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1751SL/1001SL/751SL

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ELGAR

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LIST OF ILLUSTRATIONS

SYSTEM INFORMATION

All SL models can be interconnected in several configurations for single phase or multiphase outputs using two or three power sources.

Refer to Section III, System Interconnections, for all system information.

Standard System Components are listed in Table 3-1, page 3-4.

System Model Designations refer to total output power, output phase configuration, input/output voltage, options and special features.

EXAMPLE: MODEL 3000SL-3-11T-101

3000SL	- indicates 3000VA output power available
-3	- indicates 3 phase L-N wye output
-11T	- indicates 115VAC input, 130/260VAC output, and -T option (see Table 2-1)
-101	- indicates special features such as special front panel paint

SECTION I
INTRODUCTION

1.1 GENERAL DESCRIPTION

1.1.1 This manual describes the Elgar Model 751SL, 1001SL and 1751SL power sources. The series of power sources though functionally equivalent to previously available units, exhibit several notable improvements. Marked reductions in panel height, overall weight, and volume have been achieved. Also, provision has been made in each unit for incorporation of custom functions without resorting to special designs. Each power source described herein provides AC power at precise frequencies for testing, motor operation, and frequency conversion. The basic power amplifier consists of two DC supplies and a direct coupled amplifier driving a tapped output transformer. Nominal output voltage for each of the units is: 0-65, 0-130, 0-260 VAC. Output power at full and at less than full rated voltage is illustrated in the derating chart of Figure 1-1. Figure 1-2 illustrates a typical harmonic distortion curve. Each power source may be wired for 115, 208 or 230V input, 47-63 Hz single phase.

1.1.2 Output voltage and frequency are established by a plug-in oscillator. Output frequency range for these units is 45 Hz to 5kHz.

1.1.3 Equipment tests to meet military specification operating requirements over the frequency range of 47 to 63 Hz or 47 to 425 Hz are facilitated through the use of Elgar power sources. The basic power source output is single phase, however, multiphase power may be obtained by stacking two or three power sources, all driven by one multiphase plug-in oscillator. See Section III.

1.1.4 Each power source is contained in a standard rack mountable enclosure. A meter for output voltage monitoring, a power on indicator lamp, a voltage amplitude control and a power circuit breaker that applies line power to the unit are located on the front panel. Cooling air for the power amplifier is drawn through a side panel grills and exhausted at the rear of the enclosure.

1.1.5 The enclosure contains heatsink assemblies which comprise a two section power amplifier. Control circuitry is mounted on a plug-in circuit board with test points and an adjustment control for output voltage regulation. Output voltage monitoring is available at the rear panel terminal block and at front panel binding posts.

1.2 SPECIFICATIONS

1.2.1 Performance specifications are applicable to models 751SL, 1001SL and 1751SL.

Typical output VA for Elgar SL/SX Series AC Power Sources

Conditions:

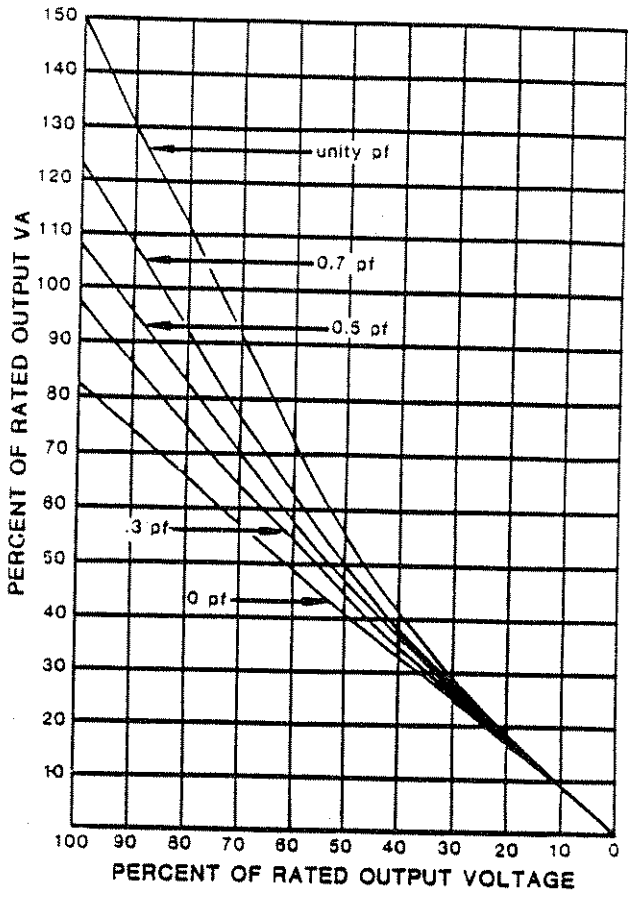
Fout = midband (200 to 500Hz)

Output distortion: ≤0.5%

Simultaneous loading of all phases for multiphase units.

Input line = nominal value

FIGURE 1-1
POWER OUTPUT DERATING



POWER DERATING CURVE

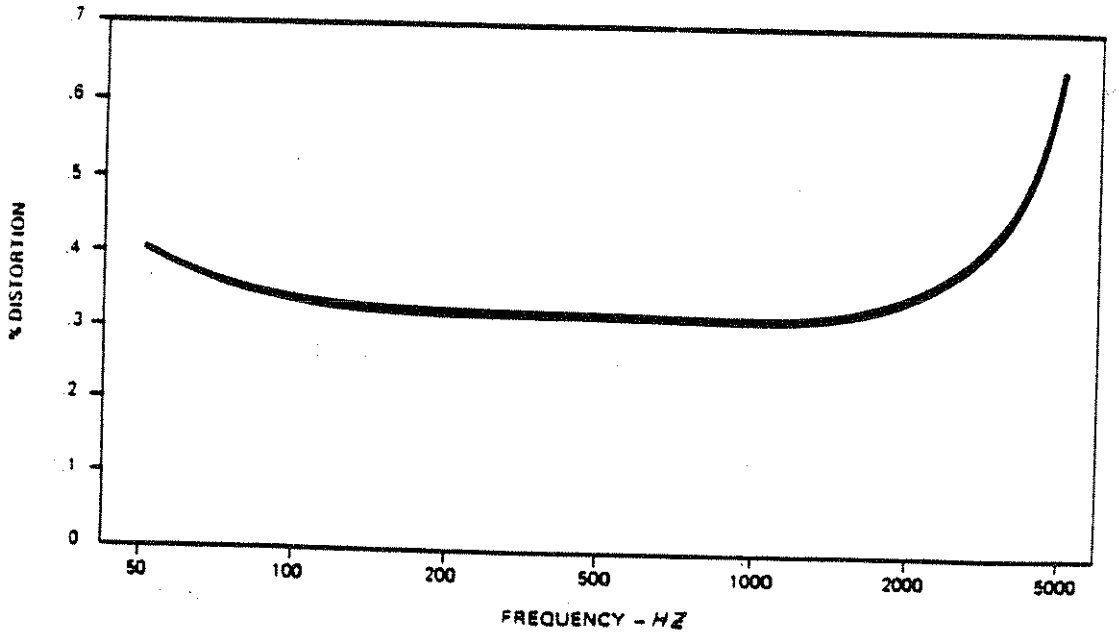


FIGURE 1-2
TYPICAL HARMONIC DISTORTION

TABLE 1-1
PERFORMANCE SPECIFICATIONS

OUTPUT CHARACTERISTICS

OUTPUT POWER:	751SL 750VA 1001SL 1000VA 1751SL 1750VA From 110 to 130 volts RMS output with a power factor from unity to ± 0.7. Refer to Figure 1-1 for power derating curve.
OUTPUT VOLTAGE RANGE:	0 to 65 volts RMS, 0 to 130 volts RMS and 0 to 260 volts RMS are available in the standard output transformer. (0 to 32 VAC and 0 to 130 VAC simultaneous output is available in an optional output transformer.)
VOLTAGE MONITOR:	Available at front panel of unit.
VOLTAGE CONTROL:	Adjustable zero to full scale output voltage with locking front panel potentiometer or optional GPIB remote.
FREQUENCY:	45 Hz to 5 kHz at full rated power.
TOTAL HARMONIC DISTORTION:	0.4% maximum from 200 Hz to 1 kHz. 0.6% maximum from 45 Hz to 5 kHz. Refer to Figure 1-2 for typical distortion curve.
LOAD REGULATION:	±1% over the range from 45 Hz to 5 kHz when tested at unity power factor. ±0.25% for fixed frequency systems between 45 Hz and 1 kHz.
LINE REGULATION:	±0.25% of rated output voltage for a ±10% input line voltage change.
RESPONSE TIME:	Less than 50 microseconds.
AC NOISE LEVEL:	70 dB below full output voltage when tested with a grounded input.
GAIN STABILITY:	±0.25% for 24 hours at constant line, load and temperature after warm-up.
OVERLOAD AND SHORT CIRCUIT PROTECTION:	Automatic electronic current limiting senses both excessive load current and/or low power factor. Automatic instantaneous reset occurs when overload is removed unless front panel circuit breaker is activated.
THERMAL PROTECTION:	Automatic resetting thermal sensor removes output voltage to prevent damage due to excessive heatsink temperature.

TABLE 1-1 (Continued)

INPUT CHARACTERISTICS

LINE VOLTAGE:	115VAC, 208VAC, or 230VAC, ±10%, single phase.
LINE FREQUENCY:	47 to 63 Hz continuous. 45 Hz to 70 Hz short term transients.
LINE POWER:	751SL, 2200 watts maximum 1001SL, 2800 watts maximum 1751SL, 5000 watts maximum
LINE VOLT-AMPERES:	751SL, 3200 watts maximum 1001SL, 4200 watts maximum 1751SL, 7500 watts maximum
LINE INPUT:	Three wire input via terminal block on rear of chassis (115VAC or 230VAC selection is made by external connection; 208VAC selection is made by internal connection.)

ATE FEATURES

RANGE CHANGE RELAYS:	Provisions for optional internal range change relays to switch between 130VAC and 260VAC ranges under GPIB control or front panel local control with optional oscillator. (Other voltage ranges available as special option.)
OUTPUT RELAY:	Provision for optional internal output relay to connect load to output of power source under GPIB control.
REMOTE SENSE:	Available with PIP and other selected oscillators.
CURRENT FEEDBACK:	Provision for optional internal current transformer to provide current feedback to PIP.
PIP SYNC IN/OUT:	Provision for optional synchronization of PIP from an external source, (sync in) or sync out signal for synchronizing a PIP to a second PIP.

