

TOSHIBA

STEREO CASSETTE DECK

PC-X88AD



SPECIFICATIONS

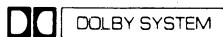
Heads:	Recording/playback: super AP combination head Erase: dual-gap ferrite head	Output terminals:	LINE OUT: 0.4V (50 k Ω) ENCODE OUT: 300mV (50 k Ω) HEADPHONE: 0.4mW (8 Ω)
Drive system:	2-motor IC logic control	Semiconductors:	20 ICs, 25 transistors, 10 FETs, 35 diodes, 9 LEDs
Motors:	Capstan drive DC servo motor Reel drive DC motor	Power supply:	AC 240V \sim , 50 Hz (for the U.K. and Australia) AC 220V \sim , 50Hz (for European Countries except the U.K.) AC 120V \sim , 50/60 Hz (for Canada)
Wow & flutter:	0.035% WTD, RMS DIN \pm 0.14%	Power consumption:	24W
FF and rewind time:	Approx. 80 seconds (C-60 tape)	Major dimensions:	420(W) x 110(H) x 280(D)mm (including knobs and supports)
Frequency response:	Metal tape: 20 Hz – 20,000 Hz Chrome position tape: 20 Hz – 19,000 Hz Normal tape: 20 Hz – 17,000 Hz	Weight:	4.8 kg
SN ratio:	60 dB (peak Level, WTD) (noise reduction OUT)	Accessories:	2 connecting cables (pin-pin) Head cleaner
THD:	0.3% (400 Hz) (adres IN)		
Bias frequency:	85 kHz		
Input terminals:	MIC: 0.25mV (600 Ω – 10k Ω) LINE IN: 70mV (50 k Ω) DECODE IN: 150mV (50 k Ω)		

Specification are subject to change without notice.

TC, TE, TU, AY

CONTENTS

1. FEATURES	2
2. SYSTEM CONNECTIONS	4
3. OPERATING INSTRUCTIONS	5 to 10
4. TECHNICAL POINT	11 to 12
5. DISASSEMBLY INSTRUCTIONS	13 to 19
6. BLOCK DIAGRAM	20
7. ELECTRICAL ADJUSTMENTS	21 to 22
8. ELECTRICAL PARTS LOCATIONS (MAIN)	23
9. SCHEMATIC DIAGRAM (MAIN)	24
10. ELECTRICAL PARTS LOCATIONS (ADRES/MUTING)	25
11. SCHEMATIC DIAGRAM (ADRES)	26
12. WIRING DIAGRAM	27
13-1. EXPLODED VIEW (MECHANISM)	28
13-2. EXPLODED VIEW (MECHANISM) PARTS LIST	29
14-1. EXPLODED VIEW (CABINET)	30
14-2. EXPLODED VIEW (CABINET) PARTS LIST	31
15. PARTS LIST	32 to 37



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adres is the new noise-reduction and Automatic Dynamic Range Expansion System developed by TOSHIBA Corp., Tokyo, Japan

1. FEATURES

- **Three-head deck with recently developed combination record/playback head**
 The new super AP head developed by TOSHIBA features a unique tapered head shape to ensure that the recording head makes perfect head-to-tape contact for optimum recording performance.
- **Dual adres system for maximum quality of sound**
 The 4-channel adres circuit in this deck enables recordings to be monitored during the recording operation.
- **4-channel adres unit for expanded adres capacity**
 When connected to another tape deck, adres recording and playback in the other deck is also possible.
- **High-performance 2-motor IC logic mechanism**
- **Memory counter and auto repeat functions**
- **Adjustable recording and playback sensitivity**
- **Fine adjustment of recording bias**
- **Tape transport mode buttons with built-in indicator lamps**
- **Remote control unit connector terminal**
- **Recording mute for easier editing**

2. OPERATING CONTROLS

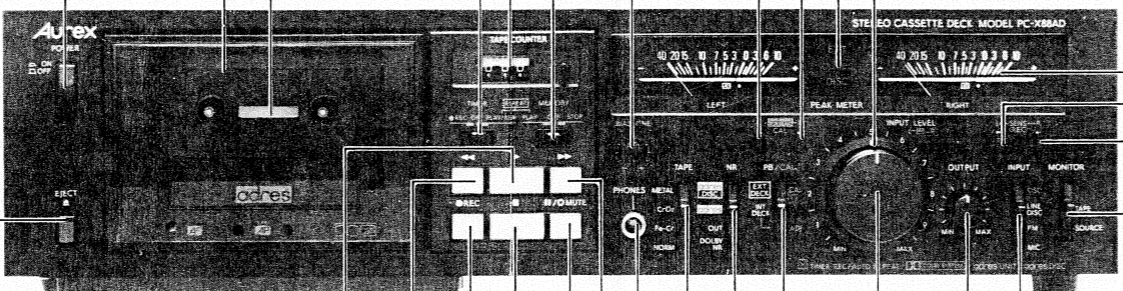
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- 1 Tape Counter [TAPE COUNTER]**
- 2 Timer Standby Switch [TIMER]**
For setting unattended recording and playback with a timer. Also used for automatic repetition playback. During normal operation, leave in the OFF position. (See pages (9) and (10) for details.)
- 3 Tape Window Lamp**
- 4 Cassette Compartment Door**
- 5 Power Switch [POWER]**
- 6 Eject Button [▲ EJECT]**
- 7 Play button [▶]**
If the pause button [■] ⑩ is pressed, the play button built-in lamp turns off, and the deck put into playback standby mode.
- 8 Rewind Button [◀◀]**
- 9 Record Button [● REC]**
Recording mode is started when this button is pressed together with the play button [▶] ⑦
If the pause button [■] ⑩ is pressed, the play button built-in lamp turns off, and the deck put into recording standby mode.
- 10 Stop Button [■]**
- 11 Pause/Record Mute [■/● MUTE]**
For temporary stop of tape transport, and preparation of blank sections of tape during recording mode. (See page (7) for details.)
- 12 Fast Forward Button [▶▶]**
- 13 Headphones Jack [PHONES]**
- 14 Tape Selector [TAPE]**
- 15 Noise Reduction Switch [NR]**
<DUPLI> Duplicate/monitor
<MONI>
Use this position for simultaneous playback monitoring and dubbing of an *adres* encoded tape.
<adres>
Use this position for *adres* recording and playback. (See page (5) and (6) for details.)
<OUT>
Set to this position when the noise reduction system is not being used.
<DOLBY NR>
- 16 Playback Deck Selector [PB/CAL]**
<EXT DECK /CAL> External deck
Set to this position when using another tape deck. (See page (6) for details.)
<INT DECK>
Set to this position when using the PC-X88AD tape deck.
<INT DECK-ADJ>
(See page (7) and (8) for details.)
- 17 Memory Switch [MEMORY]**
For automatic tape start search and automatic repetition playback. (See page (26) for details.)
- 18 Recording Bias Fine Adjustment [BIAS FINE]**
For fine adjustment of optimum recording bias for the tape to be used for recording purposes. (See page (8) for details.)
- 19 *adres* Calibration Controls [*adres* CAL]**
Used in adjusting the *adres* reference level in other tape decks. These controls are not required for recording and playback in the PC-X88AD. (See page (6) for details.)
- 20 Indicator Lamps**
- 21 Set Level Marker**
- 22 Level Meters**
- 23 Recording Level Sensitivity Adjustment Controls [SENS (REC)]**
For adjusting the correct recording level. (See page (7) for details.)
- 24 Monitor Switch [MONITOR]**
For selecting the monitor (output) signal.
<SOURCE>
For monitoring the input signal being recorded by the deck. Also set to this position when the [NR] switch ⑮ is set to the <DUPLI> position.
<TAPE>
For monitoring the signal (playback signal) just recorded by the PC-X88AD. By switching back and forth between the <SOURCE> and <TAPE> positions, the recorded signal can be compared directly with the source program (simultaneous monitoring during recording mode).
- 25 Input Selector Switch [INPUT]**
For selecting the tape deck input signal.
<OSC> Internal oscillator
Set to this position when adjusting the recording sensitivity for the PC-X88AD, and when recording with *adres* in the external tape deck. (See pages (6) for details.)
<LINE>
Set to this position for recording from phonograph records and other tapes. Also set to this position when the [NR] switch ⑮ is set to the <DUPLI> position.
<LINE-MPX ON (FM)>
Set to this position for recording FM stereo and TV multiplex broadcasts.
<MIC>
Set to this position for live microphone recordings.
- 26 Output Level Control [OUTPUT]**
For adjustment of the tape deck output (monitor) level and headphones output level.
- 27 Input Level Adjustment Control [INPUT LEVEL]**
For adjusting the input level. The outer ring is for the right channel, and the centre control for the left channel. (See page (7) for recording level adjustment details.)

Figure 1

28 Microphone Jacks

When a single microphone is used, plug into the left channel jack for monaural recording.

29 External Tape Deck Input and Output Terminals

These terminals have been included to enable adrec recording and playback in another tape deck connected to the PC-X88AD.

<ENCODE OUT> recording terminals

Connect to the recording input terminals (REC/LINE IN) of the other tape deck.

<DECODE IN> playback terminals

Connect to the playback output terminals (PLAY/LINE OUT) of the other tape deck.

REAR PANEL

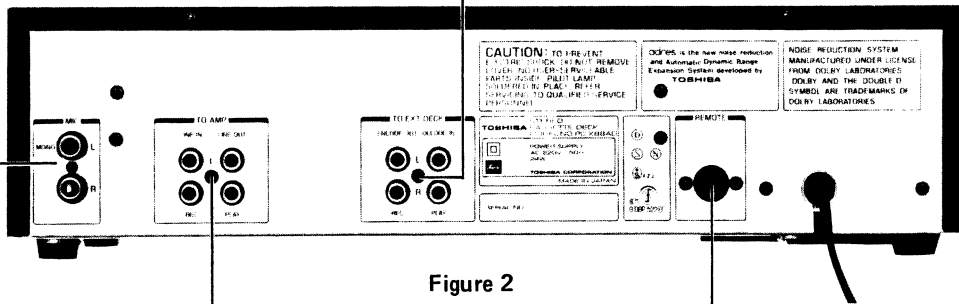


Figure 2

30 Amplifier Input and Output Terminals

<LINE IN> recording terminals

Connect to the tape playback input (REC OUT) terminals of your stereo amplifier.

<LINE OUT> playback terminals

Connect to the tape playback input (PLAY IN) terminals of your stereo amplifier.

31 Remote Control Connector

When an optional remote control unit such as the RM-15S is plugged into this connector, the PC-X88AD may be controlled from the comfort of an armchair etc.

System Connections

Connect the PC-X88AD into your audio system as shown in the following diagram using the pin-type cables provided. Make sure that each cable is connected to the correct terminal, and that all connections are made securely.

- Make sure that the power switches of all components are off before making any connections.
- Make doubly sure that there are no loose connections anywhere since these can easily give rise to unwanted noise.
- Use the red plug for the right channel.
- When connecting to the other tape deck, use the connecting cables supplied with that deck.

- 1) Another tape deck (external deck)
- 2) Connecting cable for recording (supplied with other tape deck, or purchased separately).
- 3) Connecting cable for playback (also supplied with other tape deck, or purchased separately).
- 4) Left channel microphone
- 5) Right channel microphone
- 6) Connecting cable for recording
- 7) Connecting cable for playback
- 8) Microphones (optional)
- 9) RM-15S (optional)

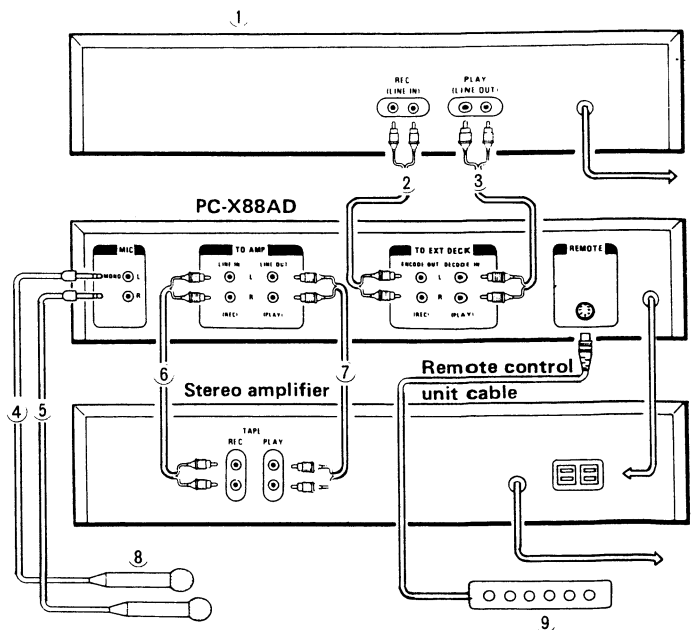


Figure 3

3. OPERATING INSTRUCTIONS

Operational Procedures

▪ Recording

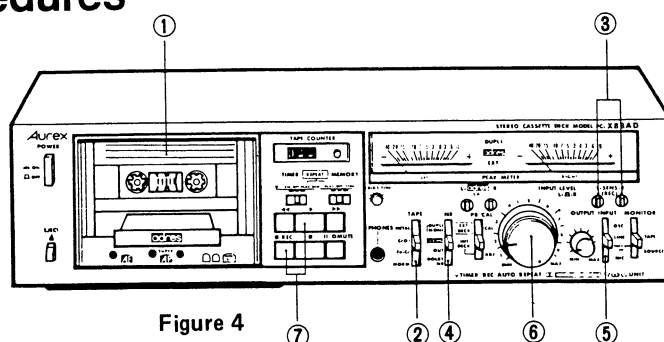


Figure 4

Note: Make sure that the timer standby switch [TIMER] is in the <OFF> position.

- ① Load a cassette tape into the cassette compartment.
Note: Make sure that the cassette tape is inserted properly.
- ② Switch the tape selector to the position designated for the type of tape being used.
- ③ Adjust the recording sensitivity. (See page 8 for details.)
Note: Recording bias fine adjustment is also described on page 8.
- ④ Set the [NR] switch to the desired position.
The <adres> position is recommended for high SN ratio recordings.

- ⑤ Set the input selector to the required position.
LINE Recording of phonograph records and AM broadcasts.
MPX ON Recording of FM stereo broadcasts (and TV multiplex broadcasts where available).
MIC For live recordings via microphone.
- ⑥ Adjust the recording level by turning the input level adjustment control while watching the level meter. (See page 7 for details.)
- ⑦ Commence recording mode by pressing the record button [●REC] and play button [▶] together.
Note: Set the monitor switch to the <TAPE> position for simultaneous monitoring when required.

▪ Playback

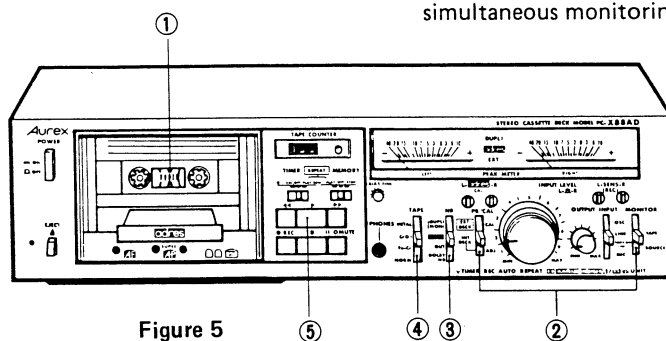


Figure 5

- ① Load the cassette tape.
Note: Make sure that the cassette tape is inserted properly.
- ② Set the playback deck selector to the <INT DECK> position, and the monitor switch to the <TAPE> position.
Note: For playback of tapes recorded with adres in another system, see page 7.
- ③ Set the [NR] switch to the position corresponding to the processing used in recording the tape.
- ④ Switch the tape selector to the position designated for the type of tape being used.
- ⑤ Press the play button [▶] to commence playback mode.
Note: Playback mode will not start if the input selector is in the <OSC> position.

▪ adres Recording and Playback in External Tape Deck

In adres recording and playback, a specific adres reference level (the [AD] level) is used. In tape decks with a built-in adres system, recording and playback levels are set automatically to this reference [AD] level. For recording and playback in the external tape deck, however, the recording and playback levels must be adjusted by the adres reference

signal (CAL TONE) beforehand to ensure compatibility between the PC-X88AD and the external tape deck. Therefore, proceed according to the following operation procedures for recording and playback in the external tape deck.

Recording

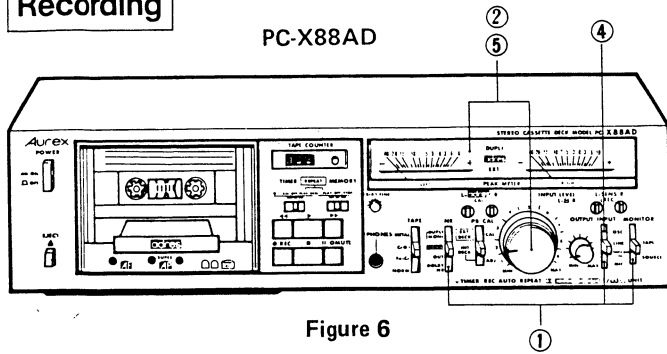


Figure 6

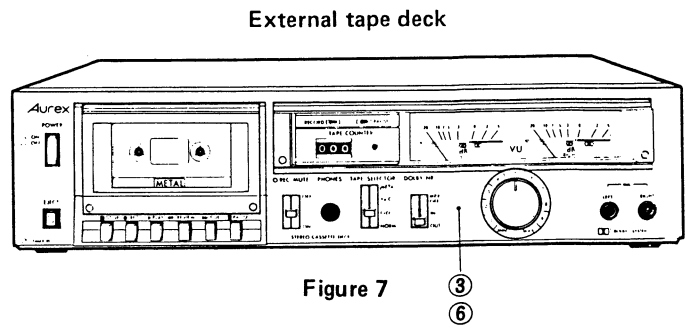


Figure 7

- ① Set the PC-X88AD input selector switch to the <OSC> position, the monitor switch to the <SOURCE> position, and the [NR] switch to the <adres> position.
 - ② Adjust the input level of the adres reference signal (CAL TONE) generated in step ① above to -3 dB ([AD] level) by turning the input level adjustment control.
 - ③ Put the external tape deck into recording mode, adjust the recording level to -3 dB ([AD] level), and record the CAL TONE at that level for about 20 seconds.
Note: The external deck NR switch should be in the OUT position.
 - ④ Next set the PC-X88AD input selector switch to the recording source position.
 - ⑤ Adjust to the optimum recording level for that source by turning the PC-X88AD input level adjustment control while watching the level meters.
 - ⑥ Preparations are now complete. Commence recording in the external tape deck.
Note: Do not readjust the external deck recording level control after setting to the meter reading of -3 dB .
- The same program can also be recorded simultaneously in the PC-X88AD if so desired.

Playback

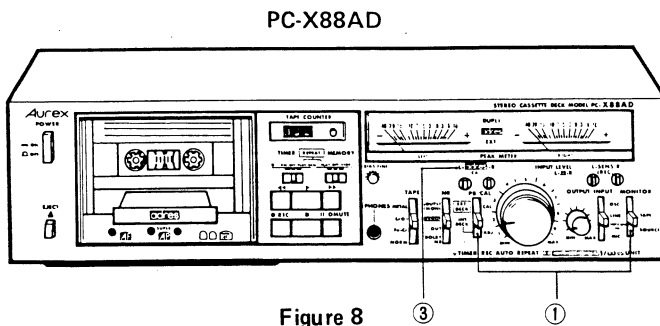


Figure 8

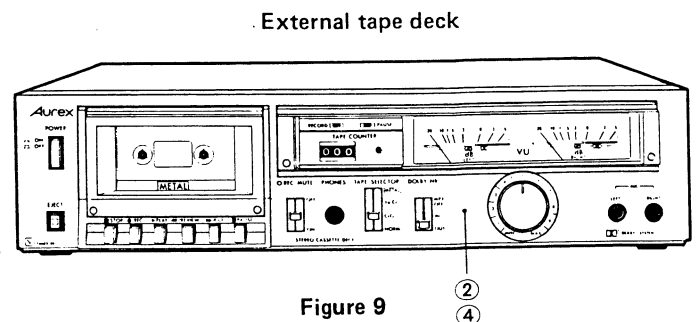


Figure 9

- ① Set the PC-X88AD playback deck selector to the <EXT DECK> position, and the monitor switch to the <TAPE> position.
 - ② Play the CAL TONE section (recorded as described in the previous operation procedure) of the adres tape in the external tape deck.
Note: 1. Leave the external deck NR switch in the OUT position.
2. Leave the output control set to maximum position.
 - ③ Adjust to -3 dB ([AD] level) with the PC-X88AD adres calibration controls [adres CAL].
Note: Leave the [NR] switch in the <adres> position.
 - ④ This completes the adjustment of the playback level. Put the external deck into playback mode.
Note: Playback mode will not start if the input selector is in the <OSC> position.
- Note:** 1. If an adres tape recorded in the external deck (cassette deck) is played back in the PC-X88AD, but the CAL TONE is not -3 dB ([AD] level), switch the playback deck selector to the <INT DECK-ADJ> position before starting in playback mode. In this case, the CAL TONE must be adjusted to -3 dB by the adres calibration control [adres CAL].
2. For playback of adres-encoded tapes (recorded in the PC-X88AD) in the external tape deck, leave the CAL TONE at the -3 dB ([AD] level) position.

