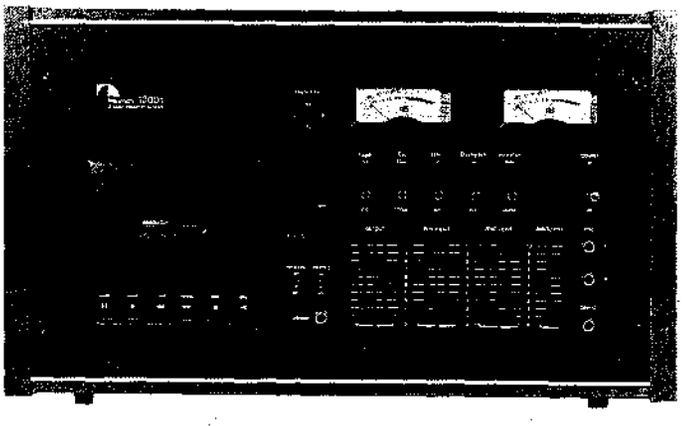
Nakamichi

# Service Manual

# Nakamichi 1000II

## 3 Head Cassette System



## CONTENTS

## 1. GENERAL

Nakamichi 1000II control functions are shown with reference to the following explanations.

To maintain the optimum performance of the Nakamichi 1000II, maintenance such as cleaning of head, capstan shaft and pressure roller, and demagnetization of head, lubrication, etc. are required.

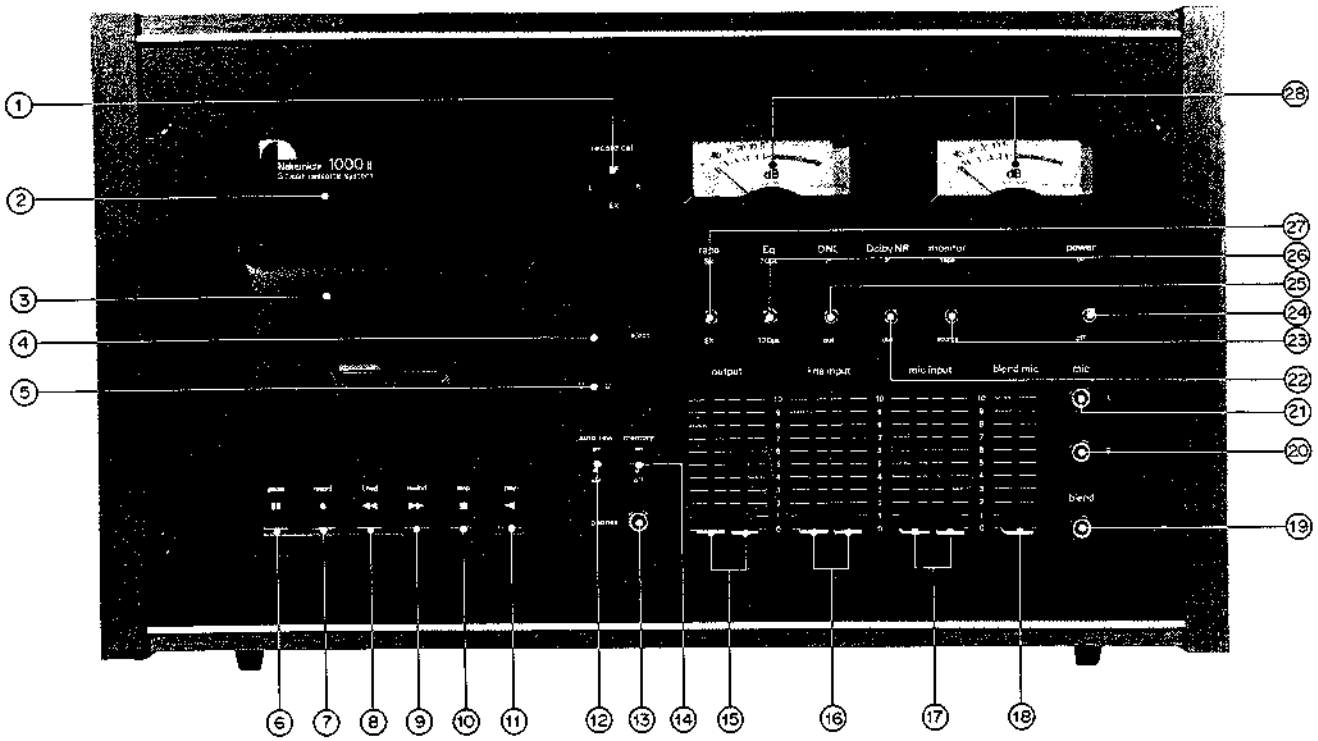



Fig. 1.1 Front View

1. Record Level Calibration Controls
2. Adjust Lid
3. Cassette Lid
4. Eject Button
5. Tape Counter
6. Pause Button
7. Record Button
8. Fast Forward Button
9. Rewind Button
10. Stop Button
11. Play Button
12. Auto Rewind Switch
13. Headphone Jack
14. Tape Start Memory Switch
15. Line Output Level Controls
16. Line Input Level Controls
17. MIC Input Level Controls
18. Blend MIC Input Level Control
19. Blend MIC Input Jack
20. MIC Input Jack R
21. MIC Input Jack L
22. Dolby NR Switch
23. Monitor Switch
24. Power Switch
25. DNL (Dynamic Noise Limiter) Switch
26. Eq Selector Switch
27. Tape Selector Switch
28. Peak Level Meter

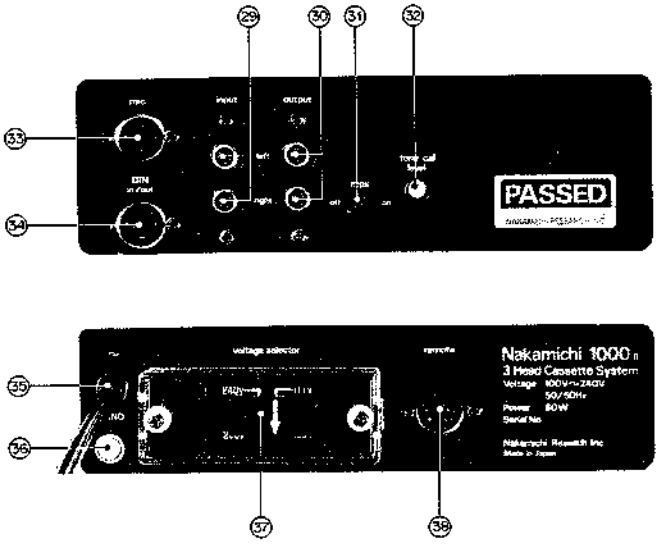



Fig. 1.2 Rear View

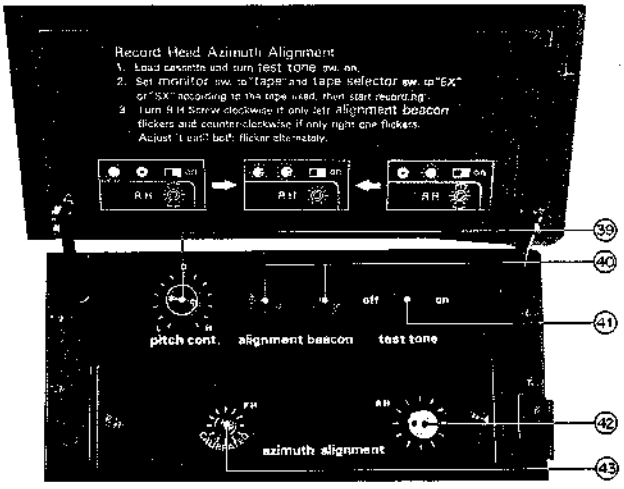
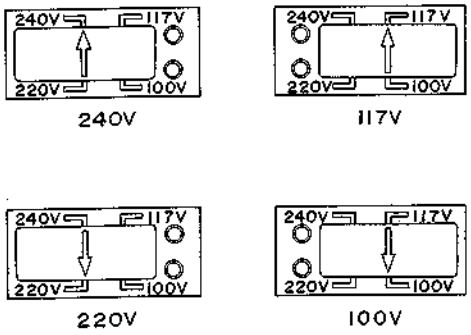



Fig. 1.3 Adjustment Panel

29. Line Input Jacks
30. Line Output Jacks
31. 19 kHz MPX Filter Switch
32. Test Tone Level Calibration
33. DIN MIC Input Socket
34. DIN In/Out Socket
35. AC Power Supply Cord
36. Ground Terminal
37. Voltage Selector Plug
38. Remote Control Socket
39. Pitch Control
40. Alignment Beacon
41. Test Tone Switch
42. Record Head Azimuth Alignment
43. Playback Head Azimuth Alignment

**Voltage Selector**

Change-over either to 100, 117, 220, or 240 V.




240V 117V

220V 100V

Fig. 1.4 Voltage Selector

Note: When a check is made on amp., etc. by means of an extension cord, re-adjustment shall be made without fail after final installation to the model chassis. The check without removal of an extension cord will cause inaccurate adjustments.

# 2. PRINCIPLE OF OPERATION

## 2.1. Mechanisms

### 2.1.1. 3-Head Configuration

Basically there are five openings in the cassette housing, and the both sides of openings are being used for left and right capstans and pressure rollers and the remaining three openings are for the two reference pins and the playback head in between. Nakamichi 1000 II and 700 II incorporate the 3-head system, and the playback head has a very narrow gap of 0.7 micron. In order to ensure the best possible frequency response particularly at the high-end the playback head should be positioned against the opening which will take advantage of the felt pad in the cassette housing as well as the shielding plate incorporated.

The record head gap is 5 micron for achieving the best bias and signal flux penetration to the tape and wide dynamic range in recording. The record head is of an exceptionally hard durable hi-Mu ferrite. With this configuration only the openings available for the separate erase and record heads are the openings of the take-up pressure roller side and the take-up reference pin side. One of the critical factors in the 3-head system is the adjustment of track width for the three independent heads. Instead of mounting the heads on the base plate of the mechanism the Nakamichi 1000 II and 700 II use quite a unique head mounting method; the three heads are hanged from the top of the head housing so that it enables an independent azimuth alignment on the three heads and the alignment becomes much easier since it can be performed with a screwdriver from the top of the head housing. See Fig. 2.1.1. If readjustment of the heads is necessary, it is highly recommendable to do the adjustment, referring to the Adjustment Procedures.

### 2.1.2. Double Capstan Tape Drive

As shown in Fig. 2.1.2, the double capstan system consists of two capstan shafts (a) and (b) connected to the two flywheels which are driven with a belt.

Against these capstans two pressure rollers (a) and (b) are engaged to run the tape with an adequate holdback tension created by the double capstan and pressure rollers. When the two capstan flywheels start rotating as shown in Fig. 2.1.2 the belt tension at side A becomes stronger than that of the side B belt and the rotation of capstan (a) becomes slightly faster than that of the capstan (b). With the pressure rollers (a) and (b) pressed against the capstans (a) and (b) it creates a tension over the tape between the capstans in proportion to the difference in capstan rotation.

As the double capstan system always creates a constant and stable holdback tension between the two capstans, the condition of the tape between two capstans will not be affected by any external conditions such as irregular take-up and supply torque, irregular loading of cassette tape, undesirable mechanism vibration, etc., thus assuring the superior wow and flutter characteristic.

The double capstan system provides a constant holdback tension on the tape and maintains the stable pressure on the tape against the heads, therefore, the tape maintains the stable contact with the erase and record head surfaces even without the pads.

The only critical factor in the double capstan system is to be considered; the two capstans have to be positioned perfectly in parallel and to be precisely vertical against the heads base, the pressure rollers have to be evenly pressed against the capstan shafts and the head surface must be positioned perfectly vertical to the tape surface. Otherwise, the running tape might become out of the tape guide resulting in the irregular tape movement.

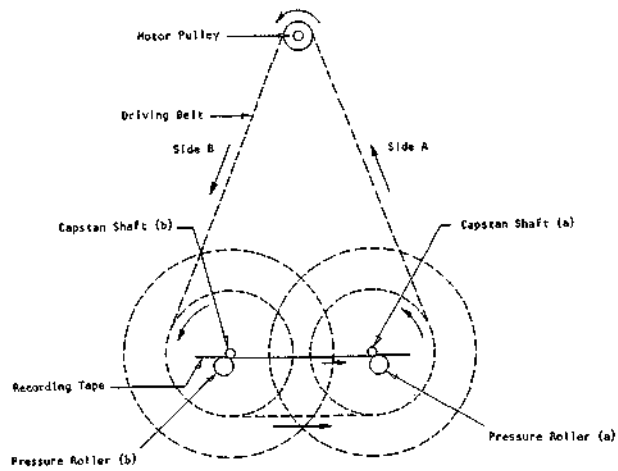



Fig. 2.1.2 Double Capstan Tape Drive

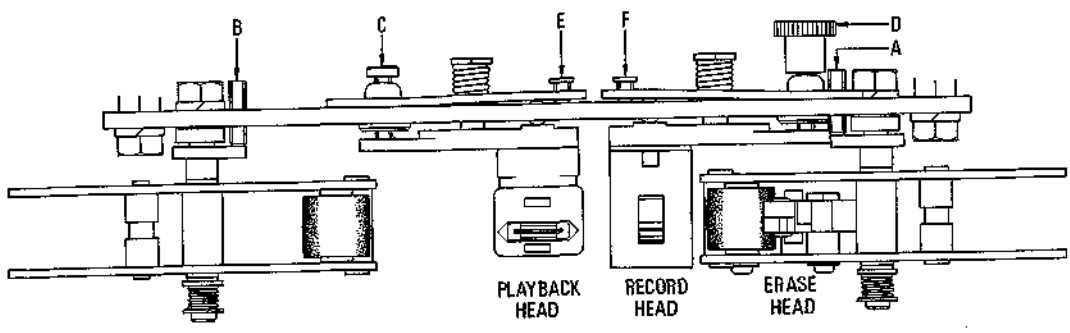



Fig. 2.1.1 3-Head Configuration

### 2.1.3. Ball Drive Mechanism

The Take-up Reel Hub and Supply Reel Hub are driven by a Reel Motor through the Ball Drive Mechanism.
Fig. 2.1.3 shows torque delivery, Fig. 2.1.4 shows the construction of the Ball Drive Mechanism, and Fig. 2.1.5 shows a cross-sectional view of the Take-up/Supply Block.

(1) Play Mode:
The Reel Motor is controlled by a governor and rotates at a constant speed. Through a belt, the torque of the Reel Motor is delivered to the Center Gear which will then rotate to the direction of "a" to communicate the torque to the Gears of both Take-up and Supply Blocks.
The Ball Clutch functions to rotate the Take-up Reel Hub to the direction of "c" at the Take-up Block as shown in the item (3). Namely, since the Ball in the Block is held between Clutch Pulley and Gear, the Clutch Pulley rotates to the same direction as the Gear does (to "c") and accordingly the Brake Drum Ass'y (i.e. Reel Hub) rotates through the Clutch Plate (a friction clutch) fitted to the Clutch Pulley. The Supply Reel Hub while in Play mode will become free as the gear torque of the Supply Block is not delivered to the Clutch Pulley.

(2) FF and REW Modes:
+12 V is directly fed to the Reel Motor, and the Center Gear rotates to the direction of "a" while in FF mode and to "b" direction while in REW. When the Center Gear rotates to the direction "a", the Ball Clutch of the Take-up Block functions to rotate the Take-up Reel in the same manner as in the Play mode. This way, a tape travels forwardly.
When the Center Gear rotates the other way round (to direction "b"), the Ball Clutch of the Supply Block functions to rotate the Supply Reel to the direction of "d". This way a tape is rewound. Meantime the Take-up Reel is released.

(3) Ball Clutch Mechanism:
Refer to Fig. 2.1.6. As shown in Fig. 2.1.5, a magnet ring is incorporated in the Take-up/Supply Block.
Since the magnetic force at the periphery is greater than that at the inner part, the Ball will stop in the state of being pushed to the Base B (Reel Hub Gear) (Fig. A).
When the Base B moves to the left hand side, the Ball will forcedly come in between the Bases A (having an angle of $\theta$) and B, since the Ball have an appropriate friction against the Base B, as a result of which the Base A also commences to move (Fig. B).
When the Base B moves to the right direction, the Ball will part from the Base A, and this way the Bases A and B will become released (Fig. C).

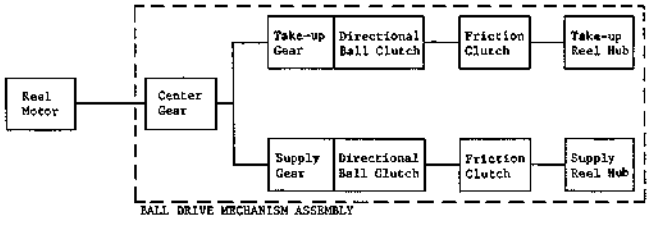



Fig. 2.1.3 Torque Delivery

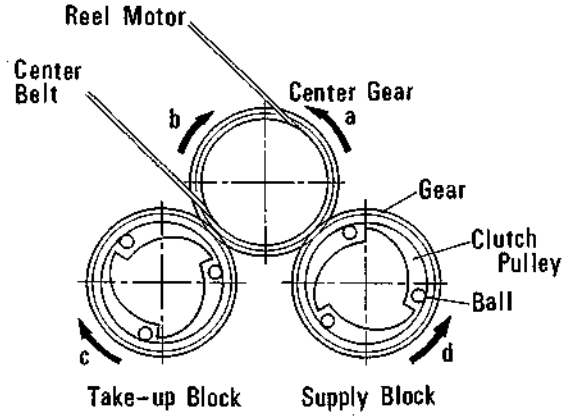



Fig. 2.1.4 Construction

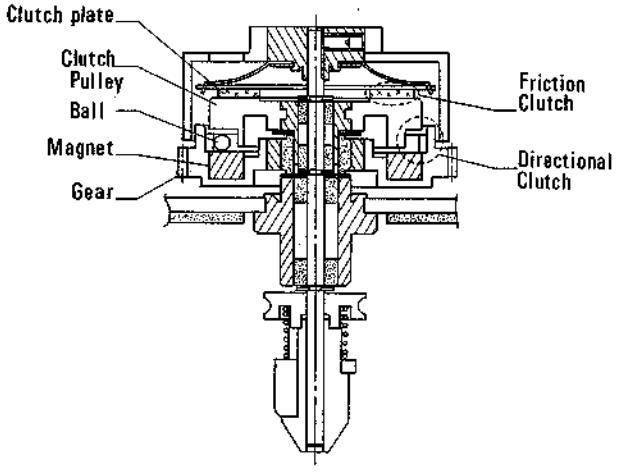



Fig. 2.1.5 Take-up/Supply Block Cross-sectional View

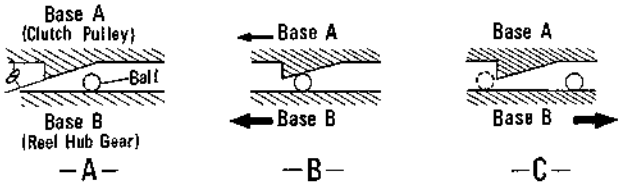



Fig. 2.1.6 Ball Clutch Model

## 2.2. Amp. Circuits

### 2.2.1. Record Dolby NR Circuit

Fig. 2.2.1 shows a recording mode Dolby NR processor circuit. The circuit input signal is applied through terminal 11 (4), while the signal applied through terminal 12 (3) is fed to the MONITOR switch and is only subjected to impedance conversion by Q101 and is not boosted by the Dolby NR processor. Terminal 10 (5) is the circuit output terminal and is linked with the REC. EQ. AMP via REC. CAL. VR and TAPE selection switches. Terminal 13 (2) is connected with the DOLBY NR switch. For DOLBY NR IN, this terminal becomes open and a feedback current is applied to the base of Q102. For DOLBY NR OUT, this terminal is grounded and the output via the emitter of Q102 is cut from the Dolby NR processor.

A detailed explanation of the Dolby NR processor can be found in other references, however, it is also briefly described here.

Fig. 2.2.2 compares input vs. output characteristics of the Dolby NR processor, where curve A shows the recording mode Dolby NR circuit and curve B the playback mode. The symmetry of these two characteristics with respect to line 0-0', bisecting the right corner, is highly significant.

Curve A for recording exhibits a linear relationship between the input and output signal levels from the high level down to −5 dB, under which the input level gradually bends. For input levels under −30 dB, the output level is boosted by 10 dB with respect to the input level. The action of the recording mode Dolby NR circuit is that the output level is boosted from 0 to a maximum of 10 dB according to the input level.

With curve B for playback, in contrast to that for recording, the output level decreases with a decrease in the input level and, for an input level of less than −30 dB, becomes a further 10 dB lower than this input level. According to this characteristic, noise generated in the playback system, such as hiss noise, playback amplifier noise, etc., is reduced by 10 dB. Combination of the above for recording and playback mode results in a linear characteristic. For example, for a −40 dB recording input, point b on curve A is recorded at −30 dB since the input is boosted by 10 dB in the recording mode Dolby NR circuit. When the signal reproduced from a recorded magnetic tape enters the playback mode Dolby NR circuit, the −30 dB input level is reduced by 10 dB to −40 dB; point b' on curve B. Thus, the 1:1 proportional relation is valid for any input level.

This action is explained using a system diagram of the recording mode Dolby NR processor as shown in Fig. 2.2.3.

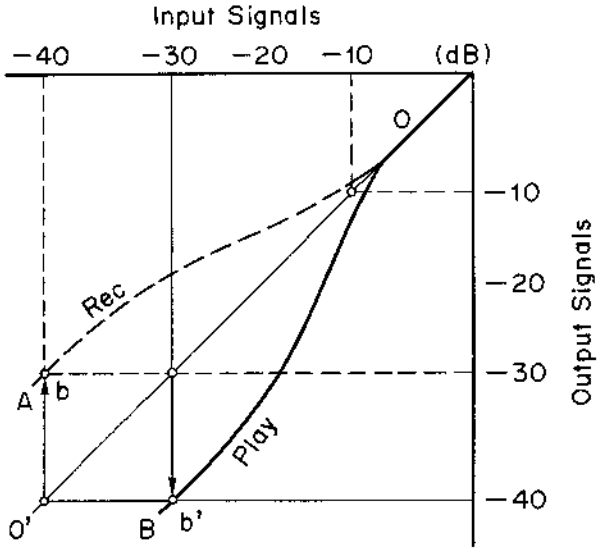



Fig. 2.2.2 Working Principle of Dolby NR Circuit

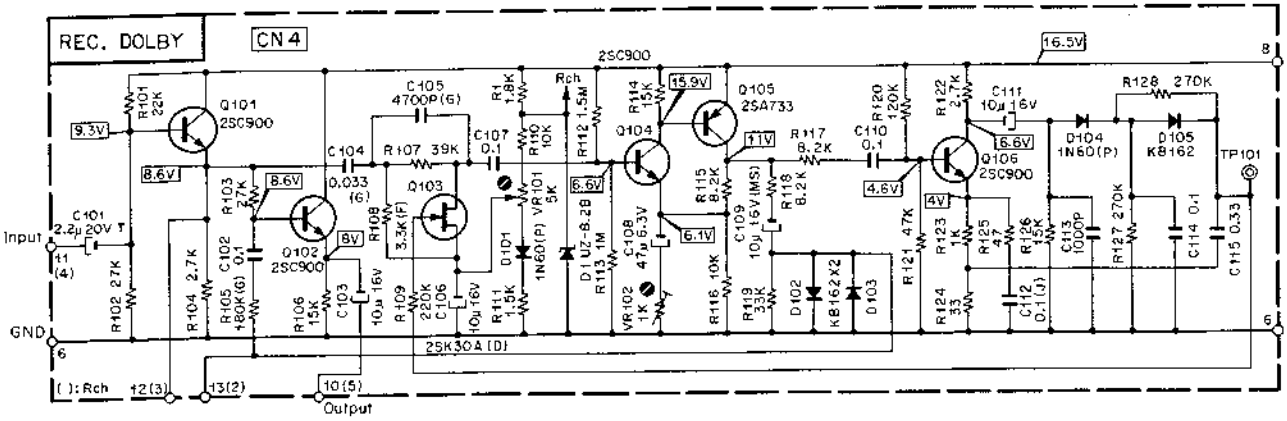



Fig. 2.2.1 Record Dolby NR Processor Circuit Diagram

The input signal enters the input of amplifier 4 (Q102) via amplifier 1 (Q101). Another signal from amplifier 1 is amplified by amplifier 2 (Q104 and Q105) after passing through a high-pass filter and enters amplifier 4. This signal is superposed by another signal as previously mentioned and this added signal is supplied to the output terminal through amplifier 4. The signal amplified by amplifier 3 (Q106) is fed back to an FET (Q103) after being rectified by diode D (D104). A circuit including the high-pass filter, amplifiers 2 and 3, and the FET in Fig. 2.2.3 is called a compressor, and the signal which appears at the point between the output of amplifier 2 and the input of amplifier 4 is called the compressor output signal ($E_2$). On the other hand, the output ($E_1$) of amplifier 1 is called the direct signal, and the FET is used as an electronic attenuator.

Indications such as 8.6 V, etc. in the circuit diagram show DC voltages when a zero signal is applied. The standard input signal level to the recording mode Dolby NR processor is 100 mV at 400 Hz. The recording output signal level is about 85 mV (r.m.s.).

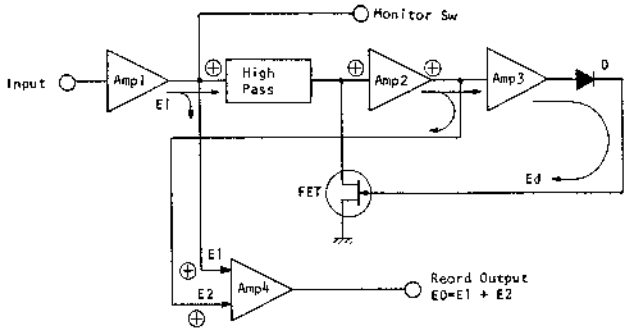



Fig. 2.2.3 Record Dolby NR Processor System Diagram

### 2.2.2. Playback Dolby NR Circuit

Fig. 2.2.4 shows a circuit diagram for a playback mode Dolby NR processor. The input for this circuit is applied through terminal 12 (3) where the output of the playback head amplifier is connected. Terminal 10 (5) is the output of the playback mode Dolby NR processor which becomes the input of the DNL circuit via the MONITOR switch. An input signal through terminal 13 (2) is applied to the DOLBY NR switch. For DOLBY NR IN, this line is open and the signal is fed back to the base of Q101. For DOLBY NR OUT, this line is grounded and no signal is fed back.

Since the general action of the Dolby NR processor is described in the preceding section, Rec. Dolby NR Circuit, only the action of the playback mode Dolby NR processor will be explained here, using its system diagram. The input signal applied through amplifier 1 (Q101, Q102) via a high-pass filter, is amplified in amplifier 2 (Q104, Q105), and is then fed back to the input of amplifier 1 in opposite phase to the phase of the input signal. Since this results in the subtraction of the feedback signal from the input signal, the resultant signal appears at the amplifier 1 output, i.e., the playback mode Dolby NR processor. Meanwhile, an output signal which has been amplified by amplifier 3 (Q106) controls the FET (Q103) after being rectified by diode D (D104).

The difference between playback and record is, as is obvious from the above explanation, that the phase of the compressor signal is opposite to that of the direct signal because of the changed signal path. Fig. 2.2.6 shows typical record and playback mode frequency characteristics for the Dolby NR processor. According to this figure, it is obvious that frequency components higher than about 200 Hz are subjected to the Dolby NR process at levels less than about −10 dB.

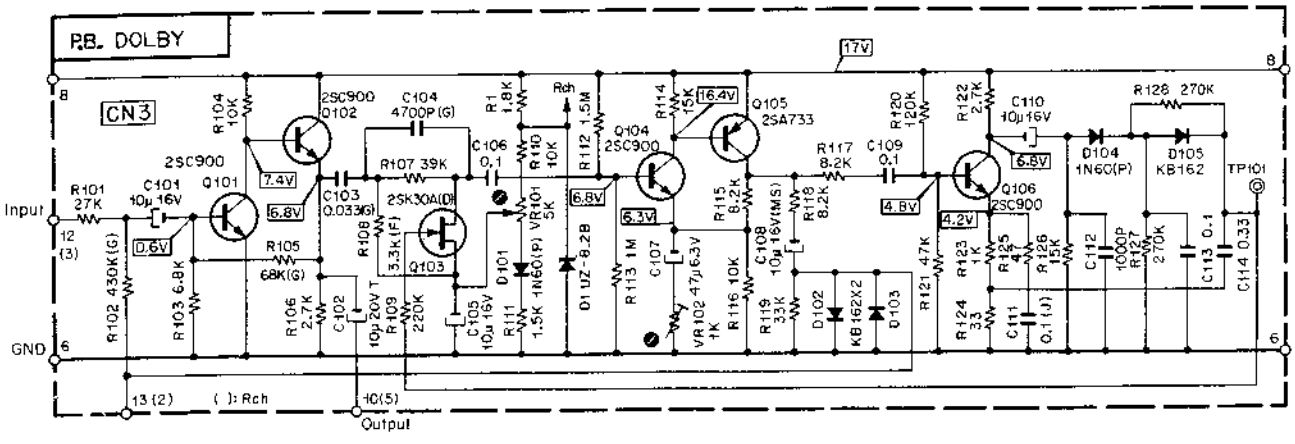



Fig. 2.2.4 Playback Dolby NR Processor Circuit Diagram

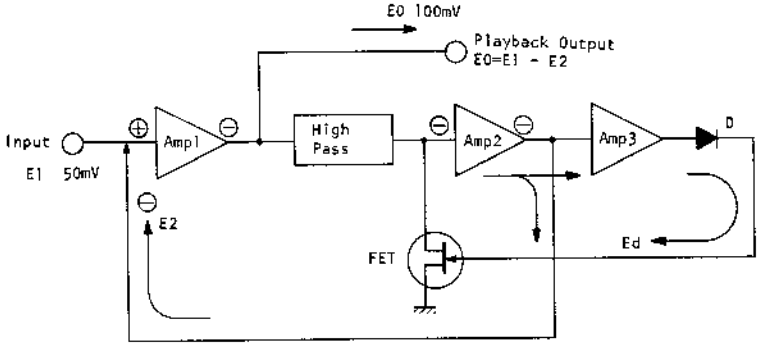
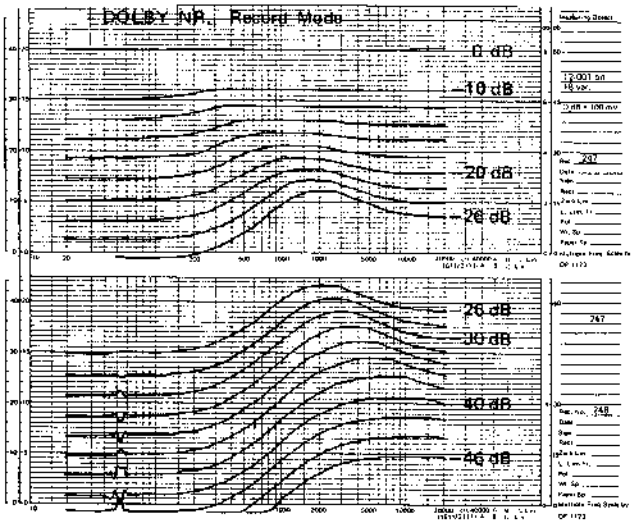



Fig. 2.2.5 Playback Dolby NR Processor System Diagram



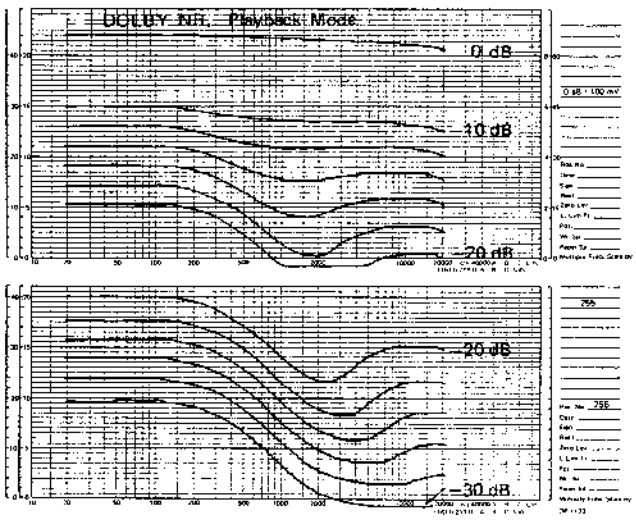




Fig. 2.2.6 Dolby NR Processor Record/Playback Frequency Response

### 2.2.3. DNL Circuit

Fig. 2.2.7 shows the circuit for the dynamic noise limiter (DNL). Its system diagram is shown in Fig. 2.2.8. Input terminal 14 (1) can be connected with the output of the mixing amplifier or that of the playback mode Dolby NR processor by the selection of MONITOR switch. The output of dynamic noise limiter 10 (5), and the other output independent of it, 12 (3) are applied to the DNL switch and becomes the input for METER AMP. A signal selected by this switch becomes the input to LINE AMP. In this system, noise reduction is performed only in the playback mode.

The input signal is amplified by amplifier 1 (Q101, 102, 103) and is branched into two paths at Q104; in branch [I], the signal is divided by the collector and emitter of Q104 and its high and low-frequency components appear at the output terminal as voltage V1 after passing through C108 and R116, respectively. Meanwhile, in branch [II] the signal enters amplifier 2 (Q106 and Q107) via the high-pass filter composed of C110 and R119. The attenuator formed by diodes D103 to D106 and other components is controlled by the output signal level and signal frequency. The output voltage of this attenuator, V2, is synthesized with the output voltage of branch [I], V1. In other words, frequency components of the signal within a band centering around 10 kHz are filtered out for playback levels at about −45 dB or above.

Fig. 2.2.9 shows the typical characteristics, and Fig. 2.2.10 is the frequency analysis data for the noise component by a 1/3 octave filter which shows results for three cases; (1) without noise reduction, (2) with only the Dolby noise reduction system, and (3) with the Dolby noise reduction system plus the dynamic noise limiter.

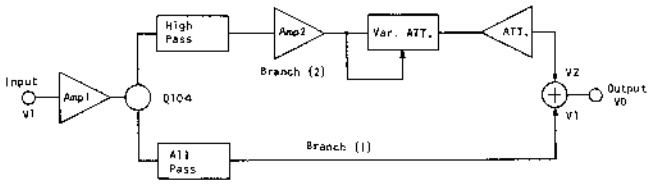



Fig. 2.2.8 Dynamic Noise Limiter System Diagram

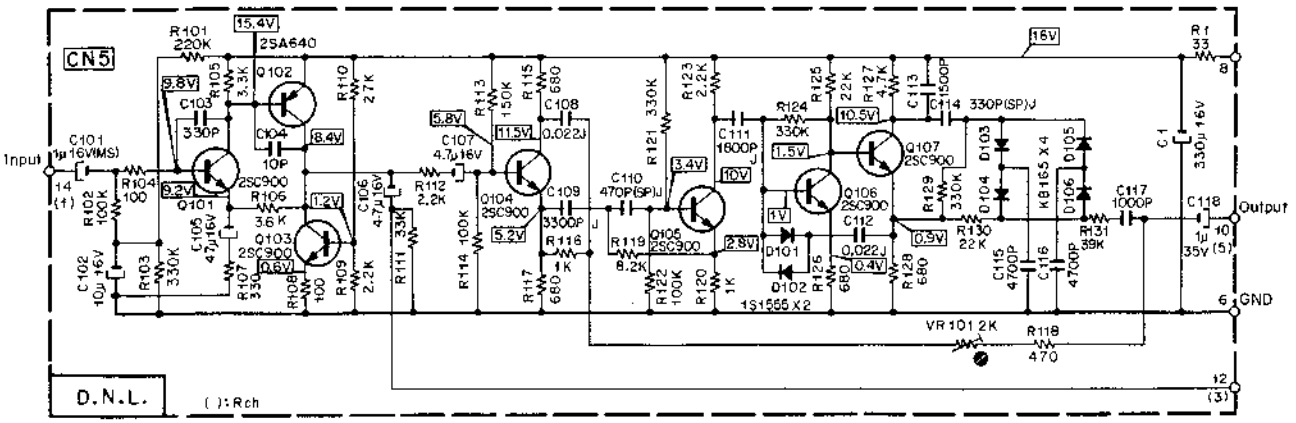



Fig. 2.2.7 Dynamic Noise Limiter Circuit Diagram

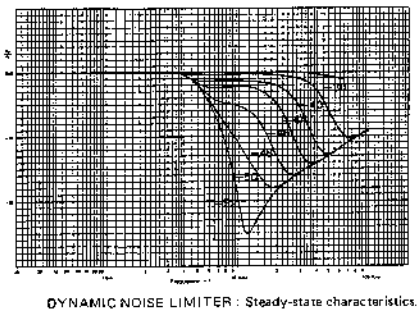



Fig. 2.2.9 DNL Characteristics

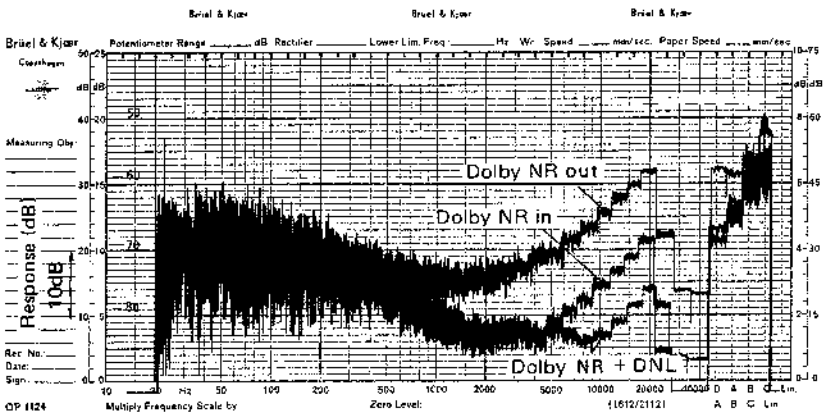



Fig. 2.2.10 Noise Figure

### 2.2.4. Playback Head Amp.

Fig. 2.2.11 shows the playback amplifier circuit, and Fig. 2.2.12 is its system diagram. The playback head is connected with terminals 13 (11) and 14 (12). Terminal 4 is provided for the mute signal. Terminal 9 (7) is connected with the EQ switch which is used to select a time constant according to the characteristics of the magnetic tape used.

Amplifier 1 (Q101 and Q102) is an equalizer amplifier. With the selection of the equalizer constants of its feedback circuit by means of a jumper wire, its time constant on the high frequency side can be varied in 10 μs steps from 110 μs to 140 μs and its gain in 1 dB steps. This selection is provided for compensation of playback head characteristics, however, the time constant of 120 μs is usually selected by short-circuiting R108 (10 kΩ) and opening R109 (22 kΩ).

Time constants of the time constant circuit are selected by 120 μs and 70 μs positions of the EQ switch so that the frequency characteristics of the circuit will fit to those of the magnetic recording tape used as follows (the time constant at low frequency is fixed to 3180 μs):

EXII ..... 3180 μs (50 Hz) + 120 μs (1326 Hz)

SX ..... 3180 μs (50 Hz) + 70 μs (2274 Hz)

The FET (Q103) acts to prevent transference of the amplifier 1 output signal to phase-shifter (Q104) by reducing its gate voltage below the pinch-off voltage for the mute signal.

Phase-shifter (Q104) acts to compensate the phase delay characteristics of the frequency response, reducing the modulation for the complex wave.

The playback amplifier gain is adjusted by VR101 in amplifier 2 (Q105, 106) so that, when the 400 Hz 20 mM/mm recorded tape is played back the output voltage of the playback mode Dolby NR processor at terminal 10 (5) becomes 100 mV and that of the playback head amplifier at terminal 3 (2) about 50 mV. The L and C in the amplifier 2 output provide a filter for bias-trapping which prevents disturbance of the Dolby NR action due to mixing bias frequencies in the Dolby NR processor.

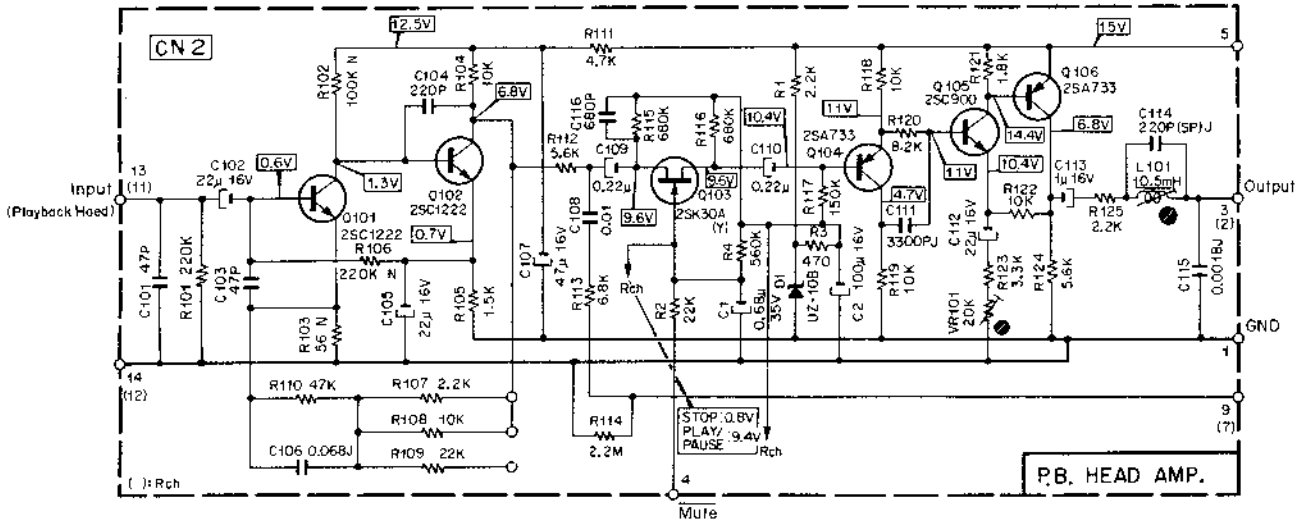



Fig. 2.2.11 Playback Head Amp. Circuit Diagram

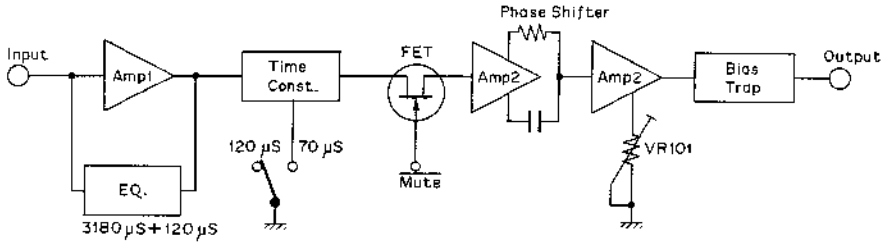



Fig. 2.2.12 Playback Head Amp. System Diagram

### 2.2.5. MIC Amp.

Fig. 2.2.13 shows a microphone amplifier circuit. This circuit board carries a DIN amplifier (DIN AMP), a input amplifier (INPUT AMP), a microphone amplifier (MIC AMP), a blending microphone amplifier (BLEND MIC AMP) and a mixing amplifier (MIX AMP). The input signal applied through the DIN connector is amplified by Q103 and that from the pin connector reaches the LINE VOLUME directly, and it is amplified by Q108 and Q109. The signal is fed to the pin connector if no DIN connector is plugged in, but becomes independent of the pin connector by plugging in the DIN connector.

Microphone amplifier (MIC AMP): Since the signal level of this input is usually low, Q101, Q102 and Q103 are provided to broaden the dynamic range. Q103 is a constant current source which provids a high MIC amp. output impedance.

For a large microphone output, this circuit is used at a reduced MIC VOLUME. In this case, however, the voltage gain of Q102 decreases because the load resistance of Q102 is reduced. Since voltage gain of the conventional microphone amplifier is constant, its amplification characteristics are not good for large input signals and its dynamic margin is about 40 dB. However, the microphone amplifier described here can be used without distortion for input voltages up to 2V because of its broad dynamic margin which is greater than approximately 80 dB. Thus, no microphone attenuator is necessary. If neither a DIN microphone nor a microphone plug is connected, the output of this circuit is grounded.

The blending microphone circuit (BLEND MIC) is the same as the microphone amplifier.

The voltage values indicated as 0.2 mV, 5 mV, etc., at the input terminals of the circuit board show that when each VOLUME control on the panel concerned is set at its maximum position, the LEVEL METER indicates 0 dB for each of these values. The output of this circuit is combined with the input of the mixing amplifier.

The output signal from the mixing amplifier is fed to the LC filter. This filter normally operates the Dolby NR by removing the leakage of the bias signals for recording and the FM broadcast multicarrier signals. L102 is adjusted to minimize the 19 kHz signal level for MPX switch IN. The output of this circuit, 100 mV, becomes the input of the recording mode Dolby NR processor.

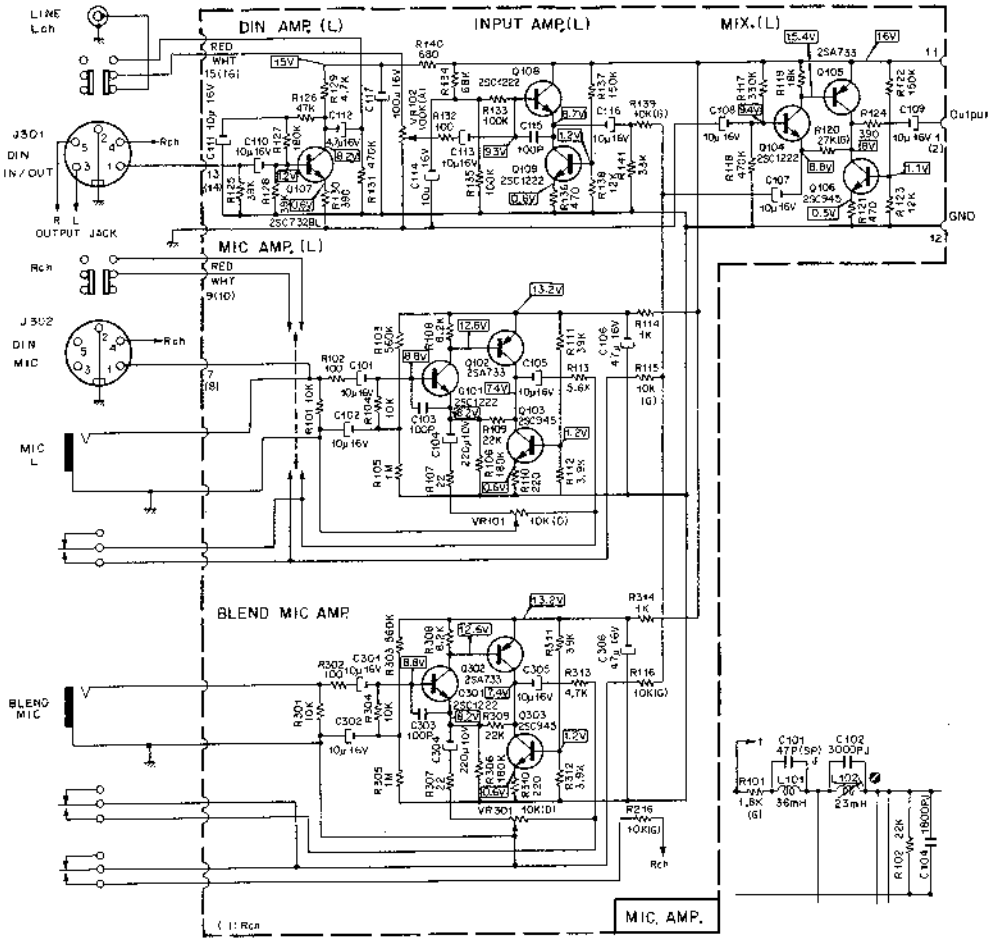



Fig. 2.2.13 MIC Amp. Circuit Diagram.

### 2.2.6. Record Equalizer Amp.

Fig. 2.2.14 shows the recording calibrator variable resistor circuit (REC CAL VR) and the recording equalizer amplifier circuit (REC EQ AMP).

This signal from the output of the recording mode Dolby NR processor becomes the input of this RECORDING CALIBRATOR circuit. The recording head (REC HEAD) is connected between the output terminal of this circuit and the ground.

The VR 702 line is prepared for EX tape and that of VR 701 for SX tape. The time constant is selected by changeover of this EQ switch. This selection, coupled with the time constant selection in the Playback Head Amplifier (PB HEAD AMP), makes it possible to obtain characteristics suitable for tape types. With respect to the details of this part, the section on the playback head amplifier should be referred to.

Since the FET (Q101) is in the OFF state for mute, the signal is cut here and no signal exists in the equalizer amplifier circuit. Without the mute signal, Q101 is in the ON state. Thus, the signal from the RECORDING CALIBRATOR is amplified by Q102 and enters Q103. A constant DC current flows in Q103 by way of Q104 and raises the output impedance, therefore, a constant current flows through the RECORDING HEAD over all frequencies used. L104 and C105 compose the recording equalizer. Compensation for the high frequency range is made by building a resonance frequency at about 23 kHz by means of adjusting L104. L103 and C109 construct a bias trap.

Figs. 2.2.15 and 2.2.16 show the frequency characteristics for recording and playback.

