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.**

CONTENTS

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 ±3dB)
Ferrichrome tape . . . . . 20 to 18,000Hz
(25 to 17,000Hz ±3dB)
Chromium dioxide tape . . . . . 20 to 18,000Hz
(25 to 17,000Hz ±3dB)
Metal tape . . . . . 20 to 19,000Hz
(25 to 18,000Hz ±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

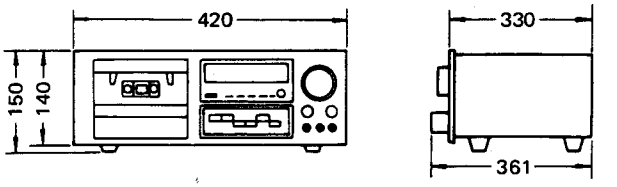
- Dolby NR system (ON-OFF) with LED indicator lamp
- Fluorescent tube level meter (−20 to +8dB)
(Peak/Average selector)
- Bias fine adjusting control knob
- 4 position tape selector (STD/METAL/CrO_2/Fe-Cr)
- Automatic tape slack canceller
- Cassette compartment illumination
- Standby mechanism with unattended 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.

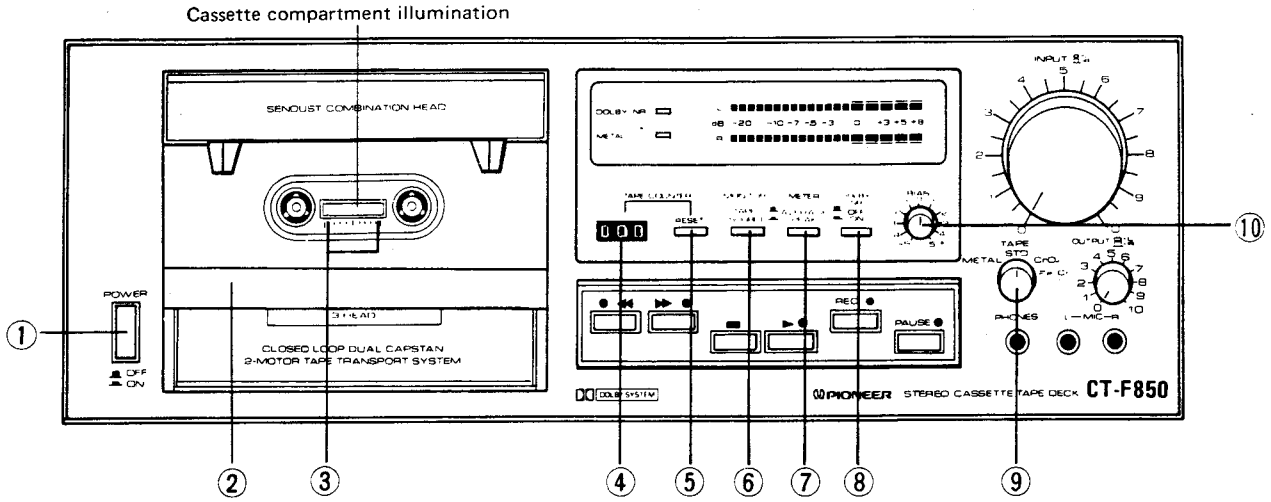
NOTES:

1. Reference Tapes: Standard & LH: DIN 45513/BLATT6 or equiv.
: CrO_2: DIN 45513/BLATT7(CrO_2) 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 ±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 FACILIES



①POWER 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.

③REMAINING TAPE MARKER

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

④TAPE 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."

⑥MONITOR 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.

⑦METER 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.

⑧DOLBY 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.

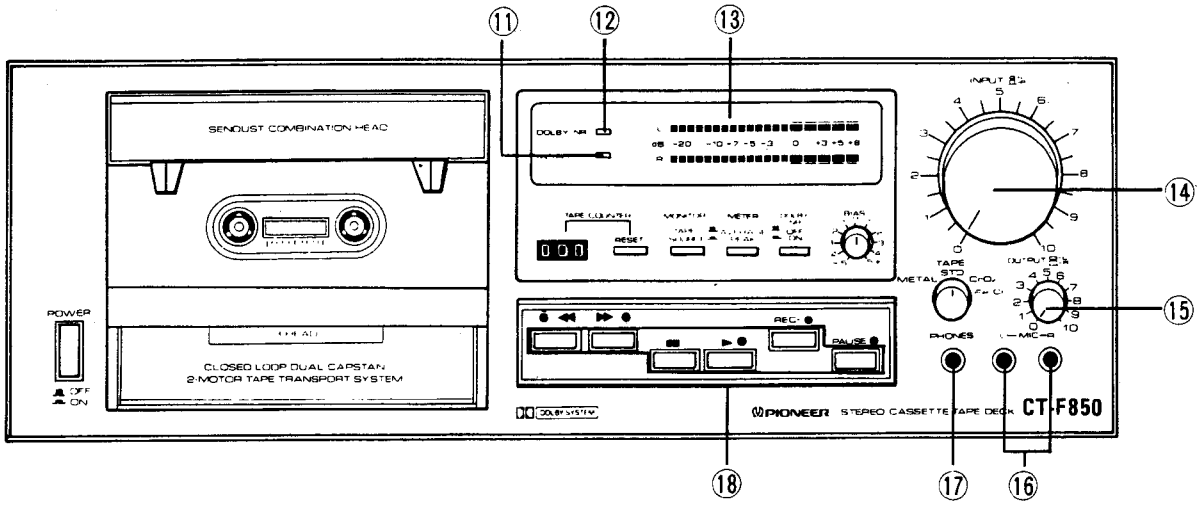
⑨TAPE SELECTOR

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

⑩BIAS 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.



⑪METAL TAPE INDICATOR

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

⑫DOLBY 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.

⑬LEVEL 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.

⑭INPUT (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.

⑮OUTPUT (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.

⑯MIC 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.

⑰HEADPHONES 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.***

⑱OPERATING 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.***

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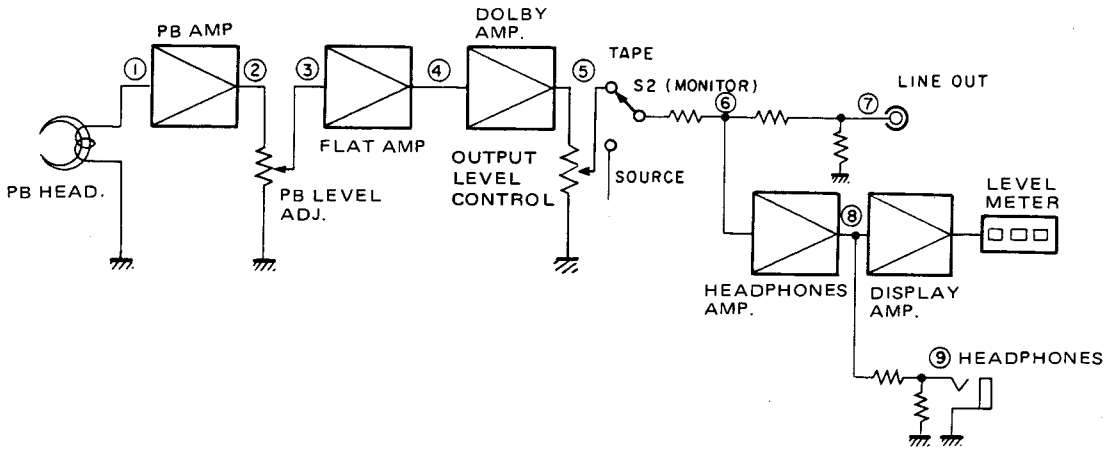
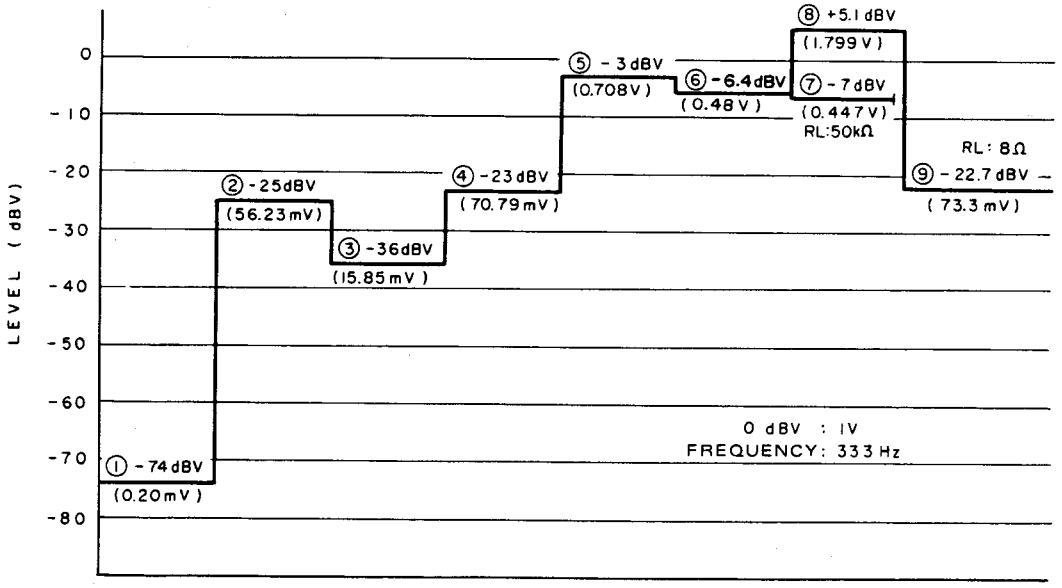
* Dolby and DD are trademarks of Dolby Laboratories.

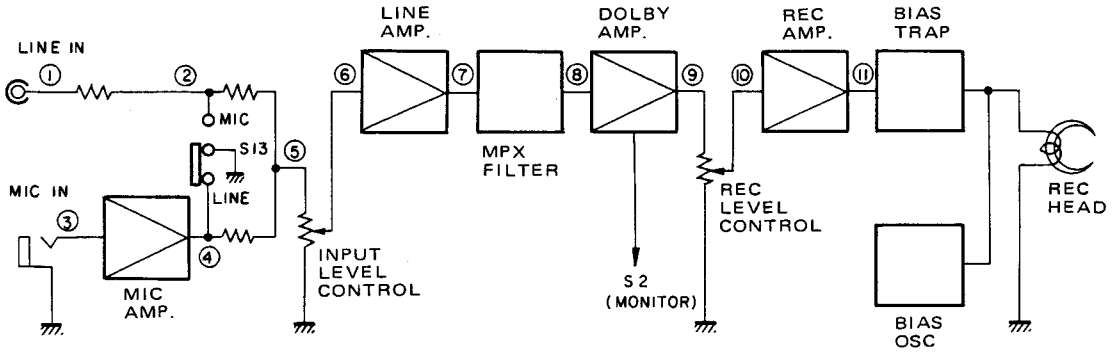
3. LEVEL DIAGRAM

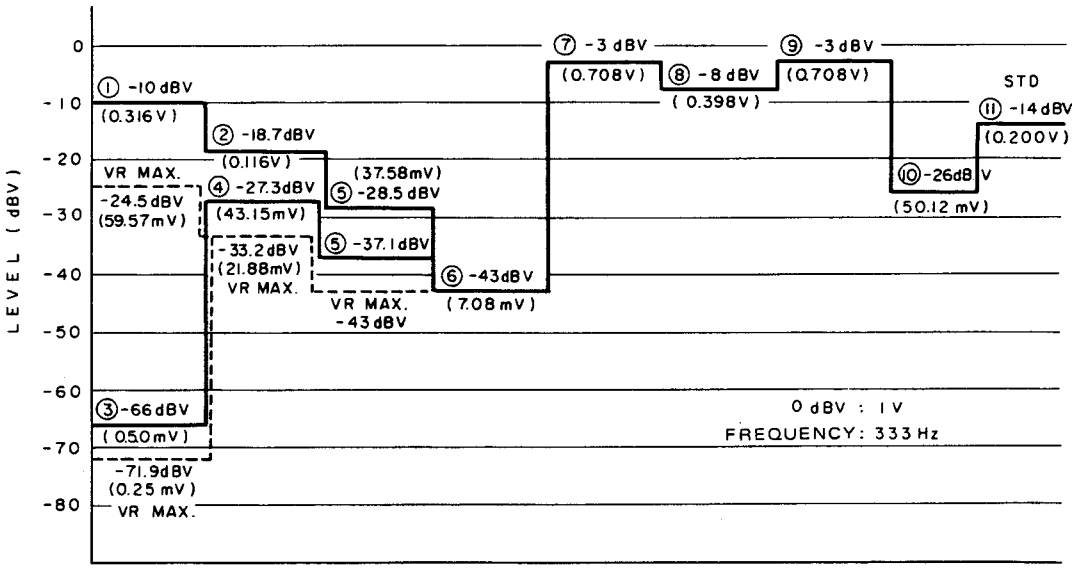
PLAYBACK





RECORDING


LINE IN
MIC
S13
LINE
MIC IN
MIC AMP.
INPUT LEVEL CONTROL
LINE AMP.
MPX FILTER
DOLBY AMP.
S2 (MONITOR)
REC AMP.
REC LEVEL CONTROL
BIAS TRAP
BIAS OSC
REC HEAD


LEVEL (dBV)
0
-10
-20
-30
-40
-50
-60
-70
-80
① -10dBV (0.316V)
② -18.7dBV (0.116V)
③ -66dBV (0.50mV)
④ -27.3dBV (43.15mV)
⑤ -28.5dBV (37.58mV)
⑤ -37.1dBV
⑥ -43dBV (7.08mV)
⑦ -3dBV (0.708V)
⑧ -8dBV (0.398V)
⑨ -3dBV (0.708V)
⑩ -26dBV (50.12mV)
⑪ -14dBV (0.200V)
STD
VR MAX. -24.5dBV (59.57mV)
-33.2dBV (21.88mV) VR MAX.
VR MAX. -43dBV
-71.9dBV (0.25mV) VR MAX.
0dBV : 1V
FREQUENCY: 333Hz

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.

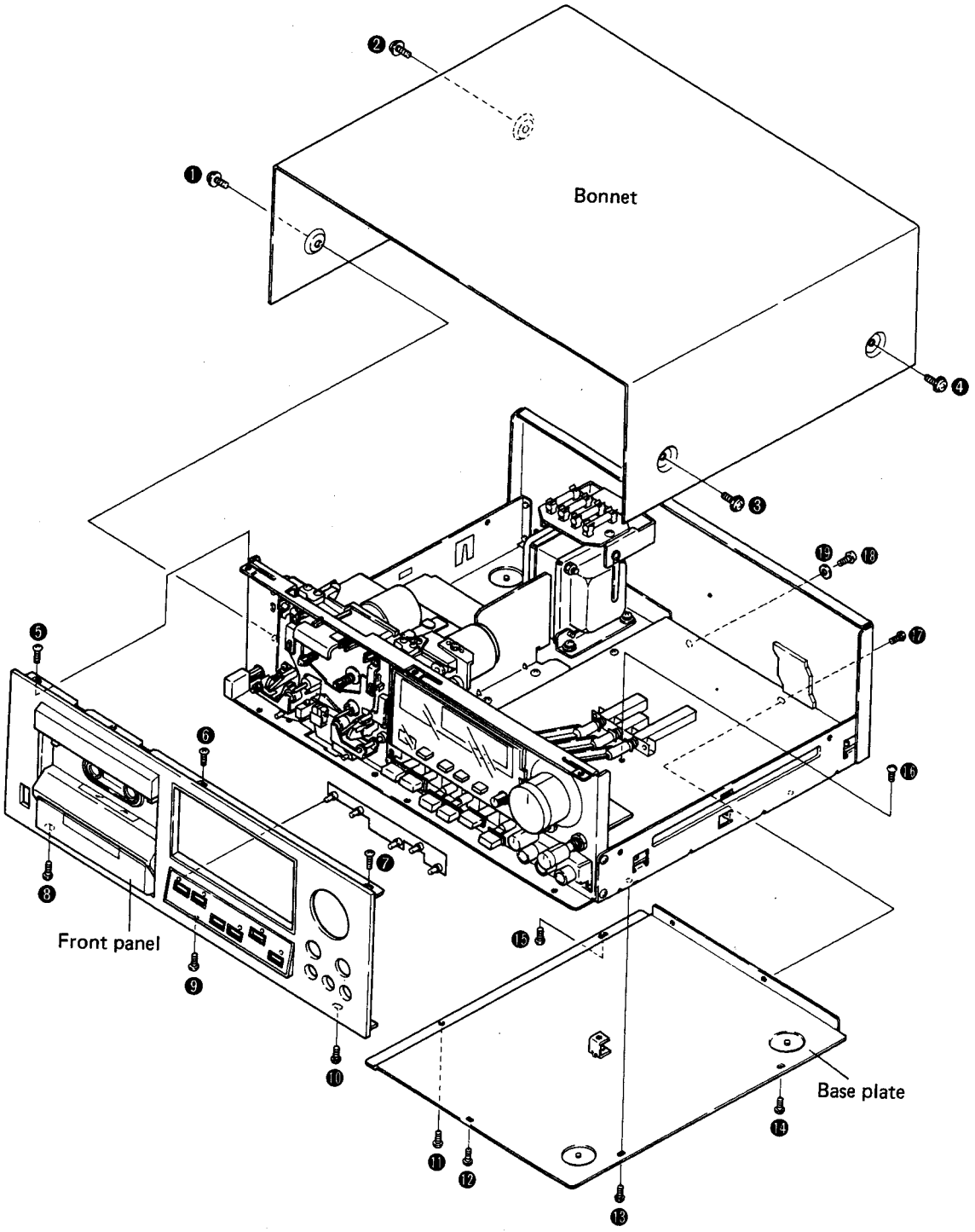


Fig. 4-1 Disassembly of external part

MECHANICAL ASSEMBLY

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

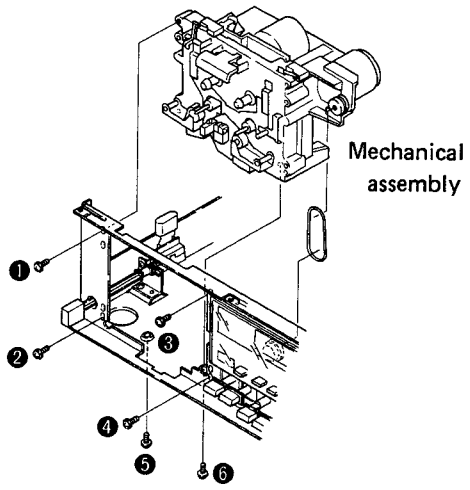


Fig. 4-2 Removing the mechanical assembly

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.