TABLE 1-1 (Continued)

GENERAL

OPERATING TEMPERATURE RANGE:	0 to 50°C.
OPERATING HUMIDITY RANGE:	Up to 95% non-condensing.
CABINET MOUNTING:	Standard 19-inch RETMA rack mounting using 20-inch rack slides.
DIMENSIONS:	751SL and 1001SL, 7.0 inch high 1751SL, 12.25 inch high All models 19.0 inch wide by 22.0 inch deep from front panel mounting surface.
NET WEIGHT:	751SL, 120 lbs. 1001SL, 125 lbs. 1751SL, 185 lbs.
SHIPPING WEIGHT:	751SL, 135 lbs. 1001SL, 140 lbs. 1751SL, 200 lbs.
FRONT PANEL FINISH:	Light gray, color #26408, per Federal Standard 595A with black silk screening, color #27038.
COOLING:	Single 5.75 inch fan mounted internal to the unit with side air intake and rear air exhaust. 1751SL contains 2 5.75 inch fans.
FRONT PANEL METER:	0 to 300 VAC voltmeter provides ±3% of full scale accuracy over the 45 Hz to 1 kHz frequency range.
J1 INTERFACE CONNECTOR:	15 pin configuration for added flexibility.

SECTION II
INSTALLATION/OPERATION

2.1 UNPACKING

The Elgar Power Source has been aligned and tested prior to shipment. The instrument is therefore ready for immediate use upon receipt. The following checks should be made, however, to assure that the instrument has suffered no damage during shipment.

1. Inspect the shipping container before accepting it from the carrier. If damage to the container is evident, remove the instrument from the container and visually inspect for damage to the instrument parts.

2. If any damage to the instrument or container is evident, a description of the damage should be noted on the carrier's receipt, and signed by the driver or carrier agent. Save all shipping containers and filler material for inspection.

3. Forward a report of any damage to the Elgar Service Department, 9250 Brown Deer Rd., San Diego, CA 92121. Elgar will provide instructions for repair or replacement of the instrument.

2.2 CONTROLS AND INDICATORS

Figures 2-1 and 2-2 show the front and rear panels of the 751SL, 1001SL and 1751SL.

2.3 INSTALLATION

Warning: Hazardous voltages are present when operating this unit. Read SAFETY in Section V before placing in operation.

1. Before installing the power source, verify that the input and output voltages ranges are compatible with the available utility power and the output voltage application. See Figures 2-3, 2-4 and the serial number tags and Table 2-1 for model number definition.

2. The Elgar Power Source is designed for installation in a standard RETMA electronic equipment rack. Install the power source so that the flow of cooling air through the side panel and rear panel grills is not obstructed.

3. Insert the plug-in oscillator.

4. Connect the load to the appropriate terminals of the rear panel output terminal block TB2 (see Figure 2-3). For bench mounted applications, the front panel binding posts may be used for 115 or 230V output.

5. Connect TB1 on the rear panel to an appropriate source of single phase power as determined in step 1.

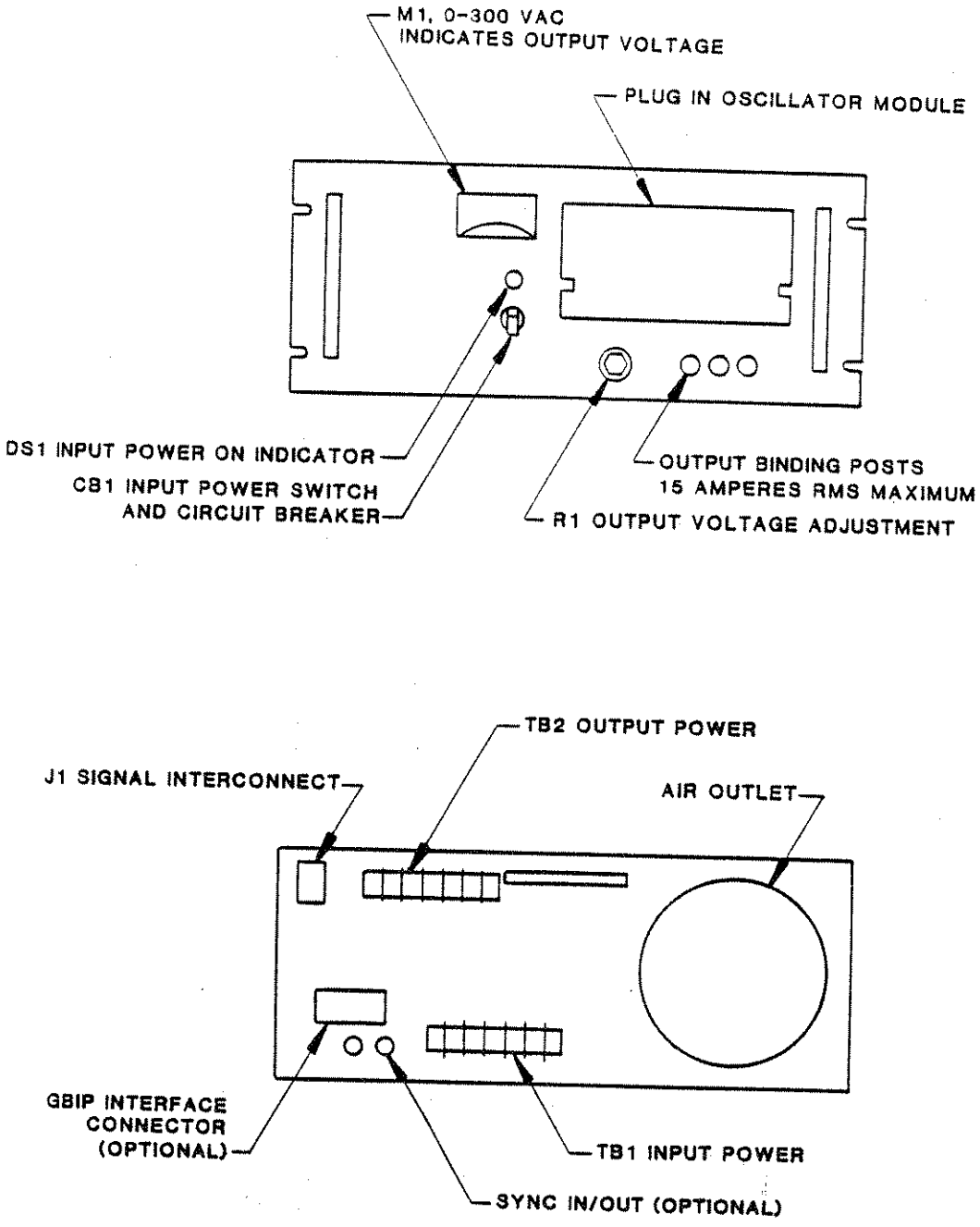


FIGURE 2-1

FRONT AND REAR PANEL VIEW
MODELS 751SL and 1001SL

6. Ensure that the front panel AMPLITUDE control is set fully CCW, then turn the front panel power switch on. The pilot lamp will illuminate, indicating power is applied to the unit.

7. Adjust the front panel AMPLITUDE control for the desired output voltage as indicated on the front panel voltmeter.

2.4 OPTIONS

Standard options are available for the power source which include several input and output voltages, automatic range changing, sync access, output monitoring and different oscillators. Some of these options are given in Table 2-1 and described thereafter.

2.5 INPUT/OUTPUT VOLTAGES

Input voltages available are 115V, 1 phase, 230V, 1 phase, and 208V, 1 phase. They are user selectable at terminal block TB1 located on the rear panel and at TB3 within the power source. Figure 2-3 defines the required jumper connections.

Output voltages available are 130VAC, 260VAC, and 65VAC. These are user selectable at terminal blocks TB2 and TB3 located on the rear panel and with unit respectively. Figure 2-4 defines the required jumper connections.

NOTE: Systems using two or more units require interconnect wiring as indicated in Section III.

2.6 OSCILLATORS

2.6.1 Power amplifiers require plug-in oscillators or an external signal of some type to be a complete power source/frequency converter.

2.6.2 Output power frequency is established by a plug-in oscillator module. A variety of fixed and variable frequency oscillator modules are available covering the range of 45 to 10 kHz at accuracies of 0.25% to .001%.

2.6.3 Specialized oscillators are available such as the Programmable PIP series which is MATE compatible and the TG-704A transient generator.

2.7 OTHER OPTIONS

Provision has been made in the SL Series for implementation of options and "specials". The large PC board, (Mother Board) has been designed with this in mind. Standard "specials" such as: automatic output voltage range change, and output current limit programming, synchronization (sync in/ sync out) and output voltage/current/power monitoring are availabe via the GPIB interface.

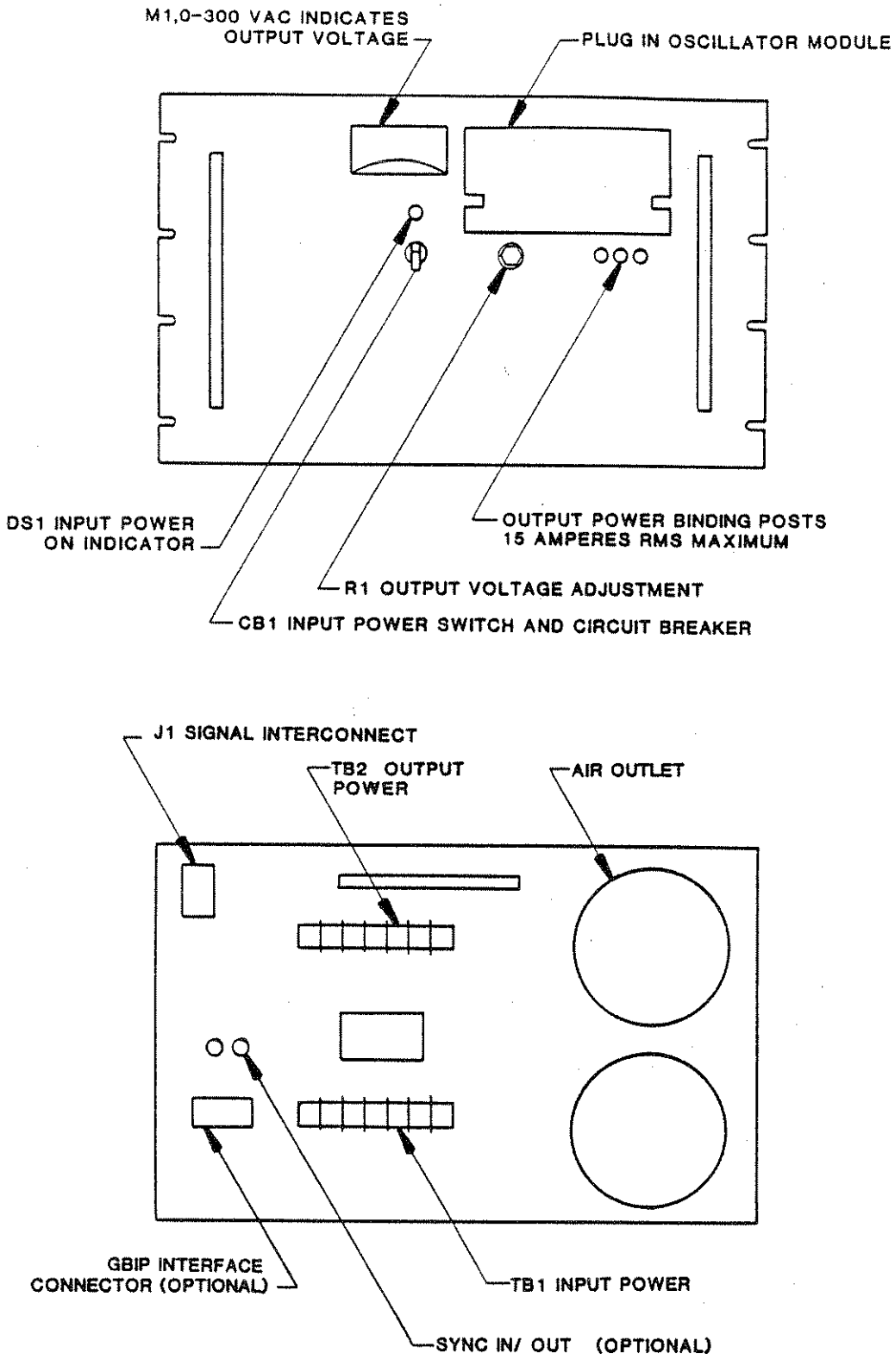
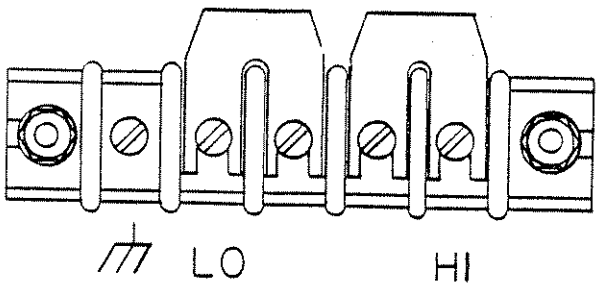


