



# *Service Manual*

CASSETTE TAPE DECK

# **CT-F1250**

 **PIONEER®**

**MODEL CT-F1250 COMES IN SIX VERSIONS DISTINGUISHED AS FOLLOWS:**

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

● This service manual is applicable to the CT-F1250/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; Quartz PLL DD motor x 1  
 Reel drive; DC high torque motor x 1  
 Heads . . . . . Ferrite 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 0.03% (WRMS)

Frequency Response  
 -20dB Recording :  
 Standard, LH tapes . . . . . 20 to 18,000Hz  
 (25 to 16,000Hz ± 3dB)  
 Ferrichrome tape . . . . . 20 to 20,000Hz  
 (25 to 17,500Hz ± 3dB)  
 Chromium dioxide tape . . . . . 20 to 19,000Hz  
 (25 to 17,500Hz ± 3dB)  
 Metal tape . . . . . 20 to 20,000Hz  
 (25 to 18,500Hz ± 3dB)

0dB Recording :  
 Chromium dioxide tape . . . . . 20 to 12,000Hz  
 Metal tape . . . . . 20 to 14,500Hz  
 Signal-to-Noise Ratio . . . . . Dolby NR OFF; More than 59dB  
 Dolby NR ON; More than 69dB  
 (over 5kHz)

Harmonic Distortion . . . . . No more than 1.0% (0dB)  
 Inputs (Sensitivity/Maximum allowable input/Impedance)  
 MIC (L, R); 0.3mV/100mV/30 kilohms, 6mm diam. jack  
 (Reference MIC impedance; 250 ohms to 10 kilohms)  
 LINE x 2; (60mV/25V/50 kilohms) Pin jack  
 Outputs (Reference level/Maximum level/Load impedance)  
 LINE x 2; (450mV/640mV/50 kilohms) Pin jack  
 HEADPHONES x 1; 63mV/90mV/8 ohms, 6mm diam.  
 jack  
 Semiconductors . . . . . Transistors x 139  
 Diodes x 125, (Zener; 9, LED; 18)  
 ICs x 22

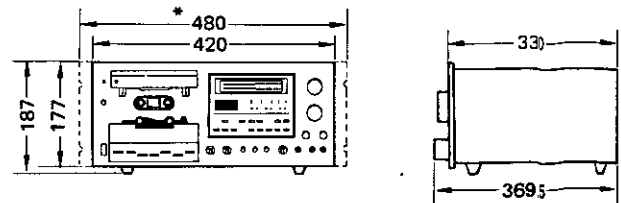
Subfunctions  
 ● Dolby NR system (ON/OFF) with LED indicator lamp  
 ● Tape selector with 4 positions (METAL/STD/CrO<sub>2</sub>/Fe-Cr).  
 ● Tape calibration function  
 ● Memory stop/Memory play function  
 ● Counter repeat/End repeat  
 ● Auto start/Auto stop  
 ● Fluorescence tube level meter (-30 to +8dB)  
 (Peak/Peakhold/Average selector)  
 ● 4-digit Fluorescence tape counter  
 ● Automatic tape slack canceller  
 ● Pitch control (±6%) Play position only  
 ● REC muting function

- Mixing control used for MIC and LINE inputs
- Level meter and Tape counter brightness selectors
- Cassette compartment illumination  
(Remaining tape marker)
- Output level controls with click-stop for reference playback level

Power Requirements . . . . . AC 120V 60Hz  
 Power Consumption . . . . . 59 watts  
 Dimensions . . . . . 420(W) x 187(H) x 369.5(D)mm Max.  
 16-9/16 x 7-3/8 x 14-1/2 in.  
 Weight . . . . . 10.9kg (24 lb)  
 Furnished parts . . . . . Stereo connecting cords with  
 pin plugs x 2  
 Head cleaning swabs x 3  
 Operating instructions x 1

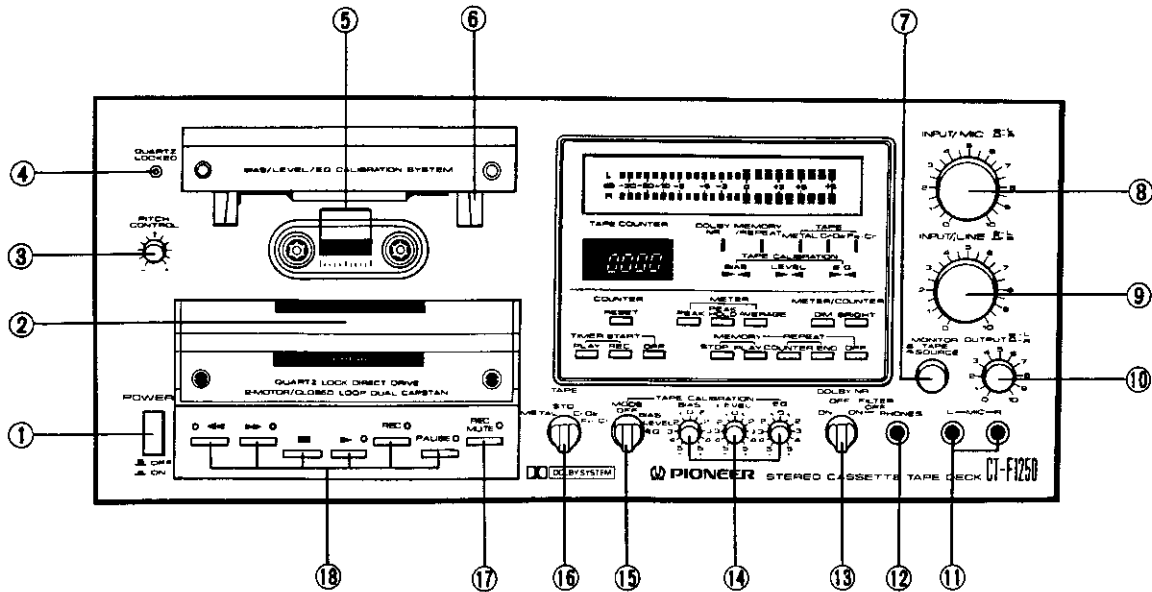
**NOTE:**  
 Specifications and the design subject to possible modification without notice due to improvements.

- NOTES:
1. Reference Tapes: Standard & LH: DIN 45513/BLATT6 or equiv.  
 : CrO<sub>2</sub>: DIN 45513/BLATT7(CrO<sub>2</sub>) 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.



420(W) x 187(H) x 369.5(D)mm Max.  
 \* with rackmount adaptor JA-R102  
 \* 480(W) x 187(H) x 380(D)mm Max.

## 2. FRONT PANEL FACILITIES



### ① POWER SWITCH

The power comes on when the POWER switch is depressed. The level meter and tape counter, and the remaining tape marker will then come on.

### ② DUST COVER

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

### ③ PITCH CONTROL KNOB

You can use this knob to make the tape travel  $\pm 6\%$  faster or slower than the rated tape speed during playback. When the knob is set to the central position (click-stop), the quartz PLL circuit is activated, the QUARTZ LOCKED indicator comes on, and the tape speed is quartz-locked to the rating (4.8 cm/sec.). When the knob is rotated counterclockwise, the speed drops and the musical steps are lowered. Conversely, when it is rotated clockwise, the speed increases and the musical steps are raised. The tape speed does not change during a recording.

### ④ QUARTZ LOCKED INDICATOR

When the PITCH CONTROL knob is set to its center position, the quartz PLL circuit is activated and this indicator comes on. It goes off, however, when the knob is rotated either clockwise or counterclockwise. During a recording, this indicator will remain on even if the PITCH CONTROL knob is rotated, and the quartz PLL circuit will be activated.

### ⑤ REMAINING TAPE MARKER

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

### ⑥ CASSETTE TAPE GUIDE

### ⑦ MONITOR SWITCH

This switch is used to select the output signal which is made available at the output jacks and headphones. Since the indication of the level meter can be switched over at the same time, always make it a rule to depress this switch when adjusting the recording level (set to SOURCE position).

**For playback:** Set the switch to the released (TAPE) position. If it is set to the depressed position, you will not be able to hear the playback sound.

**For recording:** Set the switch to the released (TAPE) position and you will then be able to hear the signals (playback sound) immediately after you have recorded the sound source.

If the switch is set to the depressed (SOURCE) position, you will be able to hear the signals (recording input) immediately before you record the sound source.

### ⑧ MIC RECORDING LEVEL CONTROLS

Use these controls to adjust the recording level when you are recording with a microphone (or microphones). Use the front control for the left channel and the back control for the right channel.

### ⑨ LINE RECORDING LEVEL CONTROLS

These adjust the recording input level from the LINE INPUT terminals on the rear panel. The level increases as the controls are turned to the right. The front control is for the left channel and the back control for the right channel.

### ⑩ 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.

⑪ 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.

⑫ HEADPHONE JACK

This is the output jack for your stereo headphones. You will be able to hear the 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-F1250. Adjust the output level with the OUTPUT controls.

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 HEADPHONE jack by mistake.

⑬ DOLBY NR/MULTIPLEX FILTER SWITCH

Set this switch to DOLBY NR ON when recording with the Dolby NR system or when playing back a tape which has been recorded with the Dolby NR system.

Set this switch to the ON (filter ON) position when recording without the FM stereo broadcast pilot signal (19kHz).

ON ..... When playback in Dolby NR or when recording an FM stereo broadcast in Dolby NR using an FM tuner with MPX pilot signal leakage.

OFF ..... When not recording or playback in Dolby NR.

ON ..... When playback in Dolby NR or when recording a FILTER OFF program source in Dolby NR other than an FM stereo broadcast, or when using an FM tuner with no MPX pilot signal leakage.

⑭ TAPE CALIBRATION BIAS, LEVEL, EQ KNOBS

When adjusting the tape calibration, set the MODE selector to the BIAS, LEVEL and EQ positions in sequence, and at each position, adjust the tape calibration knobs (BIAS, LEVEL and EQ) so that both parts of the indicators (▶ and ◀) light up at the same time in a well-balanced fashion or flicker.

⑮ TAPE CALIBRATION MODE SELECTOR

When adjusting the tape calibration, set this selector to the BIAS, LEVEL and EQ positions in sequence. When you are not using tape calibration be sure to set the MODE selector to the OFF position.

⑯ 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 standard or LH tapes

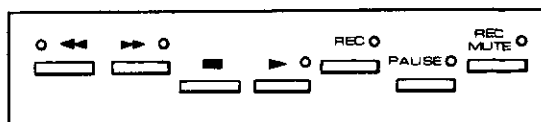
CrO<sub>2</sub>: For using chrome tapes

Fe-Cr: For using ferrichrome tapes

⑰ REC MUTE BUTTON/INDICATOR

You can create unrecorded sound gaps, or blanks, while you are recording by depressing this button. When this button is depressed, the indicator winks at intervals of about one second.

⑱ OPERATING BUTTONS



◀ (REW) ..... Depress this button to rewind the tape. (The tape will travel at high speed from right to left.)

▶ (FF) ..... Depress this button to send the tape forward at top speed. (The tape will travel from left to right.)

■ (STOP) ..... Depress this button to stop the tape run and to release the operating buttons.

▶ (PLAY) ..... Depress this button when play back a tape, and depress this button together with the REC button for recording. (The tape will travel from left to right.)

REC ..... Depress this button together with the PLAY button for recording.


This button will not work when a cassette is not loaded or when the erasure prevention tabs of a loaded cassette have been broken off.

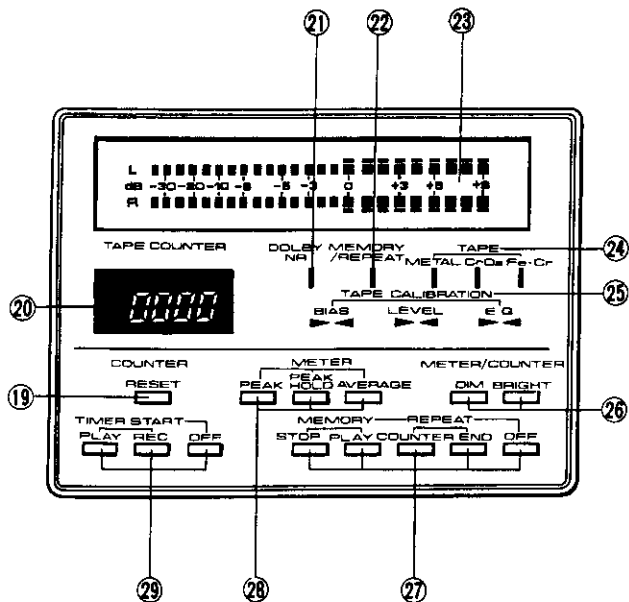
PAUSE ..... Depress this button to stop the tape temporarily during recording or playback. Depress it again to allow the tape to continue to travel as before.

NOTES:

- When any of the operating buttons are depressed, the corresponding indicator (except STOP mode) will come on signifying that the deck is set to that respective mode.
- All the operating buttons are released (OFF) to stop mode when the POWER switch is turned OFF.

\*Manufactured under license from Dolby Laboratories.

\*Dolby and  are trademarks of Dolby Laboratories.



### 19 COUNTER RESET BUTTON

Depress this button to reset the tape counter display to "0000."

### 20 TAPE COUNTER

This indicates the position of the tape run. The counter reverts to "0000" when the power is switched on.

### 21 DOLBY NR INDICATOR

This lights up when the DOLBY NR switch is set to ON.

### 22 MEMORY/REPEAT INDICATOR

This indicator comes on when the MEMORY/REPEAT switches are depressed, signifying that the deck is set to the respective mode.

### 23 LEVEL METER

This indicates the input level during recording and the output level during playback.

By operating the LEVEL METER switches, it can be made to function as a peak meter, a peak hold meter or as a level meter.

The input signal level is indicated. When the MONITOR switch is set to SOURCE, they indicate the input signal level, and when it is set to TAPE, they indicate the playback output level.

### 24 TAPE INDICATORS (METAL, CrO<sub>2</sub>, Fe-Cr)

The indicator corresponding to the position of the TAPE selector lights up to indicate what type of tape is being used. There is no indicator for standard tapes.

### 25 TAPE CALIBRATION INDICATORS

The indicator corresponding to the type of tape calibration adjustment comes on. The bias, level and equalizer characteristics are optimum for the type of tape being used if both parts (▶ and ◀) of the indicators light up at the same time in a well-balanced fashion, or flicker, when the MODE selector is set to the BIAS, LEVEL and EQ positions in sequence.

### 26 LEVEL METER/COUNTER BRIGHTNESS SELECTORS

Use this switch to select the meter/counter brightness.

**DIM:** Depress this switch at night or in dark locations when the existing meter/counter brightness is too high.

**BRIGHT:** Depress this switch when using the deck in daylight or other bright locations.

### 27 MEMORY/REPEAT SWITCHES

**MEMORY STOP:** Depress this switch and the tape will be rewound to that spot at which the tape counter was preset to "0000" during rec/play, when the REW button is depressed at any position you like.

**PLAY:** Depress this switch and the tape will be rewound to that spot at which the tape counter was preset to "0000" during rec/play, and playback will start from that spot, when the REW button is depressed at any position you like.

**REPEAT COUNTER:** Depress this switch when you want to play back a tape during playback or recording from the point at which the tape counter was set to "0000" up to the end of the tape.

**END:** Depress this switch when you want to play back a tape from the beginning to the end of that tape.

**OFF:** Depress this switch during normal tape playback or recording to release the MEMORY and REPEAT switches.

### 28 LEVEL METER SWITCHES

**PEAK** ..... When this switch is depressed, the meter functions as a peak meter, and the peak level of the signals is indicated for about 2 seconds.

**PEAK HOLD** ..... The meter functions as a peak level meter and the highest level of the signals is indicated when this switch is depressed.

**AVERAGE** ..... The meter functions as a level meter when this switch is depressed.

### 29 TIMER START SWITCHES

Depress these switches when you are playing back or recording a tape with the use of a timer.

**PLAY:** When this switch is depressed, the deck will automatically be set to the playback mode at the preset timer time, and playback will begin. Use this switch for wake-up playback instead of an alarm clock.

**REC:** When this switch is depressed, the deck will automatically be set to the recording mode at the preset timer time, and recording will begin. Use this switch for recording FM programs when you are out of the house or otherwise occupied.

**OFF:** Always depress this switch when you do not intend to record or play back a tape using the timer (This will release the REC and PLAY switches of TIMER START).

### 3. DISASSEMBLY

#### External Components

1. Remove the bonnet by undoing screws ①.
2. Remove the front panel by undoing screws ②.
3. Remove the bottom plate by undoing screws ③.
4. The function switch assembly is mounted onto the chassis by means of rubber bushes. Remove it by gently raising it up.

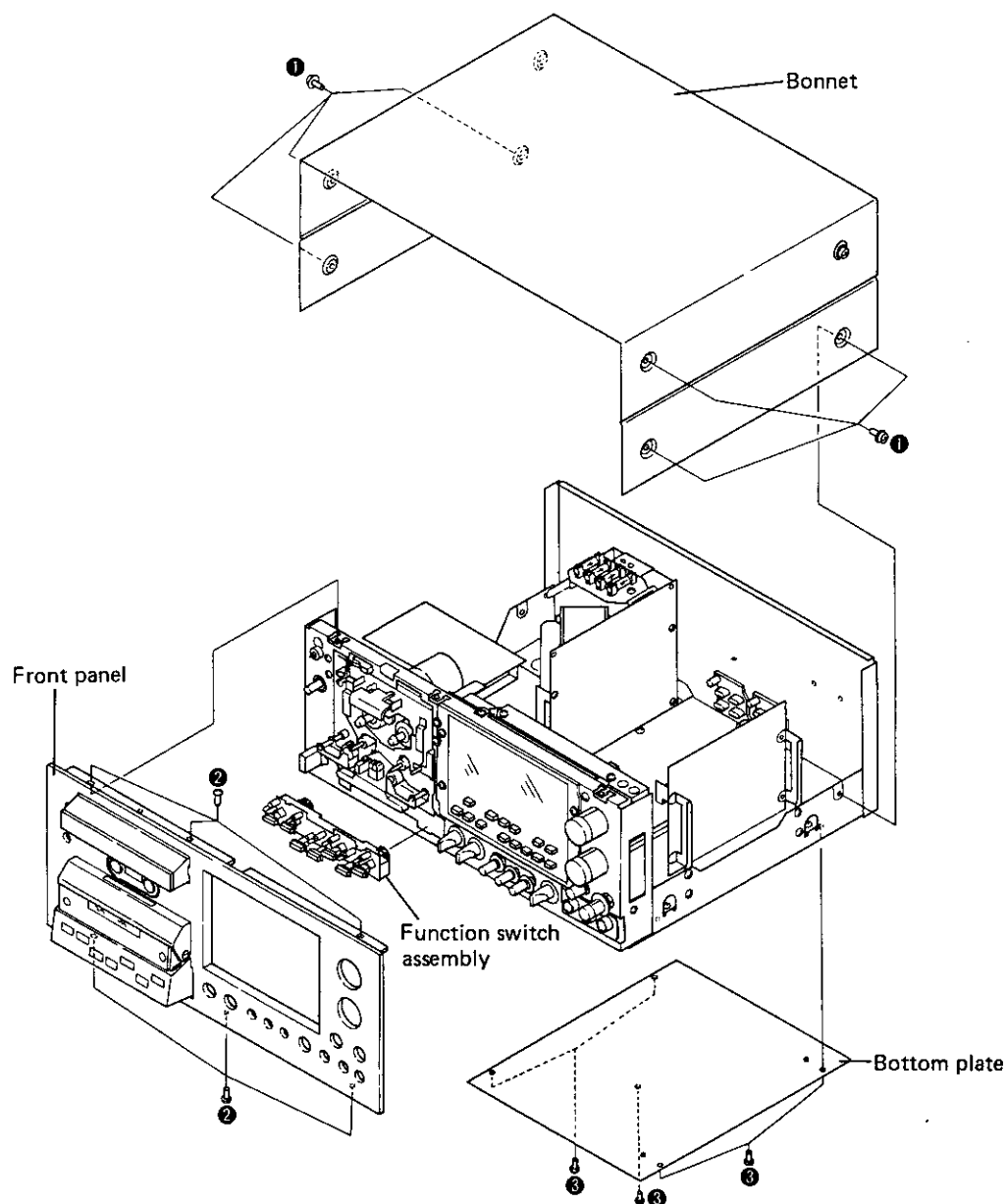


Fig. 3-1 Disassembly of exterior parts

### Mechanical Assembly

After removing the front panel, undo screws ①. **Sub-head Assembly, Pinch-roller Arm Assembly and Pressure Arm**

1. Remove the sub-head base assembly by undoing screws ① and the socket-head hexagonal bolt.
2. Remove the feed side pinch-roller arm assembly by loosening the height adjuster (nut).
3. Remove the take-up side pinch-roller arm assembly by taking off E-washer ①.
4. Remove the pressure arm by taking off E-washer ②. When the pinch pressure spring is replaced with a new one, take care to ensure that the new spring is properly seated. The requirements of the sub-section entitled "Pinch roller pressure adjustments" (Page 32) included in the section "Mechanical adjustments" shall be satisfied.

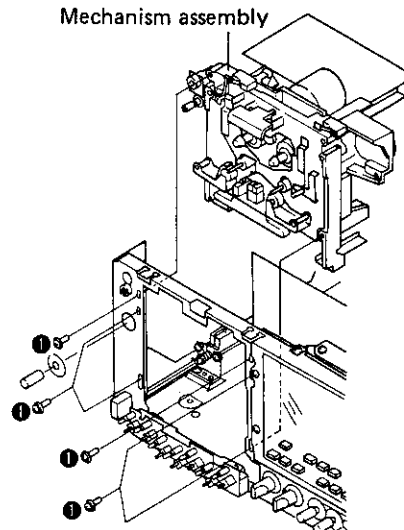


Fig. 3-2 Remove the mechanism assembly

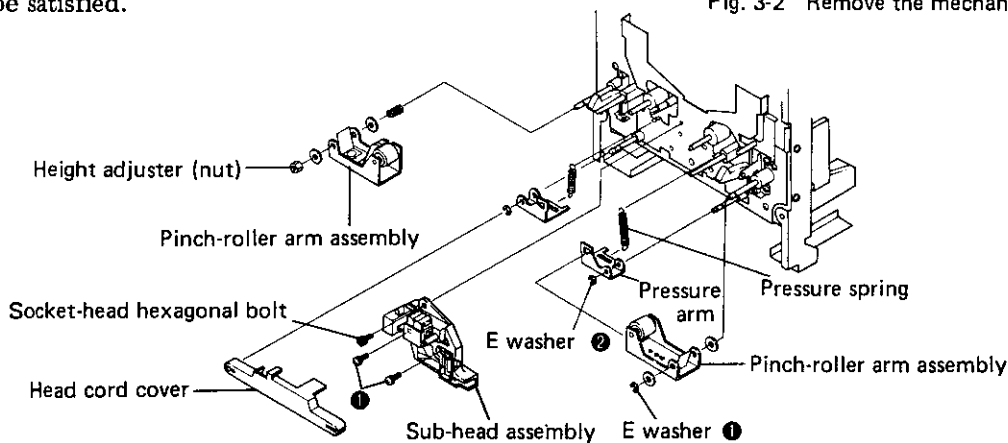


Fig. 3-3 Remove the sub-head assembly, pinch-roller arm assembly and pressure arm

### Fluorescent Indicator Tube

1. Remove the indicator lens assembly by undoing screws ①.
2. Remove the indicator amplifier assembly by undoing screws ②.
3. The fluorescent indicator tube is mounted on the indicator assembly. Remove it by means of a soldering iron. Take great care when handling the indicator tube so as to avoid damaging it.

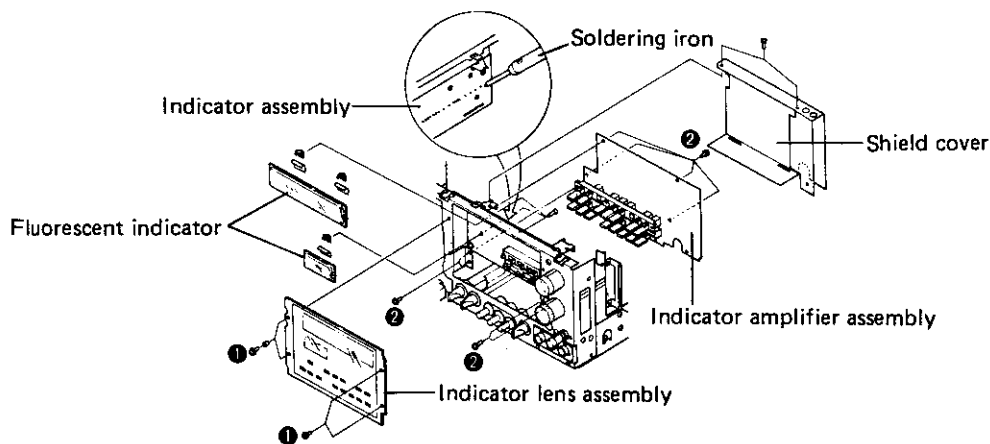


Fig. 3-4 Remove the fluorescent indicator tube



**Mechanical Assembly**

When replacing a motor or a belt, be careful of the sequence of disassembly and reassembly of the various components concerned.

1. Remove the capstan D.D motor by undoing screw ①.
2. Remove solenoid A by undoing screws ②.
3. Remove the plunger chassis assembly by undoing screws ③.
4. Remove the sub-chassis assembly by undoing screws ④.
5. Remove the take-up motor by undoing screws ⑤ and remove solenoid B by undoing screws ⑥.

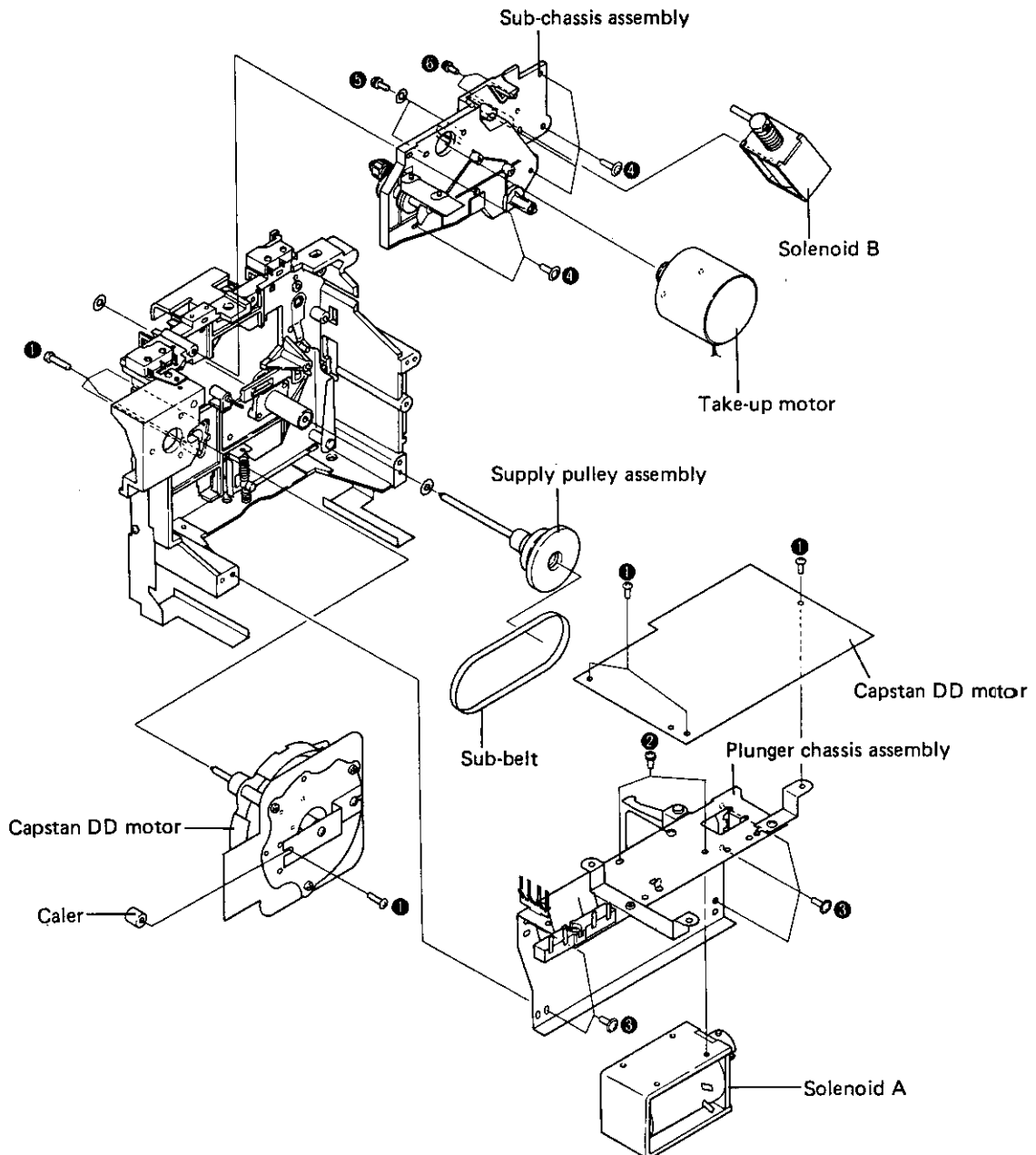
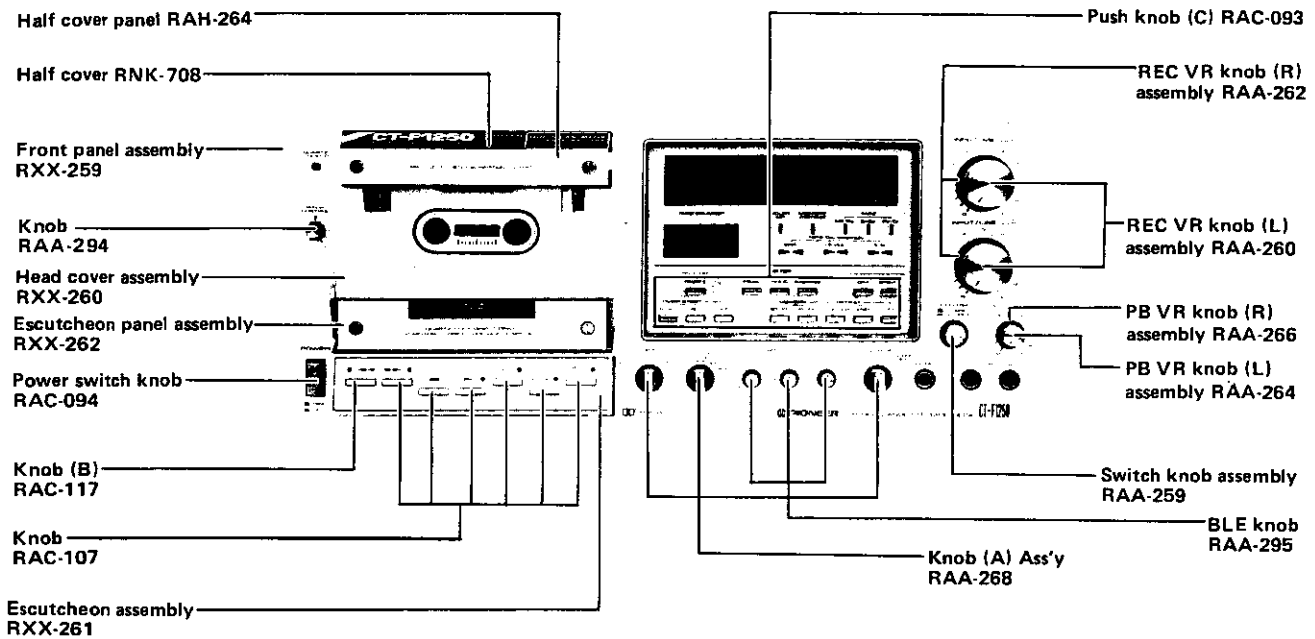


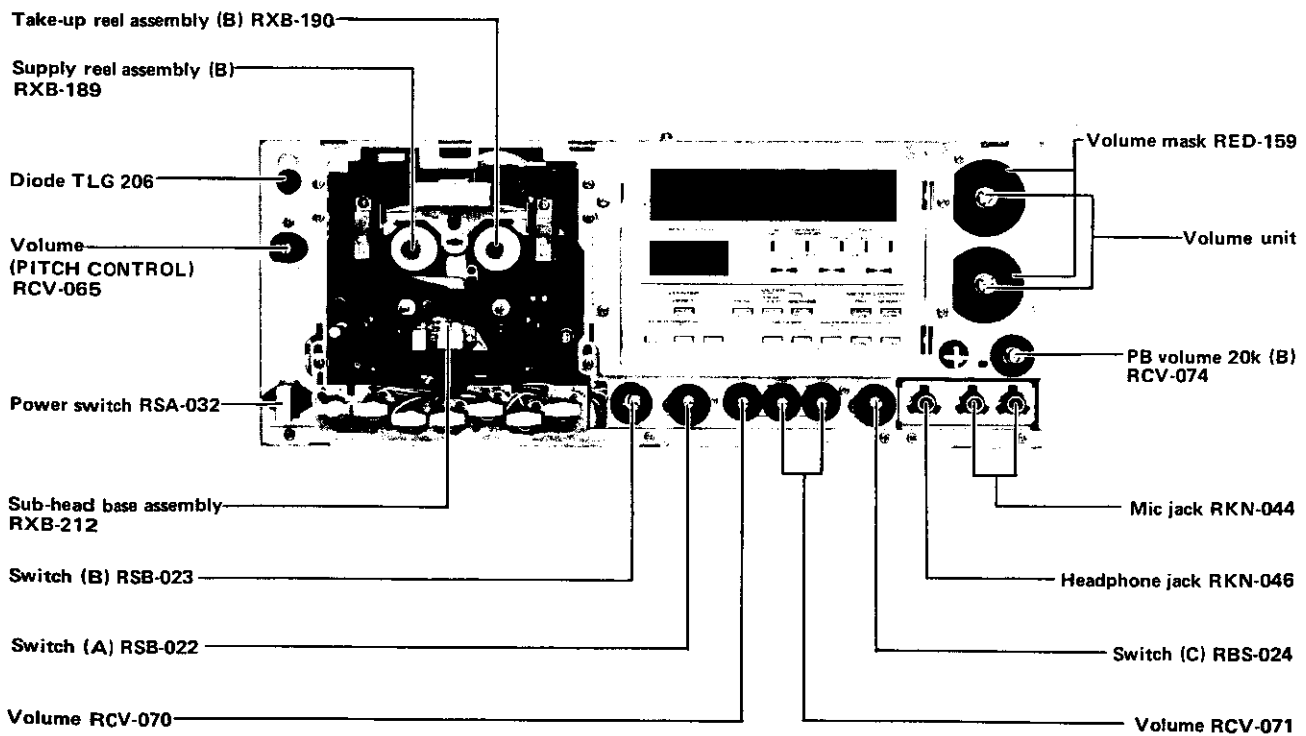
Fig. 3-5 Disassembly of mechanism assembly

