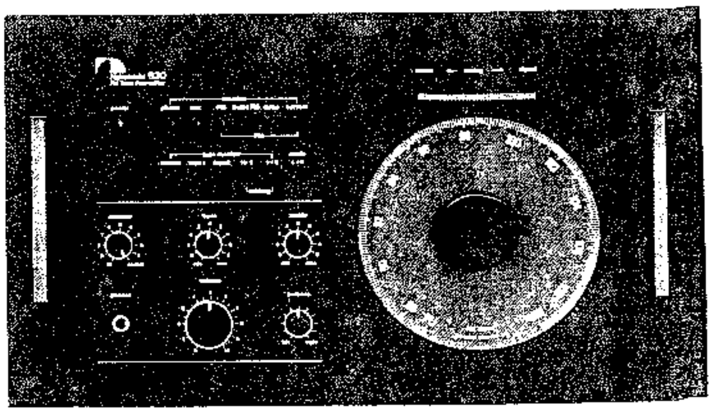
Nakamichi

Service Manual

Nakamichi 630

FM Tuner Preamplifier



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1. GENERAL

Nakamichi 630 control functions are shown below.

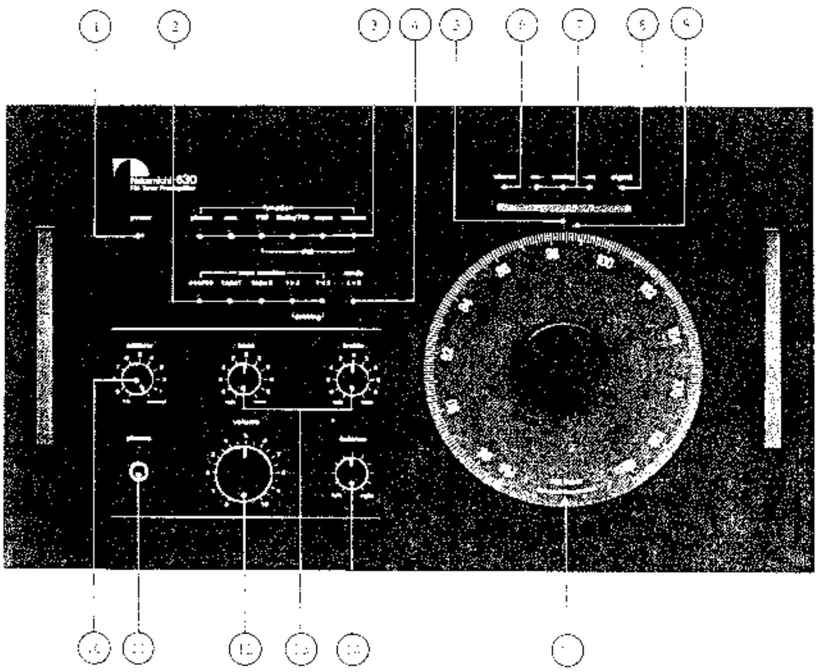


Fig. 1.1 Top View

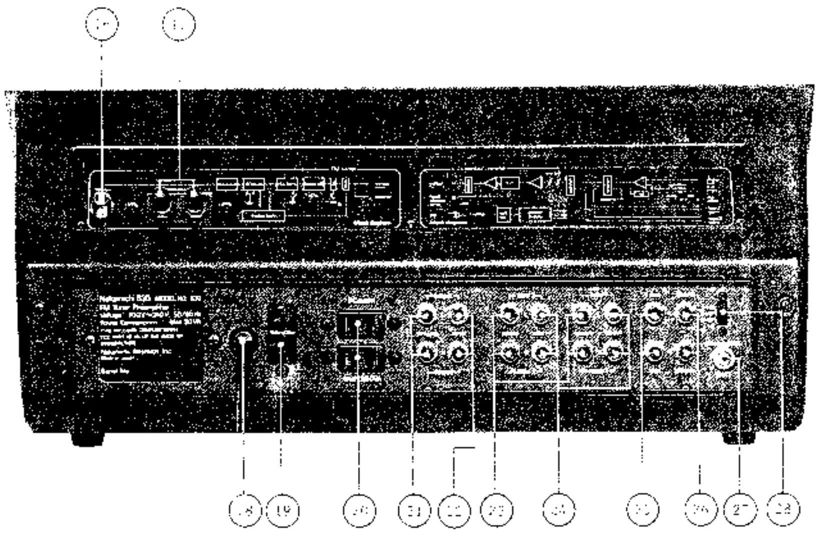


Fig. 1.2 Rear View

1. Power Switch
2. Tape Monitor/Dubbing Switches
3. Function Selector Switches
4. Mode Switch
5. Tuning Pointer
6. Stereo Indicator Lamp
7. Tuning Indicator Lamps
8. Signal Strength Indicator Lamp
9. Power Indicator Lamp
10. Contour Control
11. Stereo Headphone Jack
12. Volume Control
13. Tone Controls (Bass, Treble)
14. Balance Control
15. Tuning Dial
16. 75-ohm FM Antenna Connector
17. 300-ohm FM Antenna Terminals
18. AC Line Cord
19. AC Voltage Selector Swtich
20. Auxiliary AC Outlets
21. Preamplifier Output Jacks
22. Tuner Output Jacks
23. Tape Record Output Jacks
24. Tape Monitor (Playback Input Jacks)
25. Auxiliary Input Jacks
26. Phono Input Jacks
27. Ground Terminal
28. Phono Input Sensitivity Selector Switch

Voltage Selector

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

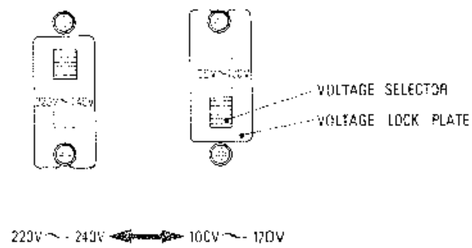


Fig. 1.3 Voltage Selector

2. PRINCIPLE OF OPERATION

2.1 Tuner Section

2.1.1. FM MPX Stereo Broadcasting Operation

As is generally known, the amplitude of the carrier wave is modulated in AM broadcasting whereas the carrier frequency is modulated in FM broadcasting. Fig. 2.1 illustrates these conditions.

FM transmitters and receivers, although considerably more complicated than those for AM broadcasting, permit radio reception with very high fidelity and any difference in technical skill will be noticeably manifested in the performance of the equipment. Compared to AM broadcasting, FM broadcasting has many advantages, such as better frequency response, higher S/N ratio, less interference, less distortion, etc. However, its greatest advantage is the capability for compatible stereo broadcasting. This is achieved by employing a composite signal, as shown in "4" of Fig. 2.2, instead of the audio signal shown in Fig. 2.1.

Since the composite signals transmitted in ordinary broadcasting have an extremely complex waveform, it is hard to recognize them, even when observed with an oscilloscope. Figure 2.2 illustrates an L channel signal of 1900 Hz with no R channel signal.

As shown in "1" of Fig. 2.2, this is a stereo signal modulated so as to swing at 38 kHz between the L channel signal and R channel signal.

Therefore, this signal can be separated into L ch/R ch, by a synchronizing signal with the 38 kHz of the stereo signal and a circuit which is conducting at the positive peak and negative peak of this synchronizing signals; the L ch/R ch signals will come out separately.

But, as is shown by the signal waveform "1" in Fig. 2.2, since the phase at 38 kHz is reversed between the positive and negative half-cycles of the L ch signal, even with the separation described above, it is not possible to distinguish L ch from R ch.

Under these conditions, it is possible that the L ch/R ch is reversed each time the power switch is turned ON/OFF. Here lies the importance of the pilot signal.

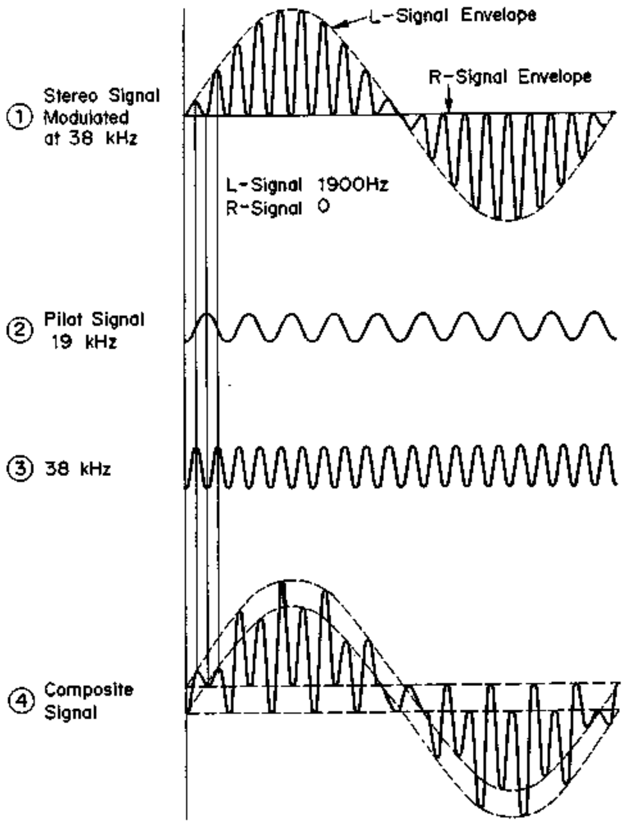


Fig. 2.2 MPX Stereo Signal

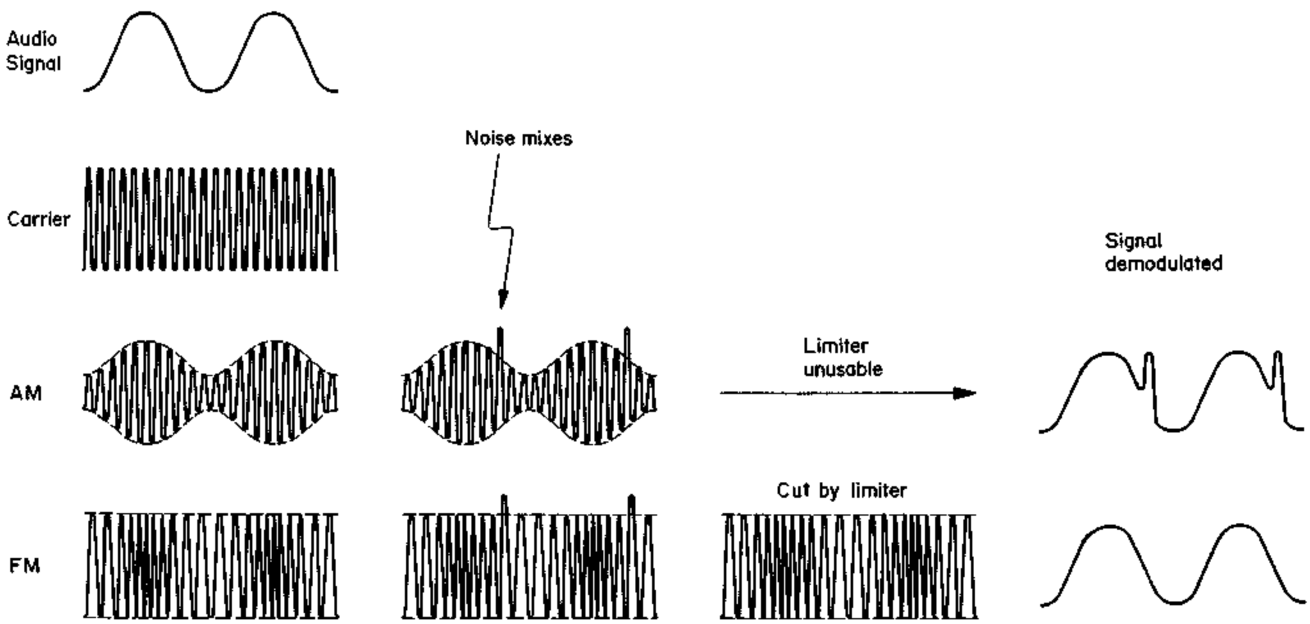


Fig. 2.1 AM and FM

That is, when making the 38 kHz signal ("3" in Fig. 2.2) by doubling the 19 kHz pilot signal, if the positive and negative peaks of the 19 kHz wave are synchronized with a negative peak on the 38 kHz, L channel can be taken out at the positive peak of the 38 kHz signal and the R channel at the negative peak. Thus, MPX stereo signals are broadcast in a waveform such as composite signal "4", obtained by combining the pilot signal "2" with the stereo signal "1" in Fig. 2.2.
In order to divide the FM signal into the left and right channels, the MPX stage of an FM tuner must synchronize the multiplex signal with the 19 kHz pilot signal. If this synchronization is not properly performed, stereo separation will be poor.

2.1.2. Operation of N-630 Tuner Section

Fig. 2.3 shows a block diagram of the N-630 tuner section.
The input from an antenna which first enters the radio frequency unit (front-end), is amplified in a tuning circuit, and mixed with a local oscillator frequency, and an inter frequency (IF 10.7 MHz) is produced. Since the radio frequency is high and it is impossible to obtain stable amplification and sufficient separation, it is converted to an easy-to-handle 10.7 MHz. Conversion to IF is made to improve these characteristics.
Frequency conversion makes use of the fact that when two different frequencies are mixed and detected, a frequency component equal to the difference between the two frequencies is generated.
Since radio frequencies vary according to the choice of the station, the tuning circuit must be adjustable. However, the use of an inter frequency fixed at 10.7 MHz makes it possible to achieve an optimum tuning characteristics with a multi-stage tuning circuit (12-stages in the N-630) and sharp separation with a ceramic filter.
Also, the function of a limiter to remove extraneous noise, as usual in an inter frequency unit, requires a sufficiently high-degree of amplification (130 dB or more in the N-630) to improve limiter characteristics.
For this purpose and to prevent instability due to output feedback to the input side, an adequate shield must be provided and the component parts must be carefully arranged.
One of the important features of an inter frequency unit is the group delay characteristic. The time required for a signal applied to the input of an inter frequency unit to emerge from the output generally varies according to frequency.

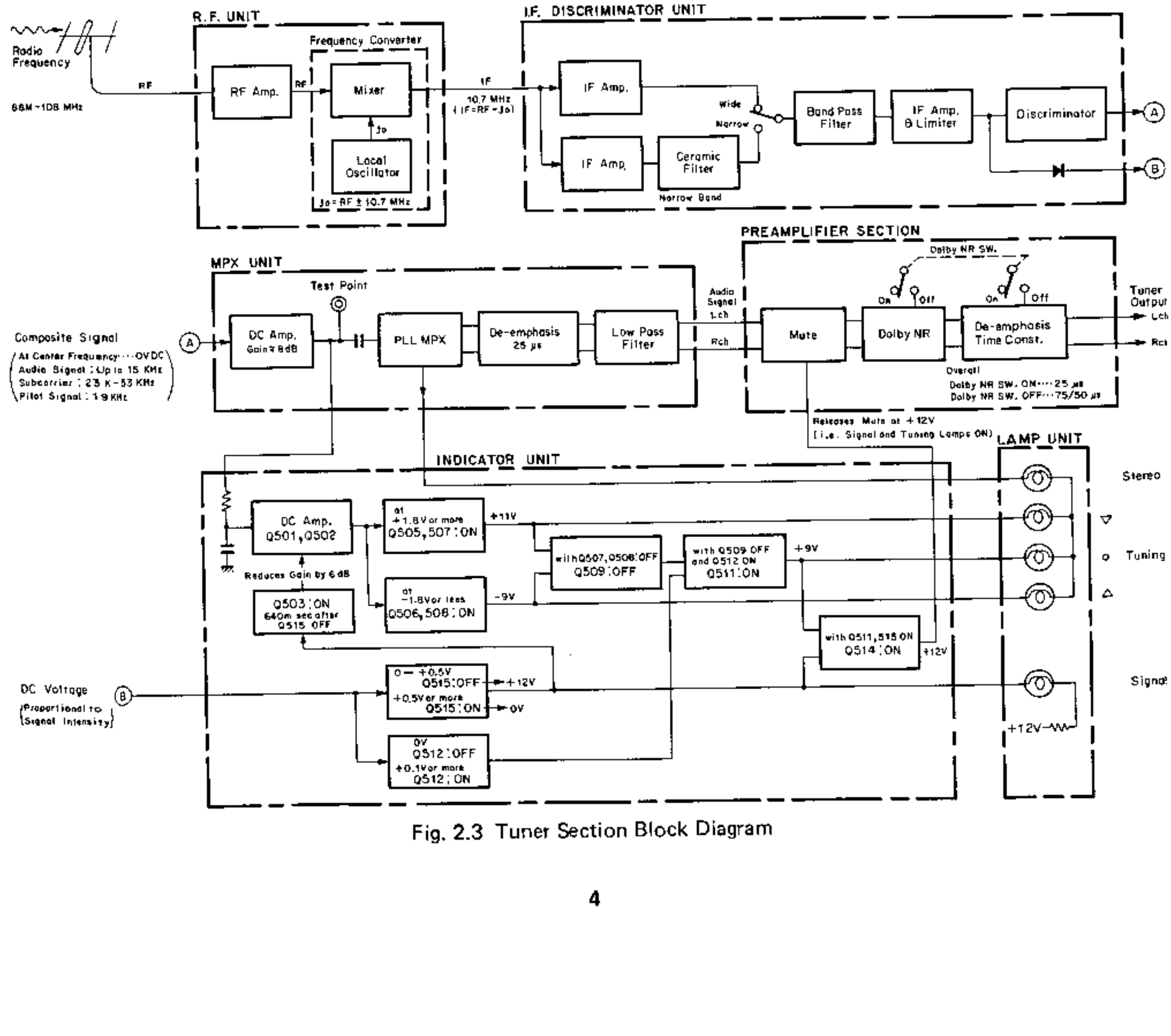


Fig. 2.3 Tuner Section Block Diagram

In ordinary broadcasting, since the frequency varies in a range of 10.7 MHz ±75 kHz, a frequency with a shorter transit time catches up with the preceding signal before emerging as output. This will result in a high frequency. Also, an interval will be opened between a slow signal and the preceding signal which produces a lower frequency. This kind of variation in the transit time occurs mainly in the tuning circuit, resulting in increased distortion.
In the N-630, a sharp improvement in the group delay characteristic has been realized by employing 6-element 1-pack LC filters having an optimum degree of coupling. Two packs, 12 elements in total, are used.
The composite signal is taken out by demodulating the FM signal with a discriminator placed in the last stage of the inter frequency unit.
Linearity of the discriminator is very important, and must be regulated with adequate care since poor linearity will result in increasing distortion and poor channel separation.
A good discriminator characteristics, are shown in Fig. 2.4 by the solid line, where the output voltage varies in a straight line over the ±100 kHz range and voltage is zero at the center frequency. If, as shown by the dotted line, there is asymmetry above and below, the voltage is not zero at the center frequency, and the degree of distortion will increase.
The discriminator of the N-630 has a broad linear zone (±200 kHz or more). The local oscillator has a high degree of stability and provides adequate stability even without using AFC. When frequency drift is compensated by AFC , power ON/OFF, extraneous noise, etc. may result in altering the station you desire to another.
When tuning, the pull-in effect of the AFC can cause the signal from a weaker station near a stronger station to become unreceivable.
In the N-630 which does not employ AFC, these sorts of troubles cannot occur. Because the discriminator output is small, it is applied to the MPX IC (PLL) after passing through a DC amplifier with about 8 dB gain at the initial stage of the MPX unit. The output of this DC amplifier constitutes a test point for measuring the S-curve and observing the composite signal. The 38 kHz signal which is synchronous with the 19 kHz involved in the composite signal is produced in MPX unit. This leads to separate the L channel and R channel signals (refer to Fig. 2.2).

Therefore, in order to achieve good channel separation, the high end and low end of the 38 kHz waveform must be symmetrical and the phase must be precisely aligned. In the N-630, good channel separation has been realized by means of a stabilized synchronizing signal obtained by a PLL (phase-locked loop) IC.
With this, even if an SCA signal is present, no beat interference can occur.
To obtain a good S/N ratio, pre-emphasis is made on the transmitter side and de-emphasis is made on the receiver side.
The time constant of 75 μs is mainly employed by the U.S.A. and Canada, and 50 μs in Europe and other countries including Japan. In Dolby FM broadcasting, the time constant is 25 μs. Consequently, in the N-630, de-emphasis is made in the MPX unit at 25 μs and a circuit is provided after the Dolby N.R. circuit to change the time constant to 75 μs or 50 μs. When resistors R112 and R212 in the main P.C.B. are short-circuited, 50 μs is obtained. This time constant is interlocked with the Dolby N.R. switch. The Dolby N. R. circuit, being highly sensitive to high frequencies, will malfunction when there is a carrier leak from the MPX unit.
Although the 19 kHz pilot signal is especially difficult to remove because of its proximity to the Audio signal, the N-630 uses a specially-designed low-pass filter to achieve an attenuation characteristic of 40 dB or more for the 19 kHz signal, while keeping flat frequency response up to 15 kHz.

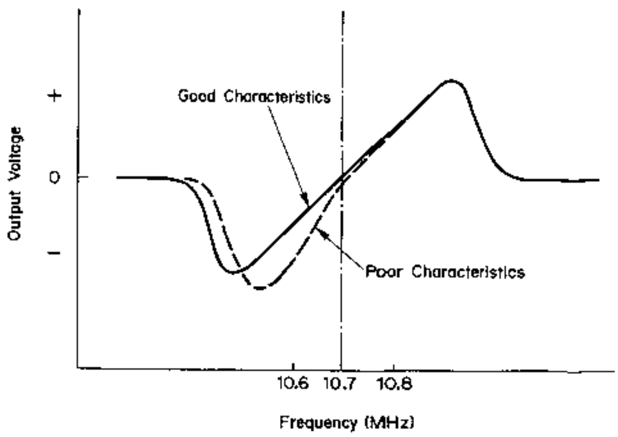


Fig. 2.4 Discriminator Characteristics (S-curve)

2.2 Indicator Unit

Refer to Fig. 2.5, indicator unit circuit diagram. The indicator unit performs various controls by a combination of the two signals; that is,the DC voltage proportional to the signal intensity obtained by amplifying and rectifying the signal from the inter frequency unit, and the signal amplified by the DC amplifier in the initial stage of the MPX unit. Fig. 2.6 shows a timing chart.

2.2.1. Tuning

When the N-630 is tuned in, the S-curve becomes symmetrical, i.e. the DC level becomes 0 V, at the test point (output of the initial stage DC amplifier) of the MPX unit. Since the input level to Q501 of the indicator unit becomes 0 V DC, the crossing points of R511, R512, R513 with C502 become 0 V.

When the Q505, 507, 506, 508, 509, 510 go OFF and the Q512 is turned ON, Q511 is turned ON, bringing the tuning lamp to illuminate and releasing the mute signal about 160 ms later. Q512 is turned ON when the DC voltage level (rectified) from the inter frequency unit exceeds the muting threshold level (17 μV 30 dBf).

When the DC voltage level from the inter frequency unit is supplied to Q515, Q515 is turned ON. Therefore, Q503 is turned OFF about 640 ms later, decreasing the gain of the DC amplifier consisting of Q501 and Q502 by 6 dB.

2.2.2. Detuning

In detuning, a DC voltage, positive or negative depending on the direction of detuning, is produced at the test point of the MPX unit due to the loss S-curve symmetry.

When a positive voltage is applied to the base of Q501, the potential of the crossing points of C502 with R511, 512, 513 becomes positive. At this time, Q505 is turned ON and Q506 goes OFF.

When Q505 is turned ON, Q507 is also turned ON, and the lamp connected to "2" of connector CN-3 illuminates. Turning Q507 ON brings Q509, 510 to ON and Q511 to OFF, and Q513 to ON. When Q513 is turned ON, Q514 is cut off and mute is applied.

This mute circuit, constituting an AND circuit with Q513 and Q516, is muted regardless of the test point level of the MPX unit, unless the DC voltage level comes from the inter frequency unit.

When there is no DC voltage level in the inter frequency unit and no signal at the test point of the MPX unit, illuminated arrows (▷ ◁) and tuning lamp are turned off.

When a negative potential is applied to Q501, Q506 is turned ON and Q505 is turned OFF.

Turning Q506 ON brings Q508 to ON, and illuminates the ▷ lamp.

Operation after Q509 is identical to the case when a positive potential is applied.

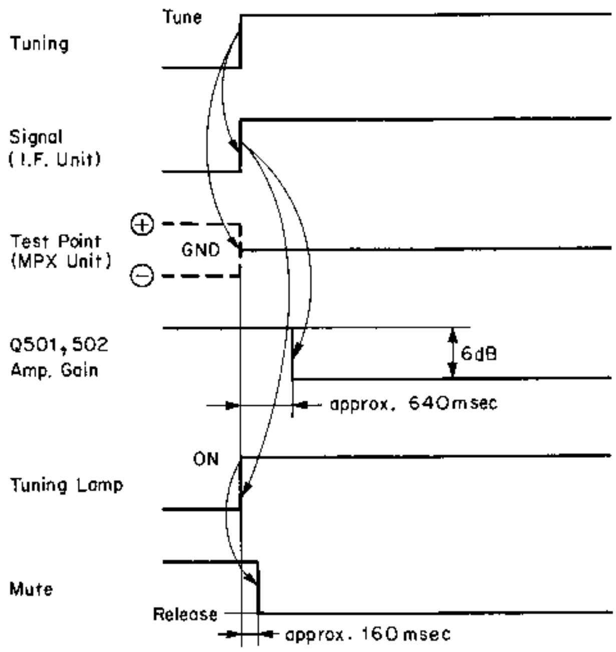


Fig. 2.6 Indicator Unit Timing Chart

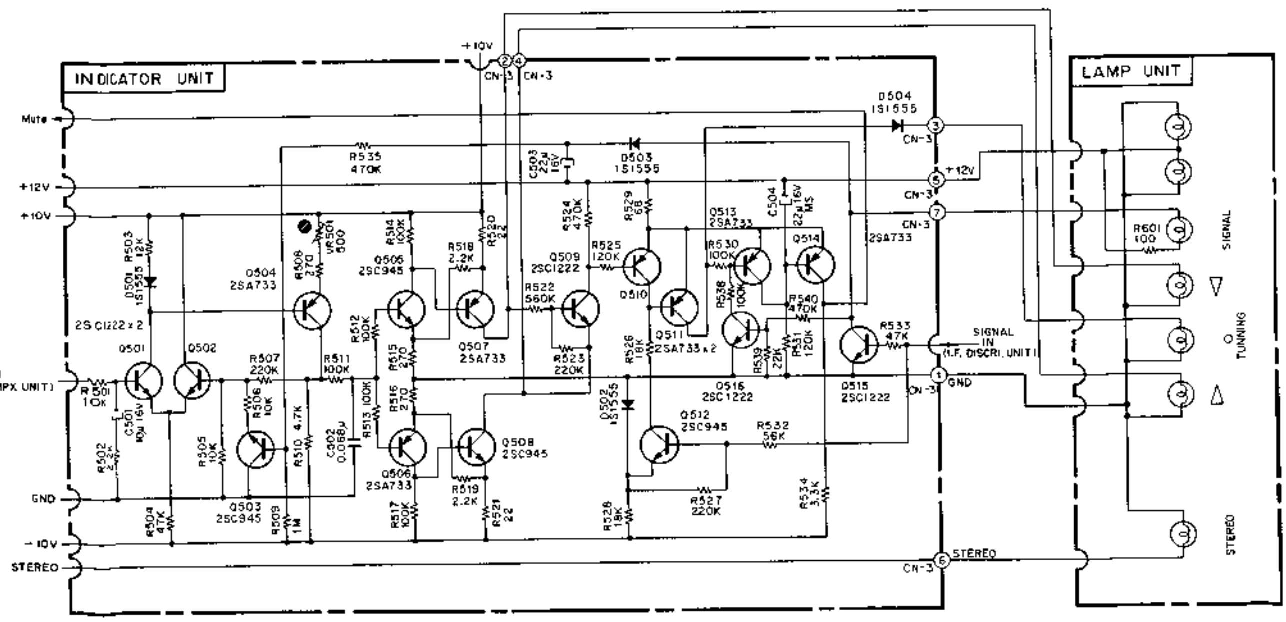


Fig. 2.5 Indicator Unit Circuit Diagram

2.3. Mute Signal

Output signals are muted for a certain period of time to prevent transient noise when power is ON or OFF. Fig. 2.7 shows the mute circuit and Fig. 2.8 shows a timing chart of the mute signal.

