



Service Manual

CASSETTE TAPE DECK

CT-F850

 **PIONEER®**

MODEL CT-F850 COMES IN SIX VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC 120V only	U.S.A. model
KC	AC 120V only	Canada model
HE	AC 220V and 240V (Switchable)	Europe model
HB	AC 220V and 240V (Switchable)	United kingdom model
D	AC 120V, 220V and 240V (Switchable)	General export model
D/G	AC 120V, 220V and 240V (Switchable)	U.S. military model

- This service manual is applicable to the CT-F850/KU, KC. For servicing of the other types, please refer to the additional service manuals.

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1. SPECIFICATIONS

Systems	Compact cassette, 2-channel stereo
Motors	Capstan drive; DC servo motor x 1 Reel drive; DC high torque motor x 1
Heads	Sendust recording/ playback combination type head x 1 Erasing head x 1
Fast Winding Time	Approximately 85 seconds (C-60 tape)
Wow and Flutter	No more than 0.04% (WRMS)
Frequency Response	
-20dB Recording ;	
Standard, LH tapes	20 to 17,000Hz (25 to 15,000Hz \pm 3dB)
Ferrichrome tape	20 to 18,000Hz (25 to 17,000Hz \pm 3dB)
Chromium dioxide tape	20 to 18,000Hz (25 to 17,000Hz \pm 3dB)
Metal tape	20 to 19,000Hz (25 to 18,000Hz \pm 3dB)
0dB Recording ;	
Chromium dioxide tape	20 to 11,000Hz
Metal tape	20 to 14,000Hz
Signal-to-Noise Ratio	Dolby NR OFF; More than 59dB Dolby NR ON ; More than 69dB (over 5kHz)
Harmonic Distortion	No more than 1.2% (0dB)
Inputs (Sensitivity/Maximum allowable input/Impedance)	
MIC (L, R); 0.3mV/100mV/10kilohms, 6mm diam. jack (Reference MIC impedance; 250 ohms to 10 kilohms)	
LINE x 2; (64mV/25V/85 kilohms) Pin jack	
Outputs (Reference level/Maximum level/Load impedance)	
LINE x 2; (450mV/630mV/50 kilohms) Pin jack	
HEADPHONES x 1; 70mV/98mV/8 ohms, 6mm diam. jack	
Semiconductors	
Amplifier Section	Transistors x 49, ICs x 10, Diodes x 51 (including Zener Diodes x 3, LEDs x 7)
Motor control Section	Transistors x 3, Diode x 1
Subfunctions	
• Dolby NR system (ON-OFF) with LED indicator lamp	
• Fluorescent tube level meter (-20 to +8dB) (Peak/Average selector)	
• Bias fine adjusting control knob	
• 4 position tape selector (STD/METAL/CrO ₂ /Fe-Cr)	
• Automatic tape slack canceller	
• Cassette compartment illumination	
• Standby mechanism with unattended recording	
• Output level controls with click stop for reference playback level	

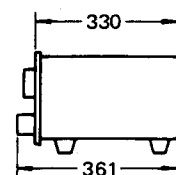
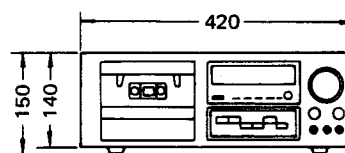
Power Requirements	AC 120V 60Hz
Power Consumption	50 watts
Dimensions	420(W) x 150(H) x 361(D) mm Max. 16-9/16 x 5-15/16 x 14-1/4 in.
Weight	9.2kg (20 lb 4 oz.)
Furnished parts.	Stereo connecting cords with pin plugs x 2 Head cleaning swabs x 3 Operating instructions x 1

NOTE:

Specifications and the design subject to possible modification without notice due to improvements.

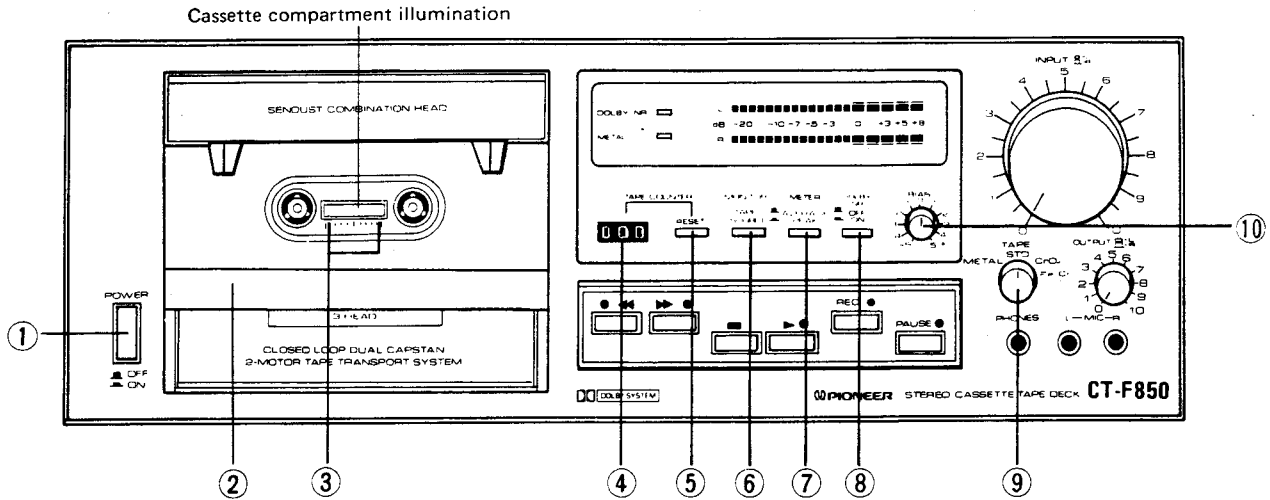
NOTES:

1. Reference Tapes: Standard & LH: DIN 45513/BLATT6 or equiv.
: CrO₂: DIN 45513/BLATT7(CrO₂) or equiv.
2. Reference Recording Level: Meter 0dB indicating level (160 nwb/m magnetic level = Philips cassette reference level)
3. Reference Signal: 333Hz
4. Wow & Flutter: • JIS [3kHz, with acoustic compensation (weighted), rms value]
5. Frequency Response: • Measured at -20dB level, DOLBY NR OFF, level deviation is \pm 6dB without indication.
6. Signal to Noise Ratio: • Measured at the third harmonic distortion 3% level, weighted.
7. Sensitivity: Input level (mV) required for reference recording level with input (REC) controls set to maximum.
8. Maximum Allowable Input: While decreasing settings of input (REC) level controls and increasing level at input jacks, this is the maximum input level (mV) at the point where recording amplifier output waveform becomes clipped.
9. Reference Output Level: Playback output level when meter indicates 0dB.
10. Maximum Output Level: Playback output level with respect to reference recording level when output (PLAY) level controls are set to maximum.



Unit mm

2. FRONT PANEL FACILITIES



① POWER SWITCH

The power comes on when the POWER switch is depressed. The level meter and the cassette compartment illumination will then come on.

② DUST COVER

When you are not using the deck, always keep this cover in place to prevent dust and dirt from adhering to the head section and rotating parts.

③ REMAINING TAPE MARKER

If this marker is visible, it means that there is enough tape remaining for several minutes of recording or playback.

④ TAPE COUNTER

This indicates the position of the tape run.

⑤ TAPE COUNTER RESET BUTTON

Depress this button to reset the tape counter display to "000."

⑥ MONITOR SWITCH

This switch is used to select the output signals including those of the headphones. The level meter display is also selected simultaneously and so when adjusting the recording level, be sure to set this switch to SOURCE (depressed position).

For recording: If you depress this switch to SOURCE, you will be able to listen to the signals (recording input) just before they are recorded. If you then release to switch to TAPE, you will be able to hear the signals immediately after they have been recorded (playback sound).

Select this switch while you are recording (alternately between TAPE and SOURCE) and monitor the recording.

For playback: Release the switch to TAPE. You will not be able to listen to the playback sound if the switch is set to SOURCE.

⑦ METER SELECTOR SWITCH

PEAK: When this switch is depressed to PEAK, the meter functions as a peak meter.

AVERAGE: When the switch is released to AVERAGE, the meter functions as an ordinary level meter.

⑧ DOLBY NR SWITCH

Set this switch to ON for recording with the built-in Dolby noise reduction system and for the playback of tapes which have been recorded using the Dolby NR system.

⑨ TAPE SELECTOR

This selector allows the bias and equalizer characteristics to be selected during recording and the equalizer characteristics during playback in line with the type of tape you are using.

METAL: For using metal tapes

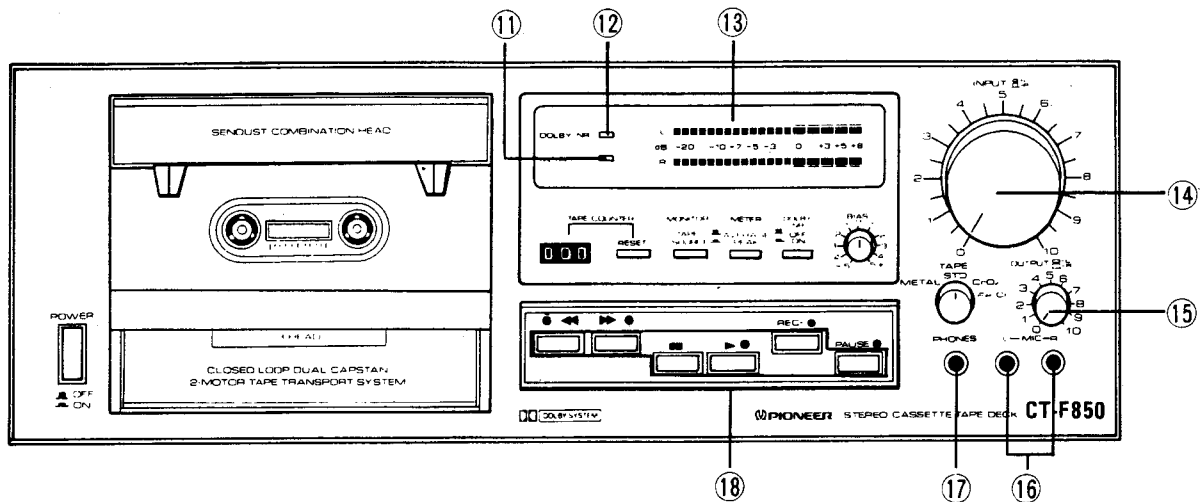
STD: For using ordinary or LH tapes

CrO : For using chrome tapes

Fe-Cr: For using ferrichrome tapes

⑩ BIAS CONTROL

Use this control to adjust the bias in accordance with the characteristics of the tape being used. It is set so that the center (click stop) position corresponds to the standard bias.



11 METAL TAPE INDICATOR

This light comes on when the TAPE selector is set to METAL.

12 DOLBY NR INDICATOR

This lights up when the DOLBY NR switch is set to ON and it indicates that a tape is being recorded or played back with the Dolby NR system.

13 LEVEL METERS

These indicate the input level during recording and the output level during playback. By operating the METER selector switch, it can be made to function as a peak meter, or as a level meter. The input signal level is indicated when the MONITOR switch has been depressed, and the playback output level is indicated when the MONITOR switch has been released.

14 INPUT (RECORDING LEVEL) CONTROLS

Use these to adjust the level of the input signals from the MIC jacks or rear panel INPUT. Turning these controls to the right increases the level. The controls are coupled to the left and right channels, but you can also use them to adjust the right channel (back) and the left channel (front) independently.

15 OUTPUT (PLAYBACK LEVEL) CONTROLS

Use these to adjust the output signal level during playback. Turning the controls to the right increases the level. The controls are coupled when turned but it is also possible to adjust the right channel (back) and the left channel (front) independently. When playing back a reference tape (160 nwb/m), a reference playback level (0dB) is obtained with these controls set to the "6" click stop position.

16 MIC JACKS

These are the input jacks for microphone recording. Plug the left channel microphone into the L jack and the right channel microphone into the R jack.

17 HEADPHONES JACK

This is the output jack for your stereo headphones. You will be able to hear sound from signals selected by the MONITOR switch. Use this jack when you want to monitor the quality of a recording or when you want to listen to a tape privately on the CT-F850.

NOTES:


- Use low-impedance headphones. If you use a high-impedance model, you will not be able to obtain sufficient volume.
- You will damage the microphone if you plug it into the PHONES jack by mistake.

18 OPERATING SWITCHES

- ◀ (REW): Depress this switch to rewind the tape at high speed. (The tape will travel from right to left.)
- ▶▶ (FF): Depress this switch to send the tape forward at high speed. (The tape will travel from left to right.)
- (STOP): Depress this switch to stop the tape run and to release the operating switches.
- ▶ (PLAY): Depress this switch when playing back a tape. (The tape will travel from left to right.)
- REC: Depress this switch together with the ▶ (PLAY) switch for recording. This switch will not work when a cassette is not loaded or when the erasure prevention tabs of a loaded cassette have been broken off.
- PAUSE: Depress this switch to stop the tape temporarily during recording or playback. Depress it again to allow the tape to continue to travel as before.

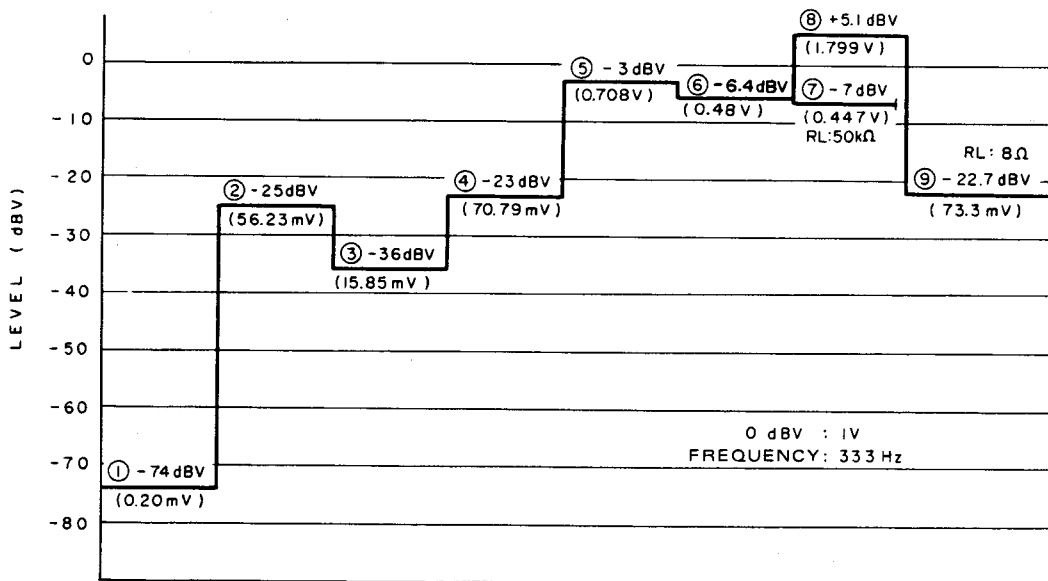
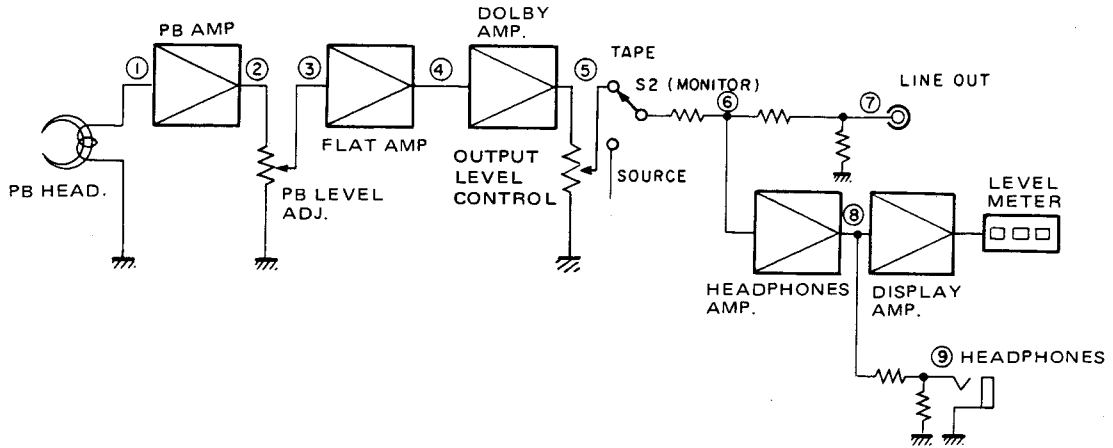
NOTES:

- When any of the operating switches are depressed, the corresponding indicator (except STOP mode) will come on signifying that the deck is set to that respective mode.
- The operating switches will not return to their original positions even when the power is switched OFF.

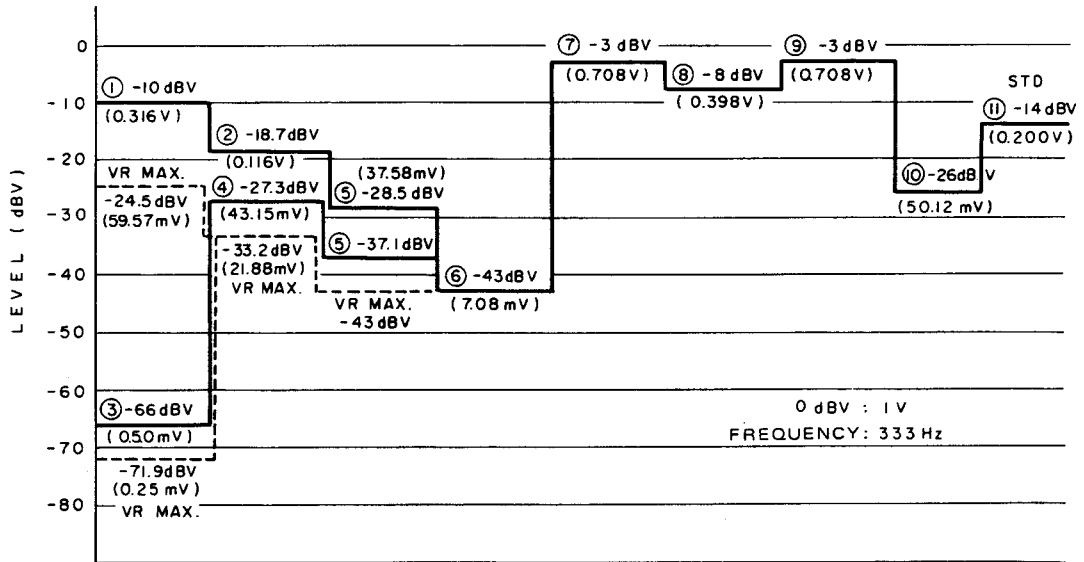
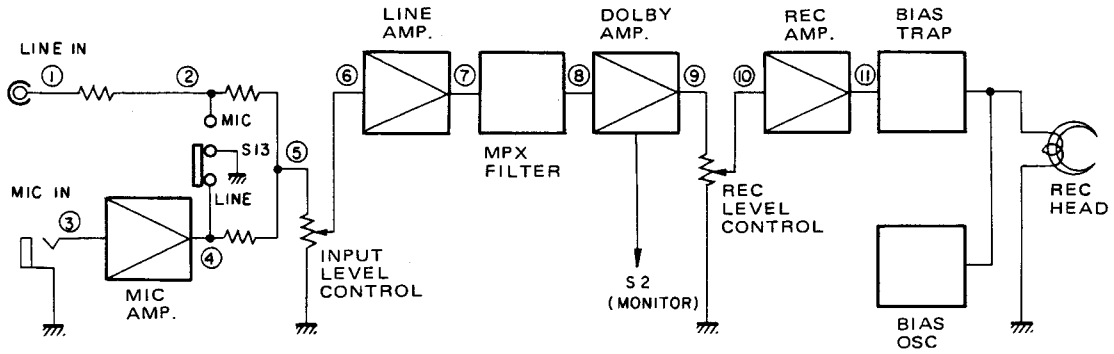
* Manufactured under license from Dolby Laboratories.
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3. LEVEL DIAGRAM

PLAYBACK



RECORDING



4. DISASSEMBLY

EXTERNAL COMPONENTS

1. Undo screws 1—4 to remove the bonnet.
2. Undo screws 5—10 to remove the front panel.
3. Undo screws 11—18 and remove washer 19 to remove the base plate.

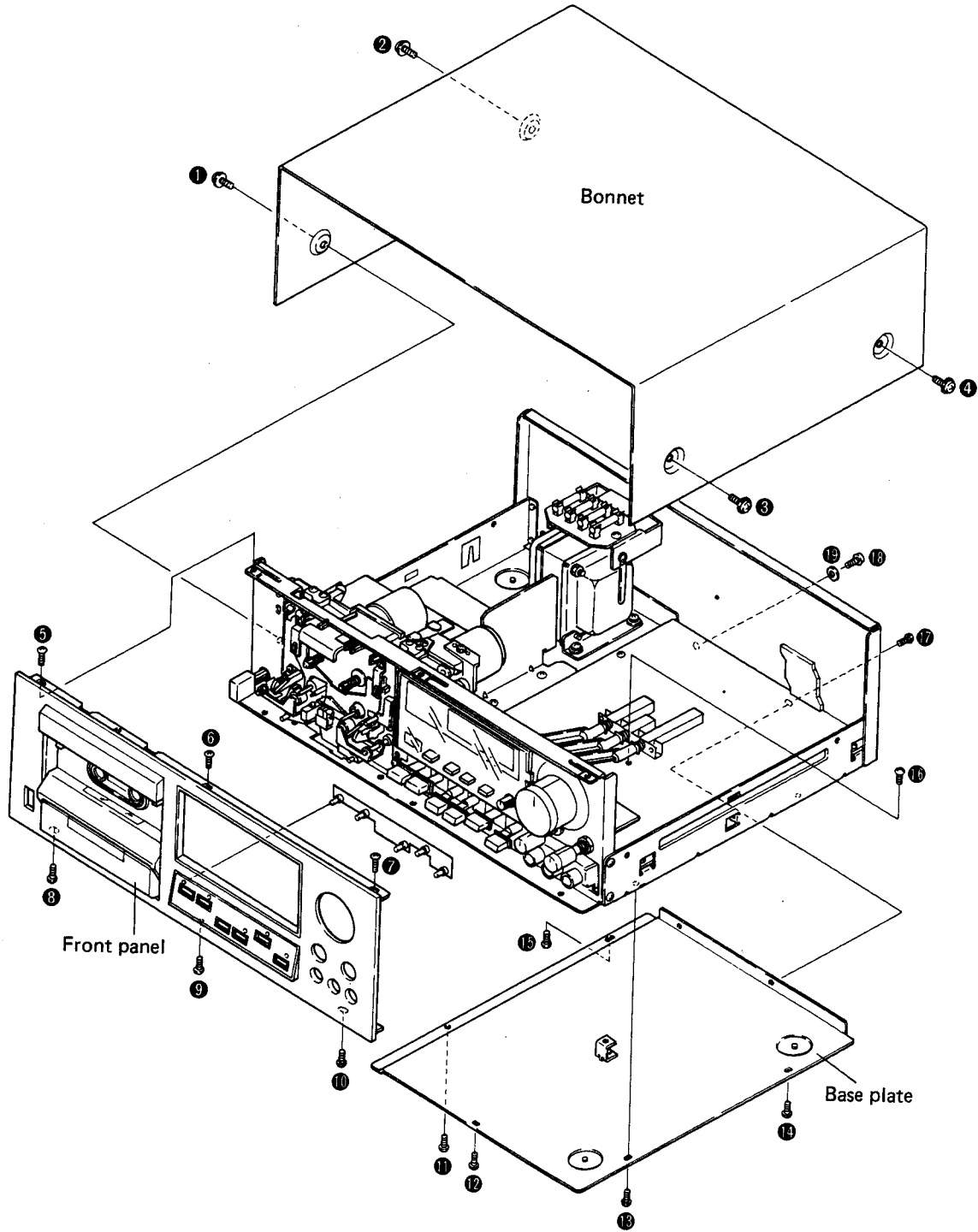


Fig. 4-1 Disassembly of external part

MECHANICAL ASSEMBLY

Once the front panel has been removed, undo screws 1-6.

