

103K-VT
S/N 3018

K SERIES

AC POWER SOURCE

OPERATIONS AND SERVICE MANUAL

PACIFIC

POWER SOURCE CORP.

"K" SERIES AC POWER SOURCES

OPERATIONS AND SERVICE MANUAL

PACIFIC PART NO. 108050

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1 NOV 1978

FIRST EDITION

K SERIES

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1.0 GENERAL DESCRIPTION

1.1 The "K" Series Manual Outline

1.1.1 Output Configurations

"K" Series units can be configured as single-phase, three-phase, WYE, or three-phase DELTA outputs. In all cases, the outputs and neutral are floating, and any terminal may be grounded to chassis. It is recommended that neutral be tied to chassis, either at the output of the source or at the load.

All configurations are comprised of 250 VA Power Amplifiers driven at the proper phase angles for 1 \emptyset , 3 \emptyset WYE or 3 \emptyset Δ output. In 1 \emptyset operation, all amplifiers are in parallel, whereas amplifiers are driven 60 $^{\circ}$ out of phase for DELTA output and 120 $^{\circ}$ out of phase for WYE output. The DELTA configuration is known as "Virtual Delta", in which two amplifiers are 60 $^{\circ}$ out of phase and the third "virtual" leg appears between them. In all configurations, higher power levels are reached by adding power amplifiers in parallel.

All outputs are normally 0-125 VAC and designated by a "R" suffix to the model number. All models are available with autoformer output and are designated by a "T" suffix. In addition, models are available in which the outputs of pairs of amplifiers are in series; this yields a 0-250 VAC output without an output autoformer, and these models are designated by "S" suffixes. The various "K" series output configurations are illustrated in Figure 1.1.1A.

1.1.2 Power Output Capacity

The "K" Series is configured from 250 VA Power Amplifiers; therefore, the output capacity of each unit will be in increments of 250 VA/phase or output terminal. Cases "A" (5" rack-mount chassis) will hold up to three amplifiers, and Cases "B" (10" rack-mount chassis) will hold up to six power amplifiers. Three-phase DELTA units are slightly less efficient because of the virtual delta method of generating power.

1.2 Electrical Performance, All "K" Models

Output characteristics are as described below under the power amplifiers. Control characteristics are determined by the plug-in oscillator selected; see the section of the manual covering the oscillator plug-in installed in your unit.

1.2.1 "K" Series Power Amplifiers

All "K" series machines use identical output stages, except for power level. The power amplifier section is a wide band, direct coupled output, linear amplifier. The amplifier is designed to operate from a 5 vrms signal from the signal generator module.

Input Power: 105-125 VAC, 1 \emptyset , 47-63 Hz. May be reconnected for any of the following inputs; 210-250 VAC, 95-115 VAC, 190-230 VAC.

Output Voltage: See model listings.

-R models produce output vectors of 0-125 VAC 1 \emptyset , or 0-125 VAC L-N if 3 \emptyset WYE, or 0-125 VAC L-L if 3 \emptyset DELTA.

-S models produce a balanced output (2 vectors 180 $^{\circ}$ apart) of 125-0-125 VAC, plus a 250 VAC output.

-T models produce a 0-125 VAC vector, plus 0-250 VAC through an output autoformer. Both outputs may be loaded simultaneously. Other autoformer tap voltages as specified by user. T model frequency range limited to 45-500 Hz.

The specifications below describe overall output characteristics, when driven by any of the oscillator modules listed on the opposite page.

Line Regulation: 0.1% max.

Load Regulation: 0.25% max. at amplifier output terminals. (May be higher at transformer tap points.)

Distortion: 0.25% amplifier only. 0.5% max. combined distortion of signal generator and amplifier.

Load Power Factor: Any (See derating curve below)

Peak Overcurrent: Approximately three times rms current available at crest of output sine wave.

Bandwidth: 20-2000 Hz full power
5-20,000 Hz small signal

Transient Response: 30 microseconds.

Output Control: Panel switch for On-Off control.

1.2.1 "K" Series Power Amplifiers Continued

Output Protection: Protected against overloads and shorts with automatic recovery.

Output Reference: Floating. Any output terminal may be tied to chassis.

Efficiency: 65% at maximum undistorted output voltage.

Temperature Range: 0-55 °C operating.

1.3 Outline and Mounting - Case Size A

The Case A is a 5½" rack mount chassis with front air intake and rear air exhaust; all controls are on the front panel and input power cord and output terminal strip are on the rear panel.

This chassis may be operated on the bench or in a standard 19" rack cabinet. When mounted in a 19" rack cabinet, it MUST be mounted with slides. They may be of the inexpensive extruded angle type, similar to that depicted by the drawing in this section, or of the mil-spec roller-bearing type whose part number is called out on the outline and mounting drawing.

Reasonable clearance must be provided near input and output vents for free air-flow.

1.4 Outline and Mounting - Case Size B

The Case B is a 10½" rack-mount chassis with front air intake and rear air exhaust; all controls are on the front panel and input power cord and output terminal strip are on the rear panel.

This chassis may be operated on the bench or in a standard 19" rack cabinet. When mounted in a 19" rack cabinet, it must be mounted with slides. They may be of the inexpensive extruded angle type, similar to that depicted by the drawing in this section, or of the mil-spec roller-bearing type whose part number is called out on the outline and mounting drawing.

Reasonable clearance must be provided near input and output vents for free air-flow.

1.5 Outline and Mounting - Multi-Case Systems

"K" series models above 1500 VA are comprised of multiple boxes; they may be multiple 5" or 10" chassis. It is perfectly acceptable to operate these units stacked on top of each other on the bench, although most users may prefer installation in rack-mount cabinets. Refer to the section on the particular case size for instructions on rack mounting.

In multiple case systems, both the input and output connections must be bussed. Input power from all cases may be bussed together and controlled by a common wall breaker or may be divided over a three-phase line to reduce the current requirement. The bussing of the outputs should be done with the cables provided with the system according to the instructions in section six of this manual.

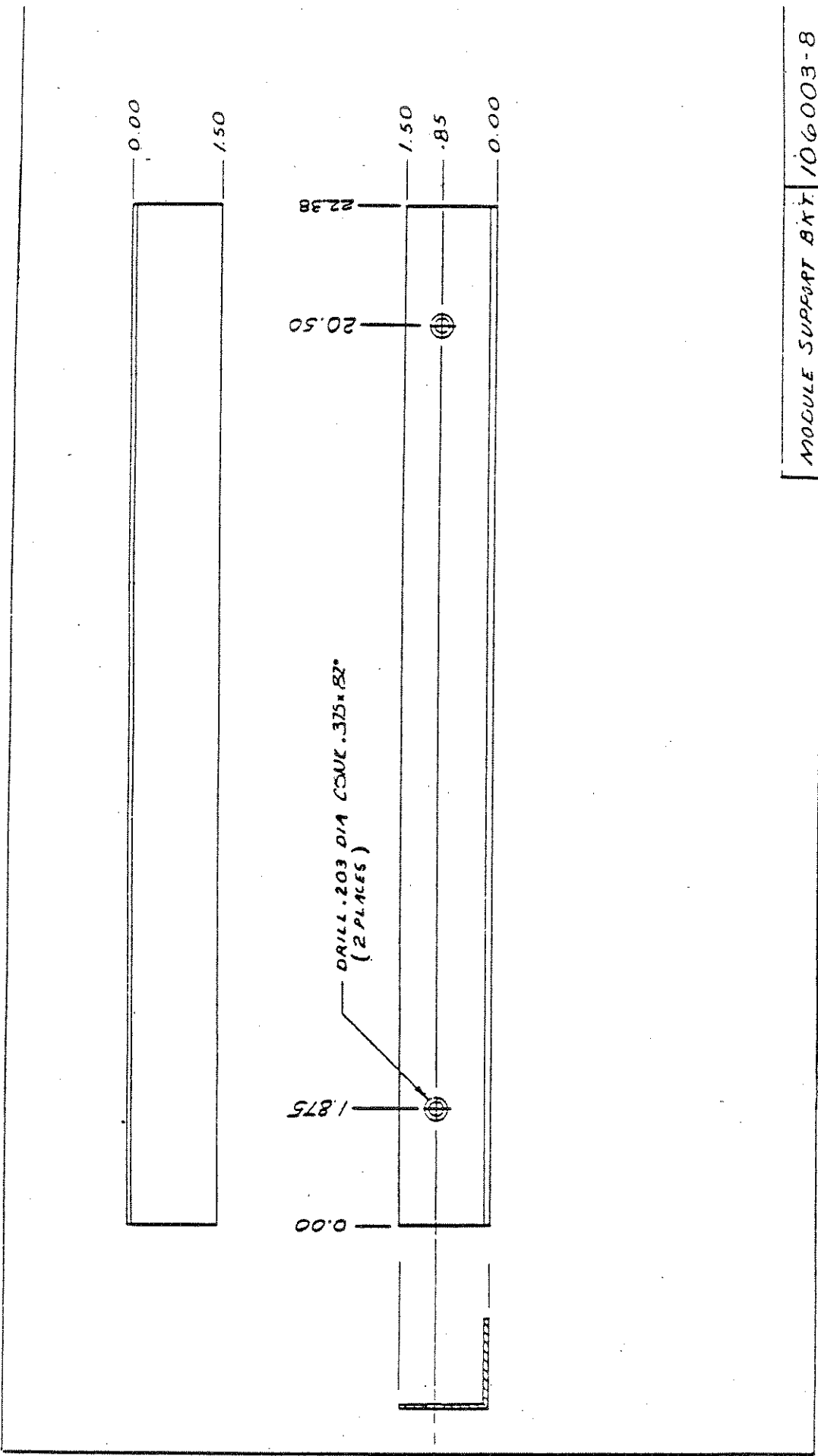
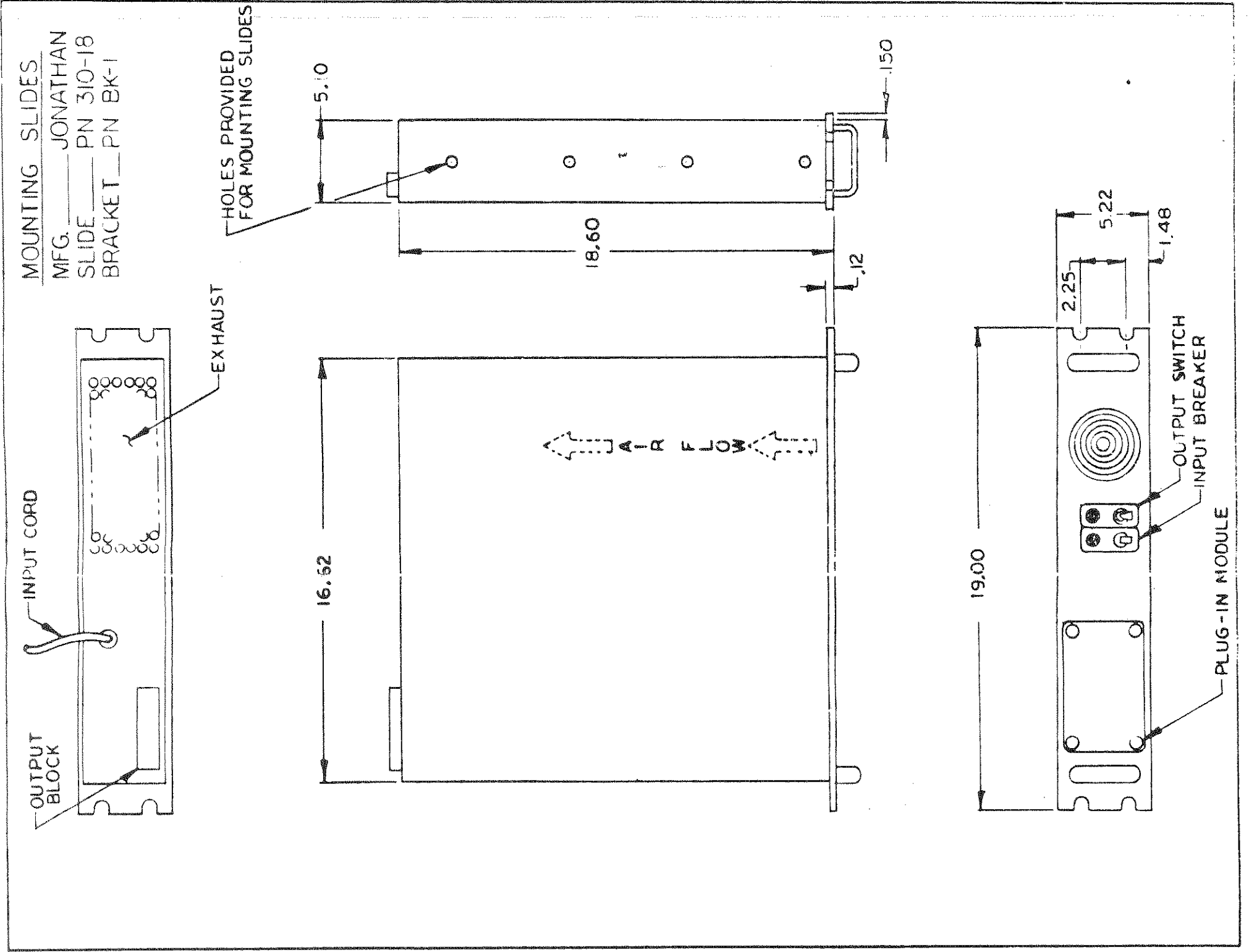
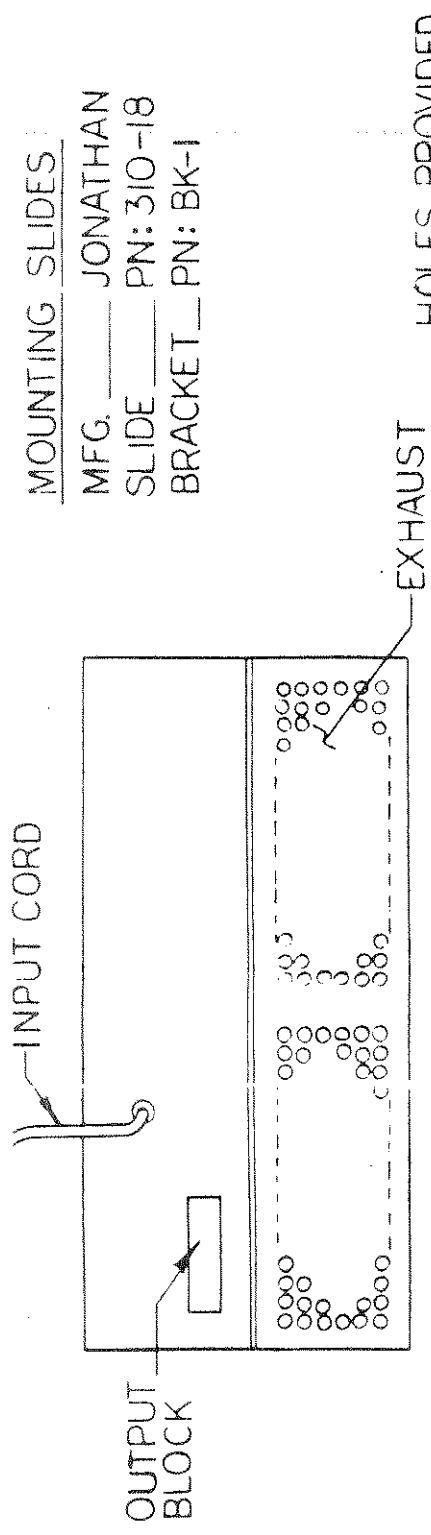


