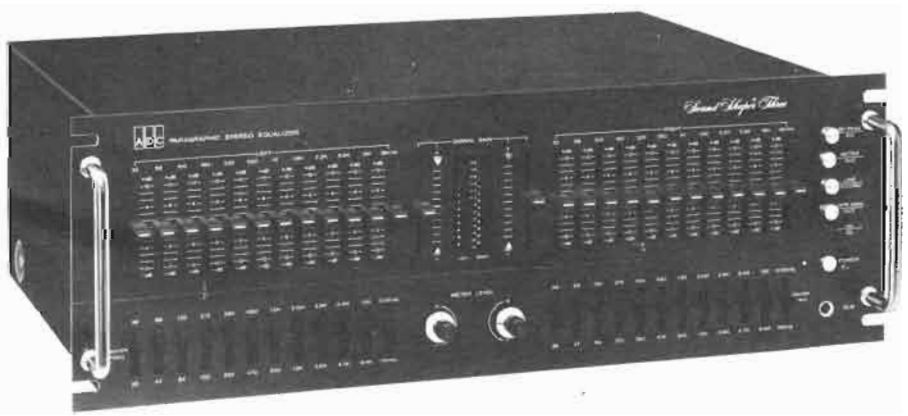
Sound Shaper® Three ADC

Service Manual



Paragraphic™

STEREO FREQUENCY EQUALIZER

Audio Dynamics Corporation

CONTENTS

ELECTRICAL PERFORMANCE SPECIFICATIONS

	(Unit)	(Nominal)	(Limit)
Frequency response at flat position, Input level = 0.775 V	(Hz)	5–100 K $^{+0.5}_{-1.0}$ dB	5–100 K $^{+0.5}_{-1.0}$ dB
Control Frequency accuracy			
at 26, 32, 39 Hz	(%)	±5	±10
at 47, 56, 68 Hz	(%)	±5	±10
at 84, 100, 120 Hz	(%)	±5	±10
at 150, 180, 215 Hz	(%)	±5	±10
at 260, 320, 390 Hz	(%)	±5	±10
at 470, 560, 680 Hz	(%)	±5	±10
at 840, 1 K, 1.2 KHz	(%)	±5	±10
at 1.5 K, 1.8 K, 2.15 KHz	(%)	±2.5	± 5
at 2.6 K, 3.2 K, 3.9 KHz	(%)	±2.5	± 5
at 4.7 K, 5.6 K, 6.8 KHz	(%)	±2.5	± 5
at 8.4 K, 10 K, 12 KHz	(%)	±2.5	± 5
at 15 K, 18 K, 21.5 KHz (Output level = 0.775 V)	(%)	±2.5	± 5
Control range at 0.775 V Input	(dB)	+13.5 −13.5	$+12^{+3.5}_{-0}$ $-12^{+0}_{-3.5}$
Harmonic Distortion at 1 V Output from 20 Hz to 20 KHz	(%)	0.018	0.04
Hum and Noise ratio at 1 V Output (Input shorted) (IHFA)	(dB)	90	85
Dynamic Range into 10 KΩ load (All Controls should be Flat)	(V/rms)	10	9
Input Impedance	(KΩ)	75	–
Output Impedance at 1 KHz	(Ω)	10	–
Intermodulation Distortion at 1 V Output, 70/70 KHz at 4/1 ratio	(%)	0.02	0.05
Meter tolerance (Frequency at 1 KHz)			
at +12 dB point	(dB)	±0.5	±1.0
at 0 dB point	(dB)	±0.5	±1.0
at −12 dB point	(dB)	±0.5	±1.0
at other points	(dB)	±1.0	±1.5

NOTE: When each control range is measured, all other controls should be at center (0 dB).

SOUND SHAPER THREE CIRCUIT DESCRIPTION

MAIN POWER SUPPLY (Refer to Figure A)

Power Transformer T1001 provides three tapped secondary windings.
One delivers +26.4 V/- 26.0 V DC at +104/- 137 mA (nominal) from a full-wave bridge rectifier – capacitor circuit consisting of a bridge rectifier D701 and C713, C714.
The second delivers –25.2 VDC at –1.1 mA (nominal) from a half-wave rectifier – capactitor circuit consisting of rectifier D709 and C715. This voltage supplies the Protector circuit, the base of TR201.
The third delivers 60 VDC at 87.5 mA (nominal) from full-wave rectifier – capacitor circuit consisting of rectifiers D702, D703 and C704.

The voltage which is rectified by D701 provides both bases of TR703 and TR706 through R716 and R717.
TR703/TR705 and TR704/TR706 consist of voltage-regulator circuits for each Plus and Minus voltages.
These regulator circuits provide approx. +15.4 V/–15 V DC to LED Meter and to Signal Gain Control circuit which are constant and independent of the load current.
The reference voltage of this circuit is obtained from Zener Diode D708. The base voltage of TR705 is supplied from the voltage divider R708 and R709.
TR703 turn-on is determined by comparing the output voltage to the reference voltage and is controlled by changes in collector current of TR705.
Voltage, which is rectified from D702 and D703, divider network R702 and R705 provides approx. 50 VDC. This is filtered further by C703, R704 and fed to the base of divider transistor TR701 which is connected to TR702 in a Darlington emitter-follower configuration. The reference voltage of this circuit is obtained from Zener Diodes D704 and D705 (Approx. 44 VDC).
The emitter of TR702, decoupled by C701, provides approx. 41.5 VDC to the Equalizer and Meter circuits. The collectors TR701 and TR702 are returned to 57.4 VDC through R701 which limits the transistor collector circuits.
The Darlington connection of TR701 and TR702 provides a low output impedance. The base of TR701 presents negligible loading on the voltage divider network, hence the ripple voltage at TR702 emitter is small. Except for the small base current into TR701, the full load current flows through R701.

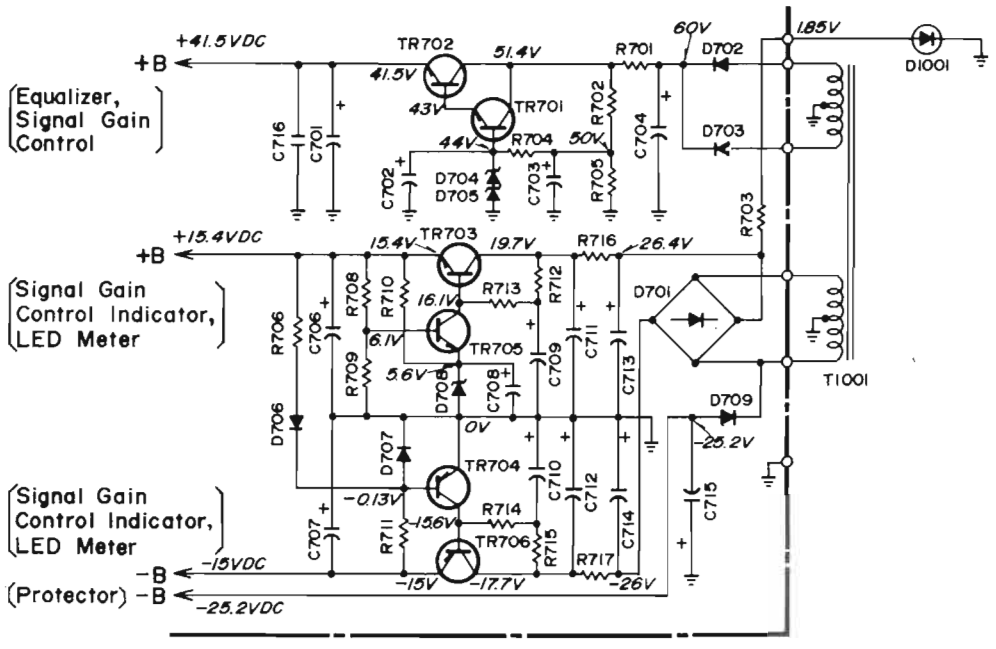


Figure A

LED METER COMPARATOR CIRCUIT DESCRIPTION

Power Supply and bias configuration (Refer to LED METER circuits)

The power supply for the LED Meter Comparator circuit consists of full-wave rectifiers, which provide plus (+) and minus (−) +15.4/−15 VDC to each of IC802 through IC814.
LED indication level is provided from the Zener diode D710 (−5.6 VDC).
The +15.4/−15 VDC source is applied to LED comparator ICs IC802 through IC814. The −5.6 VDC source provides a stable voltage to VR801 (L) and VR802 (R) for LED Meter indicator level.

OPERATIONAL AMPLIFIER FEEDBACK CIRCUIT (Refer to Figure B)

Signal to the (−) input causes a change in output that is inverted in phase relative to the input.
Signal to the (+) input causes a change in output that is in phase with the input.
With no signal to Rin, the (+) input sees 0 Volts through R_B, causing the output to be positive-going. (−) input voltage is equal to (+) input voltage (= 0 V) − known as Imaginal Short.
When the output reaches 0 V, the (−) input also sees 0 V through resistor R_F and further output change is inhibited. The output, (+) input and (−) input are now all 0 V.
The (−) input remains at 0 V regardless of the signal into Rin.

Example: An input more positive than 0 V to Rin causes the output to be negative-going. The output continues to drop until the feedback through R_F is lowered by an amount sufficient to equalize the imbalance between the (+) and (−) inputs causes by the input signal. Because of the amplifier's high gain and speed, the imbalance between the (+) and (−) inputs is always small.

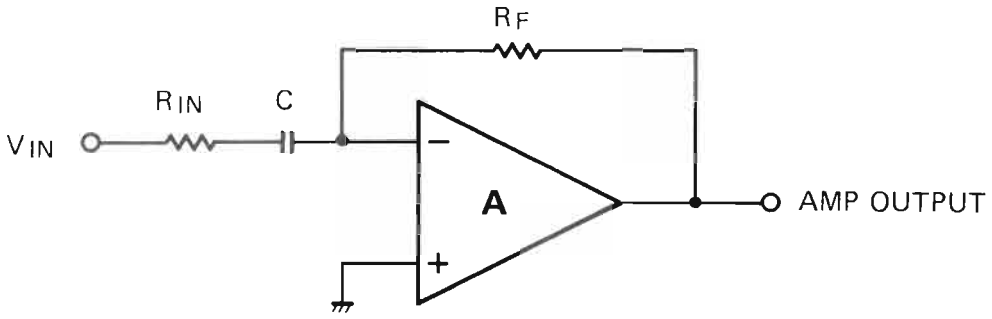
Since the voltage at the (−) input is always at 0 Volts, the (−) input is effectively at AC ground. Therefore, the entire input signal appears across Rin and the entire output signal appears across R_F.

Since the (−) input voltage is always 0 V the current into the amplifier's (−) input is constant. Since this current is supplied by Rin and R_F any change in current due to input signal through Rin is offset by an opposite and equal change of current through R_F.

For AC signal currents, if we ignore the negative values indicating signal inversion, the gain of the amplifier can be calculated as follows.

$$I(Rin) = I(R_F) \quad \text{Since } I = \frac{E}{R}, \ \frac{E(Rin)}{Rin} = \frac{E(R_F)}{R_F}, \ \frac{R_F}{Rin} = \frac{E(R_F)}{E(Rin)} = \text{GAIN}$$

NOTE: RC4709 of this circuit operates from split power supplies. [plus (+) supply at Pin No. 14 and minus (−) supply at Pin No.7].



BASIC OP. AMP. FEEDBACK CIRCUIT
Figure B

PRECISION HALF-WAVE RECTIFIER AND AMPLIFIER CIRCUIT (Refer to Figure C)

The basic fault with diode rectifier circuits is that the diodes do not conduct until a specific voltage is reached. The above circuit eliminates this problem and also amplifies the output.

Referring to the basic circuit, note that: (1) With no input signal D801 is conducting slightly to establish 0 V DC at **A** (–) input and 0 V DC at **A** out; (2) When D801 is barely conducting a small amount of feedback exists. Therefore, the gain of the amplifier is very high. Less than one millivolt will cause the output to change by a volt or more. Operation is as follows: **A** negative input causes a positive-going change in the amplifier output. Since the gain is high until D801 conducts fully, the amplifier output jumps to 0.2 Volts long before the input reaches a millivolt (in a very short time). At this point D801 is fully conducting, has a low impedance compared to R_F (n), and exhibits a 0.2 V drop across it. The rectifier output is now –85 mV DC. Since the feedback loop (R_F) has been completed by D801 any further decrease in input voltage is amplified by the ratio of $\frac{R_F(n)}{R_{in}}$ which is approximately equal to 5 for this circuit.

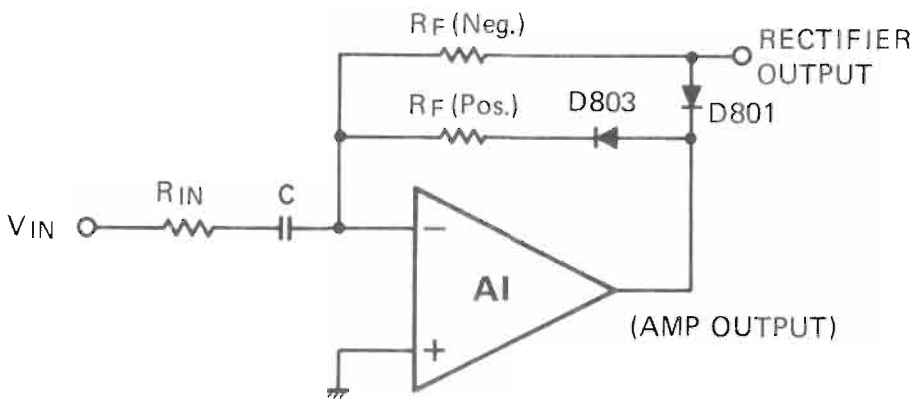
A positive input causes the output to decrease in a manner similar to just described except the feedback is through D803 and R_F (p). The amplifier output is blocked from appearing at the rectifier output by D801 (D801 is reverse biased with respect to the following stages which are returned to the 0 V DC line).

In this manner, appearing at D801 cathode are negative half-wave pulses whose amplitude is directly proportional to the input signal level.

The following refers to the complete schematic:
The negative pulses at D801 cathode are filtered into an average DC voltage by R809 and C807, and this voltage serves as input to the LED meter comparator.

R803 and D803 serve to maintain positive feedback around RC4709 during the positive half-wave excursions of the input signal. As the amplifier's output is positive during this time, D803 is forward biased (D201 is off) and the feedback path now consists of R803 and D803. The amplifier is thus kept out of saturation and free from oscillations throughout the full input cycle.

Bias circuit uses split power supply which provides +15.4 V DC at Pin No. 14 and - 15 V DC at Pin No. 7 on IC801.



BASIC OP. AMP. RECTIFIER–AMPLIFIER CIRCUIT
Figure C

COMPARATOR CIRCUIT FOR LED LEVEL METER DESCRIPTION

Comparator circuit operation

Comparator circuit consts of 13 IC's MJM-4588DM.
Comparator operates by comparing the (–) input level to (+) input level, in which output voltage is changed from minus to plus voltage. Thus DC currents flows to each LED.

With no signal, (−) input level [No. 2 (L) or No. 6 (R)] is kept to 0 V DC.
(+) input level [Pin No. 3 (L) or Pin No. 5 (R)] of IC814 is kept to minus DC voltage (about −45 mV) by half-wave rectifiers through VR801 (L) [VR802 (R)] and VR805 (L) [VR806 (R)]. Thus, the output voltage of IC814 [Pin No. 1 (L) or No. 7 (R)] is kept with minus DC voltage.

When minus DC voltage is applied to (−) input, and causes the (−) input voltage to be greater (or equal) to the (+) input voltage, the output appears as plus DC voltage. ($V3 \leqq V2$)

Thus LED D925 (L) and D926 (R) are lit at −12 dB points. But D901 through D924 are not lit because the input voltage is too low.

Each LED conducts with a (−) input level which is determined by VR801 (L), VR802 (R) (IC802), R813 (L), R814 (R) (IC803), R817 (L), R818 (R) (IC804), R821 (L), R822 (R) (IC805), R825 (L), R826 (R) (IC806), R829 (L), R830 (R) (IC807), R833 (L), R834 (R) (IC808), VR803 (L), VR804 (R) (IC809), R839 (L), R840 (R) (IC810), R843 (L), R844 (R) (IC811), R847 (L), R848 (R) (IC812), R851 (L), R852 (R) (IC813), R855 (L), R856 (R) (IC814).
With an increase in minus DC voltage, provided to the (−) input, each LED is lit in sequence from D923, D924 to D901, D902.

CIRCUIT DESCRIPTION

FREQUENCY EQUALIZATION

The input signal is fed into TR101 base. TR101, an emitter follower, provides the high input impedance required by the signal source. The low output impedance of TR101 is required to drive a voltage divider formed by R111 and the sections of the frequency control pots between the cut end of each control and its wiper. The wiper of each control effectively grounds only those frequencies resonated by the series traps (coil, capacitor and resistor from wiper to common). Thus, the voltage division which occurs can be different for each frequency and depends on the frequency control settings.