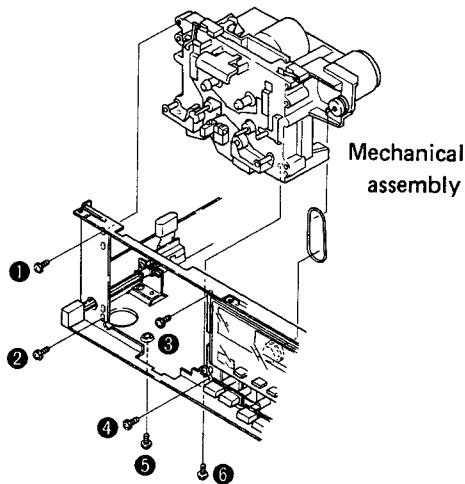


Fig. 4-2 Removing the mechanical assembly

FLUORESCENT DISPLAY TUBES

Undo the single screw to remove the display assembly. The fluorescent display tubes are mounted inside the display assembly, and will require the use of a soldering iron for removal. This step must be performed carefully in order to prevent damage to component parts.

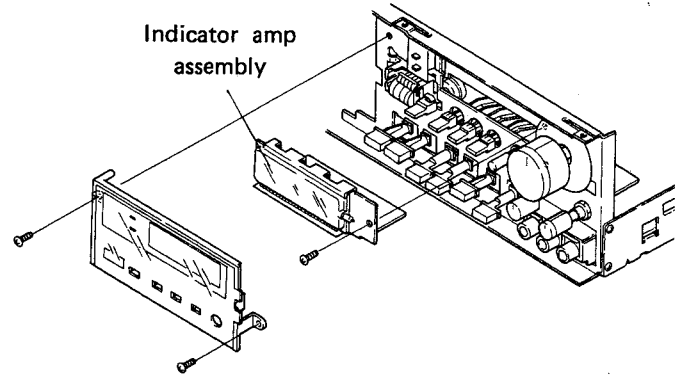


Fig. 4-3 Removing the fluorescent display tubes

Sub-Head Base Ass'y, Pinch Roller Arm Ass'y and Pressure Arm.

1. Undo screws 1 and 2 and the hexagonal socket head bolt to remove the sub-head base assembly.
2. Undo the height adjuster nut to remove the pinch roller arm assembly on the supply reel side.
3. Then remove E washer 1 to remove the pinch roller arm assembly on the take-up reel side.

4. To remove the pressure arm, simply remove E washer 2. When a pinch roller pressure spring is to be replaced, take special note of the original spring position. It will also be necessary to readjust spring pressure in accordance to the requirements specified under the section on "Pinch roller pressure adjustment" on page 25.

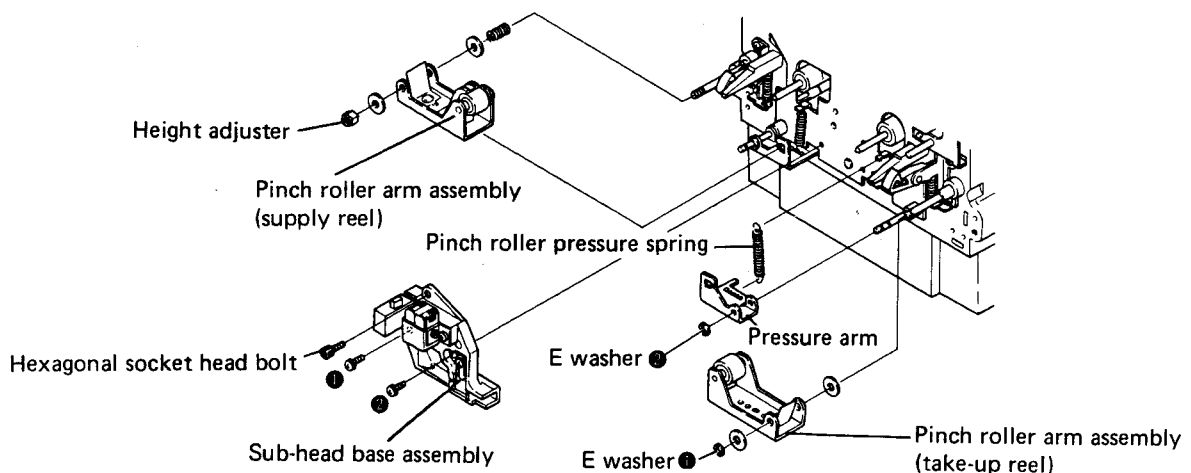


Fig. 4-4 Removing the sub-head base ass'y, pinch roller arm ass'y and pressure arm

MECHANICAL ASSEMBLY COMPONENT PARTS

When the motor belt needs to be replaced, take special note of the order in which component parts are disassembled and reassembled.

1. Remove the capstan motor by undoing screws 1-3 and washers 1-3.
2. Solenoid A is removed by undoing screws 4 and 5.
3. Undo screws 6-10 to remove the plunger chassis assembly.
4. Undo screws 11-16 to remove the sub-chassis assembly.
5. Then remove the take-up reel motor by undoing screws 17 and 18, and washers 5 and 6. Solenoid B is removed by undoing screws 19 and 20.

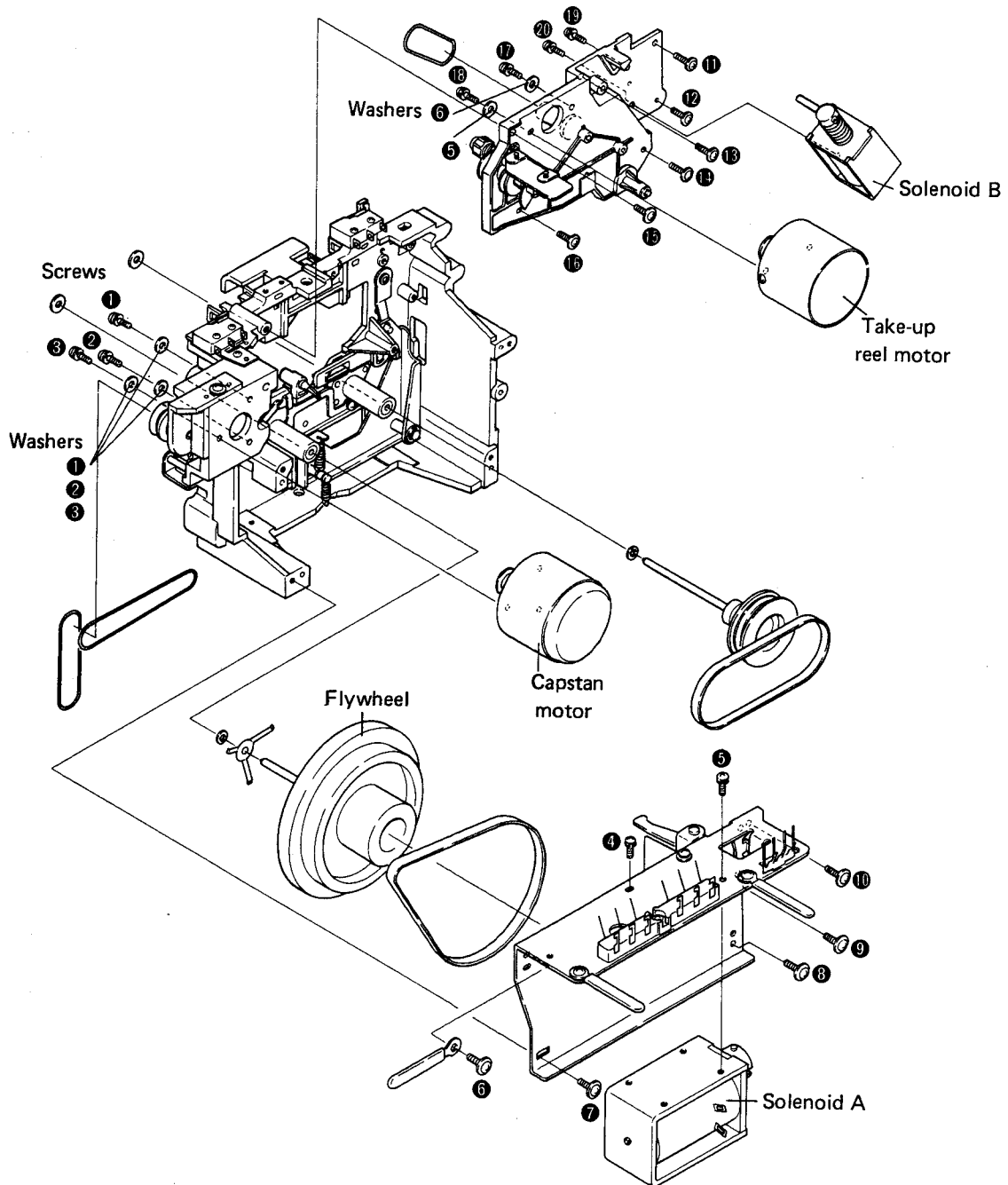
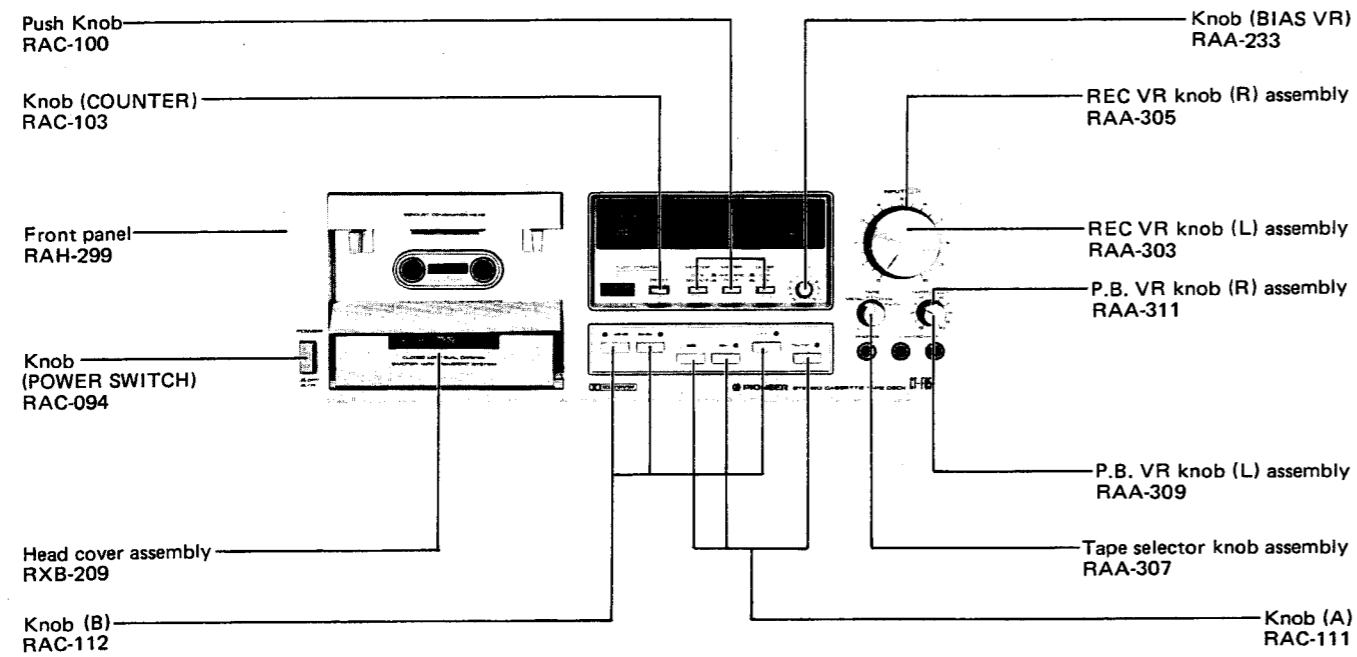


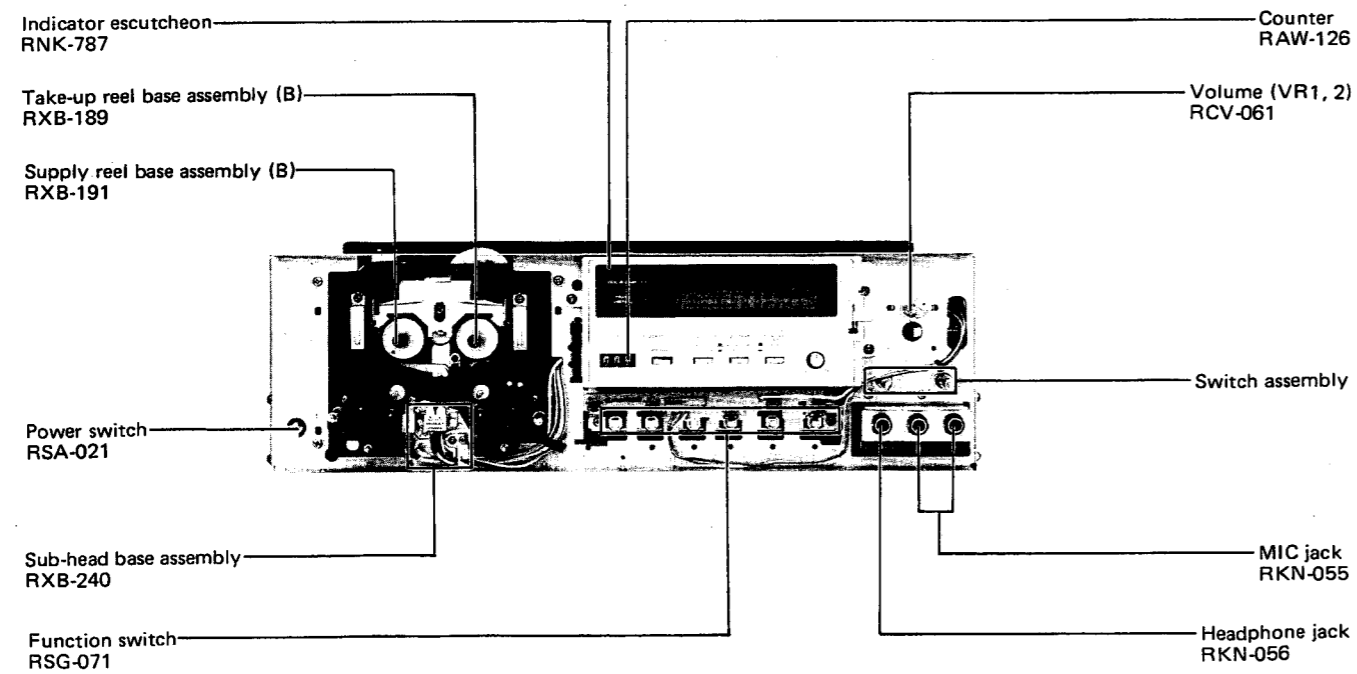
Fig. 4-5 Removing mechanical assembly component parts

5. PARTS LOCATION

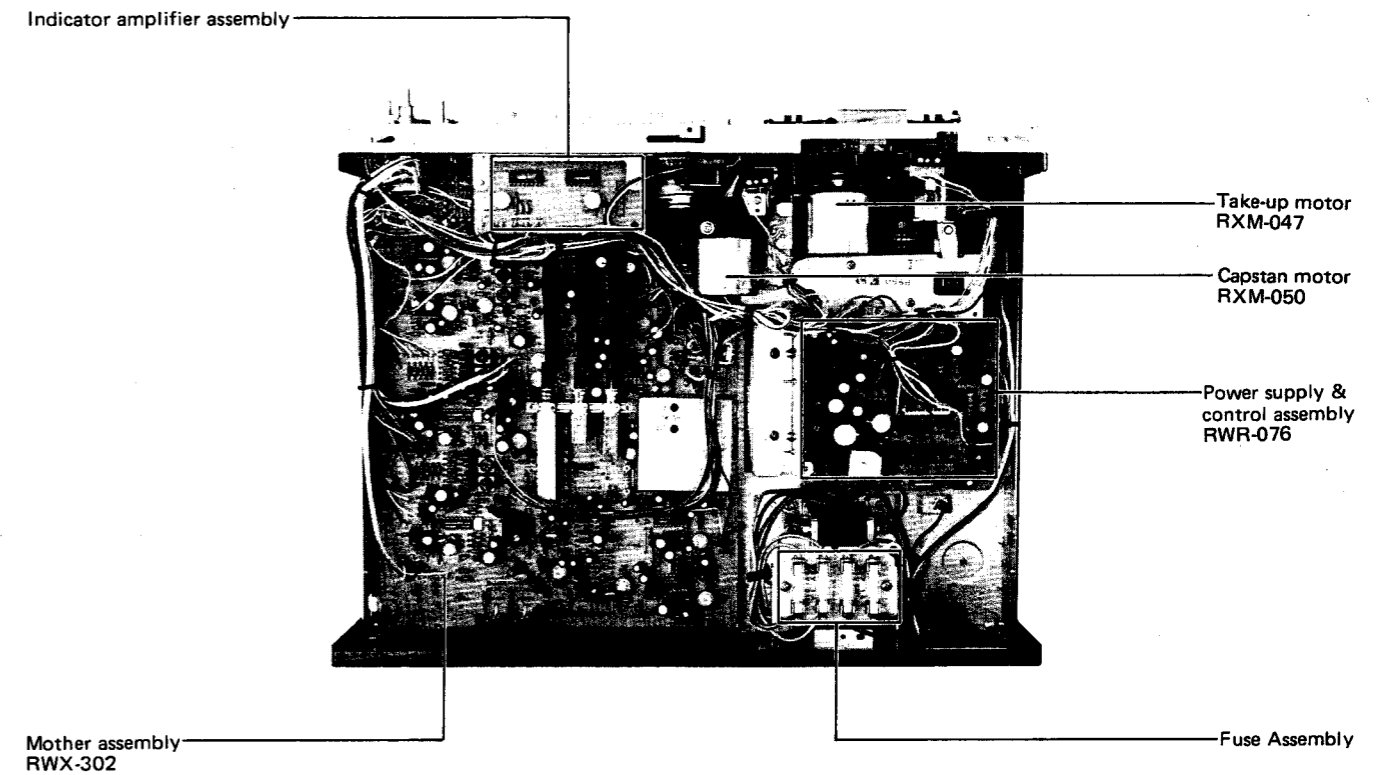
FRONT PANEL VIEW



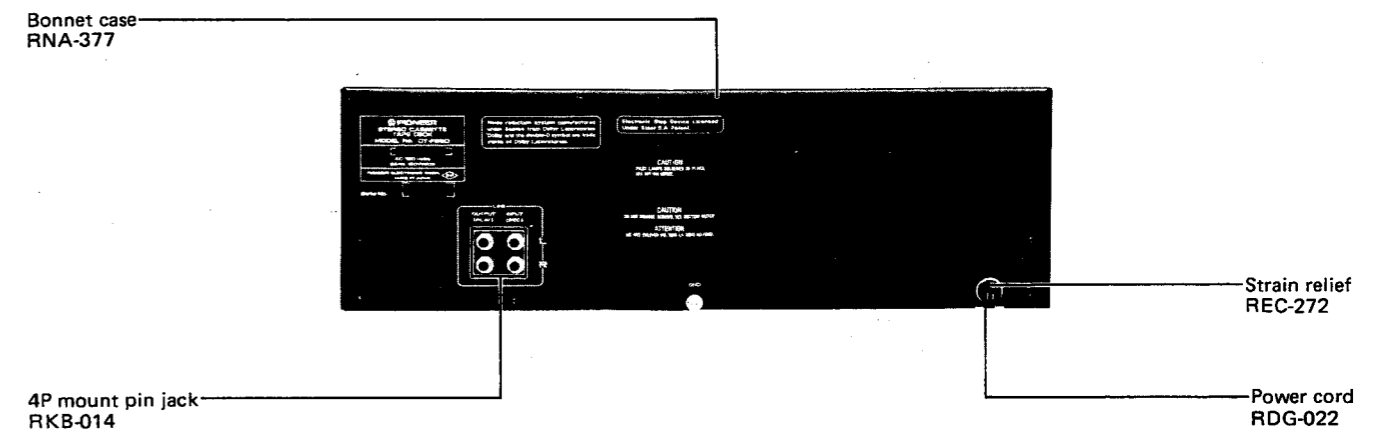
FRONT VIEW WITH PANEL REMOVED



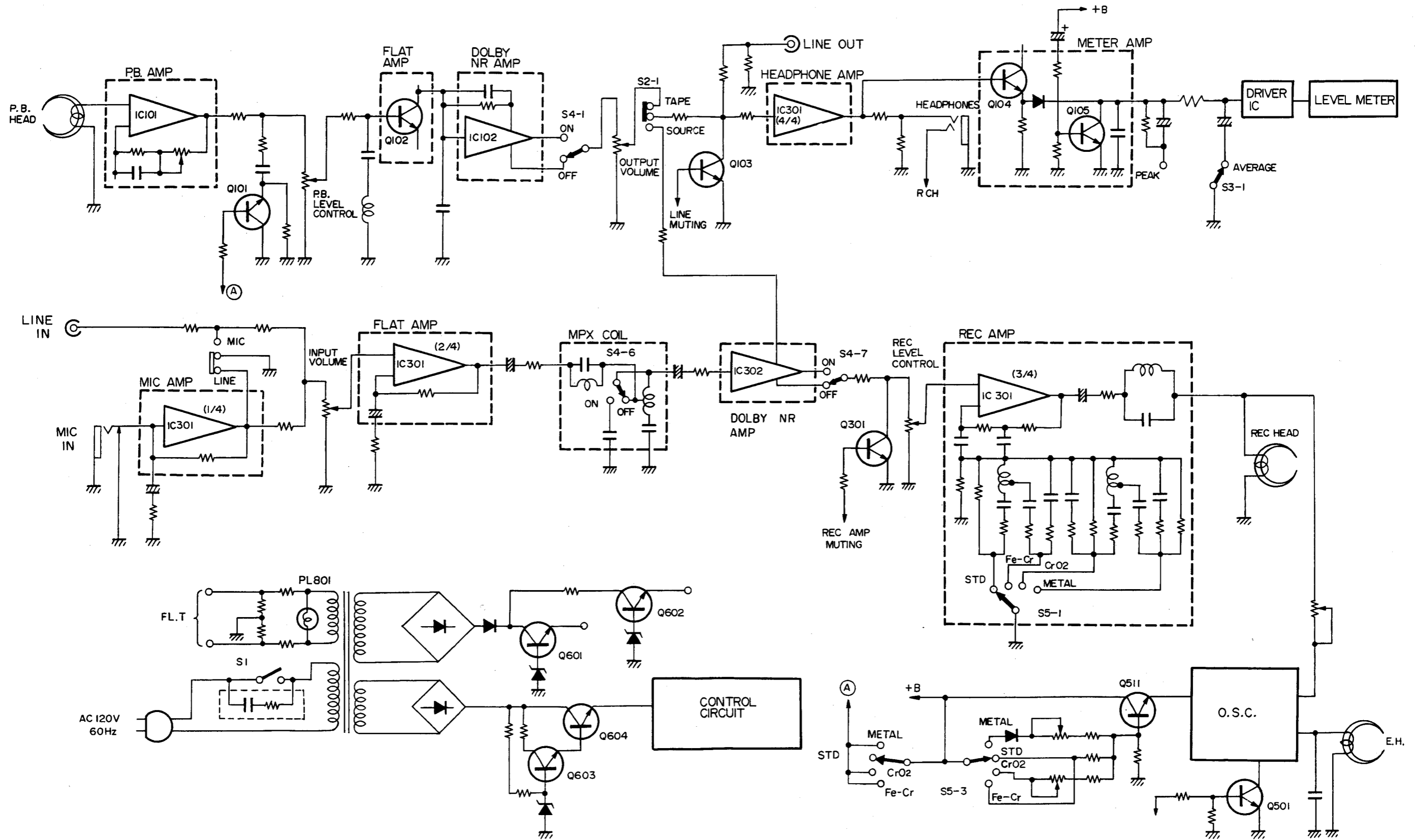
TOP VIEW WITH BONNET REMOVED



REAR PANEL VIEW



6. BLOCK DIAGRAM



7. CIRCUIT DESCRIPTIONS

7.1 RECORDING AND PLAYBACK CIRCUIT

Playback Equalizer Amplifier

This playback equalizer amplifier is an NFB type amplifier equipped with low-noise, high gain monolithic IC (AN370).