FIGURE 1.3A
 OUTLINE AND MOUNTING - CASE SIZE A





MOUNTING SLIDES
 MFG. _____ JONATHAN
 SLIDE _____ PN: 310-18
 BRACKET _____ PN: BK-1

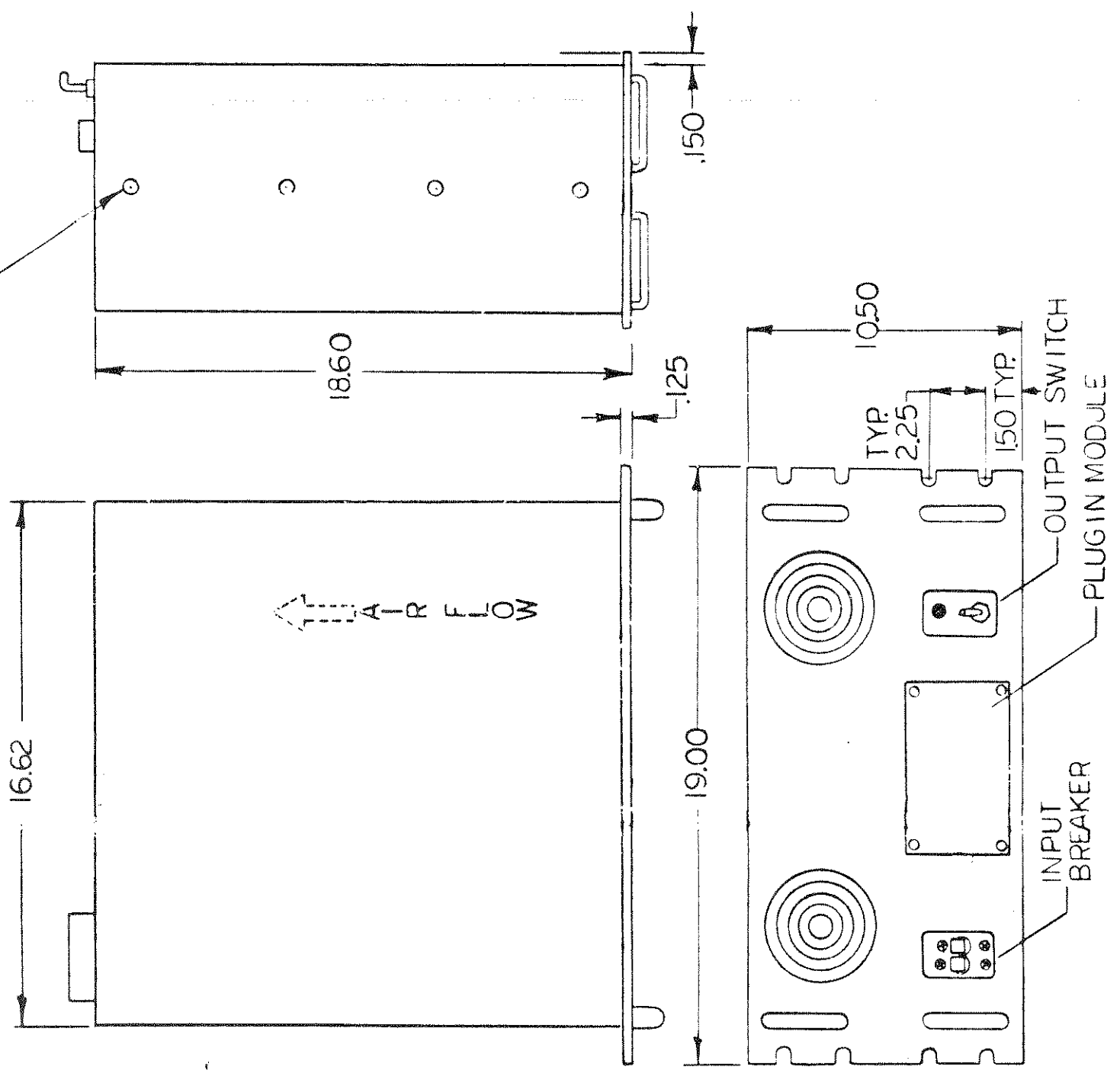


FIGURE 1.4A
 OUTLINE AND MOUNTING - CASE SIZE B

2.0 OPERATION

2.1 Hazard Warning

As with any power source equipment, these units operate from input voltages, and form output voltages, which are potentially lethal. When installing this equipment:

- (a) Examine the case for evidence of shipping damage. Do not apply power if evidence of damage or mis-handling is present.
- (b) Read the input power service label on the rear panel; make sure it agrees with the service to which it will be connected. If the label is missing, or its wording ambiguous, call your service representative or factory technical personnel before proceeding further.
- (c) In the course of installation or use of this equipment, DO NOT remove top, bottom or rear covers. This would expose internal heat sinks which operate at dangerous potentials. These covers are to be removed by qualified technical personnel only.
- (d) Read Section 2.0 of this manual.

2.2 Input Power Connections

The input voltage requirements will be clearly marked on the rear panel. Smaller 115V input units will be supplied with a 3-wire molded power plug for use in 15 amp receptacles; for safety reasons, the ground pin must not be removed or the unit operated with an isolation plug.

Other units will be provided with the proper input power cord with conventional color coding: black - hot, white - neutral, green - chassis. The cord should be connected to the appropriate connector or power main.

2.2.1 Input Service Recommendations

Several factors must be considered when determining input service capacity for "K" series units.

Actual current drawn by the unit is determined by the efficiency of the unit (65% at maximum undistorted output). Since units are not operated at maximum output in normal usage, and because of a small power allocation which must be made for the plug-in signal generator and LED display, actual conversion efficiency is somewhat lower. A good rule of thumb is that input current is twice unit output current when operating from 110 volt

2.2.1 Input Service Recommendations Continued

service; and equal to output current when operating from 220 volt service.

Maximum input power is a quantity determined by the case size of the unit, shown on the input power label on the rear panel. Since some K series units are field convertible to higher power levels by addition of power modules, and since power can vary by altering the input transformer tap, the maximum input power number is always larger than actual current and represents the highest input power which can be drawn by the case.

The recommended service capacity takes all the foregoing factors into account. Additionally, it considers a slight turn-on surge due to the single phase capacitor-input power supplies.

The user will obtain best overall performance by providing the input service tabulated below:

SERVICE REQUIRED TABLE

<u>Rated Output</u>	<u>115V Input</u>	<u>230 V Input</u>
250 VA	15 Amps	15 Amps
500 VA	15 Amps	15 Amps
750 VA	15 Amps	15 Amps
1000 VA	30 Amps	15 Amps
1500 VA	30 Amps	15 Amps
2000 VA	60 Amps	30 Amps
3000 VA	90 Amps	45 Amps

Because of the large currents involved in multiple cabinet systems, it is advantageous to use a three-phase line and spread the loads evenly among the three phases. If the three-phase house power is a five-wire 120/208V WYE, each unit can be operated phase - to - neutral with 115V input. If the house power is 230V 3Ø DELTA each unit can be operated phase-to-phase with 230 V input. See diagram below:

2.3 Input Power Conversions - Case A

2.3.1 115/230V Changeover

To change the input power form from 115 to 230V or back, it is necessary to change the primary tap selection on the input power transformer as described below; these taps are accessible by removing the top cover.

From 115V to 230V Remove jumpers from T1-1 to T1-3 Add jumper from T1-2 to T1-4 T1-2 to T1-3

From 230V to 115V Remove jumper from T1-2 to T1-3 Add jumper from T1-2 to T1-4

In addition, the input power plug and input power label will have to be changed. The power cord and circuit breaker are sized for the worst case 115V condition and need not be changed. See section 3.5 for schematic diagram of the transformer.

2.3.2 Low Line Operation

Taps are provided on the input power transformer for operation on low input lines (95-105V or 190-210V). To use the low line feature, move taps from T1-6 to T1-5 and T1-10 to T1-11. CAUTION: DO NOT USE THIS FEATURE ON NORMAL INPUT VOLTAGE OR DAMAGE MAY RESULT TO THE UNIT. Move taps back to T1-6 and T1-10 before using on normal input voltages.

2.4 Input Power Conversions - Case B

2.4.1 115/230V Changeover

To change the input power form from 115 to 230V or back, it is necessary to change the primary tap selection on both input power transformers as described below. These taps are accessible by removing the top and bottom covers and the right power amps when viewed from the rear; to remove these power amps, remove the rear screens and slide them out the back of the unit. It is also necessary to add a jumper on the circuit breaker for 115V operation.

