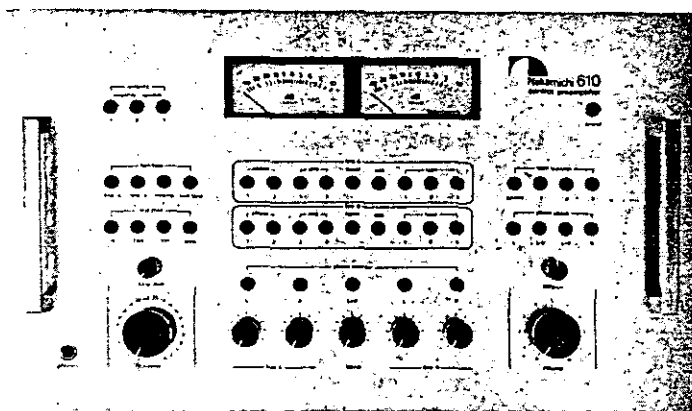




Service Manual

Nakamichi 610 control preamplifier



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1. GENERAL

Nakamichi 610 control functions are shown below.

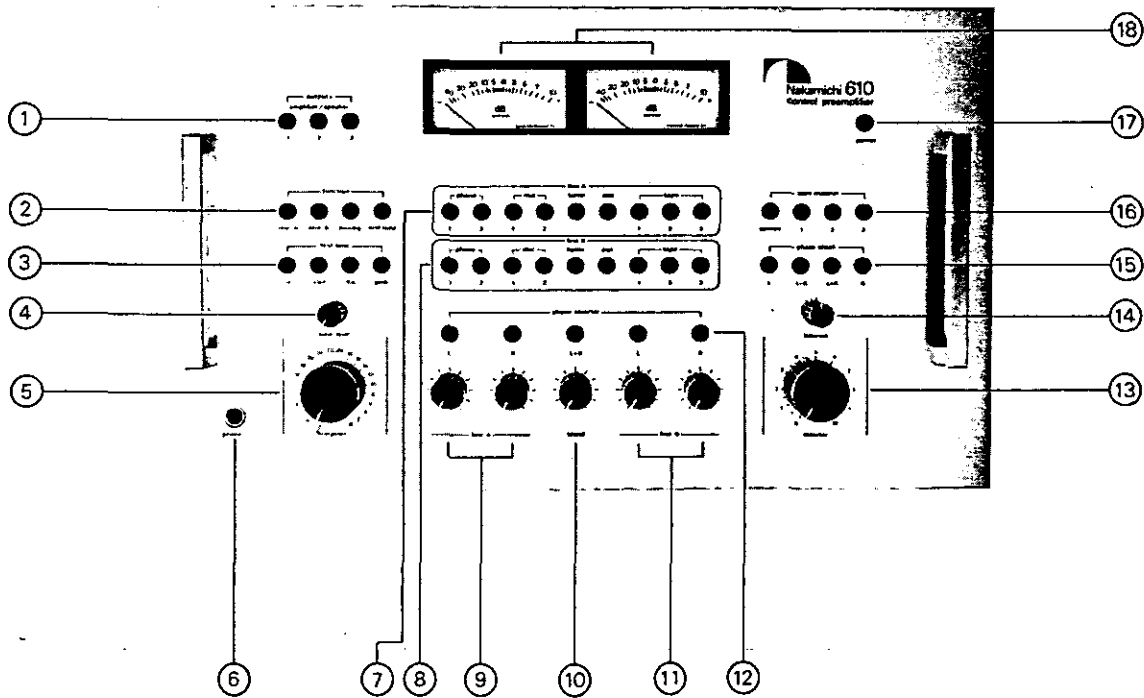


Fig. 1.1

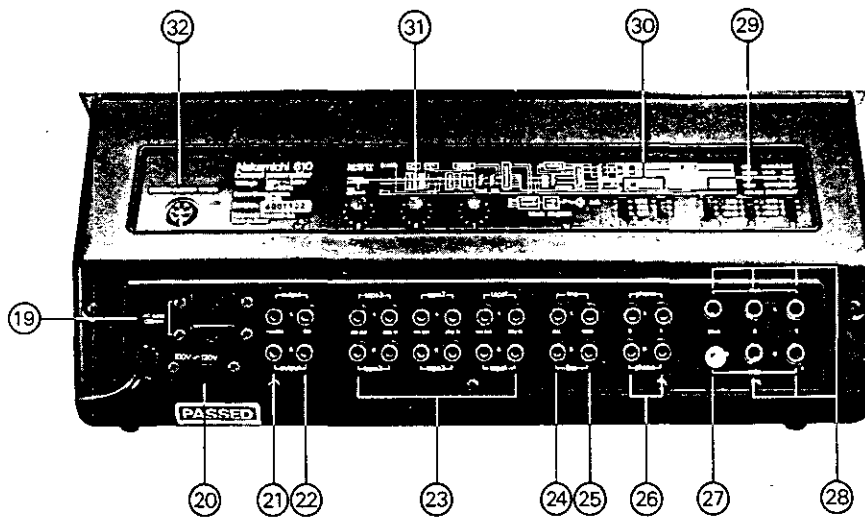


Fig. 1.2

- 1. Output Selector
- 2. Function Selector
- 3. Test Tone Selector
- 4. Test Tone Level Control
- 5. Master Level Control (with Preset Marker)
- 6. Stereo Headphone Jack
- 7. Line A Input Selector
- 8. Line B Input Selector
- 9. Line A Level Controls
- 10. Blend Mic. Level Control
- 11. Line B Level Controls
- 12. Phase Inverter Switches
- 13. Monitor Volume Control
- 14. Balance Control
- 15. Phase Check Selector
- 16. Tape Monitor Selector
- 17. Power Switch
- 18. Peak Level Meter
- 19. AC Outlets (Switched)
- 20. Voltage Selector
- 21. Monitor Output Jacks
- 22. Line Output Jacks
- 23. Tape Play-In/Rec.-Out Jacks
- 24. Auxiliary Input Jacks
- 25. Tuner Input Jacks
- 26. Phono Input Jacks
- 27. Ground Terminal
- 28. Mic. Input Jacks
- 29. Mic. Attenuator Switches
- 30. Phono Input Impedance Switches
- 31. Level Matching Controls
- 32. Remote Control Socket

Voltage Selector

Change-over either to 100~120V or 220~240V

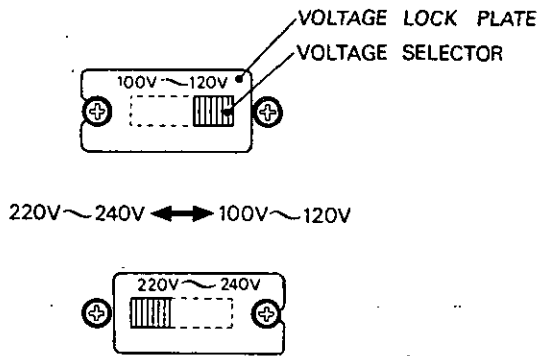


Fig. 1.3

2. PRINCIPLE OF OPERATION

2.1 Mute Signal

When power switch of Nakamichi 610 is turned to On and also Off, the line-output and monitor-output signals are muted in order to prevent the transitional noise.

Fig. 2.1 shows the mute circuit and Fig. 2.2 shows the timing chart of mute signal.

When the power switch is turned to On, +12V DC will rise. And base current will flow through resistor R915, and transistor Q911 turns to On. Therefore Q912 turns to On and mute signal becomes approximately +11V.

In the meantime, capacitor C910 is charged forward to +12V through resistor R913, and when the charged voltage of C910 exceeds the total voltage of Q911 emitter voltage and zener diode ZD903 voltage, the base current of Q910 begins to flow and Q910 turns to On.

When the Q910 turns to On, no base current of Q911 flows and Q911 becomes in cutoff mode, therefore Q912 becomes cutoff and mute signal becomes -10V i.e. mute signal is released.

When power switch is turned to Off, the charge of C910 discharges quickly through diode D905, while C911 keeps the charge for longer period of time because D904 acts to prevent the quick discharge. When the voltage of C910 becomes low, Q910 becomes cutoff therefore the base current of Q911 flows through resistor R915, and Q911 and Q912 turn to On so that mute signal will be generated.

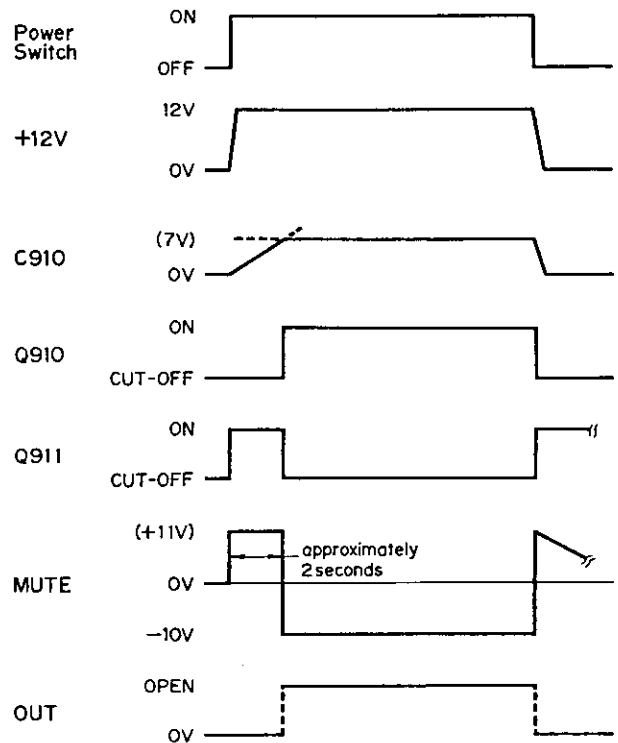


Fig. 2.2

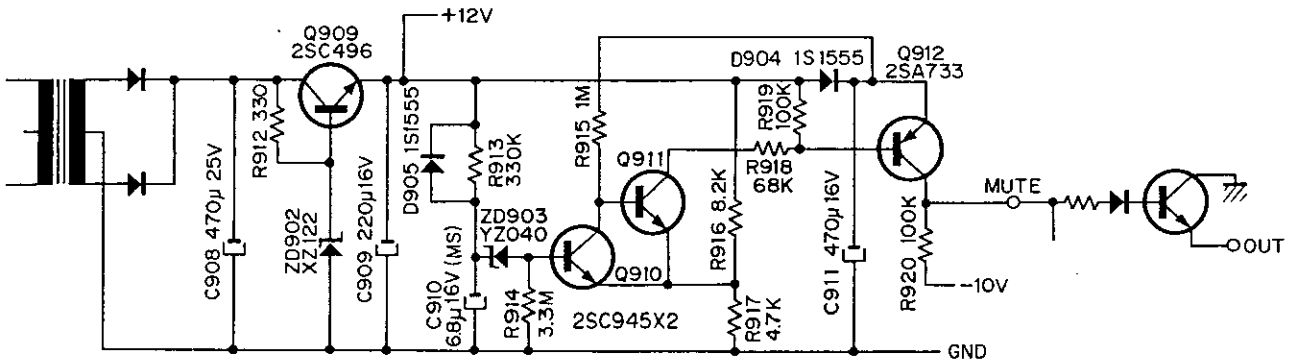


Fig. 2.1

2.2. Oscillator

Fig. 2.3 shows the oscillator circuit.

Pink noise or one of seven sine wave frequencies can be selected at test tone mode (test tone button is depressed at function selector).

Pink Noise Generator:

Pink noise has constant energy level at every octave band, and includes wide band frequencies from low to high.

Pink noise is very useful for testing speakers and tape decks, for pink noise has similar energy distribution characteristics to the wide band musical source.

Resistor R602 generates noise as ordinary resistors do. This noise is amplified by low-noise FETs (Q601, 602), operational amplifier IC601 and also IC602. And through the equalizer circuits composed of capacitor C601, resistor R601 and C603, R607 and C609, R627, thereby pink noise having flat frequency response can be obtained.

Sine Wave Oscillation:

By depressing test tone 1K, 3.16K and 10K buttons, seven frequencies (1K, 3.16K, 4.16K, 10K, 11K, 13.16K, 14.16kHz) can be obtained. For example pushing the 1K button and the 10K button simultaneously will generate an 11kHz tone.

The output voltage of IC602 is fed back to non-inverting input (terminal No. 2) as a positive feedback through resistor R616.

On the other hand, IC602 output is fed back to inverting input (terminal No. 3) as a negative feedback through filter circuit composed of capacitors and resistors (C611, C612, R630 to R635).

At the selected frequency by above filter the negative feedback voltage will reduce so that oscillation will start at that frequency. Test tone buttons (1K, 3.16K, 10K) change the resistors of filter so that oscillation frequency will change.

Oscillation level is decided as follows:

When the oscillation peak level of IC602 exceeds the base voltage of transistor Q604, capacitor C607 is charged through Q604 therefore the gate voltage of FET Q603 increases.

Accordingly the resistor between drain and source of FET Q603 decreases so that the level of positive feedback from IC602 output to non-inverting input will decrease and that oscillation level will also decrease.

When oscillation level decreases, gate voltage of FET decreases and when oscillation level increases, gate voltage of FET increases, as a result of which oscillation level is kept constant.

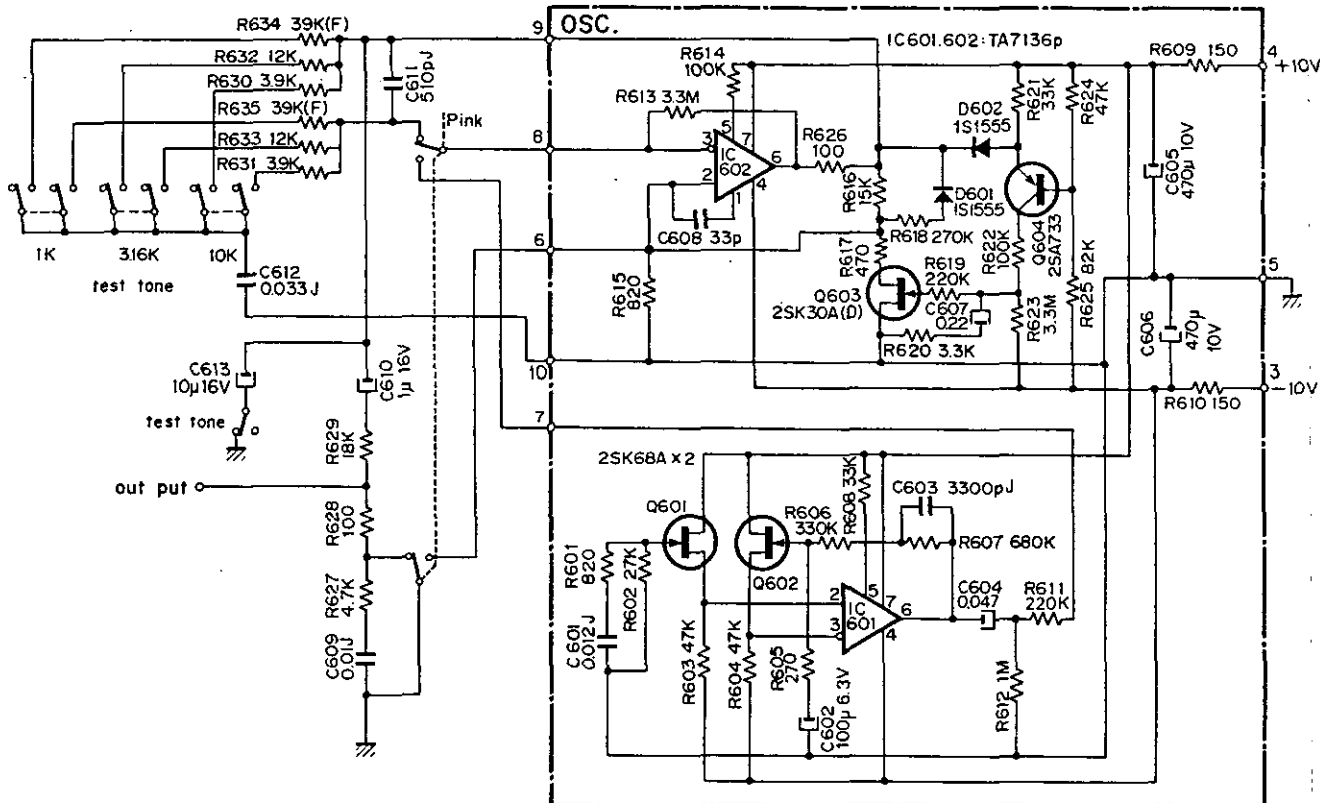


Fig. 2.3

2.3. Inverter & Mixer

Fig. 2.4 shows the inverter and mixer block diagram.

Both left and right channel inputs of line A and also line B and blend mic. input are mixed in the circuit.

And the phase of each input can be reversed independently by depressing each phase invert button.

Amp. 1 output is conducted to non-inverting input (+) of amp. 2, and when phase invert button is depressed, amp. 1 output is conducted to inverting input (-) of amp. 2. Therefore the polarity of amp. 2 output will be changed i.e. phase is reversed.

When microphone and phono cartridge are detected out of phase according to item 2.4. "Phase Check", to correct in phase is possible by depressing the phase invert button.

Note: Phase invert button operates in the mixing mode (mixing button is depressed at function selector) only.

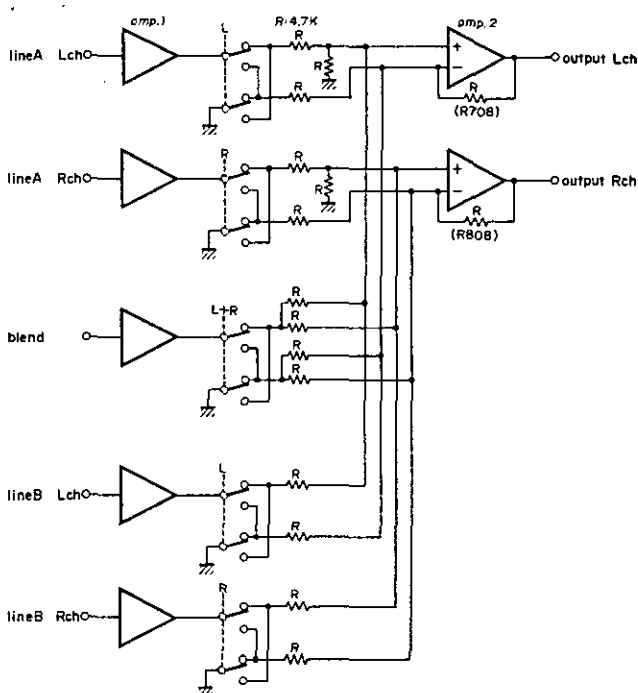


Fig. 2.4

2.4 Phase Check

Fig. 2.5 shows the phase check block diagram.

Check on phase function is useful to see whether left and right channels are wired out of phase for the microphone, phono cartridge and speakers.

By depressing phase check button (momentary contact) L or (L-R) or (L+R) or R, amplified output L or (L-R) or (L+R) or R appears at the both left and right output channels.

By depressing both L and R buttons simultaneously, amplified L and R outputs become reversed.

Following operation will serve to check the phase between left and right channels.

Feed in the same source sound to the left and right channels in the phase check circuit.

Depressing (L-R) phase check button, turn the balance VR on the front panel and check whether the sound from the loud speakers (or headphones) becomes extremely faint or not. In case sound becomes extremely faint, left and right channels are in phase.

Depressing (L+R) phase check button, turn the balance VR on the front panel and check whether the sound from the loud speakers (or headphones) becomes extremely faint or not. In case sound becomes extremely faint, left and right channels are out of phase.

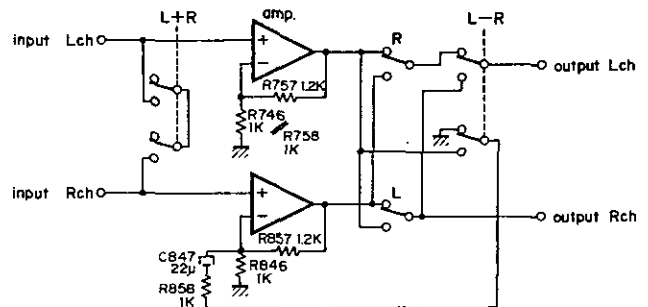


Fig. 2.5

3. REMOVAL PROCEDURES

3.1. Note

When P.C. board assembled with each switch ass'y (sw. E ass'y (output selector P.C.B. ass'y), sw. AB ass'y (function P.C.B. ass'y, oscillation selector P.C.B. ass'y), sw. FG ass'y (line A P.C.B. ass'y, line B P.C.B. ass'y), sw. BC ass'y (tape monitor P.C.B. ass'y, phase check P.C.B. ass'y), sw. D ass'y (inverter & mixer P.C.B. ass'y)) is renewed, the following mechanical adjustments are required:

Referring to the following items 3.2 and 3.3, remove cabinet and front panel.

Refer to Fig.3.1 and fasten sw. ass'y to the shassis with screw B. Loosen screw A (4 spots) then fasten screw A again.

Above adjustments fix sw. ass'y to the mother P.C. board and prevent wrong connection between renewed P.C. board and mother P.C. board.

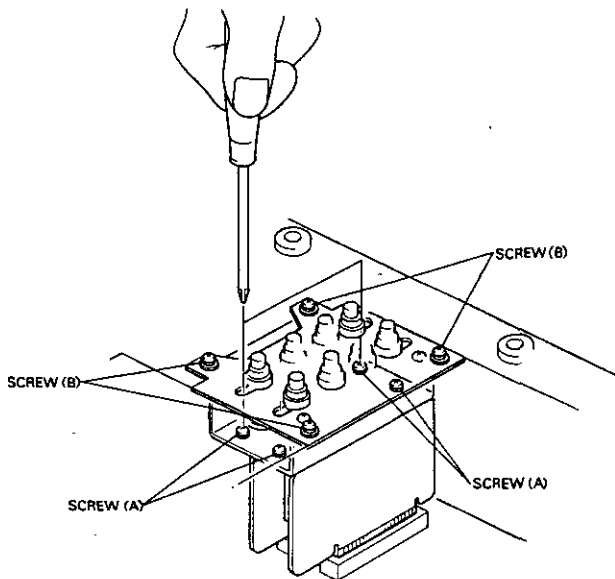


Fig. 3. 1

3.2 Cabinet Ass'y

Refer to Fig. 3.2 and remove F01 and F02.

3.3. Front Panel Ass'y

Refer to Fig. 3.2 and remove F03 through F09.

3.4. Mic. Amp. P.C.B. Ass'y, Eq. Amp. P.C.B. Ass'y, Line Amp. P.C.B. Ass'y

Remove cabinet (item 3.2). Refer to Fig. 3.3 and remove F01 through F05.

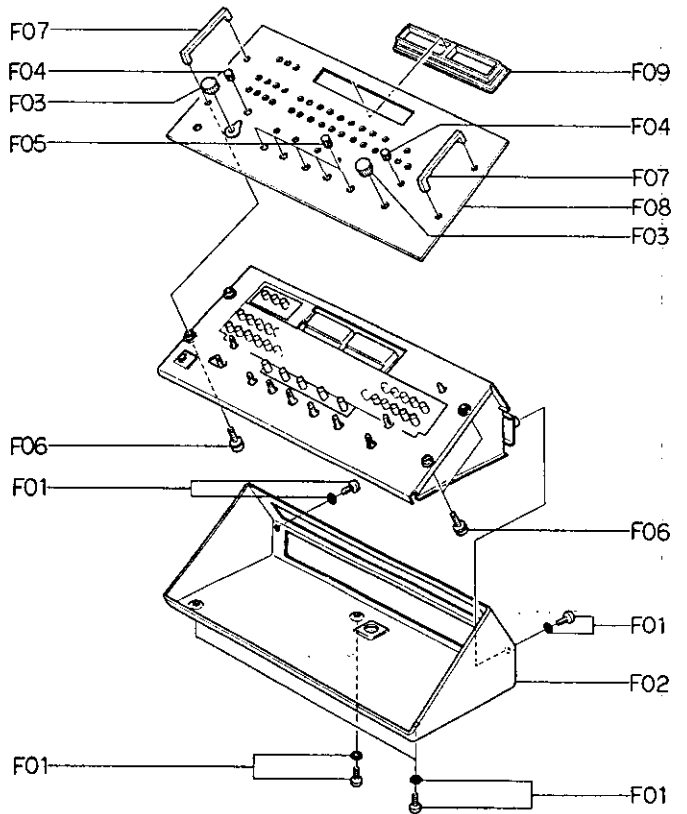


Fig. 3. 2

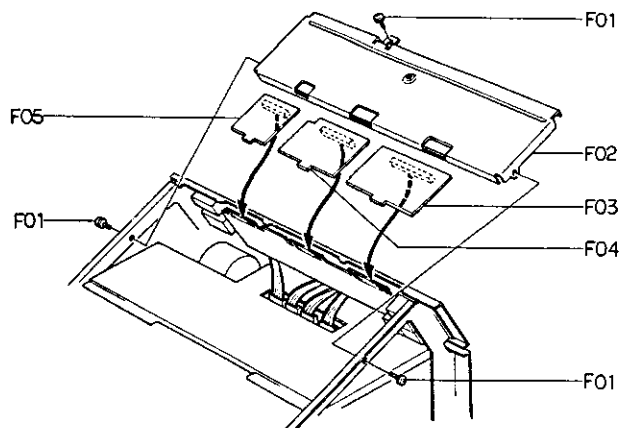


Fig. 3. 3

3.5. Rear Panel Ass'y, Jack P.C.B. Ass'y Mic. Jack

Remove cabinet and mic. amp. P.C.B. ass'y, eq. amp. P.C.B. ass'y, line amp. P.C.B. ass'y (3.2, 3.4). Refer to Fig. 3.4 and remove F01 through F05.