Playback Flat Amplifier

This flat amplifier consists of a single transistor Q₁₀₂. Recording bias mixing is prevented by a trap circuit in the input stage.

Headphone Amplifier

The headphone amplifier is incorporated inside IC₃₀₁ (PA4001) (Note 1). Gains is approximately 11dB.

Mic Amplifier

The mic amplifier is also incorporated inside IC₃₀₁ (Note 1). The input stage contains a differential amplifier, while the output stage is an emitter-follower.

Line Amplifier

The line amplifier is another of the stages located inside IC₃₀₁ (Note 1). The input stage of this flat amplifier is also a differential amplifier, but the output stage is complementary.

Recording Amplifier

The input stage of this amplifier (also contained in IC₃₀₁ (Note 1)) is again a differential amplifier, and the output stage complementary.

NOTE 1: IC₃₀₁ (PA4001)

This 16-pin dual line IC has been developed by Pioneer especially for use in tape decks. It contains the mic, line, recording, and headphone amplifiers.

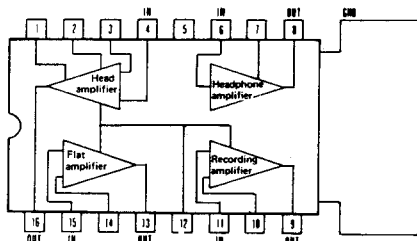


Fig. 7-1 Block diagram of the PA4001

7.2 TAPE SELECTOR AND EQUALIZER

Tape Selector

Suitable equalization and bias levels for the type of tape being used are selected by the front panel Tape Selector (S₅) (STD, METAL, CrO₂ and Fe-Cr)

Playback Equalizer

Playback equalization is 70μsec for metal, CrO₂ and Fe-Cr tapes, and 120μsec for standard tapes. In the METAL, CrO₂, and Fe-Cr positions, +B is passed via S₅ to Q₁₀₁, thereby turning the transistor on. As a result, the time constant is set to 70μsec by R₁₀₉ and C₁₁₀. In the STD position, Q₁₀₁ remains off, thereby setting the time constant at 120μsec. C₁₂₅ and R₁₁₀ are employed to reduce the switching noise generated when Q₁₀₁ is switched.

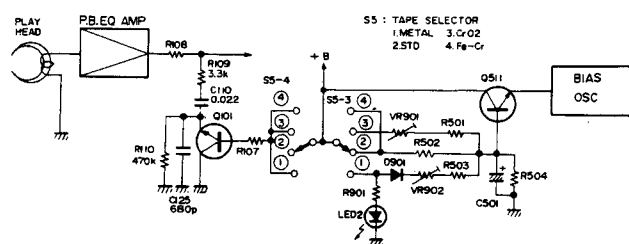


Fig. 7-2 Playback equalizer circuit

Recording Equalizer and Recording Bias

Recording Equalizer (Peaking Circuit)

The peaking characteristics are switched by the switching action of the tape selector. Peaking frequency is about 15kHz in the STD position, about 18kHz in the CrO₂ and Fe-Cr positions, and about 19kHz in the METAL position.

Recording Bias

Suitable recording bias level is also set by the switching action of the tape selector S₅. The +B voltage for the oscillator circuit is supplied by the Q₅₁₁ constant voltage circuit. The recording bias for the STD/Fe-Cr positions is increased by about 150% for the METAL position, and about 40% for the CrO₂ position. The bias adjustment control can vary the bias by up to ± 15%.

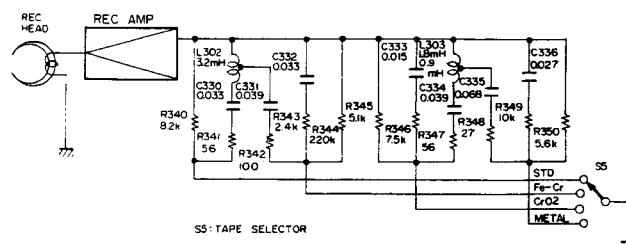


Fig. 7-3 Peaking circuit

Tape Slack Canceller Circuit

The presence of any tape slack in cassette tapes loaded in closed-loop capstan transport systems prevents the correct loop tension from being obtained, and results in loss of proper tape-to-head contact.

This circuit eliminates any tape slack by first rotating the supply reel in the rewind direction for a short period when the cassette tape is loaded. When the power is switched on and a cassette tape is loaded, the S4 cassette detector switch is turned on to pass +B from S7 to R640, C625, and Q614, the transistor being turned on for about 1 second until C625 is fully charged. And while Q614 is on, +B is also passed from S11-1 to S8-2, reel mo-

tor RM, D617, R636, and Q614, thereby turning RM in the reverse direction to eliminate any tape slack.

Q611 is also turned on at the same time as Q614, resulting in +B being passed from Q611 to Q612 via R631. When the Q613 transistor is turned on, the braking solenoid is activated. Furthermore, in order to prevent tape being wound off the take-up reel once the tape slack has been eliminated, a signal from a photo-interrupter is passed via a waveform rectifier and one shot multi circuit to Q624 which is subsequently turned on. Q614 is consequently turned off to stop the tape slack circuit and halt the reverse rotation of the RM.

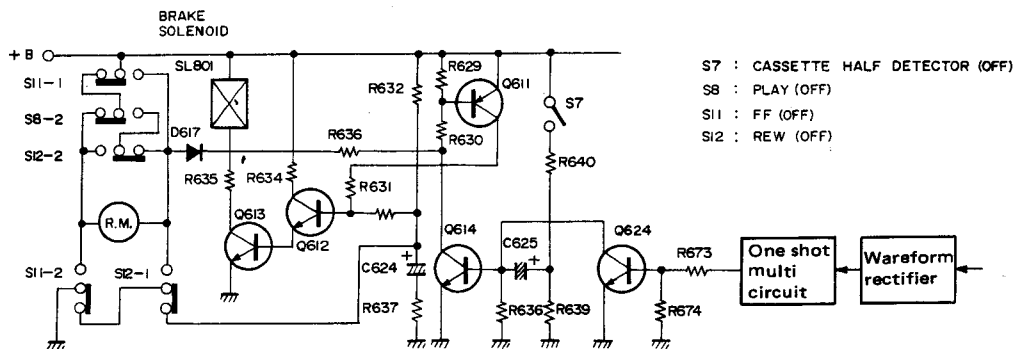


Fig. 7-4 Tape slack canceller circuit

7.3 LEVEL METERS CIRCUIT

The headphone amplifier output is amplified by Q104, and rectified by D102, the DC portion being applied to the display driver IC (IC701). This IC contains 12 level display comparators used to drive the 12 level display segments (Note 1). +B is applied to one side of the comparators to supply the reference voltage.

The reference voltage applied to each comparator is set in a stepwise sequence, the lowest voltage being applied to the low level display end.

The DC portion rectified by D102 is compared with each reference voltage, the corresponding segment being lit up if the reference voltage is exceeded.

The level meters may be used as normal VU meters, or as peak meters, depending on the S3 position (for different response characteristics).

NOTE 1:

Pairs of level display segments light up at levels below 0dB.

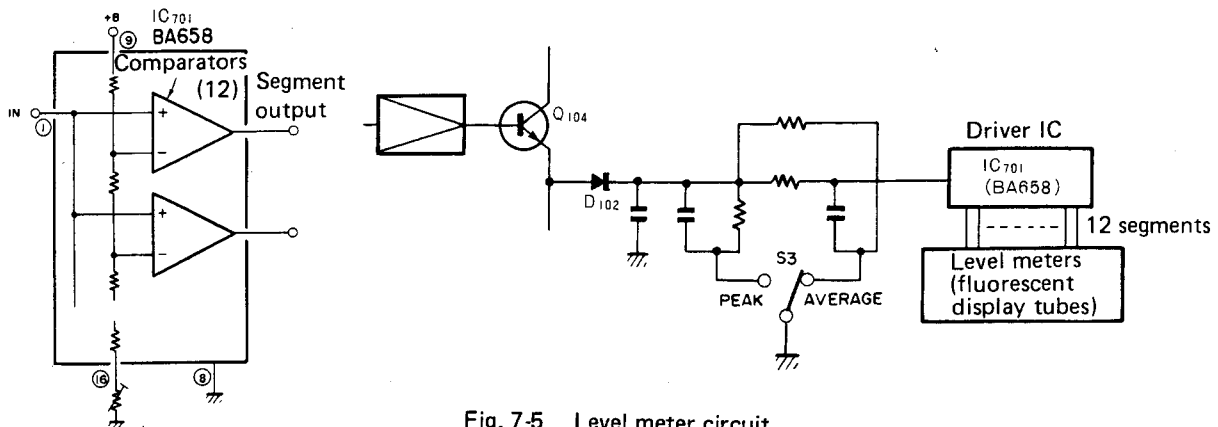


Fig. 7-5 Level meter circuit

7.4 DOLBY NR CIRCUIT

The CT-F850 features a type B Dolby NR noise reduction system where noise is reduced in the mid to high frequency region only to eliminate much of the inherent tape hiss. The S/N ratio is improved by 10dB (max.) in the high frequency range (above 5kHz).

The Dolby NR circuit is incorporated in a Dolby NR processor IC (PA4005) developed by Pioneer. This IC employs a voltage controlled variable gain circuit (VCA), rather than a variable resistance element used in other more conventional Dolby NR ICs. See Fig. 7-6 for an outline of this Dolby NR processor.

Operation During Recording Mode

1. The input signal is applied to the buffer amplifier via the MPX filter. This filter eliminates the FM pilot signal, and also serves as a 85kHz bias trap, thereby preventing any accidental system mis-operation.
2. The buffer amplifier output is divided into 2 positions, the main signal being passed on directly to the adding amplifier, while the sub-signal is diverted through the side chain amplifier and clipper before being rejoined with the main signal in the adding amplifier.
3. Besides being passed on to the clipper, the side chain amplifier output is also applied to the voltage controlled variable gain circuit and integrating amplifier to be fed back to the input side again, thereby forming a variable filter circuit.
4. Furthermore, the side chain output is also applied to a high-pass filter amplifier and rectifier circuit. The rectified signal is then applied to the voltage controlled variable gain circuit as a control signal.
5. When the level of the signal passed through the high-pass filter amplifier is low, the rectifier DC voltage will drop to almost "0". The turnover frequency of the variable filter will consequently be at a minimum. Under these conditions, the adding amplifier output level will be 10dB higher (for frequencies above 5kHz) than the main signal input, and the dynamic range will be contracted.
6. With a time delay being generated between the signal applied to the voltage controlled variable gain circuit and the main signal, the clipper will not be capable of responding to sudden level changes. No uncontrolled signal will thus be applied to the adding amplifier.
7. When the level of the signal passed through the high-pass filter amplifier is high, the rectifier DC voltage will also be high, resulting in an increase in the turnover frequency of the variable filter. The sub-signal level will consequently drop to almost "0", and there will be no contraction of the dynamic range.

Operation During Playback Mode

Although each block operates in the same way as during recording, the adding amplifier becomes an inversion amplifier (output phase becomes the inverse of the input phase), resulting in the inversion of the sub-signal phase, and the formation of reducing type NFB loop.

In Dolby NR B noise reduction systems, contraction and expansion occur within the frequency band determined by the variable filter circuit. But in order to ensure complete symmetry in these operations it is necessary to set a reference level for the operational point. This is called the "Dolby NR level", all signals above this level being contracted and expanded accordingly.

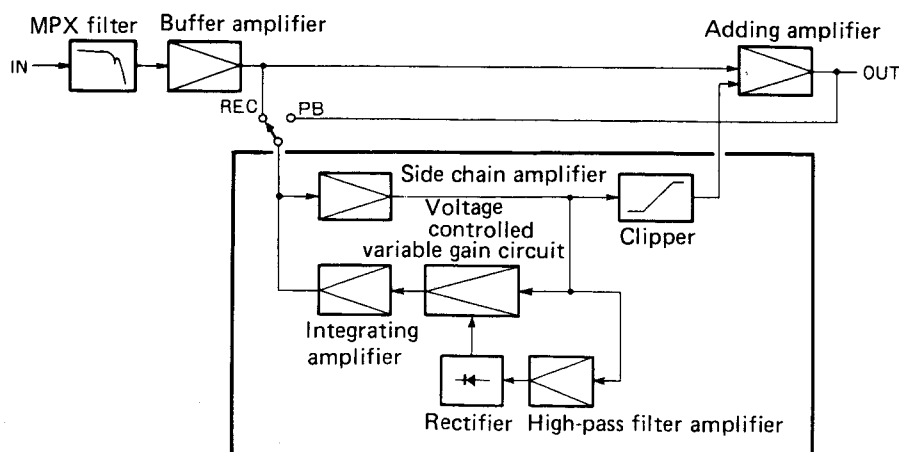


Fig. 7-6 Dolby circuit

7.5 CONTROL CIRCUITS

PLAY Mode (Fig. 7-7)

When a cassette tape is loaded into the tape deck, the cassette half switch S_7 is turned on, and the capstan motor CM commences to rotate. A tape slack elimination circuit (described later) takes up any slack present in the tape at this time.

When S_{8-1} is switched on by pressing the PLAY key, Q_{615} and Q_{616} are both turned on (Q_{503} on), and the +B current flows via the pinch solenoid, Q_{618} , D_{620} and Q_{616} to activate the solenoid. The pinch roller will consequently press against the capstan resulting in the start of play mode.

At the same time, +B also flows via the S_{11-1} , S_{8-2} , RM (reel motor), D_{621} , R_{649} , and Q_{616} route to start the take-up reel turning.

REC Mode (Fig. 7-7)

When the PLAY and REC keys are both pressed, S_8 and S_9 are switched on. The actions of the pinch solenoid and RM at this time are the same as described above under PLAY mode.

When the accidental erasure prevention switch S_{14} is set to the NO HOLE position because of the intact erasure prevention tab on the cassette half, +B flows via the R_{529} , R_{530} , S_{9-2} , S_{8-1} , Q_{503} route, resulting in Q_{506} being turned on. +B will subsequently be applied to Q_{501} via Q_{506} and R_{506} , resulting in the transistor being turned on, and the oscillator circuit being activated. At the same time +B will also flow through S_{9-1} , R_{531} , and LED_3 , resulting in the REC indicator lamp (LED_3) being lit up.

If, however, the accidental erasure prevention tab has been broken off, S_{14} will be switched to the HOLE position, thereby preventing the flow of +B current to the oscillator. It will consequently not be possible to commence recording mode.

FF and REW Modes (Fig. 7-10)

When the FF key is pressed to switch S_{11} on, +B will be applied to Q_{612} via R_{632} and R_{633} . Q_{612} and Q_{613} will both be turned on as a result.

And with Q_{613} thus turned on, +B will flow through the brake solenoid, R_{635} , and Q_{613} route to turn the solenoid off. Since +B also flows via S_{11-1} , RM, and S_{11-2} to ground, the RM will commence to rotate at FF speed.

The sequence of events is much the same during REW mode, the difference being the voltage of opposite polarity applied to RM when S_{12} is switched on.

Pause Operation (Fig. 7-7)

During both PLAY and REC modes, +B flows via the R_{641} , R_{642} , S_{10-2} , S_{8-1} , and Q_{503} route, resulting in both Q_{615} and Q_{616} being turned on, and the pinch roller being activated (refer to PLAY mode for further details). If the PAUSE key is then pressed to switch S_{10} on, this route will be cut, and both Q_{615} and Q_{616} will turn off. The pinch solenoid will thus be switched off, bringing either the PLAY or REC mode to a stop.

Auto Start Circuit (Fig. 7-7)

When the power switch is first pushed on, PLAY and REC modes are inhibited for the few moments to let the power supply voltage stabilize.

At the same time that the power switch is turned on, +B flows through C_{518} and R_{515} to turn Q_{502} on and Q_{503} off. But when C_{518} is completely charged up (about 1 second later), Q_{502} will be turned off, and Q_{503} turned on. The tape deck will thus be ready for operation in any mode.

Direct Switching Timing Circuit

If the PLAY key was pressed during either FF or REW modes, undue tape slack or tape tension

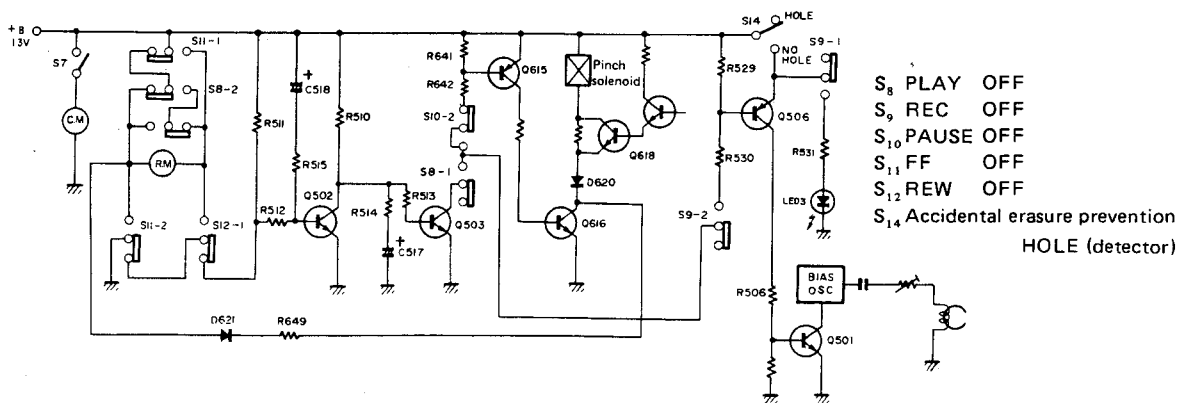


Fig. 7-7 Pause, auto-start and timing circuit

will be generated, resulting in mechanical misoperation and other accidents. In order to overcome this problem, fixed stop intervals are employed during switching operations.

Direct Switching from FF/REW Modes to PLAY Mode (Fig. 7-7)

During FF mode, +B flows through the R₅₁₁, R₅₁₂, and Q₅₀₂ route, turning Q₅₀₂ on, and Q₅₀₃ off. If the PLAY key is then pressed, S₈ will be switched on, and +B will flow via the R₅₁₁, S₁₂₋₁, S₁₁₋₂ route, turning Q₅₀₂ off. +B will subsequently commence to flow through R₅₁₀ and R₅₁₄ to charge up C₅₁₇. During the 0.6 seconds required to charge up this capacitor, Q₅₀₃ will remain off. Once the capacitor has been fully charged, however, +B will flow via R₅₁₀ and R₅₁₃ to Q₅₀₃ which will consequently be turned on. And once this transistor is turned on, +B will flow via R₆₄₁, R₆₄₂, S₁₀₋₂, S₈₋₁, and Q₅₀₃, turning Q₆₁₅ and Q₆₁₆ on to activate the pinch solenoid, and commence PLAY mode.

Direct Switching from PLAY Mode to FF/REW Modes (Fig. 7-10)

During PLAY mode, +B flows via R₆₃₂, D₅₀₅, S₁₂₋₁, and S₁₁₋₂, and Q₆₁₂ and Q₆₁₃ are off. If the FF or REW key is then pressed, S₁₁ or S₁₂ will be switched on, resulting in +B being passed via R₆₃₂ and R₆₃₇ to charge up C₆₂₄.

Once this capacitor has been fully charged (in about 0.2 seconds), +B is applied to Q₆₁₂ via R₆₃₂ and R₆₃₃ to turn the transistor on. The brake solenoid is consequently withdrawn to commence FF or REW mode.

Auto Stop Circuit (Fig. 7-8)

When tape transport stops, this circuit disengages the transport mechanism automatically by means of a reset solenoid. The tape transport detector employs a photo-interrupter featuring a

multi-blade device coupled by belt to the take-up reel, and whose rotating blades interrupt a light beam intermittently.

During tape transport, the rotating blades of the photo-interrupter result in the generation of pulse signals which turn Q₆₀₇ on and off repeatedly, and likewise charge up and discharge the C₆₂₀ capacitor.

Once tape transport stops, the signals from the photo-interrupter cease, and the Q₆₀₇ continuous switching action stops. C₆₂₀ will thus be charged by +B via R₆₁₉ and R₆₂₀.

The base potential of Q₆₀₈ will consequently increase, resulting in this transistor being turned off. The +B current will subsequently flow via R₆₂₅, C₆₂₂, R₆₂₃, and R₆₂₁, with Q₆₀₉ and Q₆₁₀ being turned on until the C₆₂₂ capacitor is fully charged (about 0.2 to 0.3 seconds).

With Q₆₁₀ turned on, the reset solenoid is activated, returning (resetting) the transport mechanism to the STOP mode. All depressed transport mode keys will also be released at this time.

Switching Circuit for Pinch Solenoid (Fig. 7-9)

At the commencement of PLAY mode, a momentarily high voltage is applied to the pinch solenoid (for about 0.5 seconds) in order to supply sufficient pulling power. But once the solenoid has been activated, the applied voltage is reduced in order to avoid overheating the solenoid coil. This operation is achieved by the Q₆₁₇/Q₆₁₈ saturation switching circuit.

When the PLAY key is pressed and S₈ switched on Q₆₁₅ and Q₆₁₆ are turned on, and +B is applied to Q₆₁₇ via R₆₄₇ and C₆₂₈, Q₆₁₇ remaining on until C₆₂₈ is fully charged up.