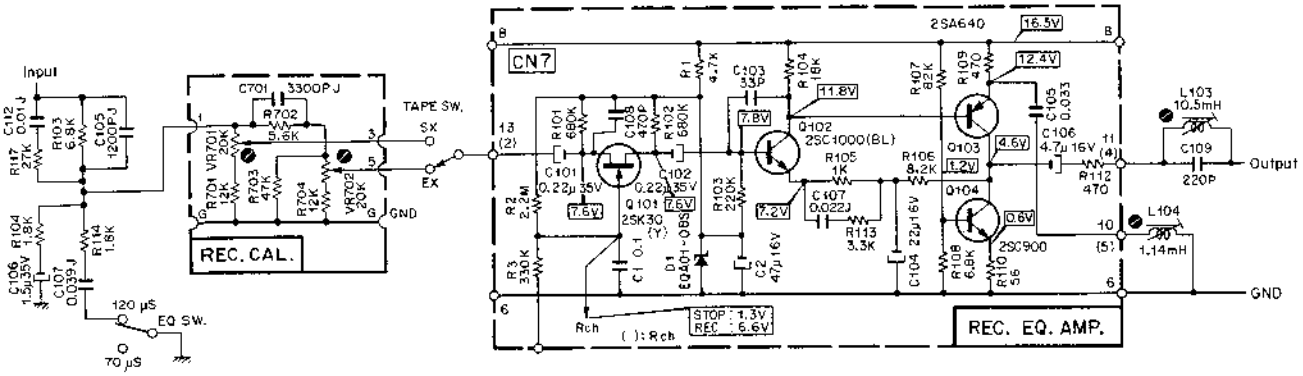



Fig. 2.2.14 Record Eq. Amp. Circuit Diagram

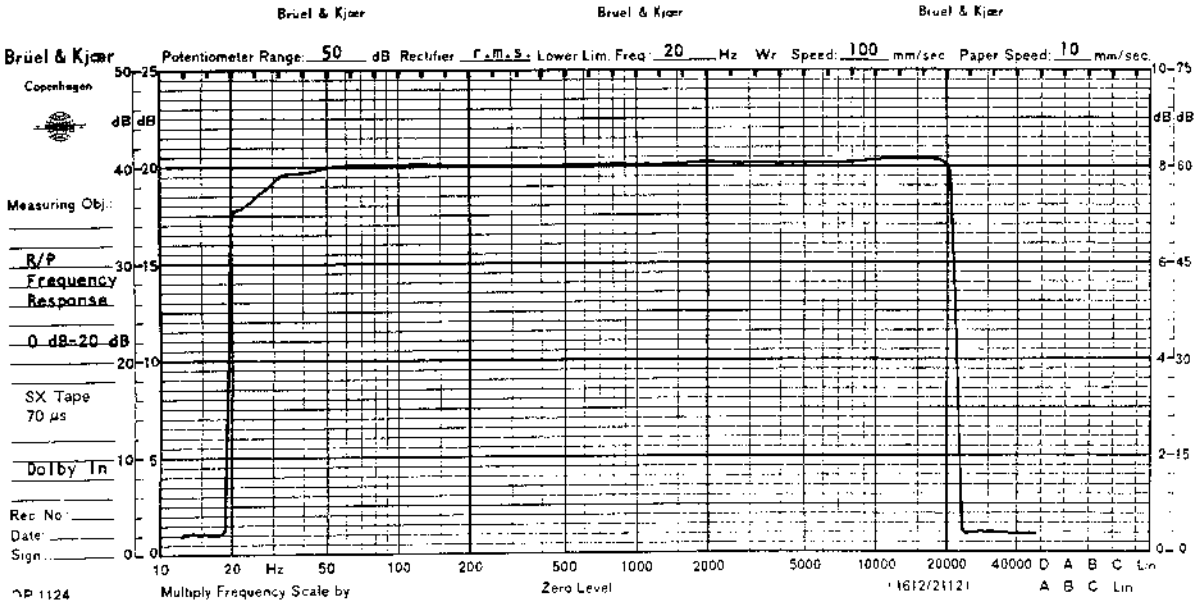



Fig. 2.2.15 Record/Playback Frequency Response (Dolby NR: IN)

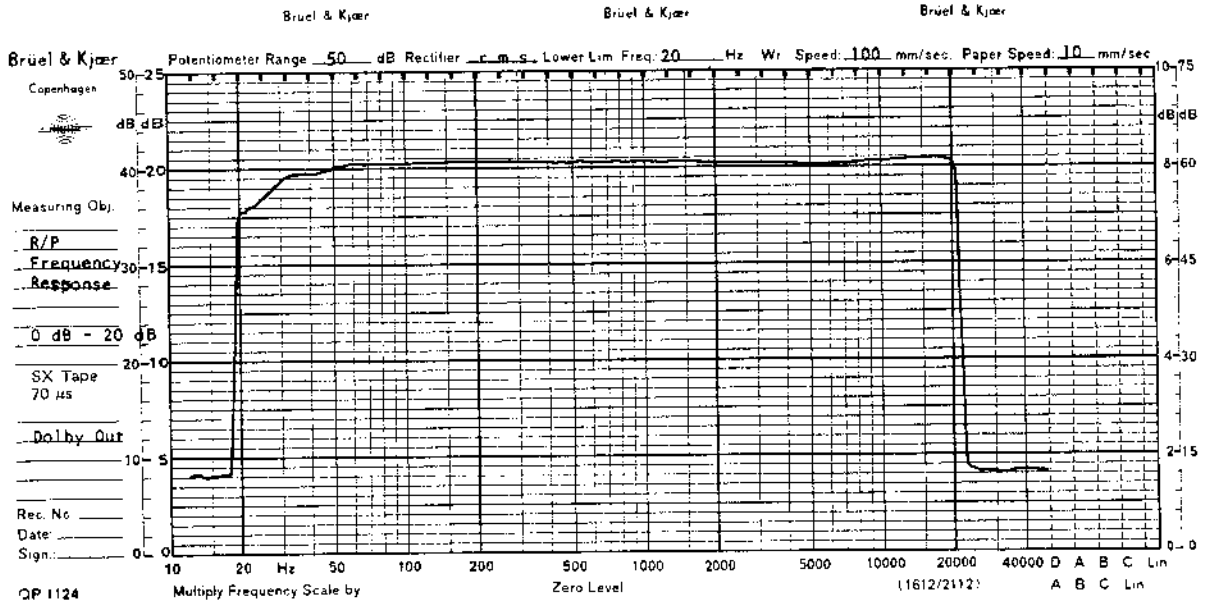



Fig. 2.2.16 Record/Playback Frequency Response (Dolby NR: OUT)

### 2.2.7. Bias Osc. and 400 Hz Osc.

Fig. 2.2.17 shows a push-pull oscillator with an oscillation frequency of 105 kHz which is constructed by capacitors C309 and C310 decoupling the collectors and bases of two transistors.

This is used to provide recording bias and as an erase signal.

By touching on the REC button, the record signal turns to high through the logic board, Q307 is put in the ON state, the bias oscillator power supply is activated, and oscillation begins. When the record mode is released, oscillator output is damped by the discharge of C313. This prevents magnetization of the head.

Fig. 2.2.18 shows a 400 Hz oscillator circuit using an RC circuit. Its signal output is used to check record and playback levels and as an alignment beacon. VR301 is used for adjusting oscillation amplitude and VR203 for matching R and L channel levels.

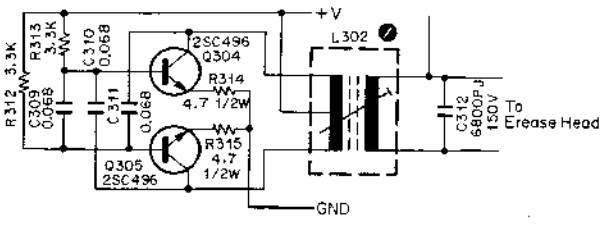



Fig. 2.2.17 Bias Osc. Circuit Diagram

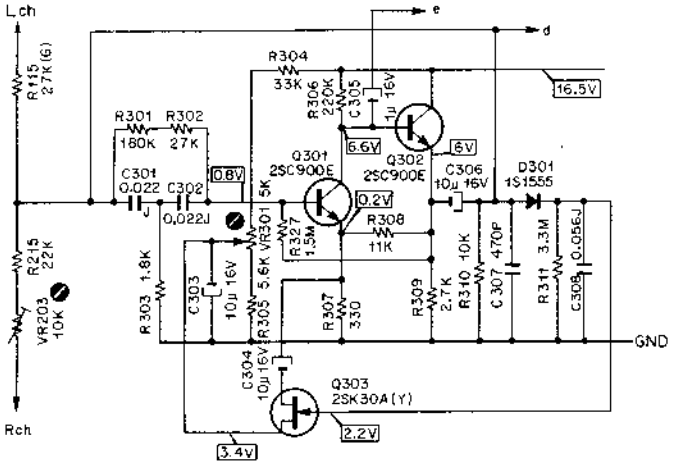



Fig. 2.2.18 400 Hz Osc. Circuit Diagram

### 2.2.8. Line Amp.

Fig. 2.2.19 shows the level meter amplifier circuit and the line output amplifier.

Terminal 12 (11) is the input of the level meter amplifier through which signals enter from terminal 12 (3) of the DNL circuit board. This input signal is not influenced by the DNL (dynamic noise limiter) regardless of the position of the DNL switch. Terminal 14 (13) is the meter output. The level meter is connected between this terminal and ground.

Q107 and Q108 form a directly coupled feedback amplifier and for a low input level, feedback occurs through R121. For high input levels which exceed the Zener voltage of diode D103, feedback magnitude increases by adding a feedback through R122 to that through R121, and the output gain decreases. That is that, the high input signals are subjected to compression during amplification. This circuit is so designed that its attack time is about 44 μs and its release time is about 105 ms, thus, even if sharp peaks such as those encountered in live music exist, the level meter indicates correct peak values.

The input of the line output amplifier is connected to the DNL switch and its level is controlled by the OUTPUT VOLUME control. The signal amplified by Q101 and Q102, and a maximum output of 1100 mV is obtained from line terminal 5 (4).

Since the output impedance is about 600 Ω, long cords are available for connection and no deterioration of characteristics occur due to multiple connections to recorders, etc. Q103, Q104 and Q105 consist of a headphone amplifier, and its input is connected to Q101 emitter and output is conducted to headphone jack via terminal 1 (2).

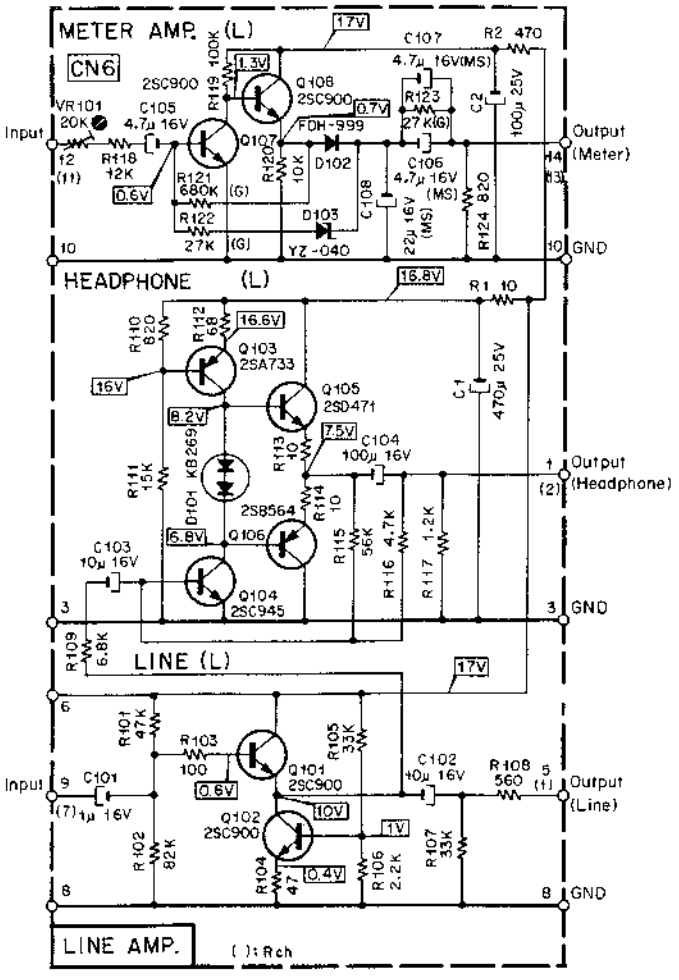



Fig. 2.2.19 Line Amp. Circuit Diagram

### 2.2.9. Power Supply

Fig. 2.2.20 shows the power supply circuit. This power supply is designed so that a constant voltage is obtained at the output on the secondary side of transformer [T1] for 100/117/220/240 V AC inputs by changing the VOLTAGE SELECTOR plug.

The 18 V DC, 0.5 A output is used as a power supply for the amplifier system, and the 12 V DC, 1.5 A output for the mechanism control. The 6 V AC, 0.3 A output is the power supply for illuminating the level meter.

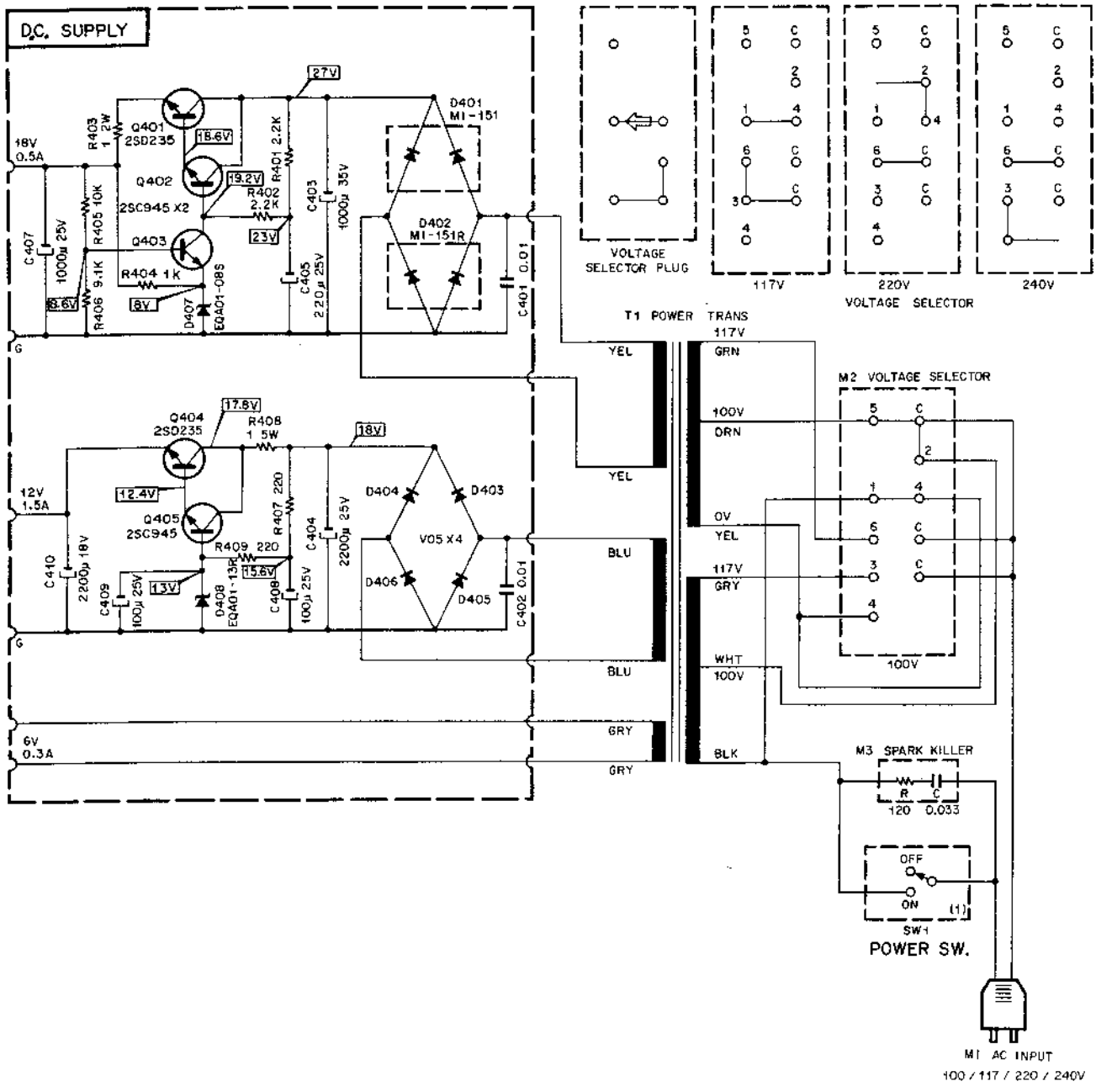



Fig. 2.2.20 Power Supply Circuit Diagram

### 2.3. Mechanism Control Circuits

The Mechanism Control Circuits consist of a logic control, shut-off control, azimuth alignment detector, motor governor, etc. Refer to Fig. 11.2 "Mechanism Control Block Diagram".

#### 2.3.1. Logic Control

**(1) General**

The commands from touch control switches are communicated to the logic control circuits. Logic outputs are connected to the delay circuits and drivers for control of mechanisms.

Logic circuits consist of TTL ICs, the details of which are as follows:

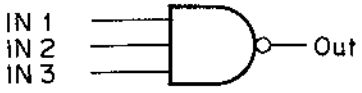
a. Main characteristics of TTL IC

| | |
|---|---|
| Supply voltage | 5 V |
| Logical L output voltage | less than 0.5 V |
| Logical H output voltage | 3 V to 4 V |
| Noise immunity | 1 V |
| Temperature range | 0° to 70°C |

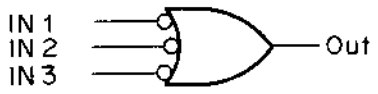
b. Gate Logic

The inputs are IN1, IN2 and IN3, and the output from the gate is shown below:

The output will be an L only if IN1 and IN2 and IN3 are all H's, and the output will be an H if IN1 is an L or IN2 is an L or IN3 is an L.




$Out = \overline{IN1 \cdot IN2 \cdot IN3}$




$Out = \overline{IN1} + \overline{IN2} + \overline{IN3}$

$Out = \overline{IN1 \cdot IN2 \cdot IN3} = \overline{IN1} + \overline{IN2} + \overline{IN3}$

Fig. 2.3.1

Truth Table 1

| IN1 | IN2 | IN3 | Out |
|---|---|---|---|
| L | L | L | H |
| H | L | L | H |
| L | H | L | H |
| H | H | L | H |
| L | L | H | H |
| H | L | H | H |
| L | H | H | H |
| H | H | H | L |

The construction of the foregoing 2 Logic Symbols is identical and intended to show the use of either AND or OR.

c. Gated Flip-Flop

The two NAND gates can be used to form flip-flop.

The inputs operate as follows:

When both S and R are H's, the flip-flop will remain in its present state, i.e., will not change states.

If however, the R input goes to an L, the NAND gate connected to R will have an H output regardless of the other feedback input to the NAND gate, and this will force the flip-flop to the L state (provided the S input is kept H). Similar reasoning shows that making the S input an L will cause the NAND gate at the S input to have an L output, forcing the flip-flop to the H state (again provided the R input is kept H).

If both inputs R and S are made L's, the next state will depend on which input is returned to H first, and if both are returned to H simultaneously, the resulting state of the flip-flop will be indeterminate. As a result, this is a "forbidden" or "restricted" input combination.

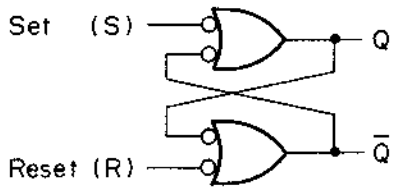



Fig. 2.3.2

Truth Table 2

| Set | Reset | Q | $\overline{Q}$ | Remarks |
|---|---|---|---|---|
| L | L | H | H | *: To maintain the previous |
| H | L | L | H | state, but indefinite if |
| L | H | H | L | both of the previous inputs |
| H | H | * | * | S and R are made L's. |

In the actual use, the activation speed of the Flip-Flop is managed to be delayed in order to prevent erroneous movements caused by noise with details being as follows:

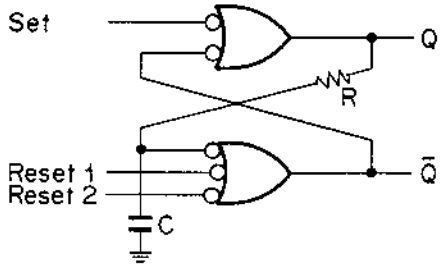



Fig. 2.3.3

d. Schematics and Block Diagrams

SN7400N (Quadruple 2-input positive NAND GATE)

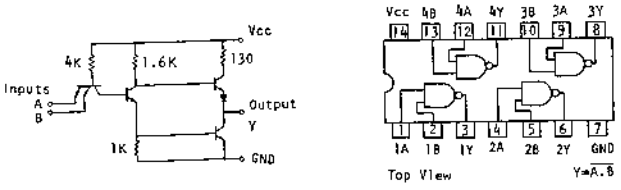



Fig. 2.3.4 SN7400N

SN7410N (Triple 3-input positive NAND GATE)

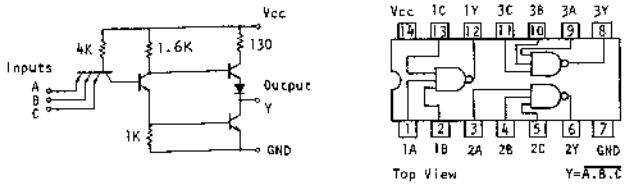



Fig. 2.3.5 SN7410N

SN7420N (Dual 4-input positive NAND GATE)

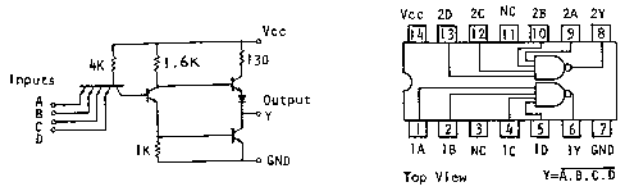



Fig. 2.3.6 SN7420N

e. Compatible ICs

The following ICs belong to the same group which can be replaced:

| | | |
|---|---|---|
| L601, L603, L605 | : | N7400A, SN7400N, M53200P, HD2503, TD3400P |
| L602, L606 | : | N7410A, SN7410N, M53210P, HD2507, TD3410P |
| L604 | : | N7420A, SN7420N, M53220P, HD2504, TD3420P |

**(2) Logic Control**

A foolproof operation will be done by logic control.

For example, when command the playback mode while fast winding or command fast-forward mode while rewinding, it is guaranteed that no abnormal tape tension will happen by passing through the stop mode. This is also guaranteed even when the buttons are touched on simultaneously.

a. Logic Signal

How to read the signals is referred to the following:

The signal H shows the condition that the signal is executing, and in case there is a – on the signal, signal L shows the condition that the signal is executing.

$\overline{\text{K stop}}$ (control stop button signal)

$\overline{\text{K stop}}$ becomes L when the stop button is touched on, and $\overline{\text{K stop}}$ is H while button is open.

$\overline{\text{PLY}}$ (Play flip-flop $\overline{\text{Q}}$ output signal)

$\overline{\text{PLY}}$ = L shows at play mode, and H shows out of play mode.

PLY (Play flip-flop Q output signal)

PLY = H shows at play mode, and L shows out of play mode.

$\overline{\text{HB}} = \overline{\text{PLY} \cdot \overline{\text{Fst DL}} \cdot \overline{\text{PAU}}}$

$\overline{\text{HB}}$ = L drives the head base solenoid.

$\overline{\text{HB}}$ signal becomes L when PLY = H AND Fst DL = L AND PAU = L.

b. Logic Operating Status

Refer to Fig. 2.3.7 (Logic Status). Each stage of logic status is shown for the sequential control button command.

c. + 5 V Power Supply for ICs

+ 5 V DC power supply is made by regulated + 12 V DC from the Power Supply Unit. The transistor Q610 acts as a regulator, being controlled by zener diode ZD601.

d. Initial Reset

At power switch ON, + 12 V DC comes up gradually then the transistors Q609 and Q608 turn to ON for only a certain period while Q609 base voltage is low with respect to the emitter (+ 5 V).

And $\overline{\text{K stop}}$ = L pulse is generated.

At power switch OFF, + 12 V discharges gradually, and $\overline{\text{K stop}}$ = L pulse is also generated. $\overline{\text{K stop}}$ = L pulse clears each flip-flop and keeps at the initial condition, stop mode.

e. Stop Mode

The stop button when touched on and the cassette well when opened make $\overline{\text{K stop}}$=L and resets each of the flip-flop. $\overline{\text{K stop}}$=L pulse is generated when shut-off is detected and when + 12 V is lowered about by 70%.

f. Play Mode (Playback or Record Mode)

The play button when touched on makes $\overline{\text{K play}}$=L and sets the PLY Flip-Flop, (PLY=H,L605-8), and head base solenoid will be activated.

g. Record Mode

REC Flip-Flop (REC,L603-6) will be set to H when record button ($\overline{\text{K rec}}$=L) and play button ($\overline{\text{K play}}$=L) are touched on simultaneously, or record button and pause button ($\overline{\text{K pau}}$=L) are touched on and then play button is touched on.

REC=H commands the bias oscillation of Amp.

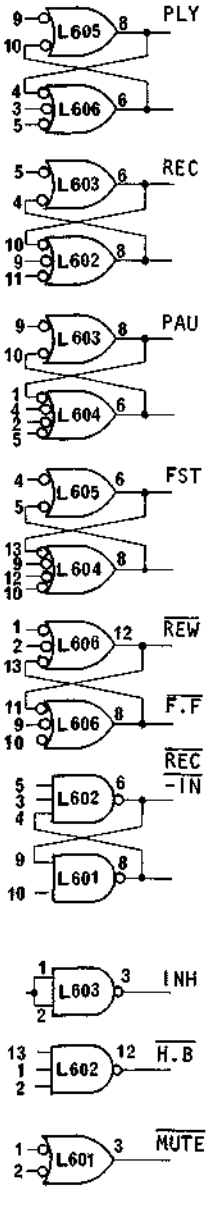
Note: To close record protect switch is required.

h. Pause Mode

While recording or playback, the pause button when touched on sets the PAU Flip-Flop, PAU=H (L603-8).
Then $\overline{HB}$ signal turns to H and head base solenoid will be released.

i. Fast Wind Mode

The rewind ($\overline{K\,rew}$=L) or fast forward button ($\overline{K\,ff}$=L) when touched on sets the FST Flip-Flop.
While the $\overline{REW}$ / $\overline{FF}$ Flip-Flop is set to $\overline{REW}$=L(L606-12) or $\overline{FF}$=L(L606-8), $\overline{REW}$ or $\overline{FF}$=L will drive the REW or FF Relay, and Reel Motor will turn backward or forward.




| MODE | STOP | RECORD | | | | PLAY BACK | FAST WIND | |
|---|---|---|---|---|---|---|---|---|
| CONTROL BUTTON | STOP | RECORD | RECORD PAUSE | PLAY | PAUSE | PLAY | F.FWD | REWIND |
| PLY | L | L | L | H | H | H | L | L |
| | H | H | H | L | L | L | H | H |
| REC | L | H | H | H | H | L | L | L |
| | H | H | L | L | L | H | H | H |
| PAU | L | L | H | L | H | L | L | L |
| | H | H | L | H | L | H | H | H |
| FST | L | L | L | L | L | L | H | H |
| | H | H | H | H | H | H | L | L |
| $\overline{REW}$ | H | H | H | H | H | H | H | L |
| F.F | H | H | H | H | H | H | L | H |
| $\overline{REC\ -IN}$ | H | L | H | H | H | H | H | H |
| | H | H | L | L | L | H | H | H |
| INH | H | H | H | L | H | L | L | L |
| $\overline{H.B}$ | H | H | H | L | H | L | H | H |
| $\overline{MUTE}$ | L | L | L | H | H | H | L | L |

Fig. 2.3.7 Logic Status

j. Mute Signal
$\overline{HB}$=L or $\overline{PAU}$=L makes Mute signal (L601-3) to H and will release the mute of the Amp.
(The mute of record Amp. is released only at record mode, and playback Amp. are released at record and playback modes).

k. Memory Stop
While memory switch is ON and rewinding, stops tape travel when the tape counter comes to "999".
At counter "999", L606-12 ($\overline{REW}$=L) and capacitor C624 are connected, therefore the differentiated pulse is generated at L604-10.
This pulse resets Fst Flip-Flop turning to $\overline{REW}$=H, and stops rewinding.

l. Auto Rewind
While auto-rewind switch is ON and in record or playback mode, $\overline{K\,rew}$=L pulse is generated by transistor Q627 ON when the tape comes to an end, then rewinding will start.
The reasons why shut-off signal does not generate at a tape end are as follow:
When tape comes to an end, shut-off condition will be detected, and transistor Q607 turns to ON.
As a result, base current flows in the Q627 and turns ON, while the base voltage of the Q608 is less than that of the Q627 by deviding resistors R627 and R626, therefore Q608 cannot turn ON.
And after Q627 turns ON completely the Q607 collector voltage falls to the ground through Q627 and Q628.

**(3) Drivers and other Signals**

a. Touch Switch
This is of electronic-control switch and will become ON when you place a finger on the while metal strips running in parallel along the Control Switch Board.
In Fig. 2.3.8, when you touch the metal strips A, B, base current will be applied to transistor Q1 through R1, R (your finger) and R7, and thus Q1 will be activated, thereby collector current is fed to the Q7 base from Q1 and Q7 will therefore become saturated.

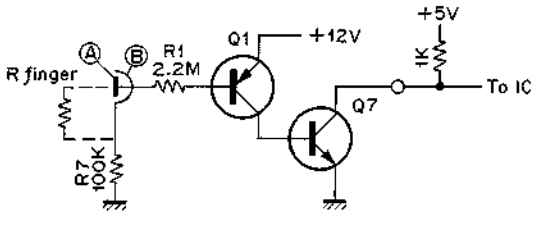



Fig. 2.3.8 Touch Switch Circuit

b. Lamps
Play Lamp — Lights on when head base solenoid is set to ON.
Record and Pause Lamps — Light on in the memory state of REC and PAU Flip-Flop respectively.
Rewind Lamp — Illuminates at Rew Relay ON.
F.Fwd Lamp — Illuminates at F.Fwd Relay ON.
Stop Lamp — Illuminates in the state other than the above.

c. Head Base solenoid
While set the PLY Flip-Flop, the head base solenoid will be driven by the $\overline{HB}$(L602-12)=L.
However while in pause mode, the $\overline{PAU}$(L602-2)=L will inhibit the $\overline{HB}$=L signal.
The $\overline{Fst\,DL}$ (L602-1) signal will serve to drive the head base solenoid after a certain period for stopping Fast Wind, when the play button is set to ON during Fast Wind.
In this regard, the resistor (R680 15 ohms) connected in series to the solenoid will be shorted by the Q627 and Q626 on the base switch P.C.B. ass'y before the drive of head base and limit switch ON.

d. Reel Motor
The FF Relay will drive while the $\overline{REW}$ / $\overline{FF}$ Flip-Flop is $\overline{FF}$=L and REW Relay being $\overline{REW}$=L.
One side of the Reel Motor is connected to the REW Relay and the other to the FF Relay, and the Relay is connected while OFF the ground and while ON + 12 V.
Rewind = REW Relay ON · FF Relay OFF
F. Fwd = REW Relay OFF · FF Relay ON
Stop = REW Relay OFF · FF Relay OFF

e. Brake solenoid
Brake solenoid driver is connected in parallel to the Reel Motor.
Brake Solenoid is released when reel motor runs, and vice versa.

f. Rec Signal
Rec signal connected to the Amp. controls ON/OFF of the bias oscillation. $\overline{Rec}$ signal H conducts the bias oscillation.
The Rec and Rec signals connected to the Pitch Control Volume serve in selecting the speed of the capstan motor for recording and playback.

g. Shut-off Detector Inhibition Signal
Prevents the shut-off signal from entering the Logic while the take-up reel is not turning.
Inhibition signal will be released by $\overline{HB}$ = L or $\overline{FST}$ = L, namely while tape is travelling or in Fast Winding mode.
After $\overline{HB}$ = L or $\overline{FST}$ = L is commanded, it is considered as enough delay time to release shut-off inhibition signal

for assurance of the stable start of the take-up reel movement.

### 2.3.2. Shut-off Sensor and Detector

Refer to Figs. 2.3.9 and 2.3.10.

Shut-off sensor consists of LED (Light Emitting Diode), photo transistor and slitted disc plate which is rotated by take-up reel.

Through turning disc plate, intermittent LED's lights are generated, while photo transistor is receiving these lights and output sensor signals. A shut-off signal which clears the Logic Flip-Flop will be generated when stop of sensor signals is detected by shut-off detector at a tape end.

(1) The capacitor C611 (0.12 $\mu$F) is charged through resistor R622 (1.8 M ohms). While sensor output signals are differentiated by C610 and differentiated positive pulses set a transistor Q605 to ON, then Q605 will discharge quickly.

(2) At a tape end, sensor signal will not generate and C611 will be kept charged. When the voltage of C611 exceeds the Q606 emitter voltage (about 2.3 V), Q606 and Q607 turn to ON, therefore Q608 turns to ON and shut-off signal ($\overline{\text{K stop}}$=L) will be generated.

(3) Shut-off signal resets PLY and Fst Flip-Flops, therefore INHIBIT signal (INH, L603-3) will be set to H. A base current of Q605 flows through INHIBIT signal H and Q605 turns to ON and discharges the C611. Therefore Q605, Q606 and Q608 turn to OFF and shut-off signal will be released.

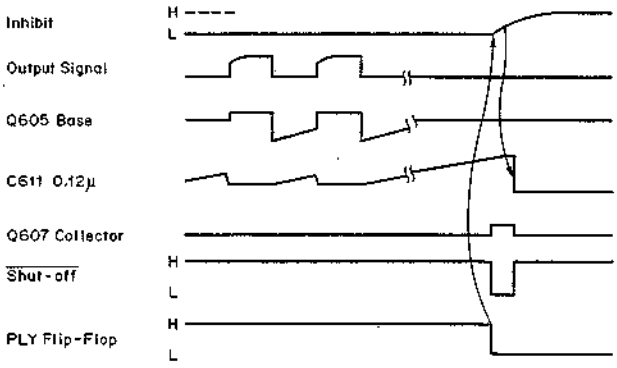



Fig. 2.3.10 Shut-off Timing Chart

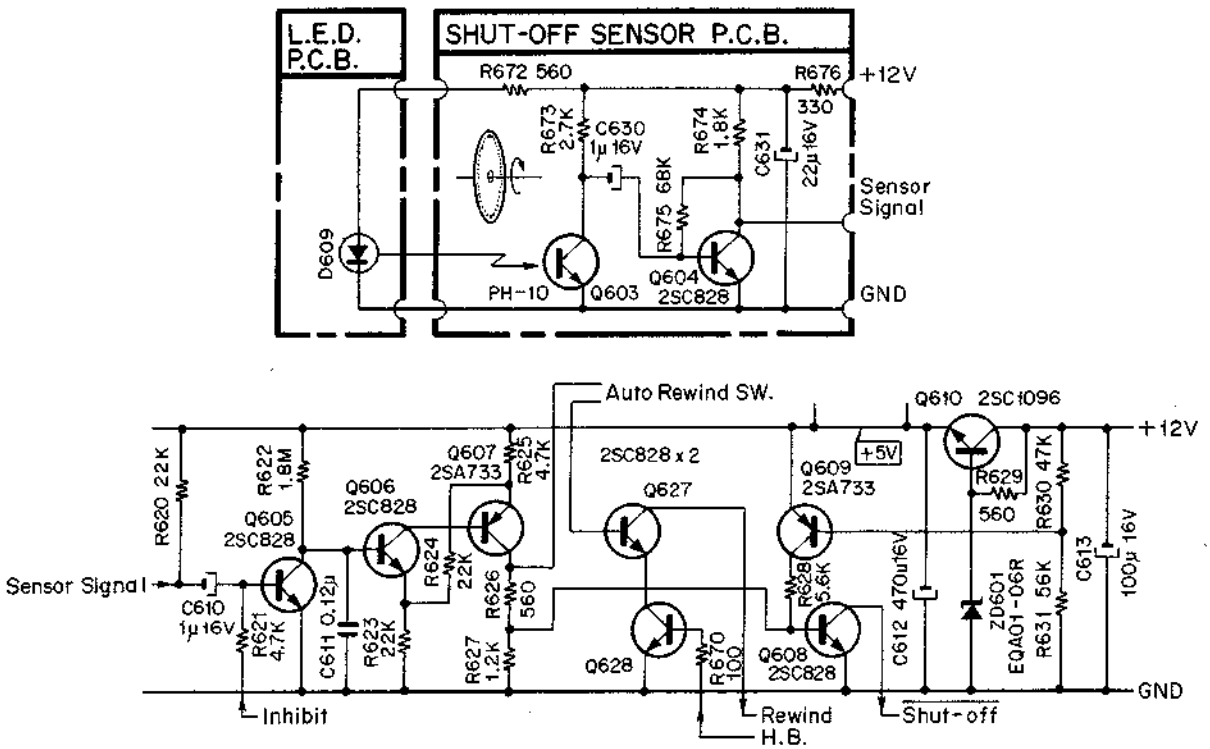



Fig. 2.3.9 Shut-off Sensor and Detector Circuit Diagram

### 2.3.3. Azimuth Alignment Detector

Refer to Figs. 2.3.13 and 2.3.14.

Prior to recording, it is required that the azimuth alignment be conducted for both sides A/B of a cassette tape to keep the optimum performance, with details being as follows:

Each cassette housing has a distortion for the molded pin locating between record and playback heads, therefore when tape is travelling through the molded pin the travelling of tape is slightly changed by each cassette housing.

And adjustment aims at an accurate azimuth alignment of the record and playback heads through a travelling tape. Adjustment shall be conducted by turning the azimuth alignment screw while record mode and the adjustment panel test tone switch is ON.

When the recorded 400 Hz tape is played back, the difference of the phase between right and left channels indicates the difference of playback and record head azimuth.

Therefore when the difference of the phase equals to zero, playback and record head azimuth is aligned then both of the alignment beacon flickers alternately.

(1) Left and right channel playback signals which are communicated to the operational amplifier terminals 5 and 9 will be amplified to the rectangular waves.

(2) These rectangular waves are converted to the TTL IC voltage level through transistors Q601 and Q602, and communicated to the L607 TTL IC terminals "T" and "D".

(3) The outputs of L607 begin to repeat ON and OFF and conduct to flicker LEDs alternately when same phase signals are conducted to "T" and "D" terminals.

(4) Function of L607:
At transition of "T" terminal from L to H, "D" terminal H conducts output Q to H and $\overline{Q}$ to L and also "D" terminal L conducts output Q to L and $\overline{Q}$ to H.

(5) SN7474N (Dual D-Type Edge-triggered Flip-Flop)

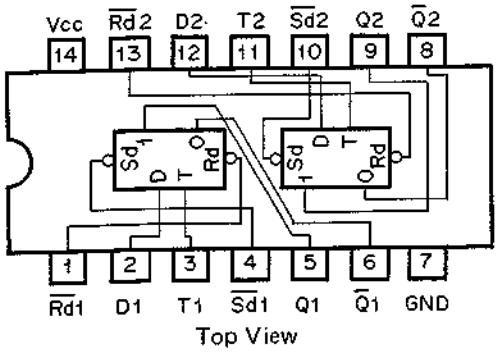



Fig. 2.3.11 SN7474N

| tn | tn+1 | |
|---|---|---|
| Input D | Output Q | Output $\overline{Q}$ |
| L | L | H |
| H | H | L |

tn: Bit time before clock pulse.
tn+1: Bit time after clock pulse.

Compatible ICs
L607: N7474A, SN7474N, M53274P, HD2510, TD3474P

(6) RC4709 (Dual Operational Amplifier)

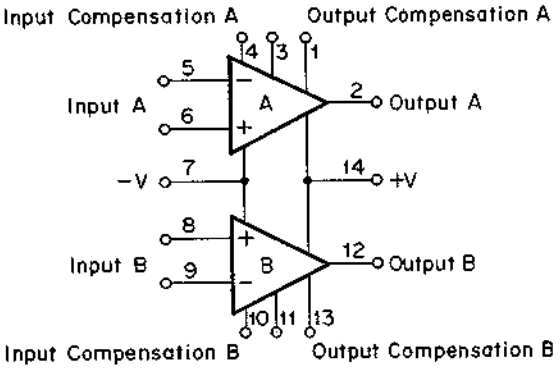



Fig. 2.3.12 RC4709

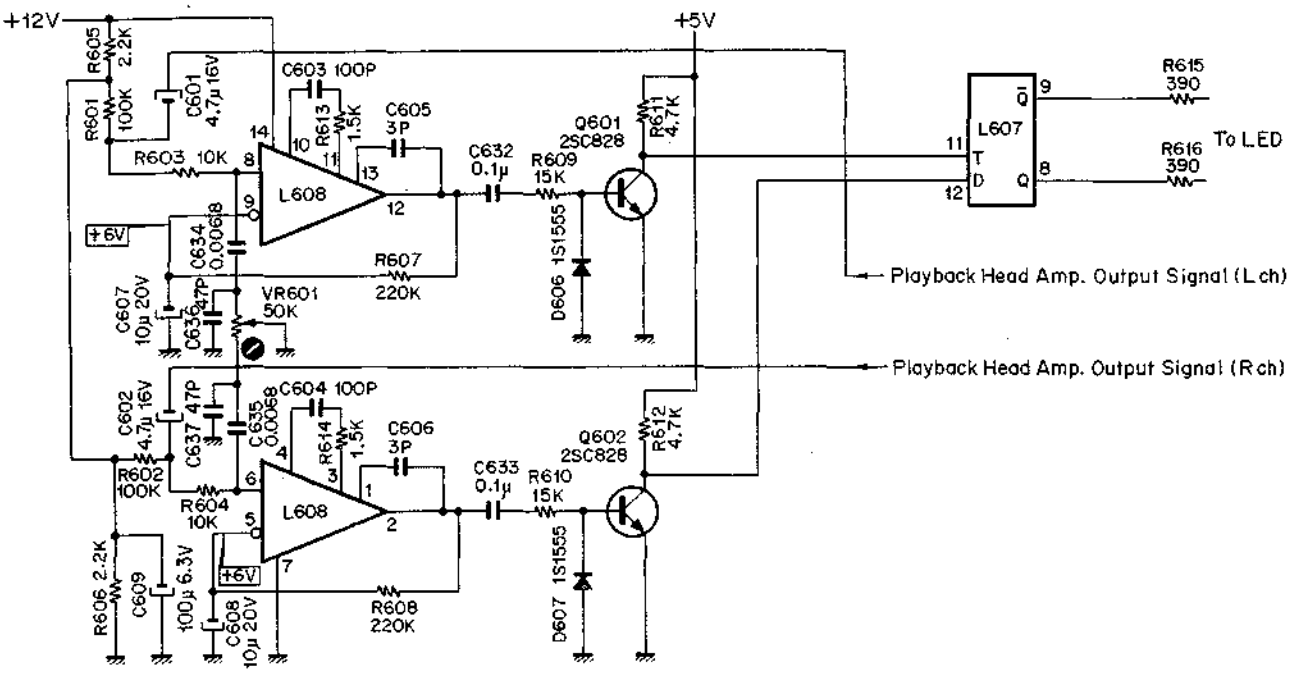
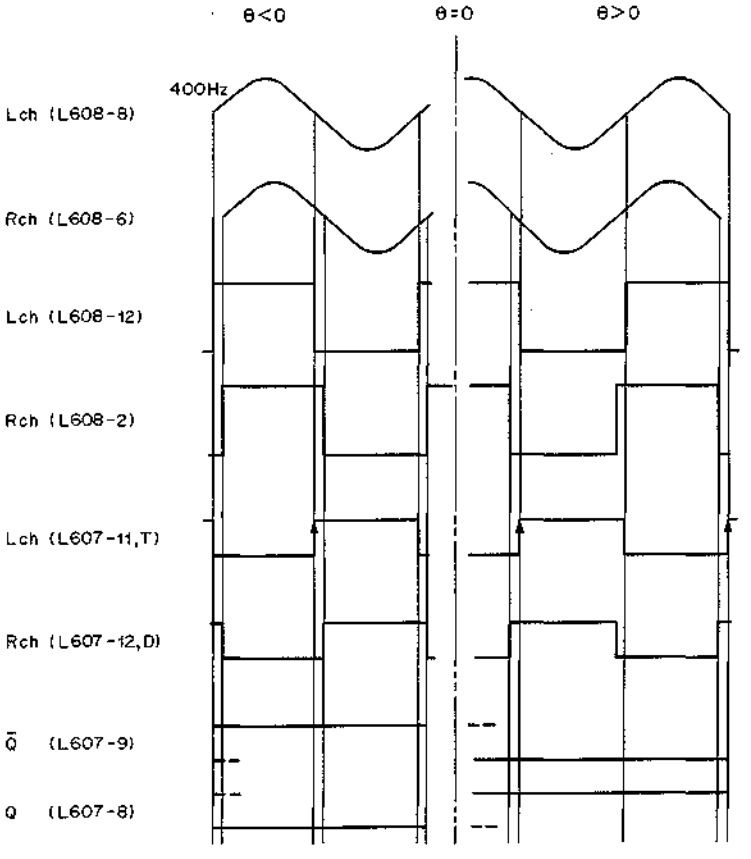



Fig. 2.3.13 Azimuth Alignment Detector Circuit Diagram




θ : difference of phase between L ch and R ch Playback Head Amp. Output signals.

Fig. 2.3.14 Azimuth Alignment Detector Timing Chart

### 2.3.4. Capstan Motor Governor

Refer to Figs. 2.3.16 and 2.3.17.

Capstan motor governor connects to the Motor Assembly consisting of motor and sensor. Sensor consists of LED (Light Emitting Diode), photo transistor and slitted disc plate which is turned by motor.

When disc plate is turned, intermittent LED's lights are generated, while photo transistor receives these lights and outputs signals to the motor governor.

Sensor generates proportional frequency signals according to the motor speed. Motor governor controls the motor current in order to keep the constant sensor output signal i.e. constant motor speed.

(1) Sensor output signals are amplified to the rectangular waves by IC 501 1/2.

(2) Through transistor Q501 differentiated pulses are generated by capacitor C506 (150 pF).

(3) C507 (3300 pF) (IC501 2/2-6) is charged through resistor R511 (150 k ohms) gradually. While the above operation, the differentiated positive pulse commands to discharge C507 quickly.
Therefore charge and discharge are repeated according to the periodic time of sensor signal.

(4) The voltage of IC 501 2/2-5 is fixed through pitch control volume, and when IC 501 2/2-6 is higher with respect to the 5 pin voltage, IC 501 2/2-7 output falls to ground and turns Q503 to ON.

(5) C509 (1 $\mu$F) will charge through Q503 and discharge through R516 (10 k ohms). A base current of Q504 flows through C509, then Q504, Q505 and Q506 amplifiers act to drive a motor.

(6) Q503 turn ON time gets short when periodic time of sensor output signal is shorted, and the voltage of C509 decreases, then motor speed will also decrease. When periodic sensor output signal becomes fast, the voltage of C509 and motor speed will increase.
Motor speed is therefore kept constant.

(7) MC1458 (Dual Operational Amplifier)

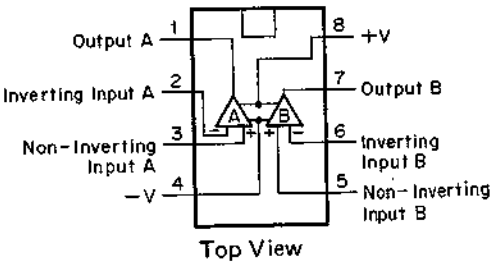



Fig. 2.3.15 MC1458

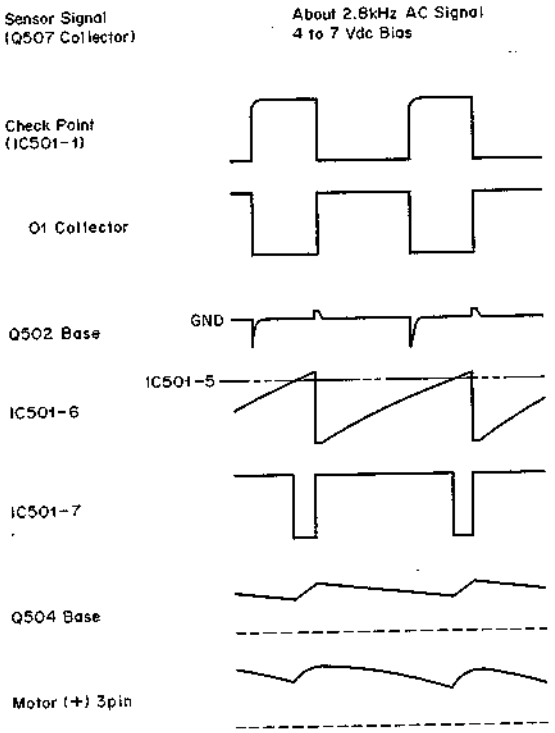



Fig. 2.3.17 Capstan Motor Governor Timing Chart

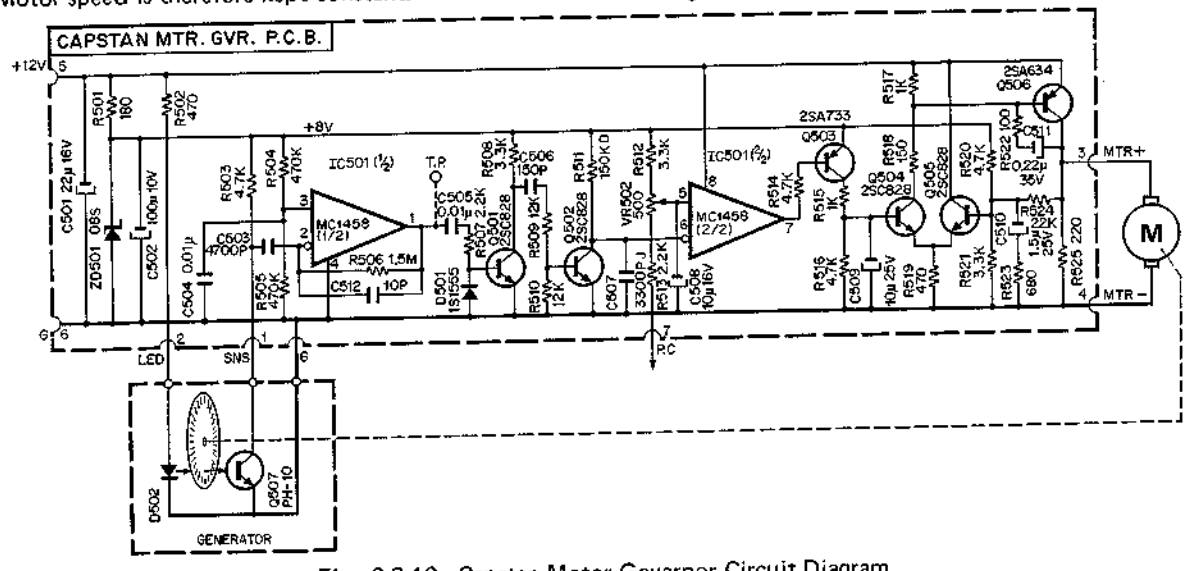



Fig. 2.3.16 Capstan Motor Governor Circuit Diagram

### 2.3.5. Reel Motor Governor

Refer to Fig. 2.3.18.

While in Play mode, motor speed is detected by bridging, observing the counter electro motive force of the motor. A bridging consists of a motor to be one side, and the electric potential between A and B (shown in Fig. 2.3.18) should theoretically become proportional to the motor speed if the condition meets the formula;

$$\frac{R}{R2} = \frac{R3//R5}{R4}$$

In the circuit, a constant motor speed can be secured because the potential between A and B is servo-controlled by Q3 to become constant.

While in FF and REW modes, + 12 V is fed directly to the Reel Motor, and the motor will rotate either clockwise or counterclockwise depending upon the given polarity.

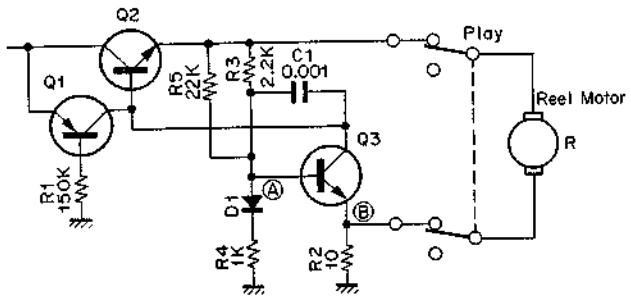



Fig. 2.3.18 Reel Motor Governor Circuit Diagram

### 2.3.6. Head Base Solenoid Driver

Refer to Fig. 2.3.19.

SW1 is closed while in Stop mode. If the PLAY button is effected, Q614 of the Logic Control Circuit will become ON. Accordingly a base current of Q1 is fed through R1 and SW1, then Q1 and Q2 become ON.

With Q2 ON, R680 (15 ohms) will be shorted and therefore + 12 V will be applied to solenoid.

When the solenoid acted to pull the Head Base inwardly, SW1 will become open. At this time base current will be fed to C1 from Q1 for a while, but Q1, Q2 will become OFF, as a result of which R680 (15 ohms) is connected in series to the solenoid and + 12 V will be supplied thereto. In other words, + 12 V is given to the solenoid while the Head Base is being mechanically pulled inwardly, and to maintain that state of the Head Base, a resistor is added in series so that the power loss can be reduced.

### 2.3.7. Brake Solenoid Driver

Refer to Fig. 2.3.20.

The brake solenoid releases brake while in REW or FF mode (brake will be mechanically released while in Play mode as the head base itself moves outwardly).