Recording and Playback in External Tape Deck without NR System

After setting the PC-X88AD [NR] switch to the <OUT> position, proceed in exactly the same way as described above for adres recording and playback.

Recording Level Adjustment

Generally, the type of tape used and the recording level setting will effect the recording frequency response. For example, the frequency response of metal tapes (particularly in middle and high frequency regions) is considerably better than normal tapes at the same level setting (see Fig. 10 below).

Furthermore, the recording/playback frequency response is also improved by setting the recording level at somewhat lower levels for the same tape (see Fig. 11).

If, however, the recording level is set too low, noise tends to become more prominent (i.e. SN ratio deteriorates). But since this deck incorporates the adres (Automatic Dynamic Range Expansion System), tape hiss is practically negligible. This means that recording levels in this tape deck can be set at lower values (particularly when recording program sources containing a large proportion of high frequency sounds) without noise becoming noticeable.

Hence, fine quality recordings with frequency response extending well into the high frequency region, and featuring a

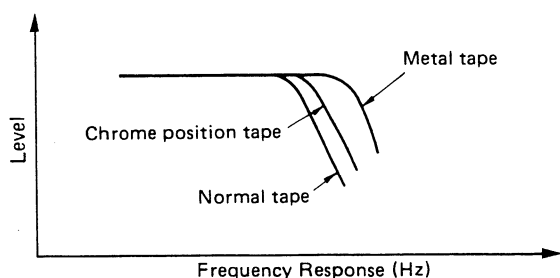


Figure 10

Playback of Tapes Recorded with adres in Another System

- Tapes recorded in other tape decks equipped with a built-in adres system may be played in the PC-X88AD.

Note: Set the playback deck selector to the <INT DECK> position.

- For playback of adres tapes recorded in another system including an adres unit, and including a recorded CAL TONE signal, proceed according to **Note 1** in the **Playback** procedure described above.

very high SN ratio can be achieved. Note that by using lower recording levels, the resultant playback level will also be relatively low, but this may be readily compensated by re-adjustment of the amplifier volume control.

The peak level meters featured in this tape deck are extremely sensitive to large transient inputs (attack time of 10 ms). In comparison with normal VU meters, transient signals read 8 to 10 dB higher in this set, while continuous "average level" signals read about 4 or 5 dB higher.

Table 1 Maximum Settings of Recording Level

Type of tape	Maximum level meter readings
Normal tape	-6 to 0 dB
Chrome position tape	-3 to +3 dB
Metal tape	0 to +6 dB

- Lower level settings are recommended for program sources with greater high frequency sound content.

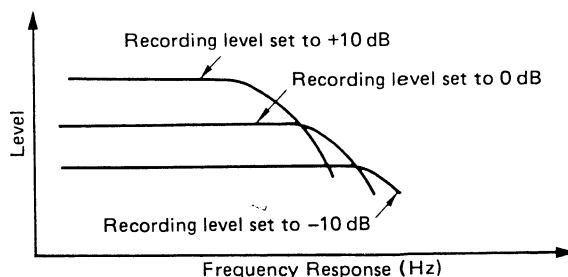


Figure 11

Mute Recording

The PAUSE/MUTE button therefore serves a dual purpose: record mute and pause.

For proper operation follow the steps given in the table just below:

- When the button is pressed during playback, only the pause function operates. The PAUSE/MUTE button is not effective in the fast-forward and rewind modes.

	① Making a non-recorded gap	② Releasing the pause mode
PAUSE/MUTE button operations	A non-recorded gap can be created by pressing and holding the PAUSE/MUTE button during recording. When the button is released, the tape stops in the pause mode. 	To restart recording, momentarily press the button again.
Tape transport and record mode		

Figure 12

Fine Adjustment of Recording Bias

Since the PC-X88AD tape selector switches the recording bias and equalization characteristics simultaneously for the type of tape used, fine adjustment of the recording bias is not normally required.

However, small differences in the optimum recording bias can result in changes in the frequency response and distortion level (see Figs. 13 and 14) with each separate tape used. In the PC-X88AD, the recording bias can be adjusted by the BIAS FINE control while monitoring during recording mode.

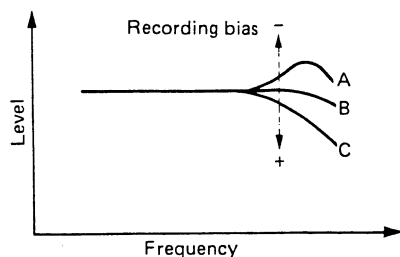


Figure 13

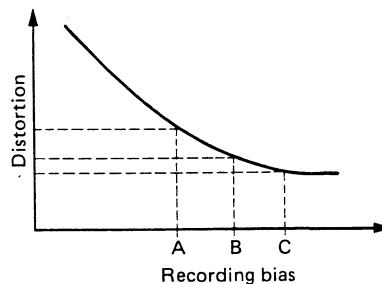


Figure 14

Recording Sensitivity Adjustments

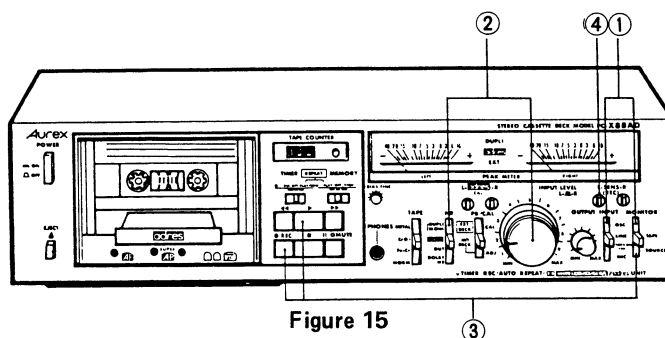


Figure 15

In general, the recording sensitivity differs slightly from tape to tape. The PC-X88AD is equipped with a built-in oscillator, and is capable of simultaneous monitoring during recording mode, thereby enabling recording sensitivity to be adjusted simply and accurately. Before commencing recording operations (as described on page 6), adjust the sensitivity as outlined in the following procedure.

- ① Set the input selector switch to the <OSC> position, and the monitor switch to the <SOURCE> position.
- ② By turning the input level adjustment control, adjust the level of the signal generated in step ① above to the reference levels listed in Table 2.

Table 2 Reference Levels

For adrec recording	-3 dB (AD level)
For Dolby recording	+3 dB (Dolby level)
For recording at NR OUT position	0 dB

- ③ Commence in recording mode, and set the monitor switch to the <TAPE> position.

Note: Also set the tape selector to the position designated for the type of tape being used.

- ④ Adjust to the reference level by turning the recording level sensitivity adjustment controls [SENS (REC)].
- ⑤ This completes the recording sensitivity adjustment. Proceed with the recording as described on page 6.

Note: 1. The signal recorded during this operation may be erased once the adjustment has been completed.

2. Adjust sensitivity for each separate cassette tape used.

3. The tone generated in the <OSC> position cannot be monitored audibly.

Unattend Recording and Morning Alarm Playback (Timer Operations)

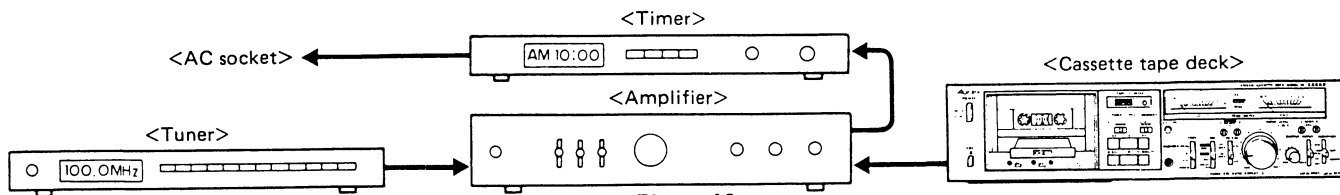


Figure 16

Note: The power switches for the amplifier, tuner and tape deck must all be left in the ON position.

Unattended Recording

- ① Setting the recording level
After first tuning to the desired radio broadcast (tuner operation), press the pause button [II] and then the record [●REC] and play [▶] buttons. Then adjust the recording level with the [INPUT LEVEL] adjustment control.
- ② Set the recording start time in the timer unit (resulting in the audio system power being switched off).
- ③ Set the tape deck [TIMER] standby switch to the <REC> position.

This completes the setting procedure. The audio system will be turned on and the recording commence automatically at the time preset in the timer.

Note:

When the end of the tape is reached during this recording mode, the tape will be stopped automatically. The amplifier, tuner and tape deck power supply, however, will remain on. It is recommended, therefore, that a 2-step timer capable of switching the power off again be used. After completing the recording in this way, be sure to return the [TIMER] standby switch to the <OFF> position. Otherwise, there is danger of erasing wanted material when the tape deck is next turned on. It is a good idea to snap off the erasure prevention tabs along the back edge of the cassette after the recording has been completed.

Morning Alarm Playback

- ① Insert the tape you wish to use as the morning alarm. Put the deck into playback mode and adjust the amplifier volume control to a suitable level.
- ② Set the alarm time in the timer unit (resulting in the power supply being switched off).
- ③ Set the tape deck [TIMER] standby switch to the <PLAY> position.

This completes the morning alarm playback setting procedure. Playback will commence automatically at the time preset in the timer unit.

Note:

If the end of the tape is reached in this mode, the tape will be rewound and playback recommenced automatically.

If the morning alarm playback is no longer required, be sure to switch the power off, and return the [TIMER] standby switch to the <OFF> position.

Tape Dubbing

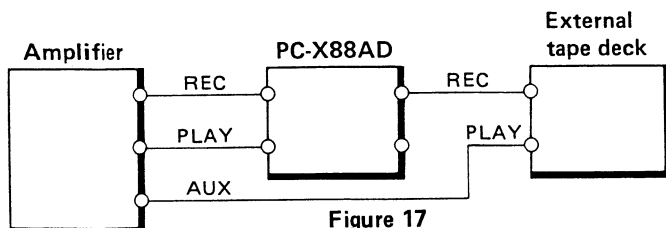


Figure 17

While listening to an adres tape, another adres tape containing the same program contents can be recorded (in the external tape deck).

- ① Calibration procedure
 1. If the tape to be copied includes a recording of the adres reference signal, play that CAL TONE in the external tape deck (with [OUTPUT] control in maximum position).
 2. If the tape does not include the adres reference signal, record a signal in a blank section of tape from a test record cut at 1 kHz, 5 cm/sec. or tuner oscillator level in the external tape deck at an input level of -3 dB, and then play the signal back again with the [OUTPUT] control at maximum level.

Using the signal played back in the external deck, adjust the input level adjustment control so that the PC-X88AD level

Connecting

Tape dubbing from one tape to another is possible if the external tape deck playback output connecting cable is connected to the AUX input terminals of the amplifier.

- meter reads -3 dB ([AD] level).
- Note:** Leave the external deck NR switch in the OUT position.
- ② Play the adres tape in the external tape deck.

Note: 1. Set the amplifier FUNCTION selector to the AUX position.
2. Leave the external deck NR switch in the OUT position.
 - ③ Record the playback signal in the PC-X88AD with the [NR] switch in the <DUPLI> position.
- Note:** 1. Set the input selector switch to the <LINE> position.
2. The calibration operation must always be completed before commencing tape dubbing in this case.
- Simultaneous monitoring of the recording is possible if the amplifier monitor switch is set to the TAPE position, and the PC-X88AD monitor switch is switched back and forth between the <TAPE> and <SOURCE> positions.

■ NR Recording of a Non-Encoded Tape

- ① Play the non-encoded tape in the external tape deck.
Note: Make sure that the amplifier FUNCTION selector is in the AUX position.
- ② Set the PC-X88AD [NR] switch to the desired noise reduction system, and proceed to record the playback signal.
Note: Set the input selector switch to the <LINE> position.

- The recording can be monitored during the dubbing process by switching the amplifier tape monitor switch to the TAPE position.
Note: Set the PC-X88AD monitor switch to the <TAPE> position.

Automatic Tape Start Search and Playback

Set the tape counter to <000> at the position where you wish the tape to start from again later on. When the tape is rewound afterwards, tape transport will stop automatically at <999>, and resume playback in repeat mode (if so set).

The [MEMORY] switch and [TIMER] switch may be used in combination in a number of ways for different automatic operational modes (see accompanying chart).

Function	TAPE COUNTER			Switch	
	Tape start	<999>	<000>	TIMER	MEMORY
Memory stop		← STOP	← REW	OFF <input type="checkbox"/>	STOP <input type="checkbox"/>
Memory play		← REW	→ PLAY	OFF <input type="checkbox"/>	PLAY <input type="checkbox"/>
Auto-rewind stop	← STOP		→ PLAY	REW <input type="checkbox"/>	OFF <input type="checkbox"/>
Auto-rewind memory stop		← STOP	→ PLAY	REW <input type="checkbox"/>	STOP <input type="checkbox"/>
Memory repeat			→ PLAY	REPEAT <input type="checkbox"/> REW <input type="checkbox"/> PLAY	

Figure 18

Major adres Features

- adres (Automatic Dynamic Range Expansion System) is a major breakthrough (successfully achieved by **TOSHIBA** engineers) in the elimination of hiss noise inherent to tape. (This noise is the result of the tape being narrow and moving slowly.)
- adres contains a variable emphasis circuit designed to vary the emphasis characteristics according to the input signal level. By compression before recording and expansion during playback of the signal right across the complete frequency spectrum, a clear, powerful playback signal may be obtained with a greatly expanded dynamic range and vastly improved SN ratio.
- Because of the effective value detector system in the adres level sensor circuit, there is practically no mis-matching due to differences in tape and tape deck characteristics. Furthermore, slight mismatching between input and output levels does not result in a significant change in sound quality.
- Furthermore, by keeping the compression/expansion ratio to a power of almost 1.5, and by incorporating the variable

emphasis circuit, there is very little "breathing" phenomenon. In other words, the adres system is the right type of noise reduction system for cassette tape decks.

Typical adres Results

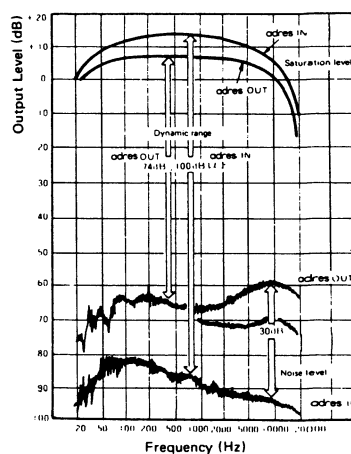
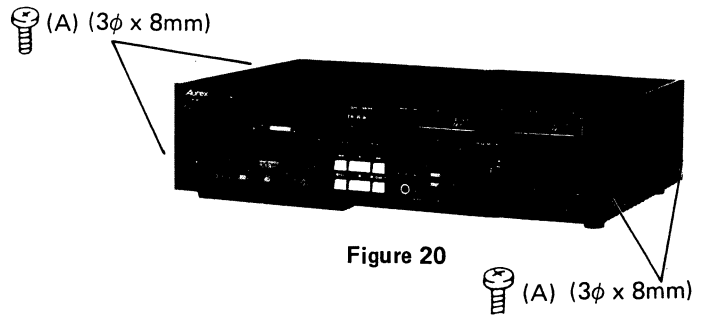
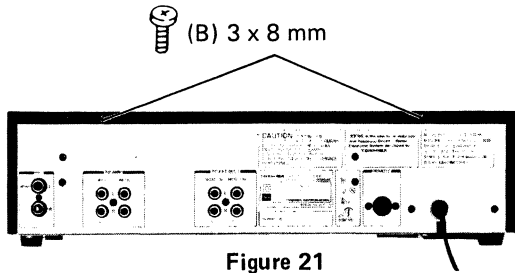


Figure 19

4. DISASSEMBLY INSTRUCTIONS

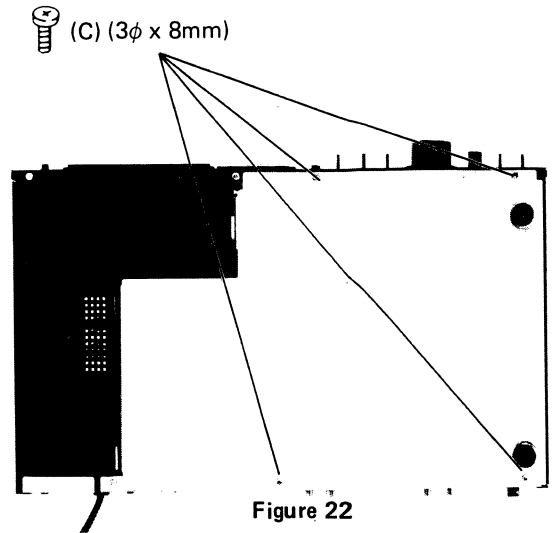
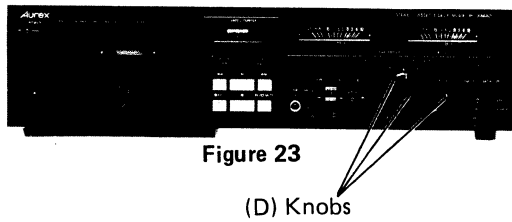
TOP COVER REMOVAL

1. Remove four screws (A) ($3\phi \times 8\text{mm}$) from each side of top cover and two screws (B) ($3\phi \times 8\text{mm}$) on jack board, then the top cover can be removed from the unit.



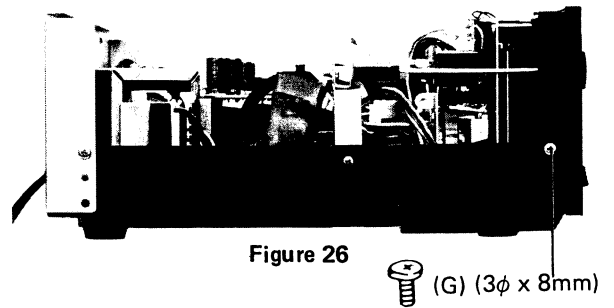
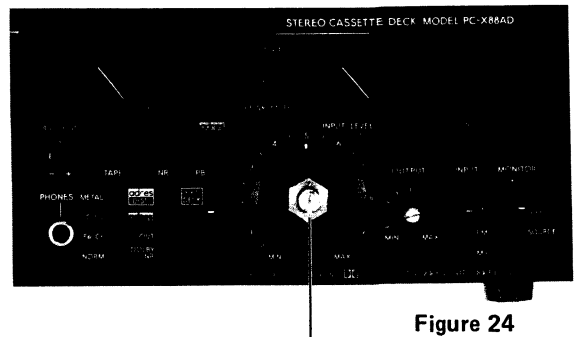
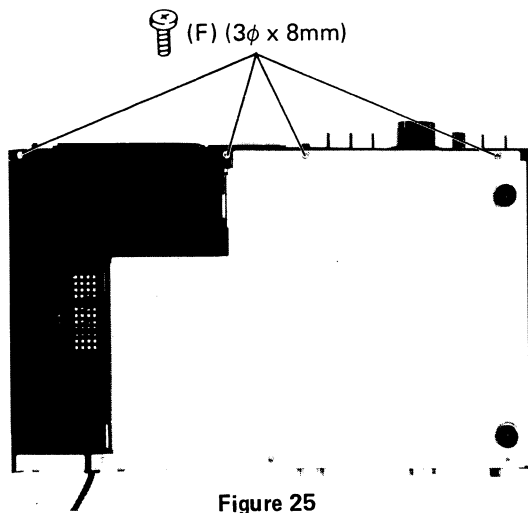
BOTTOM PLATE REMOVAL

1. Remove four screws (C) ($3\phi \times 8\text{mm}$), then the bottom plate can be removed out.
2. Then parts on main P.C. Board can be checked easily.



FRONT PANEL REMOVAL

1. Remove three knobs (D) on front panel and one hex nut (E) holding the level marker under recording level control knob.
2. Remove four screws (F) ($3\phi \times 8\text{mm}$) holding the front panel and one screw (G) ($3\phi \times 8\text{mm}$) on the left side of the unit.



3. Disconnect six joint wires (H), 7p connector and 4p connector on P.C. Board, then panel assembly can be removed frontwards.

4. Remove two screws (I) holding Main P.C. Board, then remove meter P.C. Board and peak meter from the front panel.

CAUTION:

When disconnecting joint wires, confirm the position as it is.

5. Remove one screw (J) ($3\phi \times 6\text{mm}$) on the inside of the MIC jack from the main chassis, then the shield plate can be removed.