While Q₆₁₇ is on, Q₆₁₈ is turned on by +B flowing via R₆₄₅ and Q₆₁₇. R₆₄₄ will thus be shorted out, and a voltage equal in level to +B will be applied to the pinch solenoid. Once C₆₂₈ is fully

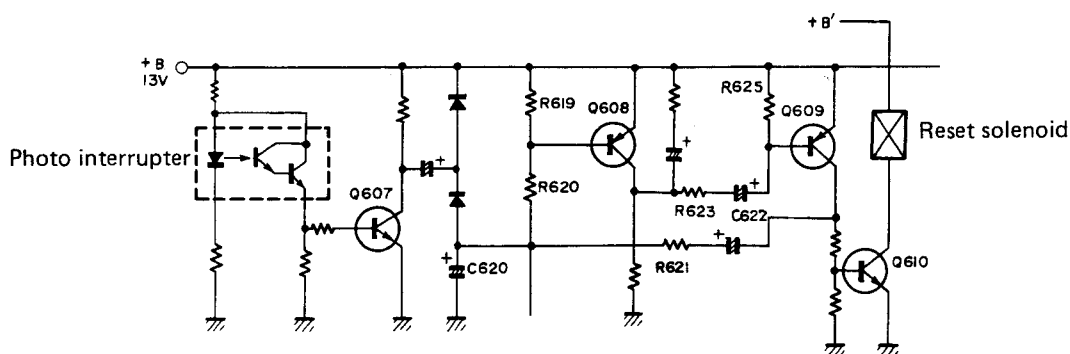


Fig. 7-8 Auto-stop circuit

charged (in about 0.5 seconds) Q₆₁₇ and Q₆₁₈ will be turned off, and R₆₄₄ will reduce the voltage being applied to the pinch solenoid.

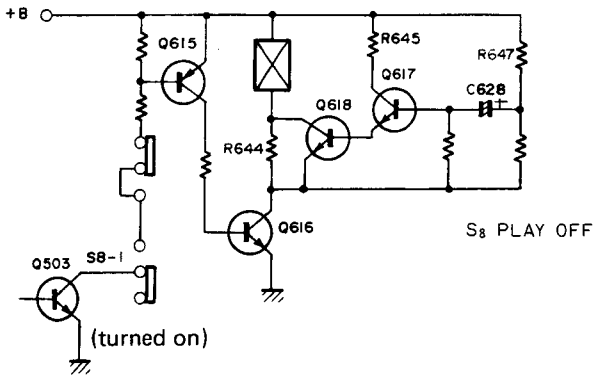


Fig. 7-9 Pinch solenoid circuit

Tape Slack Canceller Circuit (Fig. 7-10)

If there is any slack in the tape loaded in closed-loop capstan tape decks, it will not be possible to obtain normal tape tension, nor proper tape-to-head contact. This circuit causes the supply reel to be rotated in the reverse direction when a cassette half is loaded, thereby taking up slack present in the tape.

After the power switch has been turned on, and a cassette half inserted, the cassette half detector switch S₇ is switched on. +B will flow via S₇, R₆₄₀, C₆₂₅, and Q₆₁₄, the transistor remaining on until the capacitor has been fully charged up (approx. 0.7 seconds).

While Q₆₁₄ is on, +B will flow via the S₁₁₋₁, S₈₋₂, S₁₂₋₂, reel motor (RM), R₆₃₆, D₆₁₇, Q₆₁₄ route, thereby causing the reel motor to rotate in the REW direction, and taking up slack in the tape.

At the same time that Q₆₁₄ is turned on, Q₆₁₁ is also turned on, resulting in +B being applied to Q₆₁₂ via Q₆₁₁ and R₆₃₁. Q₆₁₂ and Q₆₁₃ will thus both turn on, and activate the brake solenoid.

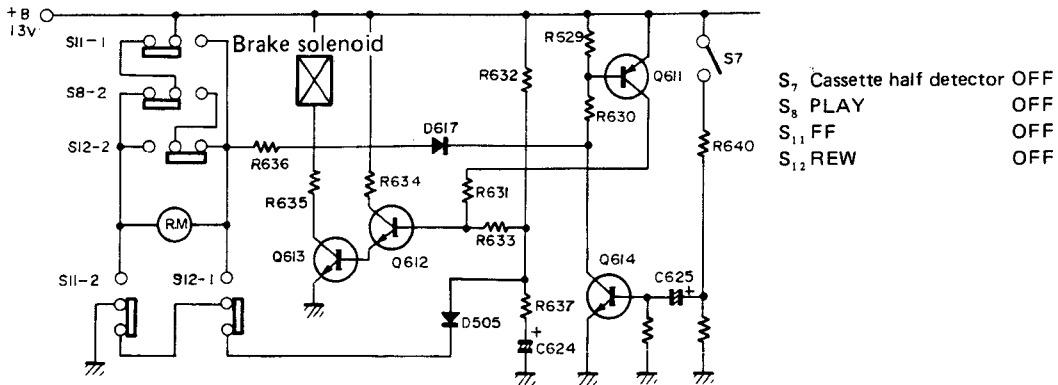


Fig. 7-10 Tape slack canceller circuit

7.6 MUTING CIRCUITS

Muting When POWER Switch Turned On

This muting circuit eliminates the click noise normally present when the POWER switch is first turned on.

When the POWER switch is first turned on, +B current flows via C₆₁₇ and R₆₁₀ to Q₆₀₅, turning this transistor on until the capacitor has been fully charged up (approx. 4 seconds). While Q₆₀₅ is on, Q₆₀₆ is also turned on. Consequently, +B will flow along the D₆₁₁, Q₆₀₆, R₁₃₈, Q₁₀₃ route, thereby muting the LINE OUTPUT. And due to +B also flowing along the D₅₁₅, R₃₃₄, Q₃₁₀ route, the REC amplifier will also be muted.

Once C₆₁₇ is fully charged, Q₆₀₅ will be turned off, resulting in Q₆₀₆, Q₁₀₃, and Q₃₁₀ also being turned off. The LINE OUTPUT and REC amplifier will thus be released from the muting action.

Muting When POWER Switch Off

When the POWER switch is turned off, the +B current decreases at a relatively slow rate. C₆₁₆, however, is designed to discharge via R₆₅₄ at a faster rate, resulting in a current flowing via the base of Q₆₀₆ and D₆₁₀, and Q₆₀₆ thereby being turned on.

C₆₁₇ will therefore discharge via 2 routes: Q₆₀₆, R₁₃₈, Q₁₀₃, and D₅₁₅, R₃₃₄, Q₃₁₀, thereby muting both the LINE OUTPUT and the REC amplifier.

Muting During FF and REW Modes

This circuit is designed to eliminate motor noise during FF and REW modes, and any other unwanted noise after the motor has been stopped.

During FF and REW modes, +B is applied to Q₅₀₅ via R₅₂₂ and R₅₂₁, turning the transistor on, which in turn results in Q₅₀₄ being turned on. +B current will consequently flow through the D₅₀₆, Q₅₀₄, MONITOR switch S₂₋₃, D₅₁₆, R₁₃₈, Q₁₀₃ route to mute the LINE OUTPUT. At the same

time, +B also flows via D514 and R334 to Q301 to mute the REC amplifier.

When the MONITOR switch is in the SOURCE position, only the LINE OUTPUT muting will be

removed. Furthermore, +B is also applied to Q301 via the erase prevention switch S14 and the REC switch S9 to mute the REC amplifier.

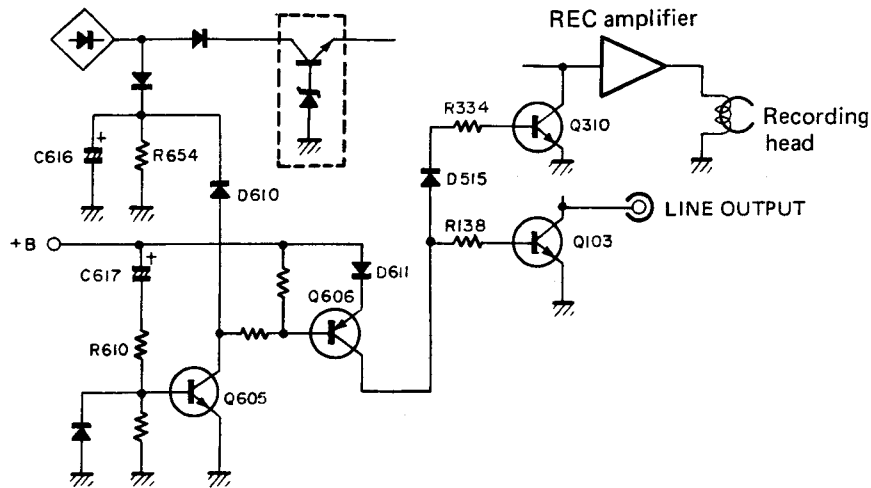


Fig. 7-11 Muting circuit (POWER ON/OFF)

Muting at Start of PLAY and REC Modes

Switching noises generated when the PLAY and REC keys are pressed are also muted. After the STOP key is pressed, Q505, Q504, Q103, and Q301 are turned on, thereby muting the LINE OUTPUT and the REC amplifier.

When the PLAY key is pressed and S8 switched on, +B flows along the R522, D509, S10-2, S8-1, Q503 route, but Q505 remains on for about 0.6

seconds longer while C520 is charged up. Once Q505 is finally turned off, Q504 and Q103 will also be turned off, resulting in the removal of the LINE OUTPUT muting. But note that because +B will still flow via the S14, S9-1, D513, R334 route to Q301, the REC amplifier will remain muted.

During REC mode when the REC key is pressed and S9 is switched on, the S9-1 route will be interrupted, thereby removing the REC amplifier

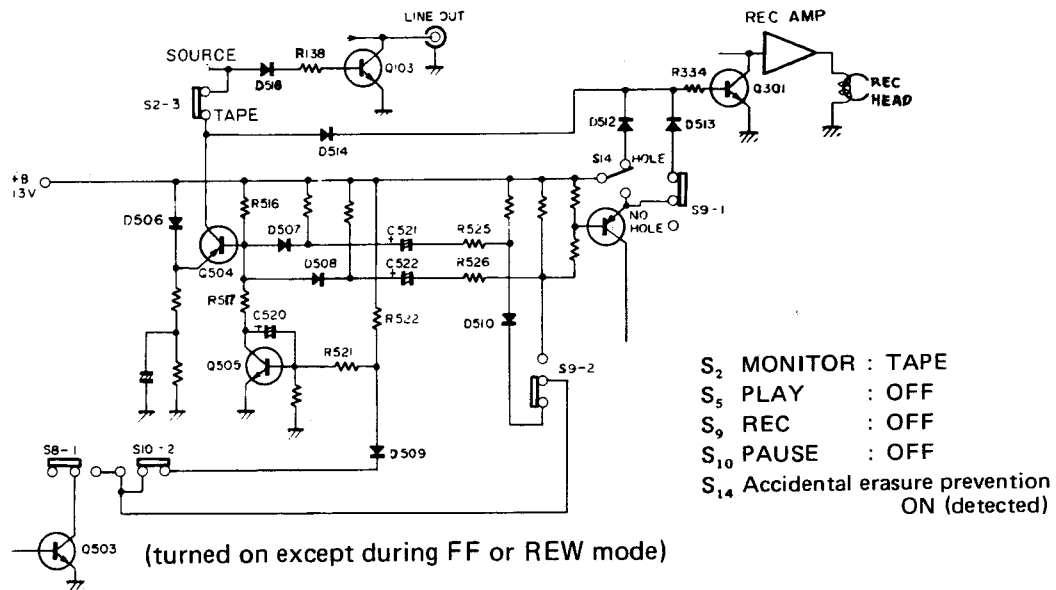


Fig. 7-12 Muting circuit (FF, REW, REC, PLAY)

muting. However, if the accidental erasure prevention tab has been broken off from the cassette half, +B will still be applied to Q301 via S14, D512, R334, thereby keeping the REC amplifier muted.

As long as the erasure prevention tabs have been left intact, all the REC amplifier muting routes will be cut to permit REC mode to proceed.

Muting When REC key Pressed during PLAY Mode

When the REC key is pressed after the PLAY key has already been pressed (S8 already switched on), the switch noise is muted by the following circuit.

When the REC key is pressed and S9 switched on, +B flows via R516, D508, C522, R526, S9-2, S8-1, Q503 route, keeping Q504 on during the period (approx. 0.3 seconds) required to fully charge C522. During this period, +B flows via D506, Q504, D514, R334 to mute out the REC amplifier. At the same time, +B also flows via the S2-3, D516, R138 route to mute the LINE OUTPUT.

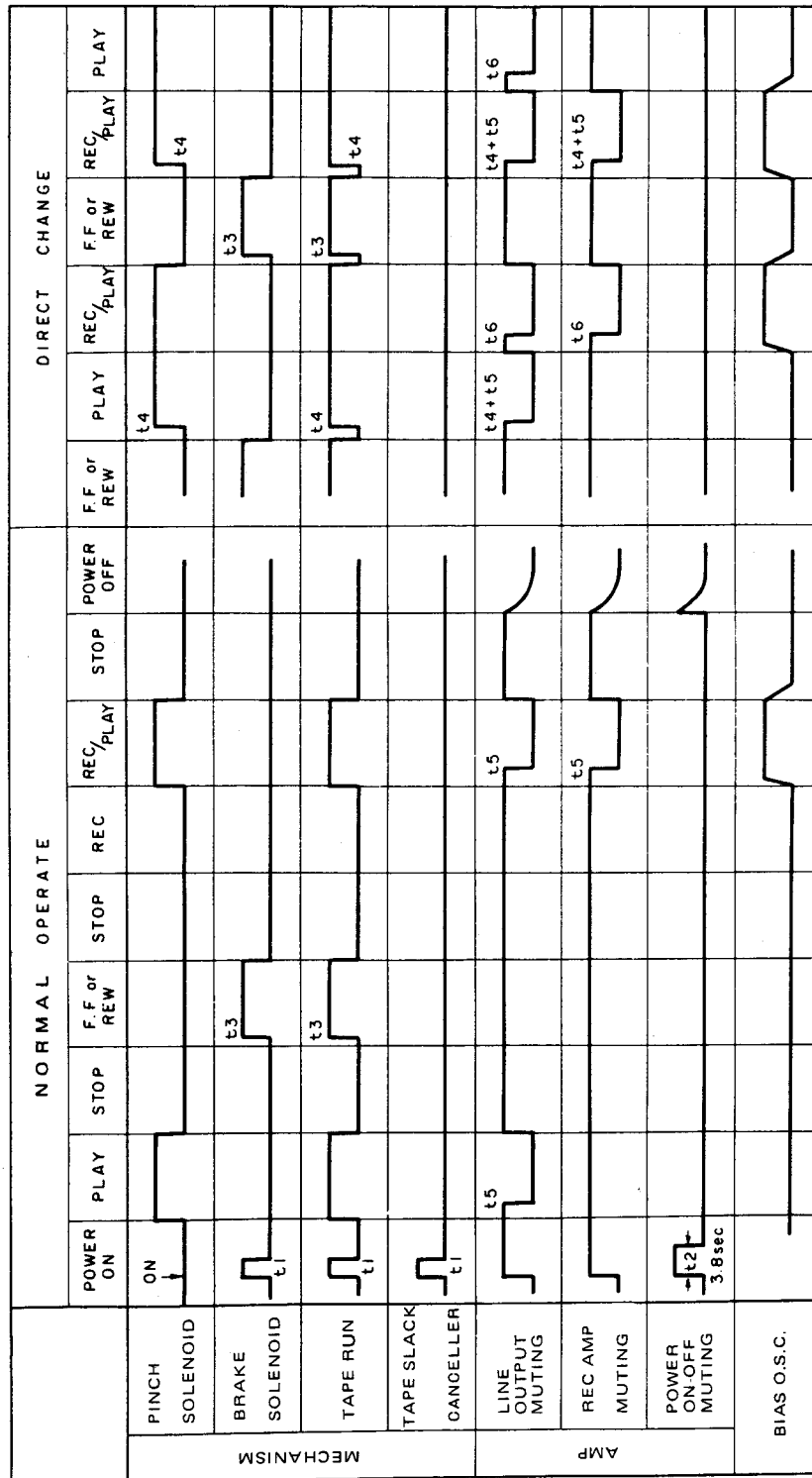
Muting When Switching from REC Mode to PLAY Mode

Muting is also achieved when the REC key alone is released during REC mode. When S9 only is switched off, thereby switching directly to PLAY mode, +B is applied to Q301 via S14, S9-1, D513 and R334. The transistor is turned on to mute out the REC amplifier immediately.

And because +B also flows along the R516, D507, C521, R525, D510, S9-2, S8-1 route to Q503, Q504 will be turned on only for the period required to charge up C521 (approx. 0.3 seconds), resulting in the LINE OUTPUT being muted for this length of time.

When the REC mode is stopped directly by releasing both the REC and PLAY keys, the REC amplifier and LINE OUTPUT are muted immediately.

Timing Chart -1



t₁: 0.7 sec t₂: 3.8 sec t₃: 0.15 sec t₄: 0.6 sec t₅: 0.6 sec t₆: 0.3 sec.

Timing Chart -2

	PAUSE OPERATE						AUTO START			AUTO STOP		
	PLAY/PAUSE	PLAY	REC./PLAY	R/P PAUSE	REC./PLAY	FF or REW	PLAY STAND-BY	REC/PLAY STAND-BY	FF or REW STAND-BY	PLAY	REC./PLAY	FF or REW
MECHANISM	PINCH SOLENOID	High	High	High	High	High	High	High	High	High	High	High
	BRAKE SOLENOID	High	High	High	High	High	High	High	High	High	High	High
	TAPE RUN	High	High	High	High	High	High	High	High	High	High	High
	TAPE SLACK CANCELLER	High	High	High	High	High	High	High	High	High	High	High
AMP.	LINE OUTPUT MUTING	High	High	High	High	High	High	High	High	High	High	High
	REC AMP MUTING	High	High	High	High	High	High	High	High	High	High	High
BIAS O.S.C.	High	High	High	High	High	High	High	High	High	High	High	High

t7 : 1.2 SEC t8 : 3 SEC

8. MECHANICAL ADJUSTMENTS

8.1 PINCH ROLLER PRESSURE ADJUSTMENT

1. Press the PLAY key.
2. Gently press tension gauges (of about 500g scale) against the pinch roller arms. (See Fig. 8-1).
3. Check that the amount of pressure required to push the pinch rollers away from the capstans lies in the 360 to 440 range on the take-up side, and in the 90 to 130g range on the supply side. If the pressure readings do not lie within these ranges, readjust by re-attaching the pinch roller pressure springs at suitable positions.
4. If the above adjustment procedure fails to satisfy the above stated conditions, the pinch roller pressure springs will have to be replaced.

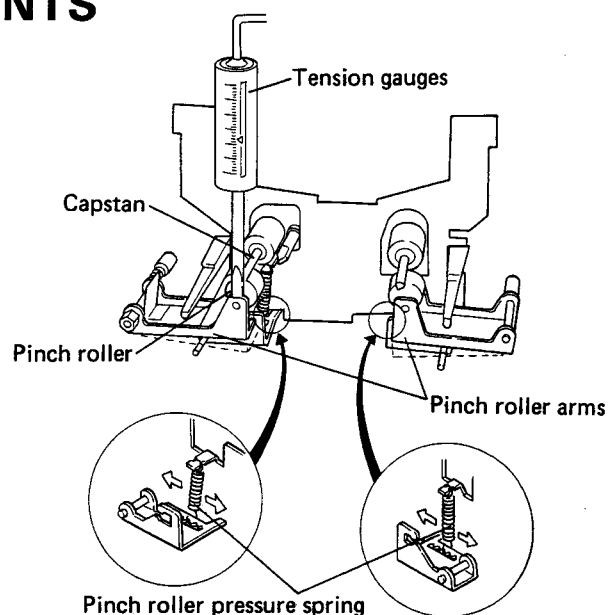


Fig. 8-1 Pinch roller pressure adjustment

8.2 TAPE SPEED ADJUSTMENT

1. Connect a frequency counter to the OUTPUT terminals.
2. Playback the 3kHz section of test tape STD-301. The frequency at the beginning of the tape should lie within 2,995Hz and 3,010Hz. Adjust the capstan motor adjustment screw (semifixed resistor) with a screwdriver (See Fig. 8-2) if necessary.
3. Tape speed is increased by turning the adjustment screw in the clockwise direction, and decreased by turning in the opposite direction.

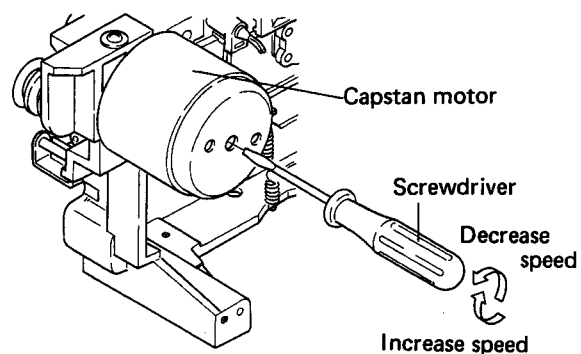


Fig. 8-2 Tape speed adjustment

8.3 TAPE GUIDE ADJUSTMENT

The tape should be free of curling at the head guide, and any other tape transport abnormality during PLAY mode.

If curling does occur at the head guide, load a cassette half equipped with a mirror, and adjust the height of the tape guide by rotating the height adjuster nut.

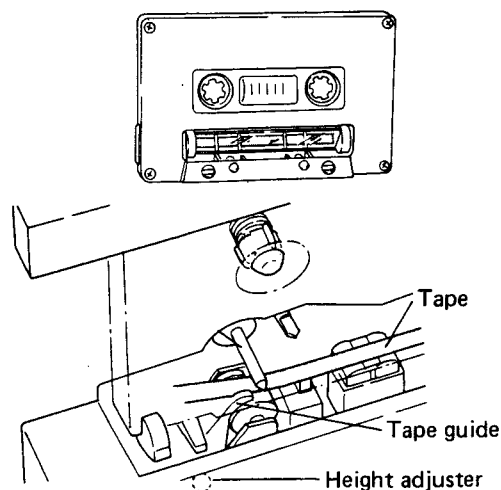


Fig. 8-3 Tape guide adjustment

9. ELECTRICAL ADJUSTMENT

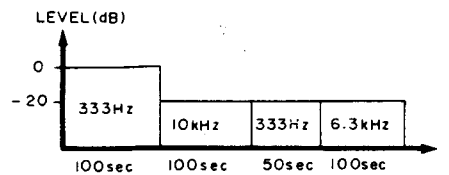
Before commencing any electrical adjustments, check the following items.