FIGURE 2-2

FRONT AND REAR PANEL VIEW
MODEL 1751SL

115VAC, 1 PHASE

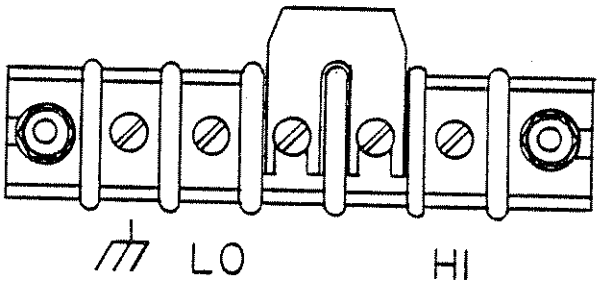
TB1



Circuit Breaker wire must be connected to T1-5 (Standard connection)

230VAC, 1 PHASE

TB1



Circuit Breaker wire must be connected to T1-5 (Standard connection)

208VAC, 1 PHASE

* If power source is shipped from factory as a 208VAC input, the serial number tag will so note.

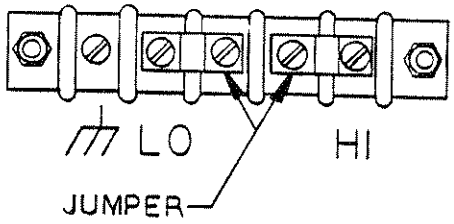
- Connect as above for 230VAC plus move wire from T1-5 to T1-4. Place insulating boot on T1-5 and sleeving at T1-4.
- To access T1, remove bottom cover.

FIGURE 2-3

INPUT VOLTAGE OPTIONS

0-130V

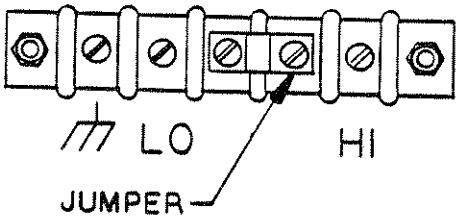
TB2



TB3 must have two jumpers only, one from 2 to 3, the other from 6 to 7.

0-260V

TB2



TB3 must have two jumpers only, one from 2 to 3, the other from 6 to 7.

65V

Connect as above for 130V plus change jumpers on TB 3 as follows: (Located inside of rear panel.)

TB3

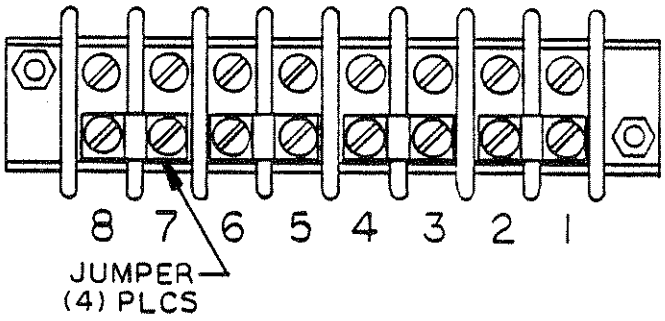


FIGURE 2-4

OUTPUT VOLTAGE OPTIONS

OTHER OPTIONS (Continued)

2.7.1 -T Option

With the addition of a current sense transformer to the power source, true rms measurement and reporting of volts, amps, frequency and watts is managed via a GPIB interface. The output voltage range will be set at 130V or 260V. Refer to Partial Schematics Figure 2-5 through 2-8.

2.7.2 -D Option

The confidence test allows the unit to verify proper output servo sensing even with a load connected to the output. The servo loop is checked locally at the power source/oscillator. This is accomplished by disconnecting the external load and servo feedback connections and switching to an internal feedback path. Relay K5 (Dwg. 5070001) switches between the normal and confidence test modes. Refer to Partial Schematic Figure 2-9.

2.7.3 -S Option

Rear panel BNC connectors are provided for oscillator sync input/output connections. Refer to Motherboard Schematic.

2.7.4 Range Change Option

Automatic range change between pre-determined output voltages (ref. Table 2-1), are enabled via a GPIB interface or from the PIP front panel local controls. Refer to Partial Schematics Figure 2-6 through 2-8.

TABLE 2-1

SL SERIES STANDARD OPTIONS

SERIAL NUMBER
TAG DASH #

1	1	T
INPUT VOLTAGE	OUTPUT VOLTAGE	STANDARD OPTIONS
-1 115VAC, 1 phase 47-63 Hz	-1 130/260VAC*	-T Monitoring and current limit programming via GPIB!
-2 230VAC, 1 phase 47-63 Hz	-2 260/130VAC**	-D Output Disconnect relay via GPIB (Confidence test)
-3 208VAC, 1 phase 47-63 Hz	-3 65/130VAC*	-S Sync in/out
-4 115VAC, 1 phase 400 Hz	-4 130/260VAC***	
	-5 65/130VAC***	
	-6 65/130/260VAC***	
	-7 35VAC	
	-8 65/260VAC***	
	-9 32V, 130V simultaneously	

* Standard manual range change on rear output barrier strip.

** Standard manual range change on rear output barrier strip but set up for 0-260VAC at factory.

*** Automatic range change via GPIB (PIP).

! T option requires that the output voltage range be set at 130V or 260V. Internal reconnections are required to change range. Output voltage options: -4,-5,-6,-8 can provide relay range change capability.

NOTE: A 0 to 300VAC output voltmeter is standard on all SL units.

EXAMPLE: Complete model designation 1001SL-12T indicates that unit is connected for 115VAC input, 0-260VAC output and has full -T option capabilities.

FIGURE 2-5

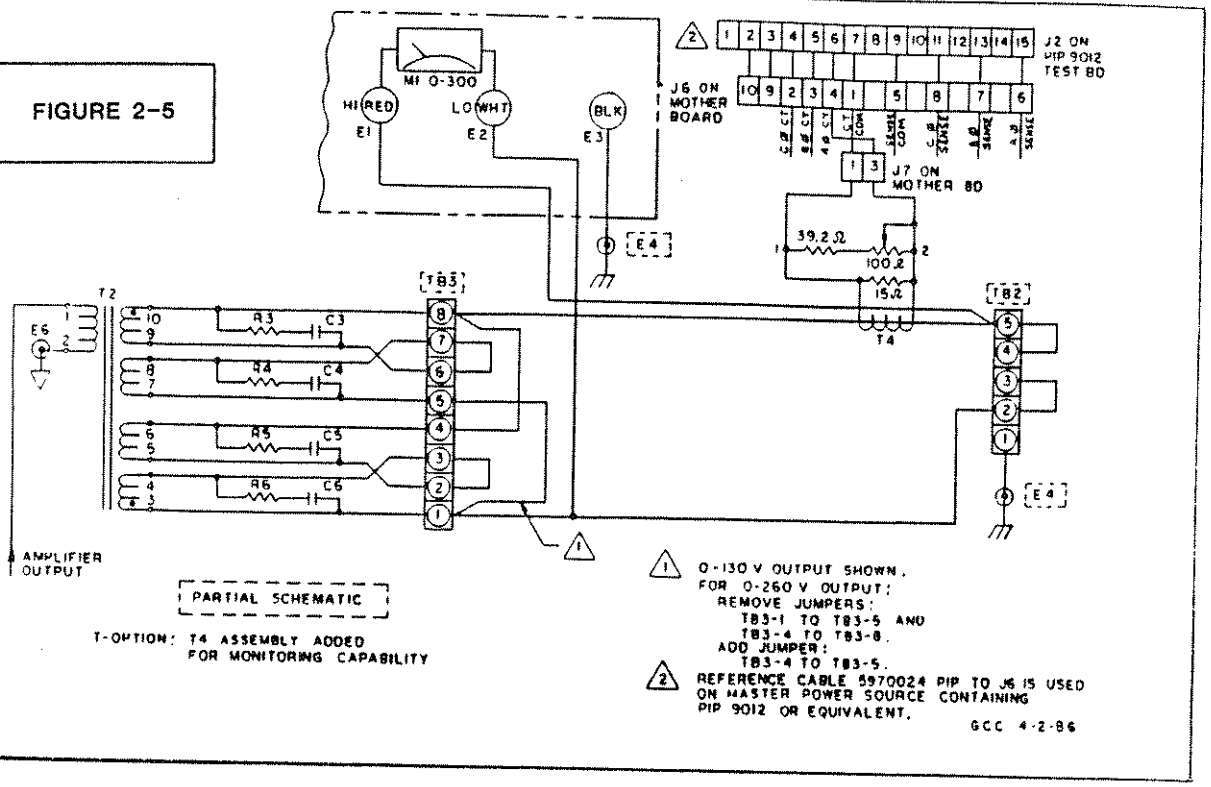
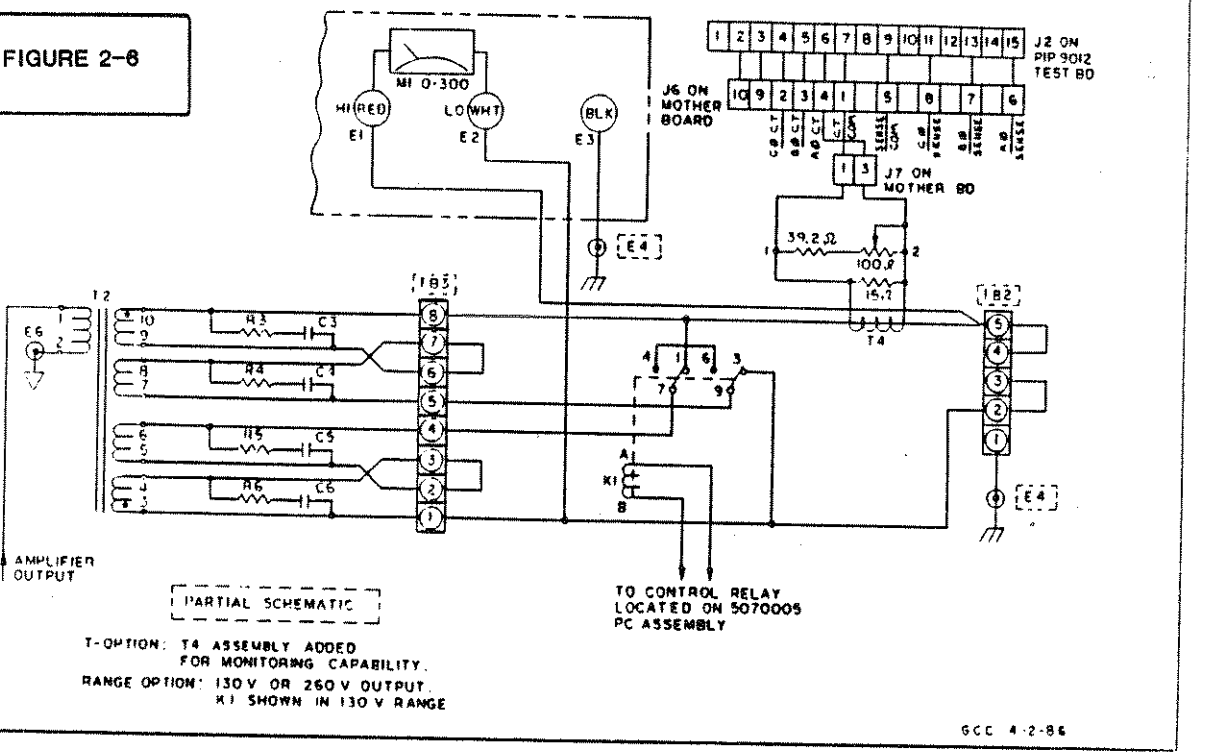