TR103, TR105 and TR107 are connected so that the voltage at TR105 base always follows the voltage at TR103 base. For example: An increase in voltage at TR103 base causes the conduction of TR103 and TR107 to increase, and feedback base drive of TR105 to increase, until the voltage at TR105 base is equal to that at TR103 base. Conduction cannot increase beyond this point since the emitter voltage supplied by TR105 then tends to make TR103 conduct less. Conversely, a decrease in voltage at TR 103 base causes a corresponding change at TR105 base.

The output voltage is taken from TR107 collector and is also fed back to TR105 base through the voltage divider formed by R115 and the sections of the frequency control pots between the boost end of each control and its wiper.

For each frequency, moving the control pot off center towards boost causes an increase in the amplitude of the signal presented to TR103 base and a decrease in the negative feedback to TR105 base. The gain is thus increased. Since the signal amplitudes at the bases of TR103 and TR105 are always equal, the output signal divided by the feedback attenuation (R115 and boost sections) is approximately equal to the input signal amplitude divided by the input attenuation (R111 and "CUT" sections). By following a similar line of thought, it will be seen that when the controls are centered the gain is unity; and when the controls are towards cut, the gain is less than one.

The resistors in series with the series resonant circuits are used to increase the bandwidth or lower the "Q", of each circuit so that the effect of controls of adjacent frequencies overlap, thus providing a smooth overall response. The resistors are of different values so that the total series resistance of each circuit (coil and resistor) is approximately the same. The ratio of the total series resistance of the resonant circuit to the base resistor of TR103 and TR105 determines the maximum boost or cut obtainable.

SIGNAL GAIN CONTROL CIRCUIT

Signal Gain Control circuit consists of TR109, 111, 113 and 115 (L ch) and TR110, 112, 114 and 116 (R ch).
This circuit configuration is identical to the Frequency Equalization circuit. For operating, see "Frequency Equalization description" section.

The input signal is fed into TR109 base.
TR111, TR113 and TR115 are connected so that the voltage at TR105 base always follows the voltage at TR111 base.
Total gain can vary from negative feedback value which consists of R135, VR101 and R143 (L ch) [R136, VR102 and R144 (R ch)].
When base voltage of TR111 is equal to base voltage of TR113, the gain is unity.

COMPARATOR CIRCUIT FOR SIGNAL GAIN CONTROL INDICATOR(LED)

Comparator circuit consists of three IC's NJM 4558DM.

Comparator operates by comparing the INPUT signal to output of TR115. These signals are supplied to Pin 6 and Pin 2 of IC201 (Lch) [or IC202 (Rch)]. Both input levels are doubled to output terminals (Pin 6 to Pin 7 and Pin 2 to Pin 1).
Output of Pin 7 is positive, half-wave rectified by D203 and filtered into an average plus DC voltage by C207 and R221, and this voltage is applied to (+) input at pin 3 of IC203.
In the same manner, the output of pin 1 is positive, half-wave rectified by D201 and filtered into an average plus DC voltage by C205 and R233, and this voltage is applied to the (−) input at pin 2 of IC203.
Thus, the difference level between Pin 2 to Pin 3 appears at Pin 1 of IC203. This voltage at Pin 1 serves as input to the Signal Gain Control indicator LED.
For example, when the input level at Pin 2 is small compared with Pin 3, the output at Pin 1 appears as positive voltage (approx. 13.6 V DC).
Thus, LED D1003 will light but D1002 will not.
When the input level at Pin 2 is greater compared with Pin 3, the output at Pin 1 appears as a negative voltage (approx. - 12.3 V DC).
Thus, LED D1002 will light but D1003 will not.

When the input level at Pin 2 is equal to Pin 3 input level, the output will appear as zero, and thus both LED's D1002 and D1003 will light. In this case, the gain is unity. (Figure D)

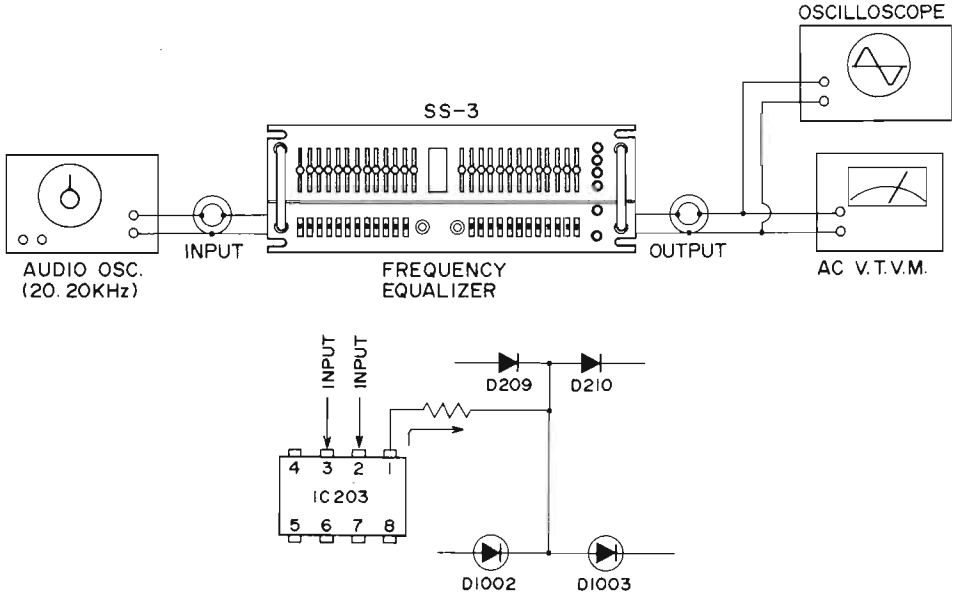


Figure D

POPPING NOISE PROTECTIVE CIRCUIT

This circuit eliminates the popping noise in the speakers when the power switch is turned "on" or "off".

This circuit consists of TR201, TR202, TR203 and a Reed Relay.

When power is switched "on", −0.5 VDC is provided to the base of TR201 through R238. TR201 will turn off. After about 6 seconds, TR202, TR203 will turn on. Thus the Reed Relay will restore connections to the OUTPUT Terminals.

When the power switch is "off", 1.7 VDC is provided to the base of TR201 through R237. TR201 will turn on, TR202 and TR203 will turn off. And thus the Reed Relay will disconnect the OUTPUT.

LED METER OPERATING CHART

AC INPUT AT VR301 (Max. CW) mV RMS @ 1 KHz See NOTE 1.	RECTIFIED DC V AT C807 (−) See NOTE 2.	LED METER INDICATION	LED METER CURRENT (mA)	VOLTAGE ACROSS EACH LED DC VOLTS See NOTE 3.
12 mV	−53 mV DC	−12 dB	2.63 mA	1.84 V DC
15 mV	−76 mV DC	−10 dB	2.63 mA	1.84 V DC
19 mV	−102 mV DC	−8 dB	2.63 mA	1.84 V DC
24 mV	−132 mV DC	−6 dB	2.63 mA	1.84 V DC
29 mV	−166 mV DC	−4 dB	2.63 mA	1.84 V DC
35 mV	−205 mV DC	−2 dB	2.63 mA	1.84 V DC
46 mV	−278 mV DC	0 dB	2.63 mA	1.84 V DC
65 mV	−395 mV DC	+2 dB	2.63 mA	1.84 V DC
74 mV	−453 mV DC	+4 dB	2.63 mA	1.84 V DC
100 mV	−618 mV DC	+6 dB	2.63 mA	1.84 V DC
120 mV	−740 mV DC	+8 dB	2.63 mA	1.84 V DC
150 mV	−940 mV DC	+10 dB	2.63 mA	1.84 V DC
190 mV	−1.18 V DC	+12 dB	2.63 mA	1.84 V DC

Rectified DC V and LED Meter data for actual levels used for LED Meter indication. (LED "ON" condition)

NOTE:

1. AC signal applied to INPUT jacks of Equalizer.
   BY-PASS/EQ switch to EQ, METER switch to IN, LINE/REC to REC and MONITOR to OUT.
2. Rectified DC voltages measured from C807 (−).
3. Indicated voltages across each LED indicator are obtained with LED Meters calibrated as specified in the CALIBRATOR PROCEDURE section of this manual.
4. All DC voltages are within ±10%, measured with AC VTVM and DC Voltmeter (over 10 KΩ/V).

SWITCH FUNCTIONS

(Applicable to LEFT or RIGHT CHANNEL)

LINE-REC and MONITOR SWITCHES "IN"

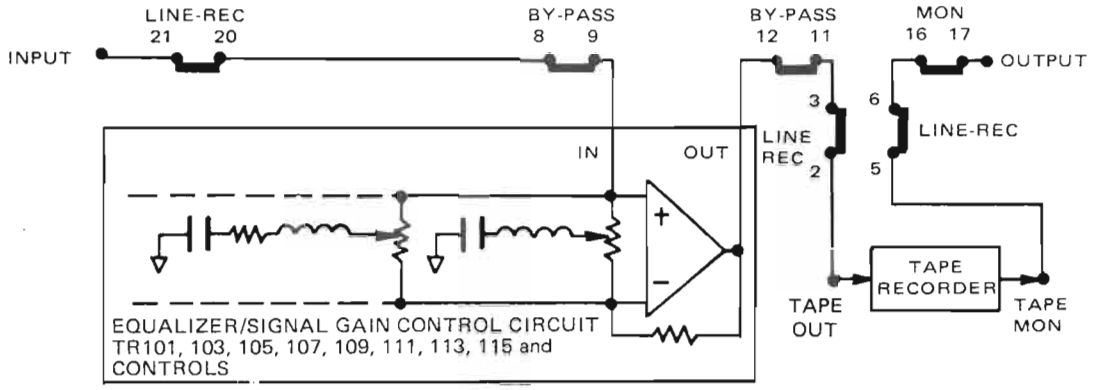


Figure 1

LINE-REC SWITCH "IN"

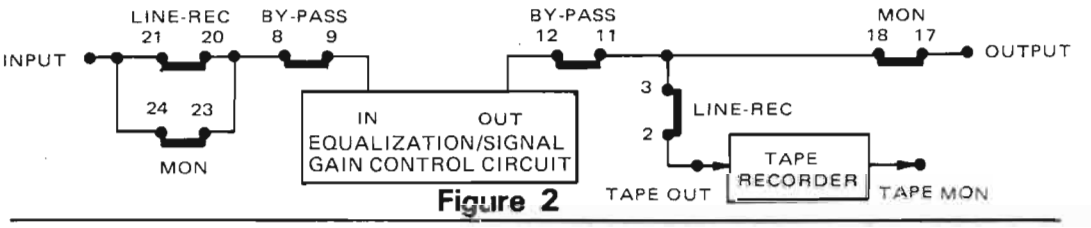


Figure 2

LINE-REC, MONITOR and BY-PASS SWITCHES "OUT"

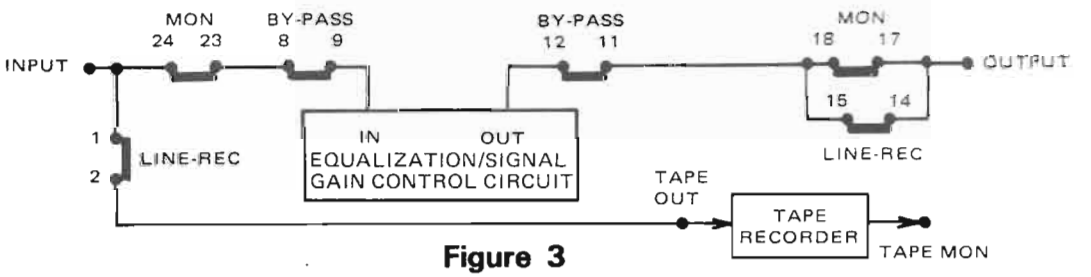


Figure 3

MONITOR SWITCH "IN"

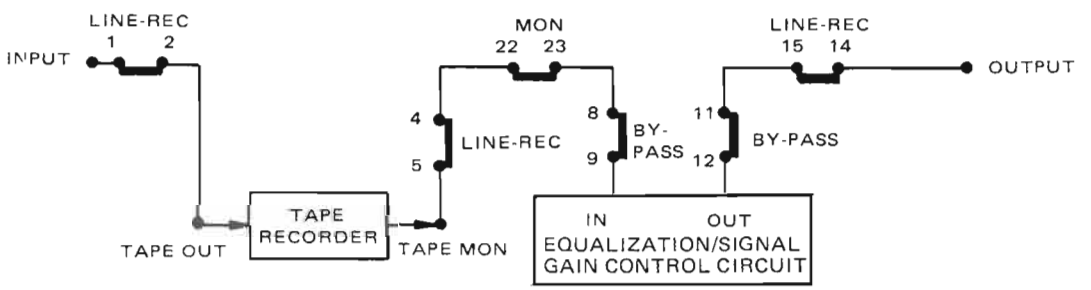


Figure 4

BY-PASS SWITCH "IN"

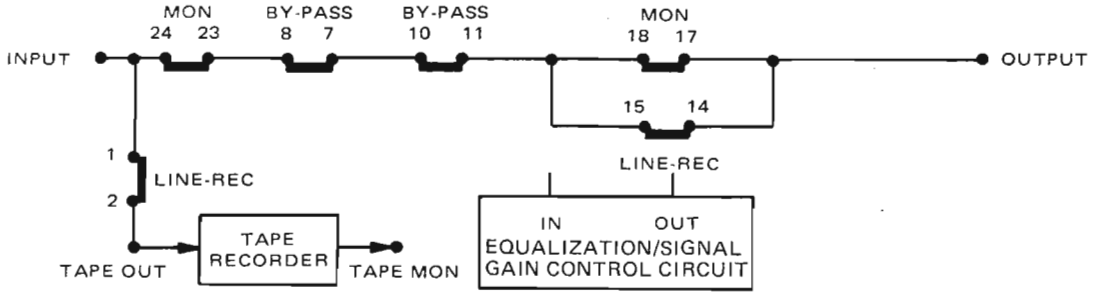


Figure 5

BY-PASS and MONITOR SWITCHES "IN" MON

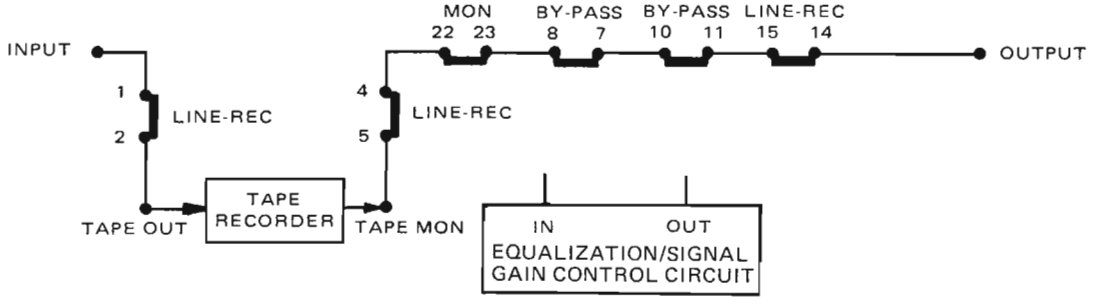


Figure 6

METER SWITCH "IN"
BY-PASS/EQ SWITCH TO "BY-PASS"

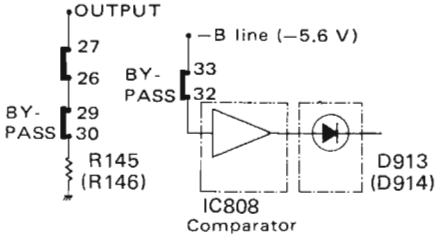


Figure 7

LED METER INDICATES SIGNAL AT OUTPUT JACK WHEN METER SWITCH IS "IN".

METER SWITCH "IN"
BY-PASS/EQ SWITCH TO "EQ"

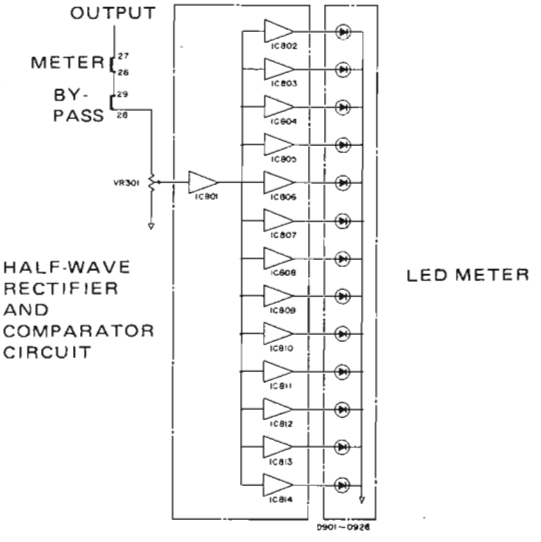


Figure 8

WHEN BY-PASS SWITCH IS "IN", LED METERS INDICATE AT 0 dB POINTS ONLY, REGARDLESS OF OUTPUT SIGNAL.