1. First complete all mechanical adjustments.
2. Connect a $50k\Omega$ ($47-52k\Omega$) resistor to the LINE OUTPUT terminals to obtain the 0dBV 1V level for measuring purposes.
3. Use the specified test tapes for these adjustments. Although test tapes are prepared with side A and side B, always use side A.
 - STD-331A : general use in playback mode
 - STD-341A : adjustments in playback mode
 - STD-601 : STD blank tape
 - STD-603 : CrO₂ blank tape
 - STD-604 : METAL blank tape
4. Prepare the following measuring instruments. millivoltmeters, low frequency generator, oscilloscope, attenuator.
5. Unless otherwise specified, "REC mode" in the following sections refers to recording mode with a cassette half not equipped with a CrO₂ detector hole, and both the PLAY and REC key in the depressed state.
6. Furthermore, adjustments will also apply to both left and right channels unless otherwise indicated.
7. Make sure the heads are cleaned, and demagnetized with a head erasure.
8. All adjustments are to be performed in the described order. If the order is changed, proper adjustments may be interfered with, and the deck may fail to perform at optimum level.

Adjustment sequence

1. Head azimuth adjustment
2. Playback equalizer adjustment
3. Playback level adjustment
4. Level meter adjustment
5. Bias trap adjustment
6. Erasure current adjustment
7. Bias adjustment
8. Recording frequency response
9. Recording level adjustment
10. Recording Dolby NR level adjustment
11. Playback Dolby NR level adjustment

STD-341A



STD-331A

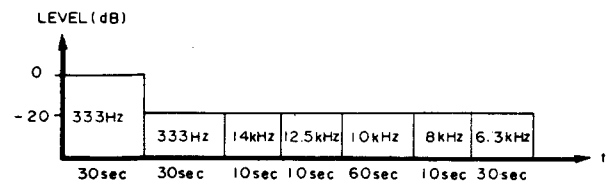


Fig. 9-1 Recorded contents of test tape

9.1 HEAD AZIMUTH ADJUSTMENT

1. Connect the millivoltmeters to the OUTPUT terminals.
2. Turn the OUTPUT level control to the maximum position, and put the TAPE switch to STD.
3. Play back the 10kHz, -20dB section of the STD-341A test tape. Turn the azimuth adjustment screw until the output from both left and right channels reaches a maximum.
4. After completing the adjustment, reapply the screw lock.

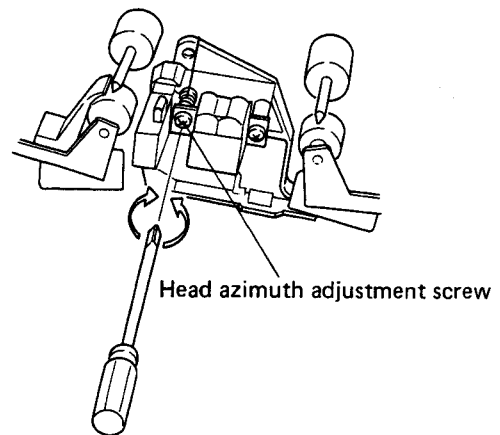


Fig. 9-2 Head azimuth adjustment

9.2 PLAYBACK EQUALIZER ADJUSTMENT

1. Connect millivolmeters to the OUTPUT terminals.
2. Set the tape selector to the TAPE position, and turn the playback level adjustment controls VR₁₀₁ (Lch) and VR₂₀₁ (Rch) up to maximum positions.
3. Play the 333Hz/−20dB section of the STD-331A test tape.
4. Next play the 10kHz/−20dB section of the same test tape, and adjust VR₁₀₁ and VR₂₀₁ to obtain a +0.5dB level difference from the 333Hz signal used in step 3.
5. Also play the 14kHz section and check that the level difference from the 333Hz signal used in step 3 varies by no more than −2dB ~ +3dB.
6. Then switch the tape selector to the Fe-Cr, CrO₂ and METAL positions, and play the 10kHz section at each tape selector position, checking that the playback level lies within −4.3dB ± 1dB from the 10kHz playback level adjusted in step 4 above.

9.3 PLAYBACK LEVEL ADJUSTMENT

Since this adjustment is used in determining the Dolby NR level, it should be performed carefully and accurately.

1. Connect millivoltmeters to the No. 40 (Lch) and No. 39 (Rch) TP terminals in the mother ass'y.
2. Play the 333Hz/0dB section of the STD-341A test tape, and adjust VR₁₀₂ (Lch) and VR₂₀₂ (Rch) until the millivoltmeters read 1dBv (1.12V). = +3.2 dB
3. Then turn the front panel OUTPUT level control around to the click-stop position (the "1 o'clock" position), and check that the OUTPUT level is −3dBv (710mV) when the 333Hz/0dB section of the STD-341A test tape is played. Adjust with the VR₁₀₄ (Lch) and VR₂₀₄ (Rch) controls if necessary.

9.4 LEVEL METER ADJUSTMENT

1. Connect the millivolmeters to the mother ass'y TP terminals No. 42 (Lch) and No. 41 (Rch).
2. Turn the DOLBY NR switch on, and the MONITOR switch to SOURCE.
3. Apply a 333Hz/−10dBv (316mV) signal to the INPUT terminals, and adjust the front panel INPUT level control to obtain a −23dBv (70mV) reading in the millivoltmeters. (Leave the VR₇₀₁ (Lch) and VR₇₀₂ (Rch) controls in the display amplifier ass'y in the central positions).

4. Turn VR₁₀₅ (mother ass'y) counterclockwise until the left and right channel level meter readings of −20dB disappear.
5. Again apply the 333Hz/−10dBv signal to the INPUT terminals, and adjust the INPUT level control to obtain millivoltmeter readings of −3dBv (710mV).
6. Adjust VR₇₀₁ (Lch) and VR₇₀₂ (Rch) in the display amplifier ass'y so that the level meters read 0dB. (Turn VR₇₀₁ and VR₇₀₂ clockwise, and stop once the 0dB position is reached).
7. Then vary the input signal as shown in the following chart, and check that the corresponding level ranges are satisfied. If the readings fail to lie within the specified ranges, repeat steps 3 to 6 above.

Table 1

TP Terminal Output	Level Meter Reading
333Hz + 2 ± 2dB	+5dB
333Hz − 23 $\begin{smallmatrix} +4 \\ -2 \end{smallmatrix}$ dB	−20dB

9.5 BIAS TRAP ADJUSTMENT

1. Connect an oscilloscope to the OUTPUT terminals.
2. Set the MONITOR switch to the TAPE position, the tape selector to the METAL position, and the OUTPUT level control to the click-stop position.
3. Play back an unrecorded portion of metal tape, or load an empty cassette half, and proceed in play mode without any input signal.
4. Check that the output level at the OUTPUT terminals is less than −45dBv (5.5mV).
5. If the output level exceeds this limit, adjust L₁₀₁ (Lch) and L₂₀₁ (Rch) to obtain the waveform of minimum amplitude in the oscilloscope.

9.6 ERASURE CURRENT ADJUSTMENT

1. Switch the tape selector to the METAL position, and turn the INPUT level control down to minimum level. Connect a millivoltmeter across terminals no. 66 and 64 (GND) in the mother ass'y.
2. Proceed in the recording mode but in the absence of an input signal (an unrecorded tape may be used for this purpose).
3. Adjust VR₉₀₁ in the switching ass'y until the millivoltmeter reads 160mV. (Since the signal frequency involved in this measurement is the high bias frequency, the measurement must be performed with care).

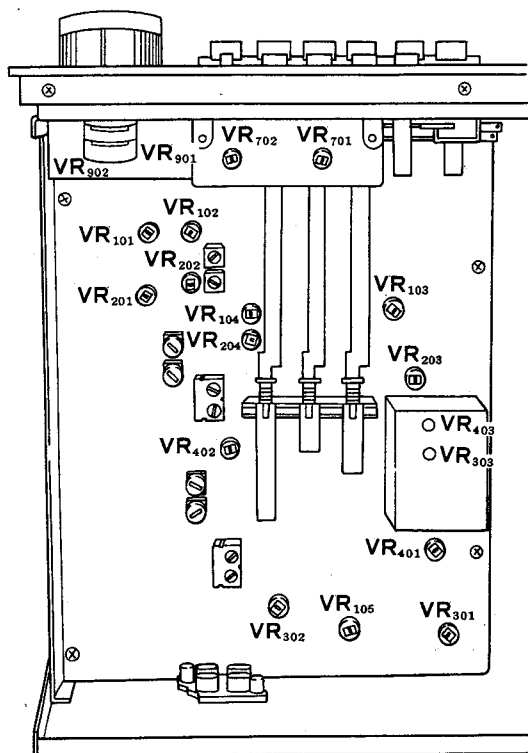


Fig. 9-3 Adjustment point

9.7 BIAS ADJUSTMENT

1. Connect the millivoltmeters to the OUTPUT terminals.
2. Turn the BIAS control to the center click-stop position, and the tape selector to the STD position. Set the recording bias adjustment controls VR303 (Lch) and VR403 (Rch) to minimum position, and the recording level adjustment controls VR302 (Lch) and VR402 (Rch) to the center positions. Then proceed in the recording mode with no input signal applied.
3. Set the MONITOR switch to SOURCE, and apply a 333Hz/−10dBv (316mV) signal to the INPUT terminals.
4. Adjust the INPUT level control to obtain millivoltmeter readings of −10dBv (316mV).
5. Record the 333Hz signal onto the STD-601 test tape, and while playing it back again, adjust VR303 and VR403 by turning clockwise, stop at the position where the playback output level drops back by 0.5dB after passing the maximum output level (see Fig. 9-4).

NOTE:

Since VR303 and VR403 effect each other, the above procedure will need to be repeated several times.

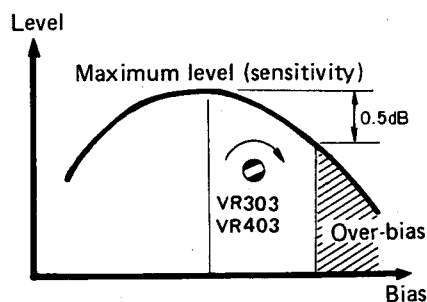


Fig. 9-4 Output level drops 0.5dB

9.8 RECORDING FREQUENCY RESPONSE

1. After connecting millivoltmeters to the OUTPUT terminals, turn the OUTPUT level control up to maximum level.
2. Set the tape selector to STD, and turn the DOLBY NR switch off. Then apply a 333Hz/−30dBv (31.6mV) signal to the INPUT terminals.
3. Then set the MONITOR switch to SOURCE, and adjust the INPUT level controls so that the millivoltmeters read −27dBv (44.6mV).
4. Record the 333Hz/−30dBv (31.6mV) signal onto the STD-601 test tape, and set the MONITOR switch to the TAPE position.

5. Then also record the 10kHz/−30dBv (31.6mV) signal onto the same test tape. Play the tape back and check that the output level for the 10kHz signal differs from the output level for the 333Hz signal (recorded in step 4 above) by +0.5dB. Adjust with VR₃₀₃ and VR₄₀₃ if necessary.
6. Repeat the above process by recording and playing back signals ranging from 40Hz to 12kHz, checking that the recording/playback frequency response specifications are fully satisfied at each frequency level.
7. Next switch the tape selector to CrO₂, and record the 333Hz and 10kHz signals onto the STD-603 test tape. Play the tape back again, and adjust VR₉₀₂ so that the 10kHz output level differs from the 333Hz output level by +0.5dB.
8. Switch the tape selector to the METAL position, and record signals ranging from 40Hz to 12kHz onto the STD-604 test tape. Play the tape back again, and check that the recording/playback frequency response specifications (as shown in page 31) are fully satisfied at all frequencies. If the specifications are not satisfied at any one frequency, fine adjust VR₉₀₁ so as to bring the erasure current to within the 150mV ±15mV range (see section 9.6 Erasure Current Adjustment for details).

9. Then switch the tape selector to the Fe-Cr position, and record the 333Hz and 10kHz signals onto the STD-601 test tape. Play the tape back again and check that the 10kHz output level differs from the 333Hz output level by −2.5dB ± 2dB.
10. Turn the DOLBY NR switch on, and confirm that the recording/playback frequency response specifications are also fully met in this case too.

9.9 RECORDING LEVEL ADJUSTMENT

NOTE:

That this adjustment must be performed accurately since the level serves as the basis for the Dolby level adjustment.

1. Connect millivoltmeters to the mother ass'y TP terminals No. 42 (Lch) and No. 41 (Rch).
2. Set the tape selector to STD, and turn the DOLBY NR switch off. Then apply a 333Hz/−10dBv (316mV) signal to the INPUT terminals.
3. Adjust the INPUT level controls so that the millivoltmeters read −3dBv (710mV).
4. Then record the signal onto the STD-601 test tape and play the tape back again, adjusting VR₃₀₂ (Lch) and VR₄₀₂ (Rch) to obtain −3dBv (710mV) readings at TP terminals No. 40 (Lch) and No. 39 (Rch).

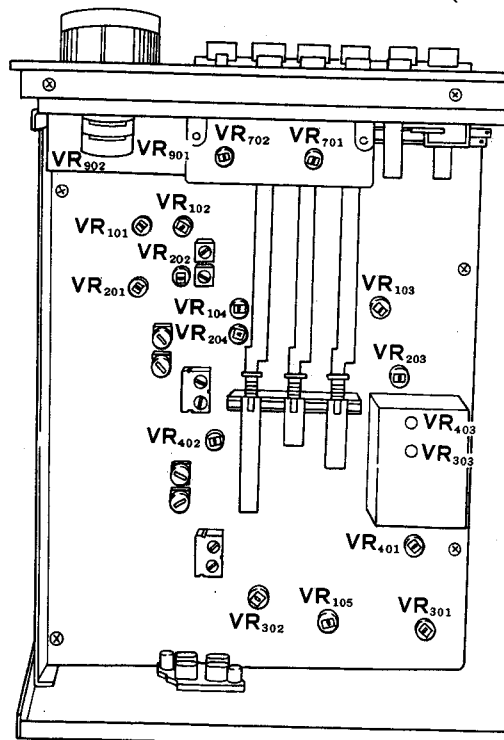


Fig. 9-5 Adjustment point

9.10 RECORDING DOLBY NR LEVEL ADJUSTMENT

1. With millivoltmeters connected to the mother ass'y TP terminals No. 42 (Lch) and No. 41 (Rch), apply a 1kHz/−10dBv (316mV) signal to the INPUT terminals.
2. Turn the DOLBY NR switch off, and adjust the INPUT level controls so as to obtain 0dBv (1V) readings in the millivoltmeters.
3. Then change the input signal to −50dBv (3.16mV).
4. Turn the DOLBY NR switch on, and adjust VR₃₀₁ (Lch) and VR₄₀₁ (Rch) to obtain a −34dBv (19.9mV) reading in the meter.

9.11 PLAYBACK DOLBY NR LEVEL ADJUSTMENT

1. Connect the millivoltmeters to the No. 40 (Lch) and No. 39 (Rch) TP terminals in the mother ass'y.

2. Turn VR₁₀₃ (Lch) and VR₂₀₃ (Rch) down to minimum positions.
3. Apply a 1kHz signal to the No. 10 (Lch) and No. 11 (Rch) terminals in the mother ass'y, and adjust the input level so that the millivoltmeters read 0dBv (1V).
4. Next apply an input signal with a level 34dB below that of the signal applied in step 3 above.
5. Turn the DOLBY NR switch on, and adjust VR₁₀₃ and VR₂₀₃ to obtain a −40dBv (10mV) reading in the millivoltmeters.

NOTE:

Since the VR₁₀₃ and VR₂₀₃ controls are used in this adjustment, readjust them as described in section 9.3 on "Playback Level Adjustment".

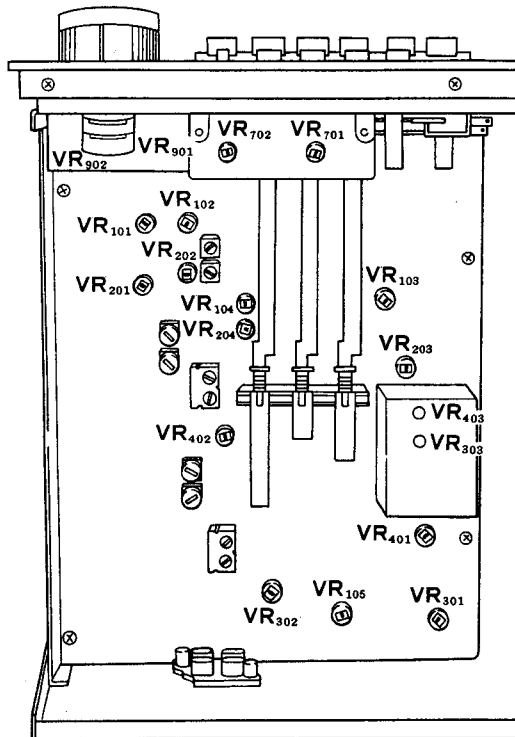
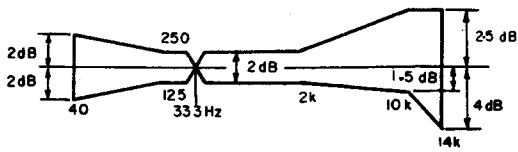
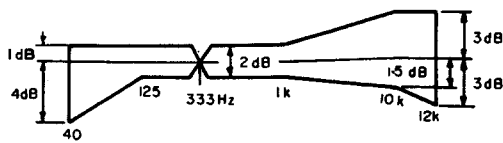


Fig. 9-6 Adjustment point

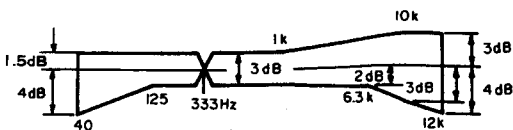


* Using STD-331A and the STD position, with DOLBY NR OFF.

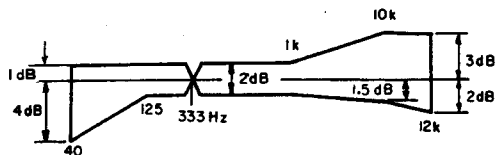
Note:
The frequency characteristics for the R channel shall be obtained by subtracting 1dB from the value indicated on the meter at 40Hz and 63kHz respectively.



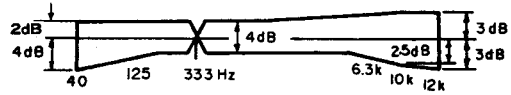
* Using STD-601 and the STD position, with DOLBY NR OFF.



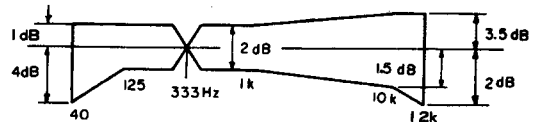
* Using STD-601 and the STD position, with DOLBY NR ON.



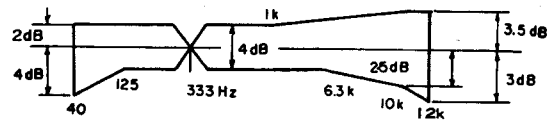
* Using STD-603 and the CrO₂ position, with DOLBY NR OFF.



* Using STD-603 and the CrO₂ position, with DOLBY NR ON.



* Using STD-604 and the METAL position, with DOLBY NR OFF.



* Using STD-604 and the METAL position, with DOLBY NR ON.

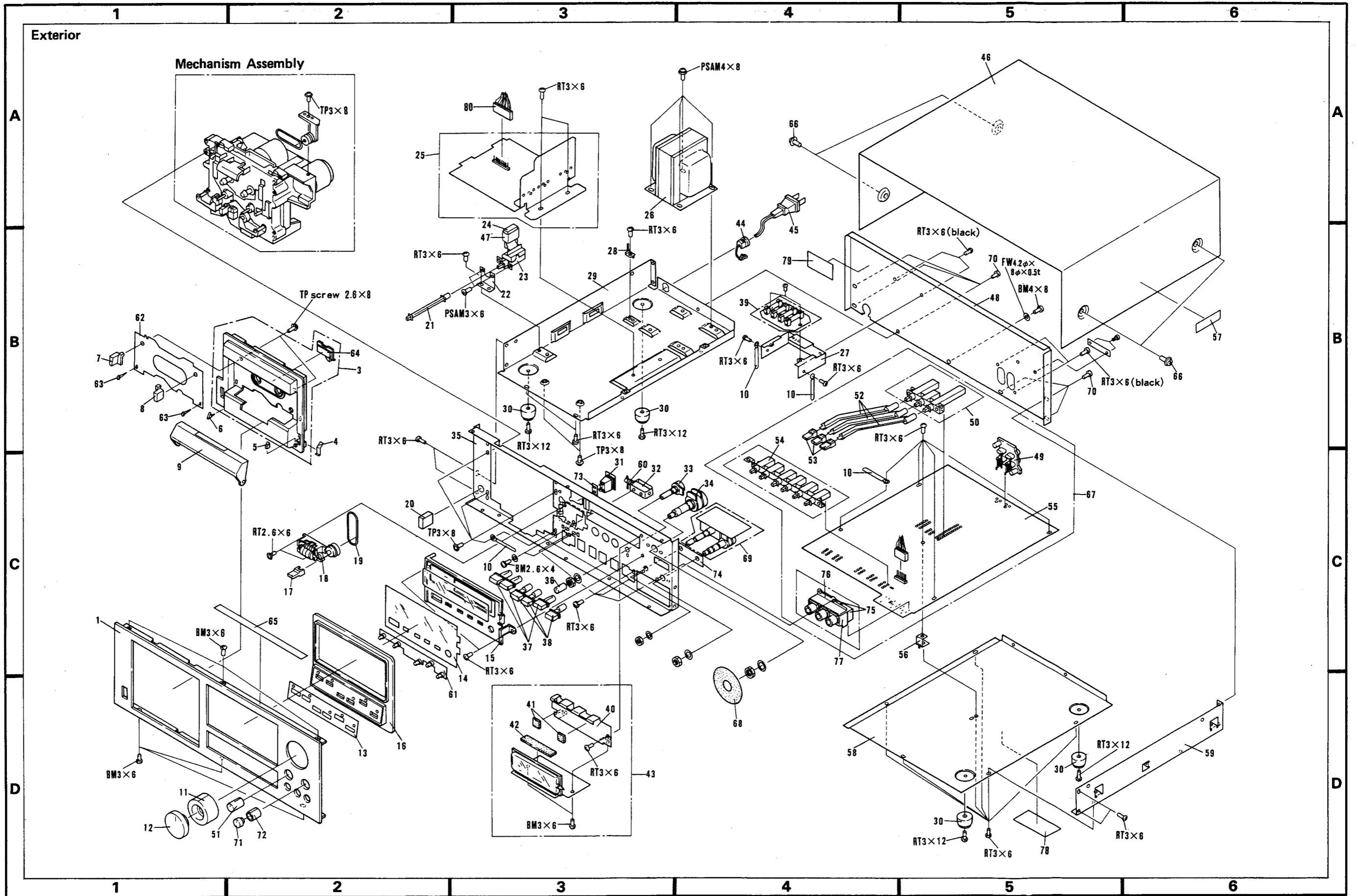
10. EXPLODED VIEWS

10.1 EXTERIOR

Parts List

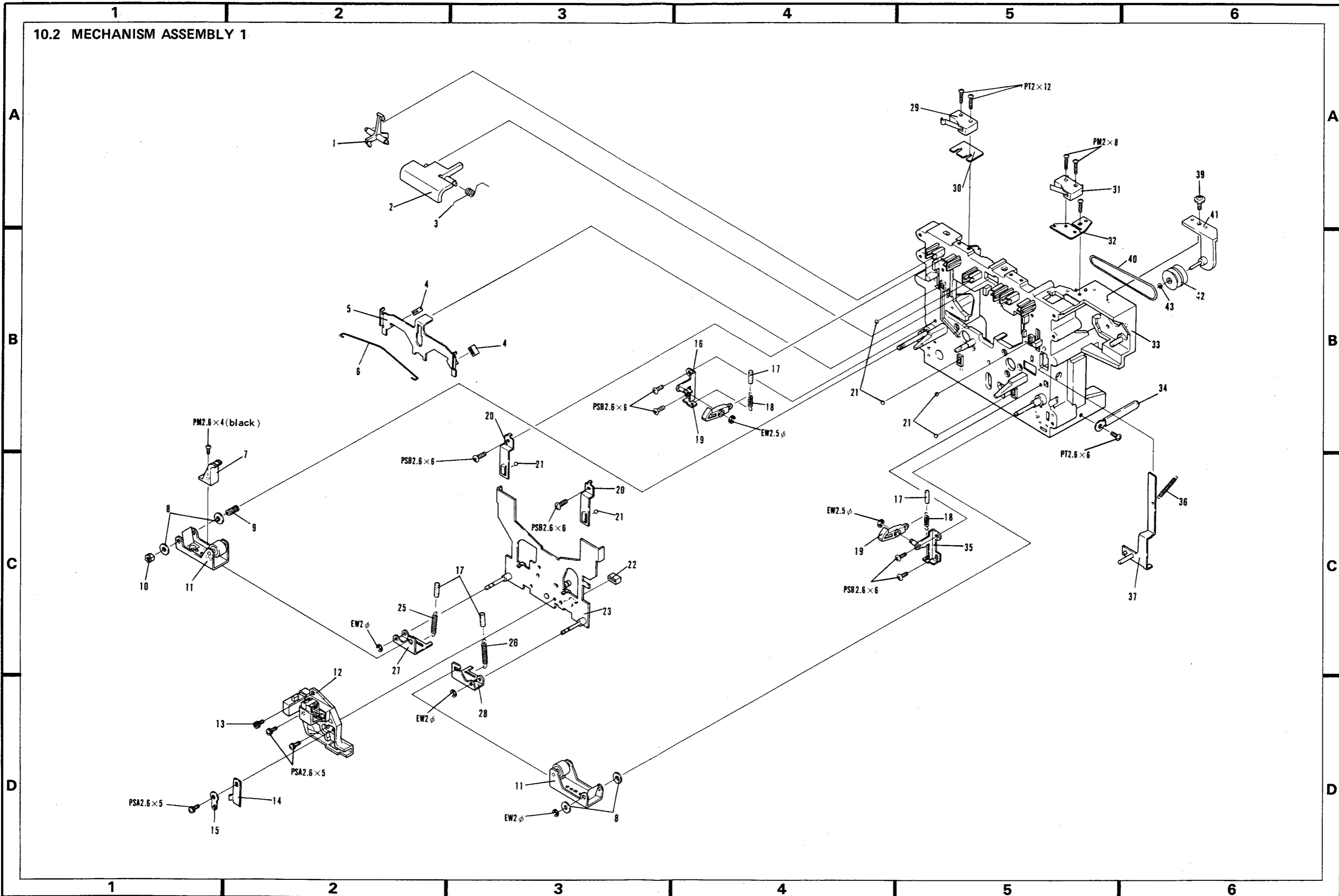
● Parts without part number cannot be supplied.