From 115V to 230V Remove jumpers from T1-1 to T1-3 Add jumpers from T1-2 to T1-4 T1-2 to T1-3
CBI-A2 to CBI-B2

From 230V to 115V Remove jumpers from T1-2 to T1-3 Add jumpers from T1-1 to T1-3
CBI-A2 to CBI-B2

2.4.1 115/230V Changeover Continued

In addition, the input power plug and input power label will have to be changed. The power cord and circuit breaker are sized for the worst case 115V condition and need not be changed. See section 3.5 for schematic diagram of the transformer.

2.4.2 Low Line Operation

Taps are provided on the input power transformer for operation on low input lines (95-105V or 190-210V). To use the low line feature, move taps from T1-6 to T1-5 and T1-10 to T1-11 on both input power transformers. CAUTION: DO NOT USE THIS FEATURE ON NORMAL INPUT VOLTAGE OR DAMAGE MAY RESULT TO THE UNIT. Move taps back to T1-6 and T1-10 before using on normal input voltages.

2.5 Input Power Conversions - Multi-Case Systems

To change the input power form on multi-case systems, it is necessary to change each unit individually; if your system is comprised of Case A units, refer to section 2.3 and if Case B, refer to 2.4 for detailed instructions.

To avoid the large currents involved in 115V single phase inputs, it is recommended that the user operate multi-case systems off of 220V or 120/208V 3Ø and distribute the load among the phases as described in section 2.2.

Each case may be turned on by its own circuit breaker, but strange outputs may result until all have been turned on. It is better to run all power inputs to a common service switch or circuit breaker of adequate size.

2.6 Output Connections - Case Size A or B

Models are available with three different output configurations; they are designated by the suffixes - R, -S, or -T according to the following legend:

Output Voltage: See model listings.

- R models produce output vectors of 0-125 VAC 1Ø or 0-125 VAC L-N if 3Ø WYE, or 0-125 VAC L-L if 3Ø DELTA.
- S models produce a balanced output (2 vectors 180° apart) of 125-0-125 VAC, plus a 250 VAC output.
- T models produce a 0-125 VAC vector, plus 0-250 VAC through an output autoformer. Both outputs may be loaded simultaneously. Other autoformer tap voltages as specified by user. T model frequency range limited to 45-500 Hz.

2.6 Output Connections - Case Size A or B Continued

All outputs are available at the output power terminal strip on the rear panel and are wired according to figure 2.6A. Three phase transformer output models will have a dual terminal strip.

2.7 Output Connection - Multi-Case Systems

Multi-case systems will be supplied with an interconnect harness and special instructions will be provided in section 6.0 of this manual.

2.8 Changing Signal Generators

Interchanging of signal generator plug-ins is limited to certain families of equipment. Plug-ins may only be exchanged within the same output form, as any single-phase plug-in can be used in a chassis wired for single-phase, three-phase delta plug-ins in three-phase delta chassis, etc.

No harm will come to the unit if a wrong plug-in is used, except that abnormal output voltages may result. If there is any question, call the factory with your model number for specific instruction.

2.9 Operating Environment and Applications

The "K" Series AC Power Sources are considered to be laboratory equipment and intended to be used in indoor or sheltered environments. The equipment should be operated in a low-dust conditions and given free air-flow both front and rear (approximately 6" minimum). Units may be operated from 0 to +55°C ambient in non-corrosive atmospheres; heavy condensation should not be permitted.

This series of equipment is well designed and constructed of the best commercial components and will yield a long service life. However, it should not be relied upon in airborne or life support systems without adequate back-up.

2.10 Equipment Handling

"K" Series equipment is portable in nature and designed to be easily handled. Most case A sized units fall into the one-man handling category and should be carried by the front handles; the weight is concentrated in the left side of the unit. Case B sized units all fall into the two-man handling category and should not be carried by one person alone; they should be lifted by both handles.

FIGURE 2.6A OUTPUT CONNECTIONS

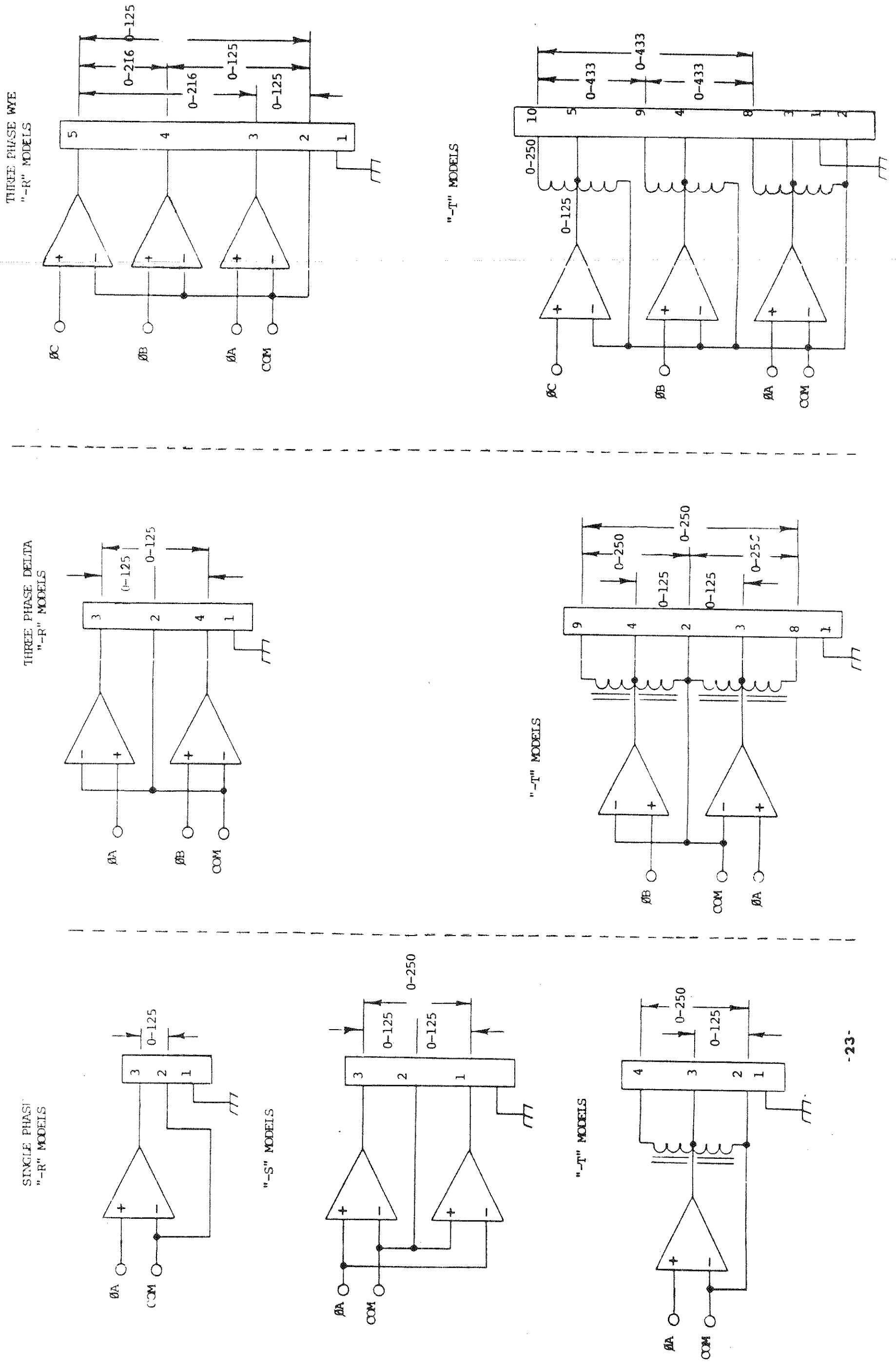


FIGURE 2.6A
OUTPUT CONNECTIONS

3.0 EQUIPMENT DESCRIPTION

3.1 How To Use This Manual

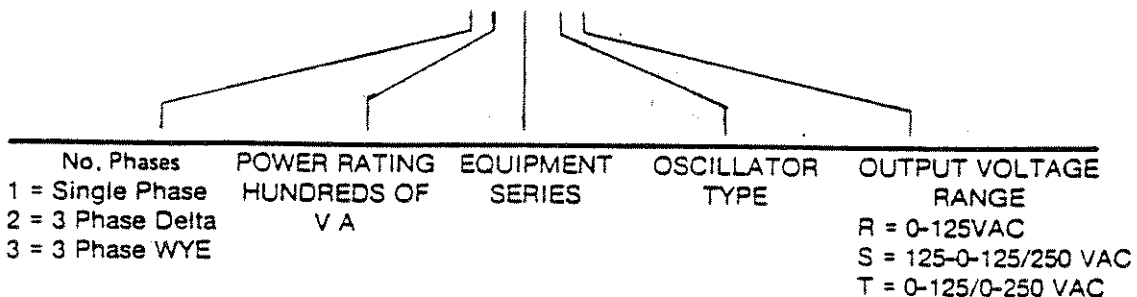
All "K" Series units are identified by a Model number, Serial number and Mod number, if applicable. The rear panel label will identify these numbers, the mod number following a " / " after the model number, as in 103K-DT/8000. In communications with the factory, always refer to your unit by these numbers.

The model number designates all the normal characteristics of the unit according to the legend below. Refer to the following tables to determine the voltages and ratings of your unit as well as the case size, plug-in and power supplies installed. In servicing, refer to those sections of the manual for technical details.

STANDARD MODELS

MODEL NUMBER LEGEND

315K-DT



SINGLE PHASE MODELS

<u>MODEL</u>	<u>VA</u>	<u>OUTPUT CURRENT (AMPS)</u>	<u>OUTPUT VOLTAGE RANGE (VAC)</u>	<u>PLUG- IN</u>	<u>CASE SIZE</u>	<u>POWER SUPPLY</u>	<u>WGT</u>	<u>PA</u>
103K-XR	250	2	0-125	X	A	PS-250	30	1
103K-FR	250	2	0-125	F	A	PS-250	30	1
103K-VR	250	2	0-125	V	A	PS-250	30	1
103K-DR	250	2	0-125	D	A	PS-250	30	1
103K-XT	250	2/1	0-125/0-250	X	A	PS-250	35	1
103K-FT	250	2/1	0-125/0-250	F	A	PS-250	35	1
103K-VT	250	2/1	0-125/0-250	V	A	PS-250	35	1
103K-DT	250	2/1	0-125/0-250	D	A	PS-250	35	1
105K-XR	500	4	0-125	X	A	PS-500	40	2
105K-FR	500	4	0-125	F	A	PS-500	40	2
105K-VR	500	4	0-125	V	A	PS-500	40	2
105K-DR	500	4	0-125	D	A	PS-500	40	2
105K-XS	500	2/2/2	125-0-125/250	X	A	PS-500	40	2
105K-FS	500	2/2/2	125-0-125/250	F	A	PS-500	40	2
105K-VS	500	2/2/2	125-0-125/250	V	A	PS-500	40	2
105K-DS	500	2/2/2	125-0-125/250	D	A	PS-500	40	2
105K-XT	500	4/2	0-125/0-250	X	A	PS-500	48	2
105K-FT	500	4/2	0-125/0-250	F	A	PS-500	48	2
105K-VT	500	4/2	0-125/0-250	V	A	PS-500	48	2
105K-DT	500	4/2	0-125/0-250	D	A	PS-500	48	2
108K-XR	750	6	0-125	X	A	PS-750	54	3
108K-FR	750	6	0-125	F	A	PS-750	54	3
108K-VR	750	6	0-125	V	A	PS-750	54	3
108K-DR	750	6	0-125	D	A	PS-750	54	3
108K-XT	750	6/3	0-125/0-250	X	A	PS-750	65	3
108K-FT	750	6/3	0-125/0-250	F	A	PS-750	65	3
108K-VT	750	6/3	0-125/0-250	V	A	PS-750	65	3
108K-DT	750	6/3	0-125/0-250	D	A	PS-750	65	3
110K-XR	1KVA	8	0-125	X	B	2 ea PS-500	80	4
110K-FR	1KVA	8	0-125	F	B	2 ea PS-500	80	4
110K-VR	1KVA	8	0-125	V	B	2 ea PS-500	80	4
110K-DR	1KVA	8	0-125	D	B	2 ea PS-500	80	4
110K-XS	1KVA	4/4/4	125-0-125/250	X	B	2 ea PS-500	80	4
110K-FS	1KVA	4/4/4	125-0-125/250	F	B	2 ea PS-500	80	4
110K-VS	1KVA	4/4/4	125-0-125/250	V	B	2 ea PS-500	80	4
110K-DS	1KVA	4/4/4	125-0-125/250	D	B	2 ea PS-500	95	4
110K-XT	1KVA	8/4	0-125/0-250	X	B	2 ea PS-500	95	4
110K-FT	1KVA	8/4	0-125/0-250	F	B	2 ea PS-500	95	4
110K-VT	1KVA	8/4	0-125/0-250	V	B	2 ea PS-500	95	4
110K-DT	1KVA	8/4	0-125/0-250	D	B	2 ea PS-500	95	4