When the relay (RL601/RL602 of the Logic Control Circuit) is turned ON either while REW or FF mode, base current will be applied to Q1 from + 12 V through R1 or R2, as a result of which Q1 becomes ON and Q2 becomes OFF. Capacitor C1 starts charging through R4, and Q3 and Q4 will become ON, when the voltage thus being charged exceeds the total of base-emitter voltage of Q3 and Q4, thereby driving the brake solenoid.

As above, there is a certain time delay until the brake solenoid circuit while in REW or FF mode releases brake.

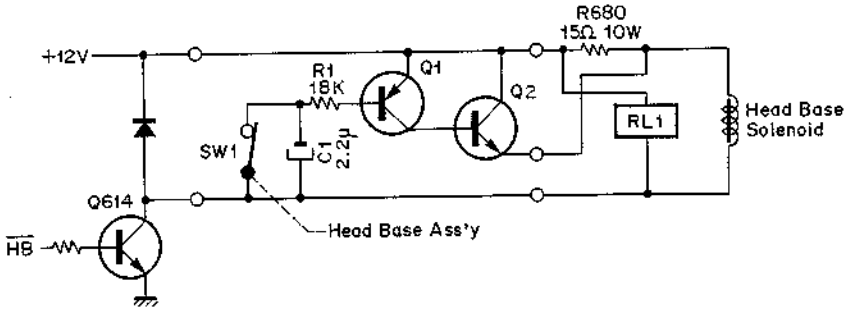



Fig. 2.3.19 Head Base Solenoid Circuit Diagram

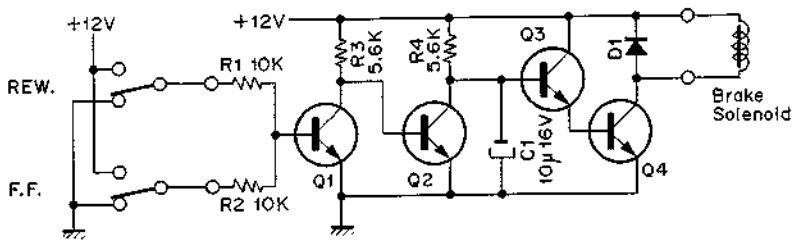



Fig. 2.3.20 Brake Solenoid Circuit Diagram

## 3. CHECK-OUT PROCEDURES

### 3.1. Check-Out Procedures for Inspection

**3.1.1. Turn on the power switch.**

(1) Check to insure whether meter lamps and stop lamp light, and whether the machine is held in stop mode.

**3.1.2. Push the eject button.**

(1) No control button operates, once cassette lid is opened.

**3.1.3. Load a reference tape then touch on the play button**

(1) Play lamp turns to on and tape runs at a speed of 1-7/8 ips.
(2) Auto shut-off function operates only a tape end so that machine is set to stop mode.
(3) While tape is travelling check to insure whether stop, fast forward and rewind buttons operate.
When stop button is touched on, machine stops. When fast forward button is touched on, fast forward lamp turns to on and tape travelling is changed to fast forward winding mode. When rewind button is touched on, rewind lamp turns to on and tape travelling is changed to rewind mode.

**3.1.4. Touch on the fast forward button.**

(1) Fast forward lamp turns to on and tape runs at a speed of about 61 ips.
(2) Auto shut-off function operates only at an end of tape so that machine is set to stop mode.
(3) When play, rewind, or stop button is touched on, fast forward mode is changed to playback mode, rewind mode, or stop mode according to each button.

**3.1.5. Touch on the rewind button with memory switch and auto rewind switch off.**

(1) Rewind lamp turns to on and tape runs at a speed of about 61 ips.
(2) Auto shut-off function operates only at an end of tape so that machine is set to stop mode.
(3) When play, fast forward, or stop button is touched on, rewind mode is changed to playback mode, fast forward mode, or stop mode according to each button.
(4) For check of memory stop, turn on the memory switch and reset the tape counter to "000". After winding the tape, set to the rewind mode and check to insure that the rewind mode changes to stop mode at counter "999".
(5) For auto rewind check, turn the auto rewind switch to on.
Touch on the fast forward or play button and check whether the tape is rewound automatically at a tape end.

**3.1.6. Touch on the pause button.**

(1) Pause button operates while playback and recording so that pause mode is set, and tape travelling is stopped by releasing head base solenoid drive. When playback or recording re-starts, mute function operates for about 1 second.
(2) When pause button is touched on at stop mode, pause lamp turns on and stop lamp turns off. When pause button is touched on at fast forward or rewind mode, pause lamp illuminates only while button is touched.

**3.1.7. Touch on the record button.**

(1) Except for break-out legs of the loaded cassette and without any loaded cassette, record mode operates only when record button is touched on at stop mode.
(2) Touch on the pause button while record mode is functioning. Record/pause mode will operate.
(3) Touch on the play button while record mode is functioning. Recording mode will operate.

**3.1.8. Touch on the stop button.**

(1) Check to insure whether playback, recording, fast forward and rewind modes are set to stop mode.

**3.1.9. Monitor switch ON/OFF.**

(1) Check to insure whether monitor outputs can be selected from source to tape monitor by setting monitor switch on and off.

**3.1.10. Dolby NR switch IN/OUT.**

(1) When playback, hiss noise will reduce at switch IN.

**3.1.11. Tape selector switch EX/SX and Eq. selector switch 120 μs/70 μs.**

(1) While playback, check to insure whether tape selector switch and Eq. selector switch are operating accurately.

**3.1.12. Test tone switch ON/OFF.**

(1) Switch on the test tone switch and set the monitor switch to source, and check to insure that 400 Hz test tone is generating by measuring level meters or headphone, etc.
(2) Check to insure whether alignment beacon is illuminating at either one channel or both channels.

**3.1.13. Listening test.**

(1) Connect music source to the input jacks and amplifier and speakers to the output jacks, and test the performance of playback and record/playback.
Prior to recording, align the record head azimuth by azimuth alignment operation.
(2) Check the wow/flutter, distortion, signal to noise ratio, erasure, etc.

### 3.2. Check Methods

#### 3.2.1. Check on playback functions:

(1) Check to insure whether the capstan, heads or pressure roller is free from dirts or dust.
(2) Check on tape travel.
(3) Load a 400 Hz tape.
(4) Set the machine in play mode.
(5) Check the output of PB head amp. (both channels).
(6) Check the output of PB Dolby NR (both channels).
(7) Check the output of DNL (both channels).
(8) Check the output of Line amp. (both channels).
(9) Check the output jack (both channels).
(10) Check headphone jack.

#### 3.2.2. Check while recording:

Set each of input level controls to maximum, apply the rated input signal level to input jack and then check indications of the meters.

(1) Check the Mic and DIN amp.
(2) Check MPX functions.
(3) Check Record Dolby NR.
(4) Check Record Eq. amp.
(5) Check the bias oscillator circuit.
(6) Check record head.
(7) Check erase head.
(8) Check monitor switch.

#### 3.2.3. Check on Mechanisms:

(1) Check the track positions of record head and playback head with Track Viewer (DA09012A).
(2) Check to insure whether the capstan motor rotates when the machine is set to On.
(3) Touch on the play button, and check to insure whether the head base solenoid activates and whether the take-up reel rotates.
(4) While in the (3) mode as above, check to insure whether auto shut-off returns the head base and the stop lamp illuminates when take-up reel is stopped by hand.
(5) When the fast forward button is touched on, check to insure whether the FF lamp illuminates and whether the fast forward mode activates.
(6) When the take-up reel is stopped by hand while in (5) mode as above, check to insure whether the auto shut-off activates to set the machine in stop mode.
(7) Touch on the rewind button and check to insure whether the rewind lamp illuminates, rewind mode activates, auto shut-off activates and whether stop lamp lights.
(8) Load a blank cassette tape.
(9) Check to insure whether the unit is free from any abnormality while in fast forward and rewind mode.
(10) Touch on the record and pause buttons simultaneously, and check to insure whether record is paused.
(11) Touch on the play button while in (10) state, and check to insure whether tape starts travelling and recording commences.
(12) Touch on the stop button and check to insure whether the machine is set to stop from any of the modes.
(13) Measure the torque of take-up, fast forward and rewind with torque gauge (DA09013A).
(14) Check the tape speed and wow/flutter with 3 kHz Speed & Wow/Flutter tape (DA09006A).
(15) Check the playback head height and tape travel with 1 kHz Track Alignment tape (DA09007A) and Tape Travelling Cassette (DA09011A).

#### 3.2.4. Overall check:

(1) Check the frequency response (bias adjustment).
(2) Check distortion.
(3) Check signal to noise ratio.
(4) Check channel separation.
(5) Check crosstalk.
(6) Check erasure.

### 3.3. Check Methods When Part(s) is(are) Replaced

When any part/part ass'y of the Nakamichi 1000II is replaced with new one, please check to insure the following.

#### 3.3.1. When capstan motor is changed:

(1) Tape speed.
(2) Wow/flutter.

#### 3.3.2. When pressure roller is changed:

(1) Tape travelling.
(2) Azimuth/height.
(3) Tape speed.
(4) Wow/flutter.

#### 3.3.3. When erase head is replaced:

(1) Tape travelling.
(2) Azimuth/height.
(3) Bias osc. frequency.
(4) Erasure performance.
(5) Bias adjustment (overall frequency response).
(6) Bias leakage.

#### 3.3.4. When record head is replaced:

(1) Azimuth/height.
(2) Record track position.
(3) Bias adjustment (overall frequency response check).
(4) Adjustment of level at 0 dB with 400 Hz test tone (record calibration).
(5) Check distortion when 1 kHz is recorded and played back at 0 dB.
(6) Bias leakage check.
(7) Phase check (between left and right).

**3.3.5. When playback head is replaced:**

(1) Azimuth/height.
(2) Tape travelling.
(3) Track position in regard to that of record head.
(4) Adjustment of playback gain (with test tape at 0 dB).
If unable to adjust to 0 dB, please adjust R123,223 at 3.3 k (P.B. Head Amp. P.C.B.) to:
if strong — make R stronger
if weak — make R weaker
(5) Frequency response check by playback with test tapes.
(6) Frequency response check by overall with reference tape.
(7) Gain check by overall with reference tape.
(8) Phase check between left and right.

**3.3.6. When flywheel ass'y is replaced:**

(1) Tape travelling.
(2) Azimuth/height.
(3) Tape speed.
(4) Wow/flutter.

**3.3.7. Ball drive mechanism ass'y is replaced:**

(1) Torque check while F/F, Rew. and Play.
(2) Mechanical noise check while F/F, Rew. and play, but without a tape.
(3) Tape speed.
(4) Wow/flutter.

**3.3.8. When meters are replaced:**

(1) Adjustment of meter level.

**3.3.9. When reel motor is replaced:**

(1) Torque check while F/F, Rew. and play.
(2) Tape speed.
(3) Wow/flutter.

**3.3.10. When drive belt is replaced:**

(1) Wow/flutter.
(2) Tape speed.

**3.3.11. When capstan motor governor is replaced:**

(1) Tape speed.
(2) Wow/flutter.

**3.3.12. When tape counter is replaced:**

(1) Tape speed.
(2) Wow/flutter.
(3) Memory rewind.
(4) Counter check (sticky, etc.).

**3.3.13. When puneumatic damper is replaced:**

(1) Damper speed check.

**3.3.14. When reel motor governor is replaced:**

(1) Tape speed.
(2) Wow/flutter.
(3) Torque check while F/F, Rew. and play.

## 4. MEASURING INSTRUMENTS, JIGS, TAPES, ETC.

(1) Audio Generator (20 Hz – 200 kHz)
(2) AC Millivolt Meter (with dB measures)
(3) Oscilloscope (DC – 5 MHz)
(4) Distortion Meter
(5) Speed and Wow/Flutter Meter
(6) Frequency Counter (DC – 1 MHz)
(7) Ohm Meter
(8) DC Volt Meter (0 – 30 V)
(9) AC Volt Meter (0 – 400 V)
(10) Audio Analyzer T-100
(Including Distortion, Wow/Flutter, Oscillator, Speed and dB meter)
(11) Tape Travelling Cassette (DA09011A)
(12) Track Viewer (DA09012A)
(13) Torque Gauge (DA09013A)
(14) 15 kHz Azimuth Tape (DA09004A)
(15) 3 kHz Speed and Wow/Flutter Tape (DA09006A)
(16) 1 kHz Track Alignment Tape (DA09007A)
(17) 400 Hz Level Tape (DA09005A)
(18) 20 kHz PB Frequency Response Tape (DA09001A)
(19) 15 kHz PB Frequency Response Tape (DA09002A)
(20) 10 kHz PB Frequency Response Tape (DA09003A)
(21) Reference EXII Tape (DA09021A)
(22) Reference SX Tape (DA09025A)
(23) Information Terminals Model M-300
(For positioning of record/playback head.)
(24) Liquid for Tape Magnetized Development
(MAGNA-SEE, a product of SOUND CRAFT, or equivalent)
(25) Extension Cord (10P) (DA09020A)
(26) Extension Cord (19P-D) (DA09019A)
(27) Extension Cord (14P-PB) (DA09015A)
(28) Extension Cord (19P) (DA09014A)
(29) Extension Cord (14P) (DA09016A)

Note: (10) – (22) and (25) – (29) are the products of NAKAMICHI RESEARCH INC.

# 5. MECHANICAL ADJUSTMENTS

## 5.1. Torque Adjustment

### 5.1.1. Torque Measurement

(1) Using a torque gauge (DA09013A), measure the torque of fast-forward (F.F.), rewind and take-up modes.
(2) F.F. and rewind torque should be 50 to 55 g-cm.
(3) Take-up torque should be 40 ± 5 g-cm.

Note: When the torque is out of these ranges, adjust torque following the adjustment steps. (In case the adjustment is not successful by observing these steps, replacement of ball drive assembly will be required. Refer to following "5.1.4. Ball Drive Assembly Replacement Procedures".)

### 5.1.2. Torque Adjustment

(1) Remove cabinet assembly, flywheel holder, capstan belt and two sets of flywheel assembly (including washer, flange thrust stud and thrust spring) in that order. (When mounting the flywheel holder, use care to attach it in the correct direction to avoid the change of clearance between the flywheel holder and flywheel assembly.)
(2) Turn on the power.
(3) Load the torque gauge (DA09013A) in the cassette well assembly.
(4) By touching the button of F.F. or rewind, measure torque for each mode. Adjustment should be so made that the torque may become in a range from 50 to 55 g-cm. Adjustment should be made on brake drum assembly of forward side and reverse side, respectively, to regulate the torque of F.F. and rewind modes. Refer to Figs. 5.1 and 5.2.
Loosen screws 1 and 2 indicated in Fig. 5.2 and move up and down the brake drum assembly in order to adjust the torque. When the brake assembly is raised, the value of torque decreases. When lowered, the value is increased. Where specified torque is achieved, securely tighten the screws. Tighten first the screw 1 (with a part of the shaft end being flat) and then tighten the screw 2. Then apply a drip of lock tight paint to the screws.
(5) Mount the flywheel assembly, capstan belt and flywheel holder. Check to insure that the clearance between the flywheel holder and the flywheel assembly is in a range of 0.05 to 0.1 mm. After installing the flywheel, be sure to clean oil off with an alcohol-dipped cloth from capstan which will be in contact with pressure roller.
(6) Touch on the PLAY button to set the device in play mode.
(7) Load the torque gauge to measure the take-up torque. Check whether the torque is in a range of 40 ± 5 g-cm. When the value is out of the range, readjustment of F.F. torque is necessary. Repeat from the step (1) and set the take-up torque to 40 ± 5 g-cm by increasing the adjusted F.F. torque of 50 to 55 g-cm into a range of 45 to 60 g-cm. When doing this, set the rewind torque to almost the same range as that of F.F. torque to balance both of them.

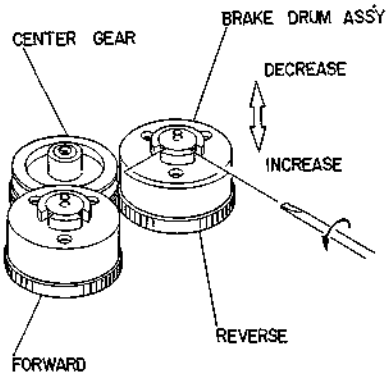



Fig. 5.1 Torque Adjustment

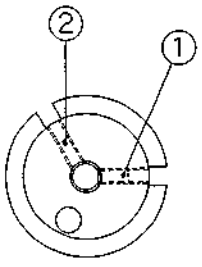



Fig. 5.2

### 5.1.3. Ball Drive Mechanism Ass'y Adjustment

(1) Check the take-up torque (40 ± 5 g-cm) with a torque gauge.
(2) Check shall be made on rewind and fast forward torque (within 50 to 55 g-cm).
(3) Measure the time length while rewinding and fast forwarding.

Notes: 1. Where rewinding and fast forwarding exceed 60 seconds, adjust the torque of the ball drive mechanism ass'y.
2. Where the take-up torque should be too weak, adjust the ball drive mechanism ass'y referring to preceding 5.1.2. (7).

### 5.1.4. Ball Drive Mechanism Ass'y Replacement Procedures

(1) Refer to Fig. 5.3. After removing the cabinet assembly, remove the counter belt and shut-off belt from the reel hub and hang them on the studs.
(2) Remove flywheel holder, capstan belt and two sets of flywheel assembly (including washer, flange thrust stud and thrust spring). (When mounting the flywheel holder, use care to attach it in the correct direction to

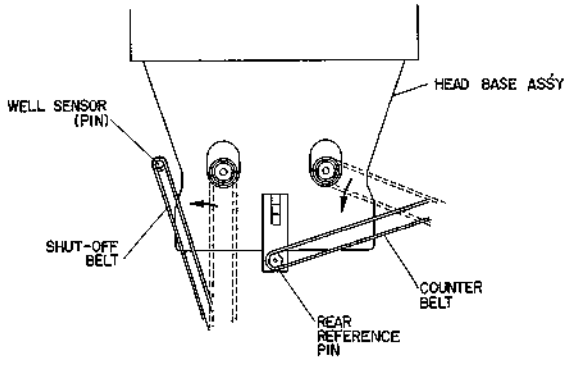



Fig. 5.3 Ball Drive Mechanism Ass'y Replacement

avoid the change of clearance between the flywheel holder and flywheel assembly.)

(3) Referring to Fig. 5.4, remove the belt driven by the reel motor from the groove of the center gear. And remove three sets of screws and washers which fix the ball drive assembly to chassis. Detouch the brake assembly that holds the drum of ball drive assembly, and then remove the ball drive assembly.

(4) Replace with a new ball drive assembly.

(5) Mount the belt driven by the reel motor on the groove of center gear. Check to insure that the belt is clean and placed in a correct position.

(6) Use care to prevent the shut-off belt from interfering with cassette holder assembly. Be sure that the belt is clean, and is placed in a correct position. Make sure not to stick grease on the counter belt. In case grease is stuck on the counter belt, clean it off with an alcohol-dipped cloth.

(7) Without loading a cassette tape, check to insure that the reel hub on supply side and that on take-up side are stopped, respectively in F.F. mode and rewind mode. (In case either one or both of them is not stationary, replacement of ball drive assembly will be necessary.)

(8) Loading the torque gauge in the cassette well assembly, check that F.F. and rewind torque are in a range of 50 to 55 g-cm. After mounting the flywheel assembly, capstan belt and flywheel holder, check to see that take-up torque is in a range of 40 ± 5 g-cm. In case these values are not achieved, adjustment should be made following the "5.1.2. Adjustement."

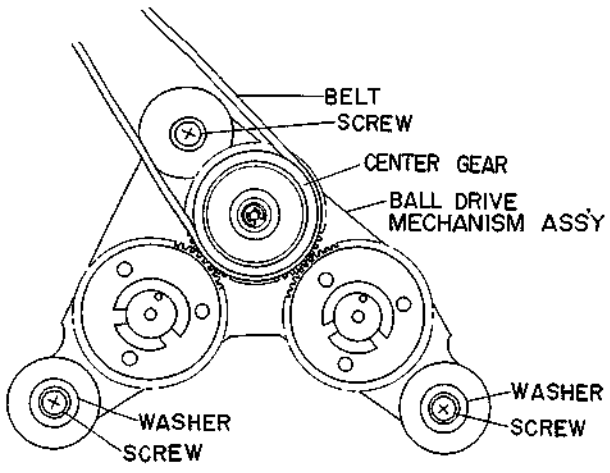



Fig. 5.4 Ball Drive Mechanism Ass'y Replacement

**5.2. Tape Speed**

Signal Source

3 kHz Speed Wow/Flutter Tape (DA09006A)

Measurement Connection

Frequency Counter to Output Jacks.

Mode

CONTROL BUTTON – Playback
MONITOR SW – TAPE
TAPE SELECTOR SW – SX
EQ SELECTOR SW – 70 μs

Adjustment

(1) Set the Pitch Control Knob to "0" position.

(2) Adjust the Speed Control VR502 to obtain 3 kHz on Frequency Counter.

VR502 Capstan Motor Governor P.C.B.

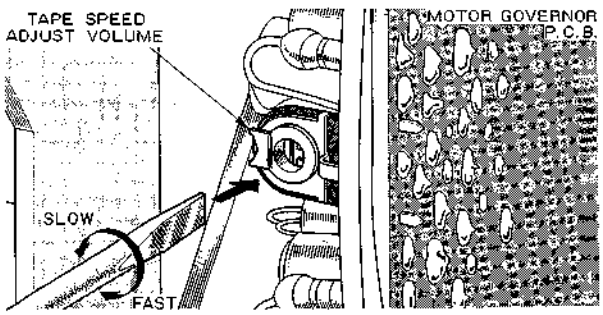



Fig. 5.5 Tape Speed Adjustment

**5.3. Head Base Damper Adjustment**

(1) Slowly turn the exhaust adjusting screw clockwise repeatedly depressing and releasing the damper piston by hand. Set the screw at such an initial position that the piston cannot be depressed into the inmost end by the decreased damper pressure.

(2) Return the screw approximately 90 degrees counter-clockwise from the set position given in Step (1) above. Check to insure whether the head base is smoothly locked by repeatedly playing back and stopping the tape feed mechanism. If the double motion or associated shock is too strong, further precise adjustment is required.

Note: Do not tighten the exhaust adjusting screw excessively as it may be damaged.

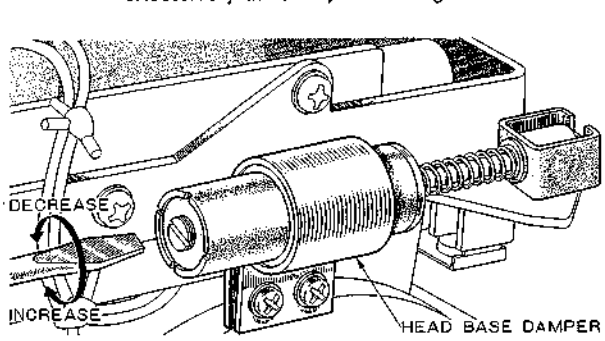



Fig. 5.6 Head Base Damper Adjustment

### 5.4. Eject Damper Adjustment

Install the cassette compartment lid. Adjust the exhaust adjusting screw at the eject damper ass'y until it takes 0.5 to 1.0 second to stop the lid eject movement after the eject push button is depressed.

Note: Do not tighten the exhaust adjsting screw excessively as it may be damaged.

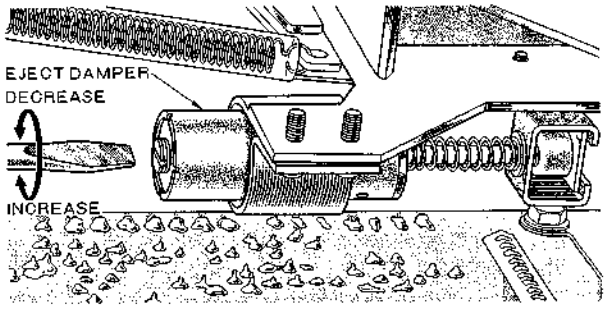



Fig. 5.7 Eject Damper Adjustment

### 5.5. Headblock

Adjustment should be made in accordance with Fig. 5.12 Flow Chart.

#### 5.5.1. Head Mount Base Ass'y Removal Procedures

(1) Remove the cabinet and separate mechanism ass'y 1000II.
(2) Remove the adjustment lid and cassette lid.
(3) Referring to Fig. 5.8, disassemble the mount base cover (03) by removing screws and washers (01,02).
(4) Remove screws 05 and 06 (two places).
(5) Referring to Fig. 5.9, lift up the head mount base ass'y (07 in Fig. 5.8) for about 3 mm high, then rotate the take-up side of the pressure roller arm ass'y as shown in the figure.
Lift up the head mount base ass'y in such a way that the ass'y will not contact other parts.

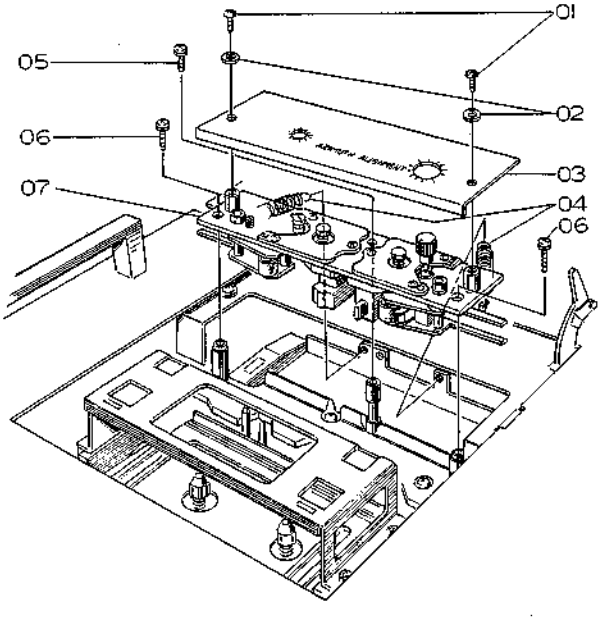



Fig. 5.8 Head Mount Base Ass'y Removal

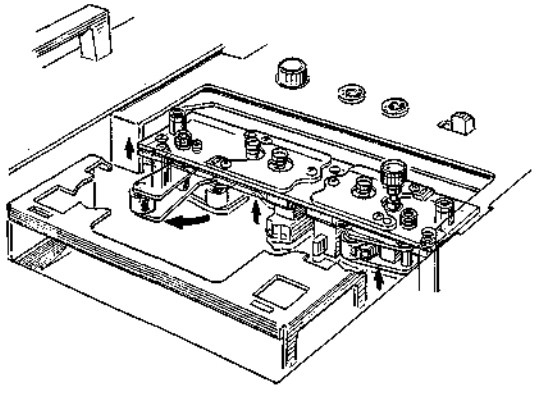


Fig. 5.9 Head Mount Base Ass'y Removal

### 5.5.2. Head Replacement Procedures

(1) Referring to Fig. 5.10, unfasten screws and springs (12,11) then remove record head (05) and playback head (06) with care not to lose washers or steel balls (L04,08).

(2) Disassemble E-ring, spring and collar (L01,01,02), then remove supply pressure roller arm ass'y (03).

(3) Remove erase head from supply pressure roller arm ass'y (03).

(4) Referring to Fig. 5.11, disconnect signal wires then replace each head.

(5) Fasten screws (12 in Fig. 5.10) of playback and record heads, insuring to keep correct direction, vertically against to the cassette tape.

(6) Fasten a screw fixing an erase head to the chassis of the supply pressure roller arm ass'y without any dust, and pushing erase head toward the pressure roller insuring to keep more than 0.1 mm space. Then apply a drip of lock tight paint to the screw. Check to insure signal wires are not in contact with the chassis.

Notes: 1. Separation of signal wires between record and playback heads will be required for avoiding bias leakage or cross feed caused by interference.

2. When replacing the heads, be careful not to contaminate dust or any other foreign materials on the head surface; otherwise, the head installation angle may deviate, resulting in irregular tape travelling.

3. Handle the heads with care not to give damages on the surface.

(7) After repalcement of each head the following adjustments are required.

**Mechanical Adjustment:**

Following items from 5.5.3 to 5.5.9 (adjustment of each head).

**Electrical Adjustment:**

Playback Head

6.5. Pfayback Level Calibration

6.6. Playback Frequency Response

6.7. Head Azimuth Alignment (Playback Head)

6.12. Record Bias and Record/Playback Level

Record Head

6.10. Recording Equalization Peaking

6.12. Record Bias and Record/Playback Frequency

Erase Head

6.8. Bias Oscillator Frequency

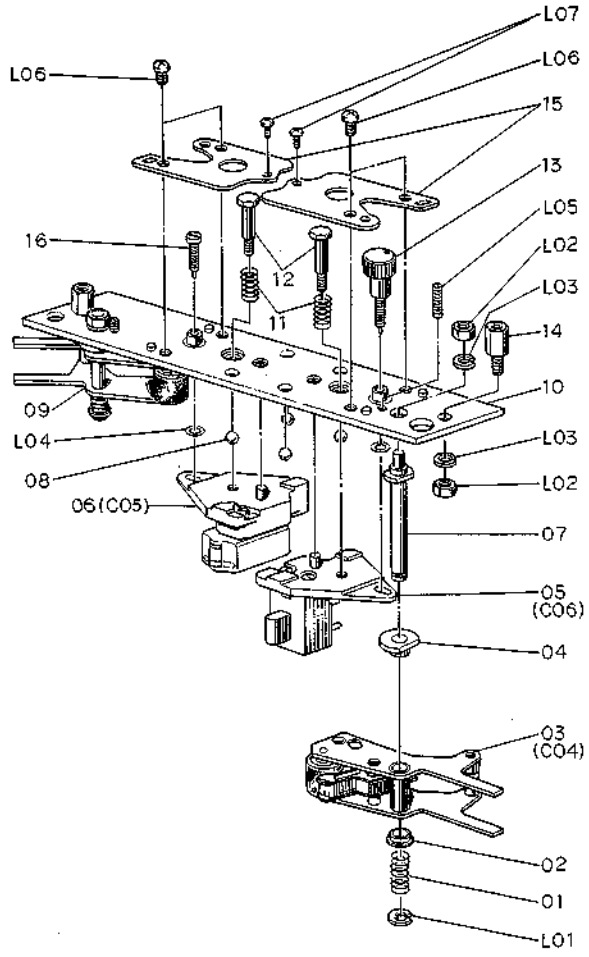



Fig. 5.10 Head Replacement

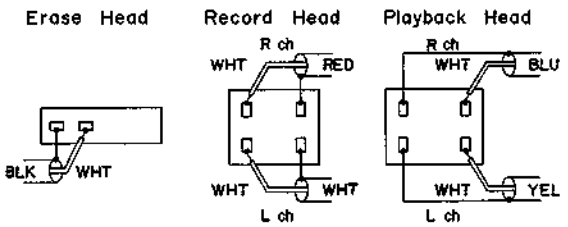



Fig. 5.11 Wiring of Heads (Rear View)

### 5.5.3. Tape Guide Height Adjustment

(1) Load with care the Tape Guide Height Measurement Jig (Model No. M300 from Information Terminals).

(2) Refer to Fig. 5.13, and adjust the tape guide height adjusting screw A so that the tape guide may become fixed to the jig.
One turning (one rotation) becomes 0.45 mm tape guide height movement.

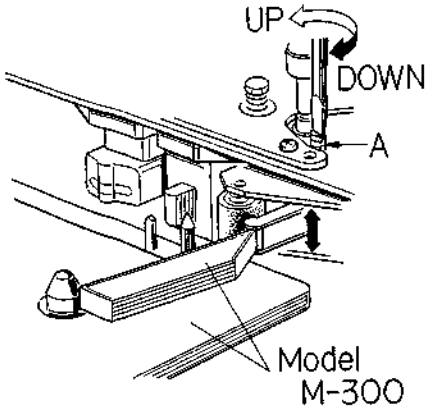



Fig. 5.13 Tape Guide Height Adjustment

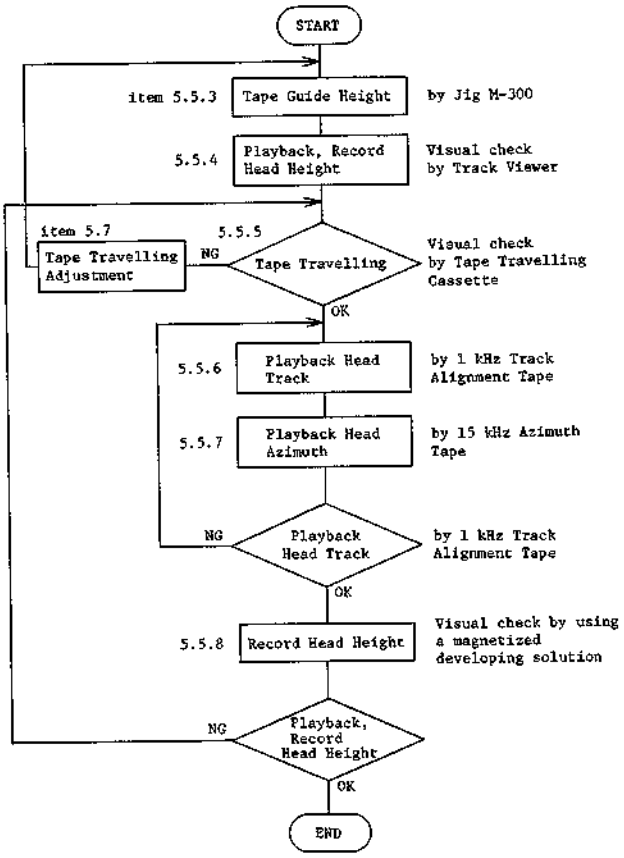



Fig. 5.12 Headblock Adjustment Flow Chart

### 5.5.4. Head Height Adjustment

(1) Load the Track Viewer (DA09012A), and check the positions of playback and record heads. While adjustment, check to insure that the L-R center of each head coincides in position with the middle point between two lines (0.3 mm distance) on the Track Viewer.

(2) If the L-R center deviates from the middle point, refer to Fig. 5.14 and correct the head height deviation by adjusting screws E and F, together with adjusting C and D for correcting head azimuth.

### 5.5.5. Tape Travelling Check

(1) Load the Tape Travelling Cassette (DA09011A), and set to the playback mode.

(2) Check to insure that the tape height while running is within ± 0.3 mm at any tape position when measured from the center of a cassette housing.

Note: Observing tape travelling on the playback head, check the following points:

a. Tape travelling does not wave.

b. At a tape starting point, the tolerance of tape travelling fluctuation is within about + 0.3 mm.

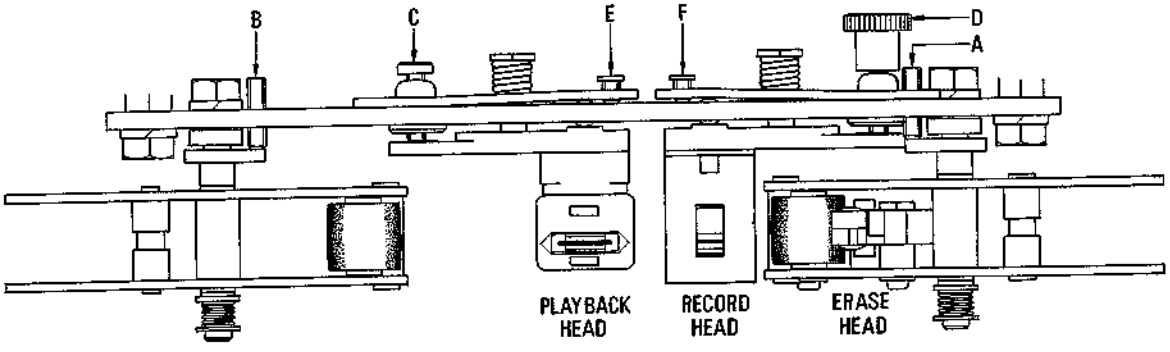



Fig. 5.14 Head Height/Azimuth Adjustment

If not, adjust the pressure roller height by adjusting screw B located at the take-up reel side. After the tape travel is corrected, check to insure that the pressure roller position is within ± 1 mm when measured from the center of a cassette housing. Note that in most cases of playback head adjustment turning of the screw B will not be required for misalignment. If tape travel cannot still be adjusted, adjust the tape travelling referring to "5.7. Tape Travelling".

### 5.5.6. Playback Head Track Alignment

(1) Load the 1 kHz Track Alignment Tape (DA09007A) and check the head height on the cassette tape deck. Set the MONITOR SW to TAPE and play the tape back.
(2) Adjust the playback head height screw E until each level meter of both channels reads the minimum value.

### 5.5.7. Playback Head Azimuth Alignment

(1) Load the 15 kHz Azimuth Tape (DA09004A) for adjusting the playback head azimuth. Set the MONITOR SW to TAPE position and playback.
(2) Adjust the playback head azimuth alignment screw C until each level meter of both channels reads the maximum value.
(3) After completion of the adjustment in this step, check the item 5.5.6 "Playback Head Track Alignment" then recheck playback head azimuth.

### 5.5.8. Record Head Height Alignment

(1) Load the Reference SX tape (DA09025A), set the TEST TONE SW to ON position and TAPE SELECTOR SW to the TAPE position.
Set to record mode and adjust record head azimuth alignment screw D until the alignment beacon started flickering alternately.
(2) Aligning Step (1) as above, align the screw F to obtain maximum reading of both channels.
(3) Record the same portion of the both A and B sides of the tape after record head azimuth is aligned.
(4) Immerse the recorded tape in a magnetized developing solution. In turn, check to insure that the recording head tracks across the center are separated with a distance of 0.4 to 0.6 mm typically 0.5 mm as illustrated in Fig. 5.15.

Note: Liquid for tape magnetized development: "MAGNA-SEE, SOUND CRAFT a product of CBS RECORDS a division of Columbia Broadcasting System, Inc., Danbury, Conn. 06810, or equivalent".

After development, clean the tape otherwise pressure roller will become dirty.
The above development will not be required if the difference of playback and record head heights are within 0.1 mm at "5.5.4. Head Height Adjustment".

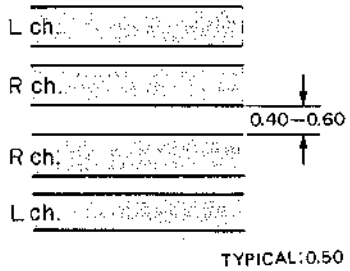



Fig. 5.15 Record Head Track

### 5.5.9. Erase Head Adjustment

After removal of erase head, refer to "5.5.2. Head Replacement Procedures".

### 5.6. Flywheel Adjustment

When mounting the flywheel holder, adjust the flywheel clearances should be 0.05 to 0.1 mm.

Caution: When installing the flywheel, be sure to clean oil off with an alcohol-dipped cloth from capstan which will be in contact with pressure roller.

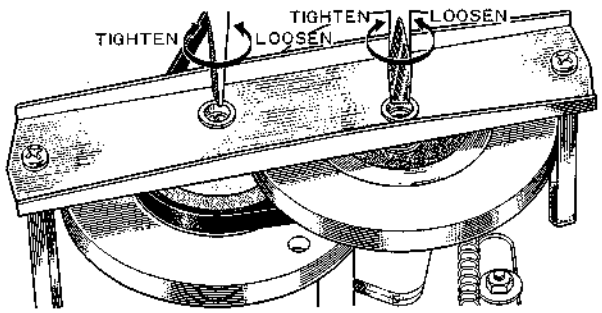



Fig. 5.16 Flywheel Adjustment

### 5.7. Tape Travelling Adjustment

Inaccurate tape travelling extremely deteriorates the performance of tape decks therefore careful checks are required.

#### 5.7.1. Check-out Method

(1) Check to insure whether the head height is correct.
(2) Load a Tape Travelling Cassette (DA090011A) and play it and check to insure freedom from waving, looseness, etc.
(3) The difference of head height between supply side and take-up side shall not be more than 0.3 mm.
(4) After more than 2 seconds when play button is touched on, tolerance of the tape on the playback head shall not be more than 0.05 mm.
(5) Feed in the test tone signals to the Reference SX Tape (DA09025A) and record and play it back, when the level change shall not be more than 1 dB.

#### 5.7.2. Adjustment

(1) Check to insure whether any of the heads is not in contact with the cassette housing.
(2) Check to insure whether the pressure roller is located in parallel with the capstan shaft (Also check to insure whether the heads are free from dust or dirts, and whether the pressure roller arm is free from bending).
(3) Check to insure whether the surface of the pressure roller is gloubular, not straight. Other than the above, concaved, or oiled surface shall be subject to replacement.
(4) The pressure of the pressure roller shall be 400 g ± 50 g.
(5) Adjustment of Pressure Roller Timing.
   a. Refer to Fig. 5.17.
      Push down the head base by hand while in stop mode till the take-up pressure roller reaches the capstan, and then check to insure whether the gap between the supply pressure roller and the capstan is 0.5 mm.
   b. While in play mode, check to insure whether the gap between the take-up pressure roller arm and the stopper is 1.25 mm, and whether the gap between the supply pressure roller arm and stopper is 0.75 mm.
   Note: If the foregoing requirements are not satisfied, adjustment shall be made by bending the stopper.
(6) The clearance between the capstan shaft and thrust shall be 0.1 — 0.05 mm.
(7) The tape guide on which if any scratches, etc. are noted shall be repalced. Check shall also be made to insure whether the erase head surface is smooth.
(8) The use of defective head base damper will deteriorate the tape travel at the beginning of activation.
(9) The parallelism between both of the capstan axis is one of the most imporatnt factors for an accurate operation. If great shock is given to the capstan, the capstan flange ass'y shall be repalced.
   Note: The cassette house shall also be checked to insure freedom from deformation, bending, etc.

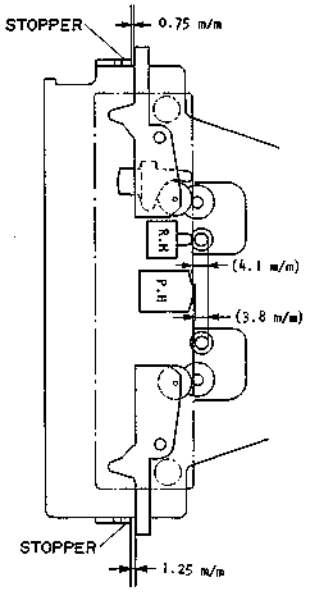



Fig. 5.17 Pressure Roller Adjustment

### 5.8. Lubrication

Place the deck in a horizontal position and then remove the cassette lid.
Apply a few drops of oil (LAUNA NO. 40) into the oil cap hole of the capstan flange every 500 hours of use.
Note: If the lubricating oil is applied also to the capstan shaft and other drive mechanisms, clean it off with an alcohol-dipped cloth.

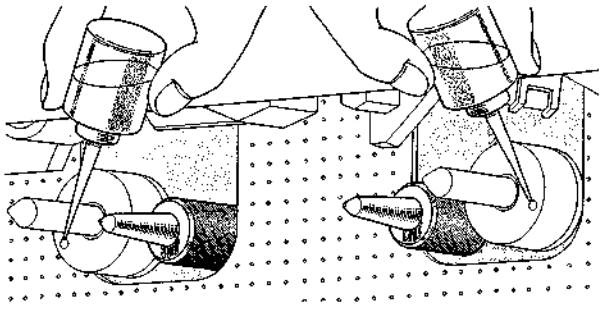


Fig. 5.18 Lubrication

## 6. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

Note: Mechanical adjustments have to be performed prior to this adjustment. Refer to Figs. 7.1 – 7.3 position of semi-fixed volume and test point.

### 6.1. Adjustments and Measurements Table

| STEP | ITEM | REMARKS | |
|---|---|---|---|
| 1 | Fast Forward, Rewind Torque<br>Take-up Torque | As per 5.1.<br>As per 5.1. | 50 – 55 g-cm<br>40 ± 5 g-cm |
| 2 | Tape Travelling Check | As per 5.5.5. | by Tape Travelling Cassette |
| 3 | Tape Speed | As per 5.2. | 1-7/8 ips ± 1% |
| 4 | Meter Level Calibration | As per 6.2. | 0 dB on level meters, at 100 mV ± 2 mV input to Test Points TP102, TP202 |
| 5 | 400 Hz Test Tone | As per 6.3. | 0 dB on level meters |
| 6 | 19 kHz MPX Filter | As per 6.4. | Minimum reading at 19 kHz |
| 7 | Playback Level Calibration | As per 6.5. | 0 dB on level meters by 400 Hz level Tape<br>(Adjust when Playback Head is replaced.) |
| 8 | Playback Frequency Response | As per 6.6. | -20 dB ± 3 dB against 400 Hz Level Tape by 10, 15 and 20 kHz Playback Reference Tape<br>(Adjust when playback Head is replaced.) |
| 9 | Head Azimuth (Playback Head) | As per 6.7. | Maximum reading by 15 kHz Azimuth Tape<br>(Adjust when Playback Head is replaced.) |
| 10 | Bias Oscillator Frequency | As per 6.8. | 105 kHz ± 3 kHz<br>(Adjust when Erase Head is replaced.) |
| 11 | Bias Trap<br>(Record Amp./Playback Amp.) | As per 6.9.1.<br>and 6.9.2. | Minimum reading |
| 12 | Recording Equalization Peaking | As per 6.10. | Peak reading at 23 kHz with bias cut mode<br>(Adjust when Record Head is replaced.) |
| 13 | Alignment-Beacon Phase | As per 6.11. | |
| 14 | Record Bias and Record/Playback Level | As per 6.12. | Frequency Response: -20 dB ± 3 dB<br>Distortion: Less than 1.5%<br>(Adjust when Playback or Record Head is replaced.) |
| 15 | Record Dolby NR<br>Playback Dolby NR | As per 6.13.<br>As per 6.14. | |
| 16 | DNL | As per 6.15. | |
| 17 | Frequency Response<br>Playback Frequency Response<br>Overall Frequency Response | As per 6.16.1.<br>As per 6.16.2. | |
| 18 | Signal-to-Noise Ratio | As per 6.17. | Better than 65 dB (Dolby NR IN, Wrms, CCITT, 400 Hz, 3% distortion) |
| 19 | Channel Separation | As per 6.18. | Better than 35 dB at 1 kHz 0 dB |
| 20 | Crosstalk | As per 6.19. | Better than 60 dB at 1 kHz 0 dB |
| 21 | Erasure | As per 6.20. | Better than 60 dB at 1 kHz saturation level |
| 22 | Total Harmonic Distortion | As per 6.21. | Less than 1.5% at 400 Hz 0 dB |
| 23 | Wow/Flutter | As per 6.22. | Less than 0.1% (DIN 45507 Weighted Peak) |

### 6.2. Meter Level Calibration

Singal Source

1 kHz 0.3 V to Input Jacks or 1 kHz 0.03 V to DIN input.

Measurement Connection

VTVM to Test Point

TP102 (Main P.C.B.) – GND (Lch),
TP202 (Main P.C.B.) – GND (Rch).

Mode

MONITOR SW – SOURCE

Adjustment

(1) Adjust the line input level controls to obtain 100 mV ± 2 mV on VTVM.
(2) Adjust the Meter Calibration VR101, 201 to obtain 0 dB on Level Meters.

VR101 (Lch)
VR201 (Rch) Line Amp. P.C.B.

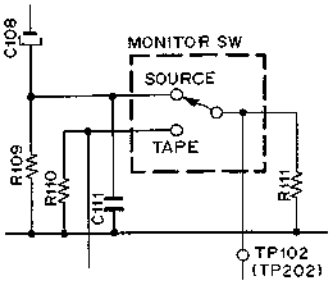



Fig. 6.1 Test Point

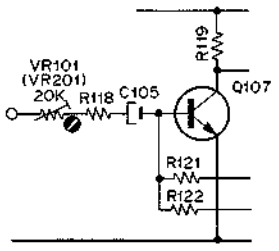



Fig. 6.2 Level Calibration

### 6.3. 400 Hz Test Tone

Mode

MONITOR SW – SOURCE
400 Hz TEST TONE SW – ON

Adjustment

Adjust the Tone Calibration VR301 so that the level meter of the L channel indicates 0 dB. If the level meter of the R channel is not balanced to L channel, adjust VR203 till the R channel meter indicates 0 dB.

VR301 (Lch)
VR203 (Rch) Main P.C.B.

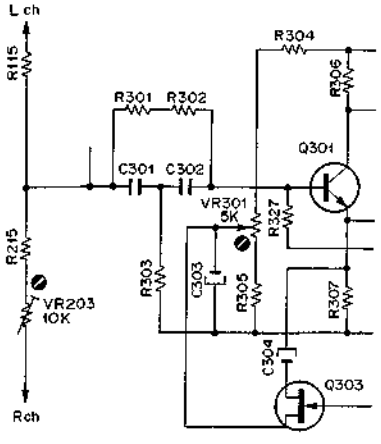



Fig. 6.3 400 Hz Test Tone

### 6.4. 19 kHz MPX Filter

Signal Source

19 kHz 0.3 V to Input Jacks or 0.03 V to DIN Input.

Measurement Connection

VTVM and Frequency Counter to Output Jacks or DIN Output.

Mode

MONITOR SW – SOURCE
MPX SW – OFF
DOLBY NR SW – OUT
DNL SW – OUT

Adjustment

(1) Adjust the line input level controls to obtain 0 dB (1 V) on Level Meters and VTVM.
(2) Set the MPX SW to ON.
(3) Adjust MPX Filter Coils L102, 202 to obtain the minimum reading on VTVM.

L102 (Lch)
L202 (Rch) Main P.C.B.

Note: Frequency has to be 19 kHz ± 100 Hz on Frequency Counter.

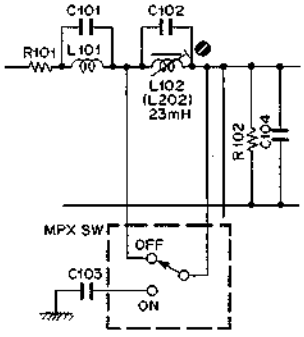



Fig. 6.4 19 kHz MPX Filter

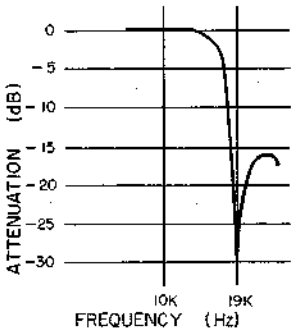



Fig. 6.5 Characteristics

### 6.5. Playback Level Calibration

Signal Source

400 Hz Level Tape (DA09005A)

Mode

CONTROL BUTTON – Playback
MONITOR SW – TAPE
TAPE SELECTOR SW – SX
EQ SELECTOR SW – 70 μs

Adjustment

Adjust the Playback Amp. Potentiometers VR101, 201 till the level meters indicate 0 dB.

VR101 (Lch)
VR201 (Rch) PB Head Amp. P.C.B.

Note: "6.2. Meter Level Calibration" to be completed prior to 6.5 as above.

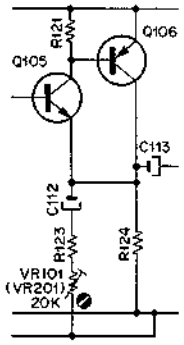



Fig. 6.6 Playback Level Calibration

### 6.6. Playback Frequency Response

Measurement Connection

VTVM to Output Jacks or DIN Output.

Mode

MONITOR SW – TAPE
TAPE SELECTOR SW – SX
EQ SELECTOR SW – 70 μs
DNL SW – OUT
DOLBY NR SW – OUT

Adjustment

(1) Load a 400 Hz Level Tape (DA09005A) and play it back.
Adjust the line output level controls to a certain level (example 0 dB).