6. Disconnect two cord cramps (K) on Main P.C. Board to release the cords.

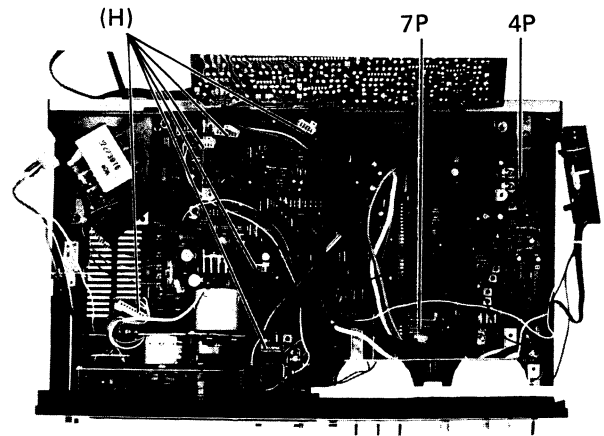


Figure 27

ADRES P.C. BOARD AND MUTING P.C. BOARD REMOVAL

1. Remove two screws (L) ($3\phi \times 8\text{mm}$) holding ADRES P.C. Board.

2. Remove two screws (M) ($3\phi \times 8\text{mm}$) holding Muting P.C. Board.

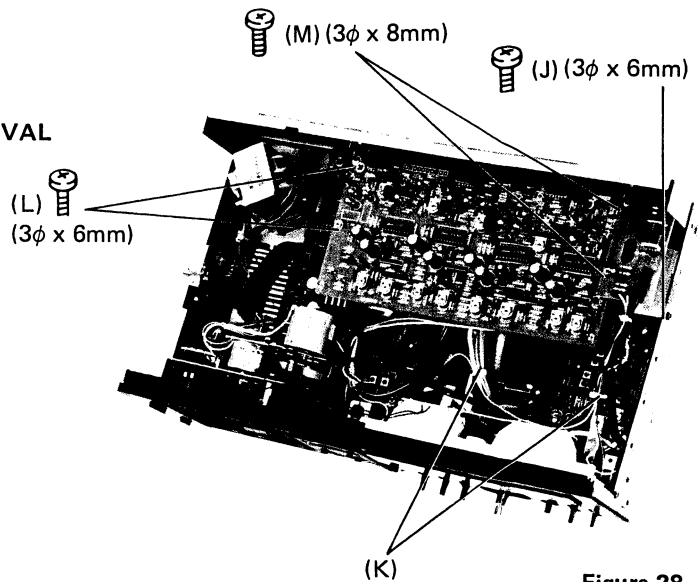


Figure 28

MECHANISM ASSEMBLY REMOVAL

1. Remove the front panel (Refer to front panel removal).

2. Remove three red screws (N) ($3\phi \times 8\text{mm}$) holding mechanism ass'y and one red screw (O) ($3\phi \times 8\text{mm}$) holding cord clamp.

CAUTION:

When removing Mechanism Ass'y from the front panel, confirm the installation position of counter belt.

TAPE COUNTER REMOVAL

1. Remove two screws (P) ($2.6\phi \times 8\text{mm}$) on the front panel, then tape counter can be removed out.

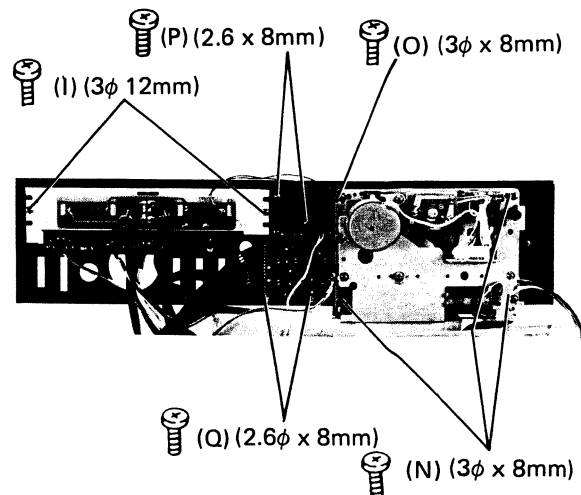


Figure 29

KEY SWITCH REMOVAL

1. Remove two screws (Q) ($2.6\phi \times 8\text{mm}$) holding key switch P.C. Board, then key switch and L.E.D. holder can be removed from the front panel.

5. TECHNICAL POINTS

Technical Points (Heads, Solenoid, Motor)

- Three head system shows the following improved characteristics and high performance mechanism as compared to conventional ones. When replacing and adjusting tape mechanisms, refer to the following instructions.

Record/Playback Combination Head

- A record head and a playback head are independently combined.
- Such a new head requires correct adjustment of head height and head pressure. Therefore, a new adjustment mechanism of head pressure is adopted.
- A head azimuth adjustment screw and a tape guide are located in the opposite side as compare with usual position and the P.C. Board is installed behind the head.

Erase Head

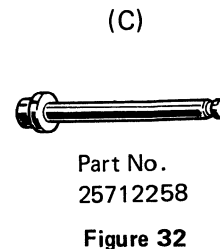
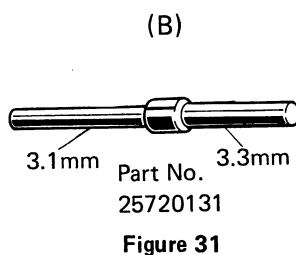
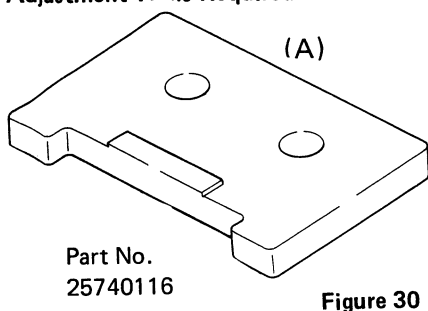
- In order to give a suitable tape tension to R/P combination head, the erase head has a movable mechanism as to press the tape between the fixed pin with felt pad and the erase head. Therefore, the erase head replacement must be carefully done.

Capstan & Pinch Roller

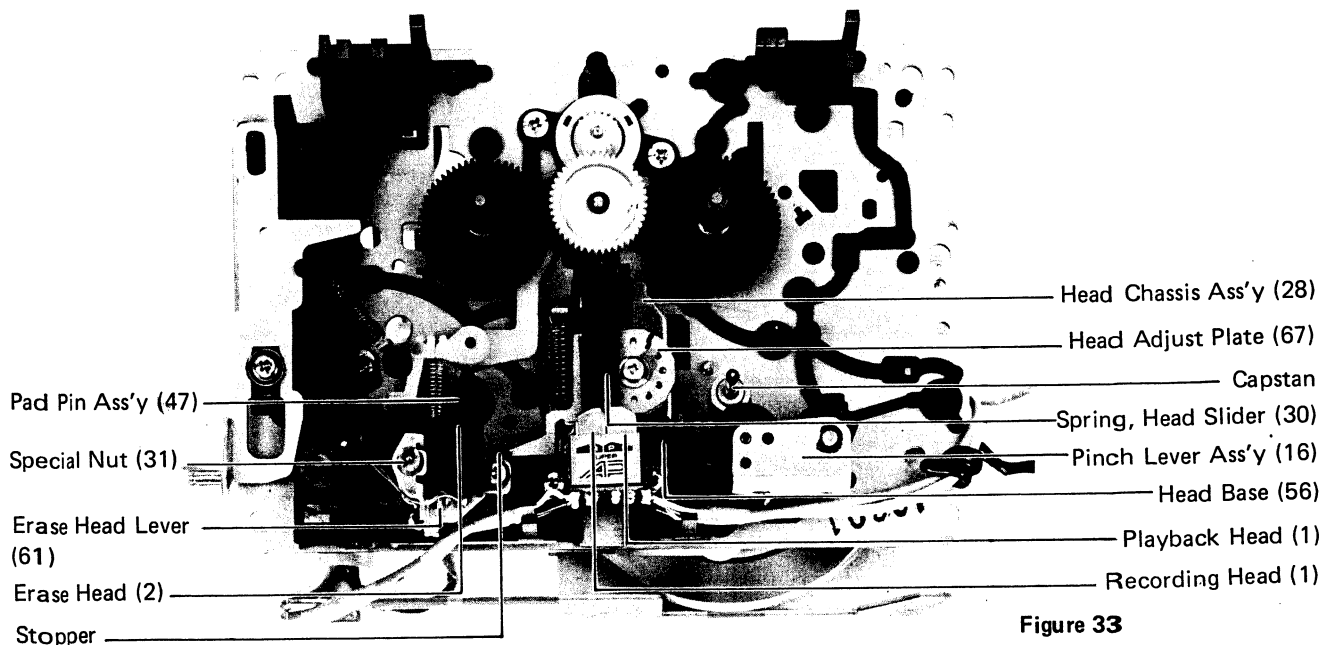
- The tape running part of the capstan shaft has been treated with special chemicals to give a tape driving force to it and also the tape running part of the pinch roller has a larger round than the other same series models (PC-X45AD, PC-X44AD). When replacing them, be sure to use the specified ones.

Mechanical Adjustment Point (Head, Solenoid, Motor)

1. Adjustment Tools Required



2. Part Names Around the Heads



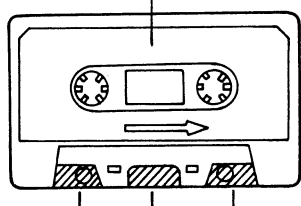
3. Replacement & Adjustment of R/P Combination Head

- Disconnect four head lead wires (single cored shield wire) and remove two head installation screws (BID $2\phi \times 5\text{mm}$ /DT BID $2\phi \times 12\text{mm}$).
- Replace the R/P head.
- Reassemble the head installation screws and the head lead wires.
- Confirm the head height as follows.

Set the Head azimuth adjustment screw so that the head becomes horizontal by measuring with the eyes and confirm that the mirror cassette (MC-09C) or C-90 cassette (cut off the shaded portions to remodel as shown in figure 34) is not curled on play mode. If the tape is curled in the upper side of tape guide, add a washer (0.2t) under the R/P head and if it curled in the lower side of tape guide, remove the washer (0.2t) under the R/P head as shown in figure 35.

- Adjust head azimuth according to the item "Head Azimuth Adjustment in Electrical Adjustment Table" in page 22.

C-90 Cassette Tape (Remodeled)



Take off the shaded portion.

Figure 34

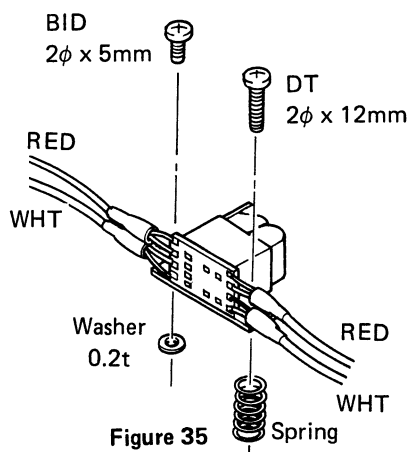


Figure 35

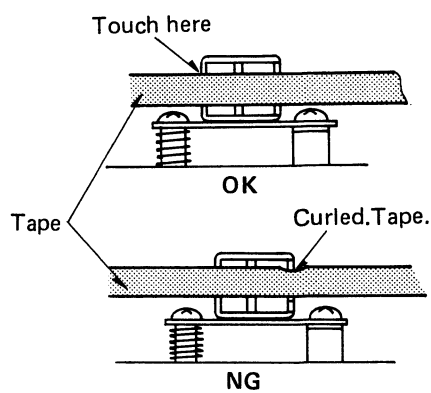


Figure 36

- Head Pressure Adjustment

Set the specified adjustment tool (A) as shown in figure 30, then check the gap between the adjustment tool (A) and the tip of R/P head by inserting the adjustment tool (B). Accordingly check that the thinner half of the tool (B) passes smoothly through the gap and the thicker half does not go through.

- When the head pressure is beyond the specifications above, loosen the screw on the head pressure adjustment plate and lift it upward a little. Then the head pressure can be changed by turning the plate to the right or left.
- The mark number "4" is the basis of the adjusting plate.
- When turning the plate clockwise, the head pressure will become weaker slightly. (4) → (5) → (6)
- When turning it counter-clockwise, the head pressure will become stronger. (4) → (3) → (2) → (1)

CAUTION: Improper adjustment of (d), (e) and (f) doesn't get the optimum result on such as frequency response, level deviation and wow/flutter. When using the adjustment tools, take care not to damage the R/P head.

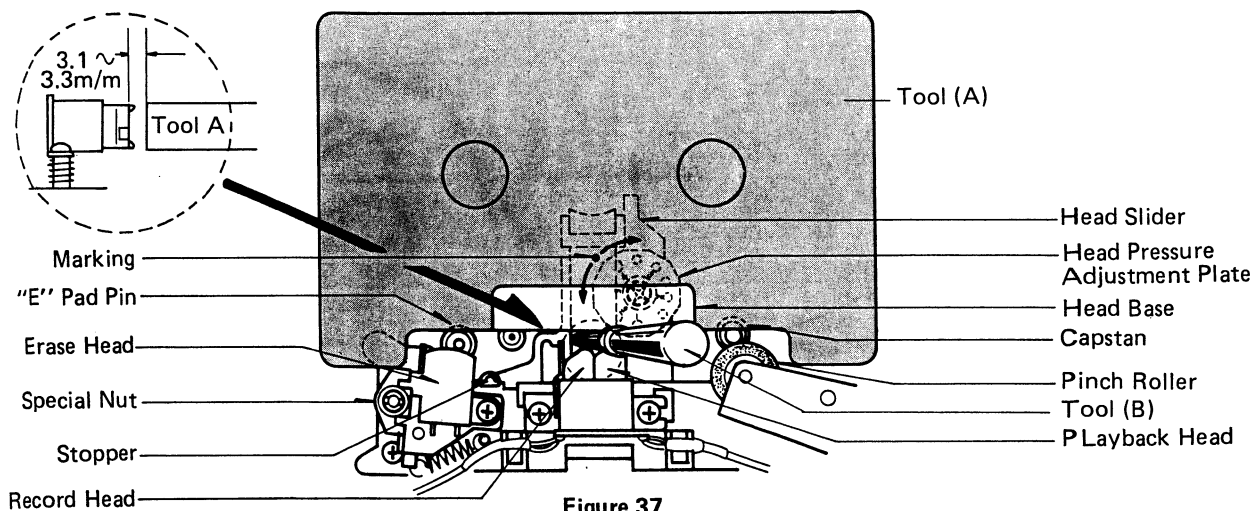


Figure 37

4. Replacement and Adjustmen of Erase Head

Disassembly

- (a) Disconnect the lead wires from the head terminal. Take off the solder of the lead wire on P.C. Board.
CAUTION:
 - The lead wires are stuck to the erase lever.
 - Do not give a strong force to the lead wires since they are thin.
 - Distinction between (+) and (-) wires is not necessary.
- (b) Remove the spring (7).
CAUTION: This spring is for the erase head to press the erase head pad properly, so unspecified parts must not be used.
- (c) Remove the special nut (1).
CAUTION: The special nut is fixed with a screw lock paint, so it can be removed with a (-) driver by heating and moving it a little.
- (d) Remove the erase head form the shaft.
CAUTION: Do not lose the two washers (2, 3).
- (e) Remove the two screws ((5) DT 2φ x 8mm/(8) BID 2φ x 3mm).

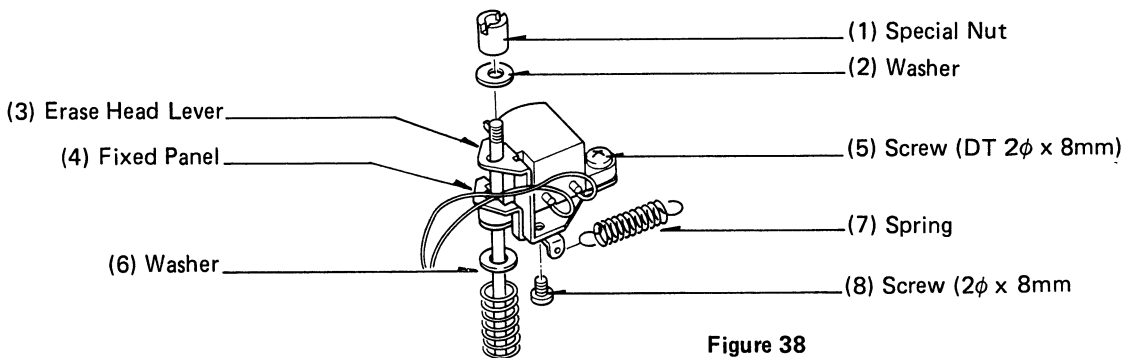


Figure 38

Reassembly

- (f) Set the adjustment tool (C) as shown in figure 32.
CAUTION: The erase head's hole and the erase lead lever's hole should be located in a concentric position, otherwise the erase head does not work smoothly.
- (g) Fix the two screws temporarily, as explained at (e).
CAUTION: When setting the screw (DT 2φ x 8mm), adjust the slip between the screws and the erase head's hole, as shown in figure 40.
- (h) Fix the screws properly, then take care of adjusting tool (C).
- (i) Since the erase head and the screw (BID 2φ x 3mm) or the erase head lever are close together, check if they are not contacted. If there is no spece between them, bend the erase head terminal a little upward.
CAUTION: If the erase head terminal contacts with the erase head lever, it may cause "no erasing" or "overheat and damage of OSC coil". Be careful not to contact them when soldering the lead wires.
- (j) Get the erase head assembly through the shaft together with a washer.
- (k) Install the spring (7).

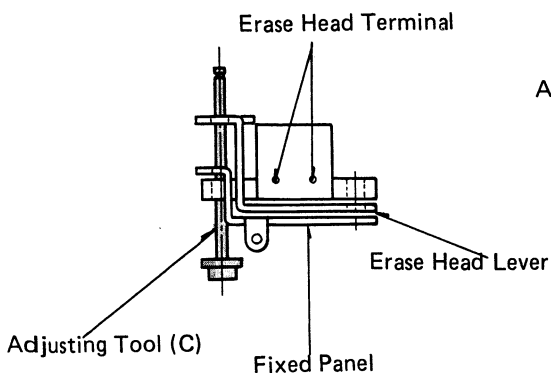


Figure 39

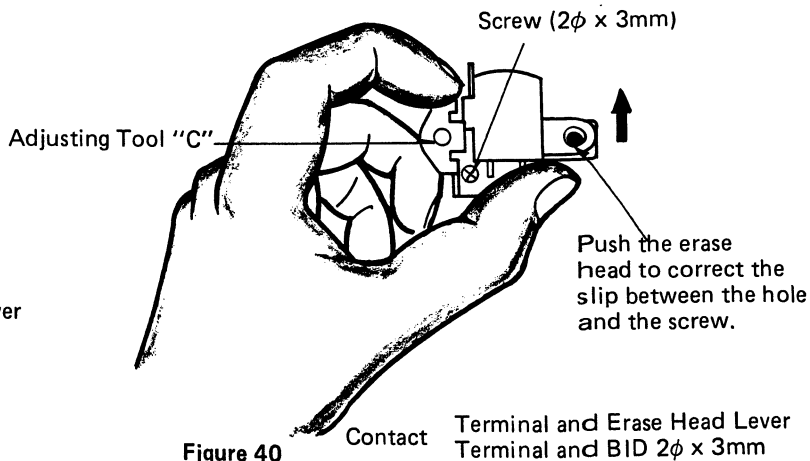


Figure 40

- (l) Fix the special nut (1), Tighten and adjust roughly until the top of the shaft becomes same level with the groove of the nut as shown in figure 41.
- (m) Solder the removed lead wires to the erase head terminals and the relay P.C. Board.
- (n) Confirm that there is a suitable clearance between the erase head level and the head base stopper in play mode as shown in figure 43.

CAUTION: This clearance depends on the setting of R/P combination head pressure and when replacing the R/P head, confirm the clearance after adjusting head pressure.

- (o) Erase head height adjustment

After rough adjustment of the above item "l", confirm that the mirror cassette tape (MC-09C) does not curl in play mode. If it curls, adjust the erase head height by turning the special nut.

- (p) Apply some lock-paint between the special nut and the shaft.

CAUTION: ● Painting can be done easily by applying some lock-paint on a thin bar such as a match bar. Be careful to keep the lock-paint away from other parts.

- If the play and stop modes are repeated to change before the lock-paint hardens, the special nut turns and consequently the erase head adjustment becomes wrong.
- Care must be taken so that the screw lock-paint does not stick to the rotating part of erase head.

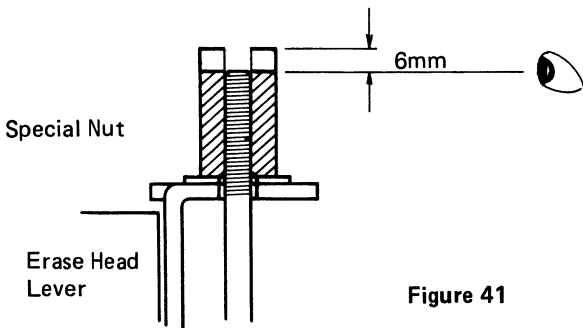


Figure 41

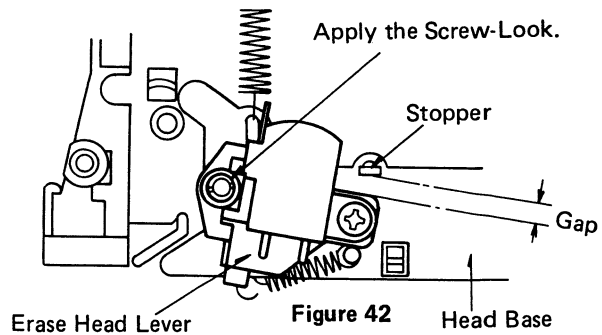


Figure 42

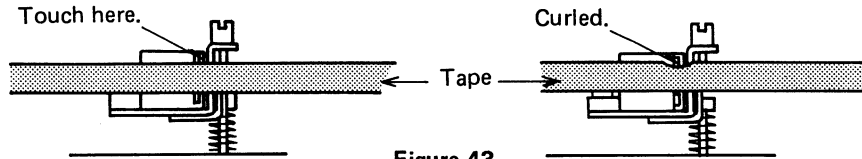


Figure 43

5 Replacement of Erase Head Pad

- Remove the screw (BID 2φ x 5mm) by inserting a screwdriver through the hole of the thrust plate on the rear side of deck mechanism, and the erase head pin can be taken off to the front.
- Prepare a new pad with a double face adhesive tape, and stick it strongly (about 1 kg pressure) on the side cleaned with benzine.
- Be careful not to touch the sticky part of the tape by fingers.