NOTE: RIGHT CHANNEL LED METER INDICATES OUTPUT OF SOUND LEVEL METER WHEN CONNECTED TO SLM JACK. (METER SWITCH IN EITHER POSITION)

METER SWITCH "IN"
BY-PASS/EQ SWITCH TO "EQ"

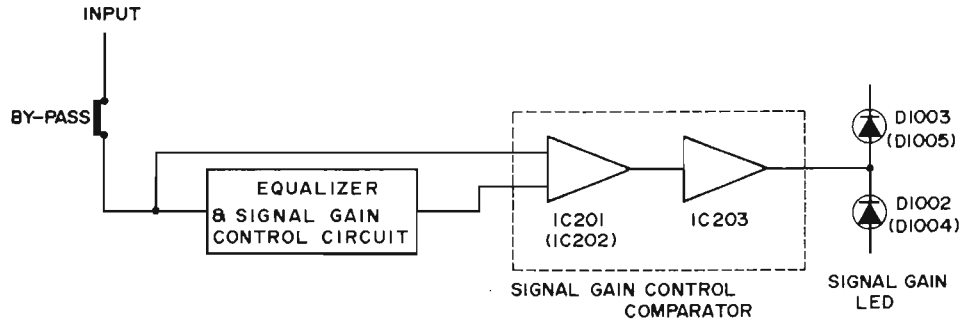


Figure 9

WHEN BY-PASS SWITCH IS "IN" AND METER SWITCH IS "OUT", SIGNAL GAIN CONTROL LED DOES NOT INDICATE REGARDLESS OF INPUT SIGNAL.

DISASSEMBLY INSTRUCTIONS

1) To remove chassis from metal cabinet

a) Remove four screws – two from each side of cabinet as shown in Figure A.
b) Remove five screws that fasten the rear panel to the metal cabinet. (See Figure B.)

2) Removal of Front Panel

a) Remove chassis from metal cabinet as described in 1).
b) Remove the four screws from the top (Figure C) and four screws from the bottom (Figure D) of the Front Panel.
c) Remove knobs and pull panel off.

NOTE: If required, remove one screw (painted red) from the top of the Front Panel as shown in Figure E.

Figure A

Figure B

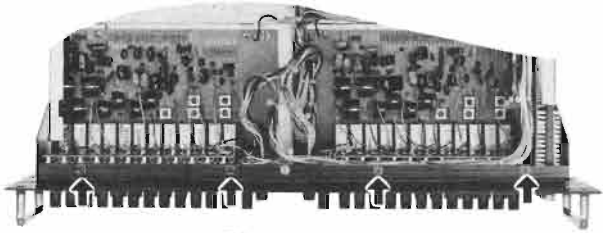


Figure C

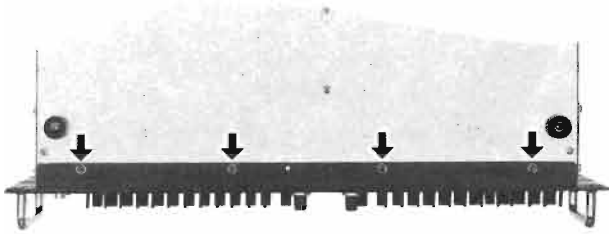


Figure D

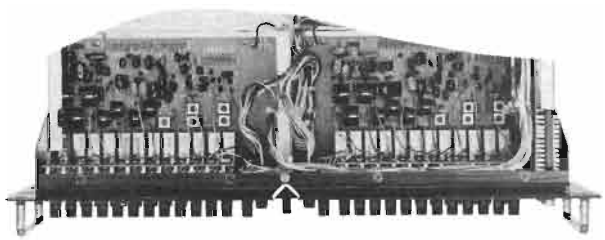
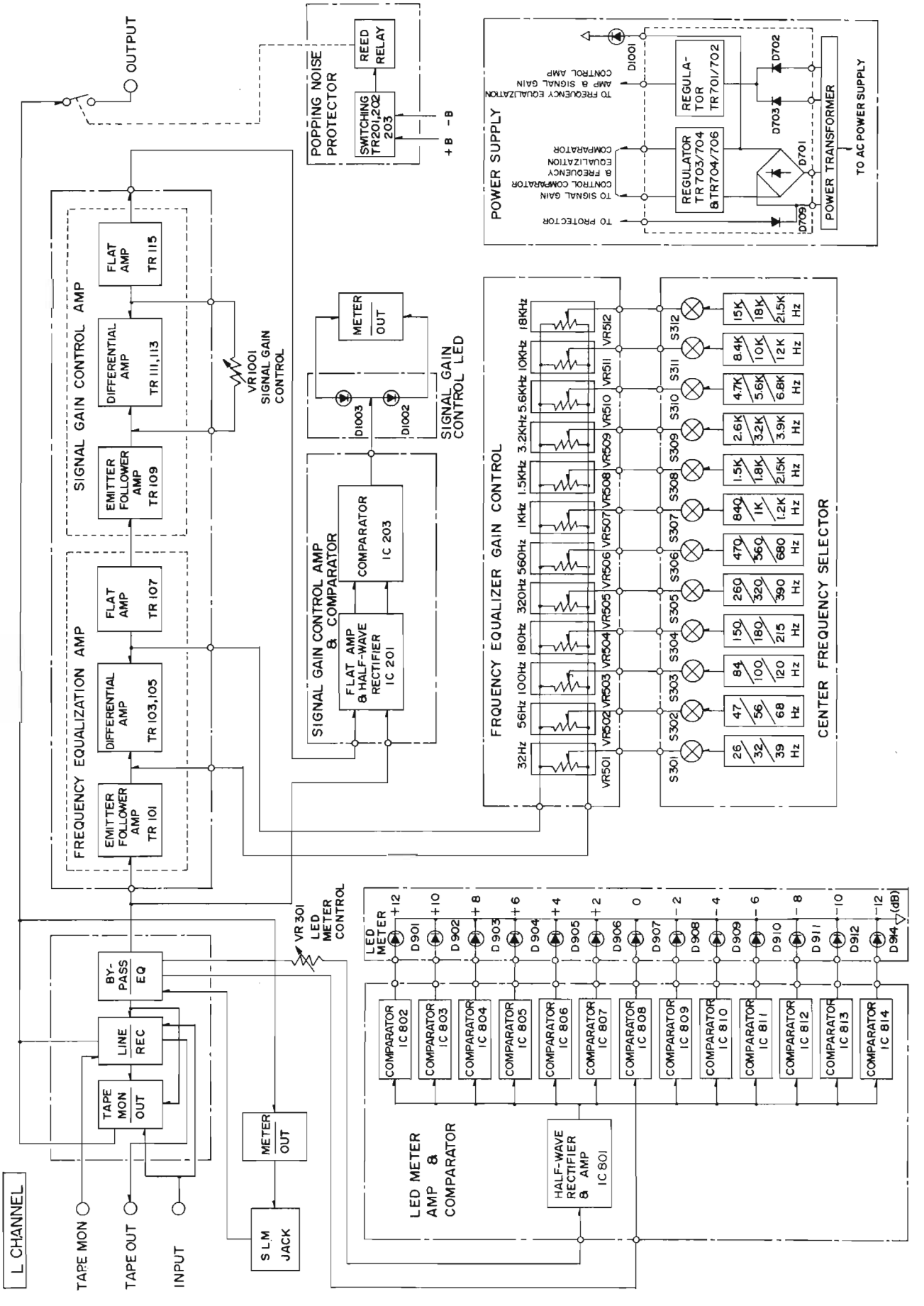


Figure E

BLOCK DIAGRAM



ADJUSTMENT PROCEDURES

(1) SIGNAL GAIN CONTROL ADJUSTMENT

EQUIPMENT REQUIRED (See Figure 10)

1. Audio Oscillator
2. AC Voltmeter
3. Calibrator (dB Attenuator)
4. Oscilloscope

NOTE:
- Maintain voltage at 120 V AC (UL, C.S.A. and PX) (220/240 V AC for European models).
- Input – INPUT Jack
- Output – OUTPUT Jack
- Set TAPE MONITOR Switch to "OUT".
- Set BY-PASS/EQ Switch to "EQ".
- Set SIGNAL GAIN Control on Front Panel at center position.

SIGNAL GAIN LED PROCEDURE (See Figure 11)

Step 1. Adjust Audio Oscillator output for 1 V at 1 KHz as read on AC Voltmeter.

Step 2. Set Calibrator at 0 dB. Adjust VR101 (left) for 1 Volt reading on output AC Voltmeter and VR102 (right) for 1 Volt reading on output AC Voltmeter.

Step 3. Adjust VR201 (left) for both LED's (D1002 and D1003) to light with equal intensity and VR202 (right) for both LED's (D1004 and D1005) to light with equal intensity.

(2) LED METER CALIBRATION PROCEDURE

Connect LED Meter calibration set-up as shown in Figure 10.

CALIBRATOR:	OFF
AC VOLTMETER:	0.3 V Range
AUDIO OSCILLATOR:	Frequency – 1 KHz
	OUTPUT – 1.5 V min. into ext. 600 Ω load.
	INT/EXT LOAD SWITCH (if any) – EXT. (Calibrator box to provide approximately 600 Ω load to generator).
FREQUENCY EQUALIZER:	Frequency Control – Flat position
	Center Frequency Selector switch – Center position
	METER switch – IN
	BY-PASS/EQ – EQ
	TAPE MONITOR – OUT
	LINE/REC – REC
METER CONTROL:	Left (VR301) – Max. counterclockwise
	Right (VR401) – Max. clockwise

CALIBRATION PROCEDURE (Figure 12)

Step 1. Set Trimmer Resistors on PCB as indicated below:
VR801, VR803, VR805(L)
VR802, VR804, VR806(R): at 12 o'clock position

Step 2. Adjust Audio Oscillator output for 180 mV as read on AC voltmeter.

Step 3. Set Calibrator at 0 dB. Adjust VR801 (left) for 12 dB on left LED Meter. And VR802 (right) for 12 dB on right LED Meter. (All LED's are lit.) (Figure 10A)

Step 4. Set Calibrator at –1 dB point, check that both 12 dB (left and right) LED's are turned off. (Figure 10B)

Step 5. Set Calibrator at −24 dB point.
Adjust VR805 (left) for −12 dB on left LED Meter.
And VR806 (right) for −12 dB on right LED Meter.
Both LED's should be lit. (Figure 10C)

Step 6. Set Calibrator at −25 dB point, check that both −12 dB on left and right LED have turned off. (Figure 10D)

Step 7. Set Calibrator at −12 dB point.
Adjust VR803 (left) for 0 dB on left LED Meter.
And VR804 (right) for 0 dB on right LED Meter.
Both LED's should be lit. (Figure 10E)

Step 8. Set Calibrator at −13 dB point.
Check for both 0 dB points. Left and right LED have turned off. (Figure 10F)

Step 9. Repeat Steps 3 through 8 for optimum performance.

NOTE: Refer to Check Point for each LED Meter below:

CHECK POINT FOR EACH LED METERS (See Figure 10 and Figure 10A through 10F.)

LED Meter point	−12 dB	−10 dB	−8 dB	−6 dB	−4 dB	−2 dB	0 dB	+2 dB	+4 dB	+6 dB	+8 dB	+10 dB	+12 dB
Calibrator position for each LED that is lit.	−24 dB	−22 dB	−20 dB	−18 dB	−16 dB	−14 dB	−12 dB	−10 dB	−8 dB	−6 dB	−4 dB	−2 dB	0 dB
Calibrator position for each LED that is not lit.	−25 dB	−23 dB	−21 dB	−19 dB	−17 dB	−15 dB	−13 dB	−11 dB	−9 dB	−7 dB	−5 dB	−3 dB	−1 dB

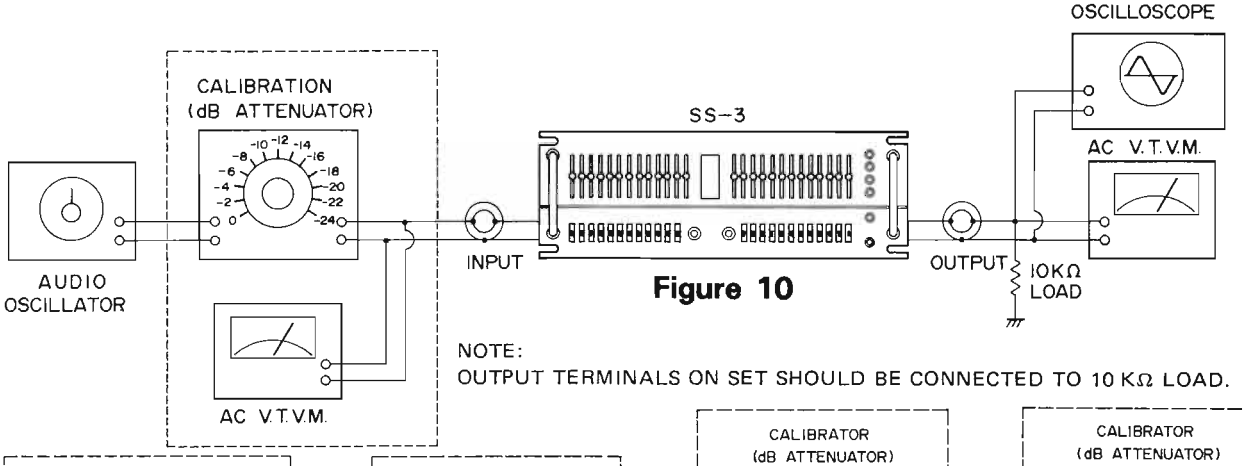


Figure 10

NOTE:
OUTPUT TERMINALS ON SET SHOULD BE CONNECTED TO 10 KΩ LOAD.

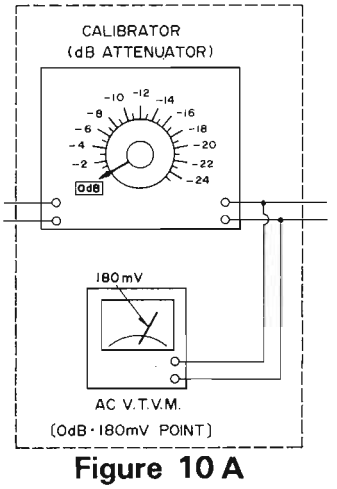


Figure 10 A

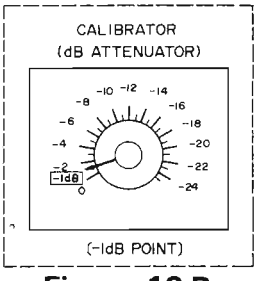


Figure 10 B

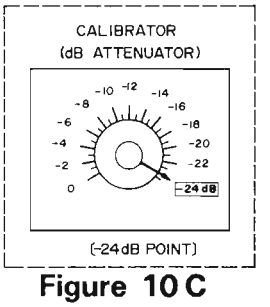


Figure 10 C

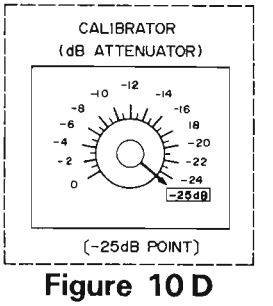


Figure 10 D

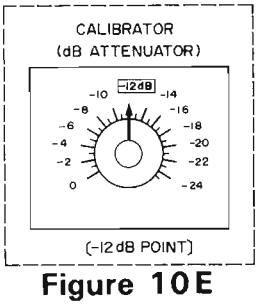


Figure 10 E

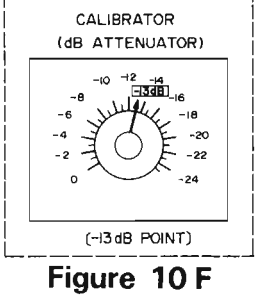


Figure 10 F

AMP P.C.B.

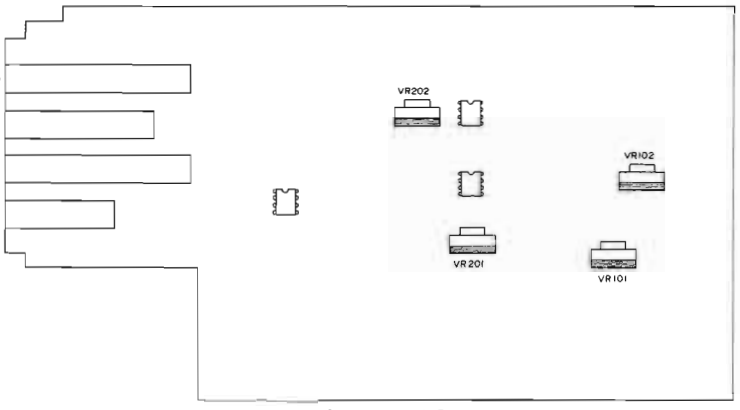


Figure 11

POWER SUPPLY & METER P.C.B.