3.6. Attenuation Selector P.C.B. Ass'y

Remove cabinet (3.2). Refer to Fig. 3.5 and remove F01 through F06.

3.7. DC Supply P.C.B. Ass'y

Remove cabinet (3.2). Refer to Fig. 3.6 and remove F01 through F03.

3.8. Power Switch Ass'y

Remove cabinet and DC supply P.C.B. ass'y (3.2, 3.7). Refer to Fig. 3.7 and remove F01 through F03.

3.9. Sw. D Ass'y (Inverter & Mixer P.C.B. Ass'y), Buffer Amp. P.C.B. Ass'y, Oscillator P.C.B. Ass'y

Remove cabinet (3.2). Refer to Fig. 3.8 and remove F01 through F03 (sw. D ass'y), F04 through F06 (buffer amp. P.C.B. ass'y) and F07 through F09 (oscillator P.C.B. ass'y).

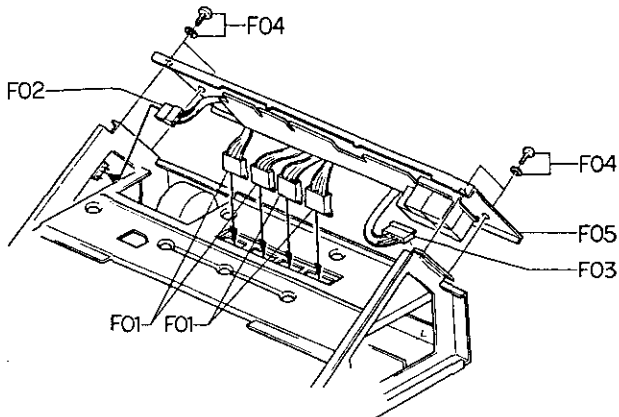


Fig. 3.4

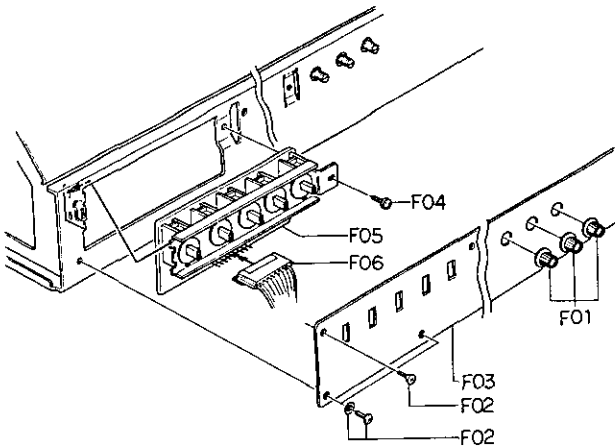


Fig. 3.5

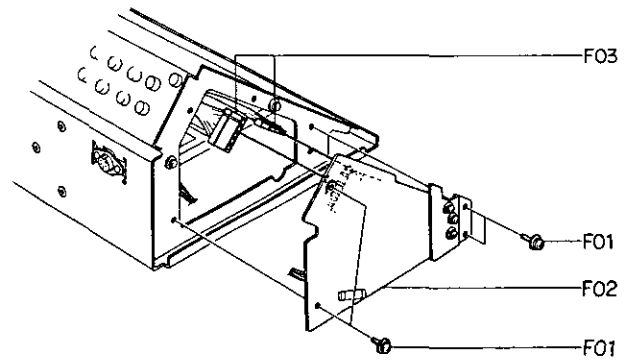


Fig. 3.6

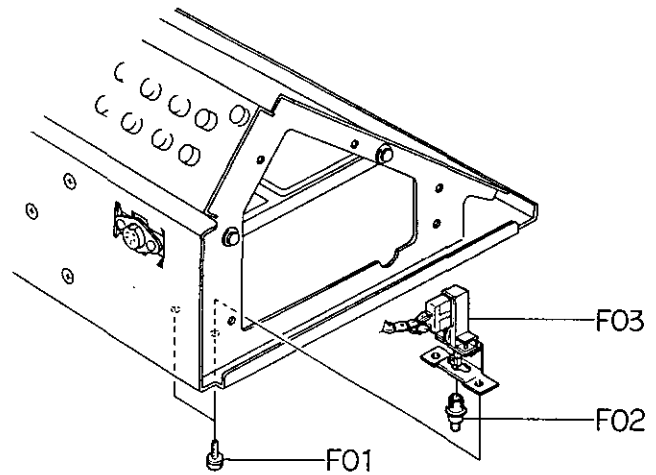


Fig. 3.7

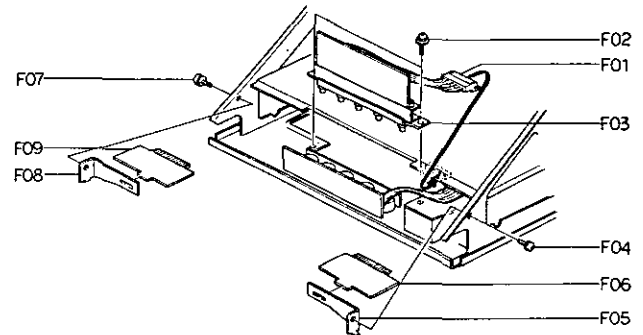


Fig. 3.8

3.10. Monitor VR P.C.B. Ass'y, Line VR P.C.B. Ass'y, Tone Level VR Ass'y, Master VR Ass'y, Headphone Ass'y

Remove cabinet (3.2), buffer amp. P.C.B. ass'y and oscillator P.C.B. ass'y (3.9). Refer to Fig. 3.9 and remove F01 through F03 (monitor VR P.C.B. ass'y), F04 through F06 (line VR P.C.B. ass'y), F07 through F09 (tone level VR ass'y), F10 through F12 (master VR ass'y) and F13 through F15 (headphone ass'y).

3.11. Meter Ass'y (Meter Amp. P.C.B. Ass'y), Sw. E Ass'y (Output Selector P.C.B. Ass'y), Sw. FG Ass'y (Line A P.C.B. Ass'y, Line B P.C.B. Ass'y), Sw. AB Ass'y (Function P.C.B. Ass'y, Oscillation Selector P.C.B. Ass'y), Sw. BC Ass'y (Tape Monitor P.C.B. Ass'y, Phase Check P.C.B. Ass'y)

Remove cabinet and front panel (3.2, 3.3). Refer to Fig. 3.10 and remove F01 through F03 (meter ass'y), F04 and F05 (sw. E ass'y), F06 and F07 (sw. FG ass'y).

Remove the buffer amp. P.C.B. ass'y and osc. P.C.B. ass'y (3.9).

Then remove F08 through F10 (sw. AB ass'y), F11 and F12 (sw. BC ass'y).

Note: When meter or meter amp. P.C.B. ass'y is replaced, readjustment of meter level calibration and meter sensitivity calibration are required (refer to items 4.1 and 4.2).

3.12. Mother P.C.B. Holder Ass'y (Mother P.C.B. Ass'y), Power Transformer Ass'y

Remove the parts according to above items 3.2 through 3.11.

Refer to Fig. 3.11 and remove F01 through F03 (mother P.C.B. holder ass'y), F04 and F05 (power transformer ass'y).

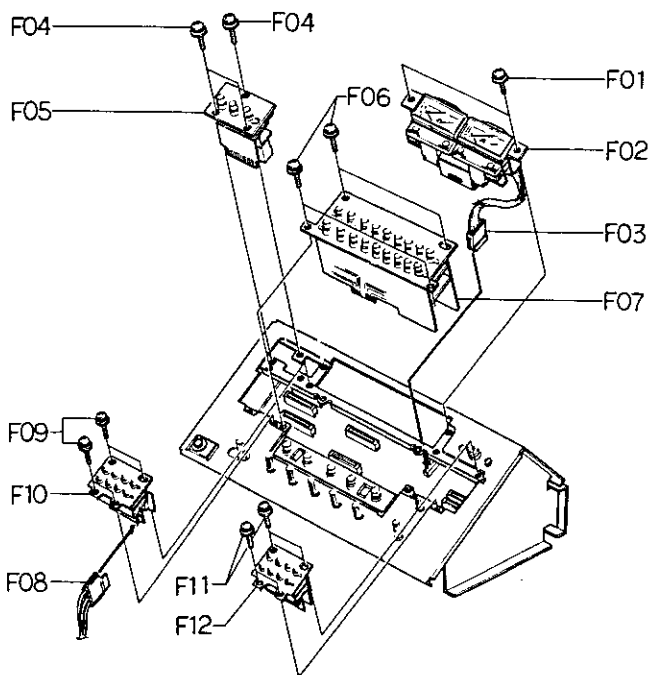


Fig. 3. 10

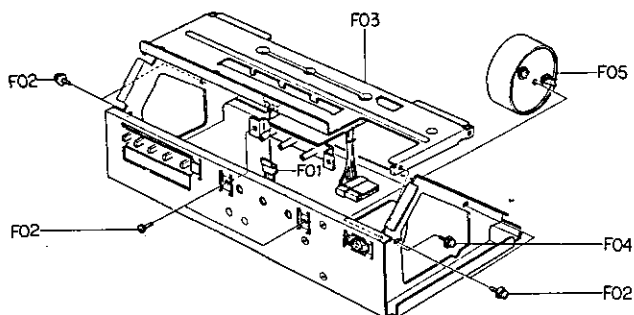


Fig. 3. 11

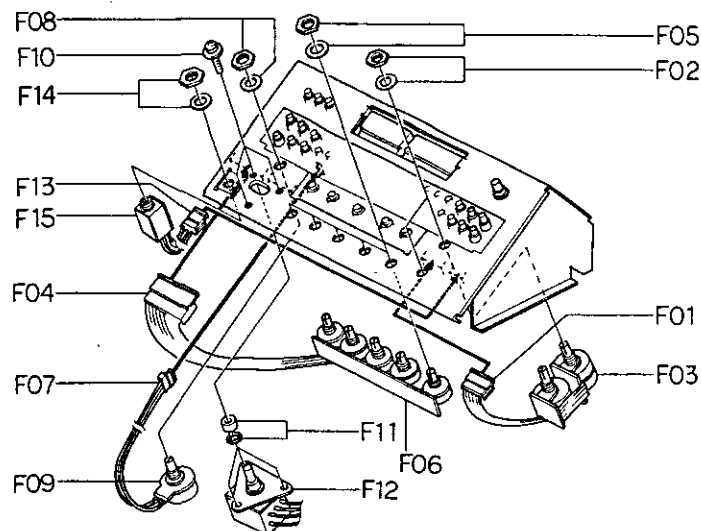


Fig. 3. 9

4. ELECTRICAL ADJUSTMENTS & MEASUREMENTS

4.1. Meter Level Calibration

- (1) Remove cabinet and rear plate (refer to item 3.6 and remove F01 through F03).
- (2) Feed in 1kHz to both L and R channels of Tuner (or Aux.) input.
- (3) Depress Tuner (or Aux.) button of Line A Selector, Line A button of Function Selector, Source button of Tape Monitor Selector and one of the Output buttons of Output Selector.
- (4) Turn Line A Level Controls to the maximum position. Set Balance Control to the center. Turn Monitor Volume Control and Level Matching Controls (Output Level VR) to the maximum position.
- (5) Adjust Master Level Control to obtain 1.07V (0dB) on the monitor outputs, then adjust semi-fixed volumes VR761 (L channel) and VR861 (R channel) to obtain 0dB on the level meters.

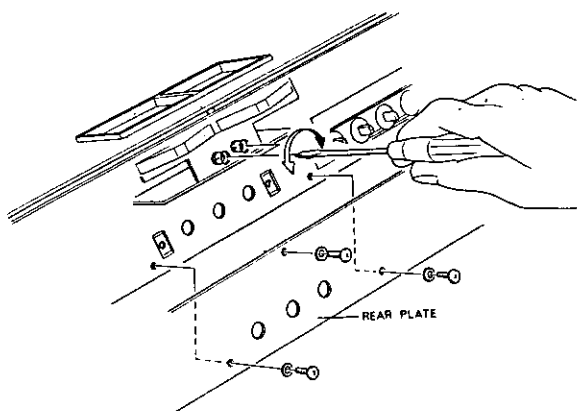


Fig. 4.1

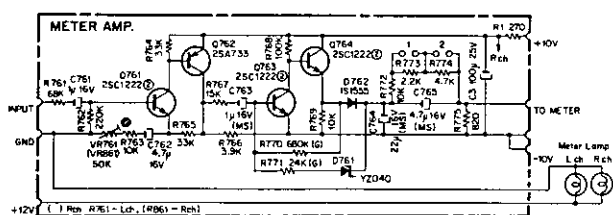


Fig. 4.2

4.2. Meter Sensitivity Calibration

- (1) Short R774 (L channel) and R874 (R channel) (Jumper No.2) from the dip side of meter amp. P.C.B. ass'y.
- (2) Calibrate the meter level according to item 4.1.
- (3) Adjust Master Level Control to obtain -15dB on the monitor outputs. In case a pointer of level meter indicates under -15dB, to short R773 (R873) (Jumper No.1) is required. In case a pointer of level meter indicates over -15dB, to open Jumper No.2 is required.
- (4) Calibrate the meter level according to item 4.1.

4.3. Signal to Noise Ratio

- Mode: Line Selector – Mic., Phono, Aux., Tuner, or Tape
PB-In
- Function Selector – Line A or Line B
Tape Monitor – Source
Output Selector – 1
Mic. Attenuator Switch – (-15dB)
Line Level Controls – Max.
Master Level Control – Max.
Balance Control – Center Position
Monitor Volume Control – Max.
Level Matching Control – Max.

Measurement:

Short each input terminal to be measured then measure the monitor output level (noise level) through IHF A network.

Reference monitor output level: 1.07V (0dB)

4.4. Residual Noise Level

- Mode: Tape Monitor – Source
Output Selector – 1
Balance Control – Center Position
Monitor Volume Control – Min.
Level Matching Controls – Max.

Measurement:

Measure the output level (residual noise level) through IHF A network at line output, headphone and monitor output terminals.

Reference monitor output level: 1.07V (0dB)

4.5. Distortion

- Mode: Line Selector – Mic., Phono, Aux., Tuner, or Tape
PB-In
- Function Selector – Line A, Line B, or Mixing
Mic. Attenuator Switch – (-15dB)
Line Level Controls – Max.
Master Level Control – (-20dB)

Measurement:

Feed in 1KHz and adjust the input level to obtain 2V output level at line output terminal, then measure the distortion.

4.6. Maximum Input Level

- Mode: Line Selector – Mic., Phono, Aux., Tuner, or Tape
PB-In
- Function Selector – Line A, Line B, or Mixing
Tape Monitor – Source
Output Selector – 1
Mic. Attenuator Switch – (-30dB)
Line Level Controls – Adjust
Master Level Control – Adjust
Balance Control – Center Position
Monitor Volume Control – Max.
Level Matching Controls – Max.

Measurement:

Feed in 1KHz to Mic. or Phono input and adjust Line Level Control and Master Level Control to obtain 1.07V on the monitor output terminal i.e. 0dB on the level meter.

Keeping approximately 0dB on the level meter by adjusting Line Level Control and Master Level Control, increase input level and check the mic. or phono amplifier clipping level observing the clipped waveform or great distortion at monitor output terminal.

Aux, Tuner and Tape PB-In inputs are connected directly to Line Level Control through a resistor. Therefore great maximum input level can be obtained.

5. MOUNTING DIAGRAM, CIRCUIT DIAGRAM & PARTS LIST

5.1. Mic. Amp. P.C.B. Ass'y

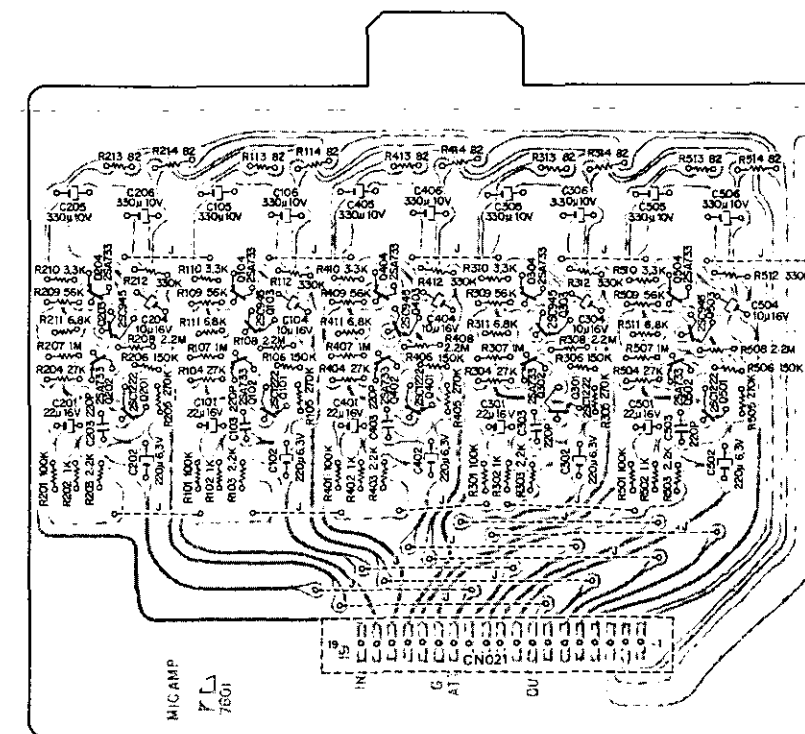


Fig. 5. 1. 1

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA03738A	Mic. Amp. P.C.B. Ass'y	R109, 209	OB05563A	Carbon Resistor 56K ELR¼ J
	OB07652A	Mic. Amp. P.C.B.	309, 409		
	OB06062A	Transistor 2SC1222 (2)	509	OB01793A	Carbon Resistor 3.3K ELR¼ J
Q101, 201			R110, 210		
301, 401			310, 410		
501			510	OB01877A	Carbon Resistor 6.8K ELR¼ J
Q103, 203	OB01872A	Transistor 2SC945 (L)	R111, 211		
303, 403			311, 411		
503			511		
Q102, 202	OB06013A	Transistor 2SA733	R112, 212	OB01921A	Carbon Resistor 330K ELR¼ J
302, 402			312, 412		
502, 104			512	OB05503A	Carbon Resistor 82 ELR¼ J
204, 304			313, 413		
404, 504			513, 114		
R101, 201	OB01920A	Carbon Resistor 100K ELR¼ J	214, 314		
301, 401			414, 514		
501			C101, 201	OB05636A	Tantalum Capacitor 22µ 16V
R102, 202	OB01781A	Carbon Resistor 1K ELR¼ J	301, 401		
302, 402			501	OB01394A	Electrolytic Capacitor 220µ 6.3V
502			C102, 202		
R103, 203	OB05566A	Carbon Resistor 2.2K ELR¼ J	302, 402		
303, 403			502	OB01289A	Ceramic Capacitor 220P 50V
503			C103, 203		
R104, 204	OB05538A	Carbon Resistor 27K ELR¼ J	303, 403		
304, 404			503	OB01412A	Electrolytic Capacitor 10µ 16V
504			C104, 204		
R105, 205	OB05600A	Carbon Resistor 270K ELR¼ J	304, 404		
305, 405			504	OB05841A	Electrolytic Capacitor 300µ 10V
505			C105, 106		
R106, 206	OB05593A	Carbon Resistor 150K ELR¼ J	205, 206		
306, 406			305, 306		
506			405, 406		
R107, 207	OB05564A	Carbon Resistor 1M ELR¼ J	505, 506		
307, 407			CN021	BA03562A	19P Connector Ass'y
507					
R108, 208	OB05672A	Carbon Resistor 2.2M ELR¼ J			
308, 408					
508					

