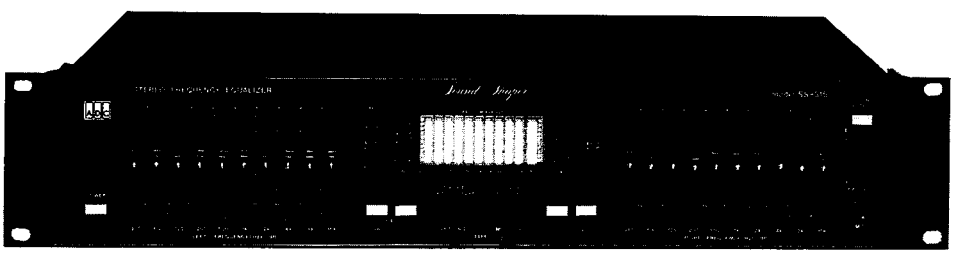
Service Manual

SS-315 STEREO FREQUENCY EQUALIZER with SPECTRUM ANALYZER

Sound Shaper®



SS-315 (U)

SS-315 (PX)

SS-315 (E)

SS-315 (C) Silver

SS-315 (J)

SS-315 (E) Silver

ADC

CONTENTS

* Rack Mount (ML633AA001) supplied optionally for USA, CANADA, EUROPE versions.

*** Destinations**

(U) . . . . U. S. A
(E) . . . . EUROPE
(J) . . . . JAPAN
(PX) . . . U. S. MILITARY
(C) . . . . CANADA

1. SPECIFICATIONS

	(Unit)	(Nominal)	(Limit)
EQUALIZER			
Center Frequencies		31.5, 63, 125, 250, 500, 1 k, 2 k, 4k, 8 k, 16 k Hz	
	(%)		±15
Control Range	(dB)	±15	±15 +2.0/–1.0
Frequency Response (5 Hz ~ 100 kHz)	(dB)	+0.5/–1.0	+0.5/–2.0
Gain (Unity)	(dB)	±1.0	+1.0/–1.5
Harmonic Distortion (20 Hz ~ 20 kHz, 1 V output)	(%)	0 008	0 012
Intermodulation Distortion (60 Hz: 7 kHz = 4:1, 1 V output)	(%)	0.008	0.012
Hum and Noise (Input shorted, A-weighted, below 1 V output)	(dB)	102	102
Dynamic Range (10 k ohm load)	(V/rms)	10	9
Subsonic Filter (15 Hz 18 dB/out)	(dB)	–3	–2 ~ –5
Input Sensitivity (LINE IN)			150 mV
Input Impedance (LINE IN, 1 kHz)			50 K ohm
Output Impedance (1 kHz)			600 ohm
Load Impedance			10 K ohm or greater
ANALYZER			
Display accuracy (31.5 Hz ~ 1 kHz)	(%)	10	
(2 kHz ~ 16 kHz)	(%)	5	
Frequency response (LINE IN, 30 Hz ~ 16 kHz)	(dB)	0.5	1.0
(MIC 30 Hz ~ 16 kHz)	(dB)	3	3
Peakhold duration	(sec)	20	15
Input Impedance (MIC)	(kohm)	47	
Input Sensitivity (MIC)	(mV)	0.5	
Pink Noise Generator Output	(mV)	100	more than 100
Pink Noise Frequency Response (20 Hz 20 kHz)	(dB, rms)	2	3
MICROPHONE			
Element type			Electret Condenser
Directivity			Omni-Directional
Impedance (1 kHz)	(kohm)	2	
Sensitivity (0 dB = 1 V/microbar)	(dB)	70	
Frequency Response (Compensated)	(Hz)	20 16 K	
Bias (Fed form SS-315)	(V)	1.5	
Power Requirements (USA/CANADA)			120 V, 60 Hz
(PX/JAPAN)			100/120/220/240 V, 50/60 Hz
(Europe)			220 V, 50 Hz
Power Consumption			12 W
Dimensions (Width)			435 mm, 17-1/8"
(Height)			88 mm, 3-1/2"
(Depth)			222 mm, 8-7/8"
Weight			4.2 kg, 9.3 lbs

2. DISASSEMBLY

1) Removal of Top Cover

a) Remove the 6 screws (① through ⑥)

2) Removal of Front Panel

a) Pull and remove the knobs

b) Remove the 13 screws (⑦ through ⑲)

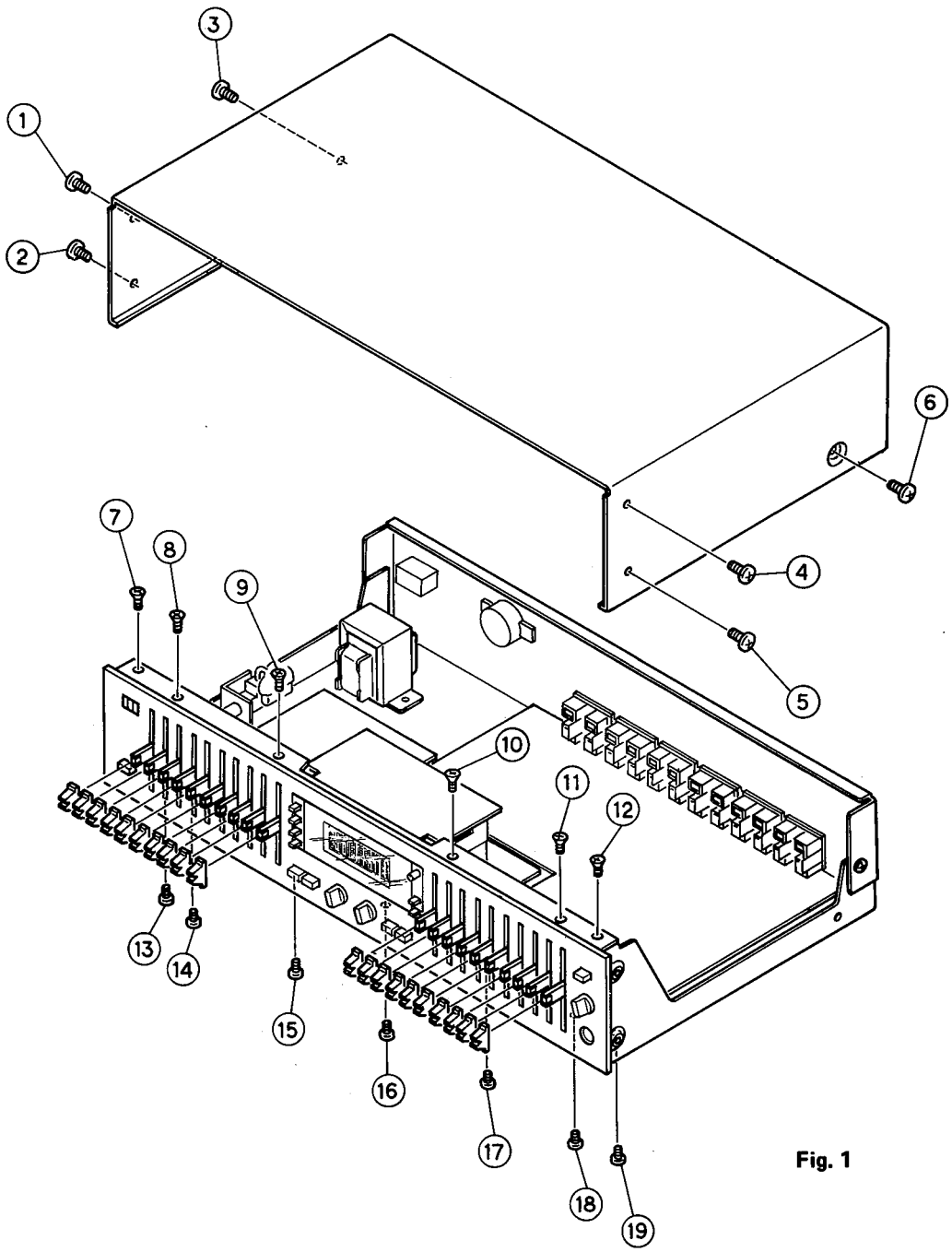


Fig. 1

3. CONTROLS AND FUNCTIONS

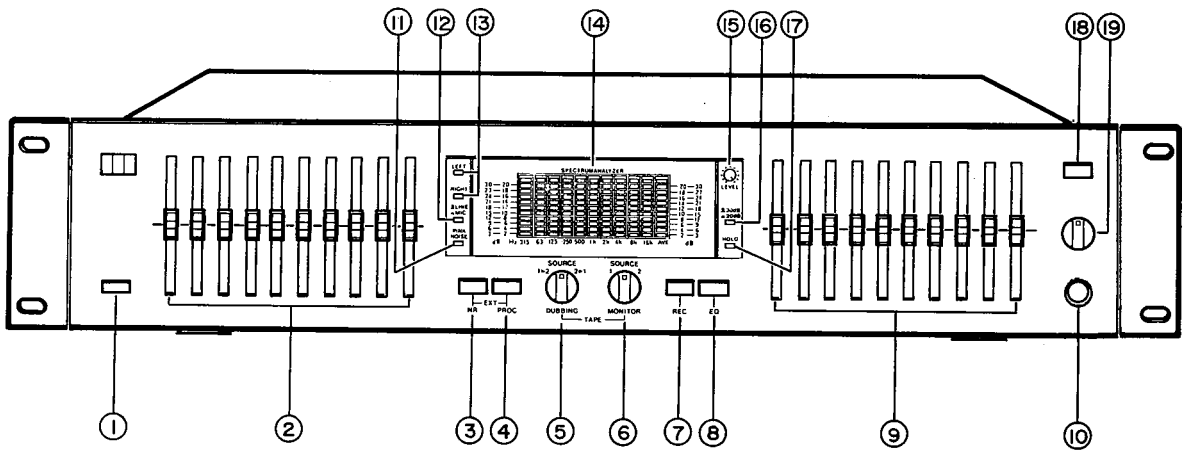


Fig. 2

① POWER switch

Depress this switch to turn the unit on or off. The 'ADC' emblem above the switch will be illuminated when the unit is on. When power is off, audio may not flow through the unit unless the EQ button is released (off).

② LEFT/FREQUENCY (Hz)/dB level controls

Each control varies by ±15 dB the level of a small range of audio frequencies which is centered around the frequency marked over each control. These controls are operative when the EQ button is depressed.

③ EXT NR (external noise reduction) button

Depress to introduce the external noise reduction device connected to the NOISE REDUCTION DECODER/ ENCODER jacks. The noise reduction device affects TAPE 1 only.

④ EXT PROC (external processor) button

Depress to introduce the external sound processing device connected to the SOUND PROCESSOR jacks.

⑤ DUBBING selector

Used to dub (copy) a tape program onto another tape. deck – in two way. Set this selector to SOURCE when recording the LINE inputs on tape decks. This selector will still function when the EQ button is released (off).

⑥ MONITOR selector

Selects the output of the either of two tape decks connected to the TAPE 1 or TAPE 2 jacks. Set this selector to SOURCE to listen to the LINE inputs.

⑦ REC button

Depress this button to make a frequency equalized tape recording or dubbing (the EQ button must be depressed for equalized recording). This button also allows to switch in the external sound processor for recording. Note that the PROC button should be left released unless an external sound processor is connected to the SS-315.

⑧ EQ button

Depress to use the FREQUENCY (Hz) level controls (the control LEDs turn on) and to make an equalized tape recording. Release this button to bypass the equalizer when no equalization is desired (the control LEDs turn off). This button also activates the SUBSONIC FILTER button and the BALANCE control.

⑨ RIGHT/FREQUENCY (Hz)/dB level controls

Operate in the same manner as the LEFT/FREQUENCY (Hz)/dB level controls except that these controls provide adjustment of the right channel level.

⑩ MIC jack

Connect the microphone supplied with the unit to make the adjustments of the frequencies involving voices, instruments, music or pink noise. Connect the microphone supplied only. The use of other microphones——dynamic type etc. will damage your system.

⑪ PINK NOISE button

Press this button and the display LEFT and/or RIGHT button and a pink noise signal is provided to the left and/or right channel LINE OUT jacks of the unit. The level of the pink noise will be displayed on the SPECTRUM ANA LYZER display. Pink noise offers a constant level of noise that eliminates this dB in terms of octave ratings. For details, see page 17.

⑫ LINE-MIC button

Depress this button to make the analyzer measurements of the signal from the microphone. When released (to LINE), the analyzer measurements are made from the LINE input signal.

⑬ Display LEFT/RIGHT buttons

Allow you to display either the left channel signal, right channel signal, or both channels (when you press both buttons simultaneously).

⑭ **SPECTRUM ANALYZER display**

A fluorescent display. The graph is divided into ten separate bands plus one average band of all audible frequencies.

⑮ **Display LEVEL control**

Allows you to adjust the SPECTRUM ANALYZER display so that you can obtain the easiest readout setting in terms of the display 20dB—30dB range selector button.

⑯ **Display 20dB—30dB button**

Used to select for a 20 dB or 30 dB readout on the SPECTRUM ANALYZER, in order to show dynamic ranges for the LINE input, microphone input, or pink noise input.

⑰ **Display HOLD button**

Used to 'freeze' the display at any desired point. When the button is depressed, the SPECTRUM ANALYZER display will hold the display immediately until the button is again depressed to release.

⑱ **SUBSONIC FILTER OUT/IN button**

Operates when the EQ button is depressed and low frequency hum or turntable rumble does not affect your program material. The SUBSONIC FILTER circuit functions to attenuate the output below 15 Hz by −18 dB/octave. Subsonic filtered signals can be recorded on the tape deck(s) if the REC and EQ buttons are depressed.

⑲ **BALANCE control**

Operates when the EQ button is depressed and provides left channel to right channel balance of output level. Normally set this control to center. The BALANCE control will affect recording if the EQ and REC buttons are depressed.

4. ADJUSTMENT PROCEDURE

Before Adjustment

- Allow a minimum of 10 minutes of warm-up for test equipments and the unit to be tested.
- Maintain rated AC line voltage.
- Before starting adjustment, confirm that the regulated DC voltages from the power supply circuitry are supplyed properly.

Test Equipment

- DC volt meter
- Vacuum tube volt meter (V. T. V. M)
- Audio signal generator
- Oscilloscope

Spectrum Analyzer Adjustment

1. Set the LINE IN open, switches and controls on the unit as shown in Fig. 3, 4.
2. Connect a DC volt meter to the test point (TP-1) and adjust the potentiometer RVL01 so that the DC volt meter reads −0.4 ± 0.02 V.
3. Connect the DC volt meter to the test point (TP-2) and adjust the potentiometer RVL02 to 1.5 ± 0.05 V.
4. Set the 30 dB/20 dB selector to 30 dB position adjust the potentiometer RVL03 for TP-3 voltage −3.5 ± 0.05 V.
5. Set the 30 dB/20 dB selector to 20 dB position and connect the DC voltmeter to the test point (TP-4) and adjust the potentiometer RVL04 to −2.5 ± 0.05 V indication on the DC voltmeter.

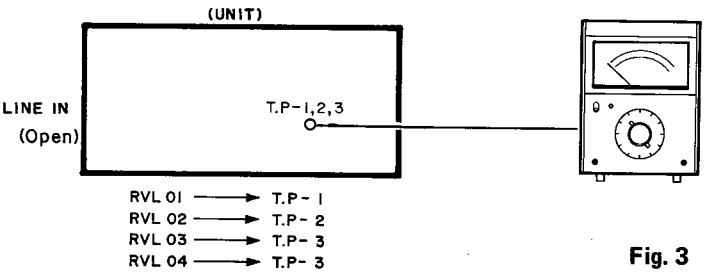


Fig. 3

(see ADJUSTMENT POINTS on page 8)

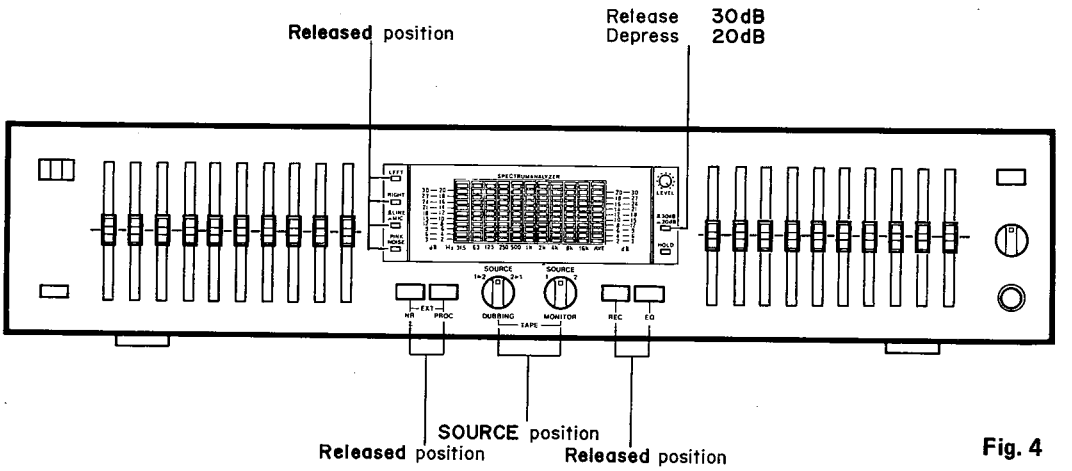
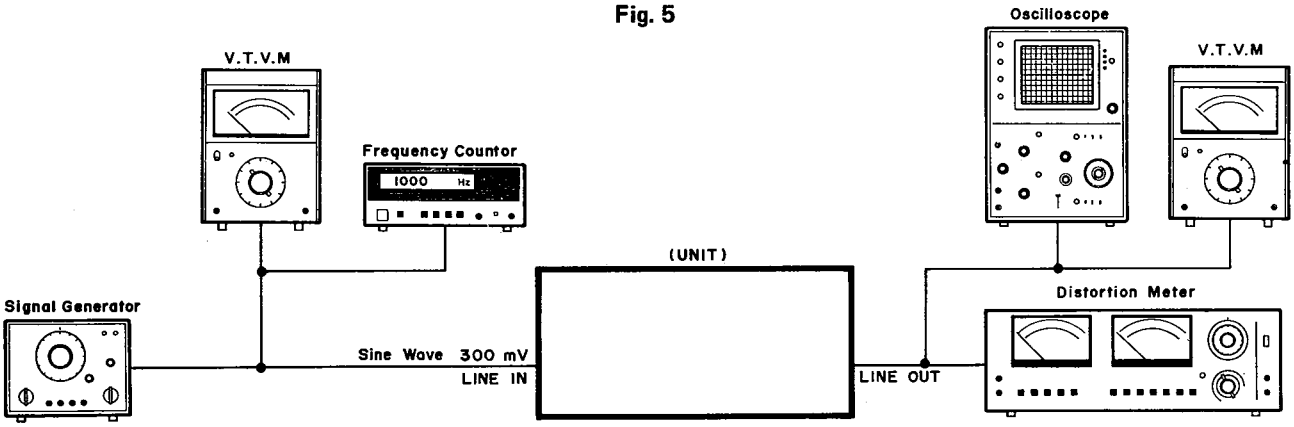


Fig. 4

Confirmation After Adjustments

1. Connect the test equipments to the unit as shown in Fig. 6.
2. Set the E.Q. switch to IN position, MONITOR switch to SOURCE position and control knobs to flat (0 dB) position. Apply sine wave of 1 kHz 300 mV to LINE IN terminals. (LINE OUT voltage is 267 ~ 336 mV).
3. Set the S.G. to 31.5 Hz and control knob of 31.5 Hz to maximum (+15 dB) position. Read a LINE OUT voltage (1503 ~ 1787 mV). Change the control knob to minimum (−15 dB) position and measure the LINE OUT voltage 47.5 ~ 56.5 mV).
4. Measure the following 63, 125, 250, 500, 1k, 2k, 4k, 8k, 16 kHz similary on step 3 above.
   Maximum (+15 dB) position 1503 ~ 1787 mV
   Flat (0 dB) position 267 ~ 336 mV
   Minimum (−15 dB) position 47.5 ~ 56.5 mV
   After measurement of LINE OUT voltage, perform a distortion test. Distortion should be 0.01% nominal, 0.015% maximum.
5. Set the LINE/MIC selector to LINE, PINK NOISE switch to IN position. The pink noise will be emitted from LINE OUT, and spectrum analyzer will display its level.