Key No.	Part No.	Description	Key No.	Part No.	Description
1.	RAH-299	Front panel	46.	RNA-377	Bonnet case
2.			47.	REC-250	Cover
3.	RXX-253	Escutcheon assembly	48.		Rear panel
4.	RBK-127	Spring	49.	RKB-014	4P mount pin jack
5.	REB-305	Cushion (R)	50.	RSG-078	Push switch
6.	REB-306	Cushion (L)	51.	RAA-307	Tape Selector knob assembly
7.	RNK-566	Guide (L)	52.	RNK-632	Switch joint bar (B)
8.	RNK-608	Guide (R)	53.	RAC-100	Push knob
9.	RXB-209	Head cover assembly	54.	RSG-071	Function switch
10.		Cord clamber	55.		Mother P.C. board assembly
11.	RAA-305	REC VR knob (R) assembly	56.		Angle
12.	RAA-303	REC VR knob (L) assembly	57.	RRW-112	Label
13.	RAH-289	Control panel	58.		Bottom cover
14.	RNK-788	Display window	59.		Side frame
15.	RNK-787	Indicator escutcheon	60.	RBH-532	Solenoid spring
16.	RNK-786	Control escutcheon	61.		Function indicator assembly
17.	RAC-103	Knob (COUNTER)	62.	RAH-233	Plate
18.	RAW-126	Counter	63.	REB-307	Stopper
19.	REB-299	Counter belt	64.	RNK-854	Lens
20.	RAC-094	Knob (POWER SWITCH)	65.	REB-223	Cover cushion (D)
21.	RNK-633	Power switch joint bar	66.		Screw M4 x 8
22.		AC switch holder	67.	RWX-302	Mother assembly
23.	RSA-021	Power switch	68.	RED-145	Volume mask
24.	RWX-109	Spark killer (KU)	69.		Switch assembly
	RWX-150	Spark killer (KC)	70.	RBA-038	Screw
25.	RWR-076	Power supply & control assembly	71.	RAA-309	P.B. VR knob (L) assembly
26.	RTT-174	Power transformer	72.	RAA-311	P.B. VR knob (R) assembly
27.		Frame	73.	RED-157	Mask
28.		Terminal 1P	74.	RED-140	Volume mask
29.		Main chassis	75.	RKN-055	MIC jack
30.		Foot assembly	76.	RKN-056	Head phone jack
31.		Indicator assembly	77.		Jack holder
32.	RXP-057	Solenoid	78.		Label
33.	RCS-021	Volume (VR3)	79.		Label
34.	RCV-061	Volume (VR1, 2)	80.	RKP-066	Connector (11p)
35.		Panel stay			
36.	RAA-233	Knob (BIAS VR)			
37.	RAC-112	Knob (B)			
38.	RAC-111	Knob (A)			
39.		Fuse assembly			
40.		Meter holder			
41.	REB-348	Meter cushion			
42.	REB-301	Meter cushion (A)			
43.		Indicator amplifier assembly			
44.	REC-272	Strain relief			
45.	RDG-022	Power cord			



CT-F850

10.2 MECHANISM ASSEMBLY 1

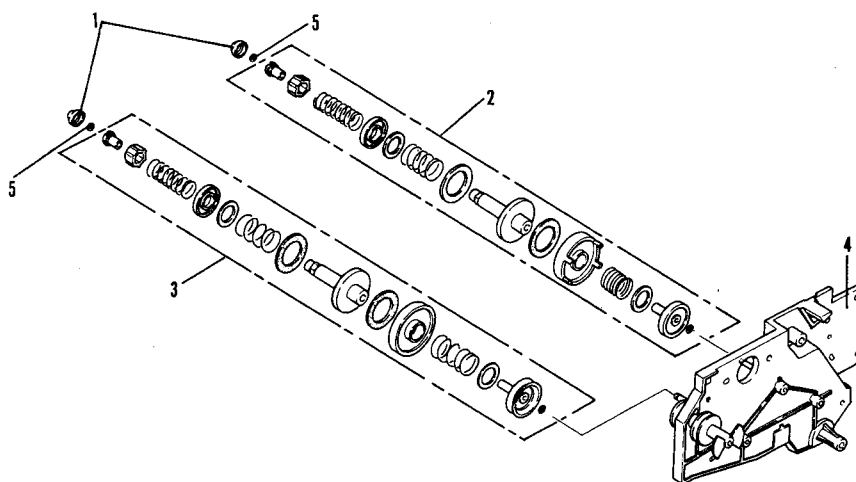


Parts List

• Parts without part number cannot be supplied.

Key No.	Part No.	Description	Key No.	Part No.	Description
1.		Detector arm	26.	RBH-373	Spring
2.	RNK-556	Half holder	27.		Arm (B)
3.	RBH-534	Spring	28.		Arm (A)
4.	REB-187	Brake shoe	29.	RSF-022	Microswitch S6
5.		Brake plate	30.	REC-278	Spacer
6.	RBH-563	Spring	31.	RSF-024	Microswitch (B) S7
7.	RNK-348	Tape guide	32.		Microswitch bracket
8.		Washer 3.2φ x 6φ x 0.25t	33.		Mechanism chassis
9.	RBH-374	Spring	34.		UL cord clamber
10.	RNK-535	Height adjuster	35.		Bracket (R) assembly
11.	RXB-005	Pinch-roller arm assembly	36.	RBH-524	Spring
12.	RXB-240	Sub-head base assembly	37.		Detector arm assembly
13.		Socket-head screw 2.6 x 5 Ni	38.		
14.		Cord clamber	39.		TP screw 3 x 8
15.		Terminal 3φ	40.	REB-300	Belt
16.		Bracket (L) assembly	41.		Holder assembly
17.	REB-194	Cushion	42.	RNK-640	Pulley
18.	RBH-503	Spring	43.		Washer 1.7φ x 3.4φ x 0.25t
19.	RNK-534	Arm			
20.	RBK-119	Head base holder			
21.	RBF-013	Steel ball			
22.	REB-153	Stopper			
23.		Head base assembly			
24.					
25.	RBH-516	Spring			

10.3 SUB-CHASSIS



Parts List

Key No.	Part No.	Description
1.	RNK-815	Reel cap (B)
2.	RXB-191	Supply reel base assembly (B)
3.	RXB-189	Take-up reel base assembly (B)
4.		Sub-chassis assembly
5.		Washer 1.7φ x 3.4φ x 0.25t

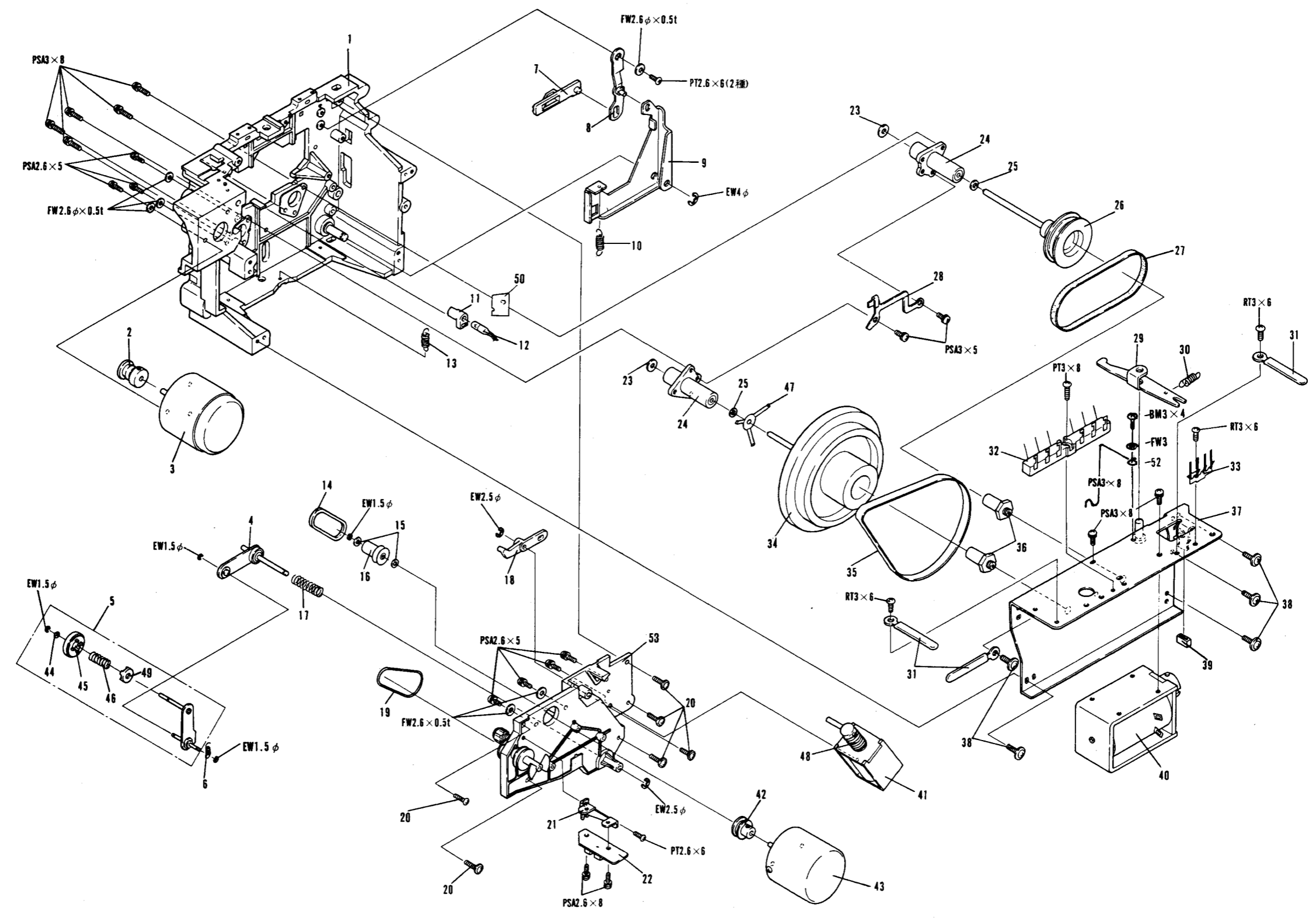
10.4 MECHANISM ASSEMBLY 2

Parts List

● Parts without part number cannot be supplied.

Key No.	Part No.	Description	Key No.	Part No.	Description
1.		Mechanism chassis	31.		Cord clamber (D)
2.	RXB-063	Motor pulley (A) assembly	32.		6P plug
3.	RXM-050	Capstan motor	33.		Terminal 4P (GND)
4.		Arm assembly	34.	RXB-055	Flywheel assembly
5.	RXB-144	Idler arm full assembly	35.	REB-270	Capstan belt
6.	RBH-564	Spring	36.		Screw
7.		Idler arm	37.		Solenoid chassis assembly
8.		Arm level assembly	38.		Screw 3φ x 8
9.		Arm	39.	REB-153	Stopper
10.	RBH-511	Spring	40.	RXP-062	Solenoid (A) SL801
11.	REB-297	Lamp holder	41.	RXP-056	Solenoid (B) SL802
12.	REL-072	Lamp PL801	42.	RXB-064	Motor pulley (B) assembly
13.	RBH-505	Spring	43.	RXM-047	Take-up motor
14.	REB-317	TU belt	44.		Washer 2.2φ x 5φ x 0.5t
15.		Washer 2.1φ x 4φ x 0.25t	45.	RNK-561	Idler
16.	RXA-998	Take-up pulley assembly	46.	RBH-498	Spring
17.	RBH-502	Spring	47.	RBK-107	Spring
18.		Brake arm	48.	RBH-507	Solenoid spring (B)
19.	REB-272	Sensing belt	49.	RNK-562	Spring holder
20.		Screw 2.6φ x 8	50.	RNF-527	Spacer
21.		Sensing holder	51.	RED-141	Cushion
22.		Sensing P.C. board	52.	RBH-557	Spring (GND)
23.	RBF-037	Washer	53.		Sub-chassis assembly
24.	RXB-093	Holder assembly			
25.		Washer 3φ x 6φ x 0.5t			
26.	RXB-058	Supply pulley assembly			
27.	REB-314	Sub-belt			
28.		Terminal (GND)			
29.		Solenoid lever			
30.	RBH-506	Solenoid spring (A)			

Mechanism Assembly 2



11. SCHEMATIC DIAGRAMS, P.C. BOARD PATTERNS AND PARTS LIST

NOTE:

• When ordering resistors, first convert resistance values into code form as shown in the following examples.

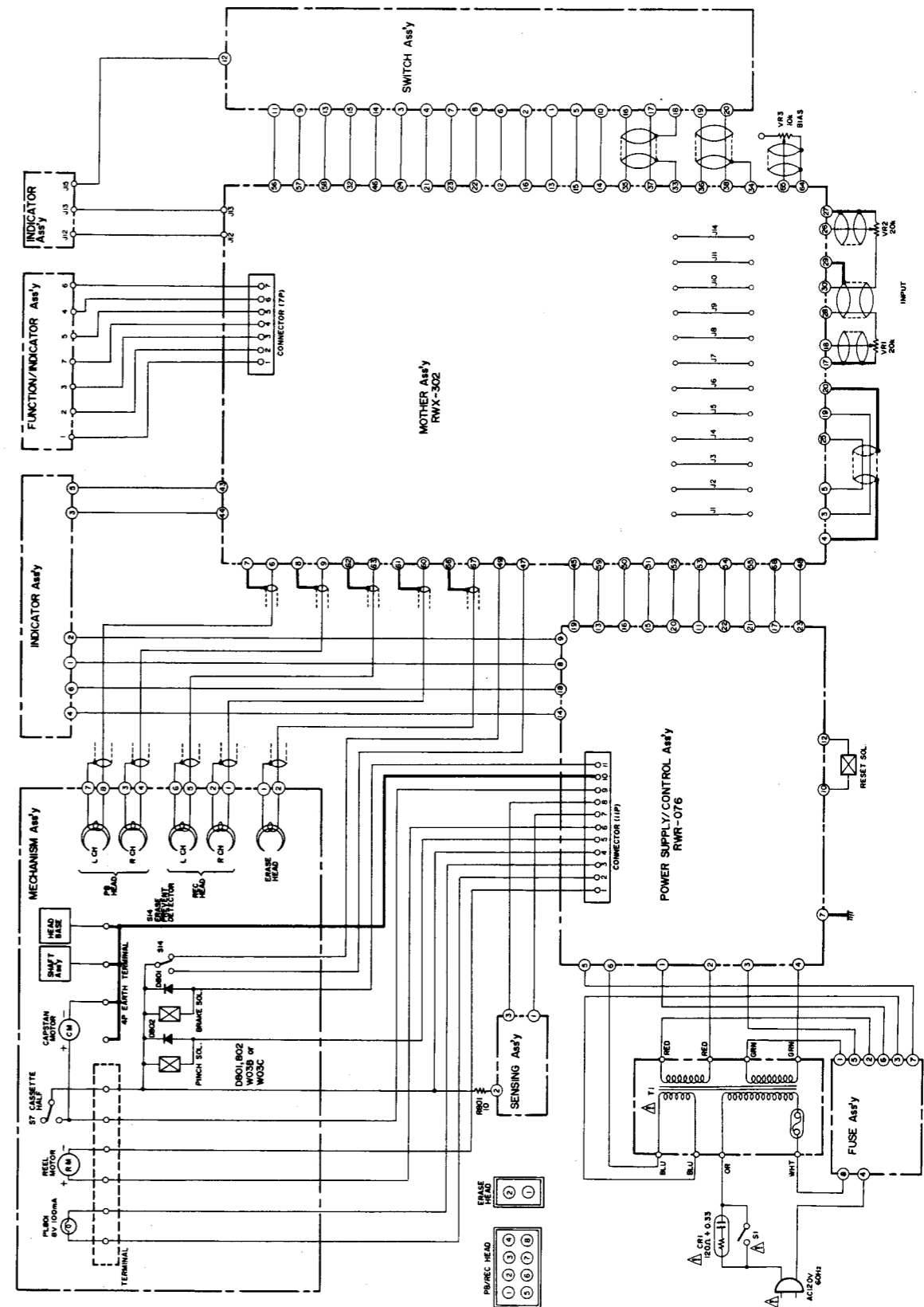
Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).
 560Ω — 56 × 10¹ — 561 RD¼PS 561 J
 47kΩ — 47 × 10³ — 473 RD¼PS 473 J
 0.5Ω — 0R5 RN2H 0R5 K
 1Ω — 010 RS1P 010 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).
 5.62kΩ 562 × 10¹ 5621 RN¼SR 5621 F

11.1 MISCELLANEOUS PART LIST

Part No.	Description	Part No.	Description
RWX-302	Mother assembly	RXP-062	SL801
RWR-076	Power supply & control assembly	RXP-056	SL802
RCV-061	VR1, VR2 (INPUT)	RD 1/4 PM100J	R801
RCS-021	VR3 (BIAS)	W03B	D801, D802
RXP-057	SL1 Reset solenoid	(W03C)	
RTT-174	T1 Power transformer		
RDG-022	AC Power cord		
RSA-021	S1 Power switch		
RWX-150 (KC)	CR1		
RWX-109 (KU)	CR1		
REL-072	PL801 8V 100mA		
RXM-047	Reel motor		
RSF-022	S6		
RSF-024	S7		
RXM-050	Capsten motor		

11.2 CONNECTION DIAGRAM



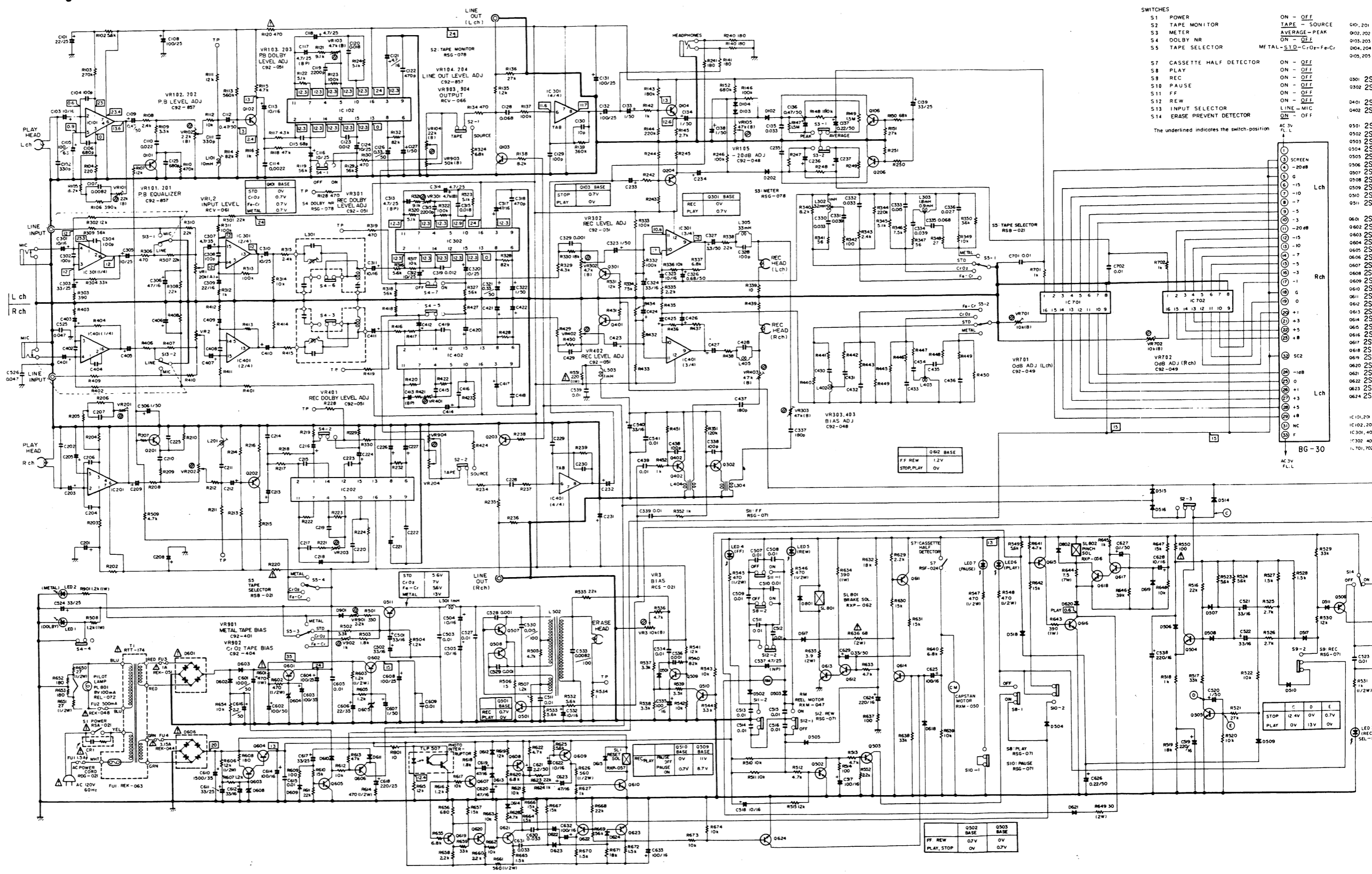
11.3 Schematic Diagram

A

B

C

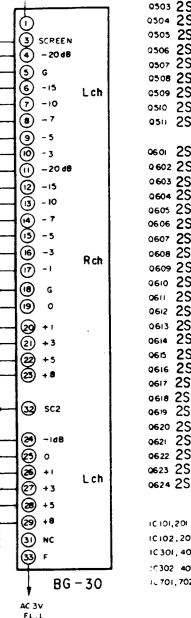
D



SWITCHES

S1	POWER	ON - OFF	0401, 201	2S
S2	TAPE MONITOR	TAPE - SOURCE	002, 202	2S
S3	METER	AVERAGE - PEAK	003, 203	2S
S4	DOLBY NR	ON - OFF	004, 204	2S
S5	TAPE SELECTOR	METAL - STD - CrO ₂ - Fe-Cr	005, 205	2S
S7	CASSETTE HALF DETECTOR	ON - OFF	0301	25C17
S8	PLAY	ON - OFF	0302	25C21
S9	REC	ON - OFF	0301	25C17
S10	PAUSE	ON - OFF	0302	25C21
S11	FF	ON - OFF	0401	25C17
S12	REW	ON - OFF	0402	25C21
S13	INPUT SELECTOR	LINE - MIC	0301	25C17
S14	ERASE PREVENT DETECTOR	ON - OFF	0301	25C17