(2) Load a 10 kHz PB Frequency Response Tape (DA09003A), 15 kHz PB Frequency Response Tape (DA09002A) and 20 kHz PB Fequency Response Tape (DA09001A), and adjust the playback head azimuth to give the maximum levels on VTVM with each Tape.
Check to insure level would be within –20 dB ± 3 dB against 400 Hz Level Tape.

(3) If above level cannot be satisfied.
Refer to "6.16.1. Playback Frequency Response Adjustment".

(4) Load a 15 kHz Azimuth Tape (DA09004A).
Adjust the playback head azimuth to give the maximum levels on VTVM.

### 6.7. Head Azimuth Alignment (Playback Head)

Signal Source

15 kHz Azimuth Tape (DA09004A)

Measurement Connection

VTVM to Output Jacks.

Mode

CONTROL BUTTON – Playback
MONITOR SW – TAPE
TAPE SELECTOR SW – SX
EQ SELECTOR SW – 70 μs
DOLBY NR SW – OUT

Adjustment

Adjust the Playback Head Azimuth Alignment Screw to obtain the maximum reading on VTVM. Be sure to check both channels. The maximum reading should be more than 70 mV on VTVM when Playback Level Calibration described in 6.5 is adjusted correctly.

### 6.8. Bias Oscillator Frequency

Measurement Connection

Frequency Counter to Test Point CN1–9 (Main P.C.B.) – GND

Mode

CONTROL BUTTON – Record/Pause

Adjustment

Adjust the Bias Oscillator Coil L302 to obtain a reading of 105 kHz on Frequency Counter.

L302 Main P.C.B.

Note: Measurement shall be made by use of a low capacity probe.

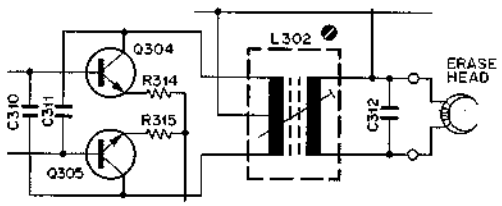



Fig. 6.7 Bias Oscillator

### 6.9. Bias Trap (Bias Leakage)

Measurement shall be made by use of a low capacity probe.

#### 6.9.1. Record Amp. Bias Trap

Measurement Connection

VTVM to Q104 Collector (Rec. Eq. Amp. P.C.B.) – GND (Lch), Q204 Collector (Rec. Eq. Amp. P.C.B.) – GND (Rch).

Mode

CONTROL BUTTON – Record /Pause

Adjustment

Adjust the Bias Trap Coils L103, 203 to obtain the minimum reading on VTVM.

L103 (Lch)
L203 (Rch) Main P.C.B.

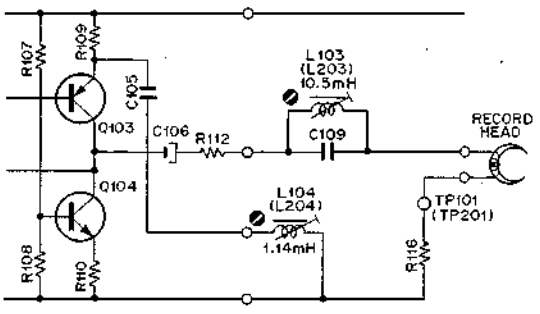



Fig. 6.8 Record Amp. Bias Trap

### 6.9.2. Playback Amp. Bias Trap

Measurement Connection

VTVM to Test Point

TP102 (Main P.C.B.) – GND (Lch),
TP202 (Main P.C.B.) – GND (Rch).

Mode

CONTROL BUTTON – Record /Pause
MONITOR SW – TAPE

Adjustment

Adjust the Bias Trap Coils L101, 201 to obtain the minimum reading on VTVM.

L101 (Lch)
L201 (Rch) PB Head Amp. P.C.B.

### 6.10. Recording Equalization Peaking

Signal Source

400 Hz and 23 kHz 0.3 V to Input Jacks or 400 Hz and 23 kHz 0.03 V to DIN Input.

Measurement Connection

VTVM to Test Point

TP101 (Main P.C.B.) – GND (Lch),
TP201 (Main P.C.B.) – GND (Rch).

Mode

CONTROL BUTTON – Record/Pause
MONITOR SW – SOURCE
TAPE SELECTOR SW – SX
EQ SELECTOR SW – 70 μs
DOLBY NR SW – OUT
MPX SW – OFF
Bias Cut (disconnect Bias-Cut Jumper accessing from the component side of the Main P.C.B. Refer to "7. Parts Location for Electrical Adjustment".)

Adjustment

(1) Adjust the line input level controls to obtain 0 dB on Level Meters at 400 Hz input signals.
(2) Feed in 23 kHz instead of 400 Hz then adjust L104, 204 to obtain peak reading (about 13 dB rise at 20 kHz). L104, L204 Main P.C.B.

Note: Refer to Fig. 6.11, frequency response curve.

### 6.11. Alignment Beacon Phase Adjustment

Before starting adjustment, be sure to adjust the record head azimuth by Record Head Azimuth Alignment Beacon whenever cassette tapes are changed (even when cassette tape is changed from A-side to B-side).

Signal Source

15 kHz 0.03 V to Input Jacks or 15 kHz 3 mV to DIN Input.

Mode:

CONTROL BUTTON – Record/playback
MONITOR SW – TAPE
TAPE SELECTOR SW – SX
EQ SELECTOR SW – 70 μs
400 Hz TEST TONE SW – OFF

Adjustment

(1) Load a Reference SX Tape (DA09025A) then set to record/playback mode.
(2) Adjust the Record Head Azimuth Alignment Screw to obtain the maximum reading on VTVM.
Be sure to check both channels.
(3) Set 400 Hz TEST TONE SW to ON.
(4) Adjust VR601 so that Alignment Beacon will flicker alternately.
VR601 Logic Control P.C.B.

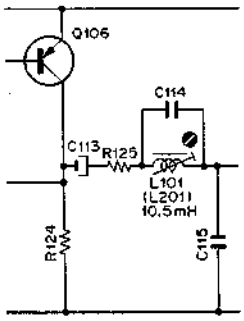



Fig. 6.9 Playback Amp. Bias Trap

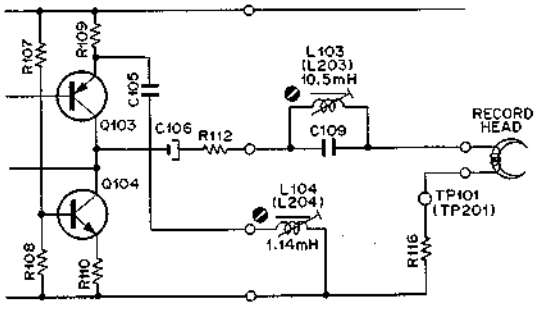



Fig. 6.10 Recording Equalization Peaking

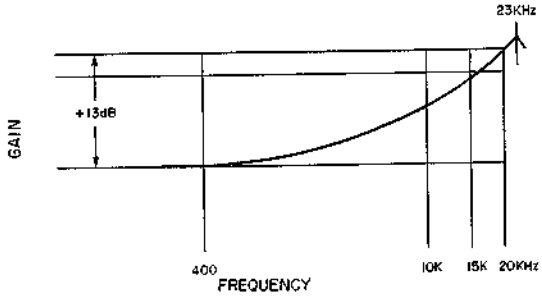



Fig. 6.11 Recording Equalization Peaking Characteristics

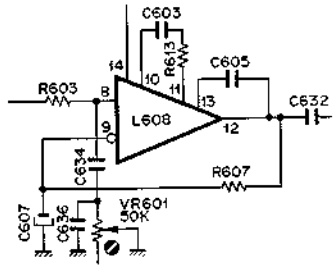



Fig. 6.12 Alignment Beacon Phase Adjustment

### 6.12. Record Bias and Record/Playback Level

Signal Source

1 kHz 0.3 V, 20 kHz 0.03 V (−20 dB), or 1 kHz 0.03 V (−20 dB) to Line Input Jacks.

Measurement Connection

VTVM and Distortion Meter to Output Jacks or DIN Output.

Mode

CONTROL BUTTON — Record/Playback
MONITOR SW — SOURCE/TAPE
TAPE SELECTOR SW — EX (SX)
EQ SELECTOR SW — 120 μs (70 μs)
DOLBY NR SW — OUT
DNL SW — OUT
MPX SW — OFF

Adjustment

(1) Load a Reference EXII Tape (DA09021A) (Reference SX Tape (DA09025A)) and set TAPE SELECTOR SW to EX (SX) and EQ SELECTOR SW to 120 μs (70 μs).
(2) Set to TEST TONE SW ON and set to record mode, and adjust the record head azimuth alignment.
(3) Set MONITOR SW to TAPE, and adjust the Bias Adj. VR101, 201 (VR102, 202) to obtain the maximum reading on VTVM.
(4) Adjust the Record Calibration VR702, 802 (VR701, 801) on the Rec. Cal. P.C.B. to obtain same level on Level Meters (0 dB) at MONITOR SW SOURCE and TAPE.
(5) Set MONITOR SW to SOURCE and TEST TONE SW to OFF. Feed in 1 kHz 0.3 V to Input Jacks and adjust the line input level controls to obtain 0 dB on Level Meters.
(6) Set MONITOR SW to TAPE. Set Audio Generator Output Level to 20 kHz −20 dB (EXII/SX).
Adjust the Bias Adj. VR101, 201 (VR102, 202) so that level would become within ± 3 dB against 1 kHz.
(7) Set MONITOR SW to TAPE. Feed in 1 kHz 0.3 V to Input Jacks and adjust the line input level controls to obtain 0 dB on Level Meters. And check whether the Total Harmonic Distortion (T.H.D.) is under 1.5%. If T.H.D. exceeds 1.5%, adjust the Bias Adj. VR101, 201 (VR102, 202) again to obtain T.H.D. of less than 1.5%, then set Audio Generator Output Level to 20 kHz −20 dB (EXII/SX) and check to insure whether the level becomes within ± 3 dB against 1 kHz −20 dB.
(8) For correction of Record Calibration after above adjustment, set to TEST TONE SW ON and set to record mode. Then adjust Record Calibration VR702, 802 (VR701, 801) on the Rec. Cal. P.C.B. to obtain same level on Level Meters (0 dB) at MONITOR SW SOURCE and TAPE.

Notes:

1. "6.11. Alignment Beacon Phase Adjustment" has to be conducted.
2. In case of defective Frequency Response, the following causes can be considered:
Defective Record Head, defective "6.6. Playback Frequency Response" check and Playback Head, defective "6.10. Recording Equalization Peaking" check, defective Mechanical Adjustments (Head Height Adjustment, Tape Travelling).
Refer to "6.16. Frequency Response Adjustment".
Main P.C.B.:
VR101 (EXII Bias Adj. VR — Lch)
VR201 (EXII Bias Adj. VR — Rch)
VR102 (SX Bias Adj. VR — Lch)
VR202 (SX Bias Adj. VR — Rch)
Rec. Cal. P.C.B.:
VR702 (EXII Rec. Cal. VR — Lch)
VR802 (EXII Rec. Cal. VR — Rch)
VR701 (SX Rec. Cal. VR — Lch)
VR801 (SX Rec. Cal. VR — Rch)

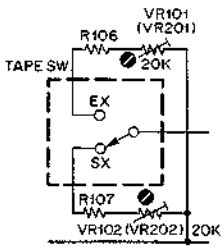



Fig. 6.13
Bias Current Adjustment

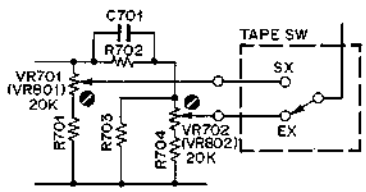



Fig. 6.14
Record Level Calibration

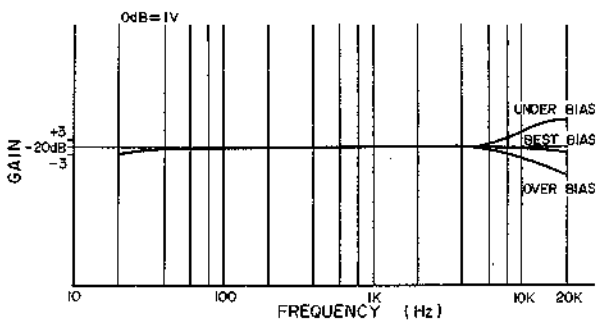



Fig. 6.15 Frequency Response

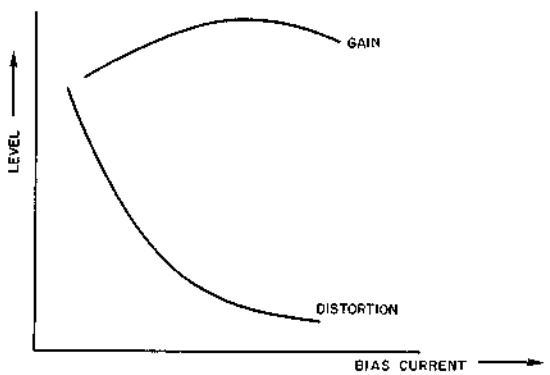



Fig. 6.16 Bias Characteristics

### 6.13. Record Dolby NR Alignment

Adjust only if Record Dolby NR P.C.B. is repaired.

(1) Set Law Control VR101 (VR201) fully clockwise, viewed from top side.
(2) Set Gain Control VR102 (VR202) fully counter-clockwise.
(3) Set DOLBY NR SW to OUT and short FET gate Test Pin Lch (Rch) to ground.
(4) Feed in 5 kHz at a level to give 3 mV at Metering terminal.
(5) Note signal level obtained at Output terminal.
(6) Set DOLBY NR SW to IN and adjust Gain Control for a 10 dB rise at Output terminal.
(7) Note output level with DOLBY NR SW IN.
(8) Remove FET gate Test Pin short and adjust Law Control for a 2 dB drop at Output terminal.

Note: Pin numbers of Record Dolby NR P.C.B.

| | Right | Left |
|---|---|---|
| DOLBY NR SW terminal | 2 | 13 |
| Metering terminal | 3 | 12 |
| Output terminal | 5 | 10 |
| Input terminal | 4 | 11 |

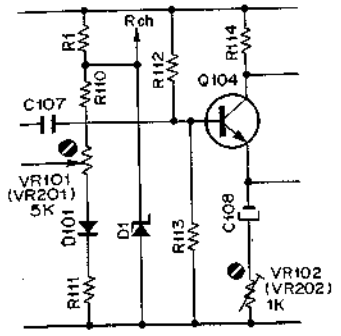



Fig. 6.17 Record Dolby NR Alignment

### 6.14. Playback Dolby NR Alignment

Adjust only if Playback Dolby NR P.C.B. is repaired.

(1) Set Law Control VR101 (VR201) fully clockwise, viewed from top side.
(2) Set Gain Control VR102 (VR202) fully counter-clockwise.
(3) Set DOLBY NR SW to OUT and short FET gate Test Pin Lch (Rch) to ground.
(4) Feed in 5 kHz at a level to give 7.6 mV at Metering terminal.
(5) Set Gain Control for a 10 dB drop at Metering terminal as DOLBY NR SW is set to IN.
(6) Set DOLBY NR SW to OUT and remove FET gate Test Pin short and adjust Law Control to give a reading of 3 mV at Metering terminal.

Note: Pin numbers of Playback Dolby NR P.C.B.

| | Right | Left |
|---|---|---|
| DOLBY NR SW terminal | 2 | 13 |
| Metering or Output terminal | 5 | 10 |
| Input terminal | 3 | 12 |

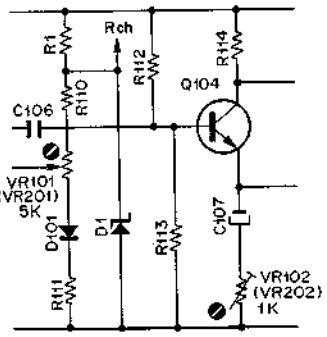



Fig. 6.18 Playback Dolby NR Alignment

### 6.15. DNL Alignment

(1) Set MONITOR SW to SOURCE, DNL SW to OUT and output level controls to maximum position.
(2) Feed in 10 kHz at a level to give 4 mV at Output Line Jacks.
(3) Set DNL SW to IN mode.
(4) Adjust VR101 (VR201) on the DNL P.C.B. for a 8 dB drop at Output Line Jacks.

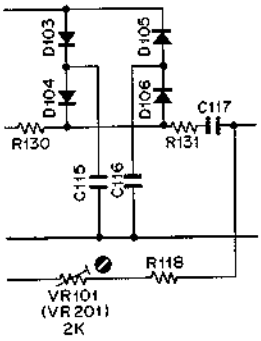



Fig. 6.19 DNL Alignment

### 6.16. Frequency Response Adjustment

#### 6.16.1 Playback Frequency Response

Measurement Connection

VTVM to Line Output Jacks.

Mode

MONITOR SW — TAPE
TAPE SELECTOR SW — SX
EQ SELECTOR SW — 70 μs
DNL — OUT
DOLBY NR SW — OUT

Adjustment

(1) Open 22 kΩ of R109,209 of the PB Head Amp. P.C.B. (EQ and time constant shall show 120 μs).

(2) Load a 400 Hz Level Tape (DA09005A) to playback, and turn the output level controls till the indication of the VTVM shows 0 dB (for example) or easy reference of value.
(3) Load a 10 kHz PB Frequency Response Tape (DA09003A) and play it back.
(4) Check the output of 10 kHz and then, referring to Fig. 6.20, adjust EQ in the range of 110 μs – 140 μs, the result of which shall be 0 to + 3 dB.
(5) Load a 15 kHz PB Frequency Response Tape (DA09002A) and play it back.
(6) If the output of 15 kHz shows the value within ± 2 dB against 400 Hz Level Tape, it is considered satisfactory.
(7) Load a 20 kHz PB Frequency Response Tape (DA09001A) and play it back.
(8) If 15 kHz at (5) shows the value within ± 2 dB and 20 kHz being less than −3 dB, replace the playback head.
(9) Adjustment shall be made so that the level at 10 kHz, 15 kHz and 20 kHz will become flat when compared with 400 Hz.
(10) If the results are shown to belong to high, set R101,201 to open – 100 kΩ. Refer to Fig. 6.21.
(11) Adjust the azimuth alignment to the maximum output with a 15 kHz Azimuth Tape (DA09004A).

Notes: 1. If adjustment is made on the jumper resistor, the alignment beacon phase shall also be adjusted.
2. If the foregoing adjustments do not suffice the requirements, the playback head shall be replaced.

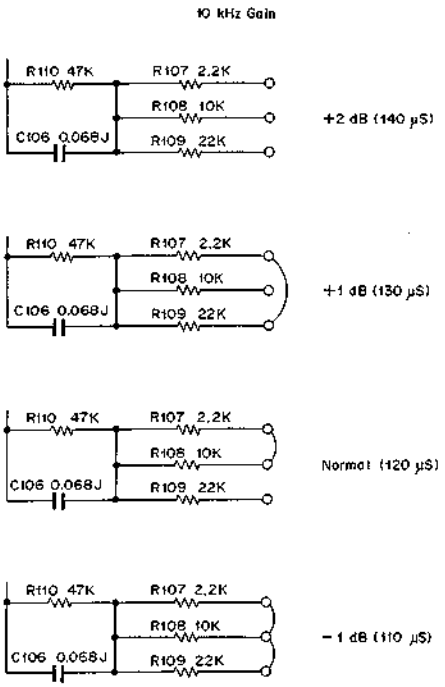



Fig. 6.20 Playback Equalizer Adjustment

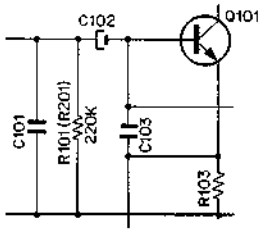



Fig. 6.21 PB Head Amp. Peaking Compensation

### 6.16.2. Overall Frequency Response

Signal Source

1 kHz 0.3 V to Line Input Jacks.

Measurement Connection

VTVM, Oscilloscope and Distortion Meter to Line Output Jacks.

Mode

MONITOR SW – SOURCE/TAPE
TAPE SELECTOR SW – EX (SX)
EQ SELECTOR SW – 120 μs (70 μs)
DNL – OUT
DOLBY NR SW – OUT

Adjustment

(1) Set TAPE SELECTOR SW to SX and EQ SELECTOR SW to 70 μs then load a Reference SX Tape (DA09025A).
(2) Set to record/pause mode.
(3) Set MONITOR SW to SOURCE and adjust line input level controls till the meters indicate 0 dB at 1 kHz 0.3 V input.
(4) While in the above state, lower the output of the Generator by 30 dB.
(5) Set MONITOR SW to TAPE then set to record/playback mode. Set the Generator to 15 kHz from 1 kHz and then adjust the azimuth alignment of the record head.
(6) Adjustment shall be made on bias till the response at 10 kHz becomes 0 dB (± 1 dB).
(7) Adjustment shall be made on peaking coils L104,204 till the response at 20 kHz becomes 0 dB (± 2 dB).
(8) Waving with a SX tape at 1 kHz – 20 kHz shall be not more than 3 dB.
(9) Set TAPE SELECTOR SW to EX and EQ SELECTOR SW to 120 μs, then load a Reference EXII Tape (DA09021A).
(10) Set to record/playback mode, then adjust the azimuth alignment of record head.
(11) Bias shall be adjusted till the response at 10 kHz becomes 0 dB (± 1 dB).
(12) Measure the response at 20 kHz (± 2 dB).
(13) Change the output of the Generator from −30 dB to −20 dB and check the frequency response.
(14) Measure the distortion at 1 kHz 0 dB Overall.
SX/EXII – less than 1.5%
(15) In case of excessive distortion, change the record head.

### 6.17. Signal-to-Noise Ratio Measurement

(1) Connect a VTVM, Oscilloscope and Distortion Meter to Line Output Jacks, and then connect an Audio Generator to Line Input Jacks.
(2) Set both of DOLBY NR and DNL switches to OUT.
(3) Record and playback 400 Hz and adjust the line input level controls till the distortion becomes 3%.
(4) Set both of DOLBY NR and DNL switches to IN at the recording level in (3) as above.
(5) Disconnect the Generator from Line Input Jacks.
(6) After rewound, playback once again and check the output difference between (4) and (5).

Note: The filter of CCITT Curve shall be used in the measurement.

### 6.18. Channel Separation Measurement

#### 6.18.1. Left Channel to Right Channel

(1) Connect a VTVM and Oscilloscope to Output Jacks, and connect an Audio Generator to Line Input Jack of L channel.
(2) Set both of DOLBY NR and DNL switches to OUT.
(3) Load a blank cassette tape.
(4) Set MONITOR SW to SOURCE and adjust the L channel line input level control till the meter indicates 0 dB at 1 kHz. Set the R channel line input level control to maximum.
(5) Set MONITOR SW to TAPE and record it.
(6) After rewound, play it back.
(7) Measure the difference between L and R channels.

#### 6.18.2. Right Channel to Left Channel

(1) Connect an Audio Generator to Line Input Jack of R channel.
(2) Set MONITOR SW to SOURCE and adjust the R channel line input level control till the meter indicates 0 dB at 1 kHz.
(3) The L channel line input level control shall be set to maximum.
(4) Set MONITOR SW to TAPE and record it.
(5) After rewound, play it back.
(6) Measure the output difference between R and L channels.

### 6.19. Crosstalk Measurement

(1) Connect a VTVM, Oscilloscope and 1 kHz Band Pass Filter to Output Jacks, and then connect an Audio Generator to Line Input Jacks.
(2) Load a blank cassette tape.
(3) Set MONITOR SW to SOURCE, and then adjust the line input level controls till the meters indicate 0 dB at 1 kHz.
(4) Set MONITOR SW to TAPE and record it.
(5) Turn the cassette tape the other way round and play it back, when measurement shall be made at 1 kHz Band Pass Filter.
(6) Measue the output difference between (4) and (5) (R channel of A (or B) side to R channel of B (or A) side).

### 6.20. Erasure Measurement

(1) Connect a VTVM and Oscilloscope to Output Jacks and connect an Audio Generator to Line Input Jacks.
(2) Set MINITOR SW to SOURCE, and adjust the line input controls till the meters indicate 0 dB at 1 kHz.
(3) Load a blank cassette tape.
(4) Set MONITOR SW to TAPE and record it.
(5) Then rewind it.
(6) Disconnect the Audio Generator from the Line Input Jacks.
(7) Record it once again (erase).
(8) Then rewind.
(9) Measure the output difference between (4) and (7).

### 6.21. Total Harmonic Distortion Measurement

(1) Connect a Distortion Meter to Line Output Jacks, and connect an Audio Generator to Line Input Jacks.
(2) Set to the following mode:
MONITOR SW – SOURCE/TAPE
TAPE SELECTOR SW – EX (SX)
EQ SELECTOR SW – 120 μs (70 μs)
DOLBY NR SW – OUT
DNL SW – OUT
OUTPUT LEVEL CONTROLS – Max.
(3) Load a blank tape (EXII/SX).
(4) Set MONITOR SW to SOURCE and adjust the line input level controls till the meters indicate 0 dB at 400 Hz.
(5) Set MONITOR SW to TAPE and record then play it back.
(6) Measure the reading of the Distortion Meter.

Note: Before the above measurement, record level calibration with 400 Hz Test Tone should be performed.

### 6.22. Wow/Flutter Measurement

(1) Connect a Wow/Flutter Meter to Output Jack.
(2) Load a 3 kHz Speed-Wow/Flutter Tape (DA09006A) and play it back.
(3) Check the reading of Wow/Flutter Meter.

Note: DIN weighted peak shall be measured (playback only).

## 7. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

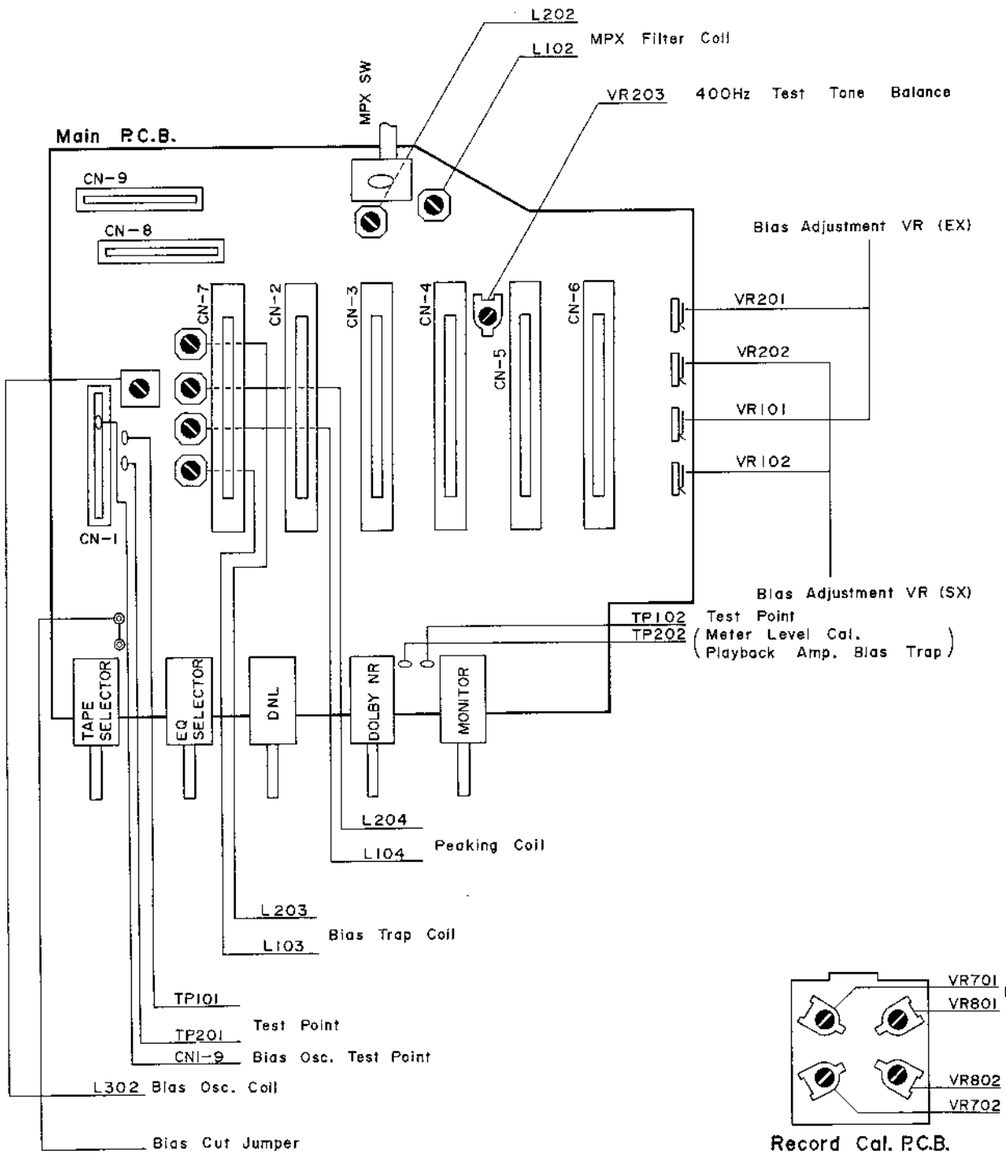



Fig. 7.1




Fig. 7.2

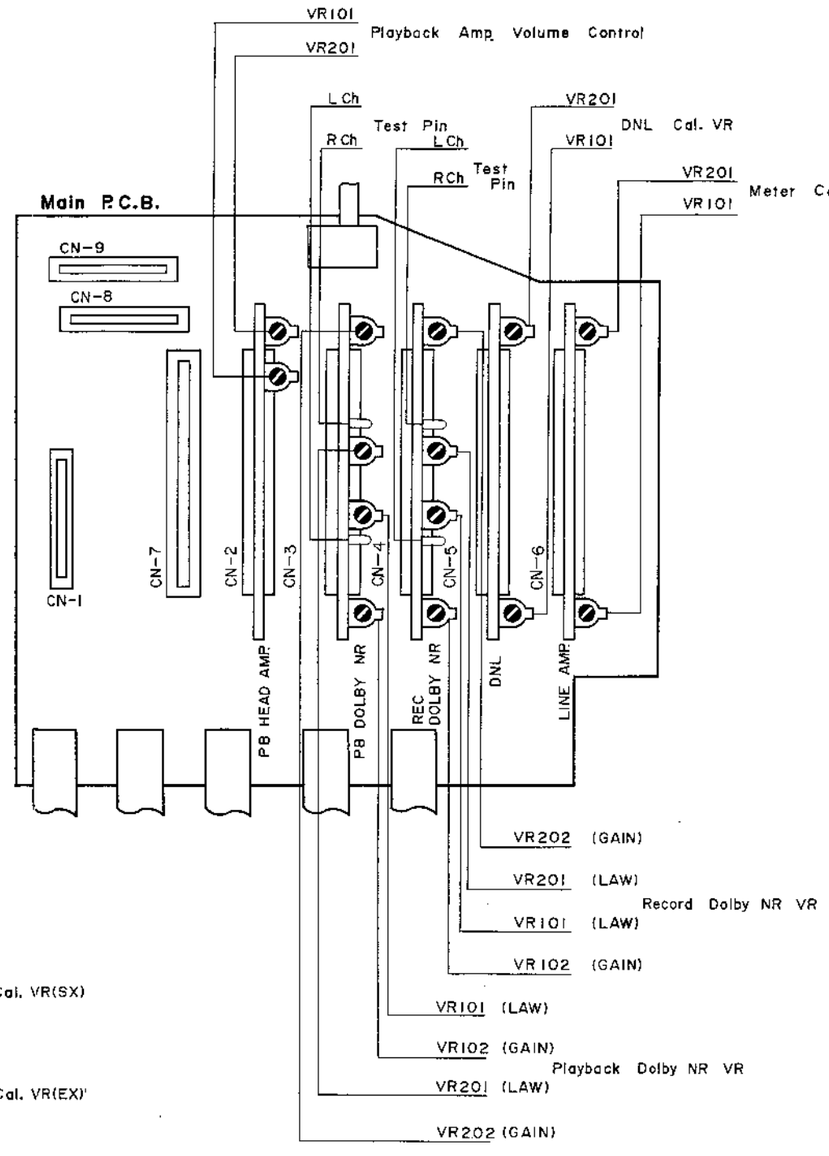



Fig. 7.3

## 8. MOUNTING DIAGRAM AND PARTS LIST

Notes: 1. Mounting Diagram shows a dip side of the printed circuit board.
2. Diode FDH-999 is compatible with 1S1555.

### 8.1. Main P.C.B. Ass'y

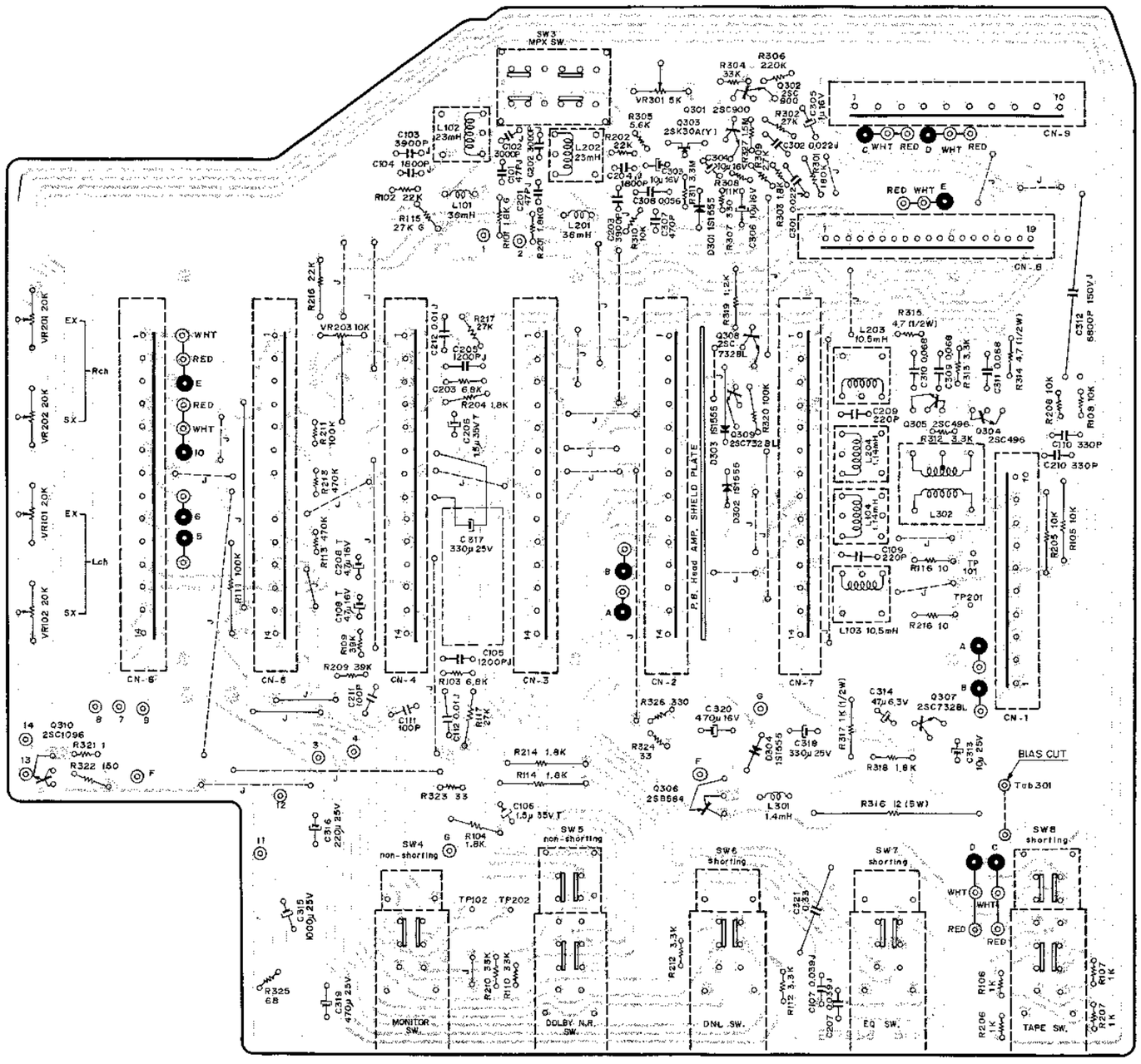



Fig. 8.1

| Schematic Ref. No. | Part No. | Description |
|---|---|---|
| | BA03881A | Main P.C.B. Ass'y |
| | – Rec. Amp. – | |
| L101,201 | 0B03919A | Inductor 36mH |
| L102,202 | 0B03563A | 19KHz Coil 23mH |
| L103,203 | 0B00068A | Trap Coil 10.5mH |
| L104,204 | 0B01434A | Peaking Coil 1.14mH |
| R101,201 | 0B05896A | Metal Film Resistor 1.8K ERO-25VK G |
| R102,202 | 0B05661A | Carbon Resistor 22K ERD-25V J |
| R103,203 | 0B01877A | Carbon Resistor 6.8K ERD-25V J |
| R104,204 | 0B01830A | Carbon Resistor 1.8K ERD-25V J |
| R114,214 | 0B05614A | Carbon Resistor 1.8K ERD-25T J |
| R117,217 | 0B05538A | Carbon Resistor 27K ERD-25V J |
| C101,201 | 0B05789A | S.P. Capacitor 47P 50V J |
| C102,202 | 0B01803A | Mylar Capacitor 3000P 50V J |
| C103,203 | 0B01804A | Mylar Capacitor 3900P 50V J |
| C104,204 | 0B01913A | Mylar Capacitor 1800P 50V J |
| C105,205 | 0B05687A | Mylar Capacitor 1200P 50V J |
| C106,206 | 0B05639A | Tantalum Capacitor 1.5μ 35V |
| C107,207 | 0B05660A | Mylar Capacitor 0.039μ 50V J |
| C108,208 | 0B05657A | Tantalum Capacitor 4.7μ 16V |
| C109,209 | 0B01289A | Ceramic Capacitor 220P 50V |
| C112,212 | 0B05681A | Mylar Capacitor 0.01μ 50V J |
| SW3 | 0B07012A | MPX Switch |
| | – 400Hz Osc. – | |
| Q301,302 | 0B01910A | Transistor 2SC900 (E) |
| Q303 | 0B01600A | FET 2SK30A (Y) |
| D301 | 0B01909A | Silicon Diode 1S1555 |
| VR203 | 0B01595A | Semi-fixed Volume 10K |
| VR301 | 0B07140A | Semi-fixed Volume 5K |
| R115 | 0B01588A | Metal Film Resistor 27K ERO-25VK G |
| R215 | 0B05661A | Carbon Resistor 22K ERD-25V J |
| R301 | 0B05669A | Carbon Resistor 180K ERD-25V J |
| R302 | 0B05538A | Carbon Resistor 27K ERD-25V J |
| R303 | 0B01830A | Carbon Resistor 1.8K ERD-25V J |
| R304 | 0B01879A | Carbon Resistor 33K ERD-25V J |
| R305 | 0B05673A | Carbon Resistor 5.6K ERD-25V J |
| R306 | 0B05596A | Carbon Resistor 220K ERD-25V J |
| R307 | 0B01789A | Carbon Resistor 330 ERD-25V J |
| R308 | 0B05826A | Carbon Resistor 11K ERD-25V J |
| R309 | 0B01782A | Carbon Resistor 2.7K ERD-25V J |
| R310 | 0B01833A | Carbon Resistor 10K ERD-25V J |
| R311 | 0B05775A | Carbon Resistor 3.3M ERD-25V J |
| R327 | 0B05601A | Carbon Resistor 1.5M ERD-25V J |
| C301,302 | 0B05582A | Mylar Capacitor 0.022μ 50V J |
| C303,304 306 | 0B01412A | Electrolytic Capacitor 10μ 16V |
| C305 | 0B01405A | Electrolytic Capacitor 1μ 16V |
| C307 | 0B01716A | Ceramic Capacitor 470P 50V |
| C308 | 0B05813A | Mylar Capacitor 0.056μ 50V J |
| | – Bias Osc. – | |
| Q304,305 | 0B01790A | Transistor 2SC496 (Y) |
| Q306 | 0B06069A | Transistor 2SB564 |
| Q307 | 0B06005A | Transistor 2SC732 (BL) |
| L301 | 0B03861A | Inductor 1.4mH |
| L302 | 0B06515A | Osc. Coil |
| VR101,102 201,202 | 0B01922A | Semi-fixed Volume 20K |
| R105,205 | 0B01888A | Carbon Resistor 10K ERD-25T J |
| R106,107 206,207 | 0B01781A | Carbon Resistor 1K ERD-25V J |
| R108,208 | 0B01833A | Carbon Resistor 10K ERD-25V J |
| R116,216 | 0B05663A | Carbon Resistor 10 ERD-25V J |
| R312, 313 | 0B01793A | Carbon Resistor 3.3K ERD-25V J |
| R314,315 | 0B05662A | Carbon Resistor 4.7 ERD-12V J |
| R316 | 0B05761A | Cement Resistor 12 5W |
| R317 | 0B00346A | Carbon Resistor 1K ERD-12V J |
| R318 | 0B01830A | Carbon Resistor 1.8K ERD-25V J |
| C110,210 | 0B01180A | Ceramic Capacitor 330P 50V |
| C309,310 311 | 0B05586A | Mylar Capacitor 0.068μ 50V K |
| C312 | 0B05634A | S.P. Capacitor 6800P 150V J |
| C313 | 0B01674A | Electrolytic Capacitor 10μ 25V |
| C314 | 0B01404A | Electrolytic Capacitor 47μ 6.3V |
| | – Miscellaneous – | |
| Q308,309 | 0B06005A | Transistor 2SC732 (BL) |
| Q310 | 0B06020A | Transistor 2SC1096 |
| D302,303 304 | 0B01909A | Silicon Diode 1S1555 |
| R109,209 | 0B01885A | Carbon Resistor 39K ERD-25V J |
| R110,210 | 0B01879A | Carbon Resistor 33K ERD-25V J |
| R111 | 0B01889A | Carbon Resistor 100K ERD-25T J |
| R112,212 | 0B01792A | Carbon Resistor 3.3K ERD-25V J |
| R113,213 | 0B05700A | Carbon Resistor 470K ERD-25V J |
| R211,320 | 0B01920A | Carbon Resistor 100K ERD-25V J |
| R319 | 0B05565A | Carbon Resistor 1.2K ERD-25V J |
| R321 | 0B05695A | Carbon Resistor 1 ERD-25V J |
| R322 | 0B05649A | Carbon Resistor 150 ERD-25V J |
| R323,324 | 0B05567A | Carbon Resistor 33 ERD-25V J |
| R325 | 0B01788A | Carbon Resistor 68 ERD-25V J |
| R326 | 0B01789A | Carbon Resistor 330 ERD-25V J |
| C111,211 | 0B01288A | Ceramic Capacitor 100P 50V |
| C315 | 0B01870A | Electrolytic Capacitor 1000μ 25V |
| C316 | 0B01391A | Electrolytic Capacitor 220μ 25V |
| C317,318 | 0B05793A | Electrolytic Capacitor 330μ 25V |
| C319 | 0B01401A | Electrolytic Capacitor 470μ 25V |
| C320 | 0B01392A | Electrolytic Capacitor 470μ 16V |
| C321 | 0B01602A | Mylar Capacitor 0.33μ 50V K |
| SW4 | BA03806A | Lever Switch Ass'y 2 (Monitor Sw.) |
| SW5 | BA03775A | Lever Switch Ass'y 4 (Dolby NR Sw.) |
| SW6,7 | BA03773A | Lever Switch Ass'y 2S (DNL, Eq. Sw.) |
| SW8 | BA03800A | Lever Switch Ass'y 4S (Tape Sw.) |
| CN1,9 | BA03807A | 10P Connector Ass'y |
| CN2,3,4 5,6,7 | BA03809A | 14P Connector Ass'y |
| CN8 | BA03808A | 19P Connector Sub Ass'y |
| TP101,102 201,202 | 0B03924A | Gate Pin |
| | 0B05107A | Separate Plug Cord E (1 pce.) |
| | 0B05108A | Separate Plug Cord F (1 pce.) |
| | 0B05171A | Osc. Cord (1 pce.) |
| | 0B08001A | Tab (1 pce.) |
| | 0B08280A | PB Amp. Shield Mylar (2 pcs.) |
| | 0E00021A | Nut Hex. M2.6 (6 pcs.) |
| | 0E00670A | Screw M2.6 x 12 Philips Pan Head (6 pcs.) |
| | 0J03080A | Connector Holder (2 pcs.) |
| | 0J03081A | Connector Stud (6 pcs.) |
| | 0J03578A | Playback Head Amp. Insulator (1 pce.) |
| | 0B05187A | Insulating Tube 1.2mm (2 pcs.) |
| | 0B07688C | Main P.C.B. 1000 |

## 8.2. Playback Dolby NR P.C.B. Ass'y

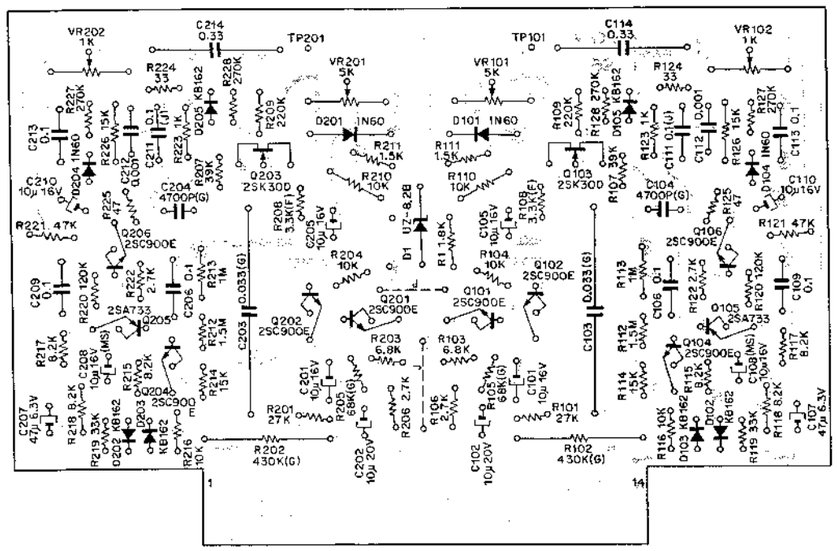



Fig. 8.2

| Schematic Ref. No. | Part No. | Description | | Schematic Ref. No. | Part No. | Description | |
|---|---|---|---|---|---|---|---|
| | BA03588A | Playback Dolby NR P.C.B. Ass'y | | R113,213 | 0B05564A | Carbon Resistor | 1M ERD-25V J |
| | 0B07522D | Playback Dolby NR P.C.B. | | R114,126 214,226 | 0B05591A | Carbon Resistor | 15K ERD-25V J |
| Q101,102 104,106 201,202 204,206 | 0B01910A | Transistor | 2SC900 (E) | R115,117 118,215 217,218 | 0B01878A | Carbon Resistor | 8.2K ERD-25V J |
| Q103,203 | 0B06001A | FET | 2SK30A (D) | R119,219 | 0B01879A | Carbon Resistor | 33K ERD-25V J |
| Q105,205 | 0B06013A | Transistor | 2SA733 | R120,220 | 0B05568A | Carbon Resistor | 120K ERD-25V J |
| D1 | 0B01808B | Zener Diode | UZ-8.2B | R121,221 | 0B05562A | Carbon Resistor | 47K ERD-25V J |
| D101,104 201,204 | 0B00030A | Germanium Diode | 1N60 (P) | R123,223 | 0B01781A | Carbon Resistor | 1K ERD-25V J |
| | | | | R124,224 | 0B05567A | Carbon Resistor | 33 ERD-25V J |
| | | | | R125,225 | 0B05569A | Carbon Resistor | 47 ERD-25V J |
| D102,103 105,202 203,205 | 0B01599A | Silicon Varistor | KB162 | R127,128 227,228 | 0B05600A | Carbon Resistor | 270K ERD-25V J |
| VR101,201 | 0B01470A | Semi-fixed Volume | 5K | C101,105 110,201 205,210 | 0B01412A | Electrolytic Capacitor | 10µ 16V |
| VR102,202 | 0B01428A | Semi-fixed Volume | 1K | | | | |
| R1 | 0B01830A | Carbon Resistor | 1.8K ERD-25V J | C102,202 | 0B05581A | Tantalum Capacitor | 10µ 20V |
| R101,201 | 0B05538A | Carbon Resistor | 27K ERD-25V J | C103,203 | 0B01786A | P.P. Capacitor | 0.033µ 50V G |
| R102,202 | 0B05536A | Metal Film Resistor | 430K ERD-25VK G | C104,204 | 0B01608A | P.P. Capacitor | 4700P 50V G |
| R103,203 | 0B01877A | Carbon Resistor | 6.8K ERD-25V J | C106,109 113,206 209,213 | 0B01603A | Mylar Capacitor | 0.1µ 50V K |
| R104,110 116,204 210,216 | 0B01833A | Carbon Resistor | 10K ERD-25V J | | | | |
| R105,205 | 0B05535A | Metal Film Resistor | 68K ERD-25VK G | C107,207 | 0B01404A | Electrolytic Capacitor | 47µ 6.3V |
| R106,122 206,222 | 0B01782A | Carbon Resistor | 2.7K ERD-25V J | C108,208 | 0B05840A | Electrolytic Capacitor | 10µ 16VM (MS) |
| | | | | C111,211 | 0B01780A | Mylar Capacitor | 0.1µ 50V J |
| R107,207 | 0B01885A | Carbon Resistor | 39K ERD-25V J | C112,212 | 0B00091A | Mylar Capacitor | 1000P 50V |
| R108,208 | 0B01585A | Metal Film Resistor | 3.3K ERD-25VK F | C114,214 | 0B01602A | Mylar Capacitor | 0.33µ 50V K |
| R109,209 | 0B05596A | Carbon Resistor | 220K ERD-25V J | TP101,201 | 0B03924A | Gate Pin | |
| R111,211 | 0B05505A | Carbon Resistor | 1.5K ERD-25V J | | 0M03345B | Playback Dolby NR Indication Label | (2 pcs.) |
| R112,212 | 0B05601A | Carbon Resistor | 1.5M ERD-25V J | | | | |