Power ON

Transformer output is rectified through diode D903 and smoothed by capacitor C907. Therefore, positive potential appears at C907 (transistor Q911 base). Accordingly, Q911 is in the cut-off state.

C906 (22 μF) is charged with negative potential through R914 (1 MΩ), therefore at the level where the voltage across C906 exceeds Vbe (base-emitter voltage) of Q910, Q910 turns from OFF to ON. As a result, Q909 turns ON and the mute signal is changed from + V to −10V, releasing the mute state. (The mute time depends on C906 and R914 after power is ON.)

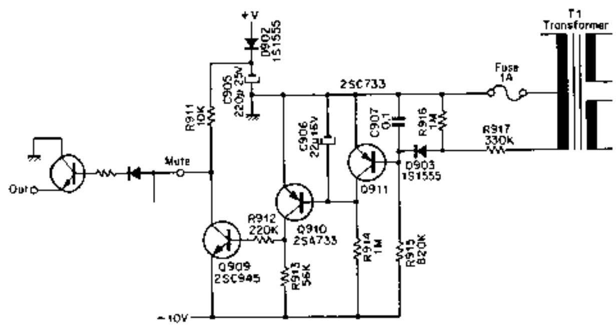


Fig. 2.7 Mute Circuit

Power OFF

Transformer output becomes zero and so C907 is charged with negative potential through R915. At the level where the voltage across C907 exceeds Vbe of Q911, Q911 turns from OFF to ON and C906 is quickly discharged. Thus, Q910 is cut off and Q909 is also cut off.

The mute signal voltage becomes positive to mute the output signal. D902 acts to prevent + V from being discharged easily when power is off.

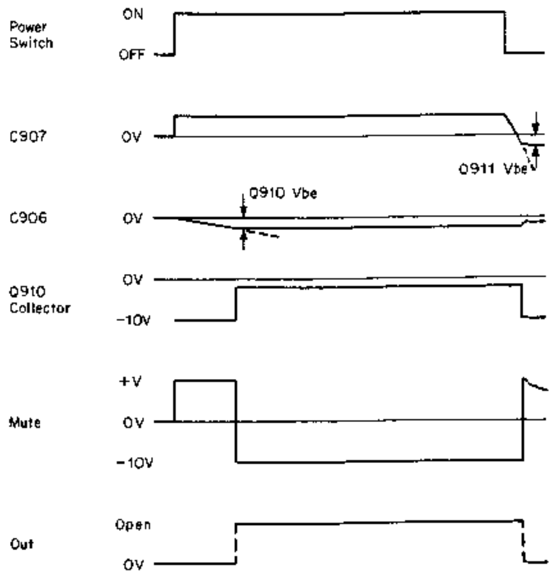


Fig. 2.8 Mute Signal Timing Chart

2.4. Phono (RIAA) Equalization Amplifier

The phono input sensitivity selector of the N-630 phono equalization amplifier allows switching the sensitivity to 1 mV, 2 mV and 5 mV so that you can select proper sensitivity matching the output level of your cartridge. (Input impedance is 100 kΩ constant.) This makes it possible to prevent an excessive input and to directly connect an MC cartridge without a booster.

To realize a better S/N ratio, a triple transistor configuration shown in Fig. 2.9 is employed at the first stage. (On the N-630, design considerations have been taken to eliminate thermal noise (En) produced by the transistor base input resistor (hie).)

As shown in Fig. 2.10 (a model of transistor showing the noise components), signal source impedance Rs is connected in series to the transistor-base-input-resistance hie.

In such a circuit, Rs is usually larger than hie and in many cases, the thermal noise produced by Rs exceeds En and En is apt to be ignored.

However, for an MC cartridge whose Rs is very small (tens - hundreds ohms), hie will have great influence to the S/N ratio.

To solve this problem, the N-630 employs a unique circuit —triple transistor system—where hie can be reduced to 1/3 the conventional level and En to $1/\sqrt{3}$. Together with application of this special circuit, the N-630 utilizes low-noise transistors, producing little current-noise In to improve the S/N ratio approximately by 10 dB.

This unique circuit is also employed in the Tone Amp. Circuit.

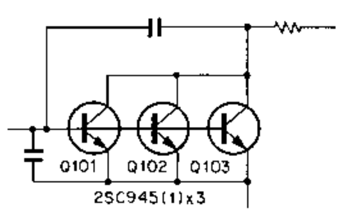


Fig. 2.9 Triple Transistor Configuration

In: Transistor current noise
Rs: Signal source impedance
hie: Transistor base input resistance
En: Thermal noise by hie

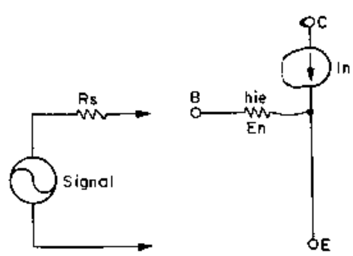


Fig. 2.10 Noise Component Model

3. REMOVAL PROCEDURES

3.1. Cabinet Ass'y and Front Panel Ass'y

Refer to Fig. 3.1. Remove F01 (five places), then F02 (cabinet ass'y). Remove F03, F04 (four knobs), F05 (knob), F06 (four places), F07 (handle B ass'y) and F08 (connector), then F09 (front panel ass'y).

3.2. Switch ST Ass'y, Tone P.C.B. Ass'y, VR P.C.B. Ass'y and Headphone Ass'y

Refer to Fig. 3.2. Remove front panel ass'y referring to above item 3.1. Remove F01 (four places), then F02 (switch ST ass'y). Remove F03 (two places), then F04 (tone P.C.B. ass'y). Remove F05 (two places) and F06 (connector), then F07 (VR P.C.B. ass'y). Remove F08 and F09 (connector), then F10 (headphone ass'y).

3.3. Pin Jack P.C.B. Ass'y, Outlet, Fuse, Voltage Selector and Power Transformer

Refer to Fig. 3.3. Remove cabinet ass'y referring to item 3.1. Remove F01 and F02, then F03 (pin jack P.C.B. ass'y). Remove F04 and F05, then F06 (ground terminal) and F07. Remove F08 (four places) and F09, then F10 (outlet). Remove F11 and F12, then F13 (fuse holder). Remove F14 and F15, then F16 (voltage selector switch). Remove F17 and F18, then F19 (power transformer) and F20 (transformer spacer). Remove F21 and F22 (rear panel sub ass'y), then F23 (power cord) and F24.

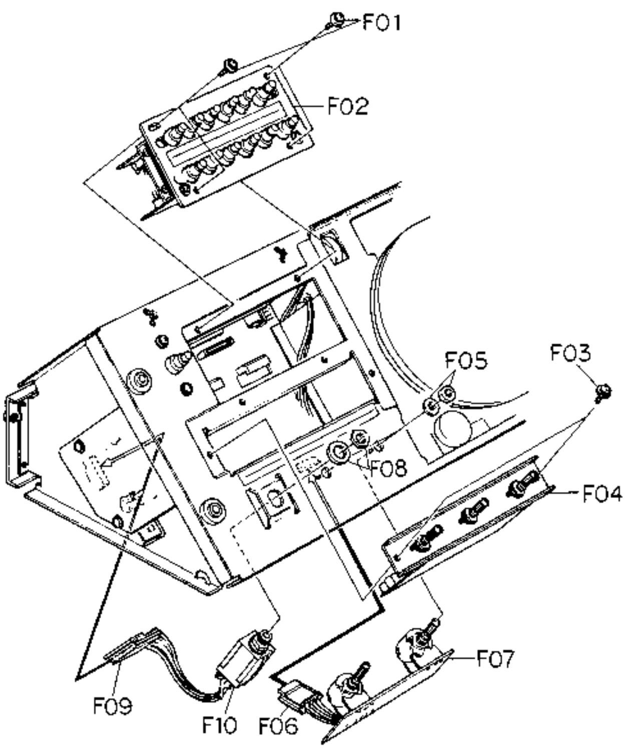


Fig. 3.2

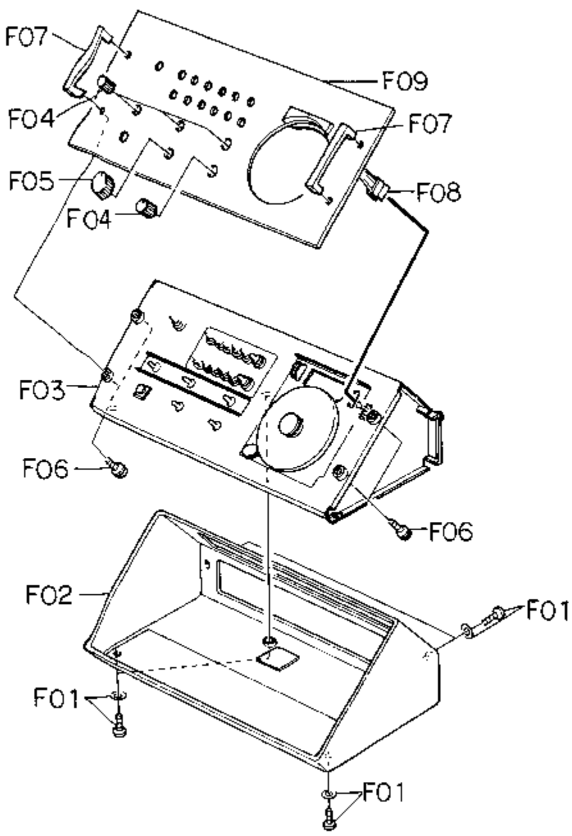


Fig. 3.1

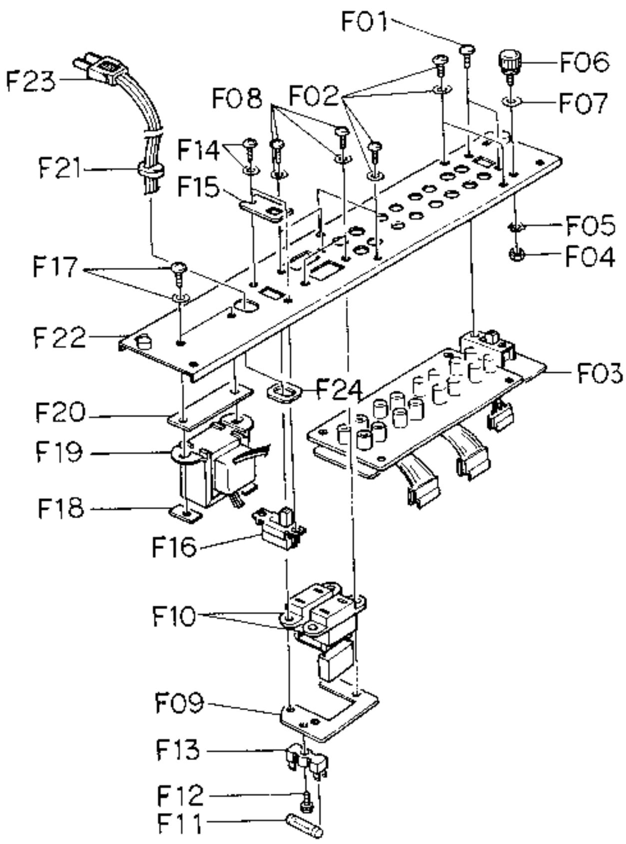


Fig. 3.3

3.4. Dial Pulley Ass'y US, Dial Chassis Ass'y, etc.

Refer to Fig. 3.4. Remove front panel ass'y referring to item 3.1. Remove F02 (rubber ring) and loosen F02 (Screw M3x6 hex. socket head), then remove F03 (tuning knob). Remove F04 (C-ring) and F05 (dial spring), then F06 (dial pulley ass'y US). Remove bonded F07 (dial thread ass'y) from F06. Remove F08 and F09, then F10 (dial chassis ass'y) from F11 (FE chassis ass'y).

Note: A specially designed tool should be used to remove F02 and F04.

3.5. Disassembly of Dial Pulley Ass'y

Refer to Fig. 3.5. Remove dial pulley ass'y referring to above item 3.4. Remove F01, F02 (retainer holder) and F03 (ball retainer), then F04 (ball 4 mm). F07 (dial scale plate US) is assembled with F05 (dial pulley) by a lock mechanism of F05. Disassemble F05 by pushing the nails of the lock mechanism to the center, accessing from the bottom of F07. Bonded F06 (dial himelon) should be replaced after removal.

3.6. Flywheel Ass'y and Guide Pulley

Refer to Fig. 3.6. Remove dial pulley ass'y referring to item 3.4. Remove F01 and F02, then F03 and F04 (flywheel ass'y). Remove F05, then F06 (guide pulley). Remove F07, then F08 (pulley holder ass'y).

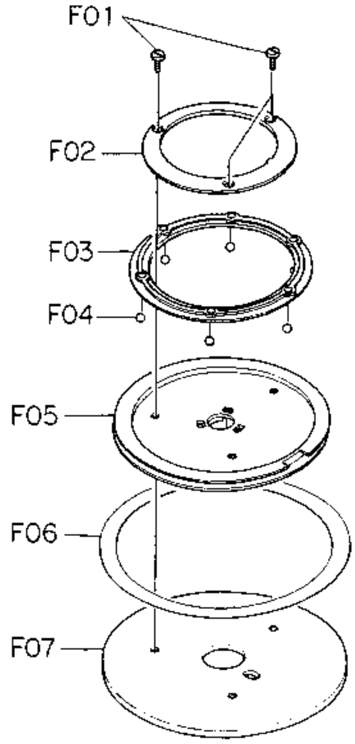


Fig. 3.5

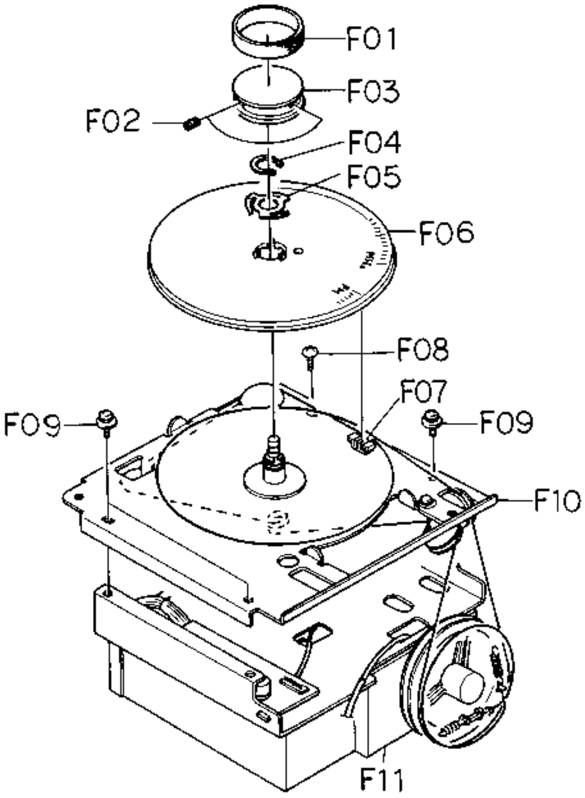


Fig. 3.4

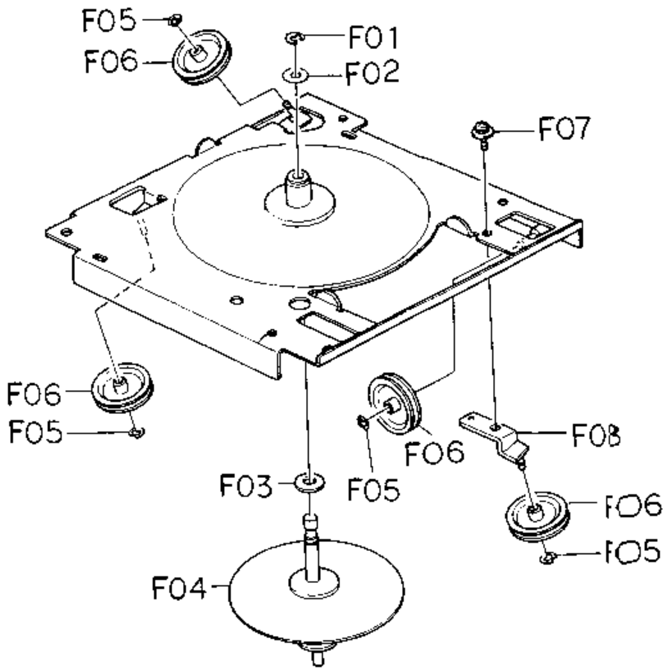


Fig. 3.6

3.7. Indicator P.C.B. Ass'y, MPX P.C.B. Ass'y, IF Block Ass'y and FE Pulley

Refer to Fig. 3.7. Remove F01, F02 (connector) and F03 (connector), then F04 (MPX P.C.B. ass'y). Remove F05 and F06, then F07 (IF block ass'y). Remove F08, then F09 (indicator P.C.B. ass'y). Remove F10, then F11 (FM front-end). Loosen F12, then remove F13 (FE pulley).

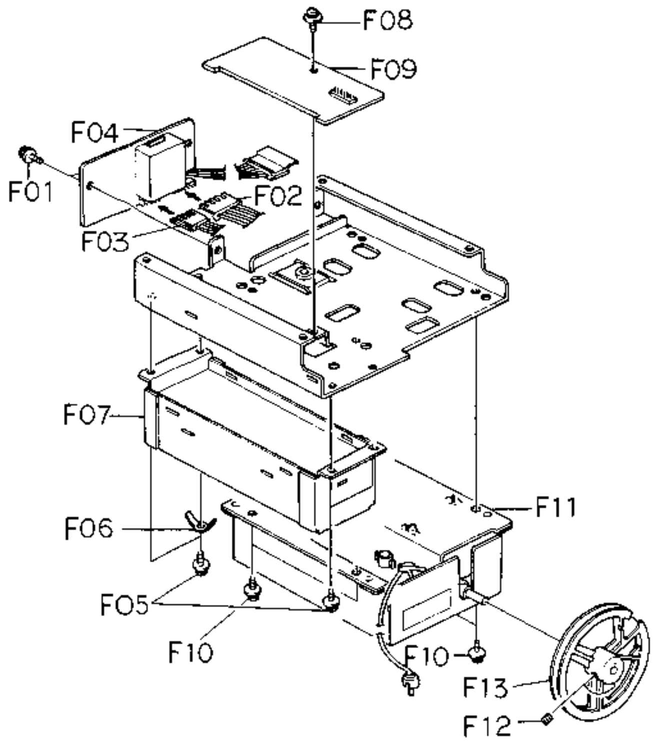


Fig. 3.7

3.8. Tuner Ass'y US and Rear Angle

Refer to Fig. 3.8. Remove front panel ass'y referring to item 3.1. Remove F01 (four places) and pull off F02, then remove F03 (tuner ass'y US). Remove F04 (two places), then F05 (rear angle).

3.9. EQ. P.C.B. Ass'y

Refer to Fig. 3.9. Remove cabinet ass'y referring to item 3.1.

Remove F01 (four places), F02 (connector) and F03 (connector), then F04 (EQ. P.C.B. ass'y).

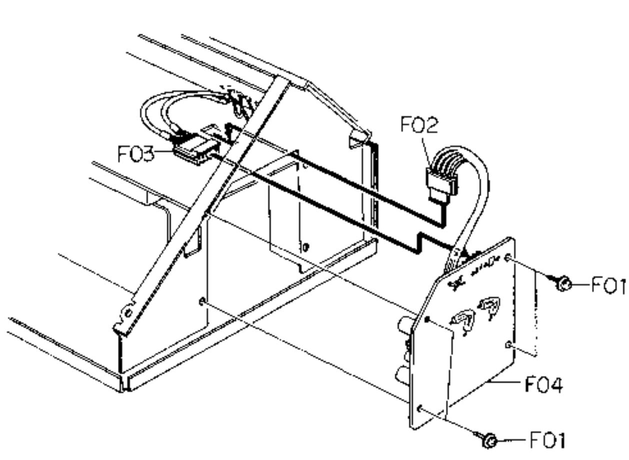


Fig. 3.9

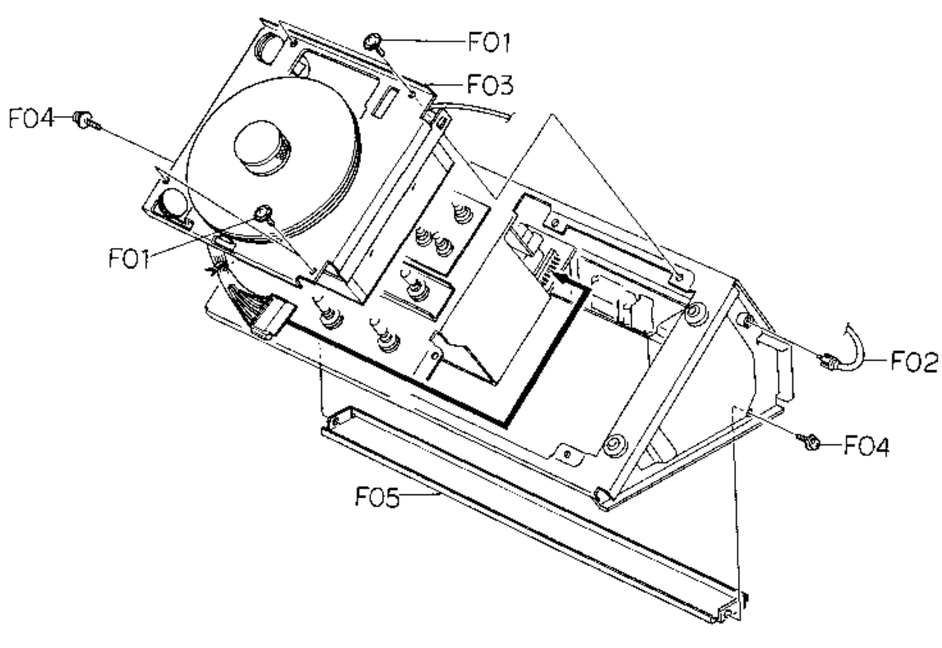


Fig. 3.8

3.10. Power Supply P.C.B. Ass'y

Refer to Fig. 3.10. Remove cabinet ass'y referring to item 3.1. Remove F01 (five places) and F02 (connector), then F03 (power supply P.C.B. ass'y).

3.11. 2P Terminal and Rear Name Plate

Refer to Fig. 3.11. Remove cabinet ass'y referring to item 3.1.

Remove F01, then F05 (coaxial connector). Remove F02 and F03, then F04 (2P terminal). Remove F06, then F07 (pin jack connector). Remove F08 (six places), then F09 (rear name plate).

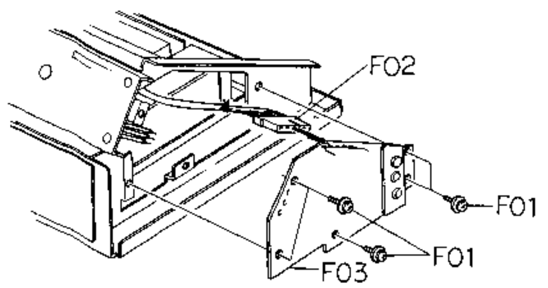


Fig. 3.10

3.12. Rear Panel Ass'y, Main P.C.B. Ass'y, Dolby NR P.C.B. Ass'y, etc.

Refer to Fig. 3.12. Remove cabinet ass'y referring to item 3.1.

Remove connectors F01, F02, F03 and F04, and F05, then F06 (rear panel ass'y). Remove F07 (five places) and F08 (main P.C.B. ass'y), then F09 (Dolby NR P.C.B. ass'y). Remove F10 (two places) and F11 (power switch ass'y), then F12 (push button ass'y).

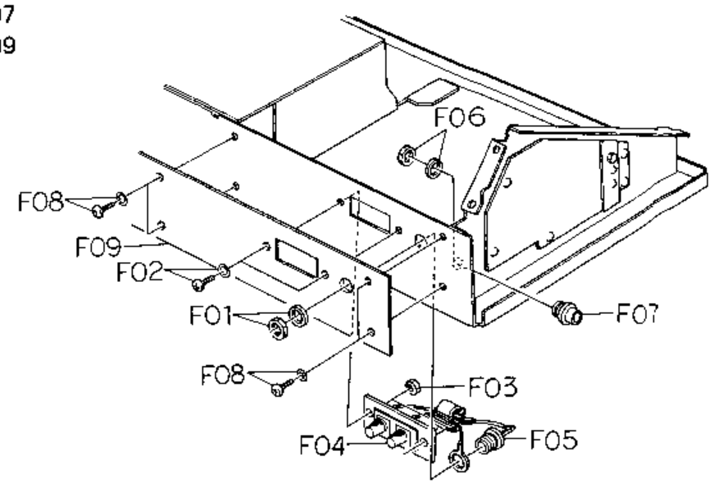


Fig. 3.11

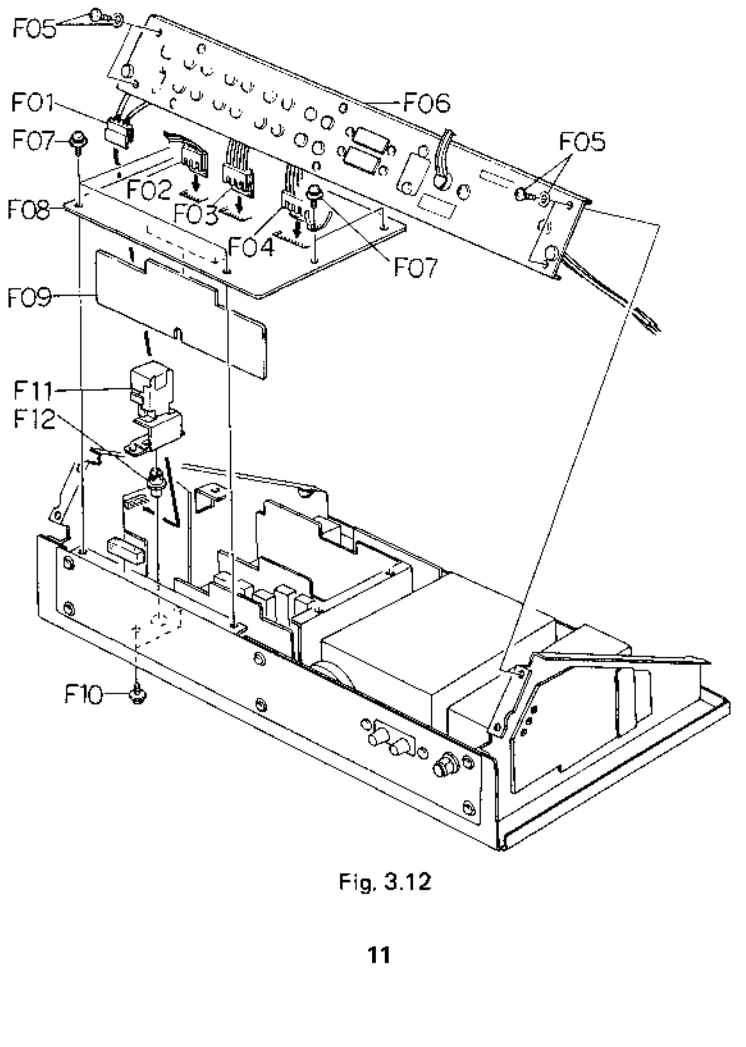


Fig. 3.12

4. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

4.1. Preamplifier Section

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
1	Hum Cancel	Shorting Plugs (whose positive and negative sides are shorted) into PHONO INPUT Jacks	AC Voltmeter and Oscilloscope to TAPE RECORD OUTPUT Jacks 1 or 2	Function Sw. – Phono Tape Monitor Sw. – Source Phono Input Sensitivity Selector Sw. – 1mV	Pin Jack P.C.B. Hum Cancel Coils	Adjust Hum Cancel Coils to obtain minimum hum level on the AC voltmeter.
2	Phono EQ. Amp. Distortion	100 Hz to PHONO INPUT Jacks	Distortion Meter and AC Voltmeter to TAPE RECORD OUTPUT Jacks 1 or 2	Function Sw. – Phono Tape Monitor Sw. – Source Balance Control – Center Position Volume Control – Minimum Phono Input Sensitivity Selector Sw. – 2mV	EQ. P.C.B. R122, R222	Adjust oscillator output level to obtain 2 V on the voltmeter. Then adjust R122 (R222) of the EQ. P.C.B. to obtain less than a 0.003% reading on the distortion meter. (Values of the resistors R122 and R222 are adjusted in a range of 100 kΩ to 150 kΩ to improve low frequency band distortion of the EQ. amplifier. (Standard value: 150 kΩ)) Note: Use an oscillator with good S/N ratio and low distortion.
3	Tone Control Frequency Response	1 KHz and 30 Hz to AUX INPUT Jacks	AC Voltmeter to PREAMP OUTPUT Jacks	Function Sw. – Aux Balance Control – Center Position Bass and Treble Controls – "0" Contour Control – "Normal"	Tone P.C.B. VR133, VR233	Feed in 1 KHz and adjust volume control to obtain 1 V (for example) on the voltmeter. Then feed in 30 Hz and adjust VR133 (VR233) to obtain same level (1 V) on the voltmeter.
4	Dolby NR Circuit	5 KHz to CN4-1, 5	AC Voltmeter to Dolby NR P.C.B. Connector Terminals		Dolby NR P.C.B. VR101, VR201 VR102, VR202	1. Turn LAW controls VR101 (VR201) fully counterclockwise. 2. Turn GAIN controls VR102 (VR202) fully counterclockwise. 3. Release the Dolby NR switch (Dolby NR: "Out") and short test pins TP101 and TP201 to ground. 4. Connect an AC voltmeter to monitor terminal 5 for the right channel or 10 for the left channel. 5. Apply 5 kHz signals having proper level to input so that the voltmeter may read 44 mV at each channel. 6. Depress the Dolby NR switch (Dolby NR: "In") and adjust GAIN controls VR102 and VR202, till the voltmeter indicates 10 dB drop the noted voltage in 5 as above. 7. Note the voltage at monitor terminal 5 for the right channel or 10 for the left channel in Dolby NR "In" mode. 8. Remove TP101, 201 short and adjust LAW controls VR101 and 201 for 2 dB up in the voltage at output terminal. Note: Adjust only if board is repaired.
5	Changeover of FM De-emphasis			50 μs / 75 μs	Main P.C.B. R112, R212	Time constants of pre-emphasis in FM broadcasting over the world are classified to 50 and 75 μs. N-630 readily performs this changeover by simply mounting or dismounting a jumper. When resistors R112 and R212 are shorted by a jumper the time constant is 50 μs. When removed, the value is 75 μs. Time constant of 75 μs is mainly employed in the U.S.A. and Canada, and 50 μs in Europe and other countries including Japan.