FIGURE 2-6



PARTIAL SCHEMATIC - OPTIONS
OUTPUT MONITORING//130V/260V RANGING

FIGURE 2-7

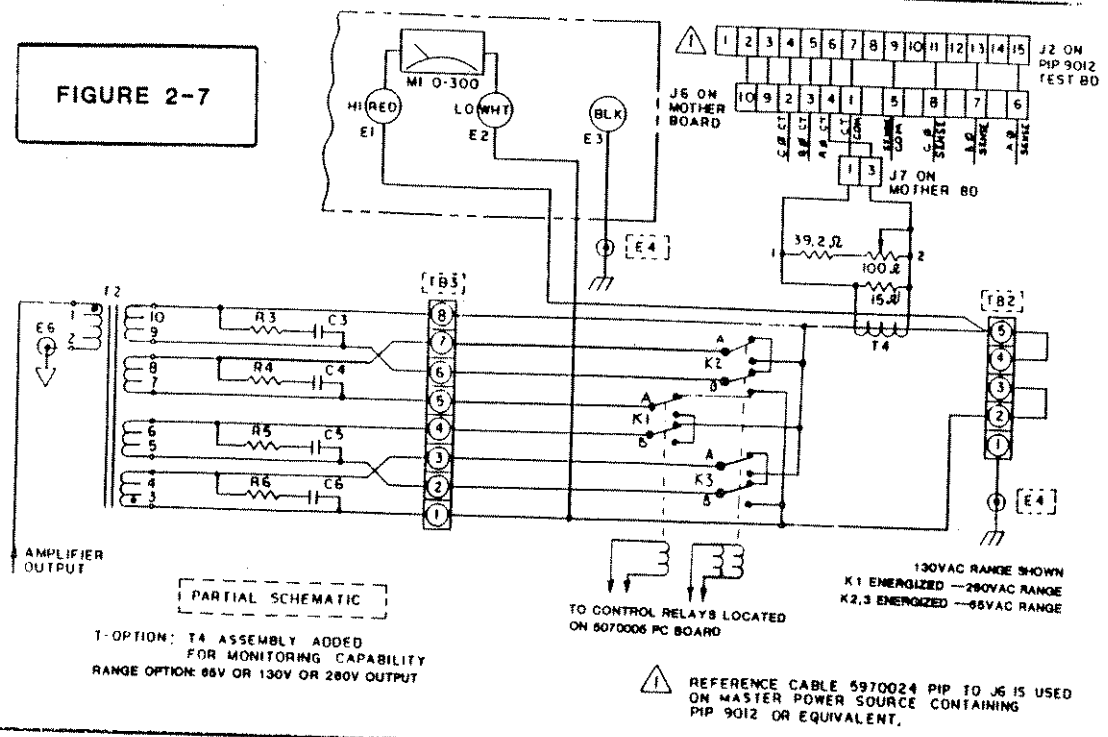
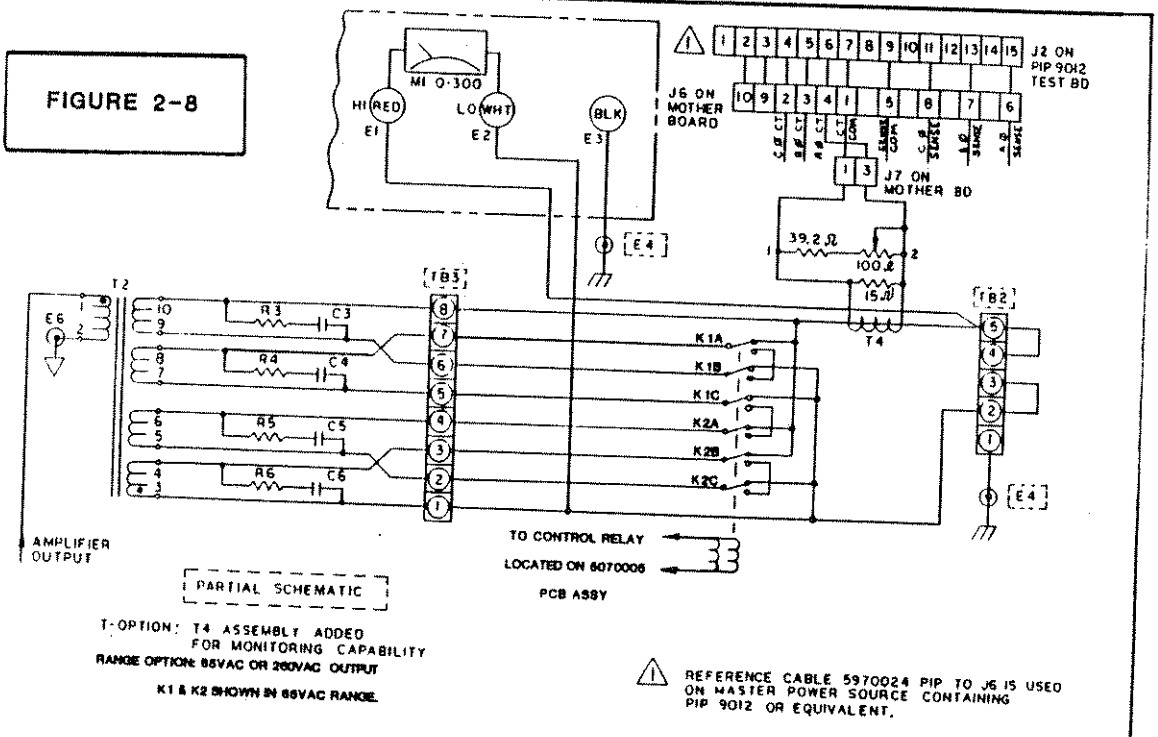
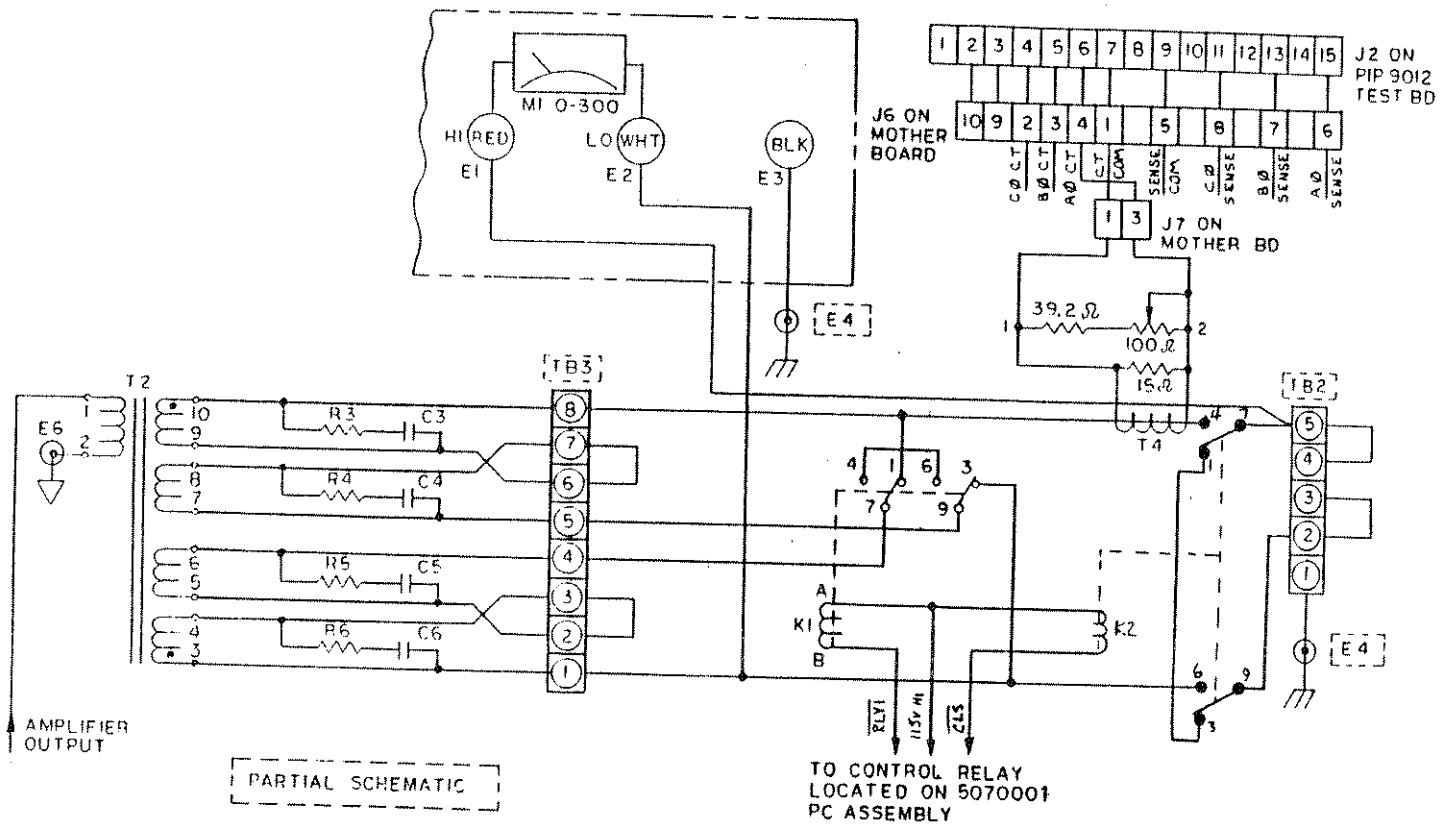