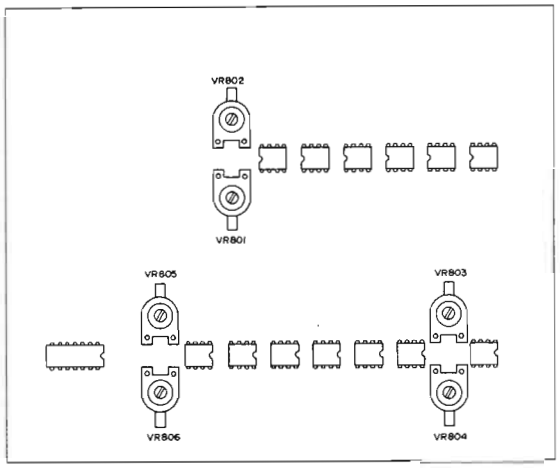
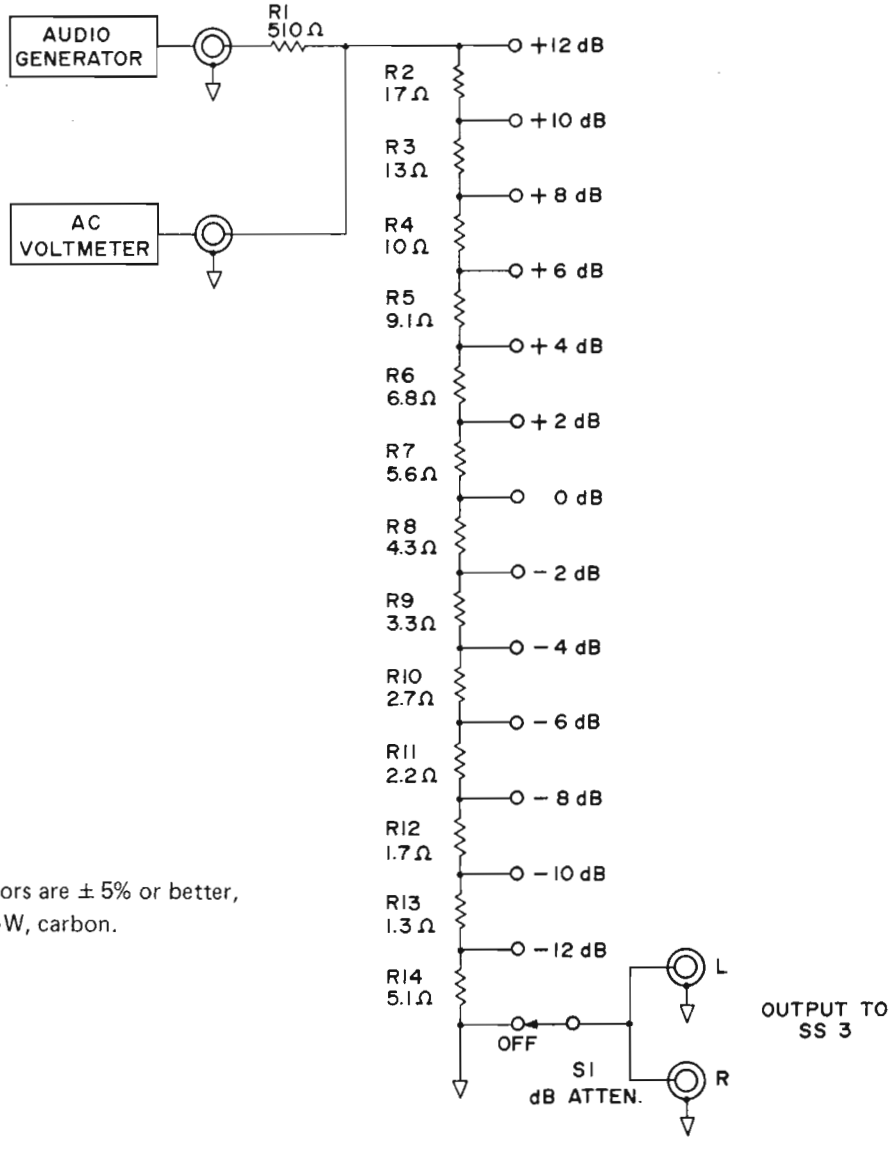


Figure 12

CALIBRATOR SCHEMATIC



NOTE:
All resistors are ± 5% or better, ¼W or ½W, carbon.

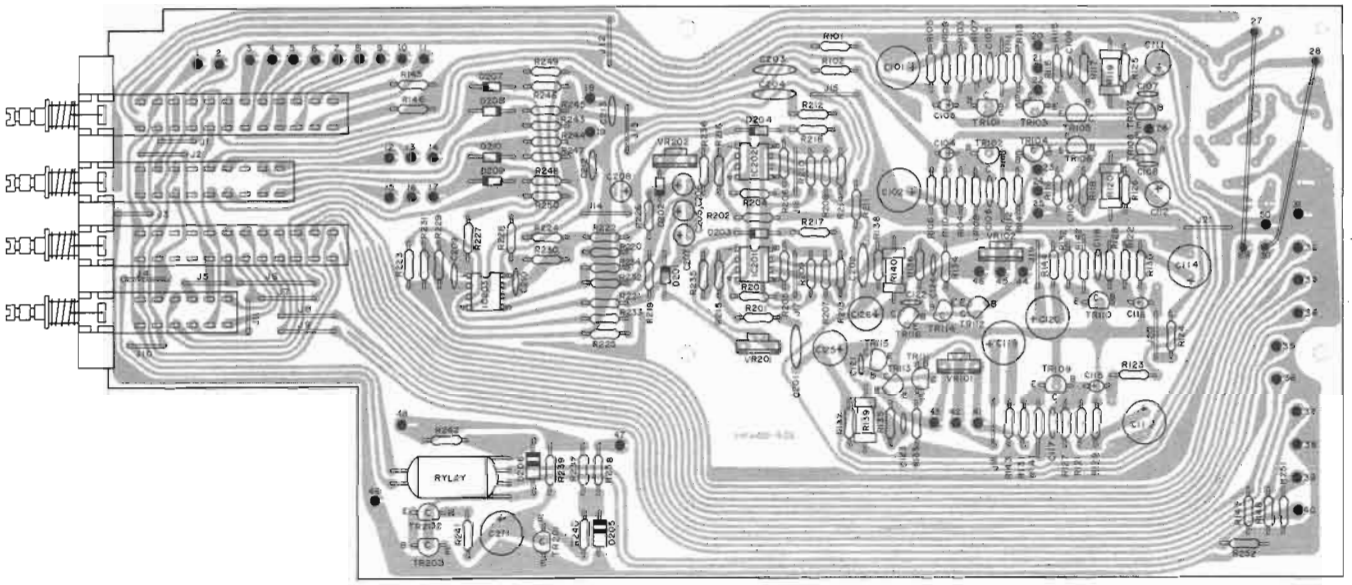
TROUBLESHOOTING

SYMPTOM	CAUSE/REMEDY
1) No output	1) Faulty AC power cord *Replace the cord. 2) Defective power switch *Replace the switch. 3) Broken wire in the power transformer (T1001) *Replace the transformer. 4) Check Fuse, European and PX only.
2) Power indicator LED does not light.	1) Defective LED D1001 *Replace the LED. 2) Open in the power transformer secondary winding *Replace the transformer. 3) Check Fuse, European and PX only.
3) Power indicator lights but no output.	1) Defective diode D702 and/or D703 *Replace the diode(s). 2) Defective transistor TR701 and/or TR702 *Replace the transistor(s).
4) No output with test signal applied to the input terminals.	1) Defective transistor TR101–116 *Replace the transistor(s). 2) Defective resistor or capacitor of Main Amp stage *Replace the defective part(s).
5) "TAPE OUT" inoperative	1) Poor contact in "TAPE OUT" input jacks *Repair or replace the jacks. 2) Faulty TAPE MONitor switch *Repair or replace the switch.
6) "INPUT" inoperative	1) Poor contact in "INPUT" input jacks *Repair or replace the jacks.
7) "OUTPUT" inoperative	1) Poor contact in "OUTPUT" output jacks *Repair or replace the jacks.
8) "TAPE MONITOR" inoperative	1) Poor contact in "TAPE MONitor" input jack *Repair or replace the jack. 2) Faulty "TAPE MONitor" switch *Repair or replace the switch.
9) Frequency control 26/32/39 Hz has no effect.	1) Faulty VR501/601 *Repair or replace. 2) Defective R301/401, 335/435, 336/436 or L301/401 *Replace the defective parts.
10) Frequency control 47/56/68 Hz has no effect.	1) Faulty VR502/602 *Repair or replace. 2) Defective R302/402, 303/403, 304/404, 337/437, 338/438 or L302/402 *Replace.
11) Frequency control 84/100/120 Hz has no effect.	1) Faulty VR503/603 *Repair or replace. 2) Defective R305/405, 306/406, 307/407, 339/439, 340/440 or L303/403 *Replace.
12) Frequency control 150/180/215 Hz has no effect.	1) Faulty VR504/604 *Repair or replace. 2) Defective R308/408, 309/409, 310/410, 341/441, 342/442 or L304/404 *Replace.

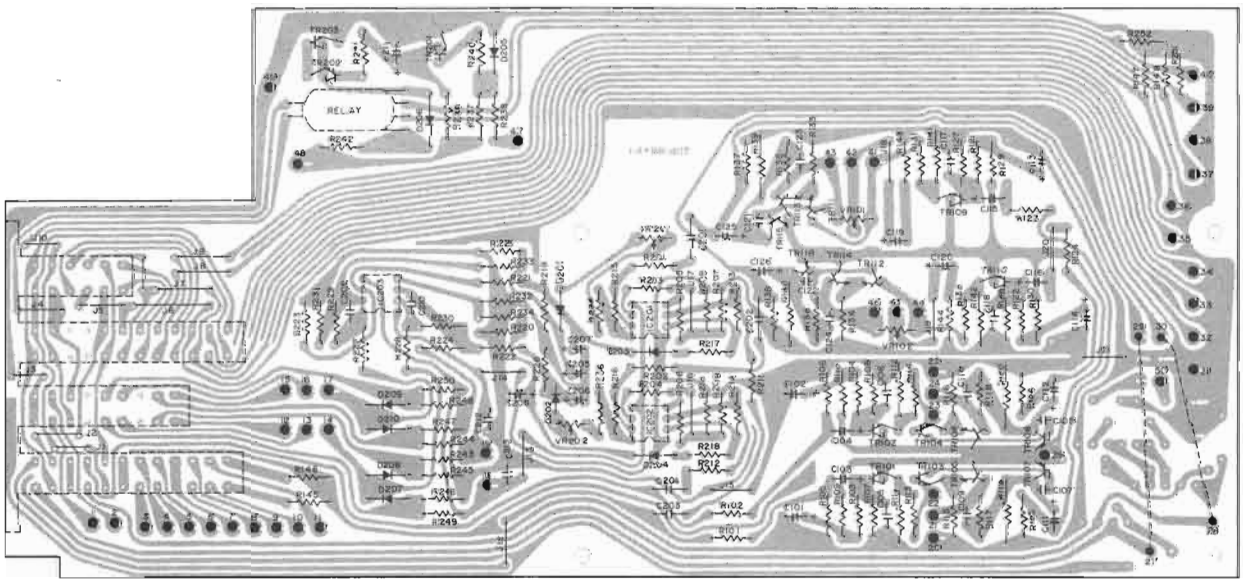
SYMPTOM	CAUSE/REMEDY
13) Frequency control 260/320/390 Hz has no effect.	1) Faulty VR505/605 *Repair or replace. 2) Defective R311/411, 312/412, 313/413, 343/443, 344/444 or L305/405 *Replace.
14) Frequency control 470/560/680 Hz has no effect.	1) Faulty VR505/605 *Repair or replace. 2) Defective R314/414, 315/415, 316/416, 345/445, 346/446 or L306/406 *Replace.
15) Frequency control 840/1K/1.2K Hz has no effect.	1) Faulty VR507/607 *Repair or replace. 2) Defective R317/417, 318/418/319/419, 347/447, 348/448 or L307/407 *Replace.
16) Frequency control 1.5K/1.8K/ 2.15 K Hz has no effect.	1) Faulty VR508/608 *Repair or replace. 2) Defective R320/420, 321/421, 322/422, 349/449, 350/450 or L308/408 *Replace.
17) Frequency control 2.6K/3.2K/ 3.9K Hz has no effect.	1) Faulty VR510/610 *Repair or replace. 2) Defective R323/423, 324/424, 325/425, 351/451, 352/452 or L309/409 *Replace.
18) Frequency control 4.7K/5.6K/ 6.8K Hz has no effect.	1) Faulty VR511/611 *Repair or replace. 2) Defective R326/426, 327/427, 328/428, 353/453, 354/454 or L310/410 *Replace.
19) Frequency control 8.4K/10K/ 12K Hz has no effect.	1) Faulty VR511/611 *Repair or replace. 2) Defective R329/429, 330/430, 331/431, 355/455, 356/456 or L311/411 *Replace.
20) Frequency control 15K/18K/ 21.5K Hz has no effect.	1) Faulty VR512/612 *Repair or replace. 2) Defective R332/432, 333/433, 334/434, 357/457, 358/458 or L312/412 *Replace.
21) All controls have no effect.	1) Defective R111/112 or R115/116 *Replace. 2) Defective Transistor TR103–106 *Replace.
22) LED Meter does not light up.	1) Defective IC801 *Replace. 2) Defective IC802–814 *Replace. 3) Defective LED Meter D901–926 *Replace.
23) SIGNAL GAIN Control indicator (LED) does not light up.	1) Defective TR109–116 *Replace. 2) Defective IC201–203 *Replace. 3) Defective LED D1002–1005 *Replace. 4) Defective Diode D207–210 *Replace.
24) Popping Noise Protector does not operate.	1) Defective TR201–203 *Replace. 2) Defective D205 or D206 *Replace. 3) Defective Reed Relay *Repair or replace.

AMP P.C.B.(TOP & BOTTOM VIEWS)

