	R1	Resistor, Fixed, Wirewound: 250 ohms ±5%, 5W (Ward-Leonard 5F250 or equal)	00 636.0224-0	A

*NOTE: THE CATEGORY COLUMN IS DESIGNED TO INDICATE AVAILABILITY OF PARTS.
A - INDICATES PARTS THAT SHOULD BE PURCHASED LOCALLY.
B - INDICATES PARTS THAT SHOULD BE PURCHASED FROM EAI.

UNIT TITLE: POWER SUPPLY

MODEL NO. 0.10.0354 Sh. 3 of Sh.

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
		0.43.0152 RECTIFIER REGULATOR CARD		
1	C1-(),6-()	Capacitor, Fixed, Plastic: 1 nf ±10%, 200V (Sprague 1N2P10292 or equal)	00 521.1266-0	A
2	C2-()	Capacitor, Fixed, Plastic: 22 nf ±10%, 200V (Gudeman 356 or equal)	00 521.0181-0	A
3	C3-(),5-()	Capacitor, Fixed, Ceramic: 2.2 uf ±20%, 25V (Sprague 5C15 or equal)	00 511.6225-4 (00 515.0240-0)	A
4	C4-()	Capacitor, Fixed, Electrolytic: 75 uf ±20%, 15V (Sprague 151D756X0015Z2 or equal)	00 516.0378-0	A
5	C7-()	Capacitor, Fixed, Electrolytic: 100 uf ±20%, 20V (Sprague 150D or equal)	00 517.1107-3 (00 516.0270-0)	A
6	CR1-() thru 6-()	Diode	00 614.0007-0	B
7	CR7-(),8-()	Diode: 1N3689A	00 614.0225-0	A
8	D1-()	Chopper	00 530.0055-0	B
9	Q1-(),2-()	Transistor	00 686.0255-0	B
10	Q3,3-1,4-1, 5,6,7	Transistor	00 686.0108-0	B
11	Q4,5-1	Transistor	00 686.0107-0	B
12	Q6-1,7-1	Transistor	00 686.0165-0	B
13	Q8-(),9-()	Transistor	00 686.0257-0	B
14	R1-(),5-()	Resistor, Fixed, Composition: 10K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0103-0	A
15	R2-(),3-()	Resistor, Fixed, Composition: 3.3K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0332-0	A
16	R4-()	Resistor, Fixed, Composition: 7.5K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0752-0	A

*NOTE: THE CATEGORY COLUMN IS DESIGNED TO INDICATE AVAILABILITY OF PARTS.
A - INDICATES PARTS THAT SHOULD BE PURCHASED LOCALLY.
B - INDICATES PARTS THAT SHOULD BE PURCHASED FROM EAI.

UNIT TITLE

POWER SUPPLY

MODEL NO.

0.10.0354 Sh.4 of Sh.

6

DATE 4 / 26 / 68

M446

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
17	R6-(),16-()	Resistor, Fixed, Composition: 15K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0153-0	A
18	R7-(),8-()	Resistor, Fixed, Composition: 1.5K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0152-0	A
19	R9-()	Resistor, Fixed, Composition: 470 ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0471-0	A
20	R10-()	Resistor, Fixed, Composition: 1K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0102-0	A
21	R11-()	Resistor, Fixed, Composition: 180 ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0181-0	A
22	R12-()	Resistor, Variable: 500 ohms ±5%, 1W (Int. Resistance Co. CT-100 or equal)	00 642.0610-0	A
23	R13-()	Resistor, Fixed, Composition: 100 ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0101-0	A
24	R14-(), 17-()	Resistor, Fixed, Composition: 100K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0104-0	A
25	R15-(), 19-()	Resistor, Fixed, Composition: 1K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0102-0	A
26	R18-()	Resistor, Fixed, Composition: 5.6K ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0562-0	A
27	R20-()	Resistor, Fixed, Composition: 33 ohms ±5%, 1/4W (Allen-Bradley CB or equal)	00 625.0330-0	A
28		Socket, Transistor: 3 Contacts (Augat 8069 or equal)	00 650.0121-0	A
29		Socket, Transistor: 3 Contacts	00 650.0162-0	B

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UNIT TITLE

POWER SUPPLY

MODEL NO.