Fig. 5



5. ADJUSTMENT POINTS

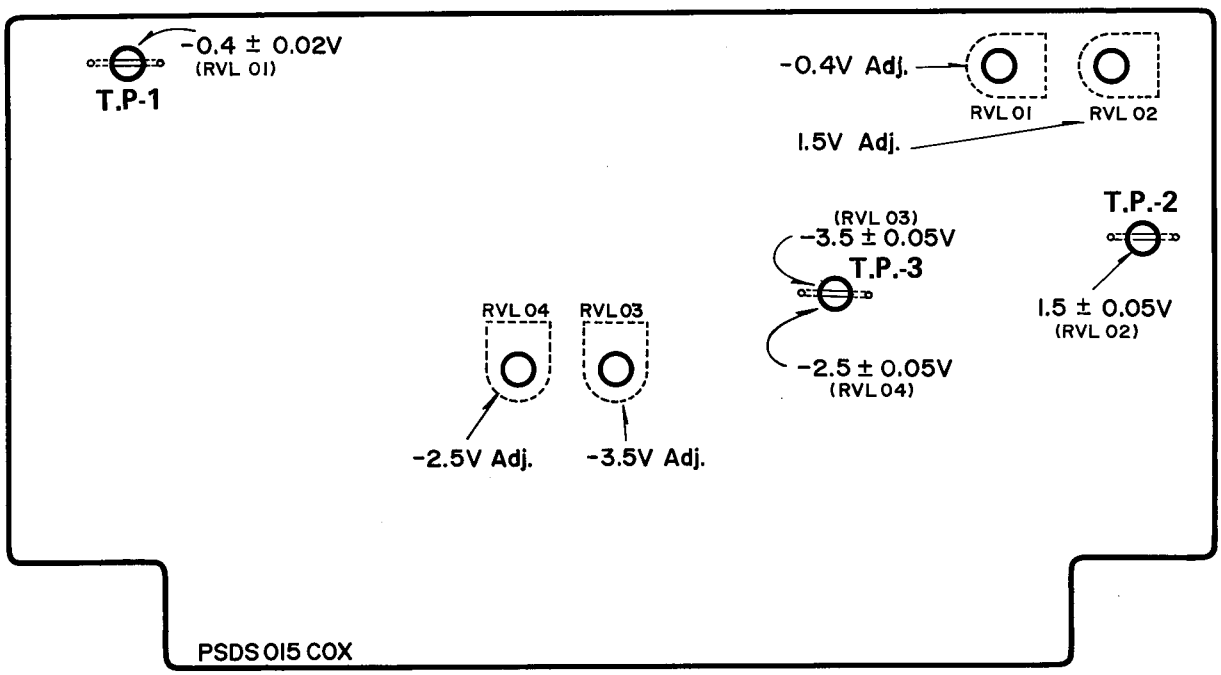
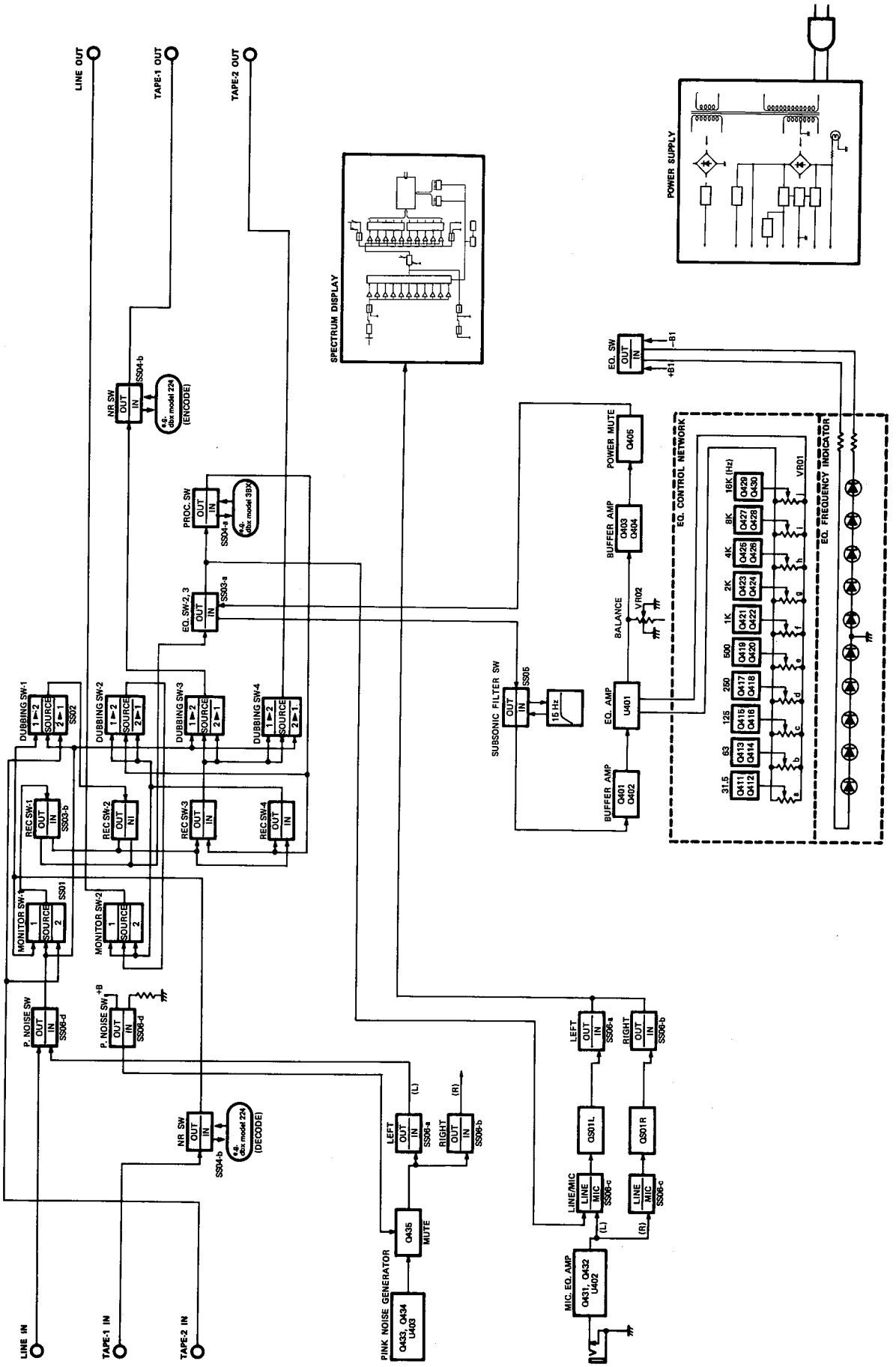


Fig. 6

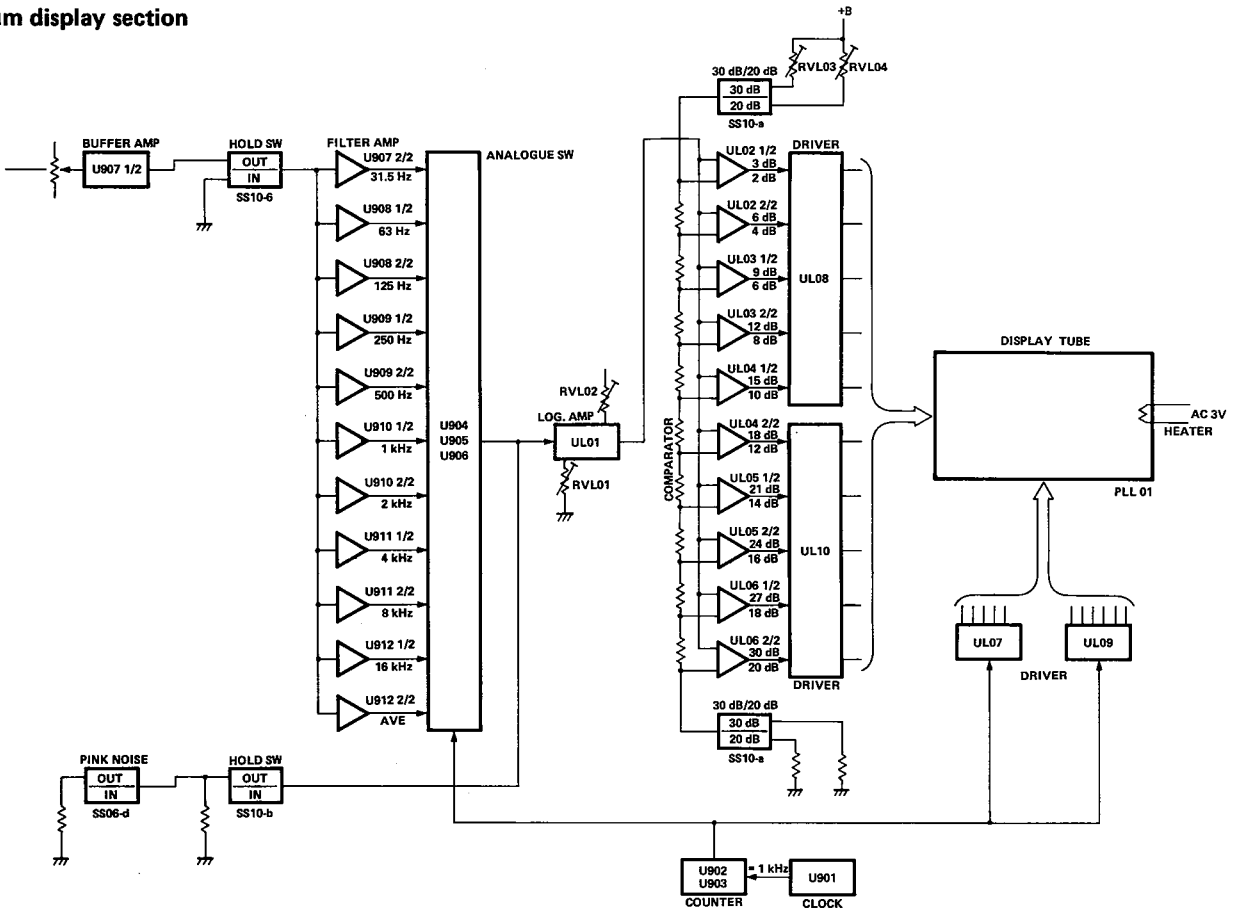
Refer to DISPLAY TUBE P. W. BOARD (AP10) on page 29.

6. BLOCK DIAGRAM

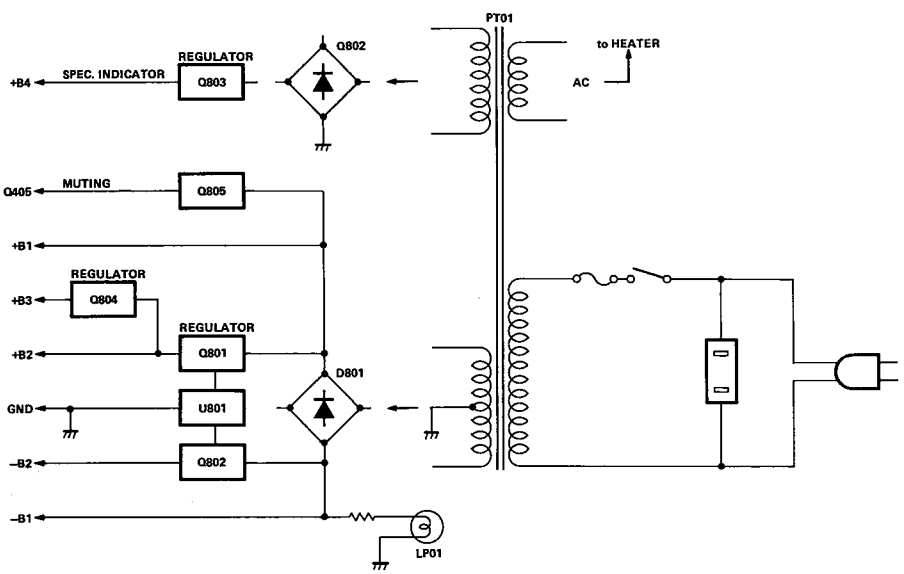
Overall



Spectrum display section

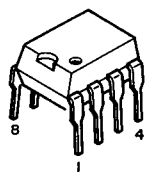


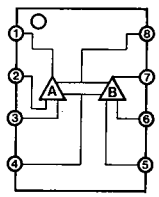
Power supply section

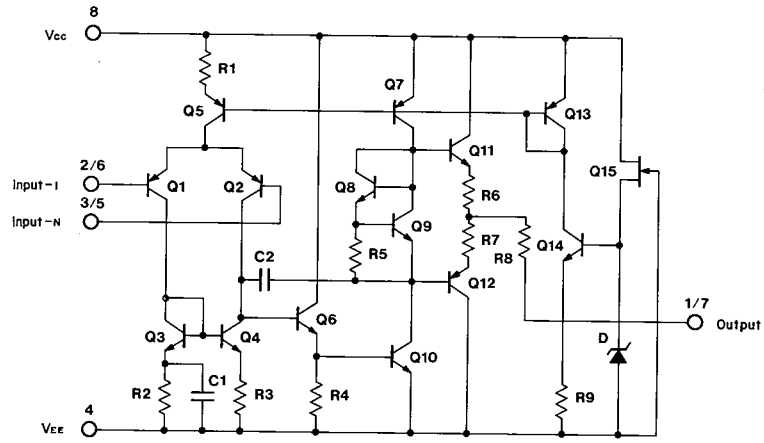


7. IC BLOCK DIAGRAM

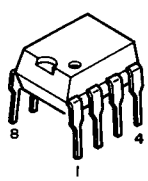
μPC4558 (Dual OP Amp.)

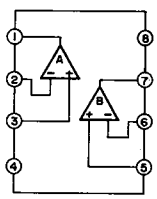


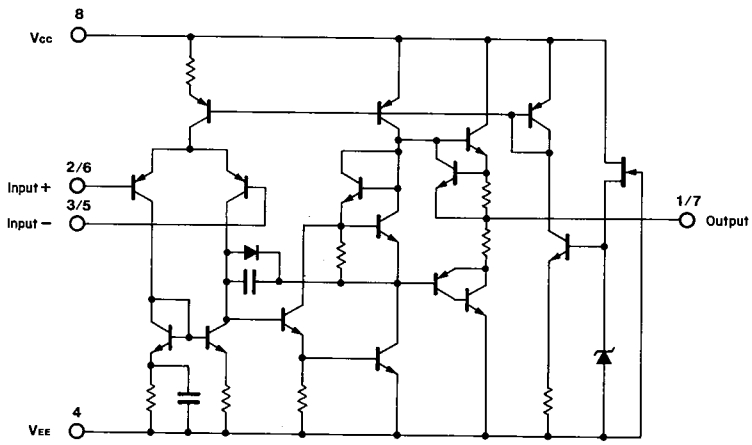




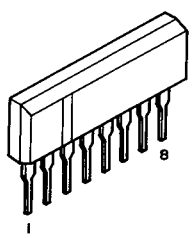
NJM 4559 (Dual OP Amp.)

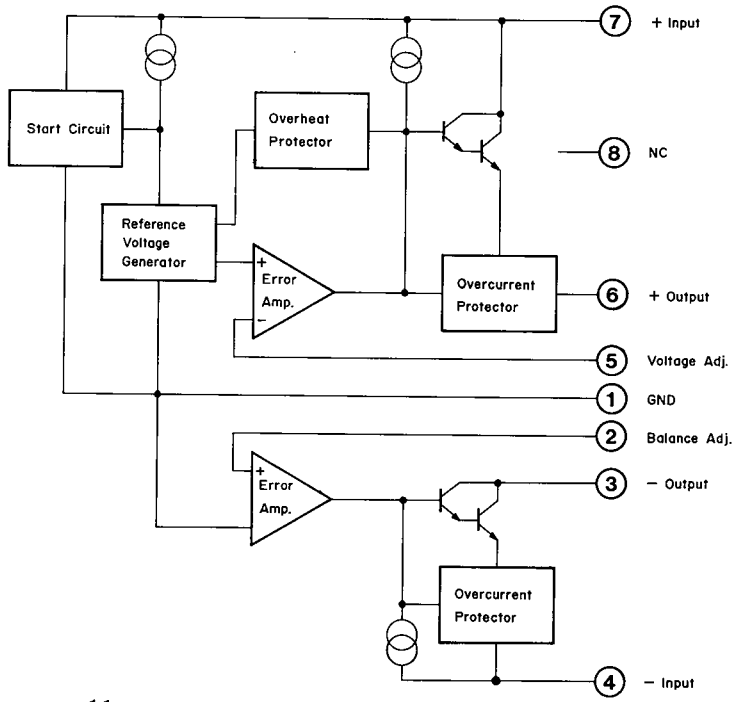




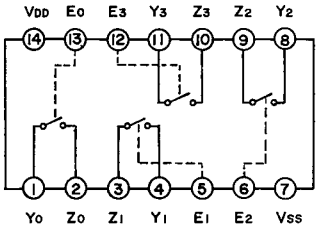


M5230L (Voltage Regulator)

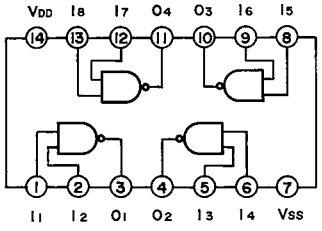


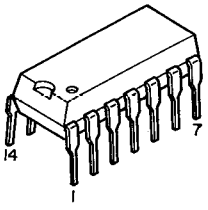


μPD4066

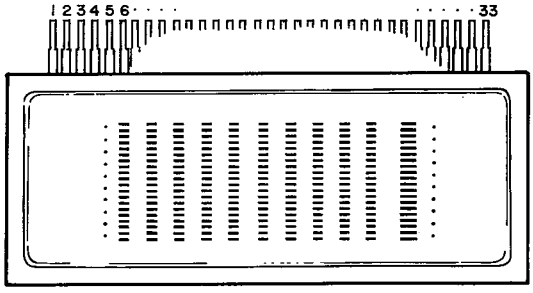


MN4011



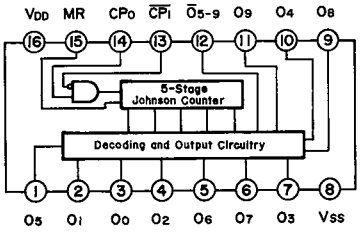


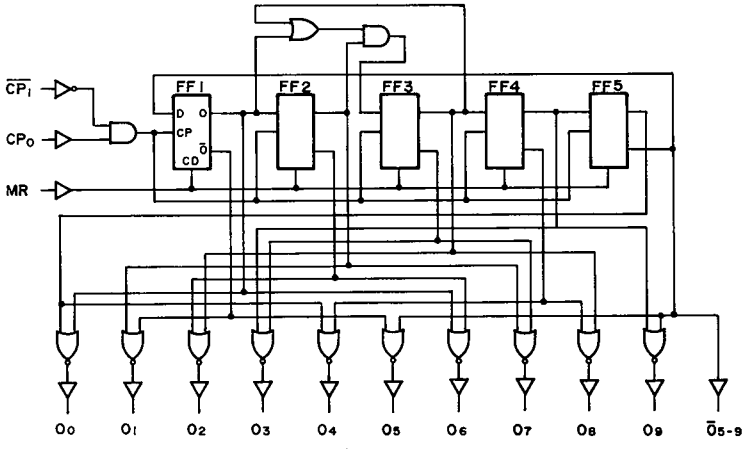
Display tube PLL01 (BG130Z)



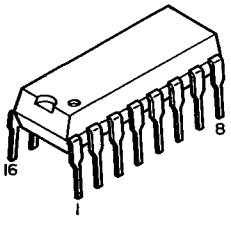
1	F	18	NC
2	NP	19	G5
3	B8	20	B7
4	B9	21	G4
5	B10	22	B6
6	G11	23	G3
7	NC	24	B5
8	G10	25	G2
9	NC	26	B4
10	G9	27	B3
11	NC	28	G1
12	G8	29	B2
13	NC	30	B1
14	G7	31	Dot
15	NC	32	NP
16	NC	33	F
17	G6		