TOP VIEW

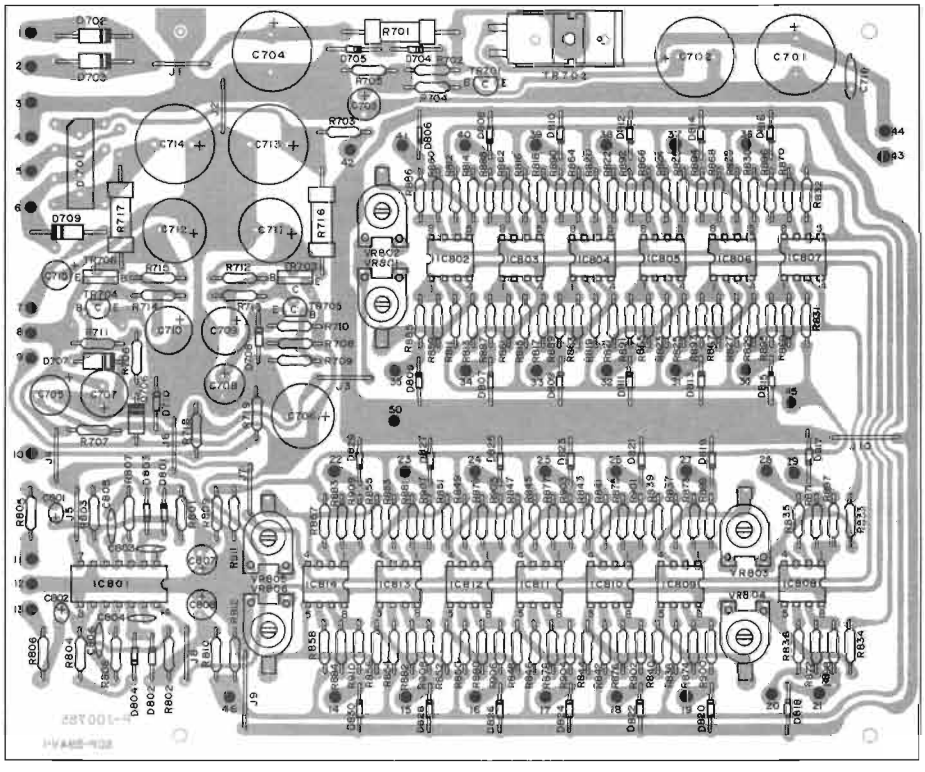


BOTTOM VIEW

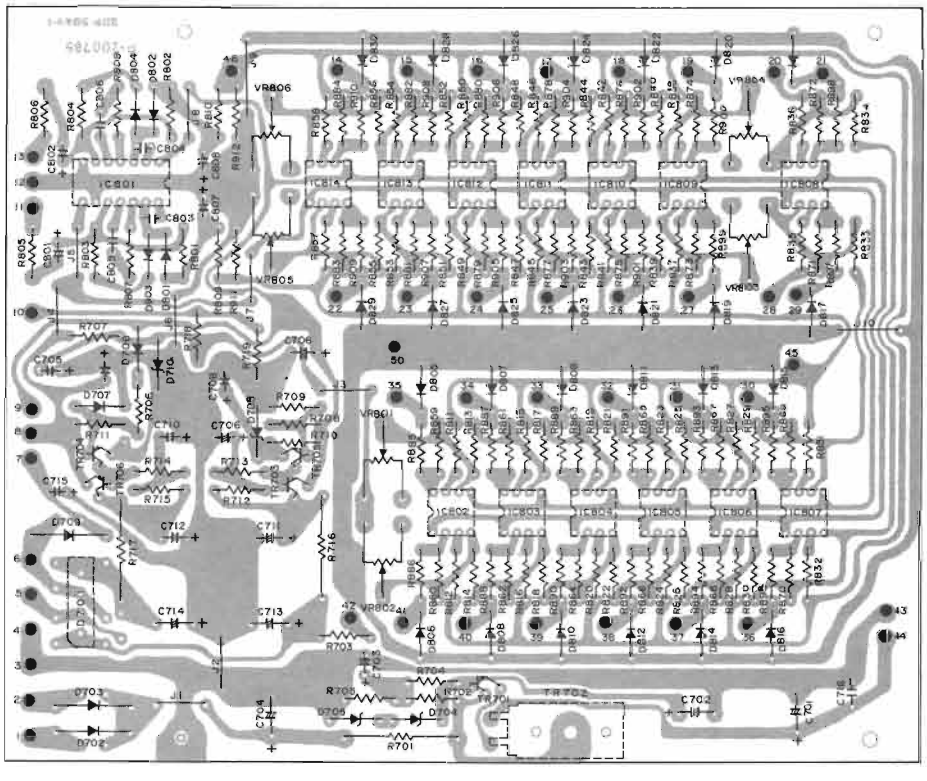


POWER SUPPLY & METER P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

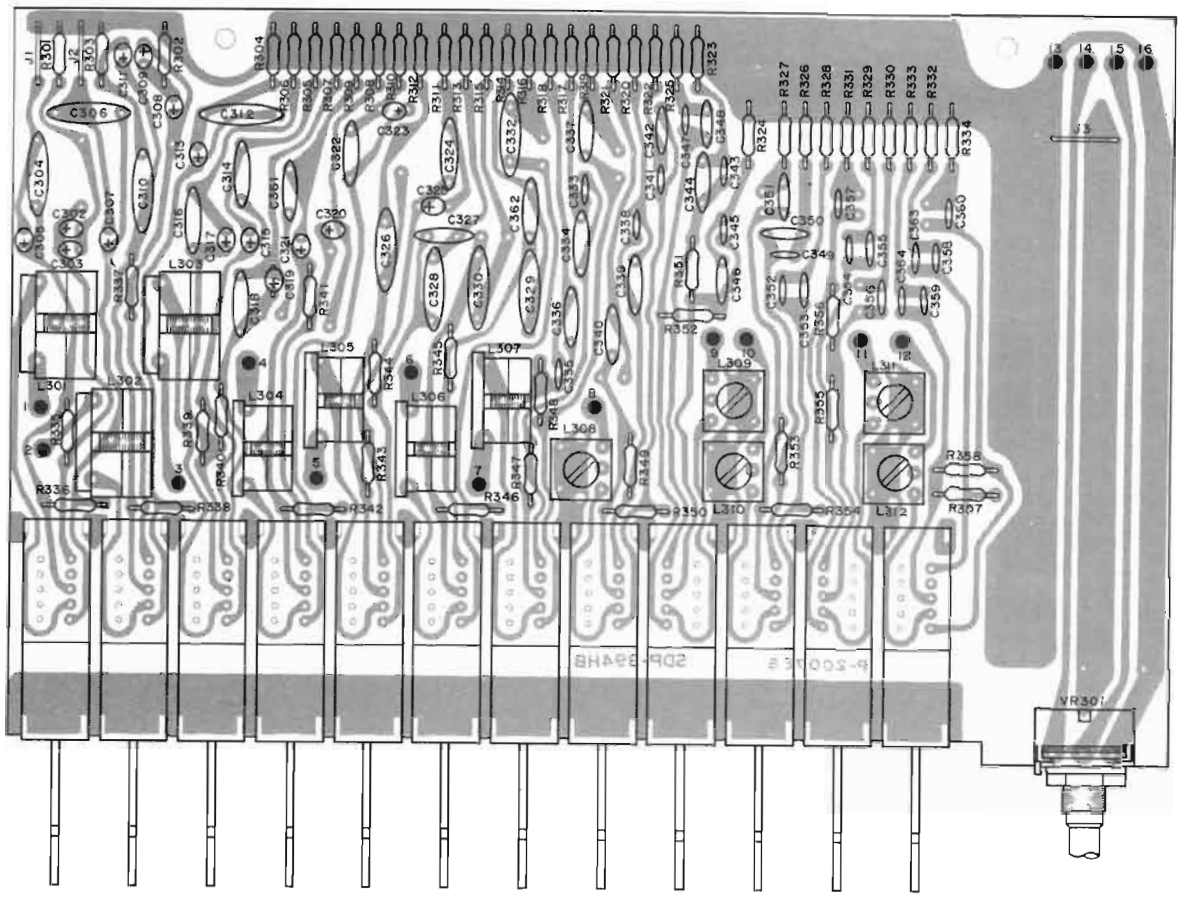


BOTTOM VIEW

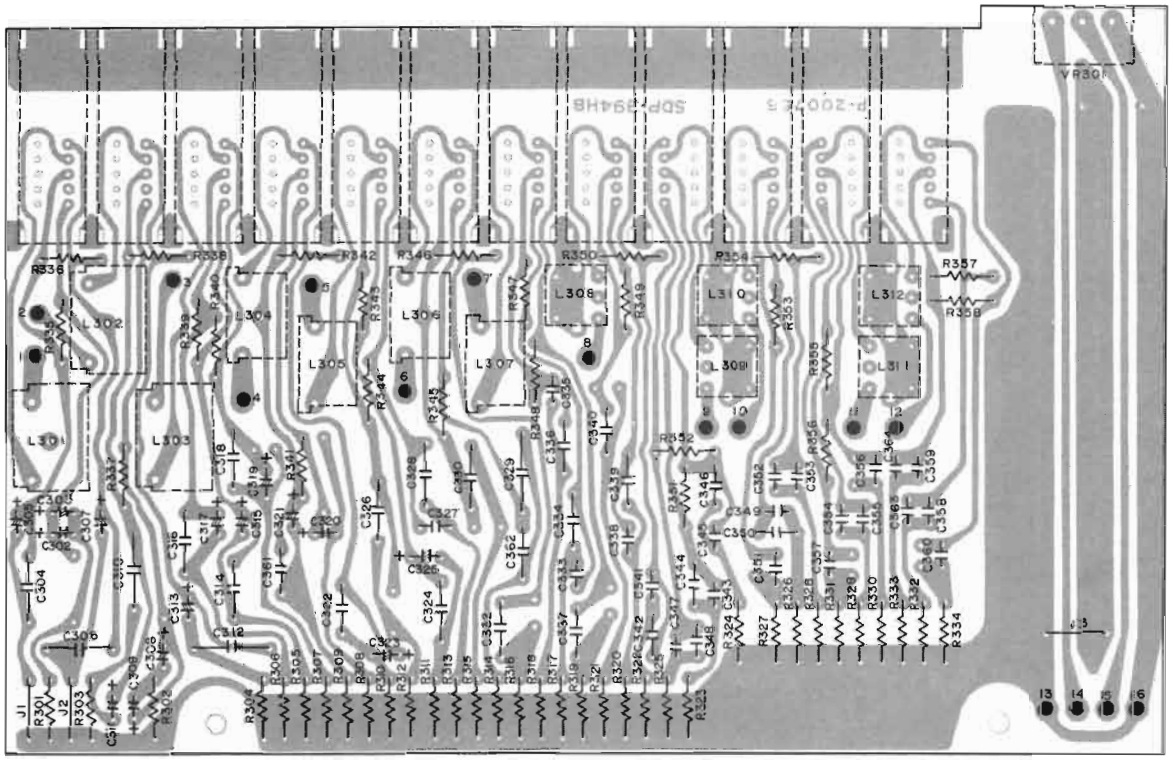


SWITCH (L) P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

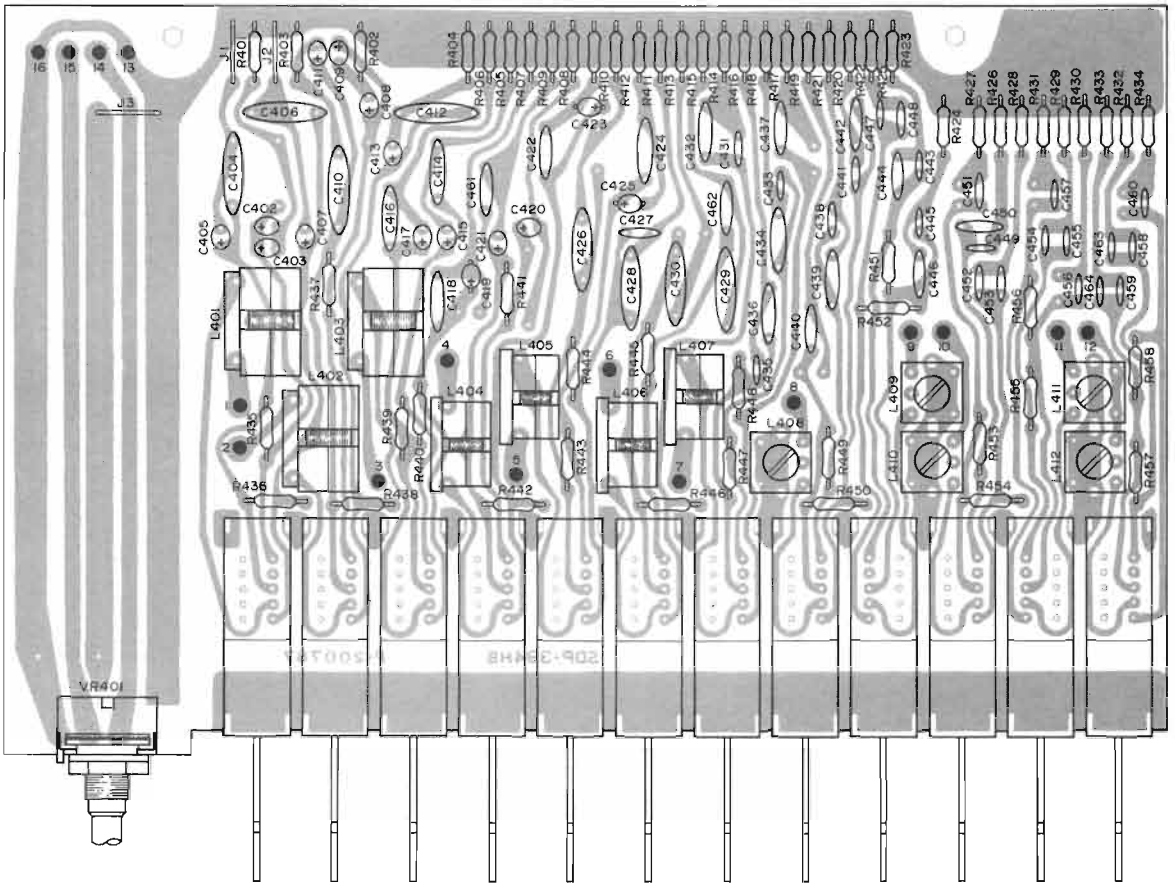


BOTTOM VIEW

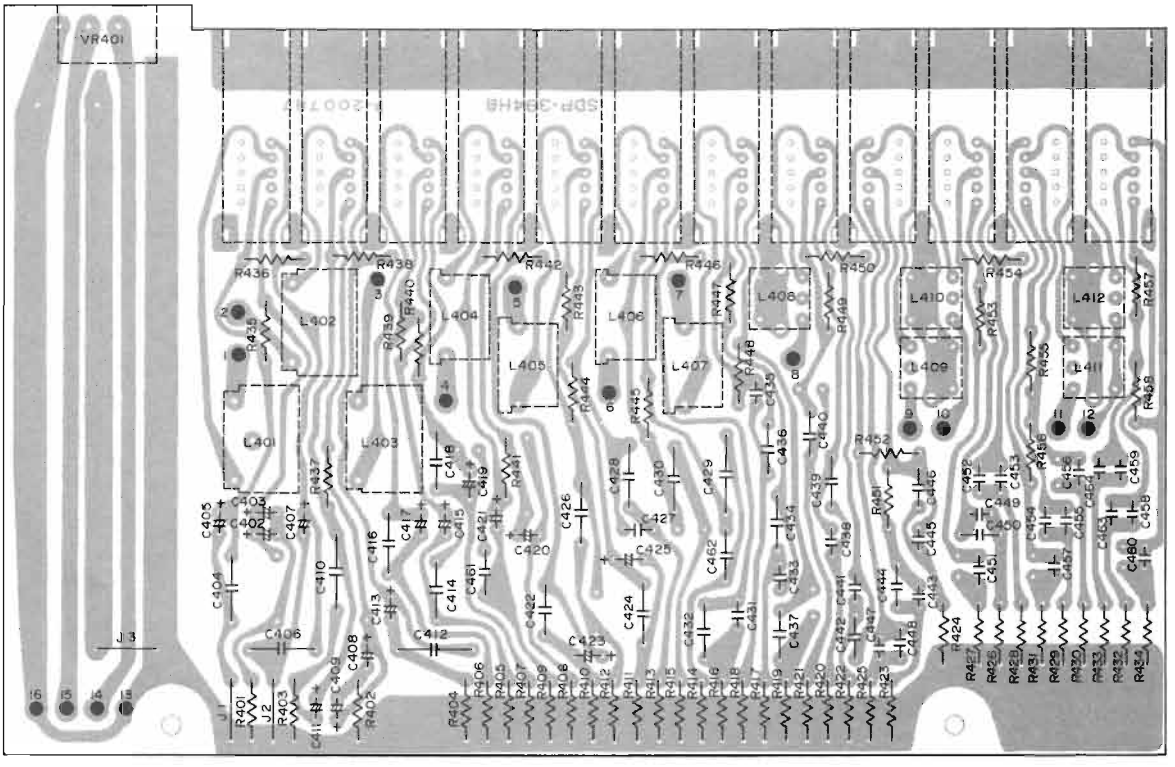


SWITCH (R) P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

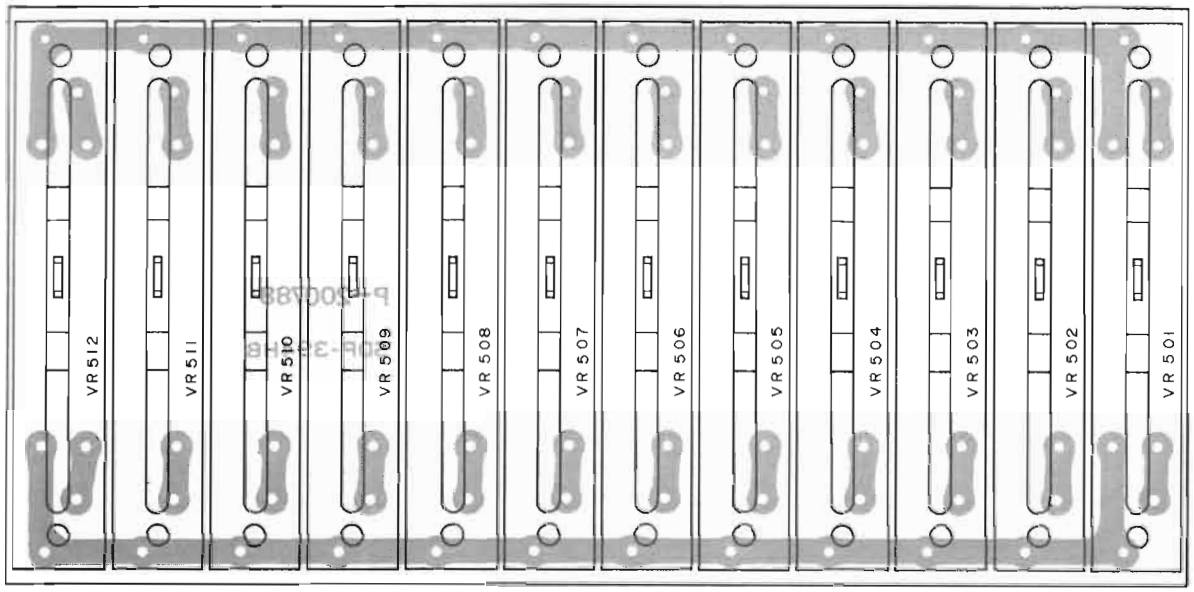


BOTTOM VIEW

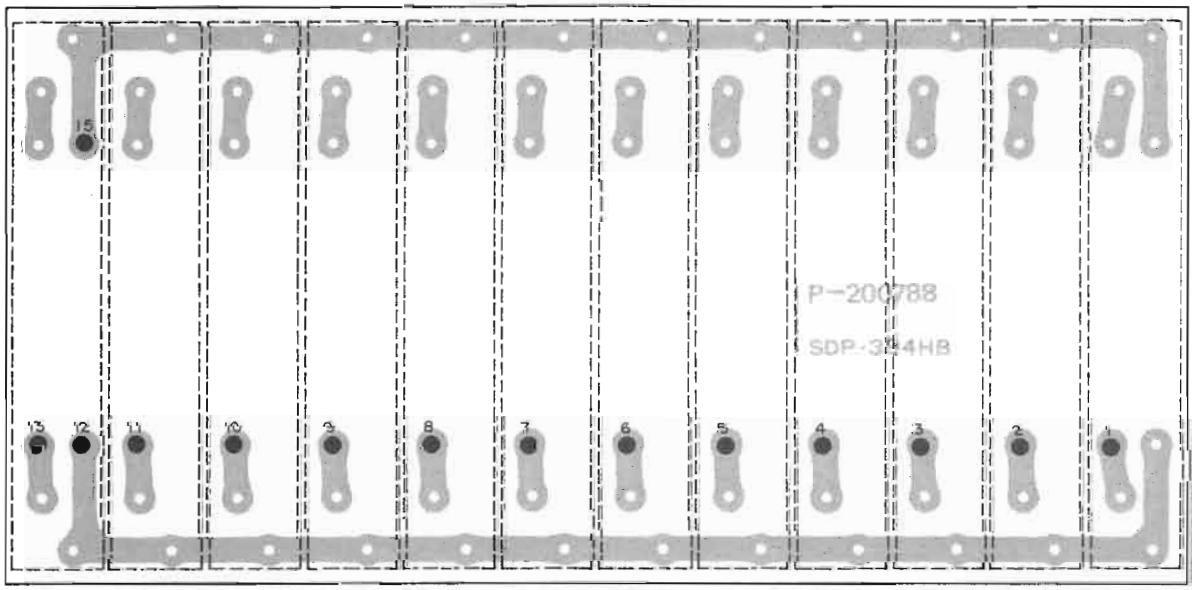


SLIDE VOLUME (L) P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW

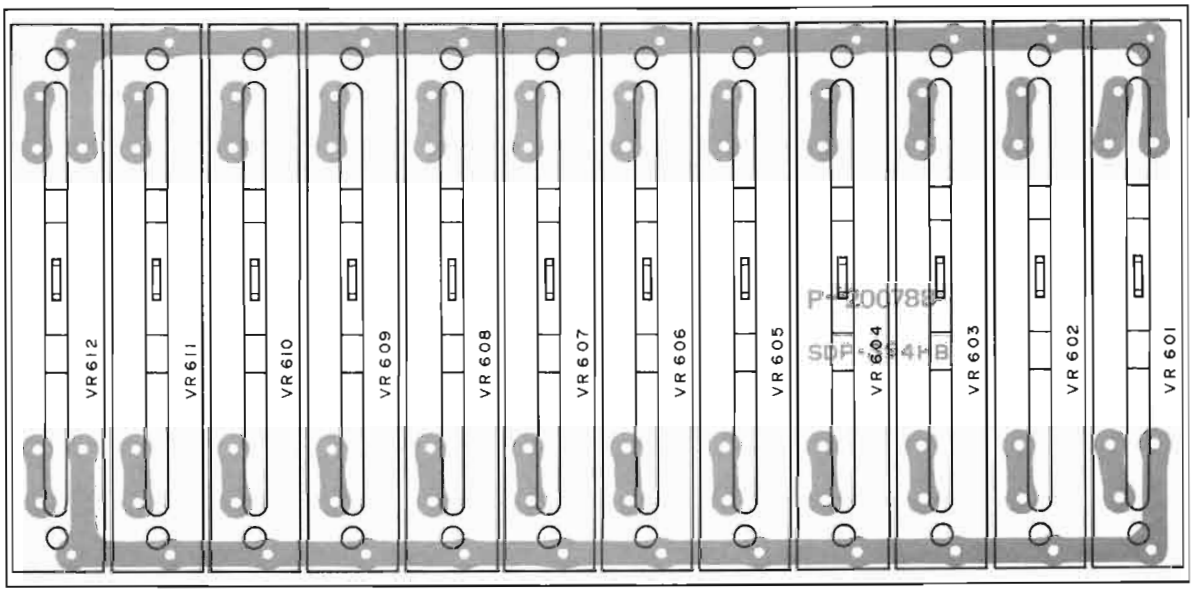


BOTTOM VIEW

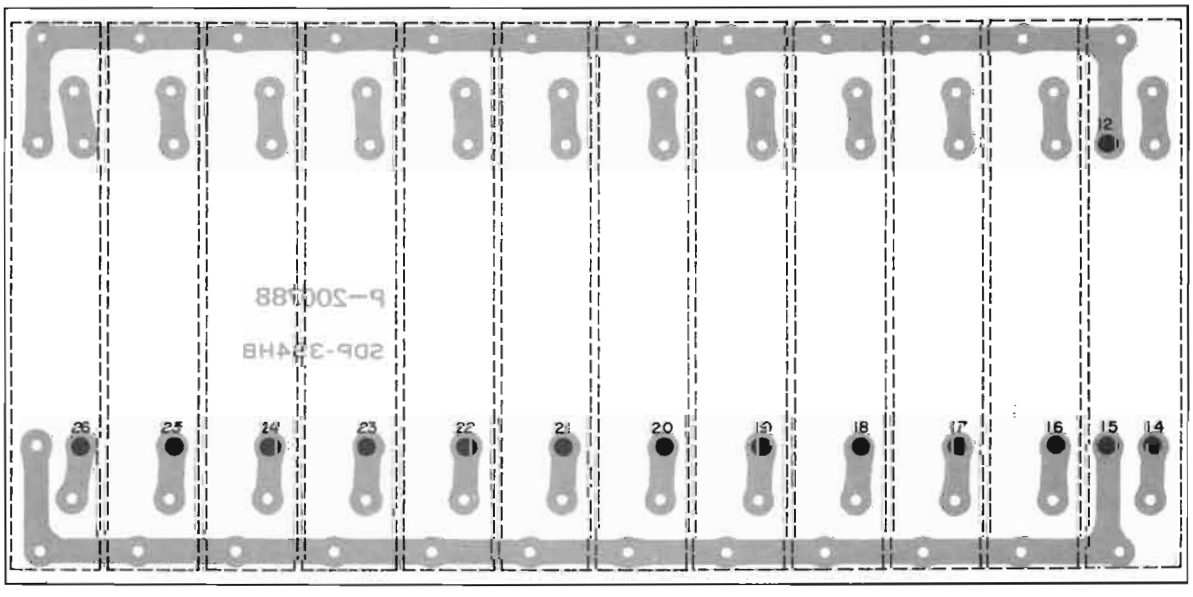


SLIDE VOLUME (R) P.C.B. (TOP & BOTTOM VIEWS)

TOP VIEW



BOTTOM VIEW



ELECTRICAL PARTS LIST

NOTE: 1. * marks value changed during the course of production.
2. Serial number is indicated on the rear panel of the unit.

REF. NO.	DESCRIPTION				BSR/ADC PART NO.	MFR'S PART NO.
CAPACITORS						
C101/102	Electrolytic	47 μF	25 V		31-25-1354	
C103/104	Tantalum	2.2 μF	35 V		31-25-1059	
C105/106	Ceramic	100 pF	50 V	±5 %	31-25-1028	
C107/108	Ceramic	10 pF	50 V	±5 %	31-25-1026	
C109/110	Ceramic	33 pF	50 V	±5 %	31-25-1068	
C111/112	Electrolytic	10 μF	35 V		31-25-1207	
C113/114	Electrolytic	47 μF	50 V		31-25-1061	
C115/116	Tantalum	2.2 μF	35 V		31-25-1059	
C117/118	Ceramic	100 pF	50 V	±5 %	31-25-1028	
C119/120	Electrolytic	47 μF	35 V		31-25-1351	
C121/122	Ceramic	18 pF	50 V	±5 %	31-25-1364	
C123/124	Ceramic	47 pF	50 V	±5 %	31-25-1365	
C125/126	Electrolytic	22 μF	35 V		31-25-1352	
C201/202	Mylar	0.1 μF	50 V	±5 %	31-25-1099	
C203/204	Mylar	0.1 μF	50 V	±5 %	31-25-1099	
C205/206	Electrolytic	4.7 μF	25 V		31-25-1353	
C207/208	Electrolytic	4.7 μF	25 V		31-25-1353	
C209/210	Ceramic	150 pF	50 V	±5 %	31-25-1368	
C211	Electrolytic	100 μF	16 V		31-25-1354	
C212/213	Ceramic	0.047 μF	50 V		31-25-1366	
C301/401	Not used					
C302/402	Tantalum	4.7 μF	35 V	±10 %	31-25-1054	
C303/403	Tantalum	1 μF	35 V	±10 %	31-25-1079	
C304/404	Mylar	0.22 μF	50 V	±3 %	31-25-1326	
C305/405	Tantalum	3.3 μF	35 V	±10 %	31-25-1077	
C306/406	Mylar	0.22 μF	50 V	±3 %	31-25-1366	
C307/407	Tantalum	2.2 μF	35 V	±10 %	31-25-1202	
C308/408	Tantalum	0.47 μF	35 V	±10 %	31-25-1080	
C309/409	Tantalum	2.2 μF	35 V	±10 %	31-25-1202	
C310/410	Mylar	0.47 μF	50 V	±3 %	31-25-1327	
C311/411	Tantalum	1.5 μF	35 V	±10 %	31-25-1204	
C312/412	Mylar	0.27 μF	50 V	±3 %	31-25-1328	
C313/413	Tantalum	1 μF	35 V	±10 %	31-25-1079	
*C314/414	Mylar	0.15 μF	50 V	±3 %	31-25-1330	
	(Use Serial No. 1 through 1000)					
*C314/414	Mylar	0.068 μF	50 V	±3 %	31-25-1380	
	(Use after Serial No. 1001)					
C315/415	Tantalum	1.5 μF	35 V	±10 %	31-25-1078	
C316/416	Mylar	0.15 μF	50 V	±3 %	31-25-1330	
C317/417	Tantalum	1 μF	35 V	±10 %	31-25-1079	
C318/418	Mylar	0.15 μF	50 V	±3 %	31-25-1330	
C319/419	Tantalum	0.68 μF	35 V	±3 %	31-25-1201	
C320/420	Tantalum	1 μF	35 V	±3 %	31-25-1079	
C321/421	Tantalum	0.68 μF	35 V	±3 %	31-25-1201	
C322/422	Mylar	0.047 μF	50 V	±3 %	31-25-1331	

REF. NO.	DESCRIPTION				BSR/ADC PART NO.	MFR'S PART NO.
C323/423	Tantalum	0.47 µF	35 V	±10 %	31-25-1080	
C324/424	Mylar	0.15 µF	50 V	±3 %	31-25-1330	
C325/425	Tantalum	0.47 µF	35 V	±10 %	31-25-1080	
C326/426	Mylar	0.39 µF	50 V	±3 %	31-25-1332	
C327/427	Mylar	0.047 µF	50 V	±3 %	31-25-1331	
C328/428	Mylar	0.22 µF	50 V	±3 %	31-25-1333	
C329/429	Mylar	0.27 µF	50 V	±3 %	31-25-1328	
C330/430	Mylar	0.22 µF	50 V	±3 %	31-25-1333	
C331/431	Not used					
C332/432	Mylar	0.15 µF	50 V	±3 %	31-25-1330	
C333/433	Mylar	0.015 µF	50 V	±3 %	31-25-1334	
C334/434	Mylar	0.15 µF	50 V	±3 %	31-25-1330	
C335/435	Mylar	0.018 µF	50 V	±3 %	31-25-1376	