0.10.0354 Sh. 5 of Sh.

DATE 4 / 26 / 68

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
		0.43.0184 -15V, +15V, +30V REGULATOR CARD		
1	C1,4,7	Capacitor, Fixed, Ceramic: 20 nf +60% -40%, 150V (Centralab DDM-203 or equal)	00 515.0180-0	A
2	C3,6,9	Capacitor, Fixed, Ceramic: (Centralab DDM-203 or equal)	00 511.1102-2	A
3	C2,5,8	Capacitor, Fixed, Electrolytic: 100 uf ±20%, 25V (Sprague 109D107X0025F2 or equal)	00 516.0208-0	A
4	CR1,4,7	Diode: 1N5313	00 614.0396-0	A
5	CR2,3	Diode: 1N941A	00 614.0276-0	A
6	CR5,6,8,9	Diode: 1N752A	00 614.0269-0	A
7	CR10,11,12	Diode: 1N4004	00 614.0209-0	A
8	Q1,4	Transistor	00 686.0380-0	B
9	Q2,3,5,6	Transistor	00 686.0376-0	B
10	Q7	Transistor	00 686.0381-0	B
11	Q8,9	Transistor	00 686.0377-0	B
12	R1,9,14	Resistor, Fixed, Film: 1.5K ohms ±1%, 1/4W (Pyrofilm PME-65-T2 or equal)	00 634.0747-2	A
13	R2	Resistor, Variable: 1K ohms ±10%, 1-1/2W (Helipot Type 55P or equal)	00 642.0629-0	A
14	R7,12	Resistor, Variable, Film: 500 ohms ±10%, 1W (Helipot Type 55P or equal)	00 642.0615-0	A
15	R3	Resistor, Fixed, Film: 600 ohms ±1%, 1/4W (Pyrofilm PME-65-T2 or equal)	00 634.0747-3	A
16	R4	Resistor, Fixed, Film: 2.5K ohms ±1%, 1/2W (Pyrofilm PME-65-T2 or equal)	00 634.0551-1	A

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UNIT TITLE
POWER SUPPLY

MODEL NO.
0.10.0354 Sh. 6 of Sh.

4 DATE 4 / 26 / 68

M446

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
17	R5	Resistor, Fixed, Composition: 2.2K ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0222-0	A
18	R6,11	Resistor, Fixed, Film: 500 ohms ±1% (Pyrofilm PME-65-T2 or equal)	00 634.0551-4	A
19	R8,13	Resistor, Fixed, Film: 240 ohms ±1% (Pyrofilm PME-65-T2 or equal)	00 634.0747-0	A
20	R10,15	Resistor, Fixed, Composition: 270 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0271-0	A
21	R16	Resistor, Fixed, Composition: 1K ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0102-0	A
22	R17,18	Resistor, Fixed, Composition: 470 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0470-0	A
		0.43.0185 +5V REGULATOR CARD		
1	C1	Capacitor, Fixed, Ceramic: 20 nf +60% -40%, 150V (Centralab DDM-203 or equal)	00 515.0180-0	A
2	C2	Capacitor, Fixed, Electrolytic: 100 uf ±20%, 25V (Sprague 109D107X0025F2 or equal)	00 516.0208-0	A
3	C3	Capacitor, Fixed, Ceramic: 0.001 uf ±5%, 200V (Erie 835 or equal)	00 511.1102-2	A
4	CR1	Diode: 1N5313	00 614.0396-0	A
5	CR2	Diode: 1N748A	00 614.0289-0	A
6	CR3	Diode: 1N4004	00 614.0209-0	A
7	Q1	Transistor	00 686.0380-0	B
8	Q2,3	Transistor	00 686.0376-0	B

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UNIT TITLE
POWER SUPPLY

MODEL NO.
0.10.0354 Sh. 7 of Sh.

4 DATE 4/26/68

ITEM	REF. DESIG.	DESCRIPTION	EAI NO.	*CAT.
9	R1	Resistor, Fixed, Composition: 680 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0681-0	A
10	R2	Resistor, Variable, Film: 500 ohms ±10%,1W (Helipot Type 55P or equal)	00 642.0615-0	A
11	R3	Resistor, Fixed, Composition: 270 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0271-0	A
12	R4	Resistor, Fixed, Composition: 390 ohms ±5%, 1/2W (Allen-Bradley EB or equal)	00 626.0391-0	A
13	R5	Resistor, Fixed, Composition: 120 ohms ±5%, 1/4W (Allen-Bradley EB or equal)	00 626.0121-0	A
14	R6	Resistor, Fixed, Composition: 560 ohms ±5%, 1/4W (Allen-Bradley EB or equal)	00 626.0561-0	A

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UNIT TITLE

POWER SUPPLY

MODEL NO.