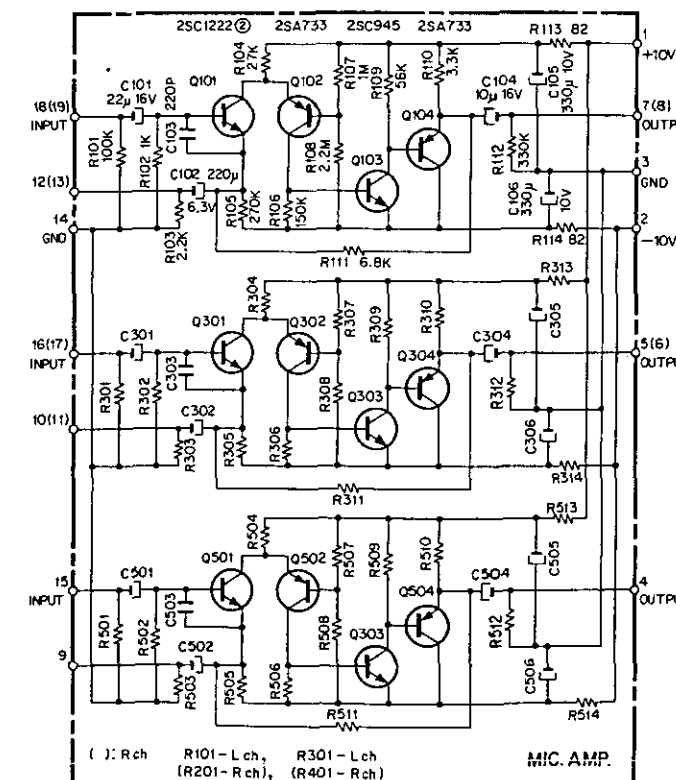


Fig. 5. 1. 2

5.2. Eq. Amp. P.C.B. Ass'y

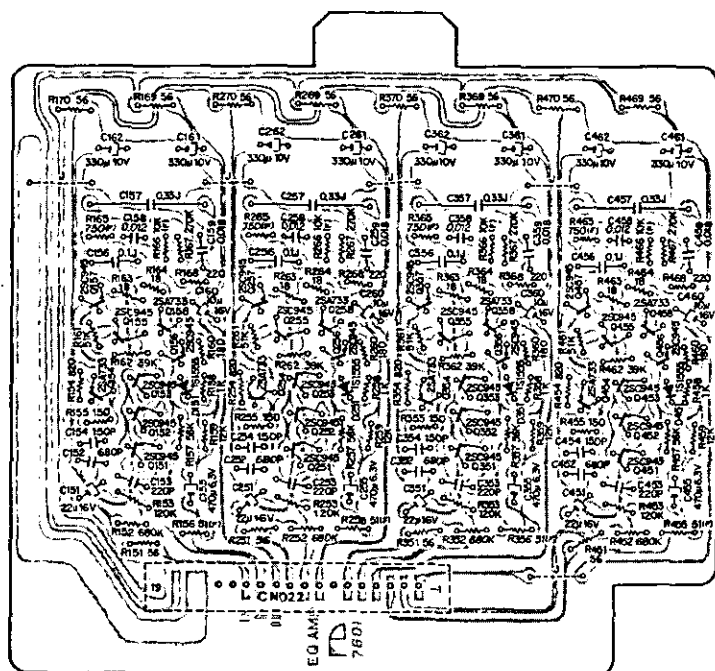


Fig. 5. 2. 1

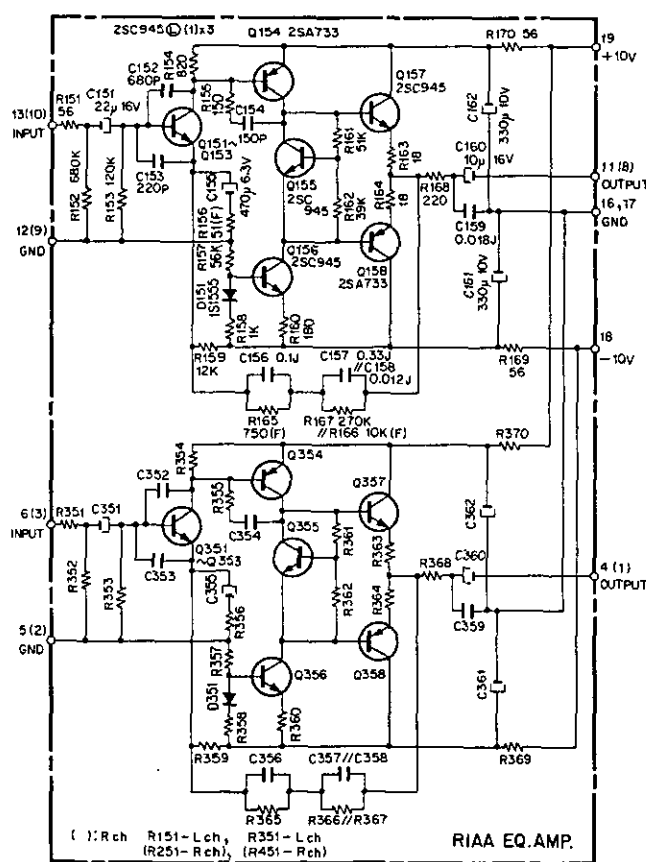


Fig. 5. 2. 2

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA03737A	EQ. Amp. P.C.B. Ass'y	R161, 261	OB05845A	Carbon Resistor 51K ELR% J
			361, 461		
Q151, 152	OB07651A	EQ. Amp. P.C.B.	R162, 262	OB01885A	Carbon Resistor 39K ELR% J
153, 251	OB06071A	Transistor 2SC945 (L-1)	362, 462		
252, 253			R163, 164	OB05545A	Carbon Resistor 18 ELR% J
351, 352			263, 264		
353, 451			363, 364		
452, 453			463, 464		
Q154, 158	OB06013A	Transistor 2SA733	R165, 265	OB05849A	Metal Film Resistor 750 CRA% F
254, 258			365, 465		
354, 358			R166, 266	OB05848A	Metal Film Resistor 10K CRA% F
454, 458			366, 466		
Q155, 156	OB01872A	Transistor 2SC945 (L)	R167, 267	OB05600A	Carbon Resistor 270K ELR% J
157, 255			367, 467		
256, 257			R168, 268	OB05608A	Carbon Resistor 220 ELR% J
355, 356			368, 468		
357, 455			C151, 251	OB05636A	Tantalum Capacitor 22µ 16V
456, 457			351, 451		
D151, 251	OB01909A	Silicon Diode 1S1555	C152, 252	OT04027A	Ceramic Capacitor 680P 50V M
351, 451			352, 452		
R151, 169	OB05587A	Carbon Resistor 56 ELR% J	C153, 253	OB01289A	Ceramic Capacitor 220P 50V M
170, 251			353, 453		
269, 270			C154, 254	OB05599A	Ceramic Capacitor 150P 50V M
351, 369			354, 454		
370, 451			C155, 255	OB05842A	Electrolytic Capacitor 470µ 6.3V
469, 470			355, 455		
R152, 252	OB05597A	Carbon Resistor 680K ELR% J	C156, 256	OB01780A	Mylar Capacitor 0.1µ 50V J
352, 452			356, 456		
R153, 253	OB05568A	Carbon Resistor 120K ELR% J	C157, 257	OB05844A	Mylar Capacitor 0.33µ 50V J
353, 453			357, 457		
R154, 254	OB05511A	Carbon Resistor 820 ELR% J	C158, 258	OB05843A	Mylar Capacitor 0.012µ 50V J
354, 454			358, 458		
R155, 255	OB05649A	Carbon Resistor 150 ELR% J	C159, 259	OB05832A	Mylar Capacitor 0.018µ 50V J
355, 455			359, 459		
R156, 256	OB05847A	Metal Film Resistor 51 CRA% F	C160, 260	OB01412A	Electrolytic Capacitor 10µ 16V
356, 456			360, 460		
R157, 257	OB05563A	Carbon Resistor 56K ELR% J	C161, 162	OB05841A	Electrolytic Capacitor 330µ 10V
357, 457			261, 262		
R158, 258	OB01781A	Carbon Resistor 1K ELR% J	361, 362		
358, 458			461, 462		
R159, 259	OB05650A	Carbon Resistor 12K ELR% J	CN022	BA03562A	19P Connector Ass'Y
359, 459					
R160, 260	OB05607A	Carbon Resistor 180 ELR% J			
360, 460					

5.3. Line Amp. P.C.B. Ass'y

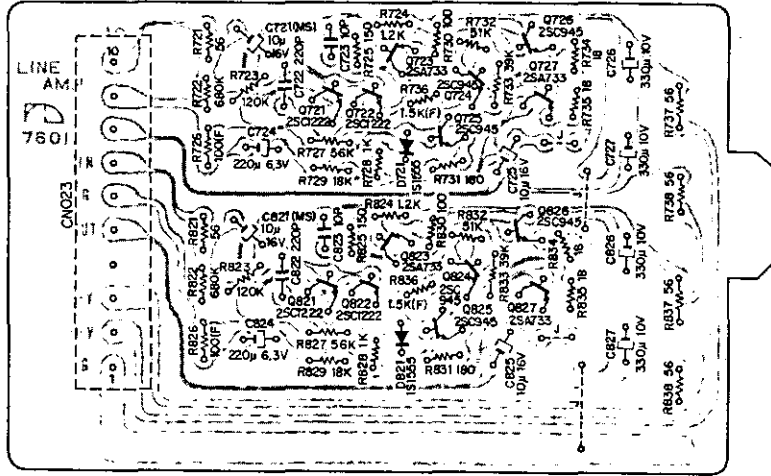


Fig. 5.3.1

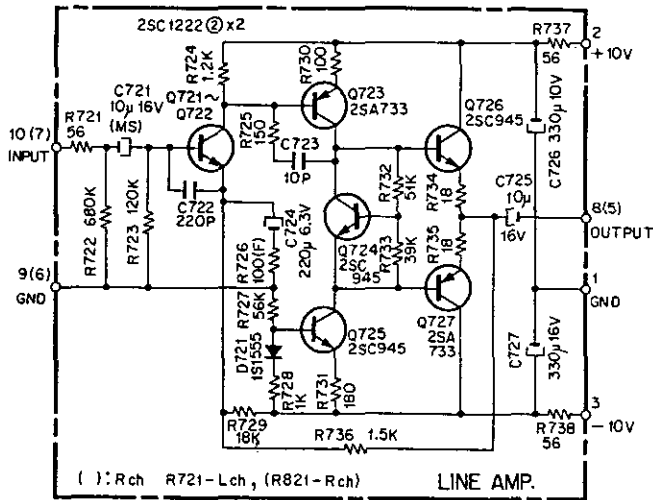


Fig. 5.3.2

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA03739A	Line Amp. P.C.B. Ass'y			
	OB07653A	Line Amp. P.C.B.	R728, 828	OB01781A	Carbon Resistor 1K ELR% J
Q721, 722	OB06062A	Transistor 2SC1222 (2)	R729, 829	OB05561A	Carbon Resistor 18K ELR% J
821, 822			R730, 830	OB05558A	Carbon Resistor 100 ELR% J
Q723, 727	OB06013A	Transistor 2SA733	R731, 831	OB05607A	Carbon Resistor 180 ELR% J
823, 827			R732, 832	OB05845A	Carbon Resistor 51K ELR% J
Q724, 725	OB01872A	Transistor 2SC945 (L)	R733, 833	OB01885A	Carbon Resistor 39K ELR% J
726, 824			R734, 735	OB05545A	Carbon Resistor 18 ELR% J
825, 826			834, 835		
D721, 821	OB01909A	Silicon Diode 1S1555	R736, 836	OB05855A	Metal Film Resistor 1.5K CRA% F
R721, 737	OB05587A	Carbon Resistor 56 ELR% J	C721, 821	OB05840A	Electrolytic Capacitor 10μ 16V M(MS)
738, 821			C722, 822	OB01289A	Ceramic Capacitor 220P 50V
837, 838			C723, 823	OB05798A	Ceramic Capacitor 10P 50V
R722, 822	OB05597A	Carbon Resistor 680K ELR% J	C724, 824	OB01394A	Electrolytic Capacitor 220μ 6.3V
R723, 823	OB05568A	Carbon Resistor 120K ELR% J	C725, 825	OB01412A	Electrolytic Capacitor 10μ 16V
R724, 824	OB05565A	Carbon Resistor 1.2K ELR% J	C726, 727	OB05841A	Electrolytic Capacitor 330μ 10V
R725, 825	OB05649A	Carbon Resistor 150 ELR% J	826, 827		
R726, 826	OB05846A	Metal Film Resistor 100 CRA% F			
R727, 827	OB05563A	Carbon Resistor 56K ELR% J			
			CN023	BA03703A	10P Connector Ass'y

5.4. Attenuation Selector P.C.B. Ass'y

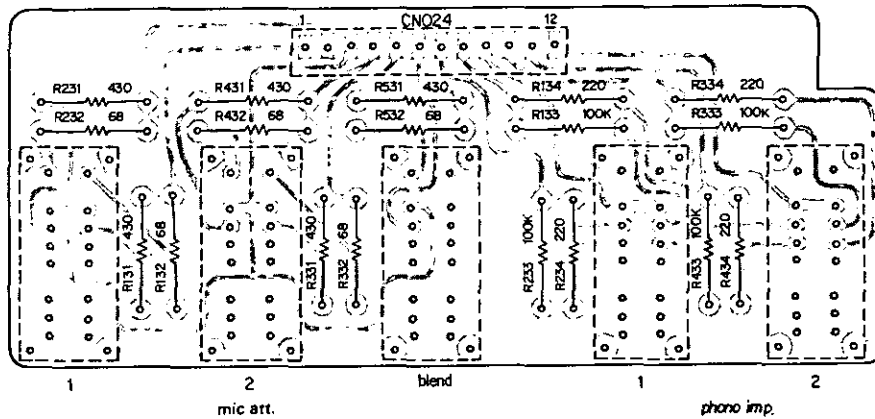


Fig. 5. 4. 1

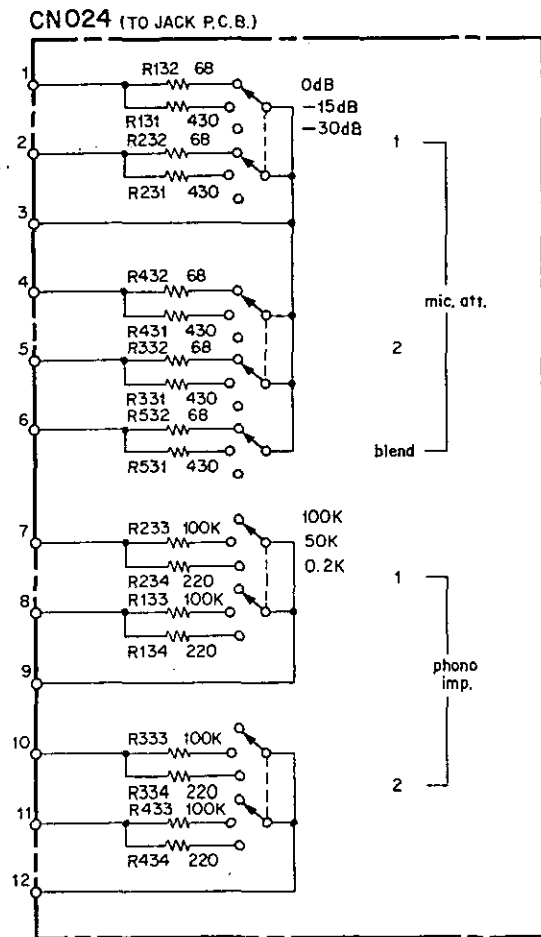


Fig. 5. 4. 2

Schematic Ref. No.	Part No.	Description
	BA03742A	Attenuation Selector P.C.B. Ass'y
R131, 231 331, 431 531	0B07656A 0B05858A	Attenuation Selector P.C.B. Carbon Resistor 430 R¼ J
R132, 232 332, 432 532	0B01704A	Carbon Resistor 68 R¼ J
R133, 233 333, 433	0B01889A	Carbon Resistor 100K R¼ J
R134, 234 334, 434	0B01933A	Carbon Resistor 220 R¼ J
	0B07105A	Slide Switch ESD-328 (5 pcs.)
	0B08178A	12P-T Post (1 pce.)
	0J03446A	Att. Sw. Holder (1 pce.)
	0E00003A	Screw M2x5 Cylinder Head (6 pcs.)
	0E00117A	Washer 2mm (6 pcs.)

5.5. Jack P.C.B. Ass'y

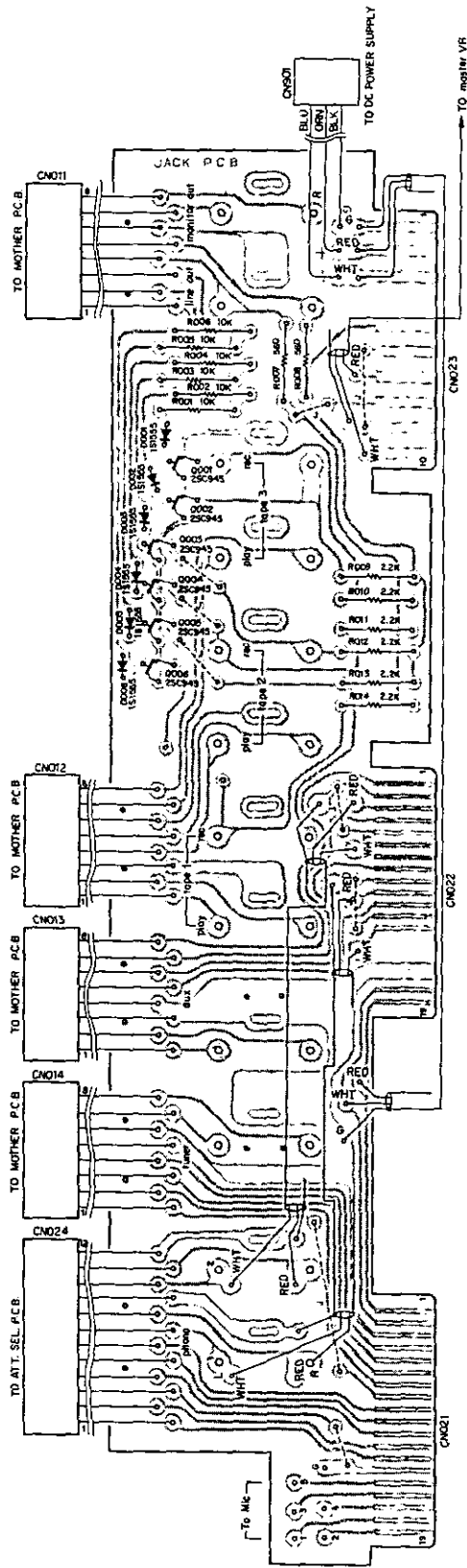


Fig. 5. 5

Schematic Ref. No.	Part No.	Description
	BA03732A	Jack P.C.B. Ass'y
	0B07646A	Jack P.C.B.
Q001, 002	0B01872A	Transistor 2SC945 (L)
003, 004		
005, 006		
D001, 002	0B01909A	Silicon Diode 1S1555
003, 004		
005, 006		
R001, 002	0B01888A	Carbon Resistor 10K R $\frac{1}{4}$ J
003, 004		
005, 006		
R007, 008	0B05575A	Carbon Resistor 560 R $\frac{1}{4}$ J
R009, 010	0B05622A	Carbon Resistor 2.2K R $\frac{1}{4}$ J
011, 012		
013, 014		
CN024	0B08187A	12P-H Connector Ass'y
CN012, 013, 014	0B08189A	8P-H Connector Ass'y A
CN011	0B08190A	8P-H Connector Ass'y B
CN901	0B08197A	3P-V Connector Ass'y
	0B08163A	Pin Jack Unit (1 pce.)
	0J03452A	Earth Plate (1 pce.)
	0J03468B	Earth Plate Holder (2 pcs.)

5.6. Line A P.C.B. Ass'y

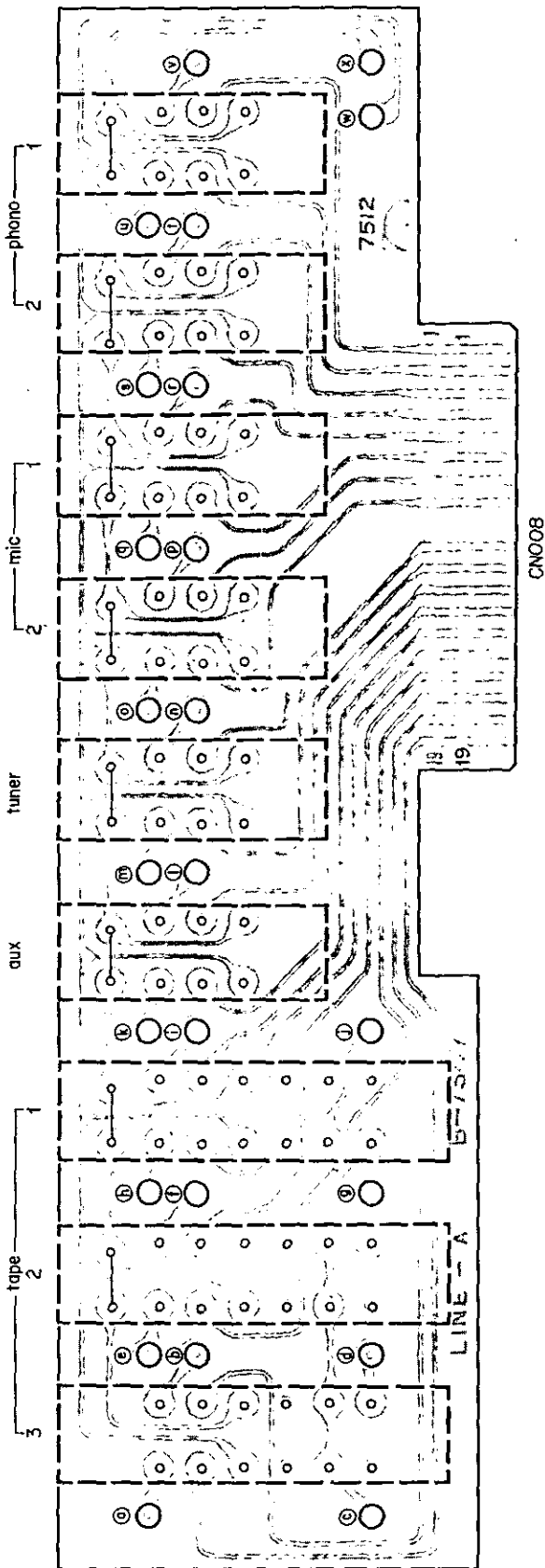


Fig. 5. 6. 1

CNO08 (TO MOTHER P.C.B.)

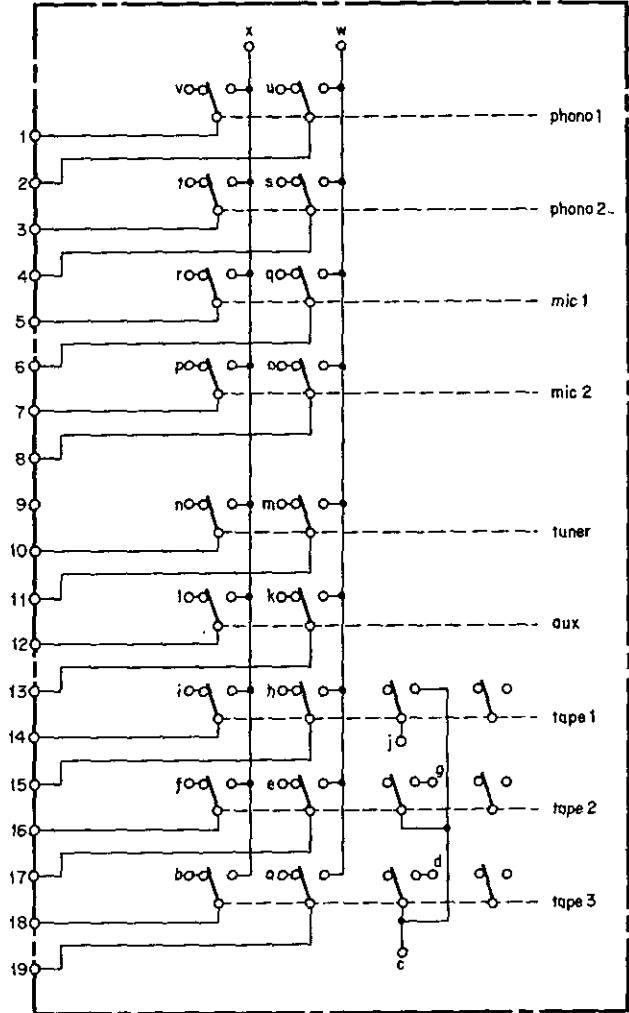


Fig. 5. 6. 2

Note: The points from (a) to (x) on the line A P.C. board are connected to the points from (a) to (x) on the line B P.C. board with signal wires.

Schematic Ref. No.	Part No.	Description
	BA03733A	Line A P.C.B. Ass'y
	OB07647A	Line A P.C.B.
	OB07097A	Push Switch F 444222222 (1 pce.)

5.7. Line B P.C.B. Ass'y

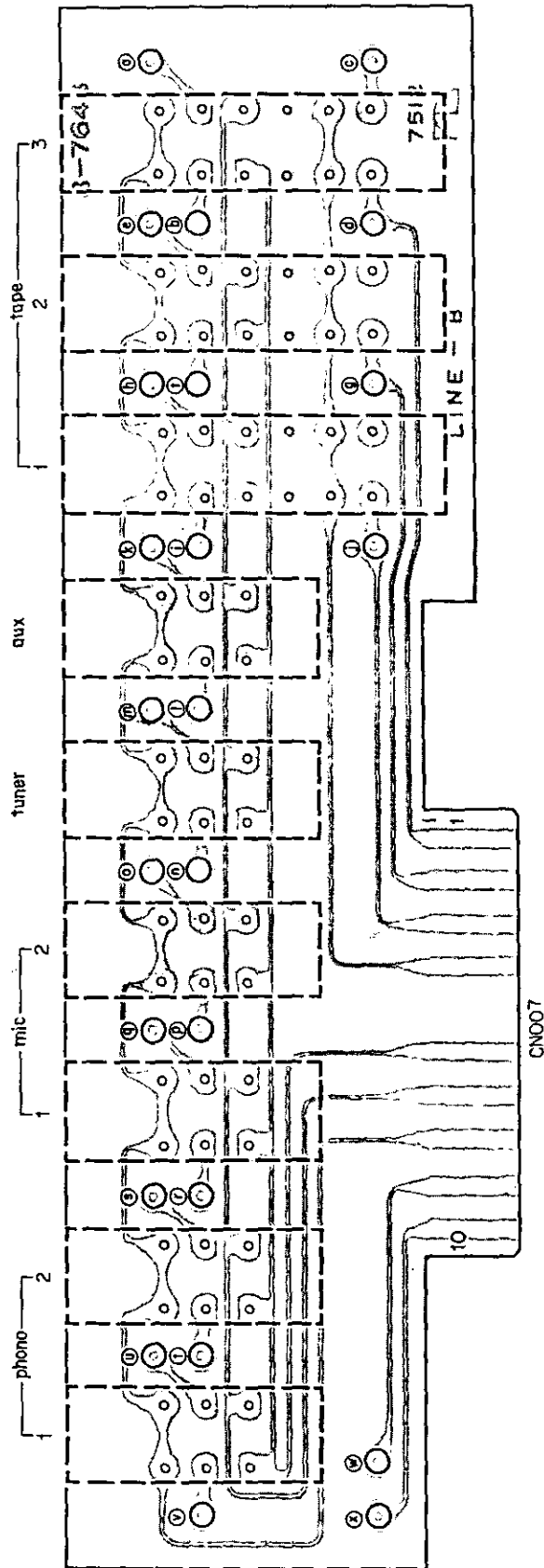


Fig. 5.7.1

CND07 (TO MOTHER P.C.B.)