C336/436	Mylar	0.1 µF	50 V	±3 %	31-25-1377	
C337/437	Mylar	0.082 µF	50 V	±3 %	31-25-1378	
*C338/438	Mylar	0.0082 µF	50 V	±3 %	31-25-1379	
	(Use for Serial No. 1 through 2000)					
*C338/438	Mylar	0.012 µF	50 V	±3 %	31-25-1392	
	(Use after Serial No. 2001)					
C339/439	Mylar	0.082 µF	50 V	±3 %	31-25-1378	
C340/440	Mylar	0.068 µF	50 V	±3 %	31-25-1380	
C341/441	Mylar	0.0082 µF	50 V	±3 %	31-25-1379	
C342/442	Mylar	0.039 µF	50 V	±3 %	31-25-1382	
*C343/443	Mylar	0.0033 µF	50 V	±3 %	31-25-1383	
	(Use for Serial No. 1 through 5000)					
*C343/443	Mylar	0.0068 µF	50 V	±5 %	31-25-1397	
	(Use after Serial No. 5001)					
C344/444	Mylar	0.056 µF	50 V	±3 %	31-25-1381	
C345/445	Mylar	0.0082 µF	50 V	±3 %	31-25-1379	
C346/446	Mylar	0.033 µF	50 V	±3 %	31-25-1384	
C347/447	Polystyrene	820 pF	50 V	±3 %	31-25-1396	
C348/448	Mylar	0.027 µF	50 V	±3 %	31-25-1385	
C349/449	Mylar	0.0039 µF	50 V	±3 %	31-25-1386	
C350/450	Mylar	0.027 µF	50 V	±3 %	31-25-1385	
C351/451	Mylar	0.022 µF	50 V	±3 %	31-25-1387	
C352/452	Mylar	0.0047 µF	50 V	±3 %	31-25-1388	
C353/453	Mylar	0.01 µF	50 V	±3 %	31-25-1389	
C354/454	Mylar	0.0018 µF	50 V	±3 %	31-25-1390	
C355/455	Mylar	0.015 µF	50 V	±3 %	31-25-1391	
C356/456	Mylar	0.012 µF	50 V	±3 %	31-25-1392	
C357/457	Mylar	0.0082 µF	50 V	±3 %	31-25-1379	
C358/458	Mylar	0.0012 µF	50 V	±3 %	31-25-1393	
C359/459	Mylar	0.0056 µF	50 V	±3 %	31-25-1394	
C360/460	Mylar	0.0047 µF	50 V	±3 %	31-25-1388	
C361/461	Mylar	0.068 µF	50 V	±3 %	31-25-1380	
C362/462	Mylar	0.039 µF	50 V	±3 %	31-25-1382	
C363/463	Mylar	0.0082 µF	50 V	±3 %	31-25-1379	
C364/464	Mylar	0.001 µF	50 V	±3 %	31-25-1395	
C701/702	Electrolytic	220 µF	50 V		31-25-1071	
C703	Electrolytic	47 µF	35 V		31-25-1351	
C704	Electrolytic	330 µF	80 V		31-25-1356	
C705	Electrolytic	47 µF	10 V		31-25-1357	

REF. NO.	DESCRIPTION	BSR/ADC PART NO.	MFR'S PART NO.
C706	Electrolytic 330 μF 16 V	31-25-1358	
C707	Electrolytic 100 μF 16 V	31-25-1359	
C708	Electrolytic 47 μF 16 V	31-25-1360	
C709/710	Electrolytic 100 μF 35 V	31-25-1355	
C711/712	Electrolytic 100 μF 35 V	31-25-1355	
C713/714	Electrolytic 470 μF 35 V	31-25-1359	
C715	Electrolytic 4.7 μF 50 V	31-25-1363	
C716	Ceramic 0.047 μF 50 V	31-25-1366	
C801/802	Tantalum 4.7 μF 35 V	31-25-1054	
C803/804	Ceramic 30 pF 50 V ±5 %	31-25-1027	
C805/806	Ceramic 330 pF 50 V ±5 %	31-25-1367	
C807/808	Electrolytic 10 μF 25 V	31-25-1208	
C1001	Ceramic for Line Pass 0.01 μF 125 V UK or LB type (U.S.A.)	31-25-1064	
C1001	Ceramic for Line Pass 0.01 μF 125 V MY type (Canadian)	31-25-1025	P-220044
C1001	Ceramic for Line Pass 0.01 μF 250 V X type (European)	31-25-1002	P-220022
C1001	Ceramic for Line Pass 0.01 μF 250 V X type (PX)	31-25-1002	P-220022
C1002/1003	Ceramic 0.01 μF 50 V	31-25-1369	
C1004	Ceramic for Line Pass 0.01 μF 250 V X type (European)	31-25-1002	P-220022
DIODES			
D201/202	Si Diode ITT-73N	31-53-1057	
D203/204	Si Diode ITT-73N	31-53-1057	
D205/206	Si Diode 10E-1 or SR-1K-2	31-53-1053	
D207/208	Si Diode ITT-73N	31-53-1057	
D209/210	Si Diode ITT-73N	31-53-1057	
D701	Bridge Diode SVB-10-200	31-53-1063	
D702/703	Si Diode 10E-1 or SR-1K-2	31-53-1053	
D704/705	Zener Diode WZ-220	31-53-1070	
D706/707	Si Diode 10E-1 or SR-1K-2	31-53-1053	
D708	Zener Diode WZ-056 or HZ-6B1	31-53-1064	
D709	Si Diode 10E-1 or SR-1K-2	31-53-1053	
D710	Zener Diode WZ-056 or HZ-6B1	31-53-1064	
D801/802	Si Diode ITT-73N	31-53-1057	
D803/804	Si Diode ITT-73N	31-53-1057	
D805/806	Si Diode ITT-73N	31-53-1057	
D807/808	Si Diode ITT-73N	31-53-1057	
D809/810	Si Diode ITT-73N	31-53-1057	
D811/812	Si Diode ITT-73N	31-53-1057	
D813/814	Si Diode ITT-73N	31-53-1057	
D815/816	Si Diode ITT-73N	31-53-1057	
D817/818	Si Diode ITT-73N	31-53-1057	
D819/820	Si Diode ITT-73N	31-53-1057	
D821/822	Si Diode ITT-73N	31-53-1057	
D823/824	Si Diode ITT-73N	31-53-1057	