FIGURE 2-8



PARTIAL SCHEMATIC - OPTIONS
65V/130V/260V RANGING//65V/260V RANGING



T-OPTION: T4 ASSEMBLY ADDED FOR MONITORING CAPABILITY.

RANGE OPTION: 130 V OR 260 V OUTPUT. K1 SHOWN IN 130 V RANGE.

D-OPTION: K2 ADDED TO CONNECT/DISCONNECT OUTPUT. SPECIAL PC BOARD REQ'D. 5070001 FOR INTERNAL SELF-TEST FUNTIONS.

FIGURE 2-9

PARTIAL SCHEMATIC - OPTIONS
CONFIDENCE TEST (-D OPTION)

FINAL ASSEMBLY - CHASSIS PARTS - 1001SL, 751SL

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
B1		Fan-Blower	115V	853-MA2-B4
C1,2	40Kufd	Capacitor	75V	826-403-75
C3,4,5,6	.22ufd	Capacitor	600V	822-224-06
C7	.10ufd	Capacitor	600V	822-104-06
*CB1	2 Pole	Circuit Breaker	20A	852-203-50
DS1	Green	Lamp	115V	854-115-GN
E1	Red	Binding Post	15A	891-030-02
E2	White	Binding Post	15A	891-030-09
E3	Black	Binding Post	15A	891-030-00
P1 P1-Pins		Rear Panel Plug, Mating with J1	6A 6A	856-115-9M 856-111-8M
J6,7	12 Pin	Socket-Heatsink	15A	856-412-S1
M1	0-300VAC	Meter	1ma	857-300-82
R1,2	10K	Resistor	10W,5%	808-102-05
R3,4,5,6	5.6	Resistor	5W,5%	807-5R6-05
*R7	.015	Resistor	50W	810-R15-05
*T1		Input Transformer		5900244-01
*T2		Output Transformer		5900245-01
T3		Current Transformer		991-260-90
U1	200V	Diode Bridge	100A	847-100-AB
*751SL Parts				
CB1	2 Pole	Circuit Breaker	15A	852-153-53
T1		Input Transformer		5900275-01
T2		Output Transformer		5900314-01
R7	.025	Resistor	50W	810-R02-05

FINAL ASSEMBLY - CHASSIS PARTS - 1751SL

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
B1,2		Fan-Blower	115V	853-MA2-B4
C1A,2A	40Kufd	Capacitor	75V	826-403-75
C1B,2B	27Kufd	Capacitor	75V	826-273-75
C3,4,5,6	.22ufd	Capacitor	600V	822-224-06
C7	.10ufd	Capacitor	600V	822-104-06
CB1	2 Pole	Circuit Breaker	30A	852-303-50
DS1	Green	Lamp	115V	854-115-GN
E1	Red	Binding Post	15A	891-030-02
E2	White	Binding Post	15A	891-030-09
E3	Black	Binding Post	15A	891-030-00
J6A,6B,7A,7B	12 Pin	Socket-Heatsink	15A	856-412-S1
M1	0-300VAC	Meter	1ma	857-300-82
P1 P1-Pins		Rear Panel Plug, Mating Pins J1	6A 6A	856-115-9M 856-111-8M
R1,2	10K	Resistor	10W,5%	808-103-05
R3,4,5,6	5.6	Resistor	5W,5%	807-5R6-05
R7A,7B	.015	Resistor	50W	810-R15-05
T1		Input Transformer		5900269-01
T2		Output Transformer		5900327-01
U1	200V	Diode Bridge	60A	847-60A-BR

PREAMPLIFIER PC BOARD ASSY

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
C1	10uf	Capacitor	50V,10%	822-106-10
C2	.0068uf	Capacitor (FSV)	100V,1%	822-682-11
C3	.022uf	Capacitor (FSV)	200V,10%	822-223-05
C4	4.7uf	Capacitor	35V	823-475-61
C5	47pf	Capacitor	500V,5%	820-470-05
C6	300pf	Capacitor	500V,5%	820-301-05
C7	50uf	Capacitor	50V	824-506-71
C9	220uf	Capacitor	10V	823-227-61
C10,12	.10uf	Capacitor	200V,10%	822-104-05
CR1		Zener 1N5242	12V	843-524-2X
CR2-8		Diode 1N4004	400V,1A	845-400-4X
L1	150uh	Inductor		851-150-01
Q1,Q4	2N3583	Transistor, NPN	1A	839-358-3X
Q2	PN3643	Transistor, NPN	150ma	835-364-3P
Q3	PN2907	Transistor, PNP	150ma	832-P29-07
Q5	2N6211	Transistor, PNP	2A	842-621-1X
R1	3.32K	Resistor	1/8W,1%	813-332-1F
R2,6,16	4.7K	Resistor (R2, FSV)	1/2W	802-472-05
R3	5.11K	Resistor	1/8W,1%	813-511-1F
R4	2.2K	Resistor	1W	803-222-05
R5	6.2K	Resistor	1/2W	802-622-05
R7	1.2K	Resistor	1/2W	802-122-05
R8	47	Resistor (FSV)	1/2W	802-470-05
R9	8.2K	Resistor	1/2W	802-822-05
R10,14,15	33	Resistor	1/2W	802-330-05

HEATSINK ASSEMBLY 1001SL, 751SL

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
5920026-01 ASSEMBLY - 1001SL w/THERMOSTAT				
CR1,2	200V	Diode	20A	845-368-DX
Q1-16	2N6259	Transistor	170V,16A	841-V62-59
R1	5.6	Resistor	5W,5%	807-5R6-05
R2-8	.22	Resistor	5W,5%	807-R22-05
TK1		Thermostat		861-340-0X
5920026-02 ASSEMBLY - 1001SL w/o THERMOSTAT				
CR1,2	200V	Diode	20A	845-368-DX
Q1-16	2N6259	Transistor	170V,16A	841-V62-59
R1	5.6	Resistor	5W,5%	807-5R6-05
R2-8	.22	Resistor	5W,5%	807-R22-05
5071026-01 ASSEMBLY - 751SL w/THERMOSTAT				
CR1,2	200V	Diode	20A	845-368-DX
Q1,2,4,6,8,10, 12,14,16	2N6259	Transistor	170V,16A	841-V62-59
R1	5.6	Resistor	5W,5%	807-5R6-05
R2,4,6,8	.22	Resistor	5W,5%	807-R22-05
TK1		Thermostat		861-340-0X
5071026-02 ASSEMBLY - 751SL w/o THERMOSTAT				
CR1,2	200V	Diode	20A	845-368-DX
Q1-2,4,6,8,10, 12,14,16	2N6259	Transistor	170V,16A	841-V62-59
R1	5.6	Resistor	5W,5%	807-5R6-05
R2,4,6,8	.22	Resistor	5W,5%	807-R22-05

PREAMPLIFIER PC BOARD ASSY

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
R11	33.2K	Resistor	1/8W,1%	813-332-2F
R12,13	2.2K	Resistor	2W	804-222-05
R23,25	10K	Resistor	1/2W	802-103-05
R26	1K	Potentiometer		819-102-30
R27	15	Resistor	1/2W	802-150-05
R28,30	4.7	Resistor	1/2W	802-4R7-05
R29,31,34,35	100	Resistor	1/2W	802-101-05
R32,33	10	Potentiometer		819-100-30
U1	2N3810	Differential Amp		849-381-0X
MOTHER BOARD PC BOARD ASSY 5070005				
MBJ1	7 Pin	Connector	5 amp	856-107-11
MBJ2	8 Pin	Connector	5 amp	856-108-11
MBJ3	15 Pin	Connector	5 amp	856-115-11
MBJ4	6 Pin	Connector	5 amp	856-106-11
MBJ5	4 Pin	Connector	5 amp	856-104-11
MBJ6	9 Pin	Connector	5 amp	856-109-11
MBJ7	3 Pin	Connector	5 amp	856-103-11
* MBK1,3	28V	Relay-Solid State	2 amp	861-28V-2A
MBK2	115V	Relay	5 amp	861-R10-E1
XA1	22 Pin	Conn. Oscillator		856-22P-90
XA2	22 Pin	Conn. Preamp		856-22P-PC

* SPECIAL FUNCTION COMPONENTS.