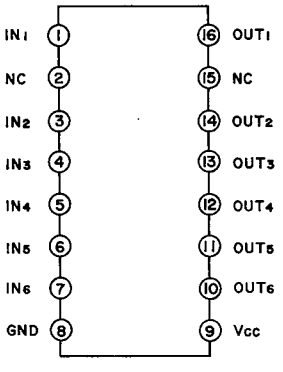
μPD4017

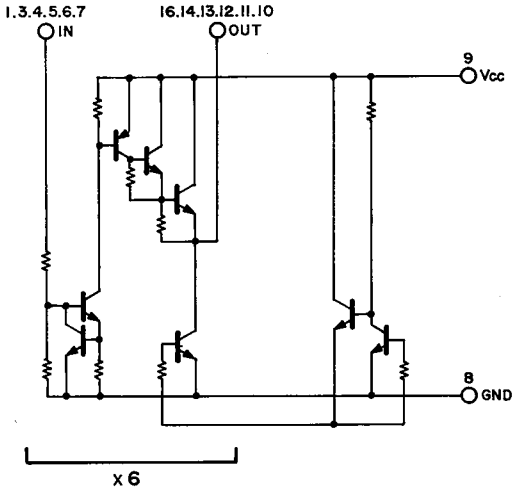




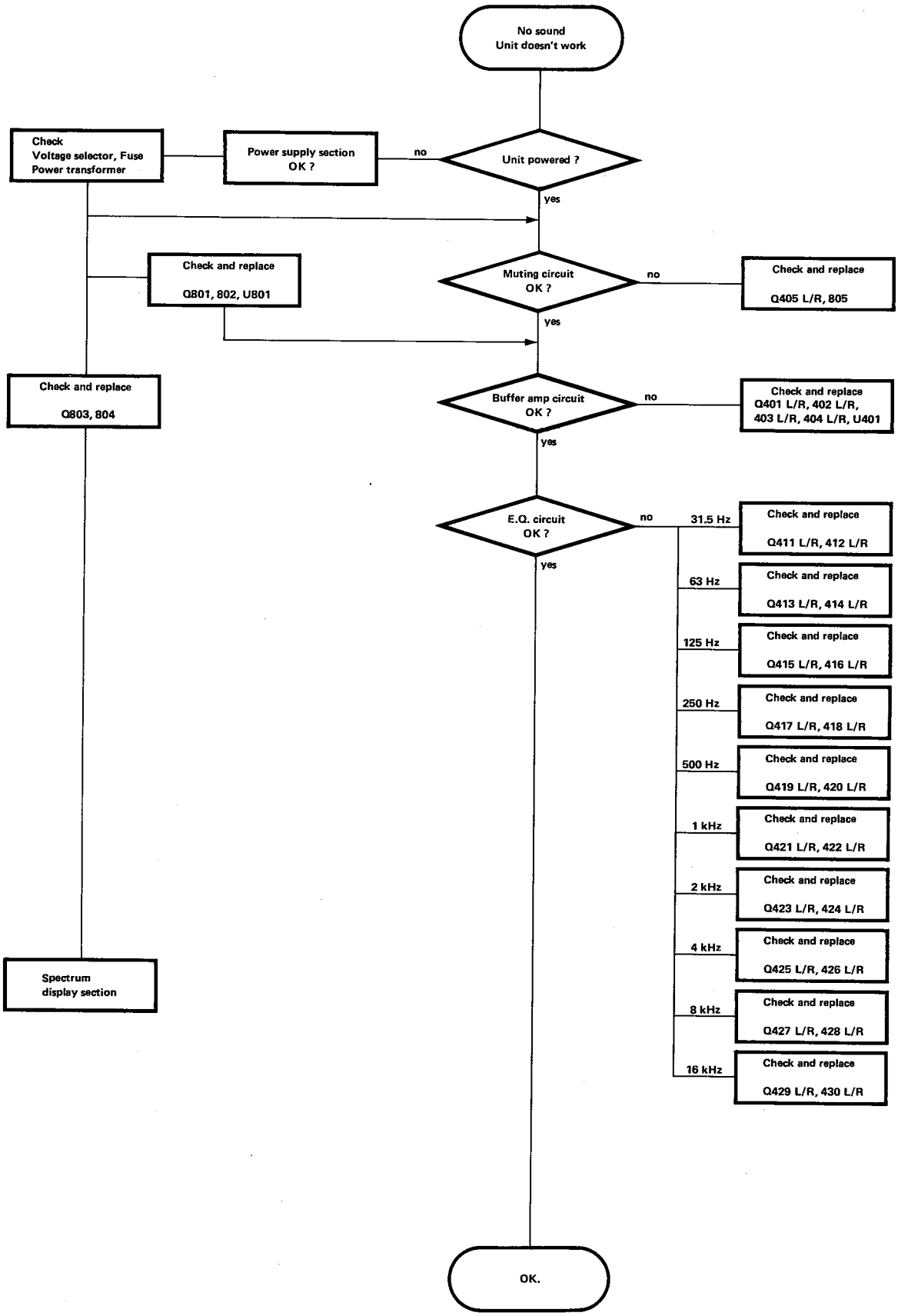
LB1292

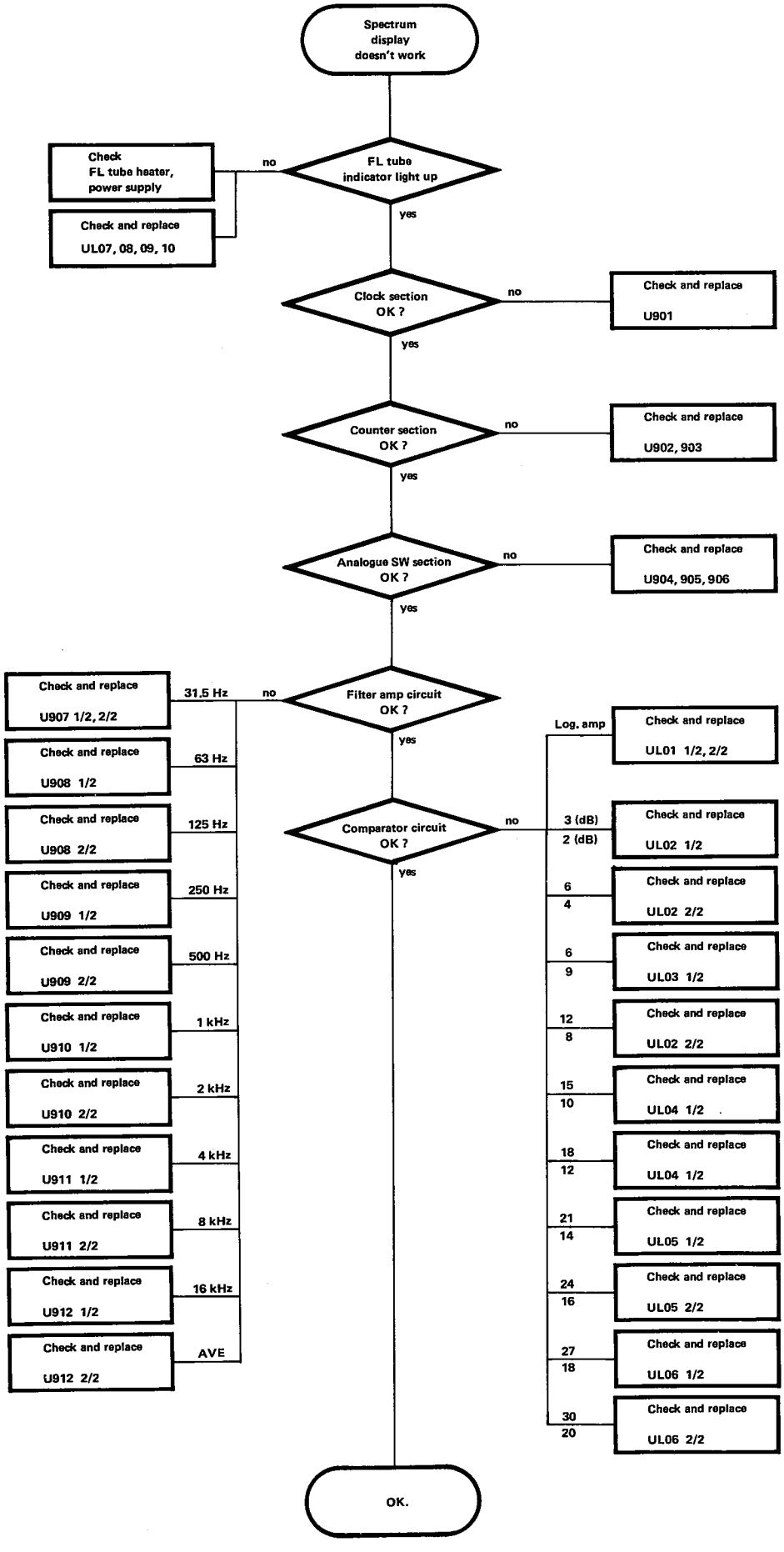






8. QUICK TROUBLE SHOOTING

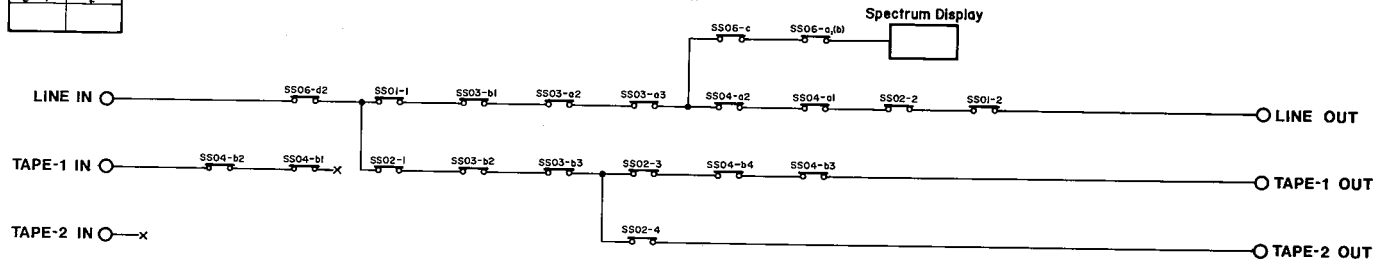



Spectrum display doesn't work
FL tube indicator light up
no
Check FL tube heater, power supply
Check and replace UL07, 08, 09, 10
yes
Clock section OK ?
no
Check and replace U901
yes
Counter section OK ?
no
Check and replace U902, 903
yes
Analogue SW section OK ?
no
Check and replace U904, 905, 906
yes
Filter amp circuit OK ?
no
31.5 Hz
Check and replace U907 1/2, 2/2
63 Hz
Check and replace U908 1/2
125 Hz
Check and replace U908 2/2
250 Hz
Check and replace U909 1/2
500 Hz
Check and replace U909 2/2
1 kHz
Check and replace U910 1/2
2 kHz
Check and replace U910 2/2
4 kHz
Check and replace U911 1/2
8 kHz
Check and replace U911 2/2
16 kHz
Check and replace U912 1/2
AVE
Check and replace U912 2/2
yes
Comparator circuit OK ?
no
Log. amp
Check and replace UL01 1/2, 2/2
3 (dB)
2 (dB)
Check and replace UL02 1/2
6
4
Check and replace UL02 2/2
6
9
Check and replace UL03 1/2
12
8
Check and replace UL02 2/2
15
10
Check and replace UL04 1/2
18
12
Check and replace UL04 1/2
21
14
Check and replace UL05 1/2
24
16
Check and replace UL05 2/2
27
18
Check and replace UL06 1/2
30
20
Check and replace UL06 2/2
yes
OK.

9. SWITCH FUNCTION

SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○								○
2—1	2								



SWITCH POSITION

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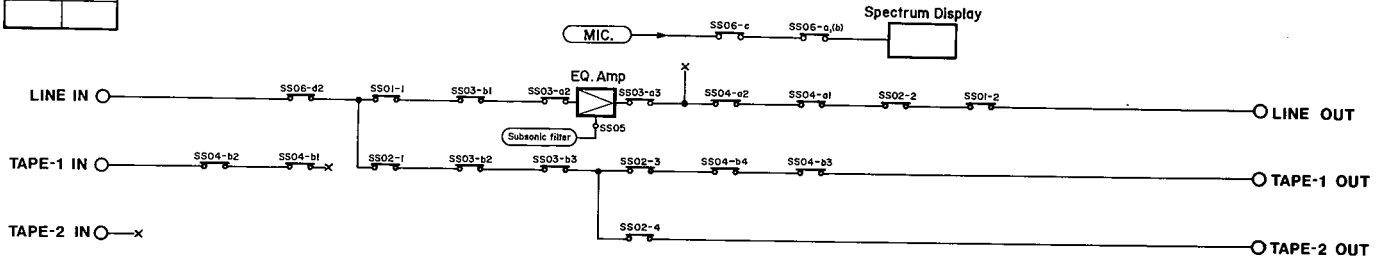
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○		○	○			
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○			○			○	○	○
2—1	2								



SWITCH POSITION

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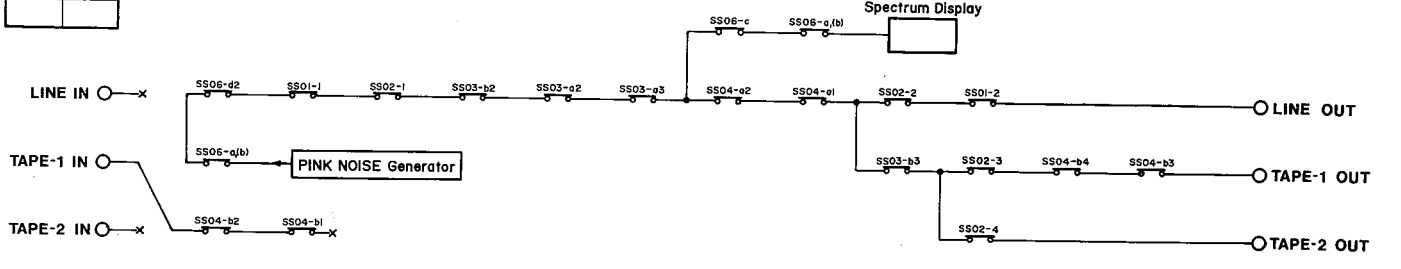
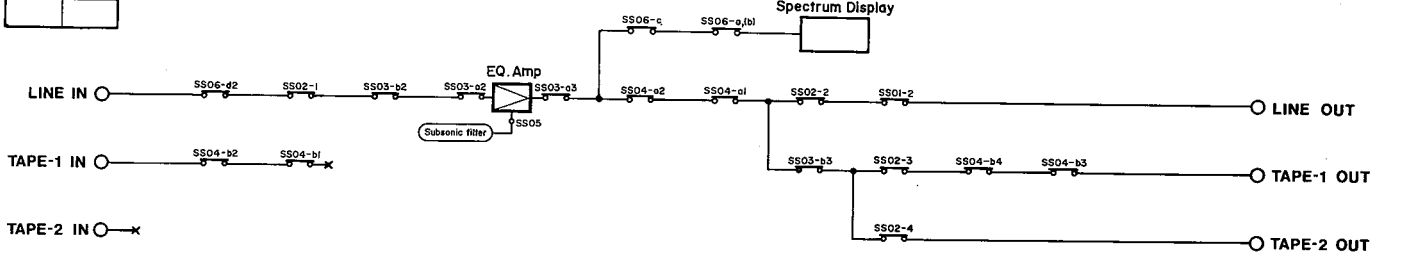
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○	○		○		○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○				○		○		○
2—1	2								



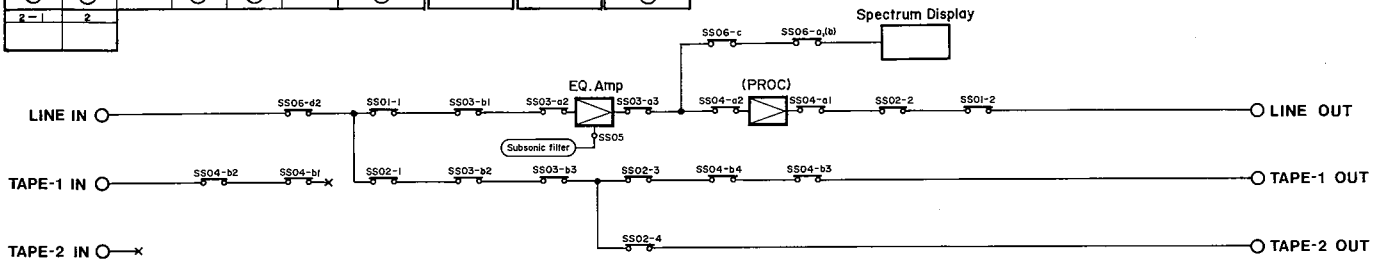
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○				○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○			○	○	○			○
2—1	2								



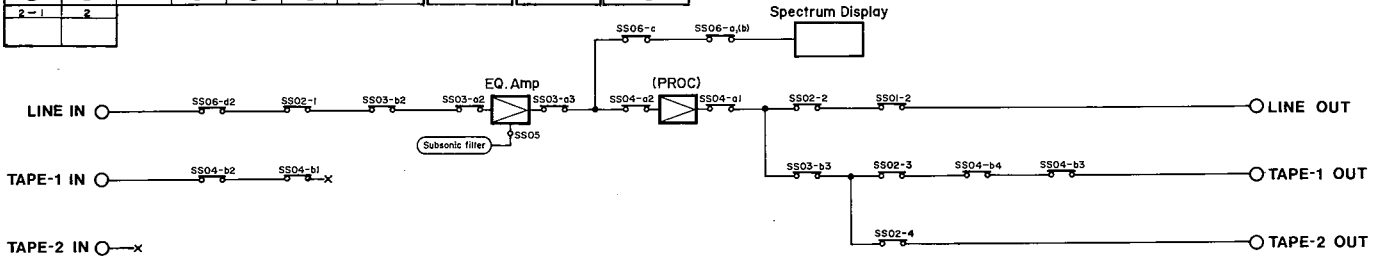
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS 06-a,(b)
1 — 2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○			○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○		○	○		○			○
2 — 1	2								



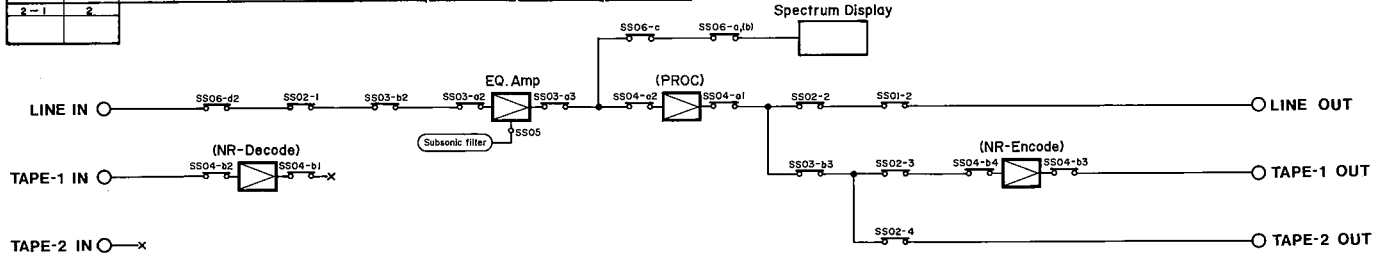
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS 06-a,(b)
1 — 2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○					○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○		○	○	○	○			○
2 — 1	2								