0.10.0354 Sh. 8 of 8 Sh.

4 DATE 4 / 26 / 68

APPENDIX 2

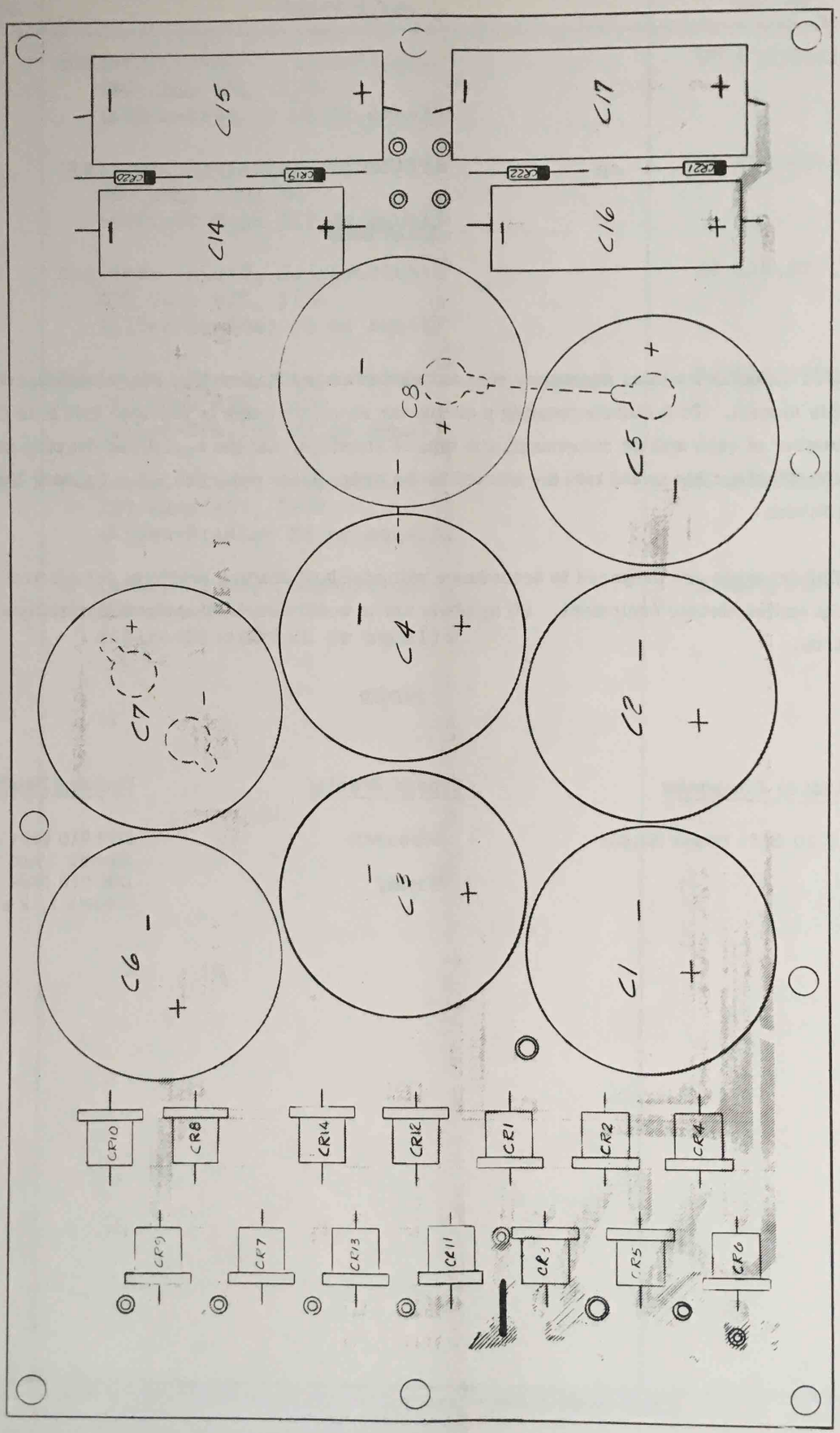
DRAWINGS

This appendix contains necessary schematics and wiring diagrams of equipment described in this manual. To facilitate locating a particular sheet, an index is provided that lists the model number of each unit or component, the type of drawings, and the associated drawing number. The drawings are bound into the manual in the order listed under the index Drawing Number column.

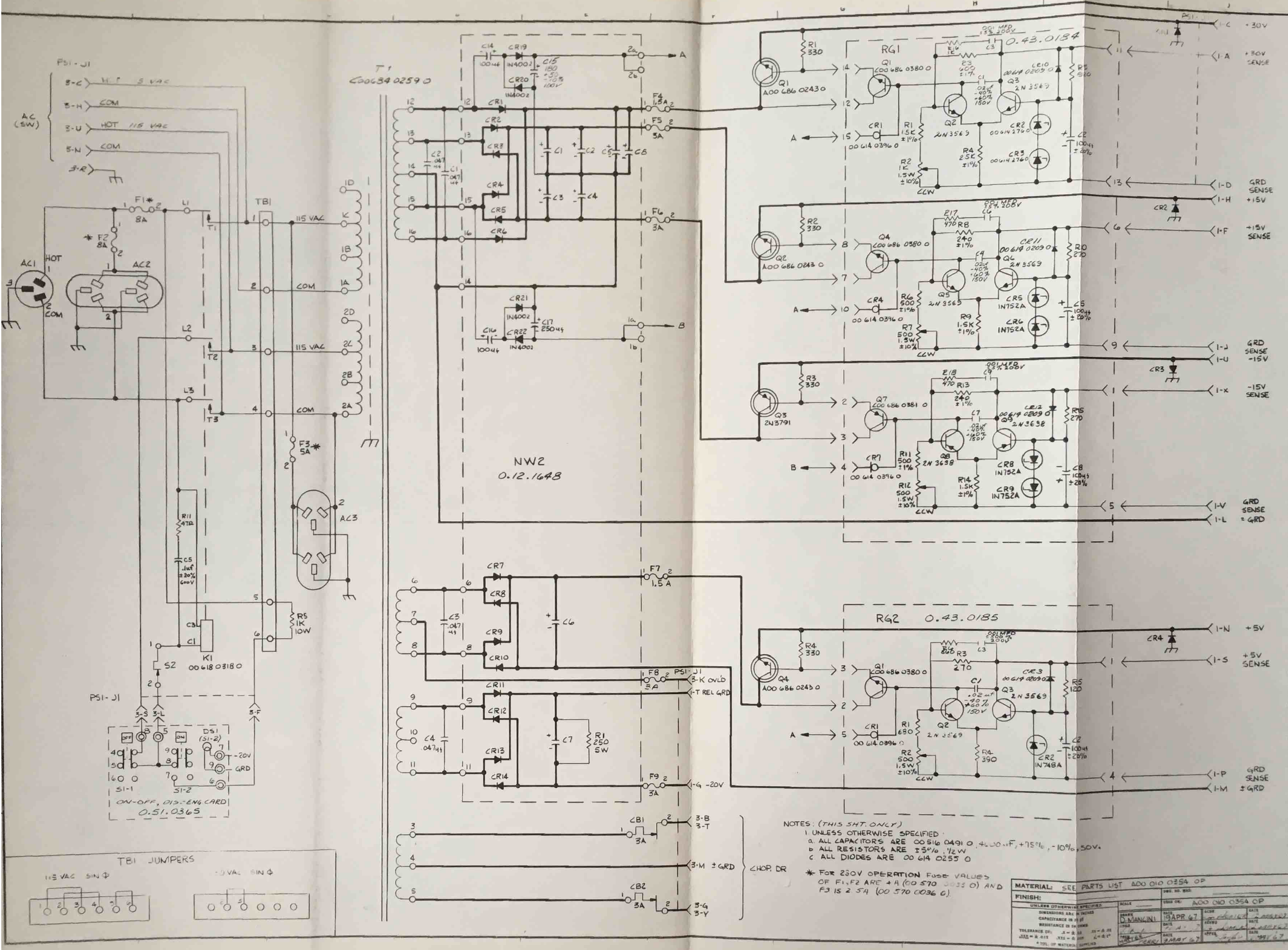
EAI drawings are prepared in accordance with standard drafting practices for electro-mechanical and electronic equipment. All symbols are in accordance with current government standards.