HEATSINK ASSEMBLY 1751SL

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
5121024-01 ASSEMBLY - 1751SL w/THERMOSTAT				
CR1,4	200V	Diode	20A	845-368-DX
Q1-32	2N6259	Transistor	170V,16A	841-V62-59
R1	5.6	Resistor	5W,5%	807-5R6-05
R2-8	.22	Resistor	5W,5%	807-R22-05
TK1		Thermostat		861-340-0X
5121024-02 ASSEMBLY - 1751SL w/o THERMOSTAT				
CR1-4	200V	Diode	20A	845-368-DX
Q1-32	2N6259	Transistor	170V,16A	841-V62-59
R1	5.6	Resistor	5W,5%	807-5R6-05
R2-8	.22	Resistor	5W,5%	807-R22-05
OPTIONAL ASSEMBLIES/PARTS				
5071029-01 ASSEMBLY - TEST OPTION SL SERIES				
T1		Current Xfmr		9900202-01
R2	15	Resistor	1%	818-15T-2F
R3	39.2	Resistor	1%	813-39R-2F
R4	100	Potentiometer		819-101-30
RANGING OPTION				
K1,2	3PDT	Relay	15A	861-W38-8A
SYNCHRONIZATION OPTION				
Sync in/sync out		BNC Connector		856-310-10

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
DISCONNECT OPTION				
K3	3PDT	Relay	15A	861-W38-8A
MOTHER BOARD PC BOARD ASSEMBLY		5070001 W/D-OPTION		
MBJ1	7 Pin	Connector	5 amp	856-107-11
MBJ2	8 Pin	Connector	5 amp	856-108-11
MBJ3	15 Pin	Connector	5 amp	856-115-11
MBJ4	6 Pin	Connector	5 amp	856-106-11
MBJ5	4 Pin	Connector	5 amp	856-104-11
MBJ6	10 Pin	Connector	5 amp	856-110-11
MBJ7	3 Pin	Connector	5 amp	856-103-11
MBJ8	9 Pin	Connector	5 amp	856-109-11
MBK1	28VDC	130/260V Range Dr. Rly	2 amp	861-28V-2A
MBK2	115V	Oscillator Signal Rly	5 amp	861-R10-E1
MBK3	28VDC	65/130/260V Range Dr. Rly	2 amp	861-28V-2A
MBK4	28VDC	D-Option Dr. Rly	2 amp	861-28V-2A
MBK5	115V	D-Option Sense Rly	5 amp	861-R10-E1
XA1	22 Pin	Conn. Oscillator		856-22P-90
XA2	22 Pin	Conn. Preamp		856-22P-PC

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	ELGAR PART NUMBER
OPTIONAL CABLES	(Connects to Mother Board):			
MBJ8		Aux signal cable used with D-Option		5970012-01
MBE1,E3		Sync Out Cable used with S-Option		5970023-01
MBE2,E3		Sync In Cable used with S-Option		5970023-01
MBJ5		Relay Drive Cable used with -T or -TD Option		5970013-01
MBJ6		PIP Test Cable used with -T Option		5970024-01
MBJ7		CT Cable used with -T Option		5970025-01

SECTION III
SYSTEMS INTERCONNECTION

3.1 MULTIPHASE OPERATION

3.1.1 Two or three sources may be interconnected to generate two or three phase AC power. Refer to Table 3-1, Standard System Components and General Information. Two or three phase signals are developed by a multiphase oscillator installed in the A phase power amplifier. Signals from the oscillator are routed to the B phase and/or C phase power amplifiers through a signal interconnect cable. These signals are then applied to the front panel AMPLITUDE control on each amplifier by a signal routing plug-in which must be installed in the unit. Upon initial calibration of the system the voltage of the A phase unit is adjusted to a desired value i.e. 115VAC. The other phase amplifier(s) output voltages are then adjusted by means of their front panel amplitude controls to equal the output voltage of A phase. After this initial calibration has been accomplished, the voltage control on the A phase amplifier is used to vary the output voltage of all phases simultaneously and equally.

3.1.2 Two phase operation requires two power sources. Three phase operation may be accomplished with three power sources, two power sources in open delta configuration, or two power sources in phantom wye configuration. Refer to Figure 3-2 for output interconnect information for the various systems.

3.1.3 In the open delta configuration two power amplifiers of equal VA rating are driven by a standard three phase oscillator having 120° phase angle between Phase A, Phase B and Phase C. An open delta requires that the two amplifiers have a 60° phase angle between them. This is accomplished by inverting the output from the second amplifier.

3.1.4 In these systems the amplifier containing the plug-in oscillator is referred to as the master or A phase source. The second amplifier is referred to as the slave or B phase source.

3.1.5 The vector diagram from the open delta connection is shown in Figure 3-1.

3.1.6 The 400 SR plug-in is a universal signal routing plug-in used in multiphase systems to route drive signals from a master plug-in oscillator or an external oscillator source. The routing is accomplished by the closing of specific switches on the 8 pole single throw DIP switch. Refer to Figure 3-4. Standard plug-ins are as follows (for special configurations refer to the addendum).

Model 400A — External oscillator adaptor. Has front panel phone jack and routes signal to power amplifier input. DIP switch not necessary. If present, switches 7 and 8 must be ON connecting pins 14 to 21 and 16 to 12.

Model 400B — Blank plug-in used in second amplifier (B phase) of multiphase system. Routes appropriate signal from oscillator in first amplifier to second amplifier input. Switches 6, 7 and 8 must be ON, connecting pins 22 to 11, 21 to 14, 16 to 12.

Model 400C — Blank plug-in used in third amplifier (C phase) of the 3 amplifier, 3 phase system. Routes appropriate signal from oscillator in first amplifier to third amplifier input. Switches 5, 7 and 8 must be ON, connecting pins 22 to 10, 21 to 14, 16 to 12.

Model 400BT — Blank plug-in in second amplifier(s) in a Tandem System such as 2000SL-1. Also used in single phase TG704A systems or in phase A of multiphase TG704A-3 systems. Switches 4, 7 and 8 must be ON connecting pins 22 to 9, 21 to 14 and 16 to 12.

Model 400DPA — Blank plug-in used in certain single phase PIP or servo controlled systems as A phase signal routing. Switches 4 and 8 must be ON, connecting pins 14 to 9, and 16 to 12.

Model 400DPB — Blank plug-in used in phase B of multiphase PIP or servo controlled oscillator systems. Switches 1 and 8 and must be ON connecting pins 14 to 11 and 16 to 12.

Model 400DPC — Blank plug-in used in phase C of multiphase PIP or servo controlled oscillator systems. Switches 2 and 8 must be ON connecting pins 14 to 10 and 16 to 12.

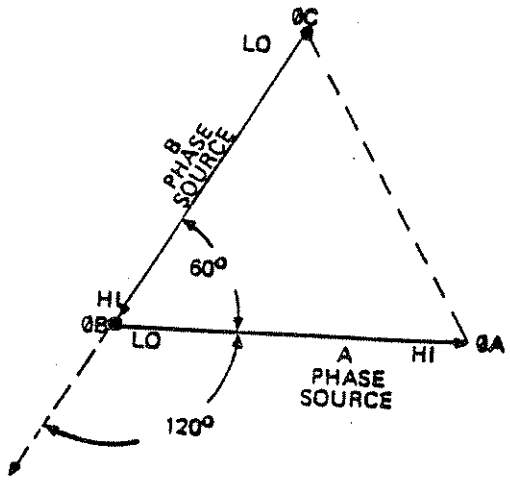


FIGURE 3-1

VECTOR DIAGRAM/OPEN DELTA

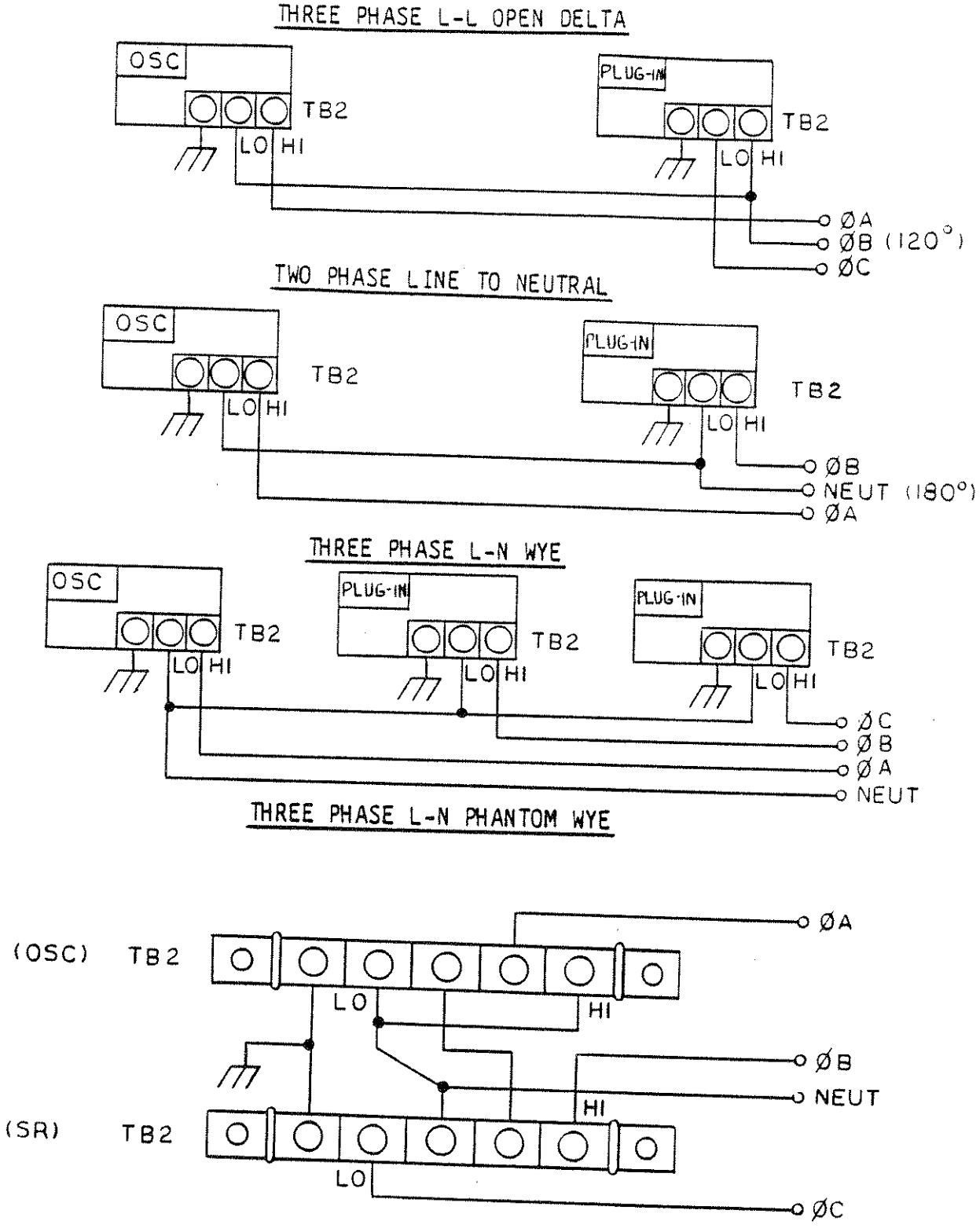


FIGURE 3-2

SYSTEM INTERCONNECTIONS

TABLE 3-1

STANDARD SYSTEMS
1, 2 OR 3 PHASE USING 2 OR 3 POWER SOURCES

SYSTEM MODEL	POWER SOURCE	PLUG-IN STANDARD	PLUG-IN SERVO	CABLE STANDARD	CABLE SERVO
1500SL-1	751SL(2)	400BT	400DPA	5970042	5970030
1500SL-2	751SL(2)	400C	400DPC	5970042	5970030
1500SL-3D	751SL(2)	400C	400DPC	5970042	5970030
2250SL-3	751SL(3)	400B,400C	400DPB,400DPC	5970041	5970029
2000SL-1	1001SL(2)	400BT	400DPA	5970042	5970030
2000SL-2	1001SL(2)	400C	400DPC	5970042	5970030
2000SL-3D	1001SL(2)	400C	400DPC	5970042	5970030
3000SL-3	1001SL(3)	400B,400C	400DPB,400DPC	5970041	5970029
3500SL-1	1751SL(2)	400BT	400DPA	5970042	5970030
3500SL-2	1751SL(2)	400C	400DPC	5970042	5970030
3500SL-3D	1751SL(2)	400C	400DPC	5970042	5970030
5250SL-3	1751SL(3)	400B,400C	400DPB,400DPC	5970041	5970029