SINGLE PHASE MODELS

<u>MODEL</u>	<u>VA</u>	<u>OUTPUT CURRENT (AMPS)</u>	<u>OUTPUT VOLTAGE RANGE (VAC)</u>	<u>PLUG- IN</u>	<u>CASE SIZE</u>	<u>POWER SUPPLY</u>	<u>WGT</u>	<u>PA</u>
112K-XR	1.25KVA	10	0-125	X	B	2 ea PS-750	92	5
112K-FR	1.25KVA	10	0-125	F	B	2 ea PS-750	92	5
112K-VR	1.25KVA	10	0-125	V	B	2 ea PS-750	92	5
112K-DR	1.25KVA	10	0-125	D	B	2 ea PS-750	92	5
112K-XT	1.25KVA	10/5	0-125/0-250	X	B	2 ea PS-750	107	5
112K-FT	1.25KVA	10/5	0-125/0-250	F	B	2 ea PS-750	107	5
112K-VT	1.25KVA	10/5	0-125/0-250	V	B	2 ea PS-750	107	5
112K-DT	1.25KVA	10/5	0-125/0-250	D	B	2 ea PS-750	107	5
112K-FT	1.25KVA	10/5	0-125/0-250	F	B	2 ea PS-750	107	5
112K-VT	1.25KVA	10/5	0-125/0-250	V	B	2 ea PS-750	107	5
112K-DT	1.25KVA	10/5	0-125/0-250	D	B	2 ea PS-750	107	5
115K-XR	1.5KVA	12	0-125	X	B	2 ea PS-750	105	6
115K-FR	1.5KVA	12	0-125	F	B	2 ea PS-750	105	6
115K-VR	1.5KVA	12	0-125	V	B	2 ea PS-750	105	6
115K-DR	1.5KVA	12	0-125	D	B	2 ea PS-750	105	6
115K-XS	1.5KVA	6/6/6	125-0-125/250	X	B	2 ea PS-750	105	6
115K-FS	1.5KVA	6/6/6	125-0-125/250	F	B	2 ea PS-750	105	6
115K-VS	1.5KVA	6/6/6	125-0-125/250	V	B	2 ea PS-750	105	6
115K-DS	1.5KVA	6/6/6	125-0-125/250	D	B	2 ea PS-750	105	6
115K-XT	1.5KVA	12/6	0-125/0-250	X	B	2 ea PS-750	125	6
115K-VT	1.5KVA	12/6	0-125/0-250	V	B	2 ea PS-750	125	6
115K-FT	1.5KVA	12/6	0-125/0-250	F	B	2 ea PS-750	125	6
115K-DT	1.5KVA	12/6	0-125/0-250	D	B	2 ea PS-750	125	6
120K-XR	2KVA	16	0-125	X	2 ea B	4 ea PS-500	160	8
120K-FR	2KVA	16	0-125	F	2 ea B	4 ea PS-500	160	8
120K-VR	2KVA	16	0-125	V	2 ea B	4 ea PS-500	160	8
120K-DR	2KVA	16	0-125	D	2 ea B	4 ea PS-500	160	8
120K-XS	2KVA	8/8/8	125-0-125/250	X	2 ea B	4 ea PS-500	160	8
120K-FS	2KVA	8/8/8	125-0-125/250	F	2 ea B	4 ea PS-500	160	8
120K-VS	2KVA	8/8/8	125-0-125/250	V	2 ea B	4 ea PS-500	160	8
120K-DS	2KVA	8/8/8	125-0-125/250	D	2 ea B	4 ea PS-500	160	8
120K-XT	2KVA	16/8	0-125/0-250	X	2 ea B	4 ea PS-500	195	8
120K-FT	2KVA	16/8	0-125/0-250	F	2 ea B	4 ea PS-500	195	8
120K-VT	2KVA	16/8	0-125/0-250	V	2 ea B	4 ea PS-500	195	8
120K-DT	2KVA	16/8	0-125/0-250	D	2 ea B	4 ea PS-500	195	8

SINGLE PHASE MODELS

<u>MODEL</u>	<u>VA</u>	<u>OUTPUT CURRENT (AMPS)</u>	<u>OUTPUT VOLTAGE RANGE (VAC)</u>	<u>PLUG- IN</u>	<u>CASE SIZE</u>	<u>POWER SUPPLY</u>	<u>WGT</u>	<u>PA</u>
125K-XR	2.5KVA	20	0-125	X	2 ea B	6 ea PS-750	184	10
125K-FR	2.5KVA	20	0-125	F	2 ea B	6 ea PS-750	184	10
125K-VR	2.5KVA	20	0-125	V	2 ea B	6 ea PS-750	184	10
125K-DR	2.5KVA	20	0-125	D	2 ea B	6 ea PS-750	184	10
125K-XS	2.5KVA	10/10/10	125-0-125/250	X	2 ea B	6 ea PS-750	184	10
125K-FS	2.5KVA	10/10/10	125-0-125/250	F	2 ea B	6 ea PS-750	184	10
125K-VS	2.5KVA	10/10/10	125-0-125/250	V	2 ea B	6 ea PS-750	184	10
125K-DS	2.5KVA	10/10/10	125-0-125/250	D	2 ea B	6 ea PS-750	184	10
125K-XT	2.5KVA	20/10	0-125/0-250	X	2 ea B	6 ea PS-750	214	10
125K-FT	2.5KVA	20/10	0-125/0-250	F	2 ea B	6 ea PS-750	214	10
125K-VT	2.5KVA	20/10	0-125/0-250	V	2 ea B	6 ea PS-750	214	10
125K-DT	2.5KVA	20/10	0-125/0-250	D	2 ea B	6 ea PS-750	214	10
130K-XR	3KVA	24	0-125	X	2 ea B	6 ea PS-750	210	12
130K-FR	3KVA	24	0-125	F	2 ea B	6 ea PS-750	210	12
130K-VR	3KVA	24	0-125	V	2 ea B	6 ea PS-750	210	12
130K-DR	3KVA	24	0-125	D	2 ea B	6 ea PS-750	210	12
130K-XS	3KVA	12/12/12	125-0-125/250	X	2 ea B	6 ea PS-750	210	12
130K-FS	3KVA	12/12/12	125-0-125/250	F	2 ea B	6 ea PS-750	210	12
130K-VS	3KVA	12/12/12	125-0-125/250	V	2 ea B	6 ea PS-750	210	12
130K-DS	3KVA	12/12/12	125-0-125/250	D	2 ea B	6 ea PS-750	210	12
130K-XT	3KVA	24/12	0-125/0-250	X	2 ea B	6 ea PS-750	250	12
130K-FT	3KVA	24/12	0-125/0-250	F	2 ea B	6 ea PS-750	250	12
130K-VT	3KVA	24/12	0-125/0-250	V	2 ea B	6 ea PS-750	250	12
130K-DT	3KVA	24/12	0-125/0-250	D	2 ea B	6 ea PS-750	250	12

THREE PHASE DELTA MODELS

<u>MODEL</u>	<u>VA</u>	<u>OUTPUT CURRENT (AMPS/PHASE)</u>	<u>OUTPUT VOLTAGE RANGE (V L-L)</u>	<u>OSC- ILL- ATOR</u>	<u>CASE SIZE</u>	<u>POWER SUPPLY</u>	<u>WGT</u>	<u>PA</u>
205K-FR	430	2	0-125	F	A	PS-500	40	2
205K-DR	430	2	0-125	D	A	PS-500	40	2
205K-FT	430	2/1	0-125/0-250	F	A	PS-500	50	2
205K-DT	430	2/1	0-125/0-250	D	A	PS-500	50	2
210K-FR	860	4	0-125	F	B	2 ea PS-500	80	4
210K-DR	860	4	0-125	D	B	2 ea PS-500	80	4
210K-FT	860	4/2	0-125/0-250	F	B	2 ea PS-500	95	4
210K-DT	860	4/2	0-125/0-250	D	B	2 ea PS-500	95	4
220K-FR	1.7KVA	8	0-125	F	2 ea B	4 ea PS-500	160	8
220K-DR	1.7KVA	8	0-125	D	2 ea B	4 ea PS-500	160	8
220K-FT	1.7KVA	8/4	0-125/0-250	F	2 ea B	4 ea PS-500	190	8
220K-DT	1.7KVA	8/4	0-125/0-250	D	2 ea B	4 ea PS-500	190	8
225K-FR	2.2KVA	10	0-125	F	2 ea B	4 ea PS-750	184	10
225K-DR	2.2KVA	10	0-125	D	2 ea B	4 ea PS-750	184	10
225K-FT	2.2KVA	10/5	0-125/0-250	F	2 ea B	4 ea PS-750	214	10
225K-DT	2.2KVA	10/5	0-125/0-250	D	2 ea B	4 ea PS-750	214	10
230K-FR	2.6KVA	12	0-125	F	2 ea B	4 ea PS-750	210	12
230K-DR	2.6KVA	12	0-125	D	2 ea B	4 ea PS-750	210	12
230K-FT	2.6KVA	12/6	0-125/0-250	F	2 ea B	4 ea PS-750	250	12
230K-DT	2.6KVA	12/6	0-125/0-250	D	2 ea B	4 ea PS-750	250	12

THREE PHASE WYE MODELS

<u>MODEL</u>	<u>VA</u>	<u>OUTPUT CURRENT (AMPS/PHASE)</u>	<u>OUTPUT VOLTAGE RANGE (V L-L)</u>	<u>OSC- ILL- ATOR</u>	<u>CASE SIZE</u>	<u>POWER SUPPLY</u>	<u>WGT</u>	<u>PA</u>
305K-FR	500	2	0-125	F	A	PS-500	44	3
305K-DR	500	2	0-125	D	A	PS-500	44	3
305K-FT	500	2/1	0-125/0-250	F	A	PS-500	54	3
305K-DT	500	2/1	0-125/0-250	D	A	PS-500	54	3
308-FR	750	2	0-125	F	A	PS-750	55	3
308-DR	750	2	0-125	D	A	PS-750	55	3
308-FT	750	2/1	0-125/0-250	F	A	PS-750	65	3
308-DT	750	2/1	0-125/0-250	D	A	PS-750	65	3
315K-FR	1.5KVA	4	0-125	F	B	2 ea PS-750	115	6
315K-DR	1.5KVA	4	0-125	D	B	2 ea PS-750	115	6
315K-FT	1.5KVA	4/2	0-125/0-250	F	B	2 ea PS-750	135	6
315K-DT	1.5KVA	4/2	0-125/0-250	D	B	2 ea PS-750	135	6
323K-FR	2.25KVA	6	0-125	F	3 ea A	3 ea PS-750	165	9
323K-DR	2.25KVA	6	0-125	D	3 ea A	3 ea PS-750	165	9
323K-FT	2.25KVA	6/3	0-125/0-250	F	3 ea A	3 ea PS-750	195	9
323K-DT	2.25KVA	6/3	0-125/0-250	D	3 ea A	3 ea PS-750	195	9

3.2 Case Size A Interconnections

Case size A is a standard 5½" rack mount chassis. Dimensions are 5½" X 19" W X 19" D and the weight varies from model to model. Refer to sections 1.3 and 3.1 of this manual for outline, mounting and weights of the chassis.

Cooling is by self-contained fans - front intake, rear exhaust. Air-flow is approximately 100 CFM. Input power is by a 6' line cord and output power available at a terminal strip; both are located at the rear of the unit.

For replacement parts, assembly, or wiring information, refer to the technical drawings at the rear of this section.