INDEX

Unit or Component	Type of Drawing	Drawing Number
0.10.0354 Power Supply	Schematic	D00 010 0354 0S (Sheets 1 and 2)
	Wiring	D00 010 0354 0W (Sheets 1, 2 and 3)



0.12.1648 Rectifier Filter NWK



NOTES: (THIS SHT. ONLY)
1. UNLESS OTHERWISE SPECIFIED:
a. ALL CAPACITORS ARE 00 516 0491 0, .4 µF, +75%, -10%, 50V.
b. ALL RESISTORS ARE ±5% ½W
c. ALL DIODES ARE 00 614 0255 0

* FOR 230V OPERATION FUSE VALUES OF F1, F2 ARE 4A (00 570 0033 0) AND F3 IS 2.5A (00 570 0036 0).

REV	DESCRIPTION
1	IN AREA E-1 ... WAS NOT SPEC... ADDED TO REDUCE RIPPLE ON +30V OUTPUT ... 67 ERN 11,340
2	... AREA A-5 ... RC NETWORK TO ... SPIKES. ... 67 ERN 11,467
	AREA A-5 ON AC2, TERMS 1 & 2 WERE REVERSED. AREA F-3 VALUE OF F-7 WAS 1 AMP. AREA H-6: VALUE OF R8 WAS 200Ω. AREA H-5: VALUE OF R13 WAS 200Ω. AREA H-3: VALUE OF R3 WAS 330Ω. AREA H-2: VALUE OF R1 WAS 510Ω. REASON: TO CORRECT DRAFTING ERRORS & TO BRING ADJUSTMENT RANGE CLOSER TO CENTER ON +15V -15V & +5V ADJUSTING POTS. 13 Nov. 67 ERN 11,373
3	Q2,3,5 & 6 WERE C00 686 0376 0. Q8 & 9 WERE C 686 0377 0 ON 0.43.0184; ON 0.43.0185 Q2 & 3 WERE C686 0376 0. REASON: TRANSISTORS WOULD NOT WITHSTAND THE SHORT CIRCUIT CONDITION. 28 Nov. 67 ERN 11529
4	IN AREA G-1 & NOTE ADDED EAI PART NO'S. IN AREAS E-5,7 CR19-22 WERE IN4004. REASON: ADDED INFO & CORRECTED JEDEC NO. 18 DEC 67 ERN 11,562
5	EXTENSIVE CHANGES MADE. REV 4 VOIDED COPY IN REPRO. REASON: TO IMPROVE THE -30V PERFORMANCE & TO IMPROVE THE POWER SUPPLY STABILITY. 27 FEB 68 ERN 11694
	AREA E-7 180, +50, -10% 100V WAS C15, 250 µF. REASON: C15 TOO LOW IN RATED VOLTAGE. 8 MARCH 68 ERN 11757

MATERIAL: SEE PARTS LIST A00 010 0354 0P

FINISH:

USED ON: A00 010 0354 0P

DRAWN: D. MANCINI — 19 APR 67

DATE: 9 MAY 67

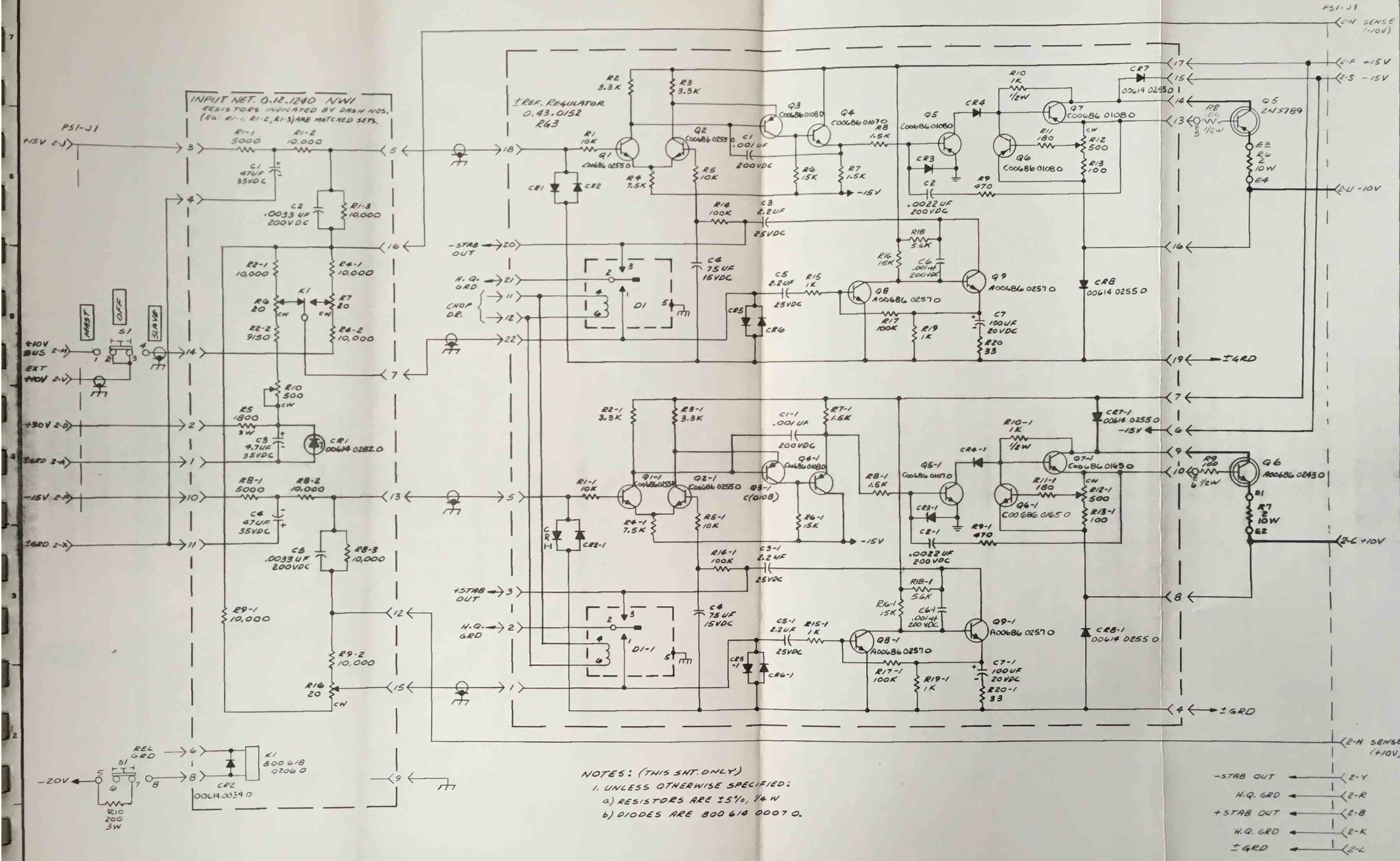
EAI

SCHEMATIC POWER SUPPLY (TR-Y)