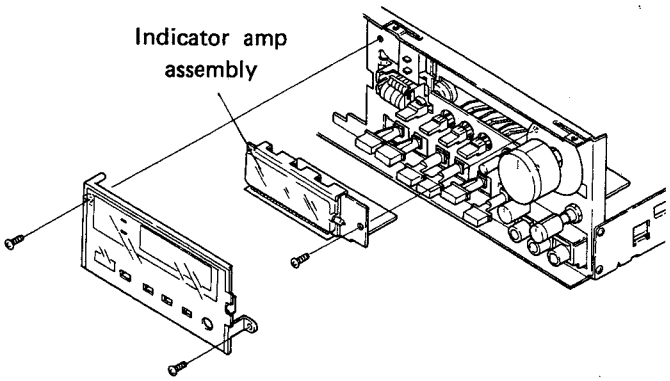


Fig. 4-3 Removing the fluorescent display tubes

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.

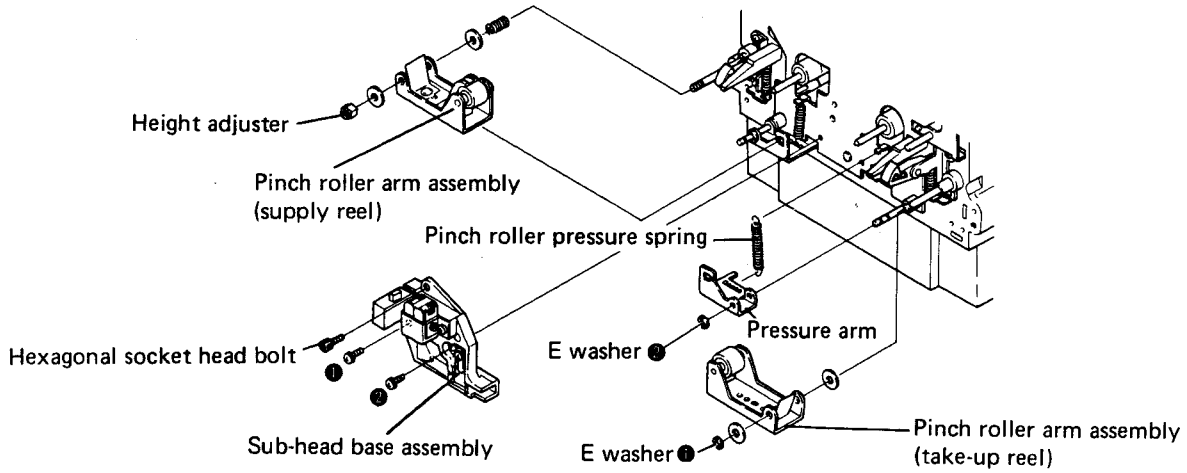


Fig. 4-4 Removing the sub-head base ass'y, pinch roller arm ass'y and pressure arm

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.

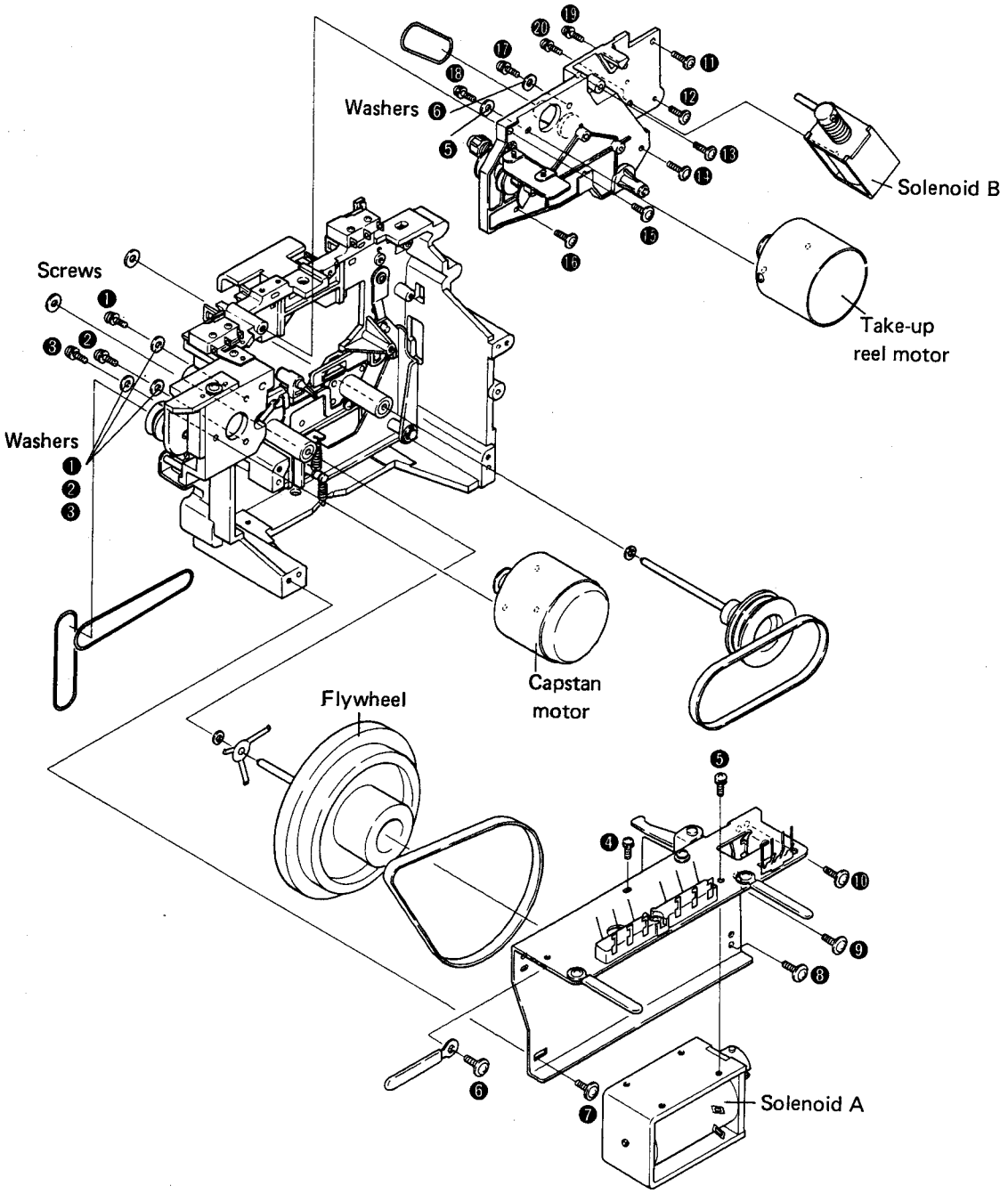
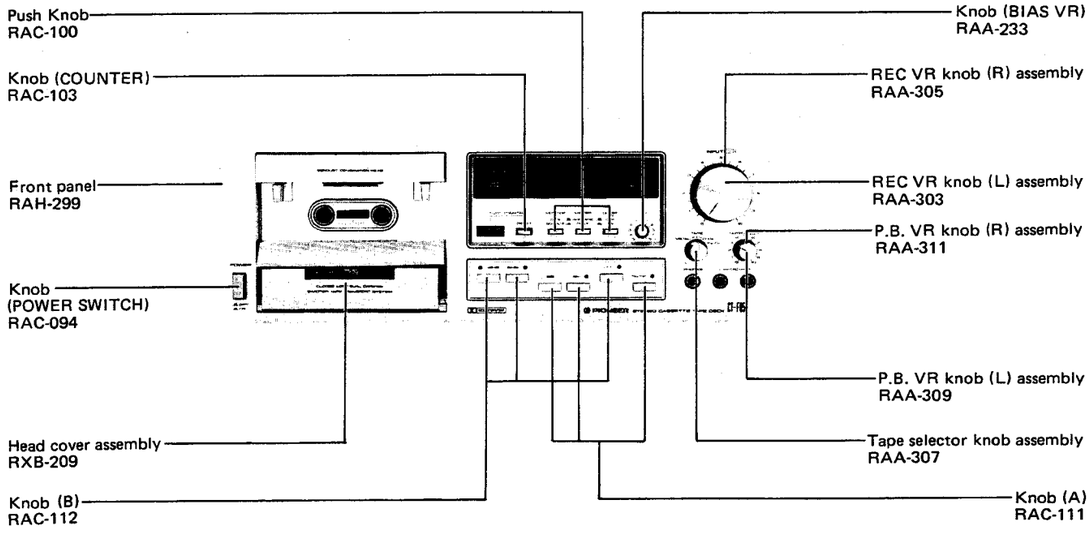


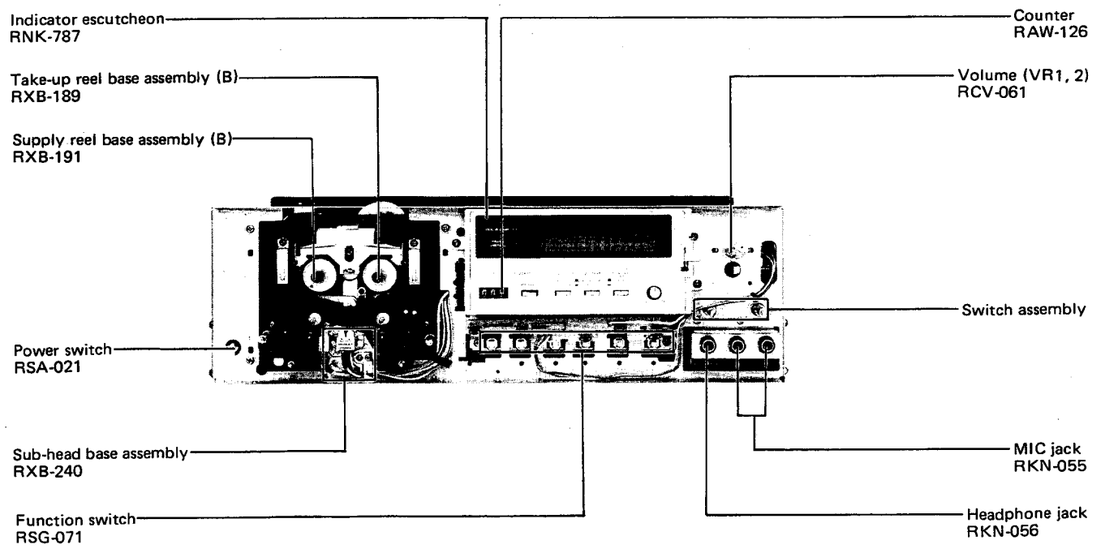
Fig. 4-5 Removing mechanical assembly component parts

5. PARTS LOCATION

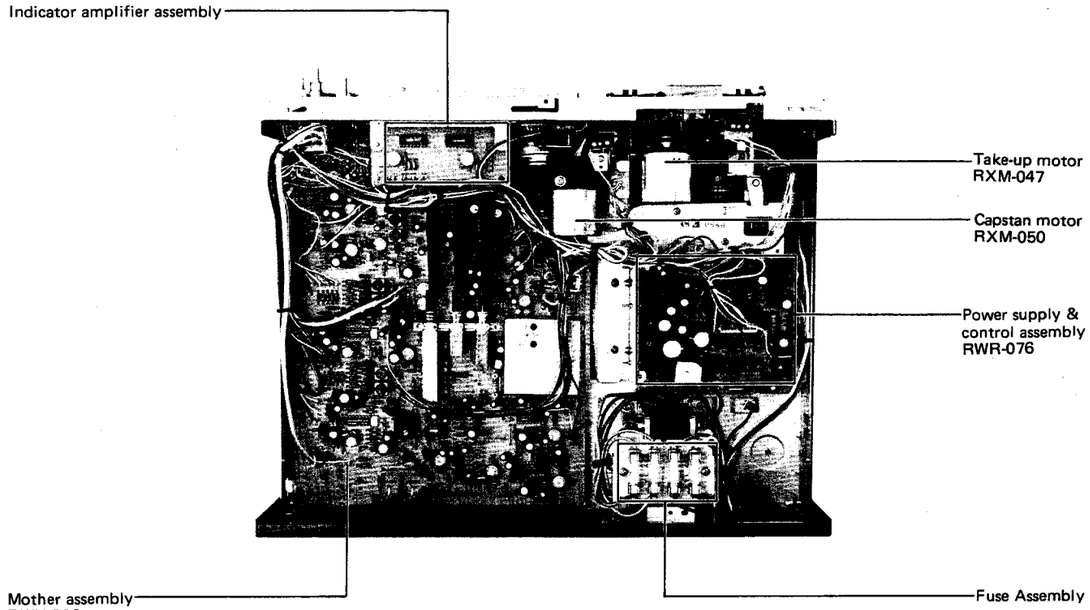
FRONT PANEL VIEW



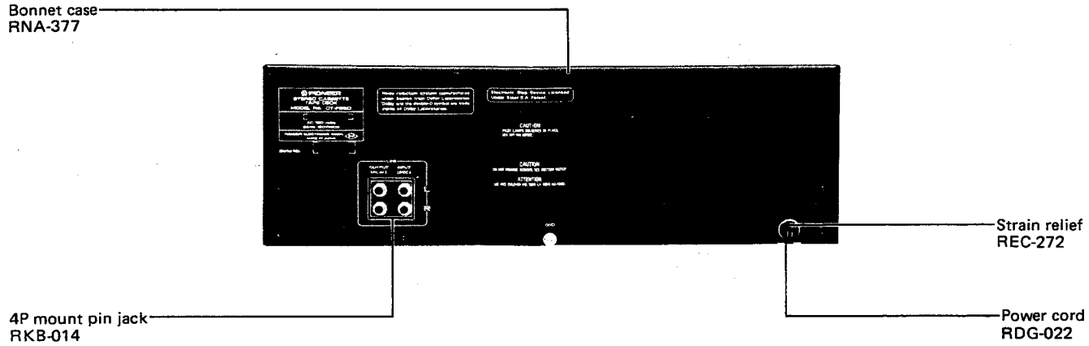
FRONT VIEW WITH PANEL REMOVED



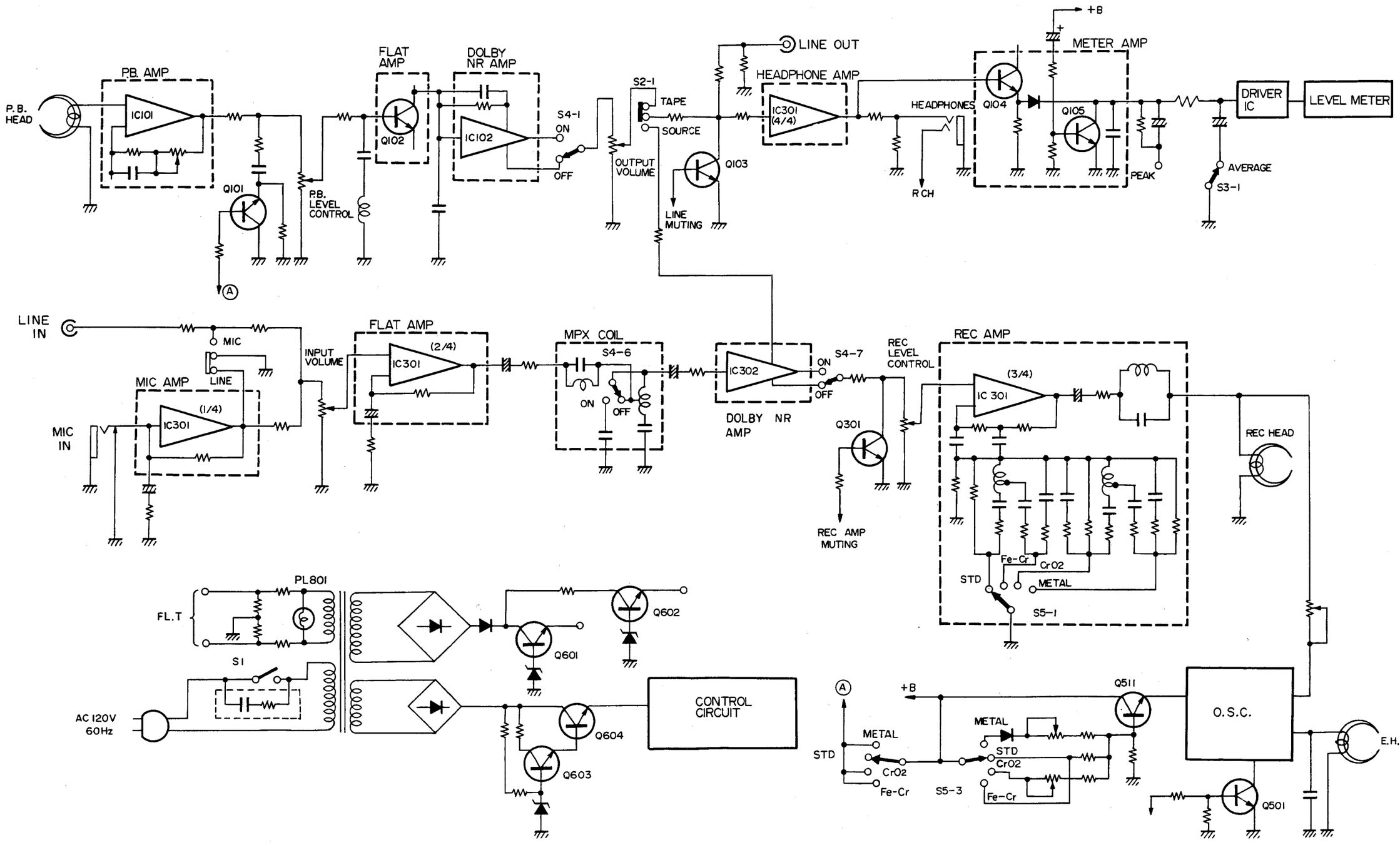
TOP VIEW WITH BONNET REMOVED



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 Q_{102}. Recording bias mixing is prevented by a trap circuit in the input stage.