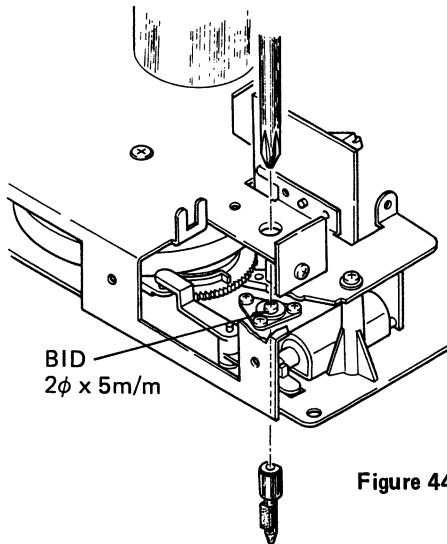


Figure 44

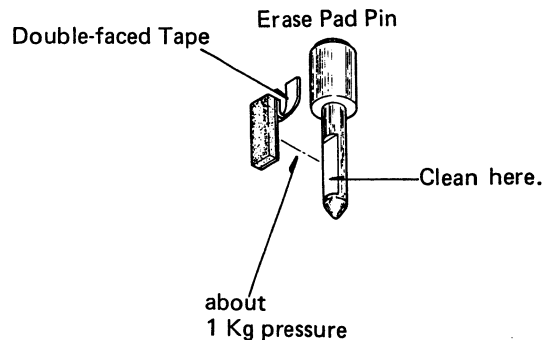


Figure 45

6. Replacement & Adjustment of Reel Motor

- After removing the P.C. Board from the rear of the reel motor, remove two screws (BID 2φ x 8mm) and take off the motor.
- When installing the new motor, be careful of the position of the marked hole (3.5φ) on the reel motor as shown in Figure 46.
- After installing the motor, apply some grease (GB-TS-1) on the take-up gear.
- After replacing the motor, set the torque cassette to check the take-up torque (specified value: 40 g/cm ±10 g/cm).
- If the above value is out of specified one because of variety of motor, adjust the semi-fixed variable resistor (R747 in the schematic diagram) on R/P P.C. Board.

Caution: The needle of torque meter indicates ±5 g/cm fluctuations because of characteristics of this motor. In this case, read a mean value on the meter.

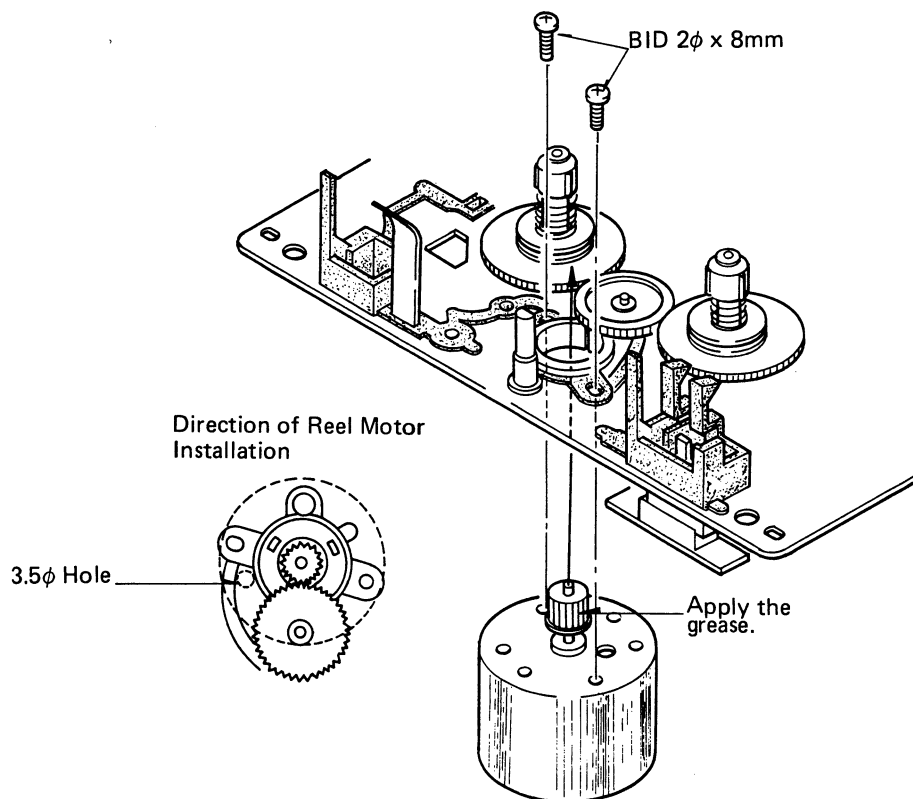


Figure 46

7. Replacement of Main Motor

- (a) After removal of the mechanism assembly according to the item "MECHANISM ASSEMBLY REMOVAL", remove four screws ($3\phi \times 6\text{mm}$, $2\phi \times 8\text{mm}$), a spring and cord cramps as shown in figure 47, and then take off the belt between the main motor and the flywheel.
- (b) Turn the mechanism assembly reversely and remove three screws ($2.6\phi \times 8\text{mm}$) together with three motor cushions and one screw ($3\phi \times 4\text{mm}$) as shown in figure 48, and then the main motor can be removed from the main chassis.

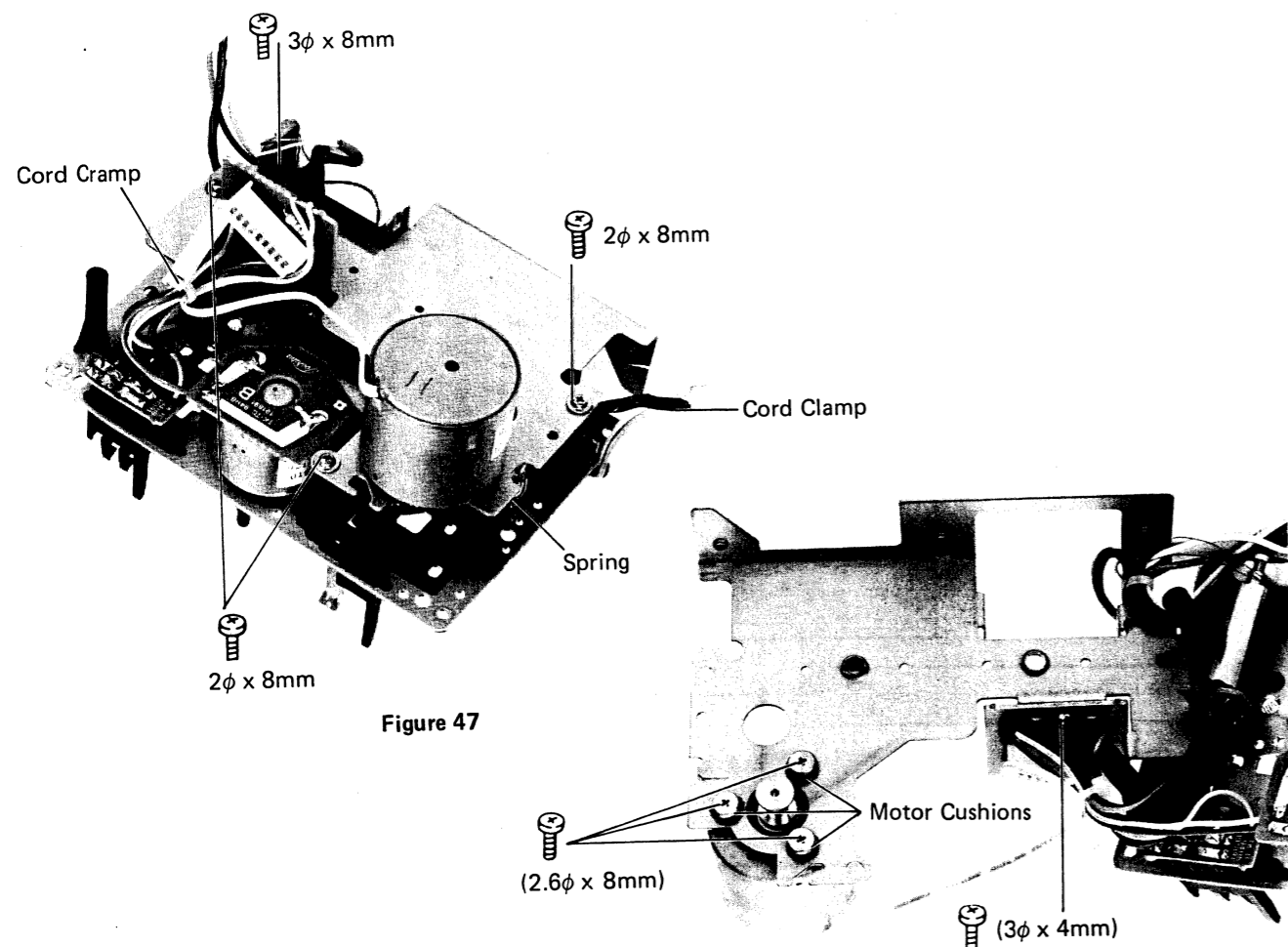


Figure 47

Figure 48

8. Replacement & Adjustment of Solenoid

- (a) Take off the solder from the solenoid terminal and remove the P.C. Board.
- (b) Remove two screws (BID 2.6 x 3.5, BID 2.6 x 4) holding the solenoid.
 - CAUTION:**
 - The tips of screws appear by shifting the lock slider (D) lightly to the left (toward outside) when removing the screws.
 - These screws can be removed with a clock screwdriver or thin driver. If such drivers are unavailable remove the eject lever and lock slider (D).
- (c) Replace the solenoid to new one.
 - CAUTION:** When reassembling, use the specified screws. Longer screws touch the coils in the solenoid and as a result, it bring a rare shorting of them. It may happen to cause not only the solenoid disorder but also a fire and a burning because of overheat of ground spring.

(d) Adjustment of Installation Position

The solenoid assembly can be moved a little forward or backward by holding the tip of solenoid pin and the rear side of it in current penetrating state. In this state, set the clearance 0.1 to 0.5 mm between the 3ϕ tip of solenoid lever and the square hole of mechanism chassis as shown in figure 49.

- If the fingers do not touch the tip of the solenoid pin but the solenoid lever, the exact adjustment cannot be done because the state becomes like that when the lever is more moved than when the electric is going through the solenoid.
 - If there is no space described above, the solenoid cannot be fully pulled when the electric is going through, does not maintain the play mode when changing from the stop mode, and the head slider goes back easily.
- (e) Confirm that the operation of the solenoid lever and the head slider is normal after repeating to change the modes from stop to play with the electric current going through.

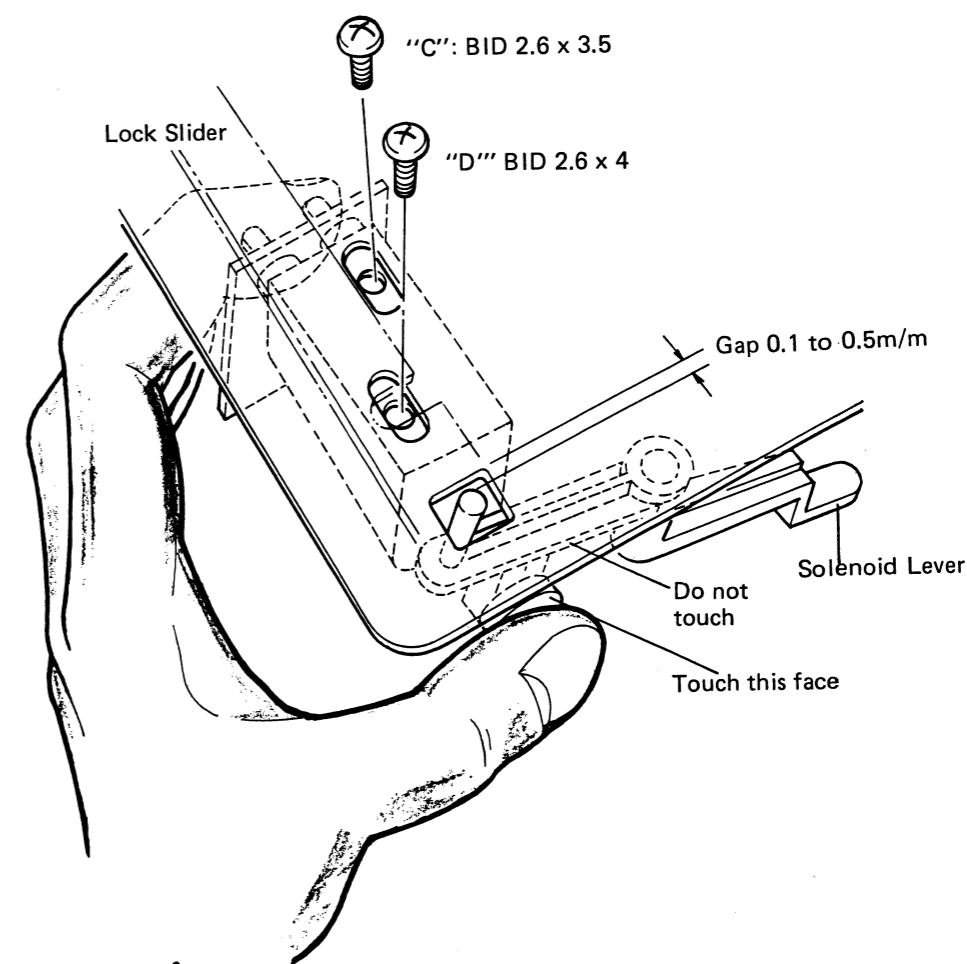


Figure 49

6. BLOCK DIAGRAM

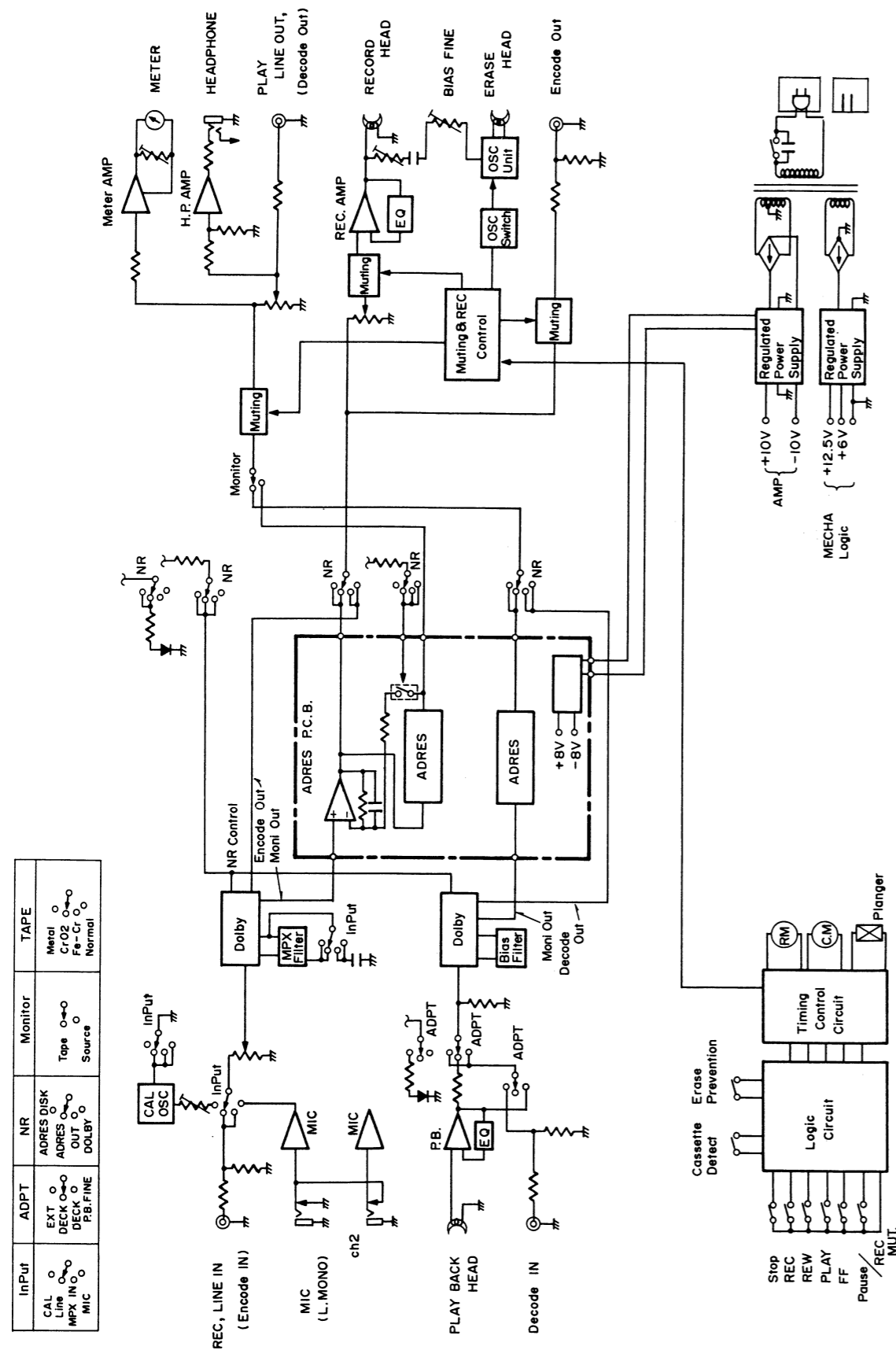
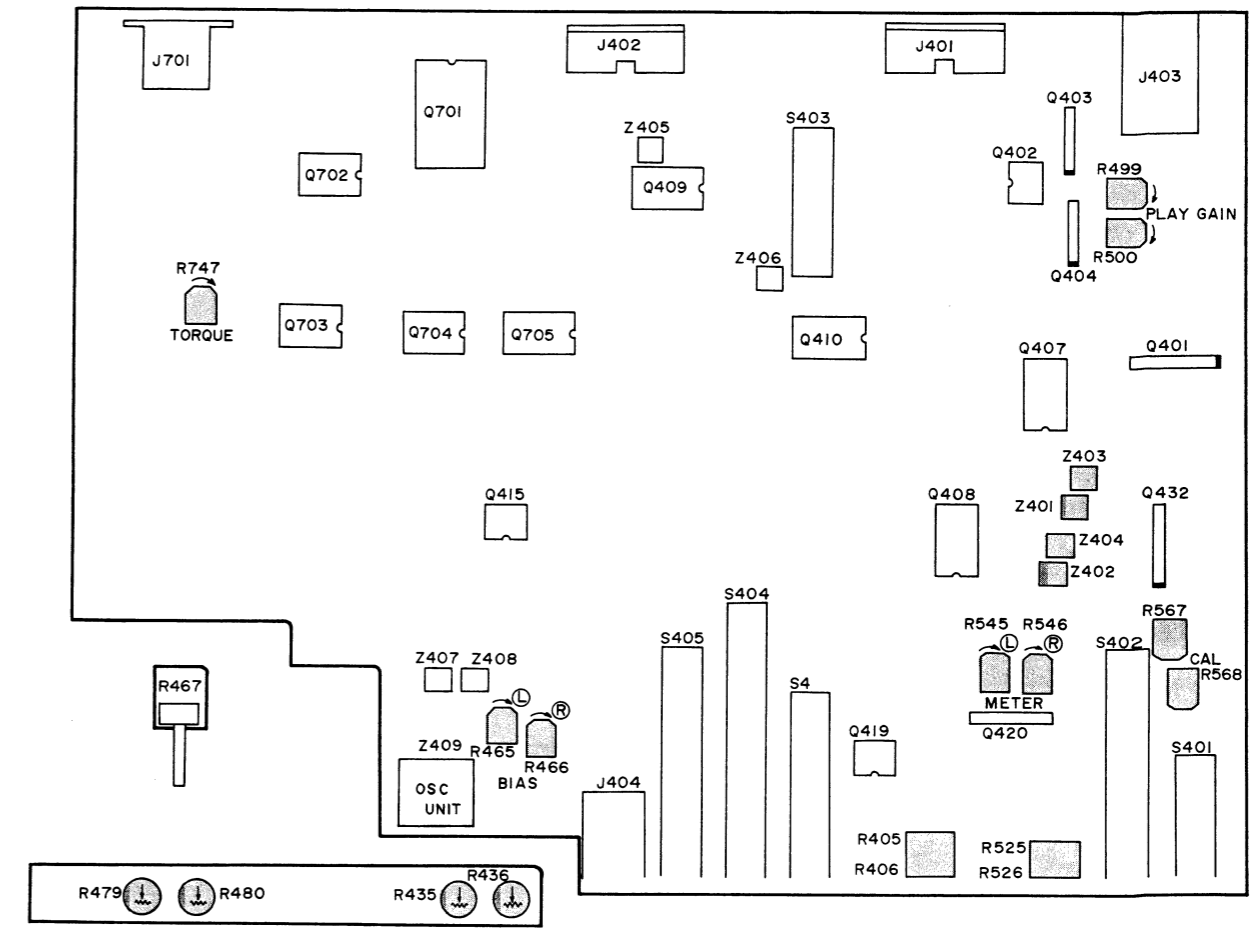
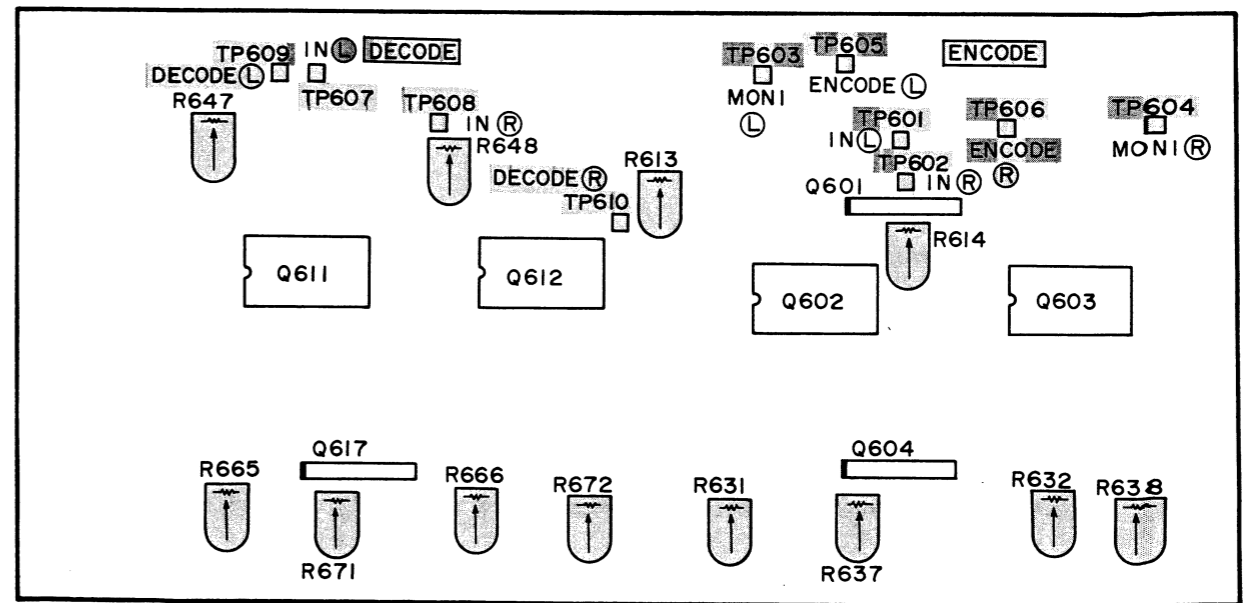