3.3 Case Size B Interconnections

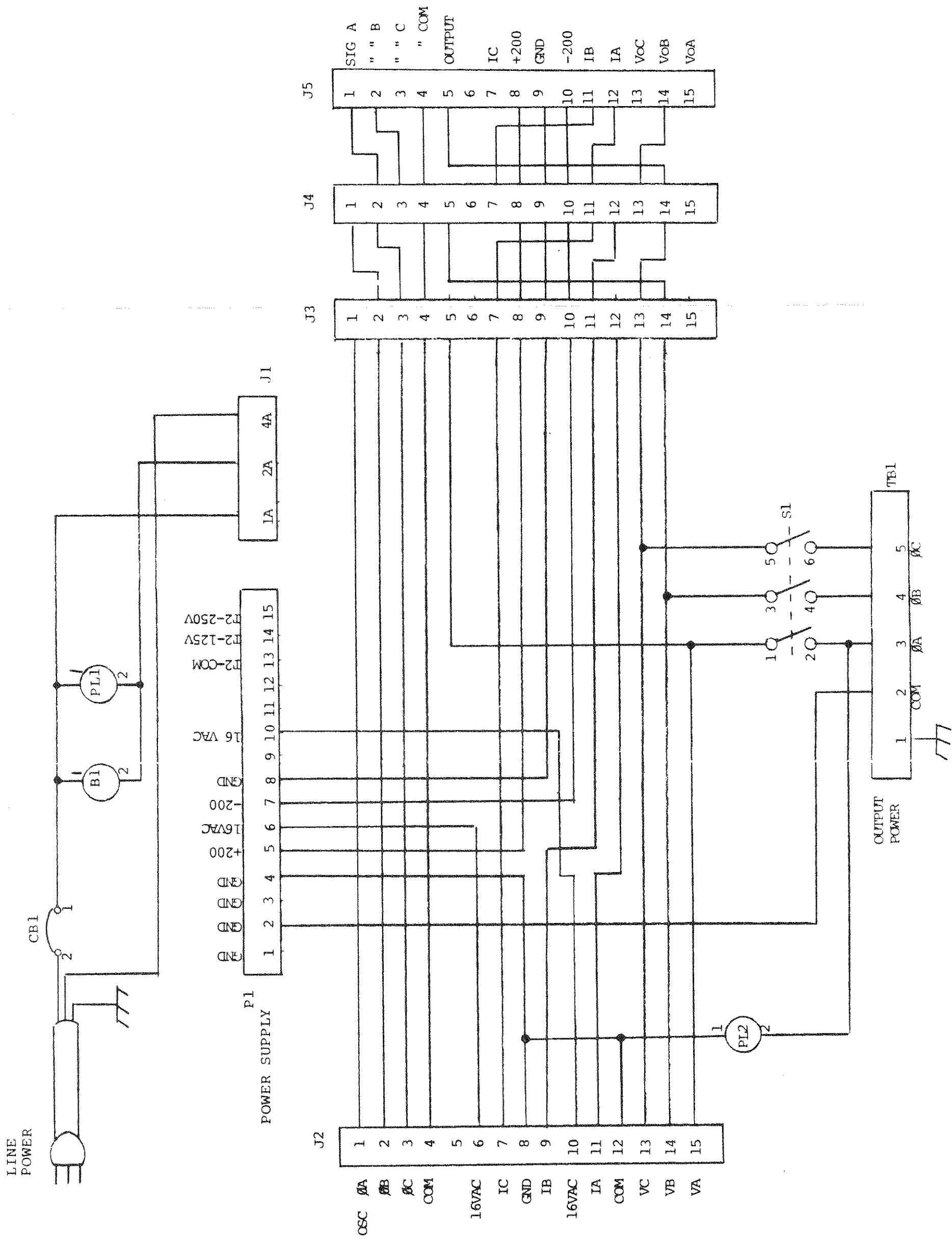
Case size B is a standard 10½" rack mount chassis. Dimensions are 10½" H X 19" W X 19" D and the weight varies from model to model. Refer to sections 1.4 and 3.1 of this manual for outline, mounting and weights of the chassis.

Cooling is by self-contained fans - front intake, rear exhaust. Air-flow is approximately 200 CFM. Input power is by a 6' line cord and output power available at a terminal strip; both are located at the rear of the unit.

For replacement parts, assembly, or wiring information, refer to the technical drawings at the rear of this section.

3.4 Multi-Case Systems Interconnections

FIGURE 3.2A
CASE SIZE A
INTERCONNECTIONS

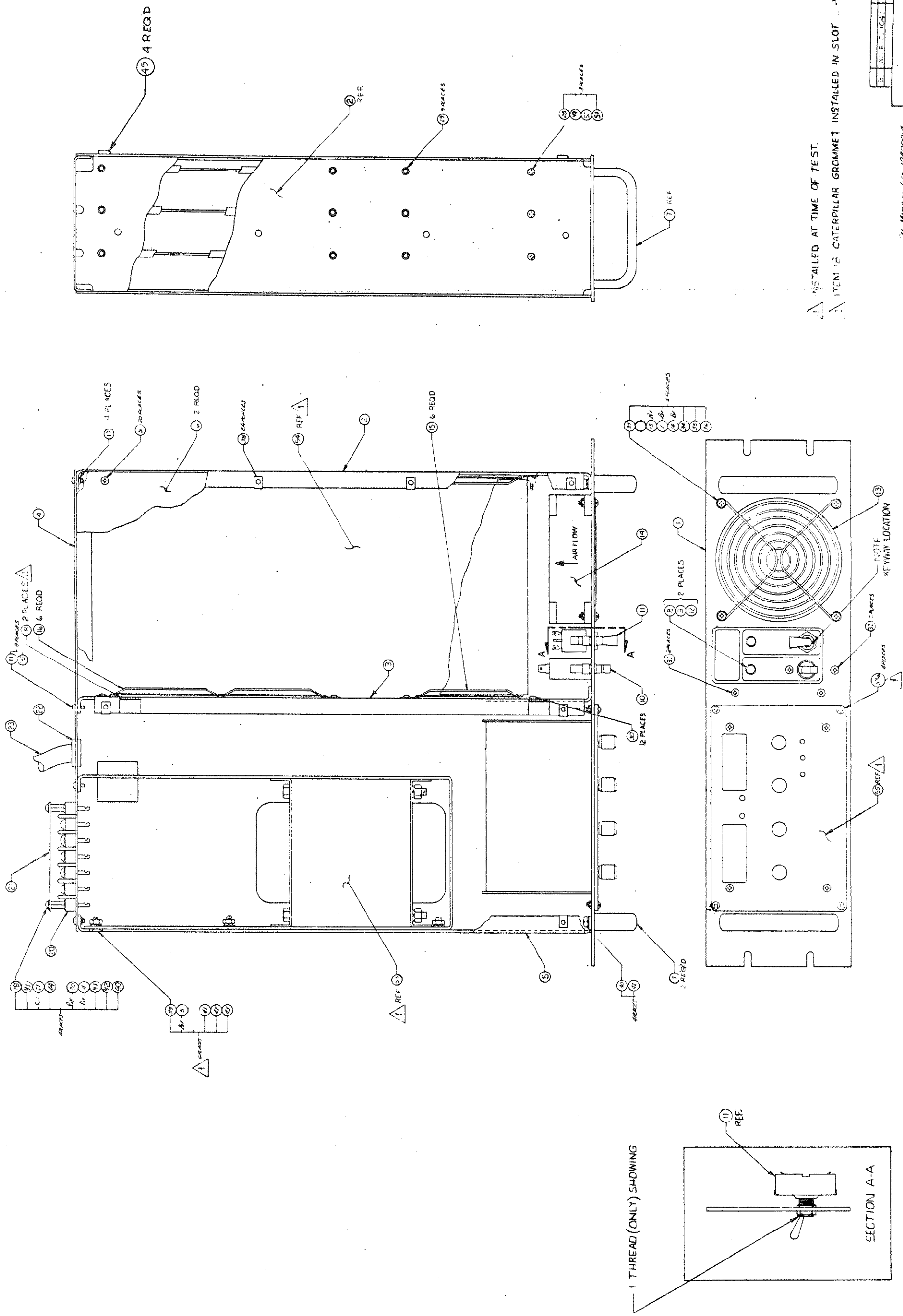


3.2B CASE SIZE A - ASSEMBLY DRAWING

REV	DATE	BY	CHKD
1	10/1/79	Y-L-T	
K-SERIES, CAS-5			
ADP - 5 1/4" QUADDP			
108000-1			

See Appendix A for 108000-8

△ INSTALLED AT TIME OF TEST.
 ▽ ITEM B CATERPILLAR GROMMET INSTALLED IN SLOT . . . P.L.C.



ITEM	DESCRIPTION	MFG P/N	MFG	QTY
01	FRONT PANEL	108001	PPSC	1
02	SIDE PANEL - RIGHT	108004	PPSC	1
03	CENTER SUPPORT	108006	PPSC	1
04	REAR PANEL	108003	PPSC	1
05	SIDE PANEL - LEFT	108002	PPSC	1
06	TOP & BOTTOM COVER	108005	PPSC	2
07	HANDLE	10937-B-1032	AMATOM	2
08	DATA LAMP	CR03-RC5-N117	ELDEMA	2
09	SPEED CLIP	515-0051	DIALIGHT	2
10	CIRCUIT BREAKER	JA1-A8-A-15-20	HEINEMAN	1
11	SWITCH	7611K2	CUTLER-HAMMER	1
12	CONNECTOR - DATA LAMP	515-0012	DIALIGHT	2
13	FAN GUARD	6-182-033	HOWARD	1
14	FAN	MX2A3	ROTRON	1
15	CARD GUIDE	90-2	TAURUS	6
16	CARD GUIDE	92-2	TAURUS	6
17	PEM NUT	CL632-6	PEM	4
18	CATAPILLAR GROMMET	CSG-09	WECKESSER	A/R
20	TERMINAL BLOCK	602-Y-5	KULKA	1
21	TERMINAL COVER	108007	PPSC	1
22	STRAIN RELIEF	R6-A	RICH CO.	1
23	POWER CORD	17419	BELDEN	1
24	CONNECTOR PINS	2478	MOLEX	30
25	CONNECTOR 15 PIN	03-09-2151	MOLEX	1
26	CONNECTOR PINS	02-09-2103	MOLEX	15
27	CONNECTOR 15 PIN FEMALE	09-50-7151	MOLEX	2

ITEM	DESCRIPTION	MFG P/N	MFG	QTY
38	SPEED NUT TYPE "U"	C11228-632	TINNERMAN	28
45	WASHER, NYLON	FW-6	WECKESSER	4
46	LABEL, REAR PANEL 1Ø	108008	PPSC	1
47	LABEL, REAR PANEL 3Ø	108009	PPSC	1
48	LABEL, FRONT PANEL	580024	PPSC	A/R