Headphone Amplifier

The headphone amplifier is incorporated inside IC_{301} (PA4001) (Note 1). Gains is approximately 11dB.

Mic Amplifier

The mic amplifier is also incorporated inside IC_{301} (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 IC_{301} (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 IC_{301} (Note 1)) is again a differential amplifier, and the output stage complementary.

NOTE 1: IC_{301} (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.

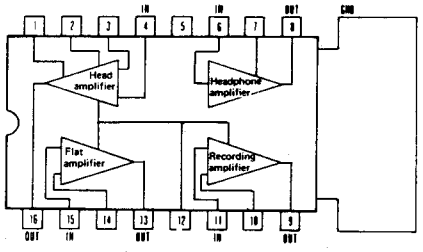


Fig. 7-1 Block diagram of the PA4001

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 (S_5) (STD, METAL, CrO_2 and Fe-Cr)

Playback Equalizer

Playback equalization is 70μsec for metal, CrO_2 and Fe-Cr tapes, and 120μsec for standard tapes. In the METAL, CrO_2, and Fe-Cr positions, +B is passed via S_5 to Q_{101}, thereby turning the transistor on. As a result, the time constant is set to 70μsec by R_{109} and C_{110}. In the STD position, Q_{101} remains off, thereby setting the time constant at 120μsec. C_{125} and R_{110} are employed to reduce the switching noise generated when Q_{101} is switched.

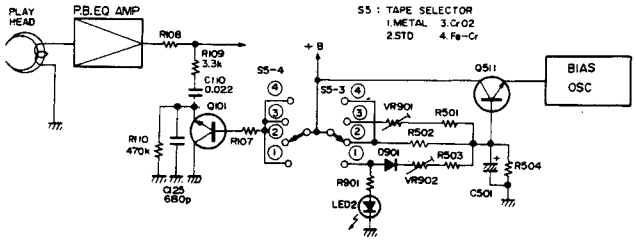


Fig. 7-2 Playback equalizer circuit

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 CrO_2 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 S_5. The +B voltage for the oscillator circuit is supplied by the Q_{511} 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 CrO_2 position. The bias adjustment control can vary the bias by up to ± 15%.

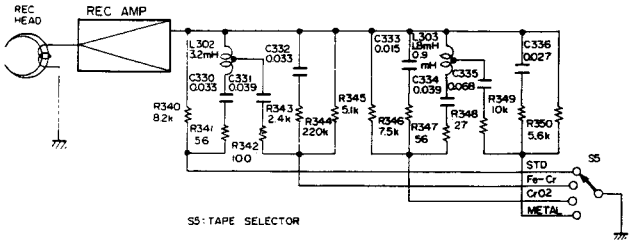


Fig. 7-3 Peaking circuit

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 S_4 cassette detector switch is turned on to pass +B from S_7 to R_{640}, C_{625}, and Q_{614}, the transistor being turned on for about 1 second until C_{625} is fully charged. And while Q_{614} is on, +B is also passed from S_{11-1} to S_{8-2}, reel motor RM, D_{617}, R_{636}, and Q_{614}, thereby turning RM in the reverse direction to eliminate any tape slack.

Q_{611} is also turned on at the same time as Q_{614}, resulting in +B being passed from Q_{611} to Q_{612} via R_{631}. When the Q_{613} 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 Q_{624} which is subsequently turned on. Q_{614} is consequently turned off to stop the tape slack circuit and halt the reverse rotation of the RM.

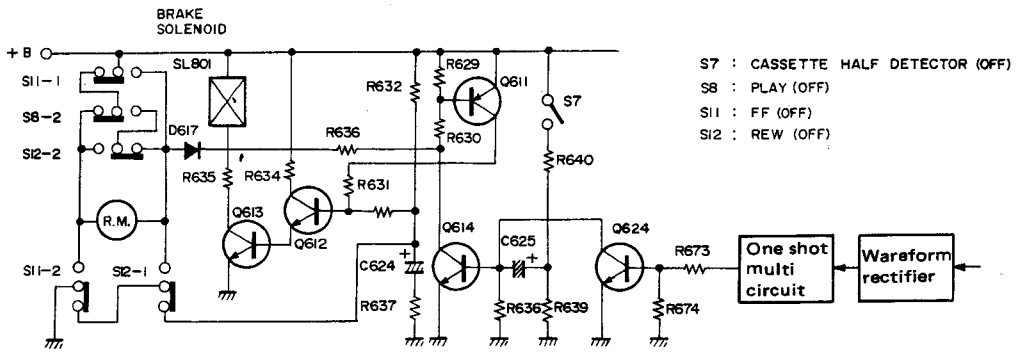


Fig. 7-4 Tape slack canceller circuit

7.3 LEVEL METERS CIRCUIT

The headphone amplifier output is amplified by Q_{104}, and rectified by D_{102}, the DC portion being applied to the display driver IC (IC_{701}). 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 D_{102} 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 S_3 position (for different response characteristics).

NOTE 1:
Pairs of level display segments light up at levels below 0dB.

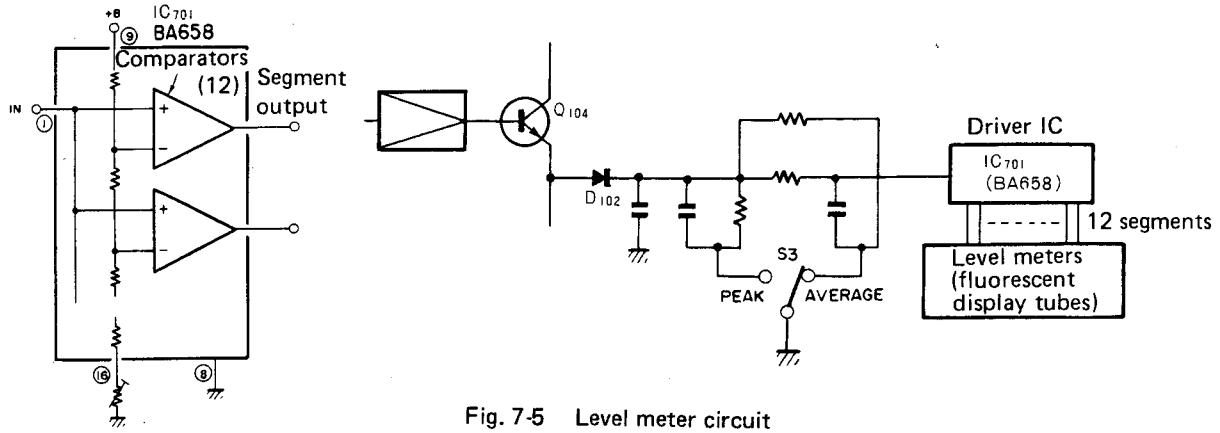


Fig. 7-5 Level meter circuit

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 amplfier 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.

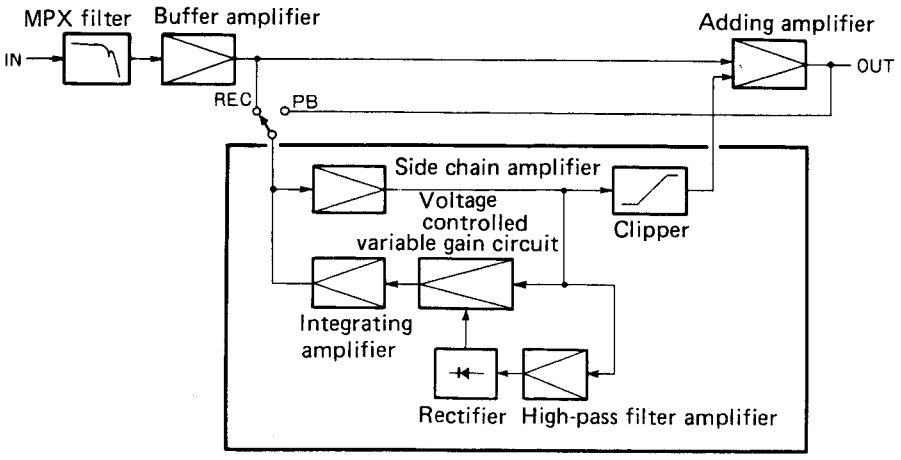


Fig. 7-6 Dolby circuit

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 tuned 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

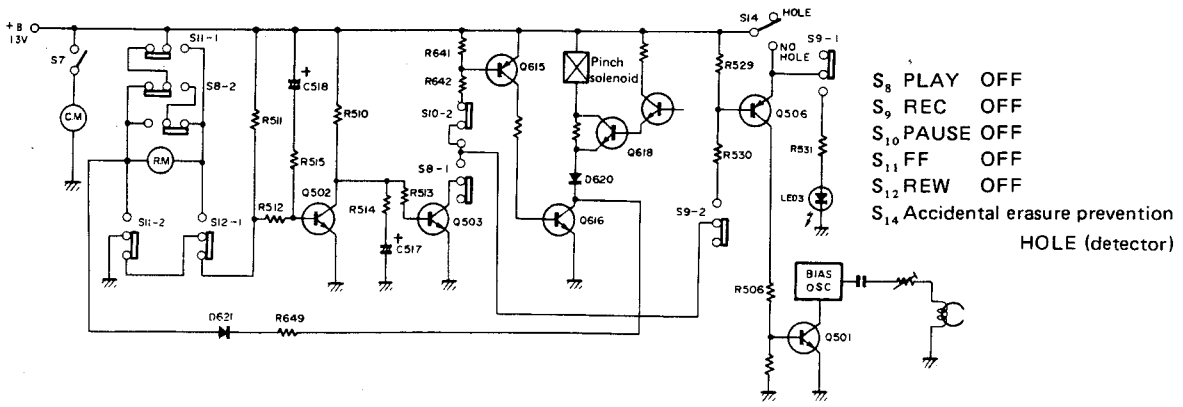


Fig. 7-7 Pause, auto-start and timing circuit

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 R_{511}, R_{512}, and Q_{502} route, turning Q_{502} on, and Q_{503} off. If the PLAY key is then pressed, S_8 will be switched on, and +B will flow via the R_{511}, S_{12-1}, S_{11-2} route, turning Q_{502} off. +B will subsequently commence to flow through R_{510} and R_{514} to charge up C_{517}. During the 0.6 seconds required to charge up this capacitor, Q_{503} will remain off. Once the capacitor has been fully charged, however, +B will flow via R_{510} and R_{513} to Q_{503} which will consequently be turned on. And once this transistor has been turned on, +B will flow via R_{641}, R_{642}, S_{10-2}, S_{8-1}, and Q_{503}, turning Q_{615} and Q_{616} 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 R_{632}, D_{505}, S_{12-1}, and S_{11-2}, and Q_{612} and Q_{613} are off. If the FF or REW key is then pressed, S_{11} or S_{12} will be switched on, resulting in +B being passed via R_{632} and R_{637} to charge up C_{624}.

Once this capacitor has been fully charged (in about 0.2 seconds), +B is applied to Q_{612} via R_{632} and R_{633} 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-interruptor featuring a multi-blade device coupled by belt to the take-up reel, and whose rotating blases interrupt a light beam intermittently.

During tape transport, the rotating blades of the photo-interrupter result in the generation of pulse signals which turn Q_{607} on and off repeatedly, and likewise charge up and discharge the C_{620} capacitor.

Once tape transport stops, the signals from the photo-interrupter cease, and the Q_{607} continuous switching action stops. C_{620} will thus be charged by +B via R_{619} and R_{620}.

The base potential of Q_{608} will consequently increase, resulting in this transistor being turned off. The +B current will subsequently flow via R_{625}, C_{622}, R_{623}, and R_{621}, with Q_{609} and Q_{610} being turned on until the C_{622} capacitor is fully charged (about 0.2 to 0.3 seconds).

With Q_{610} 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 Q_{617}/Q_{618} saturation switching circuit.

When the PLAY key is pressed and S_8 switched on Q_{615} and Q_{616} are turned on, and +B is applied to Q_{617} via R_{647} and C_{628}, Q_{617} remaining on until C_{628} is fully charged up.

While Q_{617} is on, Q_{618} is turned on by +B flowing via R_{645} and Q_{617}. R_{644} will thus be shorted out, and a voltage equal in level to +B will be applied to the pinch solenoid. Once C_{628} is fully

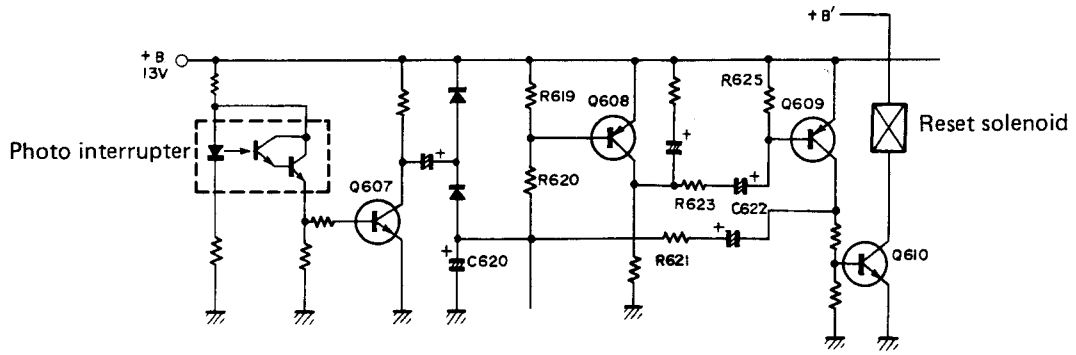


Fig. 7-8 Auto-stop circuit

charged (in about 0.5 seconds) Q_{617} and Q_{618} will be turned off, and R_{644} will reduce the voltage being applied to the pinch solenoid.

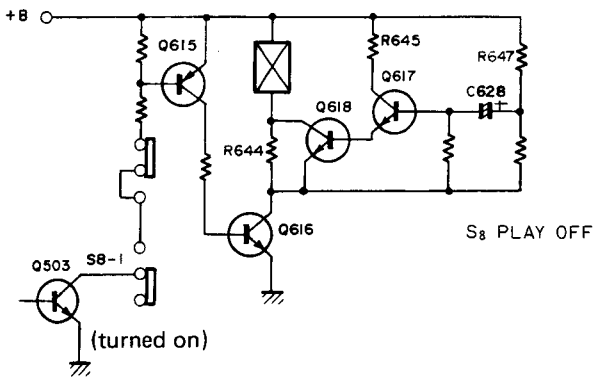


Fig. 7-9 Pinch solenoid circuit

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 S_7 is switched on. +B will flow via S_7, R_{640}, C_{625}, and Q_{614}, the transistor remaining on until the capacitor has been fully charged up (approx. 0.7 seconds).

While Q_{614} is on, +B will flow via the S_{11-1}, S_{8-2}, S_{12-2}, reel motor (RM), R_{636}, D_{617}, Q_{614} route, thereby causing the reel motor to rotate in the REW direction, and taking up slack in the tape.

At the same time that Q_{614} is turned on, Q_{611} is also turned on, resulting in +B being applied to Q_{612} via Q_{611} and R_{631}. Q_{612} and Q_{613} will thus both turn on, and activate the brake solenoid.

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 C_{617} and R_{610} to Q_{605}, turning this transistor on until the capacitor has been fully charged up (approx. 4 seconds). While Q_{605} is on, Q_{606} is also turned on. Consequently, +B will flow along the D_{611}, Q_{606}, R_{138}, Q_{103} route, thereby muting the LINE OUTPUT. And due to +B also flowing along the D_{515}, R_{334}, Q_{310} route, the REC amplifier will also be muted.