Figure 50

7. ELECTRICAL ADJUSTMENTS



MAIN P.C. BOARD



ADRES P.C. BOARD

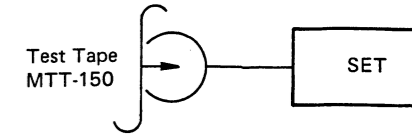
Figure 51

ADJUSTMENT PROCEDURES

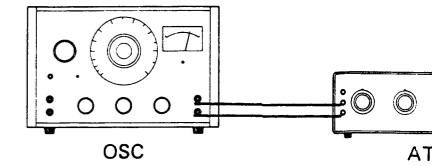
No.	Description	Nominal Specs.	Test Tape	Volume Control				Switch Position						Adjustment Point	Test Point	Input Frequency (ATT)	Remarks	
				REC	OUT	SENS REC	adres CAL	BIAS FINE	MONITOR	INPUT	PB CAL	NR	TAPE					
Main P.C. Board	1	Head Azimuth Adjustment	Maximum	MTT-144	-	MAX	-	-	-	TAPE	-	INT DECK	OUT	NOR	See Figure 36 (page 14)	LINE OUT	-	Apply a lock paint after adjustment.
	2	Playback Sensitivity Adjustment	580 ±10mV	MTT-150	-	MAX	-	-	-	TAPE	-	INT DECK	OUT	NOR	R499, 500	TP607, 608	-	Test pin must not be touched on shield board.
	3	Meter Adjustment	Meter Scale 0 VU	-	Adjust.	MAX	-	-	-	SOURCE	LINE DISC	INT DECK	OUT	-	R545, 546	Meter Scale	1 kHz -20.3 dB	
adres P.C. Board	(1)	DECODE Input Level Adjustment	300mV	-	-	MAX	-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	adres CAL R479, 480	TP-607, 608	1 kHz -17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment.
	(2)	DECODE Gain Adjustment	300 ±5mV	-	-	MAX	-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	R665, 666	TP609, 610	1 kHz -17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment.
	(3)	DECODE Distortion Adjustment	Minimum	-	-	MAX	-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	R647, 648	TP609, 610	1 kHz -17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment.
	(4)	DECODE Limiter Adjustment	+2 ±0.2 dB	-	-	MAX	-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	R671, 672	TP609, 610	1 kHz - 10 kHz - 17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment. Variation of 10 kHz for 1 kHz.
	(5)	ENCODE Input Adjustment	300mV	-	Adjust.	MAX	-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	REC VR (R405, 406)	TP601, 602	1 kHz -23 dB	REC VR must be kept after adjustment.
	(6)	ENCODE Gain Adjustment	300 ±5mV	-	Adjust.	MAX	-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	R631, 632	TP605, 606	1 kHz -23 dB	
	(7)	ENCODE Distortion Adjustment	Minimum	-	Adjust.	MAX	-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	R613, 614	TP605, 606	1 kHz -23 dB	
	(8)	ENCODE Limiter Adjustment	-2 ±0.2 dB	-	Adjust.	MAX	-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	R637, 638	TP605, 606	1 kHz - 10 kHz -23 dB	Variation of 10 kHz for 1 kHz.
	(9)	adres DISC Check (Gain)	300 ±10mV	-	Adjust.	MAX	-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	-	TP603, 604	1 kHz -23 dB	
	(10)	adres DISC Check (Limiter)	+2 +1.5 -0.5 dB	-	Adjust.	MAX	-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	-	TP603, 604	1 kHz - 10 kHz -23 dB	
Main P.C. Board	4	OSC Level Adjustment	Meter Scale +6 VU	-	Adjust.	MAX	-	-	-	SOURCE	OSC	INT DECK	OUT	-	R567, 568	Meter Scale	-	
	5	Bias Leakage Adjustment	Minimum	Blank Tape	Adjust.	MAX	-	-	Middle Position	TAPE	LINE DISC	INT DECK	OUT	METAL	Coil in the OSC Block	LINE OUT	-	Reference value: under 2mV Rec. position: no signal.
	6	Record/Playback Frequency Response Adjust	0 ±0 dB	AC-512	Adjust.	MAX	-	-	Middle Position	TAPE	LINE DISC	INT DECK	OUT	CrO ₂	R465, 466	LINE OUT	333 Hz - 12 kHz -40.3 dB	Rec. position
	7	Bias Fine Affirmation	+2 ~ -2 dB	AC-512	Adjust.	MAX	-	-	↔	TAPE	LINE DISC	INT DECK	OUT	CrO ₂	Bias Fine-VR (R467)	LINE OUT	333 Hz - 12 kHz -40.3 dB	Variation of 12 kHz at No. 6. (Bias Fine-VR is middle position after affirmation.)
	8	Record/Playback Sensitivity Adjustment	SOURCE Level	AC-512	Adjust.	MAX	Adjust.	-	Middle Position	TAPE SOURCE	LINE DISC	INT DECK	OUT	CrO ₂	SENS REC (R435, 436)	LINE OUT	333 Hz -20.3 dB	SENS REC-VR must be kept after adjustment. (Reference value: 420mV)

Measurement Condition ● Power Supply: TE = 220V, TU/AY = 240V, TC 120V
 ● Input: 0 dB = 1Vrms ● LINE IN (Input Impedance): 600 ohm ● LINE OUT (Load Impedance): 47K ohm
 ● Test Point Load Impedance: Non Load

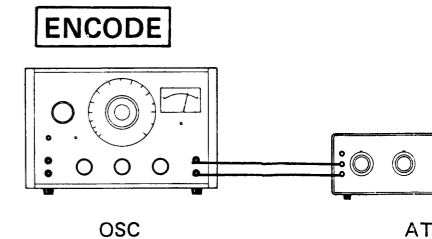
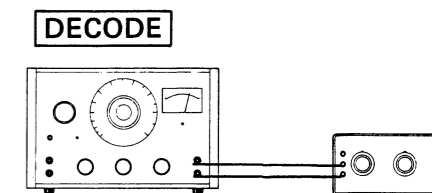
Playback Sensitivity Adjustment



Meter Level Adjustment/OSC Lev

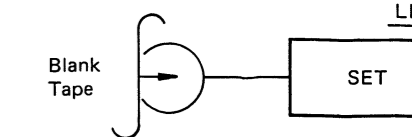


ADRES Adjustment

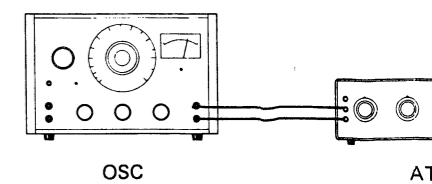


DISC Check (GAIN) { TP603 (L) DISTC
 DISC Check (Limiter) { TP604 (R) Limite

Bias Leakage Adjustment



Record/Playback Frequency Resp



Name Control			Switch Position						Adjustment Point	Test Point	Input Frequency (ATT)	Remarks
SENS REC	adres CAL	BIAS FINE	MONITOR	INPUT	PB CAL	NR	TAPE					
-	-	-	TAPE	-	INT DECK	OUT	NOR	See Figure 36 (page 14)	LINE OUT	-	Apply a lock paint after adjustment.	
-	-	-	TAPE	-	INT DECK	OUT	NOR	R499, 500	TP607, 608	-	Test pin must not be touched on shield board.	
-	-	-	SOURCE	LINE DISC	INT DECK	OUT	-	R545, 546	Meter Scale	1 kHz -20.3 dB		
-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	adres CAL R479, 480	TP-607, 608	1 kHz -17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment.	
-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	R665, 666	TP609, 610	1 kHz -17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment.	
-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	R647, 648	TP609, 610	1 kHz -17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment.	
-	Adjust.	-	TAPE	LINE DISC	EXT DECK	adres (IN)	-	R671, 672	TP609, 610	1 kHz - 10 kHz - 17 dB	CAL VR adjustment must be kept till DECODE Limiter Adjustment. Variation of 10 kHz for 1 kHz.	
-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	REC VR (R405, 406)	TP601, 602	1 kHz -23 dB	REC VR must be kept after adjustment.	
-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	R631, 632	TP605, 606	1 kHz -23 dB		
-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	R613, 614	TP605, 606	1 kHz -23 dB		
-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	R637, 638	TP605, 606	1 kHz - 10 kHz -23 dB	Variation of 10 kHz for 1 kHz.	
-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	-	TP603, 604	1 kHz -23 dB		
-	-	-	TAPE	LINE DISC	INT DECK	adres (IN)	-	-	TP603, 604	1 kHz - 10 kHz -23 dB		
-	-	-	SOURCE	OSC	INT DECK	OUT	-	R567, 568	Meter Scale	-		
-	-	Middle Position	TAPE	LINE DISC	INT DECK	OUT	METAL	Coil in the OSC Block	LINE OUT	-	Reference value: under 2mV Rec. position: no signal.	
-	-	Middle Position	TAPE	LINE DISC	INT DECK	OUT	CrO ₂	R465, 466	LINE OUT	333 Hz - 12 kHz -40.3 dB	Rec. position	
-	-	-	TAPE	LINE DISC	INT DECK	OUT	CrO ₂	Bias Fine-VR (R467)	LINE OUT	333 Hz - 12 kHz -40.3 dB	Variation of 12 kHz at No. 6. (Bias Fine-VR is middle position after affirmation.)	
Adjust.	-	Middle Position	TAPE SOURCE	LINE DISC	INT DECK	OUT	CrO ₂	SENS REC (R435, 436)	LINE OUT	333 Hz -20.3 dB	SENS REC-VR must be kept after adjustment. (Reference value: 420mV)	

TC 120V
Impedance): 600 ohm • LINE OUT (Load Impedance): 47K ohm

Playback Sensitivity Adjustment

CAUTION: Do not touch on shield board.

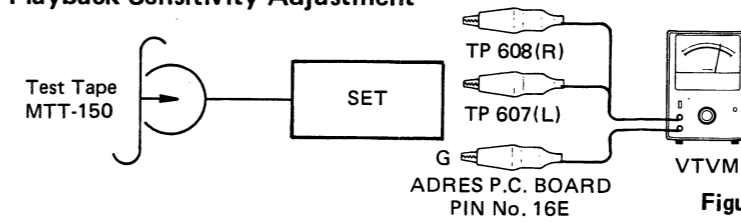


Figure 52

Meter Level Adjustment/OSC Level Adjustment

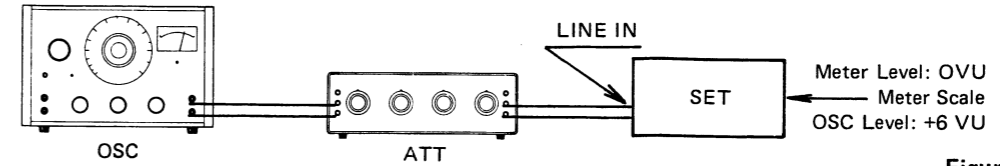


Figure 53

ADRES Adjustment

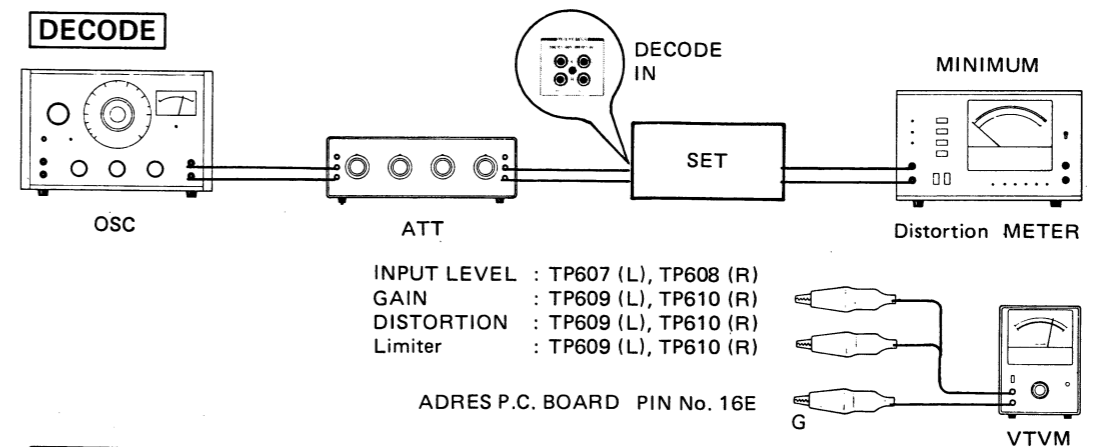


Figure 54

ENCODE

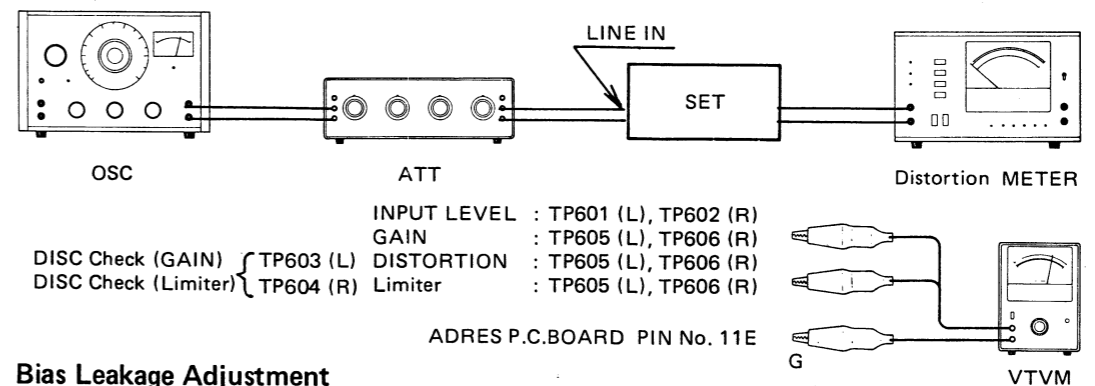


Figure 55

Bias Leakage Adjustment

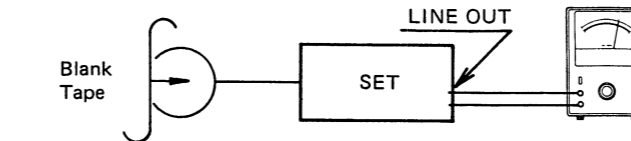


Figure 56

Record/Playback Frequency Response Adjustment/Bias Fine Adjustment

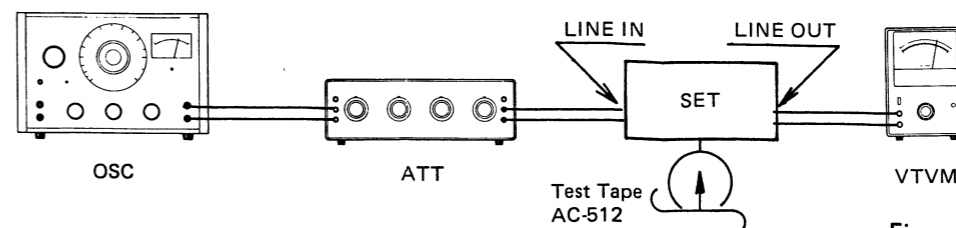


Figure 57

8. ELECTRICAL PARTS LOCATIONS (MAIN)

Q409, 410

1	2	3	4	5	6	7	8	9	10
7.7V	0V	-7.7V	0V	-0.1V	-0.1V	-7.7V	-0.8V	0.75V	0V
DOLBY	OUT	6.6V	-0.08V	-0.5V	0.24V	1.1V	5.4V		
IN	0V	0V	-0.2V	0.24V	0V	0V			

Q417, 418(G)

	T A P E	S O U R C E
REC	PLAY	0.02V 0.02V
OTHERS		0.02V -0.04V

Q701

1	0V	OTHERS
2	S701 ON 0V	5.7V
3	S703 ON 0V	5.7V
4	S702 ON 0V	5.7V
5	S704 ON 0V	5.7V
6	S705 ON 0V	6.2V
7	S706 ON-OFF	6V
8	S707 AUTO REW 0V	5.7V
9	S708 PLAY 0V	5.7V
10		
11	S708/S4 ON	6V
12	S707	5V
13	ASD	0V
14	2.4V	0V
15	EV	0V
16	PLAY R/P	5.4V 0V
17	REC	5.4V 0V
18		
19	PAUSE	5.4V 0V
20		
21	REW	5.4V 0V
22	FF	5.4V 0V
23		
24		6.2V

Q702

1	2	3	4	5	6	7	8	9
5V	0V	0V	6.2V	0V	6.2V	0V	3V	1.8V
10	11	12	13	14				
MOV	0V	MOV	6.2V	6.2V				
OTHERS	6.2V	OTHERS	0V	6.2V				

Q703

PLAY R/P	FF	STOP	PAUSE	R/P	OTHERS
1	2.5V	4V	0V	8	0V
2	2.5V	4V	0V	9	5.8V
3	1.2V	0.2V	6.2V	10	6V
4	5V	6V	0V	11	0V
5	1.2V	0.2V	6.2V	12	S704 PUSH 1.5V
6	3.4V			13	2.7V
7	0V			14	6.2V

Q705

1	6.2V	OTHERS
2	R/P REC/PAUSE	5.2V 0V
3	PLAY R/P	3V 0V
4	R/P REC/PAUSE	0V 6.2V
5	0V	
6	FF PLAY R/P	6.2V 0V
7	PLAY R/P	1V PULSE
8	0V	
9	PLAY R/P	0.5V PULSE
10	PLAY R/P	FF 6.0V 0V
11	REW	6.0V 0V
12	R/P REC/PAUSE	0V 6.2V
13	PLAY R/P	6V -8.8V
14	R/P REC/PAUSE	6V 0V
15	6.2V	
16	6.2V	

Q704

R/P	PLAY	PAUSE	3.2V	0V	8	3.8V
2	FF	PLAY R/P	5.4V	0V	9	3.8V
3	FF	PLAY R/P	6.2V	0V	10	6.2V
4	MOV		6.2V	0V	11	0V
5	FF	PLAY R/P	6.2V	0V	12	PLAY R/P 0.2V
6	REW		6.2V	0V	13	REW 5.4V 0V
7	0V				14	6.2V

Q706

1	0V	PLAY R/P	OTHERS
2	13V		17V
3	0V	PULSE	

Q707

1	0V		17V
2	0.75V		0V

Q708

1	4V		11V
2	10V		12V
3	4.5V		12V

Q709

1	4V		11V
2	4V		11V
3	3V		11V

Q710

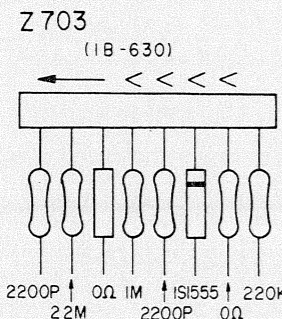
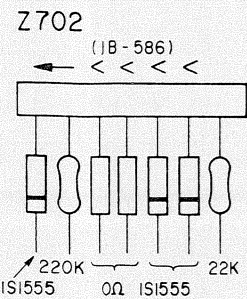
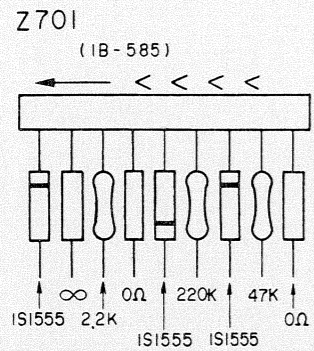
1	4V		11V
2	0V		
3	4V		11V