# 4. PARTS LOCATION

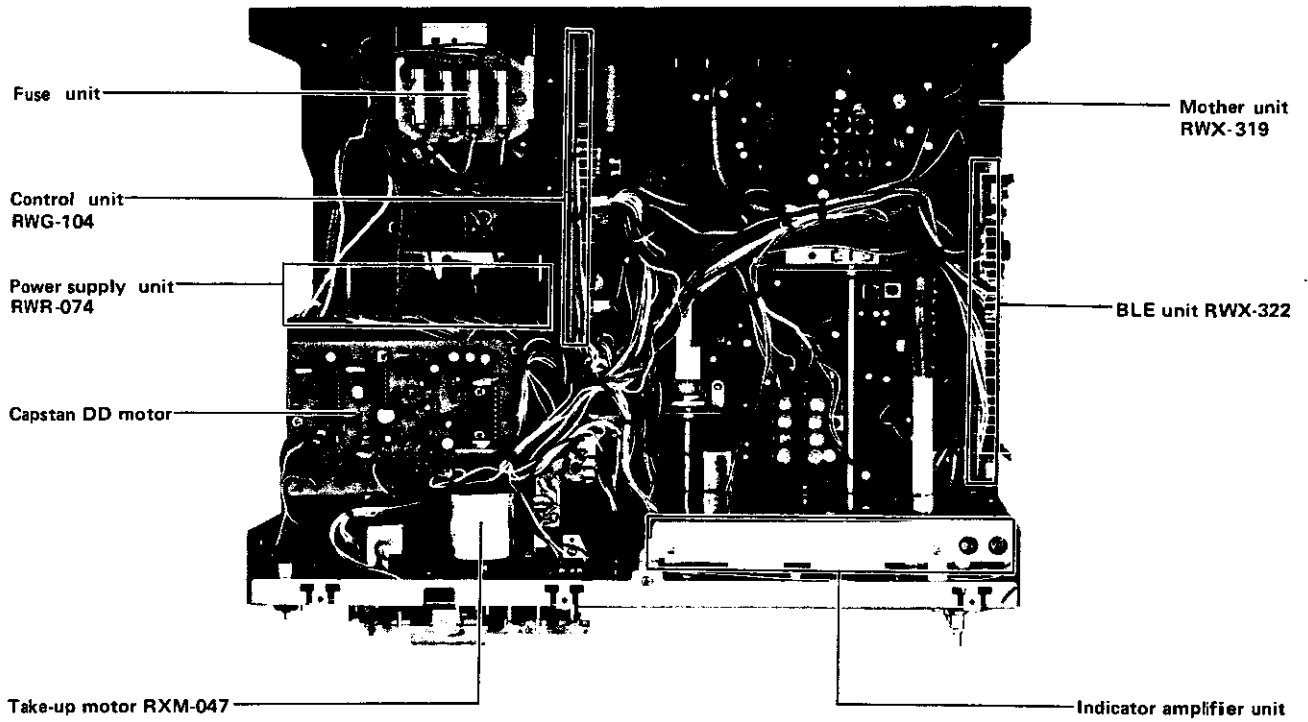
## FRONT PANEL VIEW



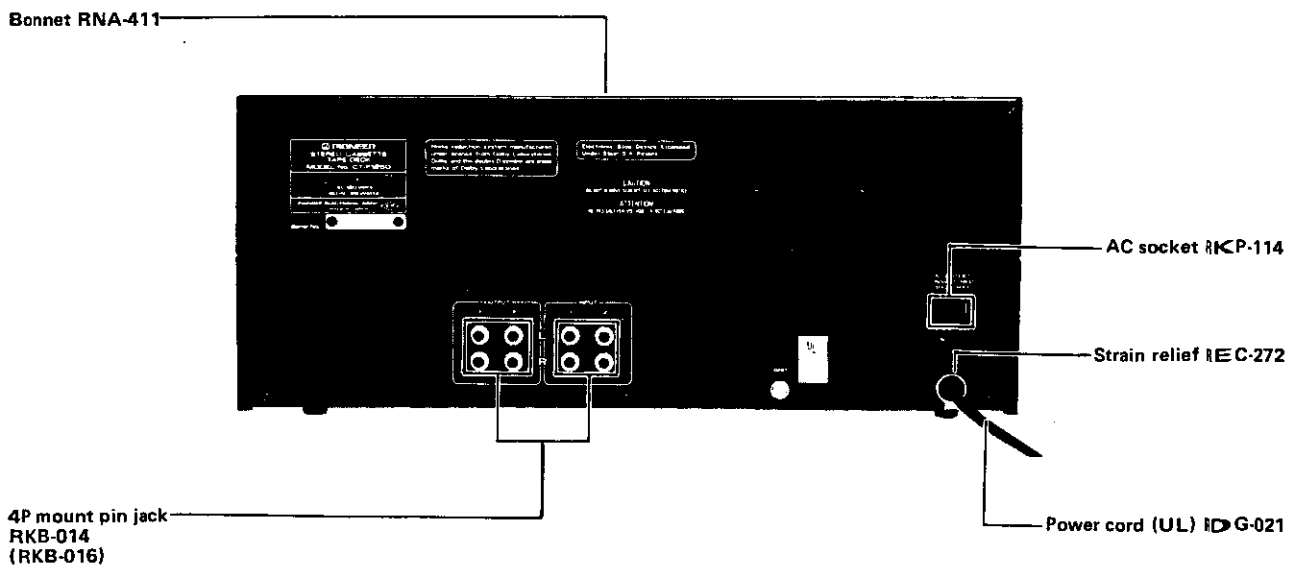
## FRONT VIEW WITH FRONT PANEL REMOVED



TOP VIEW WITH BONNET REMOVED

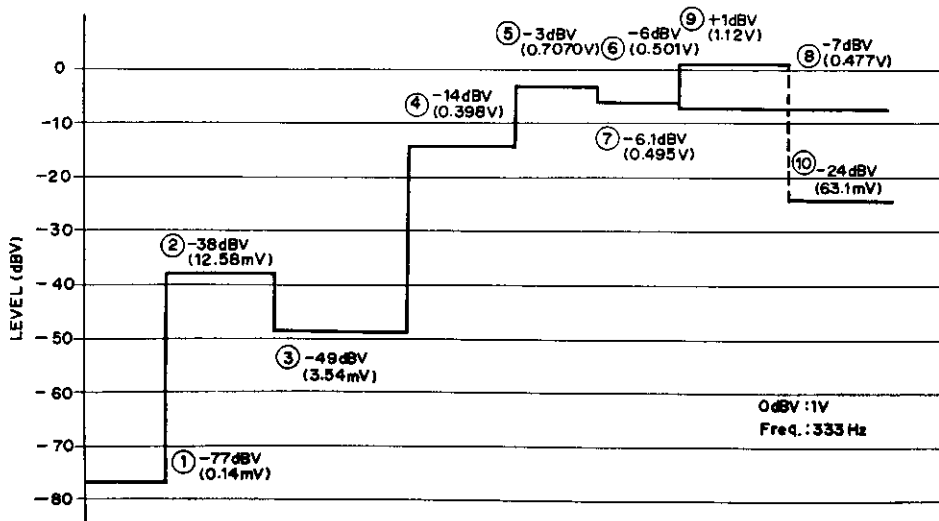
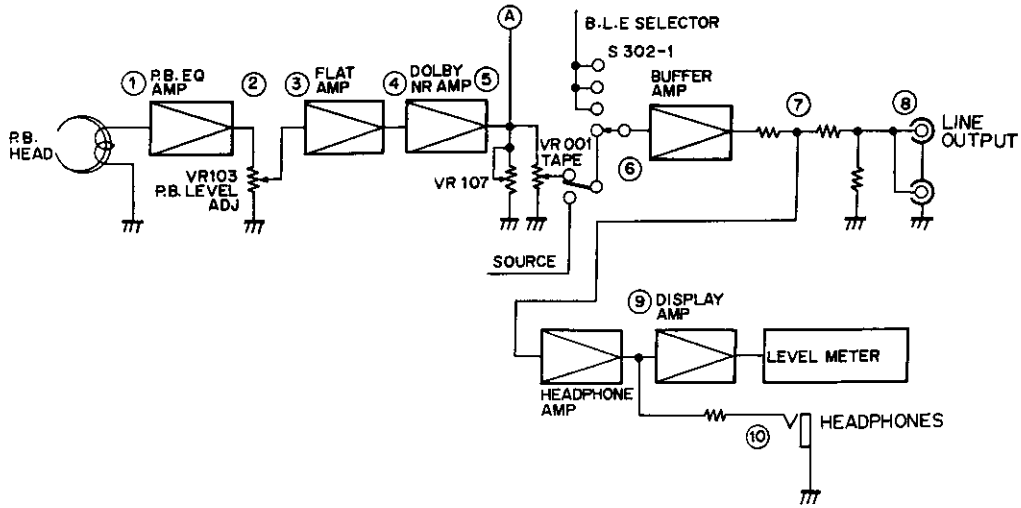


REAR PANEL VIEW

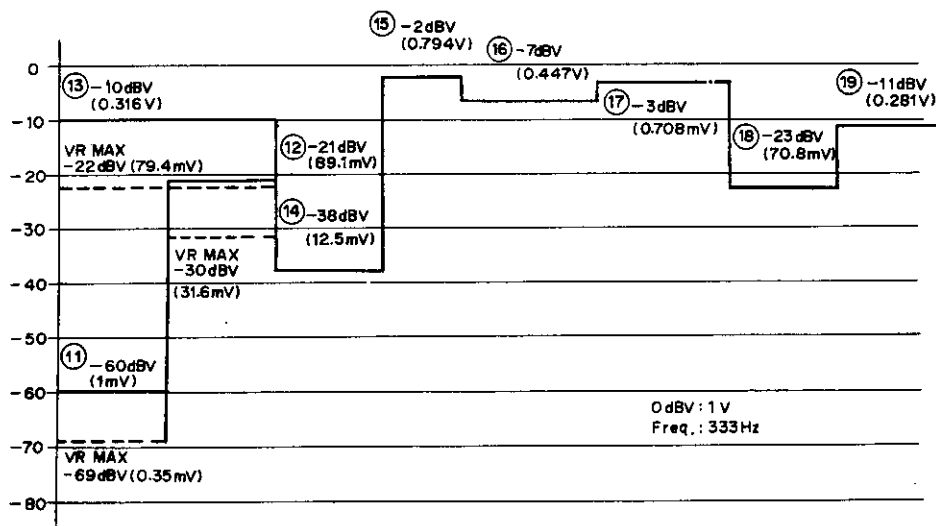
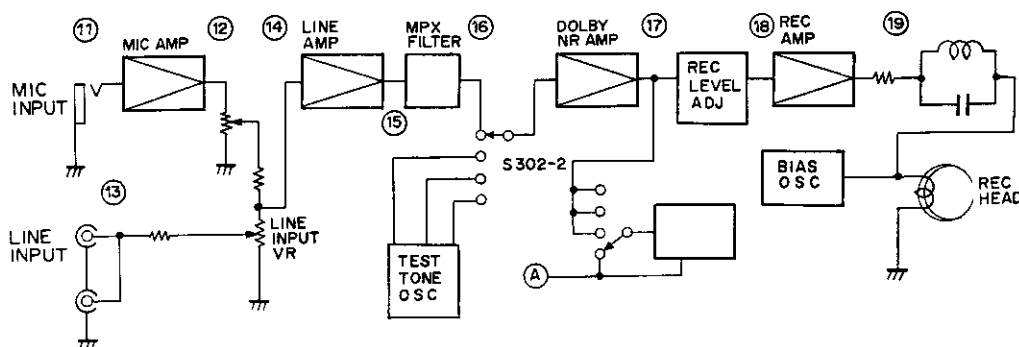


# 5. LEVEL DIAGRAM

## PLAYBACK



RECORDING



## 6. CIRCUIT DESCRIPTIONS

For the details of the circuits, refer to the block diagram on page 25, the level diagram on page 12, and the complete diagram on page 57.

### 6-1 PLAYBACK CIRCUIT

#### Equalizer Amplifier

This is a negative feedback type amplifier employing a low-noise, high-gain FET (2SK-117) in the first stage.

#### Tape selector

The bias and equalizer switches on this unit can be set to the appropriate settings for STD, CrO<sub>2</sub>, Fe-Cr and metal type tapes. This switching is performed by means of selector switch S301 on the front panel. An indicator lamp lights up to display the setting of the respective tape position.

#### Playback Equalizer

The playback equalizer can be set for Metal/CrO<sub>2</sub>/Fe-Cr tapes (70μsec) or STD tapes (120μsec).

When setting the tape selector to the Metal, CrO<sub>2</sub> or Fe-Cr positions, the +16V passes through R133 to bias Q107 and turn it on. When Q107 comes on, the fixed time constant of the high frequency playback is made 70μsec by means of the direct circuit to C119 and R129.

For STD tapes, when Q107 is off, the fixed time constant of the high frequency playback is 120μsec.

#### Playback Flat Amplifier

This is a direct-coupled amplifier utilizing two transistors (Q111, Q113) which give a flat frequency response. This amplifies the output of the playback equalizer amplifier and guards against the interference of recording bias from the trap circuit on the input side.

#### Buffer Amplifier

This is an emitter follower type buffer amplifier operated by transistor Q115. It leads the playback output to the LINE OUT.

#### Headphone Amplifier

This employs the headphone amplifier section in IC (PA4001). Output is divided by resistors R219 and R220 and supplied to the headphones.

### 6-2 RECORDING AMPLIFIER

#### Microphone Amplifier

This is utilized by the microphone amplifier section of the IC (PA4001). The input is a differential amplifier construction, and the output an emitter follower. Its gain is about 40dB.

#### Line In Amplifier

This utilizes the flat amplifier section of IC (PA4001). Its gain is about 36dB.

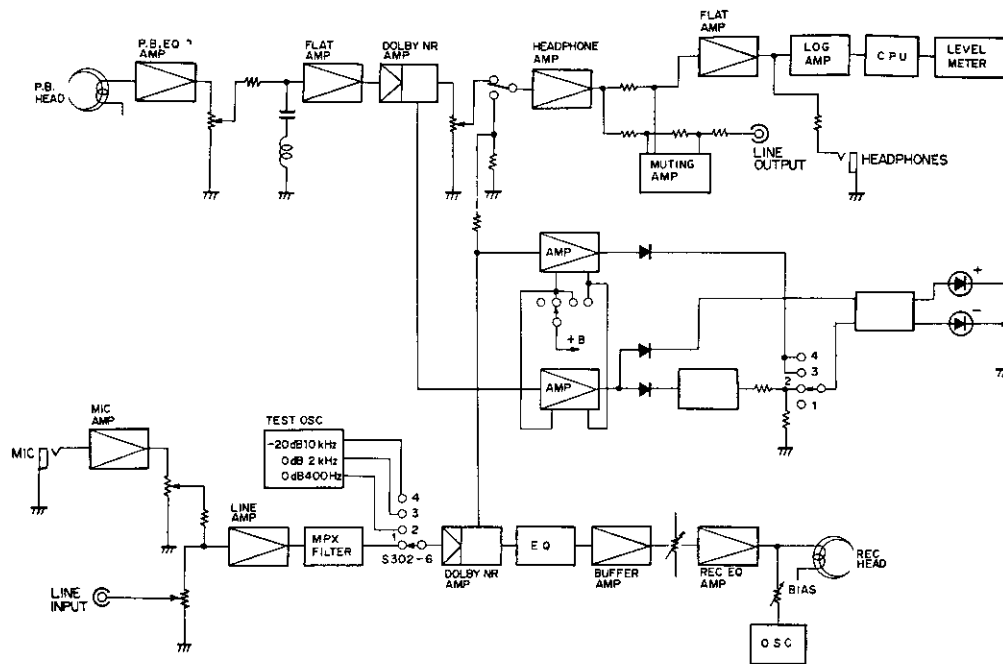


Fig. 6-1 Block diagram

### Recording Amplifier

This utilizes the record amplifier section of IC (PA4001). The input is a differential amplifier construction and the output, complementary construction.

#### • IC (PA4001)

This is shown in the block diagram in graph 6-2. This is a system IC exclusively developed for use in Pioneer tape decks. This IC is a 16 pin dual line type which incorporates the microphone amplifier, flat amplifier, recording amplifier and headphone amplifier.

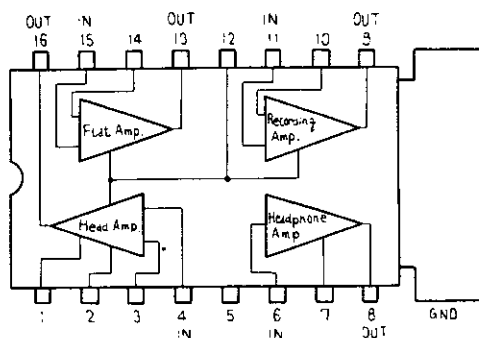


Fig. 6-2 Block diagram of PA4001

### Record Bias Switching Circuit

The record bias switch can be changed to 4 positions for use with LH, CrO<sub>2</sub>, Fe-Cr and metal tape. By changing tape selector switch S301, the semi-fixed resistors for each tape position are connected.

### Record Equalizer Switching Circuit

The record equalizer can be switched to 4 positions for use with STD, CrO<sub>2</sub>, Fe-Cr and metal tapes. The equalizer is set by changing tape selector S301. The peaking frequency for each equalizer is approximately 18kHz for STD, 17kHz for CrO<sub>2</sub>, 16kHz for Fe-Cr and 20kHz for metal tapes.

### BIAS, LEVEL, EQ Variable Circuits

#### ■ Variable Bias Circuit

The variable bias volume VR305 is connected to the bias coil of the oscillator block, and its output in turn is connected to the semi-fixed variable bias volume VR307 (metal), VR309 (STD), VR311 (CrO<sub>2</sub>) and VR313 (Fe-Cr). The bias can be adjusted within a range of approx. ±45% or greater.

#### ■ Variable Level, EQ Circuits

The output of the record Dolby amplifier enters the variable EQ circuit. This circuit, an oscillation

circuit performed by L305 and C347 ( $f_o \approx 20\text{kHz}$ ) allows variation of the high range frequency response. Next, the variable EQ circuit is connected to the variable level circuit.

### BIAS, LEVEL, EQ Calibration

To enable the tape to perform to record and playback at its optimum capability, it is necessary for the tape in use to be set the ideal bias, EQ and recording levels. This deck enables adjustment to these proper settings.

#### ■ Amplifier (Q1314, Q1317, IC1301)

The signals from the record and playback of the Dolby amplifier operate the comparator, peak level memory circuits and amplify them to the required level.

#### ■ Peak Level Memory Circuit

When performing bias calibration, this circuit memorizes the peak playback output level. This is composed of a loop containing the waveform rectifier circuit (IC1302 $\frac{1}{4}$ ), AND circuit (IC1303), comparator circuit (IC1302-2/4), counter circuit (IC1304) and D/A conversion circuit.

#### ■ Comparator (Q1310, Q1311, Q1312, Q1313)

The comparator compares an output of amplifier (IC1301), to enable adjustments.

1. When performing bias calibration, the peak playback levels (output of memory circuit) of the playback of some inputs are compared with others.
2. When performing level calibration, output of the playback of a certain input level is compared with that of another input level.
3. When performing equalizer calibration, the playback output of a certain input is compared with the record output of another input. Then when the two inputs are matched, both the tape calibration indicators on the front panel light up.

#### ■ Test Tone Circuit

This is an oscillator which puts out a signal for the various calibration adjustments. It is a Wenbridge type employing a 2-transistor amplitude governor with an FET, and there are 3 circuits which oscillate at 400Hz, 2kHz and 10kHz, respectively.

1. The 400Hz oscillator signal is for level calibration.
2. The 2kHz signal is for bias calibration.
3. The 10kHz signal is for EQ calibration.

### Level Meter Circuit

The level meters are fluorescent display tubes which provide indication by means of a 3-chip IC and microcomputer.

The signal taken from the headphone amplifier's output terminal is connected to logarithmic direct current voltage by means of the logarithmic compressor amplifier IC801. The converted direct current voltage becomes the standard input for the other comparator, the display mode of the level meter is converted to direct current by means of D/A converter IC803.

Therefore the comparator IC puts out a control signal to the microcomputer (IC804), to always compare the level meter mode with the standard input, and functions to ensure that the standard input (record or playback signal) and the compared input (display mode) are the same.

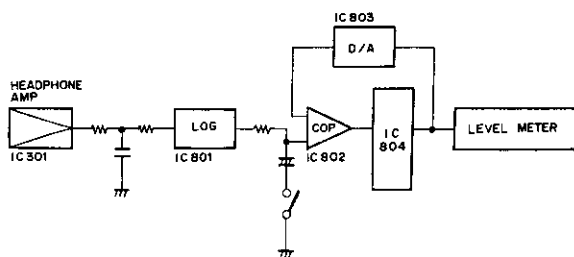


Fig. 6-3 Level meter circuit

### Counter Circuit

The counter on this unit is a fluorescent display tube driven by a 4-digit up-down counter IC.

The pulse signal for the counter is supplied from the output of the Schmidt circuit. During FF, PLAY and PLAY/REC, the Q806 is on and the Q805 is off, permitting an up count display. During REW, Q806 is off and Q805 is on, permitting the down count display.

The segment output from the counter IC passes buffer IC807 and drives the fluorescent display tubes.

After the grid output passes the dimmer circuit, it passes IC806 and drives the fluorescent tubes. When the dimmer circuit is on, the brightness is reduced by  $\frac{1}{4}$  of its ordinary intensity.

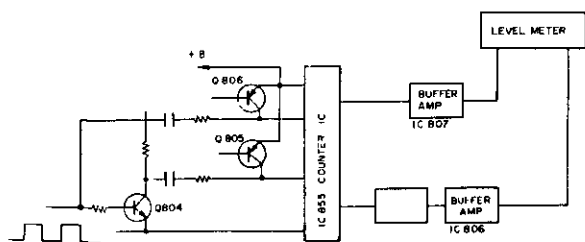


Fig. 6-4 Counter circuit

## 6-3 DOLBY NR PROCESSOR CIRCUIT

### Recording Mode Operation

1. Input signals are first applied to the MPX filter where the FM broadcasting station's pilot signal is removed, and where an 85kHz bias trap is employed to prevent mis-operation of the Dolby NR noise reduction system.
2. From the MPX filter, the signals are passed on to the buffer amplifier whose output is divided into 2 routes. The main signal is passed directly to the adding amplifier, while the sub-signal is passed via the side chain amplifier and clipper before being recombined with the main signal in the adding amplifier.
3. Besides being applied to the clipper, the side chain amplifier output is also passed via the voltage controlled amplifier and interfrating amplifier back to the side chain amplifier input, forming a variable filter circuit.
4. In addition to the above, the side chain amplifier output is further applied to a high-pass filter and rectifier where it is converted into a DC voltage for control of the voltage controlled amplifier.
5. When the level of the signal passed through the high-pass filter is low, the rectifier output DC voltage will be almost "0", resulting in a minimum turnover frequency for the variable filter. The level of the adding amplifier output will thus be 10dB (above 5kHz) higher than the level of the main signal, thereby contracting the dynamic range.
6. The clipper produces a time lag in the signal applied to the voltage-controlled amplifier, and since it is not capable of responding to sudden level changes, no uncontrolled signals will be applied to the adding amplifier.
7. When the level of the signal passed through the high-pass filter is high, the rectifier output DC voltage will also be high, and the variable filter turnover frequency will be increased. The sub-signal level will therefore become almost "0", so there will be no contraction of the dynamic range.

### Playback Mode Operation

Although each section of the Dolby NR Processor operates in the same way as during recording mode, the sub-signal is derived from the output of the adding amplifier. And since the adding amplifier is an inversion amplifier (where output phase is opposite to input phase), the sub-signal will be of opposite phase, thereby forming an NFB loop.

In Dolby NR B noise reduction systems, contraction and expansion occur within a fixed frequency range determined by the variable filter



circuit. And, in order to achieve perfectly symmetrical operation, it is necessary to fix a reference level for the operational point. This is the so-called "Dolby NR level", below which no contraction and expansion is performed.

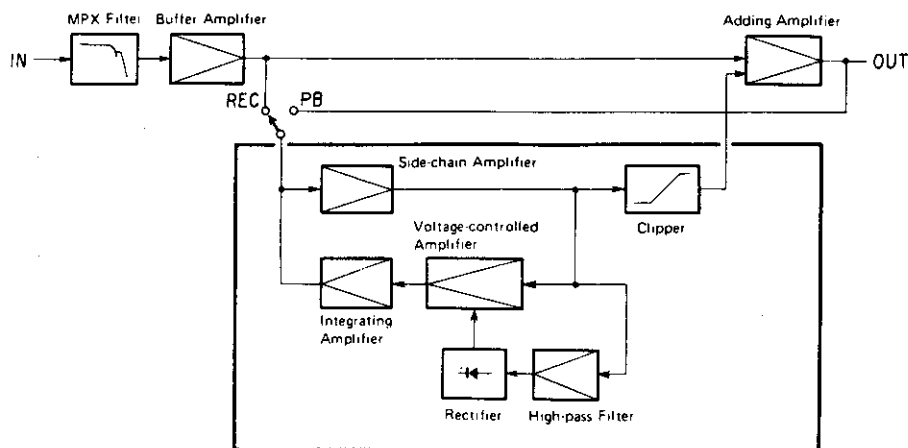


Fig. 6-5 Dolby processor circuit

## 6-4 CONTROL CIRCUIT

### Play Operation (Fig. 6-6)

1. When a cassette is loaded, the cassette detector switch S1102 is switched to the HALF side, and the tape slack removal circuit functions (this will be explained later).
2. When PLAY switch S903 is set on, the No.15 pin on IC501 reaches a high level (henceforth referred to as H level), and +B1 flows to R589 - Q531 - reel motor (RM) - R583 - Q527 and the reel motor begins rotation.
3. Also, +B1 flows to the pinch solenoid SL1101 - Q524 - Q525, and operates SL1101, starting the PLAY operation. (The capstan motor begins rotation the same time the power is turned on.)

### REC Operation (Fig. 6-6)

1. When loading a cassette on which the accidental erasure prevention tabs are attached, the accidental erasure prevention switch goes to the NO HOLE side. Then, the PLAY switch S903 and REC switch S904 come on simultaneously.
2. The No.5 pin on IC501 reaches low level (henceforth referred to as L level), the No.16 pin reaches H level, and the current flows from R434 - Q314 and Q314 comes on. When Q314 comes on, the bias oscillator circuit operates and recording function starts. Also, the pinch solenoid SL1101 and reel motor (RM) function the same as in PLAY operation.

3. In the case of a cassette from which the accidental erasure prevention tabs have been removed, S1101 goes to the HOLE side, and even if S904 goes on, since the No.5 pin on IC501 does not reach L level the REC function does not begin.

### FF/REW Operations (Fig. 6-6)

1. When the FF switch S902 is turned on, the No.22 pin on IC501 reaches H level, +B1 flows on the R589 - Q531 - reel motor - Q526 route and the reel motor begins rotation.
2. At the same time, +B1 flows to the brake solenoid SL1102 - Q523, and SL1102 operates to release the brake.
3. For REW operation, the polarity of the voltage to the reel motor is reversed, but the process is basically the same as FF operation.

### Pause Operation (Fig. 6-6)

1. As explained in the previous section, during play or REC operation +B1 is supplied to pinch solenoid SL1101, the reel motor and the capstan motor. During record operation +B is also supplied to the bias oscillator.
2. Now, if the PAUSE switch S906 is turned on, the No.15 pin on IC501 reaches L level, SL1101 does not function and the reel motor stops rotation. PLAY or REC operations are temporarily stopped.

### Timer Start Operation (Fig. 6-6)

#### ■ Play Operation

1. The timer start PLAY switch S801-1 is set to ON, and the timer turns the power supply switch on. When the power supply voltage rises completely (approx. 4 seconds later) the No.14 pin on IC501 reaches H level.
2. At the same time, current flows to Q817 via the D818 — C818 — R862 — Q817 route, and Q817 is turned on instantly. This turns on play switch S903 and play operation begins.

#### ■ REC/PLAY Operation

1. Set the TIMER START REC switch S801-2 to ON, and use the timer to turn on the power. When the power supply voltage rises completely (approx. 4 seconds later) the No.14 pin on IC501 reaches H level.
2. At the same time, in the same manner as the play operation, current flows to Q817, which comes on instantly. Then PLAY switch S903 and REC switch S904 come on simultaneously and REC/PLAY operation begins.

### Memory Stop Operation (Fig. 6-6)

To perform memory stop operation, set the MEMORY STOP switch on, and push the REW switch to rewind the tape. When the tape counter reaches the "9999" position, the rewind operation will stop.

1. Set the memory stop switch S801-4 on, and rewind switch S901 on to begin rewind. When the tape counter reaches the "9999" position, a pulse will be emitted from tape counter IC805. The pulse passes R864 to bias Q819 and turn it on. When Q819 comes on, the No.11 pin on IC501 instantly reaches L level.
2. According to the program of IC501, when the No.11 pin reaches L level, the output is stopped and all operations are halted.

### Memory Play Operation (Fig. 6-6)

To perform memory play operation, set the memory play switch to ON and push the REW switch to rewind the tape. When the tape counter reaches "9999", the unit will switch from rewind to play.

1. When the memory play switch S801-5 is set on, the No.9 pin on IC501 is boosted to L level.
2. The rewind switch is turned on, and rewind operation started. When the tape counter reaches "9999", a pulse is emitted from counter IC805. This pulse passes R864 to bias Q819 and turn it on. When Q819 comes on, the No.11 pin on IC501 instantly goes to L level.

3. According to the program of IC501, when the No.9 and No.11 pin have been boosted to L level, the set momentarily stops, and then begins play operation.

### Counter Repeat Operation (Fig. 6-6)

To perform counter repeat operation the REPEAT (counter) switch is set on, and when the tape stops (auto stop) in the PLAY or REC/PLAY modes, rewind begins automatically. When the "9999" point is reached on the tape counter, play operation resumes.

1. When the REPEAT (counter) switch S801-6 is set on, the No.8 and No.9 pins on IC501 are boosted to L level.
2. When tape run stops during PLAY or REC/PLAY operation, the No.12 pin on IC501 instantly reaches L level. (Refer to the section that follows concerning the auto stop.)
3. According to the program of IC501, when the No.8 and No.9 pins reach L level, the No.12 pin also reaches L level and the set automatically rewinds.
4. When the counter display reaches "9999", a pulse is generated from Counter IC805. This pulse passes through R864 to Q819 to bias the latter and turn it on. When Q819 comes on, the No.11 pin on IC501 instantly reaches L level.
5. According to the program of IC501, when the No.12 pin reaches L level, rewind is performed, and when the No.11 pin reaches L level during this operation the unit will assume the play mode.

### End Repeat Operation (Fig. 6-6)

To perform end repeat, set the REPEAT (end) switch to on, and perform PLAY or REC operation. When the tape is stopped (auto stop), the tape rewinds automatically and when rewound to the start, tape will commence play automatically.

1. When the REPEAT (end) switch S801-7 is set on, the No.8 and No.9 pins on IC501 are set at L level.
2. "As per step 2 of COUNTER REPEAT" the unit automatically performs rewind operation.
3. When the tape has been completely rewound, the auto stop circuit functions, and the No.12 pin on IC501 once again instantly reaches L level.
4. When the No.12 pin on IC501 reaches L level and rewind operation automatically begins, when the No.12 pin once again reaches L level during this operation IC501 is programmed to automatically set the unit to play operation.

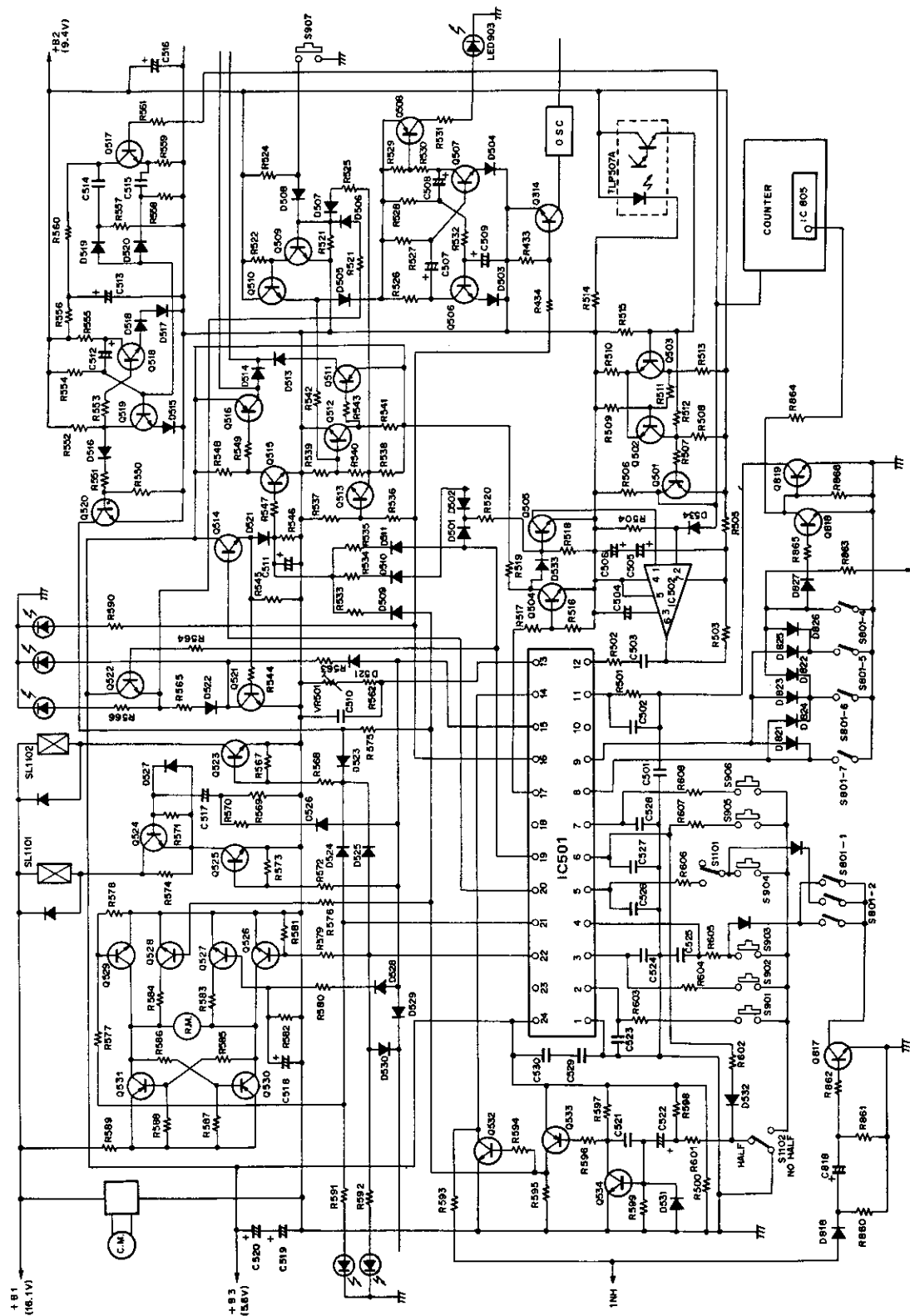


Fig. 6-6 Control circuit



### Tape Slack Removal Circuit (Fig. 6-7)

The tape transport for this unit is the closed loop dual capstan system. During PLAY or REC/PLAY operation, if slack is present in the tape, the required tape tension cannot be obtained within the loop and normal tape/head contact cannot be made. For this reason, when inserting the cassette a circuit is provided to turn the supply reel in the rewind direction and remove any slack from the tape.

1. When the cassette is inserted, the cassette switch S1102 moves to the HALF side. +B3 flows via the R598 - C522 - Q534 route and Q534, Q533 come on.
2. When Q533 comes on, +B3 flows via the Q533 - R575 - D523 - R568 - Q523 route, and Q523 comes on. By Q523 coming on, +B1 flows to the brake solenoid SL1102 route, and SL1102 functions to release the brake.
3. At the same time, +B3 flows via the Q533 - R576 - Q528 route and turns on Q528.
4. When Q508 comes on, +B1 flows via the R589 - Q530 - R586 - R584 - Q528 route to turn on Q530.
5. When Q530 and Q528 come on, +B1 flows via the Q530 - reel motor RM - R584 - Q528 route, and the reel motor turns in the rewind direction to remove the slack from the tape.
6. The time for the reel motor to rotate in the rewind direction is determined by the changing time of C522 (approx. 1 sec.). Also the rotation torque of the reel motor is determined by the value of R584.