Once C_{617} is fully charged, Q_{605} will be turned off, resulting in Q_{606}, Q_{103}, and Q_{310} 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. C_{616}, however, is designed to discharge via R_{654} at a faster rate, resulting in a current flowing via the base of Q_{606} and D_{610}, and Q_{606} thereby being turned on.

C_{617} will therefore discharge via 2 routes: Q_{606}, R_{138}, Q_{103}, and D_{515}, R_{334}, Q_{310}, 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 Q_{505} via R_{522} and R_{521}, turning the transistor on, which in turn results in Q_{504} being turned on. +B current will consequently flow through the D_{506}, Q_{504}, MONITOR switch S_{2-3}, D_{516}, R_{138}, Q_{103} route to mute the LINE OUTPUT. At the same

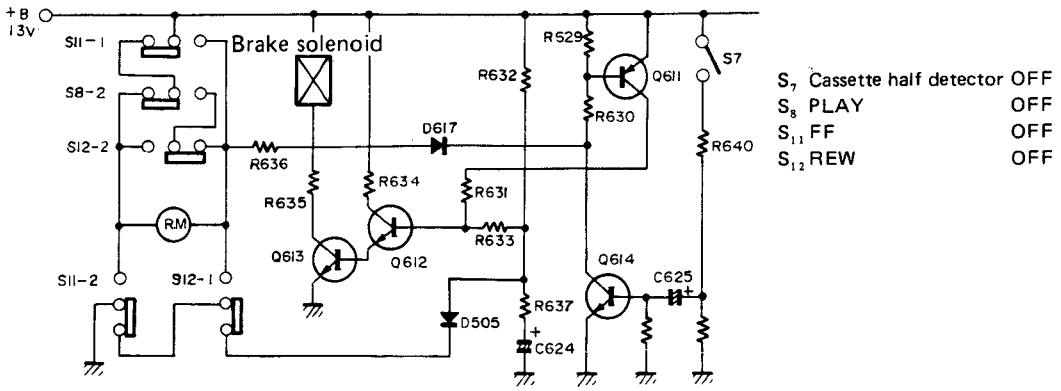


Fig. 7-10 Tape slack canceller circuit

time, +B also flows via D_{514} and R_{334} to Q_{301} 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 Q_{301} via the erase prevention switch S_{14} and the REC switch S_9 to mute the REC amplifier.

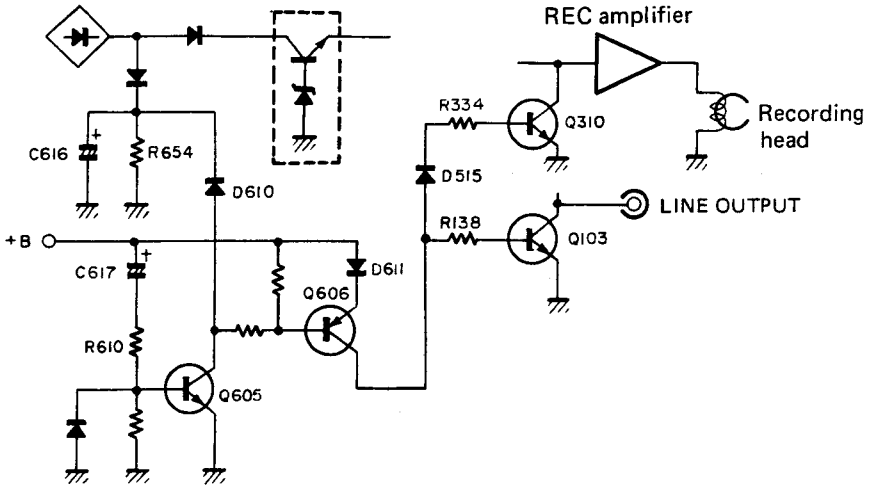


Fig. 7-11 Muting circuit (POWER ON/OFF)

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, Q_{505}, Q_{504}, Q_{103}, and Q_{301} are turned on, thereby muting the LINE OUTPUT and the REC amplifier.

When the PLAY key is pressed and S_8 switched on, +B flows along the R_{522}, D_{509}, S_{10-2}, S_{8-1}, Q_{503} route, but Q_{505} remains on for about 0.6 seconds longer while C_{520} is charged up. Once Q_{505} is finally turned off, Q_{504} and Q_{103} will also be turned off, resulting in the removal of the LINE OUTPUT muting. But note that because +B will still flow via the S_{14}, S_{9-1}, D_{513}, R_{334} route to Q_{301}, the REC amplifier will remain muted.

During REC mode when the REC key is pressed and S_9 is switched on, the S_{9-1} route will be interrupted, thereby removing the REC amplifier

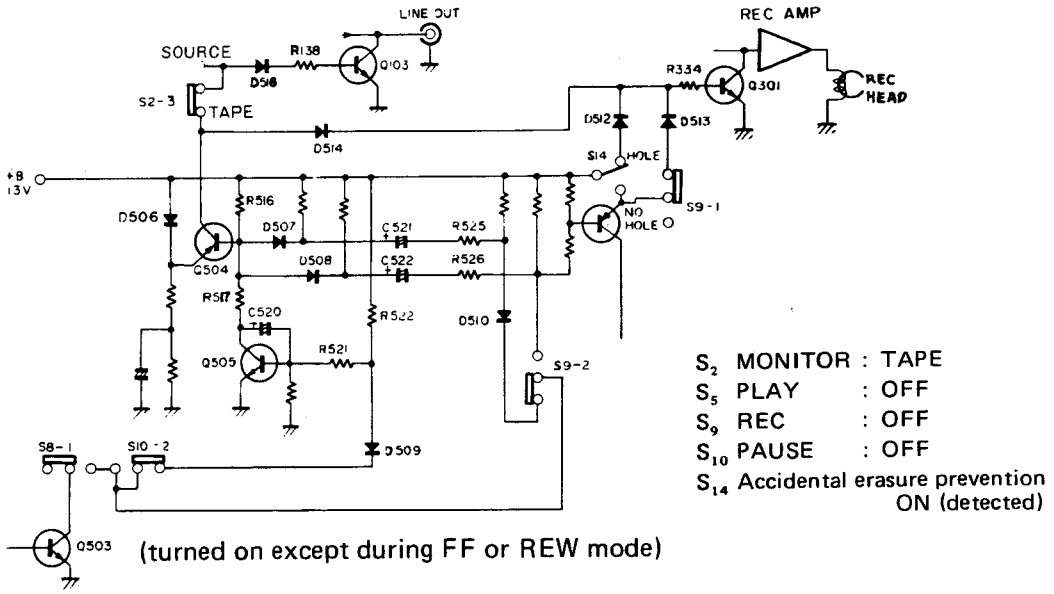


Fig. 7-12 Muting circuit (FF, REW, REC, PLAY)

muting. However, if the accidental erasure prevention tab has been broken off from the cassette half, +B will still be applied to Q_{301} via S_{14}, D_{512}, R_{334}, 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 (S_8 already switched on), the switch noise is muted by the following circuit.

When the REC key is pressed and S_9 switched on, +B flows via R_{516}, D_{508}, C_{522}, R_{526}, S_{9-2}, S_{8-1}, Q_{503} route, keeping Q_{504} on during the period (approx. 0.3 seconds) required to fully charge C_{522}. During this period, +B flows via D_{506}, Q_{504}, D_{514}, R_{334} to mute out the REC amplifier. At the same time, +B also flows via the S_{2-3}, D_{516}, R_{138} route to mute the LINE OUTPUT.

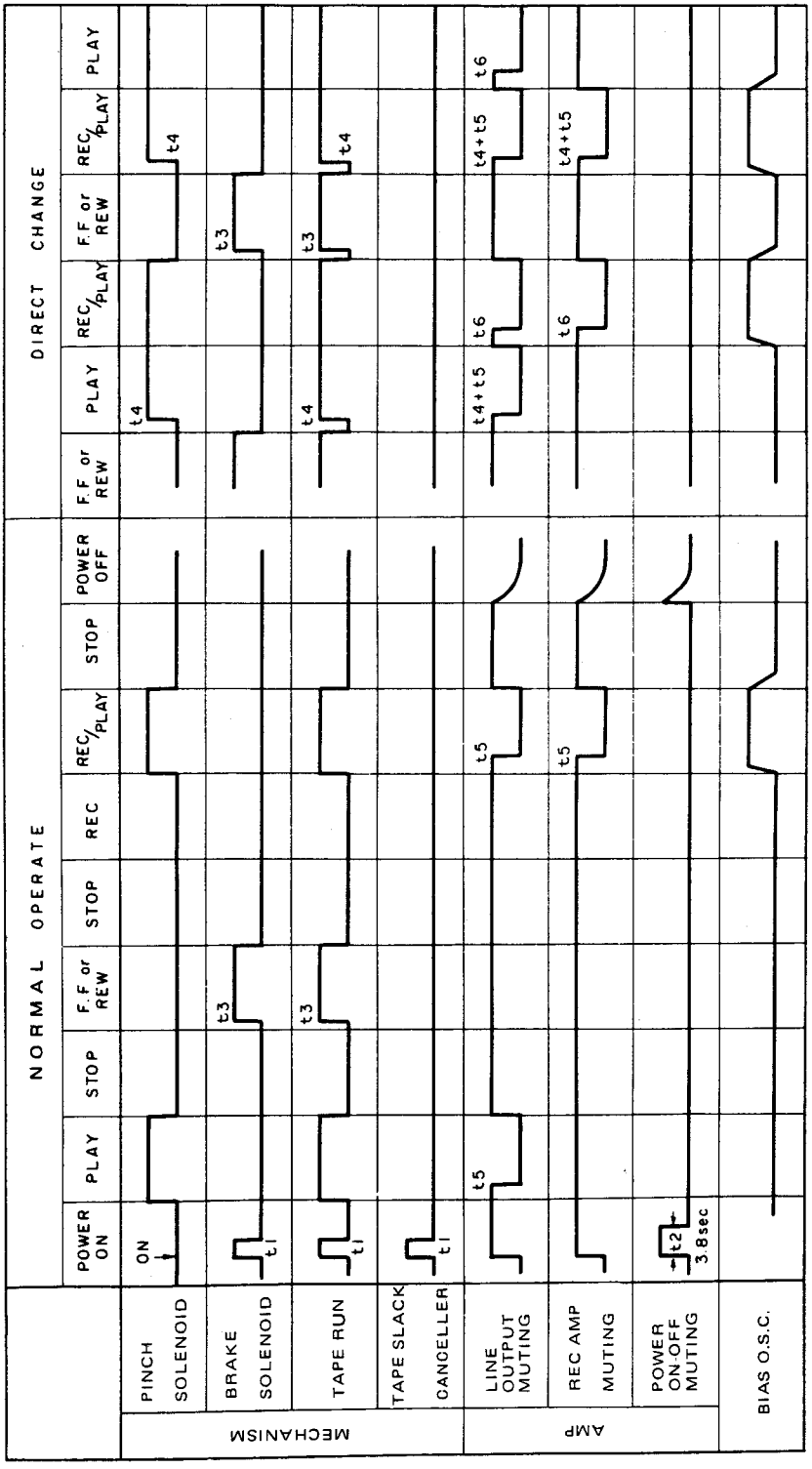
Muting When Switching from REC Mode to PLAY Mode

Muting is also achieved when the REC key alone is released during REC mode. When S_9 only is switched off, thereby switching directly to PLAY mode, +B is applied to Q_{301} via S_{14}, S_{9-1}, D_{513} and R_{334}. The transistor is turned on to mute out the REC amplifier immediately.

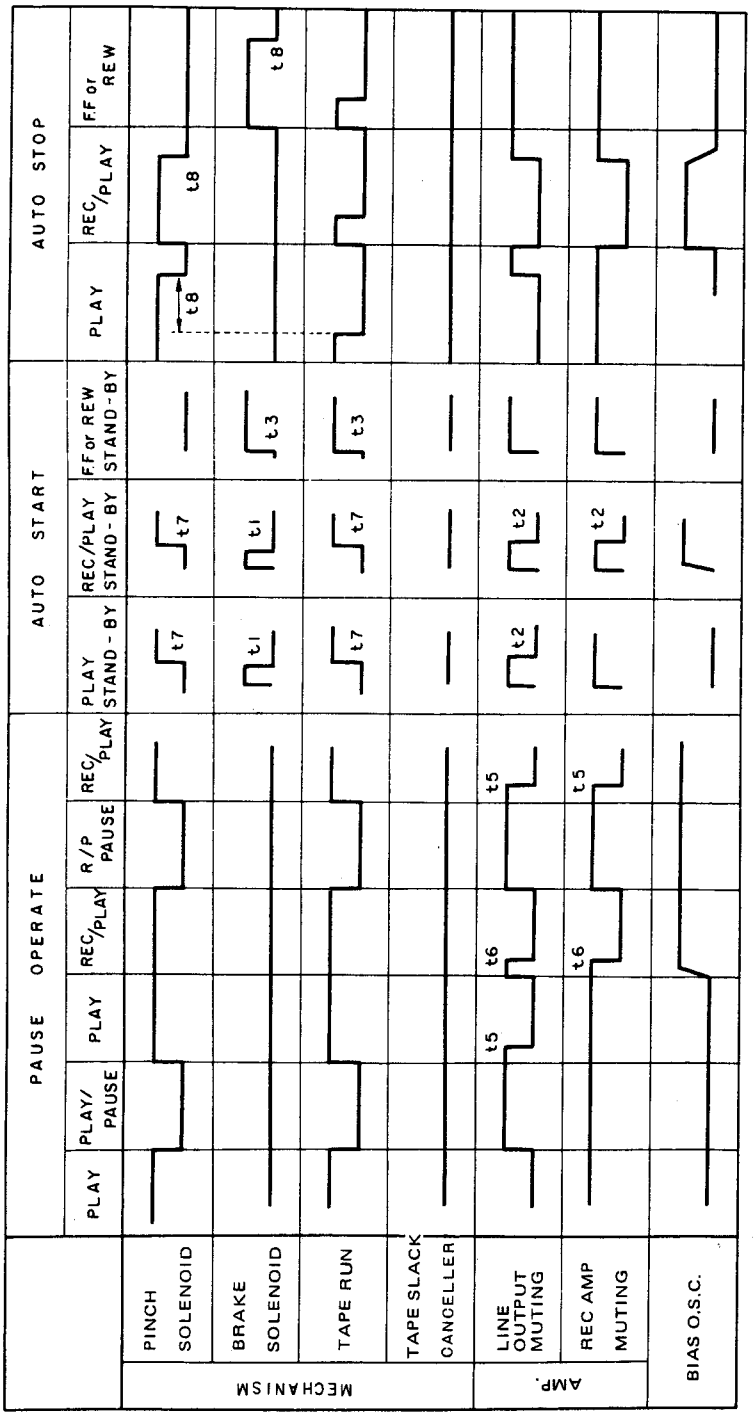
And because +B also flows along the R_{516}, D_{507}, C_{521}, R_{525}, D_{510}, S_{9-2}, S_{8-1} route to Q_{503}, Q_{504} will be turned on only for the period required to charge up C_{521} (approx. 0.3 seconds), resulting in the LINE OUTPUT being muted for this length of time.

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



Timing Chart –2



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.

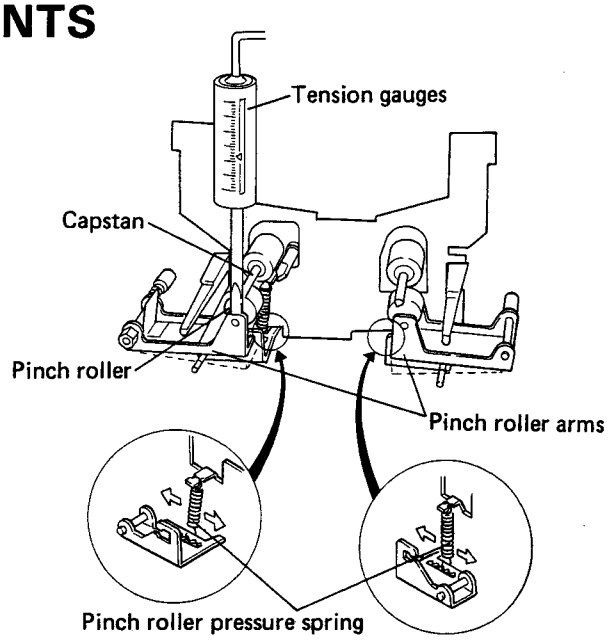


Fig. 8-1 Pinch roller pressure adjustment

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.

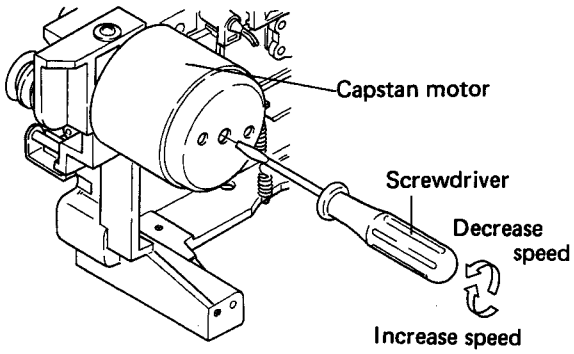


Fig. 8-2 Tape speed adjustment

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.