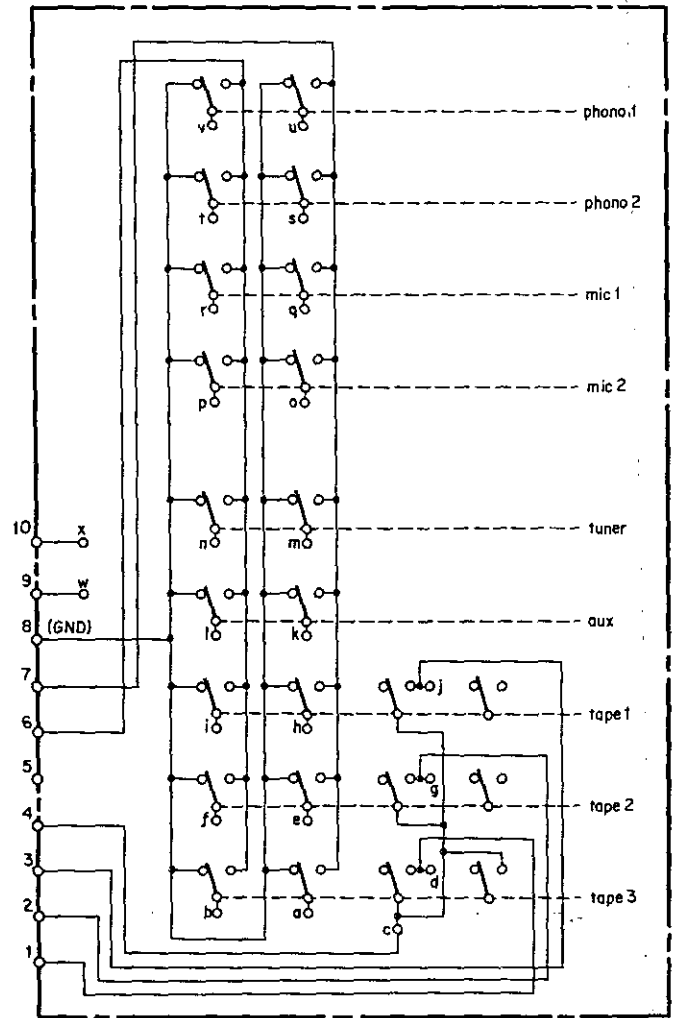


Fig. 5.7.2

Note: The points from (a) to (x) on the line B P.C. board are connected to the points from (a) to (x) on the line A P.C. board with signal wires.

Schematic Ref. No.	Part No.	Description
	BA03734A	Line B P.C.B. Ass'y
	0B07648A	Line B P.C.B.
	0B07104A	Push Switch G 22222444 (1 pce.)

5.8. Line VR P.C.B. Ass'y

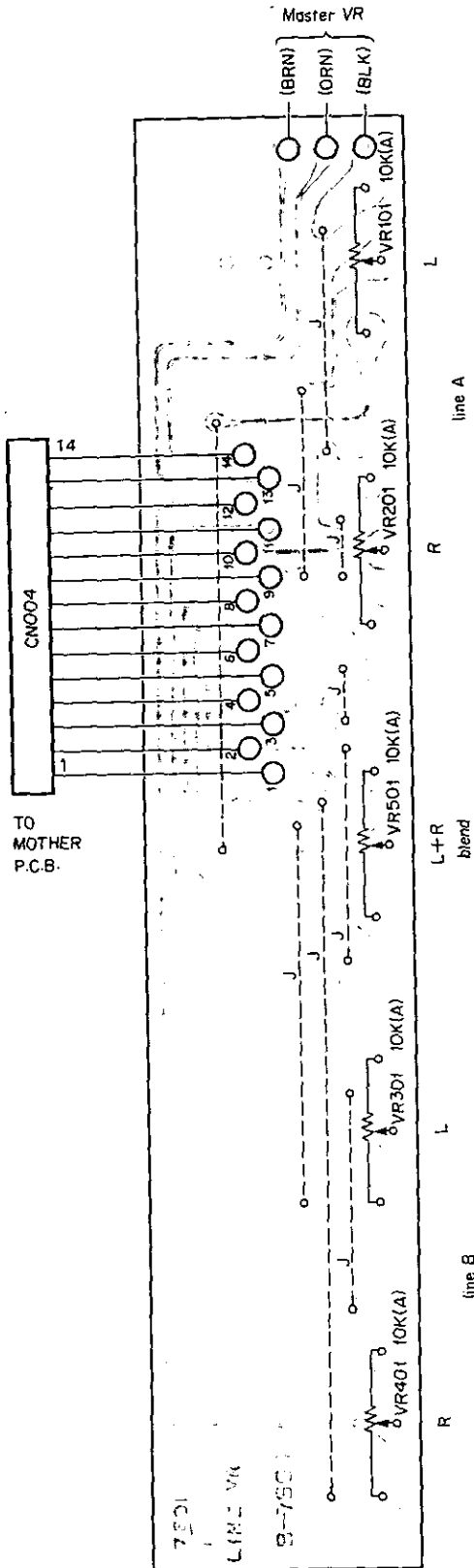


Fig. 5.8.1

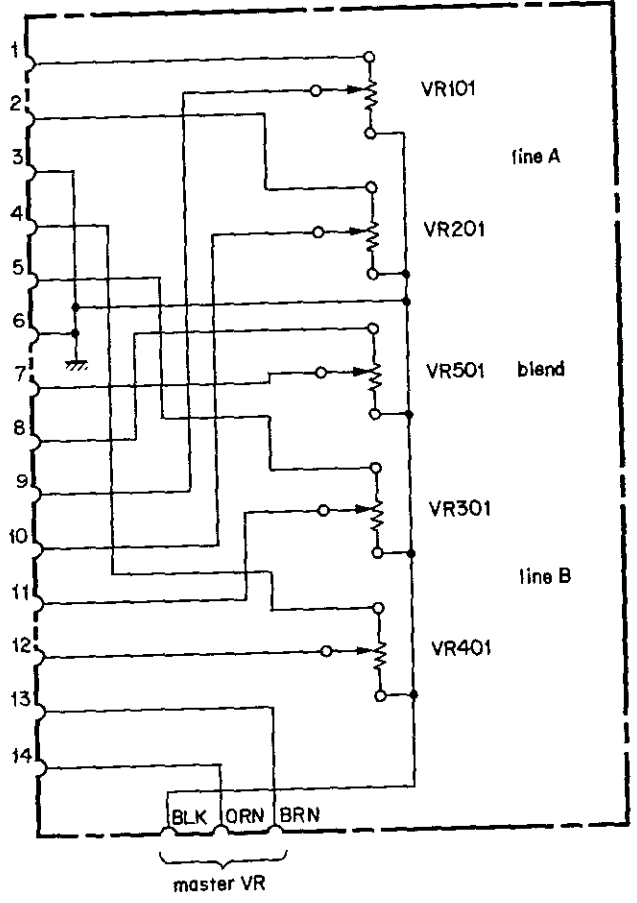


Fig. 5.8.2

Schematic Ref. No.	Part No.	Description
	BA03749A	Line VR P.C.B. Ass'y
VR101,201	0B07663A	Line VR P.C.B. Volume
301,401	0B07108A	Volume 10K (A)
501		
CN004	0B08186A	14P-H Connector Ass'y

5.9. Function P.C.B. Ass'y

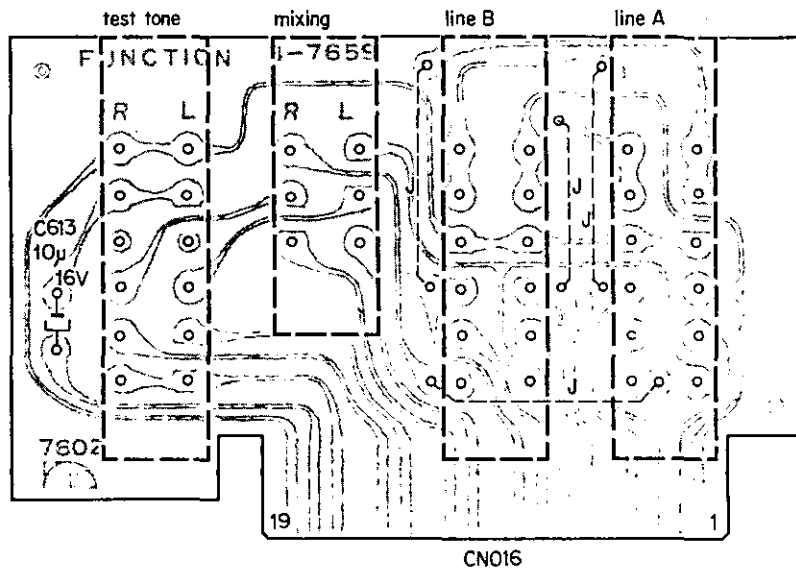


Fig. 5.9.1

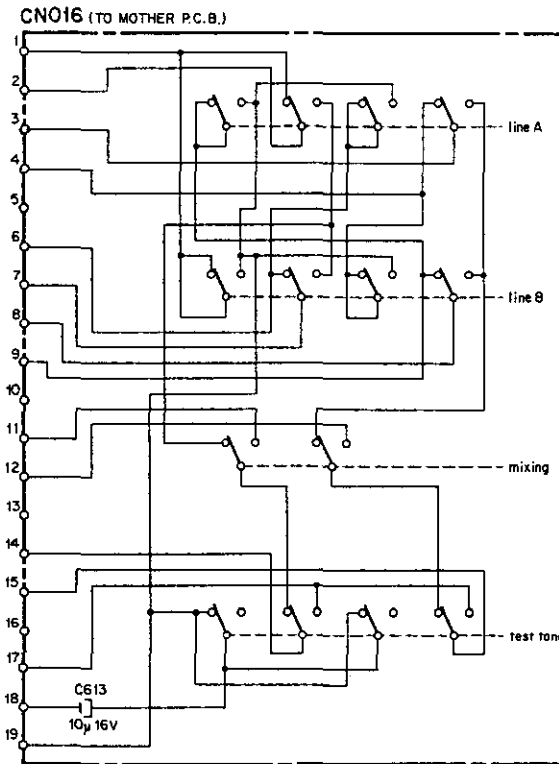


Fig. 5.9.2

Schematic Ref. No.	Part No.	Description
	BA03745A	Function P.C.B. Ass'y
C613	OB07659A	Function P.C.B.
	OB01412A	Electrolytic Capacitor 10µ 16V
	OB07103A	Push Switch A 4244 (1 pce.)

5.10. Oscillation Selector P.C.B. Ass'y

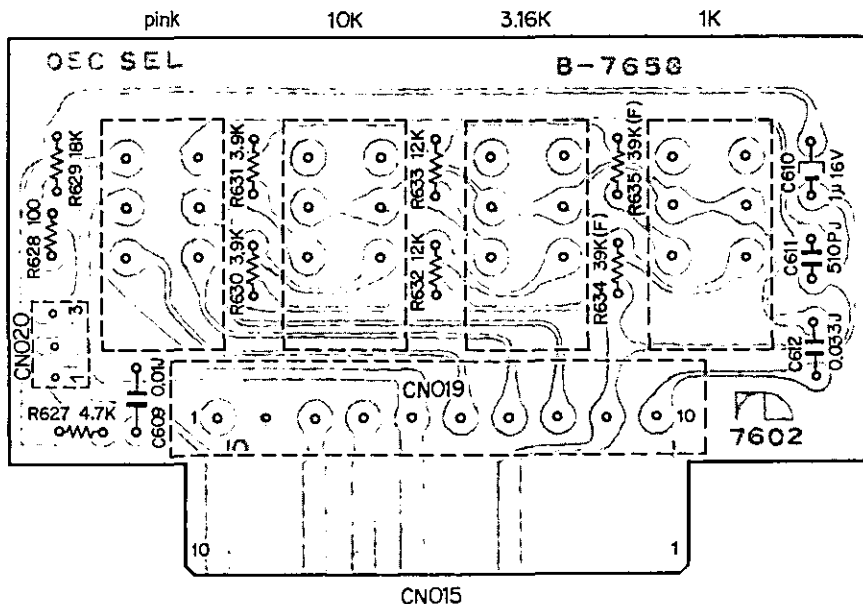


Fig. 5. 10. 1

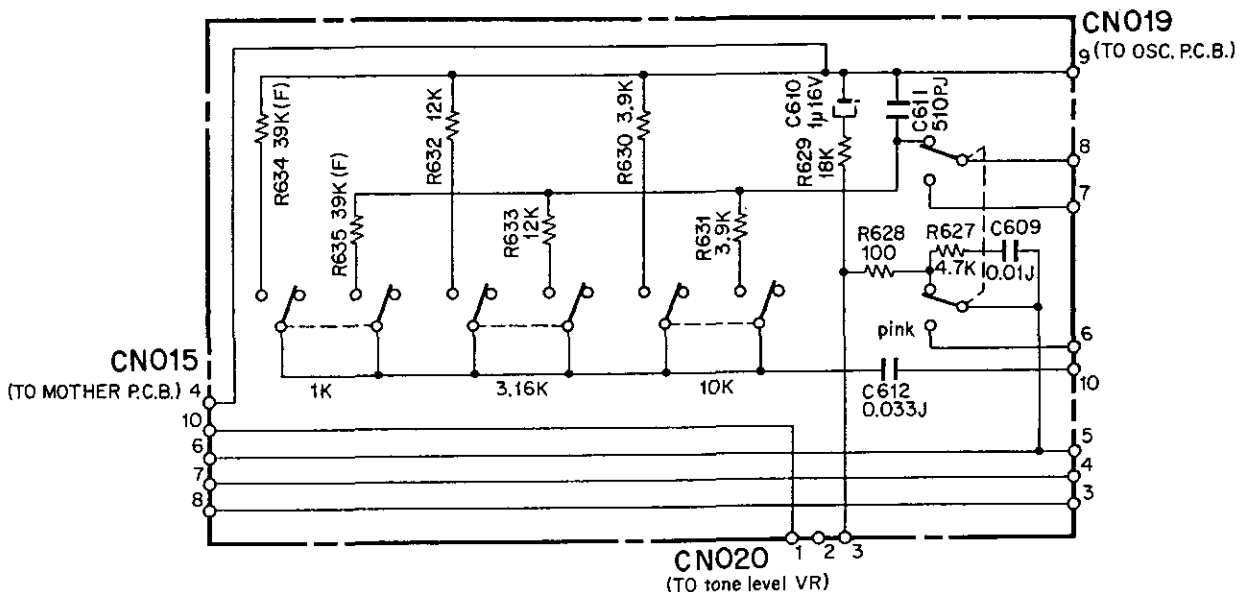
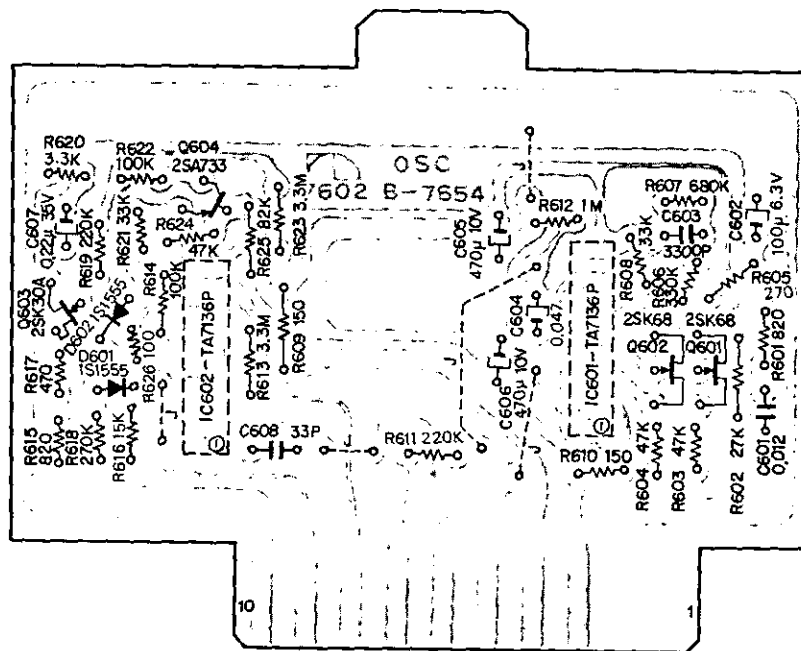


Fig. 5. 10. 2

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA03744A	Oscillation Selector P.C.B. Ass'y	C609	OB05681A	Mylar Capacitor 0.01µ 50V J
			C610	OB01405A	Electrolytic Capacitor 1µ 16V
			C611	OB05856A	SP Capacitor 510P 50V J
			C612	OB05583A	Mylar Capacitor 0.033µ 50V J
R627	OB07658A	Oscillation Selector P.C.B.	CNO19	BA03703A	10P Connector Ass'y
R628	OB01795A	Carbon Resistor 4.7K ELR½ J		OB07121A	Push Switch H 2222 (1 pce.)
R629	OB05558A	Carbon Resistor 100 ELR½ J		OB08185A	3P-T Post (1 pce.)
R630, 631	OB05561A	Carbon Resistor 18K ELR½ J			
R632, 633	OB05664A	Carbon Resistor 3.9K ELR½ J			
R634, 635	OB05650A	Carbon Resistor 12K ELR½ J			
	OB05860A	Mylar Film Resistor 39K CRA½ F			

5.11. Oscillator P.C.B. Ass'y



CNO19

Fig. 5. 11. 1

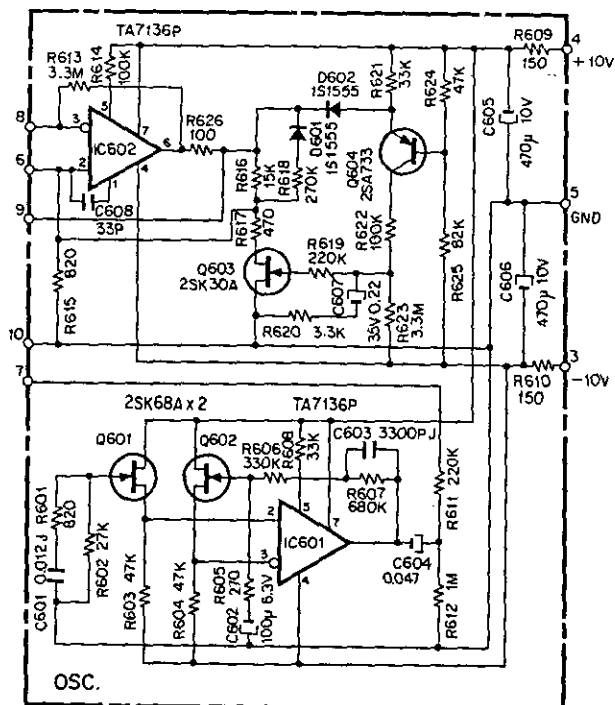


Fig. 5. 11. 2

Schematic Ref. No.	Part No.	Description
	BA03740A	Oscillator P.C.B. Ass'y
	Q601, 602	Oscillator P.C.B.
Q601, 602	0B07654A	Oscillator P.C.B.
Q603	0B06067A	FET 2SK68A
Q604	0B06001A	FET 2SK30A (D)
Q604	0B06013A	Transistor 2SA733
IC601, 602	0B06068A	IC TA7136P
D601, 602	0B01909A	Silicon Diode 1S1555
R601	0B05511A	Carbon Resistor 820 ELR% J
R602	0B05538A	Carbon Resistor 27K ELR% J
R603, 604	0B05562A	Carbon Resistor 47K ELR% J
R605	0B05651A	Carbon Resistor 270 ELR% J
R606	0B01921A	Carbon Resistor 330K ELR% J
R607	0B05597A	Carbon Resistor 680K ELR% J
R608, 621	0B01879A	Carbon Resistor 33K ELR% J
R609, 610	0B05649A	Carbon Resistor 150 ELR% J
R611, 619	0B05596A	Carbon Resistor 220K ELR% J
R612	0B05564A	Carbon Resistor 1M ELR% J
R613, 623	0B05775A	Carbon Resistor 3.3M ELR% J
R614, 622	0B01920A	Carbon Resistor 100K ELR% J
R615	0B05511A	Carbon Resistor 820 ELR% J
R616	0B05591A	Carbon Resistor 15K ELR% J
R617	0B01792A	Carbon Resistor 470 ELR% J
R618	0B05600A	Carbon Resistor 270K ELR% J
R620	0B01793A	Carbon Resistor 3.3K ELR% J
R625	0B01564A	Carbon Resistor 82K ELR% J
R626	0B05558A	Carbon Resistor 100 ELR% J
C601	0B05843A	Mylar Capacitor 0.012μ 50V J
C602	0B01411A	Electrolytic Capacitor 100μ 6.3V
C603	0B01914A	Mylar Capacitor 3300P 50V J
C604	0B00098A	Mylar Capacitor 0.047μ 50V M
C605, 606	0B05884A	Electrolytic Capacitor 470μ 10V
C607	0B05772A	Tantalum Capacitor 0.22μ 35V M
C608	0B05744A	Ceramic Capacitor 33P 50V M

5.12. Inverter & Mixer P.C.B. Ass'y

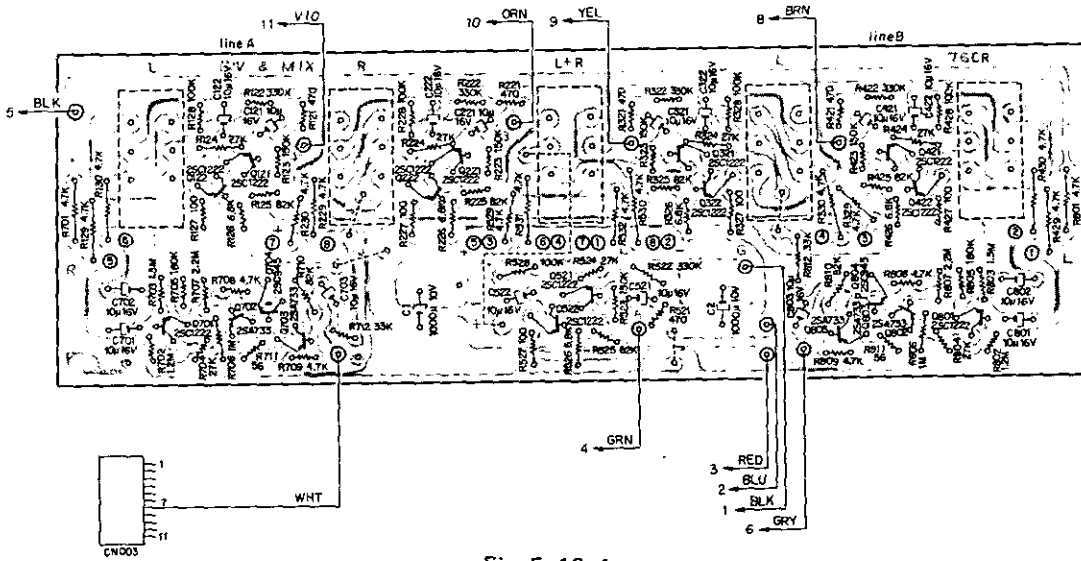


Fig. 5.12.1

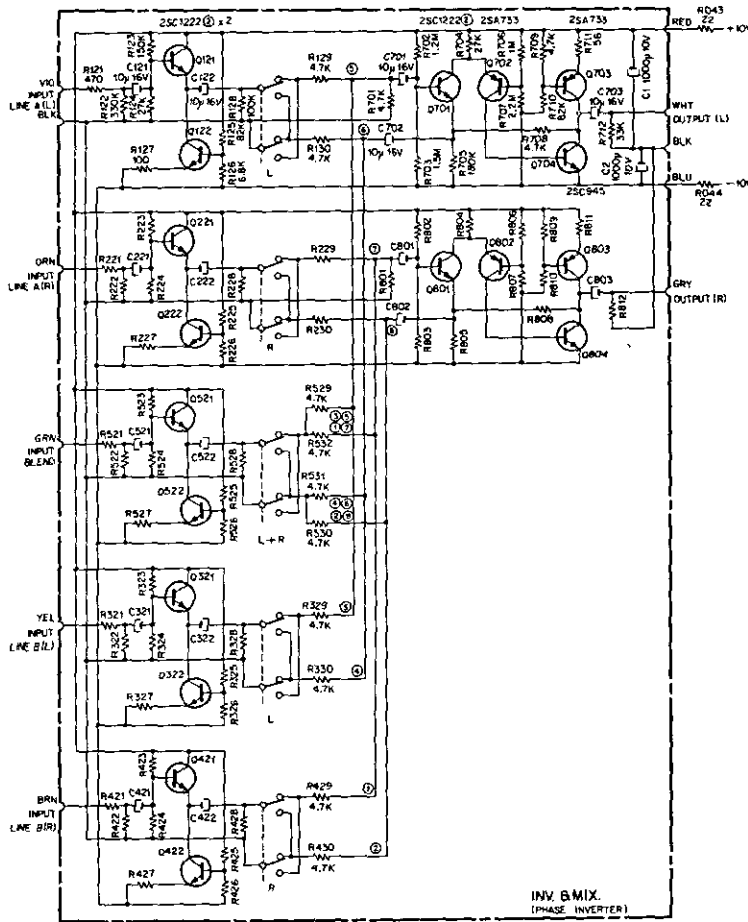


Fig. 5.12.2

Schematic Ref. No.	Part No.	Description
	BA03748A	Inverter & Mixer P.C.B. Ass'y
Q121, 122	0B07662A	Inverter & Mixer P.C.B.
221, 222	0B06062A	Transistor 2SC1222 (2)
321, 322		
421, 422		
521, 522		
701, 801		
Q702, 703	0B06013A	Transistor 2SA733
802, 803		
Q704, 804	0B01872A	Transistor 2SC945 (L)
R121, 221	0B01792A	Carbon Resistor 470 ELR% J
321, 421		
521		
R122, 222	0B01921A	Carbon Resistor 330K ELR% J
322, 422		
522		
R123, 223	0B05593A	Carbon Resistor 150K ELR% J
323, 423		
523		
R124, 224	0B05538A	Carbon Resistor 27K ELR% J
324, 424		
524, 704		
804		
R125, 225	0B01564A	Carbon Resistor 82K ELR% J
325, 425		
525, 710		
810		
R126, 226	0B01877A	Carbon Resistor 6.8K ELR% J
326, 426		
526		
R127, 227	0B05558A	Carbon Resistor 100 ELR% J
327, 427		
527		
R128, 228	0B01920A	Carbon Resistor 100K ELR% J
328, 428		
528		
R129, 130	0B01795A	Carbon Resistor 4.7K ELR% J
229, 230		
329, 330		
429, 430		
529, 530		
531, 532		
701, 708		
709, 801		
808, 809		
R702, 802	0B05537A	Carbon Resistor 1.2M ELR% J
R703, 803	0B05601A	Carbon Resistor 1.5M ELR% J
R705, 805	0B05669A	Carbon Resistor 180K ELR% J
R706, 806	0B05564A	Carbon Resistor 1 M ELR% J
R707, 807	0B05672A	Carbon Resistor 2.2M ELR% J
R711, 811	0B05587A	Carbon Resistor 56 ELR% J
R712, 812	0B01879A	Carbon Resistor 33K ELR% J
C121, 122	0B01412A	Electrolytic Capacitor 10μ 16V
221, 222		
321, 322		
421, 422		
521, 522		
701, 702		
703, 801		
802, 803		
C1, 2	0B05852A	Electrolytic Capacitor 1000μ 10V