7. In the case very little or no slack is present in the tape, overwinding of the tape may result. The following operation prevents such from happening.
8. The take-up reel rotation is detected by a photo interrupter, and its sending pulse is fed to Q517 via the Q501 - R561 - Q517 route, and Q517 is turned on and off.
9. As Q517 is turned on and off, minute pulses from C514, C515, D519, D520 are generated. The pulses cause the single stability multivibrator composed of Q518, Q519 to operate, and Q520 is turned on for a fixed period (1.5 sec.).
10. When Q520 comes on, the current which had been fed to Q523 by means of +B3 via the Q533 - R575 - D523 - R568 - Q523 route stops flowing and goes off. When Q523 goes off, brake solenoid SL1102 is released, and a brake is applied to the tape transport to prevent its overwinding.

### Pinch Solenoid Switching Circuit (Fig. 6-8)

When the play switch is turned on, a high voltage (approx. 16V) is fed to increase the strength of suction to the pinch solenoid. This circuit is to reduce the heat on the pinch solenoid when the voltage drops (to approx. 8V) after suction.

1. When the play switch S903 is set on, the No.15 pin on IC501 reaches H level. Q525 passes through R572 and is biased, turning it on.
2. At the same time, Q524 is biased via the D526 - R570 - C517 - Q524 route and comes on.

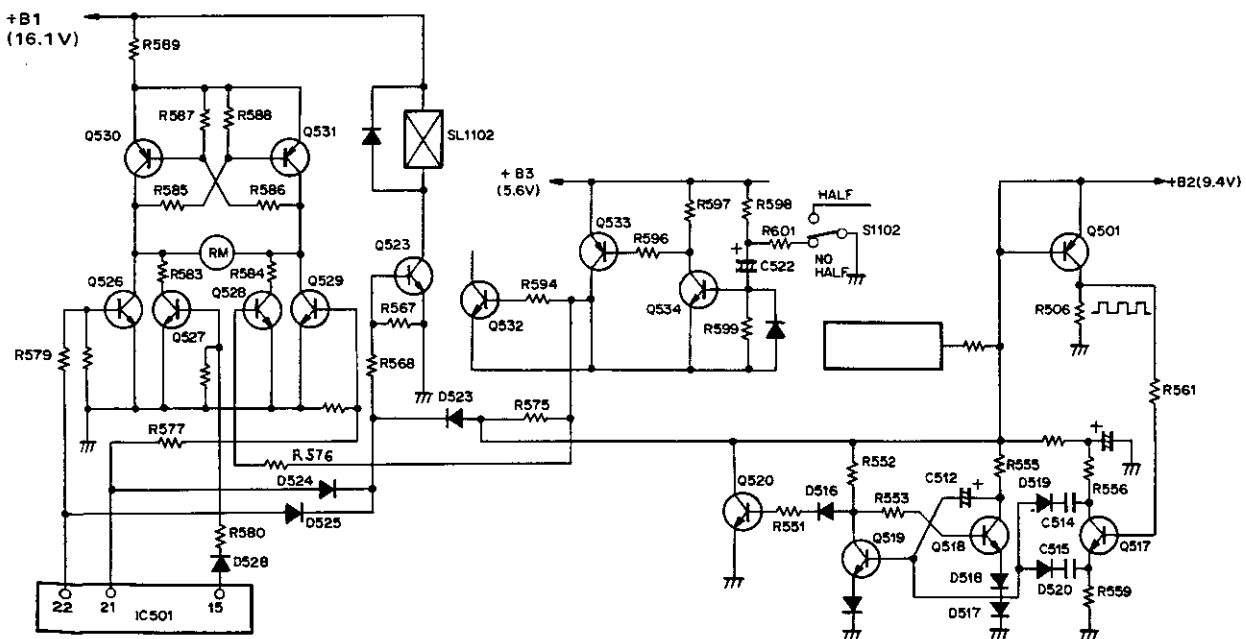


Fig. 6-7 Tape slack removal circuit



- When Q525 and Q524 come on, +B1 and a nearly equal voltage (approx. 16V) are fed to the pinch solenoid, which applies strong suction and play operation starts.
- Charging of C517 is promptly completed (after approx. 0.3 sec.) and the bias current to Q524 stops, turning it off. The current to the pinch solenoid SL1101 flows via the SL1101 - R574 - Q525 route, but a low voltage (approx. 8V) sufficient to maintain the necessary contact is fed to SL1101 by R574.

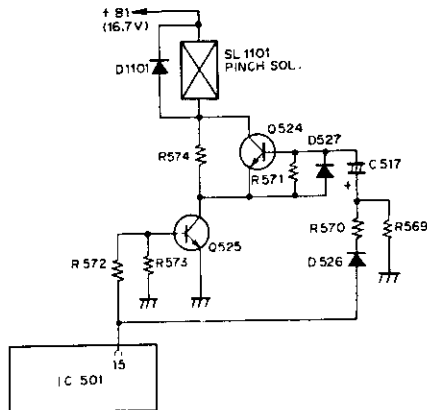


Fig. 6-8 Pinch solenoid switching circuit

**Auto Stop Circuit (Fig. 6-9)**

When the tape reaches its end in PLAY, PLAY/REC, FF or REW modes, this circuit functions to automatically release the mechanism. This circuit is jointed to the sensing switch employing a photo interrupter, and the take-up reel by a belt. It detects the tape motion and when the tape halts it releases the mechanism.

- During tape run, a pulse is generated from the photo interrupter (TLP507A). This sensing pulse is a Schmidt circuit composed of Q501, Q502, Q503, which rectifies the waves, passes them through D534 and is fed to the No.2 pin on IC502.

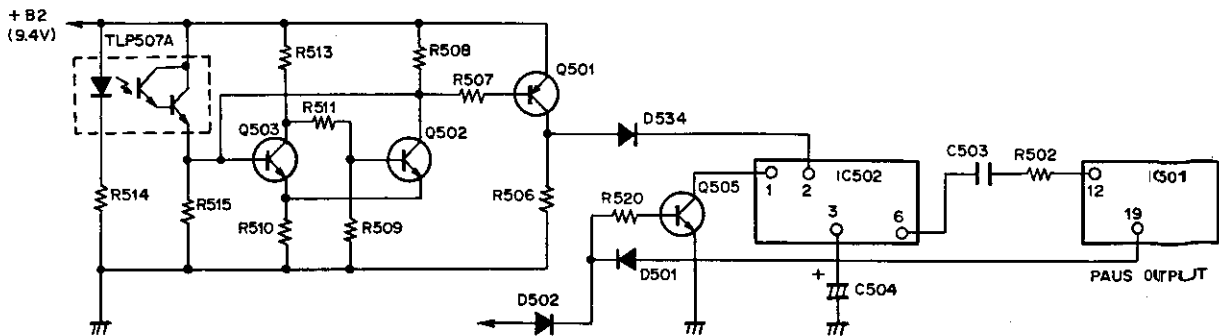


Fig. 6-9 Auto stop circuit

- When a pulse is fed to the No.2 pin on IC502, the No.6 pin reaches H level. However, since the pulse from the photo interrupter stops if the tape run halts, it reaches L level after approx. 2.5 seconds. The time it takes for the No.16 pin to change to L level is established by the condenser C504 attached to the No.3 pin.
- When the No.6 pin on IC502 reaches L level, the No.12 pin on IC501 also reaches L level via the R502 - C503 route, and the mechanism is released.
- When the power switch is turned on or the pause is operated, the No.1 pin on IC502 maintains L level by means of Q505, and prevents the No.6 pin from reaching L level.

**6-5 MUTING CIRCUIT**

This circuit prevents clicks and other noises generated during the on and off switching of the unit.

**When Switching The Power On (Fig. 6-10)**

- When the power switch is set to on, the emitter of Q1601 immediately generates approx. 5.6V. At this time since the current does not flow to C1603, the potential at both terminals of C603 is 0V. Thus, in the Schmidt circuit composed of Q1602, Q1603, the former is off and the latter on.
- Then, since Q1604 is for off and Q1605 is for on, +B 3 passes through D101 and flows with Q117, Q119, Q121 as its base. Q117, Q119 and Q121 come on and short the line output and headphone amplifier output.
- On the one hand, C1607 and C1615 are charged rapidly. As C1615 is charged, since the base potential of Q1608 becomes -0.6V, it goes off. Thus the potential at both terminals of ZD1603 becomes 6V and this current passes through R1613 to charge C1603.
- The charging of C1603 is soon complete (about 4 seconds after the power switch is turned on),



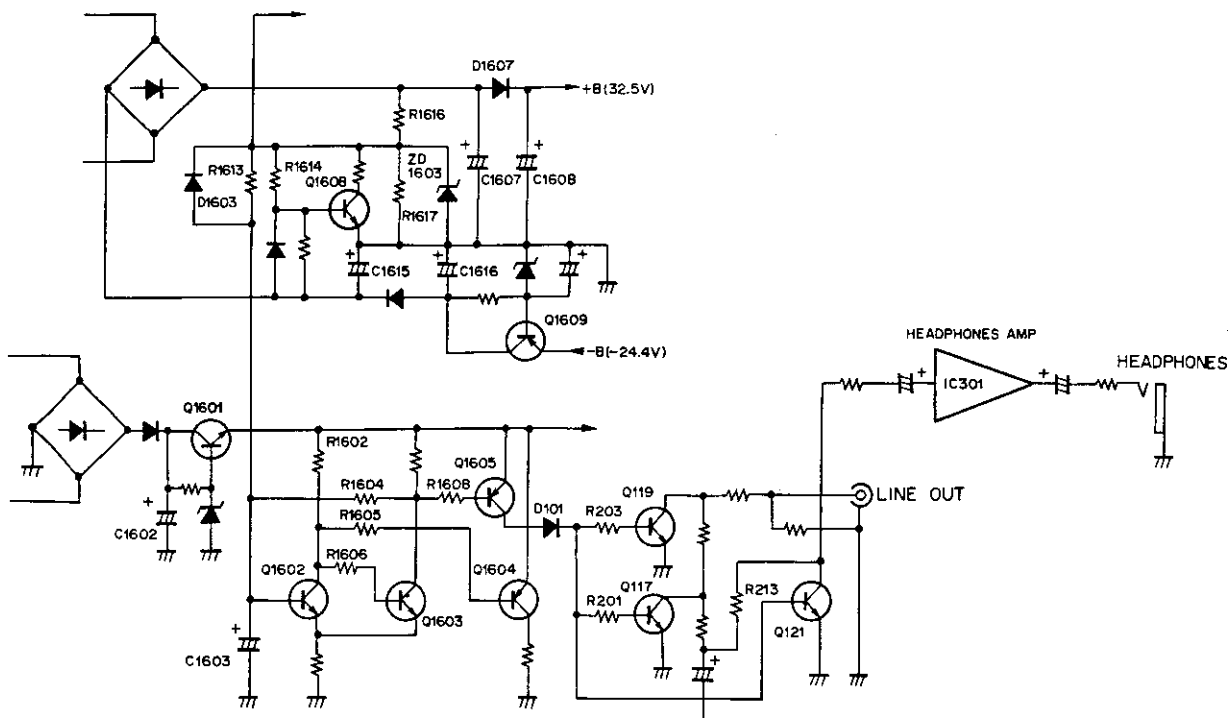


Fig. 6-10 Muting circuit 1

the Q1602 base potential rises, and as the Schmidt circuit reaches its turnover level, Q1602 comes on and Q1603 goes off. As Q1604 comes on, Q1605, Q117, Q119 and Q121 go off, and the muting of the line output is cancelled.

#### When Switching The Power Off (Fig. 6-10)

1. When switching the power off, the charge to C1607, C1615 is quickly discharged. Then the charge of C1603 passes through D1603, R1614 to flow to Q1608, turning it on.
2. The base potential of Q1602 falls due to the discharging of C1603 and the Schmidt circuit turns over to set Q1602 off and Q1603 on. Q1604 goes off and Q1605, Q117, Q119 and Q121 come on, and short the line input and headphone amplifier input.

Also, after turning off the power switch, the electrical charge of C1602 acts as a power source for working the various circuits.

#### Muting During FF, REW And STOP Operations (Fig. 6-11)

This circuit prevents noises (i.e. motor noise) from occurring during FF, REW and STOP operations.

1. During FF, REC and STOP operations, since the No.20 pin on IC501 reaches H level, the current flows to Q514 and turns it on.

2. With Q514 on, Q515, Q516 come on. +B3 takes the Q516 - S102-3 - D102 - R201 route to turn on Q117, and the Q516 - S102-3 - D102 - R203 route to turn on Q119, thus muting the line output.
3. At the same time, +B3 takes the Q516 - D514 - R373 route to bias Q303 and turn it on, thus muting the record amplifier.
4. When monitor switch S102-3 is set to the SOURCE position, the line output is not muted.

#### Muting When Switching From STOP To PLAY or PLAY/REC (Fig. 6-11)

This is a circuit to suppress noise during PLAY and REC operation.

1. When the unit is in the STOP mode, Q117, Q119 and Q303 are on, thus muting the line output and the record amplifier. Also, C511 is in the charged state (refer to the previous section on muting during FF, REW, STOP operations.).
2. By setting the PLAY switch to on, the No.20 pin on IC501 reaches L level and the current stops flowing to Q514 to turn it off. As Q514 goes off, Q515, Q516, Q117, Q119 and Q303 go off, and the muting function stops.
3. However, at the same time Q514 goes off, the electrical charge on C511 is fed to R546 and

discharges. While C511 is discharging (approx. 1 sec) Q515, Q516, Q117 and Q119 come on, and mute the switching noise produced when the unit is switched to PLAY (approx. 1 sec.)

- During PLAY operations, +B3 flows on the R538 - R540 - Q512 route, and Q512 turns on Q511. Then +B3 flows via the Q511 - D513 - R373 - Q303 route, and Q300 comes on to mute the record amplifier.
- When switching from the STOP mode to REC, the muting functions the same as in points 1-3, but since the No.16 pin on IC501 reaches H level, it passes R536 to bias Q513 and turn it on. As Q513 comes on, Q512, Q511 and Q303 go off, and the record amplifier muting is cancelled.

**Bias Muting Circuit (Fig. 6-11)**

When the PAUSE is operated during recording or when the record controls are released, the relative speed of the tape and head increases, and this in some cases causes the bias signal to be recorded.

When the tape is played back at the rated speed, this recorded bias signal can be heard as a "click" noise. The purpose of the bias muting circuit is to prevent this phenomenon.

- Bias muting functions in the same manner as the muting operates when the unit is set from STOP to RECORD. (Refer to muting during switching from the STOP mode to PLAY or PLAY/REC.)
- When the pause switch is set on during recording operation, the No.19 pin on IC501 reaches H level and takes the route D510 - R534 - R547 - Q515 to turn on Q515. When Q515 comes on, Q516 also comes on.
- As Q516 comes on, +B3 flows via the Q516 - R432 - Q317 route to bias Q317 and turn it on.
- As Q317 comes on, Q315 also comes on, and since the record bias takes the C339 - Q315 - R432 - Q317 route to bias Q317 and turn it on.

- By pressing the pause switch again, the unit is released from the PAUSE mode, and recording continues. However, even if the No.19 pin on IC501 reaches L level, no bias is fed to the record head during the time (approx. 1 sec.) that C511 discharges, and turns on Q515, Q516, Q317, Q315. The discharge of C511 ends soon and Q516 goes off, permitting the bias signal to be fed to the record head.

**REC MUTE Operation (Fig. 6-11)**

This is a circuit which enables the making of non-recorded segments without having to turn off the mic or line input volume. This is employed to create the unrecorded segment on the tape required for the operation of the music sensor (PMS) playback. Also, when the REC MUTE is pressed, the REC MUTE indicator lamp flashes (at approx. 1 sec. intervals).

- By holding the REC MUTE switch on during recording the current by which the R525 - D508 route biases Q509 is stopped and Q509 goes off.
- As Q509 goes off, +B2 passes through R522 and biases Q510 to turn it on.
- As Q510 comes on, +B2 takes the Q510 - D505 route, and the flip-flop circuit composed of Q506, Q507 functions. By this, Q508 comes on and off repeatedly, +B2 takes the Q510 - D505 - Q505 - R531 route to make LED 903 flash (at approx. 1 sec. intervals).
- At the same time, +B2 takes the Q510 - R542 route to bias Q520 and turn it on. As Q512 comes on, Q511 will also come on.
- As Q511 comes on +B3 will take the Q511 - D513 - R373 route to bias Q303 and turn it on, and this mutes the record amplifier.

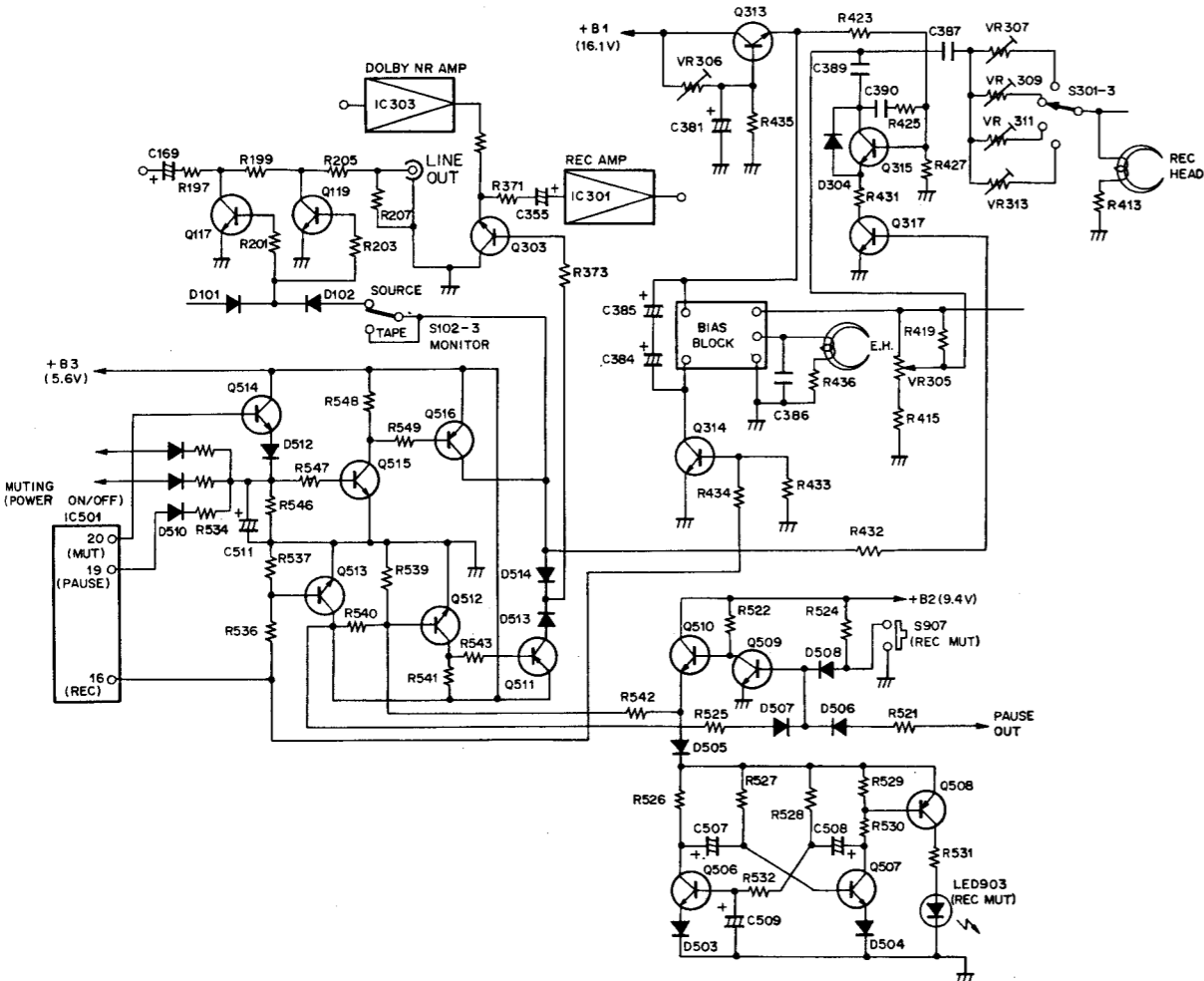


Fig. 6-11 Muting circuit 2

**Pitch Control Circuit (Fig. 6-12)**

This enables a  $\pm 6\%$  variation of the fixed tape speed during playback. However, when in the PLAY/REC setting, variation from the fixed tape speed is not possible.

- During record operation, the No.16 pin on IC501 reaches H level, and the unit is automatically quartz-locked at a fixed speed (standard speed). (LED1101 comes on.)
- During play operation, when VR1101-1,2 is at its center click position, the coupled S1103 comes on and the unit is quartz-locked at a fixed speed. (LED1101 comes on.)
- During PLAY operation, when the VR1101-1,2 is in other than the center click position, pitch control is possible, and the tape speed can be adjusted in a range of  $\pm 6\%$  or greater. (LED1101 does not come on.)

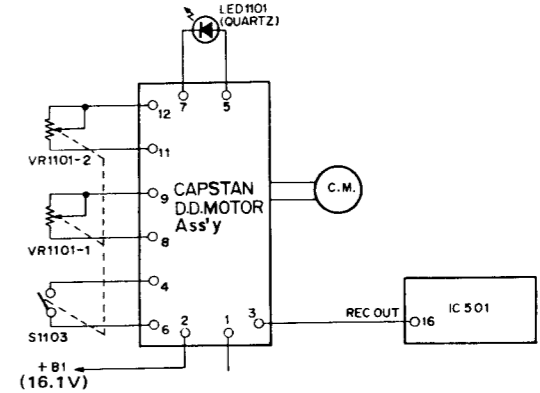
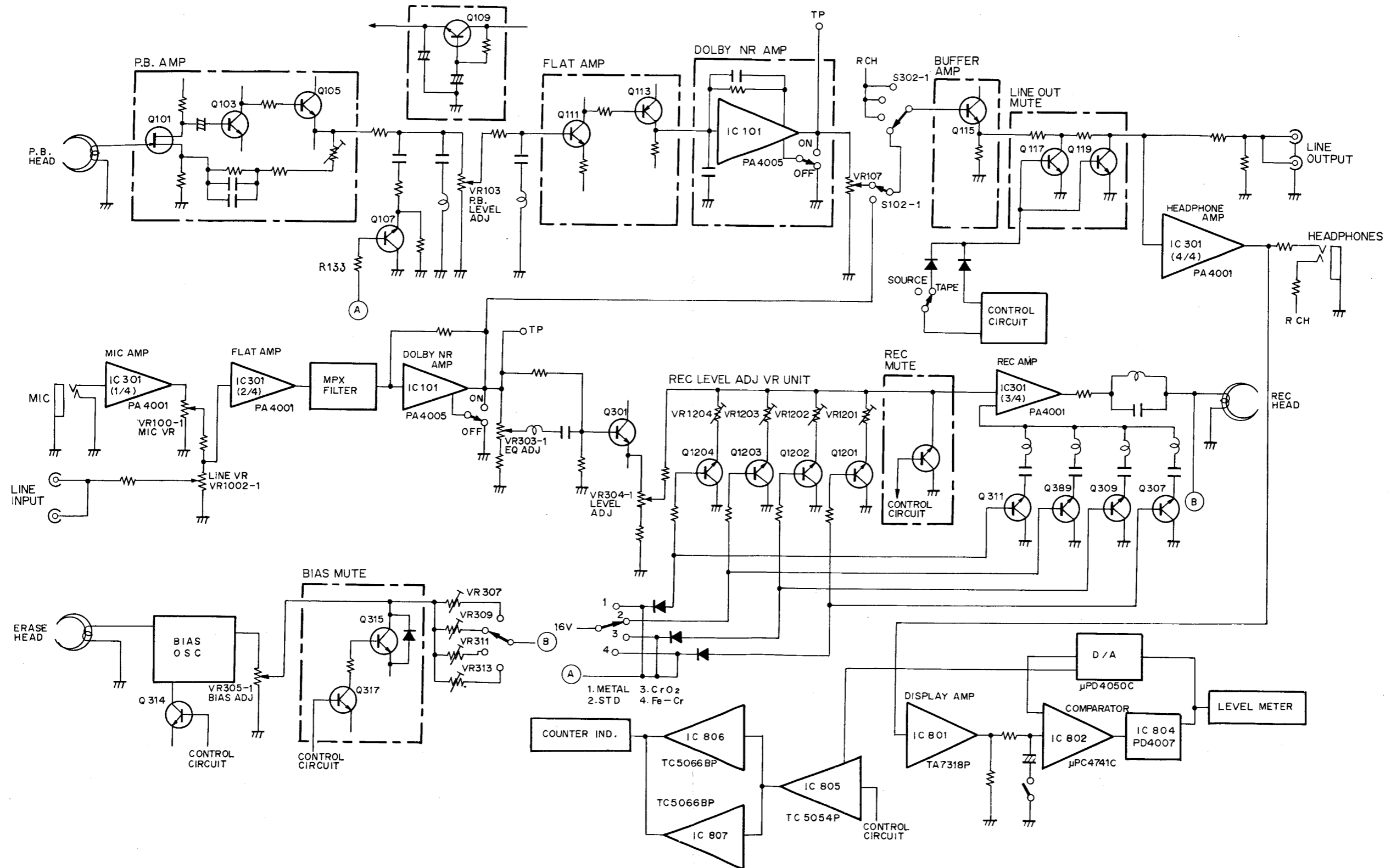


Fig. 6-12 Pinch control circuit

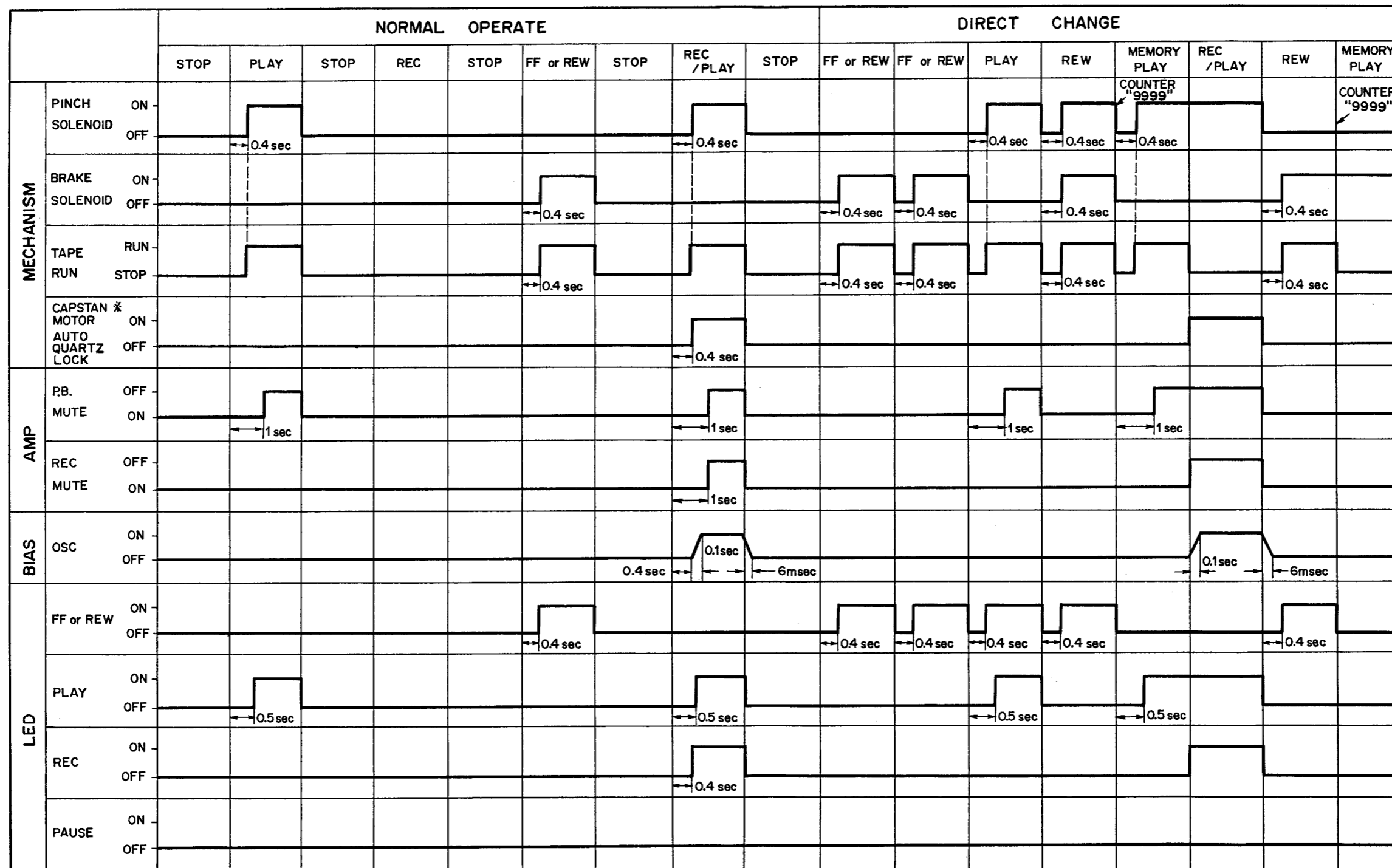
# 7. BLOCK DIAGRAM





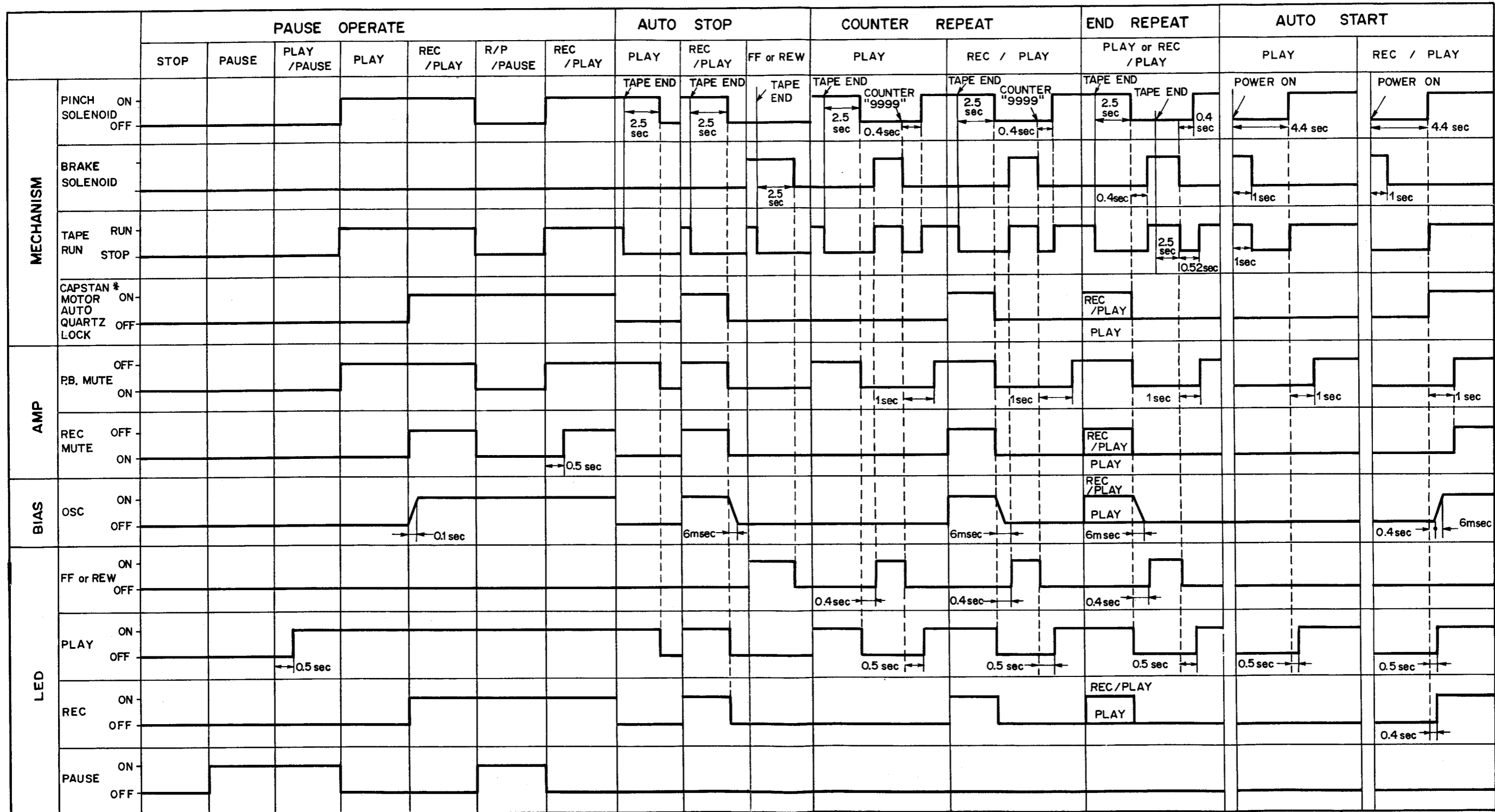
# 8. TIMING CHART

CHART 1



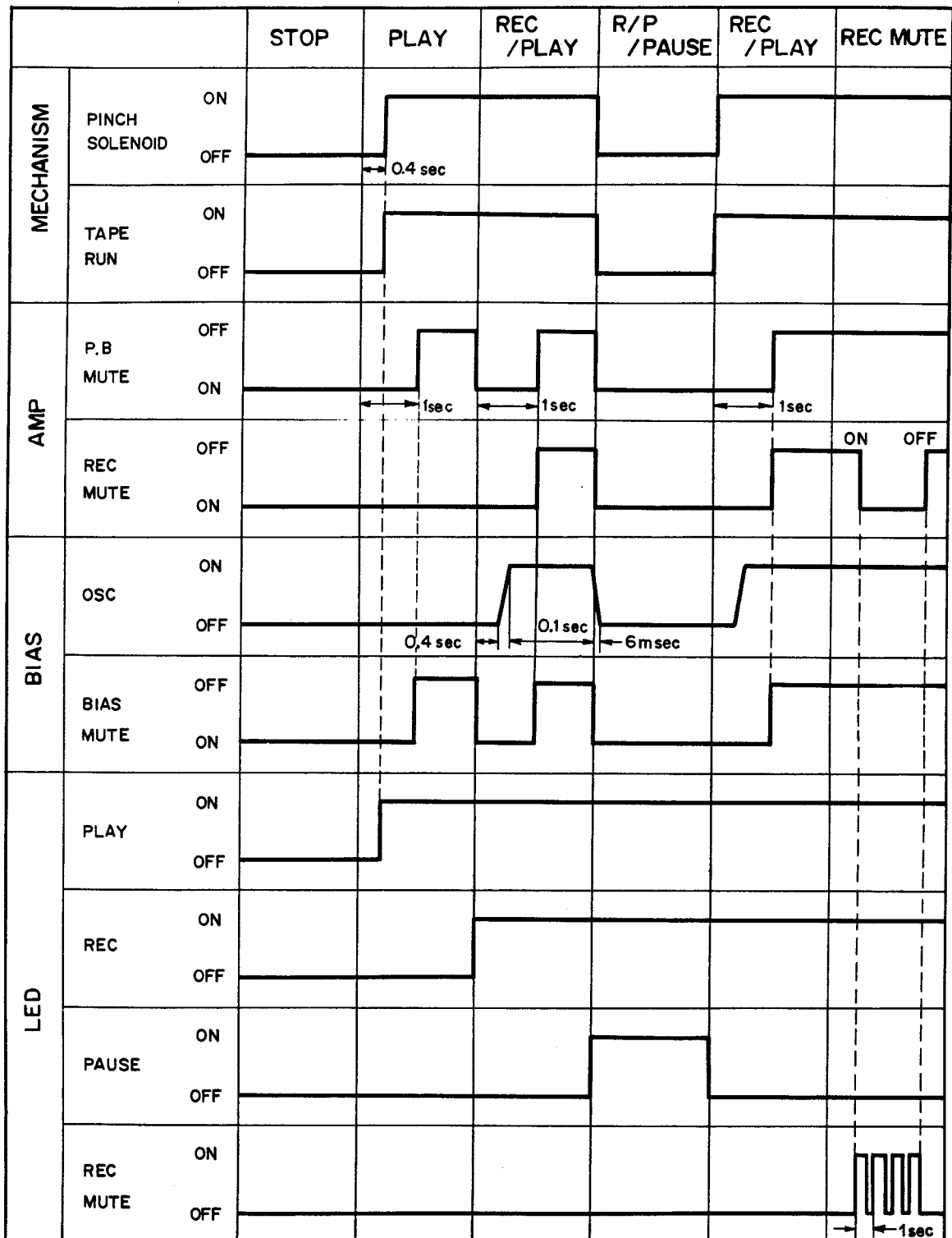
\* When the pitch controls are not at the center click-stop position.  
 (When the pitch control knobs are at the center click-stop position, the circuit stays on when the power is on.)