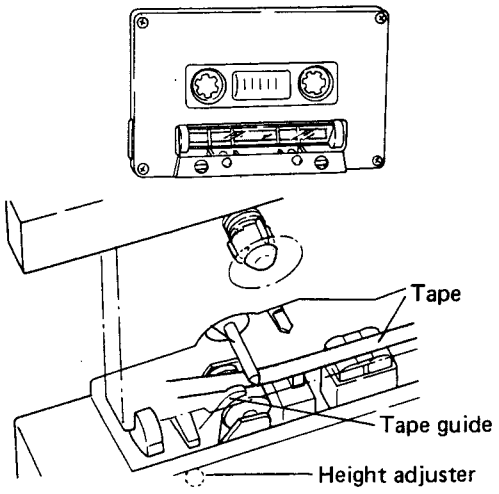


Fig. 8-3 Tape guide adjustment

9. ELECTRICAL ADJUSTMENT

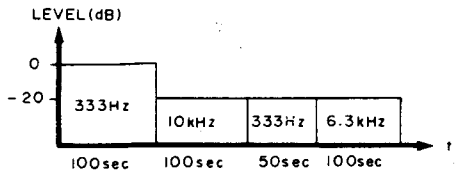
Before commencing any electrical adjustments, check the following items.

1. First complete all mechanical adjustments.
2. Connect a 50kΩ (47–52kΩ) 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 : CrO_2 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 CrO_2 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

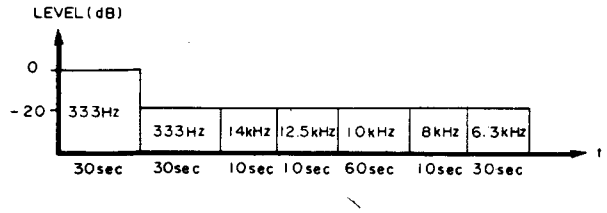


Fig. 9-1 Recorded contents of test tape

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 righ channels reaches a maximum.
4. After completing the adjustment, reapply the screw lock.

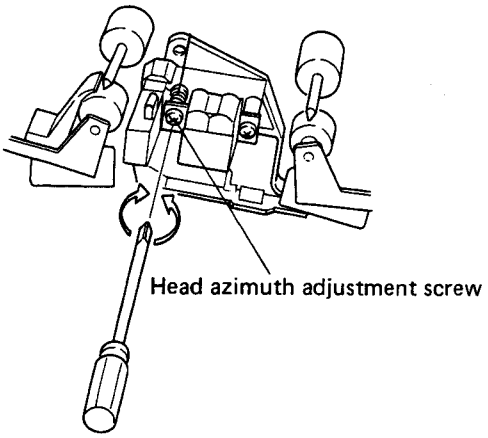


Fig. 9-2 Head azimuth adjustment

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 VR_{101} (Lch) and VR_{201} (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 VR_{101} and VR_{201} 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, CrO_2 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 VR_{102} (Lch) and VR_{202} (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 VR_{104} (Lch) and VR_{204} (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 VR_{701} (Lch) and VR_{702} (Rch) controls in the display amplifier ass'y in the central positions).
4. Turn VR_{105} (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 VR_{701} (Lch) and VR_{702} (Rch) in the display amplifier ass'y so that the level meters read 0dB. (Turn VR_{701} and VR_{702} 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 correresponding level ranges are satisfied. If the radings 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 $^{+4}_{-2}$ 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 L_{101} (Lch) and L_{201} (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 VR_{901} 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).

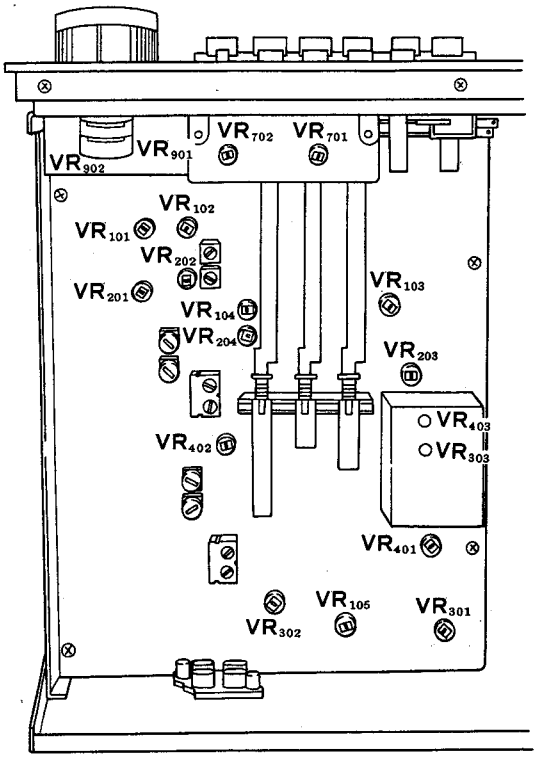


Fig. 9-3 Adjustment point

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 VR_{303} and VR_{403} 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 VR_{303} and VR_{403} effect each other, the above procedure will need to be repeated several times.

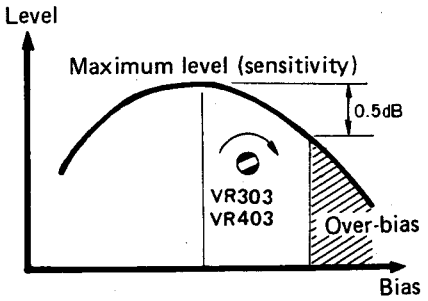


Fig. 9-4 Output level drops 0.5dB

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 VR_{303} and VR_{403} 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 CrO_2, and record the 333Hz and 10kHz signals onto the STD-603 test tape. Play the tape back again, and adjust VR_{902} 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 VR_{901} 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 VR_{302} (Lch) and VR_{402} (Rch) to obtain −3dBv (710mV) readings at TP terminals No. 40 (Lch) and No. 39 (Rch).

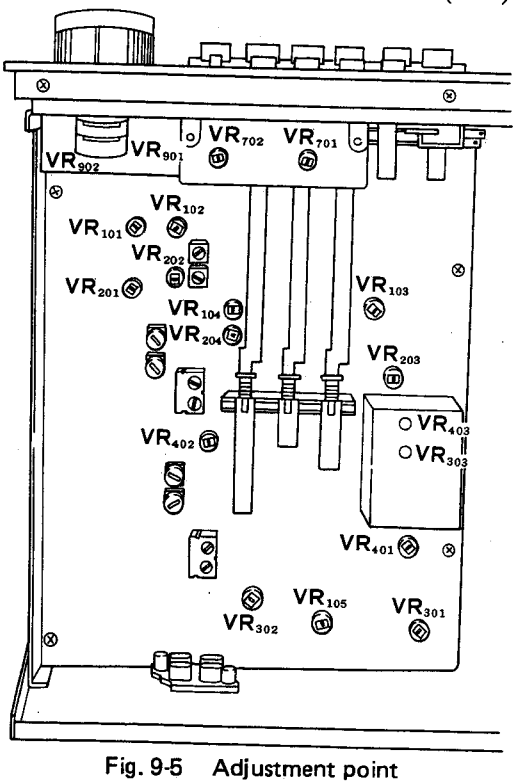


Fig. 9-5 Adjustment point

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 (IV) 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 is 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 VR_{103} and VR_{203} controls are used in this adjustment, readjust them as described in section 9.3 on "Playback Level Adjustment".

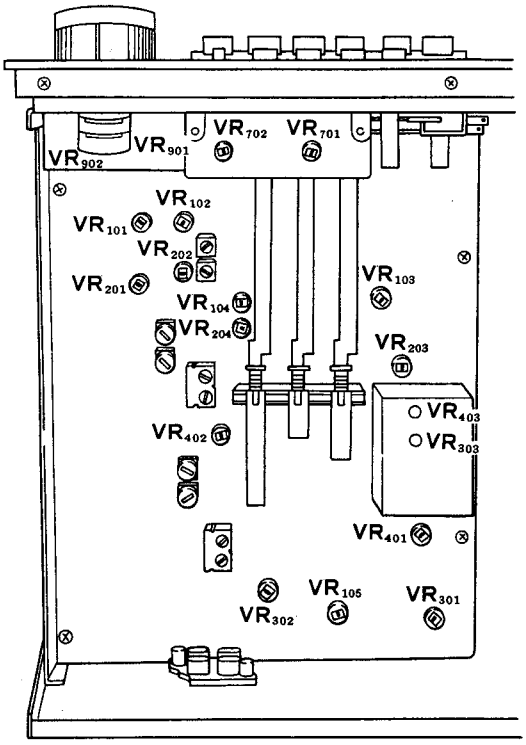
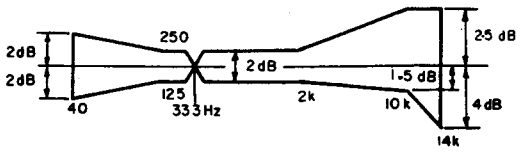
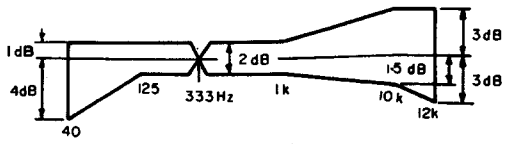


Fig. 9-6 Adjustment point

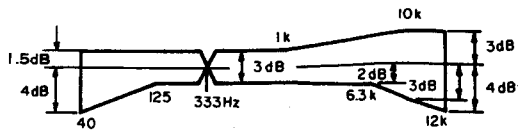


* Using STD-331A and the STD position, with DOLBY NR OFF.

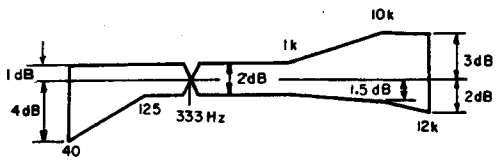
Note:
The frequency characteristics for the R channel shall be obtained by subtracting 1dB from the value indicated on the meter at 40Hz and 63kHz respectively.



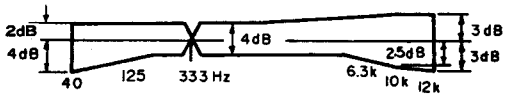
* Using STD-601 and the STD position, with DOLBY NR OFF.



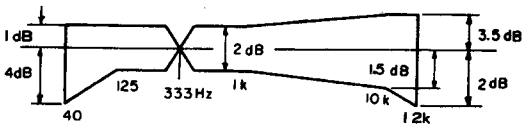
* Using STD-601 and the STD position, with DOLBY NR ON.



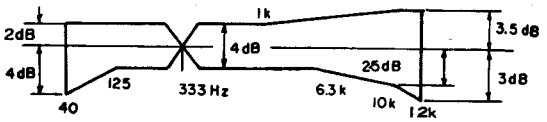
* Using STD-603 and the CrO_2 position, with DOLBY NR OFF.



* Using STD-603 and the CrO_2 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

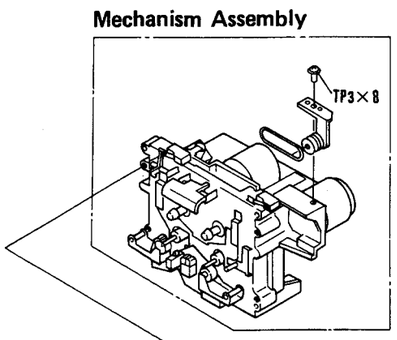
● *Parts without part number cannot be supplied.*

Key No.	Part No.	Description
1.	RAH-299	Front panel
2.		
3.	RXX-253	Escutcheon assembly
4.	RBK-127	Spring
5.	REB-305	Cushion (R)
6.	REB-306	Cushion (L)
7.	RNK-566	Guide (L)
8.	RNK-608	Guide (R)
9.	RXB-209	Head cover assembly
10.		Cord clamper
11.	RAA-305	REC VR knob (R) assembly
12.	RAA-303	REC VR knob (L) assembly
13.	RAH-289	Control panel
14.	RNK-788	Display window
15.	RNK-787	Indicator escutcheon
16.	RNK-786	Control escutcheon
17.	RAC-103	Knob (COUNTOR)
18.	RAW-126	Counter
19.	REB-299	Counter belt
20.	RAC-094	Knob (POWER SWITCH)
21.	RNK-633	Power switch joint bar
22.		AC switch holder
23.	RSA-021	Power switch
24.	RWX-109	Spark killer (KU)
	RWX-150	Spark killer (KC)
25.	RWR-076	Power supply & control assembly
26.	RTT-174	Power transformer
27.		Frame
28.		Terminal 1P
29.		Main chassis
30.		Foot assembly
31.		Indicator assembly
32.	RXP-057	Solenoid
33.	RCS-021	Volume (VR3)
34.	RCV-061	Volume (VR1, 2)
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

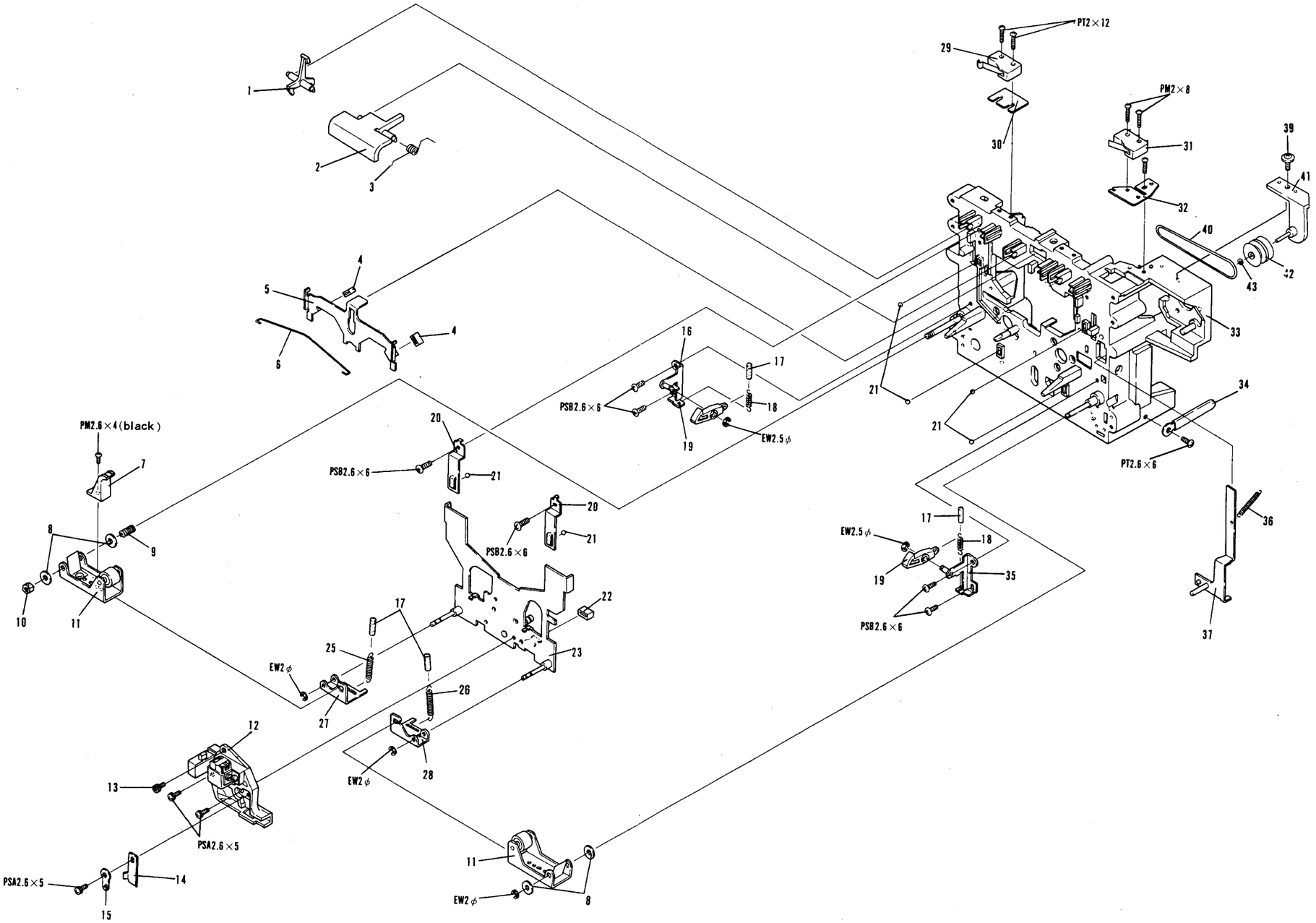
Key No.	Part No.	Description
46.	RNA-377	Bonnet case
47.	REC-250	Cover
48.		Rear panel
49.	RKB-014	4P mount pin jack
50.	RSG-078	Push switch
51.	RAA-307	Tape Selector knob assembly
52.	RNK-632	Switch joint bar (B)
53.	RAC-100	Push knob
54.	RSG-071	Function switch
55.		Mother P.C. board assembly
56.		Angle
57.	RRW-112	Label
58.		Bottom cover
59.		Side frame
60.	RBH-532	Solenoid spring
61.		Function indicator assembly
62.	RAH-233	Plate
63.	REB-307	Stopper
64.	RNK-854	Lens
65.	REB-223	Cover cushion (D)
66.		Screw M4 x 8
67.	RWX-302	Mother assembly
68.	RED-145	Volume mask
69.		Switch assembly
70.	RBA-038	Screw
71.	RAA-309	P.B. VR knob (L) assembly
72.	RAA-311	P.B. VR knob (R) assembly
73.	RED-157	Mask
74.	RED-140	Volume mask
75.	RKN-055	MIC jack
76.	RKN-056	Head phone jack
77.		Jack holder
78.		Label
79.		Label
80.	RKP-066	Connector (11p)