The underlined indicates the switch position



FF REW	Q202 BASE	Q303 BASE
PLAY, STOP	OV	0.7V

4

5

6

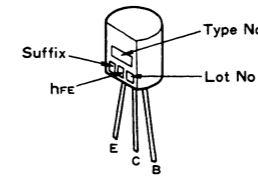
7

8

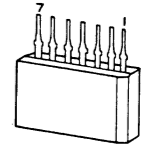
9

External Appearance of Transistors and ICs

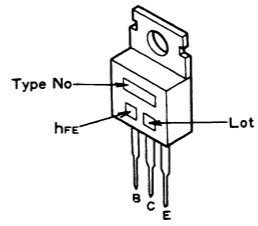
2SA825
2SC1740
2SC1815



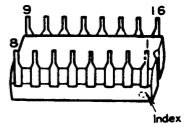
AN370



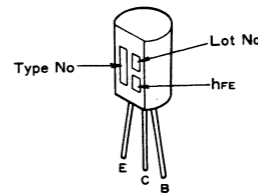
2SC1419



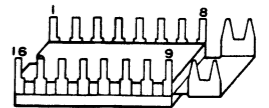
PA4001
BA658



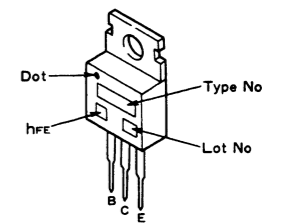
2SC2060



PA4005



2SD712



- SWITCHES
- S1 POWER ON - OFF
 - S2 TAPE MONITOR TAPE - SOURCE
 - S3 METER AVERAGE - PEAK
 - S4 DOLBY NR ON - OFF
 - S5 TAPE SELECTOR METAL - SID - C.O. - Fe-C.
 - S7 CASSETTE HALF DETECTOR ON - OFF
 - S8 PLAY ON - OFF
 - S9 REC ON - OFF
 - S10 PAUSE ON - OFF
 - S11 FF ON - OFF
 - S12 REW ON - OFF
 - S13 INPUT SELECTOR LINE - MIC
 - S14 ERASE PREVENT DETECTOR ON - OFF
- The underlined indicates the switch position.

- 040, 201 2SC1740 - R or S or 2SC828 - R or S or Q
- 040, 202 2SC1740LN - R or S or 2SC1684 - R or S
- 040, 203 2SC1740 - R or S
- 040, 204 2SC1740 - R or S or 2SC828 - R or S or Q
- 040, 205 2SC1740 - R or S or 2SC828 - R or S or Q

- 0301 2SC1740 - R or S or 2SC828 - R or S or Q
- 0302 2SC2060 - R or 2SC1384 - S
- 0401 2SC1740 - R or S or 2SC828 - R or S or Q
- 0402 2SC2060 - R or 2SC1384 - S

- 0501 2SC1815 - Y or GR
- 0502 2SC1740 - R or S or 2SC828 - R or S or Q
- 0503 2SC1740 - R or S or 2SC828 - R or S or Q
- 0504 2SA825 - P or Q
- 0505 2SC1740 - R or S or 2SC828 - R or S or Q
- 0506 2SA825 - P or Q
- 0507 2SC2060 - R or 2SC1384 - S
- 0508 2SC2060 - R or 2SC1384 - S
- 0509 2SC1815 - Y or GR
- 0510 2SC1740 - R or S or 2SC828 - R or S or Q
- 0511 2SD712 - D or E

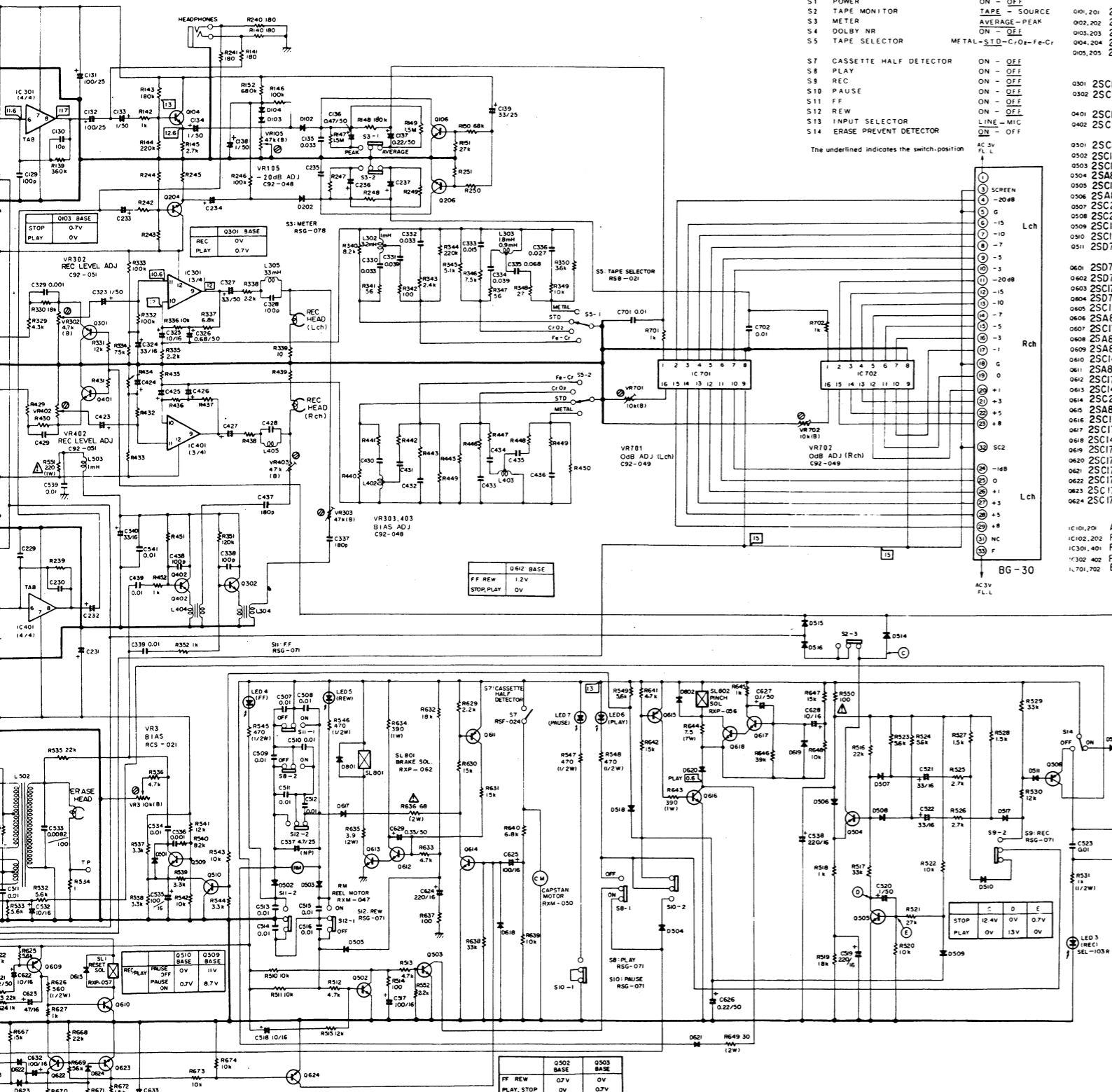
- 0601 2SD712 - D or E or 2SD234 - O or Y
- 0602 2SD712 - D or E or 2SD234 - O or Y
- 0603 2SC1740 - R or S or 2SC828 - R or S or Q
- 0604 2SD712 - D or E or 2SD234 - O or Y
- 0605 2SC1740 - R or S or 2SC828 - R or S or Q
- 0606 2SA825 - P or Q
- 0607 2SC1740 - R or S or 2SC828 - R or S or Q
- 0608 2SA825 - P or Q
- 0609 2SA825 - P or Q
- 0610 2SC1419 - Cor 2SC790 - Y
- 0611 2SA825 - P or Q
- 0612 2SC1740 - R or S or 2SC828 - R or S or Q
- 0613 2SC1419 - C or 2SC790 - Y
- 0614 2SC2060 - Q or R
- 0615 2SA825 - P or Q
- 0616 2SC1419 - Cor 2SC790 - Y
- 0617 2SC1740 - R or S or 2SC828 - R or S or Q
- 0618 2SC1419 - Cor 2SC790 - Y
- 0619 2SC1740 - R or S or 2SC828 - R or S or Q
- 0620 2SC1740 - R or S or 2SC828 - R or S or Q
- 0621 2SC1740 - R or S or 2SC828 - R or S or Q
- 0622 2SC1740 - R or S or 2SC828 - R or S or Q
- 0623 2SC1740 - R or S or 2SC828 - R or S or Q
- 0624 2SC1740 - R or S or 2SC828 - R or S or Q

- IC101, 201 AN370
- IC102, 202 PA4005
- IC301, 401 PA4001
- IC302, 402 PA4005
- IC701, 702 BA658

- 0402, 0403, 0404, 202 IS2473
- 0402, 203 W03B or W03C
- 0401, 504 - 518 IS2473
- 0601 RB - 151
- 0602 IS2471
- 0603 W03B or W03C
- 0604 IZ24 or RD24F(B) or (C)
- 0605 WZ - 157
- 0606 S4VB10

- 0608 WZ - 145
- 0609 - 614 IS2473
- 0605 W03B or W03C
- 0606, 619, 622 - 624 W03B or W03C
- 0620 IS2473
- 0620 V03C
- 0620 W03B or W03C
- 0620 W03B or W03C
- 0620 IS2473

- 1 RESISTOR, indicated in Ω, 1/4W, 1% tolerance unless otherwise noted
K, KD, M, MA, (F), 1%, (G), 1.2%, (K), 10% tolerance
 - 2 CAPACITORS, indication in capacity (μF)/voltage (V) unless otherwise noted p.p.F
Indication without voltage is 50V except electrolytic capacitor.
 - 3 VOLTAGE
□ DC voltage (V) or no input signal
 - 4 OTHERS;
○ Adjusting point
- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.



4

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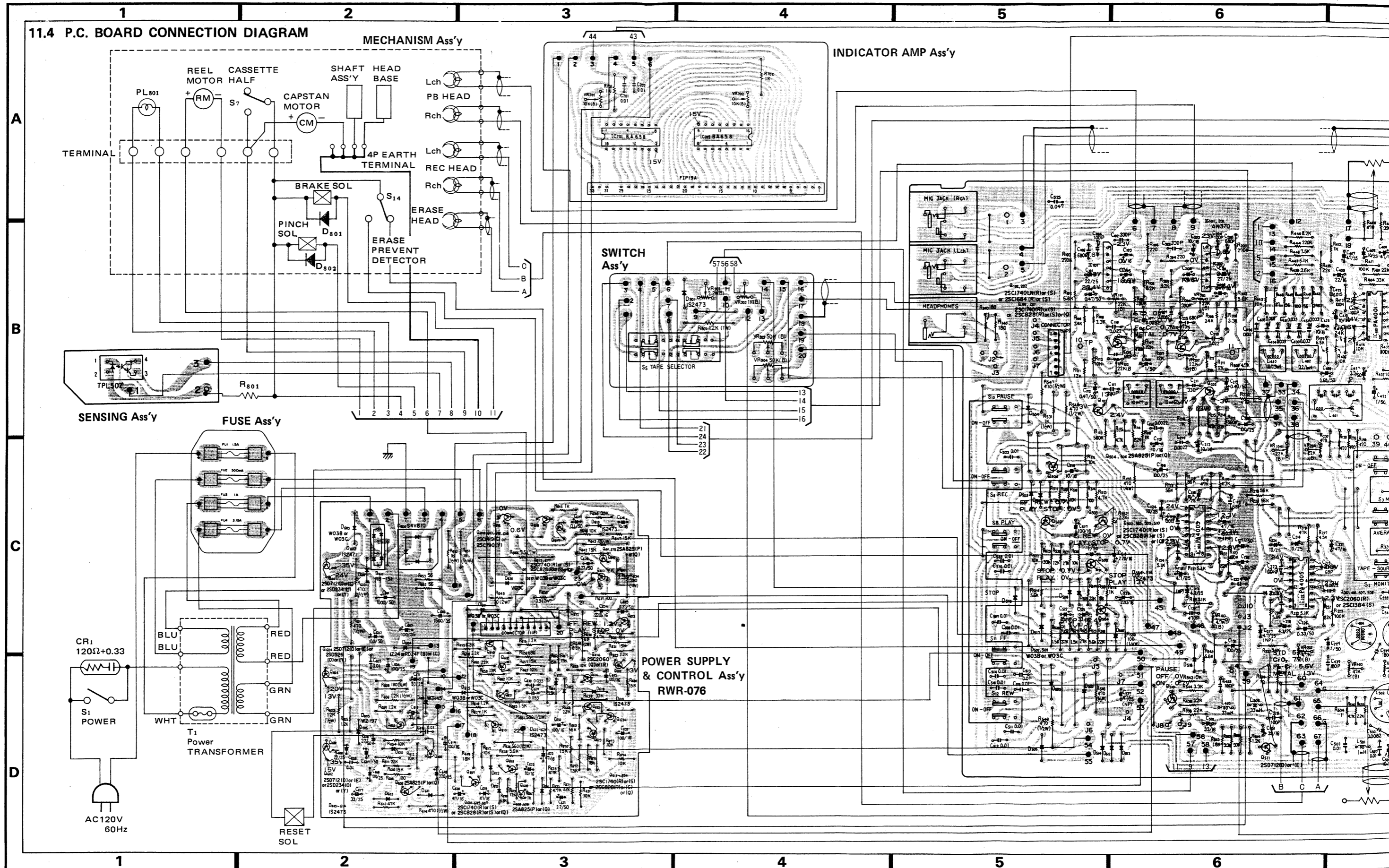
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11.4 P.C. BOARD CONNECTION DIAGRAM



CT-F850

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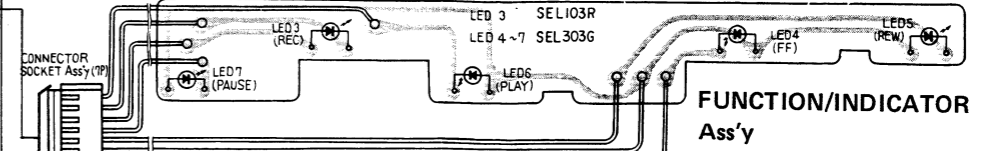
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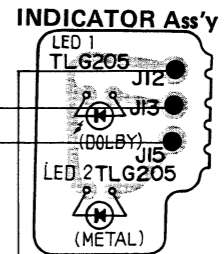
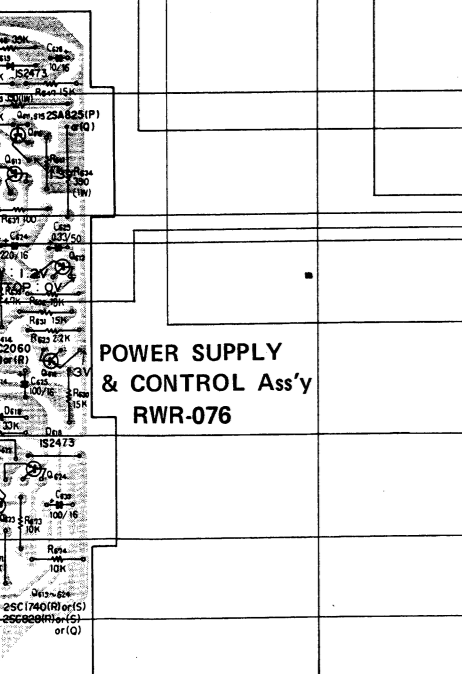
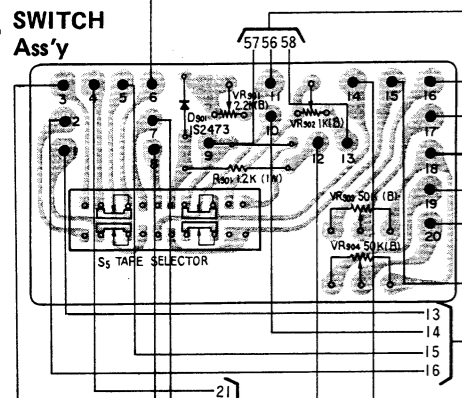
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INDICATOR AMP Ass'y



MOTHER Ass'y
RWX-302



A

B

C

D

11.5 MOTHER ASSEMBLY (RWX-302)

Part List

COILS

Part No.	Symbol & Description
RTF-044	L101, L201 Trap coil
RTF-040	L301, L401 Filter block
RTF-061	L302, L402 Peaking coil
RTF-062	L303, L403 Peaking coil
RTD-018	L304, L404 Transformer
RTF-033	L305, L405 Trap coil
RTF-057	L501, L503 Line coil
RTD-019	L502 OSC coil

OTHERS

Part No.	Symbol & Description
RKN-055	MIC jack
RKN-056	HEADPHONE jack
RSG-071	S8-S12 FUNCTION switch
RSG-078	S2-S4 Push switch
RKB-014	Pin jack (4P)
RKP-069	Connector (7P)
RBF-041	Ceramic tube
RBF-042	Ceramic tube

CAPACITORS

Part No.	Symbol & Description
CEA 220P 25	C101, C201
CEA R22M 50	C137, C237
CEA R33M 50	C126, C226, C321, C421
CEA R47M 50	C136, C236
CEA R68M 50	C326, C426
CEA 010M 50	C127, C227, C322, C422
CEA R47P 50	C109, C209, C112, C212
CEA 010P 50	C133, C134, C138, C233, C234, C323, C423, C506, C520
CEA 3R3P 50	C327, C427
CEA 4R7P 25	C118, C218, C314, C414
CEA 4R7P 35	C307, C407
CEA 100P 16	C113, C213, C311, C411, C325, C425, C504, C505, C518, C532
CEA 100P 25	C116, C216, C124, C224, C305, C405, C310, C410, C312, C412, C320, C420, C309, C409
CEA 220P 16	C324, C424, C501, C502, C521, C522, C540
CEA 330P 16	C324, C424, C501, C502, C521, C522, C540
CEA 330P 25	C139, C520
CEA 470P 16	C121, C221, C306, C406, C317, C417, C105, C205
CEA 101P 6R3	C105, C205
CEA 101P 25	C108, C131, C132, C208, C231, C232
CEA 221P 16	C519, C538

Part No.	Symbol & Description
CEA 101P 16	C535, C517
CEA 4R7M 25NP	C117, C217, C313, C413, C537
CEANL 100P 16	C103, C203, C301, C401
CEANL 330P 25	C303, C403
RCE-003	C328, C428
RCE-025	C337, C437
RCE-008	C102, C111, C202, C211
CQPA 822J 100	C533
CQPA 153J 100	C530
CCDSL 100K 50	C130, C230
CCDSL 680K 50	C115, C215
CCDSL 101K 50	C104, C204, C129, C229, C302, C304, C308, C338, C402, C404, C408, C438
CKDYB 471K 50	C122, C222, C318, C418
CKDYB 681K 50	C106, C206, C125, C225
CKDYB 102K 50	C528, C529
CKDYF 103Z 50	C507-C516, C503, C523, C527, C539, C541
CKDYF 473Z 50	C525, C526
CQMA 102K 50	C329, C429, C536
CQMA 222K 50	C114, C214, C119, C219, C315, C415
CQMA 822K 50	C107, C207
CQMA 103K 50	C339, C439, C531, C534
CQMA 123K 50	C123, C223, C319, C419
CQMA 183K 50	C120, C220, C316, C416
CQMA 223K 50	C110, C210
CQMA 333K 50	C135, C235
CQMA 683K 50	C128, C228
CQMA 273J 50	C336, C436
CQMA 333J 50	C330, C332, C430, C432
CQMA 393J 50	C331, C334, C431, C434
CQMA 153J 50	C333, C433
CQMA 683J 50	C335, C435