PROJECT 105002

D00 010 0354 0S

SHEET 1 OF 2 SHEETS



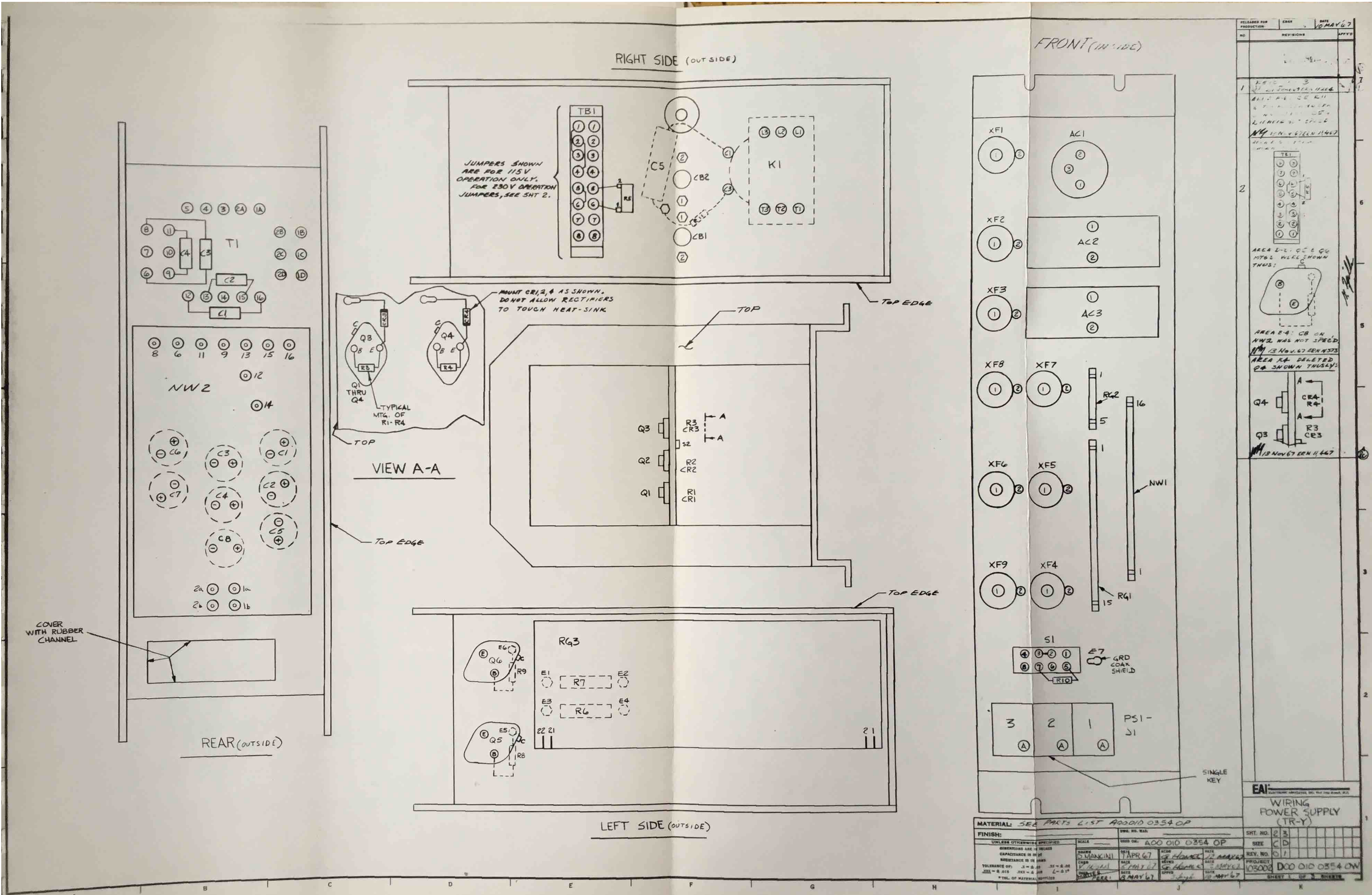
NOTES: (THIS SHT. ONLY)
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTORS ARE ±5%, 1/4 W
b) DIODES ARE 800 614 0007 0.

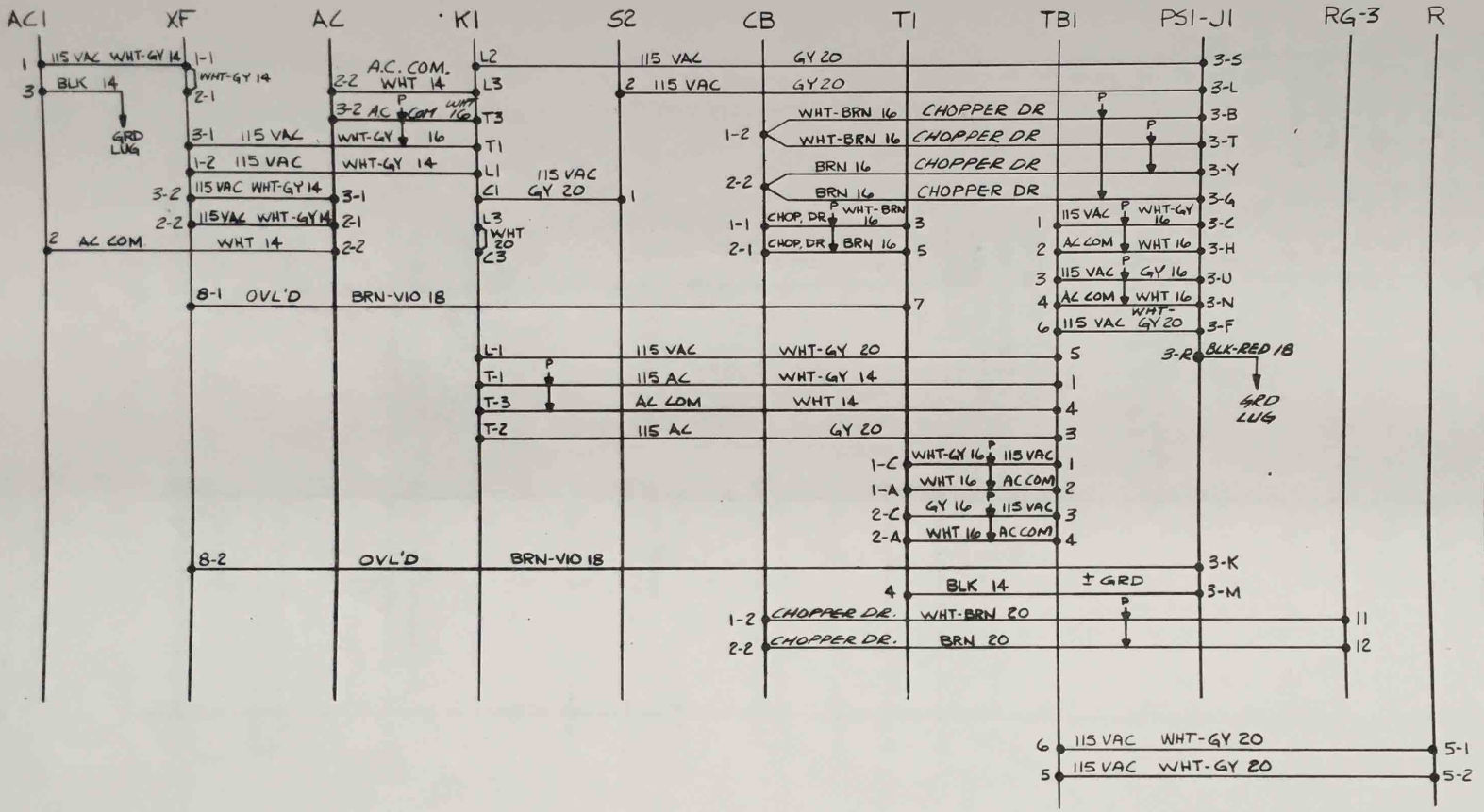
MATERIAL:
FINISH:
UNLESS OTHERWISE SPECIFIED