Exterior

Mechanism Assembly



10.2 MECHANISM ASSEMBLY 1

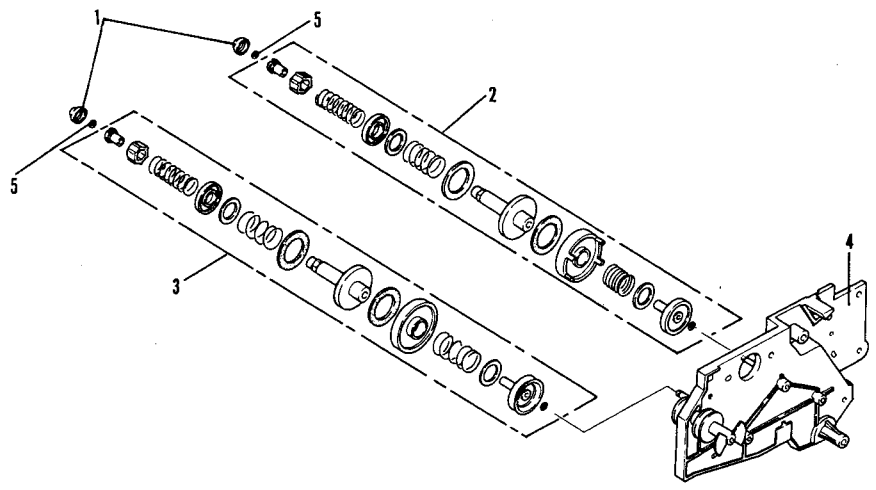


Parts List

• *Parts without part number cannot be supplied.*

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

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

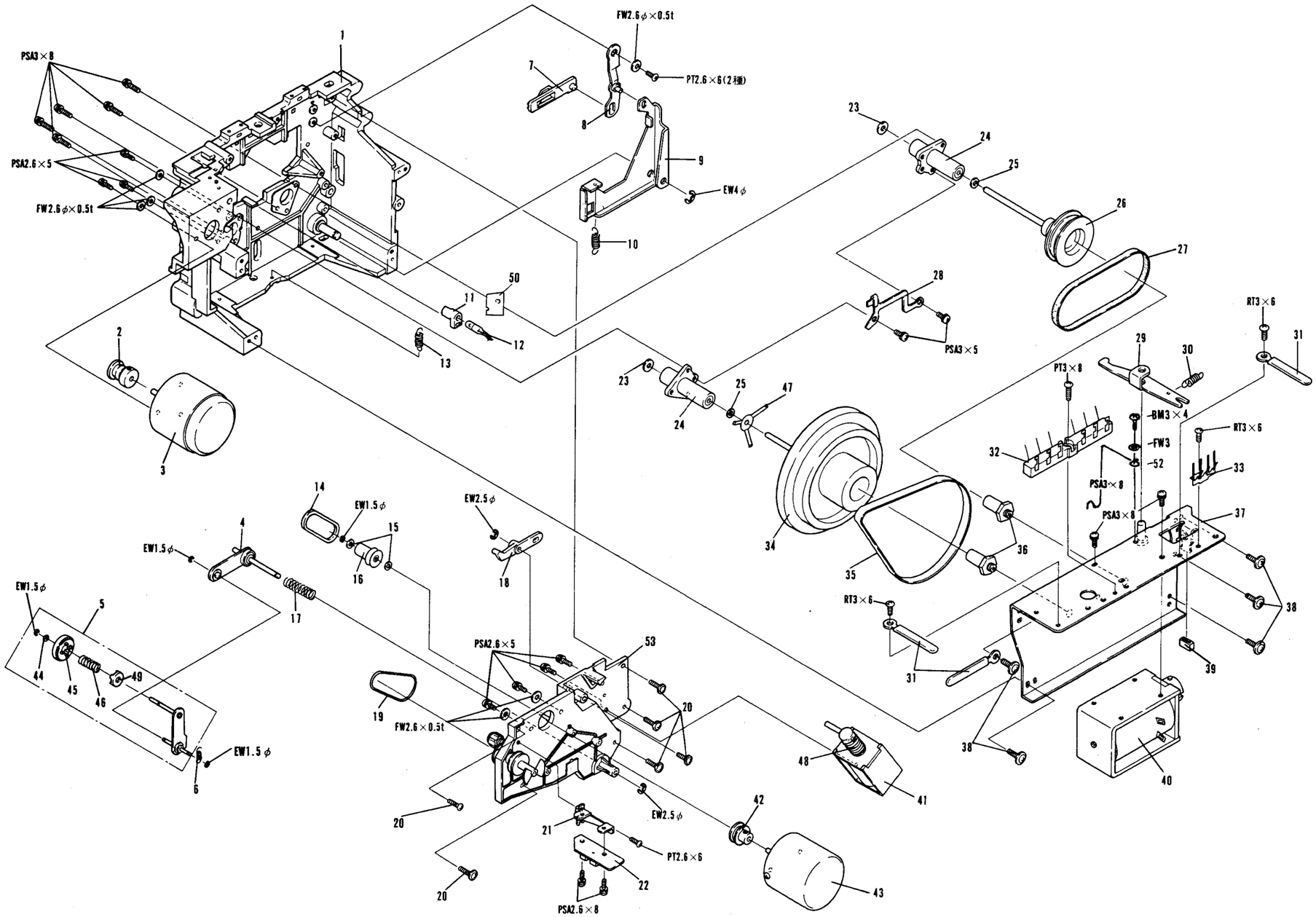
10.4 MECHANISM ASSEMBLY 2

Parts List

• *Parts without part number cannot be supplied.*

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

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 x10¹——561 ..... RD¼PS 5 6 1 J
47kΩ——47 x10³——473 ..... RD¼PS 4 7 3 J
0.5Ω——0R5 ..... RN2H 0 R 5 K
1Ω——010 ..... RS1P 0 1 0 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

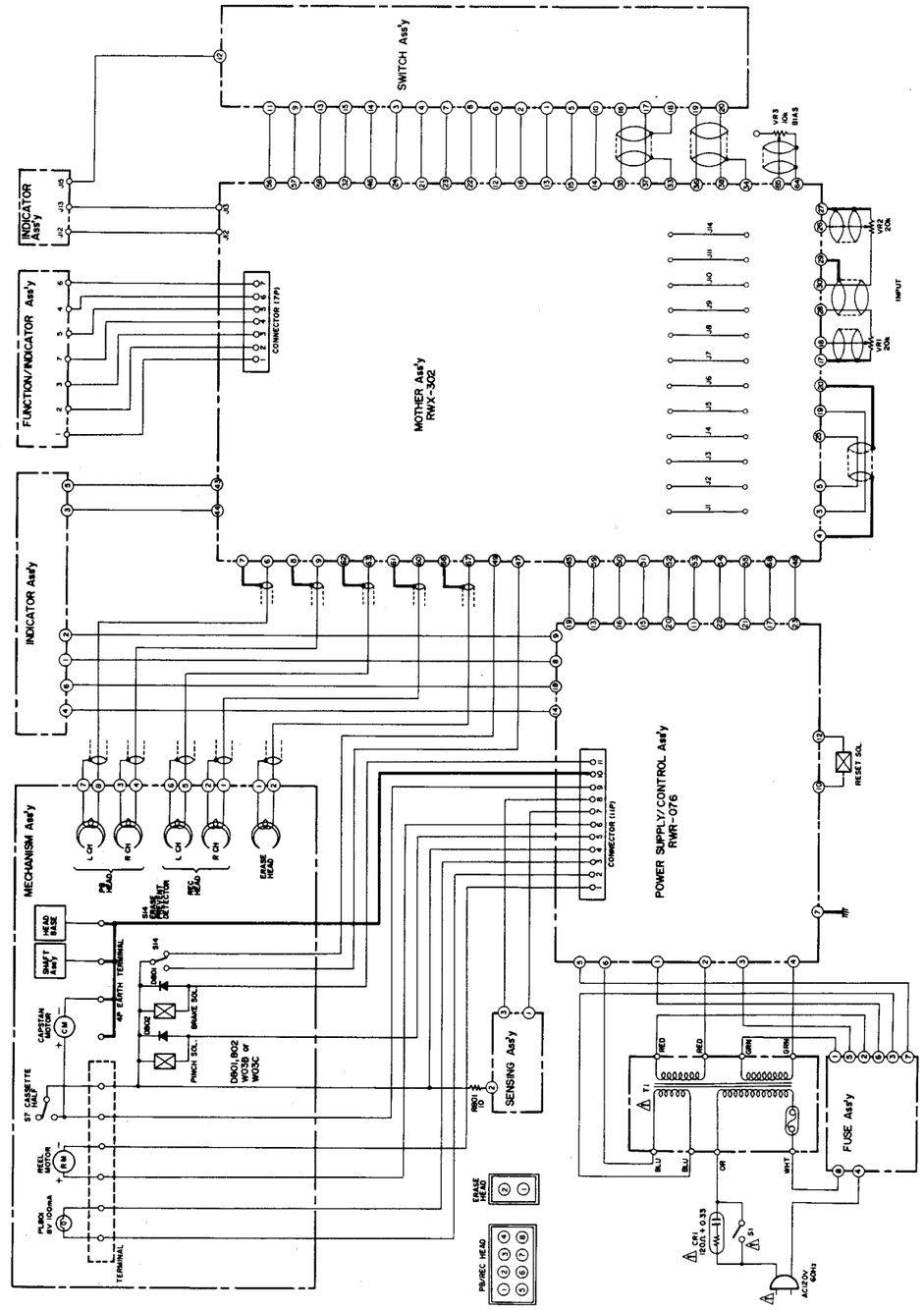
5.62kΩ 562 x 10¹ 5621..... RN¼SR 5 6 2 1 F

11.1 MISCELLANEOUS PART LIST

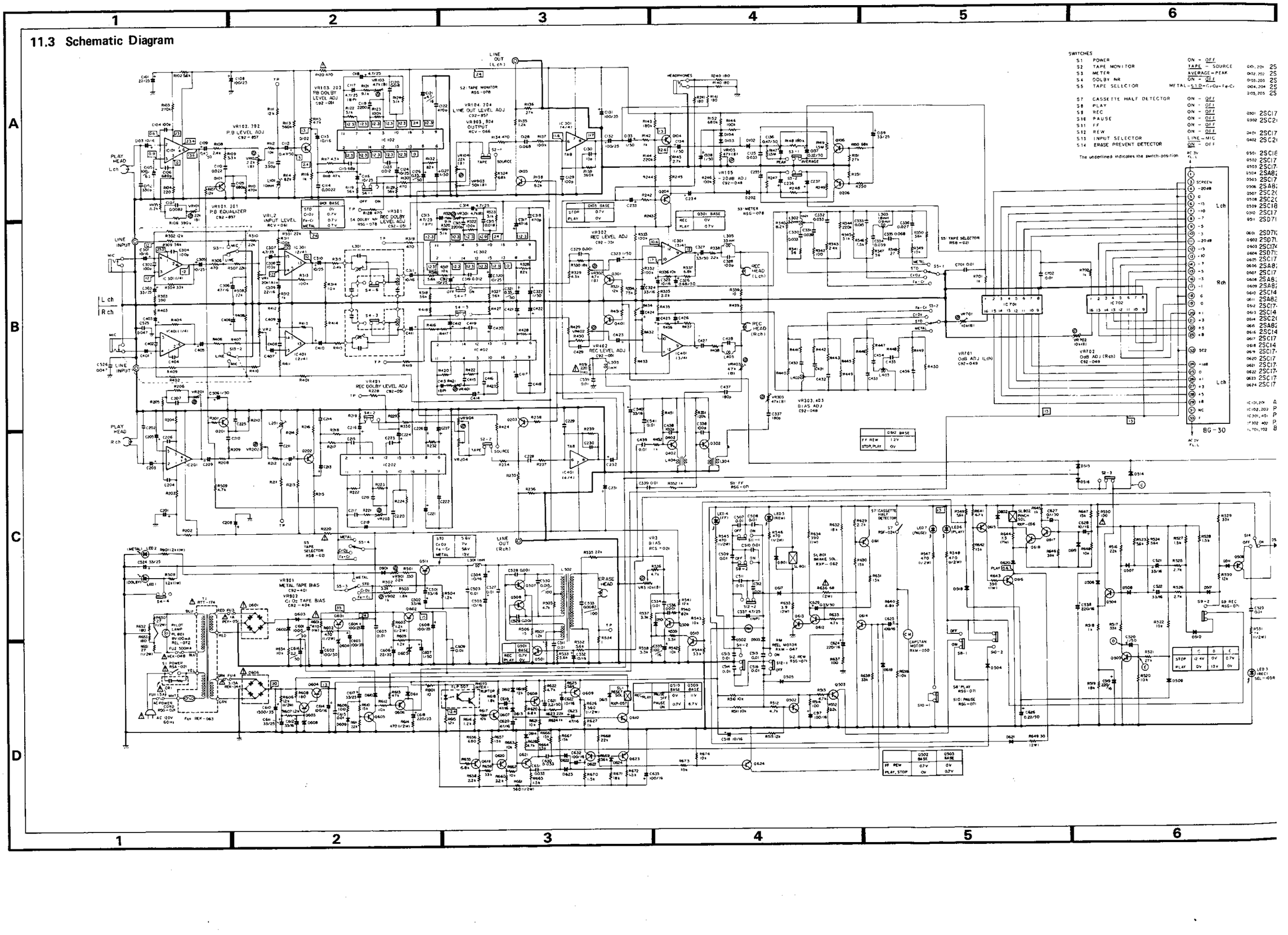
Part No.	Description
RWX-302	Mother assembly
RWR-076	Power supply & control assembly
RCV-061	VR1, VR2 (INPUT)
RCS-021	VR3 (BIAS)
RXP-057	SL1 Reset solenoid
RTT-174	T1 Power transformer
RDG-022	AC Power cord
RSA-021	S1 Power switch
RWX-150 (KC)	CR1
RWX-109 (KU)	CR1
REL-072	PL801 8V 100mA
RXM-047	Reel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

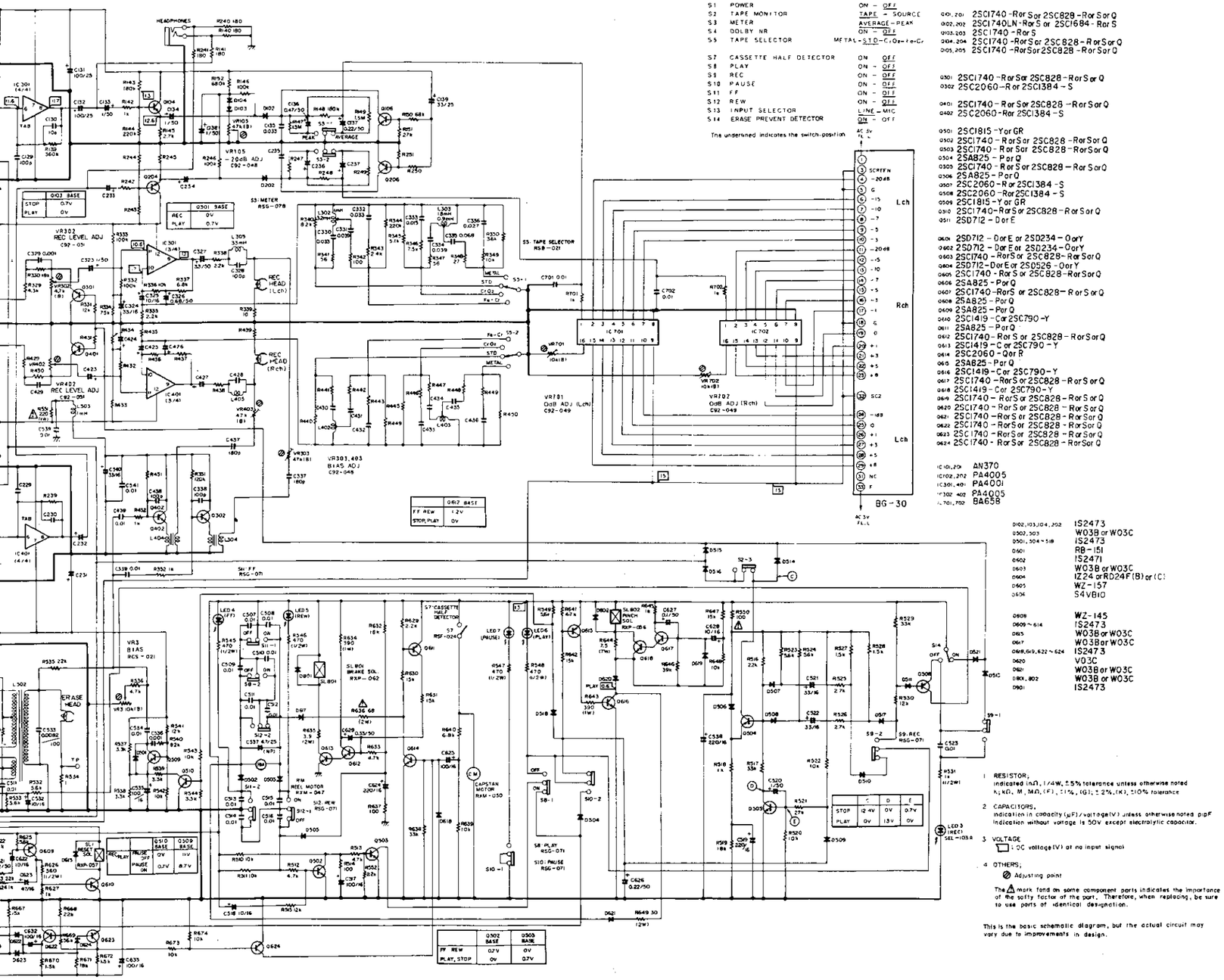
Part No.	Description
RXP-062	SL801
RXP-056	SL802
RD 1/4 PM100J	R801
W03B (W03C)	D801, D802