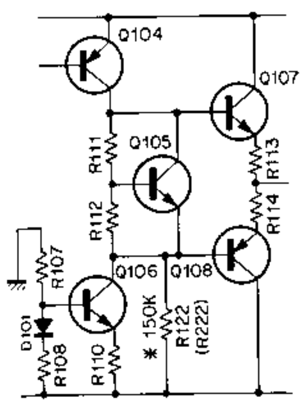


Fig. 4.1 Phono EQ. Amp. Distortion

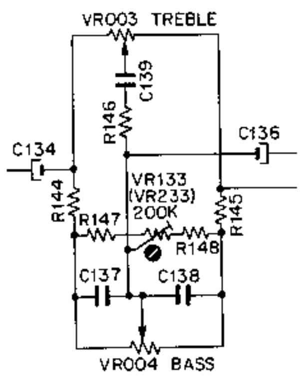


Fig. 4.2 Tone Control Frequency Response

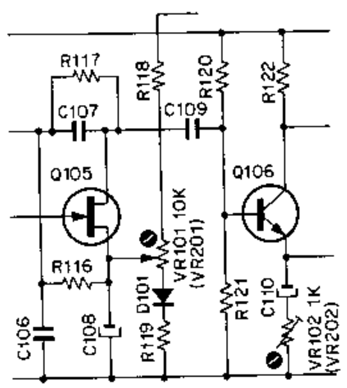


Fig. 4.3 Dolby NR Circuit

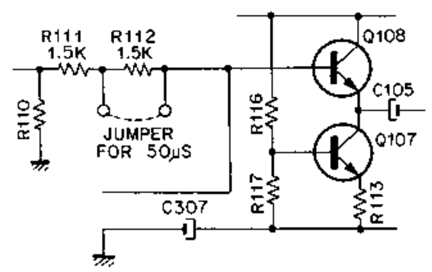


Fig. 4.4 Changeover of FM De-emphasis

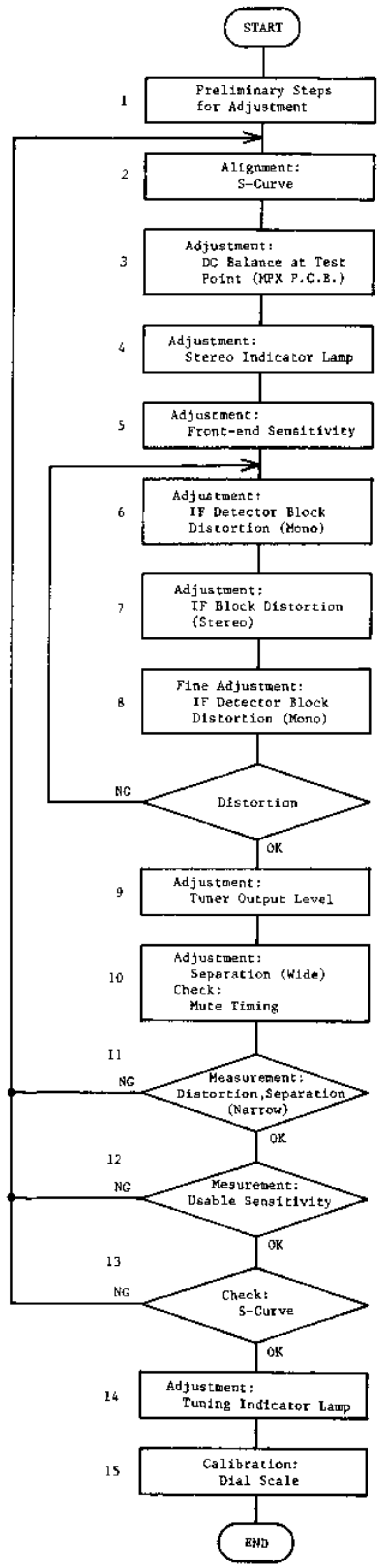


Fig. 4.5 Flow Chart

4.2. Tuner Section

Fig. 4.5 is a flow chart showing the adjustment procedures.

Fig. 4.6 is a diagram for adjustment and 4.7 is a connection diagram. Instruments and devices used for adjustment and measurement are as follows: These or equivalent instruments and devices should be used.

Model 1700B Distortion Measurement System
Model 1100A Signal Conditioner
Model 1000A FM Alignment Generator
Dummy Antenna (an accessory to Model 1000A)
(The above mentioned are supplied from Sound Technology Inc.)
Oscilloscope (vertical gain: DC 0.05 V/cm or more)
Channel Switch Box

As distortion of N-630 is less than 0.06% in Mono, the measuring device must keep its distortion much lower than that of N-630.

However the built-in oscillators of ordinary FM generators are not recommendable for the adjustment and measurement. The oscillator of M-1700B is preferable for such purposes.

Measurement and adjustment must be performed in a shielded room in principle; otherwise, the frequency should be selected so that no broadcasting frequency will become in a range of the selected frequency ±400 kHz. With all the instruments normally connected, make RF level of M-1000A FM alignment generator to be minimum, and then with Mute SW. of N-630 turned OFF (release), find out a frequency band in which no signal is received by turning Tuning Dial of N-630, while listening inter-station noise. A point of any noise tone variation should be avoided because there will be some weak radio frequency.

In this adjustment and measurement, the frequency meeting the above requirements should be set, for example, to 98 MHz on the M-1000A FM alignment generator.

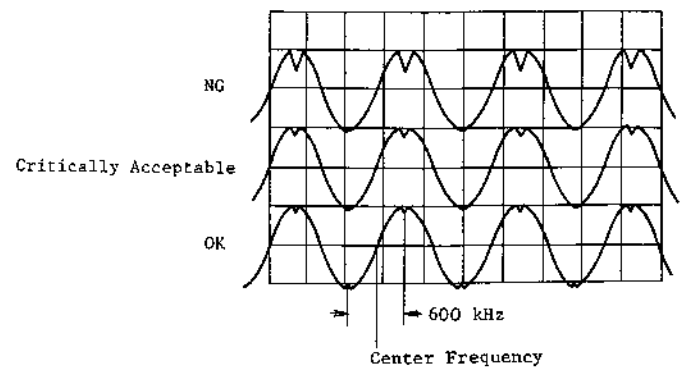


Fig. 4.8 S-curve Limit Sample

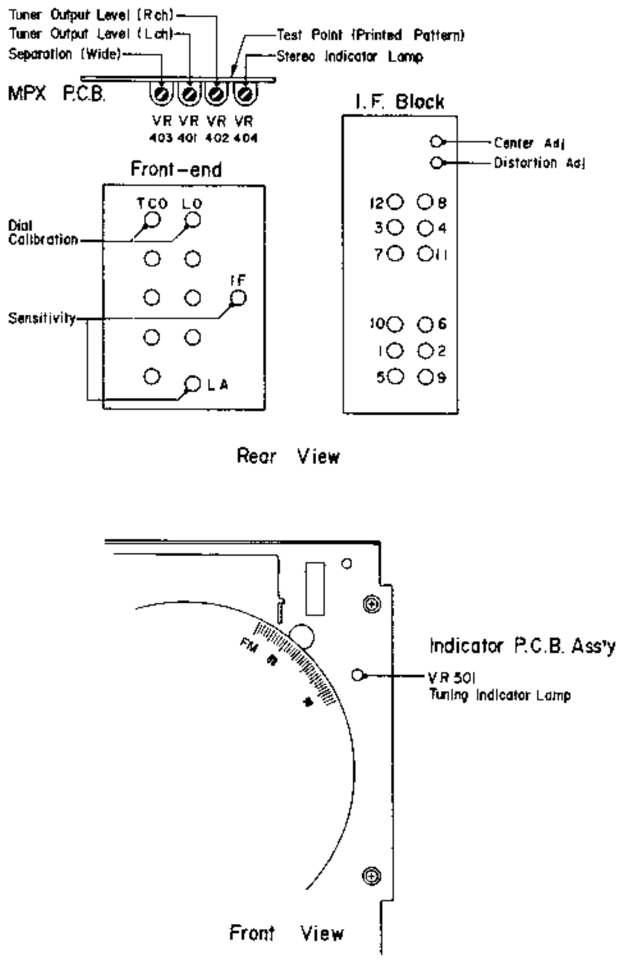


Fig. 4.6 Parts Location for Adjustment

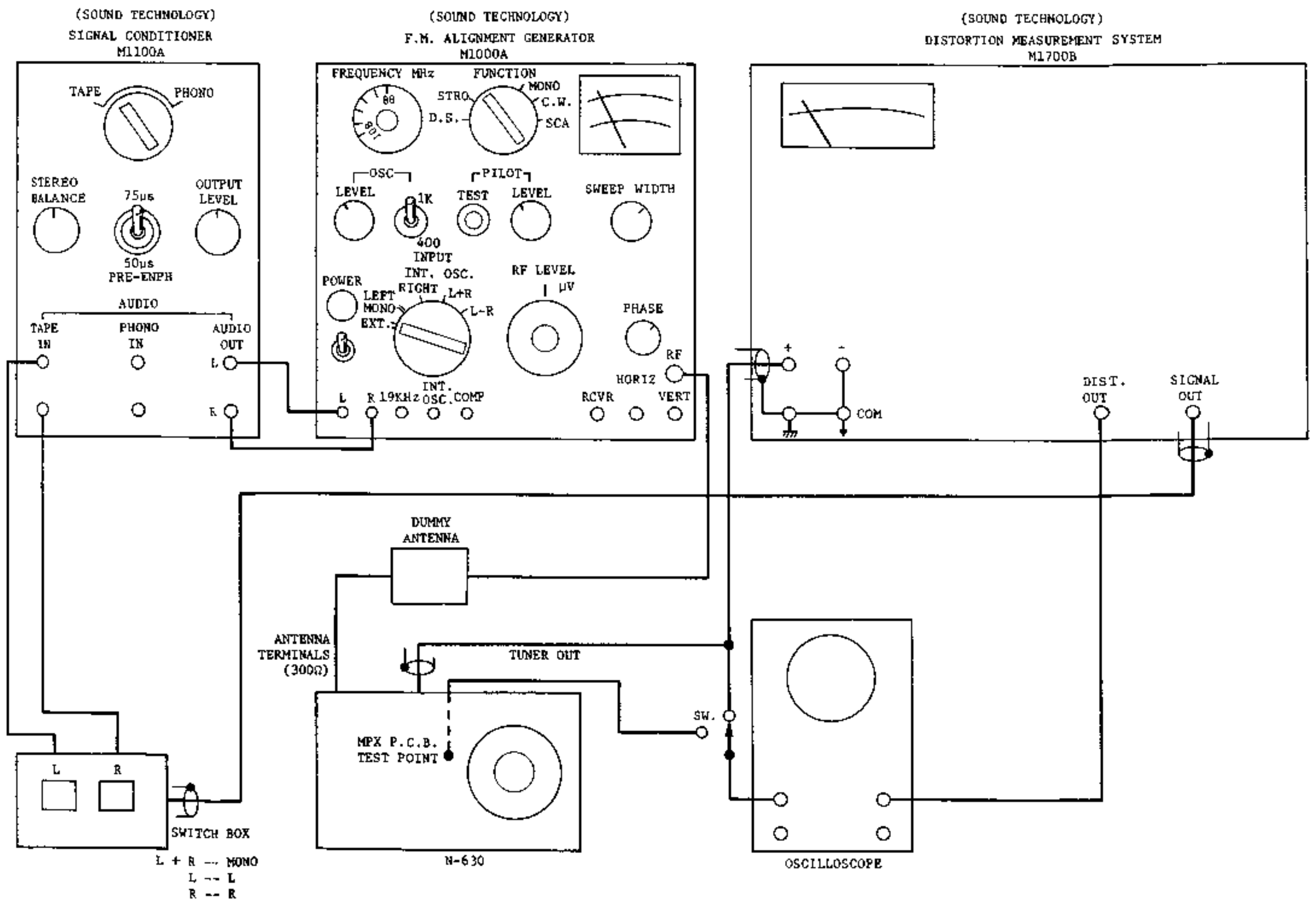


Fig. 4.7 Connection Diagram

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
1	Preliminary Steps for Adjustment				1. Disassemble the cabinet by removing five screws. 2. Position a testing pin at the test point on the MPX P.C.B. ass'y referring to MPX P.C.B. mounting diagram and circuit diagram. 3. Connect FM generator to 300 Ω FM antenna terminals of N-630. 4. Set the frequency of FM generator's to 98 MHz. (Refer to page 13.) 5. Keep N-630 mute switch released. 6. Before IF block adjustment, detouchment of the seal from the IF block is required. 7. Signal modulation is performed by adjusting signal output VR of M1700B distortion measurement system. The modulation rate is indicated by the meter on M1000A FM generator.
2	S-Curve Alignment	Oscilloscope to Test Point	FM Generator: Function – D.S. (Dual Sweep) Frequency – 98 MHz Sweep Width – 600 KHz RF Level – 1 mV (300 Ω) N-630: Narrow SW. – Depress (Narrow) Mode SW. – Depress (Mono)	IF Block Coils 1–12	1. Depress the Narrow switch, then turn the tuning dial on the N-630 to obtain longitudinally symmetrical S-curve waveform as shown "OK" in Fig. 4.8. (Center frequency at Narrow is thus obtained.) 2. Release the Narrow switch, and make sure that the S-curve is within a range of "critically acceptable" of the limit sample in the figure. If the curve is out of range, adjust all coils 1–12 by approximately 25 degrees in the same direction to set the curve within the required range. (Adjustment angle of the coils varies depending upon the asymmetry of S-curve waveform.) When adjustment is made on a single coil, turn the remaining coils in the same direction and by the same degree as with the one adjusted. Turn the coils counterclockwise if the upper portion of S-curve is distorted as "NG" in Fig. 4.8, and turn them clockwise if the lower portion is distorted. (The difference of the center frequencies between Narrow and Wide is thus corrected.) 3. Depress the Narrow switch again, then turn the tuning dial on the N-630 to obtain symmetrical S-curve waveform as shown "OK" in Fig. 4.8. Releasing the Narrow switch, make sure that the S-curve is within the range of "critically acceptable". 4. If the curve is off the range, repeat steps 1 and 2 discussed above till the curve becomes within the required area.
3	DC Balance Adjustment at the Test Point	Oscilloscope to Test Point Vertical Gain: DC 0.05 V/cm or more	FM Generator: Function – CW RF Level – 1 mV (300 Ω) N-630: Narrow SW. – Depress (Narrow) Mode SW. – Depress (Mono) Mute SW. – ON/OFF	IF Block Center Adj. Coil	1. Do not turn the frequency dial on the FM generator and tuning dial on the N-630 adjusted in above step 2 "S-Curve Alignment". This care should be paid until the adjustment of step 8 is completed. 2. Adjust the Center Adj. Coil to obtain 0 V DC (ground) level (within ±5 mV) on the oscilloscope. 3. Remove the FM generator from the antenna terminals of the N-630, then make sure that the tuning indicator lamps (▷ ◁) do not light when RF level of the FM generator is set to 0. Again connect the FM generator to the antenna terminals and set RF level to 1 mV (300 Ω).
4	Stereo Indicator Lamp Adjustment		FM Generator: Function – Stereo Frequency – 98 MHz (See note.) RF Level – 1 mV (300 Ω) Pilot Level – 0 Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% (Signal Modulation rate: 100%) Switch Box: L + R N-630: Narrow SW. – Depress (Narrow) Mode SW. – Release (Stereo)	MPX P.C.B. VR404	1. With the pilot test switch on the FM generator depressed, adjust the pilot level to obtain 80% (pilot signal modulation rate: 7.2%) on the meter of the FM generator. 2. Adjust VR404 so that the stereo indicator lamp will light up. As the lamp is illuminated in a certain range of VR, VR404 should be fixed approximately at the center of that range. 3. Depress the mode switch on the N-630, and make sure that the stereo indicator lamp goes out.
5	Sensitivity Adjustment of Front-end	Oscilloscope and Distortion Meter to TUNER OUTPUT Jacks	FM Generator: Function – Mono Frequency – 98 MHz (See note.) RF Level – 2.5 μV (300 Ω) Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L N-630: Narrow SW. – Release (Wide) Mode SW. – Depress (Mono)	Front-end Coils LA, IF	Adjust the coils LA and IF to obtain 3% or less distortion (Take care so as not to touch LO and TCO.) If a distortion of 3% or less is unable to be achieved, adjustment of the coil Nos. 1–4 in IF block will be necessary.

Note: Do not turn the frequency dial on the FM generator and tuning dial on the N-630 adjusted in step 2 "S-Curve Alignment".

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
6	Distortion Adjustment of IF Detector Block (Mono)	Oscilloscope and Distortion Meter to TUNER OUTPUT Jacks	FM Generator: Function – Mono Frequency – 98 MHz (See note.) RF Level – 1 mV (300 Ω) Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L N-630: Narrow SW. – Release (Wide) Mode SW. – Depress (Mono)	IF Block Coils 1, 3 Distortion Adj. Coil (Coils 2,4)	Adjust coil Nos. 1 and 3, and Distortion Adj. Coil to obtain 0.06% or less distortion. If a distortion of 0.06% or less is unable to be achieved, fine tuning of coil Nos. 2 and 4 will be necessary.
7	Distortion Adjustment of IF Block (Stereo)	AC Voltmeter and Distortion Meter to TUNER OUTPUT Jacks	FM Generator: Function – Stereo Frequency – 98 MHz (See note.) RF Level – 1 mV (300 Ω) Pilot Level – 100% (Pilot Signal Modulation Rate: 9%) Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L/L+R N-630: Narrow SW. – Release (Wide) Mode SW. – Release (Stereo)	IF Block Coils 5–12	1. Set the switch box to "L". 2. Adjust coil Nos. 5–12 to obtain 0.08% or less distortion. When one of the coils is turned, set the switch box to "L+R" and check whether the distortion is increased greatly. If the distortion is increased greatly, return it to the original position. Then adjust the another coil with switch box "L".
8	Distortion Fine Adjustment of IF Detector Block (Mono)	AC Voltmeter and Distortion Meter to TUNER OUTPUT Jacks	FM Generator: Function – Mono Frequency – 98 MHz (See note.) RF Level – 1 mV (300 Ω) Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L N-630: Narrow SW. – Release (Wide) Mode SW. – Depress (Mono)	IF Block Distortion Adj. Coil (Coils 1,3)	1. Adjust Distortion Adj. Coil to obtain 0.06% or less distortion. If a distortion of 0.06% or less is unable to be achieved, fine tuning of coil Nos. 1 and 3 will be necessary. 2. When readjustment of these coils is made, make sure that the distortion of the IF detector block in preceding step 7 is in a specified range. If the distortion factor does not comply with the specified value, repeat the steps 6 through 8 as described above until a satisfactory result is obtained.
9	Adjustment of Tuner Output Level	AC Voltmeter to TUNER OUTPUT Jacks	FM Generator: Function – Stereo Frequency – 98 MHz RF Level – 1 mV (300 Ω) Pilot Level – 100% Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L/R N-630: Narrow SW. – Release (Wide) Mode SW. – Release (Stereo)	MPX P.C.B. VR401, VR402	Adjust VR401 for the left channel at switch box "L" and VR402 for the right channel at "R" to obtain 580 mV on the AC voltmeter.
10	Separation Adjustment (Wide) and Check of Mute Timing	AC Voltmeter and Oscilloscope to TUNER OUTPUT Jacks	FM Generator: Function – Stereo Frequency – 98 MHz RF Level – 1 mV (300 Ω) Pilot Level – 100% Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L/R N-630: Narrow SW. – Release (Wide) Mode SW. – Release (Stereo)	MPX P.C.B. VR403	1. Set the switch box to "L". 2. Adjust VR403 to obtain 50 dB or more difference of levels between right and left channels on the AC voltmeter. 3. Set the switch box to "R", and make sure that the difference of levels is 50 dB or more. 4. Depress the mute switch. Make sure that when the tuning dial on the N-630 is tuned, the signal appears at the tuner output approximately 0.16 sec after the tuning indicator lamp is lit. At detuning make certain that the signal disappears simultaneously when the tuning indicator lamp goes out. Refer to Fig. 4.9, timing chart.

Note: Do not turn the frequency dial on the FM generator and tuning dial on the N-630 adjusted in step 2 "S-Curve Alignment".

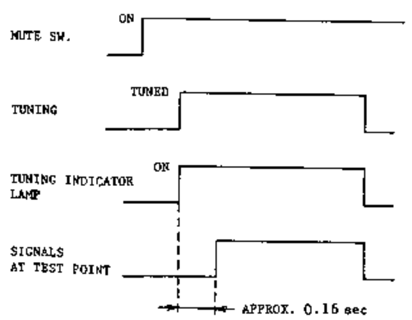


Fig. 4.9 Mute Timing Chart

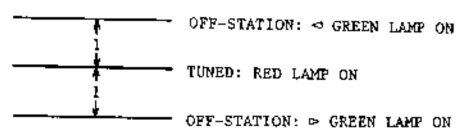


Fig. 4.10 Tuning Indicator Lamp Lighting Level

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
11	Distortion and Separation (Narrow)	AC Voltmeter and Distortion Meter to TUNER OUTPUT Jacks	FM Generator: Function – Stereo Frequency – 98 MHz RF Level – 1 mV (300Ω) Pilot Level – 100% Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L/R N-630: Narrow SW. – Depress (Narrow) Mode SW. – Release (Stereo)		1. Tune the tuning dial of the N-630 to obtain minimum distortion. 2. Make sure that the distortion is 0.5% or less at the switch box "L" or "R". 3. Setting the switch box to "L" or "R", make certain that the difference of the levels between right and left channels (separation) is 30 dB or more on the AC voltmeter for each mode. If the above distortion factor and the value of separation do not comply with specified ones, stricter readjustment starting from step 2 "S-Curve Alignment" will be necessary. (When out of specified value, inspite of the separation at wide shown in step 10 being satisfied, it will result from the great difference of the center frequencies between Wide and Narrow.)
12	Usable Sensitivity Measurement	Distortion Meter to TUNER OUTPUT Jacks	FM Generator: Function – Mono Frequency – 98 MHz Input Selector – EXT. M1700B: OSC. – 1 KHz, Level 100% Switch Box: L N-630: Narrow SW. – Release (Wide) Mode SW. – Depress (Mono)		1. Tune the tuning dial of the N-630 to obtain minimum distortion. 2. Adjusting the RF level of the FM generator, make sure that the RF level is 2.5 μV (300 Ω) or less when distortion reaches 3%. (At near 3% distortion, make a fine tuning of N-630 to obtain minimum distortion.) If the above value does not comply with the specified one, it will result from the difference of the center frequencies between Wide and Narrow. Therefore, stricter readjustment starting from step 2 "S-Curve Alignment" is necessary.
13	S-Curve Check	Oscilloscope to Test Point	FM Generator: Function – D.S. (Dual Sweep) Frequency – 98 MHz Sweep Width – 600 KHz RF Level – 1 mV (300 Ω) N-630: Narrow SW. – Depress (Narrow) Mode SW. – Depress (Mono)		1. Depress the Narrow switch, then turn the tuning dial of the N-630 to obtain longitudinally symmetrical S-curve waveform as shown in Fig. 4.8. 2. Release the Narrow switch and make sure that the S-curve is within a range of "critically acceptable" of the limit sample in the figure. If the curve is out of range, stricter readjustment starting from step 2 "S-Curve Alignment" will be necessary. 3. Remove the FM generator from the antenna terminals of the N-630, then make sure that the tuning indicator lamps (▷ ◁) do not light when RF level of the FM generator is set to 0. If the tuning indicator Lamps light, it will result from insufficient adjustment of IF block. Therefore, stricter readjustment starting from step 2 "S-Curve Alignment" is required. 4. Again connect the FM generator to the antenna terminals and set RF level to 1 mV (300 Ω).
14	Adjustment of Tuning Indicator Lamp	Oscilloscope to Test Point	FM Generator: Function – CW RF Level – 1 mV (300 Ω) N-630: Narrow SW. – Depress (Narrow) Mode SW. – Release (Stereo)	Indicator P.C.B. VR501 (for offset adjustment)	1. Remove the front panel of the N-630, then connect the connector CN-3 on the indicator P.C.B. with the indicator unit mounted on the front panel by an extension cord (Part No. DA09032A). 2. Drop RF level of the FM generator until the signal strength indicator lamp on the N-630 goes out. 3. Turn the tuning dial of the N-630 so that the tuning indicator lamp (red) will light up. 4. Increasing and decreasing the frequency of the FM generator, observe the each level lighting the tuning indicator lamps ▷ and ◁ by the oscilloscope. Adjust VR501 so that each level will become symmetrical against turned level as shown in Fig. 4.10.
15	Dial Scale Calibration			Front-end TCO, LO	1. Mount the front panel. 2. Turn the tuning dial of the N-630 CW or CCW until it stops, then make certain that the characters in alphabets MHz and FM on the dial scale correspond with the tuning pointer. If a satisfactory result is unable to be achieved, perform the fine positioning adjustment of the dial scale referring to in chapter 5 "Dial Thread Mounting Procedures". 3. Receiving the station with its frequency already known or setting the FM generator, tune the tuning dial of the N-630 to that frequency. Adjust TCO and LO so that the tuning indicator lamp (red) will light up. TCO: for higher frequency LO: for lower frequency 4. Assemble the cabinet.

5. DIAL THREAD MOUNTING PROCEDURES

Procedures for mounting a new thread on the tuning dial are described below. For preventing possible troubles caused by different types of threads or adhesives, it is recommended that you purchase the dial thread assembly (part No. JA03163A).

(1) Dismount the cabinet assembly and front panel assembly from the body, and remove the tuner block from the chassis.

(2) Refer to Fig. 5.1. Hitch F3 (dial thread) to F1 (sp stopper) with F2 (thread guide) containing the thread at the tip of F1. After pinching F2 with cutting pliers or similar, drip a drop of AVDEL BOND #C-2 onto the crushed F2 for fixing.

Thread: Hamilon Super 505 (Wadding: Aramid (Kevlar); Braided: Nylon Rope) with a length of 1600 mm.

(3) Refer to Fig. 5.2. Passing the thread through F4 (wire holder), set length of thread between F1 and F4 to be 545 mm. Drip a drop of AVDEL BOND #C-2 onto the point A for fixing the thread.