CHART 2



\* When the pitch controls are not at the center click-stop position.  
 (When the pitch control knobs are at the center click-stop position, the circuit stays on when the power is on.)

CHART 3



## 9. MECHANICAL ADJUSTMENTS

### 9-1 PINCH ROLLER PRESSURE ADJUSTMENT

1. Put the unit into the PLAY condition.
2. Using a tension gauge (Stick weighing instrument: approximately 500g full scale), gently drop the pinch arm (Fig. 9-1).
3. The force necessary to separate the pinch roller from the capstan shall be between 360 and 440g on the take-up side, and between 90 and 130g at the supply side. If outside these values, reset the pinch pressure spring.
4. If Paragraph 3 cannot be satisfied by resetting the pinch pressure spring, replace it with a new one.

### 9.2 REEL BASE TORQUE

Reel base torque during play, fast forward, and rewind modes is measured by a torque meter. Allowable torque ranges are tabulated in Table 1. If measured values lie outside these ranges, clean both reel bases and idlers, plus other areas such as the pinch roller contacting surface, and then measure again. If the measured values still lie outside the allowable ranges, replace the supply reel base full assembly (RXB-189) and/or take-up reel base full assembly (RXB-190).

Table 1

Take-up Reel Base	
Play take-up torque	35 ~ 50 g.cm
Fast forward take-up torque	80 ~ 100 g.cm
Rewind back tension torque	3 ~ 9 g.cm
Supply Reel Base	
Play back tension torque	4 ~ 8 g.cm
Rewind take-up torque	80 ~ 100 g.cm

### 9-3 TAPE GUIDE ADJUSTMENT

#### Adjustment Standard

Put the unit into the PLAY mode, and check that the tape is running normally without curling around the hand guides (Fig. 9-2).

#### Method of Adjustment

If the tape curls around the head guides, turn the height adjuster to the left or right so as to obtain a suitable tape height.

#### Post-adjustment Check

Put the unit into the PLAY mode, and check that the tape does not come into contact with the head guide.

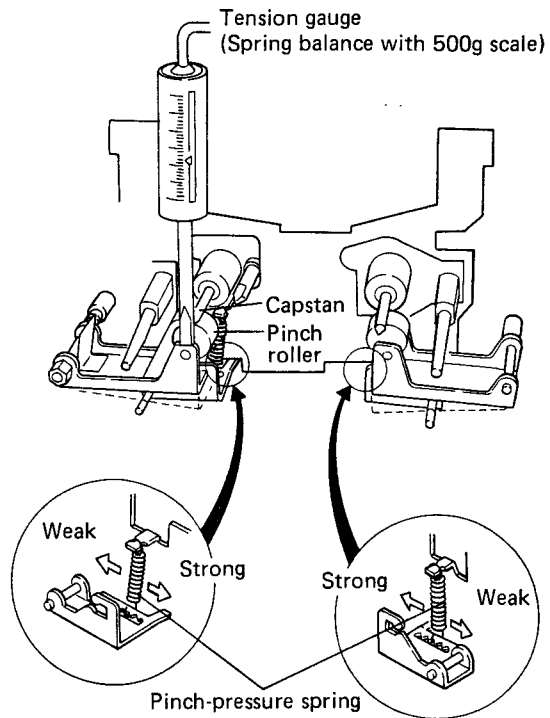


Fig. 9-1 Pinch roller pressure adjustment

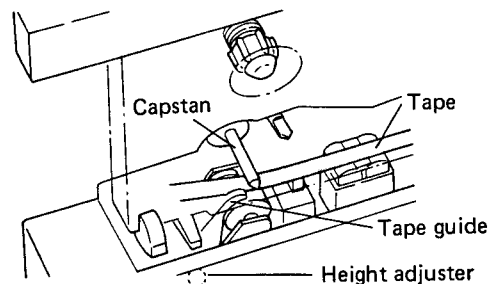


Fig. 9-2 Tape guide adjustment

**9-4 CAPSTAN MOTOR LOCK RANGE ADJUSTMENT**

**Adjustment Standard**

The phase deviation between CH1 and CH2 in diagram 8-5 should be 0.3ms or less.

**Adjustment Method**

With the mechanism assembly in PLAY, set in the quartz lock status, observe the wave forms of the two channel oscilloscope, and confirm the phase deviation between CH1 and CH2.

If the deviation is outside the standard, adjust VR1702 until the phases coincide as in diagram 9-3. Finally, lock VR1702 with paint.

**9-5 PITCH CONTROL, CENTER CLICK POSITION SPEED ADJUSTMENT**

1. Connect the frequency counter to the TP terminal of the D.D. motor control assembly.
2. Insert test tape STD-301 (for testing tape speed and wow and flutter) and put the unit in the PLAY mode.
3. Put the pitch control volume in the center click position (quartz lock ON) and measure the tape speed. Next, turn the quartz lock OFF (short terminals No.1 and 4 of the motor control assembly).
4. Adjust VR1701 of the D.D. motor control assembly so that the difference between tape speed with the quartz lock OFF is not more than  $\pm 6\text{Hz}$  different from the quartz lock ON tape speed (Fig. 9-4).

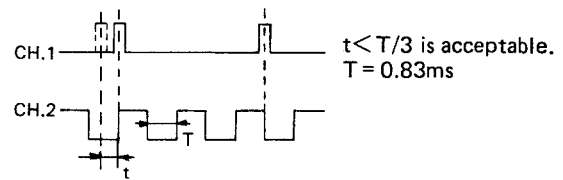
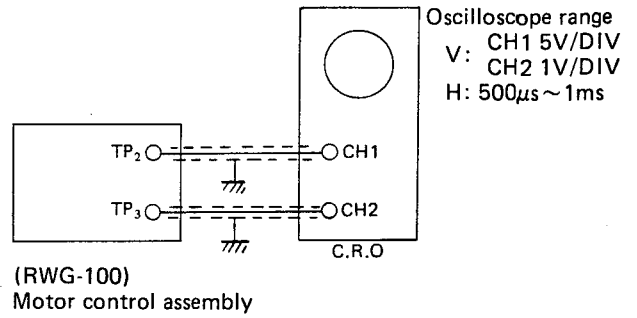


Fig. 9-3 Capstan motor lock range adjustment

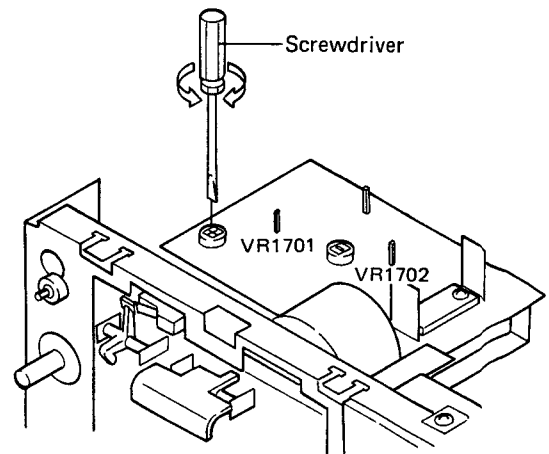


Fig. 9-4 Pitch control, center click position speed adjustment

# 10. ELECTRICAL ADJUSTMENTS

Before performing electrical adjustments, check the following items.

1. Ensure that all mechanical adjustments have been completed.
2. Adjust the measuring level to 0dBv 1V, and place a 50kΩ (47 to 52kΩ) dummy resistor across the line output terminals.
3. Perform adjustments using the A-side (the side with the label) of the specified test tapes.
  - STD-331A: For overall replay
  - STD-341A: For replay adjustments
  - STD-601 : STD blank tape
  - STD-603 : CrO<sub>2</sub> blank tape
  - STD-604 : METAL blank tape
4. Obtain the following measuring instruments. Millivoltmeter, low frequency generator oscilloscope, attenuator.
5. Unless otherwise defined, the term "recording condition" as used in this manual shall mean the condition when a cassette shell is loaded, and both the PLAY and REC switches are pressed.
6. Unless otherwise specified, adjustments shall be performed on both L and R channels.
7. Clean the heads and also remove any residual magnetism using a head demagnetizer.
8. Always perform adjustments in the specified sequence. If the sequence is changed, the performance of the unit may be degraded.

## Adjustment Sequence

1. Head angle adjustment
2. Playback equalizer adjustment
3. Playback level adjustment
4. Meter adjustment
5. Erase current adjustment
6. Confirmation and adjustment of bias trap
7. Bias adjustment
8. Adjustment of record and playback frequency response
9. Record level adjustment
10. Confirmation of tape calibration adjustment
11. Adjustment of Dolby NR recording
12. Adjustment of Dolby NR playback

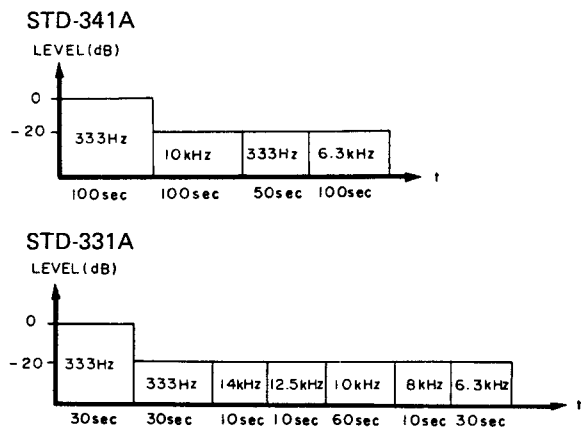


Fig. 10-1 Recorded contents of test tape

## 10-1 HEAD ANGLE ADJUSTMENT

1. Connect an mV meter to the line output terminals. Set the output volume to its maximum and the tape selector switch to the STD position.
2. Play the STD-331A test tape's 10kHz, -20dB signal and turn the head angle adjustment screw A (shown in figure 10-2) so that both the left and right channels are at their maximum outputs.
3. After adjustment, be sure to lock the screw in position using "screw tight green" No.300.

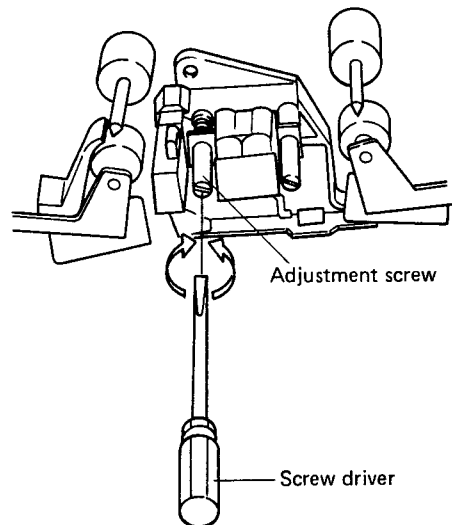


Fig. 10-2 Head angle adjustment

## 10-2 PLAYBACK EQUALIZER ADJUSTMENT

1. Connect an mV meter to the line output terminals. Set the tape selector switch to STD and set the semi-fixed volume VR103 (L ch) and VR104 (R ch) used for output level adjustment to their maximum levels.
2. Play back the 333Hz, -20dB signal from test tape STD-341A and read the display of the mV meter.
3. Play back the same tape's 10kHz, -20dB signal and adjust the EQ adjustment volume VR101 (L ch) and VR102 (R ch) so that the output deviation is within +1dB (+1dB ~ -0.3dB) of the previous 333Hz signal.
4. Confirm that the output deviation of the same tape's 14kHz, -20dB playback signal is within the range of 2.7dB (-0.5 ~ +2.2dB) of the previous mV meter reading of the 333Hz signal.
5. Move the tape selector switch to the METAL, CrO<sub>2</sub> and Fe-Cr positions. Confirm that the mV meter readings for the 10kHz, -20dB test tape playback signals in each position are within -4.3 ±1dB range of the reading for the STD position.

## 10-3 PLAYBACK LEVEL ADJUSTMENT

Because this adjustment determines the Dolby NR playback level, it should be performed precisely.

1. Connect an mV meter to the No.20 (L ch) and No.21 (R ch) TP terminals of the mother unit.
2. Play back the 333Hz, 0dB signal on the STD-341A test tape and adjust the VR103 (L ch) and VR104 (R ch) so that the mV meter indicates 1dBv (1.12V).
3. Insert an empty cassette into the unit and set it to the playback mode. Feed in a 333Hz signal from the No.5 (L ch) and No.6 (R ch) TP terminals on the mother unit.
4. Adjust the input level so that the readout of the mV meter connected to No.20 (L ch) and No.21 (R ch) TP terminals is -3dBv (710mV).
5. Set the line output to the click position, and adjust VR107 (L ch) and VR108 (R ch) so that the output level of the line input is -7dBv (447mV).

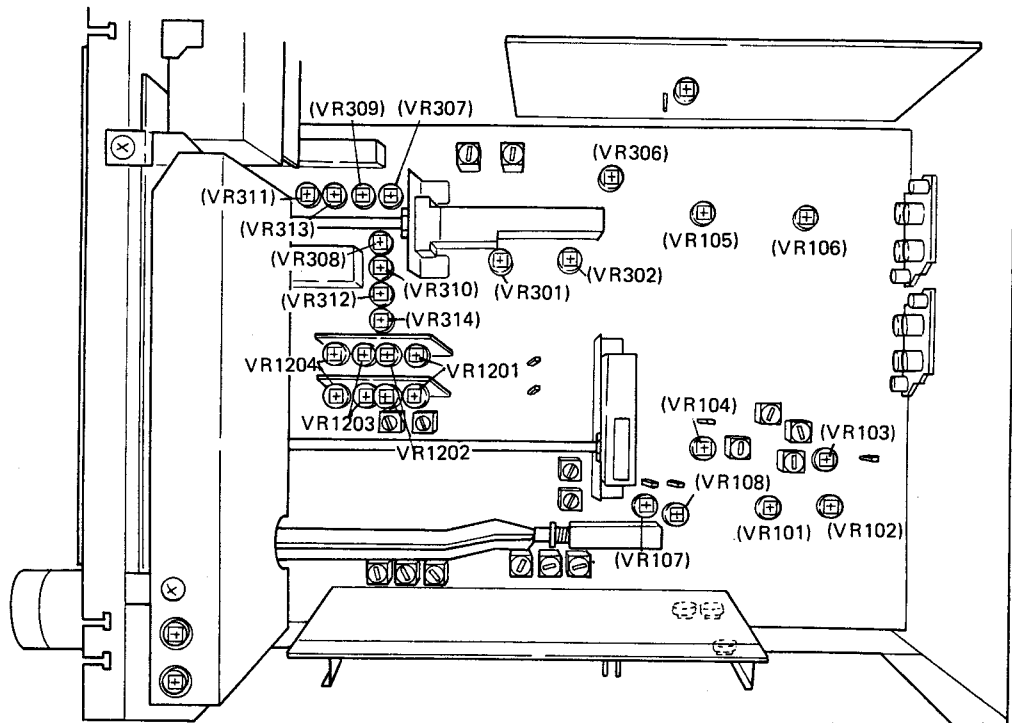


Fig. 10-3 Adjustment points

#### 10-4 METER ADJUSTMENT

1. Set the meter switches (PEAK, PEAK HOLD, AVERAGE) to OFF, and the MONITOR switch to SOURCE.
2. Connect an mV meter to the No.40 (L ch) and No.41 (R ch) TP terminals on the mother unit.
3. Feed a 333Hz, -10dBv (316mV) signal to the line input terminals and adjust the line input volume so that the mV meter displays -3dBv (710mV).
4. Turn the VR801 (L ch) and VR802 on the display amplifier unit in a clockwise direction from MIN, and stop at the point where the level meter position reaches 0dB.
5. Shut off the line input volume to "0" and raise the input of the line input terminals.
6. Confirm that when the level meter readout is at -20dB, the meter displays -23 (+3 ~ -2dBv) (100mV ~ 94mV), and when the level meter is at +5dB the mV meter displays 2 ± 2dBv (1V ~ 997mV).

TP signal	Level meter indication
+2 ± 2dBv	+5dB
-23 ± 3/2 dBv	-20dB

Table 1

#### 10-5 ERASE CURRENT ADJUSTMENT

1. Set the line input volume to the minimum and connect an mV meter to the No.103 and No.102 (GND) terminals on the mother unit.
2. Set the unit to the RECORD mode without recording any signal (or by running an unrecorded tape).
3. Adjust VR306 so that the mV meter displays 160mV (160mA). Take care at this time, since the measured frequency is very high because of the bias frequency.

#### 10-6 CONFIRMATION AND ADJUSTMENT OF BIAS TRAP

1. Connect an mV meter and oscilloscope to the No.20 (L ch) and No.21 (R ch) TP terminals on the mother unit.
2. Set the tape selector switch to the STD position and the MONITOR switch to TAPE.
3. Insert test tape STD-603 and record without any signal.
4. Move the L101 (L ch) and L102 (R ch) high enough so that the bias leakage waveforms can be confirmed on the oscilloscope.
5. Adjust L103 (L ch) and L104 (R ch) so that

the bias leakage waveforms on the oscilloscope are at their lowest level.

6. Next, re-adjust the L101 (L ch) and L102 (R ch) moved in step 4 so that the bias leakage waveforms are at their lowest level.
7. Connect an mV meter to the No.107 - No.53 (GND) (L ch) and the No.107 - 74 (GND) (R ch) TP terminals on the mother unit.
8. Set the tape selector switch to the METAL position, and set the unit to the record mode.
9. Adjust L307 (L ch) and L308 (R ch) so that the mV meter displays the lowest figure.

#### 10-7 BIAS ADJUSTMENT

- Set each of the tape calibration knobs to the following positions:  
 MODE - OFF, BIAS (VR305) - 0 (click point)  
 LEVEL (VR304) - 0 (click point),  
 EQ (VR303) - 0 (click point).

##### ■ Adjustment For STD Tape

1. Connect an mV meter to the line output terminals, set the tape selector switch to STD, and the monitor switch to the SOURCE position.
2. Set the bias adjustment volume VR309 (L ch) and VR310 (R ch) to their minimum levels and the record level adjustment volume VR1203 (L ch, R ch) to their respective mechanical center points.
3. Feed a 2kHz, -10dBv (316mV) signal into the line input terminals, and adjust the line input volume so that the mV meter shows -14.5dBv (188mV).
4. Using the STD-601 test tape, record the signal in step 3, and adjust the VR309 (L ch) and VR310 (R ch) so that during playback it passes its highest mV meter reading (playback output) and then drops 0.6dB.

##### ■ Adjustment For Metal Tape

1. Connect an mV meter to the line output terminals, set the tape selector to metal and the MONITOR switch to SOURCE.
2. Set the bias adjustment volume VR307 (L ch) and VR308 (R ch) to the minimum, and the record level adjustment volume VR1204 (L ch, R ch) to their respective mechanical center positions.
3. Feed a 2kHz, -10dBv (316mV) signal to the line input terminal and adjust the line input volume so that the mV meter indicates -14.5dB (188mV).
4. Record the signal in step 3 on the STD-604 test tape, and adjust the VR309 (L ch) and VR310 (R ch) so that during playback the mV meter reading (playback output) passes its highest value and drops 0.6dB.



■ **Adjustment For CrO<sub>2</sub> Tape**

1. Connect an mV meter to the line output terminals, set the tape selector switch to CrO<sub>2</sub> and the MONITOR switch to the SOURCE position.
2. Set the bias adjustment volume VR311 (L ch) and VR312 (R ch) to their minimum, and the record level adjustment volume VR1202 (L ch, R ch) to their respective mechanical center positions.
3. Feed a 2kHz, -10dBv (316mV) signal to the line input terminals, and adjust the line input volume so that the mV meter displays -14.5dB (188mV).
4. Using test tape STD-603, record the signal in step 3, and adjust the VR311 (L ch) and VR312 (R ch) so that during playback the mV meter reading (playback output) passes its highest level and drops 0.6dB.

■ **Adjustment For Fe-Cr Tape**

1. Connect an mV meter to the line output terminals, set the tape selector to Fe-Cr and the monitor switch to SOURCE.
2. Set the bias adjustment volume VR313 (L ch) and VR314 (R ch) to the minimum, and the record level adjustment volume VR1202 (L ch, R ch) to their respective mechanical center positions.
3. Feed a 2kHz, -10dBv (316mV) signal to the line input terminals, and adjust the line input volume to that the mV meter displays -14.5dB (188mV).
4. Using Fe-Cr tape (SONY DUAD C-60), record the signal in step 3, and adjust the VR313 (L ch) and VR314 (R ch) so that during playback the mV meter reading (playback output) passes its highest level and drops 0.6dB.

**10-8 ADJUSTMENT OF RECORD AND PLAYBACK FREQUENCY RESPONSE**

■ If the surrounding temperature is below 15°C during adjustments, the adjustment value in the brackets ( ) should be applied.

1. Set the tape selector switch to STD and the Dolby NR switch to the OFF position.
2. Connect an mV meter to the line output terminals, and feed a 333Hz, -30dBv (31.6mV) signal to the line input terminals.
3. Set the MONITOR switch to SOURCE, and adjust the line input volume so that the mV meter reads -34.5dBv (18.8mV).
4. Record the 333Hz signal on test tape STD-601, and set the monitor switch to TAPE.
5. Next, record and play back the 10kHz signal simultaneously, and adjust VR309 (L ch) and

VR310 (R ch) so that the deviation in playback output in relation to the 333Hz signal is +0.5dB (+1dB).

6. Confirm that the record and playback frequency response is within the range shown in page 40.
7. Set the tape selector switch to metal and record and play back the 333Hz and 10kHz signals on test tape STD-604 as done in the previous step. Then, adjust VR307 (L ch) and VR308 (R ch) so that the deviation of the playback output of the 10kHz signal is within +0.5dB (+1dB) of the 333Hz signal.
8. Set the tape selector switch to CrO<sub>2</sub> and record and play back the 333Hz and 10kHz signals on test tape STD-603. Then, adjust VR311 (L ch) and VR312 (R ch) so that the deviation of the playback output of the 10kHz signal is within +0.5dB (+1dB) of the 333Hz signal.
9. Set the tape selector switch to Fe-Cr and record and play back the 333Hz and 10kHz signals on Fe-Cr tape (SONY DUAD C-60). Then adjust VR313 (L ch) and VR314 (R ch) so that the deviation of the playback output of the 10kHz signal is within +0.5dB (+1dB) of the 333Hz signal.
10. After the above adjustments have been completed, if the frequency response does not meet the standards shown in page 40, adjust according to the method below.

■ If the frequency response above 8kHz is too high or too low, adjust by also matching it with the peaking coil.

Tape	Peaking coil
METAL	L <sub>313</sub> (L ch) L <sub>314</sub> (R ch)
STD	L <sub>309</sub> (L ch) L <sub>310</sub> (R ch)
CrO <sub>2</sub>	L <sub>311</sub> (L ch) L <sub>312</sub> (R ch)

Table 2

- If the 1kHz ~ 10kHz response for the tapes shows a gradual drop or rise, repeat the 10-7 "BIAS ADJUSTMENT". At this time, allow the bias point for all tapes to go to 0.6 ± 0.5dB at 2kHz.
11. After 10-9 "ADJUSTMENT OF RECORDING LEVEL" has been completed, record and play back the tape within the fixed frequency range in the standards of page 40, and confirm that they are within the standards.

**NOTE:**

Because the left and right channels on each bias adjustment volume are affected, repeat the adjustments 1 or 3 times.

## 10-9 RECORD LEVEL ADJUSTMENT

1. Set the Dolby NR switch to OFF, and connect an mV meter to the No.40 (L ch) and No.41 (R ch) TP terminals on the mother unit.
2. Feed a 333Hz, -10dBv (316mV) signal to the line input terminals, and adjust the line input volume so that the mV meter indicates -3dBv (710mV).
3. Set the tape selector switch to the STD position and the Dolby NR switch to ON, and then record the 333Hz signal on the STD-601 test tape.
4. Connect an mV meter to the No.20 (L ch) and No.21 (R ch) TP terminals on the mother unit.
5. With the set in the RECORD mode, adjust VR1203 (L ch, R ch) so that the mV meter displays -3dBv (710mV).
6. With the tape selector switch in the metal position, set the Dolby NR switch to ON and record the 333Hz signal on test tape STD-604.
7. Connect an mV meter to the No.20 (L ch) and No.21 (R ch) TP terminals on the mother unit.
8. With the unit in the RECORD mode, adjust VR1204 (L ch, R ch) so that the mV meter displays -3dBv (710mV).
9. With the tape selector switch in the CrO<sub>2</sub> position, set the Dolby NR switch to ON and record the 333Hz signal on the STD-603 test tape.
10. Connect an mV meter to the No.20 (L ch) and No.21 (R ch) TP terminals on the mother unit.
11. With the unit in the RECORD mode, adjust VR1202 (L ch, R ch) so that the mV meter displays -3dBv (710mV).
12. With the tape selector switch to the Fe-Cr position, set the Dolby NR switch to ON and record the 333Hz signal on Fe-Cr tape (SONY DUAD C-60).
13. With the unit in the record mode, adjust VR1201 (L ch, R ch) so that the mV meter shows -3dBv (710mV).

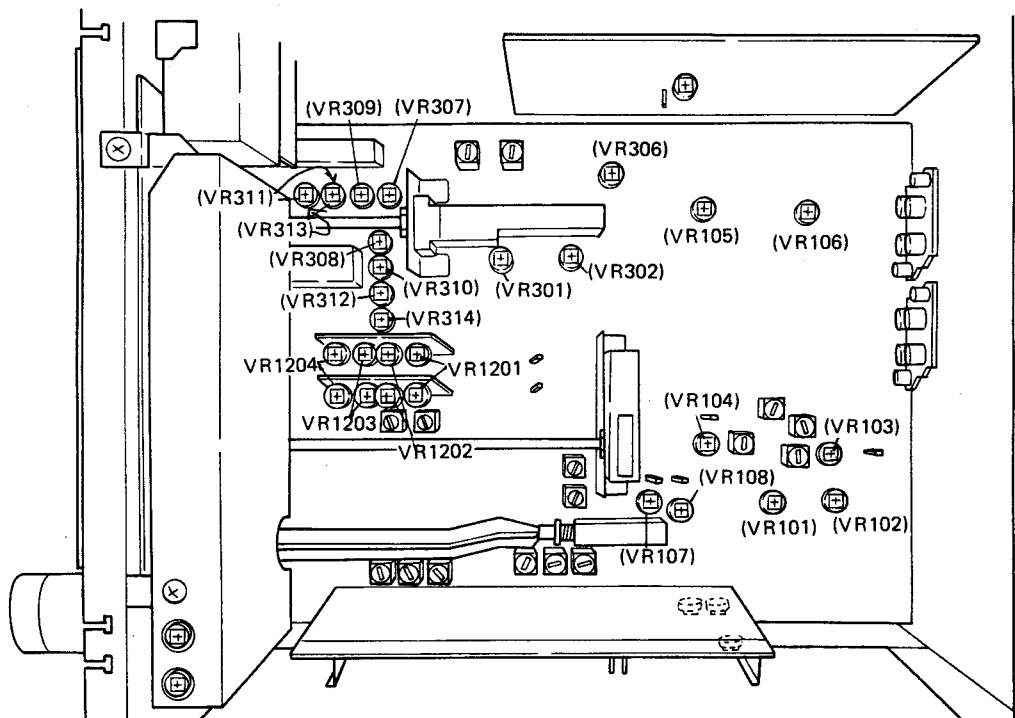


Fig. 10-4 Adjustment points

### 10-10 CONFIRMATION OF TAPE CALIBRATION ADJUSTMENT

1. Using the STD-601 test tape, perform the bias, level and EQ adjustments in accordance with "TAPE CALIBRATION PROCEDURE", and confirm that the displays of their respective knobs are within the -3 to +3 range.
2. Using STD-603 test tape, perform the bias, level and EQ adjustments as in step 1, above, and confirm that the settings of their knobs are within the -3 to +3 range.
3. Perform the adjustments for the STD-604 test tape in the same manner as step 1 for bias, level and EQ, and confirm that the settings of their knobs are within the -3 to +3 range.
4. After confirming the tape calibration adjustments with each type of tape, confirm that the record and playback frequency response is within the standards shown in page 40.

### 10-11 ADJUSTMENT OF DOLBY NR RECORDING

1. Connect an mV meter to the No.40 (L ch) and No.41 (R ch) TP terminals on the mother unit.
2. Feed a 1kHz, -10dBv (316mV) signal to the line input terminals, and with the Dolby NR switch set to OFF, adjust the input volume so that the mV meter displays 0dBv (1V).

3. When the input level has dropped 40dB in relation to the value in step 2, adjust VR301 (L ch) and VR302 (R ch) so that the mV meter displays -34dBv (20mV).

### 10-12 ADJUSTMENT OF DOLBY NR PLAYBACK

1. Connect an mV meter to the No.20 (L ch) and No.21 (R ch) TP terminals of the mother unit, and set the Dolby NR switch to OFF.
2. Set the playback adjustment level VR103 (L ch) and VR104 (R ch) to their minimum, feed a 1kHz signal from the No.5 (L ch) and No.6 (R ch) TP terminals on the mother unit, and adjust the input level so that the mV meter readout is 0dBv (1V).
3. Set the Dolby NR switch ON, and when the input level has dropped 34dB in relation to the value in step 2, adjust the VR103 (L ch) and VR104 (R ch) so that the mV meter readout is -40dBv (10mV).
4. After adjustment of Dolby playback, return the playback level adjustment VR103 (L ch) and VR104 (R ch) to their original positions. Then a repeat of the adjustment of playback level is recommendable.

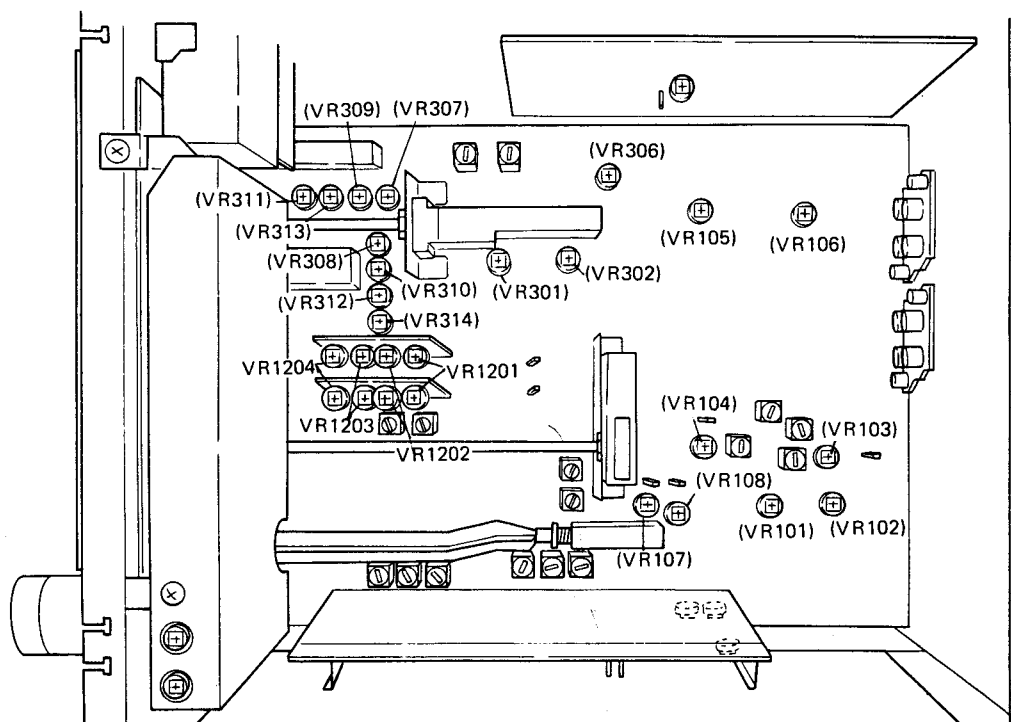
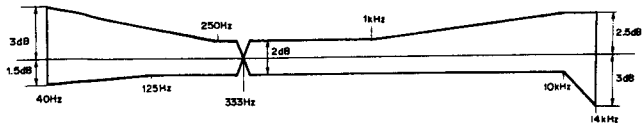


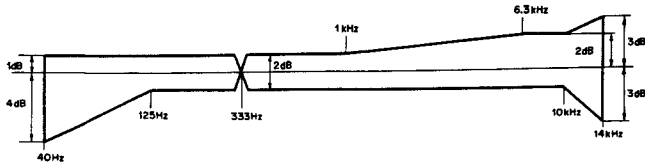
Fig. 10-5 Adjustment points



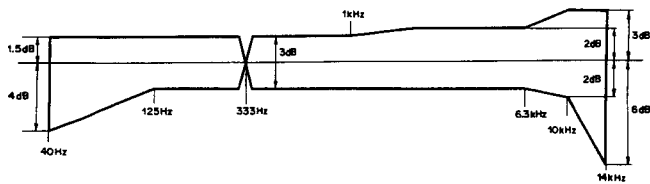
- Using STD-331A and the STD position, with DOLBY NR OFF.

Note:

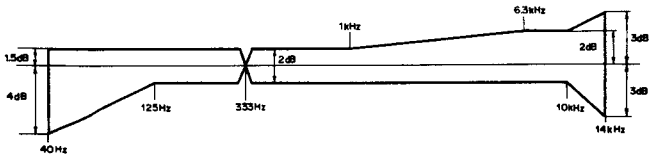
The frequency characteristics for the R channel shall be obtained by subtraction 1dB from the value indicated on the meter at 40Hz and 63kHz respectively.



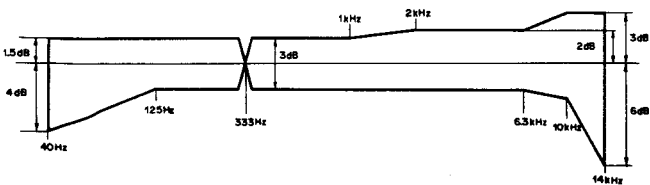
- Using STD-601 and the STD position, with DOLBY NR OFF.



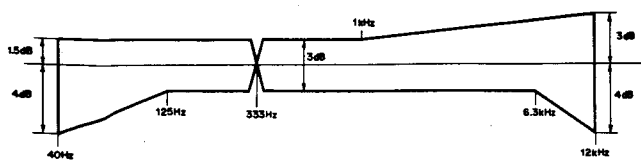
- Using STD-601 and the STD position, with DOLBY NR ON.



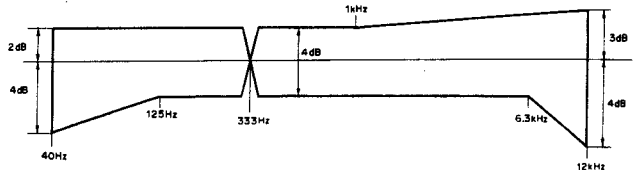
- Using STD-603 and the CrO<sub>2</sub> position, with DOLBY NR OFF.



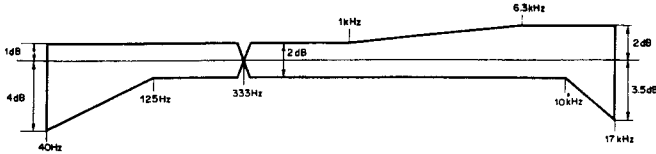
- Using STD-603 and CrO<sub>2</sub> position, with DOLBY NR ON.