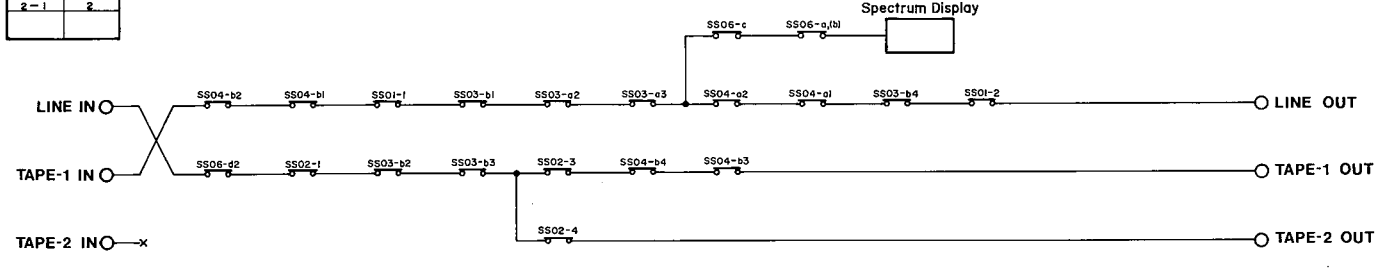
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS 06-a,(b)
1 — 2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○					○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○	○	○	○	○	○	○			○
2 — 1	2								



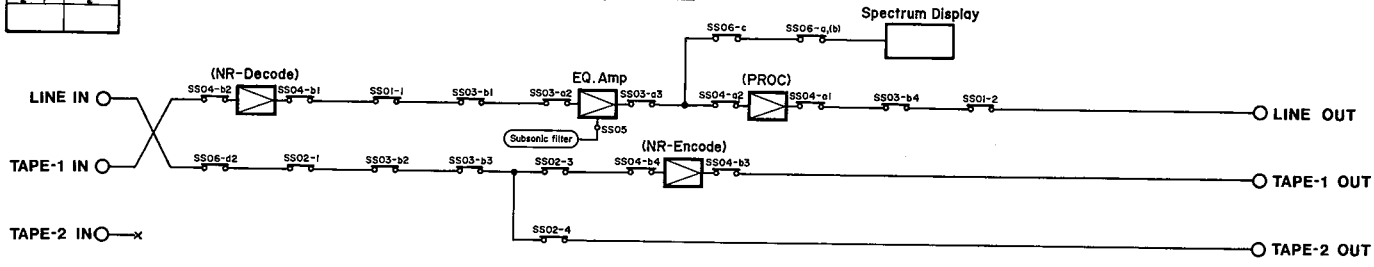
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS 06-a,(b)
1 — 2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
	○	○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○									○
2 — 1	2								



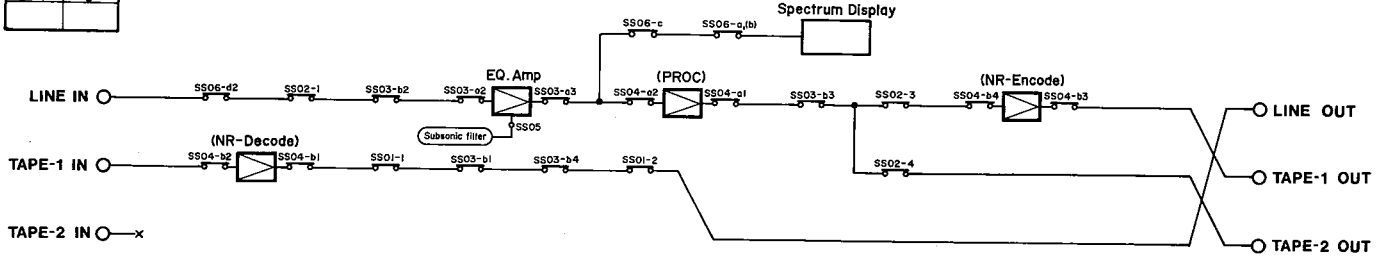
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
	○				○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○		○	○	○		○			○
2—1	2								



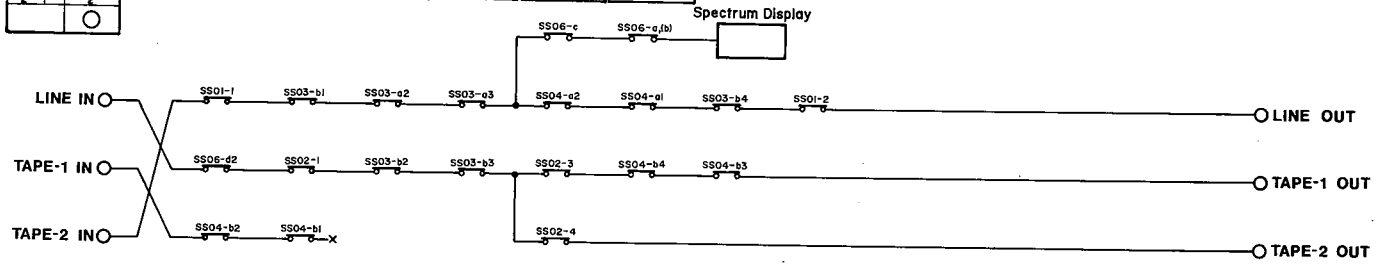
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
	○						○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○		○	○	○	○	○			○
2—1	2								



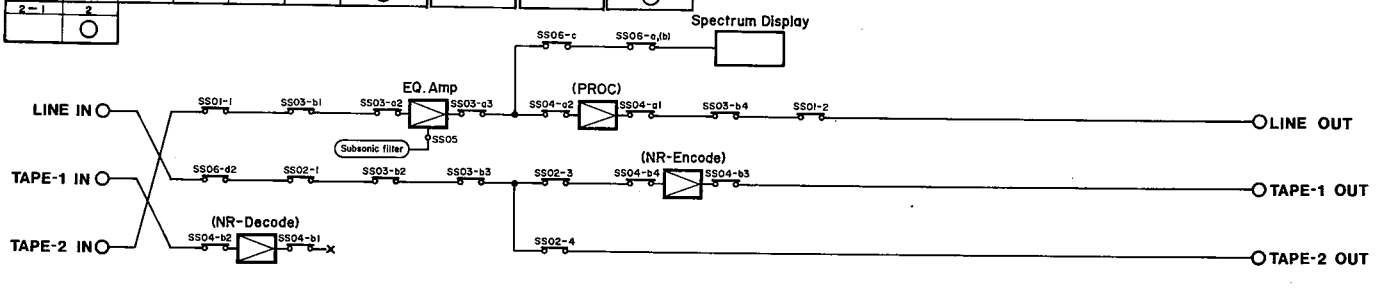
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○									○
2—1	2								
	○								



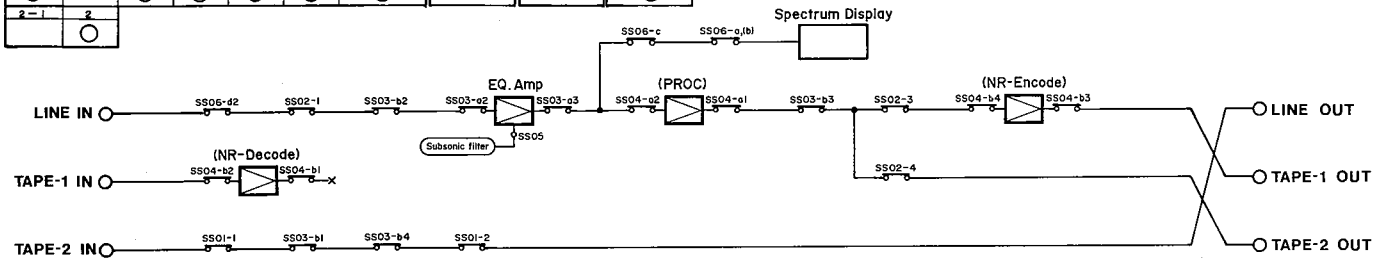
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
					○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
○		○	○	○		○			○
2—1	2								
	○								



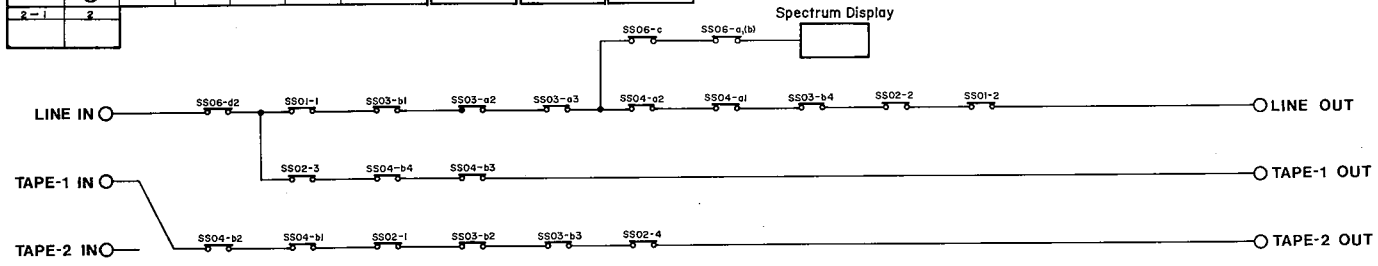
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○	○	○	○	○	○			○
2—1	2								
	○								



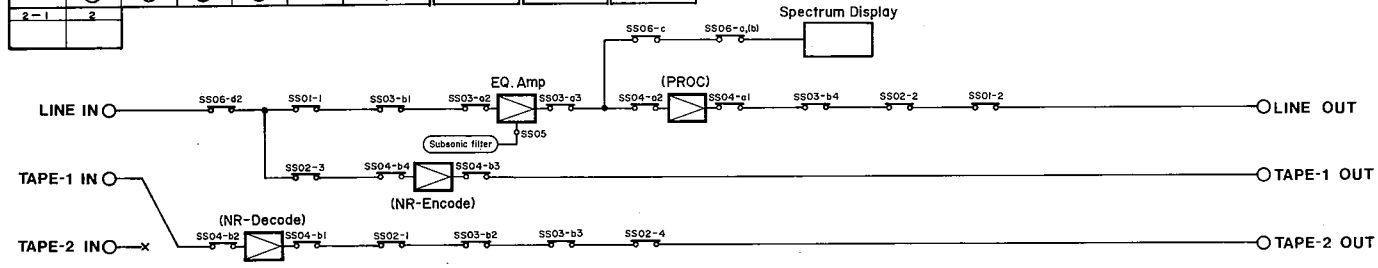
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○								○
2—1	2								



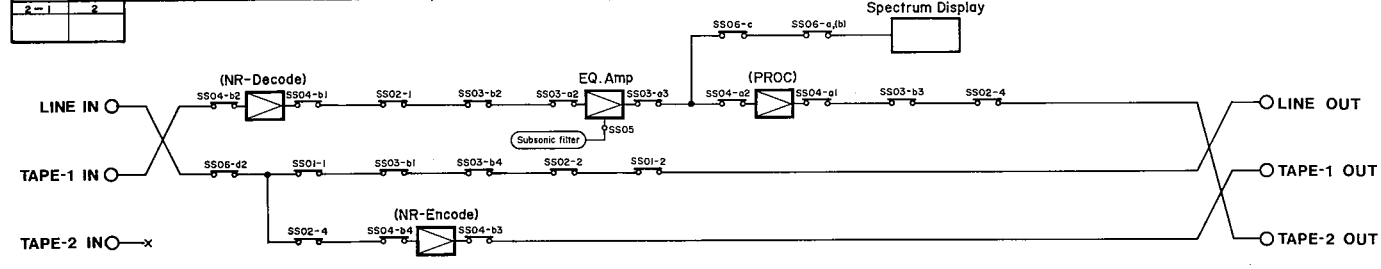
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○	○	○	○		○			○
2—1	2								



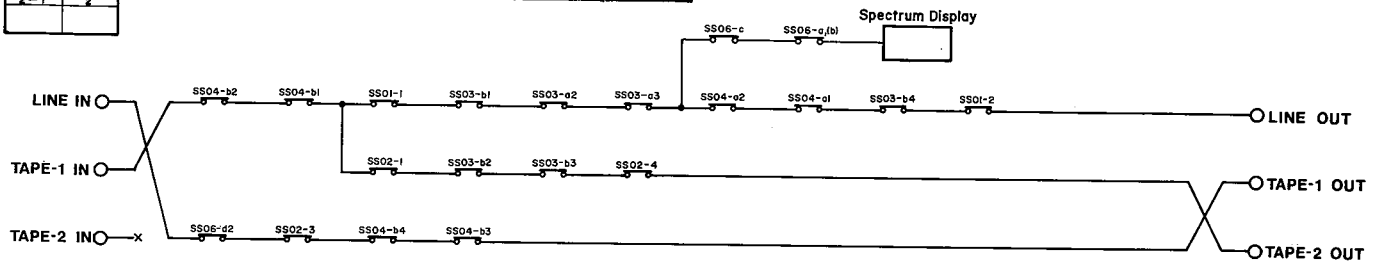
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○	○	○	○	○	○			○
2—1	2								



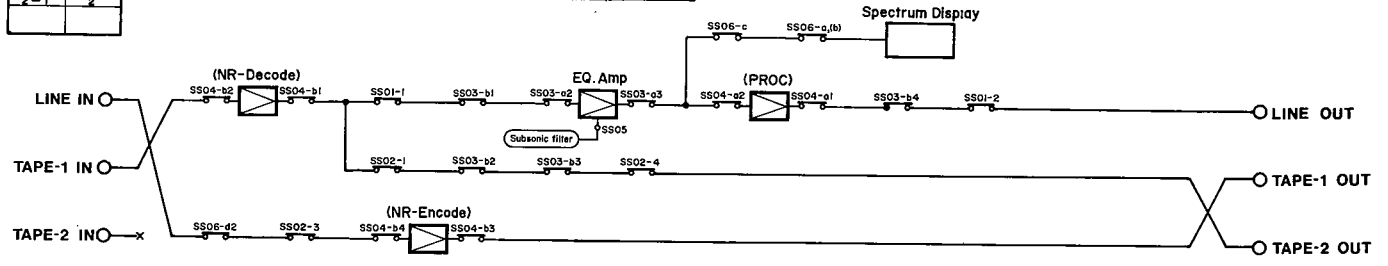
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○	○	○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
									○
2—1	2								



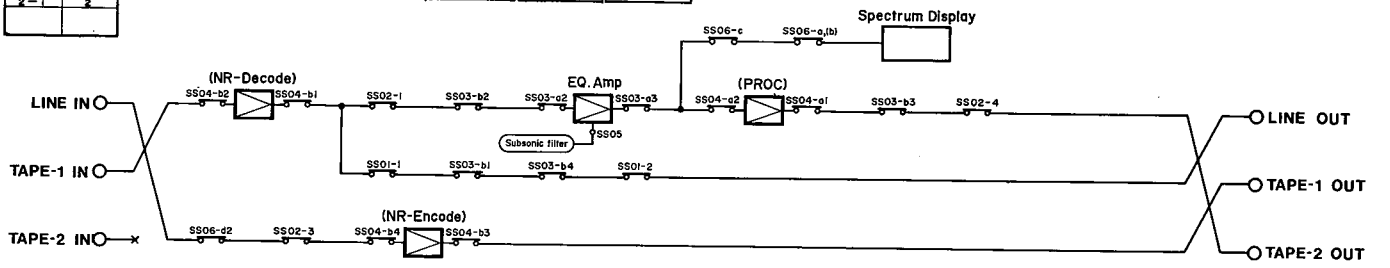
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○	○				○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
		○	○	○		○			○
2—1	2								



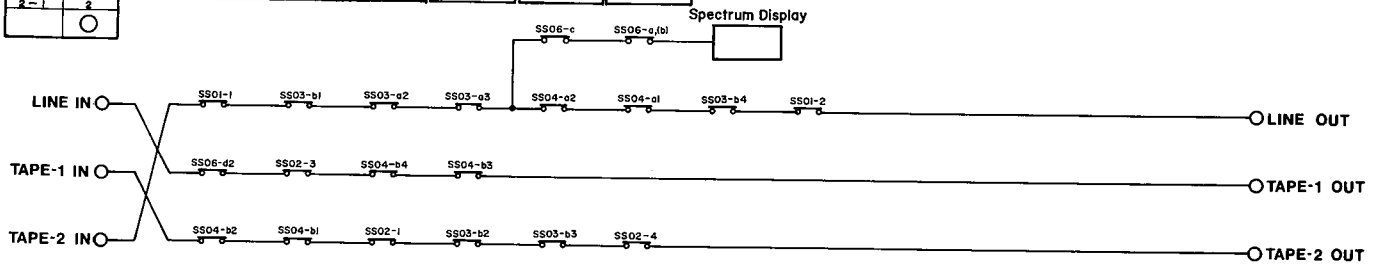
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○	○						○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
		○	○	○	○	○			○
2—1	2								



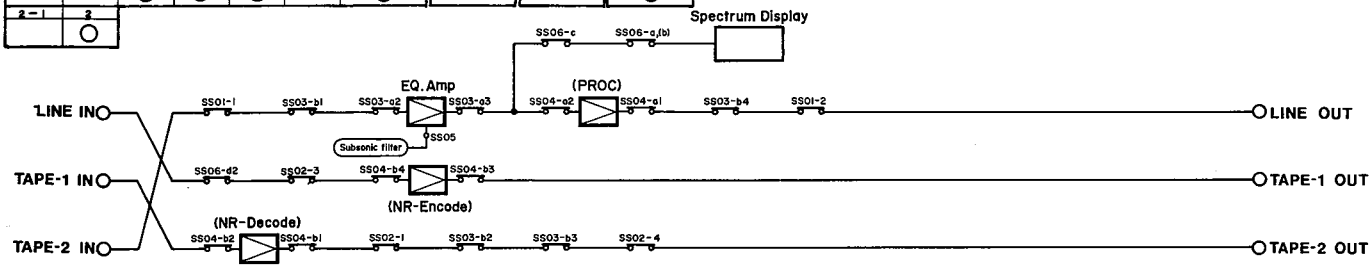
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
									○
2—1	2								
	○								



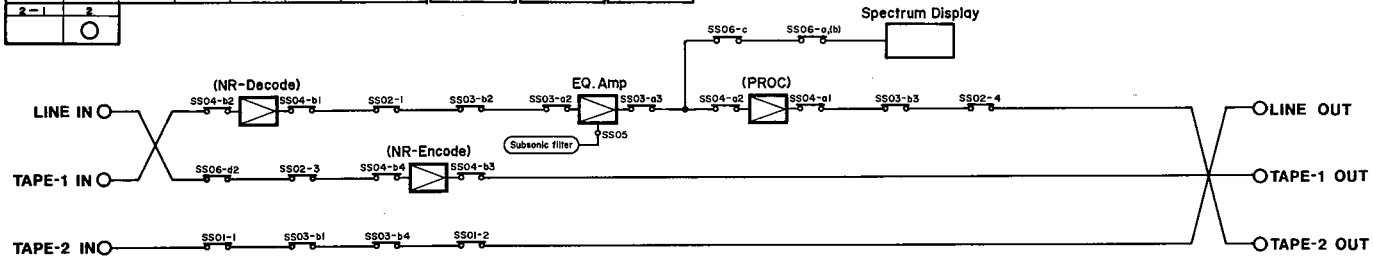
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS 03-a	REC SS 03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○					○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
		○	○	○		○			○
2—1	2								
	○								



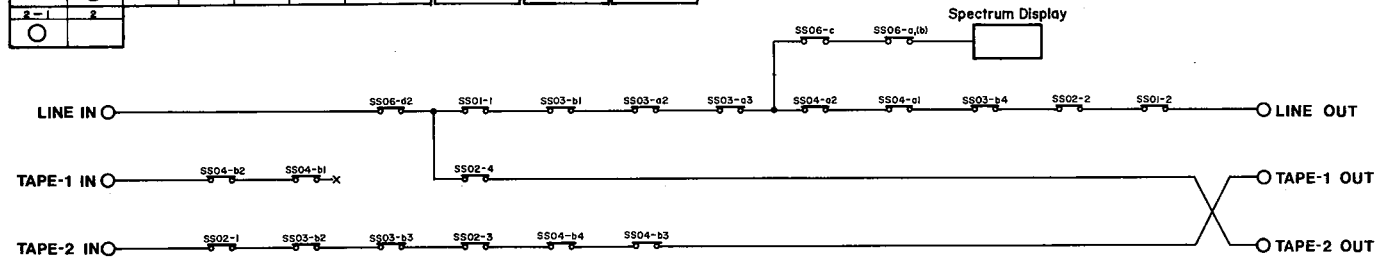
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS 03-a	REC SS 03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
○							○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
		○	○	○	○	○			○
2—1	2								
	○								