Note: When using an old wire holder, thoroughly remove the remaining adhesives from its surface.

(4) Refer to Fig. 5.3. Mount F1 (wire holder) on the wire holder fixing point of F2 (dial pulley). At this time, thoroughly remove the adhesives possibly remained before dripping a few drops of AVDEL BOND #C-2 onto the three points prepared at the end face for fixing.

(5) Refer to Fig. 5.4. Winding around F1 (dial pulley), pass the thread A via F5 (pulley). Pass the thread B above the thread A around F1, then send B along via F2 and F3.

(6) Refer to Fig. 5.5. After sending along via F2 and F3, wind the thread B around F6 (center shaft) 2 times upwardly, then pass B along via F4.

(7) Refer to Fig. 5.6. Mount F2 (dial pulley chassis ass'y) to F1 (FE chassis ass'y) by fastening F3 (screw M3x6 truss head) and F4 (screws M3x6 philips pan head (3A)).

(8) Refer to Fig. 5.7.1. Turning F7 (dial scale) to extreme CCW position, set "MHz" inscribed on the scale to the position indicated in the figure. (The position where "MHz" corresponds with the tuning point of the panel when the panel is fixed.) At this time, fix F6 (FE pulley) so that the E rib may become approximately vertical as shown in the figure. Referring to Fig. 5.7.2, connect the thread A to the pointer C of F6 via a spring.

Refer to Fig. 5.7.3. Winding the thread B about one and a half times around F6, pass along the thread B via F8 (thread guide) and F9 (spring). Fixing the spring to the hole D, determine the position of F8 (thread guide) with an allowance of 2 mm as shown in Fig. 5.7.4 while maintaining the tension of the thread. After pinching F8 with cutting pliers or similar, drip a drop of AVDEL BOND #C-2 onto F8 for fixing. Cut off the remainder of the thread.

(9) Checking and Fine Adjustment

After completing the above procedures, fix the tuner block to the chassis together with the front panel. By turning the tuning dial to extreme CW or CCW position, check to ensure that "FM" or "MHz" meets with the tuning point respectively. In case a discrepancy is found, readjust the position of the pulley by loosening two screws as shown in Fig. 5.8. Fasten these two screws and then mount the cabinet assembly.

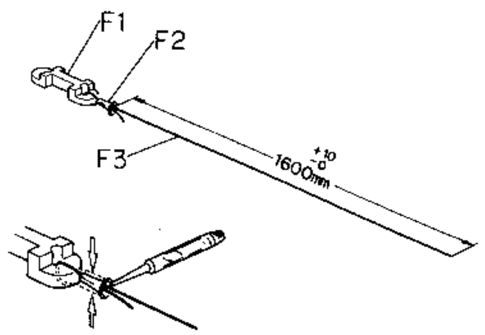


Fig. 5.1

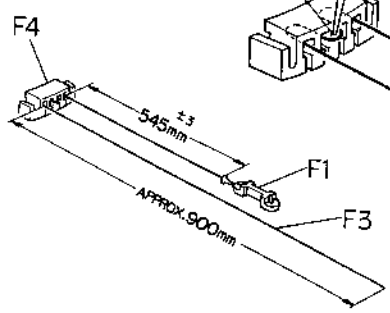


Fig. 5.2

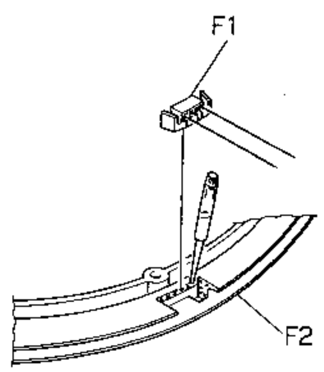


Fig. 5.3

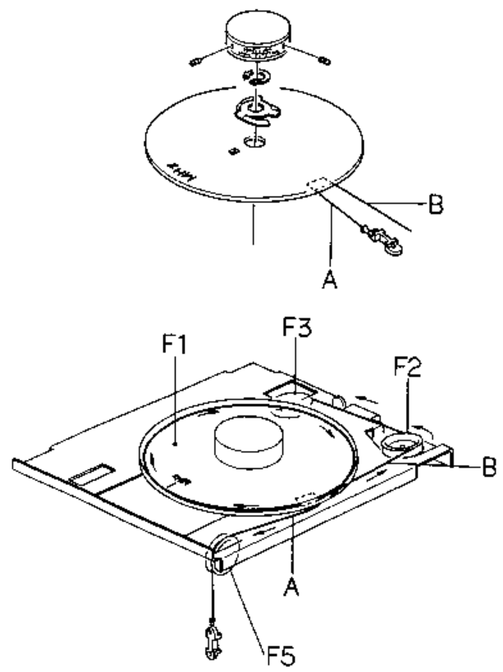


Fig. 5.4

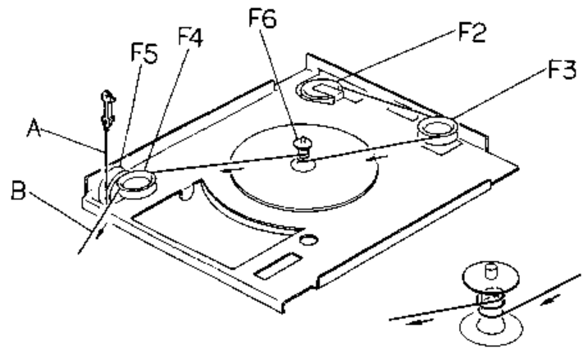


Fig. 5.5

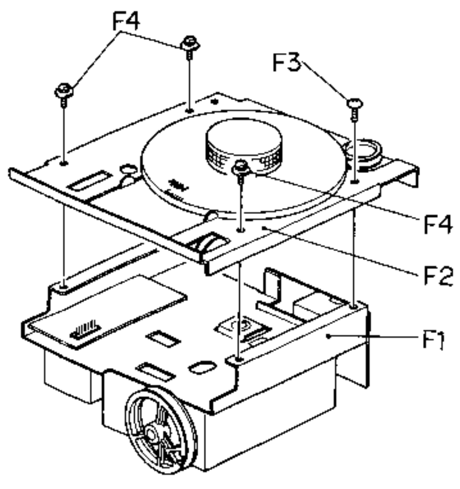


Fig. 5.6

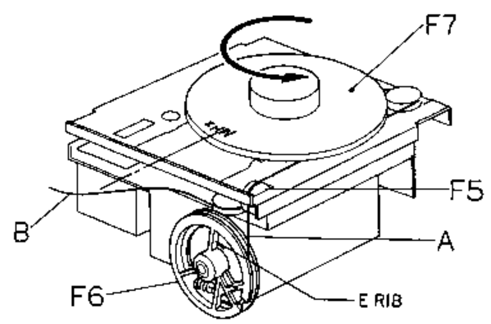


Fig. 5.7.1

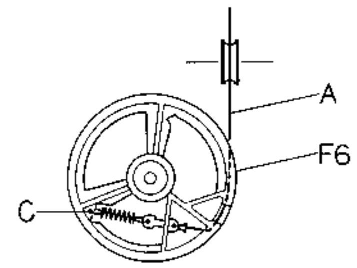


Fig. 5.7.2

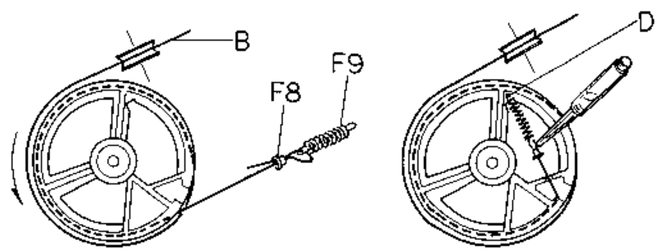


Fig. 5.7.3

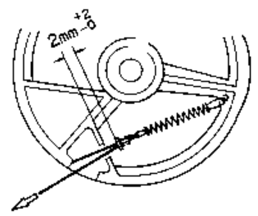


Fig. 5.7.4.

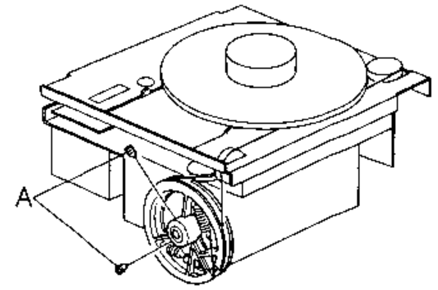


Fig. 5.8

6. MOUNTING DIAGRAM AND PARTS LIST

Note: Mounting diagram shows a dip side of the printed circuit board.

6.1. Main P.C.B. Ass'y

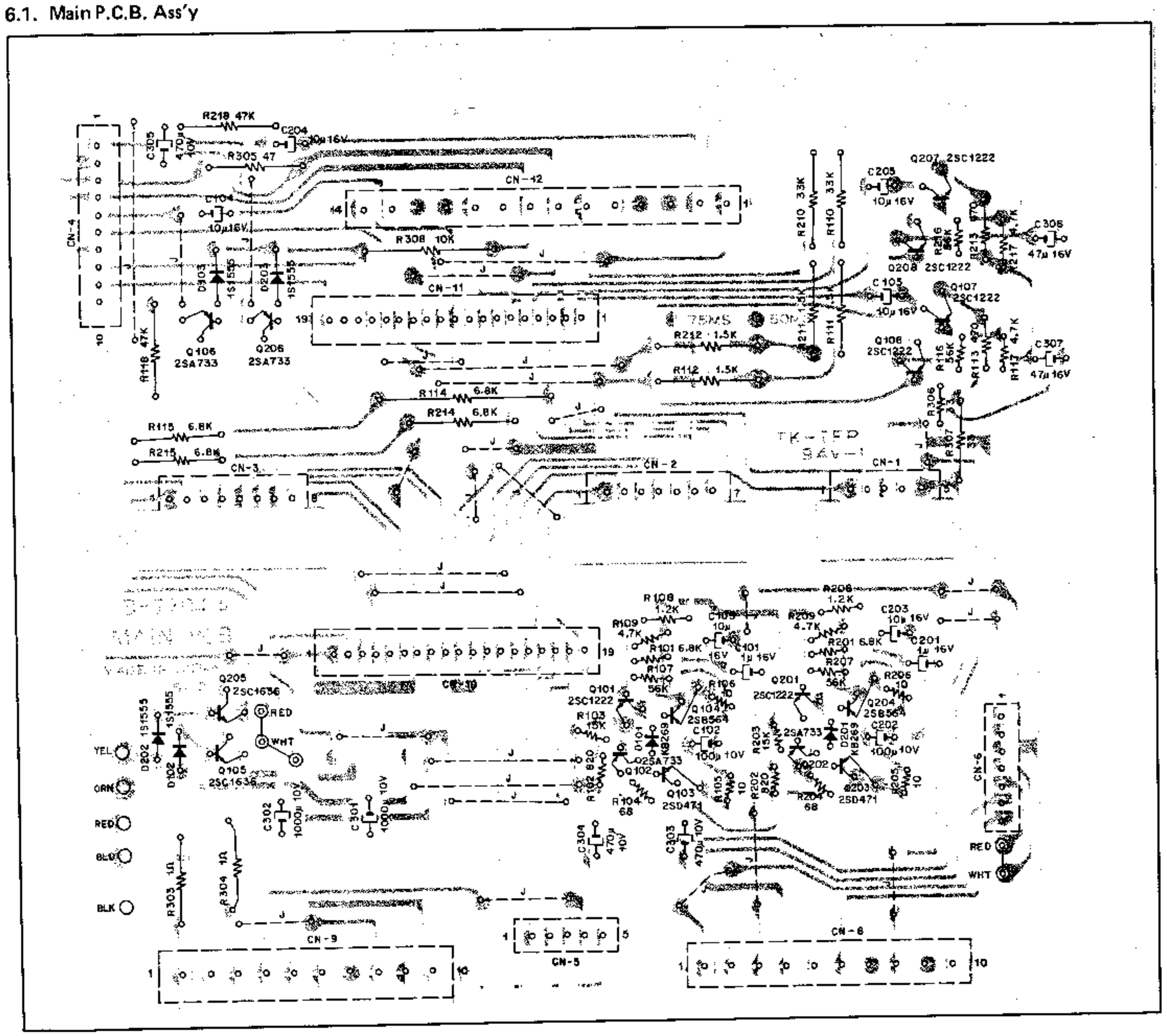


Fig. 6.1

6.2. VR P.C.B. Ass'y

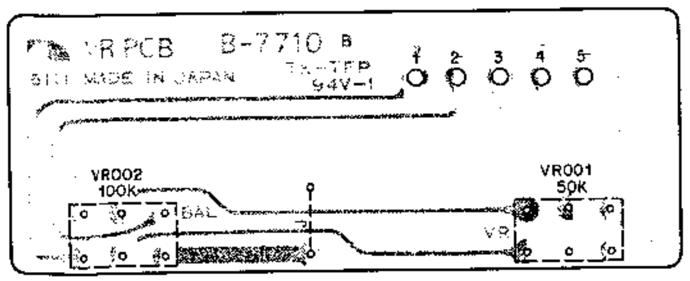


Fig. 6.2

Schematic Ref. No.	Part No.	Description
	BA03829A	VR P.C.B. Ass'y
	0B07710B	VR P.C.B.
VR001	0B07144A	Volume 50K (A)
VR002	0B07145A	Balance Volume 100K (MN)
	0B08314B	5P-H Connector Ass'y (1 pce.)

Schematic Ref. No.	Part No.	Description
	BA03823A	Main P.C.B. Ass'y
		– Headphone Amp. –
Q101, 201	0B06062A	Transistor 2SC1222
Q102, 202	0B06013A	Transistor 2SA733
Q103, 203	0B06066A	Transistor 2SD471
Q104, 204	0B06069A	Transistor 2SB564
D101, 201	0B01702A	Silicon Diode KB-269
R101, 201	0B01877A	Carbon Resistor 6.8K ERD-25V J
R102, 202	0B05511A	Carbon Resistor 820 ERD-25V J
R103, 203	0B05591A	Carbon Resistor 15K ERD-25V J
R104, 204	0B01788A	Carbon Resistor 68 ERD-25V J
R105, 106 205, 206	0B05663A	Carbon Resistor 10 ERD-25V J
R107, 207	0B05563A	Carbon Resistor 56K ERD-25V J
R108, 208	0B05565A	Carbon Resistor 1.2K ERD-25V J
R109, 209	0B01795A	Carbon Resistor 4.7K ERD-25V J
C101, 201	0B01405A	Electrolytic Capacitor 1µ 16V
C102, 202	0B05885A	Electrolytic Capacitor 100µ 10V
C103, 203	0B01412A	Electrolytic Capacitor 10µ 16V
		– Buffer Amp. –
Q107, 108 207, 208	0B06062A	Transistor 2SC1222
R306, 307	0B05567A	Carbon Resistor 33 ERD-25V J
R113, 213	0B01792A	Carbon Resistor 470 ERD-25V J
R116, 216	0B05563A	Carbon Resistor 56K ERD-25V J
R117, 217	0B01795A	Carbon Resistor 4.7K ERD-25V J
C105, 205	0B01412A	Electrolytic Capacitor 10µ 16V
C306, 307	0B01403A	Electrolytic Capacitor 47µ 16V
		– Miscellaneous –
Q105, 205	0B06070A	Transistor 2SC1636
Q106, 206	0B06013A	Transistor 2SA733
D102, 103 202, 203	0B01909A	Silicon Diode 1S1555
R110, 210	0B05509A	Carbon Resistor 33K ERD-25T J
R111, 112 211, 212	0B05698A	Carbon Resistor 1.5K ERD-25T J
R114, 214 115, 215	0B01682A	Carbon Resistor 6.8K ERD-25T J
R118, 218	0B05641A	Carbon Resistor 47K ERD-25T J
R303, 304	0B05695A	Carbon Resistor 1 ERD-25T J
R305	0B01706A	Carbon Resistor 47 ERD-25T J
R308	0B01888A	Carbon Resistor 10K ERD-25T J
C104, 204	0B01412A	Electrolytic Capacitor 10µ 16V
C301, 302	0B05852A	Electrolytic Capacitor 1000µ 10V
C303, 304 305	0B05884A	Electrolytic Capacitor 470µ 10V
CN1	0B08311A	5P-B Post
CN2	0B08312A	7P-B Post
CN3	0B08180A	8P-B Post
CN4	0B08286A	10P-S Post
CN5	0B08303A	5P-S Post
CN6	0B08302A	7P-T Post
CN8,9	BA03807A	10P Connector Ass'y
CN10, 11	BA03808A	19P Connector Ass'y
CN12	BA03809A	14P Connector Ass'y
	0B08319A	5P Connector Ass'y (1 pce.)
	0B07704D	Main P.C.B.

6.3. 17 V Dolby NR P.C.B. Ass'y

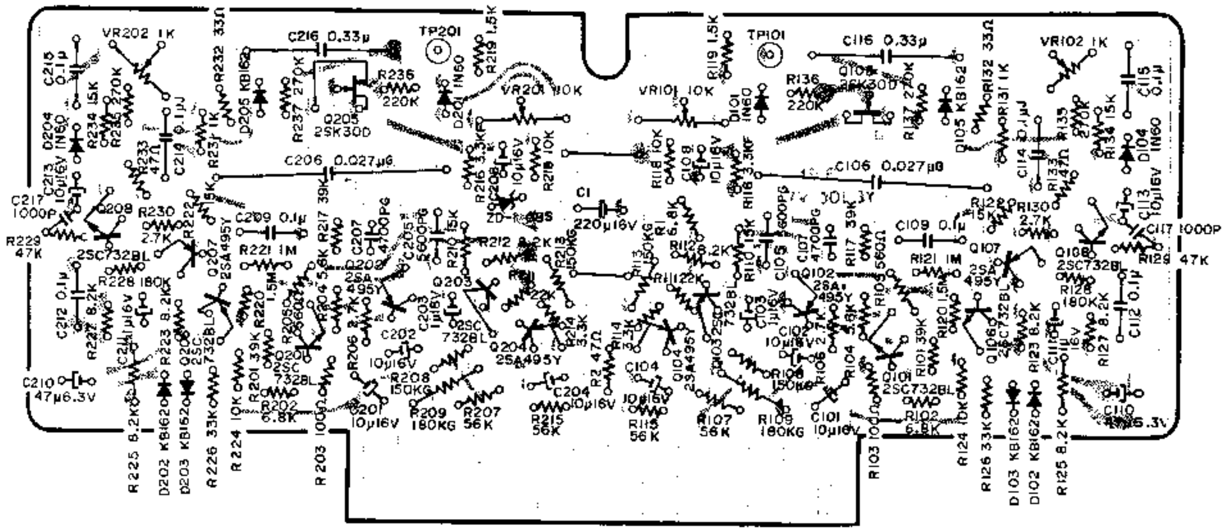


Fig. 6.3

Note: Transistors 2SA495Y and 2SC732BL are compatible with 2SA733 and 2SC900E, respectively.

6.4. Tone P.C.B. Ass'y

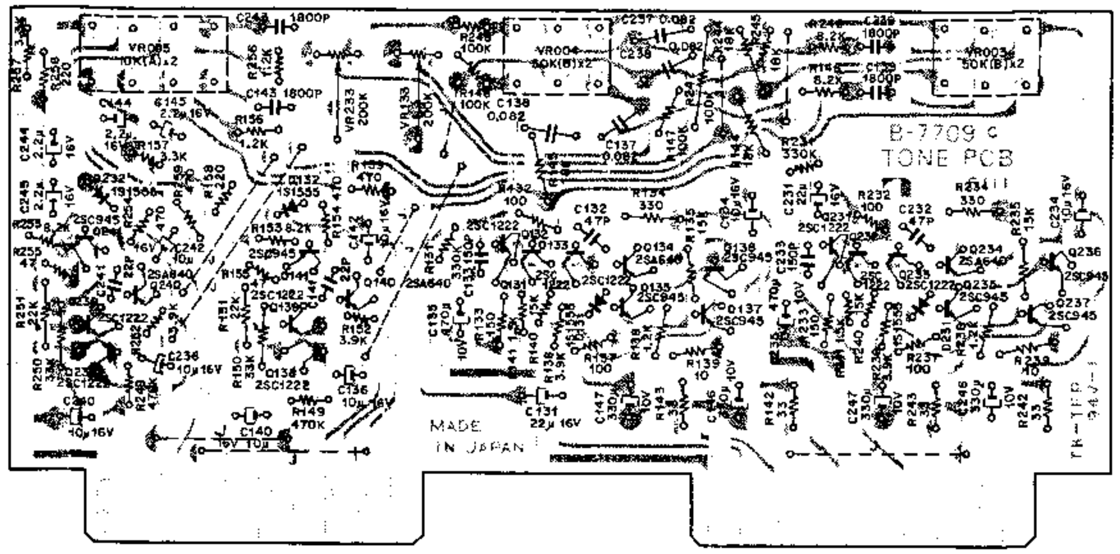


Fig. 6.4

Schematic Ref. No.	Part No.	Description
	BA03670A	**17V Dolby NR P.C.B. Ass'y**
	0B07609A	17V Dolby NR P.C.B.
Q101, 103 106, 108 201, 203 206, 208	0B01910A	Transistor 2SC900(E)
Q102, 104 107, 202 204, 207	0B06013A	Transistor 2SA733
Q105, 205	0B06001A	FET 2SK30A (D)
ZD1	0B06004A	Zener Diode EQA01 08S
D101, 104 201, 204	0B00030A	Germanium Diode 1N60(P)
D102, 103 105, 202 203, 205	0B01599A	Silicon Diode K8162
VR101, 201	0B01458A	Semi-fixed Volume 10K
VR102, 202	0B01428A	Semi-fixed Volume 1K
R1, 102, 202	0B01877A	Carbon Resistor 6.8K ERD-25V J
R2, 133 233	0B05569A	Carbon Resistor 47 ERD-25V J
R101, 117 201, 217	0B01885A	Carbon Resistor 39K ERD-25V J
R103, 203	0B05558A	Carbon Resistor 100 ERD-25V J
R104, 204	0B05673A	Carbon Resistor 5.6K ERD-25V J
R105, 205	0B05678A	Carbon Resistor 560 ERD-25V J
R106, 130 206, 230	0B01782A	Carbon Resistor 2.7K ERD-25V J
R107, 115 207, 215	0B05563A	Carbon Resistor 56K ERD-25V J
R108, 113 208, 213	0B01859A	Metal Film Resistor 150K ER0-25VK G
R109, 209	0B01590A	Metal Film Resistor 180K ER0-25VK G
R110, 122 134, 210 222, 234	0B05591A	Carbon Resistor 15K ERD-25V J
R111, 211	0B05661A	Carbon Resistor 22K ERD-25V J

Schematic Ref. No.	Part No.	Description
R112, 123 125, 127 212, 223 225, 227	0B01878A	Carbon Resistor 8.2K ERD-25V J
R114, 214	0B01793A	Carbon Resistor 3.3K ERD-25V J
R116, 216	0B01585A	Metal Film Resistor 3.3K ER0-25VK F
R118, 124 218, 224	0B01833A	Carbon Resistor 10K ERD-25V J
R119, 219	0B05505A	Carbon Resistor 1.5K ERD-25V J
R120, 220	0B05601A	Carbon Resistor 1.5M ERD-25V J
R121, 221	0B05564A	Carbon Resistor 1M ERD-25V J
R126, 226	0B01879A	Carbon Resistor 33K ERD-25V J
R128, 228	0B05669A	Carbon Resistor 180K ERD-25V J
R129, 229	0B05562A	Carbon Resistor 47K ERD-25V J
R131, 231	0B01781A	Carbon Resistor 1K ERD-25V J
R132, 232	0B05567A	Carbon Resistor 33 ERD-25V J
R135, 137 235, 237	0B05600A	Carbon Resistor 270K ERD-25V J
R136, 236	0B05596A	Carbon Resistor 220K ERD-25V J
C1	0B01398A	Electrolytic Capacitor 220μ 16V
C101, 102 104, 108 113, 201 202, 204 208, 213	0B01412A	Electrolytic Capacitor 10μ 16V
C103, 111 203, 211	0B01405A	Electrolytic Capacitor 1μ 16V
C105, 205	0B01864A	P.P. Capacitor 5600P 50V G
C106, 206	0B01892A	P.P. Capacitor 0.027μ 50V G
C107, 207	0B01608A	P.P. Capacitor 4700P 50V G
C109, 112 115, 209 212, 215	0B01603A	Mylar Capacitor 0.1μ 50V K
C110, 210	0B01404A	Electrolytic Capacitor 47μ 6.3V
C114, 214	0B01780A	Mylar Capacitor 0.1μ 50V J
C116, 216	0B01602A	Mylar Capacitor 0.33μ 50V K
C117, 217	0B04059A	Mylar Capacitor 1000P 50V K
TP101, 201	0B03924A	FET Gate Pin

Schematic Ref. No.	Part No.	Description
	BA03828A	**Tone P.C.B. Ass'y**
	– Line Amp. –	
Q131, 132 133, 231 232, 233	0B06062A	Transistor 2SC1222
Q134, 234	0B06111A	Transistor 2SA640(E)
Q135, 136 137, 235 236, 237	0B01872A	Transistor 2SC945
D131, 231	0B01909A	Silicon Diode 1S1555
R131, 231	0B01921A	Carbon Resistor 330K ERD-25V J
R132, 137 232, 237	0B05558A	Carbon Resistor 100 ERD-25V J
R133, 233	0B05912A	Metal Film Resistor 150 ER0-25VK F
R134, 234	0B01789A	Carbon Resistor 330 ERD-25V J
R135, 140 235, 240	0B05591A	Carbon Resistor 15K ERD-25V J
R136, 236	0B05664A	Carbon Resistor 3.9K ERD-25V J
R138, 238	0B05565A	Carbon Resistor 1.2K ERD-25V J
R139,239	0B05663A	Carbon Resistor 10 ERD-25V J
R141, 241	0B05855A	Metal Film Resistor 1.5K ER0-25VK F
R142, 143 242, 243	0B05567A	Carbon Resistor 33 ERD-25V J
C131, 231	0B05820A	Electrolytic Capacitor 22μ 16V M(MS)
C132, 232	0B01456A	Ceramic Capacitor 47P 50V M
C133, 233	0B05599A	Ceramic Capacitor 150P 50V M
C134, 234	0B01412A	Electrolytic Capacitor 10μ 16V
C135, 235	0B05884A	Electrolytic Capacitor 470μ 10V
C146, 147 246, 247	0B05841A	Electrolytic Capacitor 330μ 10V
	– Tone Amp. –	
Q138, 139 238, 239	0B06062A	Transistor 2SC1222
Q140, 240	0B06111A	Transistor 2SA640(E)
Q141, 241	0B01872A	Transistor 2SC945

Schematic Ref. No.	Part No.	Description
D132, 232	0B01909A	Silicon Diode 1S1555
VR003,004	0B07146A	Volume 50K (B) x 2
VR133,233	0B07154A	Semi-fixed Volume 200K
R144, 145 244, 245	0B05561A	Carbon Resistor 18K ERD-25V J
R146, 153 246, 253	0B01878A	Carbon Resistor 8.2K ERD-25V J
R147, 148 247, 248	0B01920A	Carbon Resistor 100K ERD-25V J
R149, 249	0B05700A	Carbon Resistor 470K ERD-25V J
R150, 250	0B01879A	Carbon Resistor 33K ERD-25V J
R151, 251	0B05661A	Carbon Resistor 22K ERD-25V J
R152, 252	0B05664A	Carbon Resistor 3.9K ERD-25V J
R154, 254	0B01792A	Carbon Resistor 470 ERD-25V J
R155, 255	0B05569A	Carbon Resistor 47 ERD-25V J
C136, 140 142, 236 240, 242	0B01412A	Electrolytic Capacitor 10μ 16V
C137, 138 237, 238	0B05685A	Mylar Capacitor 0.082μ 50V J
C139, 239	0B01913A	Mylar Capacitor 1800P 50V J
C141, 241	0B05806A	Ceramic Capacitor 22P 50V K
	– Contour –	
VR005	0B07143A	Volume 10K (A) x 2
R156, 256	0B05565A	Carbon Resistor 1.2K ERD-25V J
R157, 257	0B01793A	Carbon Resistor 3.3K ERD-25V J
R158, 258	0B05608A	Carbon Resistor 220 ERD-25V J
R159, 259	0B01792A	Carbon Resistor 470 ERD-25V J
C143, 243	0B01913A	Mylar Capacitor 1800P 50V J
C144, 145 244, 245	0B05862A	Electrolytic Capacitor 2.2μ 16V M (MS)
	– Miscellaneous –	
	0J03601A	Volume Holder (1 pce.)
	0B07709C	Tone P.C.B.