5.13. Tape Monitor P.C.B. Ass'y

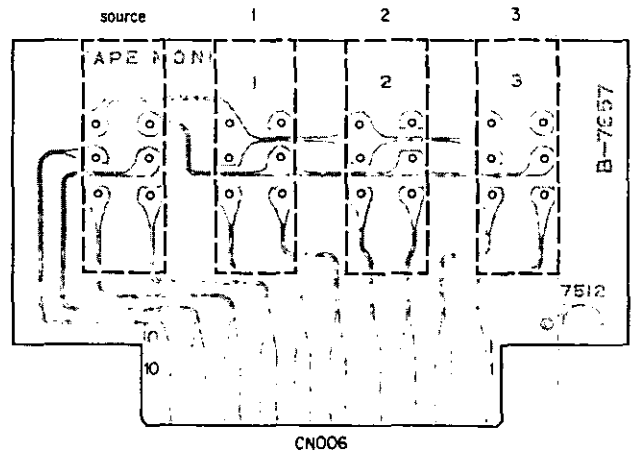


Fig. 5. 13. 1

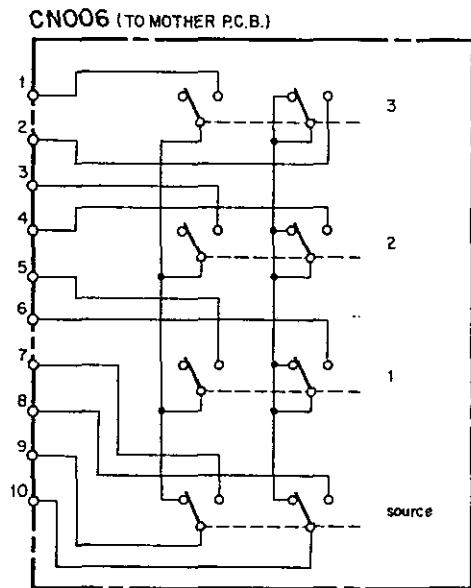


Fig. 5. 13. 2

Schematic Ref. No.	Part No.	Description
CN003	0B08188A 0B07098A	11P-H Connector Ass'y Push Switch 22222 (1 pce.)
	BA03743A	Tape Monitor P.C.B. Ass'y
	0B07657A 0B07100A	Tape Monitor P.C.B. Push Switch B 2222 (1 pce.)

5.14. Phase Check P.C.B. Ass'y

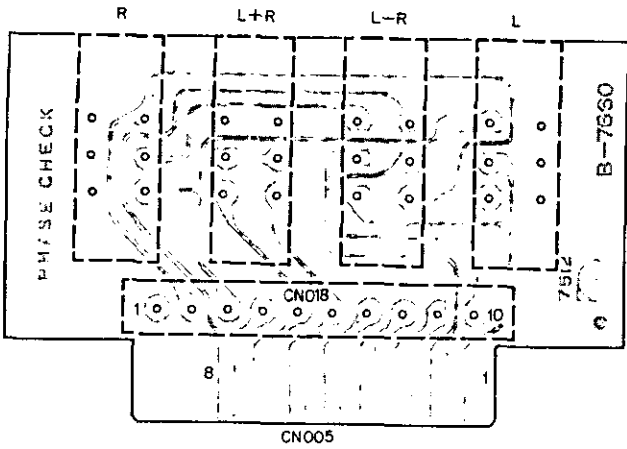


Fig. 5. 14. 1

5.15. Buffer Amp. P.C.B. Ass'y

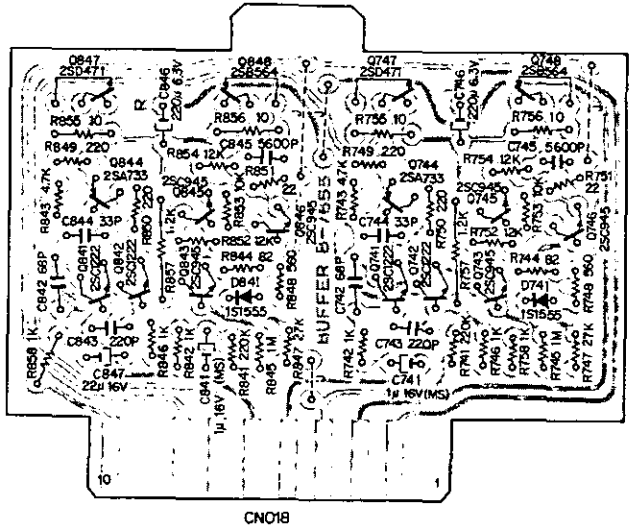


Fig. 5. 15. 1

CNO05 (TO MOTHER P.C.B.)

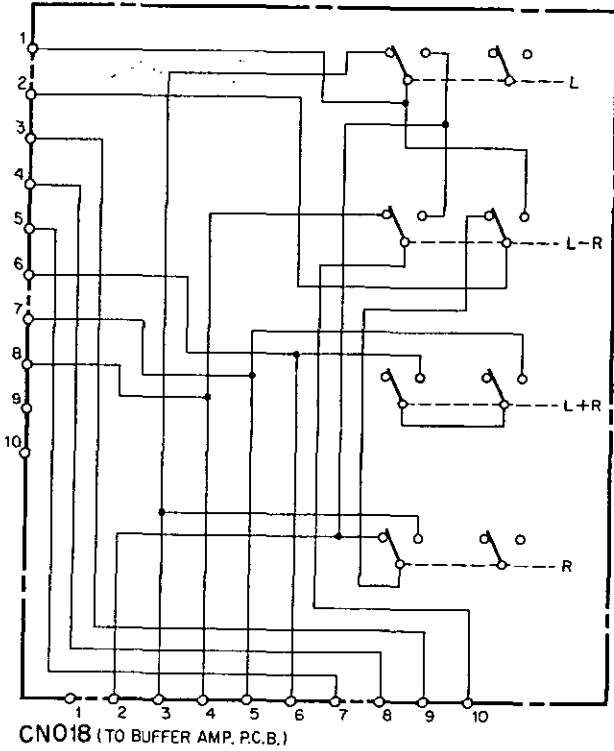


Fig. 5. 14. 2

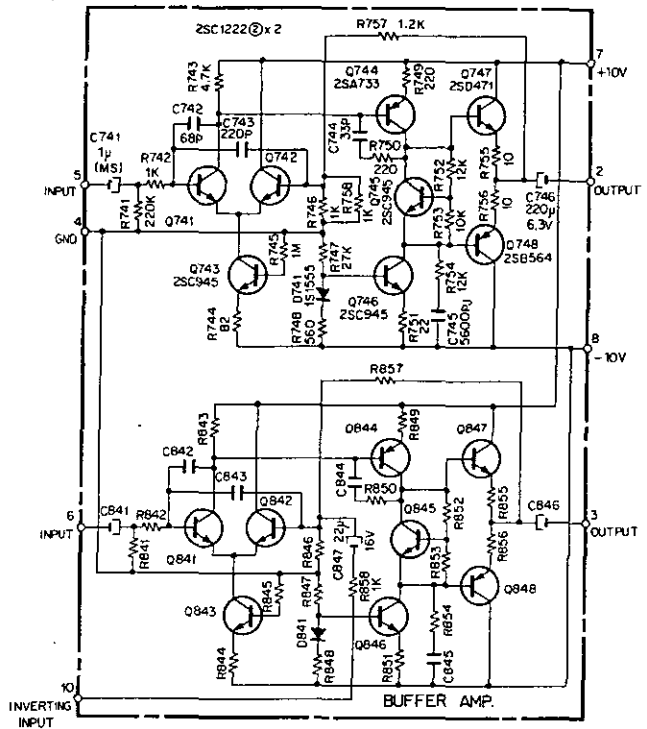


Fig. 5. 15. 2

5.16. Monitor VR P.C.B. Ass'y

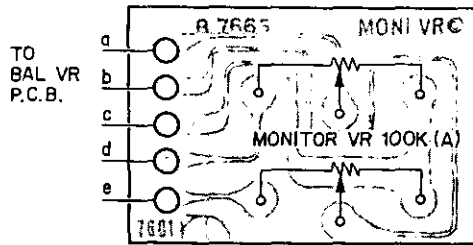


Fig. 5. 16. 1

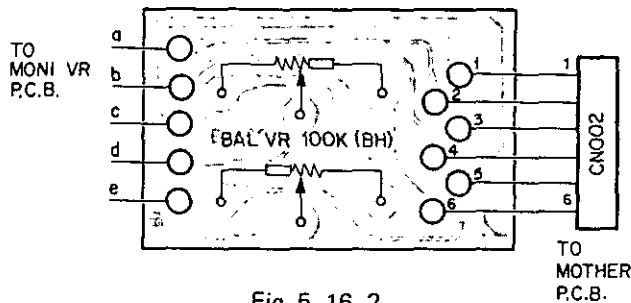


Fig. 5. 16. 2

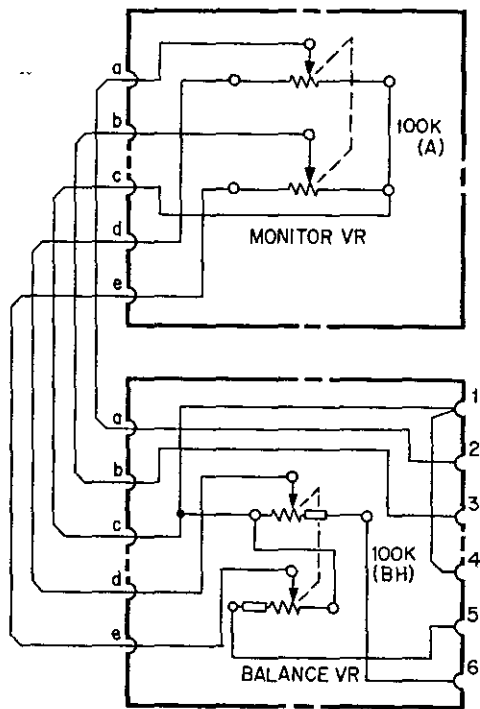


Fig. 5. 16. 3

Schematic Ref. No.	Part No.	Description	
CN018	BA03746A	Phase Check P.C.B. Ass'y	
	0B07660A	Phase Check P.C.B.	
	BA03703A	10P Connector Ass'y	
	0B07099A	Push Switch C 2222 (1 pce.)	
Q741, 742 841, 842 Q743, 745 746, 843 845, 846 Q744, 844 Q747, 847 Q748, 848 D741, 841 R741, 841 R742, 746 758, 842 846, 858 R743, 843 R744, 844 R745, 845 R747, 847 R748, 848 R749, 750 849, 850 R751, 851 R752, 754 852, 854 R753, 853 R755, 756 855, 856 R757, 857 C741, 841 C742, 842 C743, 843 C744, 844 C745, 845 C746, 846 C847	BA03741A	Buffer Amp. P.C.B. Ass'y	
	0B07655A	Buffer Amp. P.C.B.	
	0B06062A	Transistor 2SC1222 (2)	
	0B01872A	Transistor 2SC945 (L)	
	0B06013A	Transistor 2SA733	
	0B06066A	Transistor 2SD471	
	0B06069A	Transistor 2SB564	
	0B01909A	Silicon Diode 1S1555	
	0B05596A	Carbon Resistor 220K ELR½ J	
	0B01781A	Carbon Resistor 1K ELR½ J	
	0B01795A	Carbon Resistor 4.7K ELR½ J	
	0B05503A	Carbon Resistor 82 ELR½ J	
	0B05564A	Carbon Resistor 1M ELR½ J	
	0B05538A	Carbon Resistor 27K ELR½ J	
	0B05678A	Carbon Resistor 560 ELR½ J	
	0B05608A	Carbon Resistor 220 ELR½ J	
	0B05606A	Carbon Resistor 22 ELR½ J	
	0B05650A	Carbon Resistor 12K ELR½ J	
	0B01833A	Carbon Resistor 10K ELR½ J	
	0B05663A	Carbon Resistor 10 ELR½ J	
	0B05565A	Carbon Resistor 1.2K ELR½ J	
	0B05853A	Electrolytic Capacitor 1µ 16V M(MS)	
	0B05525A	Ceramic Capacitor 68P 50V M	
	0B01289A	Ceramic Capacitor 220P 50V M	
	0B05744A	Ceramic Capacitor 33P 50V M	
	0B05659A	Mylar Capacitor 5600P 50V J	
	0B01394A	Electrolytic Capacitor 220µ 6.3V	
	0B01862A	Electrolytic Capacitor 22µ 16V	
	MONI VR BAL VR CN002	BA03750A	Monitor VR P.C.B. Ass'y
		0B07665A	Monitor VR P.C.B.
		0B07664A	Balance VR P.C.B.
		0B07091A	Volume 100K (A)
		0B07107A	Volume 100K (BH)
		0B08192A	6P-H Connector Ass'y B

5.17. Output Selector P.C.B. Ass'y

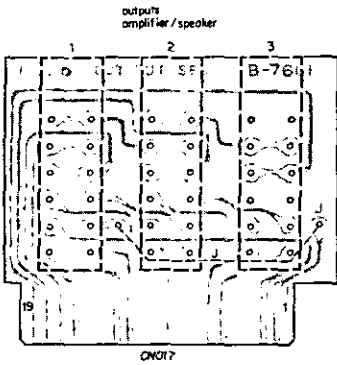


Fig. 5.17.1

5.18. Meter Amp. P.C.B. Ass'y

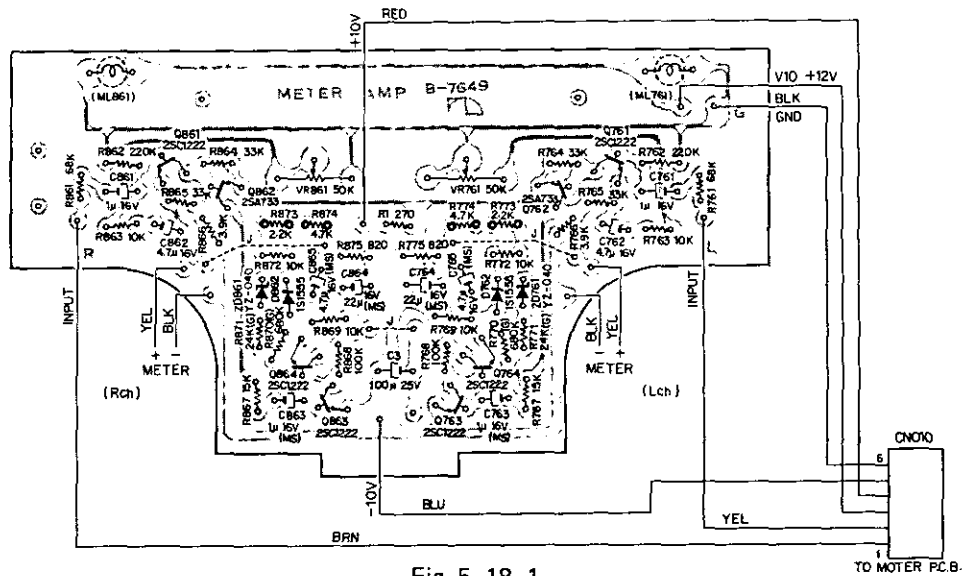


Fig. 5.18.1

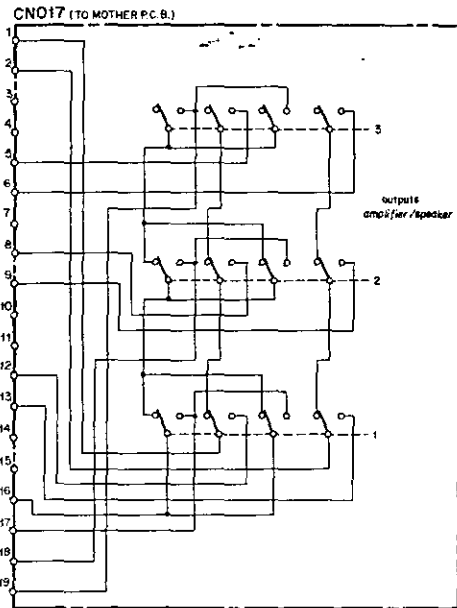


Fig. 5.17.2

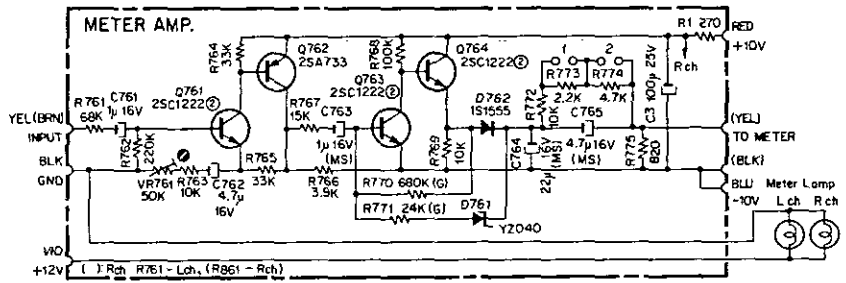


Fig. 5.18.2

Schematic Ref. No.	Part No.	Description
	BA03747A	Output Selector P.C.B. Ass'y
	OB07661A	Output Selector P.C.B.
	OB07101A	Push Switch E 444 (1 pce.)
	BA03735A	Meter Amp. P.C.B. Ass'y
	OB07649A	Meter Amp. P.C.B.
	OB06062A	Transistor 2SC1222 (2)
Q761, 763		
764, 861		
863, 864		
Q762, 862	OB06013A	Transistor 2SA733
D761, 861	OB06063A	Zener Diode YZ-040
D762, 862	OB01909A	Silicon Diode 1S1555
VR761,861	OB07116A	Semi-fixed Volume 50K
R761, 861	OB01902A	Carbon Resistor 68K ELR½ J
R762, 862	OB05596A	Carbon Resistor 220K ELR½ J
R763, 769	OB01833A	Carbon Resistor 10K ELR½ J
772, 863		
869, 872		

5.19. DC Supply P.C.B. Ass'y

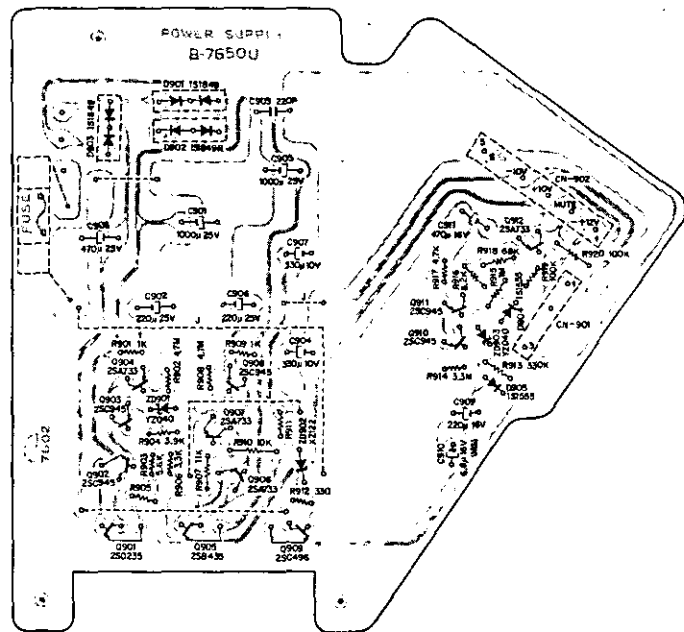


Fig. 5. 19. 1

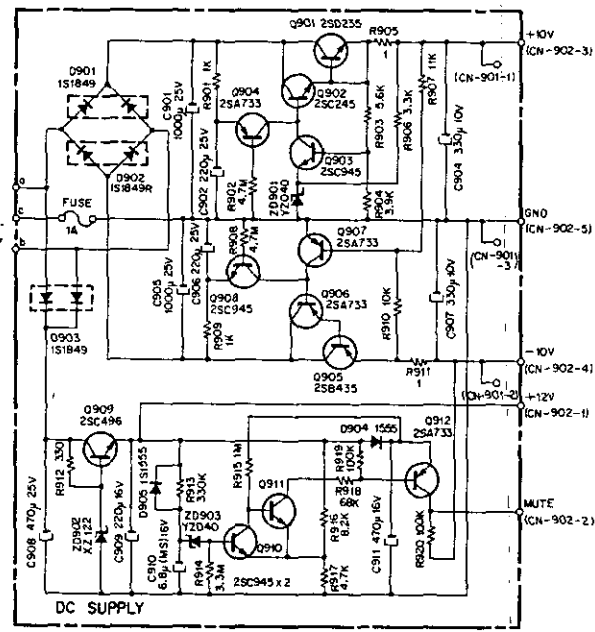


Fig. 5. 19. 2

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
R764, 765	0B01879A	Carbon Resistor 33K ELR% J	ZD902	0B06065A	Zener Diode XZ-122
864, 865			R901, 909	0B01781A	Carbon Resistor 1K ELR% J
R766, 866	0B05664A	Carbon Resistor 3.9K ELR% J	R902, 908	0B05824A	Carbon Resistor 4.7M ELR% J
R767, 867	0B05591A	Carbon Resistor 15K ELR% J	R903	0B05673A	Carbon Resistor 5.6K ELR% J
R768, 868	0B01920A	Carbon Resistor 100K ELR% J	R904	0B05664A	Carbon Resistor 3.9K ELR% J
R770, 870	0B05822A	Carbon Resistor 680K RD% G	R905, 911	0B05746A	Carbon Resistor 1 ELR% J
R771, 871	0B05863A	Carbon Resistor 24K CRB% G	R906	0B01793A	Carbon Resistor 3.3K ELR% J
R773, 873	0B05566A	Carbon Resistor 2.2K ELR% J	R907	0B05826A	Carbon Resistor 11K ELR% J
R774, 874	0B01795A	Carbon Resistor 4.7K ELR% J	R909	0B01833A	Carbon Resistor 10K ELR% J
R775, 875	0B05511A	Carbon Resistor 820 ELR% J	R910	0B01789A	Carbon Resistor 330 ELR% J
R1	0B05651A	Carbon Resistor 270 ELR% J	R912	0B01789A	Carbon Resistor 330 ELR% J
C761, 861	0B01405A	Electrolytic Capacitor 1µ 16V	R913	0B01921A	Carbon Resistor 330K ELR% J
C762, 862	0B01389A	Electrolytic Capacitor 4.7µ 16V	R914	0B05775A	Carbon Resistor 3.3M ELR% J
C763, 863	0B05853A	Electrolytic Capacitor 1µ 16V M(MS)	R915	0B05564A	Carbon Resistor 1M ELR% J
C764, 864	0B05820A	Electrolytic Capacitor 22µ 16V M(MS)	R916	0B01878A	Carbon Resistor 8.2K ELR% J
C765, 865	0B05819A	Electrolytic Capacitor 4.7µ 16V M(MS)	R917	0B01795A	Carbon Resistor 4.7K ELR% J
C3	0B01272A	Electrolytic Capacitor 100µ 25V	R918	0B01902A	Carbon Resistor 68K ELR% J
CN010	0B08191A	6P-H Connector Ass'y A	R919, 920	0B01920A	Carbon Resistor 100K ELR% J
	BA03736A	DC Supply P.C.B. Ass'y	C901, 905	0B01870A	Electrolytic Capacitor 1000µ 25V
	0B07650A	DC Supply P.C.B.	C902, 906	0B01391A	Electrolytic Capacitor 220µ 25V
Q901	0B01823A	Transistor 2SD235 (Y)	C903	0B01289A	Ceramic Capacitor 220P 50V M
Q902, 903	0B01872A	Transistor 2SC945 (L)	C904, 907	0B05841A	Electrolytic Capacitor 330µ 10V
908, 910			C908	0B01401A	Electrolytic Capacitor 470µ 25V
911			C909	0B01398A	Electrolytic Capacitor 220µ 16V
Q904, 906	0B06013A	Transistor 2SA733	C910	0B05861A	Electrolytic Capacitor 6.8µ16V M(MS)
907, 912			C911	0B01392A	Electrolytic Capacitor 470µ 16V
Q905	0B06011A	Transistor 2SB435		0B08176U	Fuse 1A (1 pce.)
Q909	0B01790A	Transistor 2SC496	CN901	0B08206A	3P Base Pin
D901, 903	0B06037U	Silicon Diode 1S1849	CN902	0B08205A	5P Base Pin
D902	0B06038U	Silicon Diode 1S1849R		0J03445A	Heat Sink (1 pce.)
D904, 905	0B01909A	Silicon Diode 1S1555		0E00510A	Screw M3x8 Philips Pan Head (2A) (3 pcs.)
ZD901, 903	0B06063A	Zener Diode YZ-040		0E00507A	Nut Hex M3
				0E00607A	Screw M3x8 Philips Pan Head (3A) (2 pcs.)