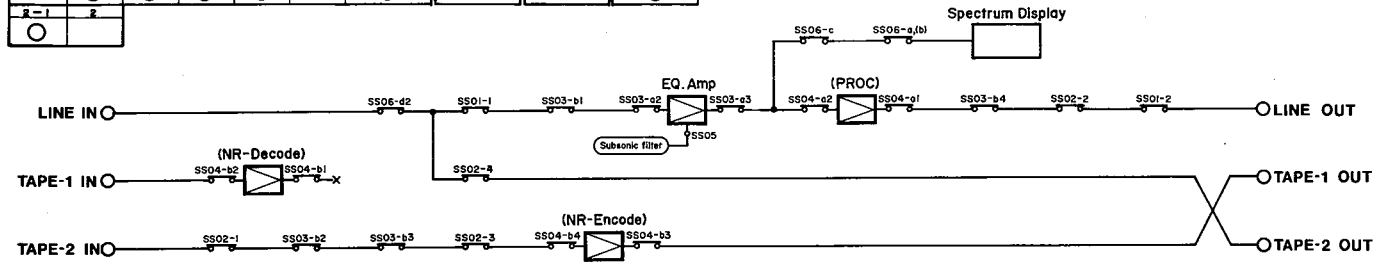
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS 03-a	REC SS 03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○								○
2—1	2								
○									



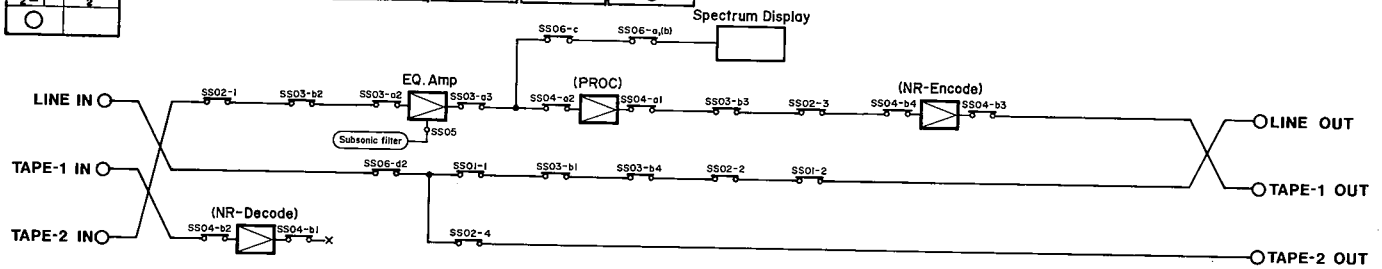
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS 03-a	REC SS 03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS 06-c	LEFT (RIGHT) SS 06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
					○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○	○	○	○		○			○
2—1	2								
○									



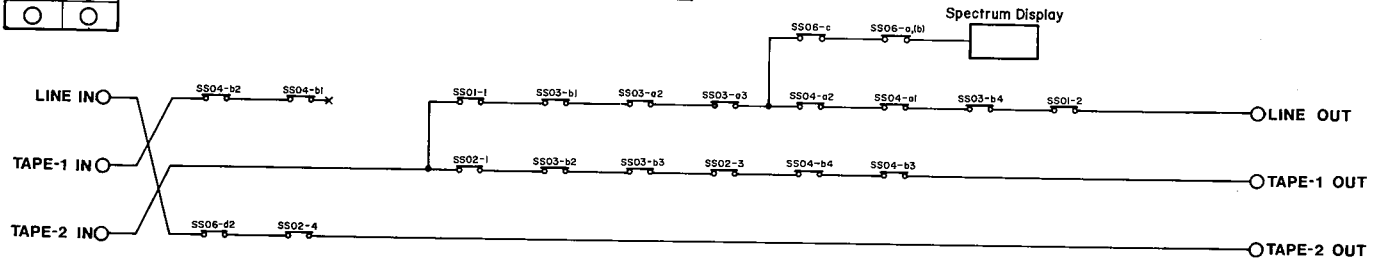
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
							○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
	○	○	○	○	○	○			○
2—1	2								
○									



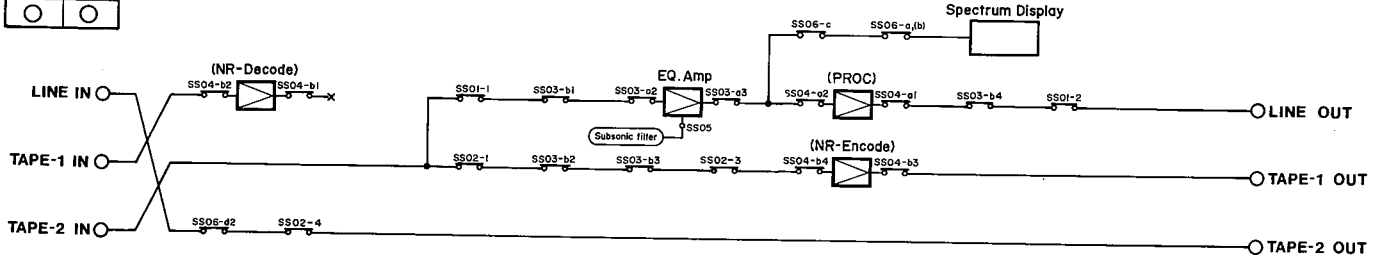
SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
		○	○	○	○	○	○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
									○
2—1	2								
○	○								



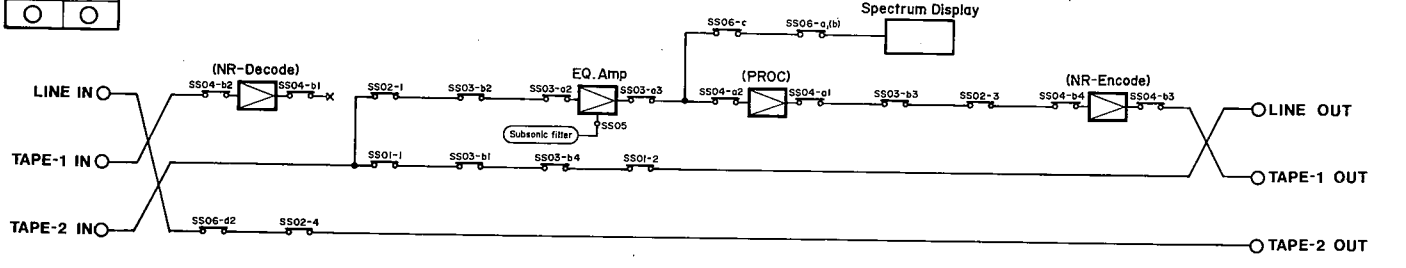
SWITCH POSITION

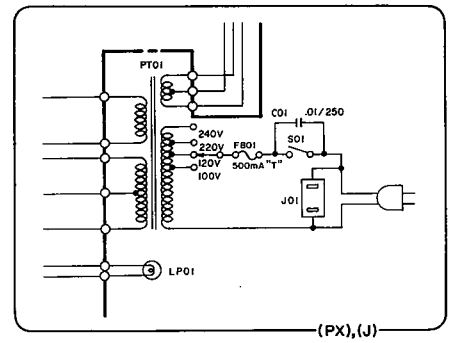
DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
					○		○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
		○	○	○		○			○
2—1	2								
○	○								

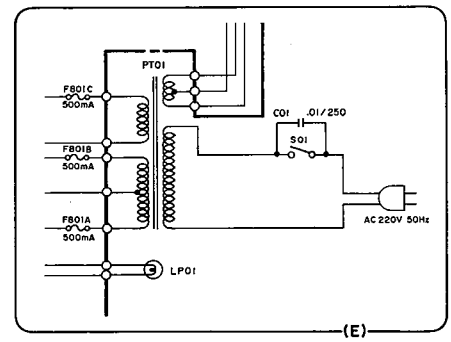


SWITCH POSITION

DUBBING SS 02	MONITOR SS 01	NR SS 04-b	PROC SS 04-a	EQ SS03-a	REC SS03-b	SUBSONIC Filter SS 05	PINK NOISE SS 06-d	LINE/MIC SS06-c	LEFT (RIGHT) SS06-a,(b)
1—2	1	OUT	OUT	OUT	OUT	OUT	OUT	LINE	OUT
							○	○	
SOURCE	SOURCE	IN	IN	IN	IN	IN	IN	MIC	IN
		○	○	○	○	○			○
2—1	2								
○	○								







Safety precaution to service personnel

(1) ⚠ Safety requirement components in accordance with present safety regulations. These components must only be replaced by original components.

(2) To comply with present safety regulations, be sure to make leakagecurrent or resistance measurements before returning the appliance to customer.

Note

All resistors are 1/8 watt unless otherwise noted.

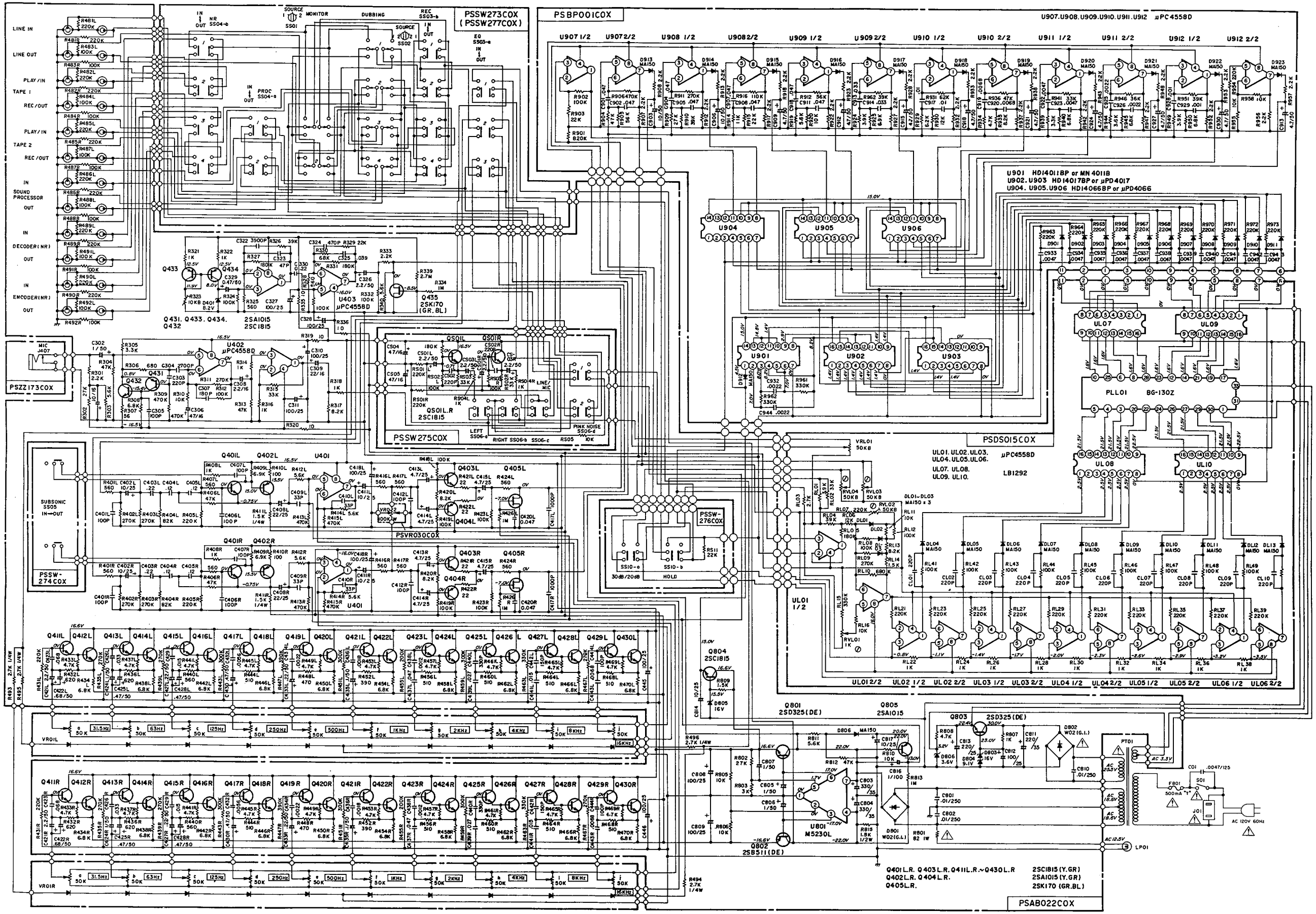
Resistor values are in ohm (1K = 1000 ohm).

All capacitor values are in micro-farad (p = pico-farad).

All voltages, read from chassis, are measured with VTVM under no signal conditions unless otherwise noted.

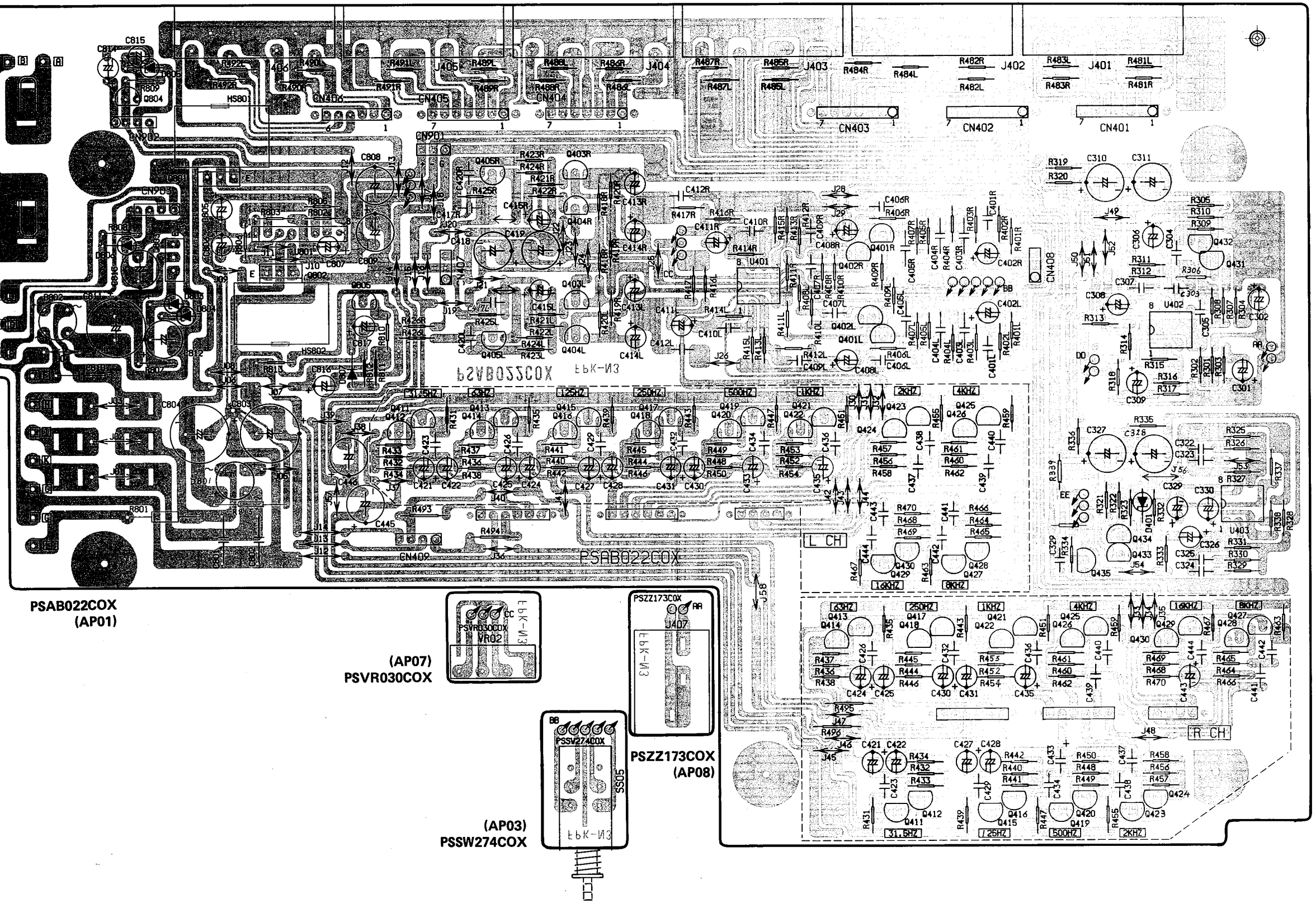
NOTE: This circuit is a standard circuit but is subject to change without notice.

10. SCHEMATIC DIAGRAM



11. WIRING BOARD LAYOUT

Top View



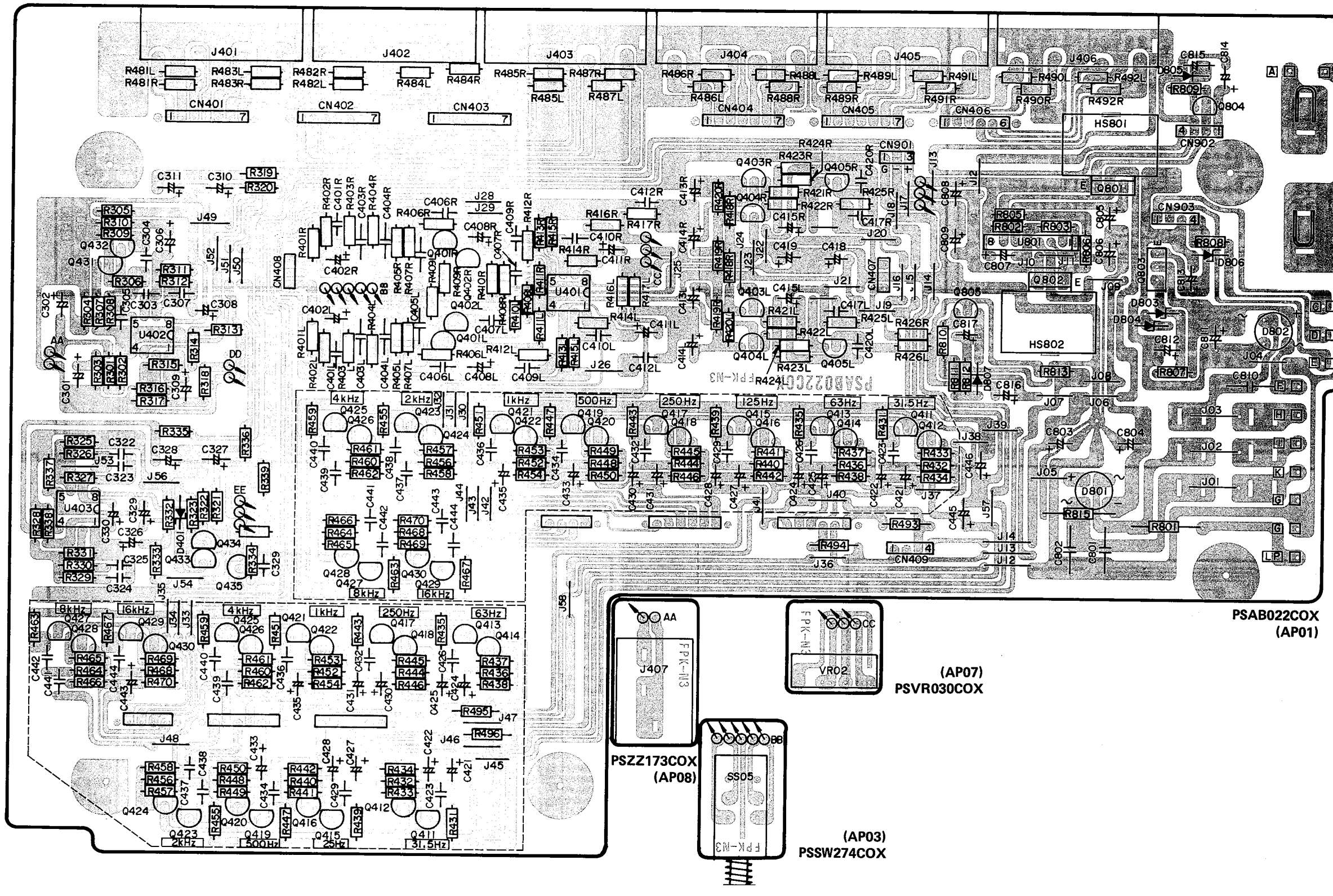
PSAB022COX
(AP01)