6. MOUNTING DIAGRAM AND PARTS LIST

Note: Mounting diagram shows a dip side of the printed circuit board.

6.1. Main P.C.B. Ass'y

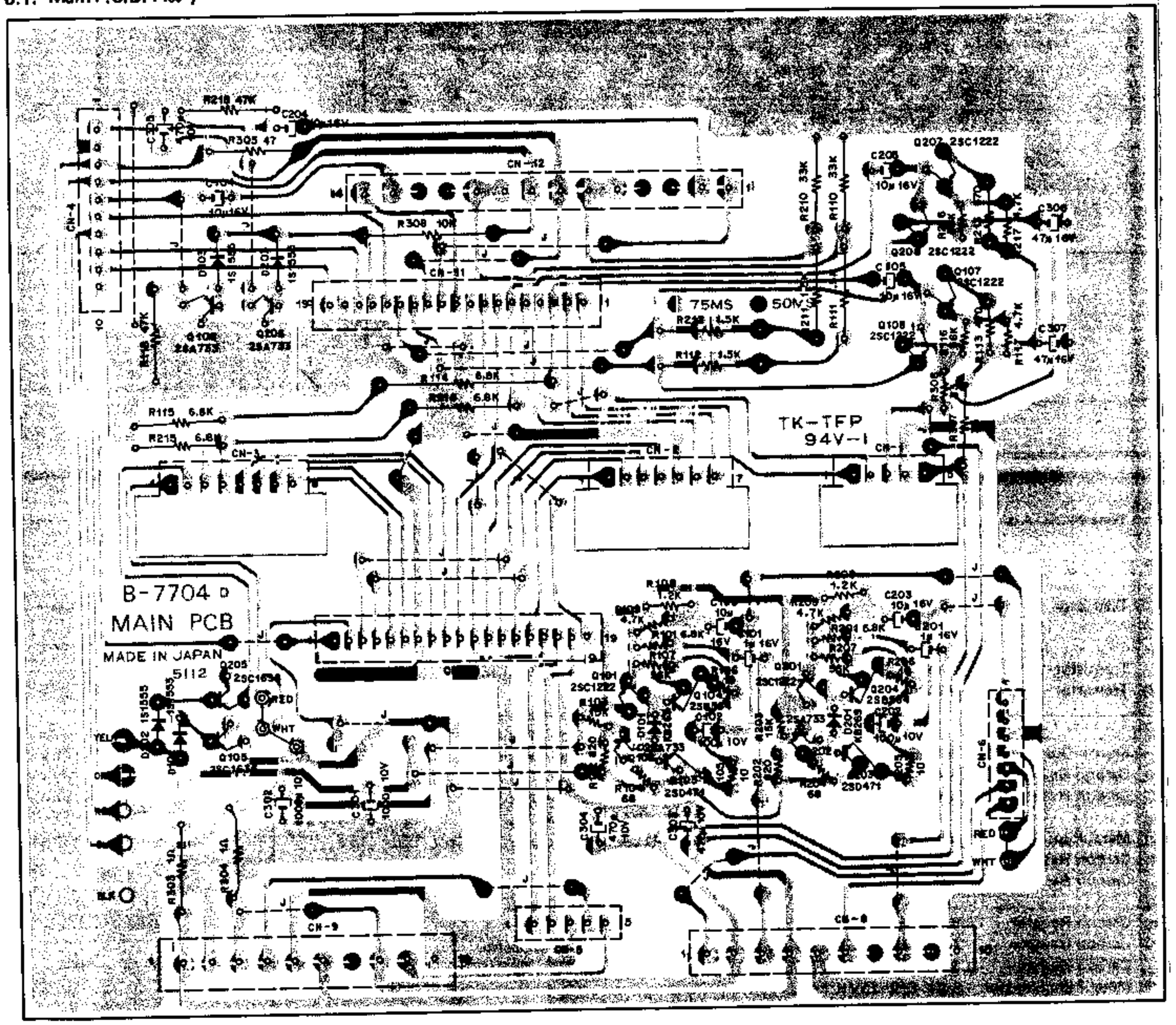


Fig. 6.1

6.2. VR P.C.B. Ass'y

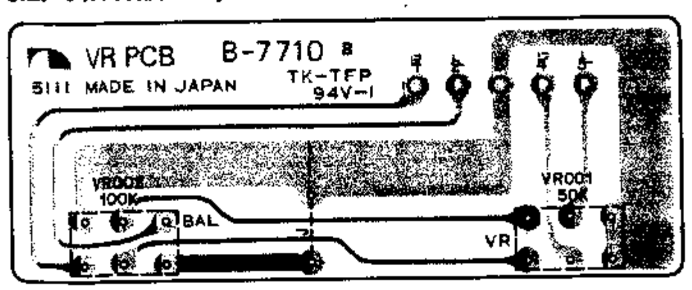


Fig. 6.2

Schematic Ref. No.	Part No.	Description
	BA03829A	VR P.C.B. Ass'y
	0B077108	VR P.C.B.
VR001	0B07144A	Volume 50K (A)
VR002	0B07145A	Balance Volume 100K (MN)
	0B08314B	5P-H Connector Ass'y (1 pce.)

Schematic Ref. No.	Part No.	Description
	BA03823A	Main P.C.B. Ass'y
	– Headphone Amp. –	
Q101, 201	0B06062A	Transistor 2SC1222
Q102, 202	0B06013A	Transistor 2SA733
Q103, 203	0B06066A	Transistor 2SD471
Q104, 204	0B06069A	Transistor 2SB564
D101, 201	0B01702A	Silicon Diode KB-269
R101, 201	0B01877A	Carbon Resistor 6.8K ERD-25V J
R102, 202	0B05511A	Carbon Resistor 820 ERD-25V J
R103, 203	0B05591A	Carbon Resistor 15K ERD-25V J
R104, 204	0B01788A	Carbon Resistor 68 ERD-25V J
R105, 106 205, 206	0B05663A	Carbon Resistor 10 ERD-25V J
R107, 207	0B05563A	Carbon Resistor 56K ERD-25V J
R108, 208	0B05565A	Carbon Resistor 1.2K ERD-25V J
R109, 209	0B01795A	Carbon Resistor 4.7K ERD-25V J
C101, 201	0B01405A	Electrolytic Capacitor 1μ 16V
C102, 202	0B05885A	Electrolytic Capacitor 100μ 10V
C103, 203	0B01412A	Electrolytic Capacitor 10μ 16V
	– Buffer Amp. –	
Q107, 108 207, 208	0B06062A	Transistor 2SC1222
R306, 307	0B05567A	Carbon Resistor 33 ERD-25V J
R113, 213	0B01792A	Carbon Resistor 470 ERD-25V J
R116, 216	0B05563A	Carbon Resistor 56K ERD-25V J
R117, 217	0B01795A	Carbon Resistor 4.7K ERD-25V J
C105, 205	0B01412A	Electrolytic Capacitor 10μ 16V
C306, 307	0B01403A	Electrolytic Capacitor 47μ 16V
	– Miscellaneous –	
Q105, 205	0B06070A	Transistor 2SC1636
Q106, 206	0B06013A	Transistor 2SA733
D102, 103 202, 203	0B01909A	Silicon Diode 1S1555
R110, 210	0B05509A	Carbon Resistor 33K ERD-25T J
R111, 112 211, 212	0B05698A	Carbon Resistor 1.5K ERD-25T J
R114, 214 115, 215	0B01682A	Carbon Resistor 6.8K ERD-25T J
R118, 218	0B05641A	Carbon Resistor 47K ERD-25T J
R303, 304	0B05695A	Carbon Resistor 1 ERD-25T J
R305	0B01706A	Carbon Resistor 47 ERD-25T J
R308	0B01888A	Carbon Resistor 10K ERD-25T J
C104, 204	0B01412A	Electrolytic Capacitor 10μ 16V
C301, 302	0B05852A	Electrolytic Capacitor 1000μ 10V
C303, 304 305	0B05884A	Electrolytic Capacitor 470μ 10V
CN1	0B08311A	5P-B Post
CN2	0B08312A	7P-B Post
CN3	0B08180A	8P-B Post
CN4	0B08286A	10P-S Post
CN5	0B08303A	5P-S Post
CN6	0B08302A	7P-T Post
CN8,9	BA03807A	10P Connector Ass'y
CN10, 11	BA03808A	19P Connector Ass'y
CN12	BA03809A	14P Connector Ass'y
	0B08319A	5P Connector Ass'y (1 pce.)
	0B07704D	Main P.C.B.

6.3. 17 V Dolby NR P.C.B. Ass'y

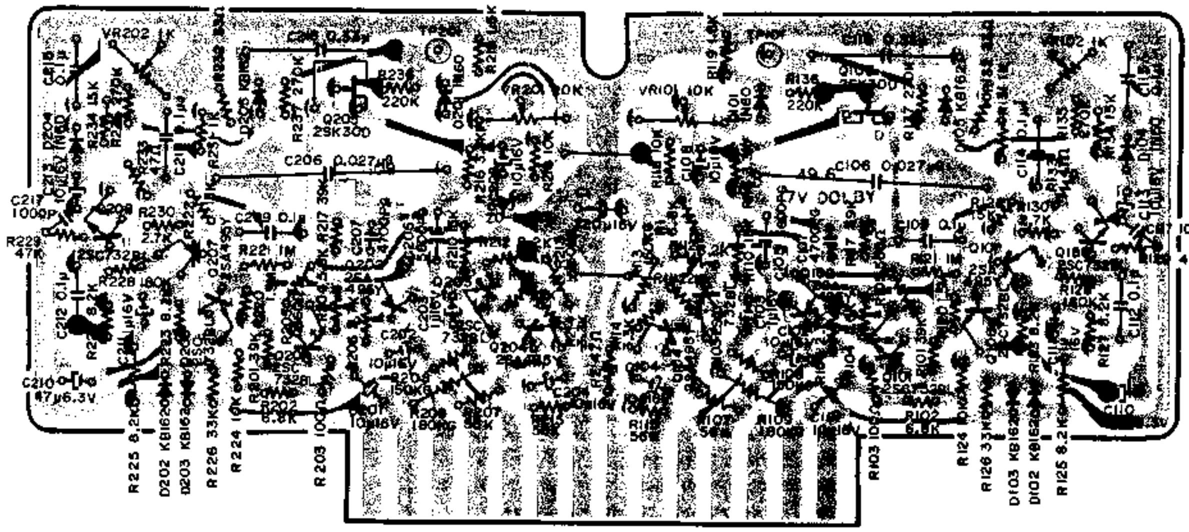


Fig. 6.3

6.4. Tone P.C.B. Ass'y

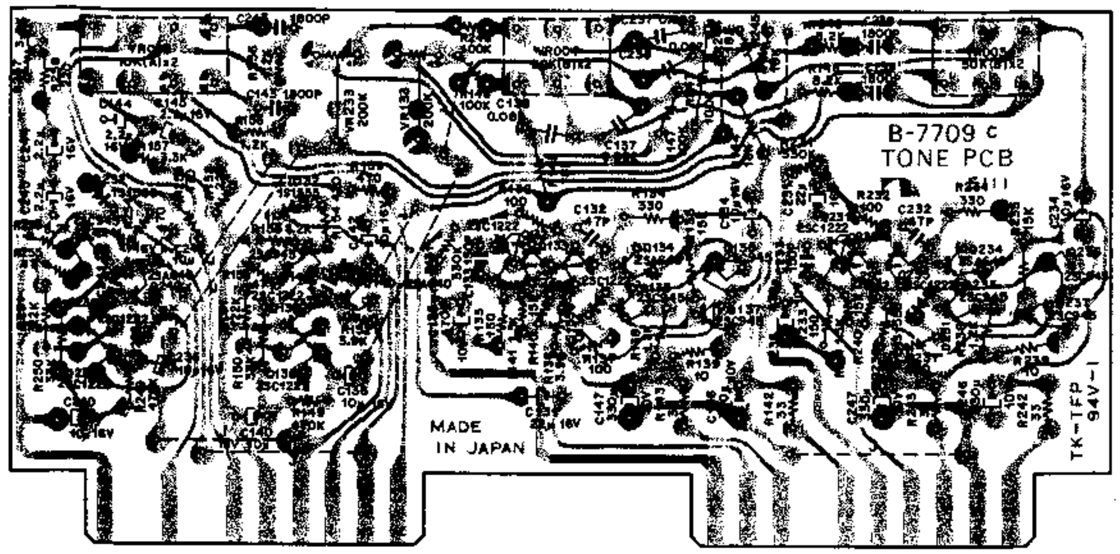


Fig. 6.4

Note: Transistors 2SA495Y and 2SC732BL are compatible with 2SA733 and 2SC900E, respectively.

Schematic Ref. No.	Part No.	Description
	BA03670A	**17V Dolby NR P.C.B. Ass'y**
	0B07609A	17V Dolby NR P.C.B.
Q101, 103 106, 108 201, 203 206, 208	0B01910A	Transistor 2SC900(E)
Q102, 104 107, 202 204, 207	0B06013A	Transistor 2SA733
Q105, 205	0B06001A	FET 2SK30A (D)
ZD1	0B06004A	Zener Diode EQA01 08S
D101, 104 201, 204	0B00030A	Germanium Diode 1N60(P)
D102, 103 105, 202 203, 205	0B01599A	Silicon Diode K8162
VR101, 201	0B01458A	Semi-fixed Volume 10K
VR102, 202	0B01428A	Semi-fixed Volume 1K
R1, 102, 202	0B01877A	Carbon Resistor 6.8K ERD-25V J
R2, 133 233	0B05569A	Carbon Resistor 47 ERD-25V J
R101, 117 201, 217	0B01885A	Carbon Resistor 39K ERD-25V J
R103, 203	0B05558A	Carbon Resistor 100 ERD-25V J
R104, 204	0B05673A	Carbon Resistor 5.6K ERD-25V J
R105, 205	0B05678A	Carbon Resistor 560 ERD-25V J
R106, 130 206, 230	0B01782A	Carbon Resistor 2.7K ERD-25V J
R107, 115 207, 215	0B05563A	Carbon Resistor 56K ERD-25V J
R108, 113 208, 213	0B01859A	Metal Film Resistor 150K ER0-25VK G
R109, 209	0B01590A	Metal Film Resistor 180K ER0-25VK G
R110, 122 134, 210 222, 234	0B05591A	Carbon Resistor 15K ERD-25V J
R111, 211	0B05661A	Carbon Resistor 22K ERD-25V J

Schematic Ref. No.	Part No.	Description
R112, 123 125, 127 212, 223 225, 227	0B01878A	Carbon Resistor 8.2K ERD-25V J
R114, 214	0B01793A	Carbon Resistor 3.3K ERD-25V J
R116, 216	0B01585A	Metal Film Resistor 3.3K ER0-25VK F
R118, 124 218, 224	0B01833A	Carbon Resistor 10K ERD-25V J
R119, 219	0B05505A	Carbon Resistor 1.5K ERD-25V J
R120, 220	0B05601A	Carbon Resistor 1.5M ERD-25V J
R121, 221	0B05564A	Carbon Resistor 1M ERD-25V J
R126, 226	0B01879A	Carbon Resistor 33K ERD-25V J
R128, 228	0B05669A	Carbon Resistor 180K ERD-25V J
R129, 229	0B05562A	Carbon Resistor 47K ERD-25V J
R131, 231	0B01781A	Carbon Resistor 1K ERD-25V J
R132, 232	0B05567A	Carbon Resistor 33 ERD-25V J
R135, 137 235, 237	0B05600A	Carbon Resistor 270K ERD-25V J
R136, 236	0B05596A	Carbon Resistor 220K ERD-25V J
C1	0B01398A	Electrolytic Capacitor 220μ 16V
C101, 102 104, 108 113, 201 202, 204 208, 213	0B01412A	Electrolytic Capacitor 10μ 16V
C103, 111 203, 211	0B01405A	Electrolytic Capacitor 1μ 16V
C105, 205	0B01864A	P.P. Capacitor 5600P 50V G
C106, 206	0B01892A	P.P. Capacitor 0.027μ 50V G
C107, 207	0B01608A	P.P. Capacitor 4700P 50V G
C109, 112 115, 209 212, 215	0B01603A	Mylar Capacitor 0.1μ 50V K
C110, 210	0B01404A	Electrolytic Capacitor 47μ 6.3V
C114, 214	0B01780A	Mylar Capacitor 0.1μ 50V J
C116, 216	0B01602A	Mylar Capacitor 0.33μ 50V K
C117, 217	0B04059A	Mylar Capacitor 1000P 50V K
TP101, 201	0B03924A	FET Gate Pin

Schematic Ref. No.	Part No.	Description
	BA03828A	**Tone P.C.B. Ass'y**
	– Line Amp. –	
Q131, 132 133, 231 232, 233	0B06062A	Transistor 2SC1222
Q134, 234	0B06111A	Transistor 2SA640(E)
Q135, 136 137, 235 236, 237	0B01872A	Transistor 2SC945
D131, 231	0B01909A	Silicon Diode 1S1555
R131, 231	0B01921A	Carbon Resistor 330K ERD-25V J
R132, 137 232, 237	0B05558A	Carbon Resistor 100 ERD-25V J
R133, 233	0B05912A	Metal Film Resistor 150 ER0-25VK F
R134, 234	0B01789A	Carbon Resistor 330 ERD-25V J
R135, 140 235, 240	0B05591A	Carbon Resistor 15K ERD-25V J
R136, 236	0B05664A	Carbon Resistor 3.9K ERD-25V J
R138, 238	0B05565A	Carbon Resistor 1.2K ERD-25V J
R139,239	0B05663A	Carbon Resistor 10 ERD-25V J
R141, 241	0B05855A	Metal Film Resistor 1.5K ER0-25VK F
R142, 143 242, 243	0B05567A	Carbon Resistor 33 ERD-25V J
C131, 231	0B05820A	Electrolytic Capacitor 22μ 16V M(MS)
C132, 232	0B01456A	Ceramic Capacitor 47P 50V M
C133, 233	0B05599A	Ceramic Capacitor 150P 50V M
C134, 234	0B01412A	Electrolytic Capacitor 10μ 16V
C135, 235	0B05884A	Electrolytic Capacitor 470μ 10V
C146, 147 246, 247	0B05841A	Electrolytic Capacitor 330μ 10V
	– Tone Amp. –	
Q138, 139 238, 239	0B06062A	Transistor 2SC1222
Q140, 240	0B06111A	Transistor 2SA640(E)
Q141, 241	0B01872A	Transistor 2SC945

Schematic Ref. No.	Part No.	Description
D132, 232	0B01909A	Silicon Diode 1S1555
VR003,004	0B07146A	Volume 50K (B) x 2
VR133,233	0B07154A	Semi-fixed Volume 200K
R144, 145 244, 245	0B05561A	Carbon Resistor 18K ERD-25V J
R146, 153 246, 253	0B01878A	Carbon Resistor 8.2K ERD-25V J
R147, 148 247, 248	0B01920A	Carbon Resistor 100K ERD-25V J
R149, 249	0B05700A	Carbon Resistor 470K ERD-25V J
R150, 250	0B01879A	Carbon Resistor 33K ERD-25V J
R151, 251	0B05661A	Carbon Resistor 22K ERD-25V J
R152, 252	0B05664A	Carbon Resistor 3.9K ERD-25V J
R154, 254	0B01792A	Carbon Resistor 470 ERD-25V J
R155, 255	0B05569A	Carbon Resistor 47 ERD-25V J
C136, 140 142, 236 240, 242	0B01412A	Electrolytic Capacitor 10μ 16V
C137, 138 237, 238	0B05685A	Mylar Capacitor 0.082μ 50V J
C139, 239	0B01913A	Mylar Capacitor 1800P 50V J
C141, 241	0B05806A	Ceramic Capacitor 22P 50V K
	– Contour –	
VR006	0B07143A	Volume 10K (A) x 2
R156, 256	0B05565A	Carbon Resistor 1.2K ERD-25V J
R157, 257	0B01793A	Carbon Resistor 3.3K ERD-25V J
R158, 258	0B05608A	Carbon Resistor 220 ERD-25V J
R159, 259	0B01792A	Carbon Resistor 470 ERD-25V J
C143, 243	0B01913A	Mylar Capacitor 1800P 50V J
C144, 145 244, 245	0B05862A	Electrolytic Capacitor 2.2μ 16V M (MS)
	– Miscellaneous –	
	0J03601A	Volume Holder (1 pce.)
	0B07709C	Tone P.C.B.

6.5. EQ. P.C.B. Ass'y

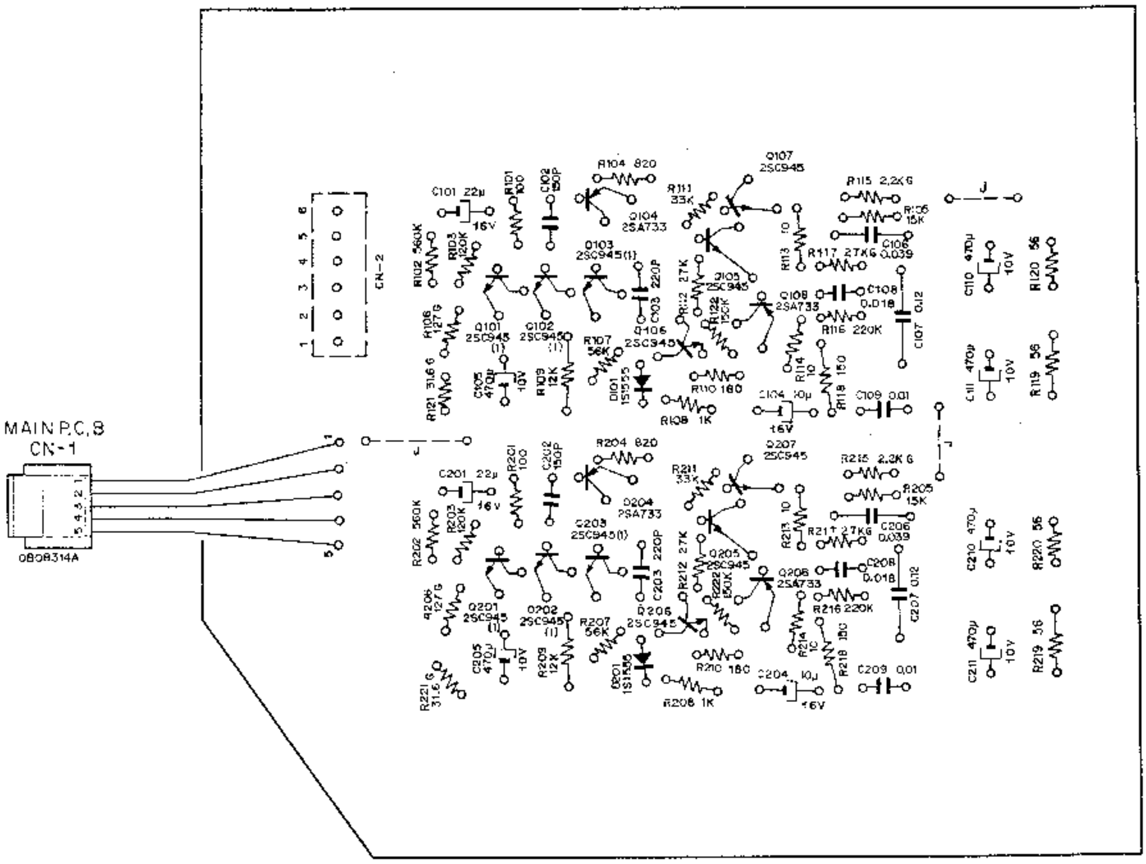


Fig. 6.5

Schematic Ref. No.	Part No.	Description
	BA03824A	EQ. P.C.B. Ass'y
	0B07705B	EQ. P.C.B.
Q101, 102, 103, 201, 202, 203	0B06071A	Transistor 2SC945 (L) (1)
Q104, 108, 204, 208	0B06013A	Transistor 2SA733
Q105, 106, 107, 205, 206, 207	0B01872A	Transistor 2SC945 (L)
D101, 201	0B01909A	Silicon Diode 1S1555
R101, 201	0B05558A	Carbon Resistor 100 ERD-25V J
R102, 202	0B05665A	Carbon Resistor 560K ERD-25V J
R103, 203	0B05568A	Carbon Resistor 120K ERD-25V J
R104, 204	0B05511A	Carbon Resistor 820 ERD-25V J
R105, 205	0B05591A	Carbon Resistor 15K ERD-25V J
R106, 206	0B05918A	Metal Film Resistor 127 ER0-25VK G
R107, 207	0B05563A	Carbon Resistor 56K ERD-25V J
R108, 208	0B01781A	Carbon Resistor 1K ERD-25V J
R109, 209	0B05650A	Carbon Resistor 12K ERD-25V J
R110, 210	0B05607A	Carbon Resistor 180 ERD-25V J
R111, 211	0B01879A	Carbon Resistor 33K ERD-25V J
R112, 212	0B05538A	Carbon Resistor 27K ERD-25V J
R113, 114, 213, 214	0B05663A	Carbon Resistor 10 ERD-25V J
R115, 215	0B05910A	Metal Film Resistor 2.2K ER0-25VK G
R116, 216	0B05696A	Carbon Resistor 220K ERD-25V J
R117, 217	0B05901A	Metal Film Resistor 27K ER0-25VK G
R118, 218	0B05649A	Carbon Resistor 150 ERD-25V J
R119, 120, 219, 220	0B05587A	Carbon Resistor 56 ERD-25V J
R121, 221	0B05916A	Metal Film Resistor 31.6 ER0-25VK G
R122, 222	0B05593A	Carbon Resistor 150K ERD-25V J
C101, 201	0B05636A	Tantalum Capacitor 22μ 16V
C102, 202	0B05599A	Ceramic Capacitor 150P 50V M
C103, 203	0B01289A	Ceramic Capacitor 220P 50V M
C104, 204	0B01412A	Electrolytic Capacitor 10μ 16V
C105, 110, 111, 205, 210, 211	0B05884A	Electrolytic Capacitor 470μ 10V
C106, 206	0B05660A	Mylar Capacitor 0.039μ 50V J
C107, 207	0B05909A	Mylar Capacitor 0.12μ 50V J
C108, 208	0B05832A	Mylar Capacitor 0.018μ 50V J
C109, 209	0B05681A	Mylar Capacitor 0.01μ 50V J
CN2	0B08182A	6P-T Post
	0B08314B	5P-H Connector Ass'y (1 pce.)