11.2 CONNECTION DIAGRAM



11.3 Schematic Diagram





Q101,201 2SC1740-R or S or 2SC828-R or S or Q
Q102,202 2SC1740LN-R or S or 2SC1684-R or S
Q103,203 2SC1740-R or S
Q104,204 2SC1740-R or S or 2SC828-R or S or Q
Q105,205 2SC1740-R or S or 2SC828-R or S or Q

Q301 2SC1740-R or S or 2SC828-R or S or Q
Q302 2SC2060-R or 2SC1384-S

Q401 2SC1740-R or S or 2SC828-R or S or Q
Q402 2SC2060-R or 2SC1384-S

Q501 2SC1815-Y or GR
Q502 2SC1740-R or S or 2SC828-R or S or Q
Q503 2SC1740-R or S or 2SC828-R or S or Q
Q504 2SA825-P or Q
Q505 2SC1740-R or S or 2SC828-R or S or Q
Q506 2SA825-P or Q
Q507 2SC2060-R or 2SC1384-S
Q508 2SC2060-R or 2SC1384-S
Q509 2SC1815-Y or GR
Q510 2SC1740-R or S or 2SC828-R or S or Q
Q511 2SD712-D or E

Q601 2SD712-D or E or 2SD234-D or Y
Q602 2SD712-D or E or 2SD234-D or Y
Q603 2SC1740-R or S or 2SC828-R or S or Q
Q604 2SD712-D or E or 2SD526-D or Y
Q605 2SC1740-R or S or 2SC828-R or S or Q
Q606 2SA825-P or Q
Q607 2SC1740-R or S or 2SC828-R or S or Q
Q608 2SA825-P or Q
Q609 2SA825-P or Q
Q610 2SC1419-C or 2SC790-Y
Q611 2SA825-P or Q
Q612 2SC1740-R or S or 2SC828-R or S or Q
Q613 2SC1419-C or 2SC790-Y
Q614 2SC2060-Q or R
Q615 2SA825-P or Q
Q616 2SC1419-C or 2SC790-Y
Q617 2SC1740-R or S or 2SC828-R or S or Q
Q618 2SC1419-C or 2SC790-Y
Q619 2SC1740-R or S or 2SC828-R or S or Q
Q620 2SC1740-R or S or 2SC828-R or S or Q
Q621 2SC1740-R or S or 2SC828-R or S or Q
Q622 2SC1740-R or S or 2SC828-R or S or Q
Q623 2SC1740-R or S or 2SC828-R or S or Q
Q624 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

D102,103,104,202 1S2473
D302,303 W03B or W03C
D501,504~518 1S2473
D601 RB-151
D602 1S2471
D603 W03B or W03C
D604 IZ24 or RD24F(B) or (C)
D605 WZ-157
D606 S4VB10
D608 WZ-145
D609~614 1S2473
D615 W03B or W03C
D617 W03B or W03C
D618,619,622~624 1S2473
D620 V03C
D621 W03B or W03C
D801,802 W03B or W03C
D901 1S2473

1 RESISTOR;
indicated in Ω, 1/4W, ±5% tolerance unless otherwise noted
k; kΩ, M, MΩ, (F), ±1%, (G), ±2%, (K), ±10% tolerance

2 CAPACITORS;
indication in capacity (μF)/voltage (V) unless otherwise noted. pipF
indication without voltage is 50V except electrolytic capacitor.

3 VOLTAGE
□ : DC voltage (V) at no input signal

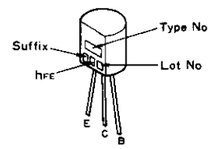
4 OTHERS;
⊘ Adjusting point

The △ mark found on some component parts indicates the importance of the safty factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

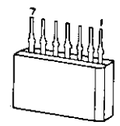
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

External Appearance of Transistors and ICs

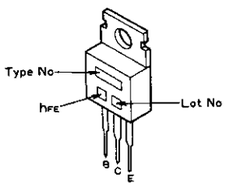
2SA825
2SC1740
2SC1815



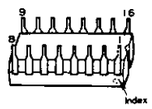
AN370



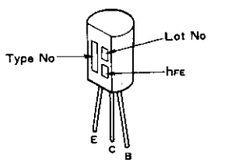
2SC1419



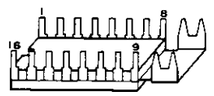
PA4001
BA658



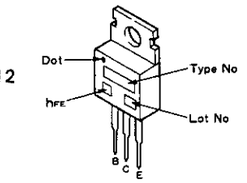
2SC2060



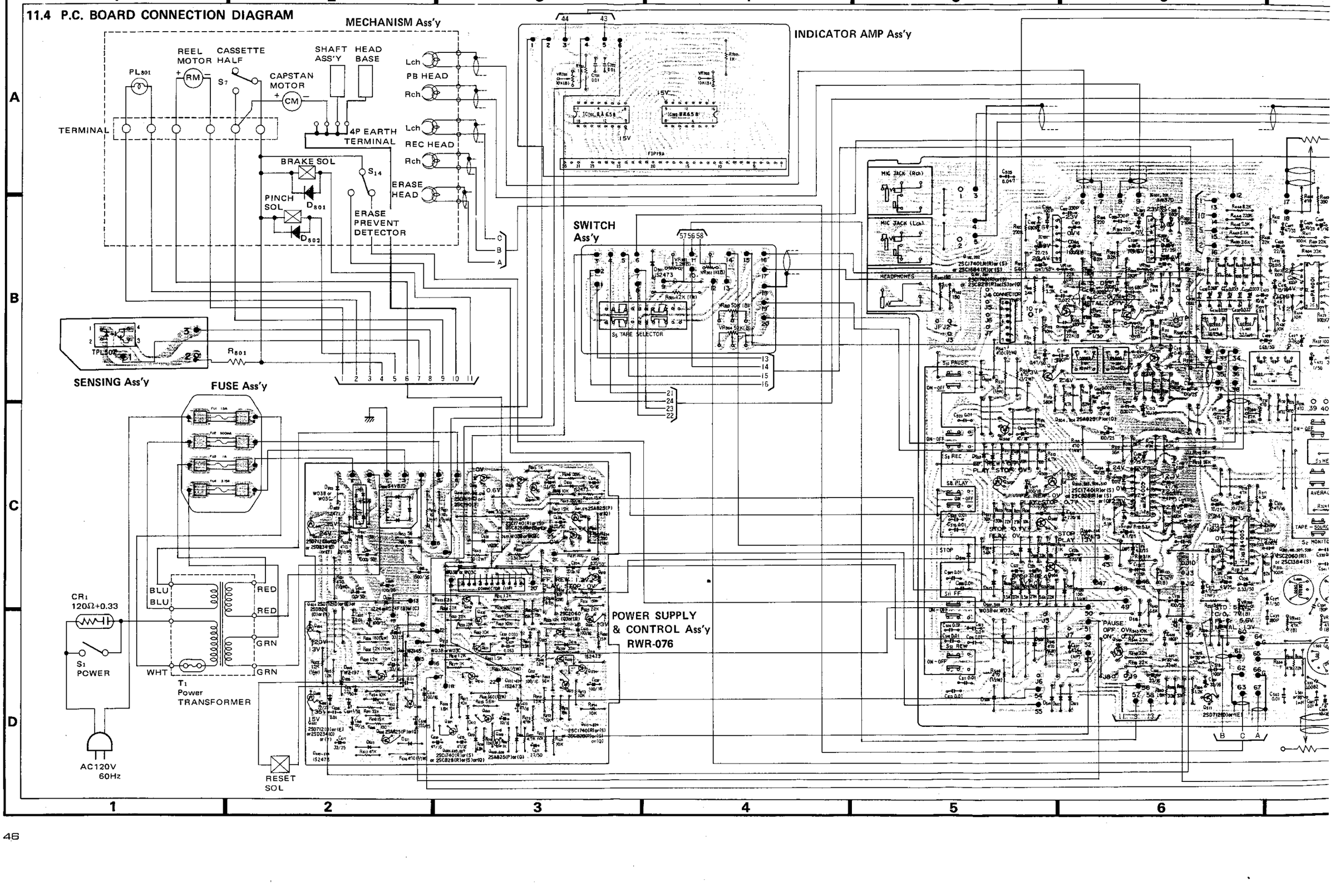
PA4005



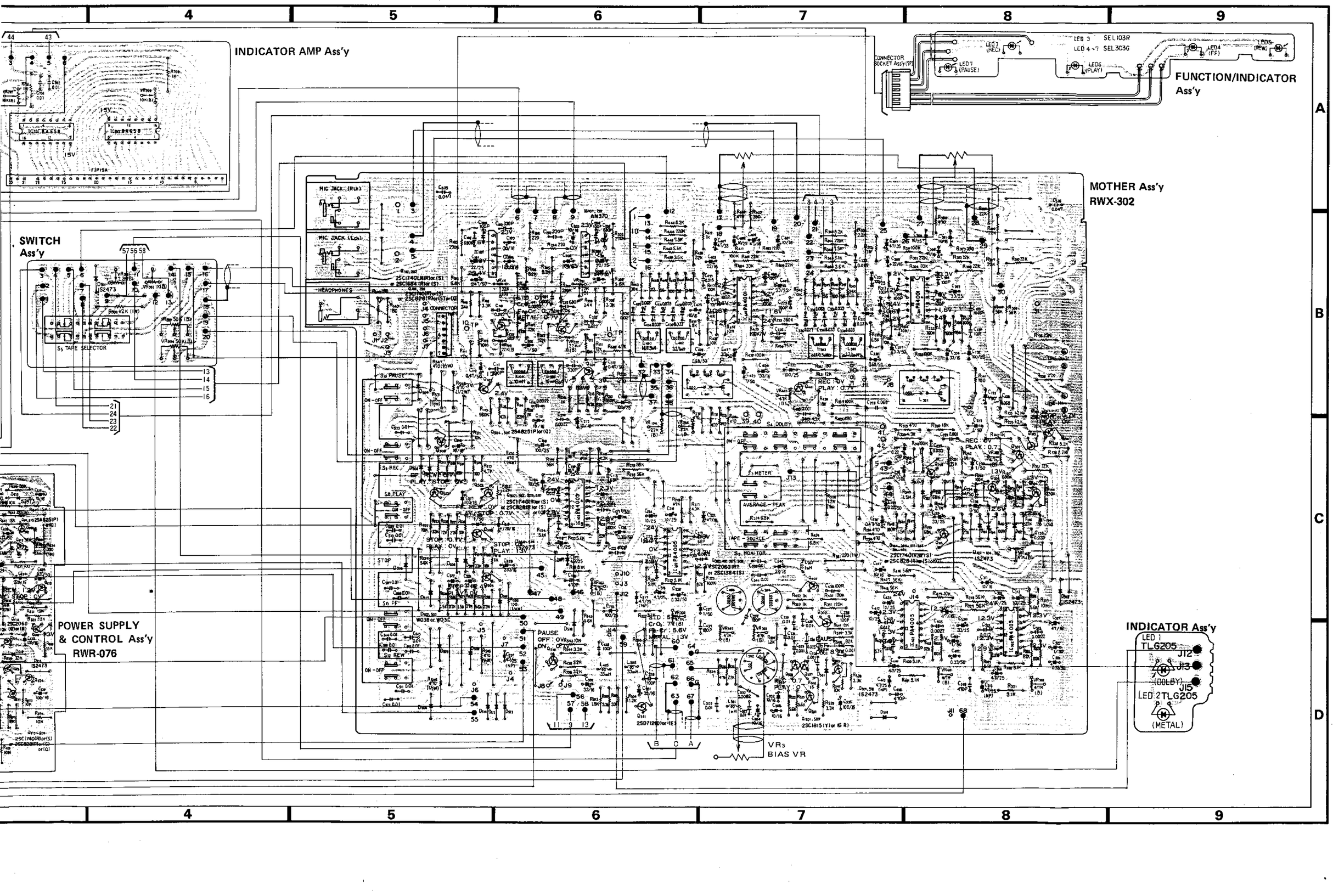
2SD712



11.4 P.C. BOARD CONNECTION DIAGRAM



CT-F850


4
5
6
7
8
9
A
B
C
D
INDICATOR AMP Ass'y
FUNCTION/INDICATOR Ass'y
MOTHER Ass'y
RWX-302
SWITCH Ass'y
POWER SUPPLY & CONTROL Ass'y
RWR-076
INDICATOR Ass'y
VR3
BIAS VR

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,
CEA 220P 16	C309, C409
CEA 330P 16	C324, C424, C501, C502, C521, C522, C540
CEA 330P 25	C139, C520
CEA 470P 16	C121, C221, C306, C406, C317, C417,
CEA 101P 6R3	C105, C205
CEA 101P 25	C108, C131, C132, C208, C231, C232
CEA 221P 16	C519, C538
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.

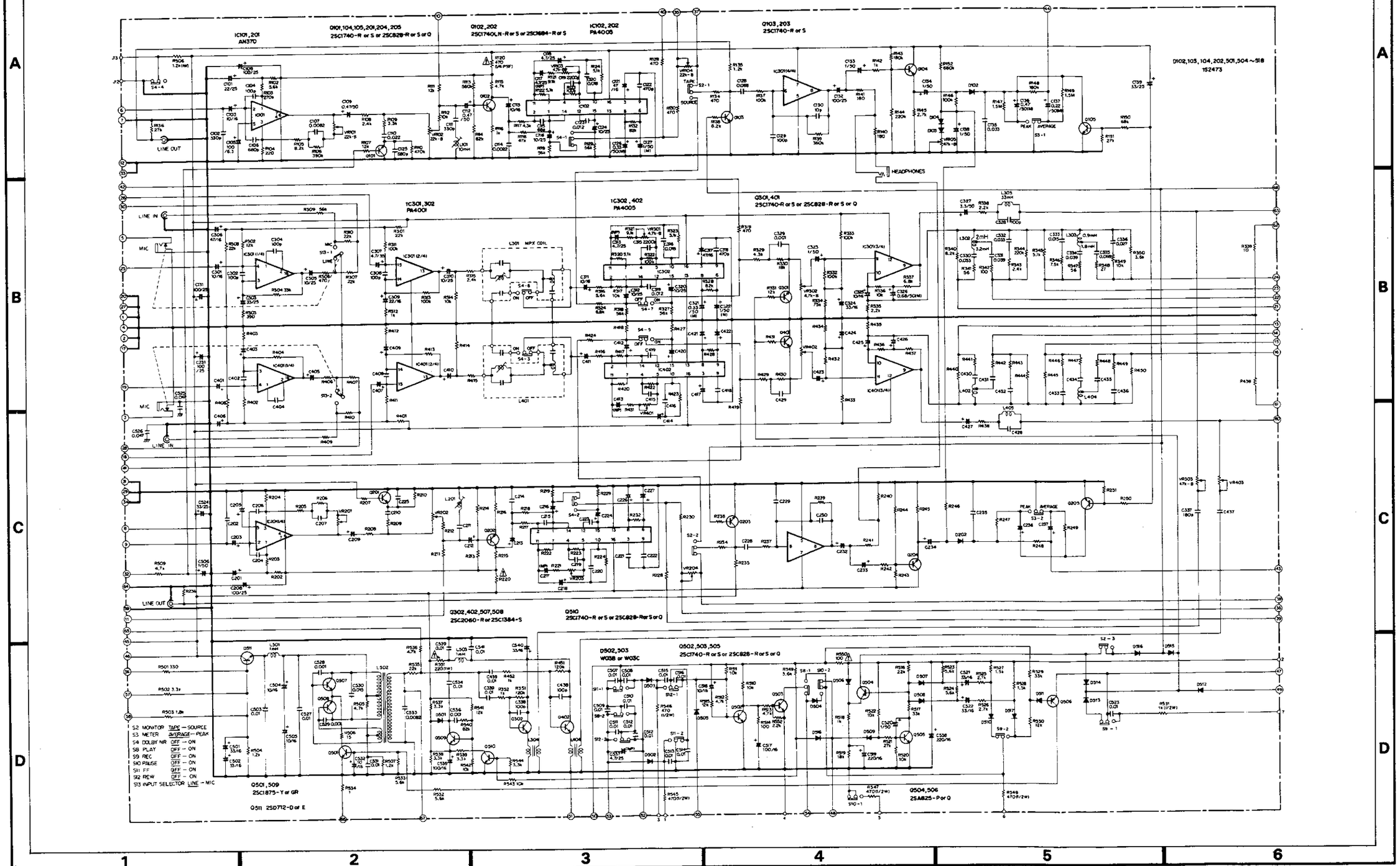
RESISTORS

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
RD¼PM □□□ 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 □□□ J	R508, R551
RD½PS □□□ J	R531, R545-R548
RD¼PSF □□□ J	R120, R220, R550