## 8.3. Record Dolby NR P.C.B. Ass'y

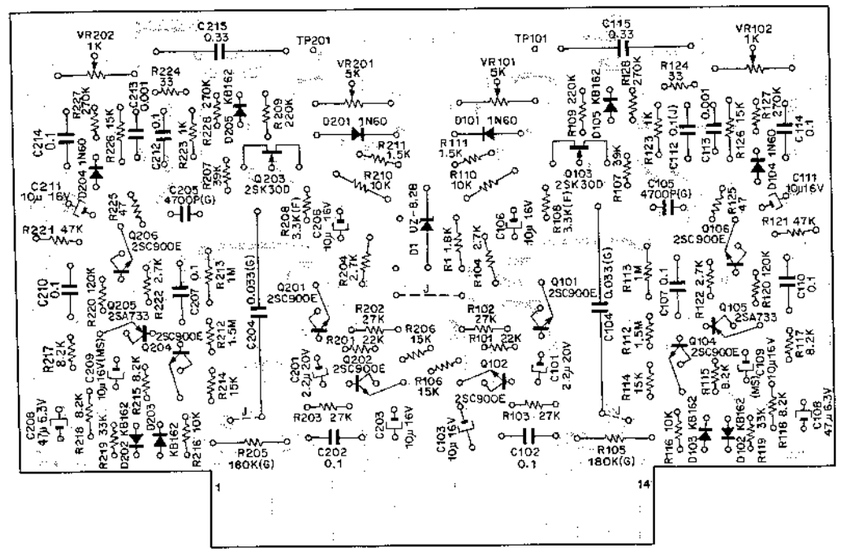



Fig. 8.3

| Schematic Ref. No. | Part No. | Description | | Schematic Ref. No. | Part No. | Description | |
|---|---|---|---|---|---|---|---|
| | **BA03589A** | **Record Dolby NR P.C.B. Ass'y** | | R111,211 | 0B05505A | Carbon Resistor | 1.5K ERD-25V J |
| | | | | R112,212 | 0B05601A | Carbon Resistor | 1.5M ERD-25V J |
| | 0B07523D | Record Dolby NR P.C.B. | | R113,213 | 0B05564A | Carbon Resistor | 1M ERD-25V J |
| Q101,102 | 0B01910A | Transistor | 2SC900 (E) | R115,117 | 0B01878A | Carbon Resistor | 8.2K ERD-25V J |
| 104,106 | | | | 118,215 | | | |
| 201,202 | | | | 217,218 | | | |
| 204,206 | | | | R119,219 | 0B01879A | Carbon Resistor | 33K ERD-25V J |
| Q103,203 | 0B06001A | FET | 2SK30A (D) | R120,220 | 0B05568A | Carbon Resistor | 120K ERD-25V J |
| Q105,205 | 0B06013A | Transistor | 2SA733 | R121,221 | 0B05562A | Carbon Resistor | 47K ERD-25V J |
| D1 | 0B01808B | Zener Diode | UZ-8.2B | R123,223 | 0B01781A | Carbon Resistor | 1K ERD-25V J |
| D101,104 | 0B00030A | Germanium Diode | 1N60 (P) | R124,224 | 0B05567A | Carbon Resistor | 33 ERD-25V J |
| 201,204 | | | | R125,225 | 0B05569A | Carbon Resistor | 47 ERD-25V J |
| D102,103 | 0B01599A | Silicon Varistor | KB162 | R127,128 | 0B05600A | Carbon Resistor | 270K ERD-25V J |
| 105,202 | | | | 227,228 | | | |
| 203,205 | | | | C101,201 | 0B05598A | Tantalum Capacitor | 2.2µ 20V |
| VR101,201 | 0B01470A | Semi-fixed Volume | 5K | C102,107 | 0B01603A | Mylar Capacitor | 0.1µ 50V K |
| VR102,202 | 0B01428A | Semi-fixed Volume | 1K | 110,114 | | | |
| R1 | 0B01830A | Carbon Resistor | 1.8K ERD-25V J | 202,207 | | | |
| R101,201 | 0B05661A | Carbon Resistor | 22K ERD-25V J | 210,214 | | | |
| R102,103 | 0B05538A | Carbon Resistor | 27K ERD-25V J | C103,106 | 0B01412A | Electrolytic Capacitor | 10µ 16V |
| 202,203 | | | | 111,203 | | | |
| R104,122 | 0B01782A | Carbon Resistor | 2.7K ERD-25V J | 206,211 | | | |
| 204,222 | | | | C104,204 | 0B01786A | P.P. Capacitor | 0.033µ 50V G |
| R105,205 | 0B01590A | Metal Film Resistor | 180K ER0-25VK G | C105,205 | 0B01608A | P.P. Capacitor | 4700P 50V G |
| R106,114 | 0B05591A | Carbon Resistor | 15K ERD-25V J | C108,208 | 0B01404A | Electrolytic Capacitor | 47µ 6.3V |
| 126,206 | | | | C109 209 | 0B05840A | Electrolytic Capacitor | 10µ 16V M (MS) |
| 214,226 | | | | C112,212 | 0B01780A | Mylar Capacitor | 0.1µ 50V J |
| R107,207 | 0B01885A | Carbon Resistor | 39K ERD-25V J | C113,213 | 0B00091A | Mylar Capacitor | 1000P 50V |
| R108,208 | 0B01585A | Metal Film Resistor | 3.3K ER0-25VK F | C115,215 | 0B01602A | Mylar Capacitor | 0.33µ 50V K |
| R109,209 | 0B05596A | Carbon Resistor | 220K ERD-25V J | TP101,201 | 0B03924B | Gate Pin | |
| R110,116 | 0B01833A | Carbon Resistor | 10K ERD-25V J | | 0M03346B | Record Dolby NR Indication Label | (1 pce.) |
| 210,216 | | | | | | | |

## 8.4. DNL P.C.B. Ass'y

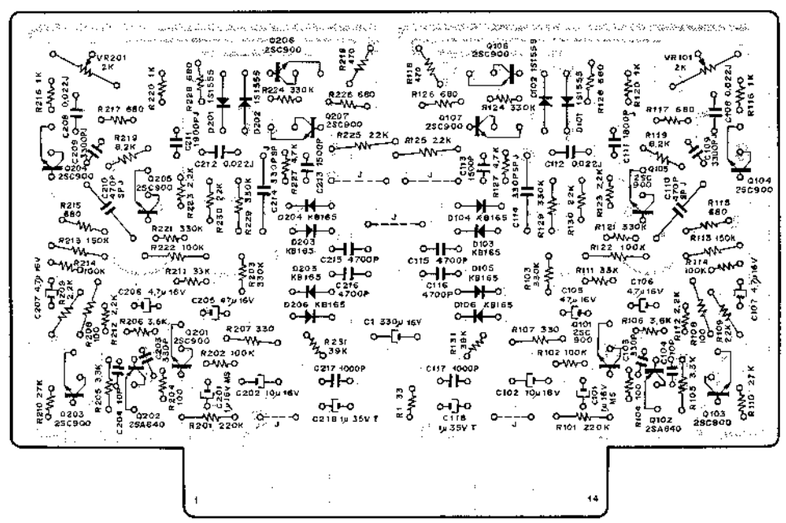


Fig. 8.4

| Schematic Ref. No. | Part No. | Description | | Schematic Ref. No. | Part No. | Description | |
|---|---|---|---|---|---|---|---|
| | **BA03880A** | **DNL P.C.B. Ass'y** | | R111,211 | 0B01879A | Carbon Resistor | 33K ERD-25V J |
| | | | | R113,213 | 0B05593A | Carbon Resistor | 150K ERD-25V J |
| | 0B07686B | DNL P.C.B. | | R115,117 | 0B05559A | Carbon Resistor | 680 ERD-25V J |
| Q101,103 | 0B01910A | Transistor | 2SC900 (E) | 126,128 | | | |
| 104,105 | | | | 215,217 | | | |
| 106,107 | | | | 226,228 | | | |
| 201,203 | | | | R116,120 | 0B01781A | Carbon Resistor | 1K ERD-25V J |
| 204,205 | | | | 216,220 | | | |
| 206,207 | | | | R118,218 | 0B01792A | Carbon Resistor | 470 ERD-25V J |
| Q102,202 | 0B06021A | Transistor | 2SA640 | R119,219 | 0B01878A | Carbon Resistor | 8.2K ERD-25V J |
| D101,102 | 0B01809A | Silicon Diode | 1S1555 | R125,130 | 0B05661A | Carbon Resistor | 22K ERD-25V J |
| 201,202 | | | | 225,230 | | | |
| D103,104 | 0B06007A | Silicon Diode | KB165 | R127,227 | 0B01795A | Carbon Resistor | 4.7K ERD-25V J |
| 105,106 | | | | R131,231 | 0B01885A | Carbon Resistor | 39K ERD-25V J |
| 203,204 | | | | C1 | 0B01502A | Electrolytic Capacitor | 330μ 16V |
| 205,206 | | | | C101,201 | 0B05853A | Electrolytic Capacitor | 1μ 16V M (MS) |
| VR101,201 | 0B05958A | Semi-fixed Volume | 2K | C102,202 | 0B01412A | Electrolytic Capacitor | 10μ 16V |
| R1 | 0B05567A | Carbon Resistor | 33 ERD-25V J | C103,203 | 0T04026A | Ceramic Capacitor | 330P 50V |
| R101,201 | 0B05596A | Carbon Resistor | 220K ERD-25V J | C104,204 | 0B05798A | Ceramic Capacitor | 10P 50V K |
| R102,114 | 0B01920A | Carbon Resistor | 100K ERD-25V J | C105,205 | 0B01403A | Electrolytic Capacitor | 47μ 16V |
| 122,202 | | | | C106,107 | 0B01389A | Electrolytic Capacitor | 4.7μ 16V |
| 214,222 | | | | 206,207 | | | |
| R103,121 | 0B01921A | Carbon Resistor | 330K ERD-25V J | C108,112 | 0B01916A | Mylar Capacitor | 0.022μ 50V J |
| 124,129 | | | | 208,212 | | | |
| 203,221 | | | | C109,209 | 0B01914A | Mylar Capacitor | 3300P 50V J |
| 224,229 | | | | C110,210 | 0B05612A | S.P. Capacitor | 470P 50V J |
| R104,108 | 0B05558A | Carbon Resistor | 100 ERD-25V J | C111,211 | 0B01913A | Mylar Capacitor | 1800P 50V J |
| 204,208 | | | | C113,213 | 0B01711A | Mylar Capacitor | 1500P 50V K |
| R105,205 | 0B01793A | Carbon Resistor | 3.3K ERD-25V J | C114,214 | 0B05611A | S.P. Capacitor | 330P 50V J |
| R106,206 | 0B05957A | Carbon Resistor | 3.6K ERD-25V J | C115,116 | 0B01915A | Mylar Capacitor | 4700P 50V K |
| R107,207 | 0B01789A | Carbon Resistor | 330 ERD-25V J | 215,216 | | | |
| R109,112 | 0B05566A | Carbon Resistor | 2.2K ERD-25V J | C117,217 | 0B00091A | Mylar Capacitor | 1000P 50V |
| 123,209 | | | | C118,218 | 0B05638A | Tantalum Capacitor | 1μ 35V |
| 212,223 | | | | | 0M03860A | DNL Label C | (1 pce.) |
| R110,210 | 0B05538A | Carbon Resistor | 27K ERD-25V J | | | | |

## 8.5. Playback Head Amp. P.C.B. Ass'y

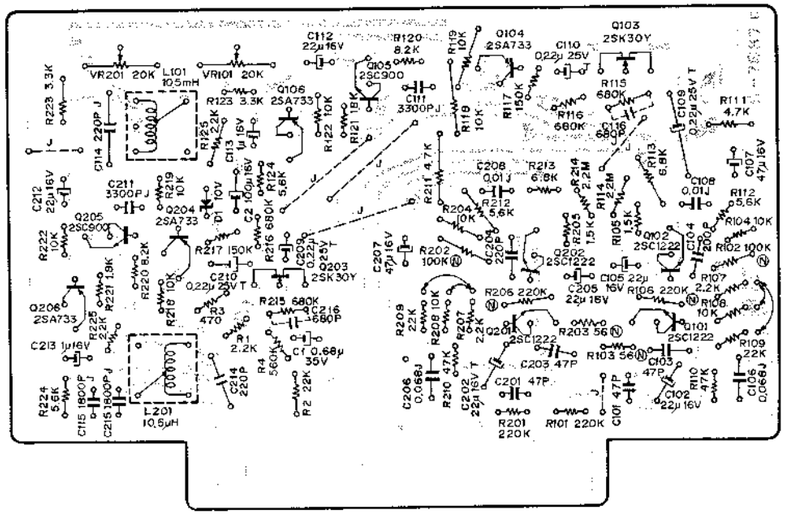



Fig. 8.5

| Schematic Ref. No. | Part No. | Description | | | Schematic Ref. No. | Part No. | Description | | |
|---|---|---|---|---|---|---|---|---|---|
| | BA03802A | Playback Head Amp. P.C.B. Ass'y | | | R112,124 212,224 | 0B05673A | Carbon Resistor | 5.6K | ERD-25V J |
| | 0B07687D | Playback Head Amp. P.C.B. | | | R113,213 | 0B01877A | Carbon Resistor | 6.8K | ERD-25V J |
| Q101,102 201,202 | 0B06062A | Transistor | 2SC1222 (2) | | R114,214 | 0B05672A | Carbon Resistor | 2.2M | ERD-25V J |
| | | | | | R115,116 215,216 | 0B05597A | Carbon Resistor | 680K | ERD-25V J |
| Q103,203 | 0B01600A | FET | 2SK30 (Y) | | R117,217 | 0B05593A | Carbon Resistor | 150K | ERD-25V J |
| Q104,106 204,206 | 0B06013A | Transistor | 2SA733 | | R120,220 | 0B01878A | Carbon Resistor | 8.2K | ERD-25V J |
| Q105,205 | 0B01910A | Transistor | 2SC900 (E) | | R121,221 | 0B01830A | Carbon Resistor | 1.8K | ERD-25V J |
| D1 | 0B06116A | Zener Diode | UZ-10B | | R123,223 | 0B01793A | Carbon Resistor | 3.3K | ERD-25V J |
| L101,201 | 0B00068A | Trap Coil | 10.5mH | | C1 | 0B05773A | Tantalum Capacitor | 0.68μ | 35V |
| VR101,201 | 0B01922A | Semi-fixed Volume | 20K | | C2 | 0B01400A | Electrolytic Capacitor | 100μ | 16V |
| R1 107,125 207,225 | 0B05566A | Carbon Resistor | 2.2K | ERD-25V J | C101,103 201,203 | 0B01456A | Ceramic Capacitor | 47P | 50V |
| | | | | | C102,202 | 0B05636A | Tantalum Capacitor | 22μ | 16V |
| R2 109,209 | 0B05661A | Carbon Resistor | 22K | ERD-25V J | C104,204 | 0B01289A | Ceramic Capacitor | 220P | 50V |
| | | | | | C105,112 205,212 | 0B01862A | Electrolytic Capacitor | 22μ | 16V |
| R3 | 0B01792A | Carbon Resistor | 470 | ERD-25V J | C106,206 | 0B05682A | Mylar Capacitor | 0.068μ | 50V J |
| R4 | 0B05665A | Carbon Resistor | 560K | ERD-25V J | C107,207 | 0B01403A | Electrolytic Capacitor | 47μ | 16V |
| R101,201 | 0B05596A | Carbon Resistor | 220K | ERD-25V J | C108,208 | 0B05681A | Mylar Capacitor | 0.01μ | 50V J |
| R102,202 | 0B01931A | Carbon Resistor (Noiseless) | 100K | ERD-14VS J | C109,110 209,210 | 0B05772A | Tantalum Capacitor | 0.22μ | 25V |
| R103,203 | 0B05642A | Carbon Resistor (Noiseless) | 56 | ERD-14VS J | C111,211 | 0B01914A | Mylar Capacitor | 3300P | 50V J |
| R104,108 118,119 122,204 208,218 219,222 | 0B01833A | Carbon Resistor | 10K | ERD-25V J | C113,213 | 0B01405A | Electrolytic Capacitor | 1μ | 16V |
| | | | | | C114,214 | 0B05532A | S.P. Capacitor | 220P | 50V J |
| | | | | | C115,215 | 0B01913A | Mylar Capacitor | 1800P | 50V J |
| | | | | | C116,216 | 0T04027A | Ceramic Capacitor | 680P | 50V |
| | | | | | | 0M03713A | Playback Head Amp. Label B (1 pce.) | | |
| R105,205 | 0B05505A | Carbon Resistor | 1.5K | ERD-25V J | | | | | |
| R106,206 | 0B05517A | Carbon Resistor (Noiseless) | 220K | ERD-14VS J | | | | | |
| R110,210 | 0B05562A | Carbon Resistor | 47K | ERD-25V J | | | | | |
| R111,211 | 0B01795A | Carbon Resistor | 4.7K | ERD-25V J | | | | | |

## 8.6. Line Amp. P.C.B. Ass'y

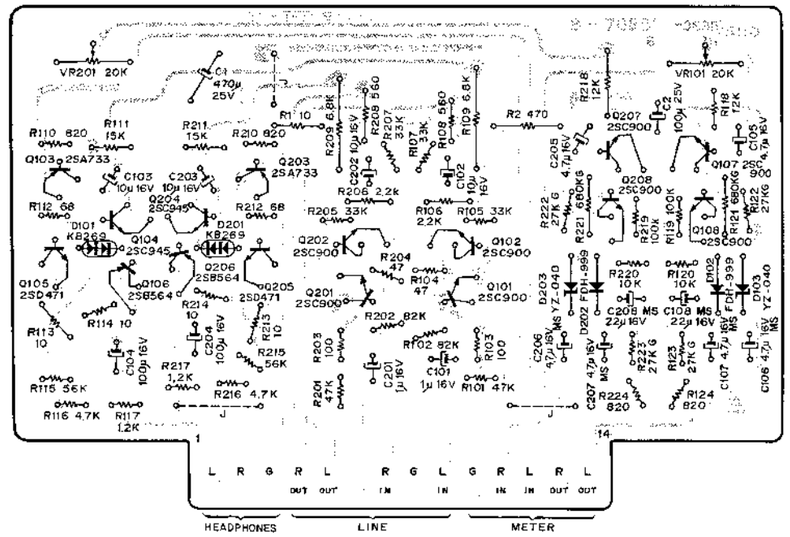



Fig. 8.6

| Schematic Ref. No. | Part No. | Description | | Schematic Ref. No. | Part No. | Description | |
|---|---|---|---|---|---|---|---|
| | BA03804A | Line Amp. P.C.B. Ass'y | | R115,215 | 0B05563A | Carbon Resistor | 56K ERD-25V J |
| | | | | R116,216 | 0B01795A | Carbon Resistor | 4.7K ERD-25V J |
| | 0B07685B | Line Amp. P.C.B. | | R117,217 | 0B05565A | Carbon Resistor | 1.2K ERD-25V J |
| Q101,102 107,108 201,202 207,208 | 0B01910A | Transistor | 2SC900 (E) | R118,218 | 0B05650A | Carbon Resistor | 12K ERD-25V J |
| | | | | R119,219 | 0B01920A | Carbon Resistor | 100K ERD-25V J |
| | | | | R120,220 | 0B01833A | Carbon Resistor | 10K ERD-25V J |
| | | | | R121,221 | 0B05822A | Carbon Resistor | 680K ER0-25VK G |
| Q103,203 | 0B06013A | Transistor | 2SA733 | R122,123 222,223 | 0B05901A | Carbon Resistor | 27K ER0-25CK G |
| Q104,204 | 0B01872A | Transistor | 2SC945 (L) | | | | |
| Q105,205 | 0B06066A | Transistor | 2SD471 | C1 | 0B01401A | Electrolytic Capacitor | 470μ 25V |
| Q106,206 | 0B06069A | Transistor | 2SB564 | C2 | 0B01272A | Electrolytic Capacitor | 100μ 25V |
| D101,201 | 0B01702A | Silicon Varistor | KB269 | C101,201 | 0B01405A | Electrolytic Capacitor | 1μ 16V |
| D102,202 | 0B06091A | Silicon Diode | FDH-999 | C102,103 202,203 | 0B01412A | Electrolytic Capacitor | 10μ 16V |
| D103,203 | 0B06063A | Zener Diode | YZ-040B | | | | |
| VR101,201 | 0B01922A | Semi-fixed Volume | 20K | C104,204 | 0B01400A | Electrolytic Capacitor | 100μ 16V |
| R1, 113,114 213,214 | 0B05663A | Carbon Resistor | 10 ERD-25V J | C105,205 | 0B01389A | Electrolytic Capacitor | 4.7μ 16V |
| | | | | C106,107 206,207 | 0B05819A | Electrolytic Capacitor | 4.7μ 16V M (MS) |
| R2 | 0B01792A | Carbon Resistor | 470 ERD-25V J | C108,208 | 0B05820A | Electrolytic Capacitor | 22μ 16V M (MS) |
| R101,201 | 0B05562A | Carbon Resistor | 47K ERD-25V J | | 0M03714A | Line Amp. Label (1 pce.) | |
| R102,202 | 0B01564A | Carbon Resistor | 82K ERD-25V J | | | | |
| R103,203 | 0B05558A | Carbon Resistor | 100 ERD-25V J | | | | |
| R104,204 | 0B05569A | Carbon Resistor | 47 ERD-25V J | | | | |
| R105,107 205,207 | 0B01879A | Carbon Resistor | 33K ERD-25V J | | | | |
| R106,206 | 0B05566A | Carbon Resistor | 2.2K ERD-25V J | | | | |
| R108,208 | 0B05678A | Carbon Resistor | 560 ERD-25V J | | | | |
| R109,209 | 0B01877A | Carbon Resistor | 6.8K ERD-25V J | | | | |
| R110,124 210,224 | 0B05511A | Carbon Resistor | 820 ERD-25V J | | | | |
| R111,211 | 0B05591A | Carbon Resistor | 15K ERD-25V J | | | | |
| R112,212 | 0B01788A | Carbon Resistor | 68 ERD-25V J | | | | |

## 8.7. MIC Amp. P.C.B. Ass'y

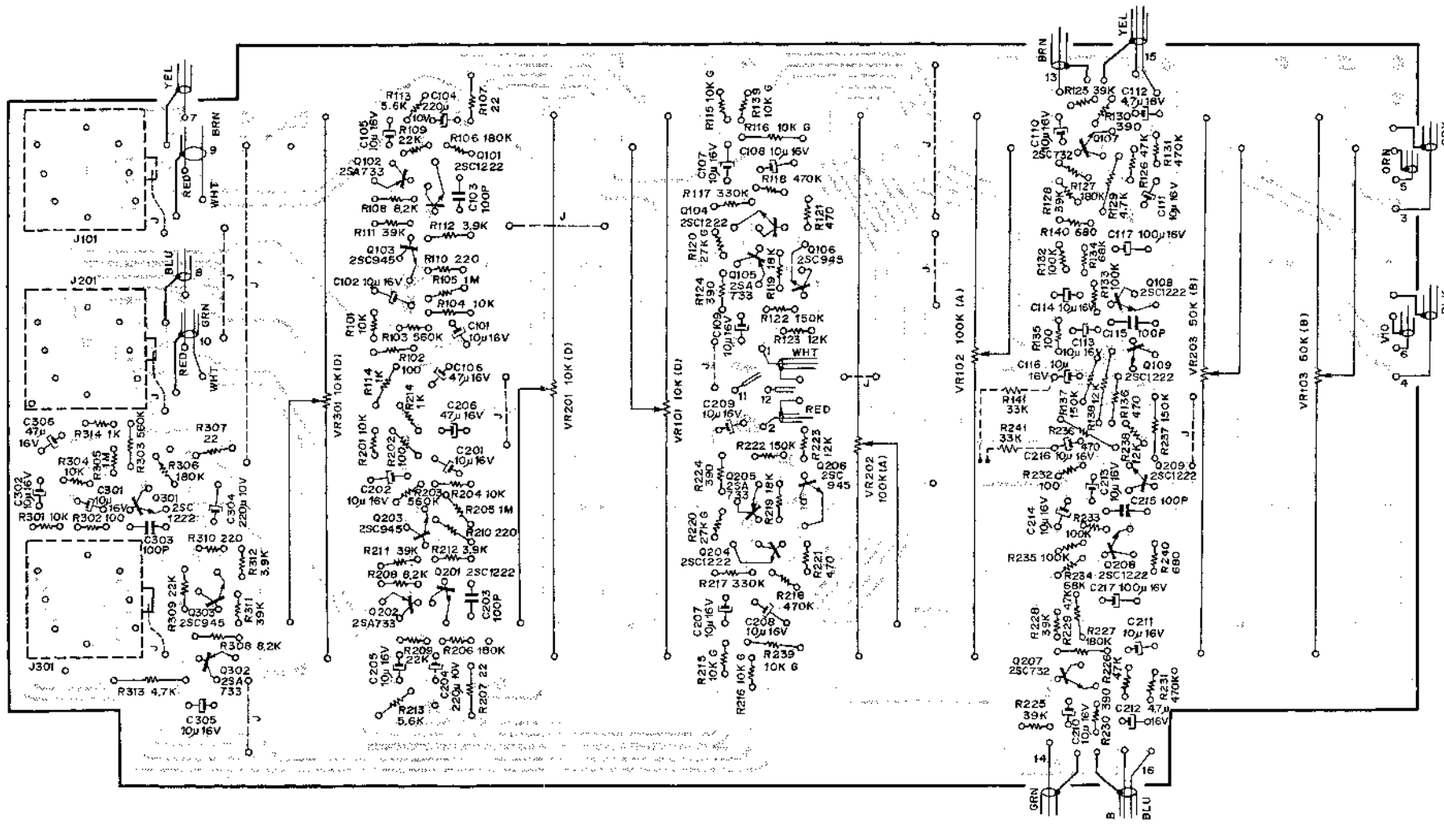


Fig. 8.7

| Schematic Ref. No. | Part No. | Description |
|---|---|---|
| | BA03805A | MIC Amp. P.C.B. Ass'y |
| | 0B07684D | MIC Amp. P.C.B. |
| Q101,104 108,109 201,204 208,209 301 | 0B06062A | Transistor 2SC1222 (2) |
| Q102,105 202,205 302 | 0B06013A | Transistor 2SA733 |
| Q103,106 203,206 303 | 0B01872A | Transistor 2SC945 (L) |
| Q107,207 | 0B06005A | Transistor 2SC732 (BL) |
| VR101,201 301 | 0B07138A | Slide Volume 10K (D) |
| VR102,202 | 0B07137A | Slide Volume 100K (A) |
| VR103,203 | 0B07139A | Slide Volume 50K (B) |
| R101,104 201,204 301,304 | 0B01833A | Carbon Resistor 10K ERD-25V J |
| R102,132 202,232 302 | 0B05558A | Carbon Resistor 100 ERD-25V J |
| R103,203 303 | 0B05665A | Carbon Resistor 560K ERD-25V J |
| R105,205 305 | 0B05564A | Carbon Resistor 1M ERD-25V J |
| R106,127 206,227 306 | 0B05669A | Carbon Resistor 180K ERD-25V J |
| R107,207 307 | 0B05606A | Carbon Resistor 22 ERD-25V J |
| R108,208 308 | 0B01878A | Carbon Resistor 8.2K ERD-25V J |
| R109,209 309 | 0B05661A | Carbon Resistor 22K ERD-25V J |
| R110,210 310 | 0B05608A | Carbon Resistor 220 ERD-25V J |
| R111,125 128,211 225,228 311 | 0B01885A | Carbon Resistor 39K ERD-25V J |
| R112,212 312 | 0B05664A | Carbon Resistor 3.9K ERD-25V J |
| R113,213 | 0B05673A | Carbon Resistor 5.6K ERD-25V J |
| R114,214 314 | 0B01781A | Carbon Resistor 1K ERD-25V J |
| R115,116 139,215 216,239 | 0B05895A | Metal Film Resistor 10K ER0-25VK G |
| R117,217 | 0B01921A | Carbon Resistor 330K ERD-25V J |
| R118,131 218,231 | 0B05700A | Carbon Resistor 470K ERD-25V J |
| R119,219 | 0B05561A | Carbon Resistor 18K ERD-25V J |
| R120,220 | 0B01588A | Metal Film Resistor 27K ER0-25VK G |
| R121,136 221,236 | 0B01792A | Carbon Resistor 470 ERD-25V J |
| R122,137 222,237 | 0B05593A | Carbon Resistor 150K ERD-25V J |
| R123,138 223,238 | 0B05650A | Carbon Resistor 12K ERD-25V J |
| R124,130 224,230 | 0B05688A | Carbon Resistor 390 ERD-25V J |
| R126,226 | 0B05562A | Carbon Resistor 47K ERD-25V J |
| R129,229 313 | 0B01795A | Carbon Resistor 4.7K ERD-25V J |
| R133,135 233,235 | 0B01920A | Carbon Resistor 100K ERD-25V J |
| R134,234 | 0B01902A | Carbon Resistor 68K ERD-25V J |
| R140,240 | 0B05559A | Carbon Resistor 680 ERD-25V J |
| R141,241 | 0B01879A | Carbon Resistor 33K ERD-25V J |
| C101,102 105,107 108,109 110,111 113,114 116,201 202,205 207,208 209,210 | 0B01412A | Electrolytic Capacitor 10μ 16V |
| 211,213 214,216 301,302 305 | 0B01412A | Electrolytic Capacitor 10μ 16V |
| C103,115 203,215 303 | 0B01288A | Ceramic Capacitor 100P 50V |
| C104,204 304 | 0B05899A | Electrolytic Capacitor 220μ 10V |
| C106,206 306 | 0B01403A | Electrolytic Capacitor 47μ 16V |
| C112,212 | 0B01389A | Electrolytic Capacitor 4.7μ 16V |
| C117,217 | 0B01400A | Electrolytic Capacitor 100μ 16V |

### 8.8. Record Eq. Amp. P.C.B. Ass'y

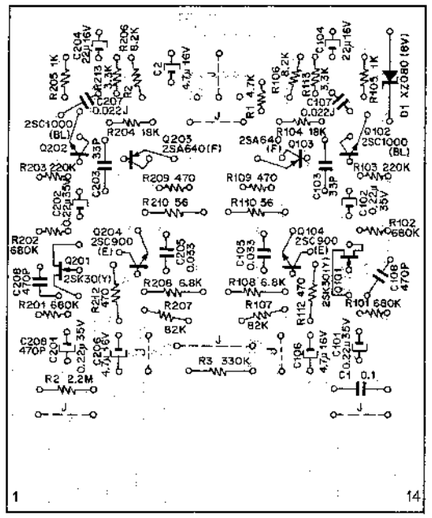



Fig. 8.8

### 8.9. Record Cal. P.C.B. Ass'y

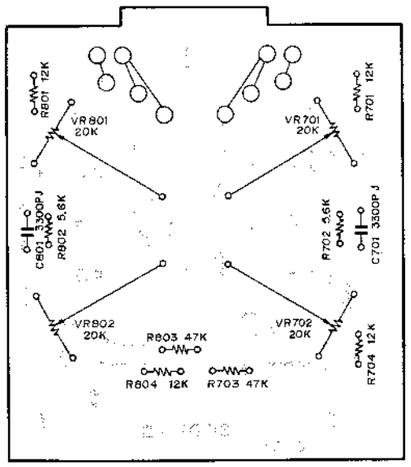


Fig. 8.9

### 8.10. Capstan Motor Governor P.C.B. Ass'y

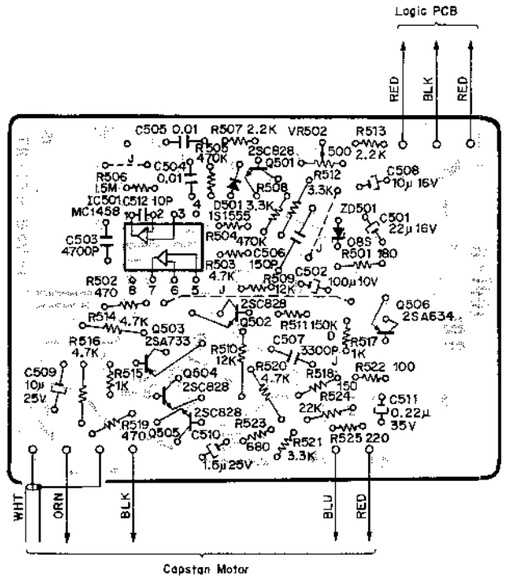



Fig. 8.10

### 8.11. Reel Motor Governor P.C.B. Ass'y

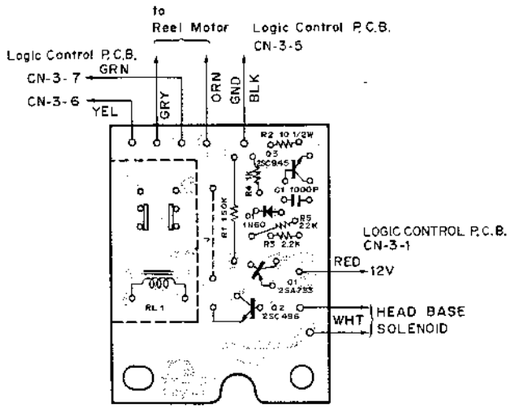



Fig. 8.11

| Schematic Ref. No. | Part No. | Description | Schematic Ref. No. | Part No. | Description |
|---|---|---|---|---|---|
| | BA03645B | **Record Eq. Amp. P.C.B. Ass'y** | R507,513 | 0B05566A | Carbon Resistor 2.2K ERD-25V J |
| | | | R508,512 | 0B01793A | Carbon Resistor 3.3K ERD-25V J |
| | 0B07585E | Record Eq. Amp. P.C.B. | 521 | | |
| Q101,201 | 0B01600A | FET 2SK30 (Y) | R509,510 | 0B05650A | Carbon Resistor 12K ERD-25V J |
| Q102,202 | 0B06003A | Transistor 2SC1000 (BL) | R511 | 0B05628A | Metal Film Resistor 150K ERD-25VK D |
| Q103,203 | 0B06021A | Transistor 2SA640 (F) | R515,517 | 0B01781A | Carbon Resistor 1K ERD-25V J |
| Q104,204 | 0B01910A | Transistor 2SC900 (E) | R518 | 0B05649A | Carbon Resistor 150 ERD-25V J |
| D1 | 0B06090A | Zener Diode XZ080 8V | R522 | 0B05558A | Carbon Resistor 100 ERD-25V J |
| R1 | 0B01795A | Carbon Resistor 4.7K ERD-25V J | R523 | 0B05559A | Carbon Resistor 680 ERD-25V J |
| R2 | 0B05672A | Carbon Resistor 2.2M ERD-25V J | R524 | 0B05661A | Carbon Resistor 22K ERD-25V J |
| R3 | 0B01921A | Carbon Resistor 330K ERD-25V J | R525 | 0B05608A | Carbon Resistor 220 ERD-25V J |
| R101,102 | 0B05597A | Carbon Resistor 680K ERD-25V J | C501 | 0B01862A | Electrolytic Capacitor 22μ 16V |
| 201,202 | | | C502 | 0B05885A | Electrolytic Capacitor 100μ 10V |
| R103,203 | 0B05596A | Carbon Resistor 220K ERD-25V J | C503 | 0B01915A | Mylar Capacitor 4700P 50V |
| R104,204 | 0B05561A | Carbon Resistor 18K ERD-25V J | C504,505 | 0B01609A | Mylar Capacitor 0.01μ 50V K |
| R105,205 | 0B01781A | Carbon Resistor 1K ERD-25V J | C506 | 0B05599A | Ceramic Capacitor 150P 50V |
| R106,206 | 0B01878A | Carbon Resistor 8.2K ERD-25V J | C507 | 0B05552A | S.P. Capacitor 3300P 100V J |
| R107,207 | 0B01564A | Carbon Resistor 82K ERD-25V J | C508 | 0B01412A | Electrolytic Capacitor 10μ 16V |
| R108,208 | 0B01877A | Carbon Resistor 6.8K ERD-25V J | C509 | 0B05581A | Tantalum Capacitor 10μ 25V |
| R109,112 | 0B01792A | Carbon Resistor 470 ERD-25V J | C510 | 0B05639A | Tantalum Capacitor 1.5μ 25V M |
| 209,212 | | | C511 | 0B05772A | Tantalum Capacitor 0.22μ 35V M |
| R110,210 | 0B05587A | Carbon Resistor 56 ERD-25V J | C512 | 0B05798A | Ceramic Capacitor 10P 50V K |
| R113,213 | 0B01793A | Carbon Resistor 3.3K ERD-25V J | | 0B08069C | Heat Sink (1 pce.) |
| C1 | 0B01603A | Mylar Capacitor 0.1μ 50V K | | 0B08077B | Capstan Motor Governor P.C.B. Holder (1 pce.) |
| C2 | 0B01403A | Electrolytic Capacitor 47μ 16V | | | |
| C101,102 | 0B05772A | Tantalum Capacitor 0.22μ 35V | | 0E00071A | Fiber Washer 3mm (2 pcs.) |
| 201,202 | | | | 0E00507A | Nut Hex. M3 (1 pce.) |
| C103,203 | 0B05744A | Ceramic Capacitor 33P 50V | | 0E00510A | Screw M3 x 8 Philips Pan Head (2A) (2 pcs.) |
| C104,204 | 0B01862A | Electrolytic Capacitor 22μ 16V | | | |
| C105,205 | 0B05531A | Mylar Capacitor 0.033μ 50V K | | 0E00597A | Washer 3mm 3 x 8 x 0.5 (1 pce.) |
| C106,206 | 0B05657A | Tantalum Capacitor 4.7μ 16V | | 0E00608A | Screw M3 x 10 Philips Pan Head (3A) (1 pce.) |
| C107,207 | 0B05582A | Mylar Capacitor 0.022μ 50V J | | | |
| C108,208 | 0B01716A | Ceramic Capacitor 470P 50V | | 0E00606A | Screw M 3 x 6 Philips Pan Head (3A) (1 pce.) |
| | 0M03452A | Record Eq. Amp. Label (1 pce.) | | | |
| | BA03814A | **Record Cal. P.C.B. Ass'y** | | BA03813A | **Reel Motor Governor P.C.B. Ass'y** |
| | 0B07696B | Record Cal. P.C.B. | | 0B07695B | Reel Motor Governor P.C.B. |
| VR701,702 | 0B07153A | Semi-fixed Volume 20K | Q1 | 0B06013A | Transistor 2SA733 |
| 801,802 | | | Q2 | 0B01790A | Transistor 2SC496 |
| R701,704 | 0B05650A | Carbon Resistor 12K ERD-25V J | Q3 | 0B01872A | Transistor 2SC945 |
| 801,804 | | | D1 | 0B00030A | Germanium Diode 1N60 (P) |
| R702,802 | 0B05673A | Carbon Resistor 5.6K ERD-25V J | R1 | 0B05593A | Carbon Resistor 150K ERD-25V J |
| R703,803 | 0B05562A | Carbon Resistor 47K ERD-25V J | R2 | 0B05913A | Carbon Resistor 10 1/2W |
| C701,801 | 0B01914A | Mylar Capacitor 3300P 50V J | R3 | 0B05566A | Carbon Resistor 2.2K ERD-25V J |
| | 0B07551B | 10P Plug P.C.B. (1 pce.) | R4 | 0B01781A | Carbon Resistor 1K ERD-25V J |
| | | | R5 | 0B05661A | Carbon Resistor 22K ERD-25V J |
| | BA03662B | **Capstan Motor Governor P.C.B. Ass'y** | C1 | 0B04059A | Mylar Capacitor 1000P 50V K |
| | | | RL1 | 0B07149A | Relay DC12V MIS2 |
| | 0B07607C | Capstan Motor Governor P.C.B. | | 0J03583B | Governor Heat Sink (1 pce.) |
| IC501 | 0B06049B | IC MC1458 | | 0E00121A | Screw M2.6 x 6 Philips Pan Head (1 pce.) |
| Q501,502 | 0B01824A | Transistor 2SC828 | | | |
| 504,505 | | | | 0E00026A | Washer 2.6mm Spring (1 pce.) |
| Q503 | 0B06013A | Transistor 2SA733 | | 0E00142A | Washer 2.6mm (1 pce.) |
| Q506 | 0B06012A | Transistor 2SA634 | | 0E00612A | Screw M3 x 6 Philips Pan Head (2A) (2 pcs.) |
| D501 | 0B01909A | Silicon Diode 1S1555 | | | |
| ZD501 | 0B06004A | Zener Diode 08S | | | |
| VR502 | 0B01883A | Semi-fixed Volume 500Ω | | | |
| R501 | 0B05607A | Carbon Resistor 180 ERD-25V J | | | |
| R502,519 | 0B01792A | Carbon Resistor 470 ERD-25V J | | | |
| R503,514 | 0B01795A | Carbon Resistor 4.7K ERD-25V J | | | |
| 516, 520 | | | | | |
| R504,505 | 0B05700A | Carbon Resistor 470K ERD-25V J | | | |
| R506 | 0B05601A | Carbon Resistor 1.5M ERD-25V J | | | |

### 8.12. Shut-off Sensor P.C.B. Ass'y and Shut-off Luminous P.C.B. Ass'y

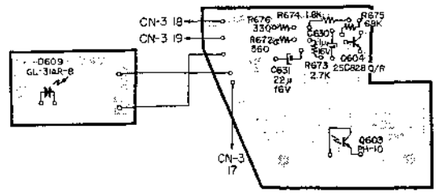



Fig 8.12

### 8.13. 400 Hz Osc. P.C.B. Ass'y

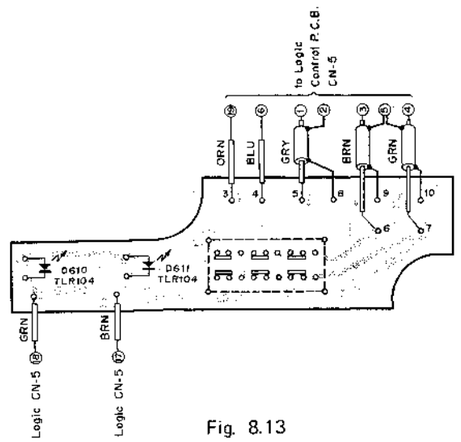



Fig. 8.13

### 8.14. Head Base Switch P.C.B. Ass'y

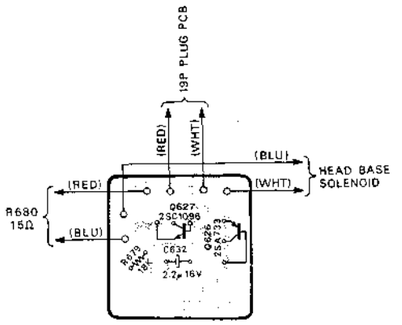



Fig. 8.14

### 8.15. Brake Solenoid P.C.B. Ass'y

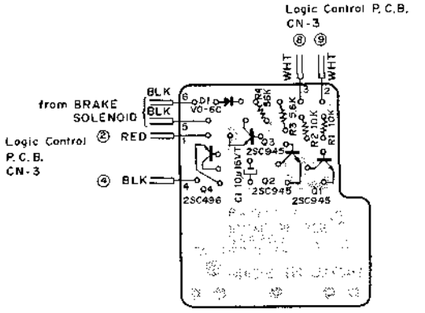



Fig. 8.15

| Schematic Ref. No. | Part No. | Description |
|---|---|---|
| | **BA03664A** | **Shut-off Sensor P.C.B. Ass'y** |
| | 0B07574C | Shut-off Sensor P.C.B. |
| Q603 | 0B06040A | Photo Transistor PH10 |
| Q604 | 0B01824A | Transistor 2SC828 |
| R672 | 0B05678A | Carbon Resistor 560 ERD-25V J |
| R673 | 0B01782A | Carbon Resistor 2.7K ERD-25V J |
| R674 | 0B01830A | Carbon Resistor 1.8K ERD-25V J |
| R675 | 0B01902A | Carbon Resistor 68K ERD-25V J |
| R676 | 0B01789A | Carbon Resistor 330 ERD-25V J |
| C630 | 0B01405A | Electrolytic Capacitor 1μ 16V |
| C631 | 0B01862A | Electrolytic Capacitor 22μ 16V |
| | **BA03663A** | **Shut-off Luminous P.C.B. Ass'y** |
| | 0B07575C | Shut-off Luminous P.C.B. |
| D609 | 0B06039A | LED (1 pce.) |
| | **BA03665B** | **400Hz Osc. P.C.B. Ass'y** |
| | 0B07571D | 400Hz Osc. P.C.B. B |
| D610,611 | 0B04120A | LED TLR104 |
| | 0B07045A | 400Hz Osc. Switch SL262A2 |

| Schematic Ref. No. | Part No. | Description |
|---|---|---|
| | **BA03666A** | **Head Base Switch P.C.B. Ass'y** |
| | 0B07578B | Head Base Switch Sub P.C.B. |
| Q626 | 0B06013A | Transistor 2SA733 |
| Q627 | 0B01895A | Transistor 2SC1096 |
| R679 | 0B05561A | Carbon Resistor 18K ERD-25V J |
| C632 | 0B05512A | Electrolytic Capacitor 2.2μ 16V |
| | **BA03836A** | **Brake Solenoid P.C.B. Ass'y** |
| | 0B07717C | Brake Solenoid P.C.B. |
| Q1,2,3 | 0B01872A | Transistor 2SC945 (L) |
| Q4 | 0B01790A | Transistor 2SC496 |
| D1 | 0B01501U | Silicon Diode V0-6C |
| R1,2 | 0B01833A | Carbon Resistor 10K ERD-25V J |
| R3 | 0B05673A | Carbon Resistor 5.6K ERD-25V J |
| R4 | 0B05563A | Carbon Resistor 56K ERD-25V J |
| C1 | 0B05667A | Tantalum Capacitor 10μ 16V M |

| Schematic Ref. No. | Part No. | Description | | Schematic Ref. No. | Part No. | Description | | |
|---|---|---|---|---|---|---|---|---|
| | **BA03688A** | **Logic Control P.C.B. Ass'y** | | R652,653 654,655 656,658 659,663 665,667 | 0B01781A | Carbon Resistor | 1K | ERD-25V J |
| | 0B07593B | Logic Control P.C.B. | | | | | | |
| L601,603 605 | 0B06041B | IC | N7400A | | | | | |
| L602,606 | 0B06042B | IC | N7410A | R660 | 0B01679A | Carbon Resistor | 100 | ERD-25T J |
| L604 | 0B06043C | IC | N7420A | R668 | 0B01877A | Carbon Resistor | 6.8K | ERD-25V J |
| L607 | 0B06044C | IC | N7474A | R670 | 0B05558A | Carbon Resistor | 100 | ERD-25V J |
| L608 | 0B06027A | IC | RC4709 | R679 | 0B05663A | Carbon Resistor | 10 | ERD-25V J |
| Q601,602 605,606 608,611 612,613 616,618 622,626 627,628 629,630 | 0B01824A | Transistor | 2SC828 | C601,602 | 0B05657A | Tantalum Capacitor | 4.7μ | 16V M |
| | | | | C603,604 | 0B01288A | Ceramic Capacitor | 100P | 50V |
| | | | | C605,606 | 0B05745A | Ceramic Capacitor | 3P | 50V |
| | | | | C607,608 | 0B05581A | Tantalum Capacitor | 10μ | 20V M |
| | | | | C609 | 0B01411A | Electrolytic Capacitor | 100μ | 6.3V |
| | | | | C610,623 | 0B01405A | Electrolytic Capacitor | 1μ | 16V |
| | | | | C611 | 0B01772A | Mylar Capacitor | 0.12μ | 50V K |
| | | | | C612 | 0B01392A | Electrolytic Capacitor | 470μ | 16V |
| Q607,609 | 0B06013A | Transistor | 2SA733 | C613 | 0B01400A | Electrolytic Capacitor | 100μ | 16V |
| Q610,614 | 0B06020A | Transistor | 2SC1096 | C614, 618 624 | 0B01412A | Electrolytic Capacitor | 10μ | 16V |
| Q615,617 619 | 0B01910A | Transistor | 2SC900 | | | | | |
| Q620,621 623,624 625 | 0B01338A | Transistor | 2SC735 | C615, 622 625 | 0B01863A | Electrolytic Capacitor | 3.3μ | 16V |
| | | | | C616, 619 | 0B01404A | Electrolytic Capacitor | 47μ | 6.3V |
| | | | | C617 | 0B01609A | Mylar Capacitor | 0.01μ | 50V K |
| D601,602 603 | 0B01501U | Silicon Diode V06C | | C620, 621 629 | 0B01862A | Electrolytic Capacitor | 22μ | 16V |
| D604,605 | 0B00030A | Germanium Diode 1N60 (P) | | C626, 628 | 0B05638A | Tantalum Capacitor | 1μ | 35V M |
| D606,607 | 0B01909A | Silicon Diode | 1S1555 | C632, 633 | 0B01603A | Mylar Capacitor | 0.1μ | 50V K |
| D608 | 0B01599A | Silicon Varistor | KB162 | C634, 635 | 0B05530A | Mylar Capacitor | 6800P | 50V K |
| ZD601 | 0B06014A | Zener Diode | 06R | C636, 637 | 0B01456A | Ceramic Capacitor | 47P | 50V |
| VR601 | 0B07058A | Semi-fixed Volume | 50K | RL601,602 | 0B07001A | Relay | LC1-C | |
| R601,602 | 0B01920A | Carbon Resistor | 100K ERD-25V J | | 0B03067A | Wiring Holder | | (2 pcs.) |
| R603,604 641,649 664,666 | 0B01833A | Carbon Resistor | 10K ERD-25V J | | 0B08001A | Tab | | (3 pcs.) |
| | | | | | 0B07535D | 19P Plug Board (D) | | (1 pce.) |
| | | | | | 0B07629B | 19P Plug Board | | (1 pce.) |
| R605,606 657 | 0B05566A | Carbon Resistor | 2.2K ERD-25V J | | 0E00174A | Earth Lug B-4 | | (1 pce.) |
| | | | | | 0E00607A | Screw M3 x 8 Philips Pan Head (3A) | | (3 pcs.) |
| R607,608 | 0B05596A | Carbon Resistor | 220K ERD-25V J | | | | | |
| R609,610 | 0B05591A | Carbon Resistor | 15K ERD-25V J | | BA03808A | 19P Connector Ass'y | | (3 pcs.) |
| R611,612 621,625 632,633 636,678 | 0B01795A | Carbon Resistor | 4.7K ERD-25V J | | 0C05157C | P.C.B. Holder A | | (2 pcs.) |
| | | | | | 0E00507A | Nut Hex. M3 | | (4 pcs.) |
| | | | | | 0E00518A | Screw M 3 x 8 Philips Flat Head | | (1 pce.) |
| | | | | | 0E00581A | Washer 3mm Spring | | (1 pce.) |
| R613,614 | 0B05505A | Carbon Resistor | 1.5K ERD-25V J | | 0B05110A | HP Separate Plug Cord | | (1 pce.) |
| R615,616 | 0B05691A | Carbon Resistor | 390 ERD-25T J | | | | | |
| R620,623 624,645 | 0B05661A | Carbon Resistor | 22K ERD-25V J | | | | | |
| R622 | 0B05670A | Carbon Resistor | 1.8M ERD-25V J | | **BA03858A** | **Touch Switch P.C.B. Ass'y** | | |
| R626,629 | 0B05678A | Carbon Resistor | 560 ERD-25V J | | | | | |
| R627 | 0B05565A | Carbon Resistor | 1.2K ERD-25V J | | 0B07726B | Touch Switch P.C.B. | | |
| R628, 643 651,681 682 | 0B05673A | Carbon Resistor | 5.6K ERD-25V J | Q1,2,3 4,5,6 | 0B06013A | Transistor | 2SA733 | |
| | | | | Q7,8,9 10,11,12 | 0B01872A | Transistor | 2SC945 | |
| R630,662 669 | 0B05562A | Carbon Resistor | 47K ERD-25V J | R1,2,3 4,5,6 | 0B05672A | Carbon Resistor | 2.2M | ERD-25V J |
| R631,642 650 | 0B05563A | Carbon Resistor | 56K ERD-25V J | R7 | 0B01920A | Carbon Resistor | 100K | ERD-25V J |
| R634 | 0B01830A | Carbon Resistor | 1.8K ERD-25V J | R8,9,10 | 0B05805A | Fail Safe Type Resistor | 22 | ERD-14F J |
| R635,638 648 | 0B01933A | Carbon Resistor | 220 ERD-25T J | C1 | 0B01403A | Electrolytic Capacitor | 47μ | 16V |
| | | | | | 0J03670A | Contact Spring | | (7 pcs.) |
| R637 | 0B05572A | Carbon Resistor | 470 ERD-12V J | | 0J03686B | Lamp Holder | | (1 pce.) |
| R639 | 0B01682A | Carbon Resistor | 6.8K ERD-25T J | | 0B03884A | Pilot Lamp | | (6 pcs.) |
| R640, 661 671 | 0B05608A | Carbon Resistor | 220 ERD-25V J | | BA03808A | 19P Connector Ass'y | | (1 pce.) |
| | | | | | 0B05187A | Insulating Tube 1.2mm | | (6 pcs.) |