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

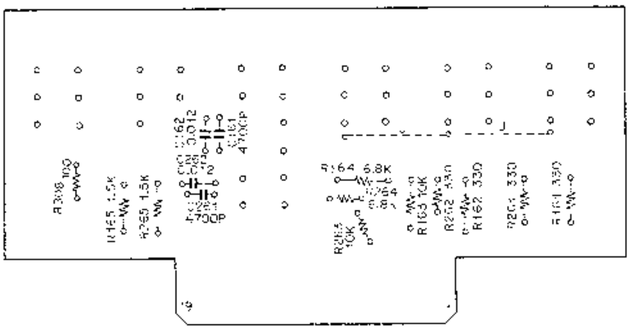


Fig. 6.6

6.7. Tape Monitor SW. P.C.B. Ass'y

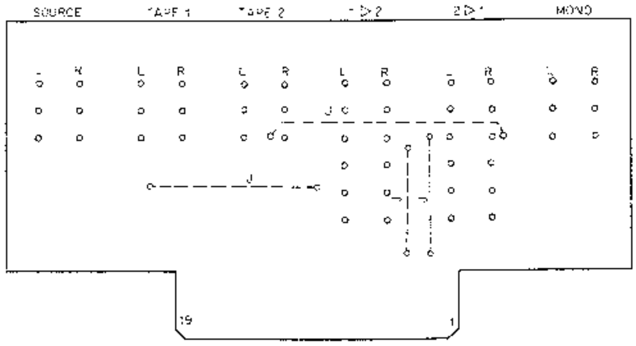


Fig. 6.7

6.8. Pin Jack P.C.B. Ass'y

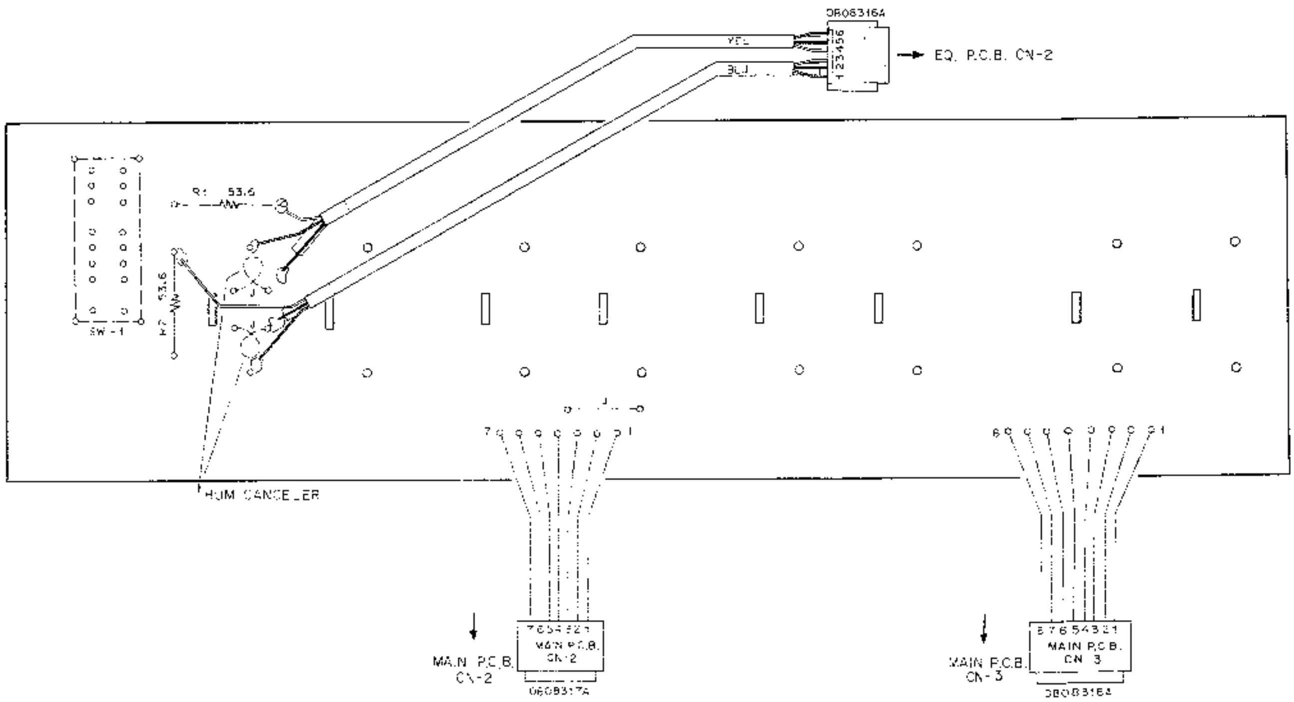


Fig. 6.8

Schematic Ref. No.	Part No.	Description		
	BA03826B	**Function P.C.B. Ass'y**		
	0B07707B	Function P.C.B.		
R161, 162 261, 262	0B01789A	Carbon Resistor	330	ERD-25V J
R163, 263	0B01833A	Carbon Resistor	10K	ERD-25V J
R164, 264	0B01877A	Carbon Resistor	6.8K	ERD-25V J
R165, 265	0B05505A	Carbon Resistor	1.5K	ERD-25V J
R308	0B05558A	Carbon Resistor	100	ERD-25V J
C161, 261	0B05652A	Mylar Capacitor	4700P	50V J
C162, 262	0B05843A	Mylar Capacitor	0.012µ	50V J
	0B07147A	Push Switch (1 pce.)		

Schematic Ref. No.	Part No.	Description
	BA03827A	**Tape Monitor SW. P.C.B. Ass'y**
	0B07708C	Tape Monitor SW. P.C.B.
	0B07148A	Push Switch (1 pce.)
	BA03830A	**Pin Jack P.C.B. Ass'y**
	0B07711C	Pin Jack P.C.B.
R1, 2	0B05917A	Metal Film Resistor 53.6 ER0-25CK G
SW1	0B07157A	Slide Switch
	0B08316B	6P-H Connector Ass'y (1 pce.)
	0B08317B	7P-H Connector Ass'y (1 pce.)
	0B08318B	8P-H Connector Ass'y (1 pce.)
	0B08315A	16P Pin Jack Ass'y (1 pce.)

6.9. Power Supply P.C.B. Ass'y

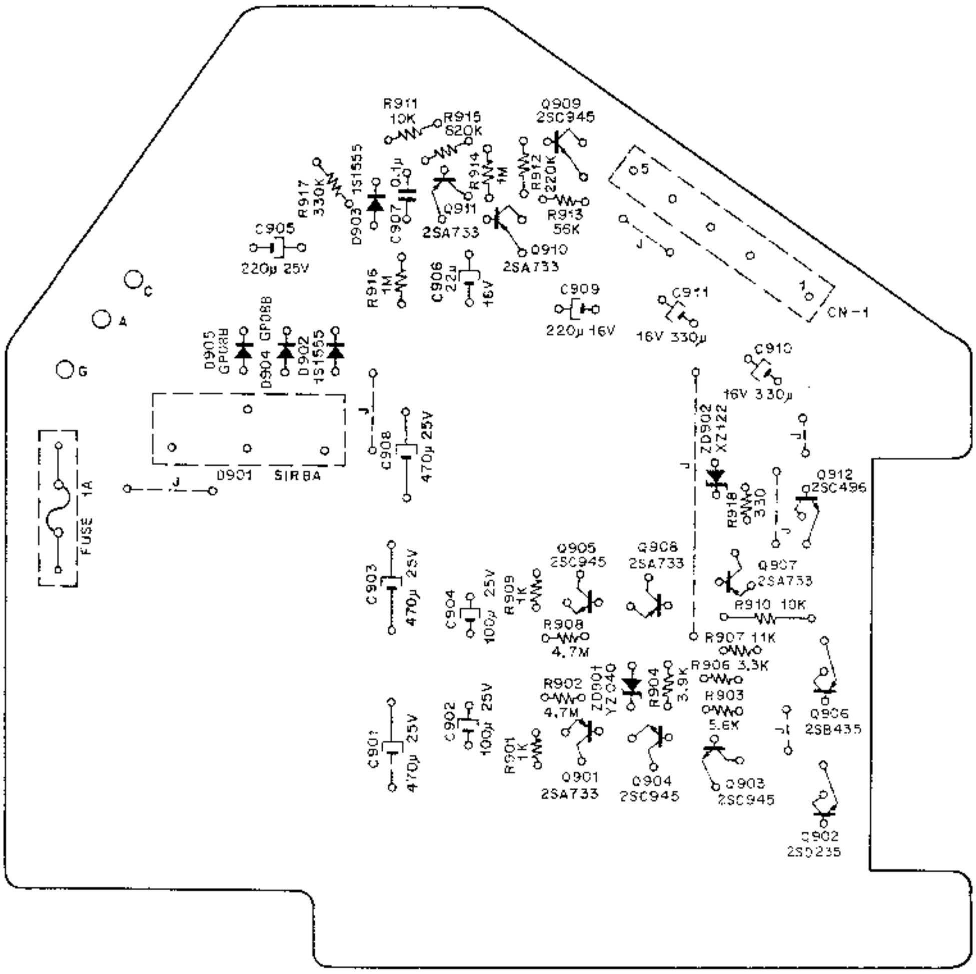


Fig. 6.9

Schematic Ref. No.	Part No.	Description	
	BA03825A	**Power Supply P.C.B. Ass'y**	
	0B07706U	Power Supply P.C.B.	
Q901, 907 908, 910 911	0B06013A	Transistor	2SA733
Q902	0B01823A	Transistor	2SD235
Q903, 904 905, 909	0B01872A	Transistor	2SC945
Q906	0B06011A	Transistor	2SB435
Q912	0B01790A	Transistor	2SC496
ZD901	0B06063A	Zener Diode	YZ040
ZD902	0B06065A	Zener Diode	XZ122
D901	0B06088A	Diode	SIRBA
D902, 903	0B01909A	Silicon Diode	1S1555
D904, 905	0B06109A	Silicon Diode	GP08B
R901, 909	0B01781A	Carbon Resistor	1K ERD-25V J
R902, 908	0B05824A	Carbon Resistor	4.7M ERD-25T J
R903	0B05673A	Carbon Resistor	5.6K ERD-25V J
R904	0B05664A	Carbon Resistor	3.9K ERD-25V J
R906	0B01793A	Carbon Resistor	3.3K ERD-25V J
R907	0B05826A	Carbon Resistor	11K ERD-25V J

Schematic Ref. No.	Part No.	Description		
R910, 911	0B01833A	Carbon Resistor	10K	ERD-25V J
R912	0B05596A	Carbon Resistor	220K	ERD-25V J
R913	0B05563A	Carbon Resistor	56K	ERD-25V J
R914, 916	0B05564A	Carbon Resistor	1M	ERD-25V J
R915	0B05674A	Carbon Resistor	820K	ERD-25V J
R917	0B01921A	Carbon Resistor	330K	ERD-25V J
R918	0B01789A	Carbon Resistor	330	ERD-25V J
C901, 903 908	0B01401A	Electrolytic Capacitor	470μ	25V
C902, 904	0B01272A	Electrolytic Capacitor	100μ	25V
C905	0B01391A	Electrolytic Capacitor	220μ	25V
C906	0B05820A	Electrolytic Capacitor	22μ	16V M (MS)
C907	0B01780A	Mylar Capacitor	0.1μ	50V J
C909	0B01398A	Electrolytic Capacitor	220μ	16V
C910, 911	0B01502A	Electrolytic Capacitor	330μ	16V
CN1	0B08140A	5P Plug		
	0B08176V	Fuse	1A (1 pce.)	
	0E00607A	Screw M3x8 Philips Pan Head (3A)	(2 pcs.)	
	0E00507A	Nut. Hex. M3	(3 pcs.)	
	0E00608A	Screw M3x10 Philips Pan Head (3A)	(3 pcs.)	

6.10. IF P.C.B. Ass'y

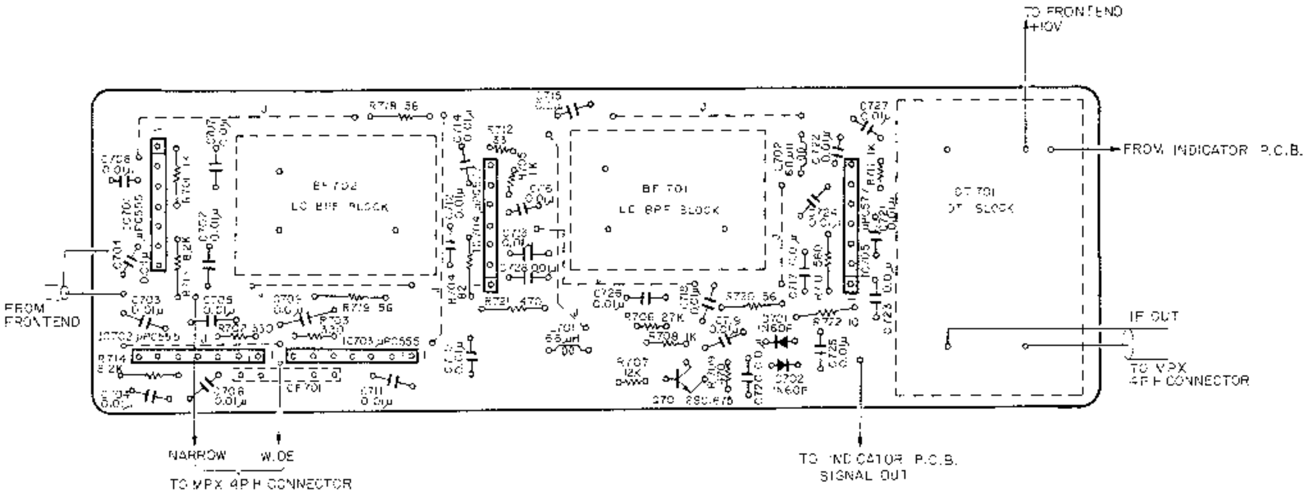


Fig. 6.10

6.11. Lamp P.C.B. Ass'y

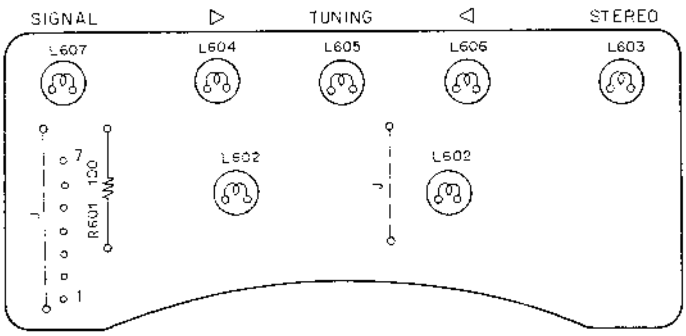


Fig. 6.11

Schematic Ref. No.	Part No.	Description		
	BA03862A	**IF P.C.B. Ass'y**		
	0B07714E	IF P.C.B.		
IC701, 702, 703	0B06113A	Linear IC	μPC555	
IC704, 705	0B06114A	Linear IC	μPC577	
Q701	0B06115A	Transistor	2SC1675	
D701, 702	0B00030A	Germanium Diode	1N60 (P)	
L701, 702	0B06561A	Inductor	68μH	
BF701, 702	0B08291A	LC-B.P.F. Block	10.7 MHz	
CF701	0B08341A	Ceramic Filter	10.7 MHz	
R701	0B01857A	Carbon Resistor	1K	ERD-25T J
R702, 703	0B01789A	Carbon Resistor	330	ERD-25V J
R704	0B05631A	Carbon Resistor	82	ERD-25T J
R705, 708, 711	0B01781A	Carbon Resistor	1K	ERD-25V J
R706	0B05538A	Carbon Resistor	27K	ERD-25V J
R707	0B05650A	Carbon Resistor	12K	ERD-25V J
R709	0B01792A	Carbon Resistor	470	ERD-25V J
R710	0B05575A	Carbon Resistor	560	ERD-25T J
R712	0B05567A	Carbon Resistor	33	ERD-25V J
R713, 714	0B01856A	Carbon Resistor	8.2K	ERD-25T J
R718, 719, 720	0B05890A	Carbon Resistor	56	ERD-25T J
R721	0B05576A	Carbon Resistor	470	ERD-25T J
R722	0B05936A	Carbon Resistor	10	ERD-25T J
C701-728	0B01290A	Ceramic Capacitor	0.01μ 50V M (28 pcs.)	
DT701	0B08293A	Detector Block DB-1		
	0B08332A	4P-H Connector Ass'y (1 pce.)		
	BA03835A	**Lamp P.C.B. Ass'y**		
	0B07715C	Lamp P.C.B.		
L601, 602	0B08324A	Illumination Lamp	12V 40mA	
L603, 604, 605, 606, 607	0B08321A	Indicator Lamp	12V 40mA	
R601	0B01679A	Carbon Resistor	100	ERD-25T J
	0B08323A	7P H Connector Ass'y (1 pce.)		

6.12. MPX P.C.B. Ass'y

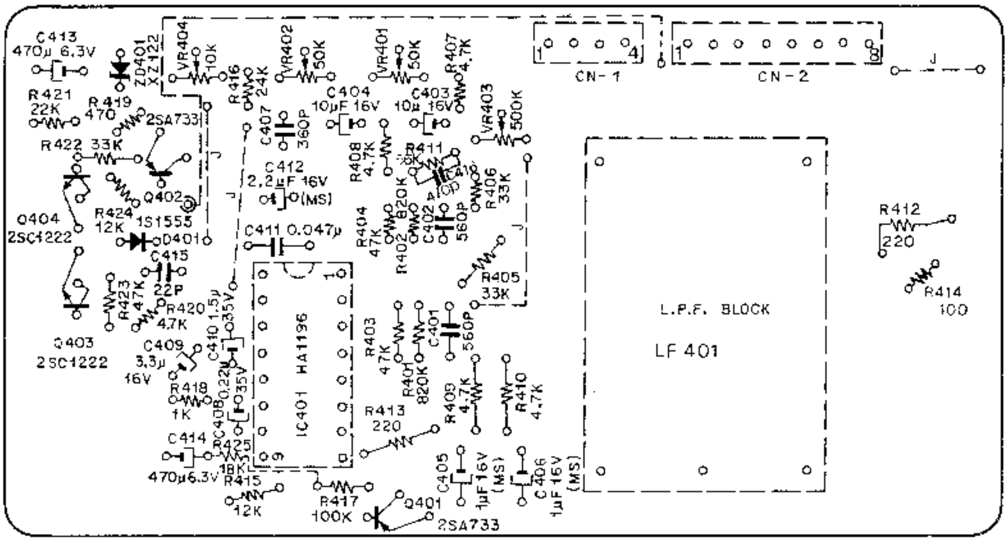


Fig. 6.12

Schematic Ref. No.	Part No.	Description		
	BA03833B	MPX P.C.B. Ass'y		
	0B07713C	MPX P.C.B.		
IC401	0B06112A	PLL IC	HA1196	
Q401, 402	0B06013A	Transistor	2SA733	
Q403, 404	0B06062A	Transistor	2SC1222	
ZD401	0B06065A	Zener Diode	XZ122	
D401	0B01909A	Silicon Diode	1S1555	
LF401	0B08295B	L.P.F. Block	BL-5	
VR401,402	0B07166A	Semi-fixed Volume	50K	
VR403	0B07163A	Semi-fixed Volume	500K	
VR404	0B07162A	Semi-fixed Volume	10K	
R401,402	0B05674A	Carbon Resistor	820K	ERD-25V J
R403, 404 423	0B05562A	Carbon Resistor	47K	ERD-25V J
R405, 406 422	0B01879A	Carbon Resistor	33K	ERD-25V J
R407, 408 409, 410 420	0B01795A	Carbon Resistor	4.7K	ERD-25V J
R411	0B05563A	Carbon Resistor	56K	ERD-25V J
R412, 413	0B05608A	Carbon Resistor	220	ERD-25V J
R414	0B05558A	Carbon Resistor	100	ERD-25V J
R415, 424	0B05650A	Carbon Resistor	12K	ERD-25V J
R416	0B05863A	Metal Film Resistor	24K	ERO-25CK G
R417	0B01920A	Carbon Resistor	100K	ERD-25V J
R418	0B01781A	Carbon Resistor	1K	ERD-25V J
R419	0B01792A	Carbon Resistor	470	ERD-25V J
R421	0B05661A	Carbon Resistor	22K	ERD-25V J
R425	0B05561A	Carbon Resistor	18K	ERD-25V J
C401, 402	0B05788A	P.P. Capacitor	560P	J
C403, 404	0B01412A	Electrolytic Capacitor	10μ	16V
C405, 406	0B05853A	Electrolytic Capacitor	1μ	16V M (MS)
C407	0B05915A	P.P. Capacitor	360P	J
C408	0B05772A	Tantalum Capacitor	0.22μ	35V M

Schematic Ref. No.	Part No.	Description		
C409	0B05768A	Tantalum Capacitor	3.3μ	16V M
C410	0B05639A	Tantalum Capacitor	1.5μ	35V M
C411	0B05811A	Mylar Capacitor	0.047μ	50V K
C412	0B05862A	Electrolytic Capacitor	2.2μ	16V M (MS)
C413, 414	0B05842A	Electrolytic Capacitor	470μ	6.3V
C415	0B05806A	Ceramic Capacitor	22P	50V K
C416	0B01716A	Ceramic Capacitor	470P	50V K
CN1	0B08236A	4P-T Post		
CN2	0B08334A	8P-T Post		
	0B08322A	10P-H Connector Ass'y (1 pce.)		

6.13. Indicator P.C.B. Ass'y

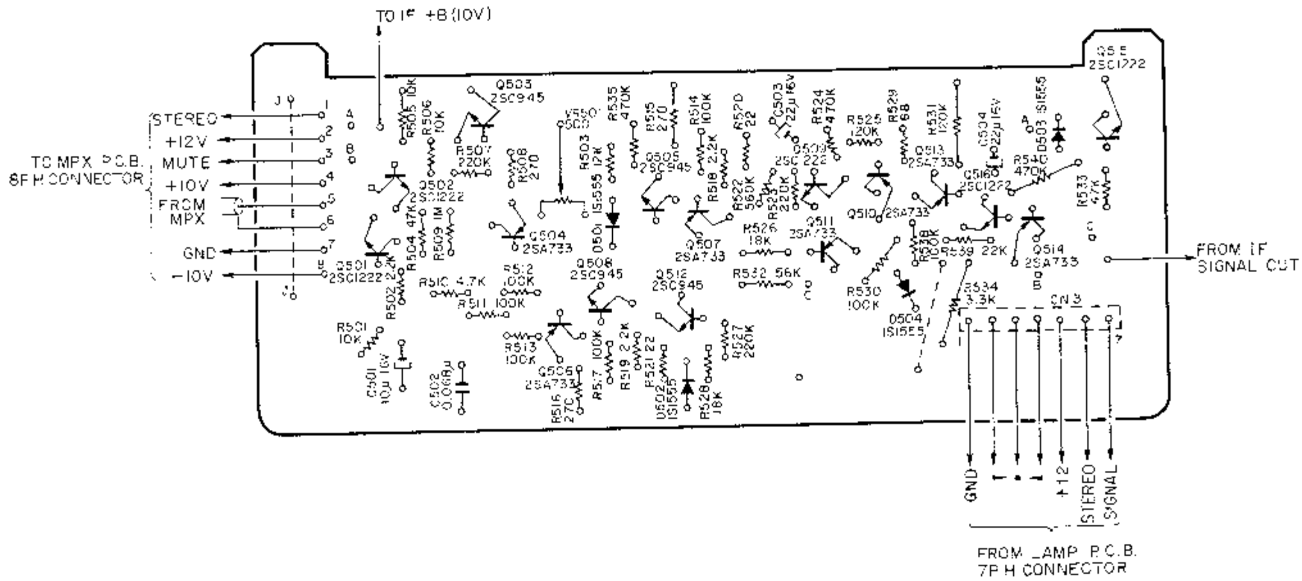


Fig. 6.13

Schematic Ref. No.	Part No.	Description		
	BA03861A	**Indicator P.C.B. Ass'y**		
	0B07712D	Indicator P.C.B.		
Q501, 502, 509, 515, 516	0B06062A	Transistor	2SC1222	
Q503, 505, 508, 512	0B01872A	Transistor	2SC945	
Q504, 506, 507, 510, 511, 513, 514	0B06013A	Transistor	2SA733	
D501, 502, 503, 504	0B01909A	Silicon Diode	1S1555	
VR501	0B07159A	Semi-fixed Volume	500	
R501, 505, 506	0B01833A	Carbon Resistor	10K	ERD-25V J
R502, 518, 519	0B05566A	Carbon Resistor	2.2K	ERD-25V J
R503	0B05650A	Carbon Resistor	12K	ERD-25V J
R504, 533	0B05562A	Carbon Resistor	47K	ERD-25V J
R507, 523, 527	0B05596A	Carbon Resistor	220K	ERD-25V J
R508, 515, 516	0B05651A	Carbon Resistor	270	ERD-25V J
R509	0B05564A	Carbon Resistor	1M	ERD-25V J
R510	0B01795A	Carbon Resistor	4.7K	ERD-25V J
R511, 512, 513, 514, 517, 530, 538	0B01920A	Carbon Resistor	100K	ERD-25V J
R520, 521	0B05606A	Carbon Resistor	22	ERD-25V J
R522	0B05665A	Carbon Resistor	560K	ERD-25V J
R524, 535, 540	0B05700A	Carbon Resistor	470K	ERD-25V J
R525, 531	0B05568A	Carbon Resistor	120K	ERD-25V J
R526, 528	0B05561A	Carbon Resistor	18K	ERD-25V J
R529	0B01788A	Carbon Resistor	68	ERD-25V J
R532	0B05563A	Carbon Resistor	56K	ERD-25V J
R534	0B01793A	Carbon Resistor	3.3K	ERD-25V J
R539	0B05661A	Carbon Resistor	22K	ERD-25V J
C501	0B01412A	Electrolytic Capacitor	10μ	16V
C502	0B05586A	Mylar Capacitor	0.068μ	50V K
C503	0B01862A	Electrolytic Capacitor	22μ	16V
C504	0B05820A	Electrolytic Capacitor	22μ	16V M(MS)
	0B08333A	8P-H Connector (1 pce.)		
	0B08302A	7P-T Post (1 pce.)		