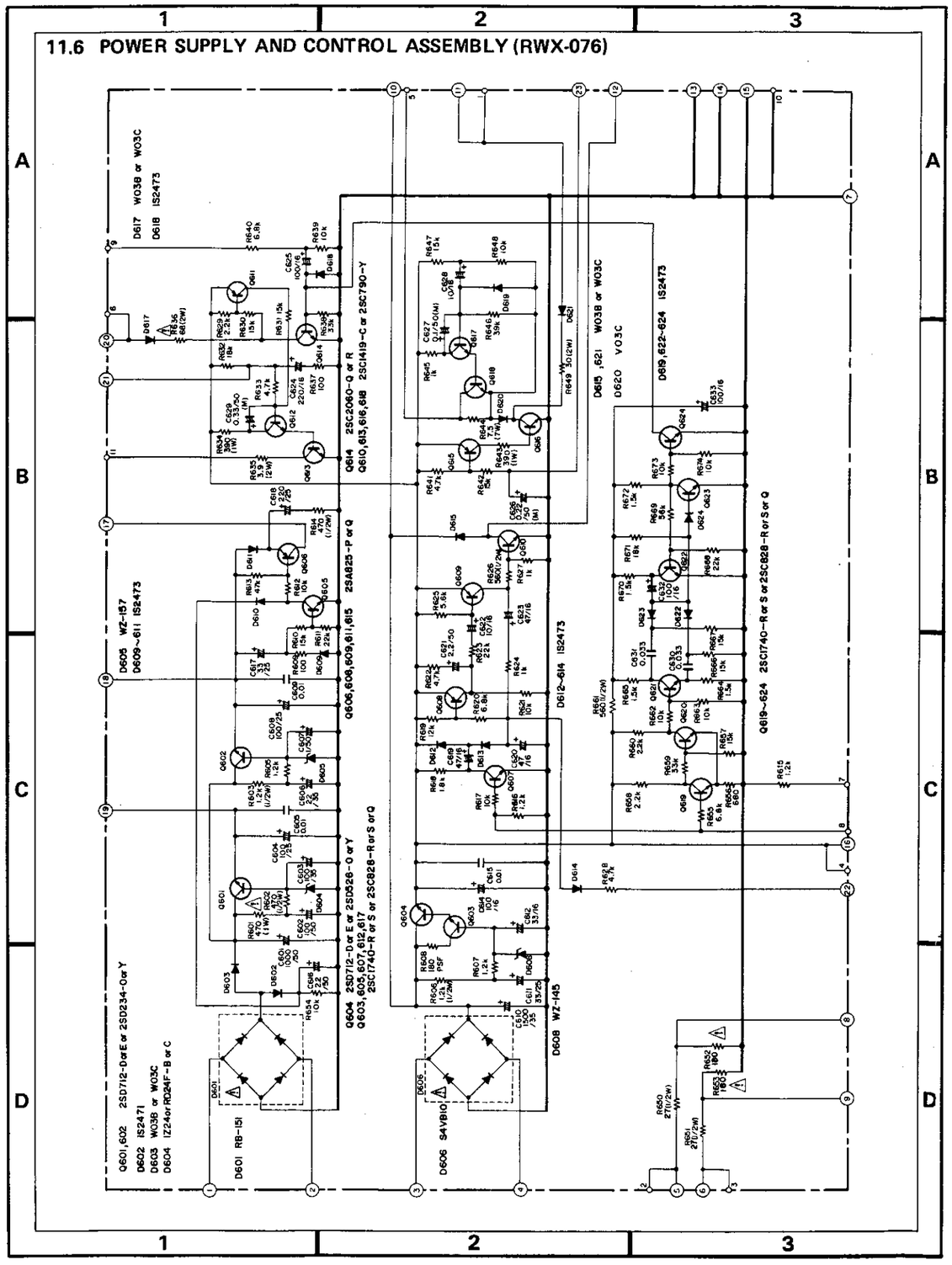
SEMICONDUCTORS

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

Mother Assembly (RWX-302)



11.6 POWER SUPPLY AND CONTROL ASSEMBLY (RWX-076)



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

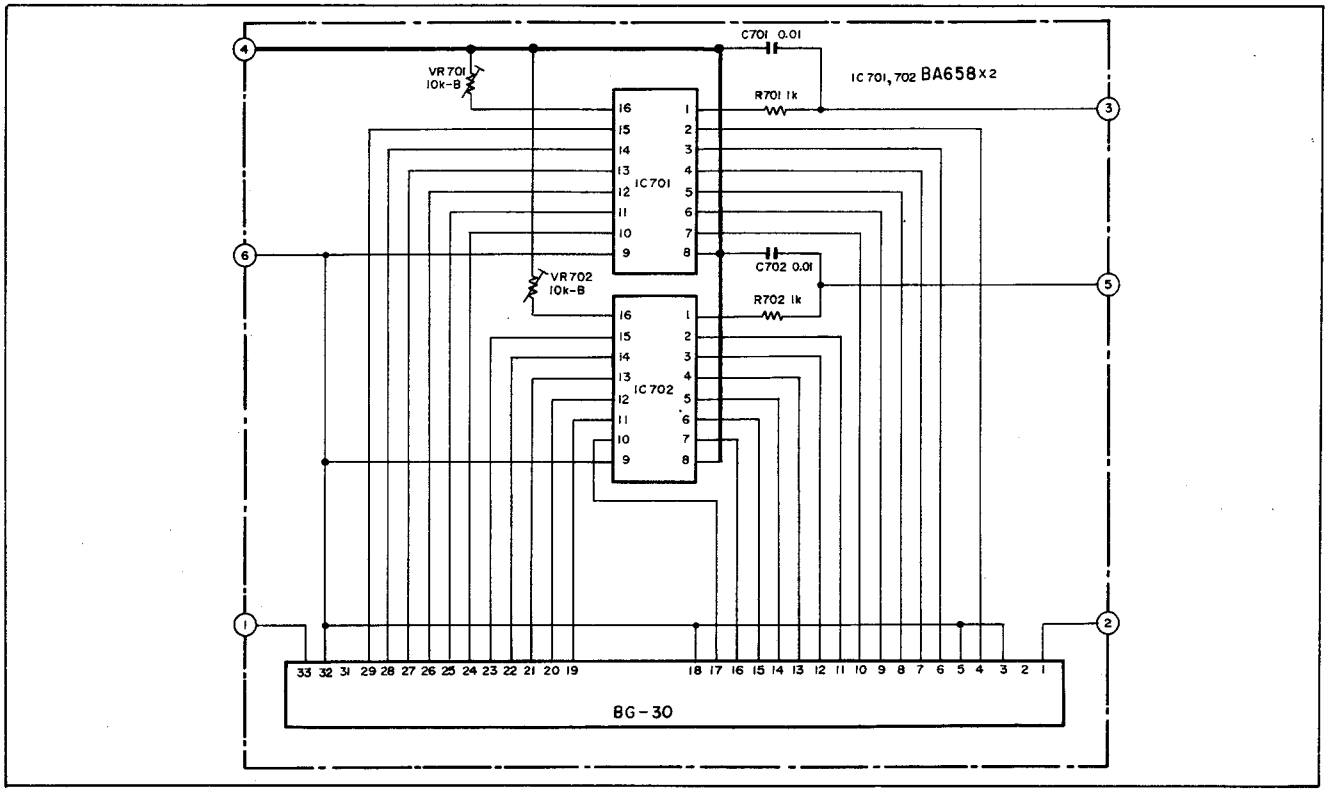
Part No.	Symbol & Description
RD½PS □□□ J	R650, R651
RD½PSF □□□ J	R602, R603, R606, R661, R614, R626
RD¼PM □□□ J	R605, R607, R609–R613, R615–R625 R627–R633, R637–R642, R645–R648, R655–R660, R662–R674, R654
RS1PF □□□ J	R601, R634, R643
RD¼PSF □□□ J	R608, R652, R653
RS2PF □□□ J	R636

RCN-031	R635	Wire wound	2W 3.9Ω
RCN-032	R644	Wire wound	7W 7.5Ω
RCN-037	R649	Wire wound	2W 30Ω

SEMICONDUCTORS

Part No.	Symbol & Description
2SD712 (2SD234)	Q601, Q602
2SC1740 (2SC828)	Q603, Q605, Q607, Q612, Q617 Q619–Q624
2SD712 (2SD526)	Q604
2SA825	Q606, Q608, Q609, Q611, Q615
2SC1419 (2SC790)	Q610, Q613, Q616, Q618
2SC2060	Q614
RB-151	D601
1S2471-T	D602
W03B (W03C)	D603, D615, D617, D621
1Z-24 (RD24F)	D604
WZ-157	D605
S4VB10	D606
WZ-145	D608
1S2473-T	D609–D614, D618, D619 D622–D624
V03C	D620

11.7 INDICATOR AMP ASSEMBLY

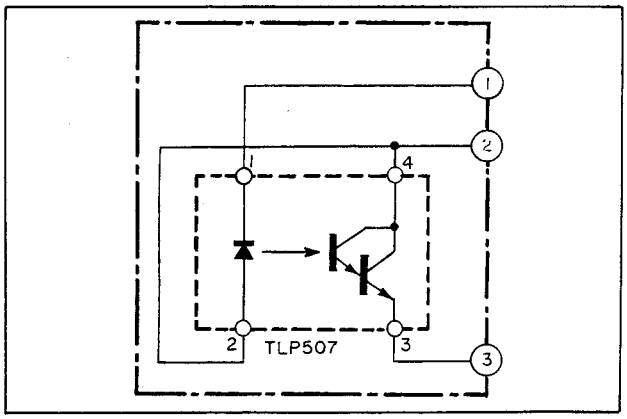


Parts List

Part No.	Symbol & Description
BA658	IC701, IC702
CKDYF 103Z 50	C701, C702
RD¼PS 102J	R701, R702
C92-049	VR701, VR702 Semi-fixed 10k(B)

Part No.	Symbol & Description
REB-301	Meter cushion A
REB-348	Meter cushion
BG-30	Fluorescent indicator tube

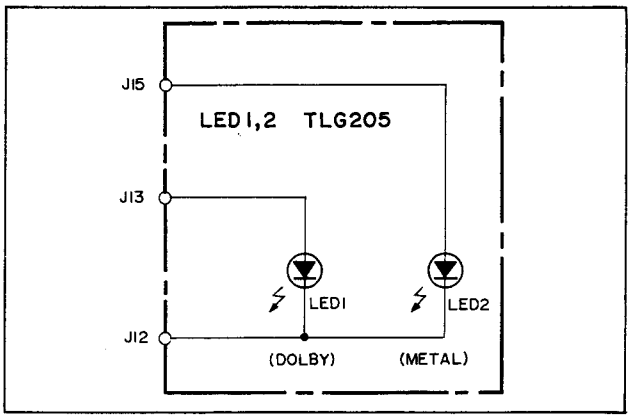
11.8 SENSING ASSEMBLY



Parts List

Part No.	Symbol & Description
TLP507	Photo interrupt

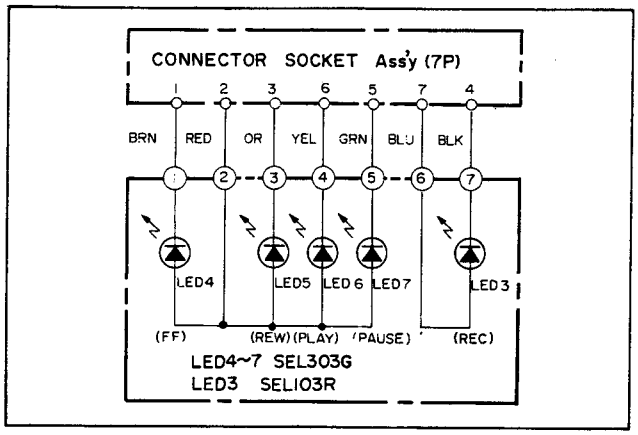
11.9 INDICATOR ASSEMBLY



Parts List

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

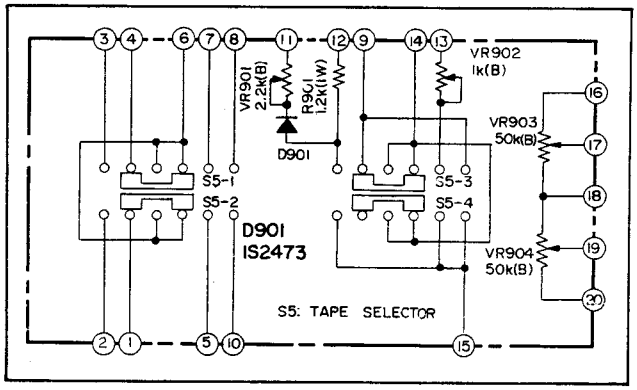
11.10 FUNCTION INDICATOR ASSEMBLY



Parts List

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

11.11 SWITCH ASSEMBLY



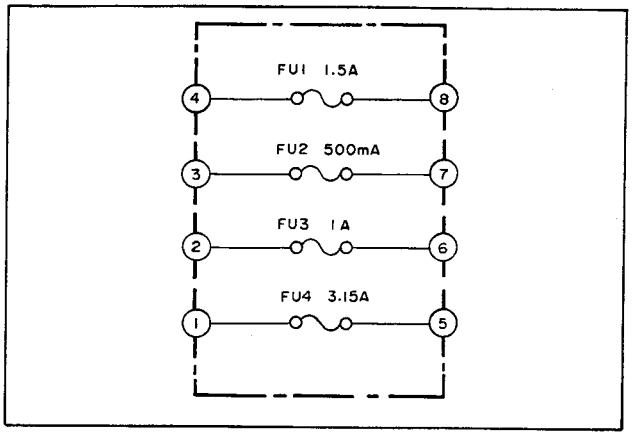
Parts List

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	

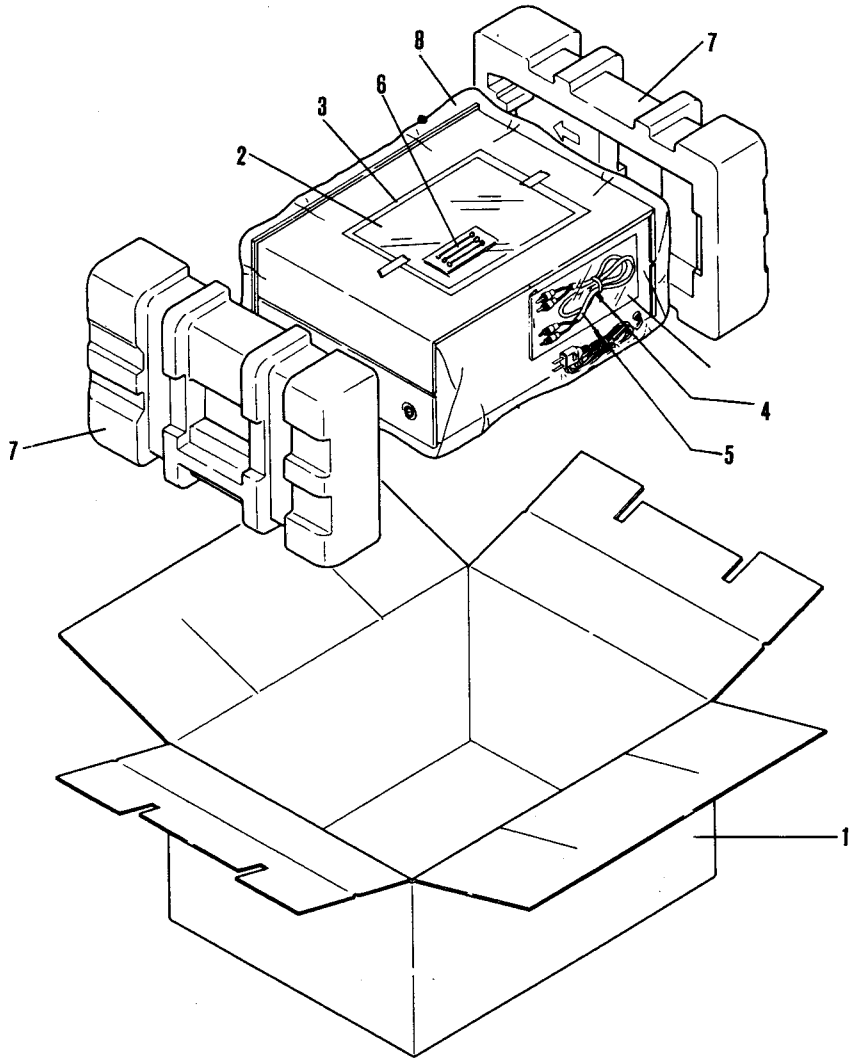
11.12 FUSE ASSEMBLY



Parts List

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

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