Q711

1	0V		
2	4V		11V
3	REW		0V

Q712

1	0V		
2	FF	PLAY R/P	11V
3	0V		
4	FF	PLAY R/P	0V



Q403, 404

1	2.6V
2	0V
3	0.8V
4	—
5	3.0V
6	0V
7	2.6V

Q401

1	-4.6V
2	-5.8V
3	-1.8V
4	7.4V
5	-1.8V
6	-5.8V
7	-4.6V
8	-4.6V
9	-7.4V

Q407, 408

1	7.7V
2	0V
3	-7.7V
4	0V
5	-0.8V
6	0V
7	-7.7V
8	0V
9	0.06V 0V
10	0V
11	6.6V 0V
12	-0.08V 0V
13	-0.5V -0.2V
14	0.24V
15	0.66V 0V
16	5.4V 0V

Q409, 410

1	7.7V
2	0V
3	-7.7V
4	0V
5	-0.1V
6	-0.1V
7	-7.7V
8	-0.8V
9	0.75V
10	0V
11	6.6V 0V
12	-0.08V 0V
13	-0.5V -0.2V
14	0.24V
15	1.1V 0V
16	5.4V 0V

Q420

1	0V
2	-7.2V
3	0V
4	-0.06V
5	-8V
6	-0.06V
7	0V
8	-7.2V
9	8V

Q419

S	0V
D	0V
G	
REC	TAPE SOURCE
PLAY	0.02V 0.02V
Others	0.02V -0.04V

Q703

1	0.02V
2	0V
3	0V
4	0V
5	-9.4V
6	0V
7	0.02V
8	9.4V

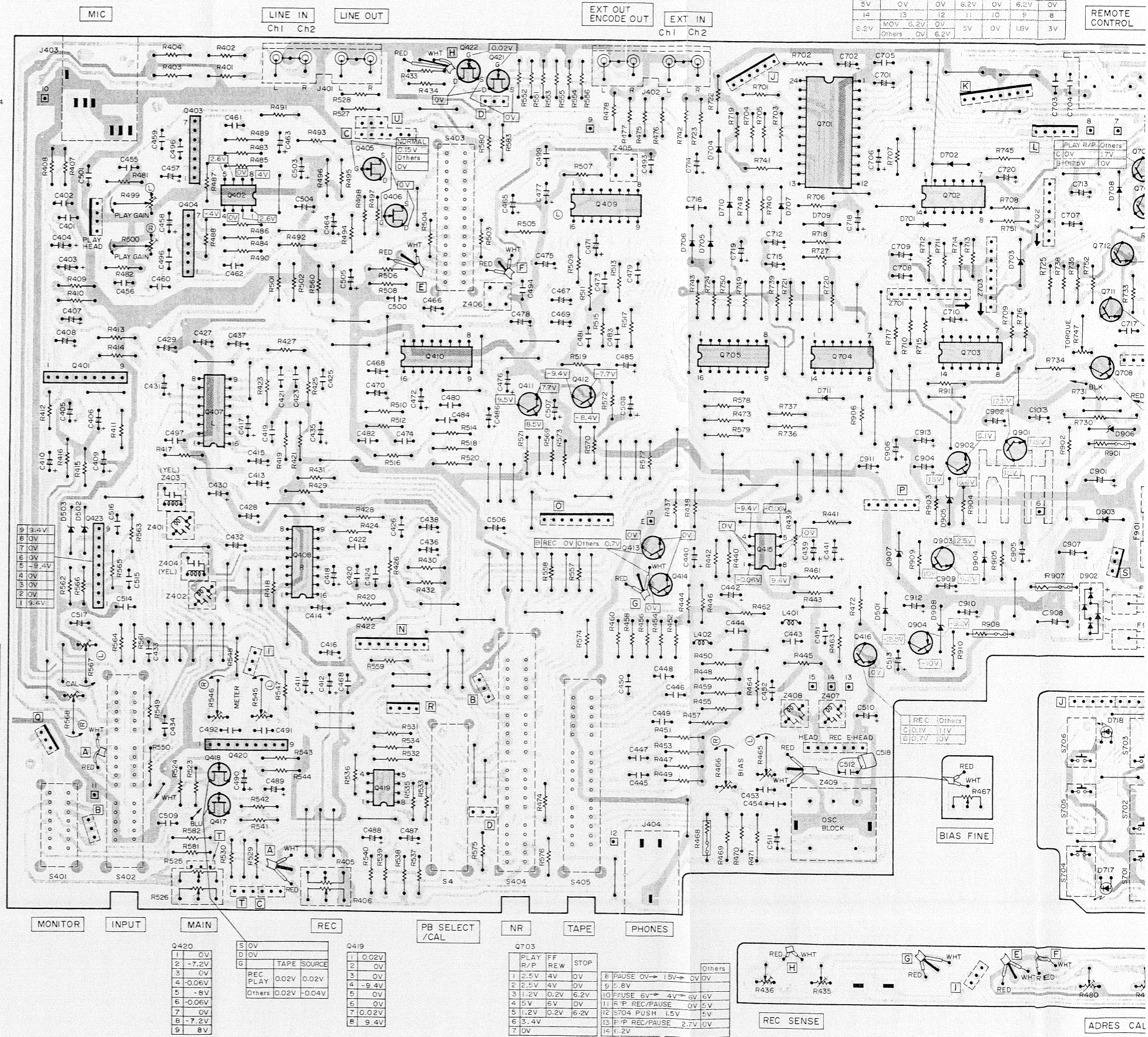


Figure 58

8. ELECTRICAL PARTS LOCATIONS (MAIN)

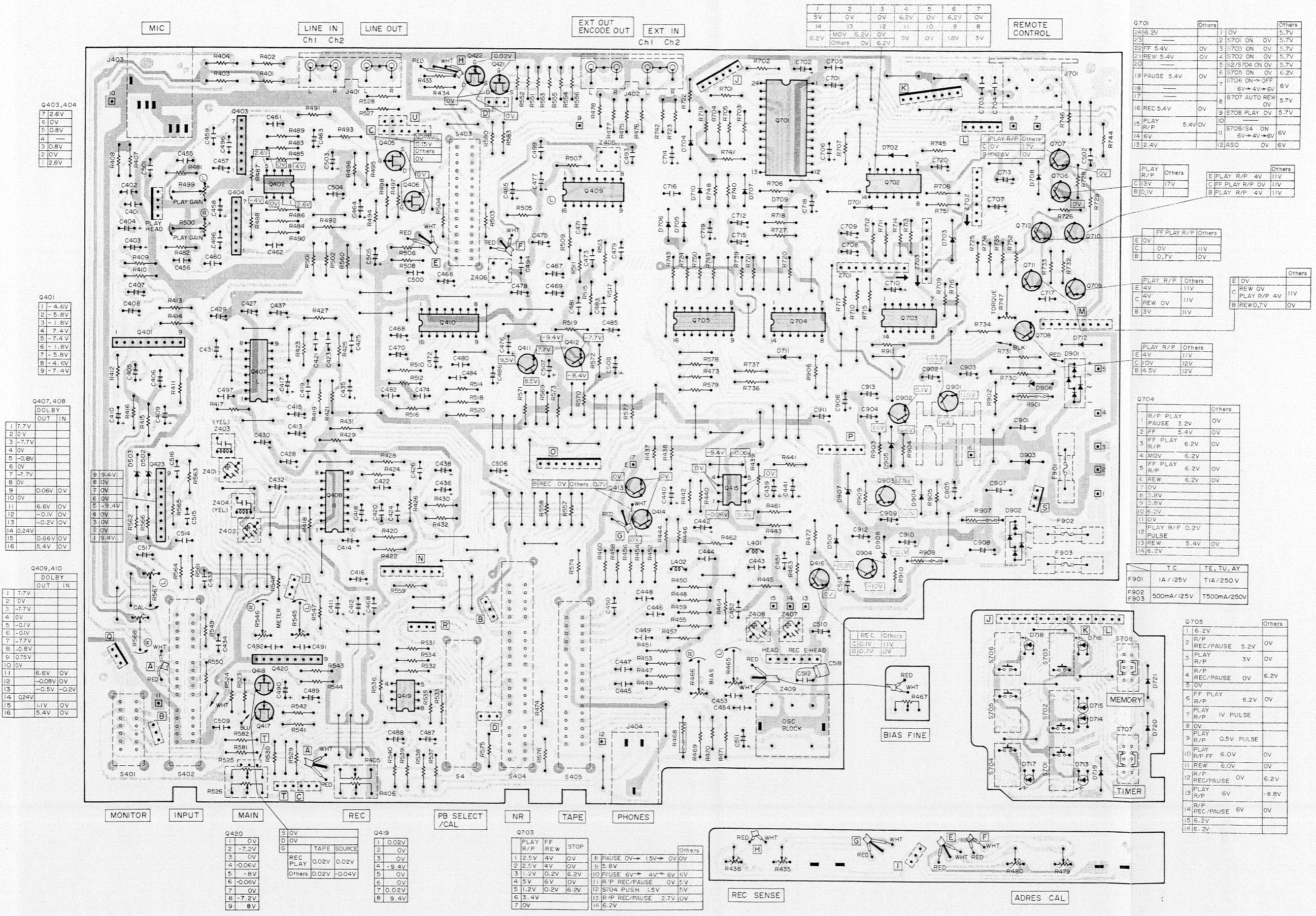


Figure 58

9. SCHEMATIC DIAGRAM (MAIN)

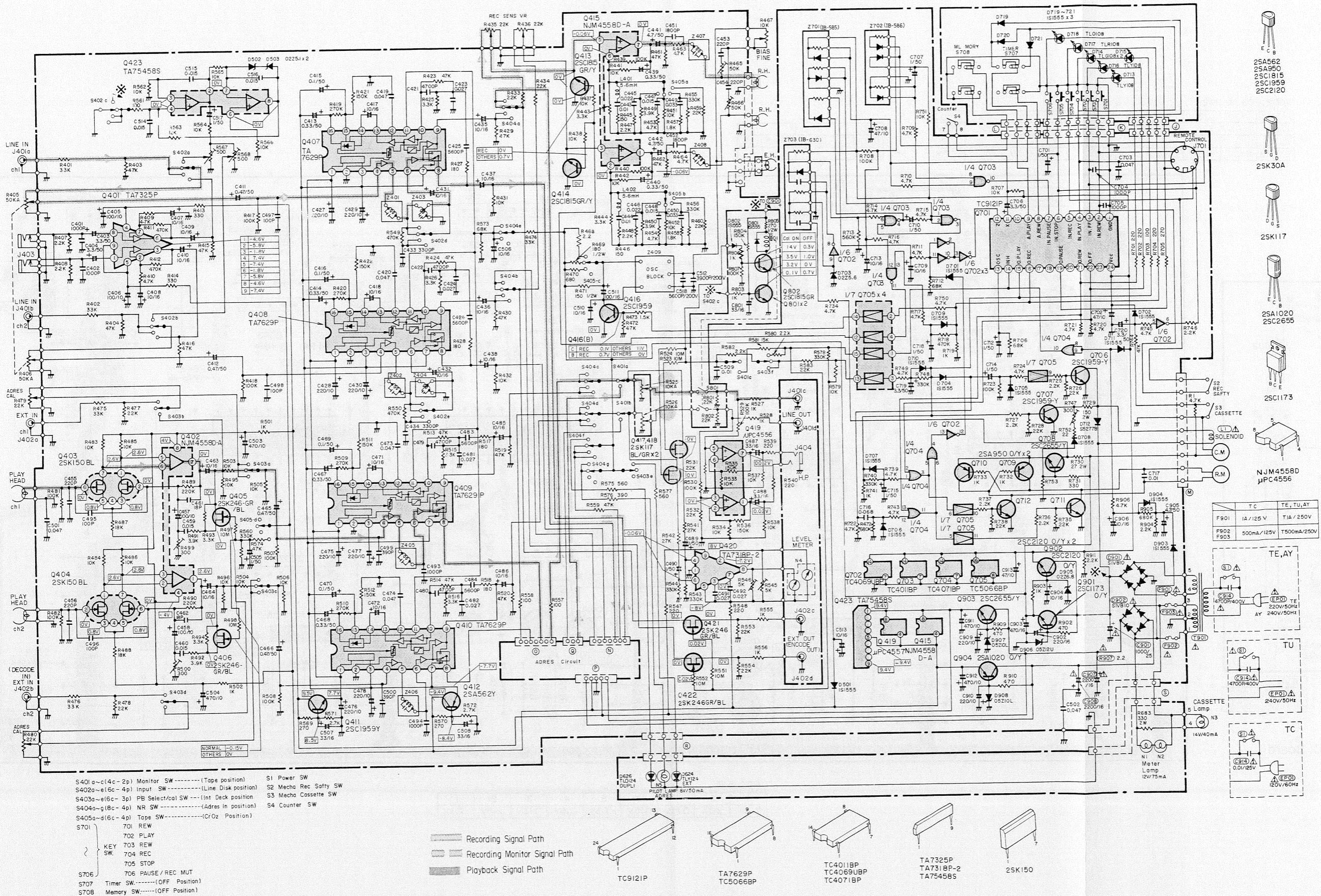


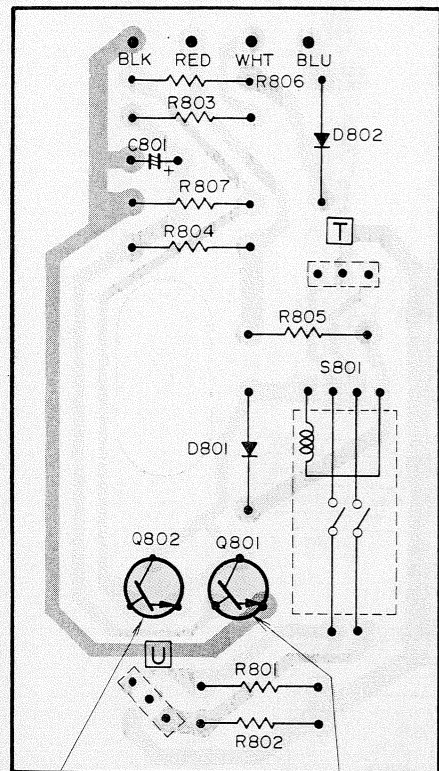
Figure 59

10. ELECTRICAL PARTS LOCATIONS(ADRES/MUTING)

Q602,603,611,612

11	12	13	14	15	16	17	18	19	20
0.01V	0.66V	0V	0.56V	-7.3V	1.35V	0.7V	0.6V	0V	7.3V
10	9	8	7	6	5	4	3	2	1
0.015V	0.01V	0.14V	0.7V	7.3V	0V	1.35V	0.7V	0V	-7.3V