(AP07)
PSVR030COX

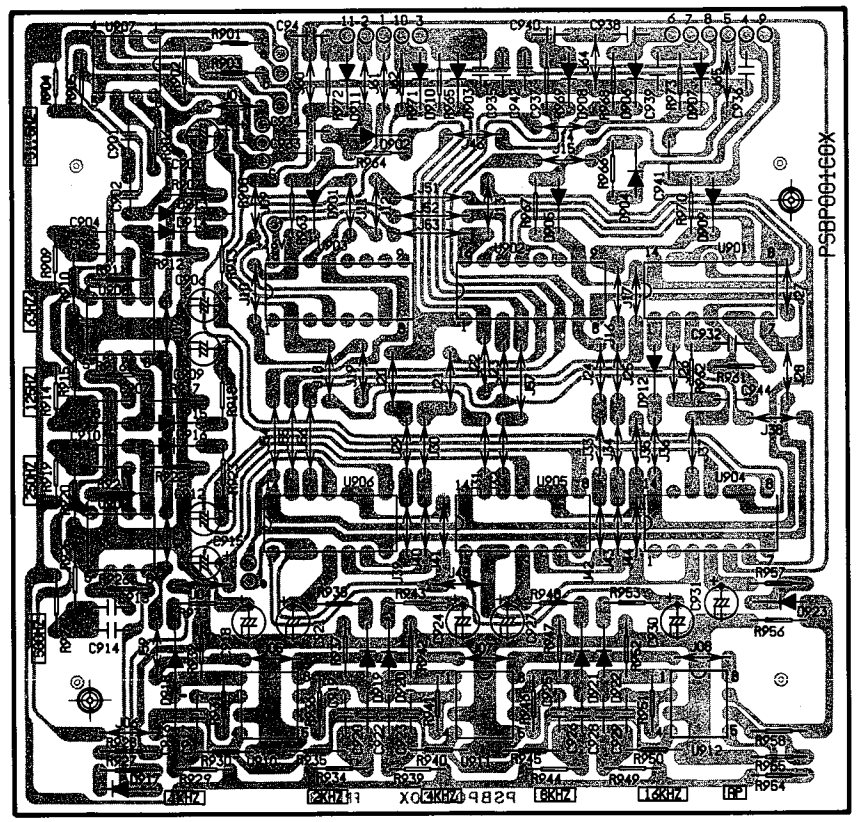
PSZZ173COX
(AP08)

(AP03)
PSSW274COX

Bottom View

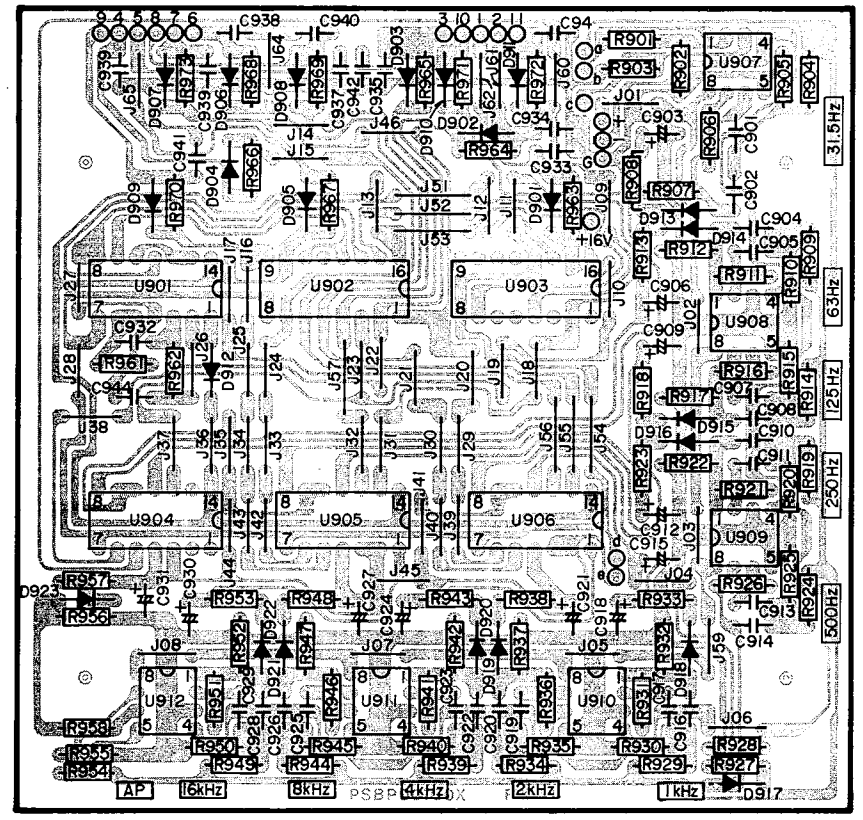

PSAB022COX
(AP01)
PSZZ173COX
(AP08)
(AP07)
PSVR030COX
(AP03)
PSSW274COX

Top View

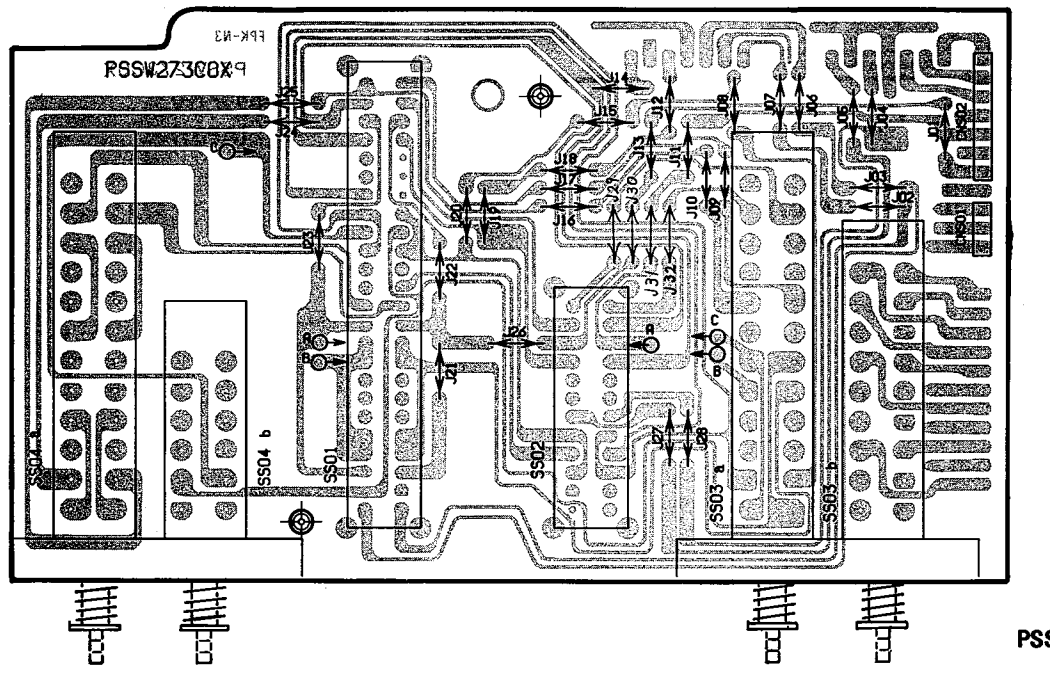


(AP09)
PSBP001COX

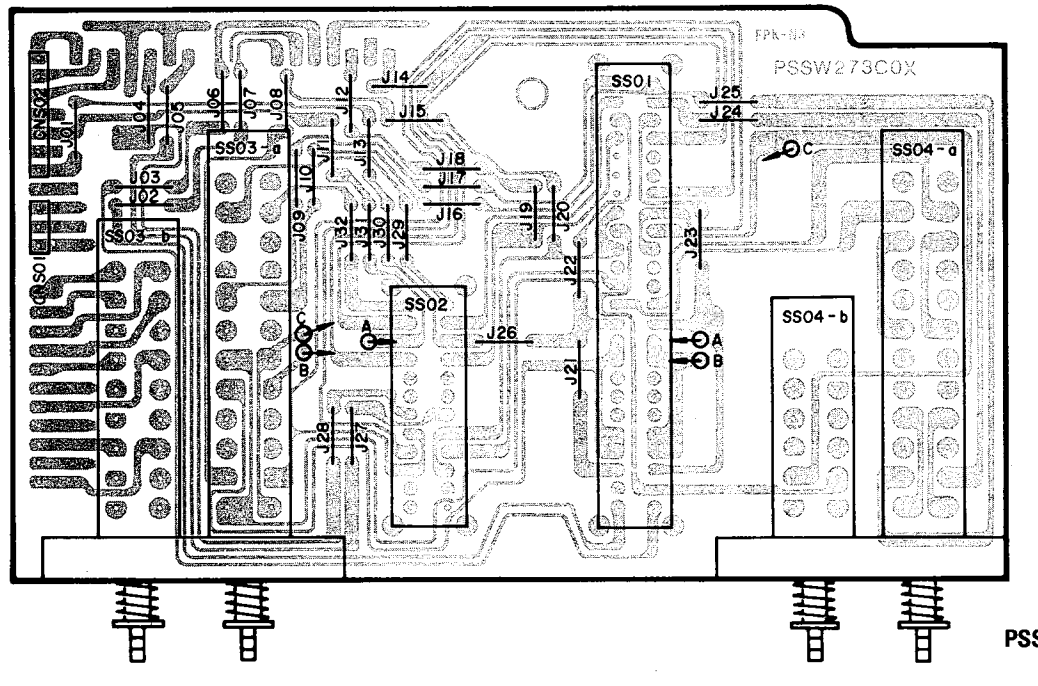
Bottom View



(AP09)
PSBP001COX

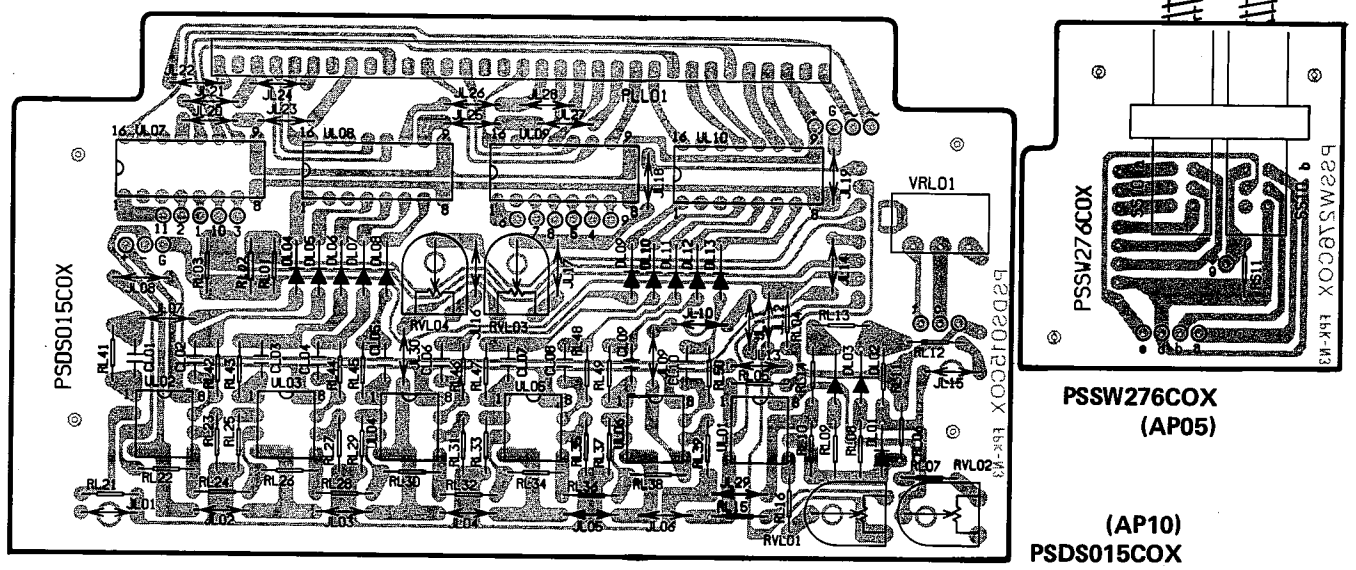


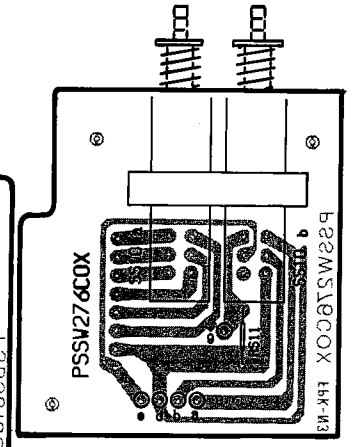
(AP02)
PSSW273COX



(AP02)
PSSW273COX

Top View

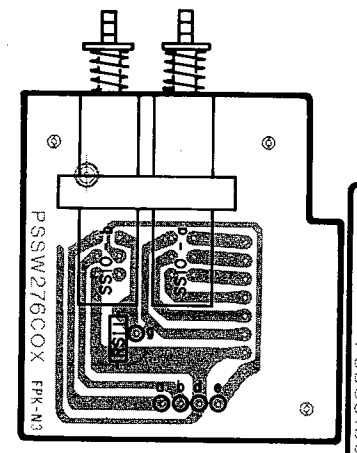




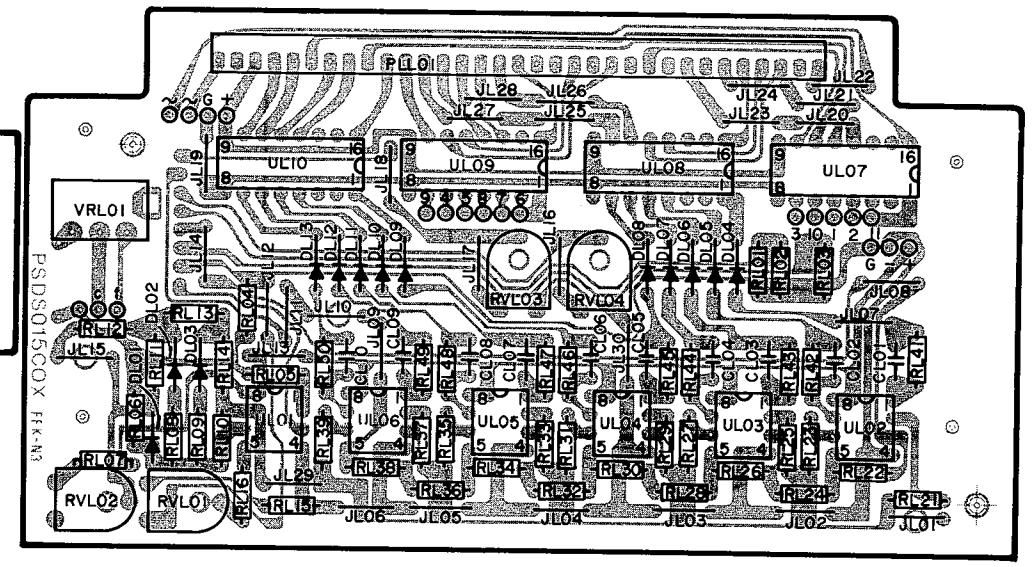
PSSW276COX
(AP05)

(AP10)
PSDS015COX

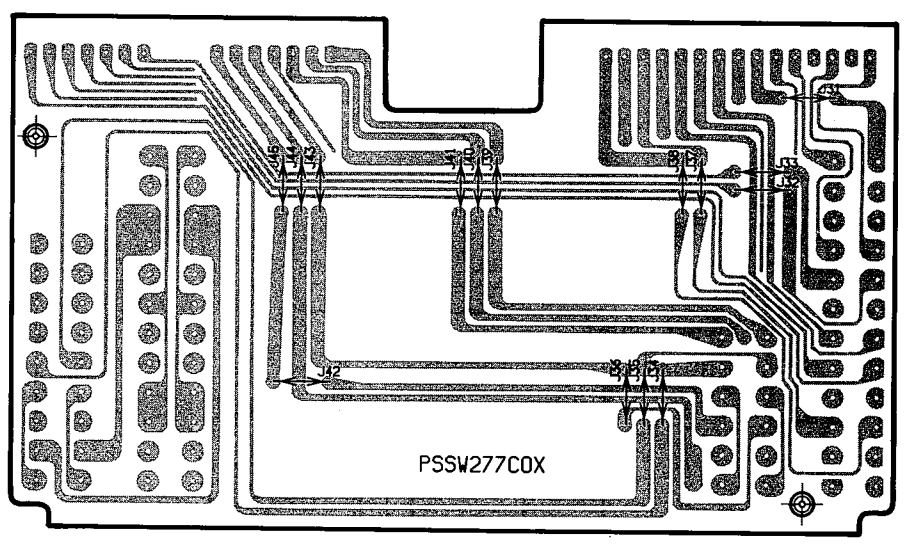
Bottom View



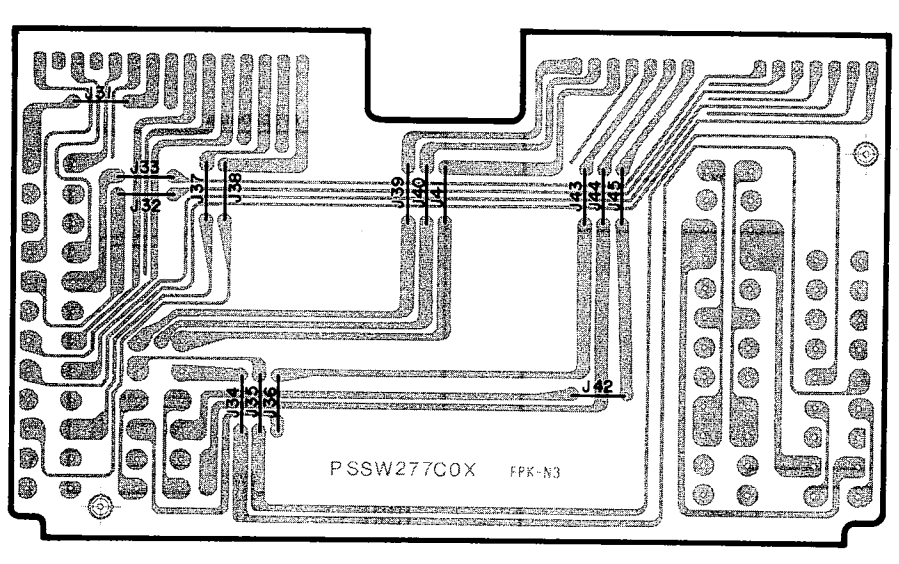
PSSW276COX
(AP05)



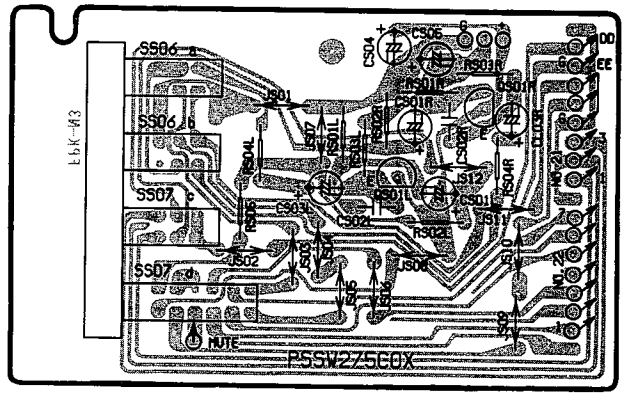
(AP10)
PSDS015COX



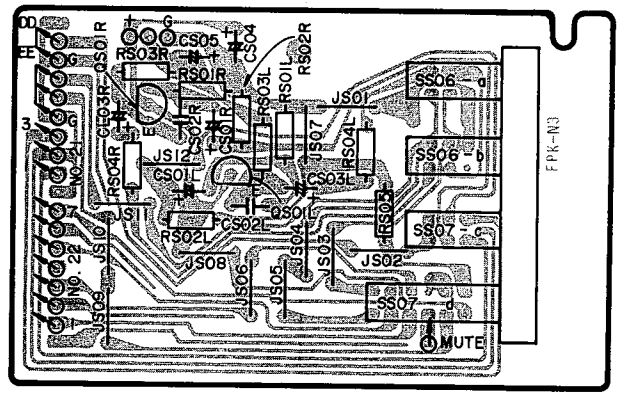
PSSW277COX
(AP06)