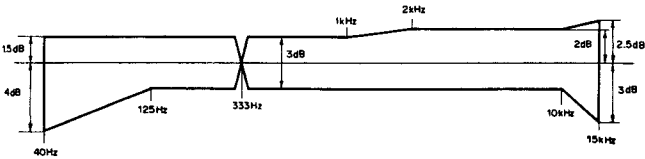
- Using Fe-Cr tape (SONY DUAD C-60) and the Fe-Cr position, with DOLBY NR OFF.



- Using Fe-Cr tape (SONY DUAD C-60) and the Fe-Cr position, with DOLBY NR ON.



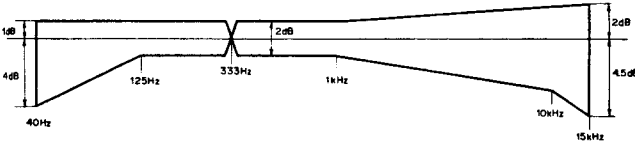
- Using STD-604 and the METAL position, with DOLBY NR OFF.



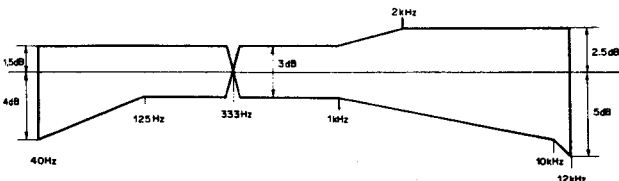
- Using STD-604 and the METAL position, with DOLBY NR ON.

**Overall frequency response after BLE adjustment.**

After BLE adjustment, frequency response must meet the specifications listed below.



- DOLBY NR OFF.



- DOLBY NR ON.

# 11. EXPLODED VIEWS

## 11.1 EXTERIOR

• *Parts without part number cannot be supplied.*

### Parts List

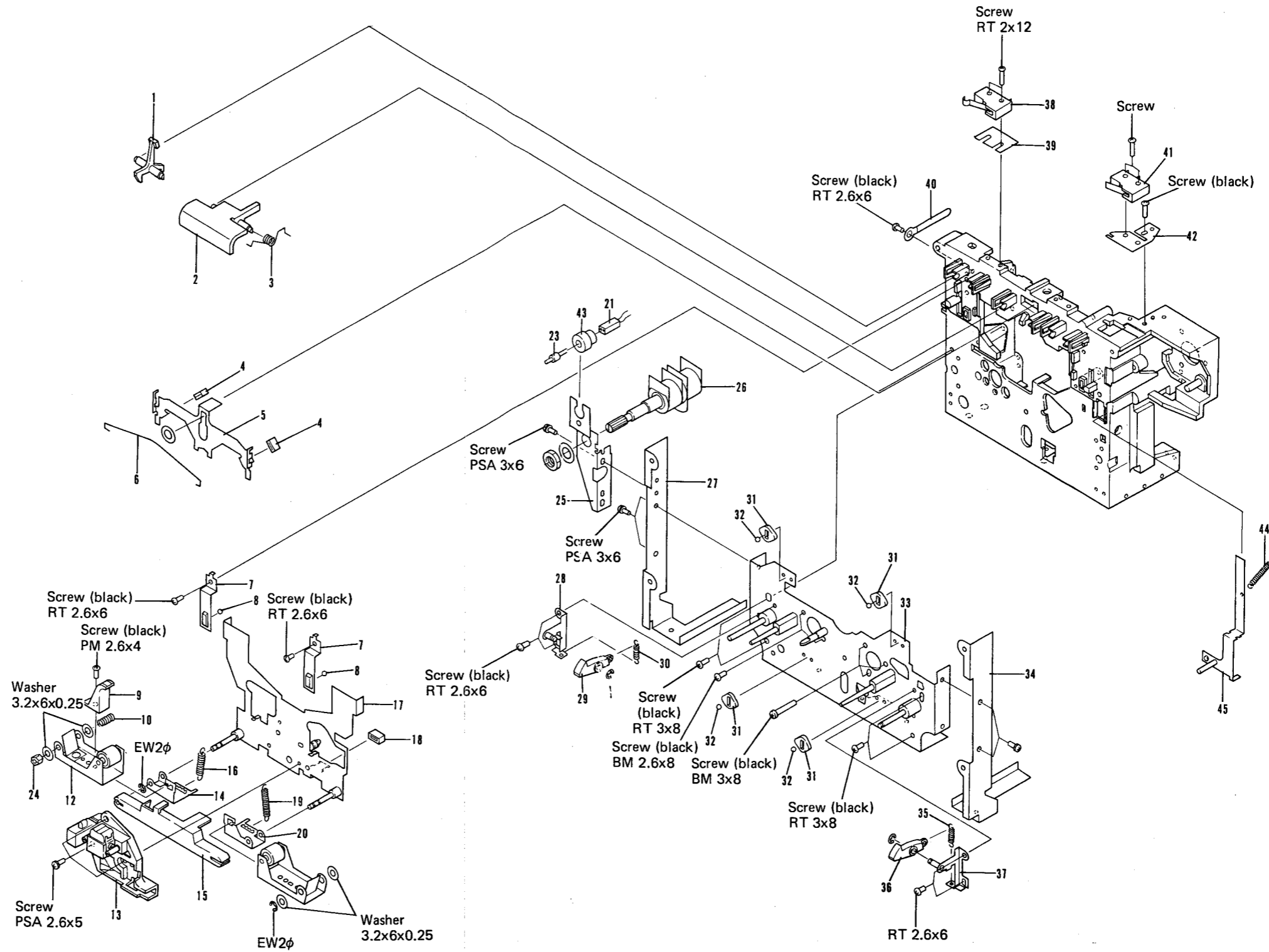
Key No.	Parts No.	Description
1.	RAC-094	Power switch knob
2.		Power switch joint-bar
3.		Power switch holder
4.	RWS-075	Function switch unit
5.		Function switch P.C. board holder
6.	RWG-104	Control unit
7.		Control bracket (A)
8.		Control bracket (B)
9.	RWR-074	Power supply unit
10.		Power supply holder
11.	RSA-032	Power switch (KU, KC)
12.		Terminal 1P
13.		Rubber bush
14.	RXA-905	Foot assembly
15.		Fuse unit
16.		P.C. board frame
17.		UL cord clamber
18.	RTT-176	Power transformer
19.	REC-272	Strain relief
20.		Main chassis
21.		P.C. board stand
22.		Bottom plate
23.	RKP-114	AC socket
24.	RNA-411	Bonnet
25.	RDG-021	Power cord (UL)
26.		Screw
27.		Rear panel
28.		BLE shield cover
29.	RWX-322	BLE unit
30.		BLE bracket
31.	RWX-109	Spark killer (KU)
	RWX-150	Spark killer (KC)
32.		Switch joint-bar (A)
33.	RWX-319	Mother unit
34.	REC-250	Capacitor cover (D)
35.	RAC-117	Knob (B)
36.	RAC-107	Knob
37.	RKP-111	Connector ass'y
38.	RAA-268	Knob (A) ass'y
39.	RED-151	Volume mask (B)
40.	RED-047	Switch mask
41.	RAA-259	Switch knob ass'y
42.	RAA-294	Knob
43.	RAA-295	BLE knob
44.	RRW-112	UL caution label



## 11.2 MECHANISM ASSEMBLY 1

### Parts List

Key No.	Parts No.	Description
1.	RNK-533	Detector arm
2.	RNK-556	Half holder
3.	RBH-534	Spring
4.	REB-187	Brake shoe
5.		Brake plate
6.	RBH-563	Brake spring
7.	RBK-119	Head base holder
8.	REF-013	Steel ball
9.	RNK-348	Tape guide
10.	RBH-374	Spring
11.		Socket-head screw 2.6x5 Ni
12.	RXB-257	Pinch-roller arm assembly
13.	RXB-212	Sub-head base assembly
14.		Arm (B)
15.	RNK-703	Head cord cover
16.	RBH-647	Spring (B).
17.		Head base assembly
18.	REB-153	Stopper
19.	RBH-373	Spring
20.		Arm (A)
21.		Connector socket assembly (2P)
22.		Quartz holder
23.	TLG 206	Diode
24.	RNK-535	Height adjuster
25.		Volume bracket
26.	RCV-065	Volume
27.		Mechanism holder (L)
28.		Half holder bracket (L) assembly
29.	RNK-534	Half holder arm
30.	RBH-503	Spring
31.		Ball guide
32.	REF-013	Steel ball
33.		Base assembly
34.		Mechanism holder (R)
35.	RBH-503	Spring
36.	RNK-534	Half holder
37.		Half holder bracket (R) assembly
38.	RSF-022	Microswitch
39.	REC-278	Switch spacer
40.		Cord clasper (B)
41.	RSF-024	Microswitch (B)
42.		Switch bracket
43.		Quartz holder
44.	RBH-524	Spring
45.		Half detector arm assembly

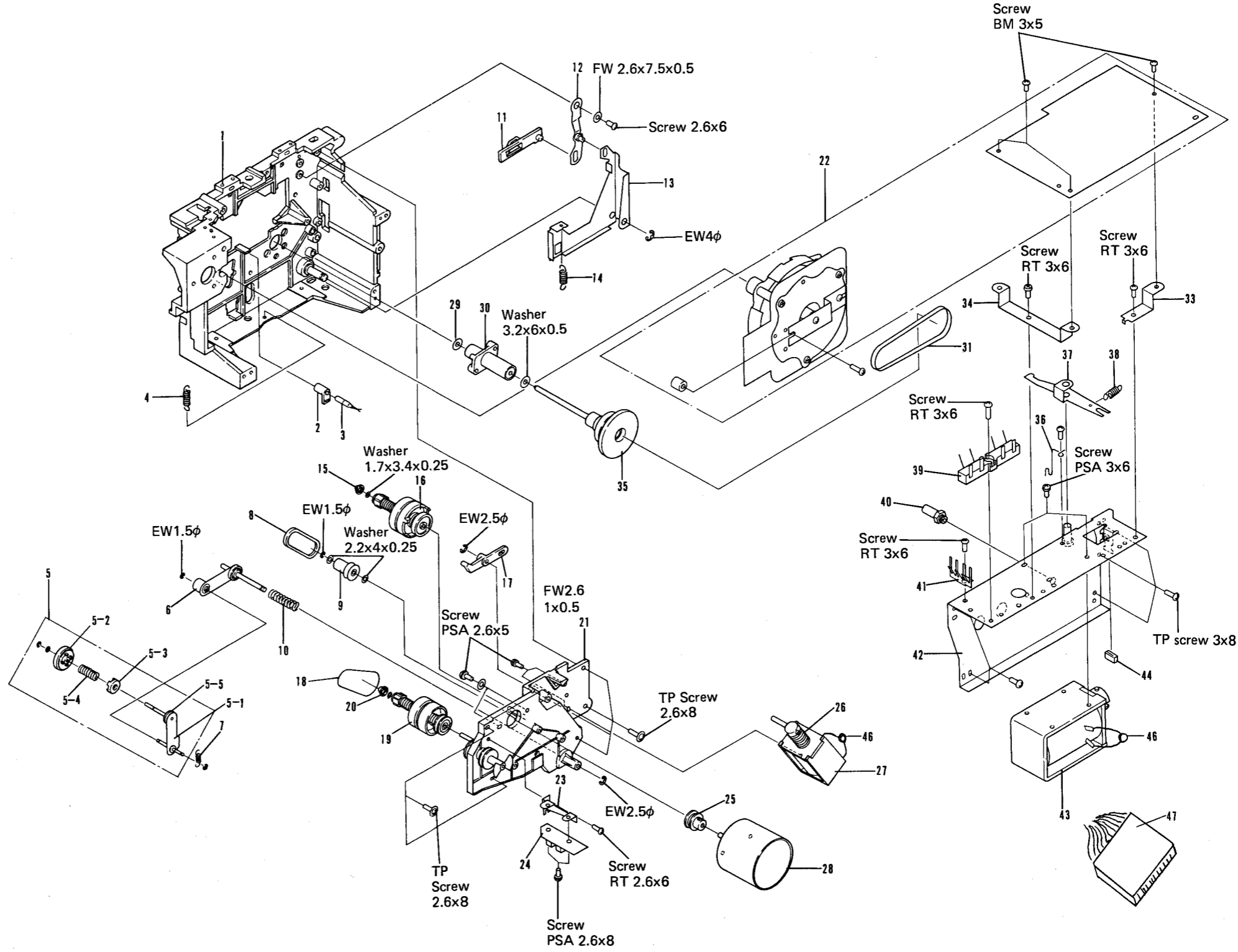




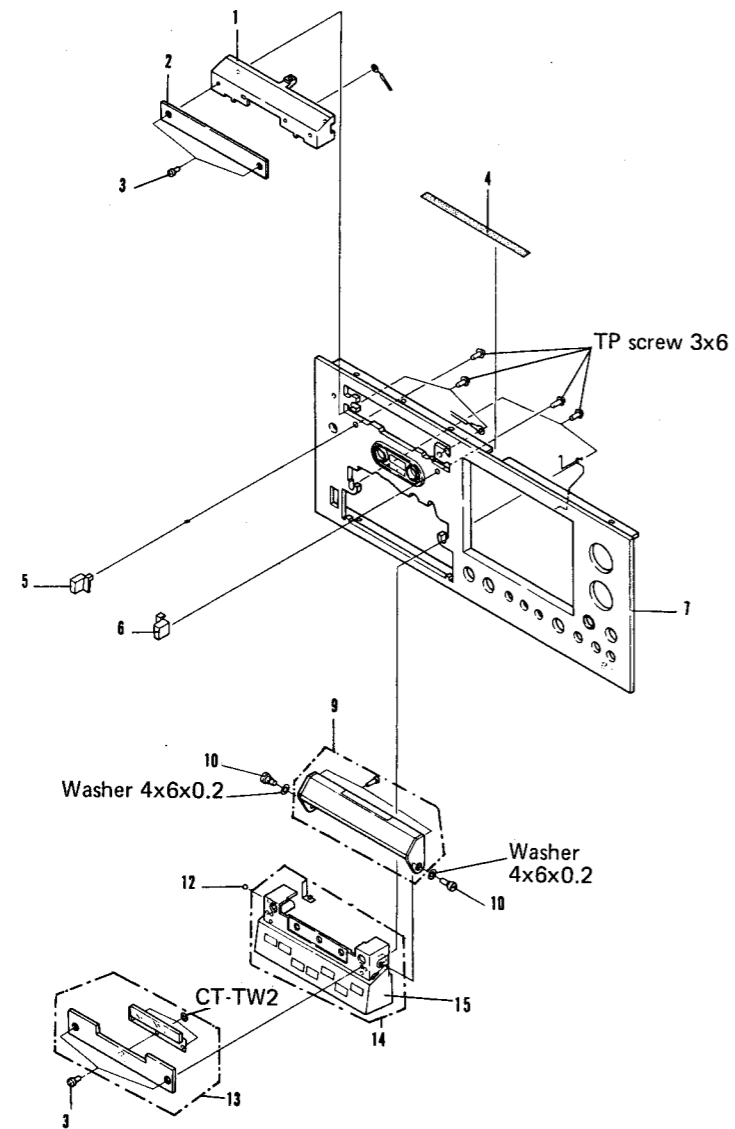
11.3 MECHANISM ASSEMBLY 2

Parts List

Key No.	Parts No.	Description
1.		Mechanism chassis
2.	REB-297	Lamp holder
3.	REL-072	Lamp (B)
4.	RBH-505	Spring
5.	RXB-144	Idler arm full assembly
5-1.		Idler arm assembly
5-2.	RNK-561	Idler
5-3.	RNK-562	Spring cap
5-4.	RBH-498	Spring
5-5.	RED-141	Felt
6.		Arm assembly
7.	RBH-564	Spring
8.	REB-317	TU belt
9.	RXA-998	Take-up pulley assembly
10.	RBH-502	Spring
11.		Idler arm
12.		Arm lever assembly
13.		Arm
14.	RBH-511	Spring
15.	RNK-815	Reel cap
16.	RXB-189	Supply reel assembly (B)
17.		Brake arm
18.	REB-272	Sensing belt
19.	RXB-190	Take-up reel assembly (B)
20.	RNK-815	Reel cap
21.		Sub-chassis assembly
22.		Capstan D.D. motor
23.		Sensing holder
24.		Sensing unit
25.	RXB-064	Motor pulley (B) assembly
26.	RBH-507	Spring
27.	RXP-069	Solenoid (B)
28.	RXM-047	Take-up motor
29.	RBF-037	Washer
30.	RXB-162	Bearing (B) assembly
31.	REB-368	Sub-belt
32.	.....	.....
33.		Control bracket (B)
34.		Control bracket (A)
35.	RXB-243	Supply pulley assembly
36.	RBH-557	Spring
37.		Solenoid lever
38.	RBH-506	Spring (A)
39.		4P terminal
40.		Screw
41.		4P terminal
42.		Solenoid chassis assembly
43.	RXP-068	Solenoid (A)
44.	REB-153	Stopper
45.	.....	.....
46.	WO3B	Diode
47.	RKP-064	Connector assembly (16P)



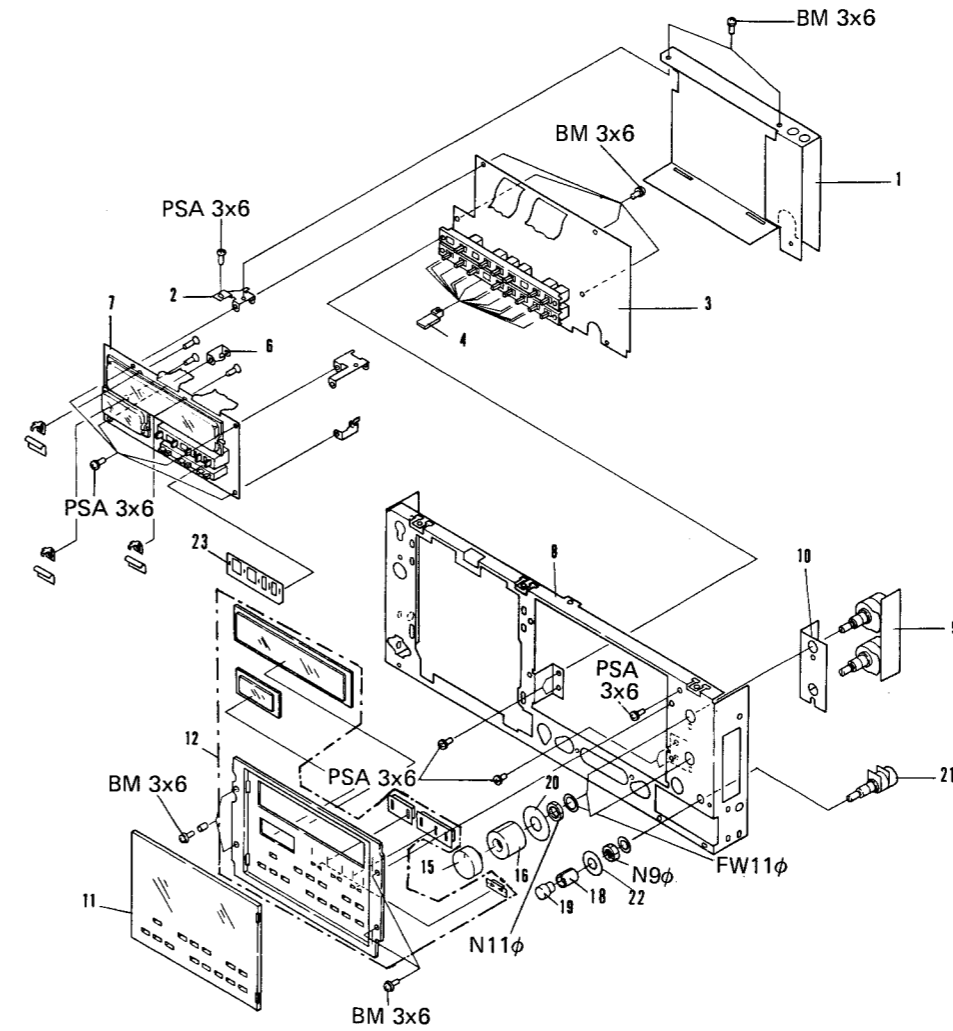
### 11.4 FRONT PANEL



#### Parts List

Key No.	Parts No.	Description	Key No.	Parts No.	Description
1.	RNK-708	Half cover	11.	.....	.....
2.	RAH-264	Half cover panel	12.	REF-014	Steel ball
3.	RBA-044	Screw (A)	13.	RXX-262	Escutcheon panel assembly
4.	REB-223	Cover cushion (D)	14.	RXX-261	Escutcheon assembly
5.	RNK-566	Guide (L)	15.	RNK-729	Escutcheon
6.	RNK-608	Guide (R)			
7.	RXX-259	Front panel assembly			
8.	.....				
9.	RXX-260	Head cover assembly			
10.	RBA-045	Screw (B)			

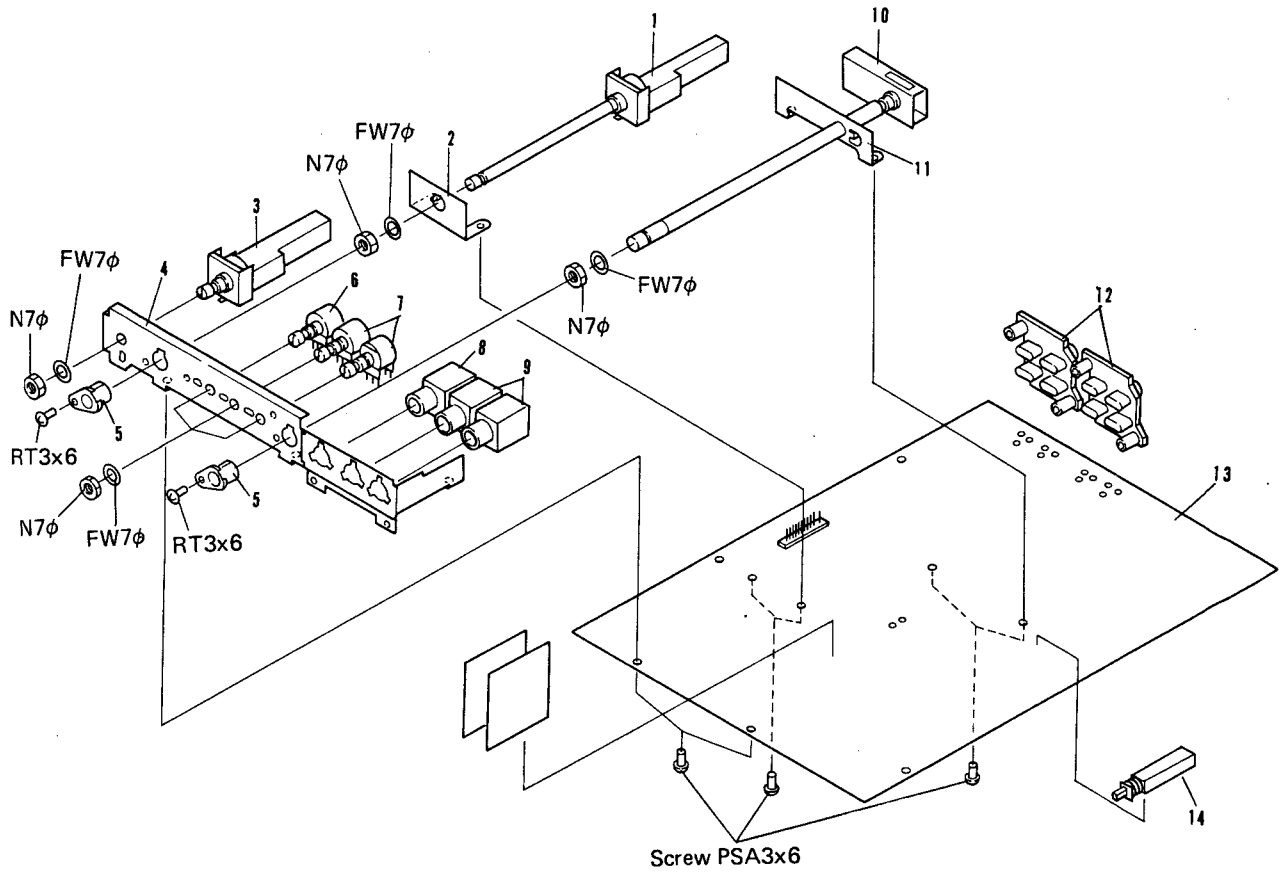
### 11.5 PANEL STAY



#### Parts List

Key No.	Parts No.	Description	Key No.	Parts No.	Description
1.		Shield cover	16.	RAA-262	REC VR knob (R) assembly
2.		Holder (A)	17.	.....	.....
3.		Indicator amplifier unit	18.	RAA-266	PB VR knob (R) assembly
4.	RAC-093	Push knob (C)	19.	RAA-264	PB VR knob (L) assembly
5.		Holder (B)	20.	RED-159	Volume mask
6.		Holder (C)	21.	RCV-074	PB volume 20K (B)
7.	RWX-317	Indicator unit	22.	RED-151	Volume mask (B)
8.		Panel stay	23.	RED-172	Diode mask
9.		Volume unit			
10.		Shield cover (B)			
11.	RNK-707	Indicator lens			
12.	RXX-263	Indicator assembly			
13.	.....				
14.	.....				
15.	RAA-260	REC VR knob (L) assembly			

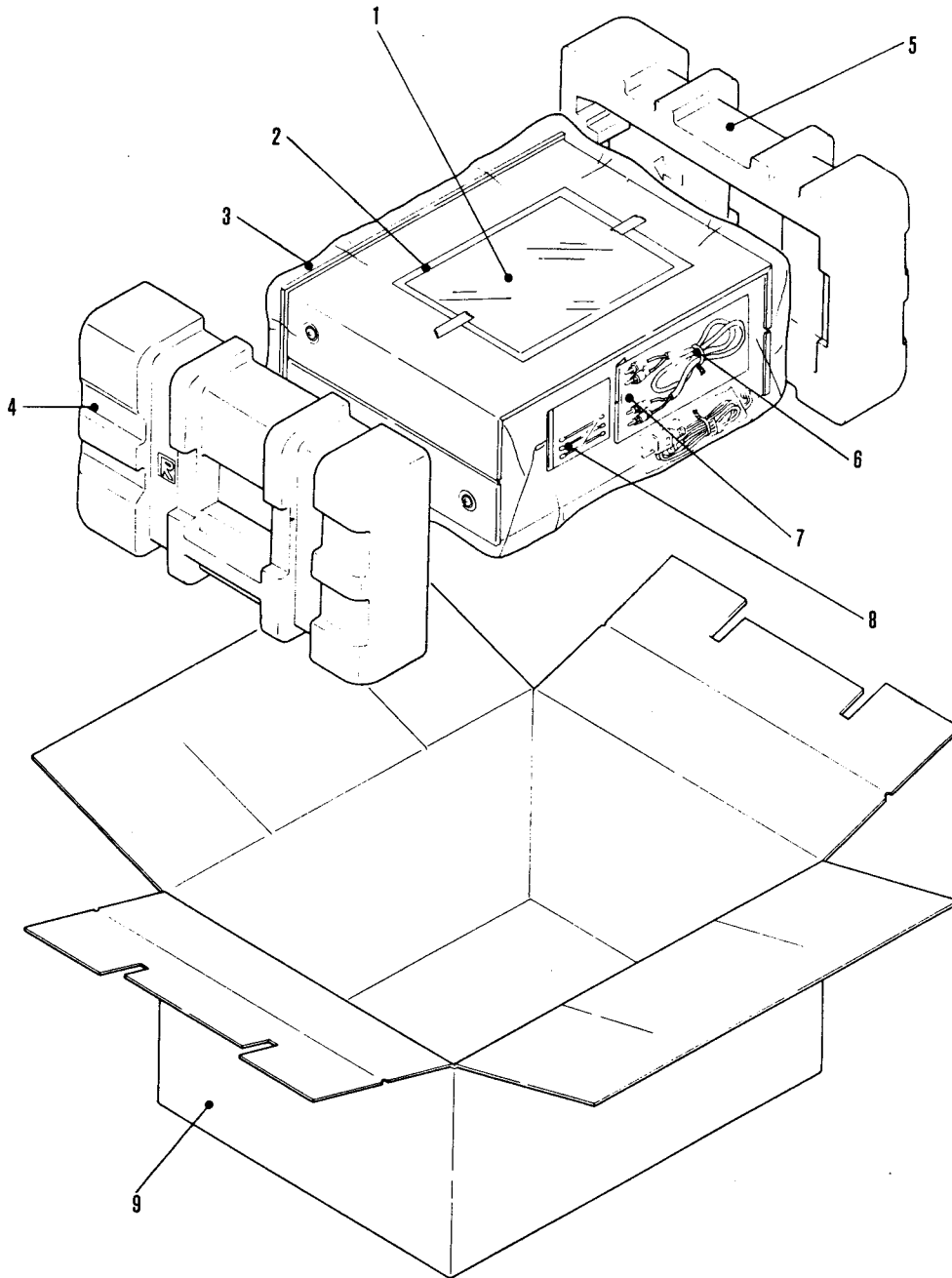
11.6 MOTHER ASSEMBLY



Parts List

Key No.	Parts No.	Description
1.	RSB-022	Switch (A)
2.		Switch holder
3.	RSB-023	Switch (B)
4.		Mother bracket
5.		Joint-bar guide (A)
6.	RCV-070	Volume
7.	RCV-071	Volume
8.	RKN-046	Headphone Jack
9.	RKN-044	Mic Jack
10.	RBS-024	Switch (C)
11.		Switch holder (A)
12.	RKB-014 (RKB-016)	4P mount pin jack
13.		Mother board
14.	RSG-083	Switch

# 12. PACKING



## Parts List

Key No.	Part No.	Description	Key No.	Part No.	Description
1.	RRB-104	Operating instructions	6.	RDE-010	Connection cord
2.	RHL-018	Vinyl bag (for operating instructions)	7.	RHL-019	Vinyl bag (for connection cord)
3.	RHL-031	Vinyl bag (for cassette tapedeck)	8.	REA-021	Head cleaning assembly
4.	RHA-175	Side pad R	9.	RHG-284	Packing case (for KU type)
5.	RHA-174	Side pad L		RHG-285	Packing case (for KC type)

# 13. SCHEMATIC DIAGRAMS, P.C. BOARD PATTERNS AND PARTS LIST

## 13.1 MISCELLANEOUS 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 × 10<sup>1</sup> 561 ..... RD¼PS 561 J  
 47kΩ 47 × 10<sup>3</sup> 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 × 10<sup>1</sup> 5621 ..... RN¼SR 5621 F

### UNITS

Part No.	Description
RWG-104	Control unit
RWS-075	Function switch unit
RWX-319	Mother unit
RWR-074	Power supply unit
RWX-322	BLE unit
RWX-317	Indicator unit
RWG-100	Control unit
RXM-056	Motor unit

### OTHERS

Part No.	Symbol & Description
RDG-021	Power cord (UL)
RWX-109	Spark killer (KU)
RWX-150	Spark killer (KC)
RKP-114	AC socket
RXM-047	Take-up motor
RXP-068	Solenoid (A)
RXP-069	Solenoid (B)
REL-072	Lamp (B)
RXB-212	Sub-head base ass'y

### SWITCHES

Part No.	Symbol & Description
RSA-032	Power switch (KCU)
RSF-022	Microswitch
RSF-024	Microswitch (B)

### TRANSFORMER

Part No.	Symbol & Description
RTT-176	Power transformer

### SEMICONDUCTORS

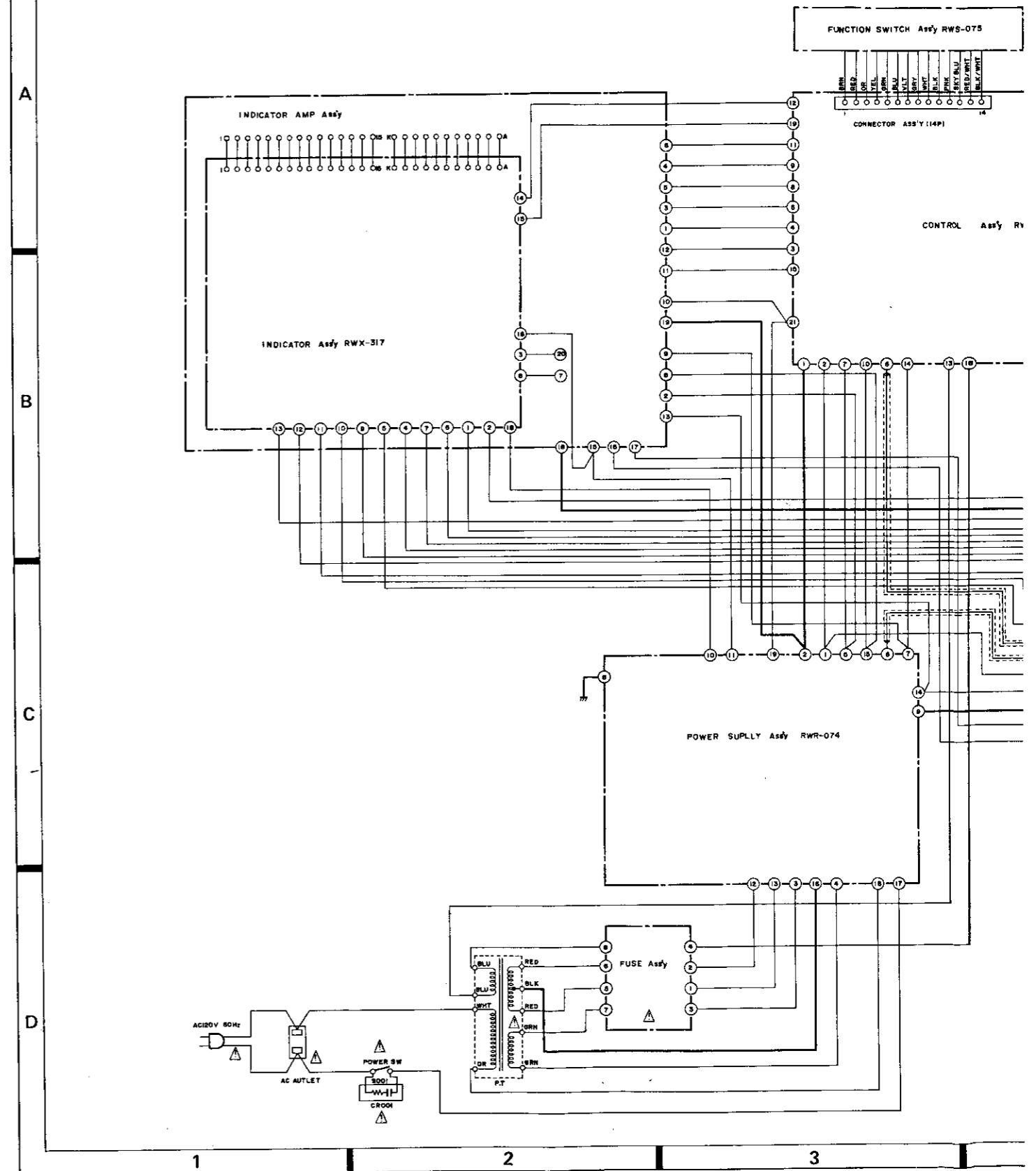
Part No.	Symbol & Description
W03B	Diode
TLG206	Diode