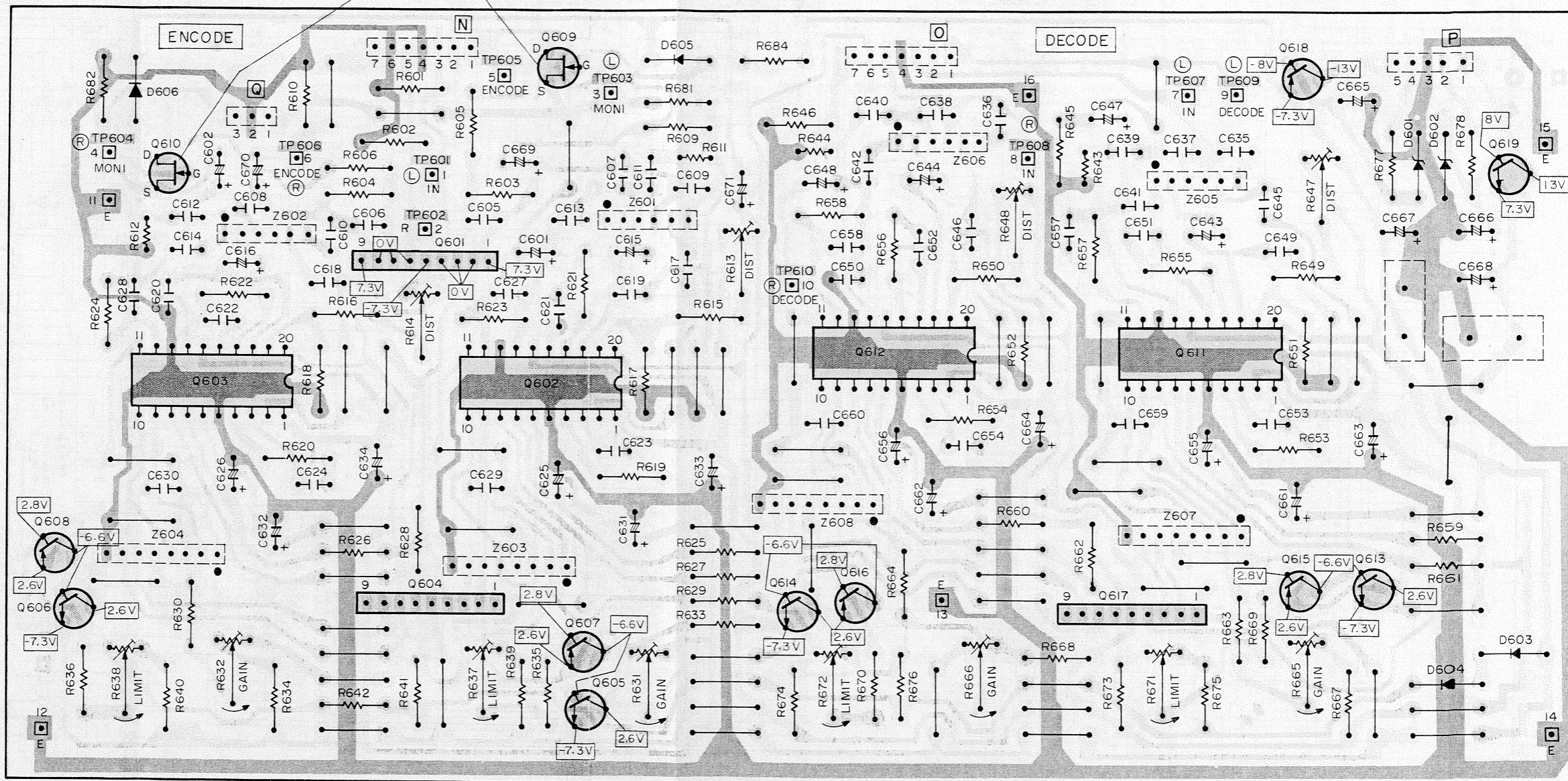
S	0V		
G	DISC	-0.15V	Others 0V
D	0V		



Q802	Cal	ON	OFF
	E	3.2V	0V
	C	1.4V	0.3V
	B	3.5V	1.0V

Q801	Cal	ON	OFF
	B	0.1V	0.7V

Muting P.C. Board



Q604,617

9	8	7	6	5	4	3	2	1
7.3V	2.8V	0.15V	0.15V	-7.3V	0.15V	0.15V	2.8V	7.3V

Figure 60

11. SCHEMATIC DIAGRAM (ADRES)

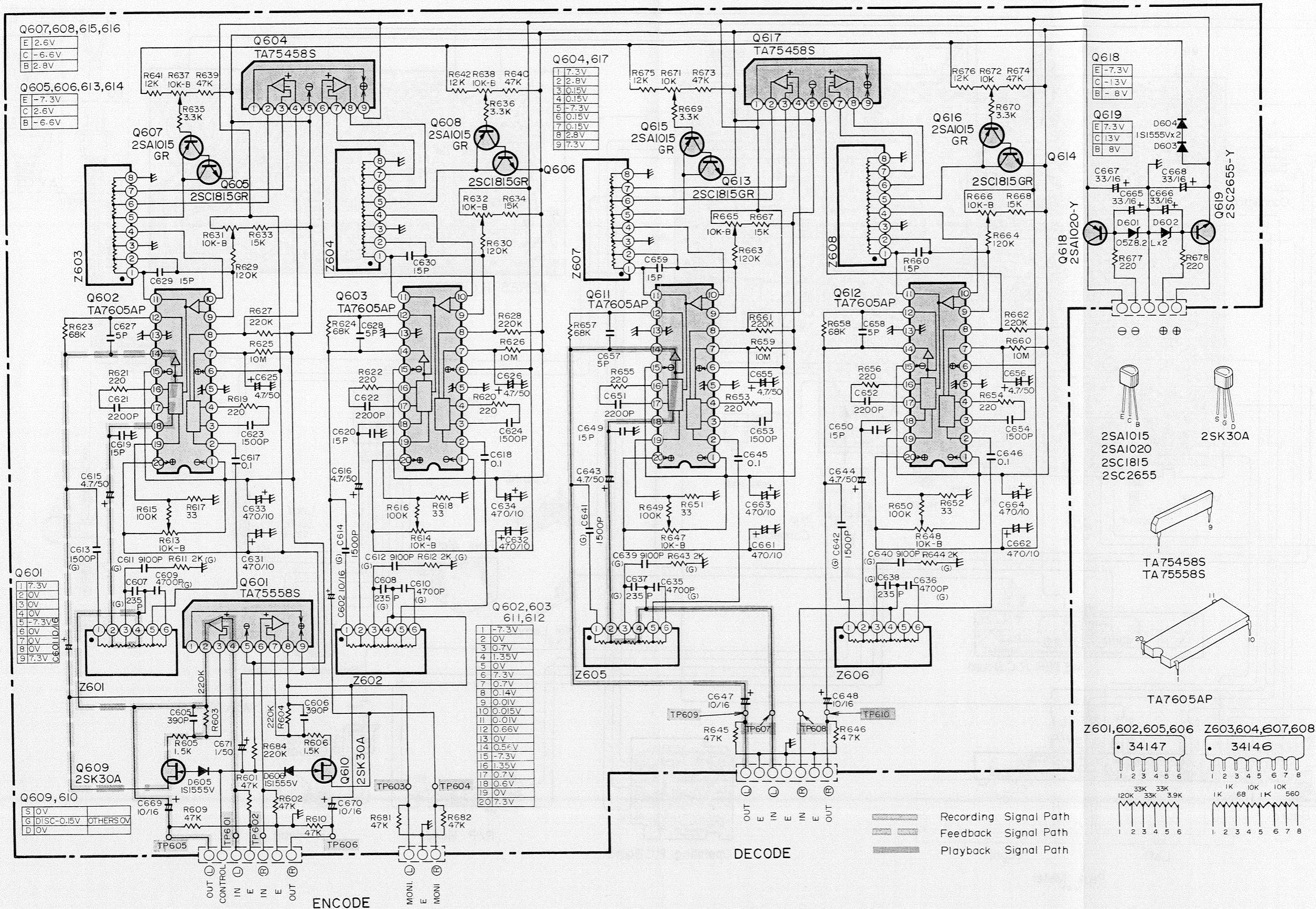


Figure 61

CAUTION:
The Δ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

12. WIRING DIAGRAM

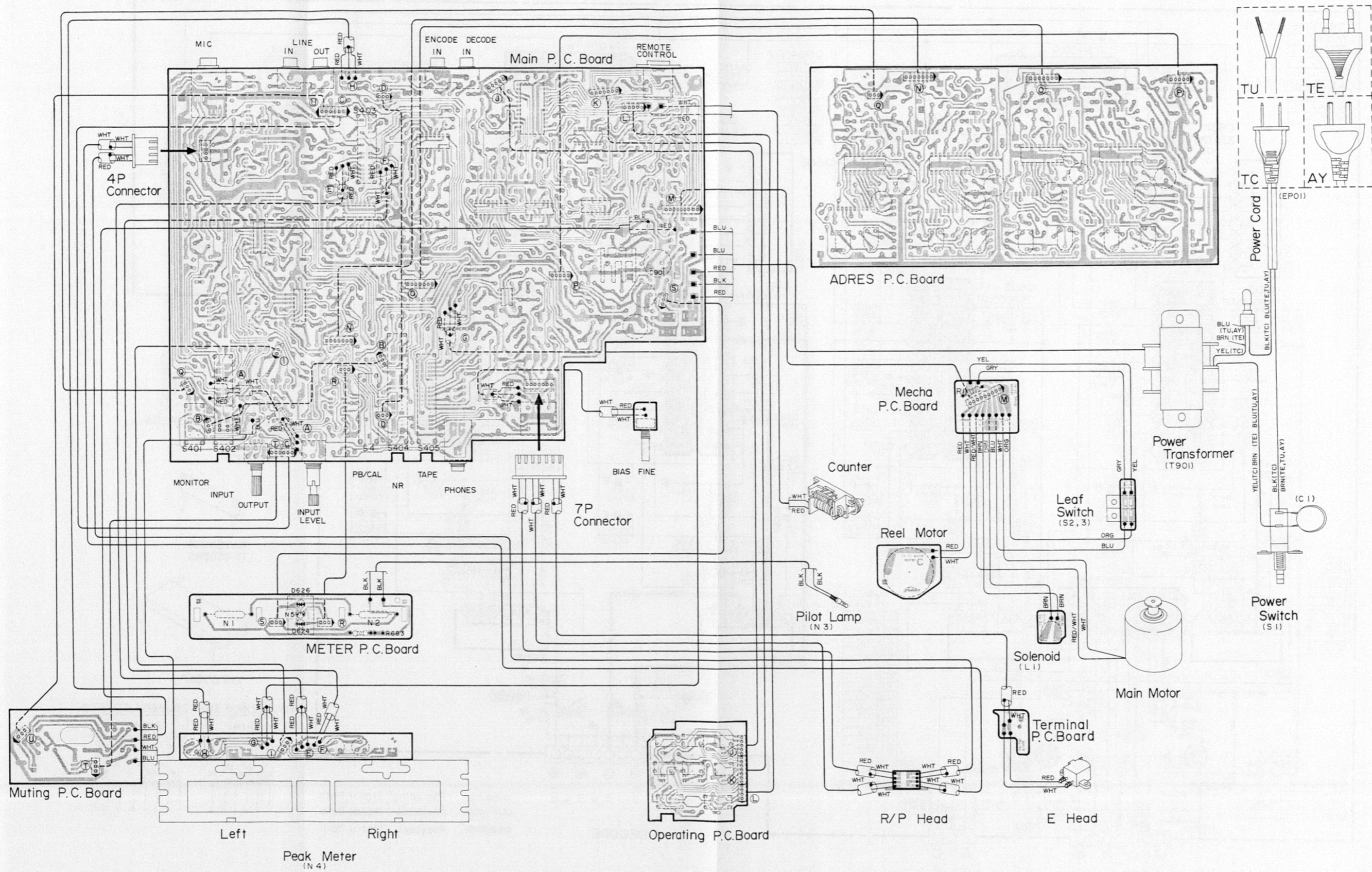


Figure 62

13-1. EXPLODED VIEW (MECHANISM)

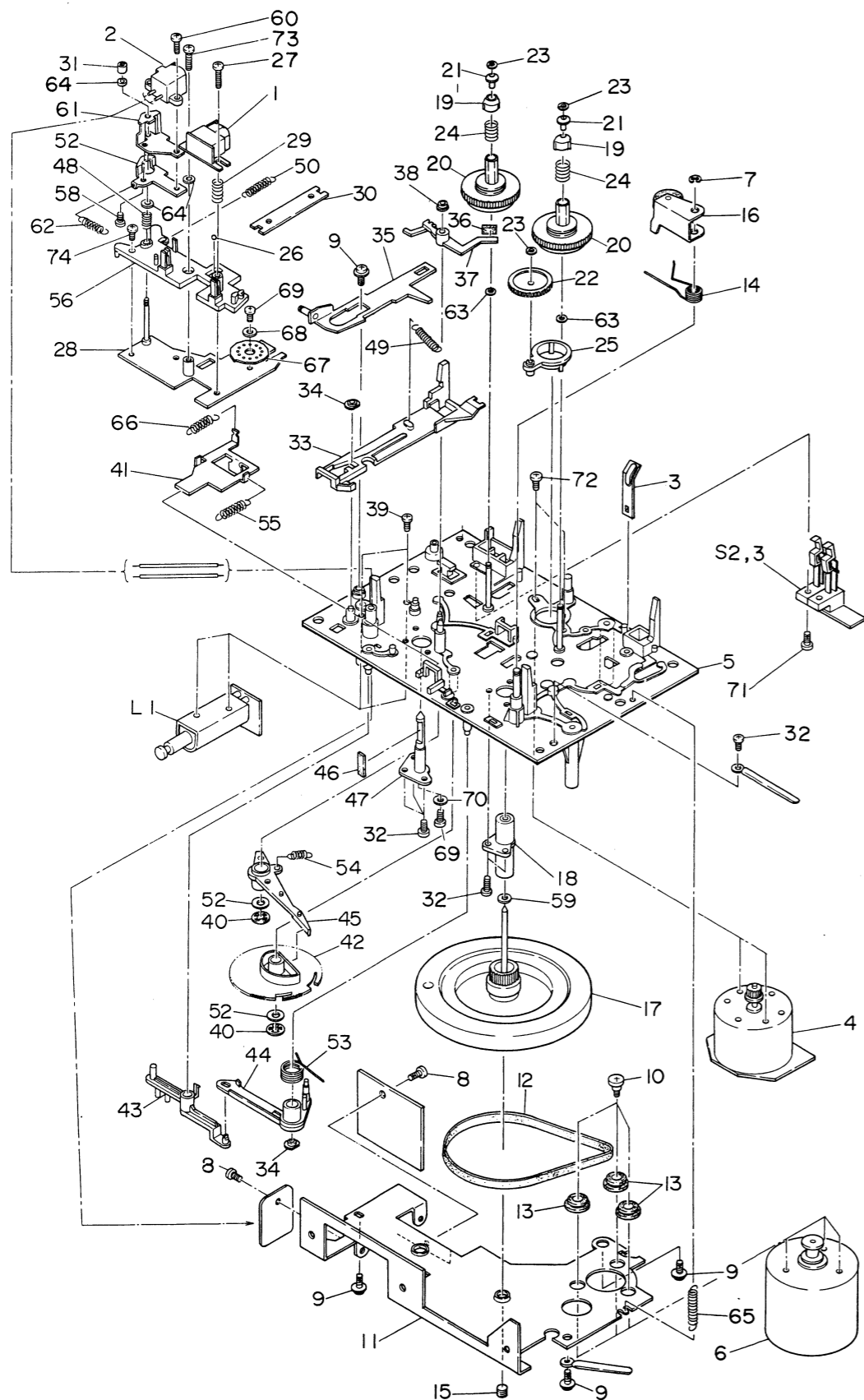


Figure 63

NOTE: Parts excluded in the Parts List are not available as replacement parts.

13-2. EXPLODED VIEW (MECHANISM) PARTS LIST

CAUTION:
The Δ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
MECHANICAL PARTS					
1	22217373	Combination Head, Record/Playback HRPT-88	52	25734448	Fix Plate, Head
2	22218223	Head, Erase HET-50	53	25773529	Spring, Play Lock Lever
3	25779142	Spring, Holder	54	25776288	Spring, Play Lever
4	25791358	Motor Ass'y, Reel	55	25771806	Spring, Play Slider
5	25791299	Chassis Ass'y, Mechanism	56	25783234	Head Base, B
6	25791341	Motor Ass'y, Main	58	22701467	Screw, BID, 2 ϕ x 3mm
7	22703118	E Washer	60	22707499	Screw, DT BID, 2 ϕ x 8mm
8	22707350	Screw, DT BID, 2.6 ϕ x 5mm	61	25748539	Lever, Erase Head
9	22707361	Screw, T PAN, 2.6 ϕ x 8mm	62	25776142	Spring
10	22707429	Screw, Special, 2.6 ϕ x 1.8mm	63	25764597	Washer
12	25755480	Belt, Main	64	25735256	Washer
13	25761238	Cushion, Motor	65	25776313	Spring
14	25773526	Spring, Pinch Lever	66	25776316	Spring
15	25783233	Screw, Trust	67	25741851	Adjust Plate, Head
16	25717484	Lever Ass'y, Pinch	68	25733497	Washer
17	25717483	Flywheel Ass'y	69	22707265	Screw, BID, 2 ϕ x 4mm
18	25717472	Bushing Ass'y, Capstan	70	25735257	Washer
19	25754304	Coller, Reel	71	22707301	Screw, BID, Tapping, 2.6 ϕ x 8mm
20	25754383	Drum, Reel	72	22707323	Screw, BID, 2.6 ϕ x 8mm
21	25754384	Capstan, Reel	73	22707451	Screw, BID, 2 ϕ x 5mm
22	25756241	Gear, Transfer	74	22707426	Screw, DT BID, 2 ϕ x 5mm
23	25764549	Washer	75	22707269	Washer, 3 ϕ
24	25777033	Spring, Reel	76	25735242	Washer, CS
25	25713539	Take Up Lever Ass'y	77	22707716	Screw, BID, 2.6 ϕ x 3.5mm
26	25757120	Steel Ball, 3 ϕ			
27	22707669	Screw, DT BID, 2 ϕ x 12mm			
28	25714208	Chassis Ass'y, Head			
29	25772240	Spring, Head			
30	25779140	Spring, Head Slider			
31	22707186	Nut, Special			
32	22707366	Screw, DT BID, 2.6 ϕ x 6mm			
33	25782425	Lock Slider, D			
34	25783226	Bush			
36	25762406	Felt, Friction			
37	25782418	Lever, Tention			
38	25783199	Washer			
39	22707475	Screw, BID, 2.6 ϕ x 4mm			
42	25756248	Gear, Cam Play D			
43	25782414	Lever, Solenoid			
44	25782415	Lever, Lock Play			
45	25782422	Lever, Play			
46	25762404	Pad, Erase Head			
47	25791301	Pin Ass'y, Pad			
48	25777040	Spring, Erase Head			
49	25771586	Spring, Lock Slider			
50	25776317	Spring, Head Base			

14-1. EXPLODED VIEW (CABINET)

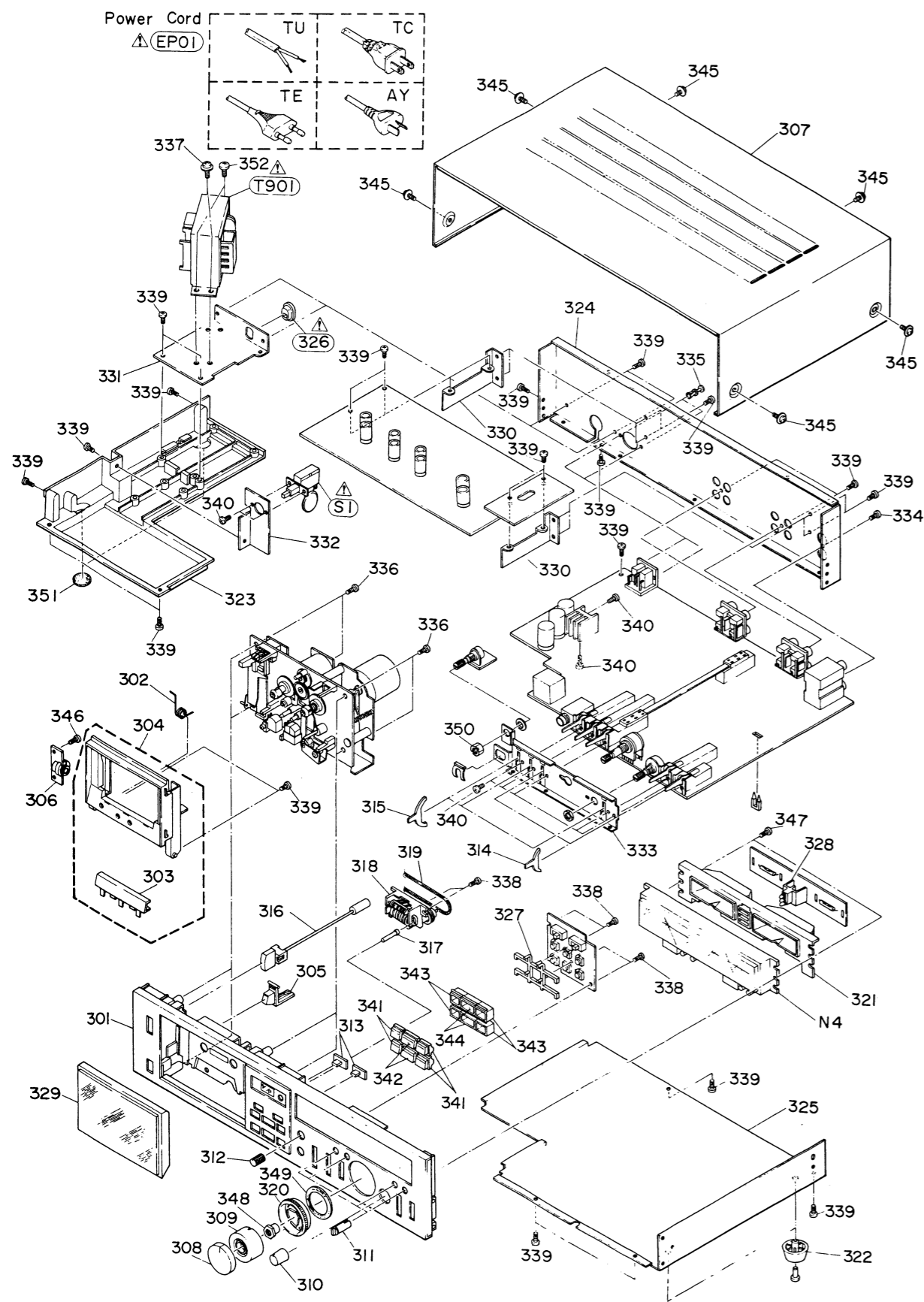


Figure 64

NOTE: Parts excluded in the Parts List are not available as replacement parts.

14-2. EXPLODED VIEW (CABINET) PARTS LIST

CAUTION:

The Δ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
CABINET PARTS					
			346	22707165	Screw, BID, Tapping, 3 ϕ x 10mm
			347	22707118	Screw, BID, Tapping, 3 ϕ x 12mm
			348	25830225	Nut, 9 ϕ
			349	25833490	Sheet, Marker
			350	25830229	Nut, Slot 7 ϕ
			351	25762407	Felt, Foot
			352	22707519	Screw, DT BID, 4 ϕ x 10mm
301	25881150	Front Panel Ass'y			
302	25775220	Spring, Eject			
303	25828956	Holder Ass'y, B			
304	25832492	Holder Ass'y, Cassette			
305	25837558	Knob, Eject			
306	25858579	Damper			
307	25838722	Cover, Top			
308	25837561	Knob, Record (Left)			
309	25837562	Knob, Record (Right)			
310	25837563	Knob, Output			
311	25837564	Knob, Calibration			
312	25837566	Knob, Level			
313	25837403	Knob, Slide			
314	25837559	Knob, Lever (23)			
315	25837560	Knob, Lever (4)			
316	25837565	Knob Ass'y, Power			
317	25837521	Knob, Counter Reset			
318	25873243	Counter			
319	25755351	Belt, Counter			
320	25837589	Marker			
321	25832478	Reflector, Meter			
322	22828070	Foot			
323	25829439	Bottom Plate (Mold)			
324	25838716	Jack Plate (TE)			
324	25838717	Jack Plate (TU, AY)			
324	25838715	Jack Plate (TC)			
Δ 326	25845528	Bush, Nylon (TE, TU, AY)			
Δ 326	25845120	Bush, Nylon (TC)			
327	25844157	Holder, LED			
328	25832485	Holder, Meter LED			
329	25829447	Cassette Cover			
334	22701394	Screw, PAN, 3 ϕ x 8mm			
335	22705022	Rivet Plastic, 3 ϕ x 5.5mm			
336	22707115	Screw, BID, Tapping, 3 ϕ x 8mm			
337	22707521	Screw, FLDT, 3 ϕ x 6mm			
338	22707301	Screw, BID, Tapping, 2.6 ϕ x 8mm			
339	22701326	Screw, BID, Tapping, 3 ϕ x 8mm			
340	22707066	Screw, BID, 3 ϕ x 6mm			
341	25837544	Button, A, Small			
342	25837545	Button, B, Large			
343	25837547	Case, Reflect A, Small			
344	25837548	Case, Reflect B, Large			
345	22707590	Screw, TPAN, 3 ϕ x 8mm			

15. PARTS LIST

CAUTION:

The Δ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description
SEMI CONDUCTOR		
Q401		IC, TA7325P
Q402	22114470	IC, NJM4558D-A
Q403, 404		Transistor, 2SK150-BL
Q405, 406		Transistor, 2SK246-GR
Q407, 408		IC, TA7629P
Q409, 410		IC, TA7629P
Q411		Transistor, 2SC1959-Y
Q412		Transistor, 2SA562-Y
Q413, 414		Transistor, 2SC1815-GR/Y
Q415	22114470	NJM4558D-A
Q416		Transistor, 2SC1959-Y
Q417, 418		Transistor, 2SK117-BL/GR
Q419	22114800	IC μ PC4556C
Q420		IC, TA7318P-2
Q421, 422		Transistor, 2SK246-GR
Q423		IC, TA75458S
Q601		IC, TA75558S
Q602, 603		IC, TA7605AP
Q604		IC, TA75458S
Q605, 606		Transistor, 2SC1815-GR
Q607, 608		Transistor, 2SA1015-GR
Q609, 610		Transistor, 2SK30A-GR/Y
Q611, 612		IC, TA7605AP
Q613, 614		Transistor, 2SC1815-GR
Q615, 616		Transistor, 2SA1015-GR
Q617		IC, TA75458S
Q618		Transistor, 2SA1020-Y
Q619		Transistor, 2SC2655-Y
Q701		IC, TC9121P
Q702		IC, TC4069U-BP
Q703		IC, TC4011BP
Q704		IC, TC4071BP
Q705		IC, TC5066BP
Q706		Transistor, 2SC1959-Y
Q707		Transistor, 2SC1959-Y
Q708		Transistor, 2SC2655-O/Y
Q709, 710		Transistor, 2SA950-O/Y
Q711		Transistor, 2SC2120-O/Y
Q712		Transistor, 2SC2120-O/Y
Q801, 802		Transistor, 2SC1815-GR
Q901		Transistor, 2SC1173-O/Y
Q902		Transistor, 2SC2120-O/Y
Q903		Transistor, 2SC2655-O/Y