PSSW277COX
(AP06)

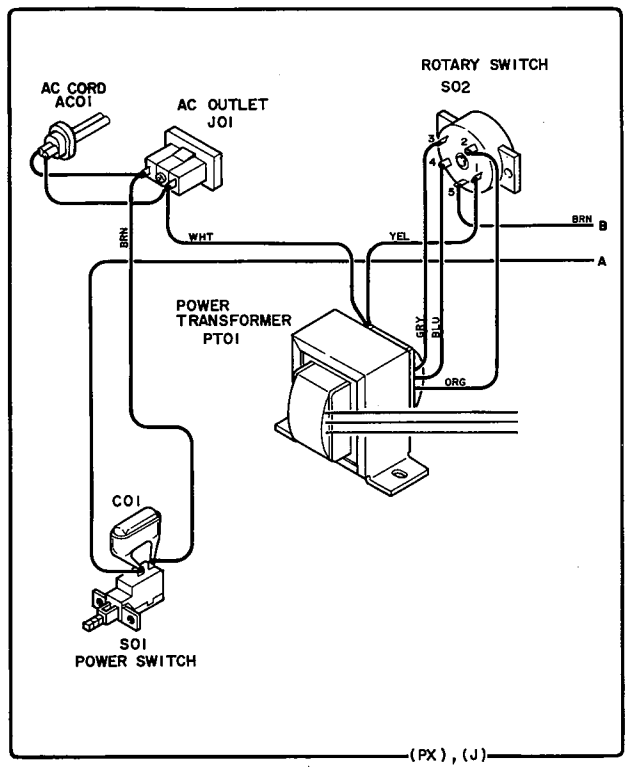


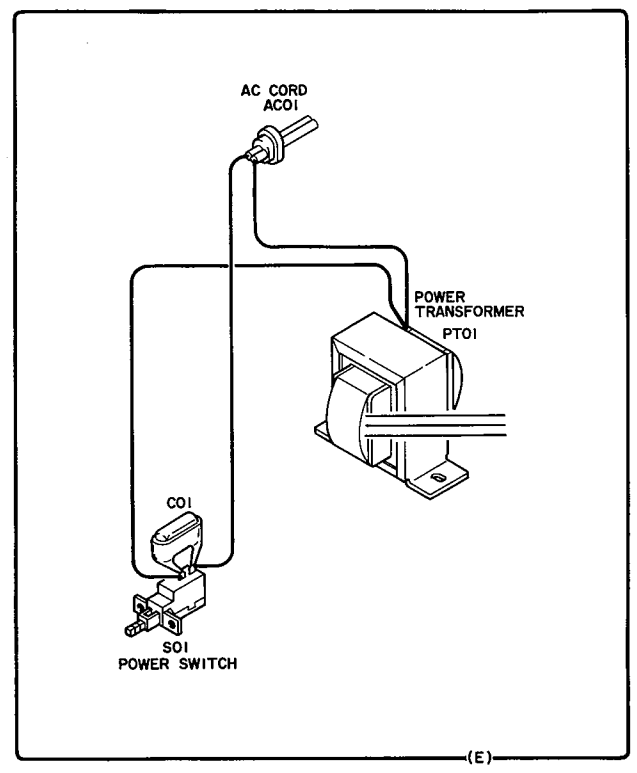
(AP04)
PSSW275COX

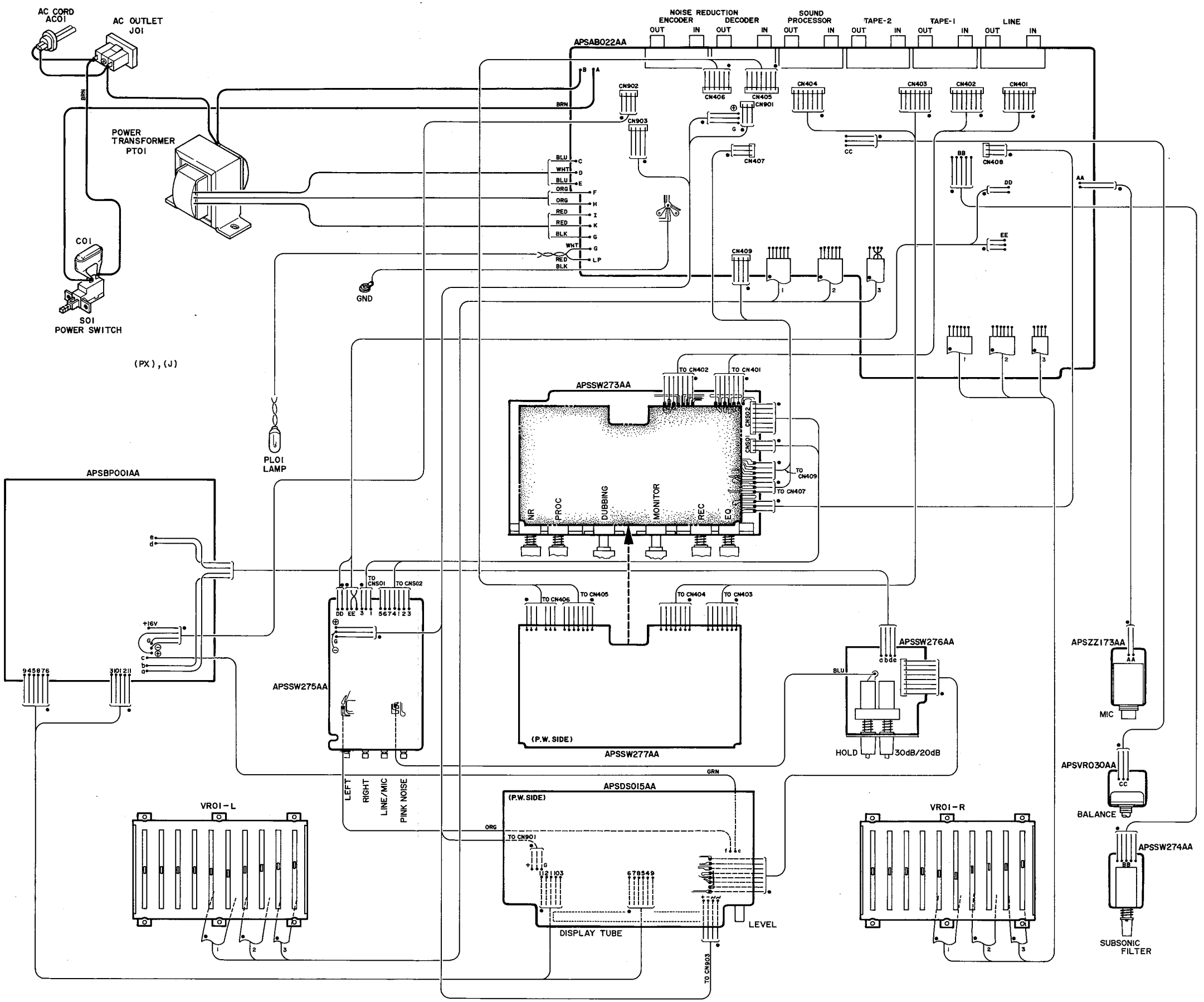


(AP04)
PSSW275COX

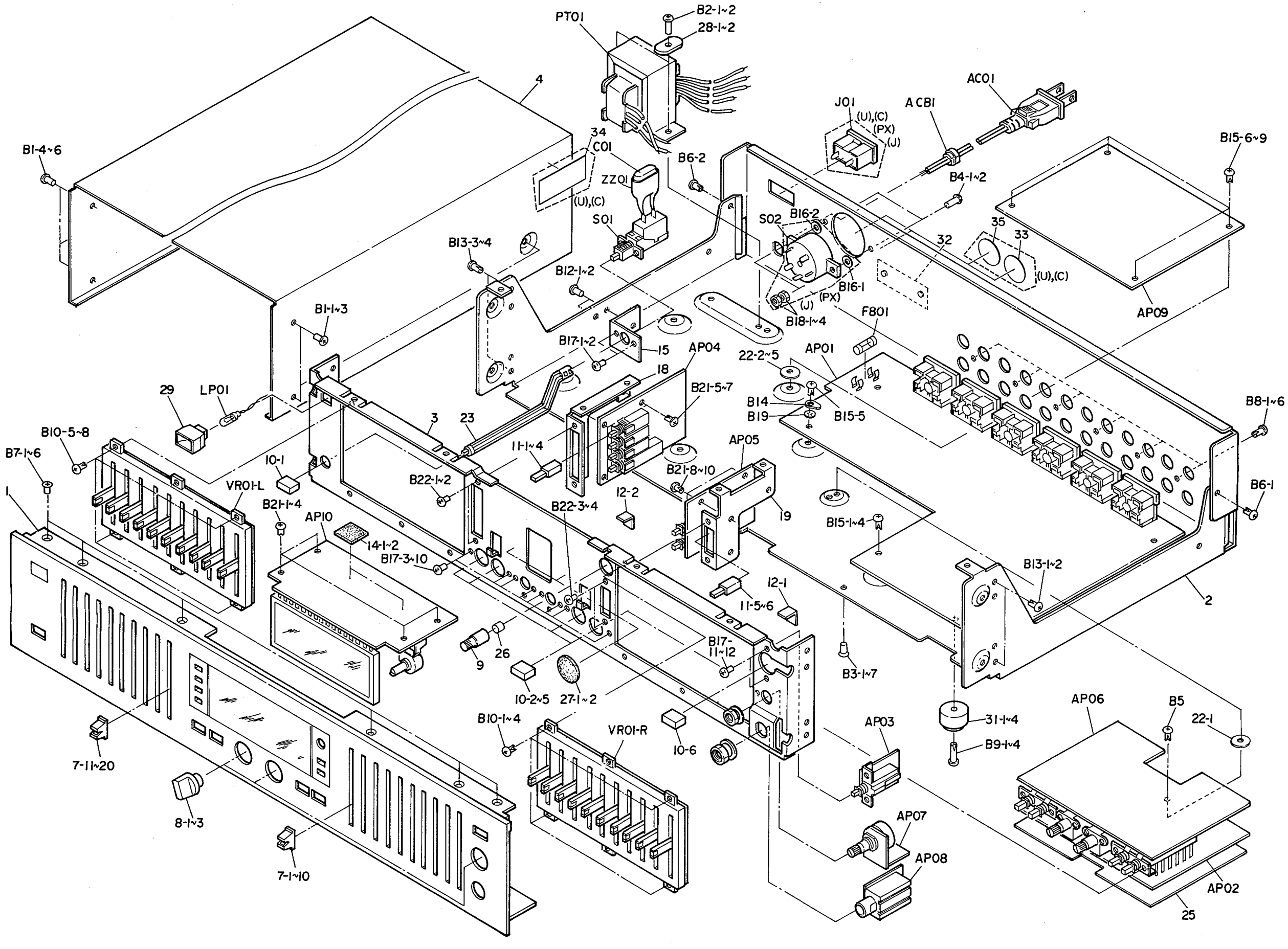
12. WIRING DIAGRAM







13. EXPLODED VIEW



14. REPLACEMENT PART LIST

ELEC, ELEMENTS

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description			
AC01		ACAC029ULA	AC Cord Assy			(U, C)
*		ACAC112JAA	AC Cord Assy			(PX, J)
*		ACAC035EEA	AC Cord Assy			(E)
No. 2		WYM114FFAA	Stranded Wire			
No. 3		WYM118FFAA	Stranded Wire			
No. 4		WYM127FFAA	Stranded Wire			
VR01R		RSOLC54G01	Slide VR			
VR01L		RSOLC54G02	Slide VR			
S01		SPO1AAW02A	Push Switch			
S02		SR0104101N	Rotary Switch			(PX, J)
PT01		TPL57U001T	Power Transformer			(U, C)
*		TPL57T001T	Power Transformer			(PX, J)
*		TPL57E001T	Power Transformer			(E)
ACB1		VM270NB001	Bushing			(U, C, PX, J)
*		VM270NB004	Bushing			(E)
ZZ01		VX331VL001	C-Cover			
J01		YJA02S007U	AC Jack			(U, C, PX, J)
LP01		ZPA148105U	Lamp	14V	80mA	Smoke
AP01		APSAB022AA	P. W. Board Assy			(PX, J)
*		APSAB022BA	P. W. Board Assy			(U, C)
*		APSAB022CA	P. W. Board Assy			(E)
AP02		APSSW273AA	P. W. Board Assy			
AP03		APSSW274AA	P. W. Board Assy			
AP04		APSSW275AA	P. W. Board Assy			
AP05		APSSW276AA	P. W. Board Assy			
AP06		APSSW277AA	P. W. Board Assy			
AP07		APSVR030AA	P. W. Board Assy			
AP08		APSZZ173AA	P. W. Board Assy			
AP09		APSBP001AA	P. W. Board Assy			
AP10		APSBS015AA	P. W. Board Assy			
C01		CQ4Y472MEN	Polyester Cap.	0.0047 μF	125VAC	(U, C)
*		CQUZ103MEN	Polyester Cap.	0.01 μF	250VAC	(PX, J, E)

MECH, ELEMENTS

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description			
1		AMSS315*01	Escutcheon Assy	Black		(U, PX, E, J)
*		AMSS315S01	Excutcheon Assy	Silver		(E, C)
B18-1~B18-4		BNHCL30NSZ	Nut	M3	S-ZNCR	
B20-1, B20-2		BRU2455XAJ	Thin Head Rivet	2.4 x 5.5	Aluminum	
B4-1, B4-2		BSPB3010NB	Bind Head Screw	+bit, M3 x 10	S-BLACK	
B17-1~B17-12		BSPC3005NZ	CEMS Screw	+bit, M3 x 5	S-ZNCR	
B21-1~B21-10		BTPB2606TZ	Bind Tap Screw	+bit, M2.6 x 6	S-ZNCR	
B5		BTPB3005TZ	Bind Tap Screw	+bit, M3 x 5	S-ZNCR	
B6-1, B6-2		BTPB3006BZ	Bind Tap Screw	+bit, M3 x 6	S-ZNCR	
B9-1~B9-4, B11, B22-1~B22-4		BTPB3006TZ	Bind Tap Screw	+bit, M3 x 6	S-ZNCR	
B2-1, B2-2		BTPB4008TZ	Bind Tap Screw	+bit, M4 x 8	S-ZNCR	
B1-1~B1-6		BTPB4010TB	Bind Tap Screw	+bit, M4 x 10	S-Black	
B10-1~B10-8		BTPP3008BZ	Pan Tap Screw	+bit, M3 x 8	S-ZNCR	
B3-1~B3-7		BTPS3006TB	Flat Tap Screw	+bit, M3 x 6	S-Black	
B7-1~B7-6		BTPS3006TZ	Flat Tap Screw	+bit, M3 x 6	S-ZNCR	
B12-1, B12-2, B13-1~B13-4		BTPW3006BZ	Bras. Tap Screw	+bit, M3 x 6	S-ZNCR	
B15-1~B15-9						
B8-1~B8-6		BTPW3008AB	Bras. Tap Screw	+bit, M3 x 8	S-Black	
B16-1, B16-2		BWK30605SN	Flat S. Washer	3 mm	S-NI	
B19		BWU30655SZ	I. T. Lock Washer	3 mm	S-ZNCR	
3		MB962SL013	Front Panel			
2		MB986SK003	Chassis			(PX, J)
*		MB986SK008	Chassis			(U, C)
12-1, 12-2		ML121SZ013	Spacer ES			
15		ML333SL005	Bracket Power Switch			
36-1, 36-2		ML633AA001	Rack Mount			(PX, J)
19		ML652SL006	Bracket PCB (R)			
28-1, 28-2		MS317SZ006	Plate			
4		MUT796SM001	Cover			
32		MVSSS11501	Serial No. Plate			
18		MZ652SL002	Bracket PCB (L)			
29		VK221RW003	Holder			
31-1~31-4		VM174SB001	Foot			
7-1~7-20		VN120SB026	Kon	Black		(U, PX, E, J)
*		VN120SM005	Knob Slide	Silver		(E, C)
10-1~10-6		VN220SP018	Button Push Switch (S)			
8-1~8-3		VN276SB033	Knob VR	Black		(U, PX, E, J)
*		VN276SM056	Knob VR			(E, C)
11-1~11-6		VN310SB001	Button Push Switch			
9		VN366SB002	Knob VR (S)			
14-1, 14-2		VQ221RF004	Sponge			
23		VQ611SB002	Shaft			
20		VS338FF001	Support P. Transformer			
22-1~22-5		VS704VF001	Barrier PCB			
25		VS764FH001	Sheet PCB			
27-1, 27-2		VS808RF003	Sheet FL			
26		VT140BN001	Spacer			
34		VVL221WN10	Caution Label			(U, C)
35		VVL431CS01	CSA Label			(U, C)
5		VVL631UL04	UL Label			(U, C)
33		VVL801UL06	UL Mark Label			(U, C)

PRINTED MATTERS

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description
		KTSS315*AX	Owner's Manual (U, PX, E, C)
		KTSS315JXX	" (J)
		KW000327XX	Warranty Card (U, PX, E, C)
		KW000328XX	" (J)
		KZ000148AX	Safety Instructions (U, C)

PACKING MATTERS

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description
		KF243400E4	Poly Bug
		KF406000E6	Poly Bug
		KNSS215*01	Patitioner
		KPSS315P01	Inner Carton
		VVL511GE09	Label

ACCESSORIES

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description
		ACSP023GEA	Stereo Audio Cable
		ZGCZZ20203	Microphone WM-2290

SHIPPING, MATTERS

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description
		KMSS315U01	Master Carton (U, C)
		KHSS315P01	" (PX, E, J)
		KSSS315P01	Outer Carton (PX, J)