REF. NO.	DESCRIPTION			BSR/ADC PART NO.	MFR'S PART NO.
D825/826	Si Diode	ITT-73N		31-53-1057	
D827/828	Si Diode	ITT-73N		31-53-1057	
D829/830	Si Diode	ITT-73N		31-53-1057	
FUSES					
	Midget Fuse	160 mAT/250 V	(European)	31-22-1407	P-250105
	Midget Fuse	315 mAT/250 V	(European)	31-22-1415	P-250084
	Fuse	1 A/250 V	(PX)	31-22-1416	P-250059
INTEGRATED CIRCUITS					
IC201	IC	NJM4558DM		31-54-1453	
IC202	IC	NJM4558DM		31-54-1453	
IC203	IC	NJM4558DM		31-54-1453	
IC801	IC	RC4709		31-54-1451	
IC802	IC	NJM4558DM		31-54-1453	
IC803	IC	NJM4558DM		31-54-1453	
IC804	IC	NJM4558DM		31-54-1453	
IC805	IC	NJM4558DM		31-54-1453	
IC806	IC	NJM4558DM		31-54-1453	
IC807	IC	NJM4558DM		31-54-1453	
IC808	IC	NJM4558DM		31-54-1453	
IC809	IC	NJM4558DM		31-54-1453	
IC810	IC	NJM4558DM		31-54-1453	
IC811	IC	NJM4558DM		31-54-1453	
IC812	IC	NJM4558DM		31-54-1453	
IC813	IC	NJM4558DM		31-54-1453	
IC814	IC	NJM4558DM		31-54-1453	
INDUCTORS					
L301/401	Inductor	6 H	±3 %	31-36-1851	P-370044S
L302/402	Inductor	3.8 H	±3 %	31-36-1852	P-370048S
L303/403	Inductor	2.05 H	±3 %	31-36-1853	P-370045S
L304/404	Inductor	1 H	±3 %	31-36-1854	P-370051S
L305/405	Inductor	0.6 H	±3 %	31-36-1855	P-370052S
L306/406	Inductor	0.36 H	±3 %	31-36-1856	P-370062S
L307/407	Inductor	0.21 H	±3 %	31-36-1857	P-370054S
L308/408	Inductor	0.12 H	±3 %	31-36-1858	P-370023S
L309/409	Inductor	0.06 H	±3 %	31-36-1859	P-370024S
L310/410	Inductor	0.037 H	±3 %	31-36-1860	P-370025S
L311/411	Inductor	0.021 H	±3 %	31-36-1861	P-370026S
L312/412	Inductor	0.012 H	±3 %	31-36-1862	P-370027S
LED's					
D901–D926	LED Meter (red)			31-53-1069	
D1001	LED SLP-144B (red)	Power Indicator		31-53-1068	
D1002/D1003	LED GL-9PR3 (red)	Signal Level Indicator		31-53-1071	
D1004/D1005	LED GL-9PR3 (red)	Signal Level Indicator		31-53-1071	

REF. NO.	DESCRIPTION			BSR/ADC PART NO.	MFR'S PART NO.
JUMPER WIRE					
(AMP Board)					
J1/3/10/11	Jumper Wire	7.5 mm			P-320126
J2/4/5/12–21	Jumper Wire	10 mm			P-320127
J7/8/9	Jumper Wire	12.5 mm			P-320128
J6	Jumper Wire	17.5 mm			P-320130
(SWITCH L & R Board)					
J1/2/3	Jumper Wire	10 mm			P-320127
(POWER SUPPLY & METER Board)					
J1–8	Jumper Wire	10 mm			P-320127
J9	Jumper Wire	15 mm			P-320129
J10	Jumper Wire	12.5 mm			P-320128
RELAY					
	Reed Relay	L23M 12 V		31-16-1036	P-290022
RESISTORS					
R101/102	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R103/104	Carbon	¼ W PZ	120 KΩ J	31-23-1001-124	
R105/106	Carbon	¼ W PZ	220 KΩ J	31-23-1001-224	
R107/108	Carbon	¼ W PZ	270 KΩ J	31-23-1001-274	
R109/110	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R111/112	Carbon	½ W PZ	3.3 KΩ J	31-23-1002-332	
R113/114	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R115/116	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R117/118	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R119/120	Metal Oxide	1 W	2.2 KΩ J	31-23-1003-222	
R121/122	Carbon	¼ W PZ	120 KΩ J	31-23-1001-124	
R123/124	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R125/126	Carbon	¼ W PZ	47 KΩ J	31-23-1001-473	
R127/128	Carbon	¼ W PZ	270 KΩ J	31-23-1001-274	
R129/130	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R131/132	Carbon	¼ W PZ	5.6 KΩ J	31-23-1001-562	
R133/134	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R135/136	Carbon	¼ W PZ	5.6 KΩ J	31-23-1001-562	
R137/138	Carbon	¼ W PZ	15 KΩ J	31-23-1001-153	
R139/140	Metal Oxide	1 W	2.2 KΩ J	31-23-1003-222	
R141/142	Carbon	½ W PZ	3.3 KΩ J	31-23-1002-332	
R143/144	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R145/146	Carbon	¼ W PZ	47 KΩ J	31-23-1001-473	
R147/148	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R201/202	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R203/204	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R205/206	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R207/208	Carbon	¼ W PZ	47 Ω J	31-23-1001-470	

REF. NO.	DESCRIPTION			BSR/ADC PART NO.	MFR'S PART NO.
R209/210	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R211/212	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R213/214	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R215/216	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R217/218	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R219/220	Carbon	¼ W PZ	91 KΩ J	31-23-1001-913	
R221/222	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R223/224	Carbon	¼ W PZ	2.2 KΩ J	31-23-1001-222	
R225/226	Carbon	¼ W PZ	91 KΩ J	31-23-1001-913	
R227/228	Carbon	¼ W PZ	2.2 KΩ J	31-23-1001-222	
R229/230	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R231/232	Carbon	¼ W PZ	2.2 KΩ J	31-23-1001-222	
R233/234	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R235/236	Carbon	¼ W PZ	100 Ω J	31-23-1001-101	
R237	Carbon	¼ W PZ	33 KΩ J	31-23-1001-333	
R238	Carbon	¼ W PZ	15 KΩ J	31-23-1001-153	
R239	Carbon	¼ W PZ	560 KΩ J	31-23-1001-564	
R240/241	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R242	Carbon	¼ W PZ	100 Ω J	31-23-1001-101	
R243/244	Carbon	¼ W PZ	2.2 KΩ J	31-23-1001-222	
R245/246	Carbon	¼ W PZ	390 Ω J	31-23-1001-391	
R247/248	Carbon	¼ W PZ	390 Ω J	31-23-1001-391	
R249/250	Carbon	¼ W PZ	2.2 KΩ J	31-23-1001-222	
R251/252	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R301/401	Carbon	¼ W PZ	330 Ω J	31-23-1001-331	
R302/402	Carbon	¼ W PZ	220 Ω J	31-23-1001-221	
R303/403	Carbon	¼ W PZ	180 Ω J	31-23-1001-181	
R304/404	Carbon	¼ W PZ	150 Ω J	31-23-1001-151	
R305/405	Carbon	¼ W PZ	270 Ω J	31-23-1001-271	
R306/406	Carbon	¼ W PZ	240 Ω J	31-23-1001-241	
R307/407	Carbon	¼ W PZ	200 Ω J	31-23-1001-201	
R308/408	Carbon	¼ W PZ	240 Ω J	31-23-1001-241	
R309/409	Carbon	¼ W PZ	200 Ω J	31-23-1001-201	
R310/410	Carbon	¼ W PZ	220 Ω J	31-23-1001-221	
R311/411	Carbon	¼ W PZ	240 Ω J	31-23-1001-241	
R312/412	Carbon	¼ W PZ	240 Ω J	31-23-1001-241	
R313/413	Carbon	¼ W PZ	240 Ω J	31-23-1001-241	
R314/414	Carbon	¼ W PZ	330 Ω J	31-23-1001-331	
R315/415	Carbon	¼ W PZ	330 Ω J	31-23-1001-331	
R316/416	Carbon	¼ W PZ	300 Ω J	31-23-1001-301	
R317/417	Carbon	¼ W PZ	390 Ω J	31-23-1001-391	
R318/418	Carbon	¼ W PZ	390 Ω J	31-23-1001-391	
R319/419	Carbon	¼ W PZ	360 Ω J	31-23-1001-361	
R320/420	Carbon	¼ W PZ	300 Ω J	31-23-1001-301	
R321/421	Carbon	¼ W PZ	330 Ω J	31-23-1001-331	
R322/422	Carbon	¼ W PZ	330 Ω J	31-23-1001-331	
R323/423	Carbon	¼ W PZ	360 Ω J	31-23-1001-361	
R324/424	Carbon	¼ W PZ	360 Ω J	31-23-1001-361	
R325/425	Carbon	¼ W PZ	360 Ω J	31-23-1001-361	
R326/426	Carbon	¼ W PZ	430 Ω J	31-23-1001-431	
R327/427	Carbon	¼ W PZ	470 Ω J	31-23-1001-471	

REF. NO.	DESCRIPTION			BSR/ADC PART NO.	MFR'S PART NO.
R328/428	Carbon	¼ W PZ	470 Ω J	31-23-1001-471	
R329/429	Carbon	¼ W PZ	510 Ω J	31-23-1001-511	
R330/430	Carbon	¼ W PZ	510 Ω J	31-23-1001-531	
R331/431	Carbon	¼ W PZ	510 Ω J	31-23-1001-531	
R332/432	Carbon	¼ W PZ	560 Ω J	31-23-1001-561	
R333/433	Carbon	¼ W PZ	560 Ω J	31-23-1001-561	
R334/434	Carbon	¼ W PZ	560 Ω J	31-23-1001-561	
R335/435	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R336/436	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R337/437	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R338/438	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R339/439	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R340/440	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R341/441	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R342/442	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R343/443	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R344/444	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R345/445	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R346/446	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R347/447	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R348/448	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R349/449	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R350/450	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R351/451	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R352/452	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R353/453	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R354/454	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R355/455	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R356/456	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R357/457	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R358/458	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R701	Metal Oxide	2 W	22 Ω J	31-23-1004-220	
R702	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R703	Carbon	¼ W PZ	8.2 KΩ J	31-23-1001-822	
R704	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R705	Carbon	¼ W PZ	470 KΩ J	31-23-1001-474	
R706	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R707	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R708	Carbon	¼ W PZ	33 KΩ J	31-23-1001-333	
R709	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R710	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R711	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	
R712/713	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R714/715	Carbon	¼ W PZ	1 KΩ J	31-23-1001-102	
R716/717	Metal Oxide	2 W	56 Ω J	31-23-1004-560	
R718	Carbon	¼ W PZ	47 KΩ J	31-23-1001-473	
R719	Carbon	¼ W PZ	3.3 KΩ J	31-23-1001-332	
R801/802	Carbon	¼ W PZ	100 KΩ J	31-23-1001-104	
R803/804	Carbon	¼ W PZ	100 KΩ J	31-23-1001-104	
R805/806	Carbon	¼ W PZ	22 KΩ J	31-23-1001-223	

REF. NO.	DESCRIPTION			BSR/ADC PART NO.	MFR'S PART NO.
R807/808	Carbon	¼ W PZ	1.5 KΩ J	31-23-1001-152	
R809/810	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R811/812	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R813/814	Carbon	¼ W PZ	1.8 KΩ J	31-23-1001-182	
R815/816	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R817/818	Carbon	¼ W PZ	1.5 KΩ J	31-23-1001-152	
R819/820	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R821/822	Carbon	¼ W PZ	1.1 KΩ J	31-23-1001-112	
R823/824	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R825/826	Carbon	¼ W PZ	910 Ω J	31-23-1001-911	
R827/828	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R829/830	Carbon	¼ W PZ	620 Ω J	31-23-1001-621	
R831/832	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R833/834	Carbon	¼ W PZ	560 Ω J	31-23-1001-561	
R835/836	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R837/838	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R839/840	Carbon	¼ W PZ	300 Ω J	31-23-1001-301	
R841/842	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R843/844	Carbon	¼ W PZ	220 Ω J	31-23-1001-221	
R845/846	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R847/848	Carbon	¼ W PZ	150 Ω J	31-23-1001-151	
R849/850	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R851/852	Carbon	¼ W PZ	130 Ω J	31-23-1001-131	
R853/854	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R855/856	Carbon	¼ W PZ	91 Ω J	31-23-1001-910	
R857/858	Carbon	¼ W PZ	10 KΩ J	31-23-1001-103	
R859/860	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R861/862	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R863/864	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R865/866	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R867/868	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R869/870	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R871/872	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R873/874	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R875/876	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R877/878	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R879/880	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R881/882	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R883/884	Carbon	¼ W PZ	2.2 MΩ J	31-23-1001-225	
R885/886	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R887/888	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R889/890	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R891/892	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R893/894	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R895/896	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R897/898	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R899/900	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R901/902	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R903/904	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R905/906	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R907/908	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	
R909/910	Carbon	¼ W PZ	4.7 KΩ J	31-23-1001-472	

REF. NO.	DESCRIPTION	BSR/ADC PART NO.	MFR'S PART NO.
R911/912	Carbon ¼ W PZ 47 KΩ J	31-23-1001-473	
SWITCHES			
S301/401	Selector Switch (26/32/39 Hz)	31-16-1028	P-180423
S302/402	Selector Switch (47/56/68 Hz)	31-16-1028	P-180423
S303/403	Selector Switch (84/100/120 Hz)	31-16-1028	P-180423
S304/404	Selector Switch (150/180/215 Hz)	31-16-1028	P-180423
S305/405	Selector Switch (260/320/390 Hz)	31-16-1028	P-180423
S306/406	Selector Switch (470/560/680 Hz)	31-16-1028	P-180423
S307/407	Selector Switch (840/1 K/1.2 KHz)	31-16-1028	P-180423
S308/408	Selector Switch (1.5 K/1.8 K/2.15 KHz)	31-16-1028	P-180423
S309/409	Selector Switch (2.6 K/3.2 K/3.9 KHz)	31-16-1028	P-180423
S310/410	Selector Switch (4.7 K/5.6 K/6.8 KHz)	31-16-1028	P-180423
S311/411	Selector Switch (8.4 K/10 K/12 KHz)	31-16-1028	P-180423
S312/412	Selector Switch (15 K/18 K/21.5 KHz)	31-16-1028	P-180423
	Voltage Selector Switch (PX)	31-16-1021	P-180333
	Power Switch (USA, Canadian & PX)	31-16-1029	P-180428
	Power Switch (European)	31-16-1030	P-180429
S1a, b	LINE RECORD Switch	31-16-1031	P-180427
S2a, b	TAPE MONITOR/OUT Switch	31-16-1031	P-180427
S3a, b	BY-PASS/EQ Switch	31-16-1031	P-180427
S4a, b	METER/OUT Switch	31-16-1031	P-180427
TRANSFORMERS			
T1001	Power Transformer 120 VAC, 60 Hz (USA & Canadian)	31-27-1027	P-100721
T1001	Power Transformer 230 VAC, 50 Hz (European)	31-27-1028	P-100722
T1001	Power Transformer 100 V/120 V/220 V/240 V AC, 50/60 Hz (PX)	31-27-1029	P-100723
TRANSISTORS			
TR101/102	2SC1222(2)(F) or 2SC1313(G)	31-53-1051	
TR103/104	2SC1222(2)(F) or 2SC1313(G)	31-53-1051	
TR105/106	2SC1222(2)(F) or 2SC1313(G)	31-53-1051	
TR107/108	2SA953(L)	31-53-1062	
TR109/110	2SC1222(2)(F) or 2SC1313(G)	31-53-1051	
TR111/112	2SC1222(2)(F) or 2SC1313(G)	31-53-1051	
TR113/114	2SC1222(2)(F) or 2SC1313(G)	31-53-1051	
TR115/116	2SA953(L)	31-53-1062	
TR201/202	2SC945A(P)	31-53-1055	
TR203	2SC945A(P)	31-53-1055	
TR701	2SC945A(P)	31-53-1055	
TR702	2SD314(E)	31-53-1056	
TR703	2SD600(E)	31-53-1072	