EAI ELECTRONIC ASSOCIATES, INC.

(± REFERENCE)

PROJECT 103002
D00 010 0354 05
SHEET 2


RIGHT SIDE (OUT SIDE)
FRONT (INSIDE)
REAR (OUTSIDE)
LEFT SIDE (OUTSIDE)
VIEW A-A
TB1
JUMPERS SHOWN ARE FOR 115V OPERATION ONLY. FOR 230V OPERATION JUMPERS, SEE SHT 2.
C5
CB2
CB1
K1
T1
NW2
MOUNT CR1,2,4 AS SHOWN. DO NOT ALLOW RECTIFIERS TO TOUCH HEAT-SINK
Q1 THRU Q4
TYPICAL MTG. OF R1-R4
TOP
TOP EDGE
COVER WITH RUBBER CHANNEL
RG3
RG1
RG2
NW1
XF1
XF2
XF3
XF4
XF5
XF6
XF7
XF8
XF9
AC1
AC2
AC3
S1
E7 GRD COAX SHIELD
PS1-J1
SINGLE KEY
MATERIAL: SEE PARTS LIST A00 010 0354 OP
FINISH:
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITANCE IS IN pf
RESISTANCE IS IN OHMS
USED ON: A00 010 0354 OP
DRAWN D MANCINI
DATE 7 APR 67
CHKD
DATE 8 MAY 67
DATE 8 MAY 67
EAI ELECTRONIC ASSOCIATES, INC.
WIRING
POWER SUPPLY
(TR-Y)
SHT. NO. 2 3
SIZE C D
REV. NO. 0 1
PROJECT 103006
D00 010 0354 OW
SHEET 1 OF 3 SHEETS



NOTE :
THE FOLLOWING JUMPERS TO BE ADDED TO TB1:

FOR 115 VAC SINGLE Φ OPERATION :

1 TO 3	WHT-GY 14
2 TO 4	GY 14
5 TO 6	STRAP

FOR 230 VAC. SINGLE Φ OPERATION :

2 TO 3	WHT-GY 14

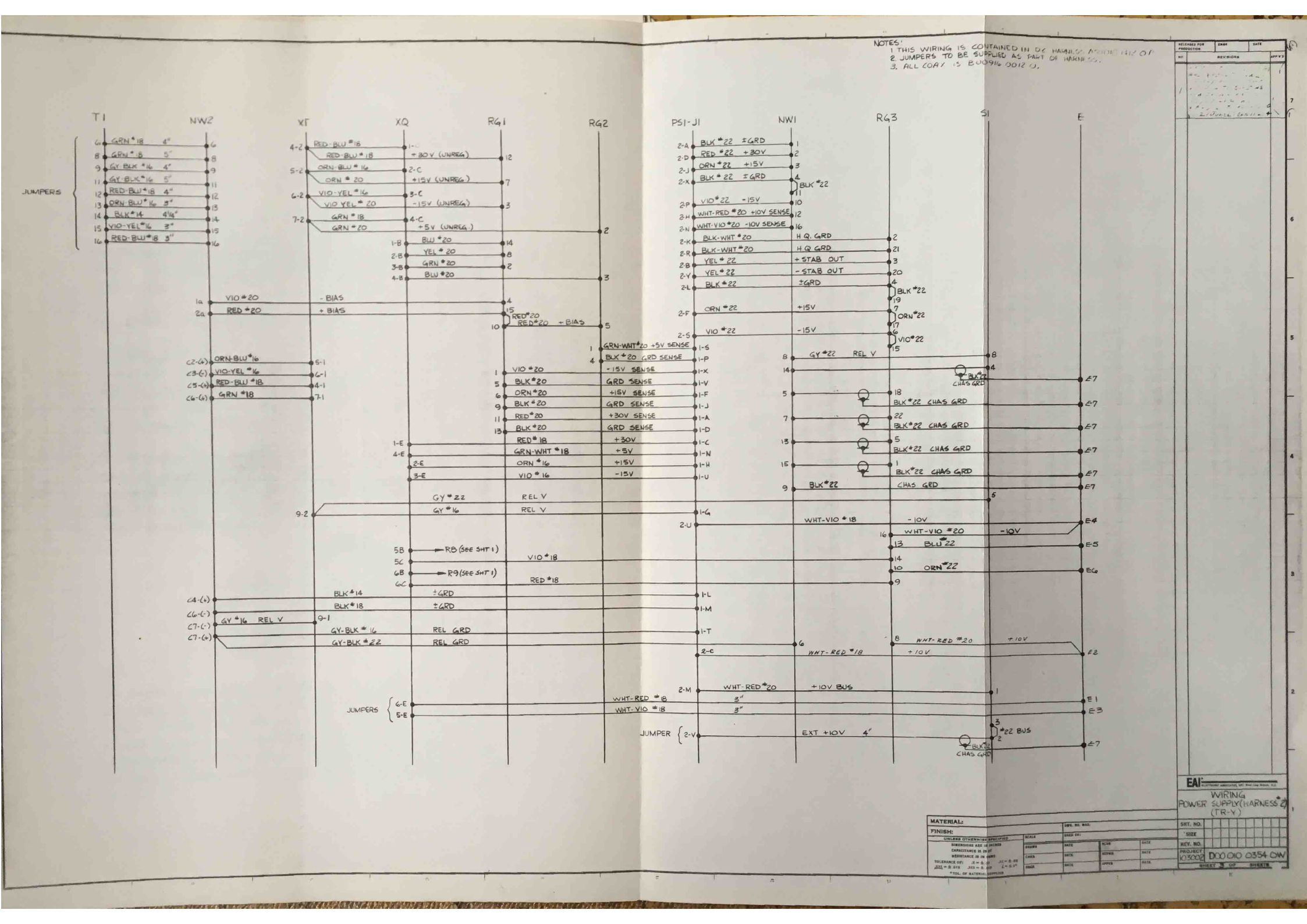
THIS WIRING IS CONTAINED IN A.C. HARNESS A00018 1411 OP.