P. W. BOARD ASSY APSAB022AA (AP01)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description				
RW01		ACRW058ULA	Ribbon Wire				
RW02		ACRW059ULA	Ribbon Wire				
RW03		ACRW060ULA	Ribbon Wire				
		ACZZ135GEA	Earth Wire Assy				
		BTPW3008AZ	Bras. Tap Screw	+bit, M3 x 8		S-ZNCR	
C401L/R, C406L/R, C412L/R		CCDB101KOM	Ceramic	100 pF	50V	−10, +10%	SL
C444L/R							
C442L/R		CCDB151KOM	Ceramic	150 pF	50V	−10, +10%	SL
C409L/R, C410L/R		CCDB330KOM	Ceramic	33 pF	50V	−10, +10%	SL
C440L/R		CCDB331KOM	Ceramic	330 pF	50V	−10, +10%	SL
C301		CEAD100ALX	Electrolytic	10 µF	16V		
C309		CEAD220ALX	Electrolytic	22 µF	16V		
C306		CEAD470ALX	Electrolytic	47 µF	16V		
C402L/R, C814, C817		CEAE100ALX	Electrolytic	10 µF	25V		
C310, C311, C327, C328		CEAE101ALX	Electrolytic	100 µF	25V		
C418, C419, C445, C446							
C808, C809, C812, C813							
C408L/R		CEAE220ALX	Electrolytic	22 µF	25V		
C411L/R, C413L/R, C414L/R		CEAE4R7ALX	Electrolytic	4.7 µF	25V		
C415L/R							
C811		CEAF221ALX	Electrolytic	220 µF	35V		
C803, C804		CEAF331ALX	Electrolytic	330 µF	35V		
C428L/R, C433L/R		CEAGR22ZMN	Electrolytic	0.22 µF	50V		MS
C329, C425L/R, C427L/R		CEAGR47ZMN	Electrolytic	0.47 µF	50V		MS
C430L/R							
C422L/R		CEAGR68ZMN	Electrolytic	0.68 µF	50V		MS
C435L/R		CEAG0R1ZMN	Electrolytic	0.1 µF	50V		MS
C302, C424L/R, C805		CEAG010ALX	Electrolytic	1 µF	50V		MS
C806, C807							
C447L/R		CEAG010ZMN	Electrolytic	1 µF	50V		MS
C308, C326, C421L/R		CEAG2R2ALX	Electrolytic	2.2 µF	50V		
C816		CEAK010ALX	Electrolytic	1 µF	100V		
C420L/R		CKDB472KBM	Ceramic	4700 pF	50V	−10, +10%	B
C801, C802, C810		CKDE103PEM	Ceramic	0.01 µF	500V	−0, +100%	E
C417L/R		CQMB102KEH	Mylar	1000 pF	50V	−10, +10%	
C438L/R		CQMB122KEH	Mylar	1200 pF	50V	−10, +10%	
C429L/R, C441L/R		CQMB153KEH	Mylar	0.015 µF	50V	−10, +10%	
C436L/R		CQMB182KEH	Mylar	1800 pF	50V	−10, +10%	
C434L/R		CQMB222KEH	Mylar	2200 pF	50V	−10, +10%	
C304		CQMB272KEH	Mylar	2700 pF	50V	−10, +10%	
C439L/R		CQMB273KEH	Mylar	0.027 µF	50V	−10, +10%	
C426L/R		CQMB333KEH	Mylar	0.033 µF	50V	−10, +10%	
C322		CQMB392KEH	Mylar	3900 pF	50V	−10, +10%	
C325		CQMB393KEH	Mylar	0.039 µF	50V	−10, +10%	
C437L/R		CQMB473KEH	Mylar	0.047 µF	50V	−10, +10%	
C432L/R		CQMB562KEH	Mylar	5600 pF	50V	−10, +10%	
C443L/R		CQMB682KEH	Mylar	6800 pF	50V	−10, +10%	
C423L/R		CQMB683KEH	Mylar	0.068 µF	50V	−10, +10%	
C305		CQSC101JEB	Styroflex	100 pF	50V	5%	
C307		CQSC181JEB	Styroflex	180 pF	100V	5%	
C303		CQSC221JEB	Styroflex	220 pF	100V	5%	
C323		CQSC470JEB	Styroflex	47 pF	100V	5%	
C324		CQSC471JEB	Styroflex	470 pF	100V	5%	
C404L/R, C405L/R		CQVB124JUN	Mylar	0.12 µF			
C330, C403L/R		CQVB224JUN	Mylar	0.22 µF			
HS801, HS802		MU242AD002	Heat Sink				
		MW201BS001	Terminal				
		MW401CX001	Short Jumper	10 mm			
		MW401CX004	Short Jumper	5 mm			
		MW401CX018	Short Jumper	7.5 mm			
D807		QDSMA150XN	Diode	MA150			
D801, D802		QDSW02MXXG	Diode	W02M			
		PSAB022COX	Printed Wiring Board				

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description			
D803, D805		QDZ160EB2A	Diode (Zener)	RD16EB2 (Vz 15.25 ~ 16.04)		
D806		QDZ3R6EB2A	Diode (Zener)	RD3.6EB2(Vz 3.60 ~ 3.85)		
D401		QDZ8R2EB2A	Diode (Zener)	RD8.2EB2(Vz 7.78 ~ 8.19)		
D804		QDZ9R1EB2A	Diode (Zener)	RD9.1EB2(Vz 8.57 ~ 9.01)		
U402, U403		QQM04558AA	IC	μPC4558C		
U401		QQM04559AJ	IC	NJM4559D-A		
U801		QQM05230AE	IC	M5230L		
Q402L/R, Q404L/R, Q432		QTA1015XAT	Transistor	2SA1015 (Y, GR)		
Q433, Q434, Q805						
Q802		QTB0511XAC	Transistor	2SB511 (D, E)		
Q401L/R, Q403L/R, Q431		QTC1815XAT	Transistor	2SC1815 (Y, GR)		
Q411L/R~Q430L/R, Q804						
Q801, Q803		QTD0325XCC	Transistor	2SD235 (D, E)		
Q405L/R, Q435		QTK0170XAT	Transistor	2SK170		
R319, R320, R335, R336		RD18PJ100X	Carbon	1/8W	10 ohm	5%
R410L/R		RD18PJ101X	Carbon	1/8W	100 ohm	5%
R314, R316, R318, R321, R322		RD18PJ102X	Carbon	1/8W	1K ohm	5%
R408L/R, R807						
R310, R805, R806, R810		RD18PJ103X	Carbon	1/8W	10K ohm	5%
R312, R323, R332, R337, R338		RD18PJ104X	Carbon	1/8W	100K ohm	5%
R418L/R, R419L/R, R423L/R						
R483L/R, R484L/R, R487L/R						
R488L/R, R491L/R, R492L/R						
R334, R426L/R, R813		RD18PJ105X	Carbon	1/8W	1M ohm	5%
R809		RD18PJ152X	Carbon	1/8W	1.5K ohm	5%
R327, R331		RD18PJ184X	Carbon	1/8W	180K ohm	5%
R421L/R, R422L/R		RD18PJ220X	Carbon	1/8W	22 ohm	5%
R301, R333		RD18PJ222X	Carbon	1/8W	2.2K ohm	5%
R329		RD18PJ223X	Carbon	1/8W	22K ohm	5%
R405L/R, R431L/R, R481L/R		RD18PJ224X	Carbon	1/8W	220K ohm	5%
R482L/R, R485L/R, R486L/R						
R489L/R, R490L/R						
R302, R802		RD18PJ273X	Carbon	1/8W	27K ohm	5%
R311, R402L/R, R403L/R		RD18PJ274X	Carbon	1/8W	270K ohm	5%
R435L/R, R439L/R, R455L/R						
R467L/R						
R339		RD18PJ275X	Carbon	1/8W	2.7M ohm	5%
R452L/R		RD18PJ331X	Carbon	1/8W	330 ohm	5%
R303, R305, R803		RD18PJ332X	Carbon	1/8W	3.3K ohm	5%
R315		RD18PJ333X	Carbon	1/8W	33K ohm	5%
R443L/R		RD18PJ334X	Carbon	1/8W	330K ohm	5%
R448L/R, R456L/R, R460L/R		RD18PJ391X	Carbon	1/8W	390 ohm	5%
R464L/R						
R326		RD18PJ393X	Carbon	1/8W	39K ohm	5%
R463L/R		RD18PJ394X	Carbon	1/8W	390K ohm	5%
R436L/R, R444L/R, R468L/R		RD18PJ471X	Carbon	1/8W	470 ohm	5%
R433L/R, R437L/R, R441L/R		RD18PJ472X	Carbon	1/8W	4.7K ohm	5%
R445L/R, R449L/R, R453L/R						
R457L/R, R461L/R, R465L/R						
R469L/R, R808						
R304, R313, R406L/R, R812		RD18PJ473X	Carbon	1/8W	47K ohm	5%
R309, R413L/R, R415L/R		RD18PJ474X	Carbon	1/8W	470K ohm	5%
R447L/R, R451L/R, R459L/R						
R440L/R		RD18PJ511X	Carbon	1/8W	510 ohm	5%
R307		RD18PJ560X	Carbon	1/8W	56 ohm	5%
R325, R328, R401L/R, R407L/R		RD18PJ561X	Carbon	1/8W	560 ohm	5%
R416L/R, R417L/R, R424L/R						
R432L/R						
R340, R412L/R, R414L/R		RD18PJ562X	Carbon	1/8W	5.6K ohm	5%
R811						
R306		RD18PJ681X	Carbon	1/8W	680 ohm	5%
R308, R409L/R, R434L/R		RD18PJ682X	Carbon	1/8W	6.8K ohm	5%
R438L/R, R442L/R, R446L/R						
R450L/R, R454L/R, R458L/R						
R462L/R, R466L/R, R470L/R						
R330		RD18PJ683X	Carbon	1/8W	68K ohm	5%

Ref No.	BSR/ADC Part No.	MFR'S Part No.	Description			
R308, R409L/R, R434L/R R438L/R, R442L/R, R446L/R R450L/R, R454L/R, R458L/R R462L/R, R466L/R, R470L/R		RD18PJ682X	Carbon	1/8W	6.8K ohm	5 %
R330		RD18PJ683X	Carbon	1/8W	68K ohm	5 %
R317, R420L/R		RD18PJ822X	Carbon	1/8W	8.2K ohm	5 %
R404L/R		RD18PJ823X	Carbon	1/8W	82K ohm	5 %
R493~R496		RD25TJ272X	Carbon	1/4W	2.7K ohm	5 %
R411L/R		RD25VJ152X	Carbon	1/4W	1.5K ohm	5 %
R815		RGHARJ182B	Metal-Oxide	1/2W	1.8K ohm	5 %
R801		RG1ARJ820B	Metal-Oxide	1W	82 ohm	5 %
RV301		RPGNB10301	Potentiometer		10K ohm	B-curve
FH801A/B		THFOP0011Z	Fuse Holder	UH-0021		(U, PX, C, J)
*		YHZOP0001Z	Fuse Holder			(E)
		VVL311GE23	Fuse Holder			(U, C)
CN407, CN408, CN901		YJFO3S042Z	Junction Jack	B3 B-XH-A		
CN409, CN902, CN903		YJFO4S043Z	Junction Jack	B4 B-XH-A		
CN406		YJFO6S035Z	Junction Jack	B6 B-XH-A		
CN401~CN405		YJFO7S018Z	Junction Jack	B7 B-XH-A		
J401~J406		YJPO4S023U	Jack 4P			
F801		ZFBQ50102U	Fuse	250V	500mA "T" UL	(U, C)
*		ZFBQ50103Z	Fuse	250V	500mA "T"	(PX, J)
*		ZFBQ50104A	Fuse	250V	500mA "T" SEMCO	(E)

P. W. BOARD ASSY APSBP001AA (AP09)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description			
NO31		ACCNC75ULA	Connection Cord Assy			
C903, C906		CEAE100ALX	Electrolytic	10 μF	25V	
C909, C912, C915, C918, C921		CEAE4R7ALX	Electrolytic	4.7 μF	25V	
C924, C927, C930, C931						
C933~C943		CKDB472KBM	Ceramic	4700 pF	50V	−10, +10%
C928, C929		CQMB102KEH	Mylar	1000 pF	50V	−10, +10%
C916, C917		CQMB103KEH	Mylar	0.1 μF	50V	−10, +10%
C925, C926, C932, C944		CQMB222KEH	Mylar	2200 pF	50V	−10, +10%
C913, C914		CQMB223KEH	Mylar	0.022 μF	50V	−10, +10%
C922, C923		CQMB272KEH	Mylar	2700 pF	50V	−10, +10%
C904, C905, C910, C911		CQMB393KEH	Mylar	0.039 μF	50V	−10, +10%
C919, C920		CQMB472KEH	Mylar	4700 pF	50V	−10, +10%
C901, C902, C907, C908		CQMB473KEH	Mylar	0.047 μF	50V	−10, +10%
		MW401CX001	Short Jumper	10 mm		
		MW401CX018	Short Jumper	7.5 mm		
		PSBP001COX	Printed Wiring Board			
D901~D923		QDSMA150XN	Diode	MA150		
U907~U912		QQM04558AA	IC	μPC4558C		
U901		QQ004011AN	IC	MN4011B		
U902, U903		QQ004017AA	IC	μPD4017		
U904~U906		QQ004066AA	IC	μPD4066C		
R955		RD18PJ103X	Carbon	1/8W	10K ohm	5%
R902		RD18PJ104X	Carbon	1/8W	100K ohm	5%
R914		RD18PJ123X	Carbon	1/8W	12K ohm	5%
R916		RD18PJ124X	Carbon	1/8W	120K ohm	5%
R915		RD18PJ153X	Carbon	1/8W	15K ohm	5%
R907, R912, R913, R917, R918		RD18PJ222X	Carbon	1/8W	2.2K ohm	5%
R922, R923, R927, R928, R932						
R933, R937, R938, R942, R943						
R947, R948, R952, R953, R956						
R957						
R903		RD18PJ223X	Carbon	1/8W	22K ohm	5%
R954, R963~R973		RD18PJ224X	Carbon	1/8W	220K ohm	5%
R958		RD18PJ272X	Carbon	1/8W	2.7K ohm	5%
R909		RD18PJ273X	Carbon	1/8W	27K ohm	5%
R911		RD18PJ274X	Carbon	1/8W	270K ohm	5%
R910		RD18PJ333X	Carbon	1/8W	33K ohm	5%
R961, R962		RD18PJ334X	Carbon	1/8W	330K ohm	5%
R944, R949		RD18PJ392X	Carbon	1/8W	3.9K ohm	5%
R946, R951		RD18PJ393X	Carbon	1/8W	39K ohm	5%
R945		RD18PJ472X	Carbon	1/8W	4.7K ohm	5%
R904		RD18PJ473X	Carbon	1/8W	47K ohm	5%
R906		RD18PJ474X	Carbon	1/8W	470K ohm	5%
R905		RD18PJ563X	Carbon	1/8W	56K ohm	5%
R919, R924, R929, R934, R939		RD18PJ682X	Carbon	1/8W	6.8K ohm	5%
R950						
R921, R926, R931, R936, R941		RD18PJ683X	Carbon	1/8W	68K ohm	5%
R920, R925, R930, R935, R940		RD18PJ822X	Carbon	1/8W	8.2K ohm	5%
R901		RD18PJ824X	Carbon	1/8W	820K ohm	5%
R908		RD18TJ222X	Carbon	1/8W	2.2K ohm	5%

P. W. BOARD ASSY APSDS015AA (AP10)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description			
NO32		ACCNC76ULA	Connection Cord Assy			
NO33		ACCNC77ULA	Connection Cord Assy			
NO34		ACCNC78ULA	Connection Cord Assy			
RW07		ACRW058ULA	Ribbon Wire			
RW08		ACRW063ULA	Ribbon Wire			
CL01~CL10		CCDB221KOM	Ceramic	220 pF	50V	−10, +10% SL
		PSDS015COX	Printed Wiring Board			
DL01~DL13		QDSMA150XN	Diode	MA150		
UL07~UL10		QQMO1292AC	IC	LB1292		
UL01~UL06		QQMO4558AA	IC	μPC4558C		
RL22, RL24, RL26, RL28, RL30		RD18PJ102X	Carbon	1/8W	1K ohm	5%
RL32, RL34, RL36, RL38						
RL11, RL16		RD18PJ103X	Carbon	1/8W	10K ohm	5%
RL08, RL12, RL41~RL50		RD18PJ104X	Carbon	1/8W	100K ohm	5%
RL06		RD18PJ123X	Carbon	1/8W	12K ohm	5%
RL14		RD18PJ153X	Carbon	1/8W	15K ohm	5%
RL05		RD18PJ184X	Carbon	1/8W	180K ohm	5%
RL07, RL21, RL23, RL25, RL27		RD18PJ224X	Carbon	1/8W	220K ohm	5%
RL29, RL31, RL33, RL35, RL37						
RL39						
RL03		RD18PJ272X	Carbon	1/8W	2.7K ohm	5%
RL01		RD18PJ274X	Carbon	1/8W	270K ohm	5%
RL02		RD18PJ333X	Carbon	1/8W	33K ohm	5%
RL15		RD18PJ334X	Carbon	1/8W	330K ohm	5%
RL01		RD18PJ392X	Carbon	1/8W	3.9K ohm	5%
RL04		RD18PJ393X	Carbon	1/8W	39K ohm	5%
RL10		RD18PJ684X	Carbon	1/8W	680K ohm	5%
RL13		RD18PJ822X	Carbon	1/8W	8.2K ohm	5%
RVL01		RD25T0000K	Short Jumper		1K ohm	B-curve
RVL03, RVL04		RPGNB10201	Potentiometer		100K ohm	B-curve
RVL02		RPGNB10401	Potentiometer		50K ohm	B-curve
VRL01		RVWA503B01	Volume		50K ohm	B-curve
		WUF533EEXX	Hi-Wrap Wire			
		WUF725AEXX	Hi-Wrap Wire			
PLL01		ZLBG130ZX7	Display Tube	BG130Z		

P. W. BOARD ASSY APSSW273AA (AP02)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description	
NO11		ACCNC66ULA	Connection Cord Assy	
NO12		ACCNC67ULA	Connection Cord Assy	
NO13		ACCNC71ULA	Connection Cord Assy	
NO14, NO15		ACCNC72ULA	Connection Cord Assy	
		MW401CX018	Short Jumper	7.5 mm
		PSSW273COX	Printed Wiring Board	
SS01		SH040308ZA	Slide Rotary Switch	
SS02		SH080304ZA	Slide Rotary Switch	
SS03		SP02CAX12A	Push Switch	
SS04		SP02CAX13A	Push Switch	
		WUF004AAXX	Hi-Wrap Wire	
		WUF114EEXX	Hi-Wrap Wire	
		WUF214EEXX	Hi-Wrap Wire	
		WUF314EEXX	Hi-Wrap Wire	
CNS01		YJF03S042Z	Junction Jack	B3 B-XH-A
CNS02		YJF07S018Z	Junction Jack	B7 B-XH-A

P. W. BOARD ASSY APSSW274AA (AP03)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description
		PSSW274COX	Printed Wiring Board
SS05		SP01AAX74D	Push Switch

P. W. BOARD ASSY APSSW275AA (AP04)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description				
NO21		ACCNC73ULA	Connection Cord Assy				
NO22		ACCNC74ULA	Connection Cord Assy				
RW04		ACRW059ULA	Ribbon Wire				
RW05		ACRW061ULA	Ribbon Wire				
RW06		ACRW062ULA	Ribbon Wire				
CS02L/R		CCDB221KOM	Cera	220 pF	50V	−10, +10%	SL
CS04, CS05		CEAE470ALX	Electrolytic	47 μF	25V		
CS01L/R, CS03L/R		CEAG2R2ALX	Electrolytic	2.2 μF	50V		
		MW401CX018	Short Jumper	7.5 mm			
		PSSW275COX	Printed Wiring Board				
QS01L/R		QTC1815XAT	Transistor	2SC1815 (Y, GR)			
RS04L/R		RD18PJ102X	Carbon	1/8W	1K ohm	5%	
RS05		RD18PJ103X	Carbon	1/8W	10K ohm	5%	
RS02L/R		RD18PJ104X	Carbon	1/8W	100K ohm	5%	
RS01L/R		RD18PJ224X	Carbon	1/8W	220K ohm	5%	
RS03L/R		RD18PJ333X	Carbon	1/8W	33K ohm	5%	
SS06		SP04FAX04D	Push Switch				

P. W. BOARD ASSY APSSW276AA (AP05)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description			
		PSSW276COX	Printed Wiring Board			
RS11		RD18PJ223X	Carbon	1/8W	22K ohm	5%
SS10		SP02FAX05D	Push Switch			
		WYF133EEXX	Stranded Wire			
		WYF233EEXX	Stranded Wire			
		WYF333EEXX	Stranded Wire			
		WYF433EEXX	Stranded Wire			
		WYF625AEXX	Stranded Wire			
CNS03		YJF08S028Z	Junction Jack	B8 B-XH-A		

P. W. BOARD ASSY APSSW277AA (AP06)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description	
NO16		ACCNC68ULA	Connection Cord Assy	
NO17, NO18		ACCNC69ULA	Connection Cord Assy	
NO19		ACCNC70ULA	Connection Cord Assy	
J31		MW401CX003	Short Jumper	7.5 mm
		MW401CX018	Short Jumper	7.5 mm
		PSSW277COX	Printed Wiring Board	

P. W. BOARD ASSY APSVR030AA (AP07)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description	
		PSVR030COX	Printed Wiring Board	
VR02		RVNA104W06	Volume	100K ohm

P. W. BOARD ASSY APSZZ173AA (AP08)

Ref. No.	BSR/ADC Part No.	MFR'S Part No.	Description
		PSZZ173COX	Printed Wiring Board
J407		YJSO3S026Z	Phone Jack

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