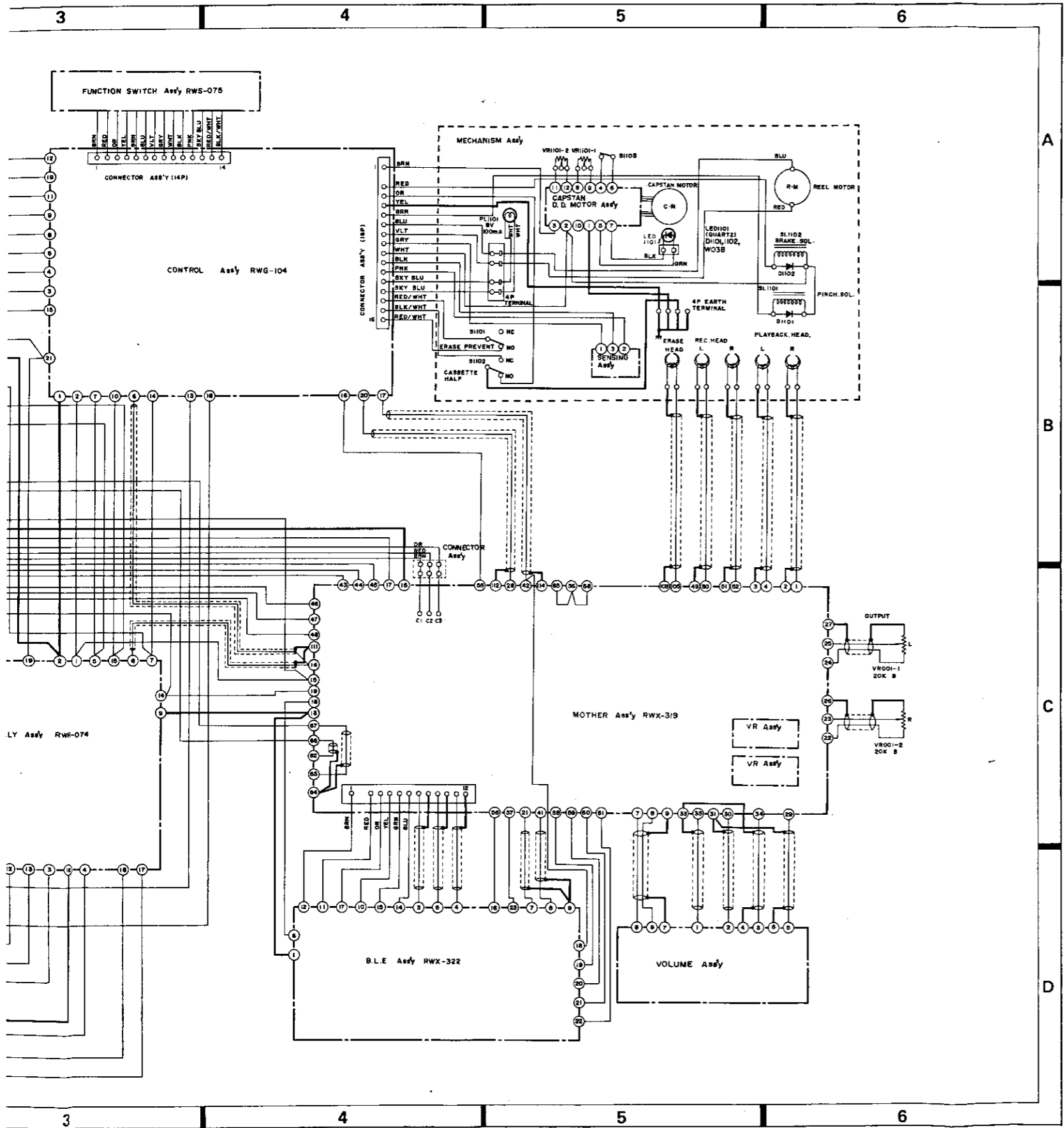
Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

### RESISTORS

Part No.	Symbol & Description
RCV-074	PB volume 20k (B)
RCV-065	Volume (at switch)

## 13.2 CONNECTION DIAGRAM



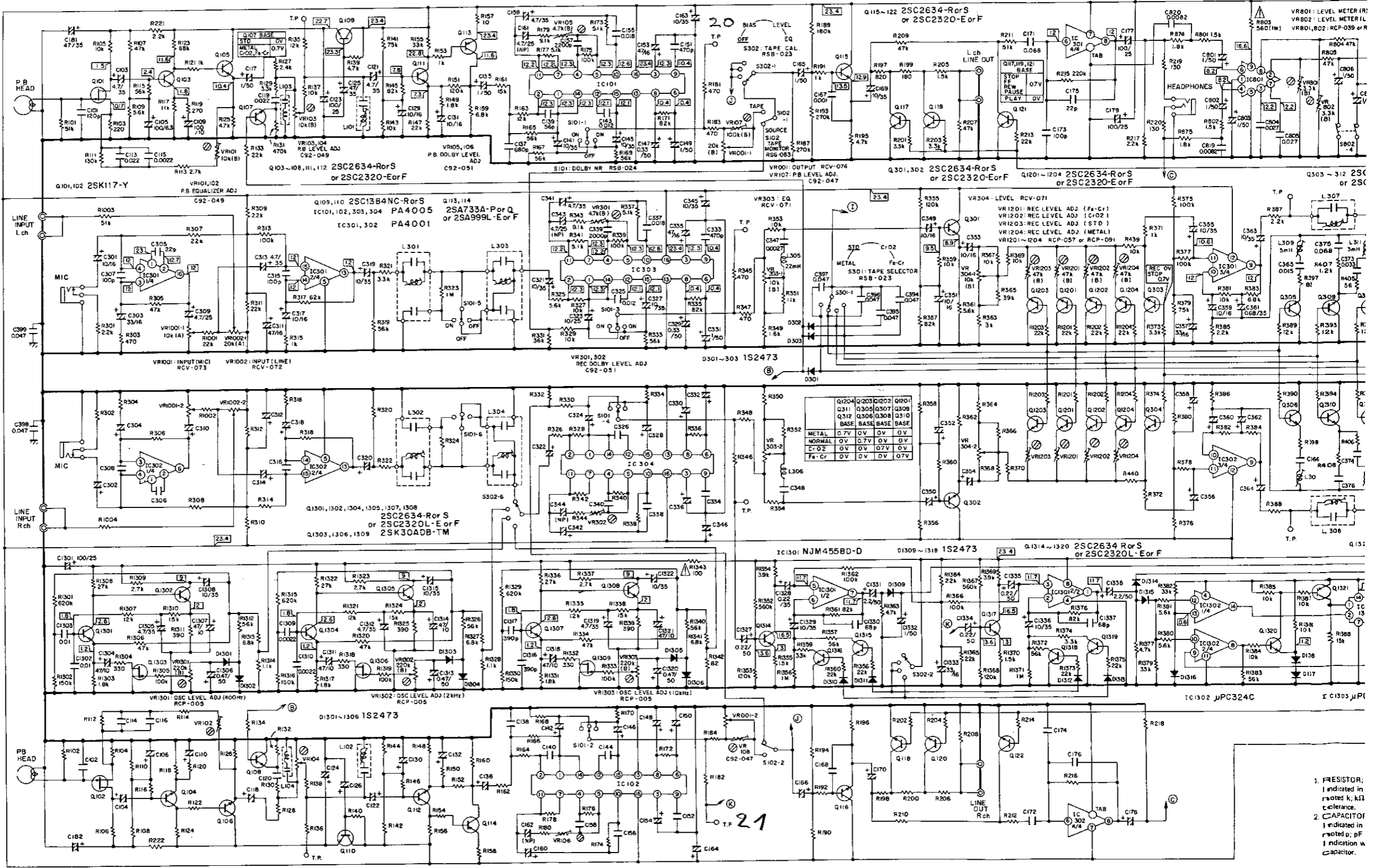


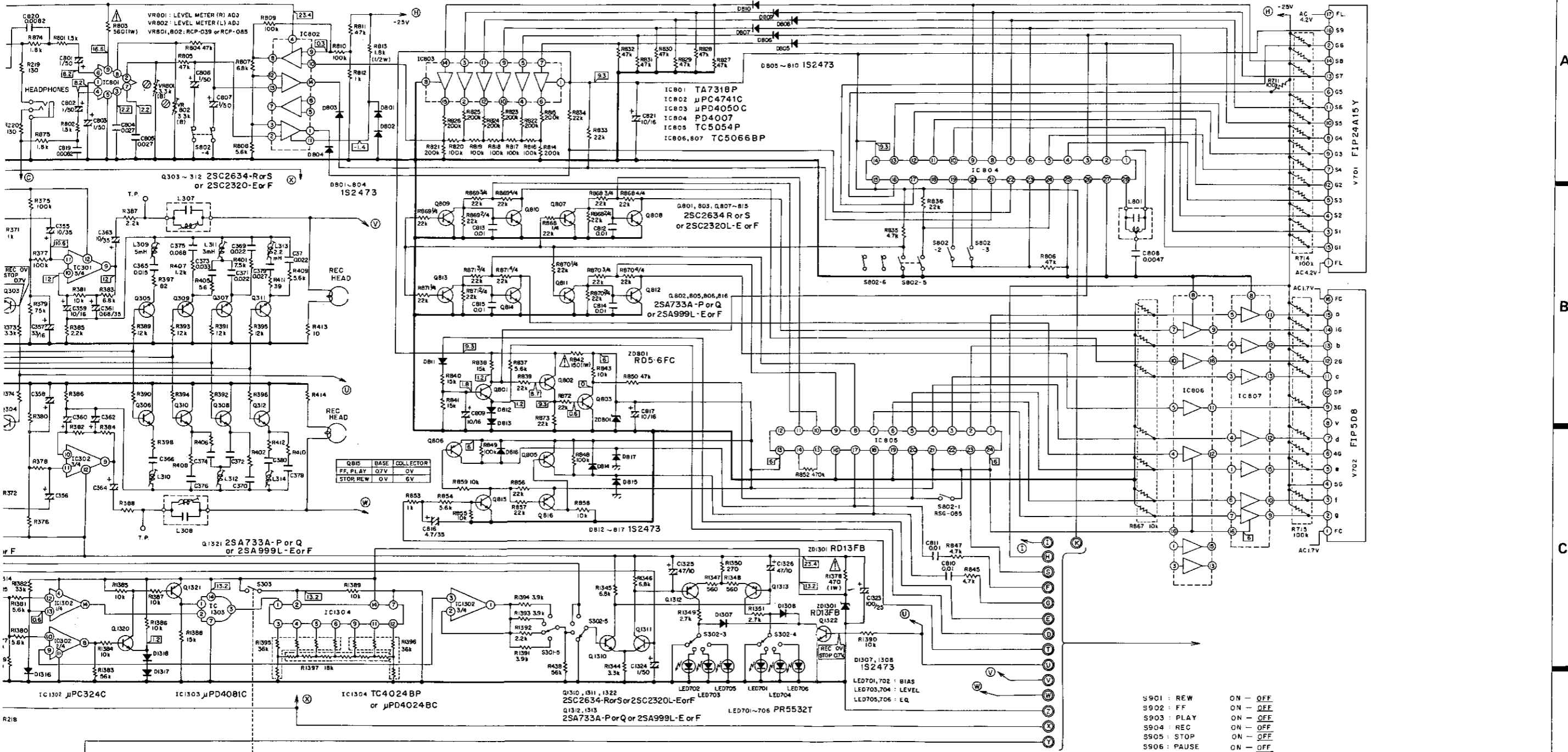
Appearance of Transistors and ICs

<p><b>2SC1384NC</b> <b>2SA684NC</b> <b>2SC1384</b></p> <p>hFE Lot No Type No E C B</p>	<p><b>2SC1419</b></p> <p>Type No Lot No hFE B C E</p>	<p><b>2SK117</b></p> <p>Type No Lot No Loss D G S</p>	<p><b>PA4001</b></p>
<p><b>2SA733A</b></p> <p>Type No Lot No hFE Suffix E C B</p>	<p><b>2SC1650</b></p> <p>Type No Lot No hFE E C B</p>	<p><b>μPC4741C</b> <b>μPC324C</b> <b>μPD4081C</b> <b>TC4024BP</b></p>	<p><b>PD4007</b></p>
<p><b>2SA887</b></p> <p>Type No hFE Lot No B C E</p>	<p><b>2SC1740</b> <b>2SC2634</b> <b>2SC1740LN</b></p> <p>Type No Lot No hFE E C B</p>	<p><b>PA4005</b> <b>μPD4050C</b> <b>PD1003</b> <b>PD1003</b> <b>PA2004</b> <b>TC5066BP</b></p>	<p><b>TA7318P</b></p>
<p><b>2SC2060</b> <b>2SA934</b></p> <p>Type No hFE Lot No E C B</p>	<p><b>2SD234</b> <b>2SD526</b> <b>2SD837</b></p> <p>Type No Lot No hFE B C E</p>	<p><b>NJM4558D-D</b></p>	<p><b>TC5054P</b></p>
<p><b>2SC2320L</b> <b>2SA999L</b></p> <p>Suffix Lot No hFE Type No B C E</p>	<p><b>2SK30A</b></p> <p>Type No Lot No Loss S G D</p>	<p><b>PA2005</b></p>	

13.3 SCHEMATIC DIAGRAM

Part 1





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;  
Indicated in capacity (μF)/voltage(V) unless otherwise noted; p: pF  
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT;  
□: DC voltage (V) at 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.

SWITCHES  
S001 : POWER ON - OFF  
S101-1-7 : DOLBY NR (MPX FIL) ON - OFF - ON (FIL OFF)  
S102-1-3 : MONITOR TAPE - SOURCE  
S301-1-5 : TAPE SELECTOR METAL - SID - CrO2 - Fe-Cr  
S302-1-6 : TAPE CALIBRATION (MODE) OFF - BIAS - LEVEL - EQ  
S303 : VR305 ON - OFF

S801-1-3 : TIMER START PLAY - REC - OFF  
S801-4-8 : MEMORY & REPEAT STOP - PLAY - COUNTER - END - OFF  
S802-1 : COUNTER RESET ON - OFF  
S802-2-4 : METER (PEAK HOLED) PEAK - PEAK HOLED - AVERAGE  
S802-5-6 : METER / COUNTER DIM - BRIGHT

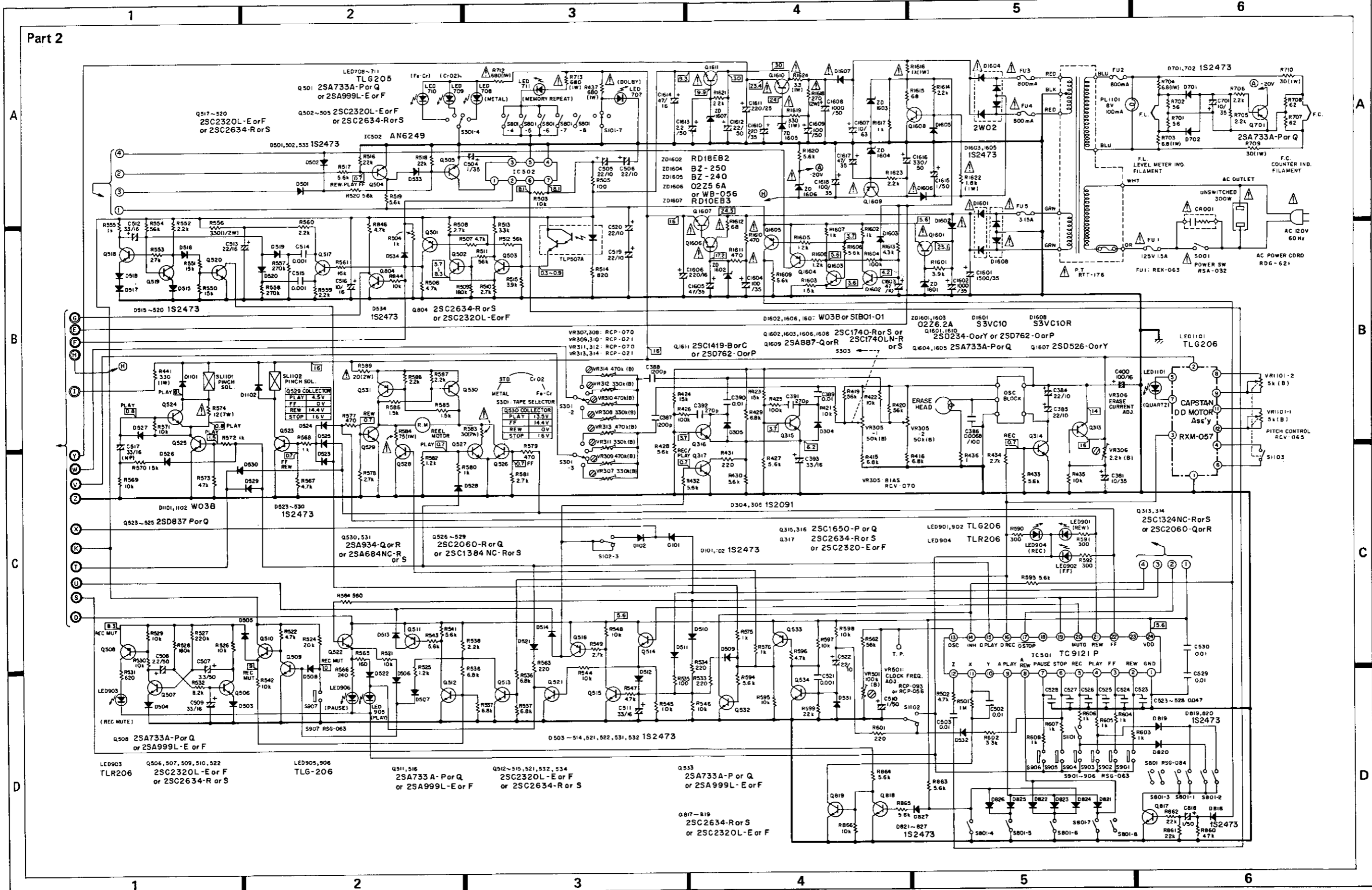
S901 : REW ON - OFF  
S902 : FF ON - OFF  
S903 : PLAY ON - OFF  
S904 : REC ON - OFF  
S905 : STOP ON - OFF  
S906 : PAUSE ON - OFF  
S907 : REC MUTE ON - OFF  
S1101 : ERASE PREVENT DETECTOR HOLE - NO HOLE  
S1102 : CASSETTE HALF HALF - NO HALF  
S1103 : QUARTZ ON - OFF

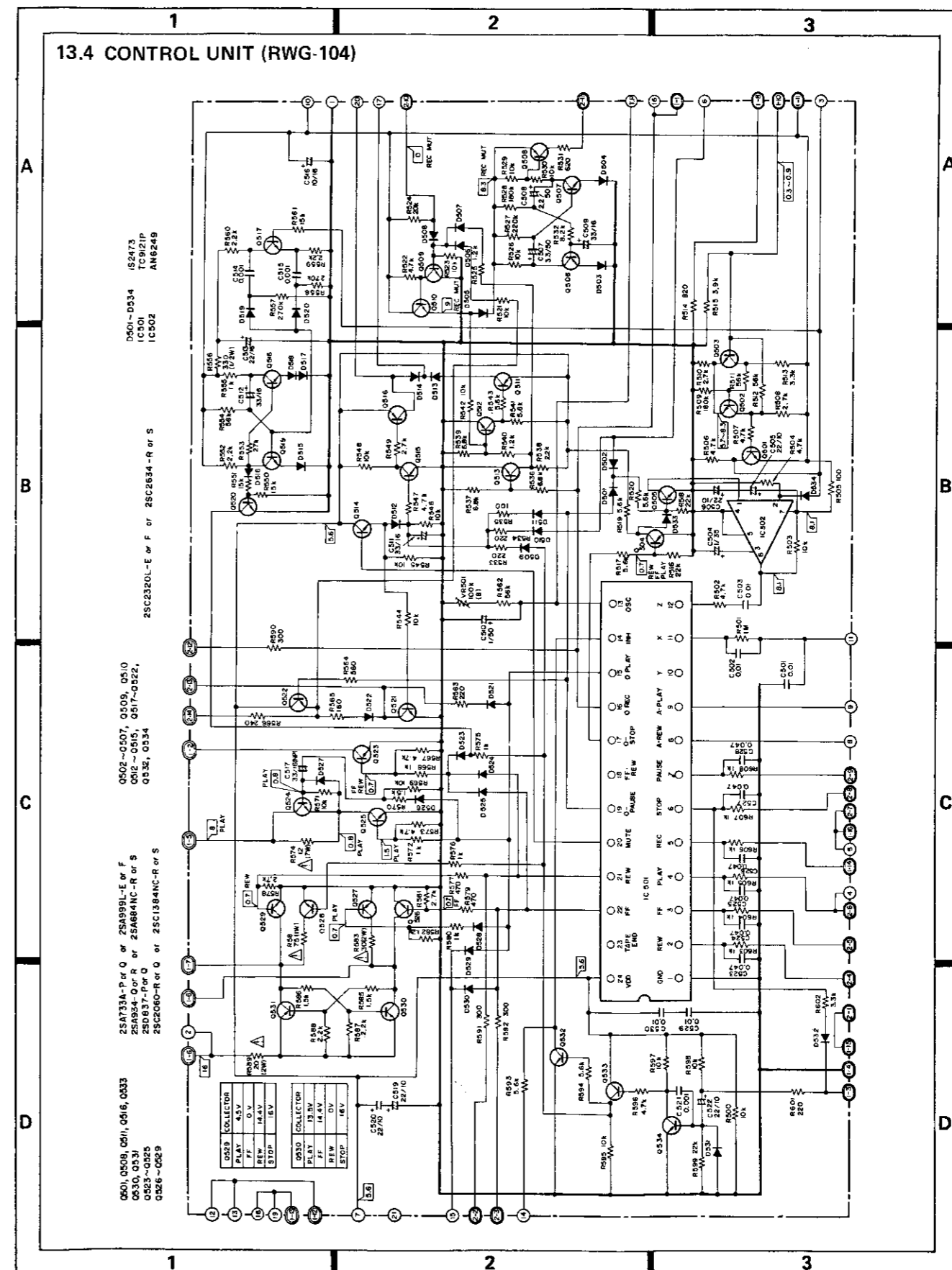
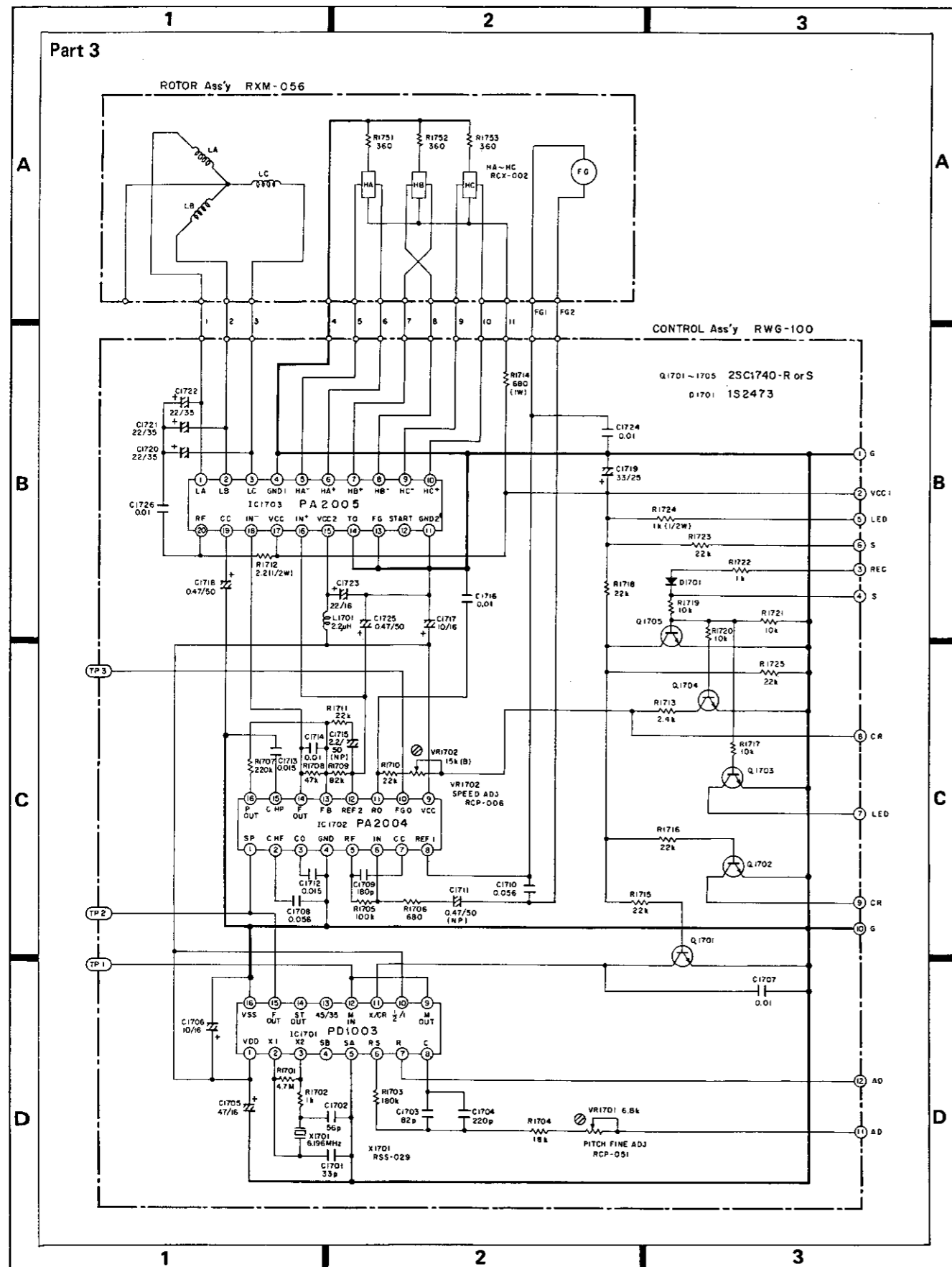
The underlined indicates the switch position.

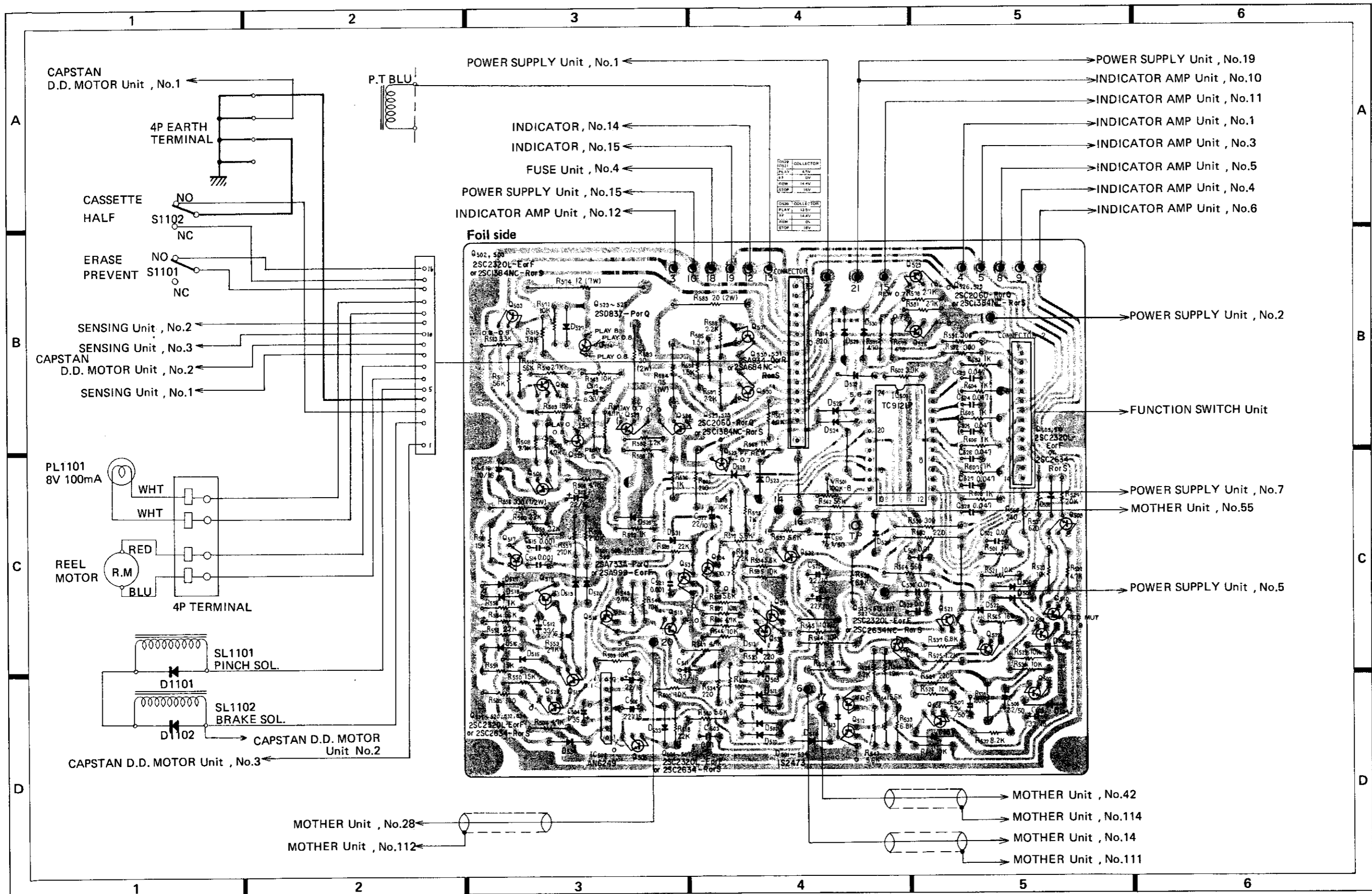
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.



Part 2







Parts List of Control unit (RWG-104)

CAPACITORS

Part No.	Symbol & Description
CQMA 103K 50	C501-C503
CSZAH 010M 35	C504
CEA 2R2P 50	C508
CEA 3R3P 50	C507
CEA 220P 16	C513
CEA 330M 16NP	C517
CEA 330P 16	C509, C511, C512
CEA 100P 16	C516
CEA 220P 10	C505, C506, C519, C520, C522
CEA 010P 50	C510
CQMA 102K 50	C514, C515, C521
CKDYF 473Z 50	C523-C528
CKDYF 103Z 50	C529, C530

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

RESISTORS

Part No.	Symbol & Description
RCP-093 (RCP-056)	VR501 Semi-fixed 100K (B)
RCN-042	R574 Wire wound 12 7W
RCN-043	R589 20 2W
RCN-044	R583 30 2W
RS1PF 750J	R584
RD½PSF 331J	R556
RD½PM 000 J	R501-R555, R557-R573, R575-R582, R585-R588, R590-R608

SEMICONDUCTORS

Part No.	Symbol & Description
2SA999L (2SA733A)	Q501, Q508, Q511, Q516, Q533
2SC2634 (2SC2320L)	Q502-Q507, Q509, Q510, Q512-Q515
2SC2060 (2SC1384NC)	Q517-Q522, Q532, Q534
2SA934 (2SA684NC)	Q530, Q531
2SD837	Q523-Q525
1S2473-T	D501-D534
TC9121P	IC501
AN6249	IC502

12.5 INDICATOR AMPLIFIER UNIT

Parts List

CAPACITORS

Part No.	Symbol & Description
CEA 100P 16	C809, C817, C821
CEA 4R7P 35	C816
CEA 010P 50	C801-C803, C806, C807, C818
CQMA 273J 50	C804, C805
CQMA 103J 50	C812-C815
CQMA 103K 50	C810, C811
CQMA 472K 50	C808
CQMA 822K 50	C819, C820

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

RESISTORS

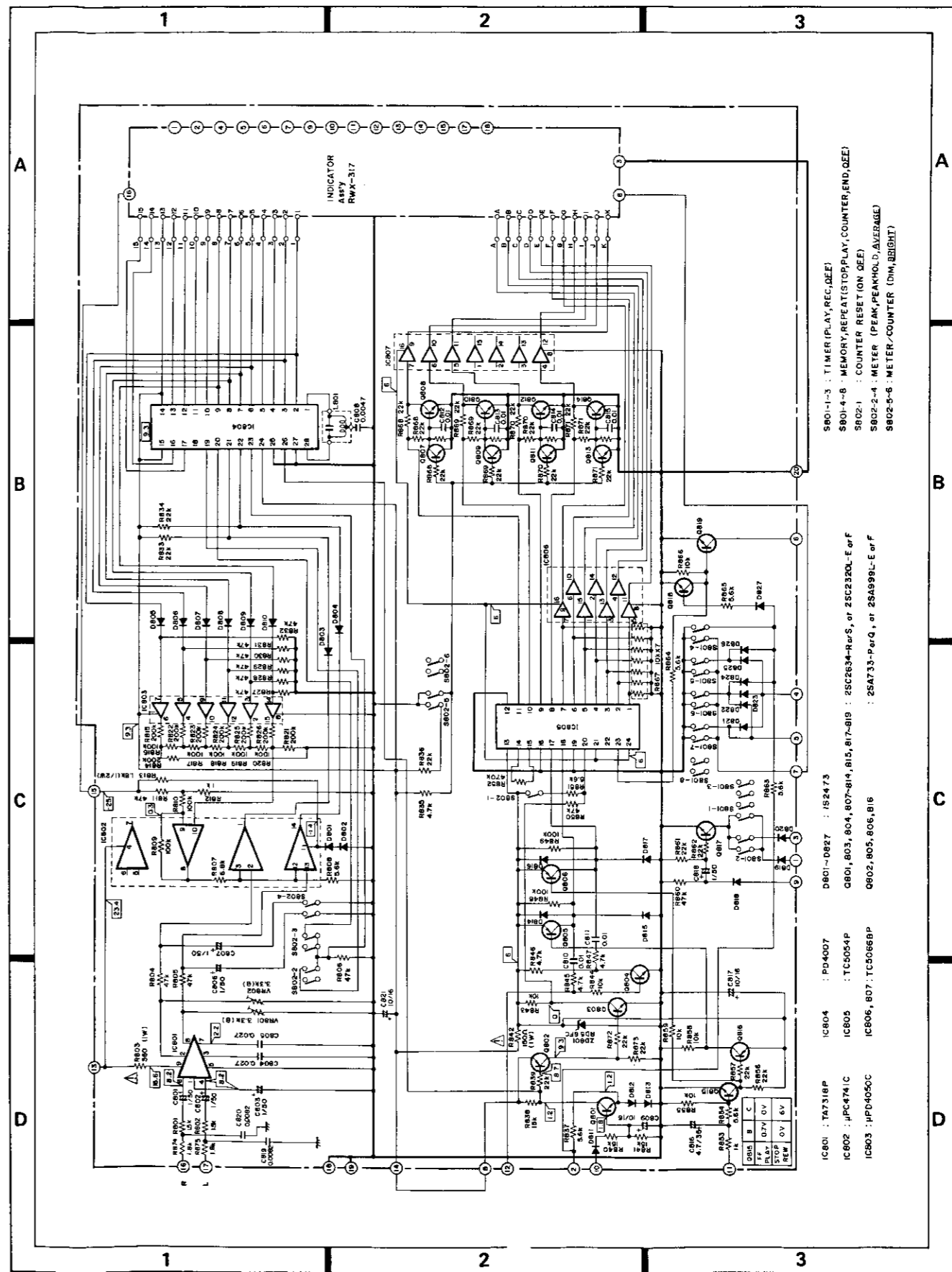
Part No.	Symbol & Description
RCP-039 (RCP-085)	VR801, VR802 Semi-fixed 3.3K (B)
RCX-005	R867 Resistor
RCX-007	R868-R871 Resistor
RS1PF 000 J	R803, R842
RS½PF 182J	R813
RD½PM 000 J	R801, R802, R804-R812, R814-R841, R843-R866, R872-R875