5.20. Mother P.C.B. Ass'y

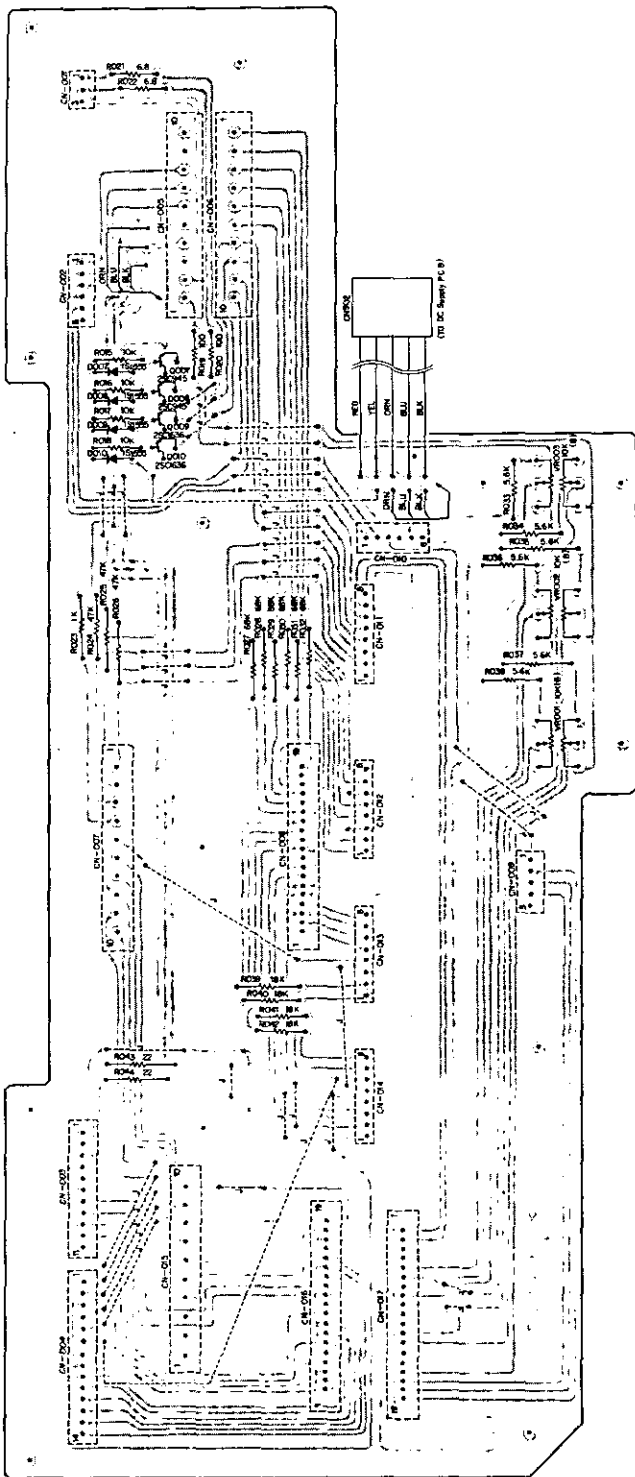


Fig. 5. 20

Schematic Ref. No.	Part No.	Description
	BA03731A	Mother P.C.B. Ass'y
	OB07645A	Mother P.C.B.
Q007, 008	OB01872A	Transistor 2SC945 (L)
Q009, 010	OB06070A	Transistor 2SC1636
D007, 008	OB01909A	Silicon Diode 1S1555
009, 010		
VR001,002	OB07110A	Volume 10K (B)
003		
R015, 016	OB01888A	Carbon Resistor 10K R $\frac{1}{2}$ J
017, 018		
R019, 020	OB01679A	Carbon Resistor 100 R $\frac{1}{2}$ J
R021, 022	OB05857A	Carbon Resistor 6.8 R $\frac{1}{2}$ J
R023	OB01857A	Carbon Resistor 1K R $\frac{1}{2}$ J
R024, 025	OB05641A	Carbon Resistor 47K R $\frac{1}{2}$ J
026		
R027, 028	OB05692A	Carbon Resistor 68K R $\frac{1}{2}$ J
029, 030		
031, 032		
R033, 034	OB01887A	Carbon Resistor 5.6K R $\frac{1}{2}$ J
035, 036		
037, 038		
R039, 040	OB05560A	Carbon Resistor 18K R $\frac{1}{2}$ J
041, 042		
R043, 044	OB05579A	Carbon Resistor 22 R $\frac{1}{2}$ J
CN001	OB08184A	3P-S Post
CN002	OB08181A	6P-S Post
CN003	OB08179A	11P-S Post
CN004	OB08177A	14P-S Post
CN005	BA03703A	10P Connector Ass'y
006, 007		
015		
CN008,	BA03562A	19P Connector Ass'y
016, 017		
CN009	OB08183A	5P-T Post
CN010	OB08182A	6P-T Post
CN011	OB08180A	8P-B Post
012, 013		
014		
CN902	OB08196A	5P-V Connector Ass'y
	OJ03447A	Out VR Holder (1 pce.)
	OE00508A	Screw M3x5 Philips Binding Head (Bronze)

6. MECHANISM ASS'Y & PART LIST

6.1. Synthesis (A01)

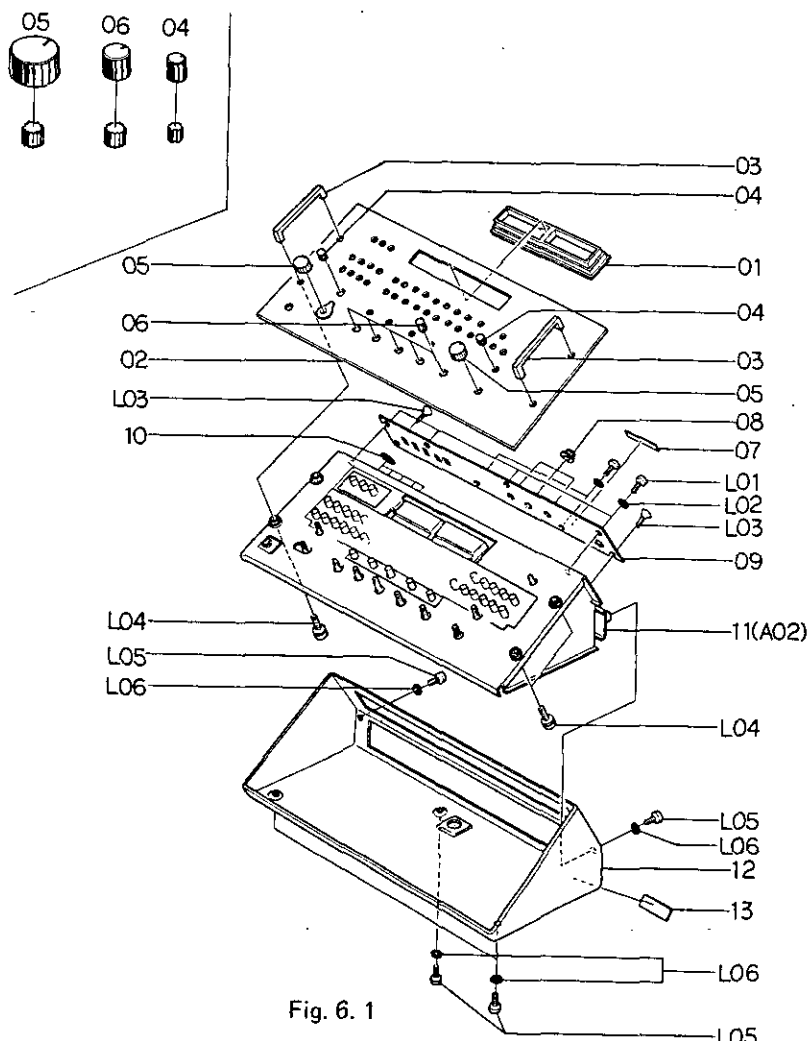


Fig. 6. 1

Schematic Ref. No.	Part No.	Description	Q'ty
A01		Synthesis	
01	OJ03417A	Meter Escutcheon	1
02	HA03633A	Front Panel Ass'y	1
03	HA03632A	Handle Ass'y	2
04	HA03635A	VR Cap (C) Ass'y	2
05	HA03631A	VR Cap (B) Ass'y	2
06	HA03630A	VR Cap (A) Ass'y	5
07	OM03639A	Serial Number Seal	1
08	OH03296B	ADJ. Knob	3
09	OM03650C	Rear Plate	1
10	OJ03429A	SW. Cover	5
11	JA03079A	Mechanism Ass'y	1
12	HA03634A	Cabinet Ass'y	1
13	OM03458A	Pass Label	1
L01	0E00685A	Screw M2.6x5 Philips Pan Head	6
L02	0E00651A	Washer 2.6mm (Plastics Black)	6
L03	0E00184A	Screw M2.6x6 Philips Countersunk	2
L04	0E00700A	Screw M5x16 Philips Pan Head (2A)	4
L05	0E00594A	Screw M3x8 Philips Binding Head (Bronze)	5
L06	0E00197A	Washer 3mm (Bronze)	5

6.2. Mechanism Ass'y (A02-1)

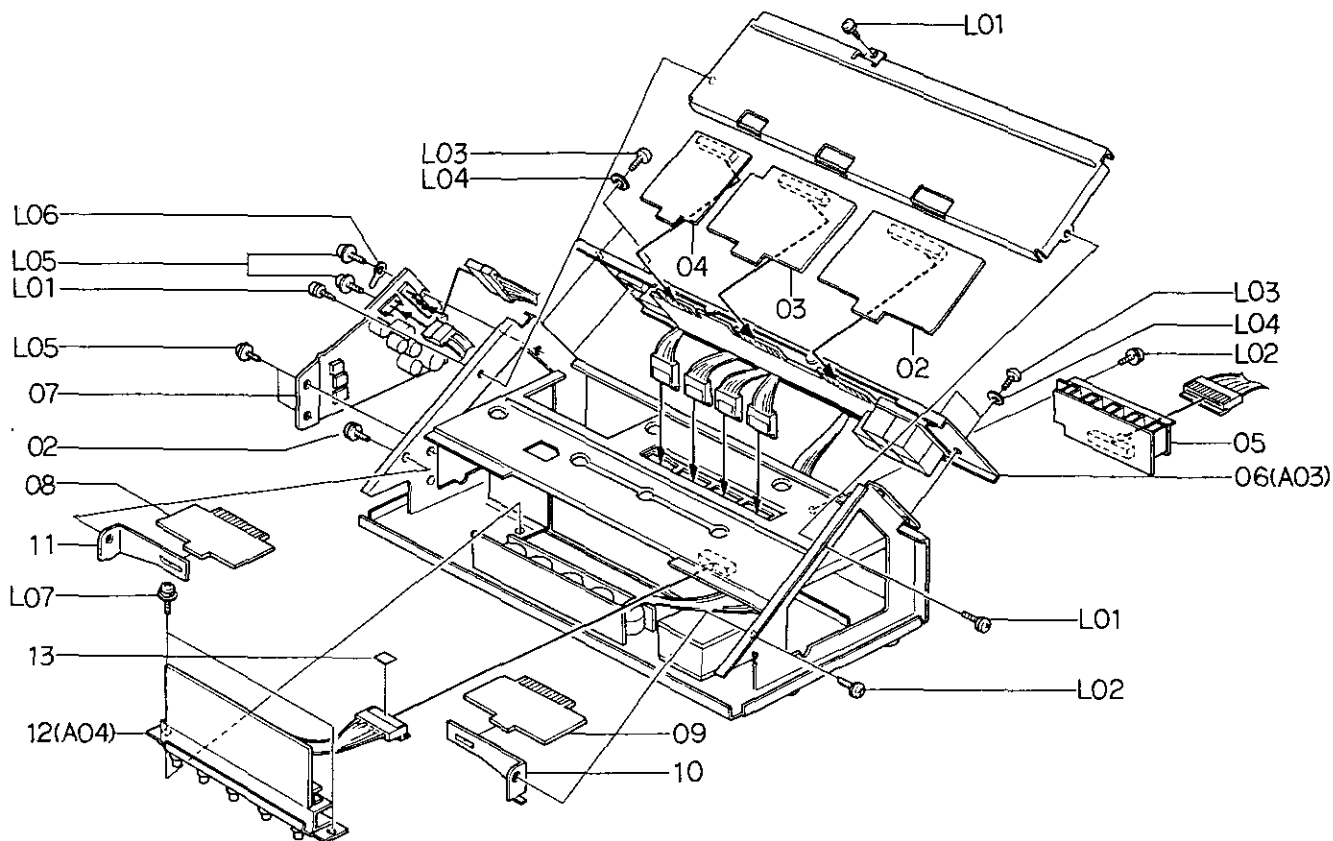


Fig. 6. 2

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	
A02-1	JA03079A	Mechanism Ass'y		A02-2	JA03079A	Mechanism Ass'y	
01	0J03462B	P.C.B. Holder	1	01	JA03078A	SW. E Ass'y	1
02	BA03738A	Mic. Amp. P.C.B. Ass'y	1	02	BA03751A	Meter Ass'y	1
03	BA03737A	Eq. Amp. P.C.B. Ass'y	1	03	0M03651A	SW. AB Label	1
04	BA03739A	Line Amp. P.C.B. Ass'y	1	04	JA03077A	SW. AB Ass'y	1
05	BA03742A	Attenuation Selector P.C.B. Ass'y	1	05	0M03652A	SW. FG Label	1
06	JA03072A	Rear Panel Ass'y	1	06	JA03074A	SW. FG Ass'y	1
07	BA03736A	DC Supply P.C.B. Ass'y	1	07	0M03653A	SW. BC Label	1
08	BA03741A	Buffer Amp. P.C.B. Ass'y	1	08	JA03076A	SW. BC Ass'y	1
09	BA03740A	Oscillator P.C.B. Ass'y	1	09	BA03754A	Headphone Ass'y	1
10	0J03448A	P.C.B. L Holder	1	10	JA03061A	Push Button Ass'y	1
11	0J03451A	P.C.B. R Holder	1	11	JA03070A	Power SW. Ass'y	1
12	JA03075A	SW. D Ass'y	1	12	BA03750A	Monitor VR P.C.B. Ass'y	1
13	0M03656A	CN3 Label	1	13	0M03655A	CN2 Label	1
L01	0E00622A	Screw M3x5 Philips Pan Head (2A)	3	14	0M03654A	CN1 Label	1
L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	3	15	BA03749A	Line VR P.C.B. Ass'y	1
L03	0E00593A	Screw M3x6 Philips Binding Head (Bronze)	4	16	BA03756A	Master VR Ass'y	1
L04	0E00157A	Washer 3mm (Plastics Black)	4	17	0J03471A	VR Flowing Bush	3
L05	0E00607A	Screw M3x8 Philips Pan Head (3A)	4	18	0J03470A	VR Stud	3
L06	0E00037A	Earth Lug B-5	1	19	0M03657A	CN4 Label	1
L07	0E00606A	Screw M3x6 Philips Pan Head (3A)	2	20	BA03753A	Tone Level VR Ass'y	1
				L01	0E00606A	Screw M3x6 Philips Pan Head (3A)	17
				L02	0E00610A	Screw M3x12 Philips Pan Head (3A)	3
				L03	0E00612A	Screw M3x6 Philips Pan Head (2A)	2