FIGURE 3.3A
CASE SIZE B INTERCONNECTIONS

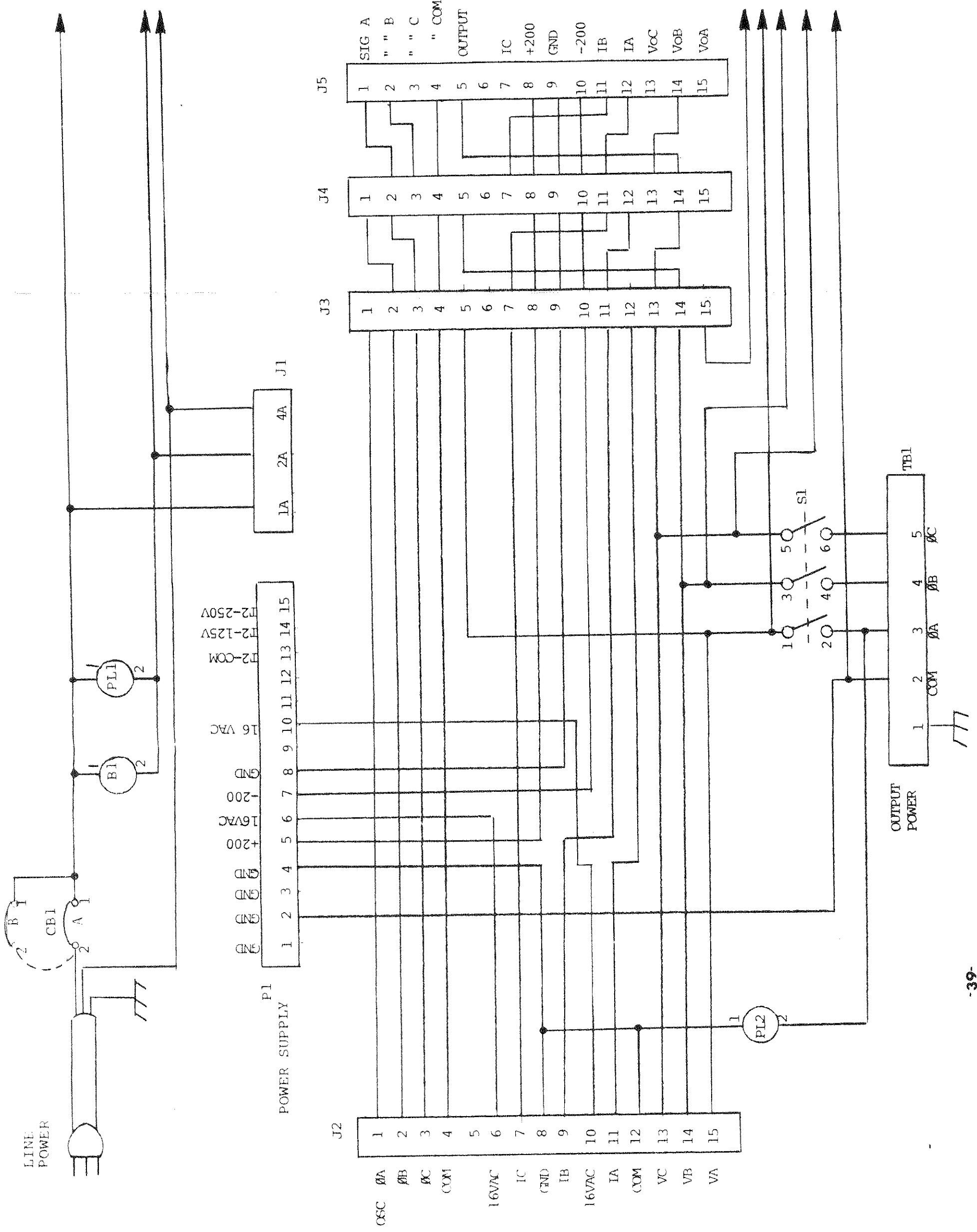
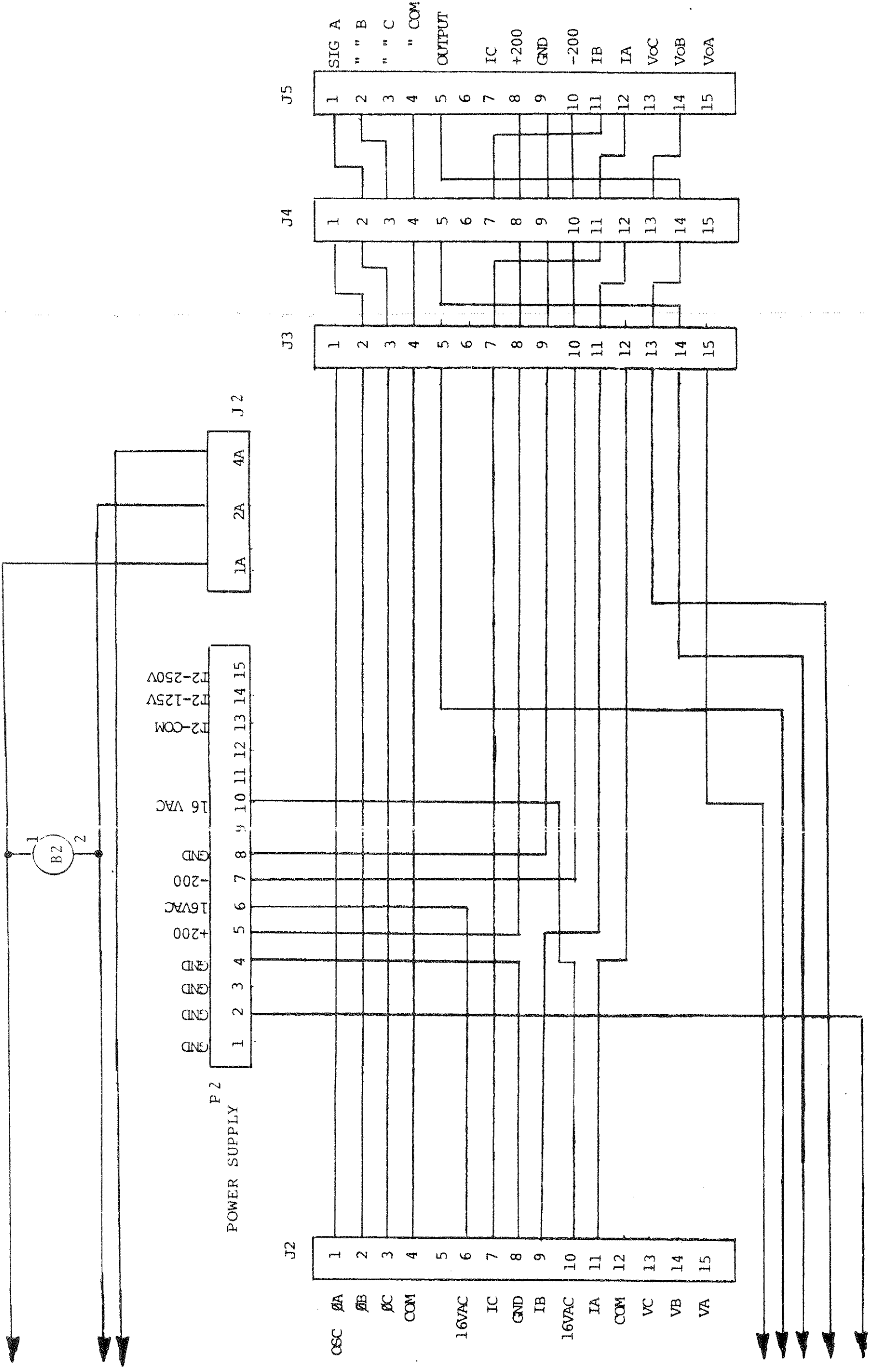


FIGURE 3.3B
CASE SIZE B INTERCONNECTIONS



ITEM	DESCRIPTION	MFG P/N	MFG	QTY
01	FRONT PANEL	108101	PEE	1
02	SIDE PANEL - RIGHT	108102	PEE	1
03	CENTER SUPPORT	108006	PEE	1
04	REAR PANEL	108103	PEE	1
05	SIDE PANEL - LEFT	108106	PEE	1
06	TOP & BOTTOM COVER	108005	PEE	2
07	HANDLE	10941-B-1032	AMATOM	2
08	DATA LAMP	CR03-RC5-N117	ELDEMA	2
09	SPEED CLIP	515-0051	DIALIGHT	2
10	CIRCUIT BREAKER	JA2-A3-A-15-2	HEINEMAN	2
11	SWITCH	7611K2	CUTLER-HAMMER	1
12	CONNECTOR - DATA LAMP	515-0012	DIALIGHT	2
13	FAN GUARD	6-182-033	HOWARD	2
14	FAN	MX2A3	ROTRON	2
15	CARD GUIDE	90-2	TAURUS	12
16	CARD GUIDE	92-2	TAURUS	12
17	STANDOFF (SQ)	8454-B-0440	AMATOM	6
18	CATAPILLAR GROMMET	CSG-09	WECKESSER	A/R
20	TERMINAL BLOCK	602-Y-5	KULKA	1
21	TERMINAL COVER	MS602-5	KULKA	1
22	STRAIN RELIEF	CG-3150	APPLETON	1
23	POWER CORD, 10' TYPE S.O.	12-3		1
24	REAR COVER	108104	PEE	1
25	CONNECTOR 15 PIN	03-09-1151	MOLEX	2
26	CONNECTOR PINS	02-09-2103	MOLEX	30
27	CONNECTOR 15 PIN FEMALE	09-50-7151	MOLEX	3
	CONNECTOR PINS	2478	MOLEX	45

3.5 DC Power Supplies

There is a choice of three different power supplies that may be installed in a "K" Series unit, and they are designated as PS-250, PS-500, or PS-750; the model number of the power supply does not refer to the PC output rating of the supply but to DC output of the amplifiers that they power.

They are unregulated transformer-rectifier-capacitor filter type power supplies of open-frame construction. They are identical with the exception of the rating of the power transformer and the PS-750, in which extra filter capacitors have been added. An optional output autoformer will be installed in the cavity in the "T" model units.

The transformer primary is split wound for 115/230V operation. As indicated on the schematic in section 5.2 and in 2.3 of this manual, the primary may be paralleled for 115V input or connected in series for 230V input.

Low line taps are provided on the transformer for low line conditions, as in a 208V line, but the unit should not be operated from normal line voltages with low line input taps selected.

3.6 Power Amplifier, PA-250

All "K" Series machines use identical output stages, except for power level. The power amplifier section is a wide band, direct coupled output, linear amplifier. The amplifier is designed to operate from a 5 vrms signal from the signal generator module.

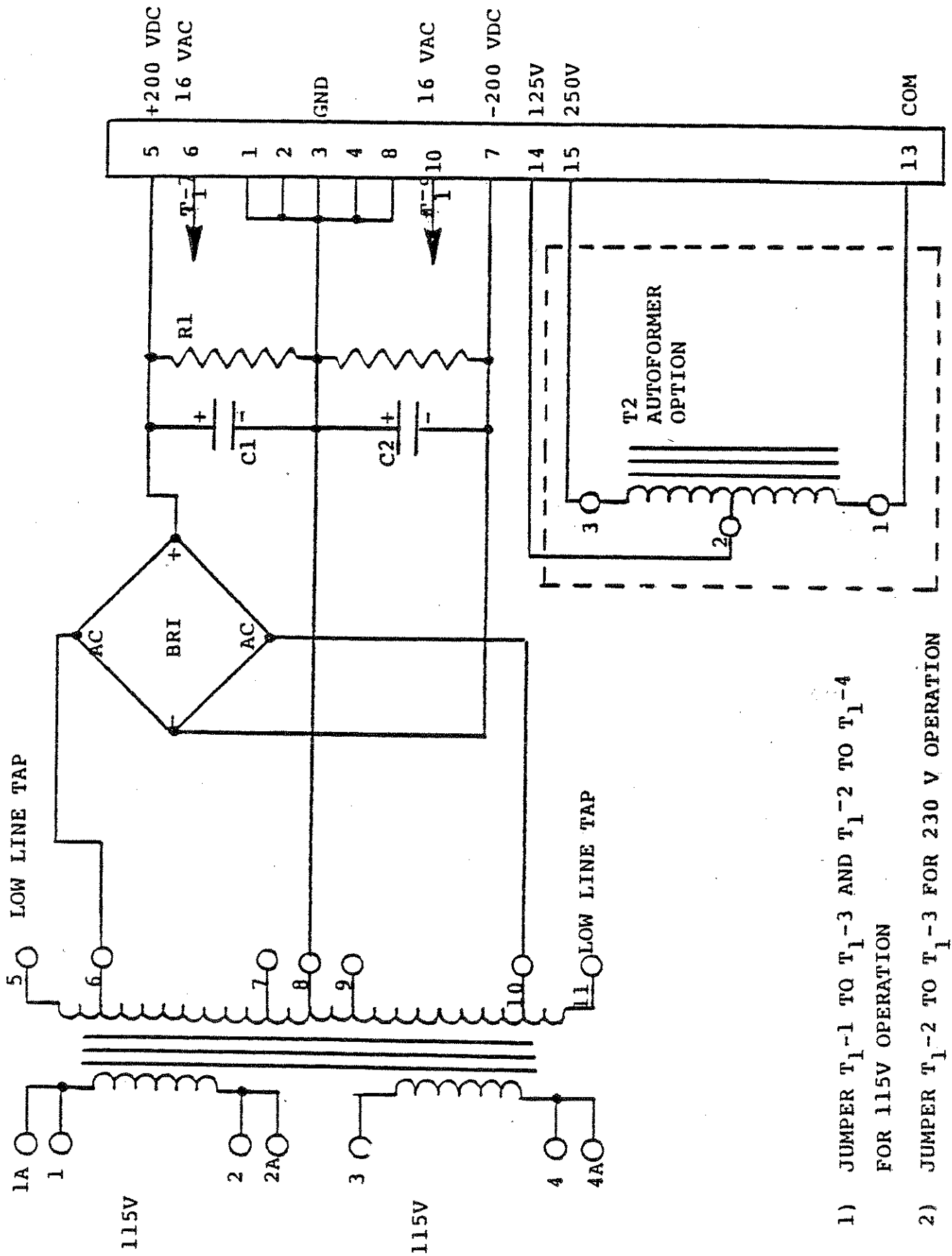
The transistorized linear amplifier is designed to provide up to 125 vrms output at 2 amps into normal loads.