## 8.16. Logic Control P.C.B. Ass'y

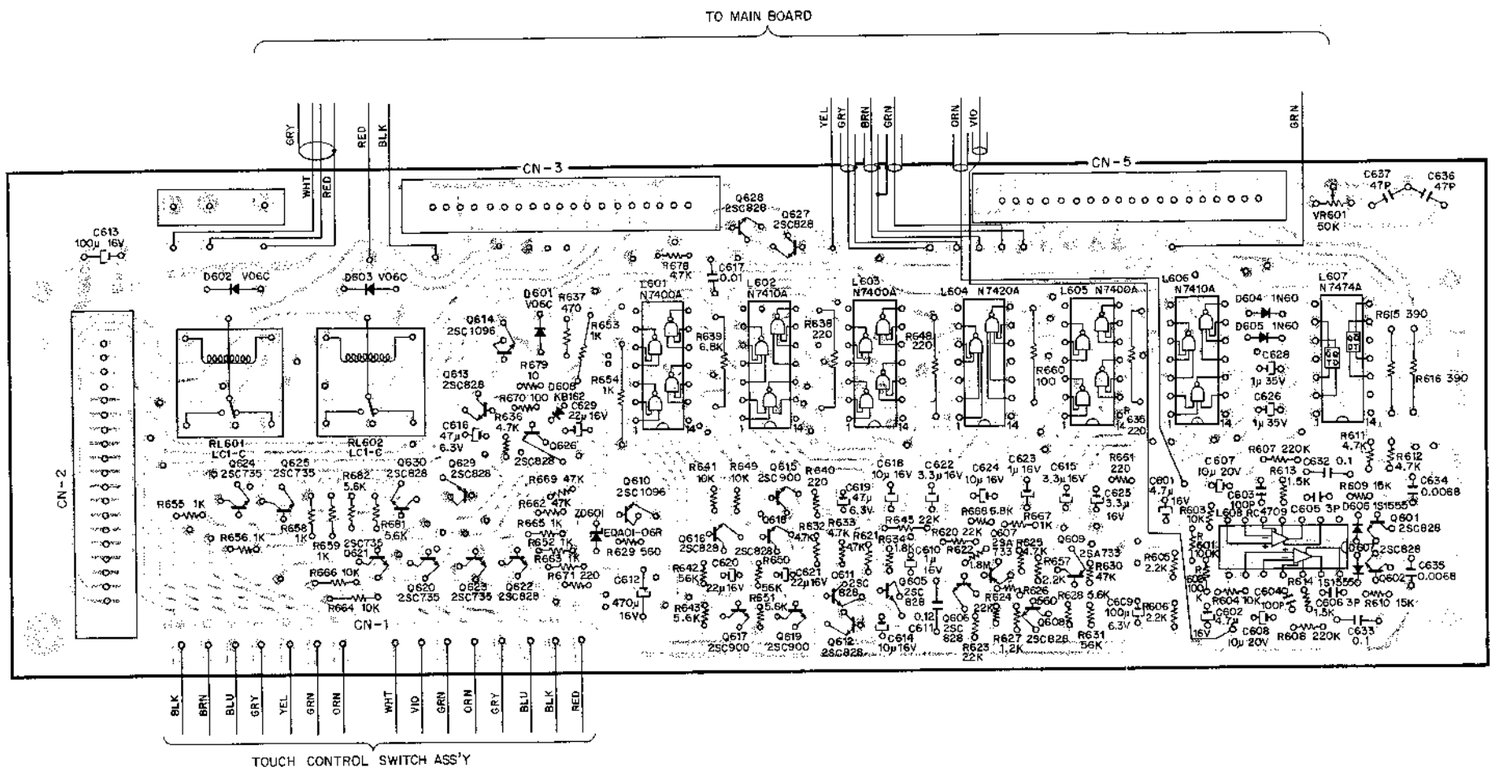



Fig. 8.16

## 8.17. Touch Switch P.C.B. Ass'y

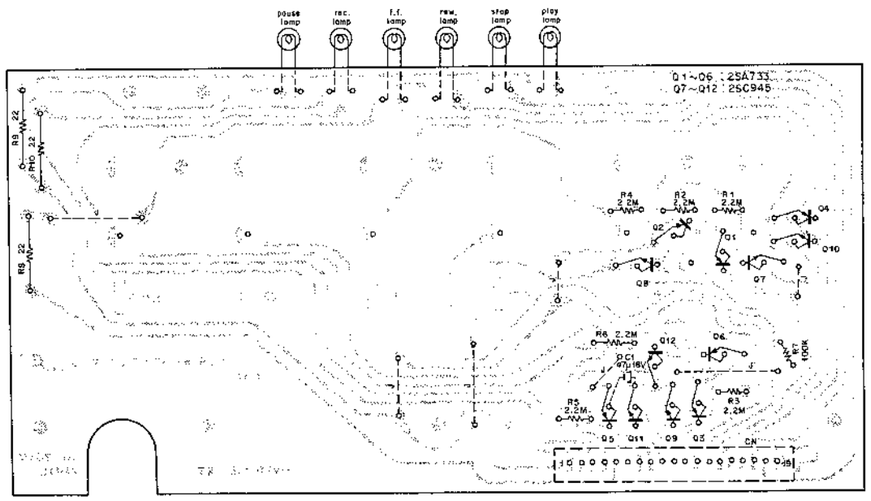



Fig. 8.17

## 8.18. DC Supply P.C.B. Ass'y

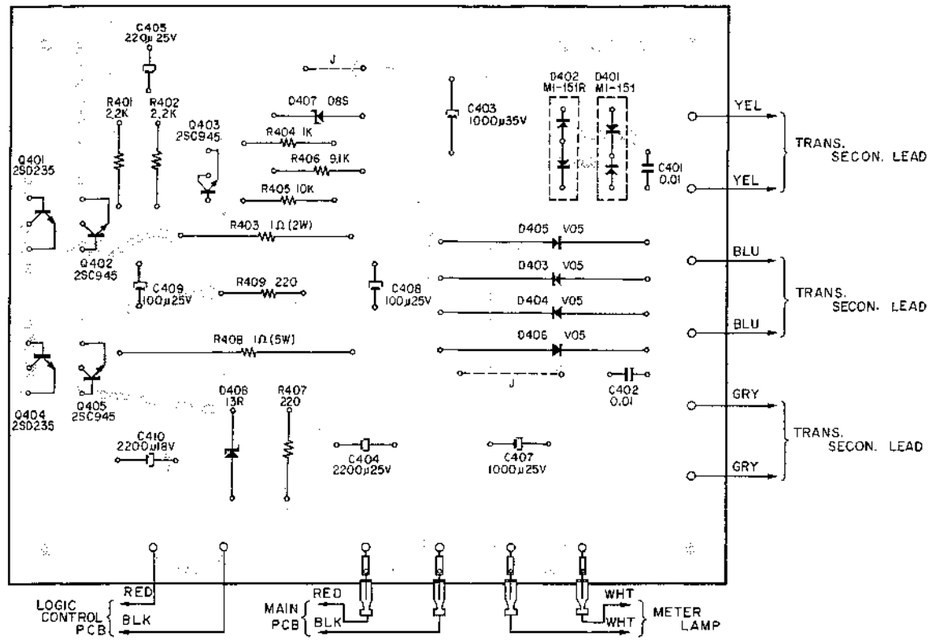



Fig. 8.18

| Schematic Ref. No. | Part No. | Description | | Schematic Ref. No. | Part No. | Description | |
|---|---|---|---|---|---|---|---|
| | BA03595A | DC Supply P.C.B. Ass'y | | | 0E00507A | Nut Hex. M3 | (4 pcs.) |
| | | | | | 0E00606A | Screw M3 x 6 Philips Pan Head (3A) | |
| | 0B07526C | DC Supply P.C.B. | | | | | (2 pcs.) |
| Q401,404 | 0B01823A | Transistor | 2SD235 | | 0E00608A | Screw M3 x 10 Philips Pan Head (3A) | |
| Q402,403 | 0B01872A | Transistor | 2SC945 | | | | (4 pcs.) |
| 405 | | | | | 0J03079D | Heat Sink | (1 pce.) |
| D401 | 0B06092U | Silicon Diode | MI-151 | | 0J03082A | Supply P.C.B. Holder | (1 pce.) |
| D402 | 0B06093U | Silicon Diode | MI-151R | | 0E00037A | B-5 Earth Lug | (1 pce.) |
| D403,404 | 0B06010A | Silicon Diode | V05 | | | | |
| 405,406 | | | | | | | |
| D407 | 0B06004A | Zener Diode | 08S | | | | |
| D408 | 0B06009A | Zener Diode | 13R | | | | |
| R401,402 | 0B05622A | Carbon Resistor | 2.2K ERD-25T J | | | | |
| R403 | 0B05755A | Metal Film Resistor | 1 2W | | | | |
| R404 | 0B01857A | Carbon Resistor | 1K ERD-25T J | | | | |
| R405 | 0B01888A | Carbon Resistor | 10K ERD-25T J | | | | |
| R406 | 0B05694A | Carbon Resistor | 9.1K ERD-25T J | | | | |
| R407,409 | 0B01933A | Carbon Resistor | 220 ERD-25T J | | | | |
| R408 | 0B05542A | Cement Resistor | 1 5W | | | | |
| C401,402 | 0B01290A | Ceramic Capacitor | 0.01μ 50V | | | | |
| C403 | 0B05540A | Electrolytic Capacitor | 1000μ 35V | | | | |
| C404 | 0B05654A | Electrolytic Capacitor | 2200μ 25V | | | | |
| C405 | 0B01391A | Electrolytic Capacitor | 220μ 25V | | | | |
| C407 | 0B01870A | Electrolytic Capacitor | 1000μ 25V | | | | |
| C408,409 | 0B01272A | Electrolytic Capacitor | 100μ 25V | | | | |
| C410 | 0B01835A | Electrolytic Capacitor | 2200μ 18V | | | | |
| | 0B08001A | Tab | (4 pcs.) | | | | |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **K1** | | **Synthesis** | |
| 01 | HA03568A | Cabinet Ass'y | 1 |
| 02 | BA03594A | DC Power Supply Ass'y | 1 |
| 03 | BA03596C | Amp. Chassis Ass'y | 1 |
| 04 | CA05213B | Mechanism Ass'y N-1000II | 1 |
| 05 | HA03704A | Touch Control Switch Ass'y | 1 |
| 06 | HA03639B | Front Panel Ass'y | 1 |
| 07 | HA03570B | Cassette Lid Ass'y | 1 |
| 08 | HA03646B | AJ Lid Ass'y | 1 |
| 09 | 0H03196B | Volume Knob | 7 |
| 10 | 0J03635A | P.C.B. Holder | 1 |
| 11 | 0J03640A | Connector Stopper D | 1 |
| 12 | BA03814A | Record Cal. P.C.B. Ass'y | 1 |
| 13 | 0J03636A | P.C.B. Holder Pad | 1 |
| L01 | 0E00606A | Screw M3x6 Philips Pan Head (3A) | 6 |
| L02 | 0E00634A | Screw M4x10 Philips Pan Head (3A) | 7 |
| L03 | 0E00667A | Screw M4x6 Philips Pan Head (2A) | 1 |
| L04 | 0E00624A | Screw M3x10 Philips Pan Head (2A) | 2 |
| L05 | 0E00660A | Screw M3x12 Philips Pan Head (3A) | 2 |
| L06 | 0H03221B | Set Screw | 4 |
| L07 | 0H03222A | Set Washer | 4 |
| L08 | 0E00046A | Washer 4mm Wave | 1 |
| L09 | 0E00587A | Screw M4x25 Philips Round Head | 1 |
| L10 | 0E00141A | Washer 4mm | 1 |

## 9. MECHANISM ASS'Y AND PARTS LIST

### 9.1. Synthesis (K1)

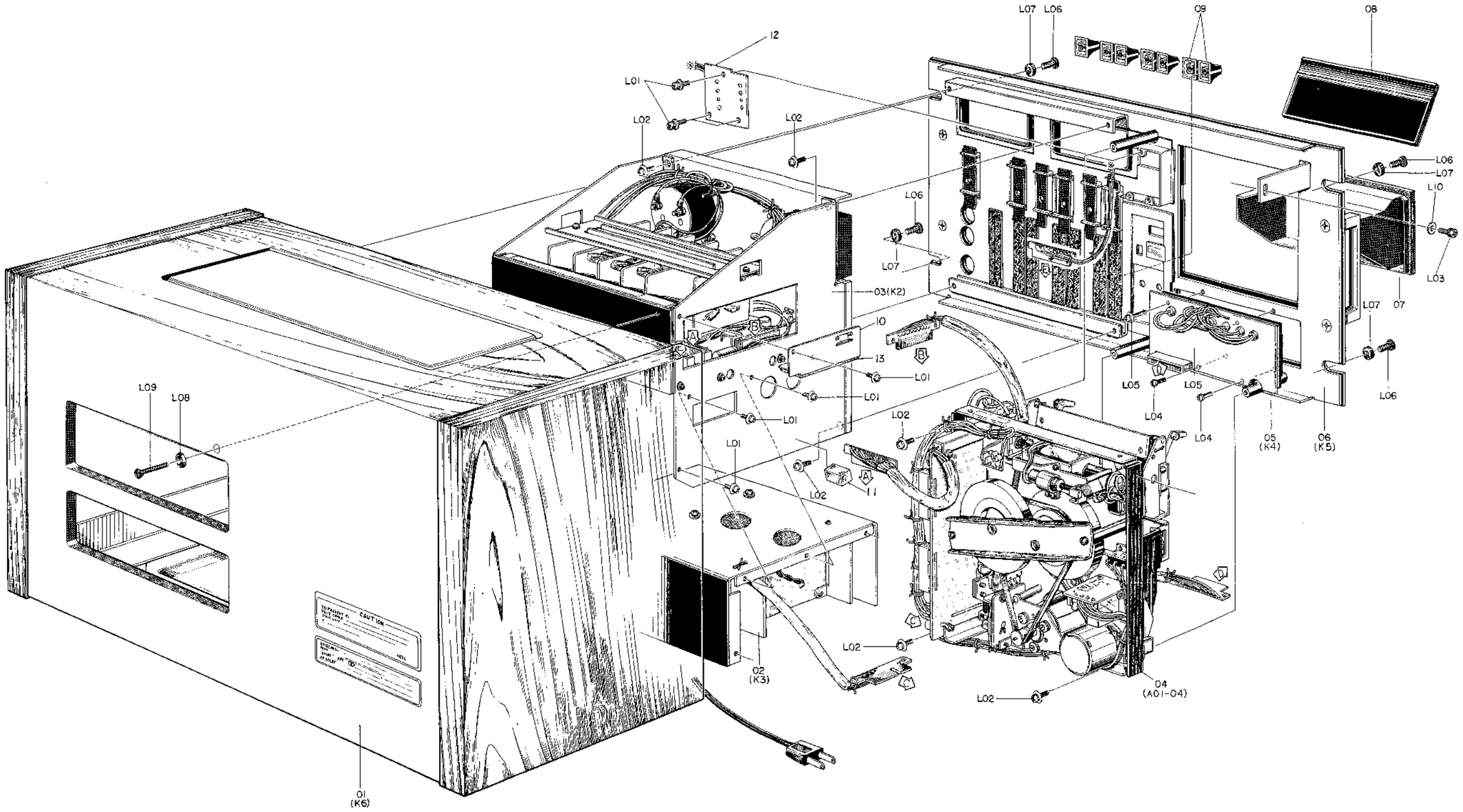



Fig. 9.1

9.2. Amp. Chassis Ass'y (K2)

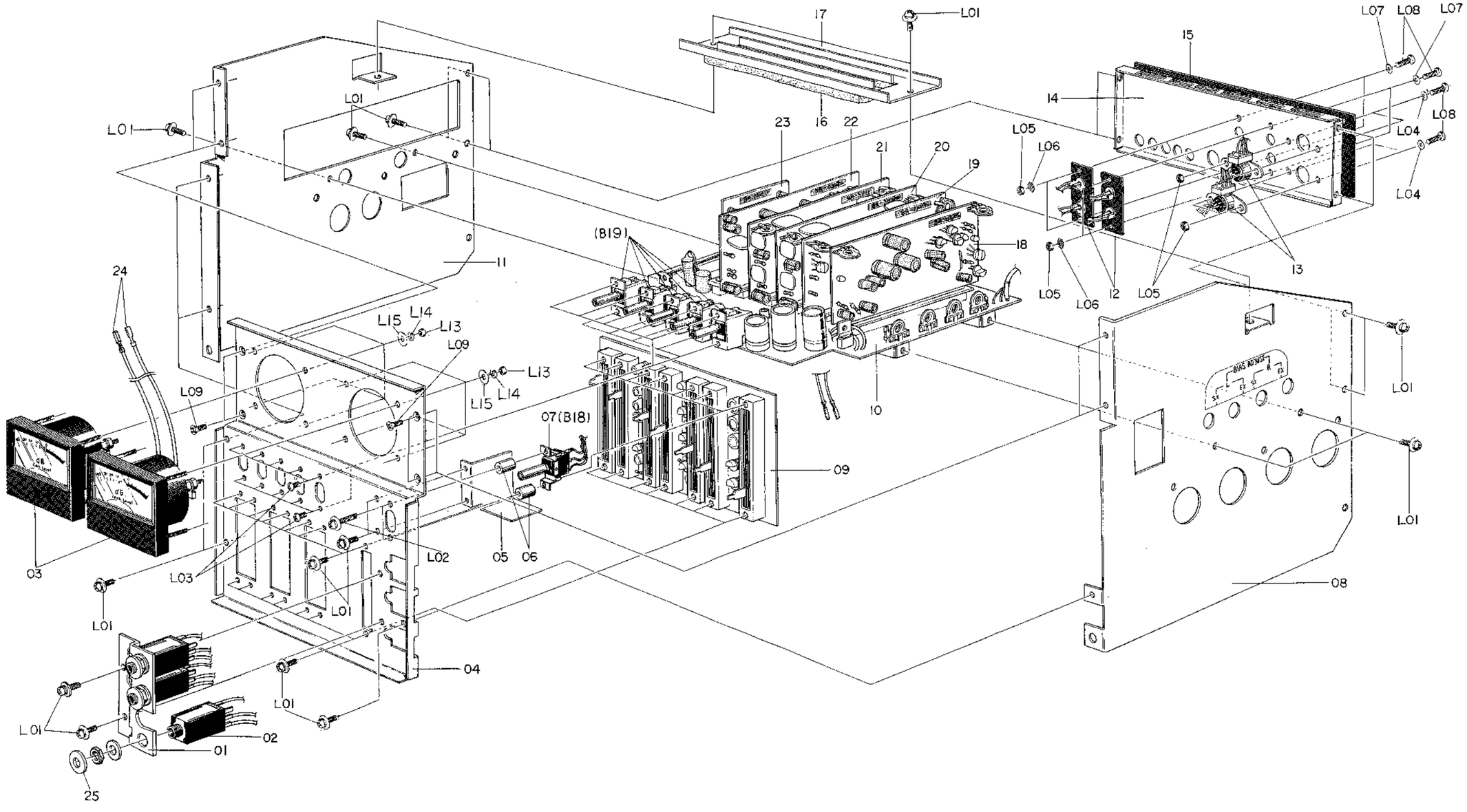



Fig. 9.2

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **K2** | **BA03596C** | **Amp. Chassis Ass'y** | **1** |
| 01 | 0J03091A | Mic. Jack Holder | 1 |
| 02 | 0B03881A | Mic. Jack | 3 |
| 03 | 0B08284A | Level Meter | 2 |
| 04 | 0J03084C | Amp. Chassis | 1 |
| 05 | 0J03092A | Power Switch Shield Plate | 1 |
| 06 | 0J03087A | Power Switch Pipe | 2 |
| 07 | BA03772A | Power Switch Ass'y | 1 |
| 08 | 0J03089G | Amp. Side Plate R | 1 |
| 09 | BA03805A | Mic. Amp. Ass'y | 1 |
| 10 | BA03881A | Main P.C.B. Ass'y | 1 |
| 11 | 0J03088H | Amp. Side Plate L | 1 |
| 12 | 0B03072A | 2P Pin Jack | 2 |
| 13 | 0B08044A | DIN Socket | 2 |
| 14 | 0J03090C | Amp. Rear Chassis | 1 |
| 15 | 0M03721A | Rear Chassis Name Plate | 1 |
| 16 | 0J03086C | P.C.B. Cushion | 2 |
| 17 | 0J03486B | P.C.B. Holder | 1 |
| 18 | BA03804A | Line Amp. P.C.B. Ass'y | 1 |
| 19 | BA03880A | DNL P.C.B. Ass'y | 1 |
| 20 | BA03589A | Record Dolby NR P.C.B. Ass'y | 1 |
| 21 | BA03588A | Playback Dolby NR P.C.B. Ass'y | 1 |
| 22 | BA03802A | Playback Head Amp. P.C.B. Ass'y | 1 |
| 23 | BA03645B | Record Eq. Amp. P.C.B. Ass'y | 1 |
| 24 | 0B05109A | Separate Plug Cord G | 2 |
| 25 | 0J03236B | Jack Cover | 3 |
| | 0M03667A | Bias Adjust Label | 1 |
| | 0M03861A | Module Label E | 1 |
| L01 | 0E00606A | Screw M3x6 Philips Pan Head (3A) | 31 |
| L02 | 0E00610A | Screw M3x12 Philips Pan Head (3A) | 2 |
| L03 | 0E00501A | Screw M3x3 Philips Pan Head | 10 |
| L04 | 0E00677A | Washer 3mm Plastics | 4 |
| L05 | 0E00507A | Nut Hex. M3 | 8 |
| L06 | 0E00172A | Washer 3mm Toothed Lock | 4 |
| L07 | 0E00157A | Washer 3mm Plastics | 4 |
| L08 | 0E00588A | Screw M3x8 Philips Pan Head | 8 |
| L09 | 0E00533A | Screw M3x5 Philips Countersunk Head | 4 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **K3** | **0B03594A** | **DC Power Supply Ass'y** | **1** |
| 01 | 0B07535D | 19P Plug P.C.B. | 1 |
| 02 | 0J03083G | Transformer Chassis | |
| 03 | 0B08062A | 7P DIN Socket | 1 |
| 04 | 0B03877B | Voltage Selector | 1 |
| 05 | 0B06513U | Power Transformer | 1 |
| 06 | 0B03920B | Ground Terminal | 1 |
| 07 | 0B08037U | Cord Bushing C | 1 |
| 08 | 0B08350A | Power Cord | 1 |
| 09 | 0H03335A | Voltage Selector Cover SO | 1 |
| 10 | 0H03366A | Voltage Selector Acrylic Cover | 1 |
| 11 | 0B08240U | Spark Killer | 1 |
| 12 | 0B03863A | 5P Terminal Insulation Plate A | 1 |
| 13 | 0B08025U | 5P Terminal Strip | 1 |
| 14 | BA03595A | DC Supply P.C.B. Ass'y | 1 |
| 15 | 0M03730C | Power Supply Name Plate | 1 |
| L01 | 0E00634A | Screw M4x10 Philips Pan Head (3A) | 4 |
| L02 | 0E00507A | Nut Hex. M3 | 5 |
| L03 | 0E00172A | Washer 3mm Toothed Lock | 3 |
| L04 | 0E00037A | Earth Lug B-5 | 1 |
| L05 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 1 |
| L06 | 0E00510A | Screw M3x8 Philips Pan Head (2A) | 2 |
| L07 | 0E00588A | Screw M3x8 Philips Pan Head (Bronze) | 2 |
| L08 | 0E00590A | Screw M3x12 Philips Pan Head (Bronze) | 2 |
| L09 | 0E00157A | Washer 3mm Plastics | 2 |
| L10 | 0E00606A | Screw M3x6 Philips Pan Head (3A) | 3 |
| L11 | 0B03067A | Wire Holder | 1 |
| L12 | 0H03366A | Voltage Selector Cover Washer | 2 |
| L13 | 0E00591A | Screw M3x10 Philips Pan Head (Bronze) | 2 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **K4** | **HA03704A** | **Touch Control Switch Ass'y** | **1** |
| 01 | BA03858A | Touch Switch P.C.B. Ass'y | 1 |
| 02 | HA03705A | Control Escutcheon Ass'y | 1 |
| L01 | 0E00195A | Screw M3x6 Philips Pan Head FT | 5 |

### 9.3. DC Power Supply Ass'y (K3)

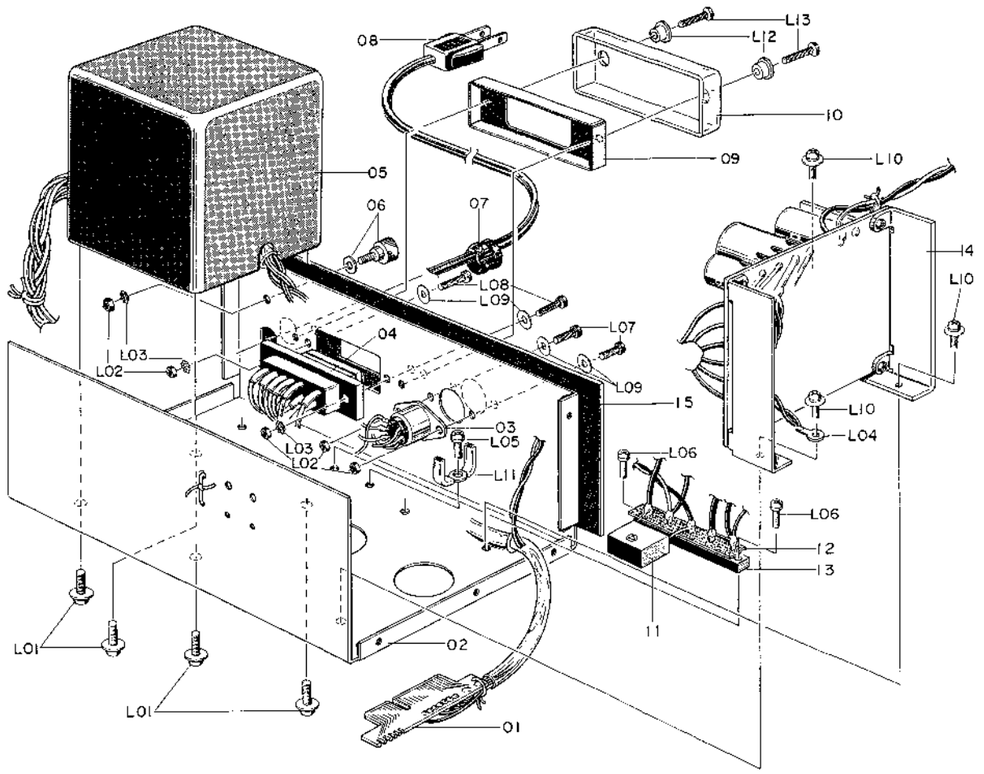



Fig. 9.3

### 9.4. Touch Control Switch Ass'y (K4)

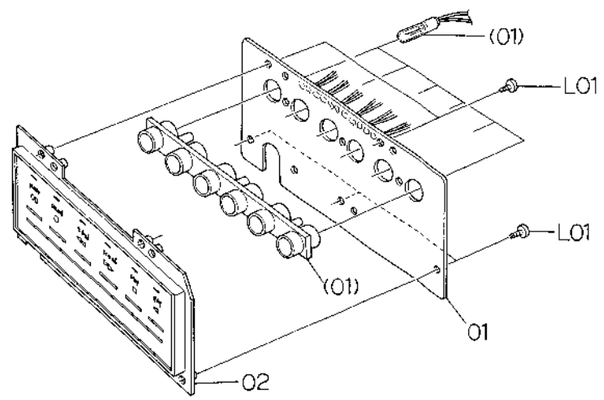



Fig. 9.4

9.5. Front Panel Ass'y (K5)

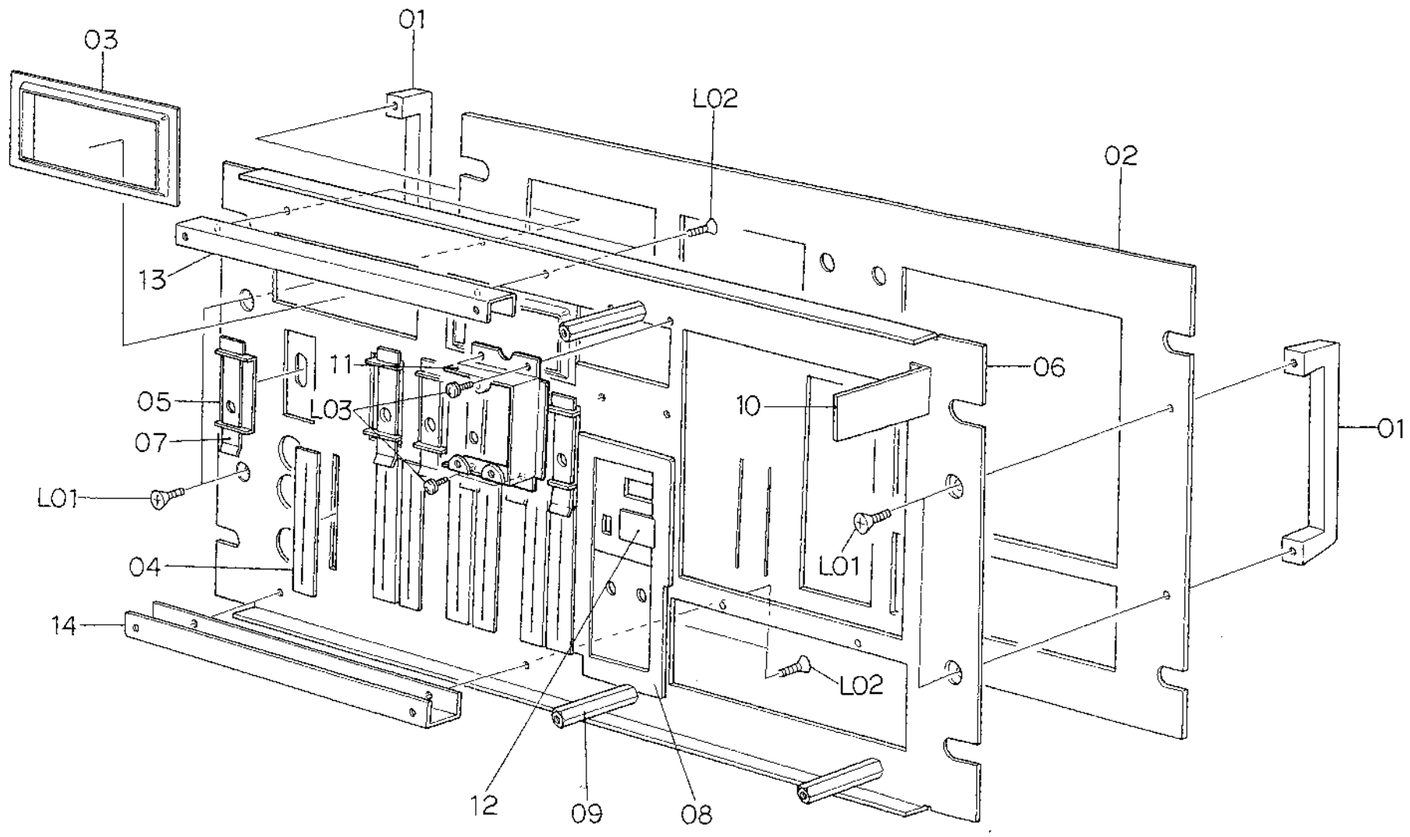



Fig. 9.5

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **K5** | **HA03639B** | **Front Panel Ass'y** | **1** |
| 01 | 0H03454A | Handle B | 2 |
| 02 | 0H03471B | Front Panel | 1 |
| 03 | 0H03203A | Meter Escutcheon | 2 |
| 04 | 0H03238A | Volume Himelon | 7 |
| 05 | 0H03195C | Switch Escutcheon | 6 |
| 06 | 0H03198H | Panel Chassis | 1 |
| 07 | 0H03284C | Switch Escutcheon Shade B | 6 |
| 08 | 0H03473A | Counter Escutcheon | 1 |
| 09 | 0H03199D | Mechanism Stud | 3 |
| 10 | 0H03200D | Mechanism Angle | 1 |
| 11 | 0J03581A | Cal. P.C.B. Holder | 1 |
| 12 | 0H03099A | Counter Lens V | 1 |
| 13 | 0H03201C | Amp. Angle A | 1 |
| 14 | 0H03202C | Amp. Angle B | 1 |
| L01 | 0E00525A | Screw M4x10 Philips Countersunk Head | 4 |
| L02 | 0E00632A | Screw M4x8 Philips Countersunk Head | 4 |
| L03 | 0E00631A | Screw M5x8 Philips Countersunk Head | 4 |
| L04 | 0E00620A | Screw M3x4 Philips Pan Head (2A) | 4 |
| **K6** | **HA03568A** | **Cabinet Ass'y** | **1** |
| 01 | 0A03130B | Aluminum Sash | 2 |
| 02 | 0A03129F | Cabinet | 1 |
| 03 | 0A03168B | Panching Board | 2 |
| 04 | 0A03132B | Cabinet Angle B | 2 |
| 05 | 0A03131B | Cabinet Angle A | 2 |
| 06 | 0A00042A | Leg | 4 |
| 07 | 0M03339A | Caution Label | 1 |
| 08 | 0M03330A | Dolby NR Label ZT | 1 |
| L01 | 0E00577A | Screw M3x20 Philips Pan Head | 4 |
| L02 | 0E00178A | Washer 3mm | 8 |
| L03 | 0E00172A | Washer 3mm Toothed Lock | 4 |
| L04 | 0E00507A | Nut Hex. M3 | 4 |
| L05 | 0E01002A | WS 2.7x10 Philips Round Head | 10 |
| L06 | 0E01005A | WS 2.7x8 Philips Round Head | 40 |
| L07 | 0E01001A | WS 3.1x10 Philips Round Head | 28 |

9.6. Cabinet Ass'y (K6)

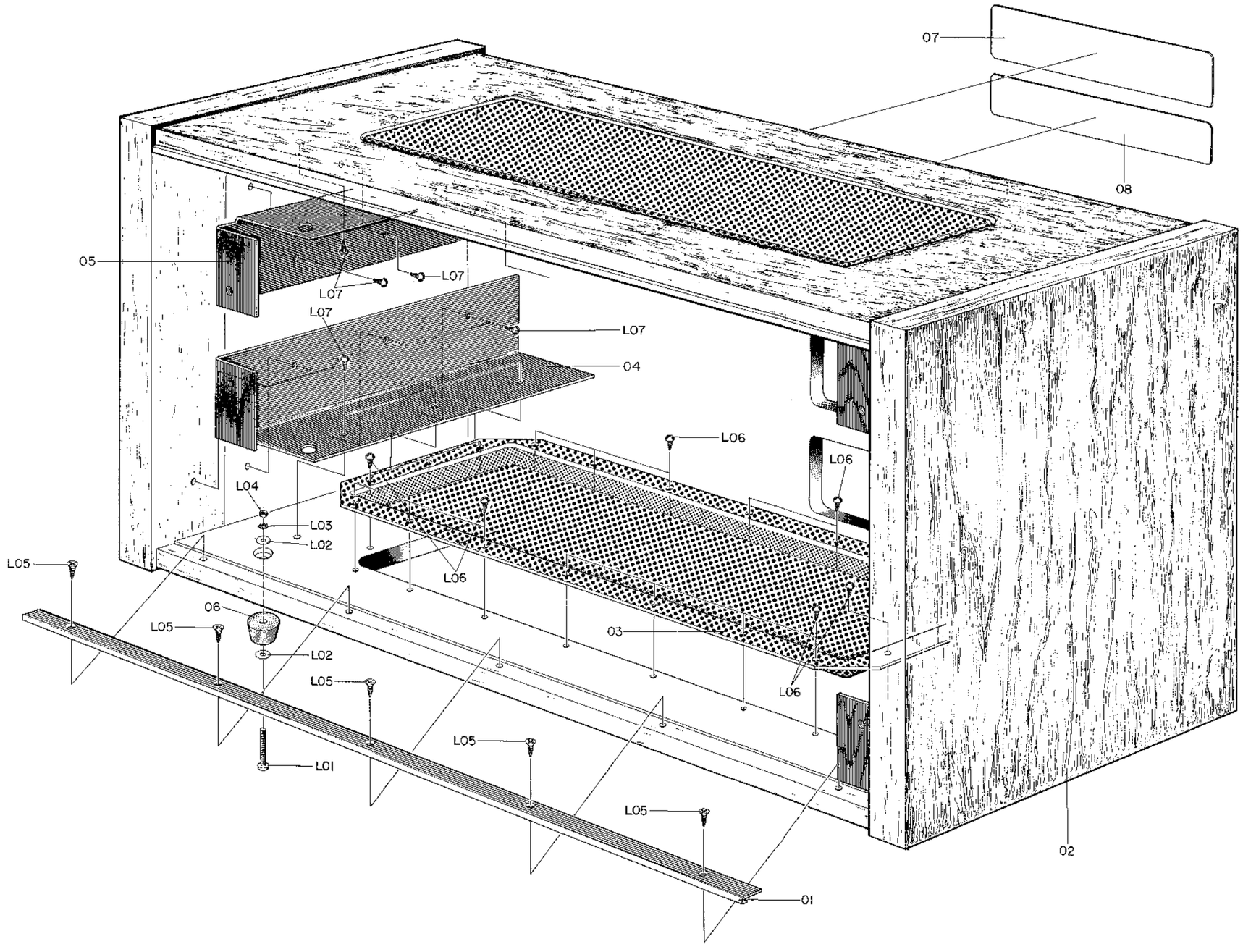



Fig. 9.6

9.7. Mechanism Ass'y N-1000II (1/4) (A01)

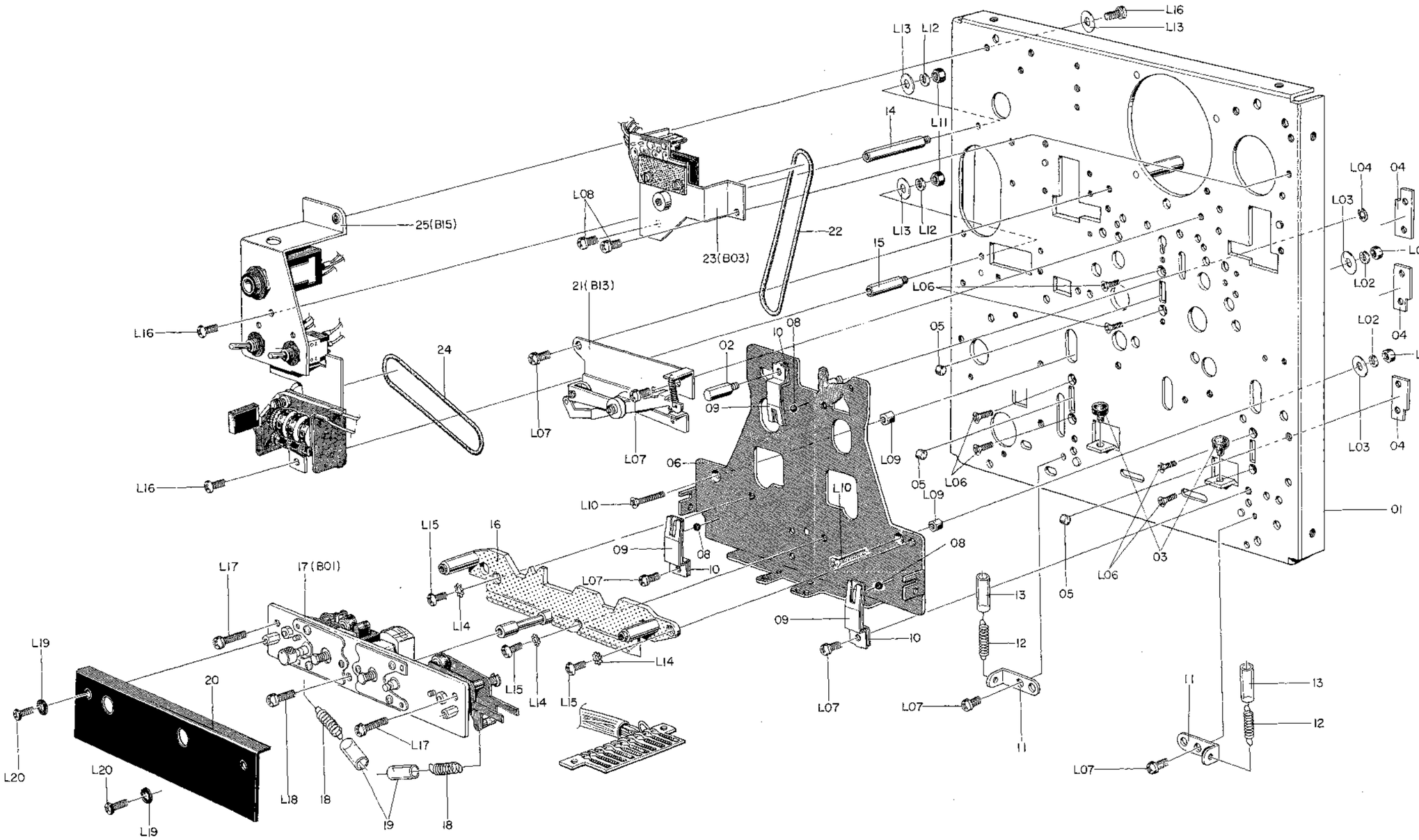
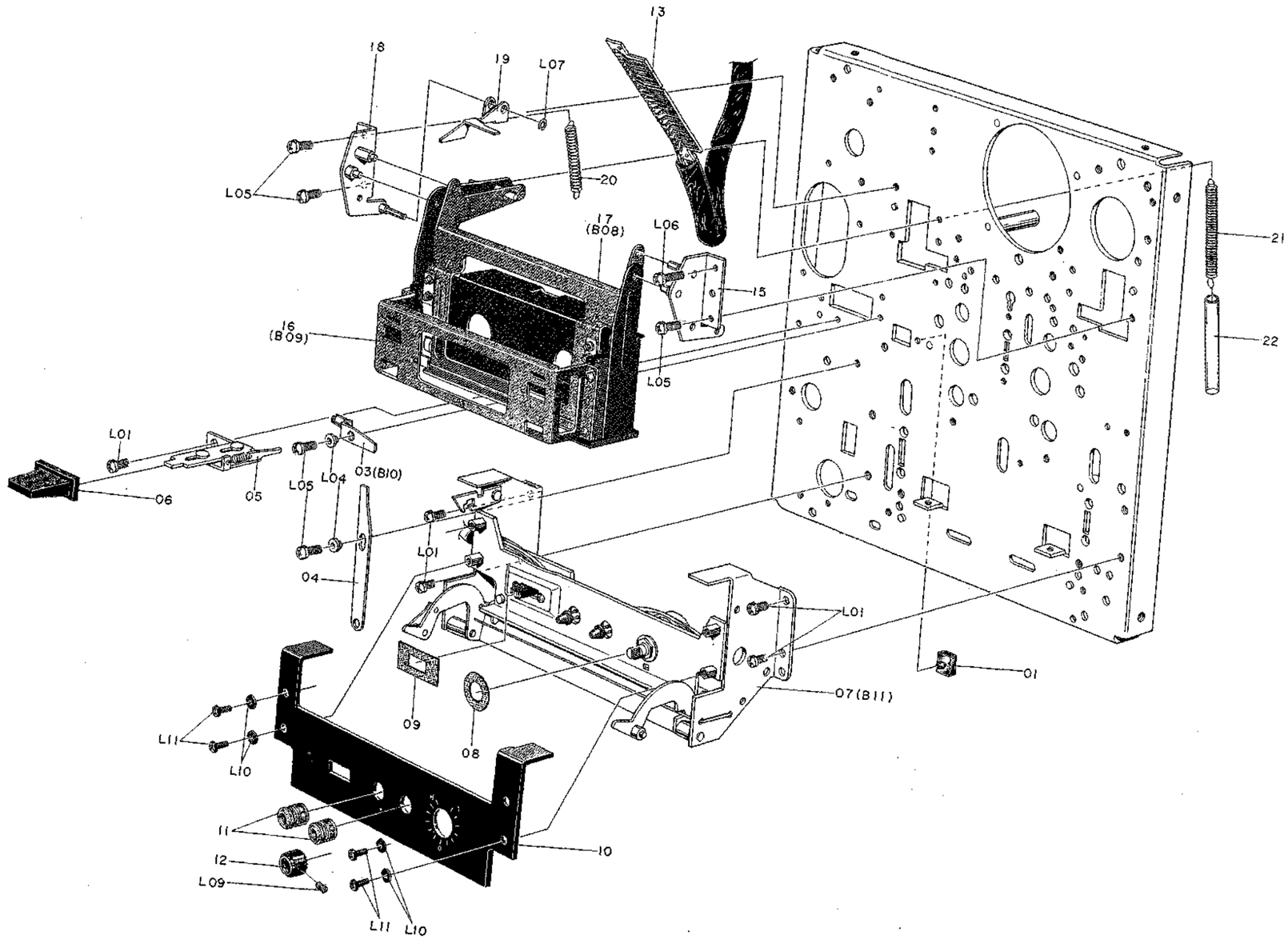



Fig. 9.7

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **A02** | **CA05213B** | **Mechanism Ass'y N-1000II (2/4)** | **1** |
| 01 | 0C05126A | Well Stopper Rubber | 1 |
| 03 | CA05172A | Eject Linkage Ass'y | 1 |
| 04 | 0C05134A | Stopper Plate | 1 |
| 05 | CA05037A | Eject Bracket Ass'y | 1 |
| 06 | 0H03194B | Eject Knob | 1 |
| 07 | CA05144B | Alignment Beacon Ass'y | 1 |
| 08 | 0H03297A | Pitch Control Volume Himelon | 1 |
| 09 | 0C05369B | Osc. Switch Himelon | 1 |
| 10 | 0C05680A | Adjust Cover | 1 |
| 11 | 0C05323B | LED Holder | 2 |
| 12 | 0H03223D | Pitch Control Knob | 1 |
| 13 | 0B07629B | 19P Plug P.C.B. (D) | 1 |
| 15 | CA05035A | Case Holder Ass'y R | 1 |
| 16 | CA05135A | Cassette Well Ass'y | 1 |
| 17 | CA05062A | Cassette Well Plate Ass'y | 1 |
| 18 | CA05034A | Case Holder Ass'y L | 1 |
| 19 | 0C05116B | Sensor Guide R | 1 |
| 20 | 0C05127A | Well Stopper Spring | 1 |
| 21 | 0C05123B | Well Spring | 1 |
| 22 | 0C05536A | Well Spring Tube | 1 |
| L01 | 0E00622A | Screw M3x5 Philips Pan Head (2A) | 5 |
| L04 | 0C05135A | Center Guide | 2 |
| L05 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 5 |
| L06 | 0E00510A | Screw M3x8 Philips Pan Head (2A) | 1 |
| L07 | 0E00222A | E-Ring 2mm | 1 |
| L09 | 0E00626A | Screw M2x3 Cup Point | 1 |
| L10 | 0E00677A | Washer 3mm Plastics | 4 |
| L11 | 0E00661A | Screw M3x4 Philips Pan Head (Bronze) | 4 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **A01** | **CA05213B** | **Mechanism Ass'y N-1000II (1/4)** | **1** |
| 01 | CA05210A | Mechanism Chassis Ass'y | 1 |
| 02 | 0C05570A | Rear Reference Shaft | 1 |
| 03 | 0C05101C | Base Stopper Rubber | 2 |
| 04 | 0C05457A | Base Roller Holder A | 3 |
| 05 | 0C05456B | Base Roller B | 3 |
| 06 | CA05002A | Head Base Ass'y | 1 |
| 08 | 0C02024A | Steel Ball 2mm | 3 |
| 09 | 0C05459A | Ball Retainer Spring B | 3 |
| 10 | 0C05030A | Ball Retainer Spring | 3 |
| 11 | 0C05032A | Spring Hook | 2 |
| 12 | 0C05426A | Base Return Spring B | 2 |
| 13 | 0C05575A | Return Spring Tube | 2 |
| 14 | 0C05319B | Counter Holder Stud | 1 |
| 15 | 0C05315B | Counter Stud B | 1 |
| 16 | CA05073A | Head Adjust Plate Ass'y | 1 |
| 17 | CA05167B | Head Mount Base D Ass'y | 1 |
| 18 | 0C05178F | Pressure Arm Spring | 2 |
| 19 | 0C05537A | Spring Tube | 2 |
| 20 | 0C05679A | Mount Base Cover | 1 |
| 21 | CA05044A | Cassette Holder Ass'y | 1 |
| 22 | 0C05465B | Shut-off Belt | 1 |
| 23 | CA05137A | Auto Shut-off Ass'y | 1 |
| 24 | 0C05139B | Counter Belt | 1 |
| 25 | CA05136A | Counter Holder Ass'y | 1 |
| L01 | 0E00021A | Nut Hex. M2.6 | 2 |
| L02 | 0E00026A | Washer 2.6mm Spring | 2 |
| L03 | 0C06295A | Washer 3-9-0.5F | 2 |
| L04 | 0E00222A | E-Ring 2mm | 1 |
| L06 | 0E00076A | Screw M2.6x4 Philips Countersunk Head | 6 |
| L07 | 0E00622A | Screw M3x5 Philips Pan Head (2A) | 6 |
| L08 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 2 |
| L09 | 0C05435B | Head Base Holder Nut B | 2 |
| L10 | 0E00056A | Screw M2.6x10 Philips Countersunk Head | 2 |
| L11 | 0E00507A | Nut Hex. M3 | 2 |
| L12 | 0E00581A | Washer 3mm Spring | 2 |
| L13 | 0E00597A | Washer 3mm | 3 |
| L14 | 0E00172A | Washer 3mm Toothed Lock | 3 |
| L15 | 0E00502A | Screw M3x5 Philips Pan Head | 3 |
| L16 | 0E00509A | Screw M3x6 Philips Pan Head | 3 |
| L17 | 0E00624A | Screw M3x10 Philips Pan Head (2A) | 2 |
| L18 | 0E00510A | Screw M3x8 Philips Pan Head (2A) | 1 |
| L19 | 0E00677A | Washer 3mm Plastics | 2 |
| L20 | 0E00661A | Screw M3x4 Philips Pan Head (Bronze) | 2 |


13
18
19
L07
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L05
17
(B08)
L06
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16
(B09)
22
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07(B11)
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L11
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L11
L10