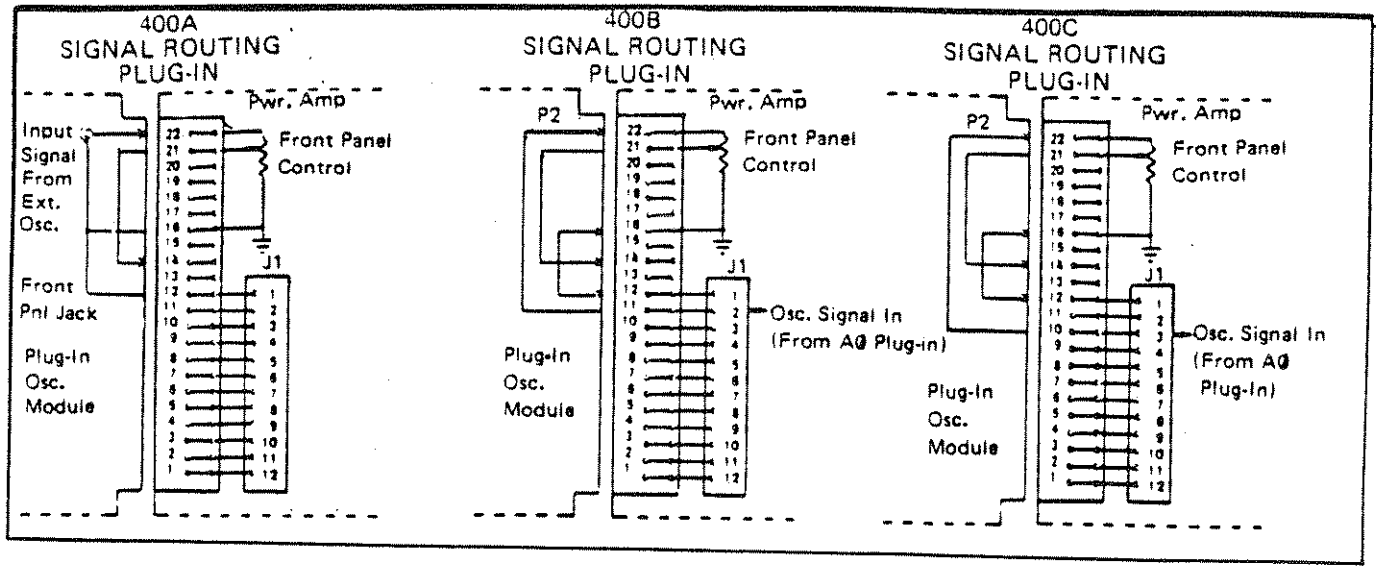
NOTES:

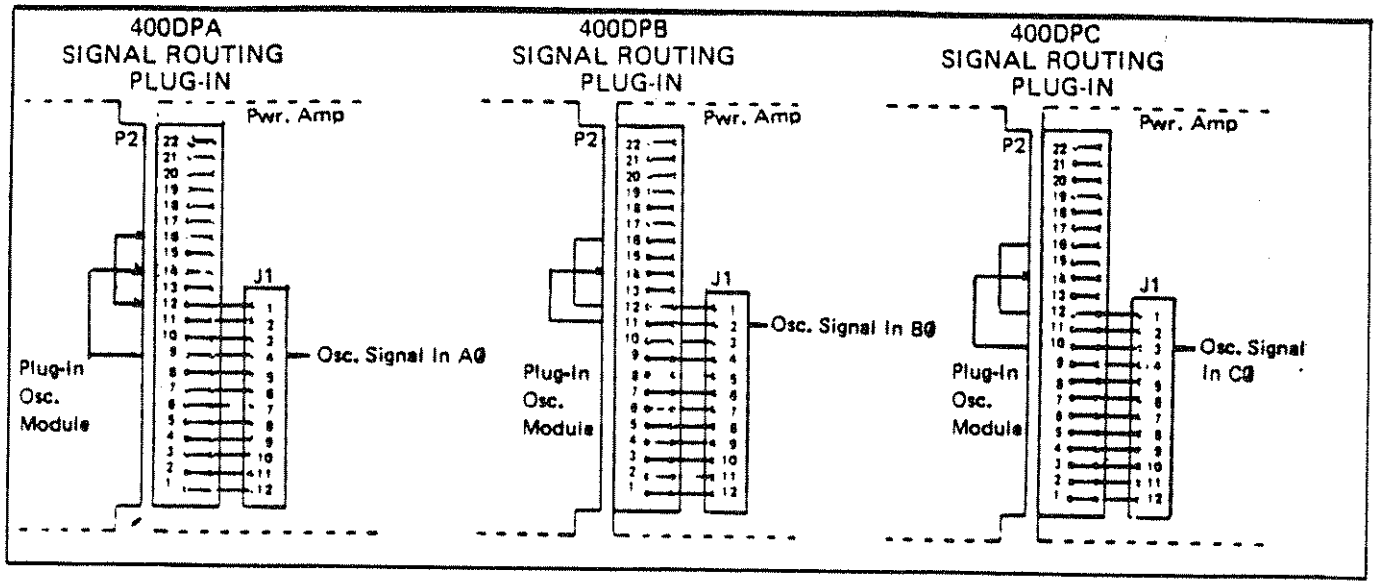
1. A three digit dash number may be used to identify system input, output or special functions. Refer to Table 2-1 for information.

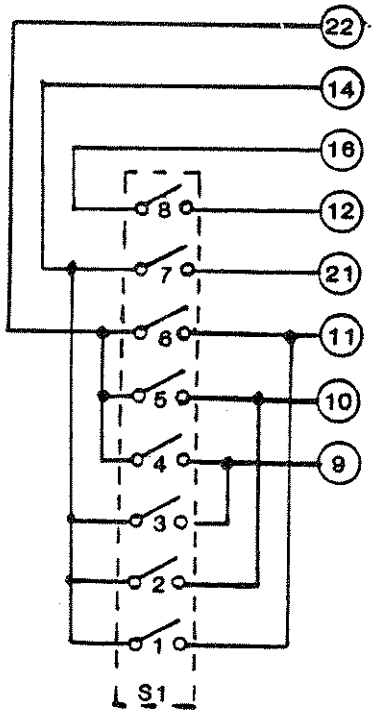
   Example: 3000SL-3-11T will be 115VAC input, 130/260VAC output with -T option monitoring.

2. An additional plug-in master oscillator is required to complete the system, such as a model PIP9012-3, a 3 phase oscillator would be used in a 3000SL-3 system.

3. An additional cable, 5970014, is required for auxillary signal interconnect when -D option is installed in a 3 amplifier system.







MODEL 400SR CONTAINS AN 8 POLE SWITCH, S1, WHICH IS USED TO SELECT 1 OF 7 CONFIGURATIONS.

REFER TO SECTION III FOR ADDITIONAL INFORMATION.

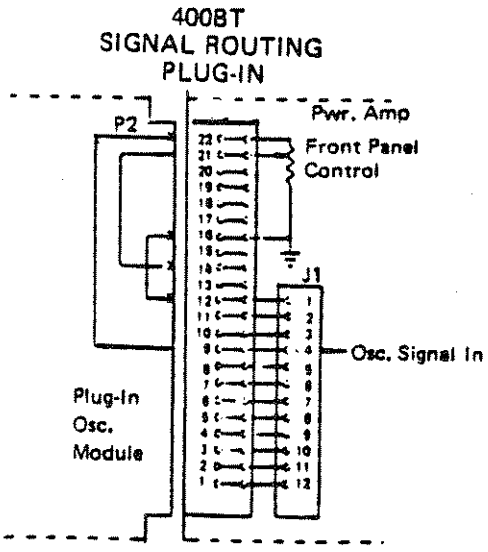
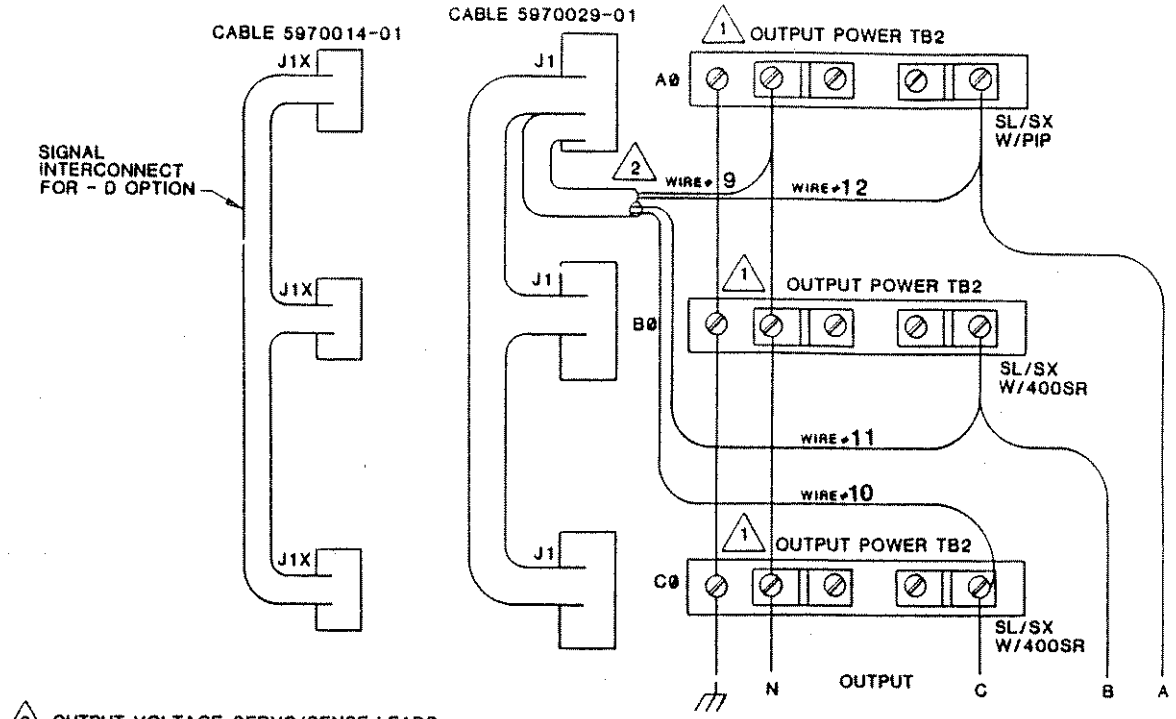