The power amplifiers are versatile and may be operated in series or parallel, or driven out of phase for three phase output. The total output power is 250 VA times the number of amplifiers installed. Each operates off \pm 200 VDC power supplies and provides full 125 vrms output without the need of output transformers.

To achieve full output voltage without overstressing transistors, the output stage is configured as a "totem pole"; transistors are operated in series to reduce voltage stress.

Wide bandwidth and high loop gain are combined to produce good regulation, low distortion and minimal DC offset without the need for any adjustments.

For theory of operation and detail drawings, refer to section 5.3 of this manual.

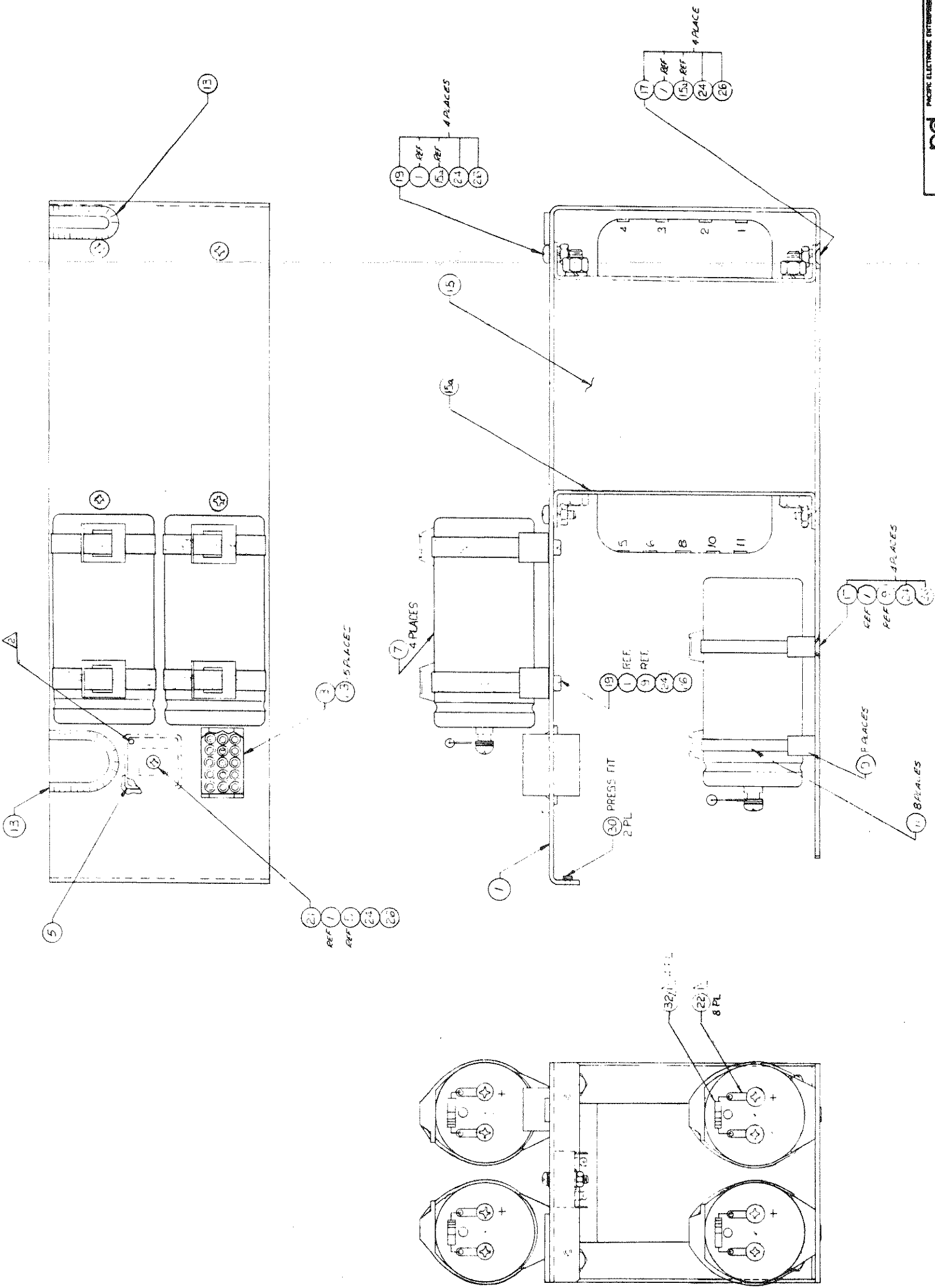


- NOTES: 1) JUMPER T₁-1 TO T₁-3 AND T₁-2 TO T₁-4 FOR 115V OPERATION
- 2) JUMPER T₁-2 TO T₁-3 FOR 230 V OPERATION

FIGURE 3.5A

3.5B DC POWER SUPPLY ASSEMBLY DRAWING

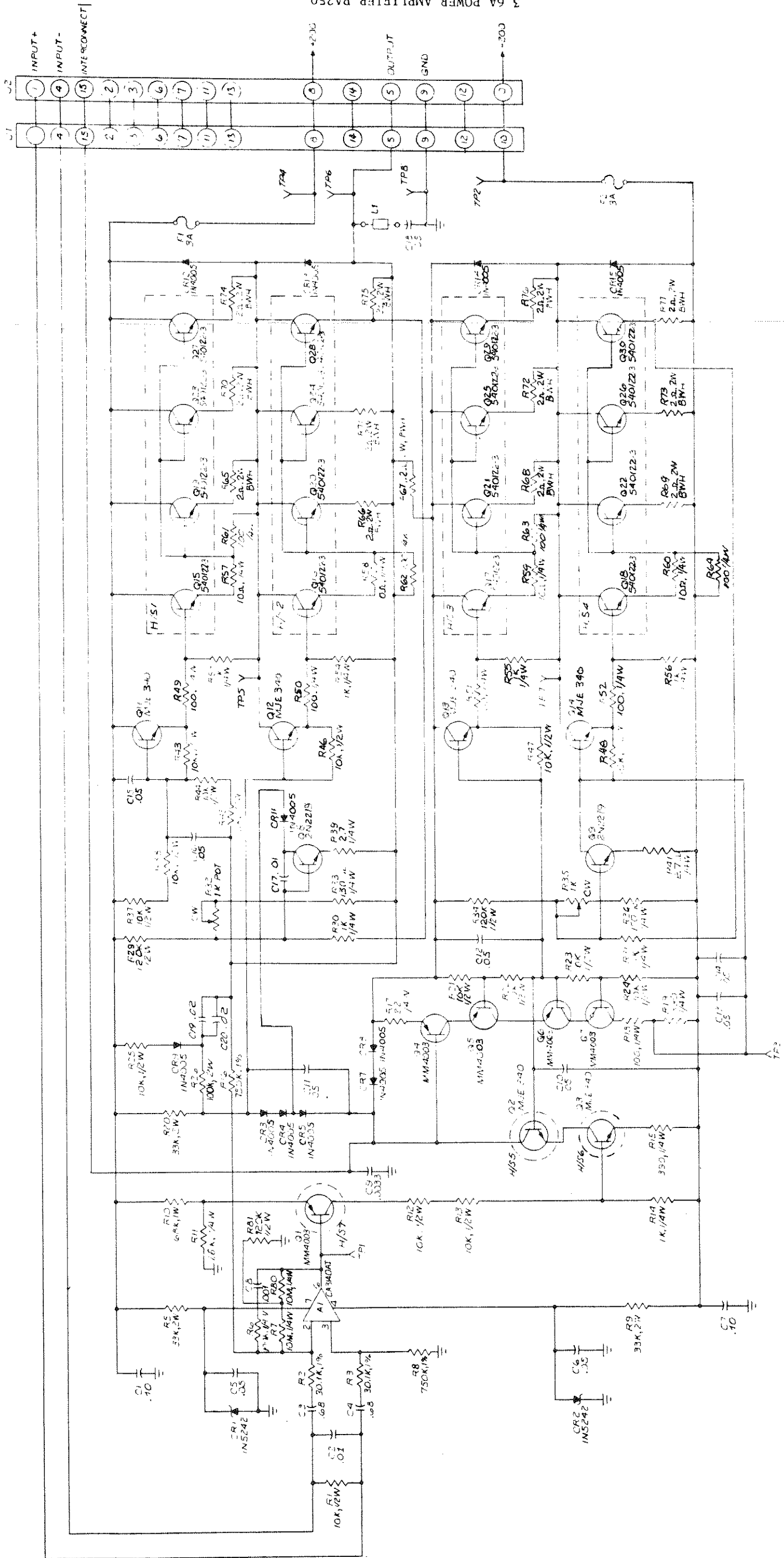
	PACIFIC ELECTRONIC ENTERPRISES, INC.
	ELECTRONIC DESIGN ASSOCIATES, INC.
DATE: 12-27-70 DRAWN BY: [Signature] CHECKED BY: [Signature]	K. H. R. S. PS 150 POWER SUPPLY ASSY 108220-1