REF. NO.	DESCRIPTION	BSR/ADC PART NO.	MFR'S PART NO.
TR704	2SA750(E)	31-53-1073	
TR705	2SC945A(P)	31-53-1055	
TR706	2SB631(E)	31-53-1074	
VARIABLE RESISTORS			
VR101/102	Trimmer Resistor 50 KΩ B	31-16-1033	P-170492
VR201/202	Trimmer Resistor 2 KΩ B	31-16-1034	P-170488
VR301	Trimmer Resistor 50 KΩ B	31-16-1035	P-170274
VR401	Trimmer Resistor 50 KΩ B	31-16-1035	P-170274
VR501–512/ VR601–612	Slide Volume 50 KΩ 5B (Use for Serial No. 1–1,500 of USA Version)	31-21-1010	P-170265
VR501–512/ VR601–612	Slide Volume 50 KΩ 5B (Use after Serial No. 1,501 of USA Version and other Versions)	31-21-1003	P-170543
VR801/802	Trimmer Resistor 100 KΩ B	31-16-1026	P-170444
VR803/804	Trimmer Resistor 1 KΩ B	31-16-1027	P-170433
VR805/806	Trimmer Resistor 500 Ω B	31-16-1032	P-170432
VR1001/1002	Slide Volume 50 KΩ 5B	31-21-1016	P-170529

EXPLODED VIEW PARTS LIST

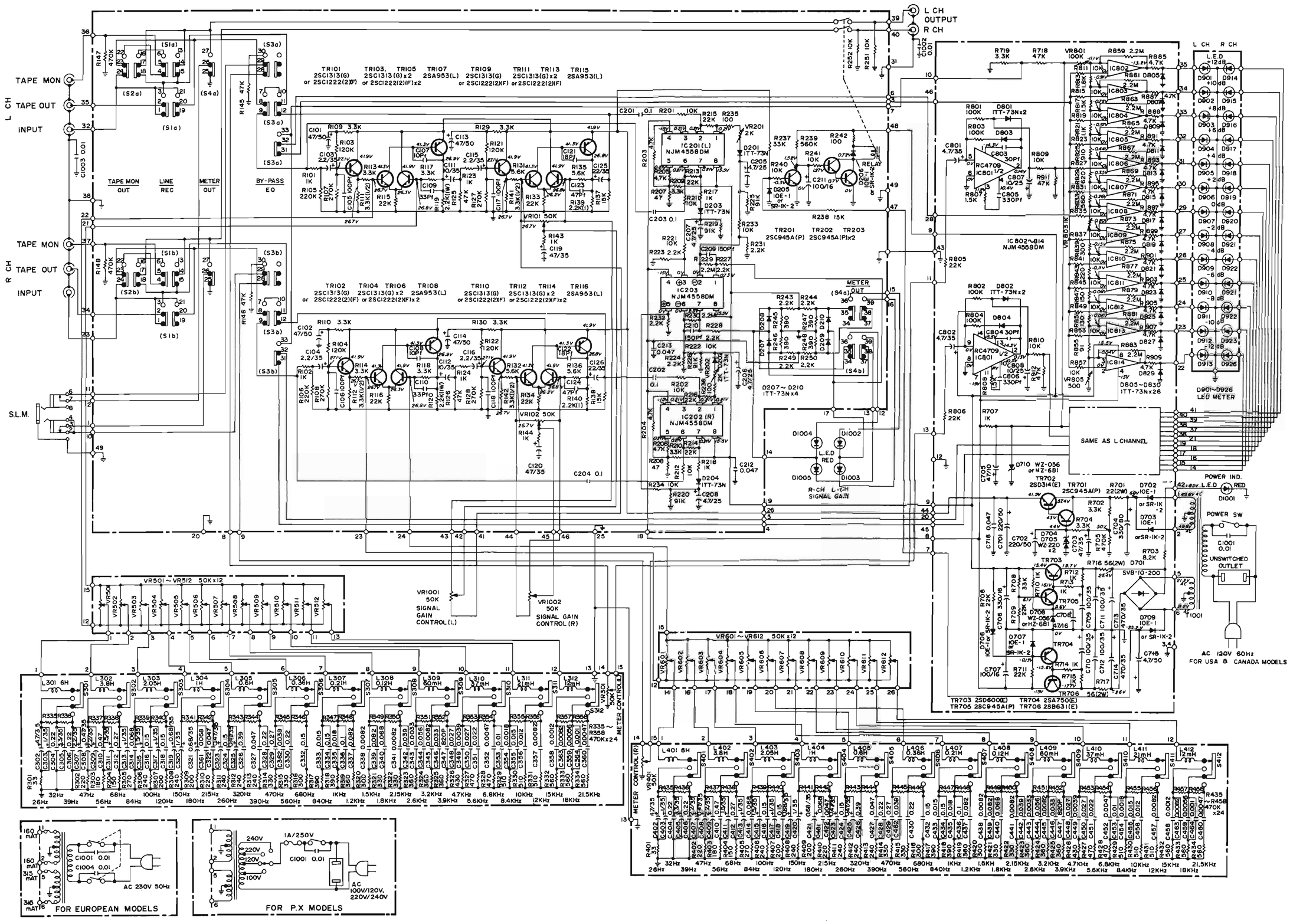
REF. NO.	DESCRIPTION	BSR/ADC PART NO.	MFR'S PART NO.
1	Front Panel Ass'y	31-14-1134	P-700452
	Consists of Front Panel	31-14-1140	P-700451
	Sheet	31-40-1021	P-480269
	Blind Sheet B	31-40-1003	P-480271
	Knob Guide	31-14-1150	P-610692
	Blind Sheet A	31-40-1004	P-480270
2	Handle	31-14-1135	P-710180
3	Cabinet	31-14-1145	P-600151
4	Push Knob	31-14-1148	P-650138
5	Slide Control Knob	31-14-1139	P-650409
6	Selector Switch Knob	31-14-1147	P-650408
7	Meter Level Control Knob	31-14-1138	P-650400
8	Signal Gain Control Knob	31-14-1144	P-650418
9	Meter Holder	31-14-1141	P-411974
10	Front Chassis Ass'y	31-14-1142	P-400269
	Consists of Front Chassis	31-14-1143	P-400249
	Phone Jack Bracket	31-13-1275	P-411973
11	Slide Volume P.C.B.	31-17-1522	U-23155
12	Chassis Frame R	31-34-1050	P-400256
13	Chassis Frame L	31-34-1049	P-400257
14	Chassis Frame C	31-34-1048	P-400258
15	P.C.B. Bracket C	31-13-1078	P-412001
16	P.C.B. Bracket A	31-13-1079	P-411999
17	Back Panel (USA)	31-14-1151	P-411992
17	Back Panel (Canadian)	31-14-1152	P-411993
17	Back Panel (European)	31-14-1153	P-411994
17	Back Panel (PX)	31-14-1154	P-411995
18	P.C.B. Bracket B	31-13-1080	P-412000
19	Power Trans. Bracket	31-13-1081	P-412003
20	Bottom Plate	31-13-1082	P-412004
21	Foot D	31-14-1155	P-610494
22	Amp P.C.B.	31-17-1523	U-23151
23	Power Supply & Meter P.C.B.	31-17-1526	U-23152
24	Switch (L) P.C.B.	31-17-1524	U-23153
25	Switch (R) P.C.B.	31-17-1525	U-23154
26	LED Meter P.C.B.	31-17-1527	U-23156
	Consists of LED Meter Ass'y	31-29-1008	P-230092
	14P Wiring Socket	31-18-1020	P-190263
	14P Wiring Plug	31-18-1021	P-190264
	Solderless Terminal	31-13-1627	P-320313
27	AC Cord (USA & Canadian)	31-46-1020	P-310115
27	AC Cord (European)	31-46-1018	P-310105
27	AC Cord (PX)	31-46-1019	P-310106
28	Clamp Connector	31-13-1252	P-320006
29	AC Cord Strain Relief (USA, Canadian & PX)	31-13-1251	P-480010
29	AC Cord Strain Relief (European)	31-13-1066	P-480080
30	AC Outlet (USA, Canadian & PX)	31-18-1005	P-190098
31	Power Transformer (USA & Canadian)	31-27-1027	P-100721
31	Power Transformer (European)	31-27-1028	P-100722
31	Power Transformer (PX)	31-27-1029	P-100723
32	Power Switch (USA, Canadian & PX)	31-16-1029	P-180428
32	Power Switch (European)	31-16-1030	P-180429
33	Line Pass Capacitor (USA)	31-25-1064	

REF. NO.	DESCRIPTION		BSR/ADC PART NO.	MFR'S PART NO.
33	Line Pass Capacitor (Canadian)		31-25-1025	P-220044
33	Line Pass Capacitor (European & PX)		31-25-1002	P-220022
34	Cover for Capacitor (USA & PX)		31-40-1007	P-610466
34	Cover for Capacitor (Canadian)		31-40-1018	P-610670
35	SLM Jack		31-20-1010	P-190155
36	Power Indicator LED		31-53-1075	
37	LED Holder C		31-18-1019	P-680219
38	Slide Volume		31-21-1016	P-170529
39	4P RCA Pin Jack		31-20-1011	P-320137
40	Number Plate		31-59-1224	P-730184
41	Block Terminal (European)		31-18-1008	P-320251
42	Insulation Sheet (European)		31-40-1023	P-690251
43	Insulation Cap (European)		31-40-1013	P-690284
44	Fuse Holder (European)		31-18-1953	P-260008
45	Midget Fuse 160 mAT, 250 V (European)		31-22-1407	P-250105
46	Midget Fuse 315 mAT, 250 V (European)		31-22-1415	P-250084
47	Voltage Selector Switch (PX)		31-16-1021	P-180333
HARDWARE				
S1	Tapping Screw	3 x 8BT-2		
S2	Screw (black)	4 x 14F		
S3	Tapping Screw (black)	4 x 12BT-3		
S4	Tapping Screw (black)	3 x 8BT-3		
S5	Flange Lock Screw	3 x 6P-FL		
S6	Tooth Tapping Screw (black)	3 x 8BT-2		
S7	Tapping Screw	3 x 12BT-2		
S8	Screw	3 x 5P		
S9	Tapping Screw	4 x 10BT-3		
S10	Tapping Screw	3 x 20BT-3		
S11	Flange Lock Screw (black)	3 x 8P-FL		
S12	Tapping Screw (black)	3 x 8BT-3		
S13	Flange Lock Screw	3 x 6P-FL		
N1	Nut	4N		
N2	Nut	3N		
W1	Washer	SS41	31-13-1100	P-420299
W2	Washer (black)	4W		
W3	Washer	3W		
SW1	Spring Washer	3SW		
SW2	Spring Washer	4SW		
R1	Rivet (black)	YB-320		

MISCELLANEOUS PARTS LIST

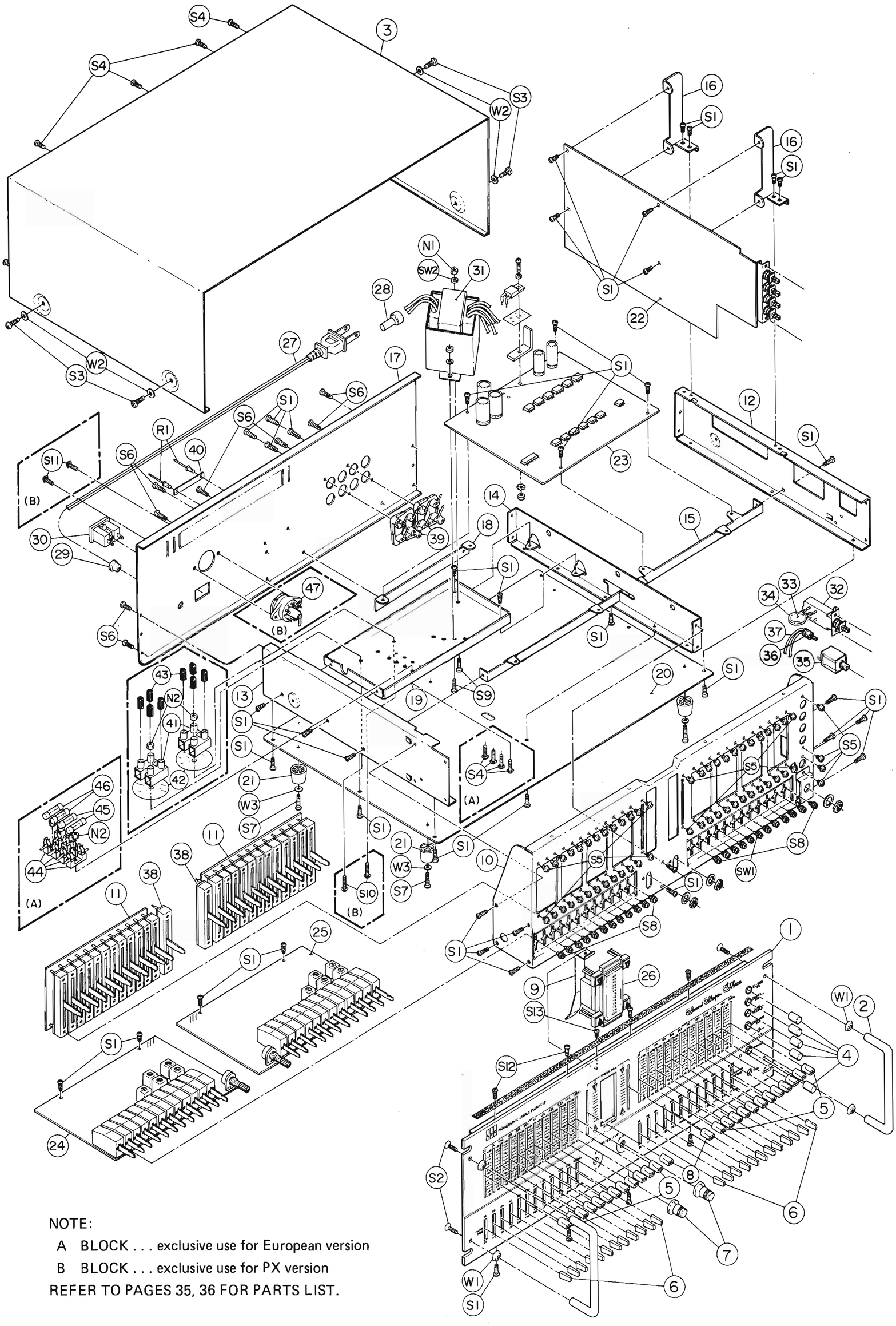
DESCRIPTION	BSR/ADC PART NO.	MFR'S PART NO.
Pin Terminal for P.C.B.	31-13-1065	P-320245
Heat Sink for Transistor (Part of Power Supply P.C.B.)	31-49-1003	P-411332
Fuse Label (European)	31-59-1100	P-810720
Fuse Label (European)	31-59-1609	P-810906
Power Switch Cover (European)	31-40-1007	P-480145
LED Holder for Signal Level Indicator	31-18-1022	P-680220
Master Carton (USA, Canadian & European)	31-59-1610	P-800843
Master Carton (PX)	31-59-1612	P-800850
Double Master Carton (PX)	31-59-1613	P-800851
Gift Box (USA, European & PX)	31-59-1614	P-800844
Gift Box (Canadian)	31-59-1615	P-800845
Sheet for Gift Box A	31-59-1616	P-820625
Sheet for Gift Box B	31-59-1617	P-820626
Snow Box	31-59-1618	P-820621
Cushion Plate	31-59-1619	P-820657
Owner's Manual	31-59-1982	P-810901
Warranty Card (USA) 2 years	31-854-2231	P-810762 or P-810939
Warranty Card (European & PX) 1 year	31-59-1475	P-810782
Frequency Response Curve Sheet	31-59-1620	P-810937
Caution Label (USA, European & PX)	31-59-1899	P-810009
C.S.A. Caution Label (Canadian)	31-59-1268	P-810511
QC Label	31-59-1227	P-810019
PASS Label	31-59-1230	P-810183
UL Label (USA)	31-59-1229	P-810100
C.S.A. Label (Canadian)	31-59-1269	P-810024
IHF Tag (USA)	30-853-0463	P-810770
AC Cord Tag (European)	31-59-1239	P-810698
㊦ Mark Label (PX)	31-59-1621	P-810902
Patch Cord	31-46-1015	P-190124
Poly Bag for Set	31-59-1622	P-820362
Poly Bag for AC Cord (USA, Canadian & PX)	31-59-1251	P-820041
Poly Bag for AC Cord (European)	31-59-1252	P-820418
Service Manual	31-59-1983	

SCHEMATIC DIAGRAM



NOTE:
1. ALL CAPACITANCE VALUES ARE INDICATED IN "μF" (Pf = 10^{-6}μF)
2. ALL RESISTANCE VALUES ARE INDICATED IN "Ω" (KΩ = 10^{3} Ω)
3. VOLTAGES ARE MEASURED TO CHASSIS GROUND WITH A VOLTMETER (DIGITAL VOLTMETER: OVER 10 KΩ/V) WITH NO INPUT.

EXPLODED VIEW



NOTE:

A BLOCK . . . exclusive use for European version

B BLOCK . . . exclusive use for PX version

REFER TO PAGES 35, 36 FOR PARTS LIST.

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