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

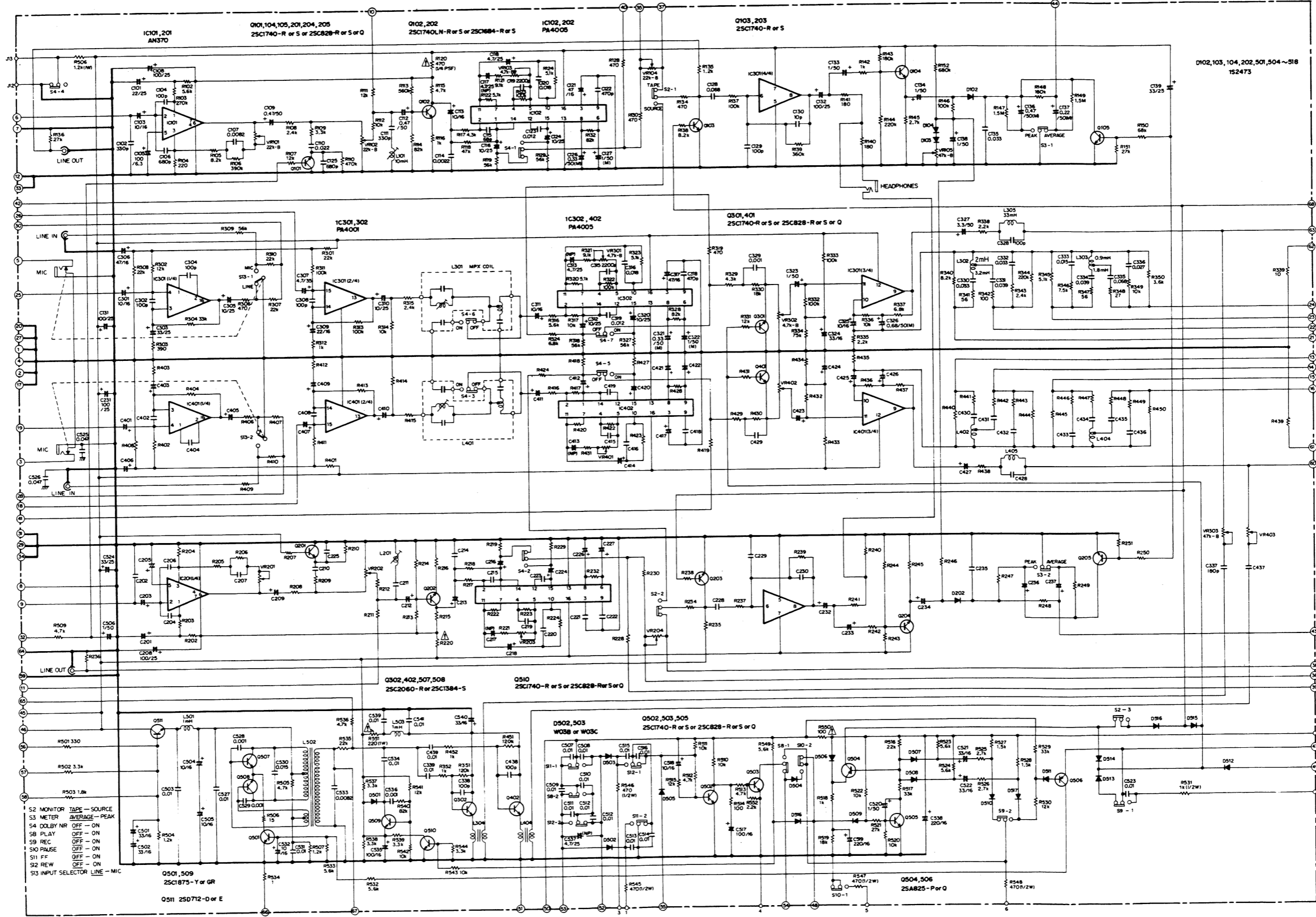
RESISTORS

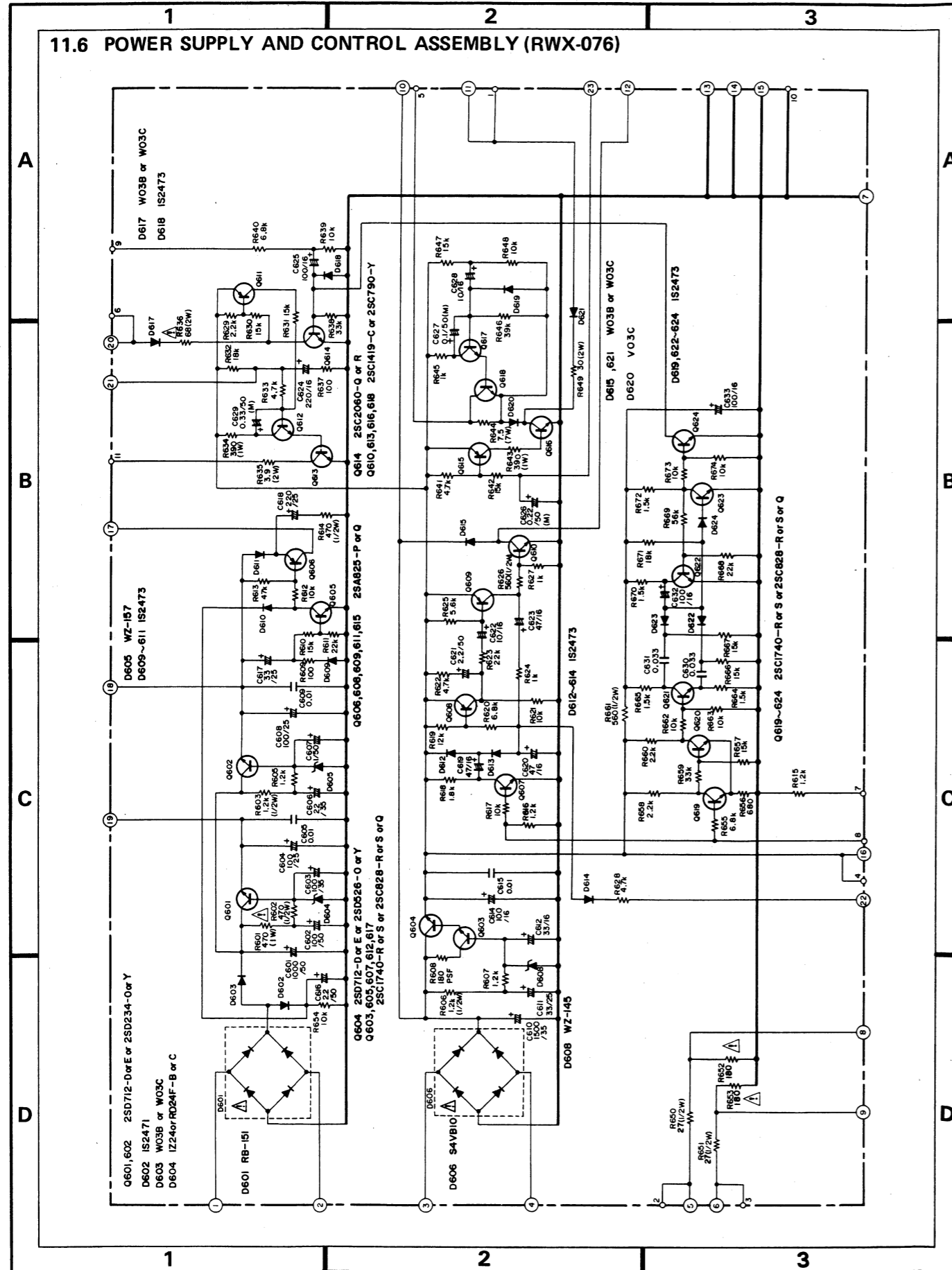
Part No.	Symbol & Description
C92-857	VR101, VR102, VR104, VR201, VR202, VR204 Semi-fixed 22K-B
C92-051	VR103, VR203, VR301, VR302, VR401, VR402 Semi-fixed 4R7K-B
C92-048	VR105, VR303, VR403 Semi-fixed 47K-B
RD $\frac{1}{2}$ PM $\square\square\square$ J	R102-R119, R121-R124, R128-R130, R132, R134-R152 R202-R219, R221-R224, R228-R230, R232, R234-R251, R239-R254, R301-R304, R306-R324, R327-R352, R401-R404, R406-R424, R427-R452, R501-R507, R509-R530, R532-R544, R549, R552
RS1PF $\square\square\square$ J	R508, R551
RD $\frac{1}{2}$ PS $\square\square\square$ J	R531, R545-R548
RD $\frac{1}{2}$ PSF $\square\square\square$ J	R120, R220, R550

SEMICONDUCTORS

<u>Part No.</u>	<u>Symbol & Description</u>
AN370	IC101, IC201
PA4005	IC102, IC202, IC302, IC402
PA4001	IC301, IC401
2SC1740 (2SC828)	Q101, Q104, Q105, Q201, Q204, Q205, Q301, Q401, Q502, Q503, Q505, Q510
2SC1740LN (2SC1684)	Q102, Q202
2SC1740	Q103, Q203
2SC1815	Q501, Q509
2SD712	Q511
2SC2060 (2SC1384)	Q302, Q402, Q507, Q508
2SA825	Q504, Q506
1S2473-T W03B (W03C)	D102-D104, D202, D501, D504-D518 D502, D503

Mother Assembly (RWX-302)





Parts List

OTHERS

Part No.	Symbol & Description
RKH-005	Insulator
REE-051	Insulator
RKP-067	Connector (11P)
RBA-039	Screw
RBF-041	Ceramic tube
RBF-042	Ceramic tube

CAPACITORS

Part No.	Symbol & Description
CEA 102P 50	C601
CEA 101P 50	C602
CEA 101P 35	C603
CEA 101P 25	C604, C608
CKDYF 103Z 50	C605, C609, C615
CEA 220P 35	C606
CEA 010P 50	C607
CEA 152P 35	C610
CEA 330P 16	C612
CEA 101P 16	C614, C625, C632, C633
CEA 2R2P 50	C616, C621
CEA 330P 25	C611, C617
CEA 221P 25	C618
CEA 470P 16	C619, C620, C623
CEA 221P 16	C624
CEA R22M 50	C626
CEA R10M 50	C627
CEA 100P 16	C622, C628
CEA R33M 50	C629
CQMA 333K 50	C630, C631

Note: When ordering resistors, convert the resistance value into code form and then rewrite the part no. as before.

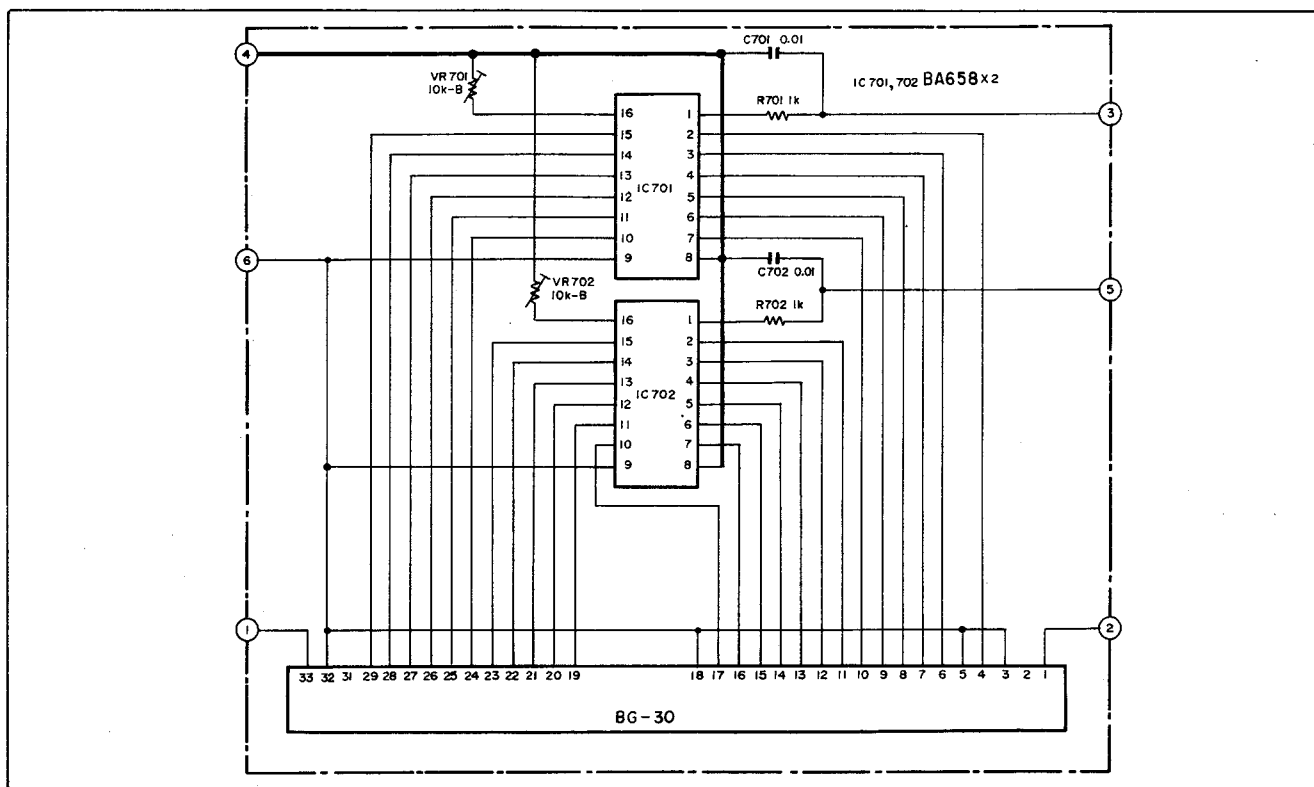
RESISTORS

Part No.	Symbol & Description
RD $\frac{1}{2}$ PS $\square\square\square$ J	R650, R651
RD $\frac{1}{2}$ PSF $\square\square\square$ J	R602, R603, R606, R661, R614, R626
RD $\frac{1}{2}$ PM $\square\square\square$ J	R605, R607, R609-R613, R615-R625 R627-R633, R637-R642, R645-R648, R655-R660, R662-R674, R654
RS1PF $\square\square\square$ J	R601, R634, R643
RD $\frac{1}{2}$ PSF $\square\square\square$ J	R608, R652, R653
RS2PF $\square\square\square$ J	R636
RCN-031	R635 Wire wound 2W 3.9 Ω
RCN-032	R644 Wire wound 7W 7.5 Ω
RCN-037	R649 Wire wound 2W 30 Ω

SEMICONDUCTORS

Part No.	Symbol & Description
2SD712	Q601, Q602
(2SD234)	
2SC1740	Q603, Q605, Q607, Q612, Q617
(2SC828)	Q619-Q624
2SD712	Q604
(2SD526)	
2SA825	Q606, Q608, Q609, Q611, Q615
2SC1419	Q610, Q613, Q616, Q618
(2SC790)	
2SC2060	Q614
RB-151	D601
1S2471-T	D602
W03B	D603, D615, D617, D621
(W03C)	
1Z-24	D604
(RD24F)	
WZ-157	D605
S4VB10	D606
WZ-145	D608
1S2473-T	D609-D614, D618, D619
	D622-D624
VO3C	D620

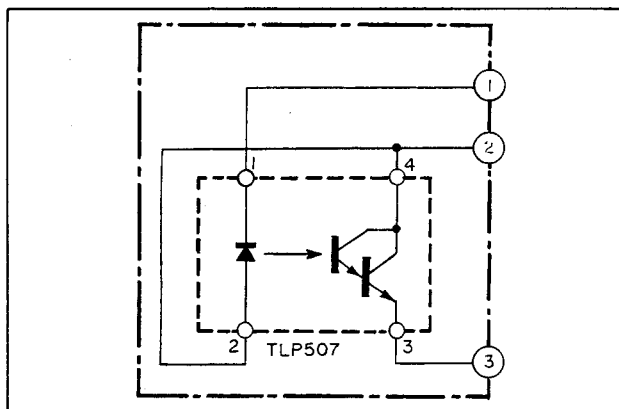
11.7 INDICATOR AMP ASSEMBLY



Parts List

Part No.	Symbol & Description	Part No.	Symbol & Description
BA658	IC701, IC702	REB-301	Meter cushion A
CKDYF 103Z 50	C701, C702	REB-348	Meter cushion
RD¼PS 102J	R701, R702	BG-30	Fluorescent indicator tube
C92-049	VR701, VR702 Semi-fixed 10k(B)		

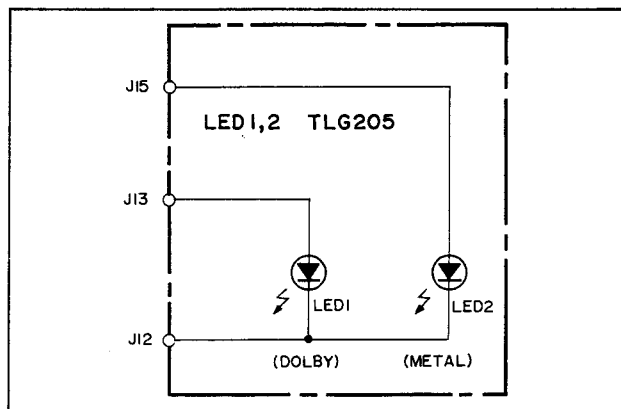
11.8 SENSING ASSEMBLY



Parts List

Part No.	Symbol & Description
TLP507	Photo interrupt

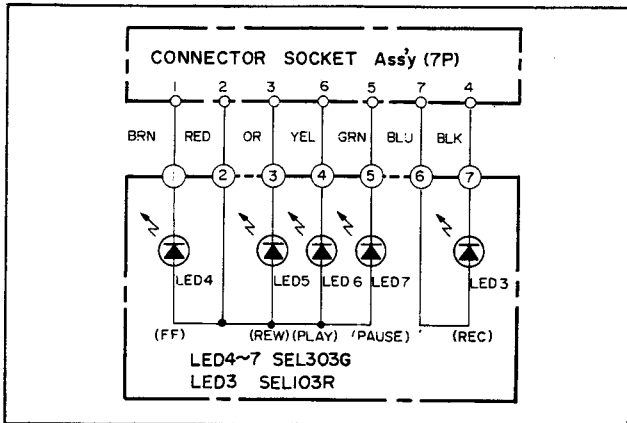
11.9 INDICATOR ASSEMBLY



Parts List

Part No.	Symbol & Description
TLG205	LED1, LED2
REB-342	Diode holder

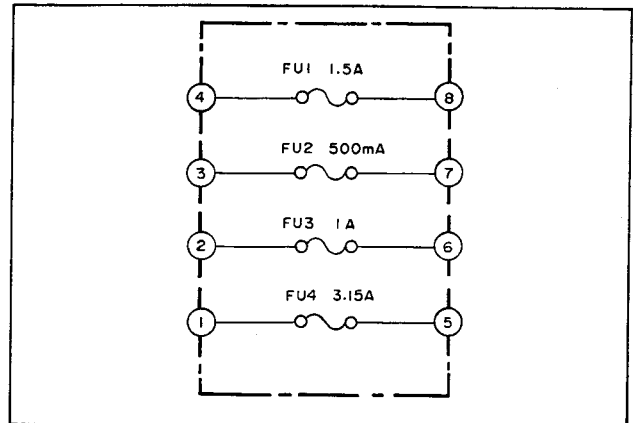
11.10 FUNCTION INDICATOR ASSEMBLY



Parts List

Part No.	Symbol & Description
SEL 103R	LED3
SEL 303G	LED4-LED7
RKP-068	Connector assembly (7p)

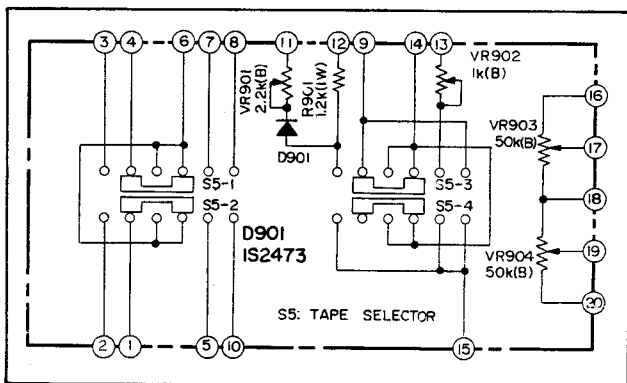
11.12 FUSE ASSEMBLY



Parts List

Part No.	Symbol & Description
REK-063	FU1 1.5A
REK-048	FU2 500mA
REK-051	FU3 1A
REK-044	FU4 3.15A

11.11 SWITCH ASSEMBLY



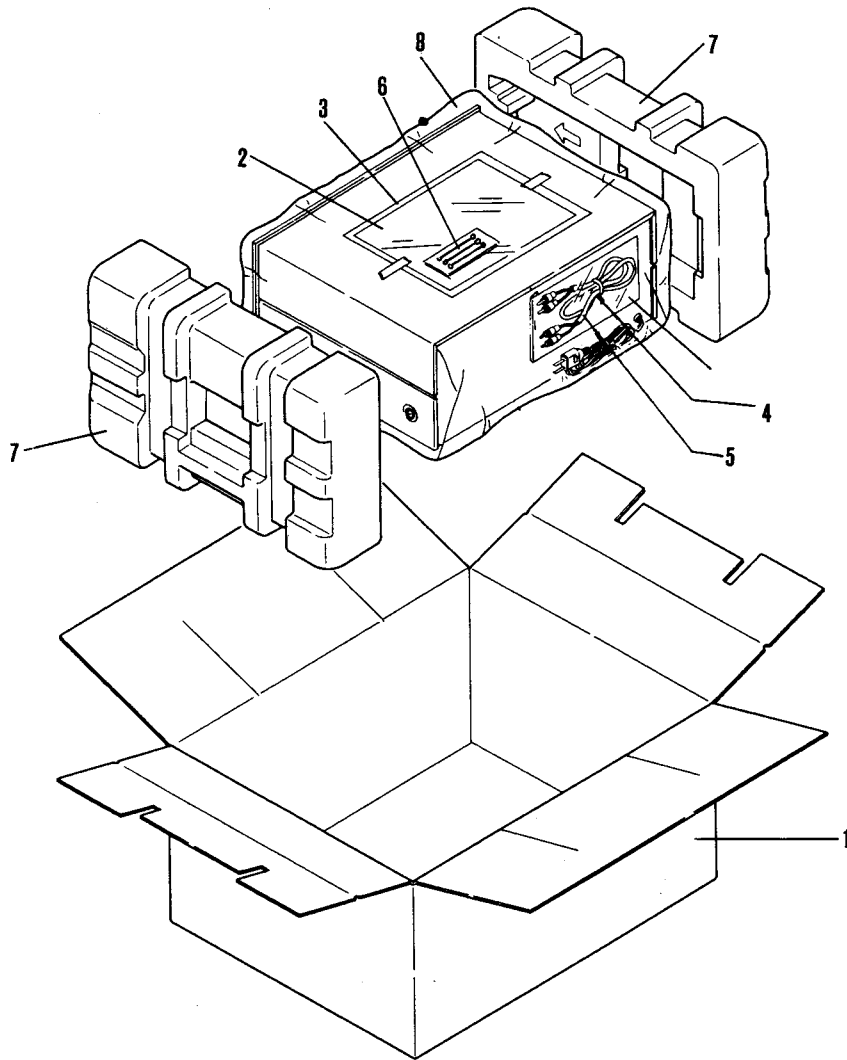
Parts List

RESISTORS

Part No.	Symbol & Description
C92-401	VR901 Semi-fixed 2R2K (B)
C92-404	VR902 Semi-fixed 1K (B)
RS1PF 122J	R901

Part No.	Symbol & Description
RCV-066	S903, S904 Volume switch
RSB-021	S5 Rotary switch
1S2473	D901

12. PACKING



Parts List

Key No.	Part No.	Description
1.	RHG-286	Packing case (KC)
	RHG-287	Packing case (KU)
2.	RRB-109	Operating instruction
3.	RHL-018	Vinyl bag
4.	RDE-027	Connection cord assembly
	(RDE-028)	
	(RDE-031)	
5.	RDE-010	Connection cord
6.	REA-021	Head cleaning
7.	RHA-184	Side pad
8.	RHL-041	Vinyl bag