7. MECHANISM ASS'Y AND PARTS LIST

7.1. Synthesis

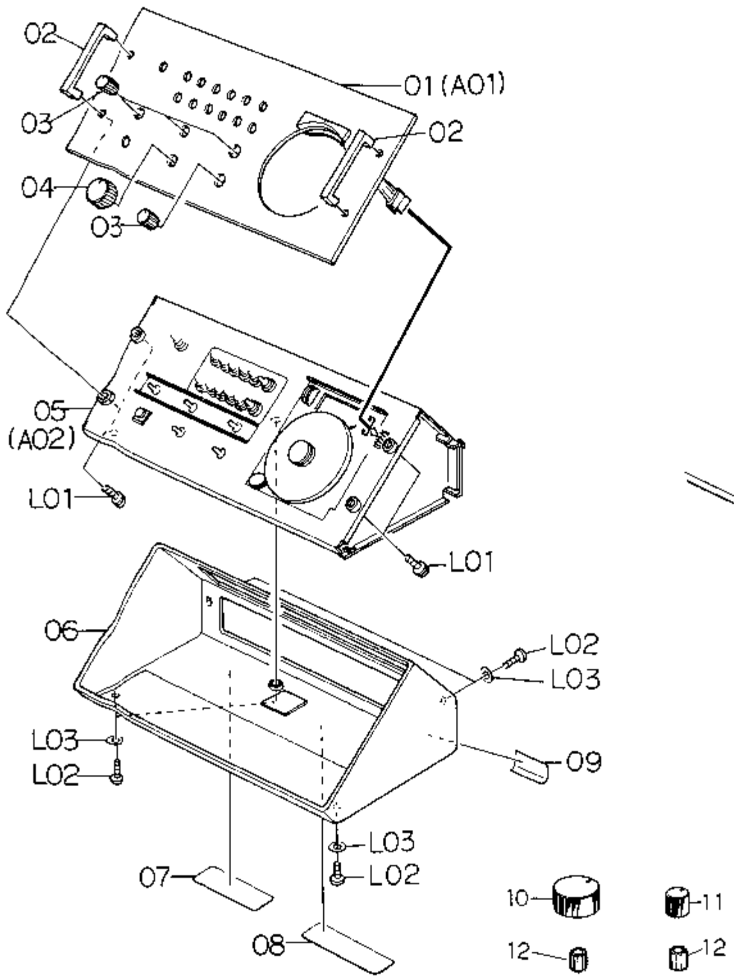


Fig. 7.1

7.2. Front Panel Ass'y (A01)

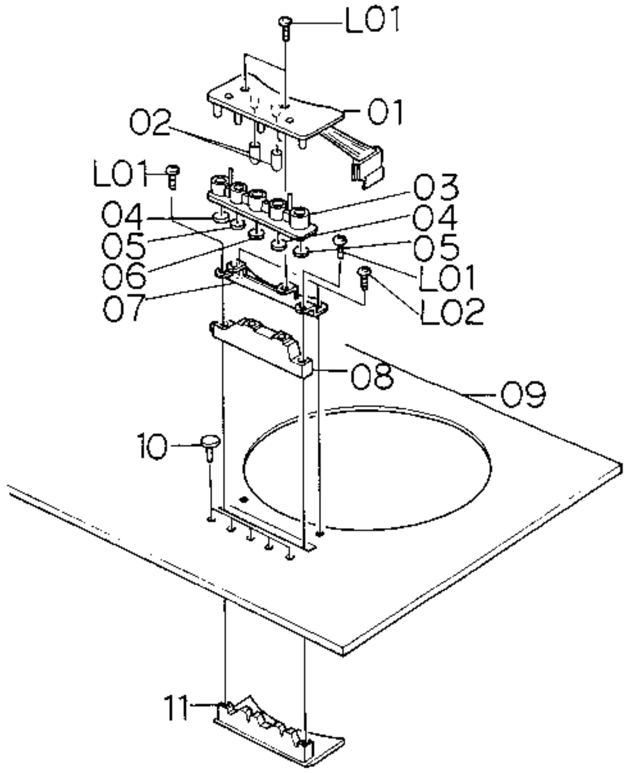


Fig. 7.2

Schematic Ref. No.	Part No.	Description	Q'ty
		Synthesis	
01	HA03692A	Front Pannel Ass'y	1
02	HA03675A	Handle Ass'y	2
03	HA03630A	VR Knob A Ass'y	4
04	HA03631A	VR Knob B Ass'y	1
05	JA03148A	Mechanism Ass'y	1
06	HA03634A	Cabinet Ass'y	1
	0M03674A	Shield Foil	1
07	0M03339A	Caution Label	1
	0M03619A	Gate Cover Plate	1
08	0M03330A	Dolby NR Label	1
	0A00518D	Rubber Foot	4
09	0M03458A	Pass Label	1
10	0H03411A	VR Knob A	4
11	0H03412A	VR Knob B	1
12	0H03410A	VR Sleeve	5
L01	0E00700A	Screw M5x16 Philips Pan Head (2A)	4
L02	0E00594A	Screw M3x8 Philips Binding Head (Bronze)	5
L03	0E00197A	Washer 3mm (Bronze)	5
	0E00701A	Screw M3x10 Philips Binding Head (Bronze)	4
	0E00253A	Washer 3.3mm	4
	0E00552A	Nut Hex. M3	4
A01	**HA03692A**	**Front Panel Ass'y**	**1**
01	BA03835A	Lamp P.C.B. Ass'y	1
02	0H03499A	Filter Cap (Green)	2
03	0H03493A	Light Intercepting Rubber A	1
04	0H03495A	Filter (Orange)	2
05	0H03496A	Filter (Green)	2
06	0H03497A	Filter (Red)	1
07	0H03498A	P.C.B. Holder	1
08	0H03494A	Light Intercepting Rubber B	1
09	0H03489B	Front Panel	1
10	0H03484B	Indicator Point	5
11	0H03492A	Lamp House	1
L01	0E00226A	Screw M2.6x4 Philips Pan Head	4
L02	0E00124A	Screw M2x4 Philips Pan Head	2

7.3. Mechanism Ass'y (A02)

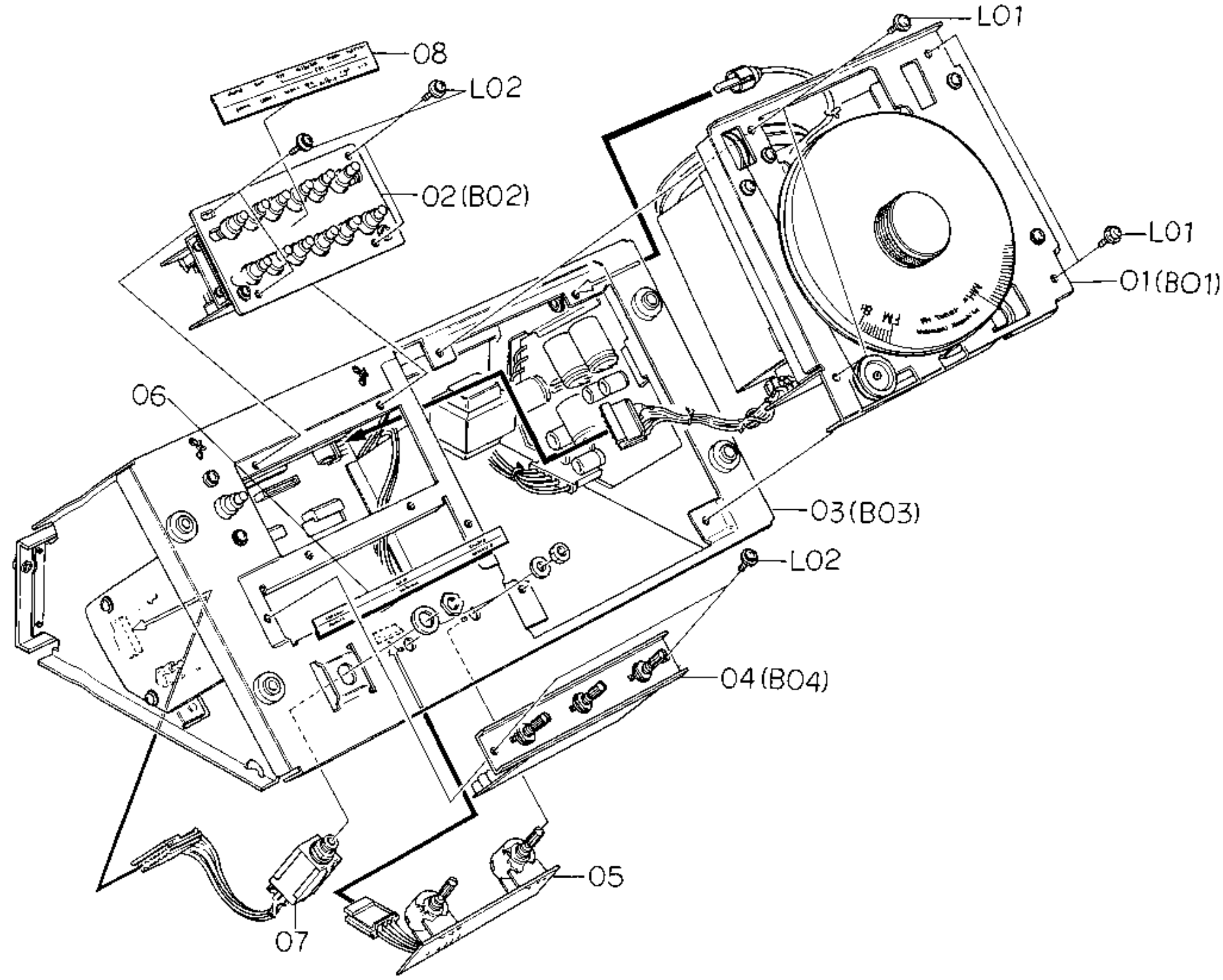


Fig. 7.3

Schematic Ref. No.	Part No.	Description	Q'ty
A02	**JA03148A**	**Mechanism Ass'y**	**1**
01	JA03172A	Tuner Ass'y US	1
02	JA03156A	SW. ST Ass'y	1
03	JA03151A	Main Chassis Sub Ass'y	1
04	BA03828A	Tone P.C.B. Ass'y	1
05	BA03829A	VR P.C.B. Ass'y	1
06	0M03754A	Indicator Label	1
07	BA03831A	Headphone Ass'y	1
08	0M03753A	Button Name Plate	1
L01	0E00763A	Screw M3x6 Philips Polywave	4
L02	0E00606A	Screw M3x6 Philips Pan Head (3A)	6

7.4. Tuner Ass'y US (B01)

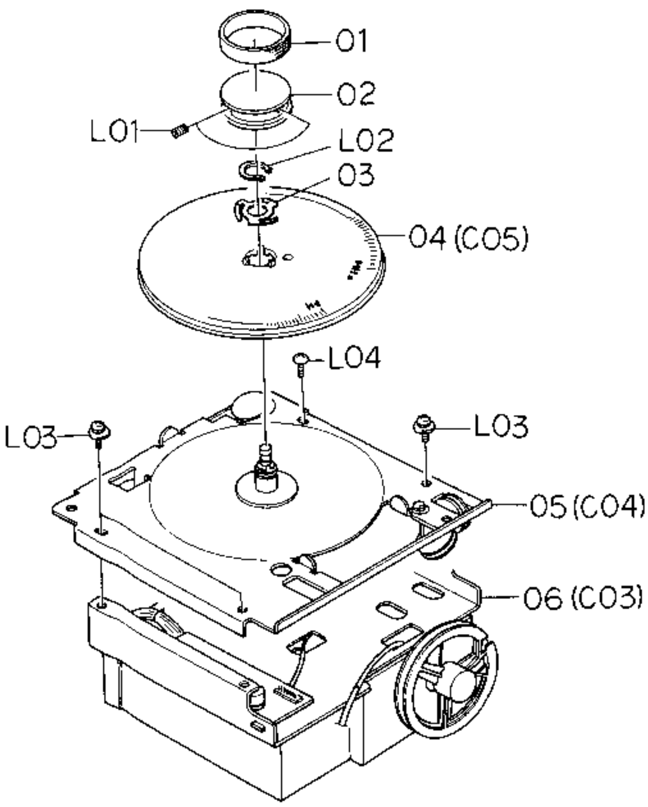


Fig. 7.4

7.5. SW. ST Ass'y (B02)

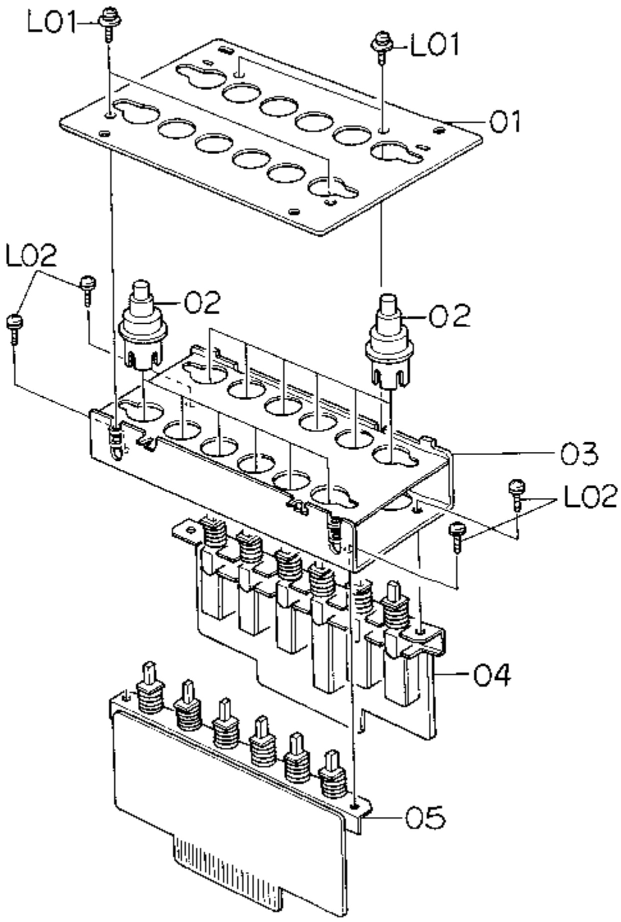


Fig. 7.5

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
B01	**JA03172A**	**Tuner Ass'y US**	**1**	**B02**	**JA03156A**	**SW. ST Ass'y**	**1**
01	0H03501B	Rubber Ring	1	01	0J03607B	SW. ST Block Plate	1
02	0H03500B	Tuning Knob	1	02	JA03061A	Push Button Ass'y	12
03	0J03626B	Dial Spring	1	03	JA03157A	ST Block Sub Ass'y	1
04	JA03165A	Dial Pulley Ass'y US	1	04	BA03826A	Function P.C.B. Ass'y	1
05	JA03160A	Dial Chassis Ass'y	1	05	BA03827A	Tape Monitor SW. P.C.B. Ass'y	1
06	JA03161B	FE Chassis Ass'y	1	L01	0E00611A	Screw M3x14 Philips Pan Head (3A)	4
L01	0E00755A	Screw M3x6 Hex. Socket Head	2				
L02	0E00753A	C-Ring	1	L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	4
L03	0E00606A	Screw M3x6 Philips Pan Head (3A)	3				
L04	0E00713A	Screw M3x6 Philips Truss Head (Bronze)	1				

7.6. Main Chassis Sub Ass'y (B03)

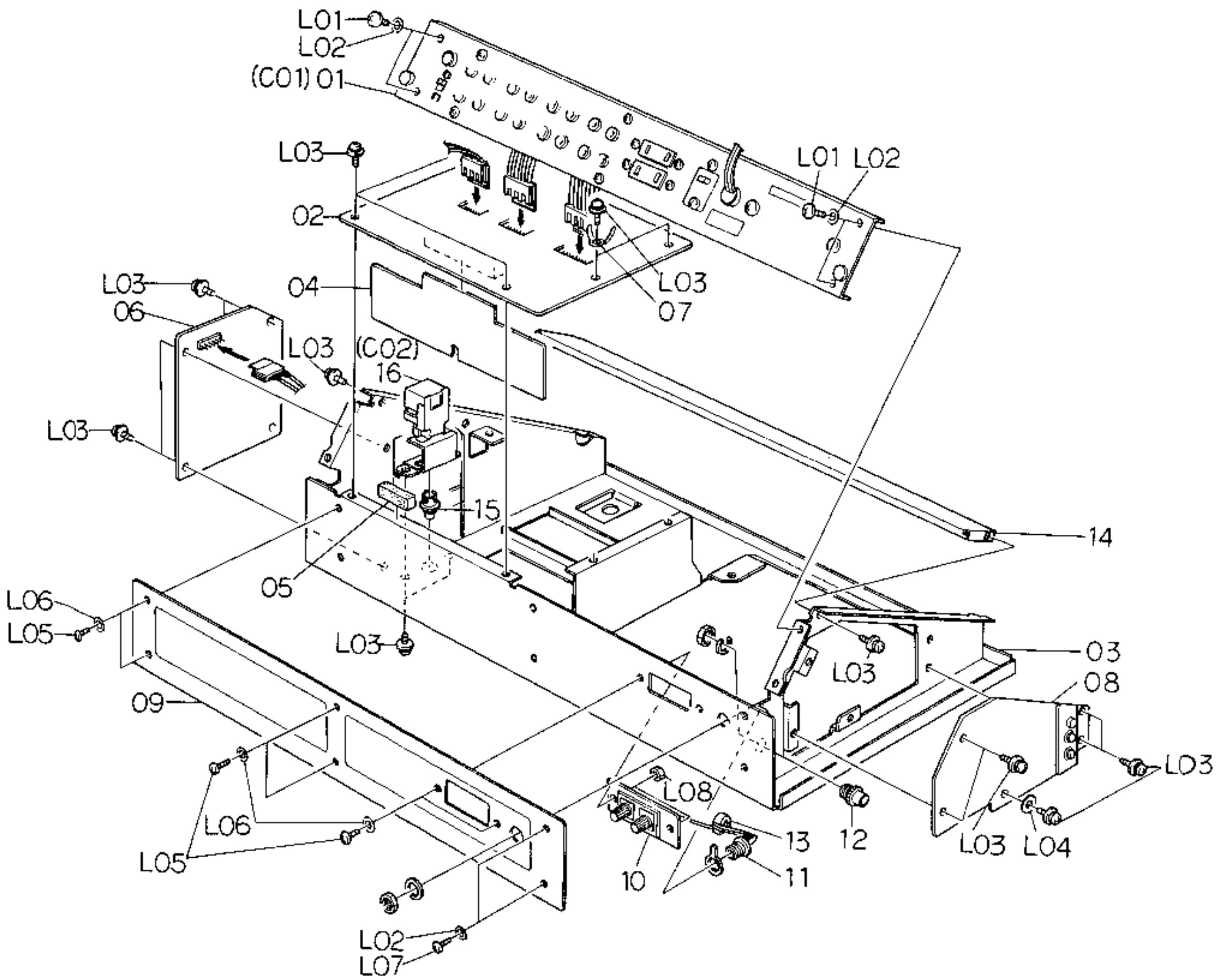


Fig. 7.6

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
B03	**JA03151A**	**Main Chassis Sub Ass'y**	**1**	L01	0E00593A	Screw M3x6 Philips Binding Head (Bronze)	4
01	JA03153A	Rear Panel Ass'y	1	L02	0E00157A	Washer 3mm (plastics)	6
02	BA03823A	Main P.C.B. Ass'y	1	L03	0E00606A	Screw M3x6 Philips Pan Head (3A)	18
03	JA03151A	Main Chassis Sub Ass'y	1				
04	BA03670A	Dolby N.R. P.C.B. Ass'y	1	L04	0E00071A	Washer 3mm (Fiber)	1
05	0J03421A	Dolby N.R. P.C.B. Pad	1	L05	0E00685A	Screw M2.6x5 Philips Pan Head (Bronze)	6
06	BA03824A	EQ. P.C.B. Ass'y	1				
07	0B03067A	Wire Holder	2	L06	0E00651A	Washer 2.6mm (Plastics)	6
08	BA03825A	Power Supply P.C.B. Ass'y	1	L07	0E00594A	Screw M3x8 Philips Binding Head (Bronze)	2
09	0M03741C	Rear Name Plate	1				
10	0B08309A	2P Terminal	1	L08	0E00507A	Nut Hex. M3	2
11	0B08320A	Coaxial Connector	1				
12	0B08336A	Pin Jack Connector	1				
13	0B06558A	Balun Transformer	1				
14	0J03506A	Rear Angle	1				
15	JA03061A	Push Button Ass'y	1				
16	JA03152A	Power Switch Ass'y	1				

7.7. Tone P.C.B. Ass'y (B04)

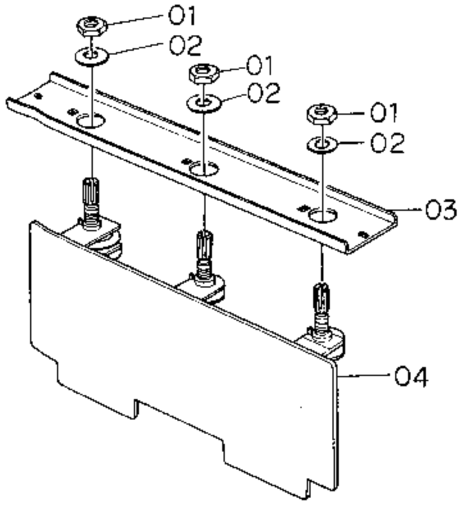


Fig. 7.7

7.9. Power Switch Ass'y (C02)

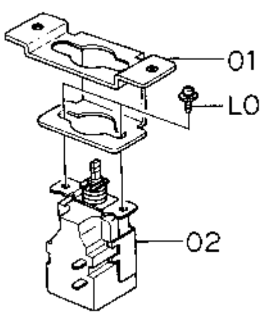


Fig. 7.9

7.8. Rear Panel Ass'y (C01)

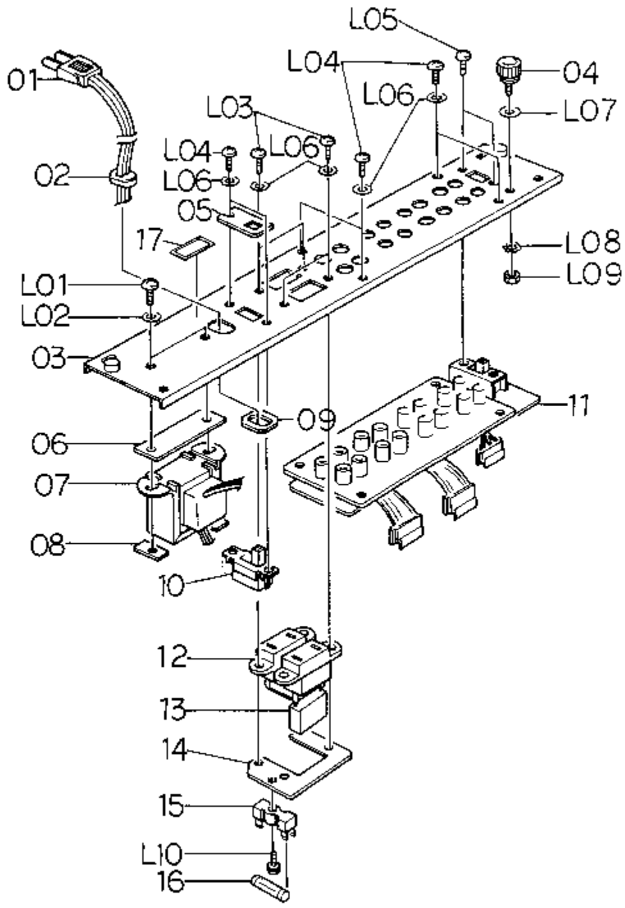


Fig. 7.8

Schematic Ref. No.	Part No.	Description	Q'ty
B04		**Tone P.C.B. Ass'y**	**1**
01		Volume Nut	3
02		Volume Washer	3
03	0J03601A	Volume Holder	1
04	BA03828A	Tone P.C.B. Ass'y (Including 01, 02)	1
C01	**JA03153A**	**Rear Panel Ass'y**	**1**
01	0B08350A	Power Cord	1
02	0B08037U	Cord Bushing	1
03	JA03155A	Rear Panel Sub Ass'y	1
04	0B03920B	Ground Terminal	1
05	0M03737A	Voltage Lock Plate	1
06	0J03631A	Transformer Spacer	1
07	0B06557U	Power Transformer	1
08	0C01162B	Bolt Receptacle Plate	2
09	0A03154B	Cord Spacer	1
10	0B07092U	Voltage Selector	1
11	BA03830A	Pin Jack P.C.B. Ass'y	1
12	0B08162U	Outlet	2
13	0B08240U	Spark Killer	1
14	0J03435B	Outlet Holder	1

Schematic Ref. No.	Part No.	Description	Q'ty
15	0B08310U	Fuse Holder	1
16	0B08098U	Fuse 315mA, 250V	1
L01	0E00756A	Screw M4x8 Philips Binding Head (Bronze)	2
L02	0E00645A	Washer 4mm (Plastics)	2
L03	0E00594A	Screw M3x8 Philips Binding Head (Bronze)	4
L04	0E00593A	Screw M3x6 Philips Binding Head (Bronze)	6
L05	0E00748A	Screw M2.6x3 Philips Pan Head (Bronze)	2
L06	0E00157A	Washer 3mm (Plastics)	10
L07	0E00732A	Washer 3mm	1
L08	0E00172A	Washer 3mm Toothed Lock	1
L09	0E00507A	Nut Hex. M3	1
L10	0E00612A	Screw M3x6 Philips Pan Head (2A)	1
C02	**JA03152A**	**Power Switch Ass'y**	**1**
01	0J03449C	Power Switch Holder	1
02	0B07158U	Power Switch	1
L01	0E00606A	Screw M3x6 Philips Pan Head (3A)	2

7.10. FE Chassis Ass'y (C03)

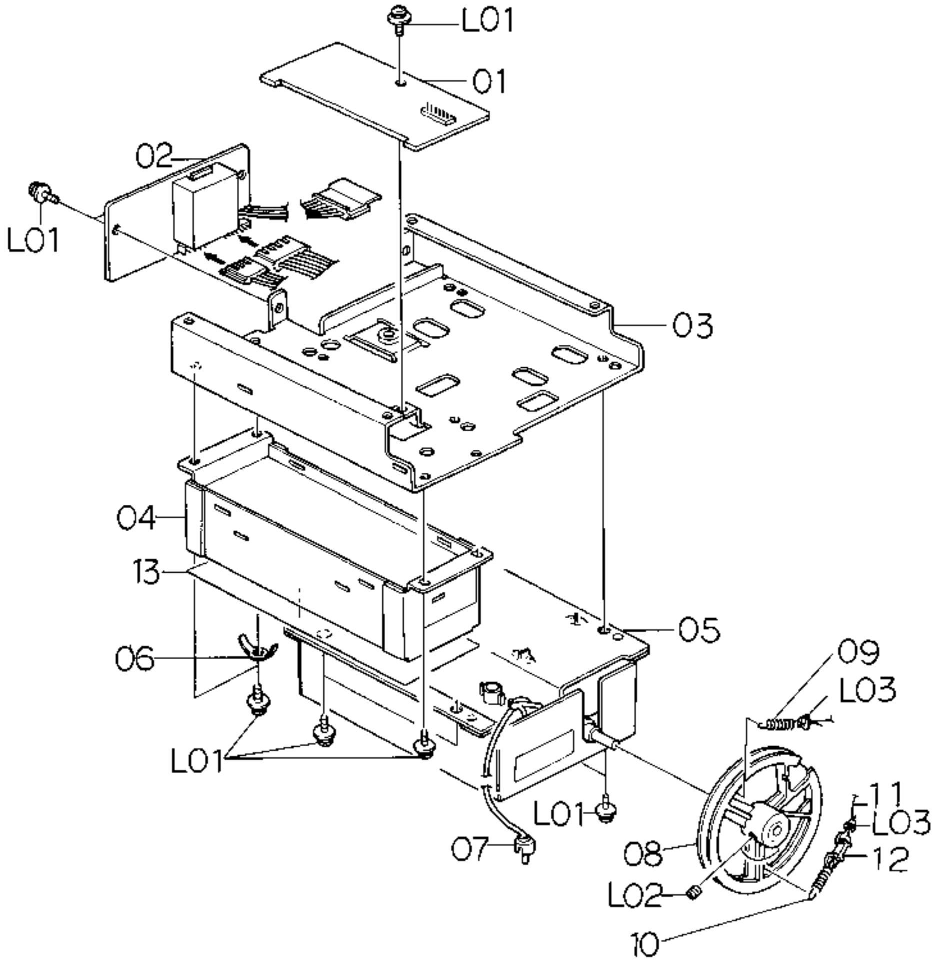


Fig. 7.10

Schematic Ref. No.	Part No.	Description	Q'ty
C03	JA03161B	**FE Chassis Ass'y**	1
01	BA03861A	Indicator P.C.B. Ass'y	1
02	BA03833B	MPX P.C.B. Ass'y	1
03	JA03166A	FE Chassis Sub Ass'y	1
04	JA03178A	IF Block Ass'y	1
05	0B08288A	FM Front-end	1
06	0B03067A	Wire Holder	1
07	0B08337A	Pin Cord Ass'y	1
08	0J03621C	FE Pulley	1
09	0J03633A	FE Pulley Spring	1
10	0J03643A	Stopper Spring	1
11	0J03632A	Dial Thread	1
12	0J03641A	SP Stopper	1
L01	0E00606A	Screw M3x6 Philips Pan Head (3A)	11
L02	0E00755A	Screw M3x6 Hex. Socket Head	2
L03	0E00752A	Thread Guide	2

7.11. Dial Chassis Ass'y (C04)

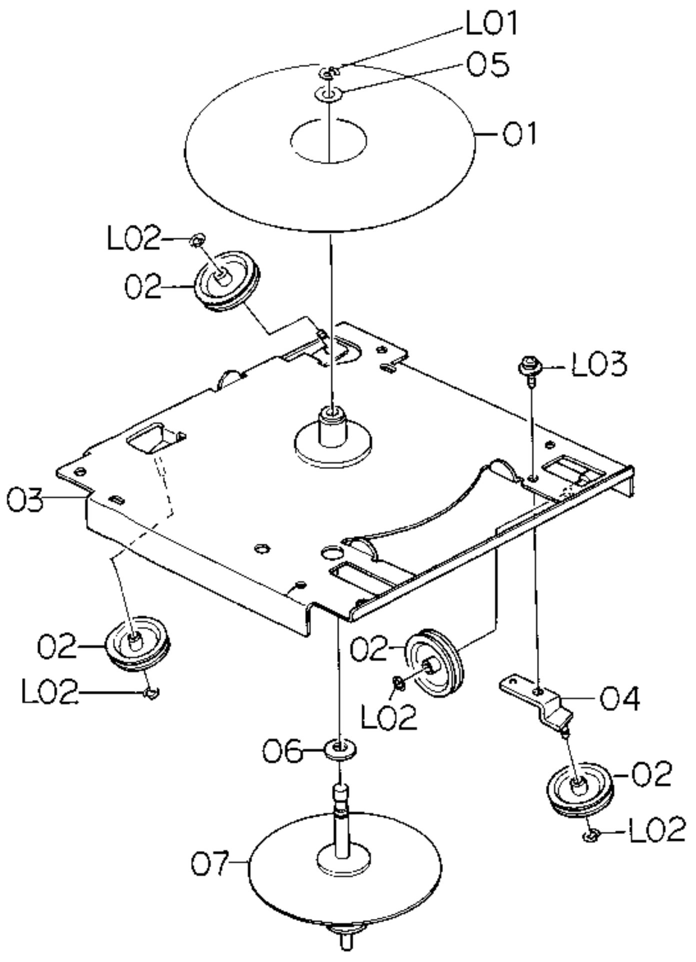


Fig. 7.11

7.12. Dial Pulley Ass'y US (C05)

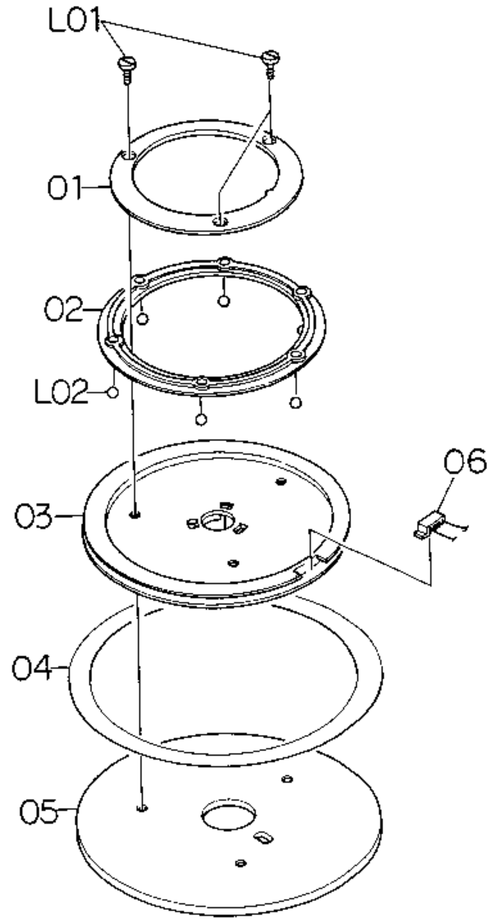


Fig. 7.12

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
C04	**JA03160A**	**Dial Chassis Ass'y**	**1**	**C05**	**JA03165A**	**Dial Pulley Ass'y US**	**1**
01	0J03630B	Dial Sheet	1	01	0J03629C	Retainer Holder	1
02	0J03611A	Guide Pulley	4	02	0J03628A	Ball Retainer	1
03	JA03168A	Dial Chassis Sub Ass'y	1	03	0J03627C	Dial Pulley	1
04	JA03169A	Pulley Holder Ass'y	1	04	0J03645A	Dial Himelon	1
05	0J03625B	Shaft Washer	1	05	0H03491B	Dial Scale Plate US	1
06	0J03647A	Buff Washer A	1	06	0J03624B	Thread Holder	1
07	JA03162A	Flywheel Ass'y	1	L01	0E00003A	Screw M2x5 Cylinder Head	3
L01	0E00134A	E-Ring 4mm	1	L02	0E00751A	Ball 4mm	6
L02	0E00042A	E-Ring 1.5mm	4				
L03	0E00606A	Screw M3x6 Philips Pan Head (3A)	1				