6.3. Mechanism Ass'y (A02-2)

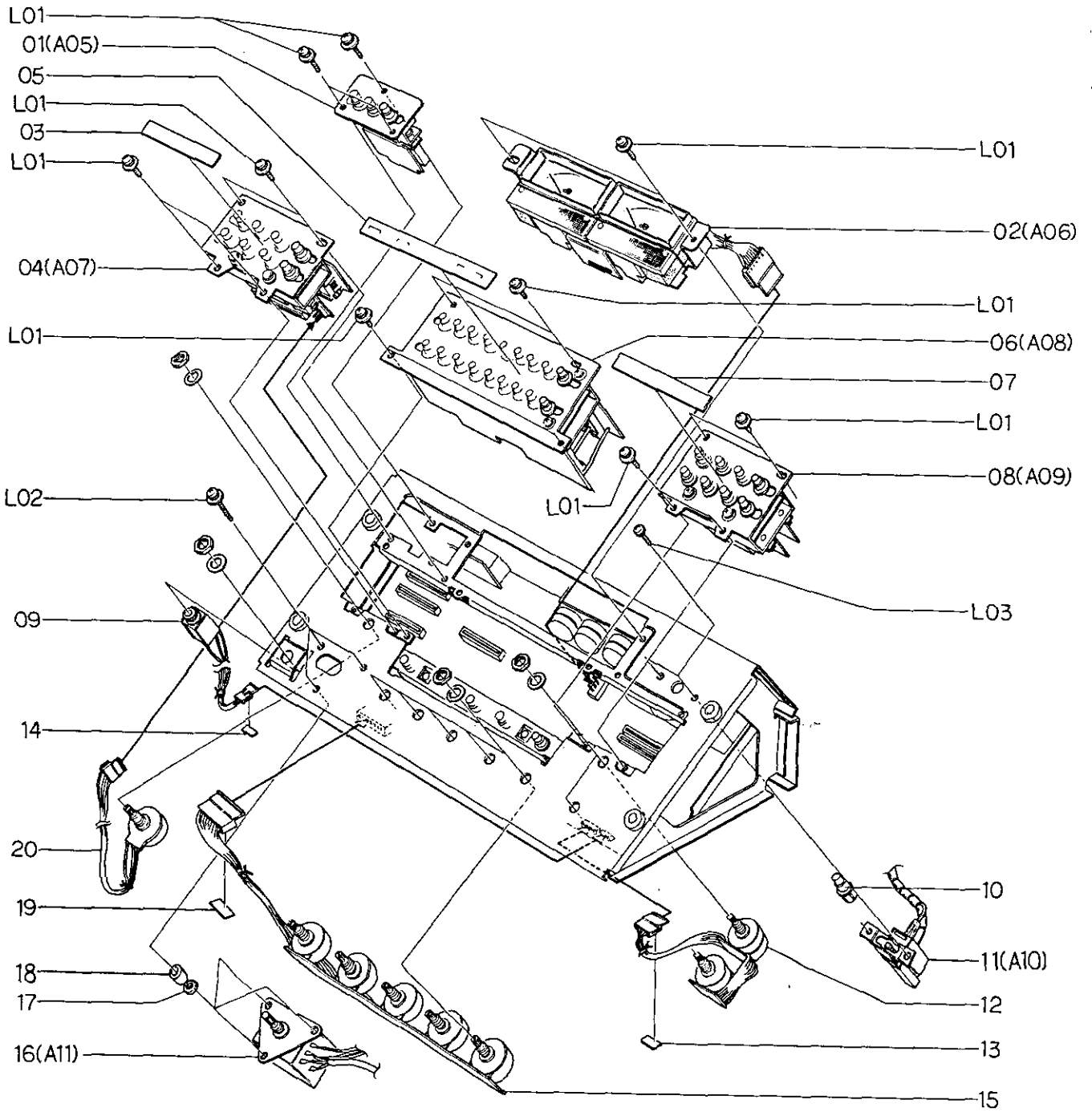


Fig. 6. 3

6.4. Mechanism Ass'y (A02-3)

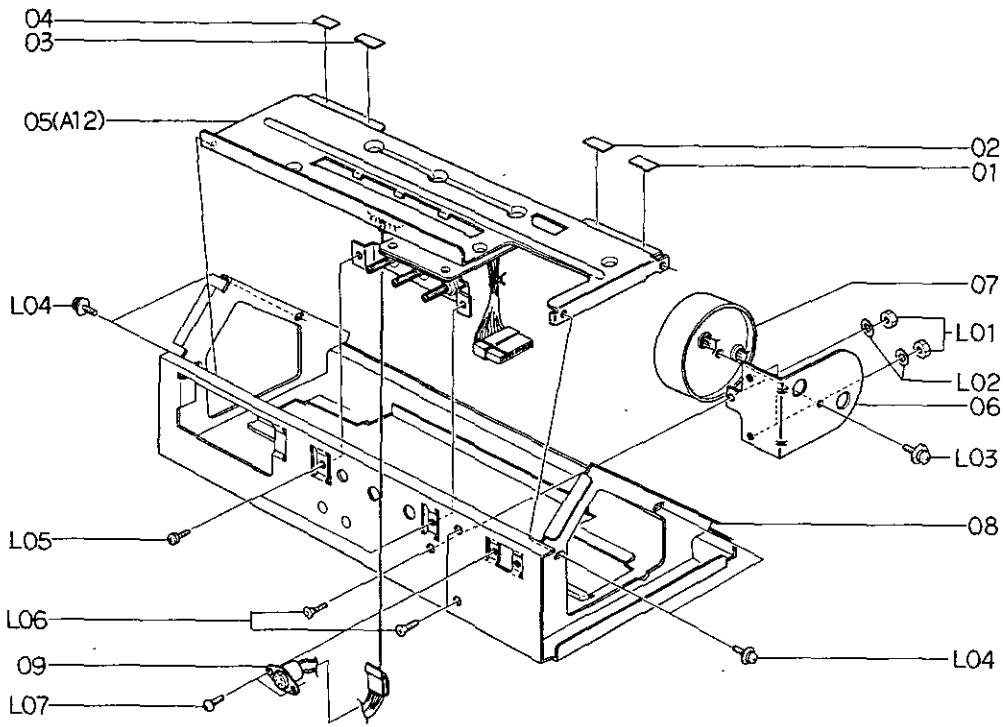


Fig. 6. 4

6.5. Rear Panel Ass'y (A03)

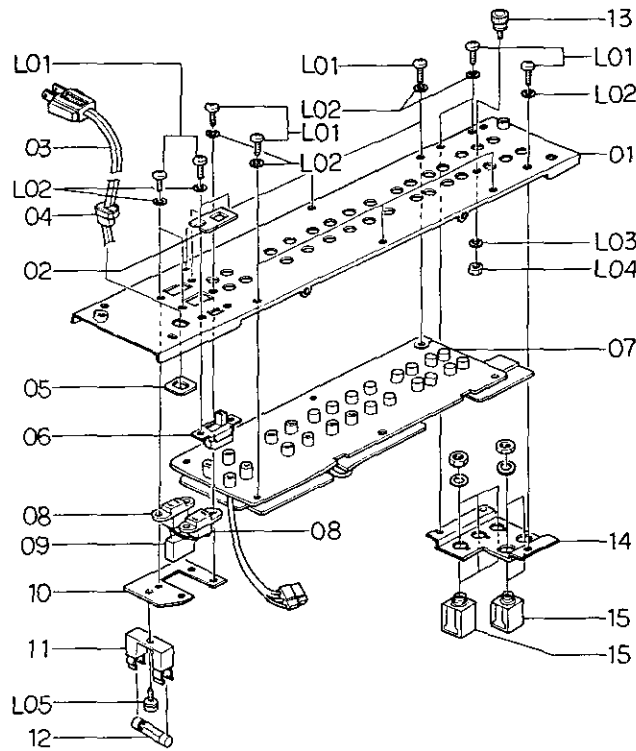


Fig. 6. 5

6.6. Sw. D Ass'y (A04)

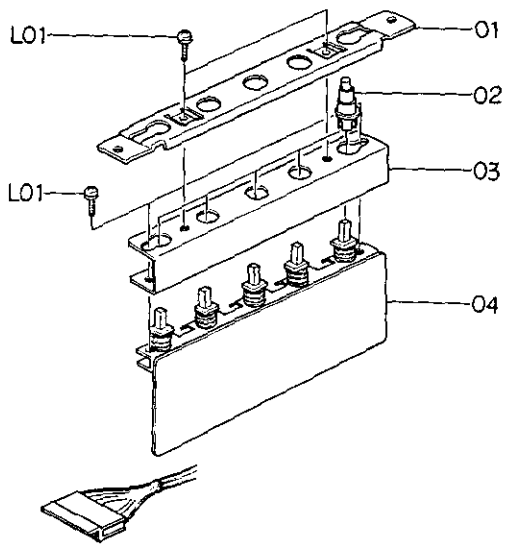


Fig. 6. 6

6.7. Sw. E Ass'y (A05)

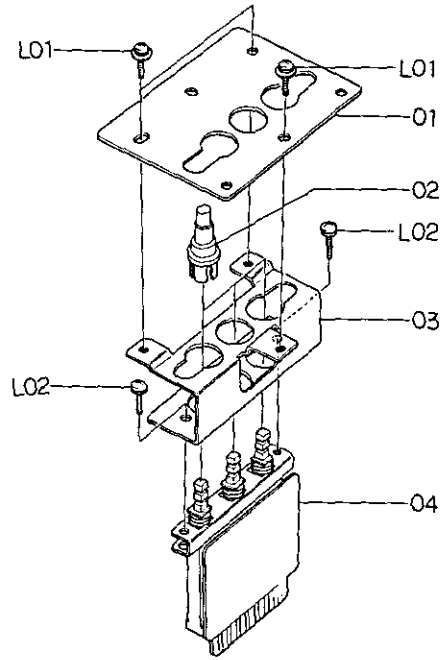


Fig. 6. 7

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
A02-3	JA03079A	Mechanism Ass'y		09	0B03873U	Spark Killer	1
01	0M03654A	CN1 Label	1	10	0J03435B	Outlet Holder	1
02	0M03655A	CN2 Label	1	11	0B08048U	Fuse Holder	1
03	0M03656A	CN3 Label	1	12	0B08047U	Fuse 1A	1
04	0M03657A	CN4 Label	1	13	0B03920A	Ground Pin	1
05	JA03080A	Mother P.C.B. Holder Ass'y	1	14	0J03453A	Mic. Jack Holder	1
06	0J03465B	Power Transformer Holder	1	15	0B08166A	Mic. Jack	5
07	JA03069A	Power Transformer Ass'y	1	L01	0E00594A	Screw M3x8 Philips Binding Head (Bronze)	15
08	JA03071A	Main Chassis Ass'y	1	L02	0E00157A	Washer 3mm (Plastics Black)	15
09	BA03752A	5P DIN Jack Ass'y	1	L03	0E00581A	Washer 3mm Spring	1
L01	0E00552A	Nut Hex M3	3	L04	0E00507A	Nut Hex M3	1
L02	0E00030A	Washer 3mm	3	L05	0E00612A	Screw M3x6 Philips Pan Head (2A)	1
L03	0E00643A	Screw M4x8 Philips Pan Head (3A)	1	A04	JA03075A	SW. D Ass'y	1
L04	0E00606A	Screw M3x6 Philips Pan Head (3A)	4	01	0J03443A	SW. D Block Plate	1
L05	0E00612A	Screw M3x6 Philips Pan Head (2A)	2	02	0J03061A	Push Button Ass'y	5
L06	0E00505A	Screw M3x6 Philips Countersunk	3	03	0J03444A	SW. D Block Base	1
L07	0E00712A	Screw M2.6x5 Philips Truss Head	2	04	BA03748A	Inverter & Mixer P.C.B. Ass'y	1
A03	JA03072A	Rear Panel Ass'y	1	L01	0E00612A	Screw M3x6 Philips Pan Head (2A)	4
01	JA03073A	Rear Panel Sub Ass'y	1	A05	JA03078A	SW. E Ass'y	1
02	0M03643A	Voltage Lock Plate	1	01	0J03439A	SW. E Block Plate	1
03	0B03900U	Power Cord	1	02	JA03061A	Push Button Ass'y	3
04	0B08037U	Cord Bushing (C)	1	03	0J03440A	SW. E Block Base	1
05	0A03154A	Cord Spacer	1	04	BA03747A	Output Selector P.C.B. Ass'y	1
06	0B07092U	Voltage Selector	1	L01	0E00606A	Screw M3x6 Philips Pan Head(3A)	3
07	BA03732A	Jack P.C.B. Ass'y	1	L02	0E00612A	Screw M3x6 Philips Pan Head(2A)	2
08	0B08162U	Outlet	2				

6.8. Meter Ass'y (A06)

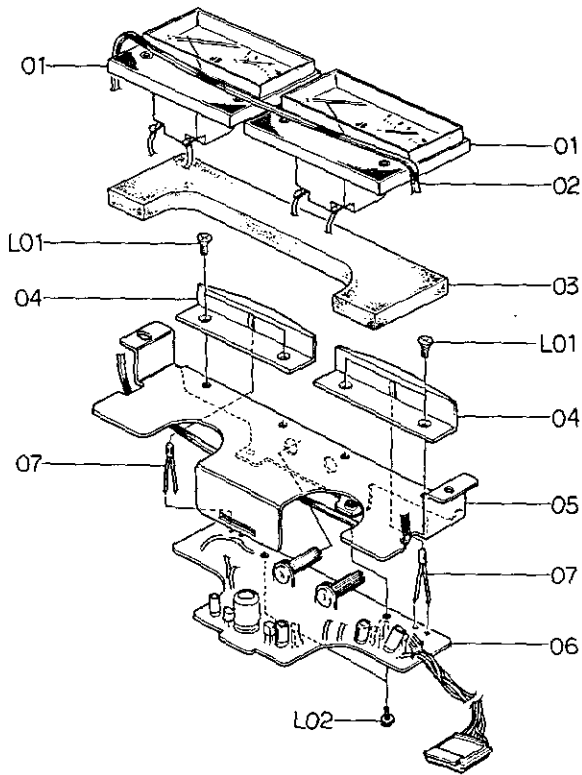


Fig. 6. 8

6.10. Sw. FG Ass'y (A08)

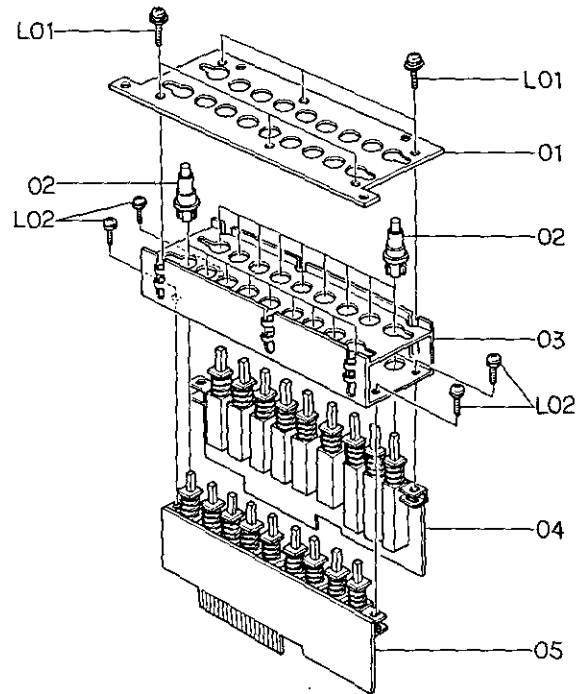


Fig. 6. 10

6.9. Sw. AB Ass'y (A07)

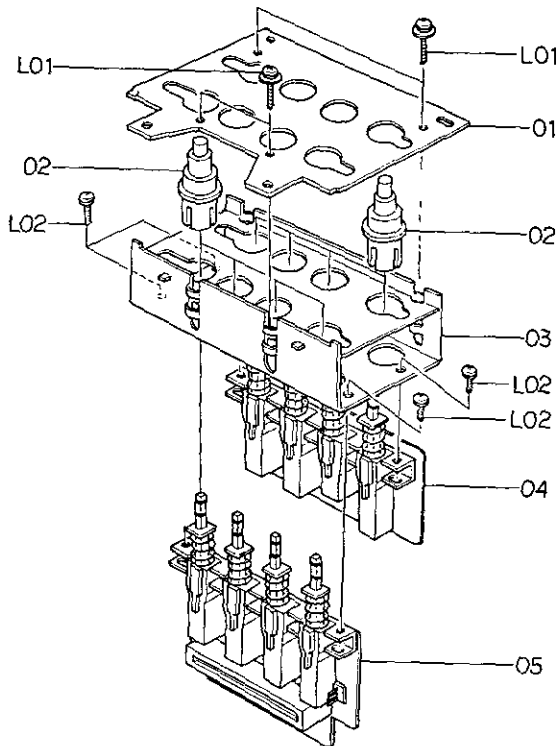


Fig. 6. 9

6.11. Sw. BC Ass'y (A09)

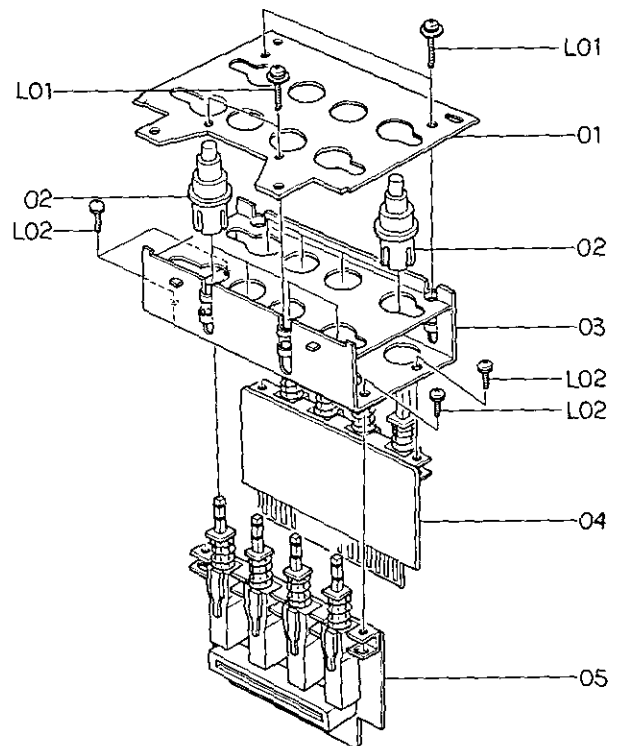


Fig. 6. 11

6.12. Power Sw. Ass'y (A10)

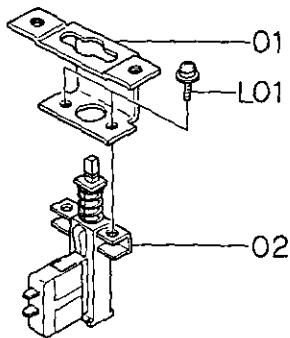


Fig. 6. 12

6.13. Master VR Ass'y (A11)

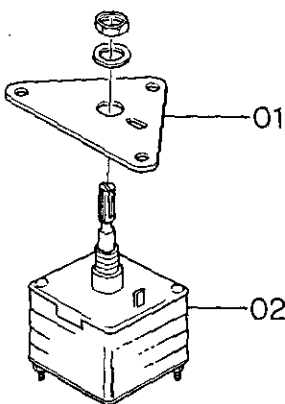


Fig. 6. 13

6.14. Mother P.C.B. Holder Ass'y (A12)

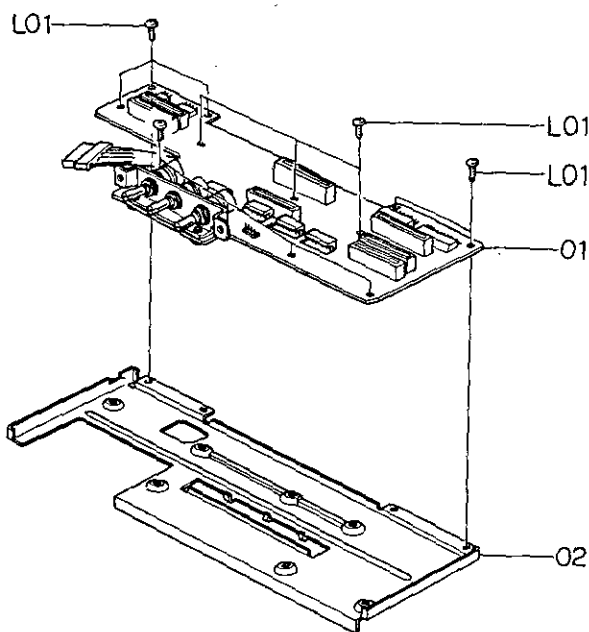


Fig. 6. 14

Schematic Ref. No.	Part No.	Description	Q'ty
A06	BA03751A	Meter Ass'y	1
01	0B08198A	Level Meter	2
02	0B08199B	Meter Band	1
03	0J03456A	Meter Cushion	1
04	0J03418A	Lamp House	2
05	0J03455A	Meter Holder	1
06	BA03735A	Meter Amp. P.C.B. Ass'y	1
07	0B08155A	Meter Lamp	2
L01	0E00505A	Screw M3x6 Philips Countersunk	4
L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	2
A07	JA03077A	SW. AB Ass'y	1
01	0J03441A	SW. B Block Plate	1
02	JA03061A	Push Button Ass'y	8
03	JA03081A	SW. B Block Sub. Ass'y	1
04	BA03745A	Function P.C.B. Ass'y	1
05	BA03744A	Oscillation Selector P.C.B. Ass'y	1
L01	0E00611A	Screw M3x14 Philips Pan Head (3A)	4
L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	4
A08	JA03074A	SW. FG Ass'y	1
01	0J03458B	SW. FG Block Plate	1
02	JA03061A	Push Button Ass'y	18
03	JA03083A	FG Block Sub. Ass'y	1
04	BA03733A	Line A P.C.B. Ass'y	1
05	BA03734A	Line B P.C.B. Ass'y	1
L01	0E00611A	Screw M3x14 Philips Pan Head (3A)	6
L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	4
A09	JA03076A	SW. BC Ass'y	1
01	0J03441A	SW. B Block Plate	1
02	JA03061A	Push Button Ass'y	8
03	JA03081A	SW. B Block Sub. Ass'y	1
04	BA03743A	Tape Monitor P.C.B. Ass'y	1
05	BA03746A	Phase Check P.C.B. Ass'y	1
L01	0E00611A	Screw M3x14 Philips Pan Head (3A)	4
L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	4
A10	JA03070A	Power SW. Ass'y	1
01	0J034449C	Power SW. Holder	1
02	0B07093A	Power SW.	1
L01	0E00606A	Screw M3x6 Philips Pan Head (3A)	2
A11	BA03756A	Master VR Ass'y	1
01	0J03450A	Volume Plate	1
02	0B07106A	Volume 20Kx2 (22 p)	1
A12	JA03080A	Mother P.C.B. Holder Ass'y	1
01	BA03731A	Mother P.C.B. Ass'y	1
02	0J03461B	Mother P.C.B. Holder	1
L01	0E00508A	Screw M3x5 Philips Binding Head (Bronze)	11

7. WIRING DIAGRAM

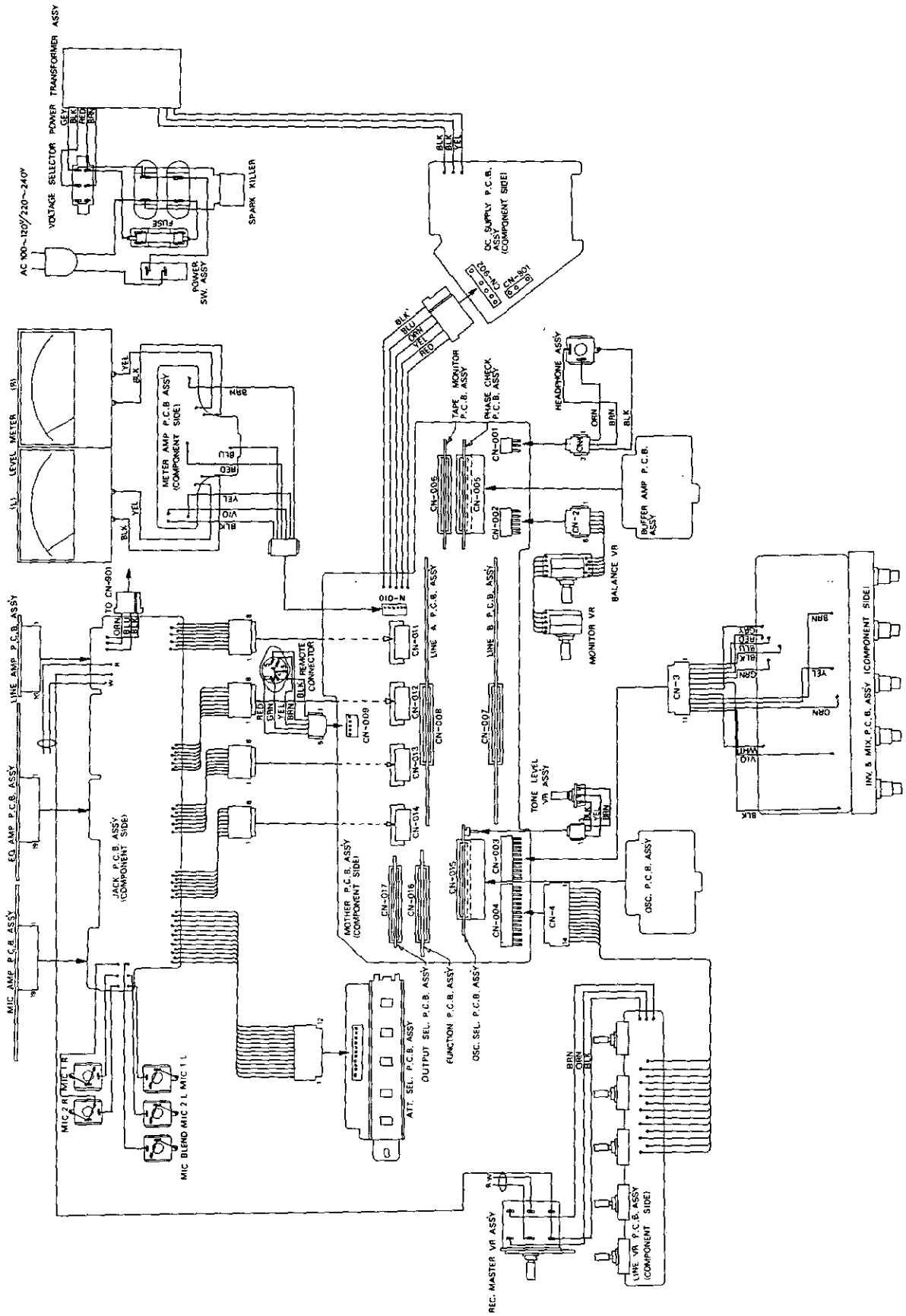
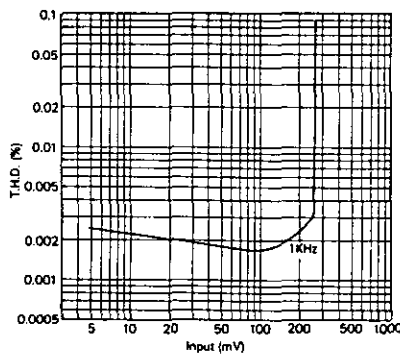


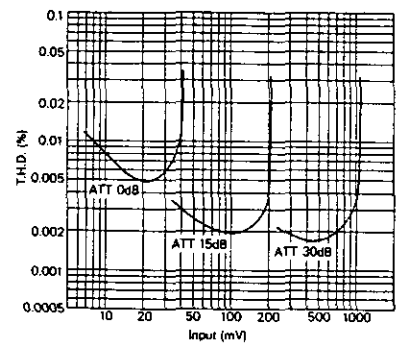
Fig. 7

8. PERFORMANCE DATA

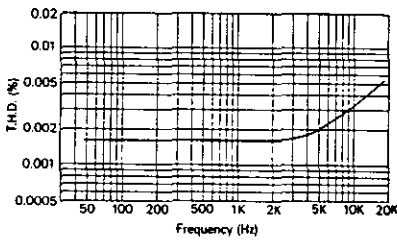
RIAA. Equalizer Amp.
Input vs
Total Harmonic Distortion
Line Output: 2 V Constant
H.P.F.: 400 Hz
L.P.F.: 80 KHz in



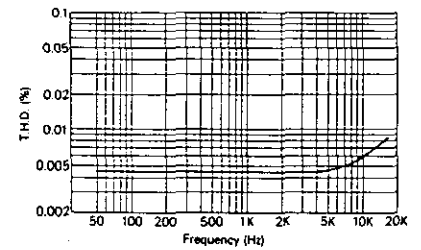
Microphone Amp.
Input vs
Total Harmonic Distortion
Frequency: 1 KHz
Line Output: 2 V Constant
H.P.F.: 400 Hz
L.P.F.: 80 KHz



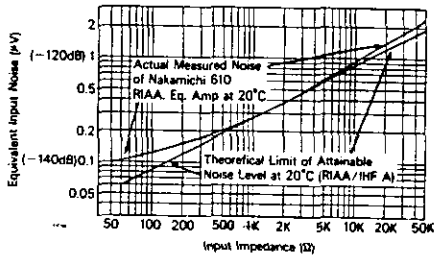
RIAA. Equalizer Amp.
Frequency vs
Total Harmonic Distortion
Line Output: 2 V Constant



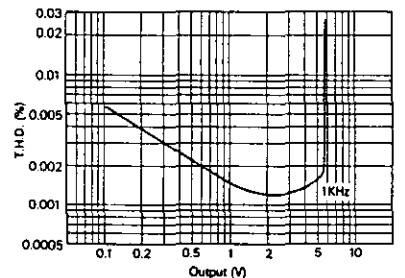
Microphone Amp.
Frequency vs
Total Harmonic Distortion
Att.: 15 dB
Master VR: -20 dB
Line Output: 1 V Constant
L.P.F.: 80 KHz



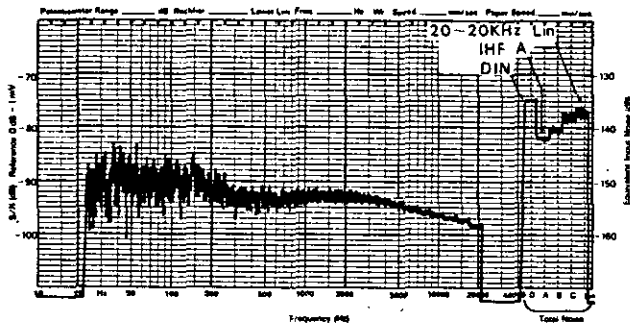
RIAA. Equalizer Amp. (Phono)
Input Impedance vs
Noise Level



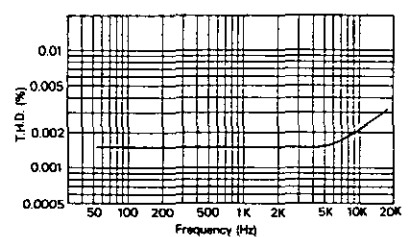
Monitor Amp.
Output vs
Total Harmonic Distortion
Input: Tape PB-1
Output: Monitor Output
H.P.F.: 400 Hz
L.P.F.: 80 KHz