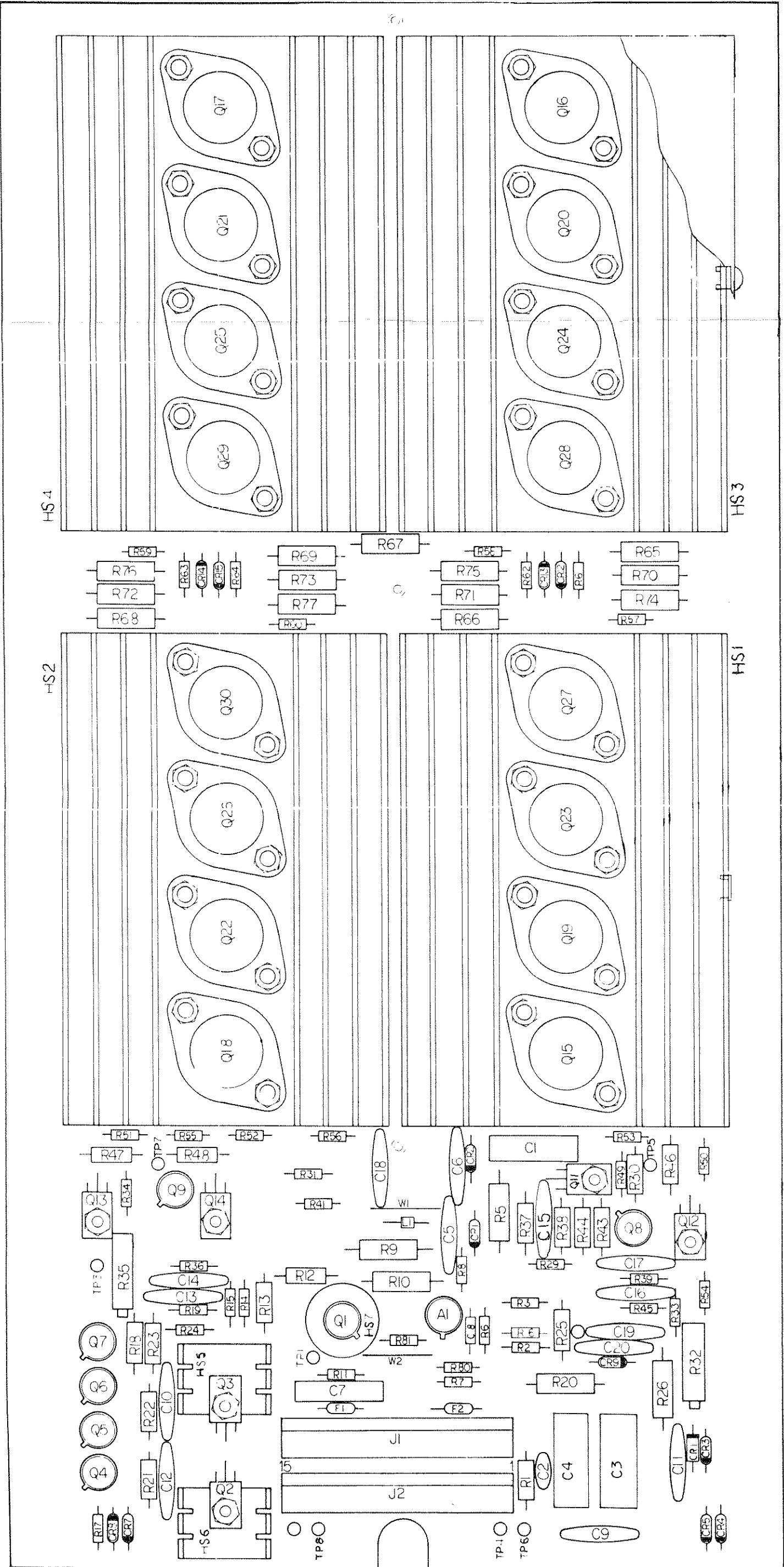


4. REF. MATL. LIST 108220-4.
 5. FOR WIRING INFORMATION SEE 108220-11.
 6. WHEN MOUNTING BR, APPLY 5641 THERMAL COMPOUND TO UNDERSIDE,
 7. PLACE LOCATING PIN IN THIS HOLE.
 8. INSTALL AT TIME OF HARNESS INSTALLATION

NOTES UNLESS OTHERWISE SPECIFIED

3.6A POWER AMPLIFIER PA250
SCHEMATIC DIAGRAM







ITEM	DESCRIPTION	MFG P/N	MFG	QTY
	POWER AMPL PRINTED CIRCUIT BOARD	PC108060	PEE	1
	OPERATIONAL AMPLIFIER A1	LM741C		1
	CAPACITOR .0033 μ f @ 500V C9	225P33294XD3	SPRAGUE	1
	CAPACITOR .001 μ f @ 500V C8	5GA-D10	SPRAGUE	1
	CAPACITOR .05 μ f @ 500V C5,6, 10-20	5GA-S50	SPRAGUE	13
	CAPACITOR .01 μ f @ 500V C2	5GA-S10	SPRAGUE	
	CAPACITOR .68 μ f @ 50V C3,4	75F7R5-684	GEN ELEC	2
	CAPACITOR .1 μ f @ 400V C1,2	75F6R4-104	GEN ELEC	2
	DIODE ZENER 12V CR1,2	1N5242		2
	DIODE RECT 1A CR3-5, 7-15	1N4005		12
	PICOFUSE 3A F1,2	275003	LITTLE FUSE	2
	TRANSISTOR Q1, 4-7	MM4003	MOTOROLA	5
	TRANSISTOR Q2,3, 11-14, 31	MJE340	MOTOROLA	7
	TRANSISTOR Q8-10	2N2219		3
	TRANSISTOR Q15-30	540121R	PEE	16
	RESISTOR 30.1K Ω , 1/8W, 1% R1, 2	RN55C3012		2
	RESISTOR 750K Ω , 1/8W, 1% R8, 16	RN55C7503		2
	RESISTOR 2.7 Ω , 1/4W, 5% R39			1
	RESISTOR 22 Ω , 1/4W, 5% R17			1
	RESISTOR 100 Ω , 1/4W, 5% R18, 41, 49-52, 61-64			10
	RESISTOR 220 Ω , 1/4W, 5%, R36, 33			2
	RESISTOR 390 Ω , 1/4W, 5% R15, 19, 42			3
	RESISTOR 1K Ω , 1/4W, 5% R14, 30, 31, 53-56			7
	RESISTOR 1.6K Ω , 1/4W, 5% R11			1
	RESISTOR 10 Ω , 1/4W, 5% R57-60			4
	RESISTOR 100K Ω , 1/4W, 5% R6, 78			2

ITEM	DESCRIPTION	MFG P/N	MFG	QTY
	RESISTOR 150K Ω , 1/4W, 5% R29,34,81			3
	RESISTOR 10MEG Ω , 1/4W, 5% R7,80			2
	RESISTOR 10K Ω , 1/2W, 5% R12,13, 21-25, 37,38, 43-48, 79,1			17
	RESISTOR 68K Ω , 1W, 5% R10,27,28,40			4
	RESISTOR 33K Ω , 2W, 5% R5,9,20			3
	RESISTOR 100K Ω , 2W, 5% R26			1
	RESISTOR .2 Ω , 2W, BWH R67			1
	RESISTOR 2 Ω , 2W, BWH R65,66, 68-77			12
	RESISTOR SAT R4			1
	POTENTIOMETER, 1K Ω R32,35	3009P-102	BOURNS	2
	HEATSINK HSI-4	106608	PEE	4
	HEATSINK - FINGER HS5,6	PA1-1U	IERC	2
	HEATSINK - FAN TOP HS7	TXBF-032-025B	IERC	1
	TERMINAL - TEST POINT TP1-7	1280-B	USECO	7
	CONNECTOR (15PIN MALE)	09-65-1151	MOLEX	2
	HEATSINK COVER	108061	PPSC	1
	WARNING DECAL	580020	PPSC	1
	PLUG BUTTON	207-080531-00	FASTEX	5
	SPEED NUT		TINNERMAN	4
	FERRITE BEAD L1	K500100-3B	FERROXCUBE	1

3.7 Signal Generation

The manual section covering the plug-in oscillator installed in your unit is supplied as a separate manual.

Refer to the attached plug-in manual to explain the control features that it offers as well as service and maintenance documentation.

4.0 CALIBRATION AND ALIGNMENT

4.1.1 Requirements

Pacific Power Source Corporation recommends Performance Verification Test per paragraph 4.1.2 at six-month intervals. If the unit fails this test, or if the unit has undergone major repairs, it should be recalibrated per paragraph 4.1.3.

Operation in a dusty atmosphere may require frequent removal of internally accumulated dust in the power amplifiers.

4.1.2 Performance Verification

- a) Turn unit on. Insure that all cooling fans (located on the front panel) function properly.
- b) Make sure that the time delay circuit is functioning properly as indicated by a one second delay before the output voltage reaches its set value (not applicable to "D" suffix models).
- c) Turn amplitude to zero. Using a Digital VTVM with long averaging time, verify the DC voltage from each output to common is less than 10mvdc.
- d) Turn amplitude up. Using a CRO, observe each output vector and verify clean sinusoidal appearance, at all frequencies, and at all positions of the OSC switch.
- e) Check voltmeter calibration and recalibrate if necessary.
- f) Check load regulation. Verify less than .25 vrms change in 125 vrms output with 0 to rated load per phase.
- g) On three-phase units, check Phase Separation by measuring proper vector addition with the panel meter. Set each vector output exactly 100 vrms. Set meter select switch in each position and read the following:

Voltmeter Reading

	ϕA	ϕB	ϕC	AB	BC	CA
Single-Phase	100					
3 ϕ Delta	100	100	0	100	0	0
3 ϕ Wye	100	100	100	173	173	173

4.1.3 Current Limit

Turn amplitude to zero. Apply a 1 OHM 25 Watt resistor to the ØA output. Carefully increase amplitude while observing output with CRO. Current should start limiting at about +3 amps peak per amplifier and should limit squarely as the amplitude is increased. The limit on this parameter is 2.75 + .25 amps. Adjust R32 for positive limit and R35 for negative limit as necessary to meet these limits. CAUTION: Do not adjust current above 3 amps per amplifier or damage may result to the unit. Adjust ØB and ØC amplifiers in the same manner.

Recheck after machine warms up. Make sure current does not drift to a value higher than +3.0 amps per amplifier

4.2 Oscillator Calibration

The calibration and alignment procedures for the plug-in oscillator have been incorporated in the plug-in portion of the manual supplied with the unit; please refer to that manual for service.

5.0 MAINTENANCE AND REPAIR

5.1 Pre-Service Instructions

Before servicing, check to determine if equipment is within warranty period (two years), in which case, the unit should be returned to the factory. Field repairs during this period may void the warranty.

Complete assemblies may be ordered, as well as any components, from Pacific Power Source Corporation. Always include unit model number, mod number and serial number when ordering.

5.2 Service Aids

All normal adjustments may be made by either removing the plug-in or removing the rear cover screws and exposing the power amplifiers for more accessibility.

For more detailed repairs requiring changing of components, it will be necessary to remove the power amplifier boards from the rear cover to access parts.

CAUTION: NOTE THAT THE HEATSINKS ARE ELECTRICALLY HOT AND PRESENT A HEALTH HAZARD. USE EXTREME CAUTION WHEN SERVICING THIS UNIT.

5.3 Fault Detection and Localization

This manual is created to facilitate installation, servicing and calibration of the Pacific "K" series of solid-state power sources. As are the units, this manual is modular in concept and reference must be made to the appropriate section to troubleshoot a particular module.

To locate a fault, it is necessary to determine if the problem resides in the power supply, amplifier, or plug-in module.

5.4 DC Power Supplies

There is a choice of three different power supplies that may be installed in a "K" series unit and they are designated as PS-250, PS-500, or PS-750; the model number of the power supply does not refer to the DC output rating of the supply, but to AC output of the amplifiers that they power.

5.4 DC Power Supplies Continued

They are unregulated transformer-rectifier-capacitor filter type power supplies of open-frame construction. They are identical, with the exception of the rating of the power transformer and the PS-750, in which extra filter capacitors have been added. An optional output autoformer will be installed in the cavity in "T" model units.

The transformer primary is split wound for 115/230V operation. As indicated in the schematic in section 5.2 and in 2.3 of this manual, the primary may be paralleled for 115V input or connected in series for 230V input.

Low line taps are provided on the transformer for low line conditions, as in a 208V line, but the unit should not be operated off normal line voltages with low line input taps selected.

5.5 Power Amplifier, PA-250

All "K" series machines use identical output stages, except for power level. The power amplifier section is a wide band, direct coupled output, linear amplifier. The amplifier is designed to operate from a 5 vrms signal from the signal generator module.

The transistorized linear amplifier is designed to provide up to 125 vrms output at 2 amps into normal loads.

The power amplifiers are versatile and may be operated in series or parallel, or driven out of phase for three phase output. The total output power is 250 VA times the number of amplifiers installed. Each operates off +200VDC power supplies and provides full 125 vrms output without the need of output transformers.

To achieve full output voltage without overstressing transistors, the output stage is configured as a "totem pole"; transistors are operated in series to reduce voltage stress.

Wide bandwidth and high loop gain are combined to produce good regulation, low distortion and minimal DC offset without the need for any adjustments.

5.6 PA-250 Technical Description

The front end of the PA-250 is an operational amplifier A1 operating differentially; it may be driven either inverting or non-inverting. Feedback and bandwidth shaping occur at this stage of amplification.

Transistor Q1 level shifts the signal to Q3; the voltage gain is divided over series transistors Q2 and Q3.

The four output heatsinks are operated in series to reduce voltage stresses. Transistor Q8 is the positive current limiting transistor and the level is adjusted to +3 amps with R32; likewise, transistor Q9 is the negative current limit and is adjusted to -3 amps by R35. Both current limits have foldback resistors R29 and R34, which shape the current limit as a function of the output voltage; this allows high peak currents at the peak of the sine wave and reduced current at the bottom of the sine wave for reduced stresses.

In troubleshooting this amplifier, first check if all voltages are properly dividing and then follow the signal path; finally, check the current limit adjustment as described in section 4.

If amplifiers are operated in parallel, it will be necessary to disconnect the other amplifiers to check out a particular amplifier.

6.0 MODIFICATIONS TO SPECIAL ORDER .

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