FIGURE 3-4

SIGNAL ROUTING PLUG-IN CONNECTIONS



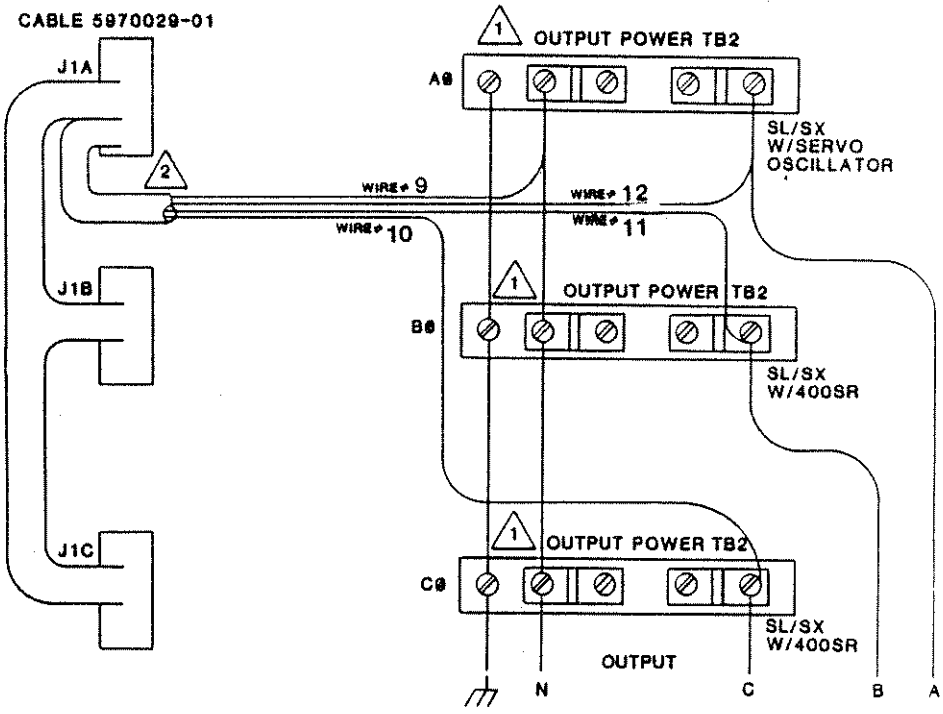
2 OUTPUT VOLTAGE SERVO/SENSE LEADS MUST BE CONNECTED AT THE LOAD TO ACHEIVE LINE/LOAD REGULATION SPECIFICATIONS.

1 0-130 VAC SHOWN REFER TO SECTION II FOR OUTPUT OPTIONS.

NOTES: UNLESS OTHERWISE SPECIFIED.

3 AMPLIFIER SL/SX, 3 PHASE SYSTEM WITH - D OPTION, SERVO CONTROL

Figure 3-6: System output/signal interconnect with -D option.



2 OUTPUT VOLTAGE SERVO/SENSE LEADS MUST BE CONNECTED AT THE LOAD TO ACHIEVE LINE/LOAD REGULATION SPECIFICATIONS.

1 0-130 VAC SHOWN REFER TO SECTION II FOR OUTPUT OPTIONS.

NOTES: UNLESS OTHERWISE SPECIFIED.

3 AMPLIFIER SL/SX, 3 PHASE SYSTEM WITH SERVO OSCILLATOR

Figure 3-5: System output/signal interconnect

SECTION IV
THEORY OF OPERATION

4.1 CIRCUIT DESCRIPTION

4.1.1 Block Diagram. Figure 4-1 outlines the fundamental components of the power amplifier described hereafter.

1. The circuitry for the power amplifier consists of a preamplifier/ power stage of which the gain is stabilized and determined by an AC feedback loop. Regulation is controlled by another feedback path from transformer T3.

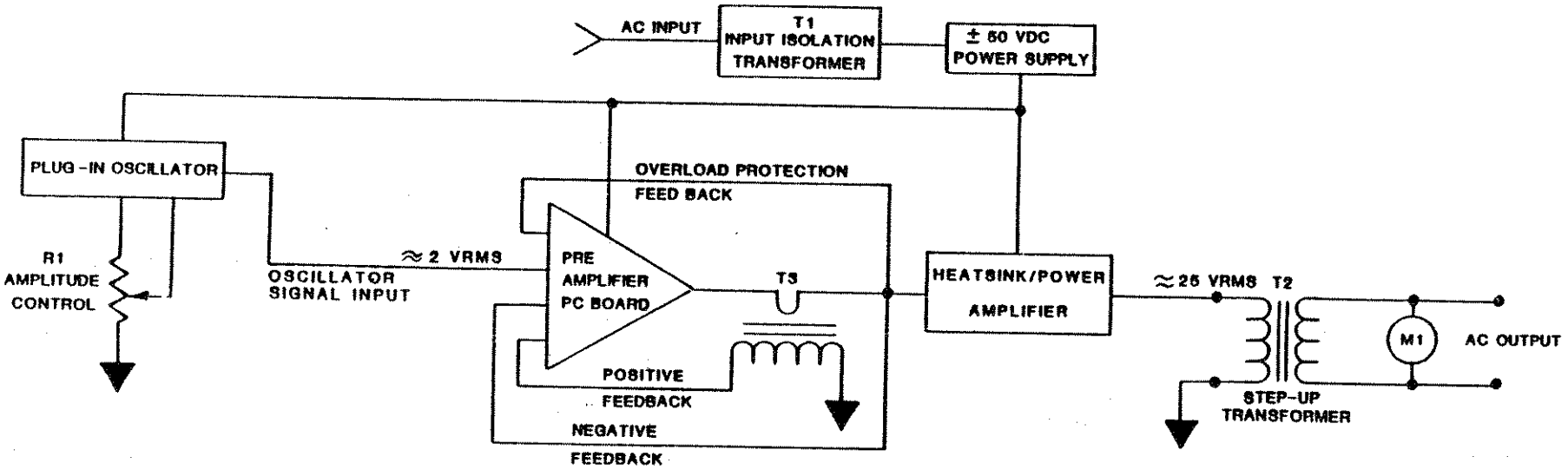
2. To realize an overall gain sufficient to provide for the required power amplifier output voltages, a step-up transformer T2 is interposed between the power amplifier and the output load. The output voltage is monitored by meter M1.

3. An input signal with a magnitude of approximately 2V rms is required for the preamplifier and is controlled by R1, the front panel AMPLITUDE control. The signal is derived from either a plug-in oscillator module or from an external signal source.

4.1.5 Schematic Outline. Schematics for the power amplifier are found in Section VI, Support Documents, Figures 6-1, 6-2, and 6-4 which the following text describes.

1. The preamplifier circuit as shown in the schematic, Figure 6-6, consists of a first stage differential amplifier U1A/B. The differential amplifier receives feedback from the output amplifier, thereby maintaining approximately zero DC offset to the output transformer. The emitter currents are supplied by R5 from the +12V supply, regulated by CR1. The output of U1B provides base drive for Q1 operating as a class A amplifier. Q1 supplies base drive for common emitter driver Q5 and emitter follower Q4. Diodes CR2, 3 and 4 provide a small amount of forward bias to the output amplifier to minimize crossover distortion. Q4 and Q5 are drivers for emitter followers located on the power heatsink assemblies. Transistors Q2 and Q3 are part of a circuit designed to protect power transistors on the power heatsink assemblies.

2. The power amplifier as shown in schematics, Figure 6-8, 6-10 or 6-12, consists of power transistors mounted on heatsink assemblies in the wind tunnel. The .22 ohm resistors in the emitter of each device are to ensure equal current sharing. The preamplifier and the output stage are operated from nominal plus and minus 50VDC supplies. Thermal switch TK1 shown on heatsink layout removes drive signal from the power amplifier in the event the amplifier overheats from excessive load or restricted airflow through the wind tunnel.



SL BLOCK DIAGRAM

FIGURE 4-1
MODEL 751SL, 1001SL & 1751SL
BLOCK DIAGRAM

3. Power transistor protection on the preamplifier is driven by feedback from the heatsink assemblies. Current flow in the upper half of the power heatsink is sampled by R6 on the heatsink assembly. The voltage from R6 is then applied through R29 to the base of upper current limit transistor Q2 (reference Preamplifier Schematic). When the voltage reaches the conduction threshold (approximately .6V) of Q2, Q2 conducts and diverts drive current from the base of Q4 thus preventing any further increase in output current. Simultaneously, the current in the lower half of the power amplifier is sampled by R7, 50W resistor (reference Interconnect Diagram). This voltage is applied through R31 to the base of lower limit transistor Q3 (reference Preamplifier Schematic). Q3 conducts when the current in the lower half of the power amplifier reaches limit threshold and prevents further increase in the output current. The resistor-diode network in the base circuits of Q2 and Q3 senses the amplifier output voltage and modifies the bias voltages of Q2 and Q3 to further reduce the output current under short circuit or severe overload conditions, thus preventing excess dissipation in the power amplifier transistors.

4. The power amplifier output (approximately 25 Vrms) is connected to output transformer T2, which steps up the amplifier voltage to the required output level. Negative AC feedback is taken from the amplifier output to the base of U1A through resistor R11. Capacitor C5 across R11 helps stabilize the amplifier against high frequency instabilities.

5. In order to maintain proper load regulation, the primary current in T2 is sensed through T3 current transformer. As load is applied to the output of the unit a positive feedback signal is developed at the secondary of T3, and applied across shunt resistor R27 and regulation adjustment potentiometer R26. This signal is then applied to the input of the differentrial amplifier through R3. Capacitor C2 and resistor R2 comprise a boost network which increases the positive feedback at higher output frequencies to maintain regulation.

4.2 POWER SUPPLIES

4.2.1 Plus and minus 50VDC supplies for the amplifier are developed by full wave bridge rectifier U1 at the secondary of T1. Filter capacitors and supply bleeder resistors are connected across the output of the bridge.