Symbol No.	Part No.	Description
Q904		Transistor, 2SA1020-O/Y
D501		Diode, 1S1555V
D502, 503		Diode, 02Z5.1A
D601, 602		Diode, 05Z8.2L
D603, 604		Diode, 1S1555V
D605, 606		Diode, 1S1555V
D624		Diode, TLY124 (EXT)
D626		Diode, TL0124 (DUPLI)
D701, 702		Diode, 1S1555V
D703		Diode, 02Z5.6A
D704, 705		Diode, 1S1555V
D706, 707		
D708, 709		
D710, 711		
D712		Diode, S5277B
D713		Diode, TLY108
D714, 715		Diode, TLG108
D716		Diode, TLY108
D717		Diode, TLR108
D718		Diode, TLO108
D719, 720		Diode, 1S1555V
D801, 802		Diode, 1S1555V
Δ D901, 902	22115571	Diode, SIVB10
D903, 904		Diode, 1S1555V
D905		Diode, 02Z6.8A
D906		Diode, 05Z12U
D907, 908		Diode, 05Z10L
ELECTRICAL PARTS		
Δ T901	22223976	Transformer, Power (TE)
Δ T901	22223977	Transformer, Power (TU, AY)
Δ T901	22223978	Transformer, Power (TC)
Δ S1	22195686	Switch, Power (TE, TU, AY)
Δ S1	22195811	Switch, Power (TC)
S2	22195727	Switch, Leaf (Rec Safety)
S3	22195727	Switch, Leaf (Cassette)
S4	22195772	Switch, Drive (S403)
S401	22195458	Switch, Lever (MONITOR)
S402	22195791	Switch, Lever (INPUT)
S403	22195790	Switch, Slide (PE/CAL)
S404	22195792	Switch, Lever (NR)
S405	22195791	Switch, Lever (TAPE)

Symbol No.	Part No.	Description
S701	22195623	Switch, Key (Logic) (REW)
S702	22195623	Switch, Key (Logic) (PLAY)
S703	22195623	Switch, Key (Logic) (FF)
S704	22195623	Switch, Key (Logic) (REC)
S705	22195623	Switch, Key (Logic) (STOP)
S706	22195623	Switch, Key (Logic) (PAUSE)
S707	22195566	Switch, Slide (TIMER)
S708	22195566	Switch, Slide (MEMORY)
S801	22148647	Relay
Z401, 402	22153158	Filter Block, Dolby 85K
Z403, 404	22153157	Filter Block, Dolby 19K
Z405, 406	22153158	Filter Block, Dolby 85K
Z407, 408		
Z409	22132536	Bias OSC Block
Z601, 602	22134147	Composite Part, RRM-T18
Z603, 604	22134146	Composite Part, RRM-T17
Z605, 606	22134147	Composite Part, RRM-T18
Z607, 608	22134146	Composite Part, RRM-T17
Z701	22130585	Composite Part, Logic E
Z702	22130586	Composite Part, Logic F
Z703	22130584	Composite Part, Logic D
J401, 402	22163831	Jack, US4P
J403	22163658	Jack, Microphone
J404	22163853	Jack, Headphone
J701	22167931	Socket, DIN 7P
N1, 2	22113536	Lamp, Pilot, 12V/75mA (Meter)
N3	22113509	Lamp, Pilot, 14V/40mA (Cassette)
N4	22104558	Meter, Peak
N5	22113540	Lamp, Pilot, 8V/50mA (ADRES)
△ L1	22147228	Solenoid, Play
L401, 402	22211264	Coil, 5.6mH
△ F901	22144337	Fuse, T1A/250V (TE, TU, AY)
△ F902, 903	22144408	Fuse, T500mA/250V (TE, TU, AY)
△ F901	22144440	Fuse, 1A/125V (TC)
△ F902, 903	22144439	Fuse, 500mA/250V (TC)
△ EP01	22176286	Cord, Power (TE)
△ EP01	22176536	Cord, Power (TU)
△ EP01	22176588	Cord, Power (AY)
△ EP01	22176573	Cord, Power (TC)
CAPACITORS		
G = ± 2%, J = ± 5%, K = ± 10%, M = ± 20%, P = 0 + 100% Z = -20 + 80%, D = ± 0.5 pF ABBREVIATIONS: EL = Electrolytic, CD = Ceramic Disk MY = Mylar Film, PS = Polystyrene PP = Polypropylene		
C401, 402	22349102	CD, 1000pF, 50V, K
C403, 404	22488339	EL, 3.3mfd, 50V, M

Symbol No.	Part No.	Description
C405, 406	22483101	EL, 100mfd, 10V, M
C407, 408	22485100	EL, 10mfd, 16V, M
C409, 410	22488339	EL, 10mfd, 16V, M
C411, 412	22488478	EL, 0.47mfd, 50V, M
C413, 414	22480006	EL, 0.33mfd, 50V, K
C415, 416	22480003	EL, 0.1mfd, 50V, K
C417, 418	22485100	EL, 10mfd, 16V, M
C419, 420	22371473	MY, 0.047mfd, 50V, J
C421, 422	22371472	MY, 4700pF, 50V, J
C423, 424	22371273	MY, 0.027mfd, 50V, J
C425, 426	22371562	MY, 5600pF, 50V, J
C427, 428	22483221	EL, 220mfd, 10V, M
C429, 430	22483221	EL, 220mfd, 10V, M
C431, 432	22485100	EL, 10mfd, 16V, M
C433, 434	22371332	MY, 3300pF, 50V, J
C435, 436	22485100	EL, 10mfd, 16V, M
C437, 438	22485100	EL, 10mfd, 16V, M
C439, 440	22480006	EL, 0.33mfd, 50V, K
C441, 442	22488479	EL, 4.7mfd, 50V, M
C443, 444	22371103	MY, 0.01mfd, 50V, J
C445, 446	22371223	MY, 0.022mfd, 50V, J
C447, 448	22371153	MY, 0.015mfd, 50V, J
C449, 450	22371333	MY, 0.033mfd, 50V, J
C451, 452	22371182	MY, 1800pF, 50V, J
C453, 454	22349221	CD, 220pF, 50V, K
C455, 456	22321166	PP, 220pF, 50V, K
C457, 458	22483101	EL, 100mfd, 10V, M
C459, 460	22371153	MY, 0.015mfd, 50V, J
C461, 462	22362180	CD, 18pF, 50V, K
C463, 464	22485100	EL, 10mfd, 16V, M
C465, 466	22488478	EL, 0.47mfd, 50V, M
C467, 468	22480006	EL, 0.33mfd, 50V, K
C469, 470	22480003	EL, 0.1mfd, 50V, K
C471, 472	22485100	EL, 10mfd, 16V, M
C473, 474	22371473	MY, 0.047mfd, 50V, J
C475, 476	22483221	EL, 220mfd, 10V, M
C477, 478	22483221	EL, 220mfd, 10V, M
C479, 480	22371472	MY, 4700pF, 50V, J
C481, 482	22371273	MY, 0.027mfd, 50V, J
C483, 484	22371562	MY, 5600pF, 50V, J
C485, 486	22485100	EL, 10mfd, 16V, M
C487, 488	22485330	EL, 33mfd, 16V, M
C489, 490	22488109	EL, 1mfd, 50V, M
C491, 492	22371273	MY, 0.027mfd, 50V, J
C493, 494	22371102	MY, 1000pF, 50V, J
C495, 496	22362101	CD, 100pF, 50V, K
C497, 498	22362101	CD, 100pF, 50V, K
C499, 500	22349391	CD, 390pF, 50V, K
C501, 502	22342473	CD, 0.047mfd, 50V, Z
C503, 504	22483471	EL, 470mfd, 10V, M
C505	22488109	EL, 1mfd, 50V, M
C506	22485100	EL, 10mfd, 16V, M
C507, 508	22485330	EL, 33mfd, 16V, M

Symbol No.	Part No.	Description
C509	22342103	CD, 0.01mfd, 50V, Z
C510	22485100	EL, 10mfd, 16V, M
C511	22485101	EL, 100mfd, 16V, M
C512	22380101	PS, 3900pF, 200V, K
C513	22485100	EL, 10mfd, 16V, M
C514	22371153	MY, 0.015mfd, 50V, J
C515	22371153	MY, 0.015mfd, 50V, J
C516	22371153	MY, 0.015mfd, 50V, J
C517	22488109	EL, 1mfd, 50V, M
C518	22380103	PS, 5600pF, 200V, K
C601, 602	22485100	EL, 10mfd, 16V, M
C605, 606	22349391	CD, 390pF, 50V, K
C607, 608	22380124	PS, 235pF, 250V, G
C609, 610	22321157	PP, 4700pF, 100V, G
C611, 612	22321181	PP, 9100pF, 100V, G
C613, 614	22321094	PP, 1500pF, 100V, G
C615, 616	22488109	EL, 4.7mfd, 50V, M
C617, 618	22371104	MY, 0.1mfd, 50V, J
C619, 620	22362150	CD, 15pF, 50V, K
C621, 622	22349222	CD, 2200pF, 50V, K
C623, 624	22349152	CD, 1500pF, 50V, K
C625, 626	22488109	EL, 4.7mfd, 50V, M
C627, 628	22361509	CD, 5pF, 50V, D
C629, 630	22362150	CD, 15pF, 50V, K
C631, 632	22483471	EL, 470mfd, 10V, M
C633, 634	22483471	EL, 470mfd, 10V, M
C635, 636	22321157	PP, 4700pF, 100V, G
C637, 638	22380124	PS, 235pF, 250V, G
C639, 640	22321181	PP, 9100pF, 100V, G
C641, 642	22321094	PP, 1500pF, 100V, G
C643, 644	22488479	EL, 4.7mfd, 50V, M
C645, 646	22371104	MY, 0.1mfd, 50V, J
C647, 648	22485100	EL, 10mfd, 16V, M
C649, 650	22362150	CD, 15pF, 50V, K
C651, 652	22349222	CD, 2200pF, 50V, K
C653, 654	22349152	CD, 1500pF, 50V, K
C655, 656	22488479	EL, 4.7mfd, 50V, M
C657, 658	22361509	CD, 5pF, 50V, D
C659, 660	22362150	CD, 15pF, 50V, K
C661, 662	22483471	EL, 470mfd, 10V, M
C663, 664	22483471	EL, 470mfd, 10V, M
C665, 666	22485330	EL, 33mfd, 16V, M
C667, 668	22485330	EL, 33mfd, 16V, M
C669, 670	22485100	EL, 10mfd, 16V, M
C701	22488109	EL, 1mfd, 50V, M
C702	22483470	EL, 47mfd, 10V, M
C703	22342473	CD, 0.047mfd, 50V, Z
C704	22349102	CD, 1000pF, 50V, K
C705	22349102	CD, 1000pF, 50V, K
C706	22488339	EL, 3.3mfd, 50V, M
C707	22488109	EL, 1mfd, 50V, M

Symbol No.	Part No.	Description
C708	22483470	EL, 47mfd, 10V, M
C709	22485100	EL, 10mfd, 16V, M
C710	22488109	EL, 1mfd, 50V, M
C711	22349102	CD, 1000pF, 50V, K
C712	22488109	EL, 1mfd, 50V, M
C713	22485100	EL, 10mfd, 16V, M
C714	22488109	EL, 1mfd, 50V, M
C715	22488109	EL, 1mfd, 50V, M
C716	22360332	CD, 0.068mfd, 25V, M
C717	22342103	CD, 0.01mfd, 50V, Z
C718	22488109	EL, 1mfd, 50V, M
C719	22488339	EL, 3.3mfd, 50V, M
C720	22488339	EL, 3.3mfd, 50V, M
C801	22485330	EL, 33mfd, 16V, M
C901	22486102	EL, 1000mfd, 25V, M
C902	22485221	EL, 220mfd, 16V, M
C903	22485471	EL, 470mfd, 16V, M
C904	22485100	EL, 10mfd, 16V, M
C905	22488479	EL, 4.7mfd, 50V, M
C906	22485100	EL, 10mfd, 16V, M
△ C907, 908	22485222	EL, 220mfd, 16V, M
C909, 910	22483221	EL, 220mfd, 10V, M
C911, 912	22483471	EL, 470mfd, 10V, M
C913	22483470	EL, 47mfd, 10V, M
△ C914	22340150	CD, 4700pF, 400V, M (TE, TU, AY)
△ C914	22340140	CD, 0.01mfd, 125V, P (TC)
RESISTORS		
All resistors are carbon film $\frac{1}{4}W$, $\pm 5\%$ unless otherwise noted. G = $\pm 2\%$		
R1	22545472	4.7K ohm
R401, 402	22545333	33K ohm
R403, 404	22545473	47K ohm
R405, 406	22655434	50K ohm, A Variable (INPUT)
R407, 408	22545222	2.2K ohm
R409, 410	22545472	4.7K ohm
R411, 412	22545474	470K ohm
R413, 414	22545331	330 ohm
R415, 416	22545473	47K ohm
R417, 418	22545104	100K ohm
R419, 420	22545274	270K ohm
R421, 422	22545154	150K ohm

Symbol No.	Part No.	Description
R423, 424	22545473	47K ohm
R425, 426	22545332	3.3K ohm
R427, 428	22545181	180 ohm
R429, 430	22545473	47K ohm
R431, 432	22545103	10K ohm
R433, 434	22545223	22K ohm
R435, 436	22658280	22K ohm, B, Semi-fixed
R437, 438	22545103	10K ohm
R439, 440	22545104	100K ohm
R441, 442	22545103	10K ohm
R443, 444	22545332	3.3K ohm
R445, 446	22545151	150 ohm
R447, 448	22545222	2.2K ohm
R449, 450	22545392	3.9K ohm
R451, 452	22545103	10K ohm
R453, 454	22545472	4.7K ohm
R455, 456	22545334	330K ohm
R457, 458	22545182	1.8K ohm
R459, 460	22545223	22K ohm
R461, 462	22545473	47K ohm
R463, 464	22545472	2.7K ohm
R465, 466	22658464	50K ohm, Semi-fixed (BIAS)
R467	22612400	10K ohm, B, Variable (BIAS FINE)
R468	22545229	2.2K ohm
R469	22547181	180 ohm, ½W
R470	22545681	680 ohm
R471	22547151	150 ohm ½W
R472	22545473	47K ohm
R473	22545152	1.5K ohm
R474	22545333	33K ohm
R475, 476	22545333	33K ohm
R477, 478	22545223	22K ohm
R479, 480	22658280	22K ohm, Semi-fixed (CAL)
R481, 482	22545104	100K ohm
R483, 484	22545103	10K ohm
R485, 486	22545103	10K ohm
R487, 488	22545183	18K ohm
R489, 490	22545224	220K ohm
R491, 492	22545392	3.9K ohm
R493, 494	22545332	3.3K ohm
R495, 496	22545103	10K ohm
R497, 498	22545106	10M ohm
R499, 500	22658491	300 ohm, Semi-fixed (BIAS)
R501, 502	22545102	1K ohm
R503, 504	22545103	10K ohm
R505, 506	22545103	10K ohm
R507, 508	22545104	100K ohm
R509, 510	22545274	270K ohm
R511, 512	22545154	150K ohm
R513, 514	22545473	47K ohm
R515, 516	22545332	3.3K ohm
R517, 518	22545181	180 ohm

Symbol No.	Part No.	Description
R519, 520	22545473	47K ohm
R523, 524	22545106	10M ohm
R525, 526	22651553	10K ohm, A, Variable (OUTPUT)
R527, 528	22545102	1K ohm
R529, 530	22545104	100K ohm
R531, 532	22545223	22K ohm
R533, 534	22545103	10K ohm
R535, 536	22545154	150K ohm
R537, 538	22545103	10K ohm
R539, 540	22545221	220 ohm
R541, 542	22545273	27K ohm
R543, 544	22545334	330K ohm
R545, 546	22658488	5K ohm, Semi-fixed (METER)
R547, 548	22545221	220 ohm
R549, 550	22545474	470K ohm
R551, 552	22545106	10M ohm
R553, 554	22545223	22K ohm
R555, 556	22545102	1K ohm
R557, 558	22545101	100 ohm
R559	22545473	47K ohm
R560	22545334	330K ohm
R561	22545101	100 ohm
R562	22545103	10K ohm
R563	22545123	12K ohm
R564	22545103	10K ohm
R565	22545103	10K ohm
R566	22545103	10K ohm
R567, 568	22658588	500 ohm, Semi-fixed (CAL)
R569, 570	22545271	270 ohm
R571, 572	22545272	2.7K ohm
R573	22545683	68K ohm
R574	22545473	47K ohm
R575	22545561	560 ohm
R576	22545391	390 ohm
R577	22545561	560 ohm
R578	22545334	330K ohm
R579	22545103	10K ohm
R580	22545223	22K ohm
R581	22545223	22K ohm
R581	22545153	15K ohm
R582	22545223	22K ohm
R583	22545223	22K ohm
R601, 602	22545473	47K ohm
R603, 604	22545224	220K ohm
R605, 606	22545152	1.5K ohm
R609, 610	22545473	47K ohm
R611, 612	22550235	2K ohm, G
R613, 614	22658463	10K ohm, B, Semi-fixed (DIST)
R615, 616	22545104	100K ohm

Symbol No.	Part No.	Description
R617, 618	22545330	33 ohm
R619, 620	22545221	220 ohm
R621, 622	22545221	220 ohm
R623, 624	22545683	68K ohm
R625, 626	22545106	10M ohm
R627, 628	22545224	220K ohm
R629, 630	22545124	120K ohm
R631, 632	22658463	10K ohm, B, Semi-fixed
R633, 634	22545153	15K ohm
R635, 636	22545332	3.3K ohm
R637, 638	22658463	10K ohm, B, Semi-fixed
R639, 640	22545473	47K ohm
R641, 642	22545123	12K ohm
R643, 644	22550235	2K ohm
R645, 646	22545473	47K ohm
R647, 648	22658463	10K ohm, B, Semi-fixed
R649, 650	22545104	100K ohm
R651, 652	22545330	33 ohm
R653, 654	22545221	220 ohm
R655, 656	22545221	220 ohm
R657, 658	22545683	68K ohm
R659, 660	22545106	10M ohm
R661, 662	22545224	220K ohm
R663, 664	22545124	120K ohm
R665, 666	22658463	10Kohm, B, Semi-fixed(GAIN)
R667, 668	22545153	15K ohm
R669, 670	22545332	3.3K ohm
R671, 672	22658463	10K ohm, B, Semi-fixed (LIMIT)
R673, 674	22545473	47K ohm
R675, 676	22545123	12K ohm
R677, 678	22545221	220 ohm
R681, 682	22545473	47K ohm
R683	22570313	330 ohm, 2W, Metal Oxied Film
R684	22545224	220K ohm
R701	22545221	220 ohm
R702	22545221	220 ohm
R703	22545101	100 ohm
R704	22545221	220 ohm
R705	22545271	270 ohm
R706	22545683	68K ohm
R707	22545103	10K ohm
R708	22545104	100K ohm
R709	22545472	4.7K ohm
R710	22545472	4.7K ohm
R711	22545472	4.7K ohm
R712	22545683	68K ohm
R713	22545564	560K ohm
R714	22545472	4.7K ohm
R715	22545472	4.7K ohm
R716	22545472	4.7K ohm
R717	22545472	4.7K ohm

Symbol No.	Part No.	Description
R718	22545474	470K ohm
R719	22545102	1K ohm
R720	22545472	4.7K ohm
R721	22545472	4.7K ohm
R722	22545472	4.7K ohm
R723	22545104	100K ohm
R724	22545472	4.7K ohm
R725	22545222	2.2K ohm
R726	22545223	22K ohm
R727	22545222	2.2K ohm
R728	22545223	22K ohm
△ R729	22570309	150 ohm, 2W, Metal Oxied Film
△ R730	22570300	27 ohm, 2W, Metal Film
R731	22545331	330 ohm
R732	22545102	1K ohm
R733	22545102	1K ohm
R734	22545472	4.7K ohm
R735	22545223	22K ohm
R736	22545222	2.2K ohm
R737	22545222	2.2K ohm
R738	22545223	22K ohm
R739	22545472	4.7K ohm
R740	22545334	330K ohm
R741	22545102	1K ohm
R742	22545684	680K ohm
R743	22545472	4.7K ohm
R744	22545473	47K ohm
R745	22545472	4.7K ohm
R746	22545222	2.2K ohm
R747	22658491	300 ohm, Semi-fixed (TORQUE)
R748	22545334	330K ohm
R749	22545472	4.7K ohm
R750	22545472	4.7K ohm
R751	22545103	10K ohm
R725	22545220	22 ohm
R801, 802	22545223	22K ohm
R803	22545102	1K ohm
R804	22545154	150K ohm
R805	22547271	270 ohm, ½W
R806	22545102	1K ohm
R902	22545471	470 ohm
R903	22545102	1K ohm
R904	22545222	2.2K ohm
R905	22545684	680K ohm
R906	22545472	2.7K ohm
R909, 910	22545471	470 ohm
R911	22545222	2.2K ohm

Symbol No.	Part No.	Description
ACCESSORIES		
AC01	22164775	Joint Cord
AC02	22903024	Owner's Manual (TE, TU, AY)
AC02	22903023	Owner's Manual (TC)
AC03	22990756	Cleaner, Head

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PRINTED IN JAPAN 22955994 Apr., 1981 ©