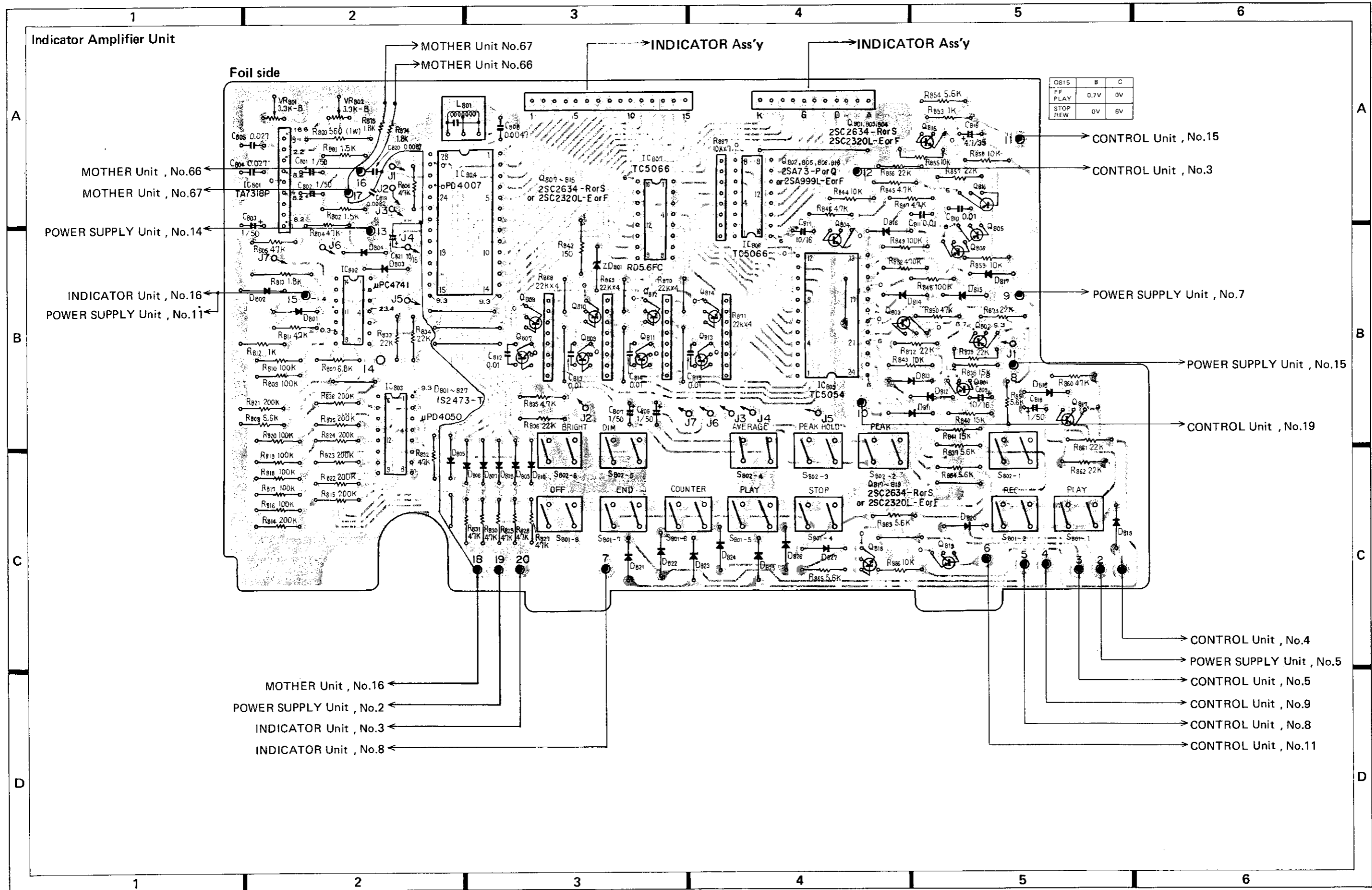
SWITCHES AND OTHERS

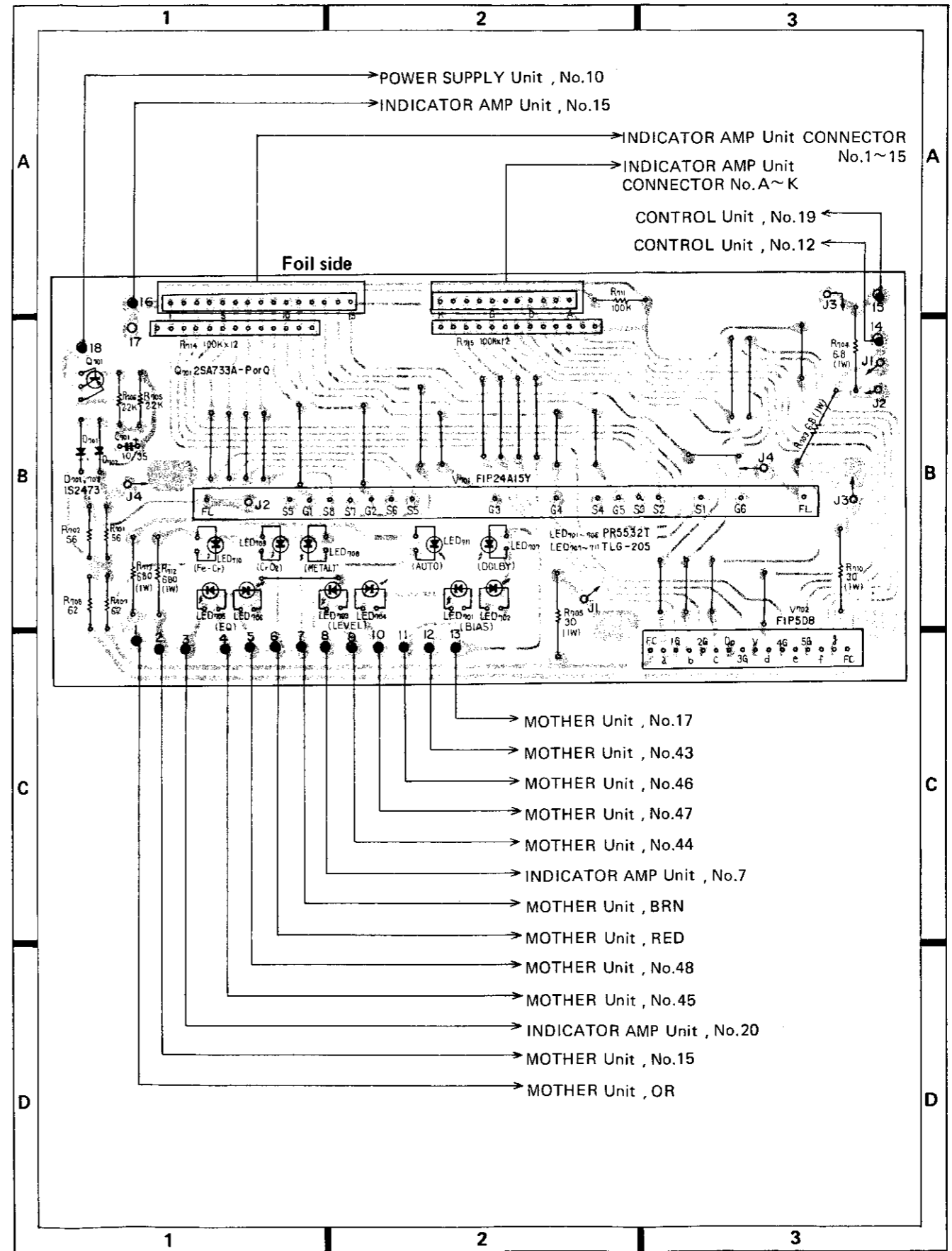
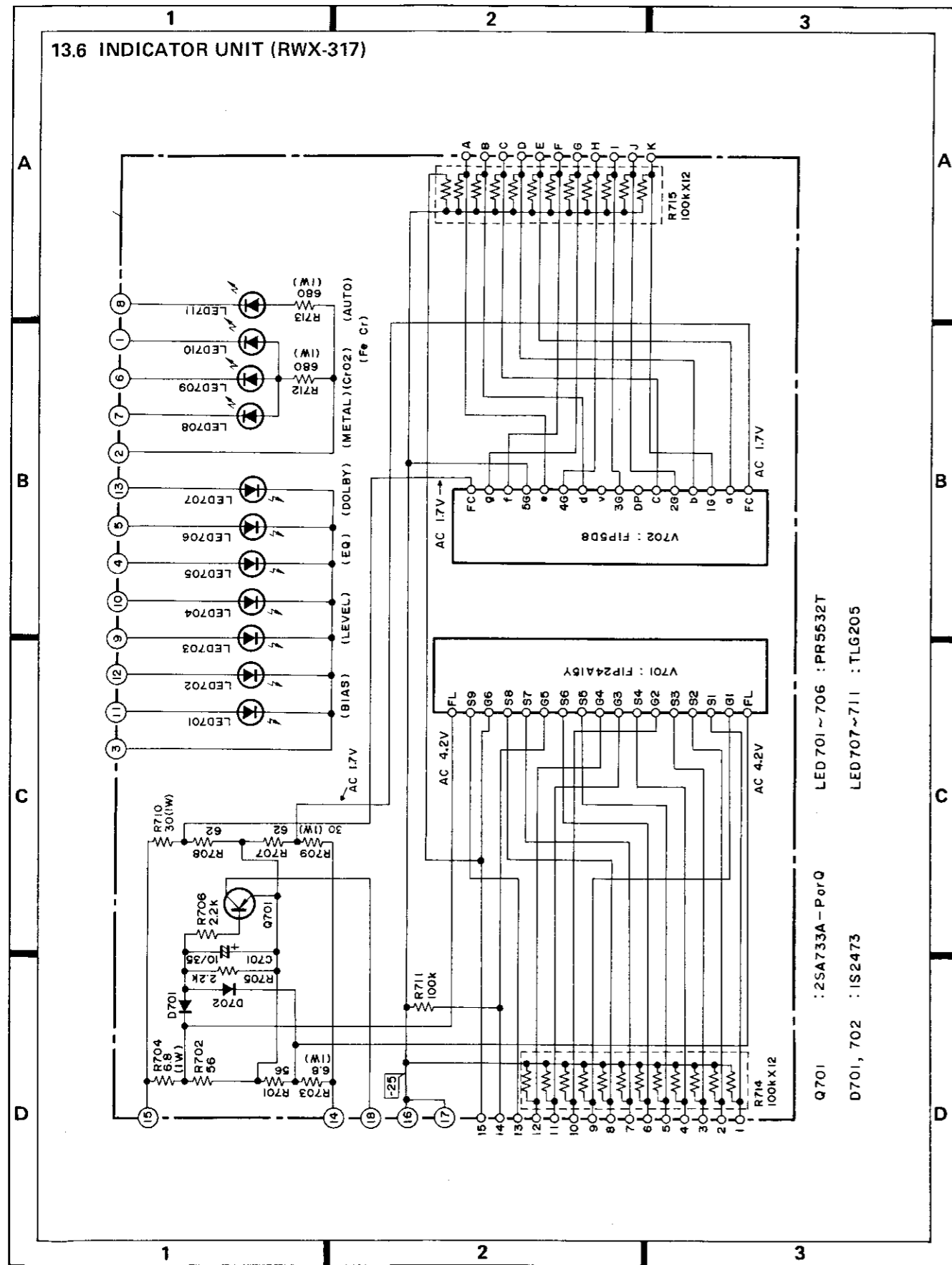
Part No.	Symbol & Description
RSG-084	S801 Switch D
RSG-085	S802 Switch E
RTD-015	L801 Oscillator coil
RWX-317	Indicator unit

SEMICONDUCTORS

Part No.	Symbol & Description
2SC2634 (2SC2320L)	Q801, Q803, Q804, Q807-Q815, Q817-Q819
2SA733A (2SA999L)	Q802, Q805, Q806, Q816
1S2473-T	D801-D819, D821-D827
1S2473	D820
RD5-6FC	ZD801
TA7318P	IC801
µPC4741C	IC802
µPD4050C	IC803
PD4007	IC804
TC5054P	IC805
TC5066BP	IC806, IC807







Parts List

CAPACITOR

Part No.	Symbol & Description
CEA 100P 35	C701

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

RESISTORS

Part No.	Symbol & Description
RS1PF □□□ J	R703, R704, R709, R710, R712, R713
RD¼PM □□□ J	R701, R702, R705–R708, R711
RCX-006	R714, R715 Resistor

SEMICONDUCTORS

Part No.	Symbol & Description
2SA733A	Q701
1S2473	D701, D702
PR5532T	LED701–LED706
TLG205	LED707–LED711

OTHERS

Part No.	Symbol & Description
FIP24A15Y	V701 Fluorescent indicator tube
FIP5D8	V702 Fluorescent indicator tube

13.7 BLE UNIT (RWX-322)

Parts List

CAPACITORS

Part No.	Symbol & Description
CEA 101P 25	C1301, C1323
CEA 470P 10	C1304, C1307, C1311, C1314, C1318, C1321, C1325, C1326
CEA 330P 16	C1333
CEA 100P 35	C1308, C1315, C1322, C1329, C1336
CEA 4R7P 35	C1305, C1312, C1319
CEA 2R2P 50	C1331, C1338
CEA 010P 50	C1324, C1332
CEA R47P 50	C1306, C1313, C1320
CEA R22M50	C1327, C1328, C1334, C1335
CQMA 103J 50	C1302, C1303
CQMA 222J 50	C1309, C1310
CQSA 391J 50	C1316, C1317
CQSA 680J 50	C1330, C1337

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

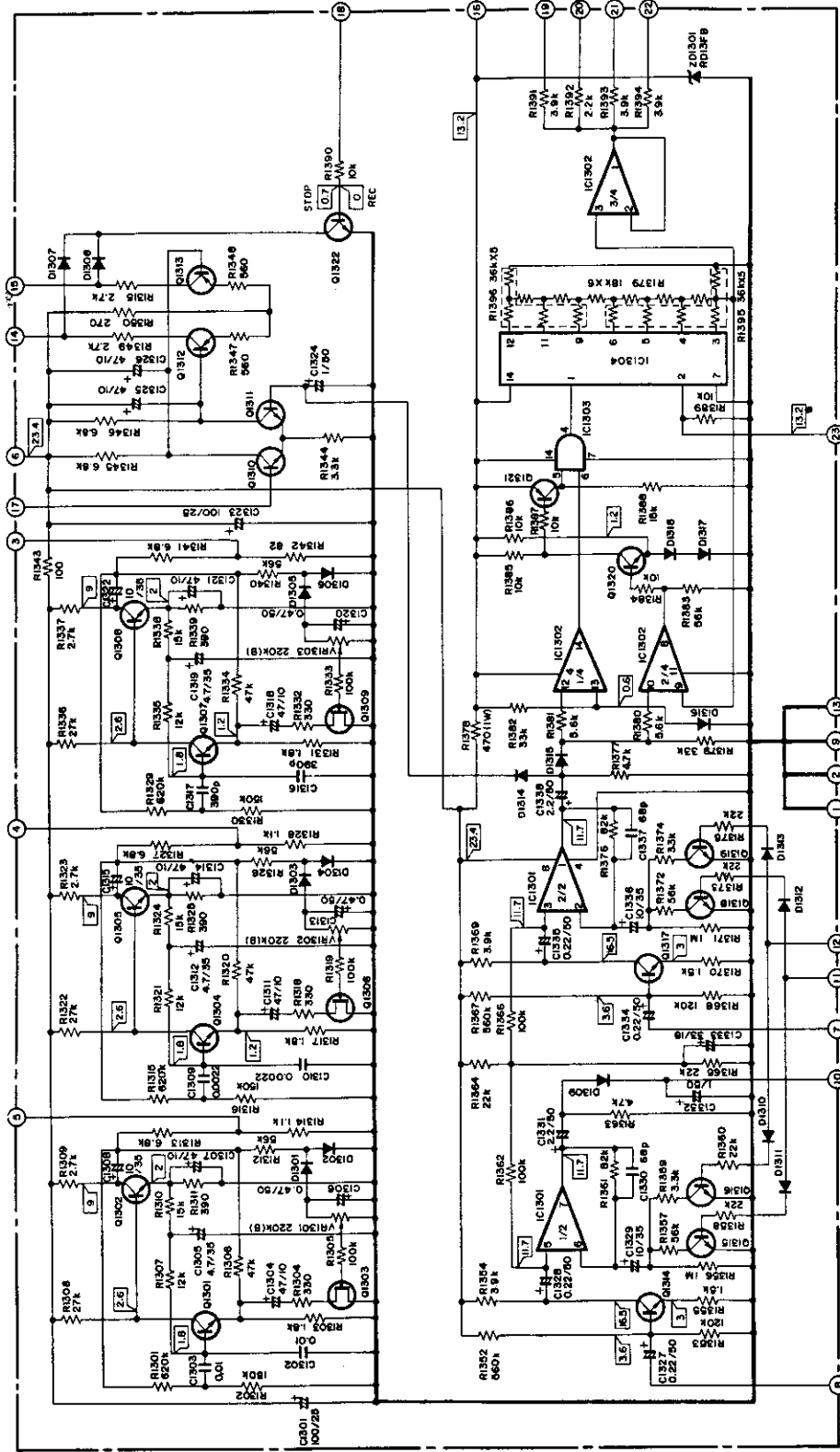
RESISTORS

Part No.	Symbol & Description
RCP-005	VR1301–VR1303 Semi-fixed 220K (B)
RCX-008	R1395, R1396 Resistor
RCX-009	R1397 Resistor
REK-062	R1343 Fuse resistor
RS1PF 471J	R1378
RD¼PM□□□ J	R1301–R1342, R1344–R1377, R1379–R1394

SEMICONDUCTORS

Part No.	Symbol & Description
2SC2634 (2SC2320L)	Q1301, Q1302, Q1304, Q1305, Q1307, Q1308, Q1310, Q1311, Q1314–Q1320, Q1322
2SK30A-DB-TM	Q1303, Q1306, Q1309
2SA733A (2SA999L)	Q1312, Q1313, Q1321
1S2473-T RD13FB	D1301, D1302, D1304–D1318 ZD1301
NJM4558D-D	IC1301
μPC324C	IC1302
μPD4081C	IC1303
TC4024BP	IC1304

BLE Unit (RWX-322)

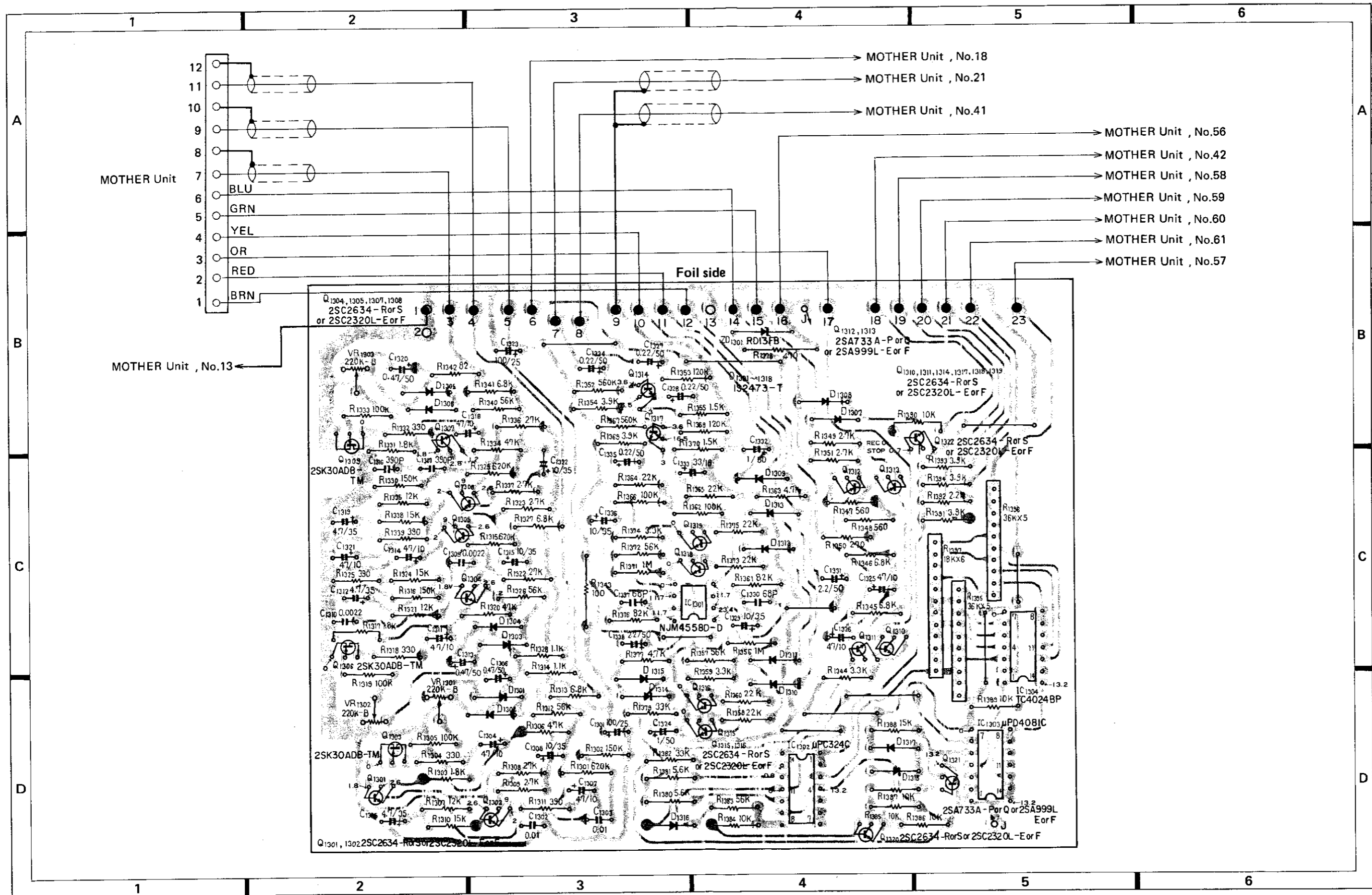


IC1301 : NJM4558D-D  
 IC1302 :  $\mu$ PC324C  
 IC1303 :  $\mu$ PD4081C  
 IC1304 : TC4024BP

O1312, I313, I321 : 2SA733A-P<sub>01</sub>Q or 2SA999L-E<sub>01</sub>F  
 O1303, I306, I309 : 2SK30AD8-TM  
 D1301~I318 : IS2473

O1301, I302, I304, I305, I307, I308, I310, I311, I314, I315, I316, I317, I318, I319, I320, I322 : 2SC2634-Rev S or 2SC2320L-E<sub>01</sub>F



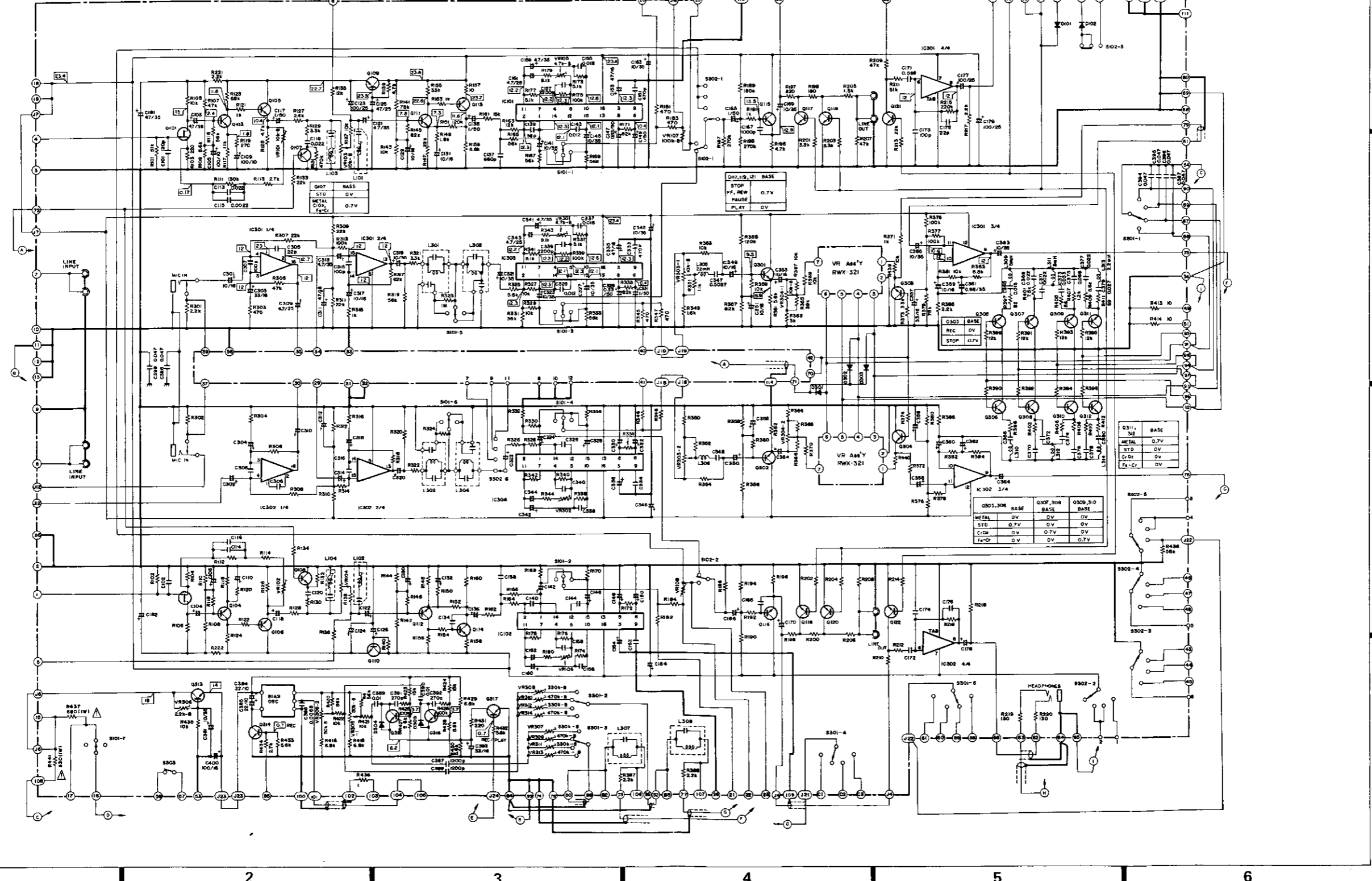


# 13.8 MOTHER UNIT (RWX-319)

Q101,102 : 2SK17-Y  
 Q13,14 : 2SA735A-R or Q or 2SA999L-E or F  
 Q103~108, 111, 112,  
 Q115~122, Q301~312, 317 : 2SC2634-R or S or 2SC2320-E or F  
 Q109, 110, 313, 314 : 2SC1384NC-R or S or 2SC2060-Q or R

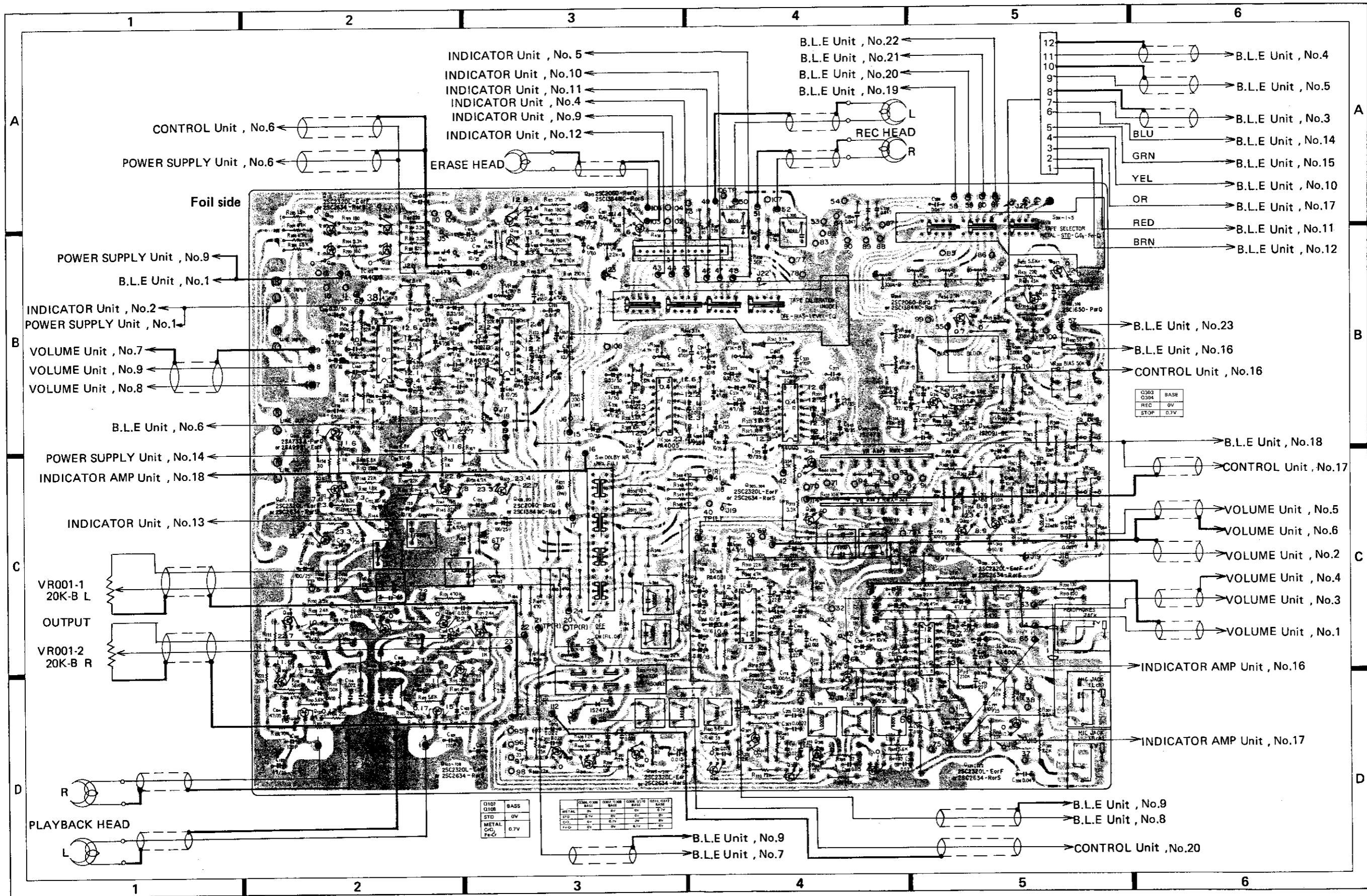
Q315,316 : 2SC1650-Par O  
 IC301,302 : PA4001  
 IC101,102,303,304 : PA4005  
 D101,102,301,302,303 : IS2473  
 D304,305 : IS2091-BL

S101~17 : DOLBY NR&IMPX FIL ON-OFF-ON  
 S102-1-3 : MONITOR SOURCE-TAPE  
 S301-1-5 : TAPE SELECTOR METAL-STD-CrO2-Fe-Cr  
 S302-1-6 : B.L.E SELECTOR OFF-BIAS-LEVEL-EQ  
 S303 : RESET ON-OFF



Q302,306	BASE	Q307,308	BASE	Q309,310	BASE
METAL	0.7V	DV	DV	DV	DV
STD	0.7V	DV	DV	DV	DV
CrO2	0.7V	DV	DV	DV	DV
Fe-Cr	0.7V	DV	DV	DV	DV

Q311	BASE
1/2	
METAL	0.7V
STD	DV
CrO2	DV
Fe-Cr	DV



### Parts List of Mother Unit (RWX-319)

#### SWITCHES

Part No.	Symbol & Description
RSB-024	S101 Rotary switch (C)
RSG-083	S102 Push switch
RSB-023	S301 Rotary switch (B)
RSB-022	S302 Rotary switch (A)

#### CAPACITORS

Part No.	Symbol & Description
CQSA 121J 50	C101, C102
CEA 101P 25	C123, C124, C177-C179
CEA 101P 10	C105, C106, C109, C110
CEA 470P 35	C125, C126, C181, C182
CEA 470P 16	C153, C154, C311, C312, C335, C336
CEA 330P 16	C303, C304, C357, C358, C393
CEA 220P 10	C384, C385
CEA 100P 35	C141, C142, C145, C146, C163, C164, C169, C170, C319-C324, C327, C328, C345, C346, C355, C356, C363, C364, C381
CEA 100P 16	C129-C132, C317, C318, C349-C354, C359, C360
CEA 4R7P 35	C103, C104, C121, C122, C159, C160, C313, C314, C341, C342
CEA 010P 50	C117, C118, C165, C166, C135, C136
CEA R47P 50	C171, C172
CEA 010M 50	C149, C150, C331, C332
CEA R33M 50	C147, C148, C329, C330
CEA 4R7M 25NP	C161, C162, C343, C344
CEANL 100P 16	C301, C302
CEANL 4R7P 25	C309, C310
CSZA R68M 35	C361, C362
CQMA 223J 50	C113, C114, C119, C120, C369-C372, C377, C378
CQMA 183K 50	C155, C156, C337, C338
CQMA 123K 50	C143, C144, C325, C326
CQMA 272K 50	C347, C348
CQMA 222J 50	C115, C116
CQMA 222K 50	C157, C158, C339, C340
CQMA 153J 50	C365, C366
CQMA 273J 50	C379, C380
CQMA 333J 50	C374
CQMA 683J 50	C375, C376
CQMA 103K 50	C389, C390
CCDSL 101K 50	C173, C174, C307, C308, C315, C316
CQSA 560J 50	C139, C140
CCDSL 220K 50	C175, C176, C305, C306
CQSA 681J 50	C137, C138
CKDYB 471K 50	C151, C152, C333, C334
CKDYF 473Z 50	C394-C399
CKDYF 102Z 50	C167, C168
CQSA 271J 50	C391, C392
CQSA 122K 50	C387, C388
CQPA 682J 100	C386
CEA 101P 16	C400

#### COILS

Part No.	Symbol & Description
RTF-058	L101-L104, L307, L308 Trap coil
RTF-034	L301, L302 MPX coil (C)
RTF-035	L303, L304 MPX coil (D)
RTF-064	L305, L306 EQ coil
RTF-067	L309, L310 Peaking coil (5mH) STD
RTF-068	L311, L312 Peaking coil (3mH) CrO <sub>2</sub>
RTF-050	L313, L314 Peaking coil

#### OTHERS

Part No.	Symbol & Description
RKB-014 (RKB-016)	Mount pin jack 4P
RKN-046	Headphones jack
RKN-044	Mic jack

#### SEMICONDUCTORS

Part No.	Symbol & Description
2SK117-Y	Q101, Q102
2SA999L (2SA733)	Q113, Q114
2SC1384NC (2SC2060)	Q109, Q110, Q313, Q314
2SC2634 (2SC2320L)	Q103-Q108, Q111, Q112, Q115-Q122, Q301-312, Q317
2SC1650	Q315, Q316
1S2473-T	D101, D102, D301-D303
1S2091-BL	D304, D305
PA4001	IC301, C302
PA4005	IC101, IC102, IC303, IC304

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

#### RESISTORS

Part No.	Symbol & Description
RCV-071	VR303, VR304 Volume 10K (B)
RCV-070	VR305 Volume 50K (B) at switch
C92-049	VR101-VR104 Semi-fixed 10K (B)
C92-051	VR105, VR106, VR301, VR302 Semi-fixed 4.7K (B)
C92-047	VR107, VR108 Semi-fixed 100K (B)
C92-401	VR306 Semi-fixed 2.2K (B)
RCP-021	VR307, VR308, VR311, VR312 Semi-fixed 330K (B)
RCP-070	VR309, VR310, VR313, VR314 Semi-fixed 470K (B)

Part No.	Symbol & Description
RS1PF 000 J	R437, R441
RD¼PM 000 J	R101-R184, R187-R222, R301-R398, R401-R416, R419-R436, R438-R440