Fig. 9.8

### 9.9. Mechanism Ass'y N-1000II (3/4) (A03)

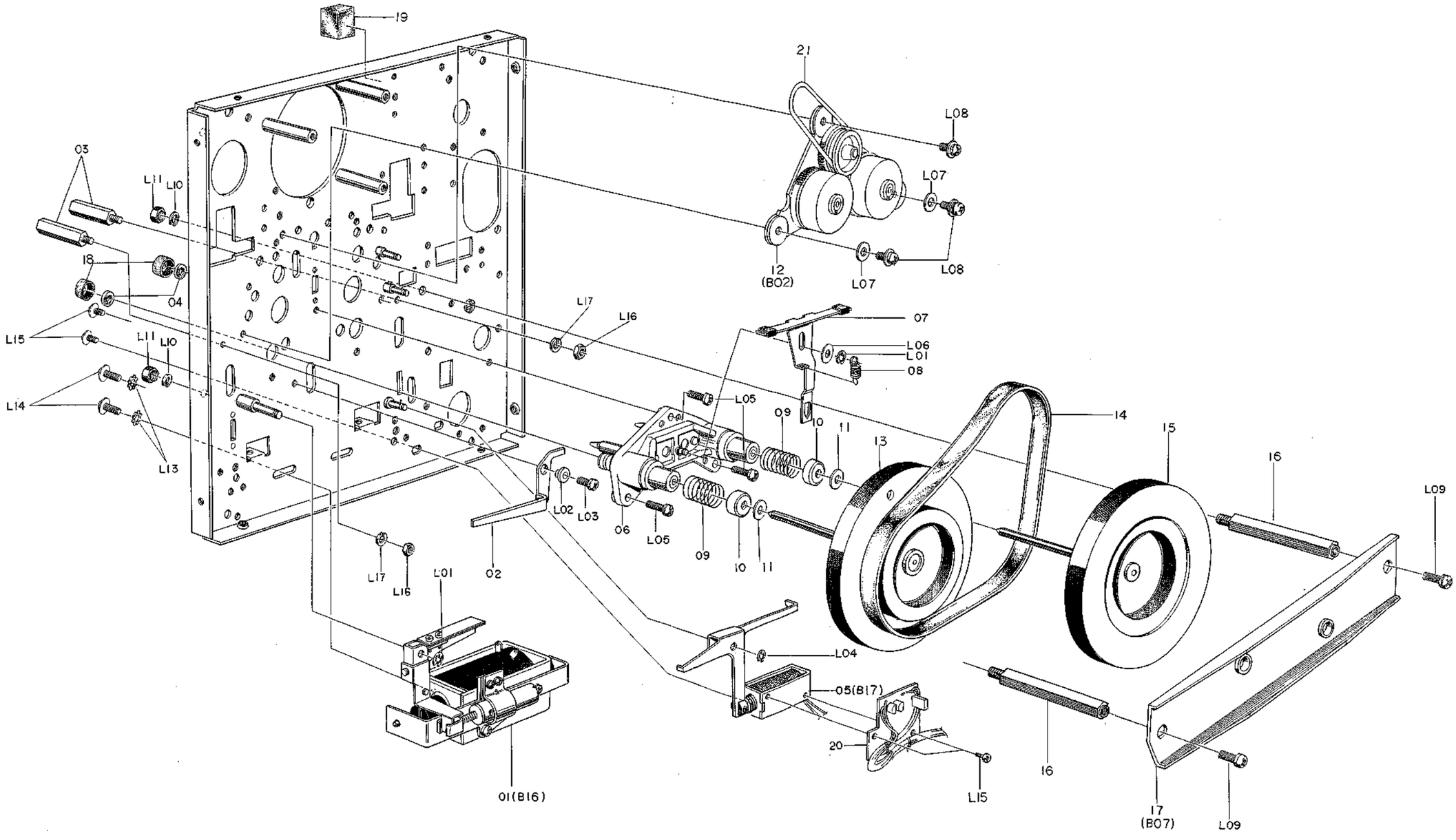



Fig. 9.9

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **A03** | **CA05213B** | **Mechanism Ass'y N-1000II (3/4)** | **1** |
| 01 | CA05145A | Head Base Solenoid Ass'y | 1 |
| 02 | 0C05100B | Base Switch Arm | 1 |
| 03 | 0C05568A | Front Reference Shaft | 2 |
| 04 | 0C05512A | Flange Felt | 2 |
| 05 | CA05053A | Brake Solenoid Ass'y | 1 |
| 06 | CA05212A | Capstan Flange Holder Ass'y D | 1 |
| 07 | CA05222A | Brake Arm Ass'y | 1 |
| 08 | 0C05084B | Brake Arm Spring | 1 |
| 09 | 0C05514B | Thrust Spring | 2 |
| 10 | 0C05495B | Flange Thrust Cap | 2 |
| 11 | 0C05552A | Flywheel Thrust Washer | 2 |
| 12 | CA05219C | Ball Drive Mechanism Ass'y | 1 |
| 13 | CA05006H | Flywheel Ass'y A | 1 |
| 14 | 0C05104A | Capstan Belt | 1 |
| 15 | CA05007G | Flywheel Ass'y B | 1 |
| 16 | 0C05496B | Flywheel Holder Stud B | 2 |
| 17 | CA05171A | Flywheel Holder Ass'y | 1 |
| 18 | 0C05511B | Flange Cap | 2 |
| 19 | 0J03639A | Connector Stopper C | 1 |
| 20 | BA03836A | Brake Solenoid P.C.B. Ass'y | 1 |
| 21 | 0C05699A | Center Drive Belt | 1 |
| L01 | 0E00181A | E-Ring 3mm | 2 |
| L02 | 0C05135A | Center Guide | 1 |
| L03 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 1 |
| L04 | 0E00222A | E-Ring 2mm | 1 |
| L05 | 0E00510A | Screw M3x8 Philips Pan Head (2A) | 3 |
| L06 | 0E00031A | Washer 4mm | 1 |
| L07 | 0E00597A | Washer 3-8-0.5 | 2 |
| L08 | 0E00607A | Screw M3x8 Philips Pan Head (3A) | 3 |
| L09 | 0E00664A | Screw M4x8 Philips Pan Head (2A) | 2 |
| L10 | 0E00574A | Washer 4mm Spring | 2 |
| L11 | 0E00669A | Nut Hex. M4 | 2 |
| L13 | 0E00172A | Washer 3mm Toothed Lock | 2 |
| L14 | 0E00614A | Screw M3x6 Philips Pan Head Triple | 2 |
| L15 | 0E00259A | Screw M2.6x4 Philips Pan Head Triple | 2 |
| L16 | 0E00507A | Nut Hex. M3 | 2 |
| L17 | 0E00581A | Washer 3mm Spring | 2 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **A04** | **CA05213B** | **Mechanism Ass'y N-1000II (4/4)** | **1** |
| 01 | 0B05754A | Cement Resistor 15Ω 10W | 1 |
| 02 | CA05132A | Base Switch Ass'y | 1 |
| 03 | CA05026A | Cassette Sensor Ass'y | 1 |
| 04 | CA05221A | Reel Motor Ass'y | 1 |
| 05 | CA05220A | Capstan Motor Ass'y | 1 |
| 06 | CA05134A | Eject Damper Bracket Ass'y | 1 |
| 07 | CA05223A | Back Tension Arm Ass'y | 1 |
| 08 | 0C05673A | Back Tension Spring | 1 |
| 09 | CA05031A | Record Sensor Ass'y | 1 |
| 10 | BA03688A | Logic Control P.C.B. Ass'y | 1 |
| 11 | 0B07629B | 19P Plug P.C.B. | 3 |
| 12 | CA05158A | Motor Cap Ass'y | 1 |
| 13 | BA03813A | Reel Motor Governor P.C.B. Ass'y | 1 |
| L01 | 0E00607A | Screw M3x8 Philips Pan Head (3A) | 1 |
| L02 | 0E00622A | Screw M3x5 Philips Pan Head (2A) | 8 |
| L03 | 0E00222A | E-Ring 2mm | 1 |
| L04 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 5 |
| L05 | 0E00510A | Screw M3x8 Philips Pan Head (2A) | 1 |
| L06 | 0E00597A | Washer 3mm | 1 |
| L07 | 0E00507A | Nut Hex. M3 | 1 |

### 9.10. Mechanism Ass'y N-1000II (4/4) (A04)

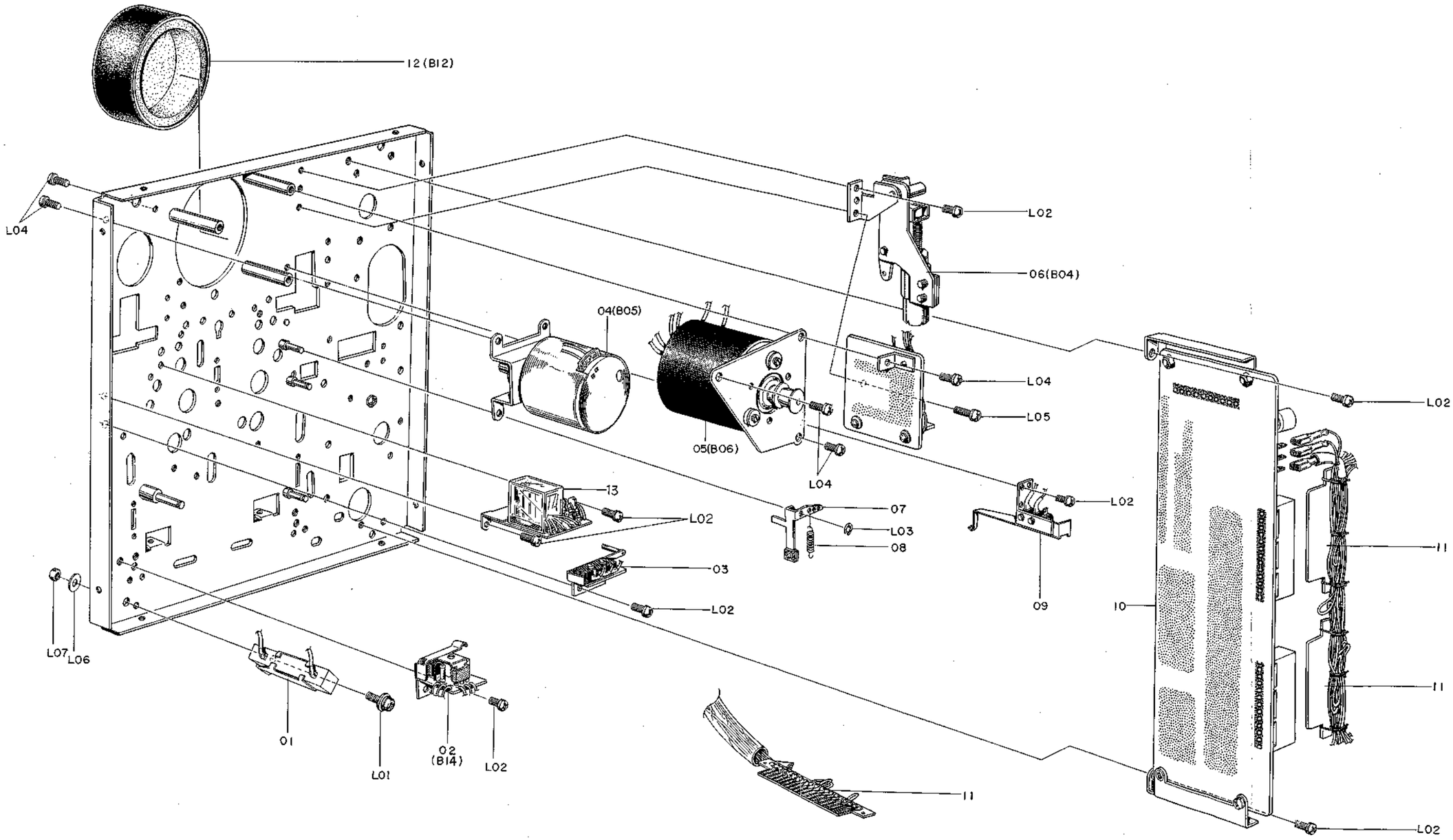



Fig. 9.10

### 9.11. Head Mount Base D Ass'y (B01)

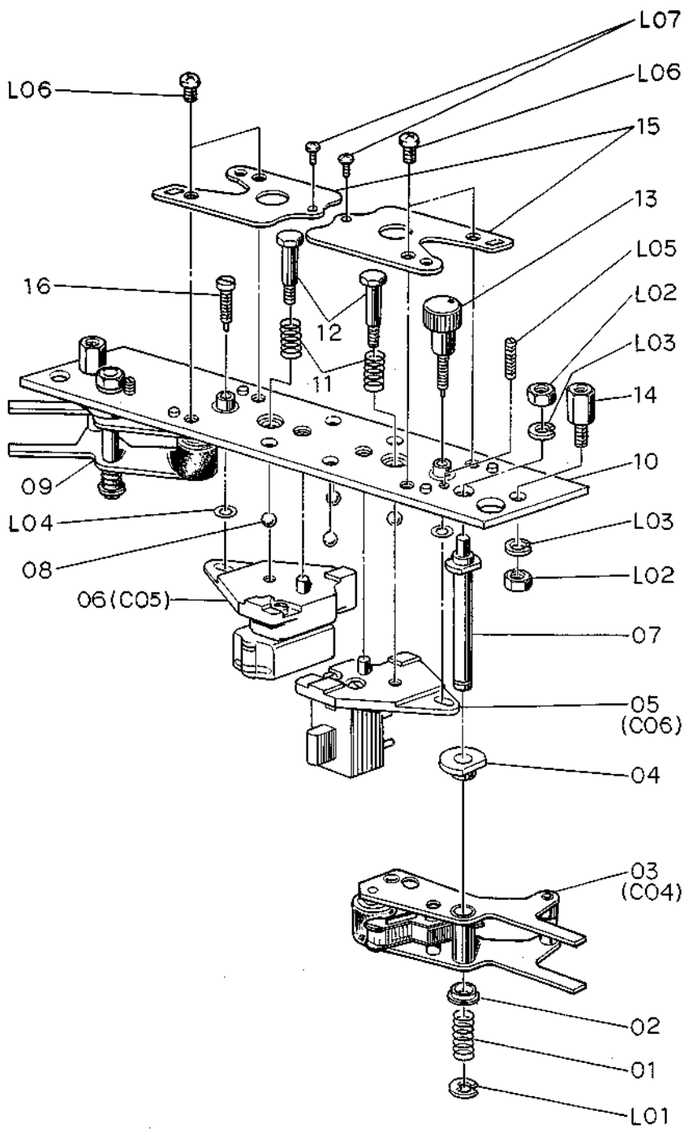



Fig. 9.11

### 9.12. Ball Drive Mechanism Ass'y (B02)

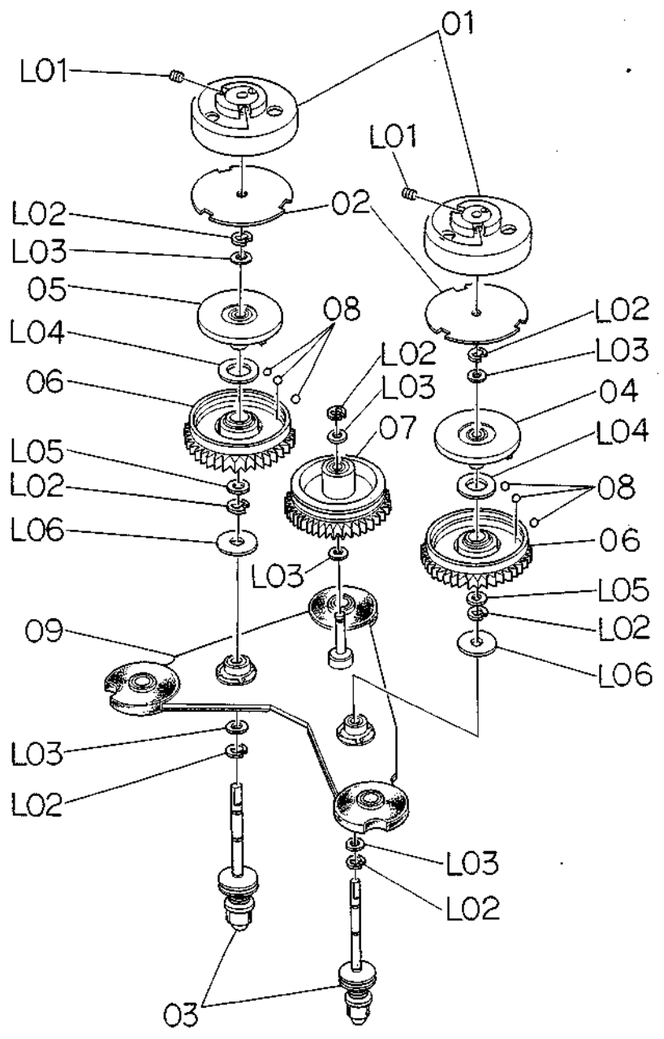



Fig. 9.12

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **B01** | **CA05167B** | **Head Mount Base D Ass'y** | **1** |
| 01 | 0C05179C | Pressure Roller Arm Shaft Spring | 2 |
| 02 | 0C05175B | Pressure Roller Arm Collar (B) | 2 |
| 03 | CA05208B | Pressure Roller Arm D Ass'y B | 1 |
| 04 | 0C05174C | Pressure Roller Arm Collar (A) | 2 |
| 05 | CA05174A | R-52 Record Head Ass'y | 1 |
| 06 | CA05173B | P-53 Playback Head Ass'y | 1 |
| 07 | 0C05477B | Pressure Roller Arm Shaft C | 2 |
| 08 | 0C03595A | Steel Ball 3mm | 4 |
| 09 | CA05207A | Pressure Roller Arm D Ass'y | 1 |
| 10 | CA05169C | Head Mount Base F Ass'y | 1 |
| 11 | 0C05555A | Head Spring B | 2 |
| 12 | 0C05559A | Head Spring Shaft A | 2 |
| 13 | 0C05561A | Record Head Azimuth Screw 1000 | 1 |
| 14 | 0C05564A | Plate Stud | 2 |
| 15 | 0C05556B | Head Pressure Plate | 2 |
| 16 | 0C05558B | Playback Head Azimuth Screw | 1 |
| | 0B07551B | 10P Plug P.C.B. | 1 |
| L01 | 0E00222A | E-Ring 2mm | 2 |
| L02 | 0E00507A | Nut Hex. M3 | 4 |
| L03 | 0E00581A | Washer 3mm Spring | 4 |
| L04 | 0C05567A | Washer 1mm Steel | 2 |
| L05 | 0E00629A | Screw M2.6x8 Cup Point | 2 |
| L06 | 0E00120A | Screw M2.6x3 Philips Pan Head | 4 |
| L07 | 0E00692A | Screw M2x2.5 Philips Pan Head (JCIS) | 2 |
| **B02** | **CA05219C** | **Ball Drive Mechanism Ass'y** | **1** |
| 01 | CA05217A | Brake Drum Ass'y | 2 |
| 02 | 0C05666A | Clutch Plate B | 2 |
| | 0C05667B | Clutch Felt | 2 |
| 03 | CA05235A | Reel Hub C Ass'y | 2 |
| 04 | CA05230C | Clutch Pulley R Ass'y | 1 |
| 05 | CA05231C | Clutch Pulley F Ass'y | 1 |
| 06 | CA05233A | Reel Hub Gear B Ass'y | 2 |
| 07 | CA05232C | Center Gear Ass'y | 1 |
| 08 | 0C02024A | Ball 2mm | 6 |
| 09 | CA05214B | Reel Holder Ass'y | 1 |
| L01 | 0E00626A | Screw M2x3 Cup Point | 2 |
| L02 | 0E00042A | E-Ring 1.5mm | 7 |
| L03 | 0C05672B | Washer 2.15mm | 6 |
| L04 | 0C05687A | Clutch Washer | 2 |
| L05 | 0C05707A | Washer 2.15x0.2mm | 2 |
| L06 | 0C05688A | Washer 5.1mm | 2 |

### 9.13. Auto Shut-off Ass'y (B03)

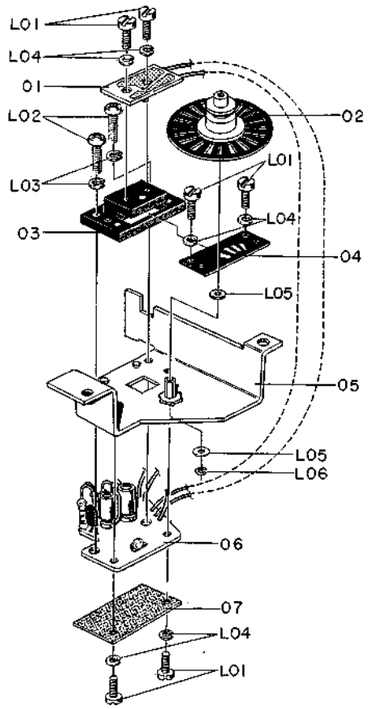



Fig. 9.13

### 9.14. Eject Damper Bracket Ass'y (B04)

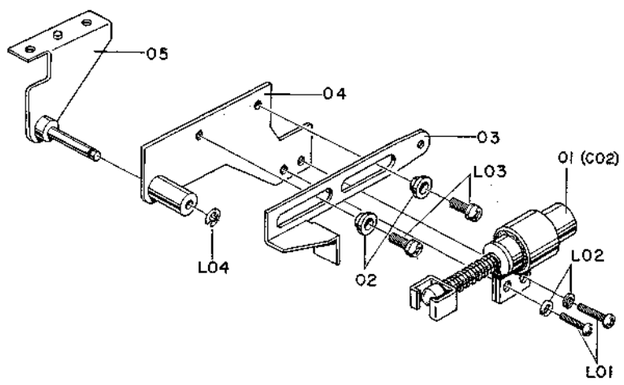



Fig. 9.14

### 9.15. Reel Motor Ass'y (B05)

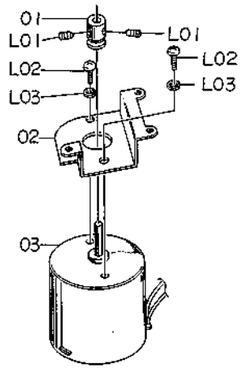



Fig. 9.15

### 9.16. Capstan Motor Ass'y (B06)

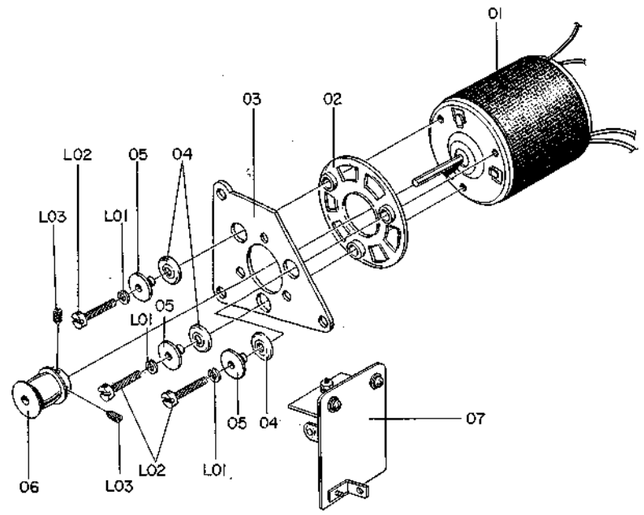



Fig. 9.16

### 9.17. Flywheel Holder Ass'y (B07)

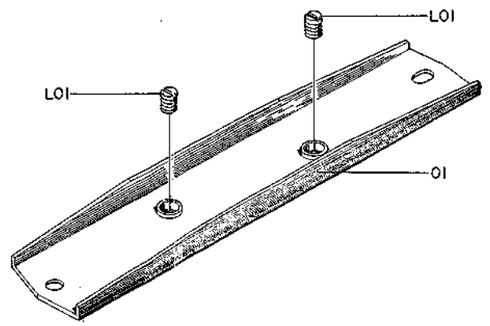



Fig. 9.17

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **B03** | **CA05137A** | **Auto Shut-off Ass'y** | **1** |
| 01 | BA03863A | Shut-off Luminous P.C.B. Ass'y | 1 |
| 02 | CA05156A | Shut-off Blade Ass'y | 1 |
| 03 | 0C05461C | Shut-off Holder | 1 |
| 04 | 0C05467A | Shut-off Shutter | 1 |
| 05 | CA05138A | Shut-off Base Ass'y | 1 |
| 06 | BA03664A | Shut-off Sensor P.C.B. Ass'y | 1 |
| 07 | 0C05476B | Photo Transistor P.C.B. Cover | 1 |
| L01 | 0E00166A | Screw M2x4 Cylinder Head | 6 |
| L02 | 0E00121A | Screw M2.6x6 Philips Pan Head | 2 |
| L03 | 0E00026A | Washer 2.6mm Spring | 2 |
| L04 | 0E00025A | Washer 2mm Spring | 6 |
| L05 | 0C03613A | Washer 1.6mm Plastics | 2 |
| L06 | 0E00165A | E-Ring 1.2mm | 1 |
| **B04** | **CA05134A** | **Eject Damper Bracket Ass'y** | **1** |
| 01 | CA05047A | Eject Damper Ass'y | 1 |
| 02 | 0C05135A | Center Guide | 2 |
| 03 | 0C05232C | Eject Damper Linkage | 1 |
| 04 | CA05068A | Damper Plate Ass'y | 1 |
| 05 | CA05046A | Damper Plate Holder Ass'y | 1 |
| L01 | 0E00220A | Screw M2.6x8 Philips Pan Head | 2 |
| L02 | 0E00026A | Washer 2.6mm Spring | 2 |
| L03 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 2 |
| L04 | 0E00053A | E-Ring 2.3mm | 1 |
| **B05** | **CA05221A** | **Reel Motor Ass'y** | **1** |
| 01 | 0C05700A | Reel Motor Pulley A | 1 |
| 02 | 0C05702A | Reel Motor Holder A | 1 |
| 03 | 0C03771A | Reel Motor (MHI) | 1 |
| L01 | 0E00626A | Screw M2x3 Cup Point | 2 |
| L02 | 0E00120A | Screw M2.6x3 Philips Pan Head | 2 |
| L03 | 0E00026A | Washer 2.6mm Spring | 2 |
| **B06** | **CA05220A** | **Capstan Motor Ass'y** | **1** |
| 01 | CA05203A | Motor NSM-2 | 1 |
| 02 | 0C05509A | Floating Sheet | 1 |
| 03 | 0C05198D | Motor Plate | 1 |
| 04 | 0C05510A | Floating Bush | 3 |
| 05 | 0C05508A | Bush Collar | 3 |
| 06 | 0C05671A | Motor Pulley D | 1 |
| 07 | BA03662B | Capstan Motor Governor P.C.B. Ass'y | 1 |
| L01 | 0E00025A | Washer 2mm Spring | 3 |
| L02 | 0E00004A | Screw M2x8 Cylinder Head | 3 |
| L03 | 0E00626A | Screw M2x3 Cup Point | 2 |
| **B07** | **CA05171A** | **Flywheel Holder Ass'y** | **1** |
| 01 | CA05008A | Flywheel Holder Sub Ass'y | 1 |
| L01 | 0C05494B | Thrust Screw | 2 |

### 9.18. Cassette Well Plate Ass'y (B08)

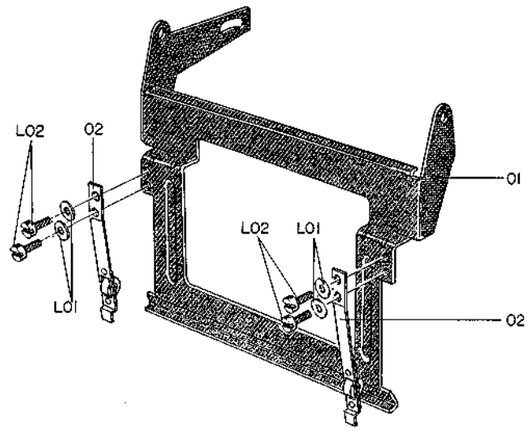



Fig. 9.18

### 9.19. Cassette Well Ass'y (B09)

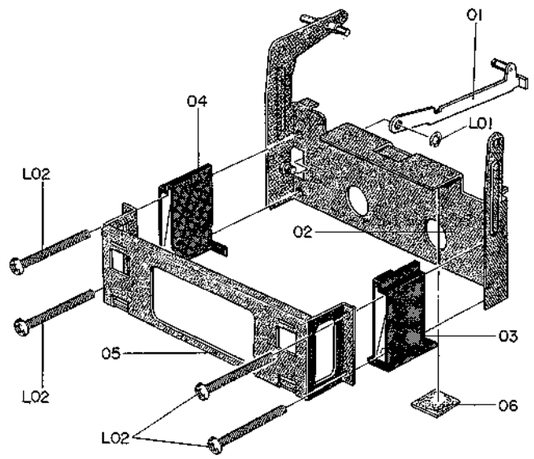



Fig. 9.19

### 9.20. Eject Linkage Ass'y (B10)

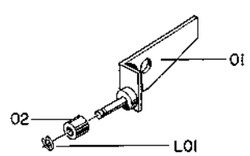



Fig. 9.20

### 9.21. Alignment Beacon Ass'y (B11)

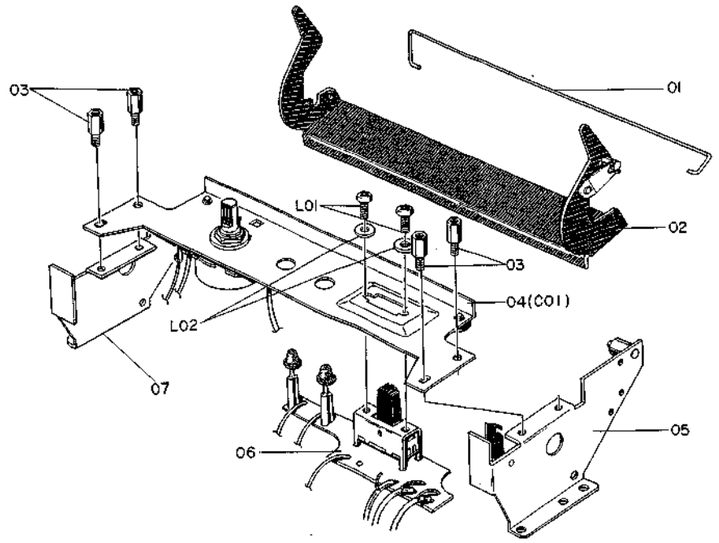



Fig. 9.21

### 9.22. Motor Cap Ass'y (B12)

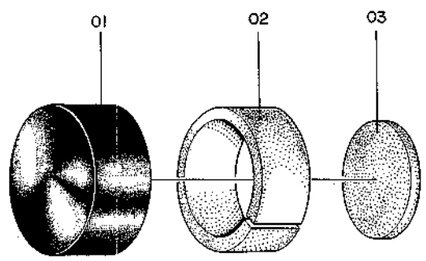



Fig. 9.22

### 9.23. Cassette Holder Ass'y (B13)

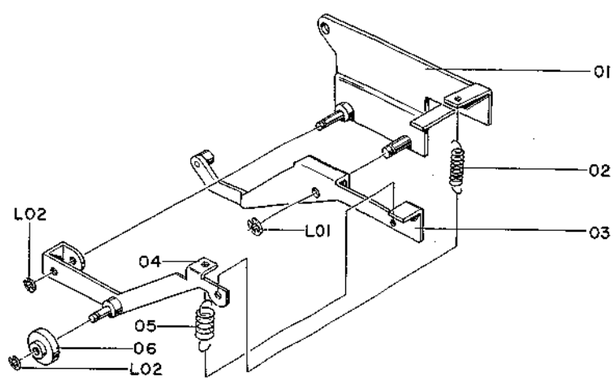



Fig. 9.23

### 9.24. Base Switch Ass'y (B14)

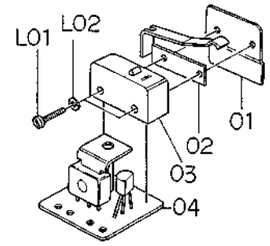



Fig. 9.24

### 9.25. Counter Holder Ass'y (B15)

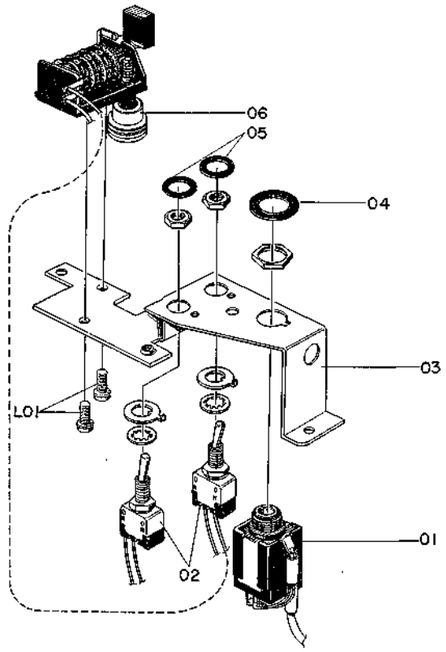



Fig. 9.25

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **B08** | **CA05062A** | **Cassette Well Plate Ass'y** | **1** |
| 01 | 0C05335B | Cassette Well Plate B | 1 |
| 02 | CA05153A | Cassette Spring Ass'y | 2 |
| L01 | 0E00025A | Washer 2mm Spring | 4 |
| L02 | 0E00002A | Screw M2x3 Cylinder Head | 4 |
| **B09** | **CA05135A** | **Cassette Well Ass'y** | **1** |
| 01 | CA05055A | Well Stopper Ass'y | 1 |
| 02 | CA05061A | Cassette Well Ass'y (B) | 1 |
| 03 | 0C05276C | Cassette Case B.R | 1 |
| 04 | 0C05277C | Cassette Case B.L | 1 |
| 05 | 0C05265C | Lid Holder | 1 |
| 06 | 0C06373A | Cassette Rubber | 1 |
| L01 | 0E00222A | E-Ring 2mm | 1 |
| L02 | 0E00245A | Screw M2.6x25 Philips Pan Head | 4 |
| **B10** | **CA05172A** | **Eject Linkage Ass'y** | **1** |
| 01 | CA05043A | Eject Linkage Sub Ass'y | 1 |
| 02 | 0C05132A | Eject Roller | 1 |
| L01 | 0E00042A | E-Ring 1.5mm | 1 |
| **B11** | **CA05144B** | **Alignment Beacon Ass'y** | **1** |
| 01 | 0C05261C | AJ Lid Arm Spring | 1 |
| 02 | CA05064A | AJ Lid Arm Ass'y | 1 |
| 03 | 0C05311B | AJ Cover Stud | 4 |
| 04 | CA05143B | AJ Plate Ass'y | 1 |
| 05 | CA05063A | AJ Plate Holder Ass'y L | 1 |
| 06 | BA03665B | 400Hz Osc. P.C.B. Ass'y | 1 |
| 07 | CA05069A | AJ Plate Holder Ass'y R | 1 |
| L01 | 0E00226A | Screw M2.6x4 Philips Pan Head | 2 |
| L02 | 0E00026A | Washer 2.6mm Spring | 2 |
| **B12** | **CA05158A** | **Motor Cap Ass'y** | **1** |
| 01 | 0C03796A | Motor Cap | 1 |
| 02 | 0C03794A | Motor Cover A | 1 |
| 03 | 0C03795A | Motor Cover B | 1 |
| **B13** | **CA05044A** | **Cassette Holder Ass'y** | **1** |
| 01 | CA05058A | Cassette Hold Plate Ass'y | 1 |
| 02 | 0C05244B | Linkage Spring | 1 |
| 03 | CA05059A | Cassette Arm A Ass'y | 1 |
| 04 | CA05060A | Cassette Arm B Ass'y | 1 |
| 05 | 0C05245C | Hold Spring | 1 |
| 06 | 0C05217B | Hold Roller | 1 |
| L01 | 0E00222A | E-Ring 2mm | 1 |
| L02 | 0E00042A | E-Ring 1.5mm | 2 |
| **B14** | **CA05132A** | **Base Switch Ass'y** | **1** |
| 01 | 0C05091A | Base Switch Holder | 1 |
| 02 | 0C05092A | Switch Spring A | 1 |
| 03 | 0B07086A | Micro Switch (SS-5) | 1 |
| 04 | BA03666A | Head Base Switch P.C.B. Ass'y | 1 |
| L01 | 0E00218A | Screw M2x10 Cylinder Head | 2 |
| L02 | 0E00025A | Washer 2mm Spring | 2 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **B15** | **CA05136A** | **Counter Holder Ass'y** | **1** |
| 01 | 0B03882A | Headphone Jack | 1 |
| 02 | 0B08057A | Memory Switch | 2 |
| 03 | 0C05316D | Counter Holder | 1 |
| 04 | 0J03236B | Jack Cover | 1 |
| 05 | 0B01295A | Jack Insulating Washer | 2 |
| 06 | CA05038A | Tape Counter Ass'y | 1 |
| L01 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 2 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **B16** | **CA05145A** | **Head Base Solenoid Ass'y** | 1 |
| 01 | CA05027A | Base Lock Arm Ass'y | 1 |
| 02 | 0C05099A | Head Base Solenoid | 1 |
| 03 | CA05041A | Base Damper Holder Ass'y | 1 |
| 04 | CA05133A | Base Damper Ass'y | 1 |
| L01 | 0E00507A | Nut Hex. M3 | 1 |
| L02 | 0E00172A | Washer 3mm Toothed Lock | 1 |
| L03 | 0C05098A | Solenoid Bolt | 1 |
| L04 | 0E00612A | Screw M3x6 Philips Pan Head (2A) | 2 |
| L05 | 0E00026A | Washer 2.6mm Spring | 2 |
| L06 | 0E00220A | Screw M2.6x8 Philips Pan Head | 2 |
| **B17** | **CA05053A** | **Brake Solenoid Ass'y** | 1 |
| 01 | 0C05086B | Brake Solenoid | 1 |
| 02 | 0C05087B | Brake Solenoid Spring | 1 |
| 03 | 0C05085A | Brake Linkage | 1 |
| L01 | 0C05419A | Brake Bolt | 1 |
| L02 | 0E00233A | Washer 2.6mm Toothed Lock | 1 |
| L03 | 0E00021A | Nut Hex. M2.6 | 1 |
| **B18** | **BA03772A** | **Power Switch Ass'y** | 1 |
| 01 | 0M03321A | Lever Cover Name Plate B | 1 |
| 02 | 0H03391D | Switch Lever Cover C | 1 |
| 03 | 0B07080U | Power Switch | 1 |
| **B19** | **BA03773A** | **Lever Switch Ass'y 2S (DNL, EQ SW)** | 2 |
| 01 | 0M03320A | Lever Cover Name Plate A | 1 |
| 02 | 0H03192D | Switch Lever Cover A | 1 |
| 03 | 0B07009A | Lever Switch 2S | 1 |
| **B19** | **BA03775A** | **Lever Switch Ass'y 4 (Dolby NR SW)** | 1 |
| 01 | 0M03320A | Lever Cover Name Plate A | 1 |
| 02 | 0H03192D | Switch Lever Cover A | 1 |
| 03 | 0B07020A | Lever Switch 4 | 1 |
| **B19** | **BA03800A** | **Lever Switch Ass'y 4S (Tape SW)** | 1 |
| 01 | 0M03320A | Lever Cover Name Plate A | 1 |
| 02 | 0H03192D | Switch Lever Cover A | 1 |
| 03 | 0B07133A | Lever Switch 4S | 1 |
| **B19** | **BA03806A** | **Lever Switch Ass'y 2 (Monitor SW)** | 1 |
| 01 | 0M03320A | Lever Cover Name Plate A | 1 |
| 02 | 0H03192D | Switch Lever Cover A | 1 |
| 03 | 0B07142A | Lever Switch 2 | 1 |
| **C01** | **CA05143B** | **AJ Plate Ass'y** | 1 |
| 01 | 0C05708A | Adjust Plate | 1 |
| 02 | 0C05101C | Base Stopper Rubber | 2 |
| 03 | 0B07038A | VR 500Ω (Pitch Control) | 1 |
| L01 | 0E00150A | Nut Hex. M8 | 1 |

| Schematic Ref. No. | Part No. | Description | Q'ty |
|---|---|---|---|
| **C02** | **CA05047A** | **Eject Damper Ass'y** | 1 |
| 01 | 0C06258E | Damper Holder | 1 |
| 02 | 0C06279A | Damper Holder Ring | 1 |
| 03 | 0C05429A | Exhaust Adjust Screw C | 1 |
| 04 | 0C05283A | Cylinder B | 1 |
| 05 | 0C06278D | Seal | 1 |
| 06 | CA05125A | Piston Ass'y | 1 |
| 07 | 0C06277A | Guide | 1 |
| 08 | 0C05328A | Damper Spring | 1 |
| 09 | 0C05488A | Damper Linkage Plate | 1 |
| 10 | 0C06274B | Bush | 1 |
| 11 | 0C06335C | Exhaust Bush B | 1 |
| L01 | 0E00253A | Washer 3.3mm | 2 |
| L02 | 0E00053A | E-Ring 2.3mm | 1 |
| **C03** | **CA05133A** | **Base Damper Ass'y** | 1 |
| 01 | 0C06258E | Damper Holder | 1 |
| 02 | 0C06279A | Damper Holder Ring | 1 |
| 03 | 0C05429A | Exhaust Adjust Screw C | 1 |
| 04 | 0C05283A | Cylinder B | 1 |
| 05 | 0C06278D | Seal | 1 |
| 06 | CA05125A | Piston Ass'y | 1 |
| 07 | 0C06277A | Guide | 1 |
| 08 | 0C05328A | Damper Spring | 1 |
| 09 | 0C05513A | Head Base Damper Plate | 1 |
| 10 | 0C06274B | Bush | 1 |
| 11 | 0C06335C | Exhaust Bush B | 1 |
| L01 | 0E00253A | Washer 3.3mm | 2 |
| L02 | 0E00053A | E-Ring 2.3mm | 1 |
| **C04** | **CA05208B** | **Pressure Roller Arm D Ass'y B** | 1 |
| 01 | GA02014A | Erase Head E-54 | 1 |
| 02 | CA05207A | Pressure Roller Arm D Ass'y | 1 |
| L01 | 0E00691A | Screw M2x3 Philips Pan Head | 2 |
| L02 | 0E00117A | Washer 2mm | 2 |
| **C05** | **CA05173B** | **P-53 Playback Head Ass'y** | 1 |
| 01 | GA02013A | P-53 Playback Head | 1 |
| 02 | GA01017A | PH Plate Ass'y | 1 |
| L01 | 0E00004A | Screw M2x8 Cylinder Head | 2 |
| **C06** | **CA05174A** | **R-52 Record Head Ass'y** | 1 |
| 01 | GA02007E | R-52 Record Head | 1 |
| 02 | GA01018A | RH Plate Ass'y | 1 |
| L01 | 0E00004A | Screw M2x4 Cylinder Head | 2 |

### 9.26. Head Base Solenoid Ass'y (B16)

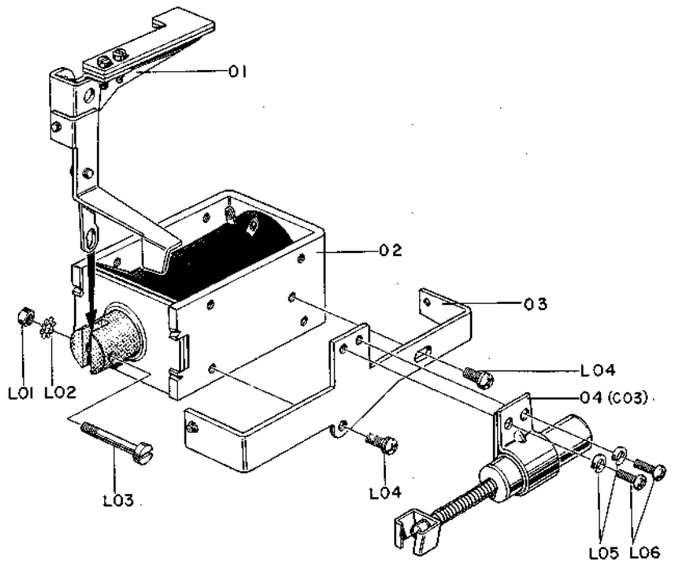



Fig. 9.26

### 9.27. Brake Solenoid Ass'y (B17)

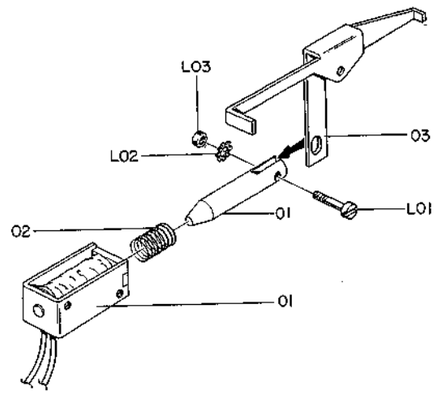



Fig. 9.27

### 9.28. Power Switch Ass'y (B18)

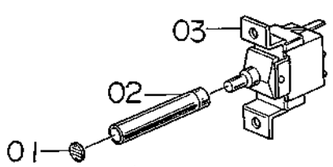



Fig. 9.28

### 9.29. Lever Switch Ass'y 2S, 4, 4S, 2 (B19)

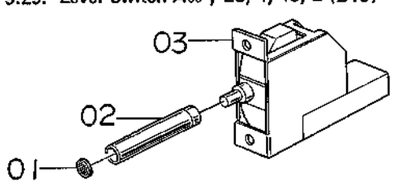



Fig. 9.29

### 9.30. AJ Plate Ass'y (C01)

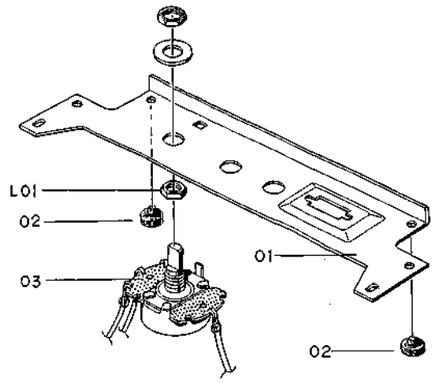



Fig. 9.30

### 9.31. Eject Damper Ass'y (C02)

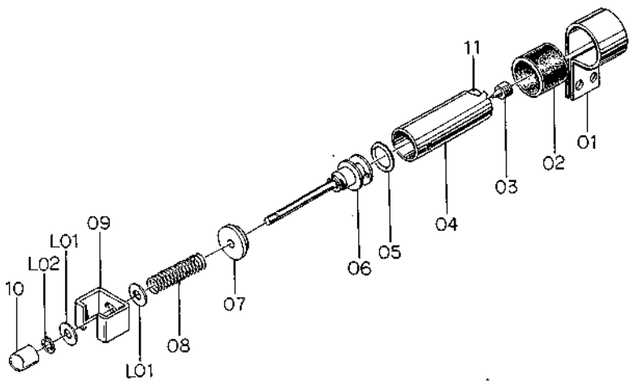



Fig. 9.31

### 9.32. Base Damper Ass'y (C03)

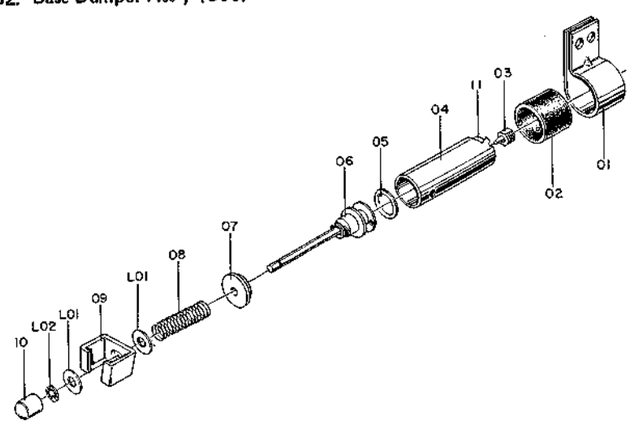



Fig. 9.32

### 9.33. Pressure Roller Arm D Ass'y B (C04)

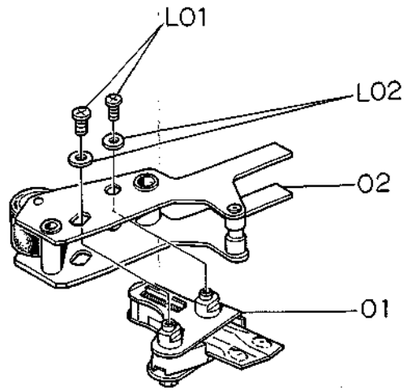



Fig. 9.33

### 9.34. P-53 Playback Head Ass'y (C05)

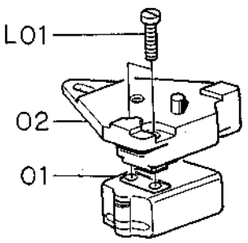



Fig. 9.34

### 9.35. R-52 Record Head Ass'y (C06)

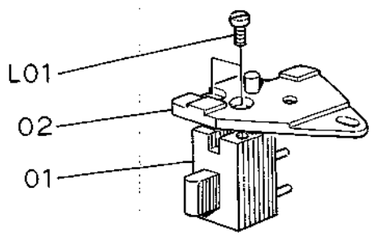



Fig. 9.35

## 10. WIRING DIAGRAM

### 10.1. Amplifier

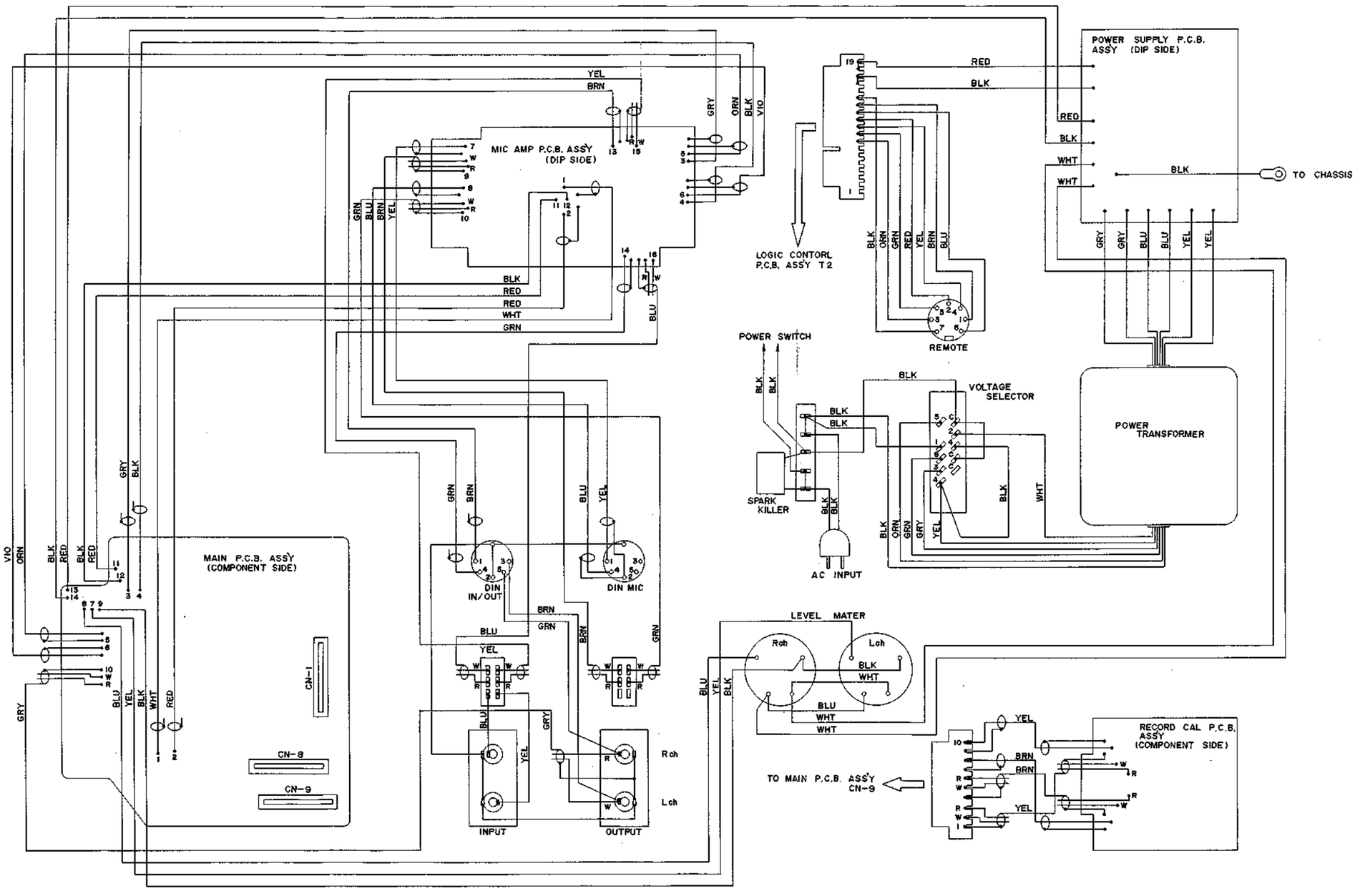



Fig. 10.1

Note: Table of wire colors

| | | |
|---|---|---|
| BLK - Black | GRY - Gray | BRN - Brown |
| BLU - Blue | GRN - Green | YEL - Yellow |
| ORN - Orange | RED - Red | WHT - White |