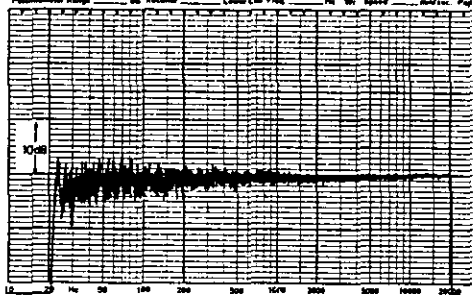
RIAA. Equalizer Amp. (Phono)
Noise Characteristics
Frequency vs
Noise Level



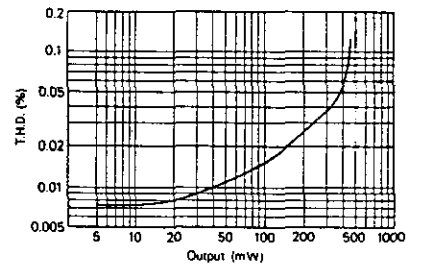
Monitor Amp.
Frequency vs
Total Harmonic Distortion
Line Output: 2 V Constant
Monitor VR: max.
L.P.F.: 80 KHz



Pink Noise Generator
Characteristics
1/3 Octave Analysis



Headphone Amp.
Output vs
Total Harmonic Distortion
Frequency: 1 KHz
Load Impedance: 8 ohms



H.P.F. — High Pass Filter
L.P.F. — Low Pass Filter

Fig. 8

9. BLOCK DIAGRAM & LEVEL DIAGRAM

Block Diagram

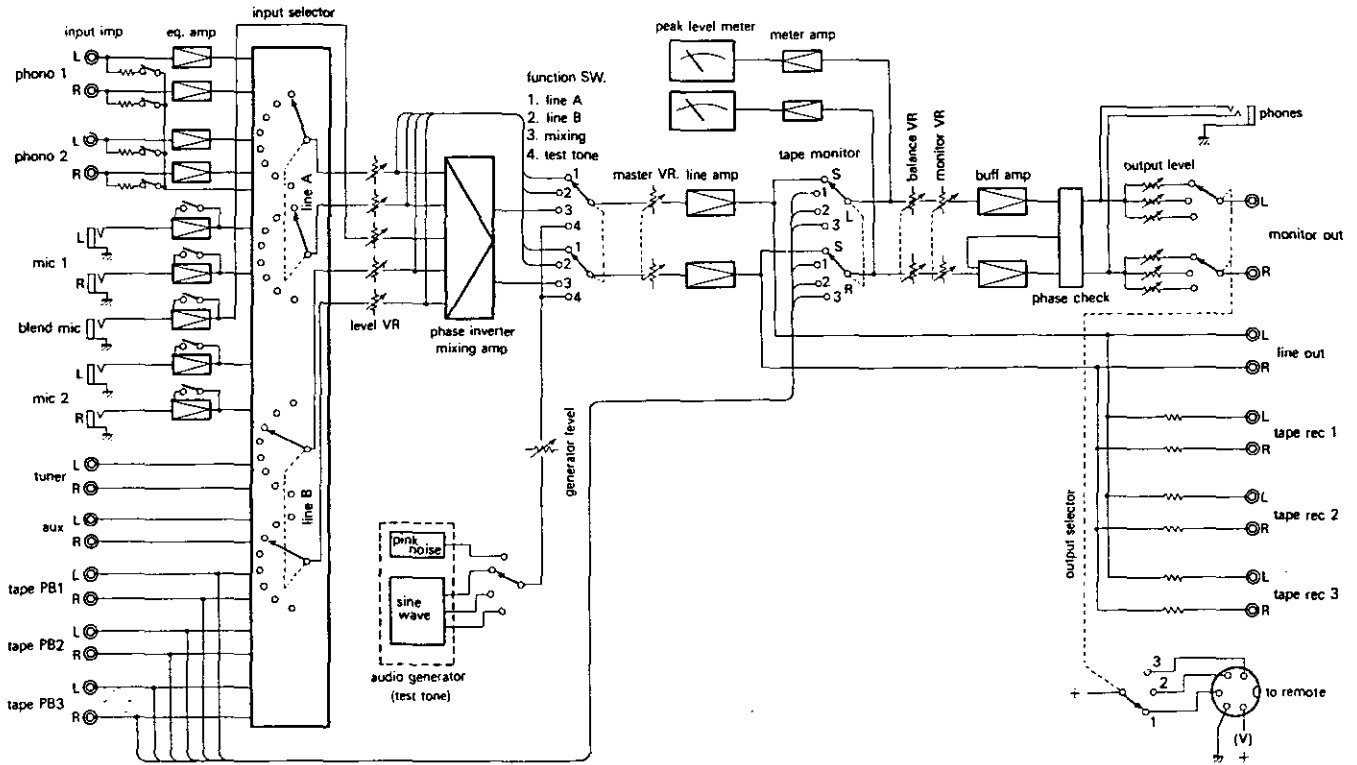


Fig. 9. 1

Level Diagram

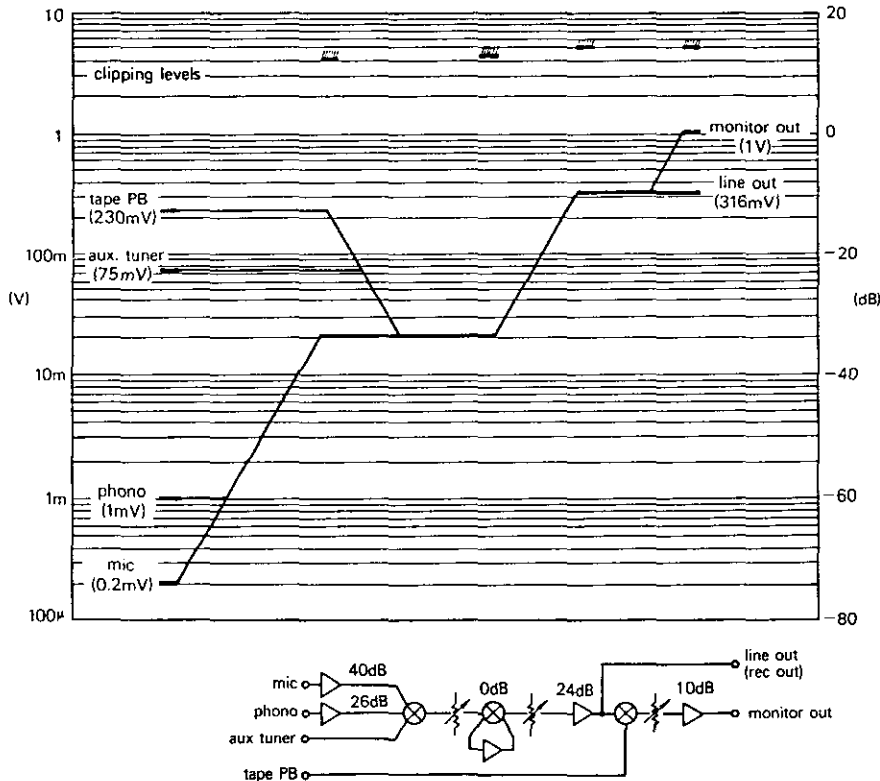


Fig. 9. 2

10. SCHEMATIC DIAGRAM

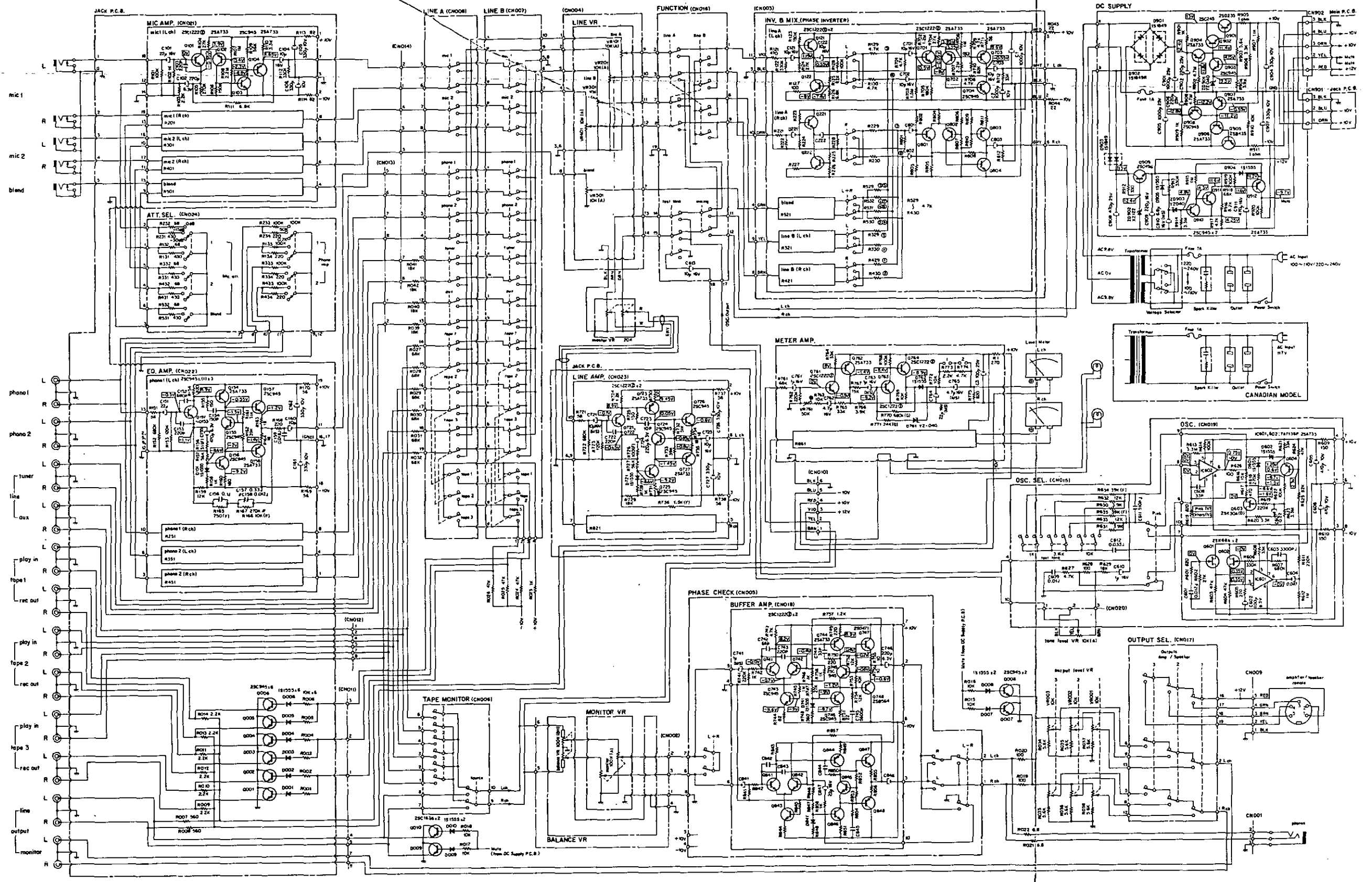


Fig. 10

11. REMOTE CONTROLLER RM610 (OPTION)

Mechanism Ass'y, Circuit Diagram, Mounting Diagram & Parts List

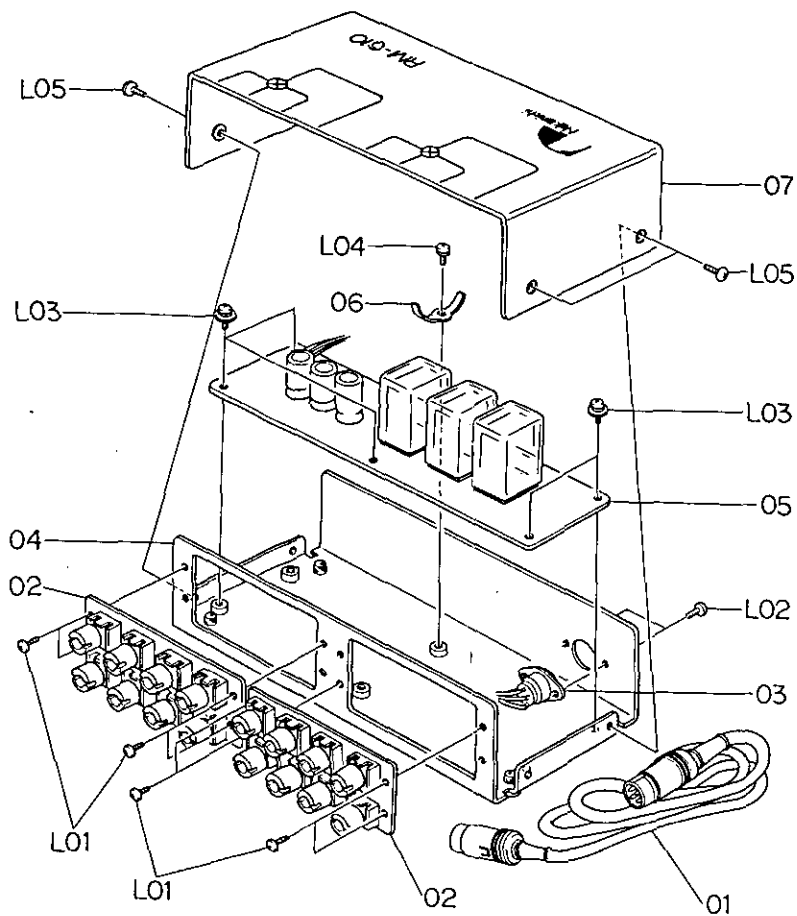


Fig. 11.1

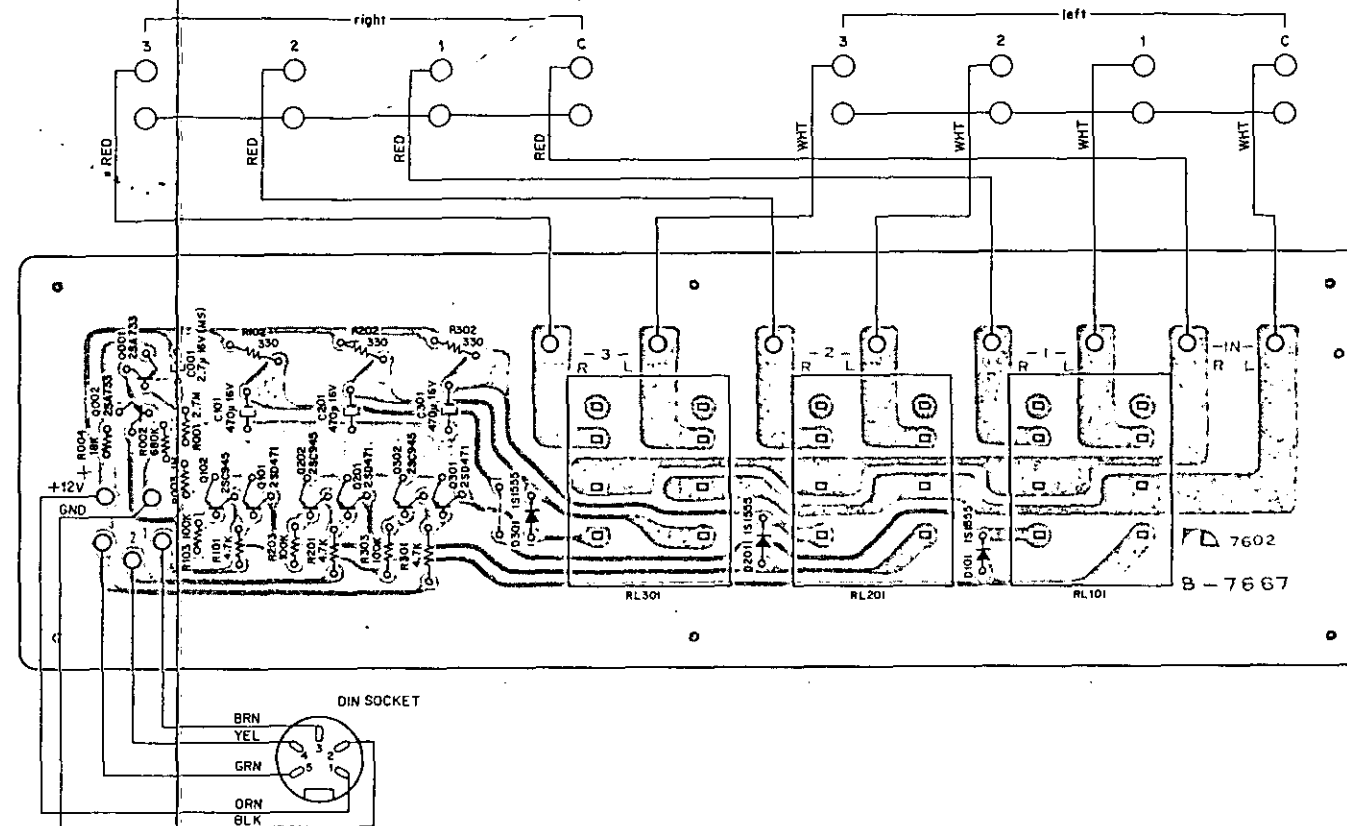


Fig. 11.3

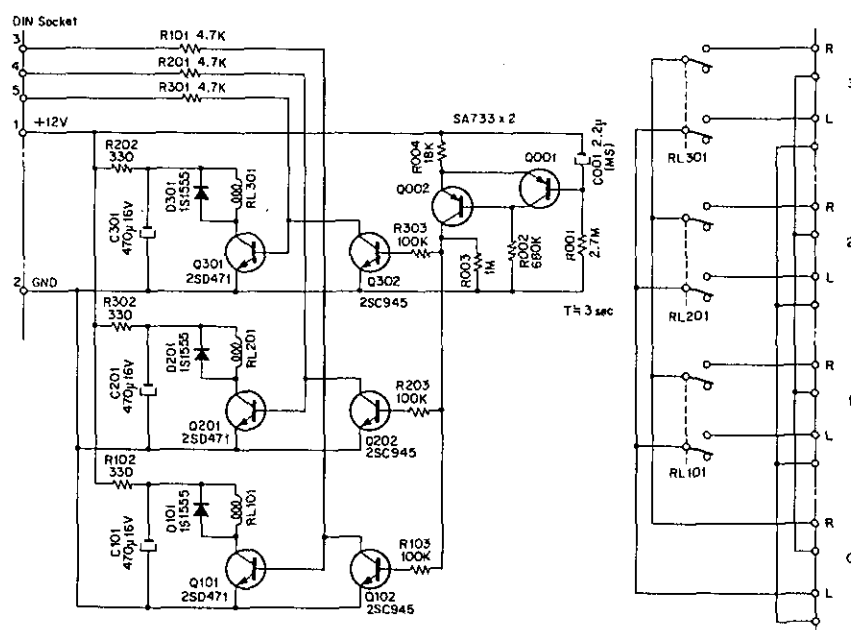


Fig. 11.2

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description
		RM-610 Mechanism	1		BA03769A	RM P.C.B. Ass'y
01	DA03198A	5P Plug Cord Ass'y	1		0B07667A	RM P.C.B.
02	0B08209A	Output Terminal (8P)	2	RL101, 201	0B08210A	Power Relay
03	0B08208A	5P Jack	1	301		
04	HA03641A	Main Chassis Ass'y	1	Q101, 201	0B06066A	Transistor 2SD471
05	BA03769A	RM P.C.B. Ass'y	1	302		
06	0B03067A	Cord Holder	1	Q102, 202	0B01872A	Transistor 2SC945 (L)
07	0E03435A	Upper Cover	1	Q001, 002	0B06013A	Transistor 2SA733
L01	0E00593A	Screw M3x6 Philips Binding Head (Bronze)	8	D101, 201	0B01909A	Silicon Diode 1S1555
L02	0E00714A	Screw M2.6x6 Philips Binding Head (Bronze)	2	301		
L03	0E00606A	Screw M3x6 Philips Pan Head (3A)	5	R001	0B05753A	Carbon Resistor 2.7M ELR½ J
L04	0E00612A	Screw M3x6 Philips Pan Head (2A)	1	R002	0B05597A	Carbon Resistor 680K ELR½ J
L05	0E00713A	Screw M3x6 Philips Truss Head	4	R003	0B05564A	Carbon Resistor 1M ELR½ J
				R004	0B05561A	Carbon Resistor 18K ELR½ J
				R101, 201	0B01795A	Carbon Resistor 4.7K ELR½ J
				301		
				R102, 202	0B01789A	Carbon Resistor 330 ELR½ J
				302		
				C001	0B05862A	Electrolytic Capacitor 2.2µ 16V M(MS)
				C101, 201	0B01392A	Electrolytic Capacitor 470µ 16V
				301		

12. SPECIFICATIONS



Fig. 11.4 Front View

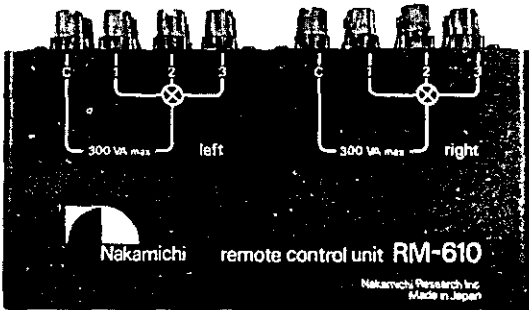


Fig. 11.5 Top View



Fig. 11.6 Rear View

Power Source	100-120/220-240V AC 50/60 Hz
Power Consumption	20 VA
Input Sensitivity/Impedance	
mic	0.2 mV/1 K ohms (attenuators: 15, 30 dB)
phone	1 mV/200, 50K, 100K ohms
aux, tuner	75 mV/25K ohms
tape PB	230 mV/75K ohms
tape monitor	316 mV/75K ohms
Maximum Input Levels	
mic	1 V (+74 dB) ... Att: 30 dB
phono	250 mV (+48 dB)
aux, tuner, tape PB	50 V
Output Levels (@ 0 dB)/Output impedance/min. load impedance	
monitor out	1 V/100 ohms/1 K ohms
line out	316 mV/600 ohms/10K ohms
rec out	316 mV/2.2K ohms/50K ohms
headphone	40 mW/8 ohms/8-200 ohms
Maximum Output at Clipping	
monitor out	5V into 1 K ohms
line out	5V into 10K ohms
rec out	5V into 50K ohms
headphone	300 mW into 8 ohms
Frequency Response	
mic	30-100,000 Hz +0, -1.5 dB
phono	30-15,000 Hz ±0.3 dB
aux, tuner	20-100,000 Hz +0, -1.5 dB
tape PB	10-50,000 Hz ±0.3 dB
monitor out	5-150,000 Hz +0, -1.5 dB
Signal-to-Noise Ratio (IHF A) - (ref. level)/equivalent input noise	
mic	better than 53 dB (0 dB)/-127 dB (65 dB; Att: 15 dB)
phono	better than 80 dB (1 mV)/-140 dB (90 dB @ 3mV)
aux, tuner, tape PB	better than 85 dB (Master @ max) better than 93 dB (Master @ min)
Residual Noise Level (IHF A)	
headphone (8 ohms)	4 microvolts or less
line out	7 microvolts or less (Master @ min) 15 microvolts or less (Master @ -30 dB)
Distortion (Master Vol. @ -20 dB, Level Vol. @ max, line out @ 2V)	
mic	less than 0.01% at all freq. up to 10 KHz
phono	less than 0.005% at all freq. up to 10 KHz
aux, tuner, tape PB	less than 0.005%
Test Tones	
sine wave oscillator	1K, 3.16K, 4.16K, 10K, 11K, 13.16K, 14.16K Hz (all possible combinations)
pink noise generator	50-15,000 Hz ±2 dB (1/3 octave analysis)
sine wave distortion	1 KHz - 14.16 KHz less than 0.2%
Peak Level Meters (2)	
range	-40dB to +10 dB
accuracy	-20 dB to +10 dB ±1 dB -40 dB to -20 dB ±2 dB
frequency response	50-20,000 Hz +0, -1 dB (-30~+10 dB)
Semiconductor Complement	
FET's	3
transistors	134
diodes	27
zener diodes	5
integrated circuits	2
Miscellaneous	
AC outlets	2, switched, 350 VA max.
dimensions	15.75 (W) x 6.70 (H) x 9.33 (D) inches 400 (W) x 170 (H) x 237 (D) mm
weight	15-1/2 lbs. (7 kg)

• Specifications and appearance design are subject to change for further improvement without notice.

Service Manual

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