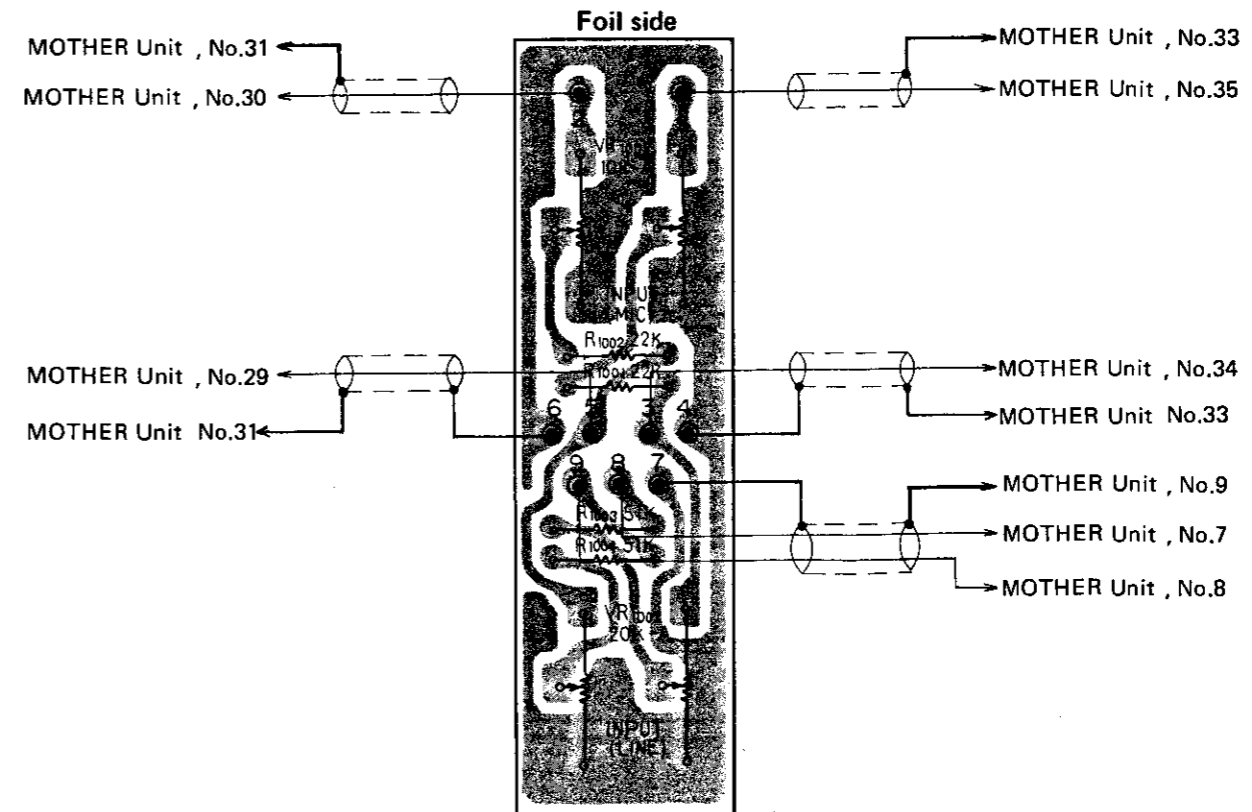
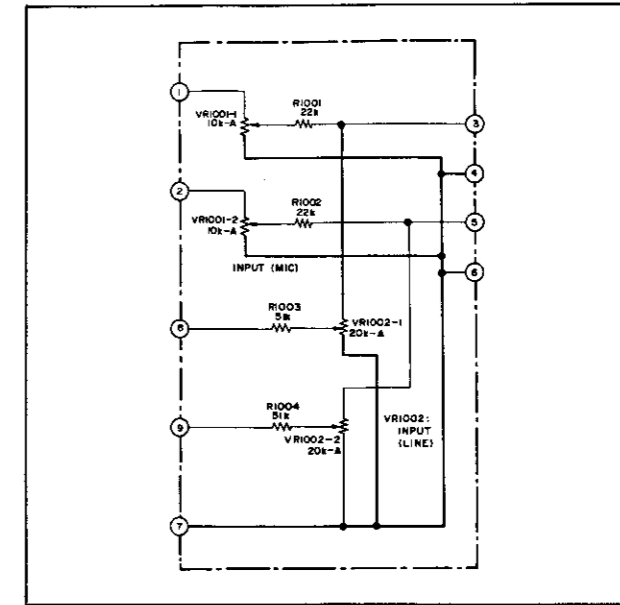
### 13.9 VOLUME UNIT

#### Parts List

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

#### RESISTORS

Part No.	Symbol & Description
RCV-073	VR1001 Volume 10K (A)
RCV-072	VR1002 Volume 20K (A)
RD¼PM 000 J	R1001-R1004



13.10 FUNCTION SWITCH UNIT (RWS-075)

SWITCHES

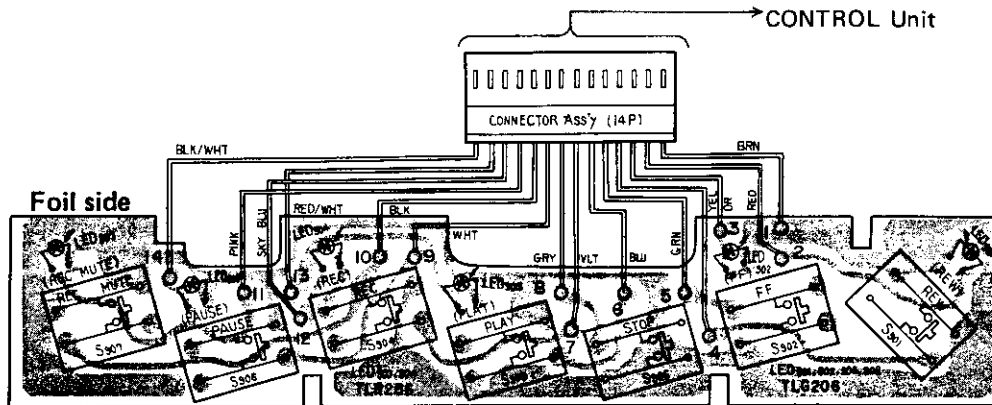
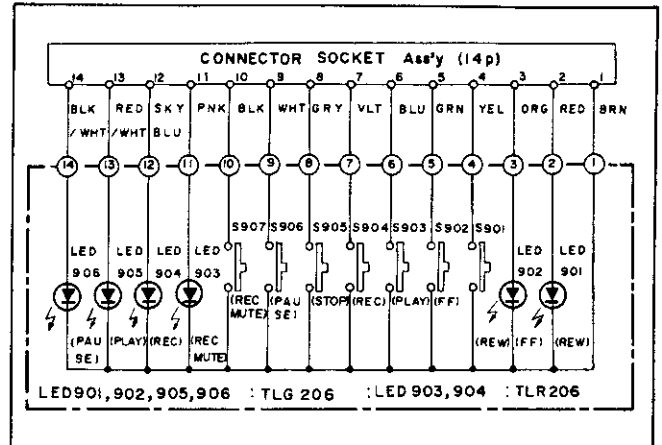
Part No.	Symbol & Description
RSG-063	S901-S907 Function switch

SEMICONDUCTORS

Part No.	Symbol & Description
TLG206	LED901, LED902, LED905, LED906
TLR206	LED903, LED904

OTHERS

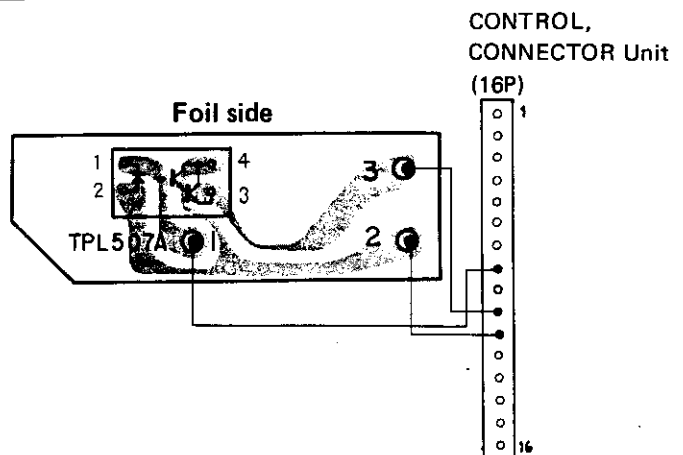
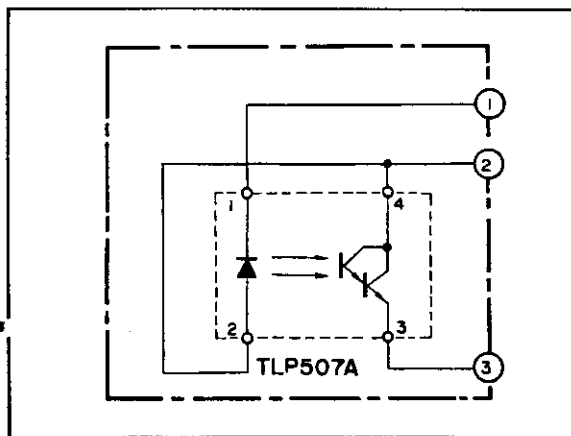
Part No.	Symbol & Description
RKP-110	Connector socket assembly 14P
RNK-733	LED holder



13.11 SENSING UNIT

Part List

Part No.	Symbol & Description
TLP507A	Photo coupler



### 13.12 SEMI-FIXED VOLUME UNIT

#### Parts List

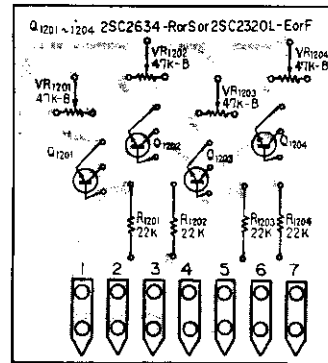
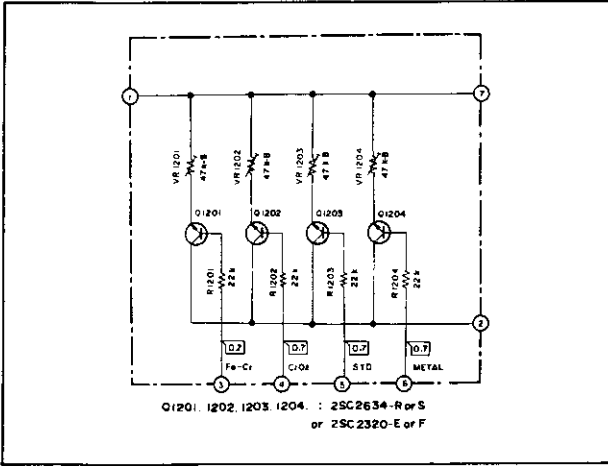
*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

#### RESISTORS

Part No.	Symbol & Description
RCP-057 (RCP-091)	VR1201—VR1204 Semi-fixed 47K (B)
RD $\frac{1}{2}$ PM 223J	R1201—R1204

#### SEMICONDUCTORS AND OTHER

Part No.	Symbol & Description
2SC2634 (2SC2320L)	Q1201—Q1204

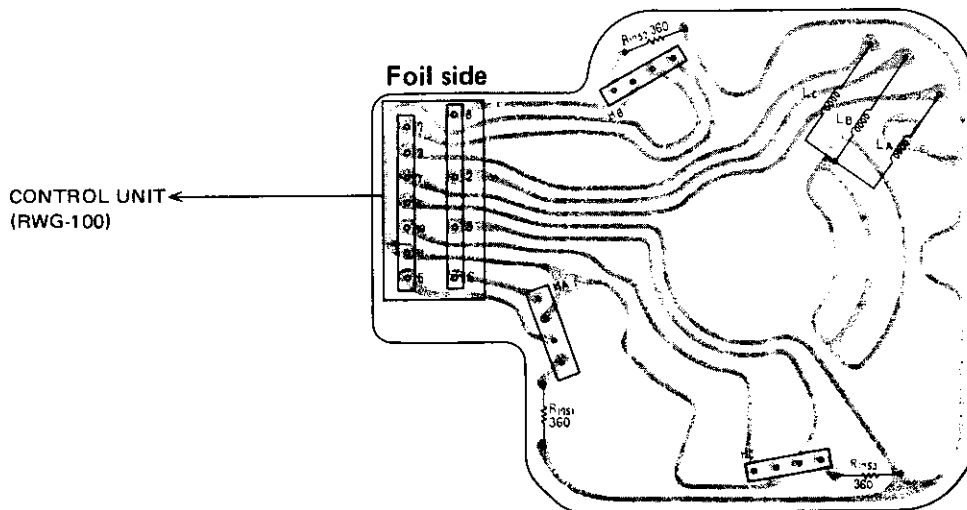


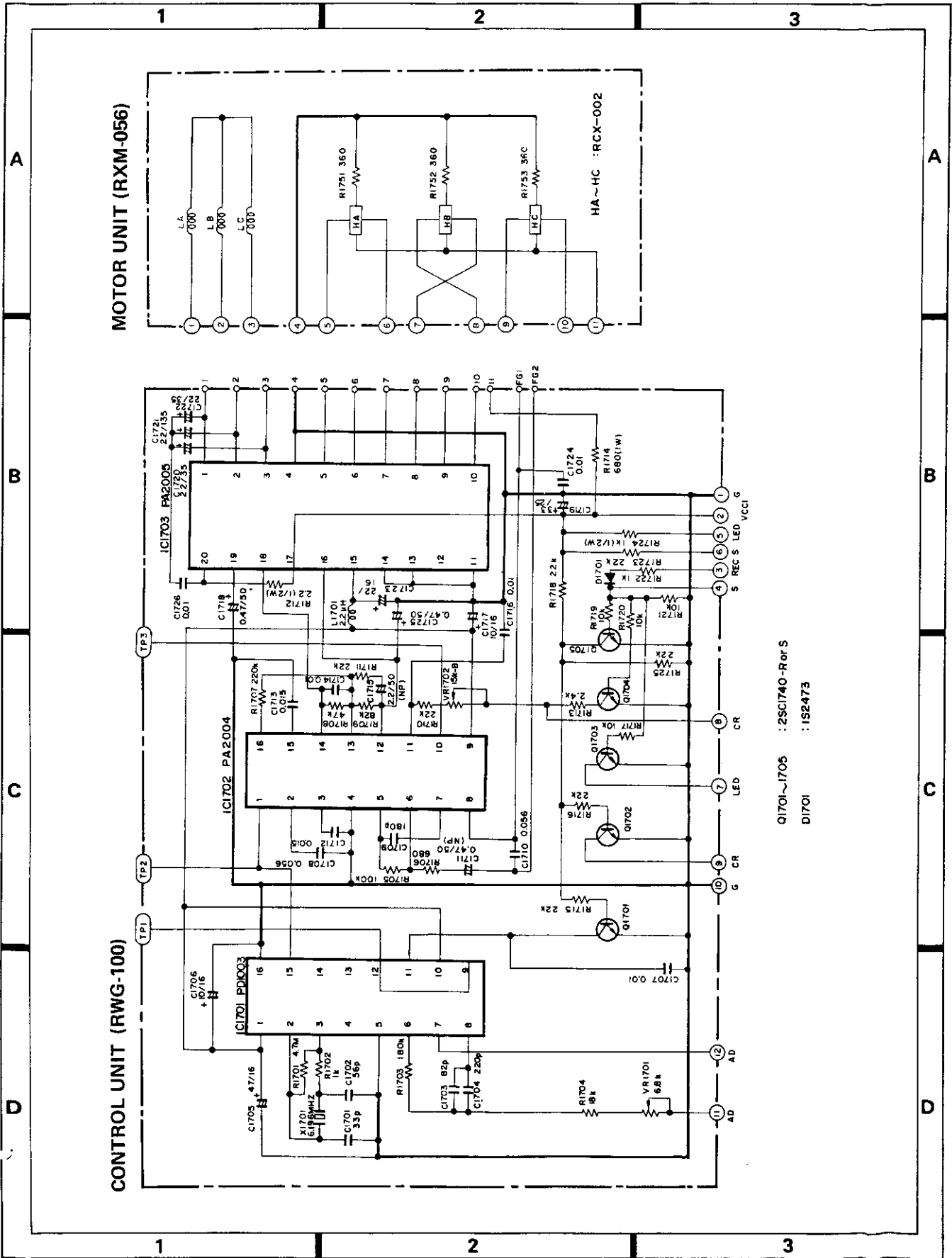
### 13.13 CAPSTAN D. D. MOTOR

#### Parts List

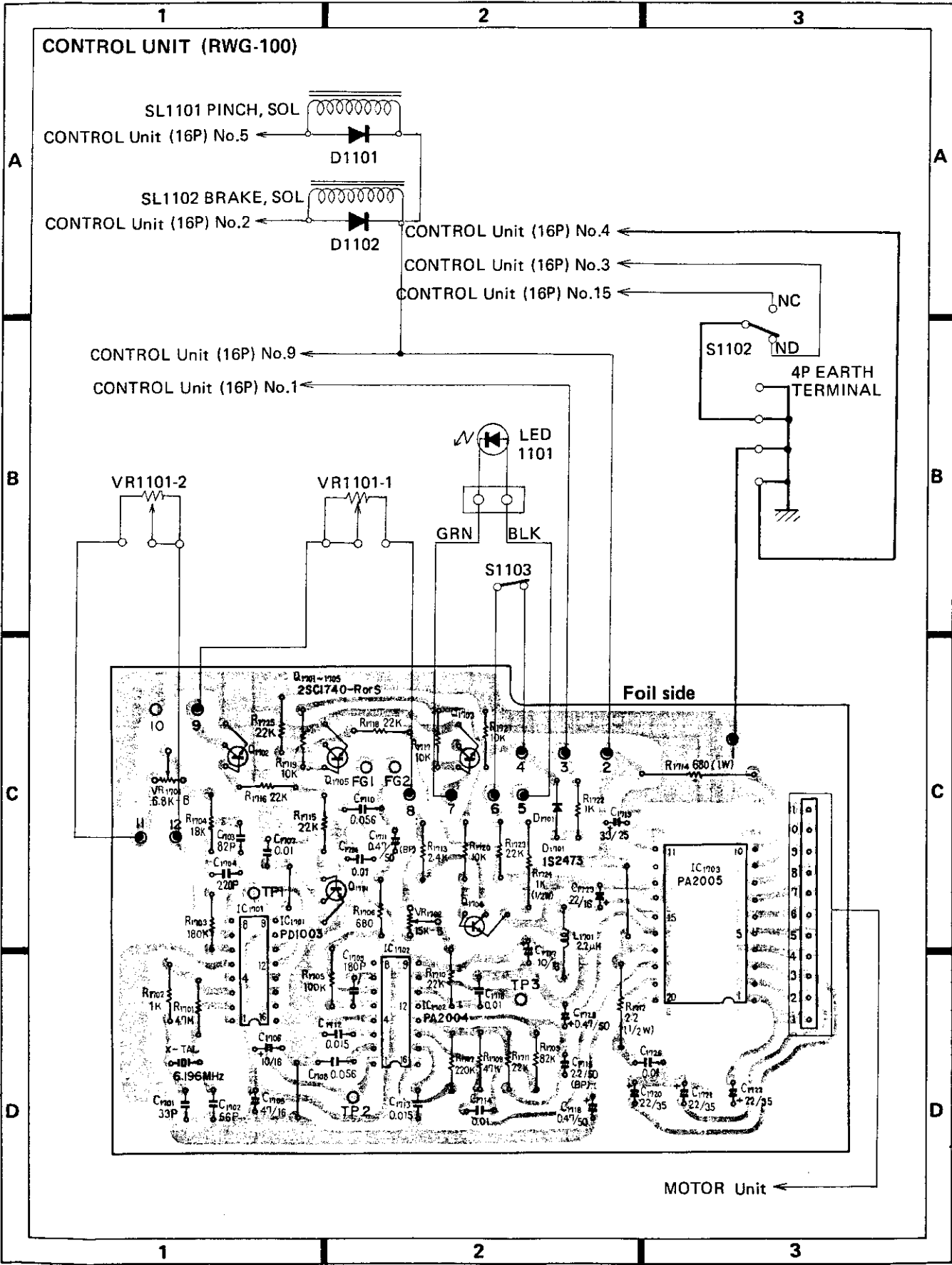
Part No.	Symbol & Description
RXM-056	Motor unit
RNG-100	Control unit

#### Motor unit (RXM-065)





Q1701~1705 : 2SC1740-R or S  
 D1701 : 1S2473





## Control Unit (RWG-100) Parts List

### CAPACITORS

Part No.	Symbol & Description
CCDCH 330J 50	C1701
CCDCH 560J 50	C1702
CCDCH 820J 50	C1703
CCDSL 181K 50	C1709
CKDYF 103Z 50	C1707, C1716, C1724, C1726
CEA R47P 50	C1718, C1725
CEA 100P 16	C1717
CEA 220P 16	C1723
CEA 220P 35	C1720-C1722
CEA 330P 25	C1719
CEA 470P 16	C1705
CEA R47M 50NP	C1711
CEA 2R2M 50NP	C1715
CSZAH 100M 16	C1706
QOSH 221J 50	C1704
QOMA 153J 50	C1712
QOMA 153K 50	C1713
QOMA 563K 50	C1708, C1710
QOMA 103K 50	C1714

### OTHERS

Part No.	Symbol & Description
RSS-029	X1701
RTH-002	L1701

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

### RESISTORS

Part No.	Symbol & Description
RCP-051	VR1701 Semi-fixed 6.8K (B)
RCP-006	VR1702 Semi-fixed 15K (B)
RD $\frac{1}{2}$ PM $\square\square\square$ J	R1701-R1703, R1705-R1711, R1713, R1715-R1723, R1725
RD $\frac{1}{2}$ PS $\square\square\square$ J	R1712, R1724
RN $\frac{1}{2}$ PR 1802F	R1704
RS1PF 681J	R1714

### SEMICONDUCTORS

Part No.	Symbol & Description
PD1003	IC1701
PA2004	IC1702
PA2005	IC1703
2SC1740	Q1701-Q1705
1S2473	D1701

## 13.14 POWER SUPPLY UNIT (RWR-074)

### CAPACITORS

Part No.	Symbol & Description
CEA 152P 35	C1601
CEA 010P 50	C1615
CEA 2R2P 50	C1613
CEA 100P 63	C1607
CEA 220P 50	C1612
CEA 470P 10	C1603
CEA 470P 16	C1614
CEA 470P 35	C1605, C1617
CEA 101P 50	C1609
CEA 101P 35	C1604, C1618
CEA 221P 16	C1606
CEA 221P 35	C1610
CEA 221P 25	C1611
CEA 331P 50	C1616
CEA 102P 35	C1602
CEA 102P 50	C1608

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

### RESISTORS

Part No.	Symbol & Description
RCN-045	R1618
RS1PF $\square\square\square$ J	R1616, R1619, R1622, R1624
RD $\frac{1}{2}$ PSF $\square\square\square$ J	R1601, R1610-R1612, R1621, R1623
RD $\frac{1}{2}$ PS $\square\square\square$ J	R1602-R1609, R1613-R1615, R1617, R1620

### SEMICONDUCTORS

Part No.	Symbol & Description
2SD234	Q1601, Q1610
2SC1740LN (2SC1740)	Q1602, Q1603, Q1606, Q1608
2SA733A	Q1604, Q1605
2SD526	Q1607
2SA887	Q1609
2SC1419	Q1611

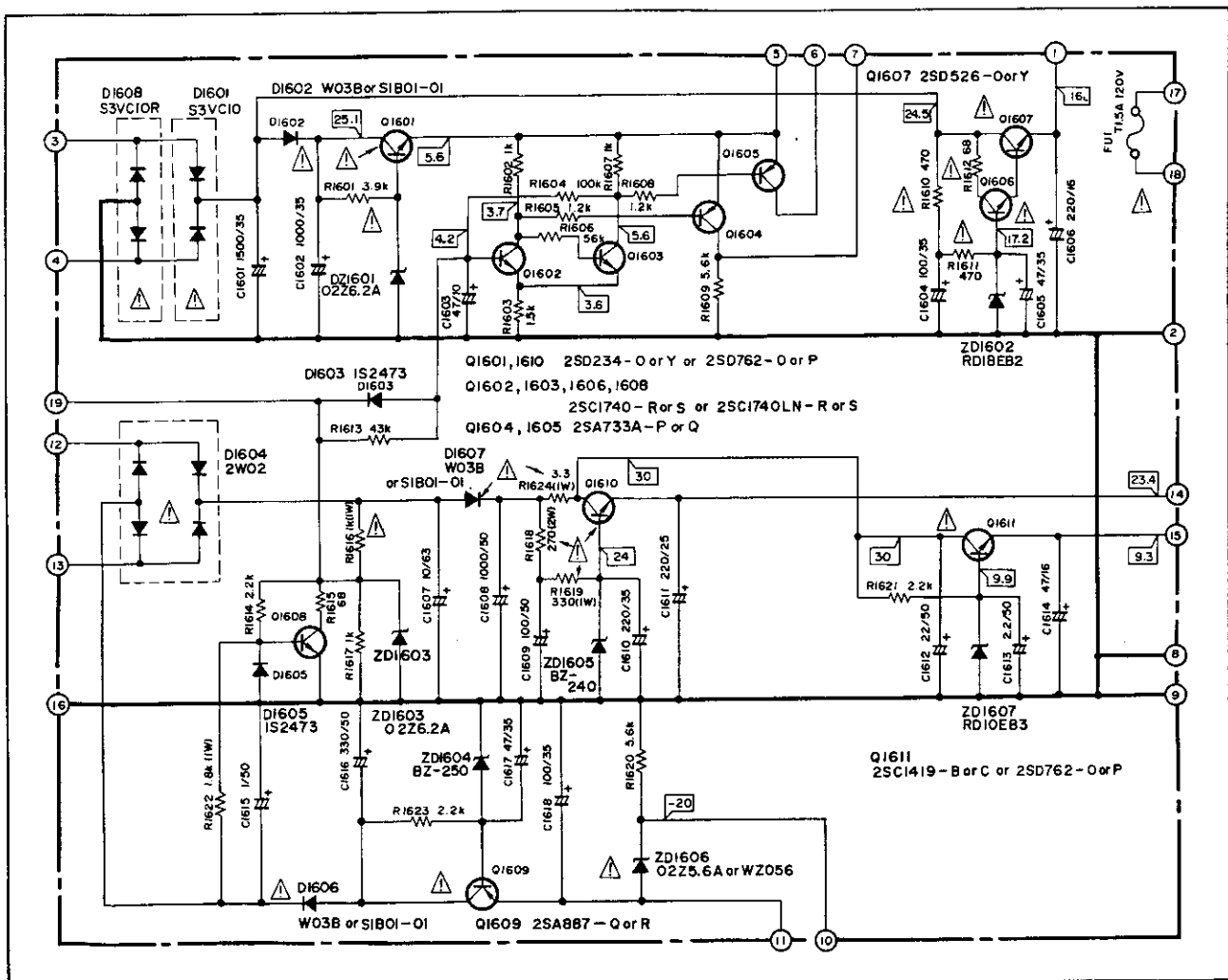
Part No.	Symbol & Description
S3VC10	D1601
W03B	D1602, D1606, D1607
(SIB01-01)	
1S2473	D1603, D1605
2W02	D1604
S3VC10R	D1608
02Z6-2A	ZD1601, ZD1603
RD18EB2	ZD1602
BZ-250	ZD1604
BZ-240	ZD1605
02Z5.6A	ZD1606
(WZ-056)	
RD10EB3	ZD1607

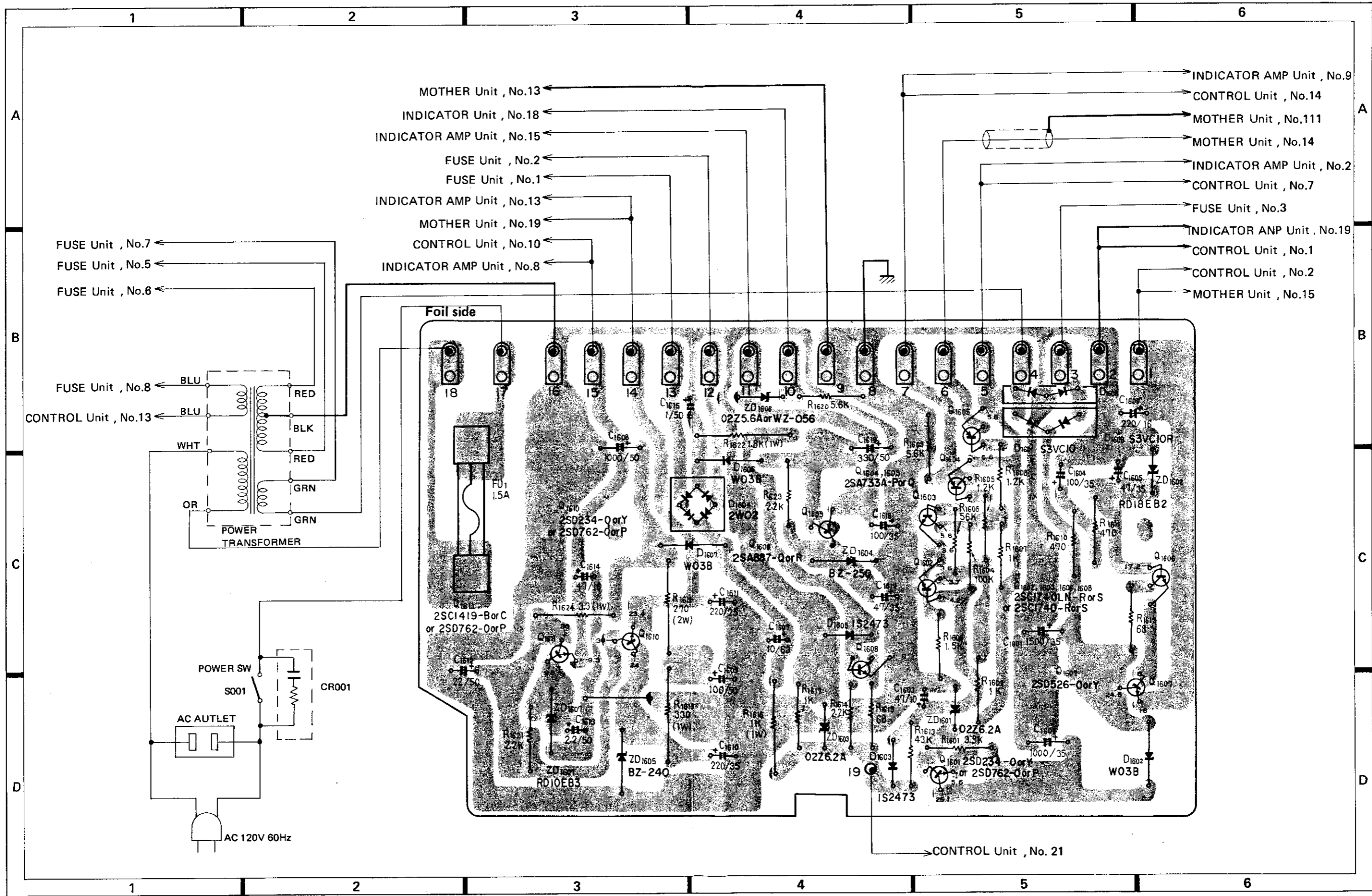
### FUSE

Part No.	Symbol & Description
REK-063	FU1 Fuse 1.5A

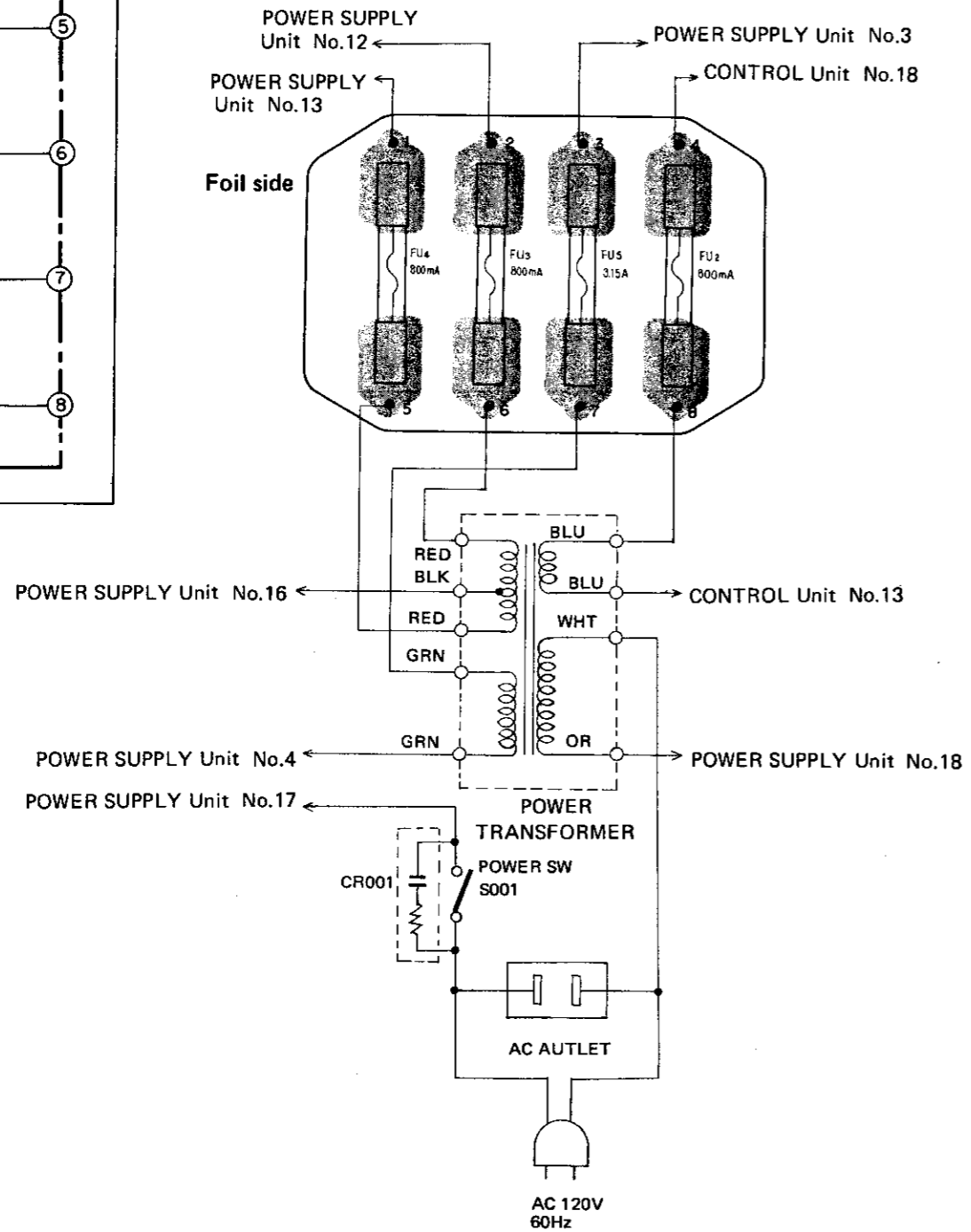
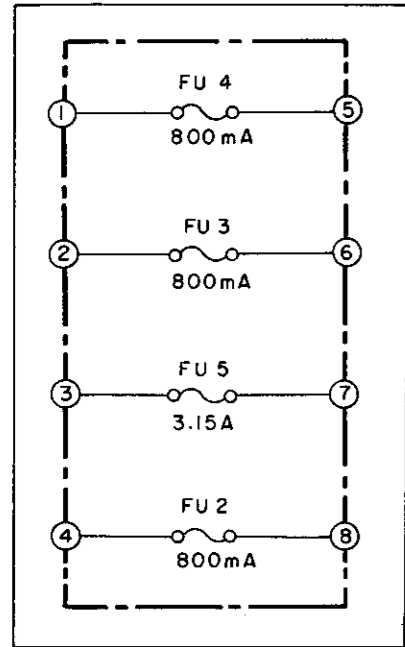
### OTHERS

Part No.	Symbol & Description
REE-051	Insulator
RKH-005	Insulator
RBA-026	Screw





13.15 FUSE ASSEMBLY



Parts List

Part No.	Symbol & Description
REK-058	FU2-FU4 Fuse 800mA
REK-044	FU5 Fuse 3.15A