## 10.2. Mechanism

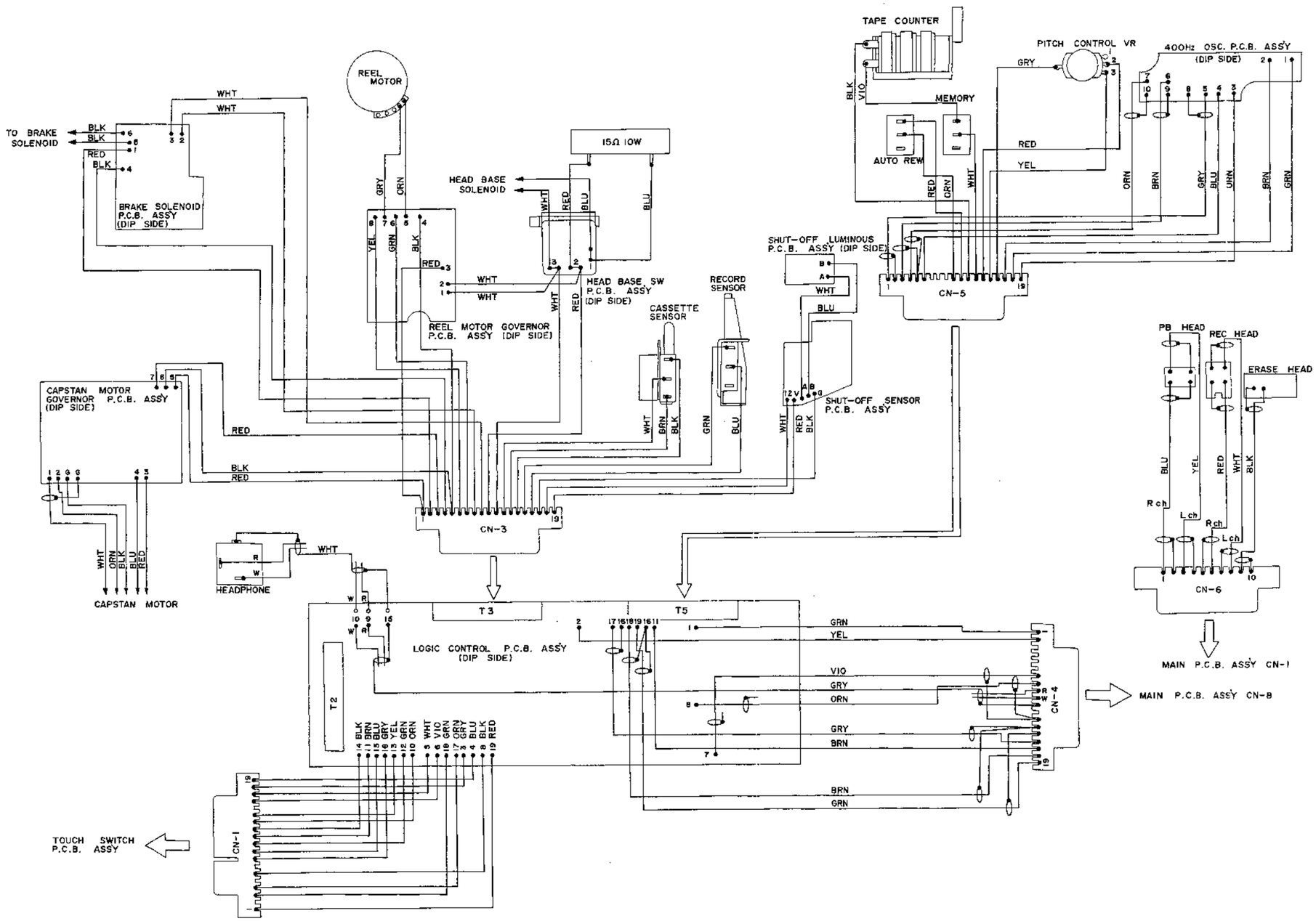



Fig. 10.2

## 11. BLOCK DIAGRAM

### 11.1. Amplifier

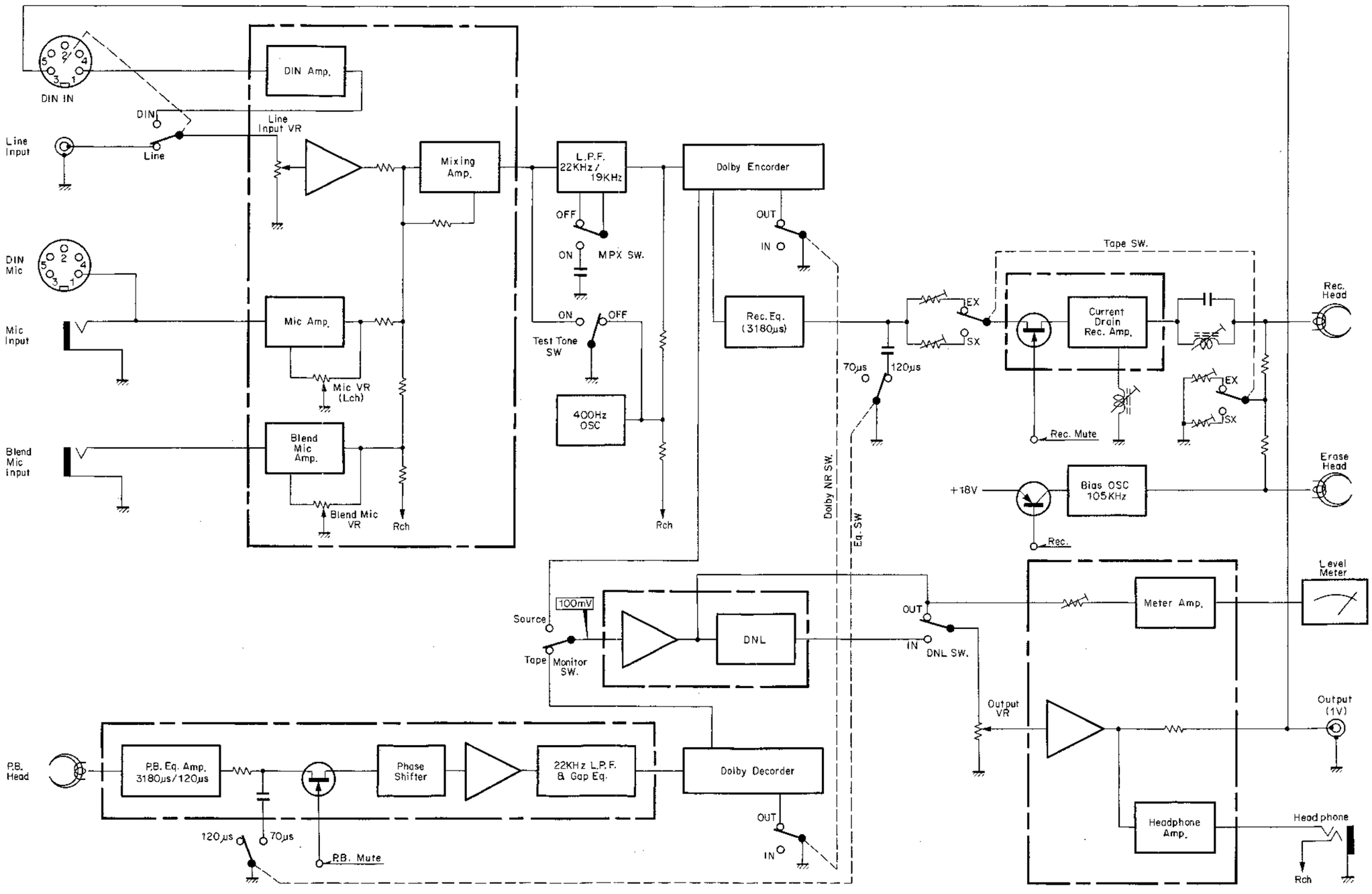



Fig. 11.1

## 11.2. Mechanism

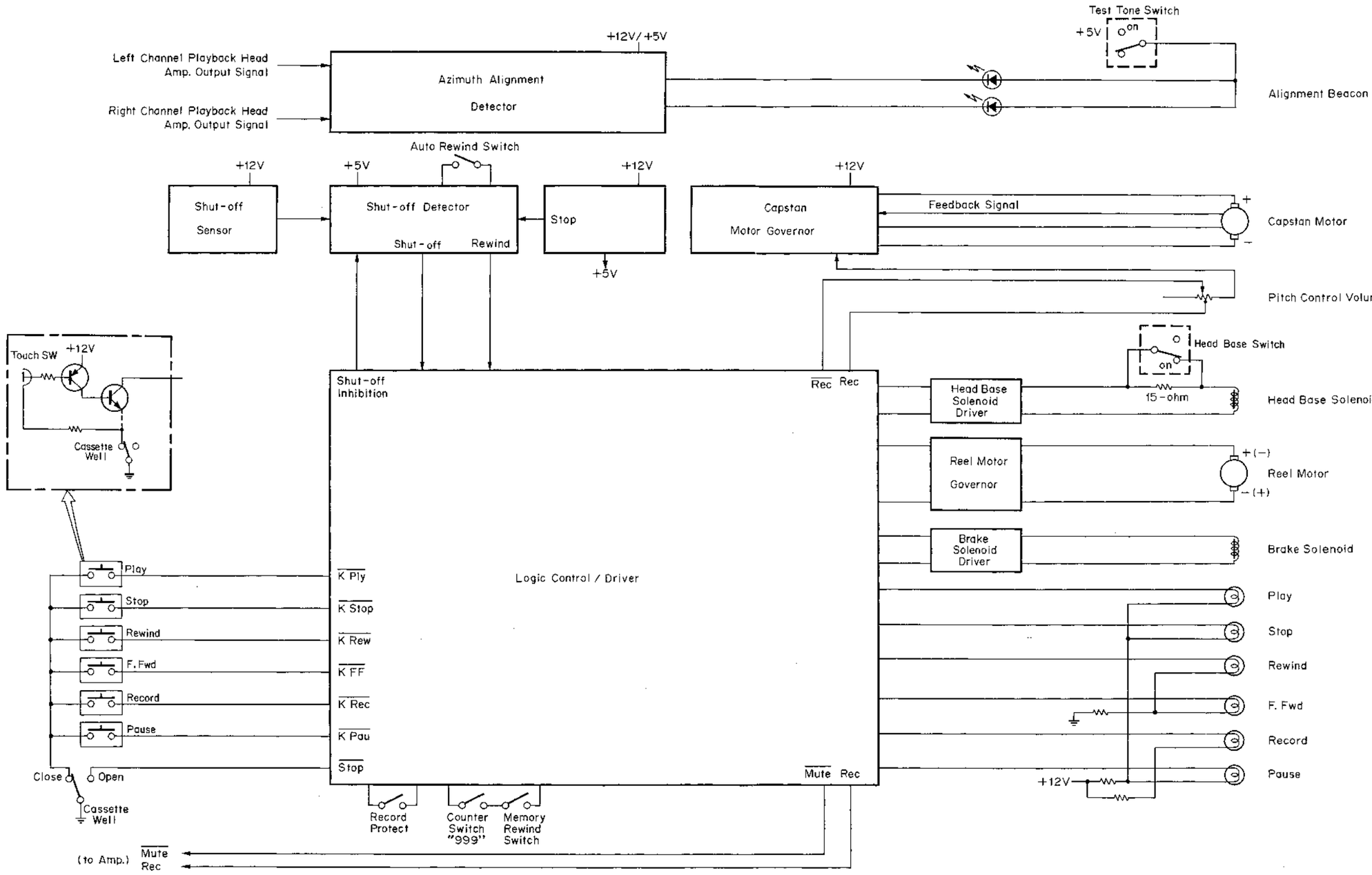
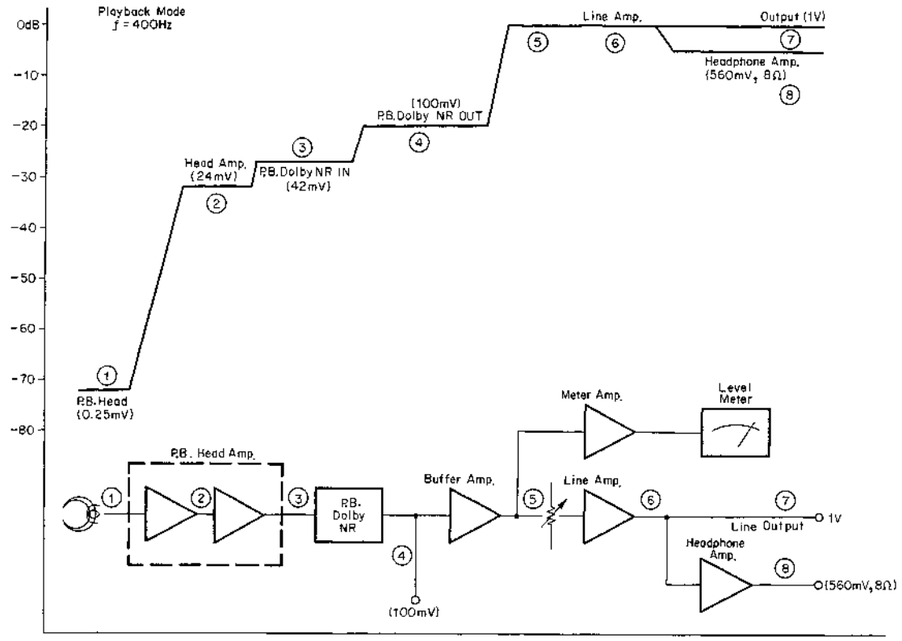



Fig. 11.2

## 12. LEVEL DIAGRAM



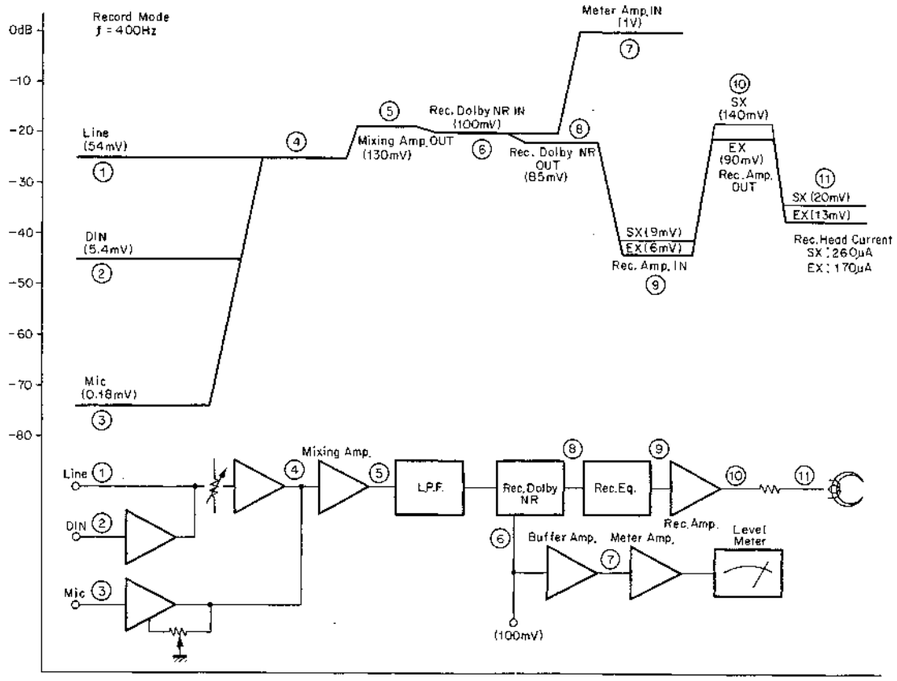




Fig. 12

## 13. EQ. AMP. FREQUENCY RESPONSE

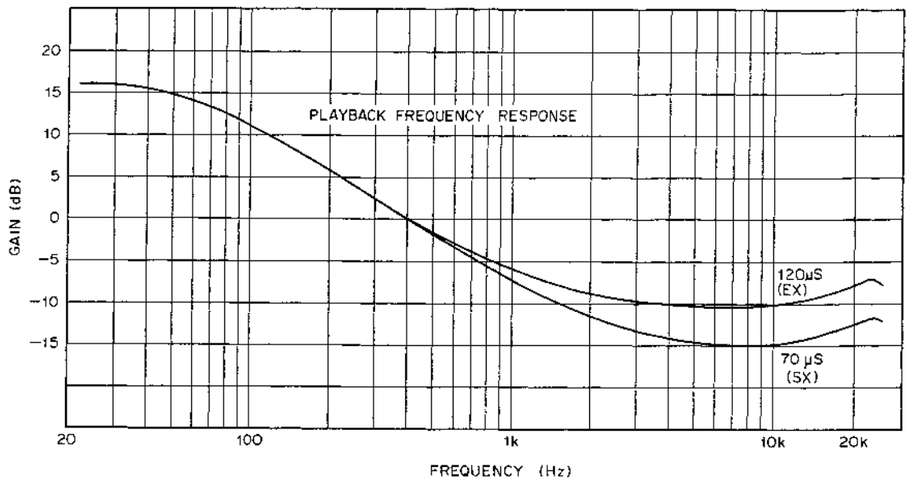



Fig. 13.1

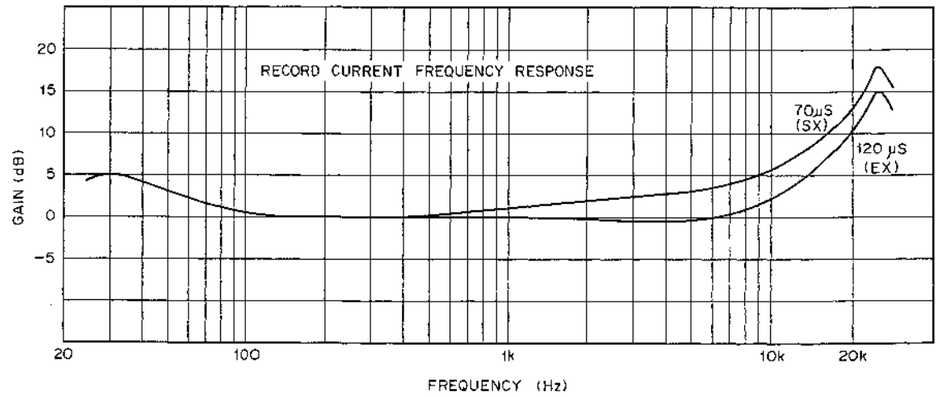



Fig. 13.2

## 14. SCHEMATIC DIAGRAM

### 14.1. Amplifier

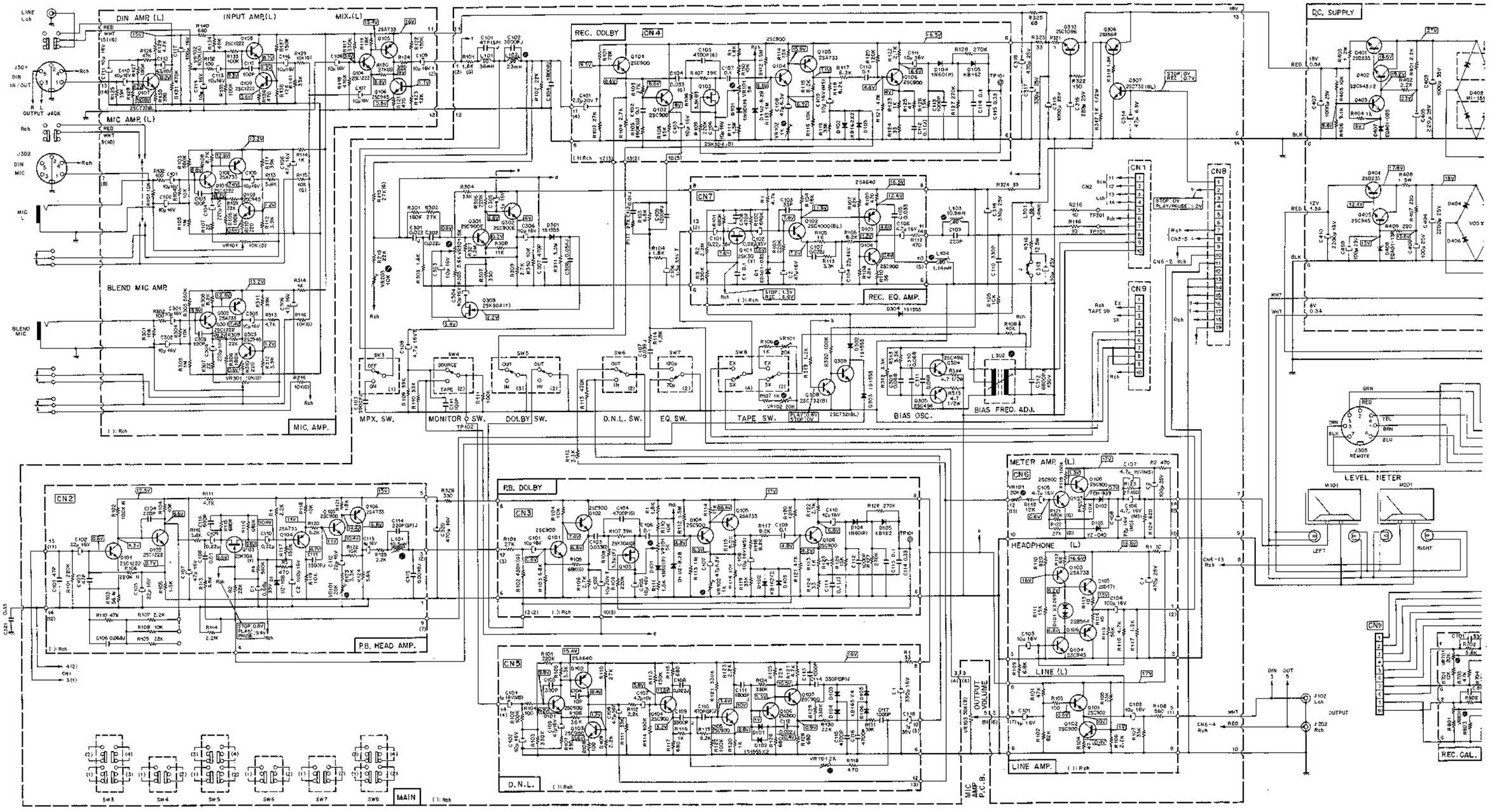



Fig. 14.1

Notes:
1. R channel circuits are omitted when R channel circuits are equal to the L channel. Schematic reference Nos. 100-199, 700-799 show L channel's parts and 200-299, 800-899 show R channel's. (For example, R101 is an L channel's resistor and omitted R201 is an R channel's.)
2. Schematic reference Nos. 300-399, 400-499 show common parts for both L and R channels.
3. ( ) shows an R channel's terminal No.

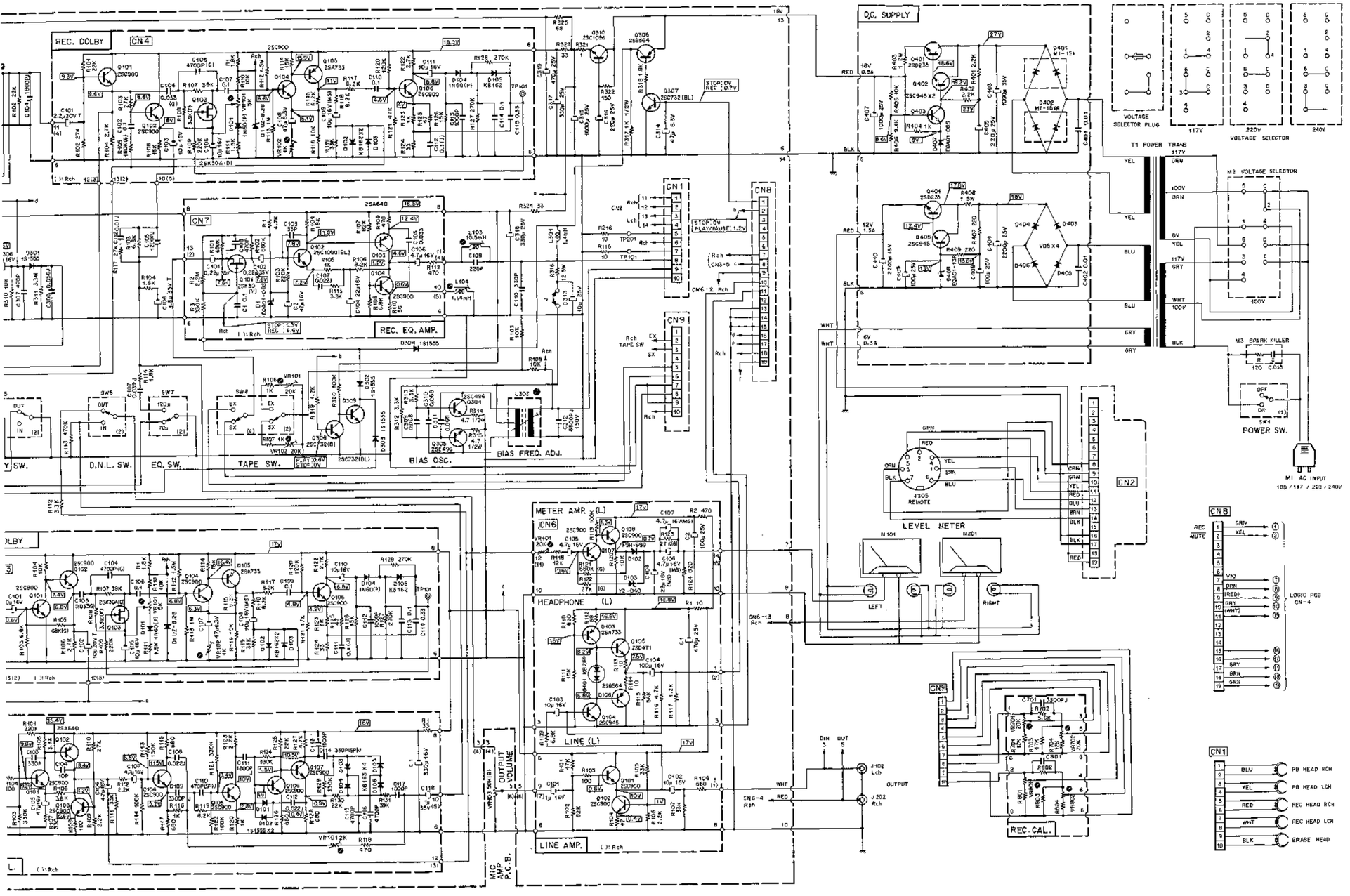



Fig. 14.1

800-899 show R channel's.

.)

2. Schematic reference Nos. 300-399, 400-499 show common parts for both L and R channels.
3. ( ) shows an R channel's terminal No.

## 14.2. Mechanism

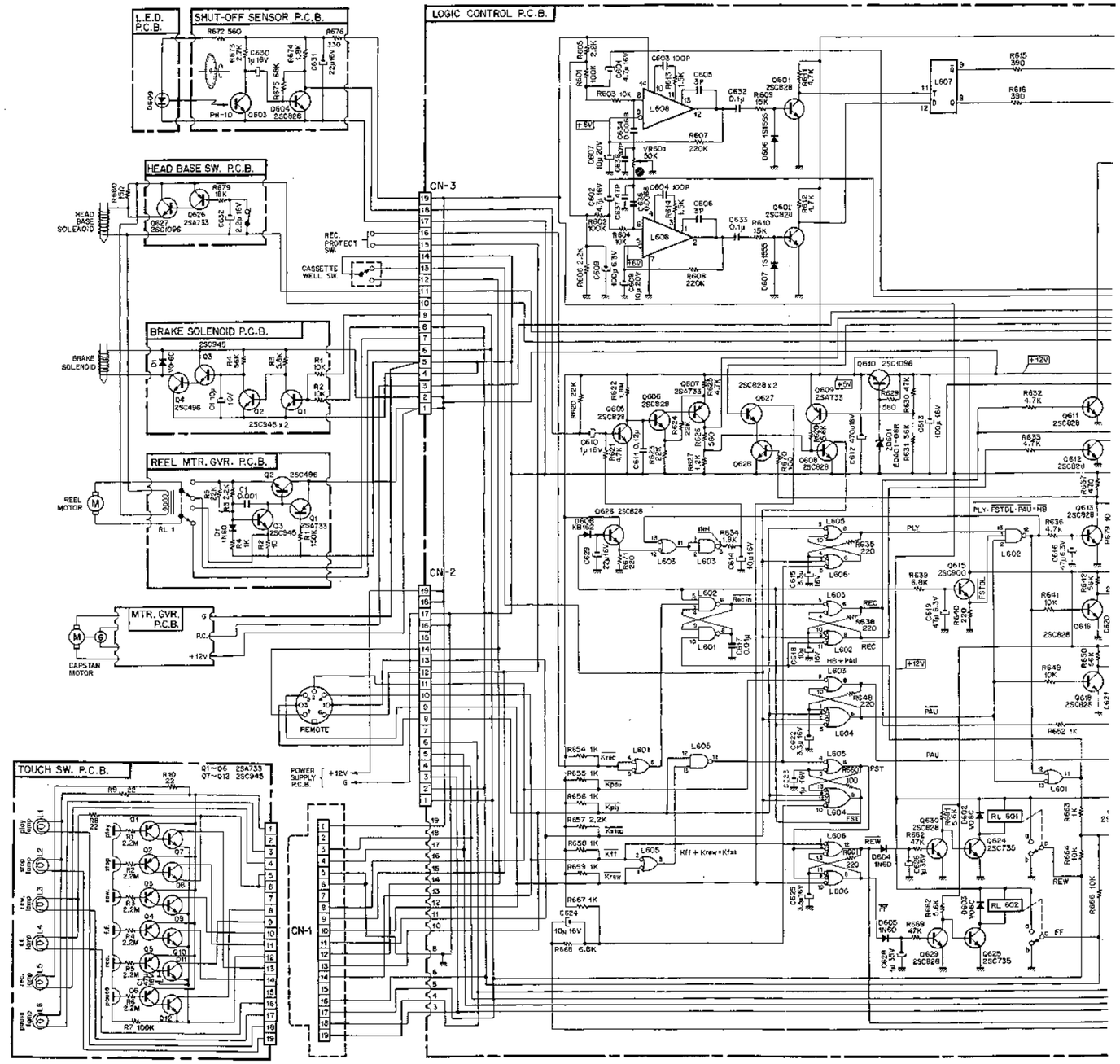



Fig. 14.2

## 14.2. Mechanism

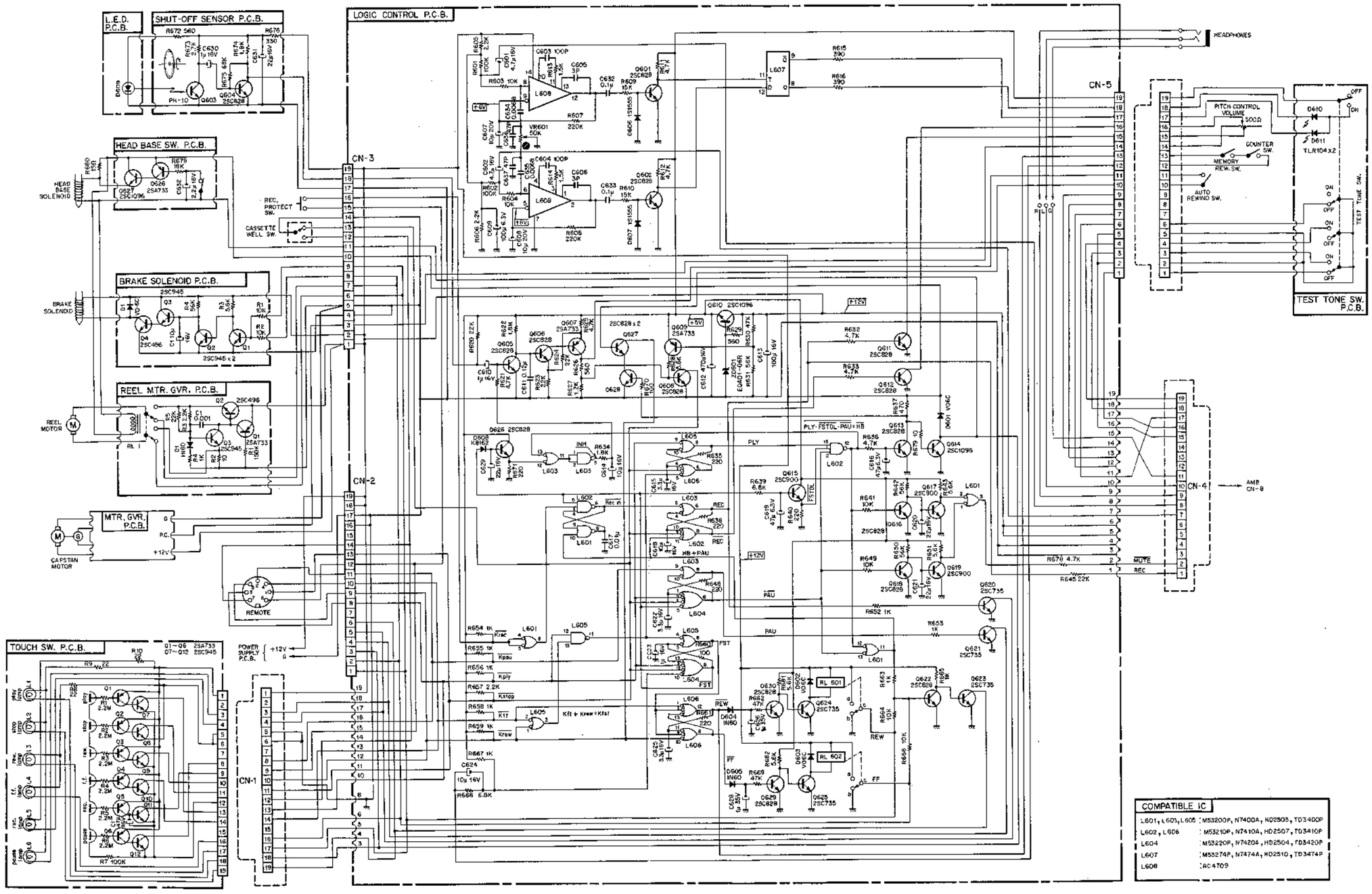



Fig. 14.2

### 14.3. Capstan Motor Governor

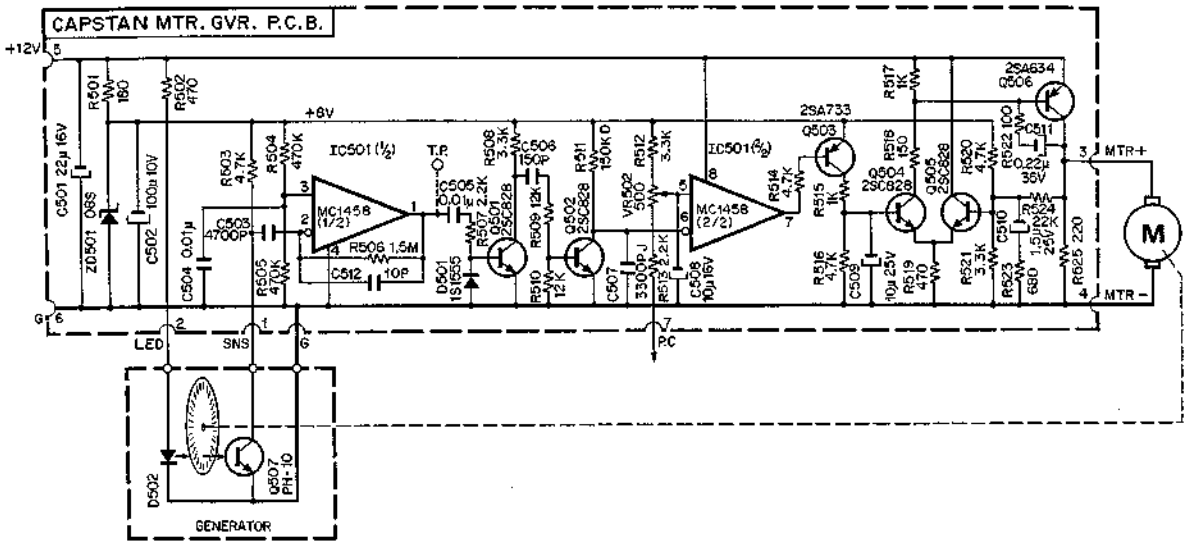



Fig. 14.3

## 15. TROUBLESHOOTING

### 15.1. Note

(1) Check to insure whether the outputs + 12 V, + 17 V and + 5 V of the logic control are correct.

(2) In general logics, the output high level is not less than 2.4 V, and output low level not more than 0.4–0.5 V.
The output between 0.4–2.4 V does not belong either to "L" or "H", and is generated if TTL IC is damaged or over-loaded (This voltage is called "Half Level").
The threshold level of the TTL IC is shown to be less than 1.1–0.8 V while "L" level, and more than 1.9 V–2.0 V while "H" level.
Normally, if the input is open, it is regarded as high level.

(3) The logic control board if separated from the chassis does not activate accurately as its grounding is also separated, therefore check thereon shall be made upon connecting the grounding of the PCB control and chassis with a jumper wire both ends of which are provided with a clip (particularly when an extension cord is used).

(4) When a check is made on Amp. etc. by means of an extension cord, re-adjustment shall be made without fail (after final installation to the model chassis).
The check without removal of an extension cord will cause inaccurate adjustments.

(5) Either Nakamichi SX or EXII tape shall be used while adjustments (particularly while adjustments of bias and record/playback level).
Should another difference branded tape be used in its place, the set shall previously be adjusted according to each of the actual tape in use.
However, if low quality tape should be used, optimum quality of a set will not be obtained (such as distortion, S/N, Dynamic Range, etc. will be deteriorated).

### 15.2. Troubleshoots

**15.2.1 Capstan motor does not rotate:**

(1) Defective capstan motor governor.
(2) Defective capstan motor.
(3) Pitch control volume is out of accuracy.
(4) The lead wire between capstan motor governor and capstan motor is cut.
(5) The lead wire between the governor and pitch control volume is cut.
(6) + 12 V is not being supplied to the governor.

**15.2.2 Auto Shut-off does not work (at tape end):**

(1) One of D403 through D406 is defective (excessive ripple of + 12 V)
(2) Shut-off driver is defective.
(3) Shut-off sensor is defective.
(4) + 12 V regulator is defective (excessive ripple of + 12 V).

**15.2.3 Auto Shut-off activates (other than tape end):**
(1) Shut-off belt is cut.
(2) Shut-off sensor is defective.
(3) Take-up torque is too weak.
(4) Defective shut-off driver.
(5) Pressure roller spring is not at the correct position.

**15.2.4 Beacon does not flicker:**
(1) IC 607 is defective.
(2) IC 608 is defective.
(3) Defective playback head.
(4) Defective playback head amp.
(5) Defective record head.
(6) Defective beacon LED.
(7) Tape travel is incorrect.
(8) Defective Record Eq. Amp.

**15.2.5 Does not Shut-off while FF, Rew (at tape end):**
(1) Defective IC603.
(2) Defective IC604.
(3) Defective fast driver (in Q626 circuit).

**15.2.6. Remained only in Play mode:**
(1) Defective IC605.
(2) Defective IC606.
(3) The driver of the head base solenoid is defective.
(4) Defective touch control switch ass'y.
(5) Defective head base solenoid.

**15.2.7. Remained only in Record mode:**
(1) Defective IC601.
(2) Defective IC602.
(3) Defective IC603.
(4) Defective touch control switch ass'y.

**15.2.8 Remained only in Rewind mode:**
(1) Defective touch control switch ass'y.
(2) Defective IC606.
(3) Either RL 601 or driver is defective.

**15.2.9. Remained only in Fast Forward mode:**
(1) Defective touch control switch ass'y.
(2) Defective IC606.
(3) Either RL 602 or driver is defective.

**15.2.10. Remained only Pause mode:**
(1) Defective IC601.
(2) Defective IC603.
(3) Defective IC604.
(4) Defective touch control switch ass'y.

**15.2.11. Does not change to Play mode:**
(1) Defective touch control switch Ass'y.
(2) Defective IC605.
(3) Defective IC606.
(4) Head base solenoid and driver are defective.
(5) Auto shut-off driver is defective.
(6) Head base is not operating accurately (when heavy).
(7) Ball drive mechanism is ont operating accurately.
(8) Defective take-up reel.
(9) Defective cassette tape (hard to rotate, etc.).
(10) Pressure roller spring is out of the correct position.

**15.2.12. Does not change to Record mode:**
(1) Touch control switch ass'y is not operating accurately.
(2) Defective record protect switch.
(3) Defective IC601.
(4) Defective IC602.
(5) Defective IC603.

**15.2.13. Does not rewind:**
(1) Touch control switch ass'y is not operating accurately.
(2) Defective IC606.
(3) RL601 and driver are defective.
(4) Defective reel motor.
(5) Pulley of the reel motor is too loose.
(6) Defective ball drive mechanism ass'y.
(7) RL602 and driver are defective.
(8) Defective brake solenoid driver.
(9) Defective brake solenoid.

**15.2.14. Does not Fast Wind:**
(1) Defective touch control switch ass'y.
(2) Defective IC606.
(3) RL602 and driver are defective.
(4) Defective reel motor.
(5) Pulley of the reel motor is too loose.
(6) Defective ball drive mcehanism ass'y.
(7) RL602 and driver are defective.
(8) Brake solenoid driver is defective.
(9) Defective brake solenoid.

**15.2.15. Does not pause:**
(1) Touch control switch ass'y is defective.
(2) Defective IC603.
(3) Defective IC604.
(4) Defective IC602.
(5) Head base solenoid and driver are defective.

**15.2.16. Brake does not operate:**
(1) Defective solenoid.
(2) Defective solenoid driver.
(3) Defective IC606.
(4) RL601 and driver are defective.
(5) RL602 and driver are defective.

**15.2.17. Head base solenoid does not operate:**
(1) Defective head base solenoid.
(2) Defective head base switch ass'y.
(3) Defective solenoid driver.
(4) Defective IC602.
(5) Defective IC605.
(6) Defective IC606.
(7) Head base is not operating accurately (when heavy).

**15.2.18. Record mode operates without cassette tape:**
(1) Incorrect adjustment of record protect switch.
(2) Defective IC601.
(3) Defective IC602.
(4) Defective IC603.

**15.2.19. Logic Control does not operate:**
(1) + 5 V not being induced.
(2) Cassette sensor switch is defective.
(3) Incorrect adjustment of cassette sensor switch.
(4) Defective touch control switch ass'y.
(5) 19P connector is out of contact.

**15.2.20. Does not auto rewind:**
(1) Auto rewind switch is out of order.
(2) Defective auto rewind driver.
(3) Defective IC606.

**15.2.21. Tape speed is too fast:**
(1) Defective capstan motor governor.
(2) Defective capstan motor generator.
(3) Lead wire of sensor is cut.
(4) Incorrect adjustment (semi-fixed VR).

**15.2.22. Does not playback:**
(1) Playback head is defective.
(2) Defective PB head amp. ass'y.
(3) Defective PB Dolby NR Ass'y.
(4) Defective DNL ass'y.
(5) Defective line amp. ass'y.
(6) Dirty PB head.
(7) Mute is not operating.
(8) Wire between playback head and 10P connector is cut.

**15.2.23. Does not record:**
(1) Defective record Eq. amp. ass'y.
(2) Defective record head.
(3) Defective record Dolby NR Ass'y.
(4) Bias oscillation is not generating.
(5) Defective Mic. amp. ass'y.
(6) Defective 19 kHz MPX filter.
(7) Incorrect tape travel.
(8) Either capstan or pressure roller is dirty.
(9) Dirty playback head.
(10) Remained only in mute.
(11) Cut lead wire between record head and 10P connector.
(12) Defective tape switch.

**15.2.24. Bias does not oscillate:**
(1) No voltage to bias oscillation circuit.
(2) Defective bias oscillation circuit.
(3) Defective erase head.

**15.2.25. Does not erase:**
(1) Defective erase head.
(2) Dirty erase head.
(3) Bias is not oscillating.
(4) Incorrect tape travel.

**15.2.26. Level variations:**
(1) Incorrect tape travel.
(2) Defective pressure roller.
(3) Variation of take-up torque.
(4) Defective erase head guide (including incorrect adjustment).
(5) Dirtycapstan or pressure roller.
(6) Defective flywheel ass'y.
(7) Incorrect adjustment of pressure roller.
(8) Record head and playback head are out of correct alignment.
(9) Defective playback head.
(10) Defective record head.
(11) Incorrect adjustment of flywheel thrust screws.

**15.2.27. Tape folds:**
(1) Tape guide is in incorrect position.
(2) Pressure roller is not in the right position against capstan.
(3) Head mount base is bent.
(4) Dirty capstan.
(5) Defective pressure roller.
(6) Defective cassette tape (non-uniformity of magnetic surface).
(7) Defective cassette housing.

**15.2.28. Unable to secure correct level while record/playback:**
(1) Distorted.
(2) Defective record head.
(3) Defective playback head.
(4) Defective record eq. amp.
(5) Defective playback amp.
(6) Incorrect adjustment of playback head amp.
(7) Playback head and record head are not in correct alignment.
(8) Incorrect tape travel.

**15.2.29. Great mechanical noise:**
(1) Defective pressure roller.
(2) Defective ball drive mechanism.
(3) Defective capstan motor.
(4) Flywheel is defective.
(5) Defective counter.
(6) Defective reel motor.

**15.2.30. Sound is distorted:**
(1) Playback head is dirty.
(2) Record head is dirty.
(3) Head(s) is(are) magnetized.
(4) Record head is defective.
(5) Playback head is defective.
(6) Bias oscillator circuit is defective.
(7) Excessive high level at Record/Playback.

**15.2.31. Signal to Noise ratio is deteriorated:**
(1) PB Head is magnetized.
(2) Bias leakage.
(3) Excessive ripple from power source.
(4) Either PB head or Rec. Head is defective.
(5) Defective PB head amp. (Noise level is great).
(6) Defective record amp. (Noise level is great).

**15.2.32. High frequency is deteriorated:**
(1) Misalignment of Record head azimuth.
(2) Record head is dirty.
(3) Playback head is dirty.
(4) Defective Playback head.
(5) Defective Record head.
(6) Head(s) is(are) magnetized.
(7) Incorrect bias adjustment against tape.
(8) Defective 19 kHz MPX Filter.

**15.2.33. Induction of Wow/flutter:**
(1) Defective capstan belt.
(2) Defective flywheel ass'y.
(3) Defective capstan flange.
(4) Defective pressure roller ass'y.
(5) Defective capstan motor.
(6) Variation of take-up torque.
(7) Abnormality of back tension.
(8) Drive part(s) is(are) dirty.
(9) Slippage between pressure roller and tape.
(10) Defective ball drive mechanism ass'y.

**15.2.34. Meters do not flutter:**
(1) Meters themselves are defective.
(2) Defective meter amp.
(3) Tape is not played back.
(4) Neither being recorded nor monitored.
(5) Meter lead is shorted.
(6) Meter lead is cut.

**15.2.35. No power transmission:**
(1) Defective power cord.
(2) Defective power switch.
(3) Defective change-over plug and socket.
(4) Defective main transformer.
(5) Defective DC supply circuit.

**15.2.36. Ineffective mute:**
(1) No mute signal from logic board.
(2) Defective mute driver.
(3) Defective record eq. amp.
(4) Defective PB Head Amp..

**15.2.37. No oscillation of 400 Hz:**
(1) Defective oscillation circuit.
(2) Defective test tone switch.
(3) Shorted lead between test tone switch and main P.C.B. ass'y.
(4) Cut lead between test tone switch and main P.C.B. ass'y.

**15.2.38. Tape speed is too slow:**
(1) Defective capstan motor governor.
(2) Defective capstan motor.

**15.2.39. Remained in mute mode:**
(1) Continuous generation of mute signals from logic board.
(2) Defective mute driver.
(3) Defective record amp.
(4) Defective playback head amp.

**15.2.40. Defective memory rewind:**
(1) Defective tape counter.
(2) Defective memory switch.
(3) Defective driver of memory rewind.

**15.2.41. No activation of tape counter:**
(1) Defective tape counter.
(2) Defective counter belt.

**15.2.42. Unsatisfactory sound at Dolby NR IN:**
(1) Record/playback level is away from correct level (0 dB).
(2) Incorrect adjustment of Record Dolby NR.
(3) Incorrect adjustment of Playback Dolby NR.
(4) Incorrect bias adjustment against tape.
(5) Defective Record Dolby NR.
(6) Defective Playback Dolby NR.
(7) Incorrect playback gain (400 Hz level tape (DA09005A)).

**15.2.43. Pneumatic damper ineffective:**
(1) Defective pneumatic damper.
(2) Defective mechanism (heavy or does not work).
(3) Incorrect adjustment of damper.

## 16. SPECIFICATIONS

| | |
|---|---|
| Power supply | 100, 117, 220, 240 V AC 50/60 Hz |
| Power consumption | 60 W Max. |
| Tape speed | 1-7/8 ips ± 1% |
| Wow & flutter | less than 0.1% (DIN 45507 weighted peak)<br>less than 0.05% Wrms |
| Frequency response | 35 – 20,000 Hz ± 3 dB<br>(Dolby NR in, SX or EXII tape) |
| Signal to Noise Ratio | better than 65 dB<br>(Dolby NR in, Wrms, CCITT, 400 Hz,<br>3% distortion) |
| Total harmonic distortion | less than 1.5% (at 400 Hz, 0 dB) |
| Erasure | better than 60 dB<br>(at 1 kHz, saturation level) |
| Channel separation | better than 35 dB (at 1 kHz, 0 dB) |
| Crosstalk | better than 60 dB (at 1 kHz, 0 dB) |
| Bias frequency | 105 kHz |
| Input: | |
| Mic input | 0.2 mV 10 kΩ |
| Blend mic | 0.2 mV 10 kΩ |
| DIN mic input | 0.2 mV 10 kΩ |
| Line | 50 mV 50 kΩ |
| DIN Radio | 5 mV 20 kΩ |
| Output: | |
| Line | 1.0 V (Max.) variable |
| DIN line output | 1.0 V (Max.) variable |
| Headphones | 40 mW/8 Ω (1 kHz, 0 dB) |
| Transistors | 156 pcs. |
| Diodes | 78 pcs. |
| ICs | 9 pcs. |
| Dimensions | 20-11/16" (W) x 11-11/16" (H) x 8-5/8" (D) |
| Weight | 38 lbs approx. |

- Specifications and appearance design are subject to change for further improvement without notice.
- Dolby NR under license from Dolby Laboratories Inc.
- The word "DOLBY NR" and the Double-D-Symbol are trademarks of Dolby Laboratories Inc.

# Service Manual

# Nakamichi 1000II


Nakamichi Corp.
1-153 Suzukicho, Kodaira, Tokyo
Phone: (0423) 42-1111
Telex: 2832610 (NAKAM J)
Cable: NAKAMICHI KOKUBUNJI

Nakamichi U.S.A. Corp.
220 Westbury Avenue
Carle Place, N.Y. 11514
Phone: (516) 333-5440

1101 Colorado Avenue
Santa Monica, Calif. 90401
Phone: (213) 451-5901
Telex: 652429 (NAKREI SNM)



C-801001C Printed in Japan