8. WIRING DIAGRAM

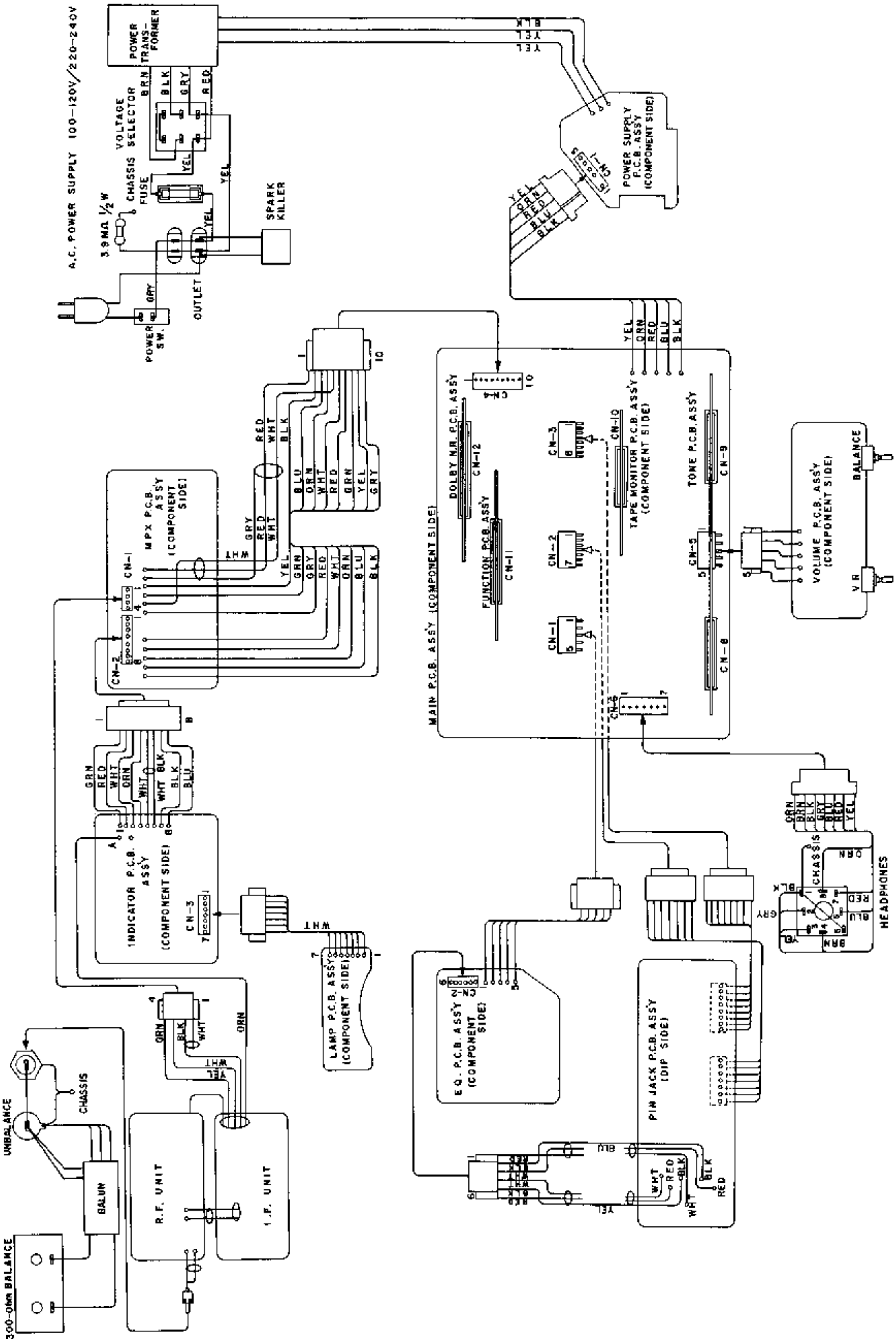
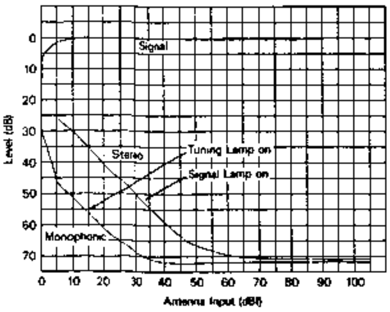
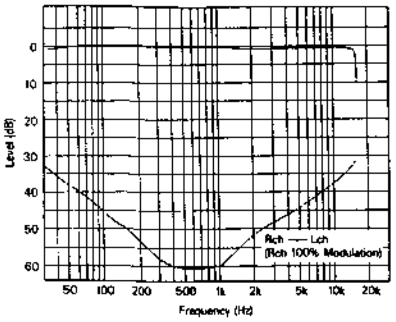


Fig. 8

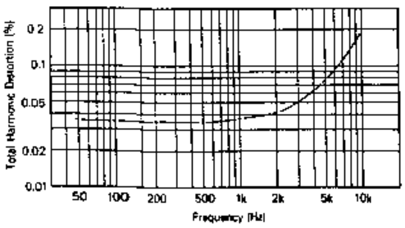
9. PERFORMANCE DATA



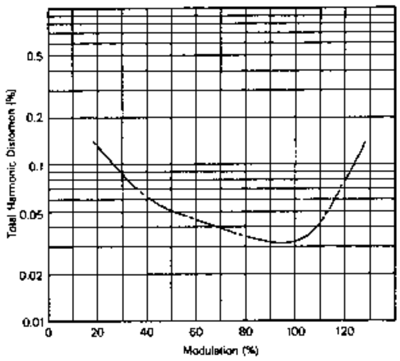
Input vs. Noise Level



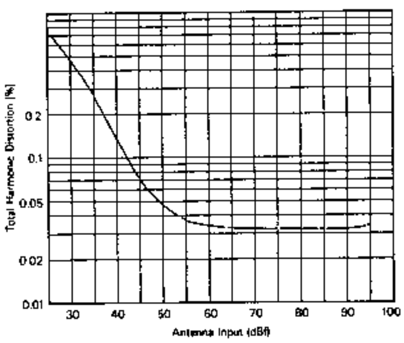
Stereo Separation
Antenna Input: 98MHz, 65dBf, 1mV, 300ohm
IF: Normal



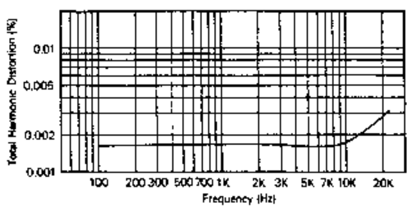
Frequency vs. Total Harmonic Distortion (Stereo)
Antenna Input: 98MHz, 65dBf, 1mV, 300ohm
Modulation: main 45.5%
sub-carrier 45.5%
pilot 9%



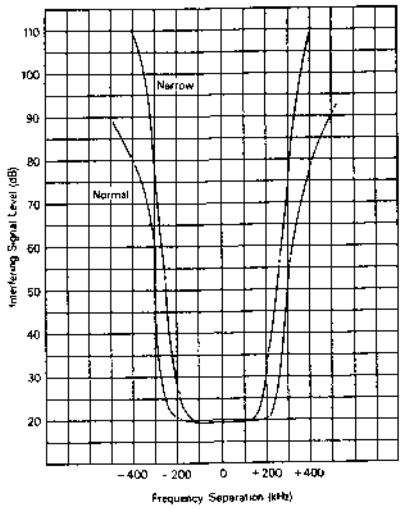
Modulation vs. Total Harmonic Distortion
Modulation: main 45.5%
sub-carrier 45.5%
pilot 9%
Frequency: 1kHz
Antenna Input: 98MHz, 65dBf, 1mV, 300ohm



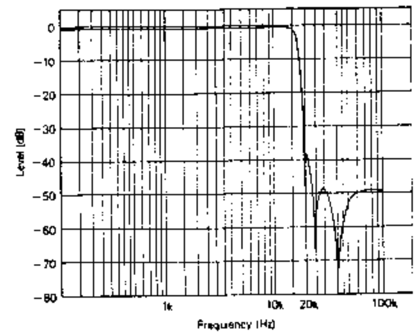
Input vs. Total Harmonic Distortion (Stereo)
Modulation: main 45.5%
sub-carrier 45.5%
pilot 9%



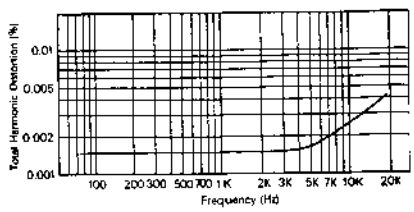
Frequency vs Total Harmonic Distortion
Phono Input Output: 2V constant
Input: 2mV



Selectivity
Impedance: 300ohm
Interfering Signal: 1kHz, 100% Modulation
Interference Output Level: −30dB
Desired Signal: unmodulated



MPX Filter Characteristics



Frequency vs Total Harmonic Distortion
Aux Input Output: 2V constant

Fig. 9

10. BLOCK DIAGRAM

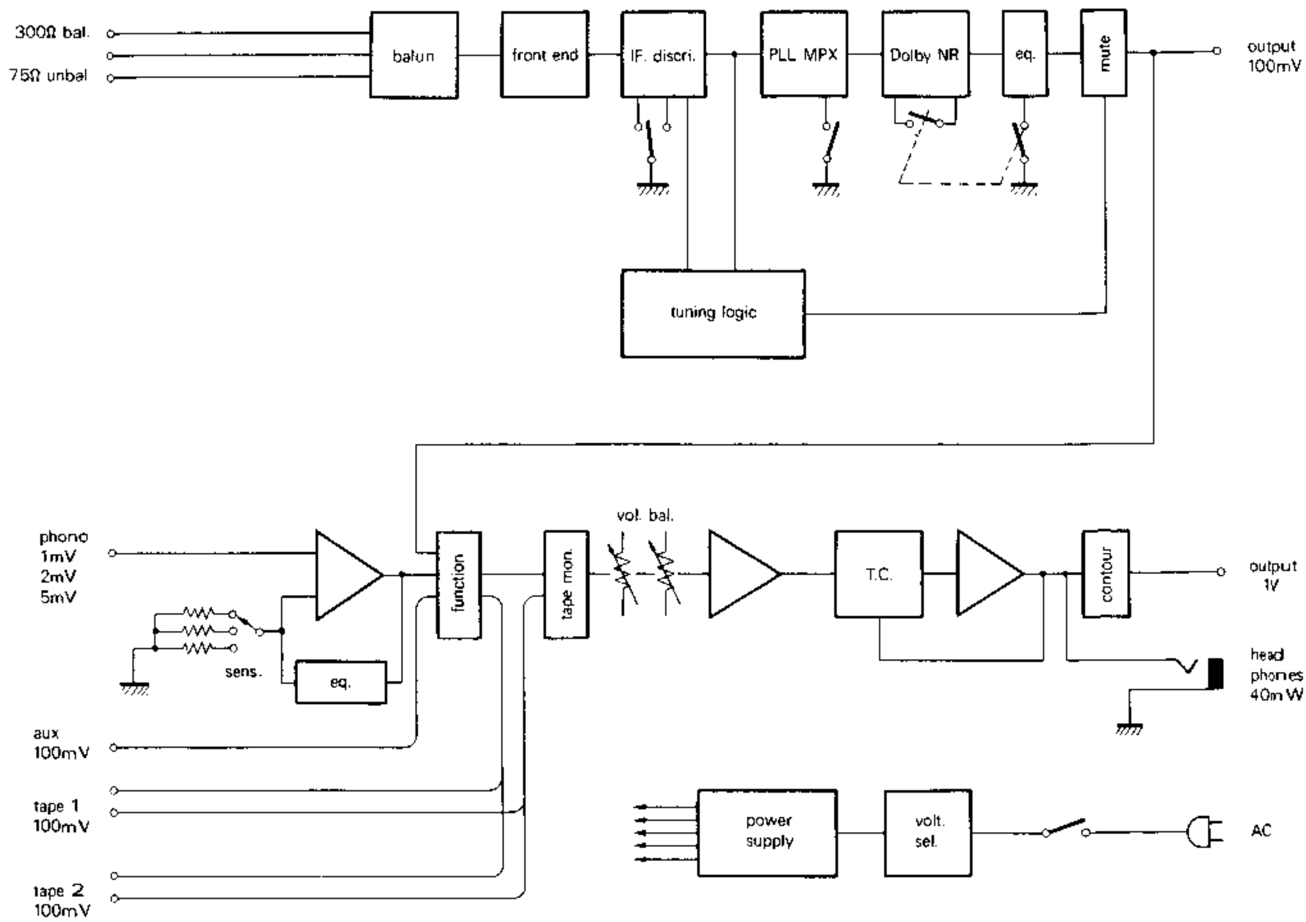


Fig. 10

11. SCHEMATIC DIAGRAM

11.1. Preamplifier Section

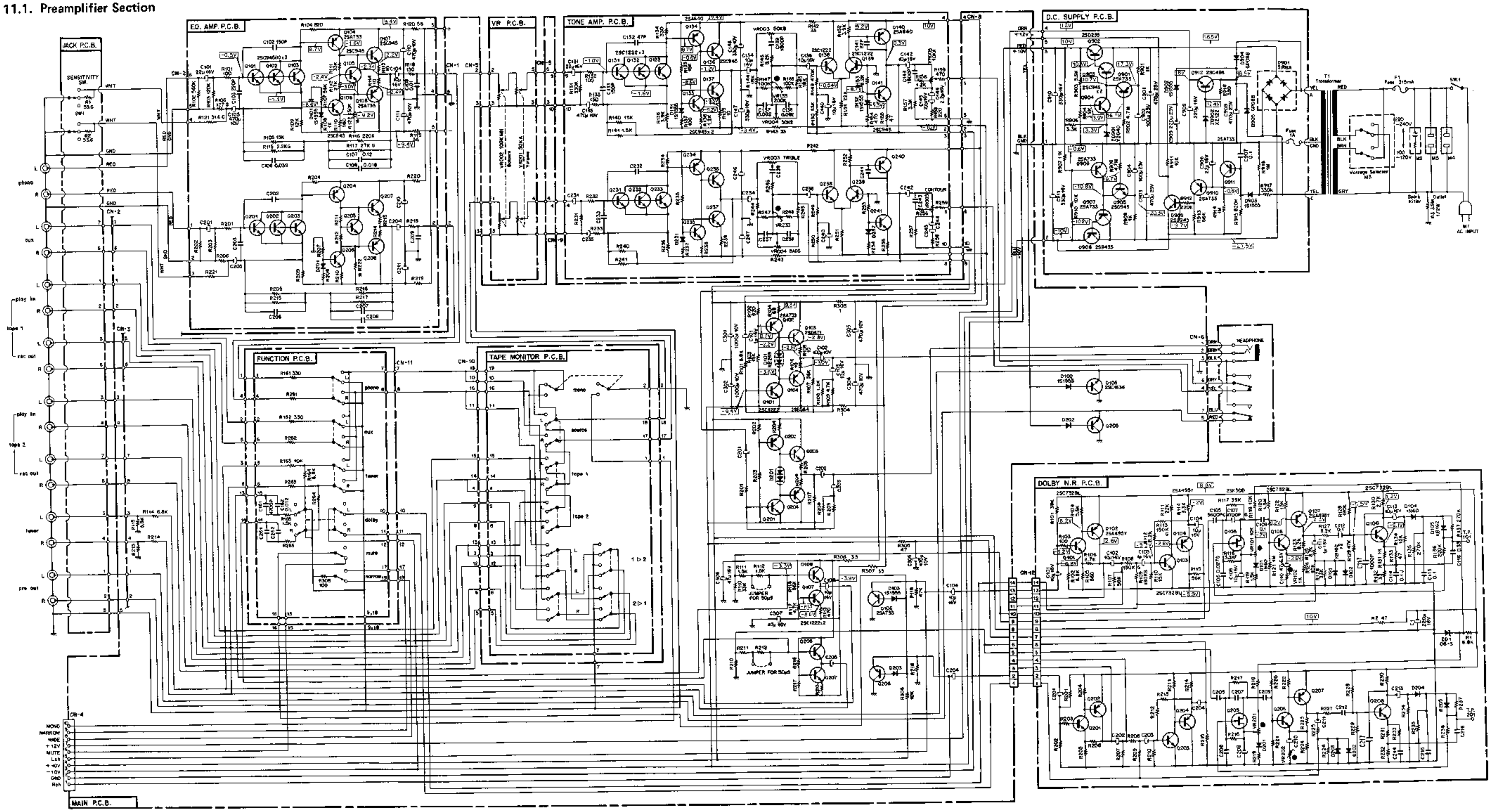


Fig. 11.1

Note: In Tone Amp. P.C.B., L channel and R channel of controls VR003 (Treble), VR004 (Bass) and VR005 (Contour) are interlocked.

11.2. Tuner Section

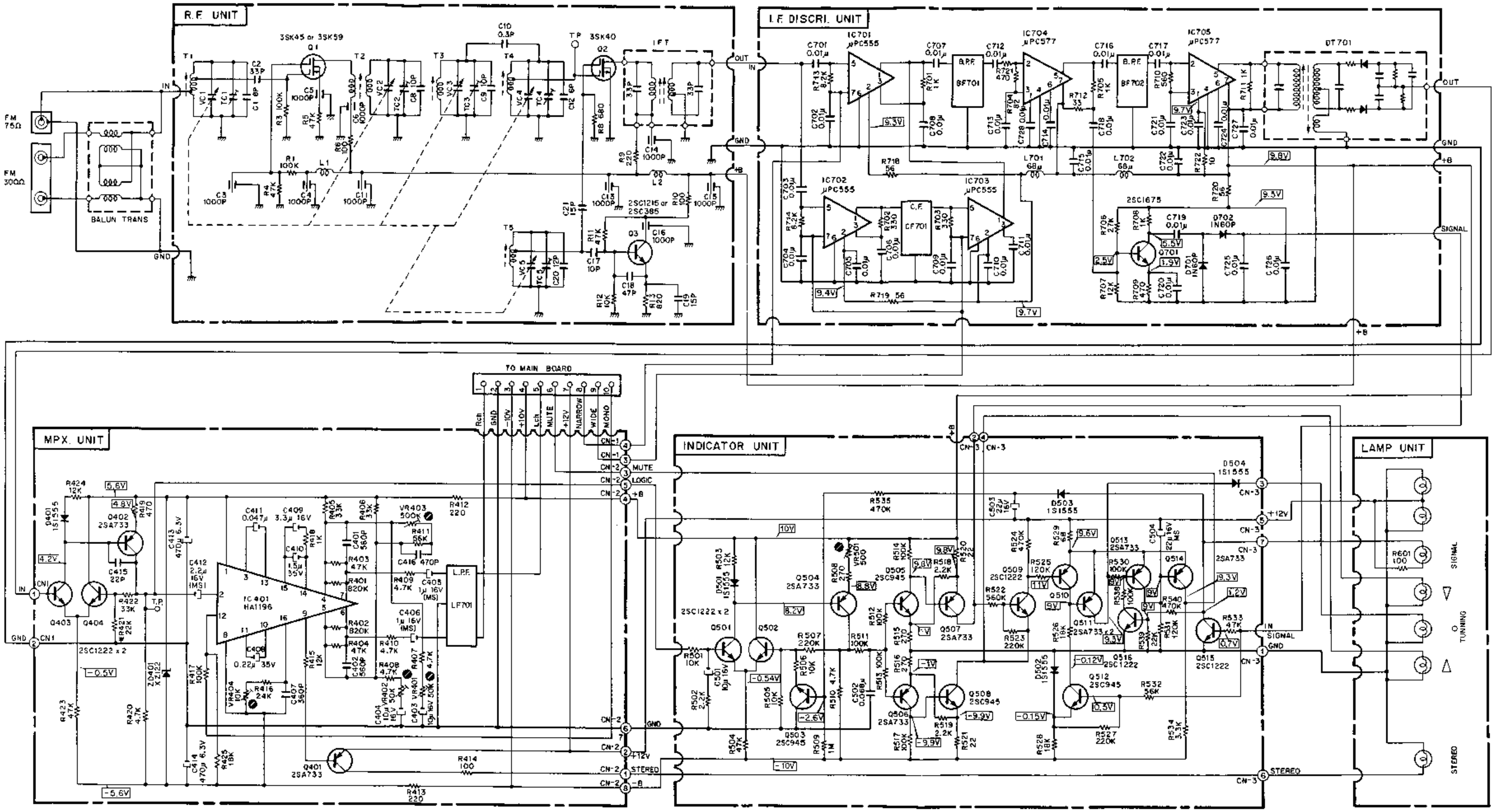


Fig. 11.2

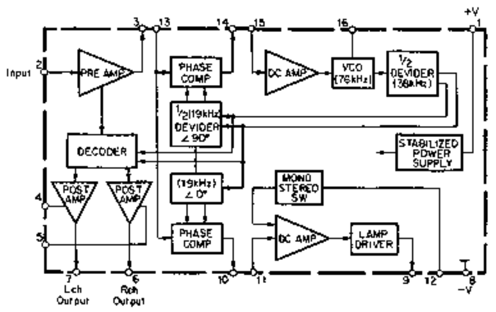


Fig. 11.3 PLL IC(IC401)

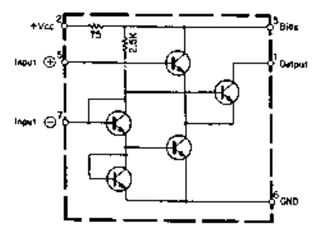


Fig. 11.4 RF IF Amplifier(IC701-703)

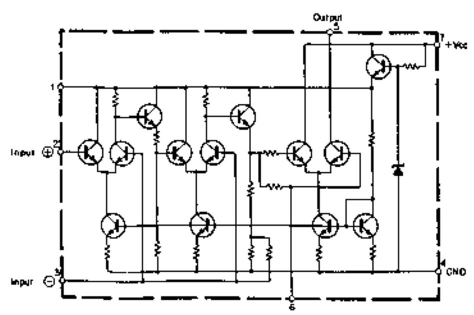


Fig. 11.5 FM-IF Amplifire(IC704, 705)

12. SPECIFICATIONS

Nakamichi 630 Specifications
Power Requirements ···100–120/220–240 VAC, 50/60 Hz
Power Consumption ···20 VA

Preamplifier Section
Input Sensitivity/Impedance
phono ··················1 mV, 2 mV, 5 mV/100k ohms
aux ··················100 mV/50k ohm
tape monitor 1, 2 ···100 mV/50k ohms
Maximum Input Levels
phono ·············· 250 mV (1 kHz, 5 mV position)
Output Levels/Output Impedance/Load Impedance
Preamplifier output 1 V/600 ohms/10k ohms
rec out ·············· 100 mV/1k ohms/50k ohms
headphone ········ 40 mW/4.5 ohms/8 ohms
Maximum Output at Clipping
preamplifier output 5 V into 50k ohms
rec out ·············· 4 V into 50k ohms
headphone ········ 300 mW into 8 ohms
Frequency Response
phono RIAA
deviation ········ within ±0.3 dB
aux ·················· 20–50,000 Hz +0, –1.5 dB
tape monitor ······ 20–50,000 Hz +0, –1.5 dB
Signal-to-Noise Ratio
(IHF-A)/Equivalent Input Noise
phono ·············· Better than 80 dB (ref. 1 mV)/–140 dB
aux, tape monitor Better than 100 dB/–120 dB
Residual Noise Level (IHF-A)
headphone ·········· 8 microvolts or less (8 ohms)
preamplifier output 4 microvolts or less (VR @ min.)
Distortion
phono ·············· Less than 0.003% (all freq. up to 10 kHz)
aux, tape monitor Less than 0.004%
Tone Control
bass ·················· ±9 dB at 20 Hz
treble ················ ±9 dB at 20 kHz
Contour (control @ "8")
–30 dB @ 3 kHz
–15 dB @ 20 Hz
–24 dB @ 20 kHz

Tuner Section
Frequency Band ········ 88 MHz – 108 MHz
Usable Sensitivity (for 30 dB quieting)
mono ·················· 2.5 μV (300 ohms), 13 dBf
stereo ················ 2.5 μV (300 ohms), 33 dBf
Sensitivity for 50 dB quieting
mono ·················· 5 μV (300 ohms), 19 dBf
stereo ················ 50 μV (300 ohms), 39 dBf
Sensitivity for 3% Total Noise and Distortion (Stereo)
······························ 35 dBf
Signal-to-Noise Ratio (@65 dBf)
Dolby NR out mono ···better than 70 dB
stereo ··· better than 68 dB
Dolby NR in mono ··· better than 75 dB
stereo ··· better than 73 dB
Muting Threshold ······ 17 μV (300 ohms), 30 dBf
(tuning lamp "on")
Frequency Response ··· 30–15,000 Hz +0.3 dB, –1.5 dB
Distortion (@ 65 dBf, 100% modulation)
100 Hz and 1 kHz
wide mono less than 0.05%
stereo less than 0.08%
narrow mono less than 0.15%
stereo less than 0.5%
6 kHz
wide mono less than 0.1%
stereo less than 0.15%
narrow mono less than 0.3%
stereo less than 0.8%
Caputre Ratio ·········· 1 dB (wide)
Alternate Channel Selectivity
wide ·················· better than 40 dB
narrow ················ better than 80 dB
Stereo Separation
wide 100 Hz ··· better than 40 dB
1 kHz ······ better than 50 dB
10 kHz ··· better than 35 dB
narrow 100 Hz ··· better than 30 dB
1 kHz ······ better than 30 dB
10 kHz ··· better than 30 dB
Spurious Response
Rejection ·········· better than 100 dB
Image Rejection ········ better than 100 dB @ 98 MHz
IF Rejection ·············· better than 100 dB
AM Suppression ········ better than 60 dB
SCA Rejection ········ better than 75 dB
Frequency Drift ······ less than 30 kHz, –10° to 60°C
MPX Filter ················ –70 dB @ 19 kHz
Antenna ·················· 300 ohms balanced
75 ohms unbalanced
Tuner Output ········ 0.1V (50% modulation)
Dimensions ·············· 16(W) x 6-11/16(H) x 9-5/16(D) inches
400(W) x 170(H) x 237(D) mm
Weight ···················· 15-1/2 lb. (approx.)
7 kg.

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- The word "Dolby" is trademarks of Dolby Laboratories.