MATERIAL:
FINISH:
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITANCE IS IN Ø
RESISTANCE IS IN OHMS
TOLERANCE OF: .X ± .03 .XX ± .02 .XXX ± .015 .XXX ± .005 ∠ ± 1°
* TOL. OF MATERIAL SUPPLIED
SCALE
DRAWN
CHKD
DSGR
DWG. NO. WAS:
USED ON:
DATE
NEXT ASSY
REVWD
APPVD

EAI

WIRING
POWER SUPPLY (HARNESS *)
(TR-Y)

SHT. NO.
SIZE
REV. NO.
PROJECT 103002
C00 010 0354 OW
SHEET 2 OF SHEETS


NOTES:
1. THIS WIRING IS CONTAINED IN DX HARNESS ASSEMBLY
2. JUMPERS TO BE SUPPLIED AS PART OF HARNESS.
3. ALL COAX IS B00916 0012 0.
T1
NW2
XT
XQ
RG1
RG2
PS1-J1
NW1
RG3
S1
E
JUMPERS
GRN *18 4"
GRN *18 5"
GY BLK *16 4"
GY BLK *16 5"
RED-BLU *18 4"
ORN-BLU *16 3"
BLK *14 4 1/4"
VIO-YEL *16 3"
RED-BLU *18 3"
RED-BLU *18
+30 V (UNREG)
ORN-BLU *16
ORN *20
+15V (UNREG)
VIO-YEL *16
VIO YEL *20
-15V (UNREG)
GRN *18
GRN *20
+5V (UNREG.)
BLU *20
YEL *20
GRN *20
BLU *20
VIO *20
- BIAS
RED *20
+ BIAS
RED *20
RED *20 + BIAS
GRN-WHT *20 +5V SENSE
BLK *20 GRD SENSE
VIO *20
- 15V SENSE
BLK *20
GRD SENSE
ORN *20
+15V SENSE
BLK *20
GRD SENSE
RED *20
+30V SENSE
BLK *20
GRD SENSE
RED *18
+30V
GRN-WHT *18
+5V
ORN *16
+15V
VIO *16
-15V
GY *22
REL V
GY *16
REL V
RB (SEE SHT 1)
R9 (SEE SHT 1)
VIO *18
RED *18
BLK *14
±GRD
BLK *18
±GRD
GY *16 REL V
GY-BLK *16
REL GRD
GY-BLK *22
REL GRD
WHT-RED *18
WHT-VIO *18
BLK *22 ±GRD
RED *22 +30V
ORN *22 +15V
BLK *22 ±GRD
VIO *22 -15V
WHT-RED *20 +10V SENSE
WHT-VIO *20 -10V SENSE
BLK-WHT *20
H.Q. GRD
BLK-WHT *20
H.Q. GRD
YEL *22
+STAB OUT
YEL *22
-STAB OUT
BLK *22
±GRD
ORN *22
+15V
VIO *22
-15V
GY *22 REL V
BLK *22 CHAS GRD
WHT-VIO *18
-10V
WHT-VIO *20
-10V
BLU *22
ORN *22
WHT-RED *20
+10V
WHT-RED *18
+10V
WHT-RED *20
+10V BUS
3"
WHT-VIO *18
3"
EXT +10V 4"
*22 BUS
WIRING
POWER SUPPLY (HARNESS *2)
(TR-Y)
D00 010 0354 OW
MATERIAL:
FINISH: