

# *Service Manual*

CASSETTE TAPE DECK

# **CT-F615**

 **PIONEER®**

MODEL CT-F615 COMES IN ONE VERSION DISTINGUISHED AS FOLLOWS.

Type	Voltage	Remarks
KU	120V only	U.S.A. model

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### NOTE;

- This service manual is applicable to the CT-F615/KU type which serial numbers from ZL3600001 through ZL3600100.
- As an improvement, the mother assembly was modified of which serial numbers are after ZL3600101. For detailed, refer to the additional service manual on page 45.

# 1. SPECIFICATIONS


Systems . . . . . Compact cassette, 2-channel stereo  
 Motor . . . . . DC servo motor x 1  
 Heads . . . . . "Sendust" recording/playback head x 1  
    Erasing head x 1  
 Fast Winding Time . . . . . Approximately 100 seconds  
    (C-60 tape)  
 Wow and Flutter . . . . . No more than 0.06% (WRMS)  
 Frequency Response  
     Standard, LH tapes . . . . . 20 to 15,000Hz  
    (25 to 14,000Hz ± 3dB)  
     Ferrichrome tape . . . . . 20 to 17,000Hz  
    (25 to 16,000Hz ± 3dB)  
     Chromium dioxide tape . . . . . 20 to 17,000Hz  
    (25 to 16,000Hz ± 3dB)  
     Metal tape . . . . . 20 to 18,000Hz  
    (25 to 17,000Hz ± 3dB)  
 Signal-to-Noise Ratio . . . . . Dolby NR OFF; More than 58dB  
    Dolby NR ON; More than 68dB  
    (over 5kHz)  
 Harmonic Distortion . . . . . No more than 1.3% (0dB)  
 Input (Sensitivity/Maximum allowable input/Impedance)  
     MIC (L, R); 0.3mV/100mV/10 kilohms, 6mm diam, jack  
     (Reference MIC impedance; 250 ohms to 10 kilohms)  
     LINE x 2; 50mV/25V/75 kilohms Pin jack  
 Output (Reference level/Load impedance)  
     LINE x 2; 450mV/50 kilohms Pin jack  
     HEADPHONES x 1; 73mV/8 ohms, 6mm diam. jack  
 Semiconductors  
     Amplifier Section . . . . . Transistor x 55  
    Diodes x 45 (Zener x 3, LED x 3), ICs x 5  
     Motor control Section . . . . . Transistor x 2, Diode x 1  
 Subfunctions  
 ● Air damp eject function  
 ● Fluorescent display level meter (-20 to +8dB)  
 ● 4 position tape selector (STD/Fe-Cr/CrO<sub>2</sub>/METAL)  
 ● IC logic control

- Dolby NR system (ON/OFF)
- Standby mechanism with unattended recording
- REC muting function
- Full automatic stop mechanism

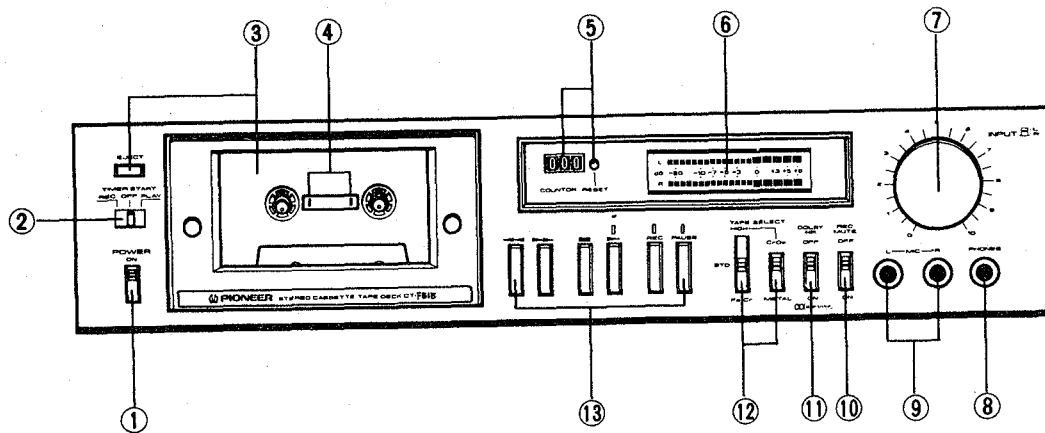
Power Requirements . . . . . AC120V, 60Hz  
 Power Consumption . . . . . 31 watts  
 Dimensions . . . . . 420(W) x 98(H) x 328(D)mm Max.  
    16-9/16 x 3-7/8 x 12-15/16in.  
 Weight . . . . . 6kg (13 lb 4oz)  
 Furnished Parts . . . . . Stereo connecting cords with pin plugs x 2  
    Head cleaning swabs x 3  
    Operating instructions x 1

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

- NOTES:
1. Reference Recording Level: Meter 0dB indicating level (160 nwb/m magnetic level = Philips cassette reference level)
  2. Reference Signal: 333Hz
  3. Wow & Flutter: ● JIS [3kHz, with acoustic compensation (weighted), rms value]
  4. Frequency Response: ● Measured at -20dB level, DOLBY NR OFF, level deviation is ±6dB without indication.
  5. Signal to Noise Ratio: ● Measured at the third harmonic distortion 3% level, weighted.
  6. Sensitivity: Input level (mV) required for reference recording level with input (REC) controls set to maximum.
  7. 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.
  8. Reference Output Level: Playback output level when meter indicates 0dB.

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 \*Dolby and  are trademarks of Dolby Laboratories.

## 2. FRONT PANEL FACILITIES



### ① POWER SWITCH

Power is supplied to the deck when this switch is set to ON, and the level meter lights up. To turn OFF the power, set it to bottom position.

### ② TIMER START SWITCH

This is used when the timer is employed along with the deck for unattended recording and wake up playback.

**REC:** Set to this position to set the deck automatically to the recording mode at the time preset on the timer and to start the recording of programs unattended, for instance.

**OFF:** Set to this position for normal tape playback and recording.

**PLAY:** Set to this position to set the deck automatically to the playback mode at the time preset on the timer and to start the playback. The tape playback function can be used to wake up in the morning instead of an alarm clock.

### ③ CASSETTE HOLDER/EJECT BUTTON

The cassette tapes are loaded into this holder. It jumps out when the EJECT button is depressed. To close the holder, push the top back until it locks.

### ④ REMAINING TAPE MARKER

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

### ⑤ COUNTER RESET BUTTON/TAPE COUNTER

Depress this button to reset the tape counter display to "000." Tape counter indicates the position of the tape run.

### ⑥ LEVEL METERS

These indicate the input level during recording and the output level during playback.

### ⑦ INPUT (RECORDING LEVEL) CONTROLS

Use these to adjust the level of the input signals from the MIC jacks or rear panel LINE-INPUT.

Turning these controls to the right increases the level.

The controls are coupled to the left and right channels, but you can also use them to adjust the right channel (back) and the left channel (front) independently.

### ⑧ HEADPHONE JACK

This is the output jack for stereo headphones. Plug your headphones into this jack when you want to monitor the quality of a recording or when you want to listen to a tape privately.

#### 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 this jack by mistake.

### ⑨ 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.

### ⑩ REC MUTE SWITCH

While this switch is depressed (ON) during recording (switch is kept depressed), blanks can be recorded on the tape since the input signals are not recorded.

### ⑪ DOLBY NR SWITCH

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

### ⑫ 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.

**STD position:** For using standard or LH tapes

**Fe-Cr position:** For using ferrichrome tapes

**HIGH position:** Set to this position when using chrome or metal tapes and then set the right-hand switch to CrO<sub>2</sub> or METAL.

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

—METAL: For using metal tapes

### ⑬ OPERATING SWITCHES

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

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

■ (Stop): Depress this switch to stop the tape run and to release the operating switches.

▶ (Play): Depress this switch when playing back a tape. (The tape will travel from left to right.)

REC: Depress this switch together with the ▶ (Play) switch for recording.

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

PAUSE: Depress this switch to stop the tape temporarily during recording or playback. Depress ▶ (Play) switch to allow the tape to continue to travel.

**NOTE:**

- The operating switches will not return to their original positions even when the power is switched OFF.

### 3. DISASSEMBLY

#### BONNET

Remove screws ① .

#### Front Panel

Remove screws ② .

#### Mechanical Ass'y

1. Disconnect the sensing belt coupling the take-up reel base to the runner.
2. Remove screws ③ .

#### Base Plate

Remove screws ④ .

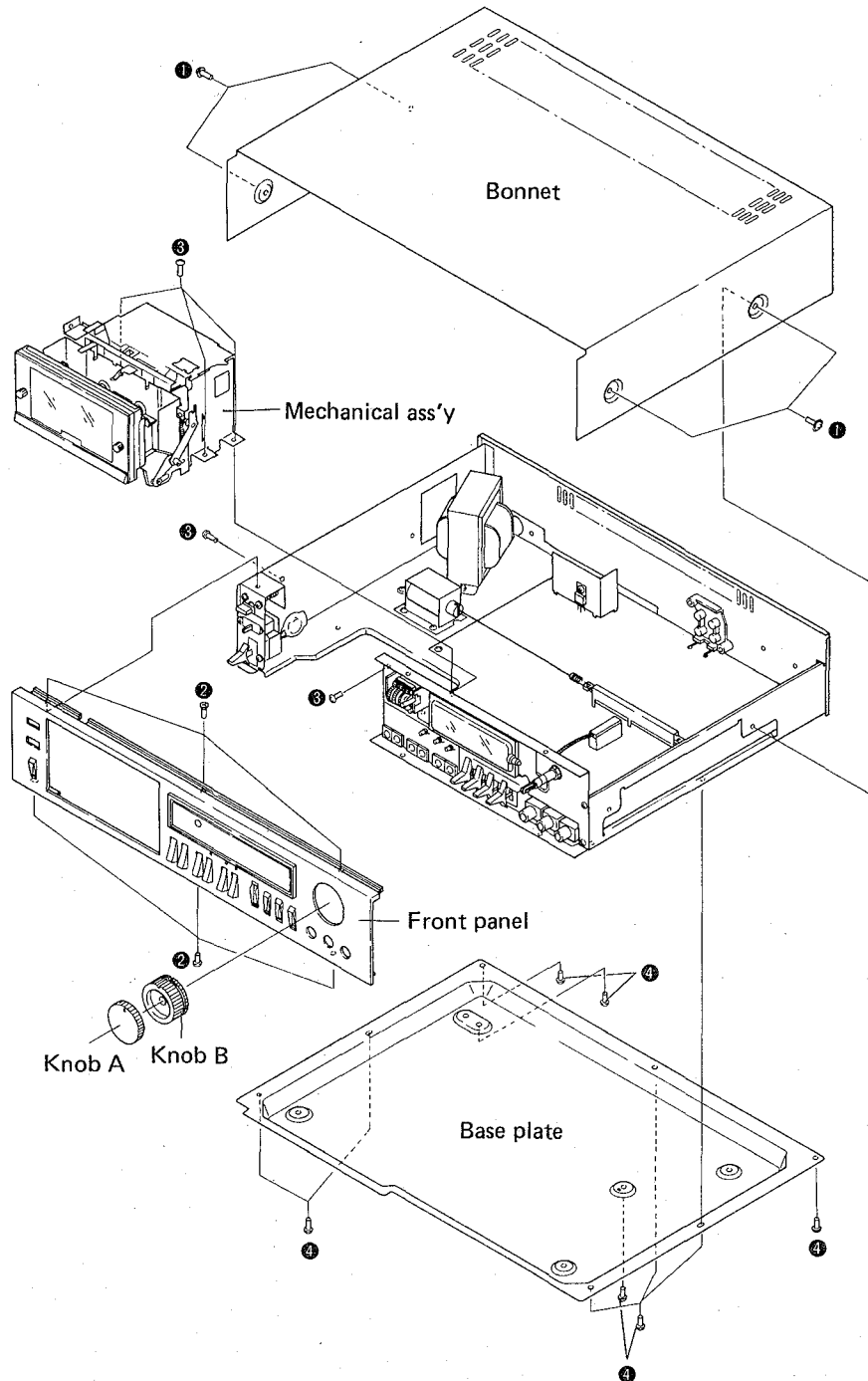
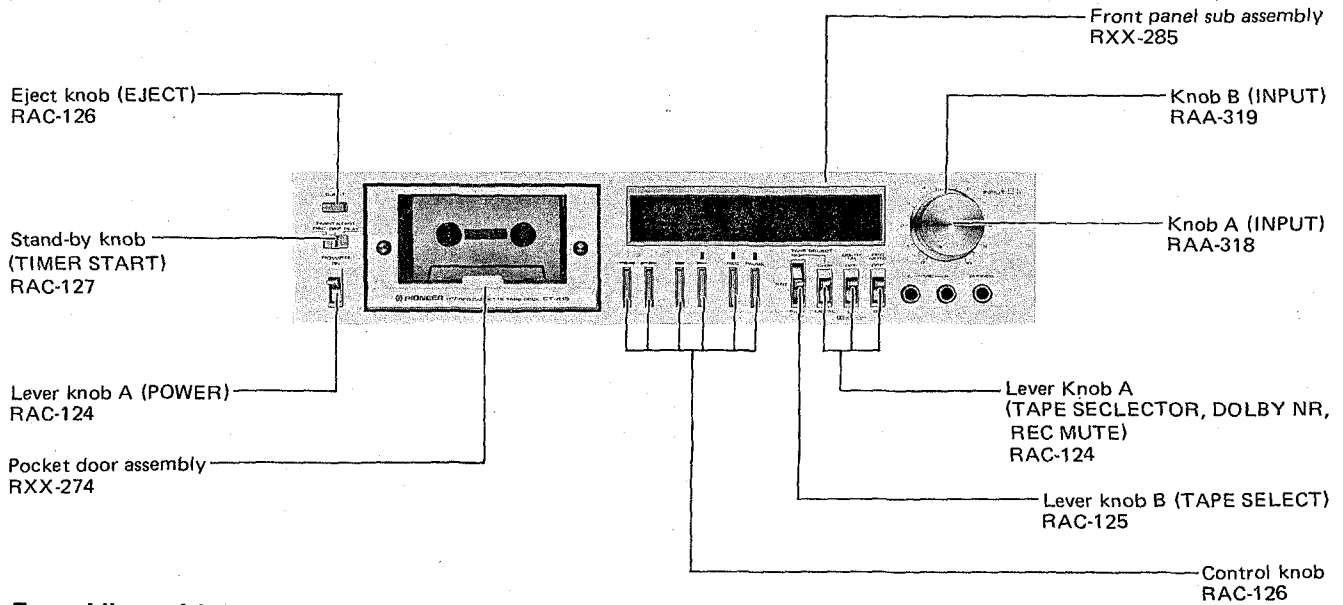


Fig. 1-1 Disassembly

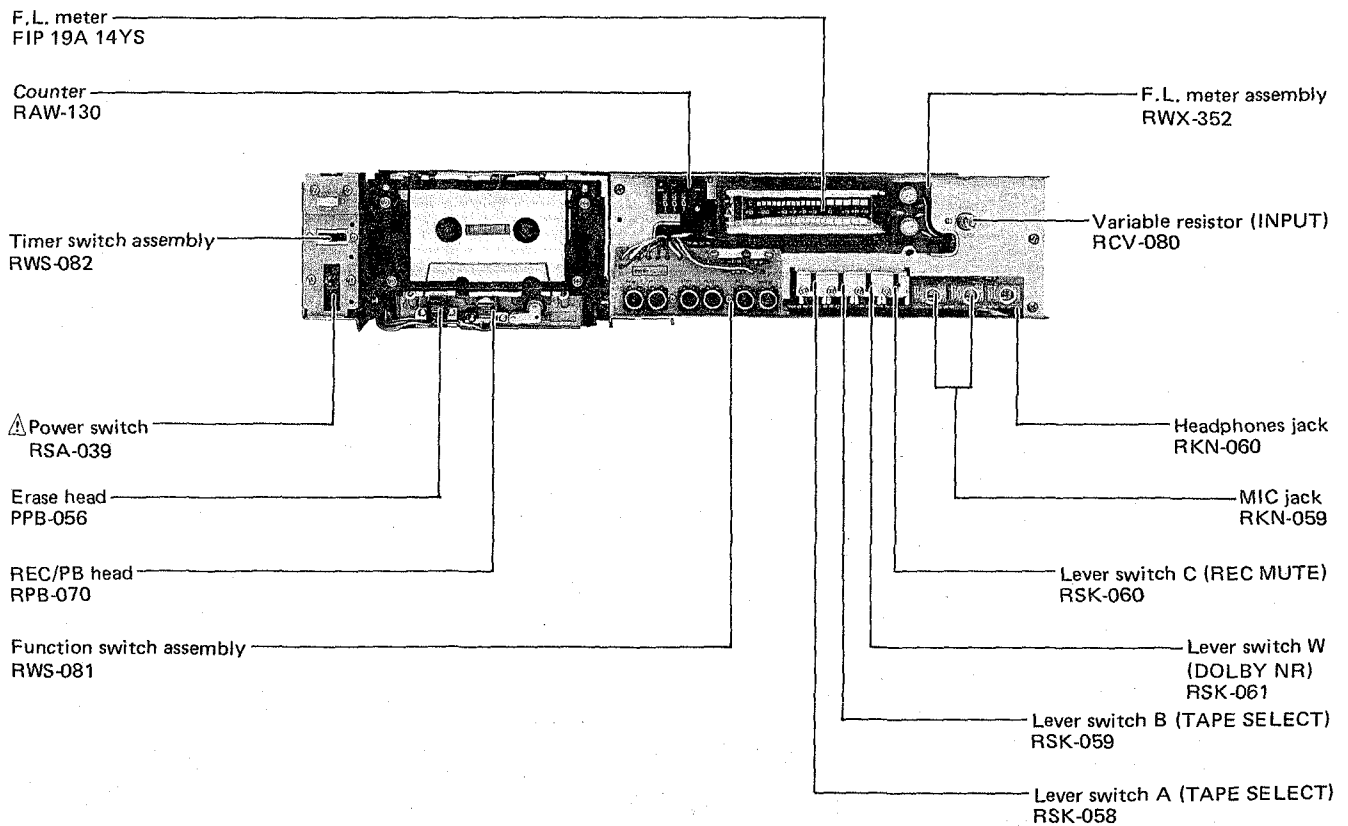
# 4. PARTS LOCATION

- The  $\Delta$  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.

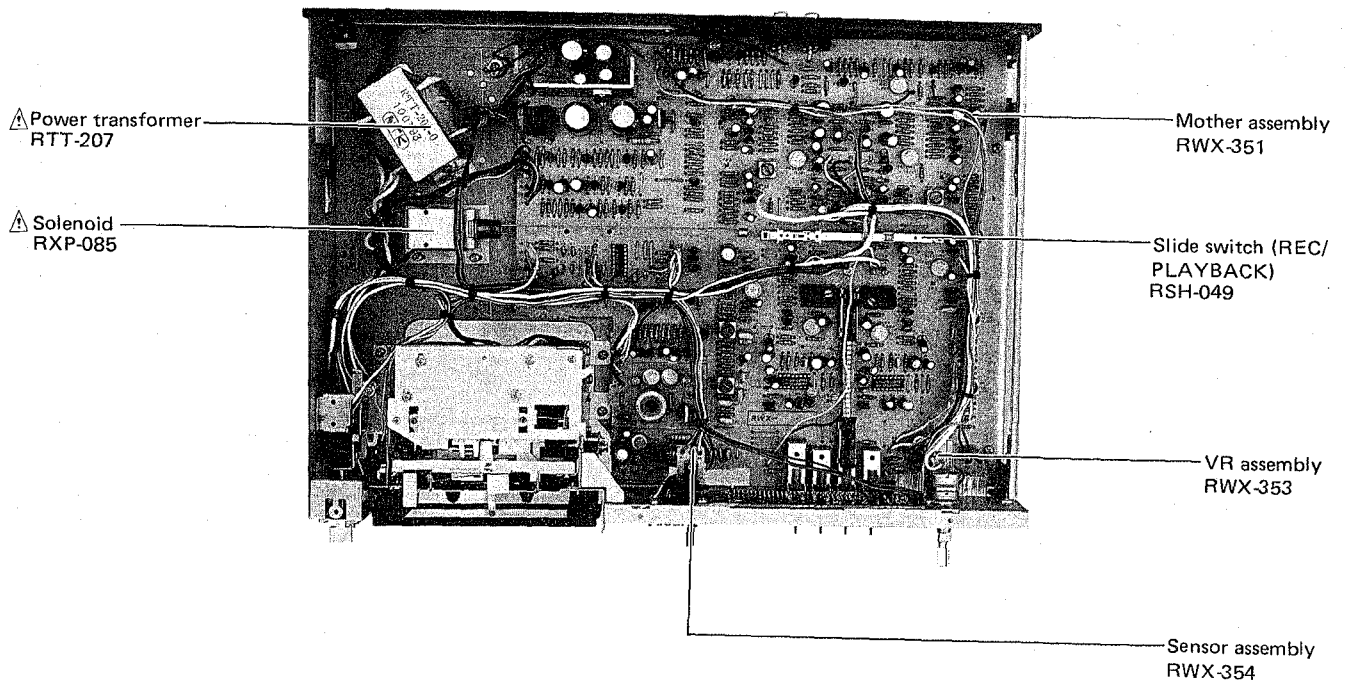
## Front Panel View



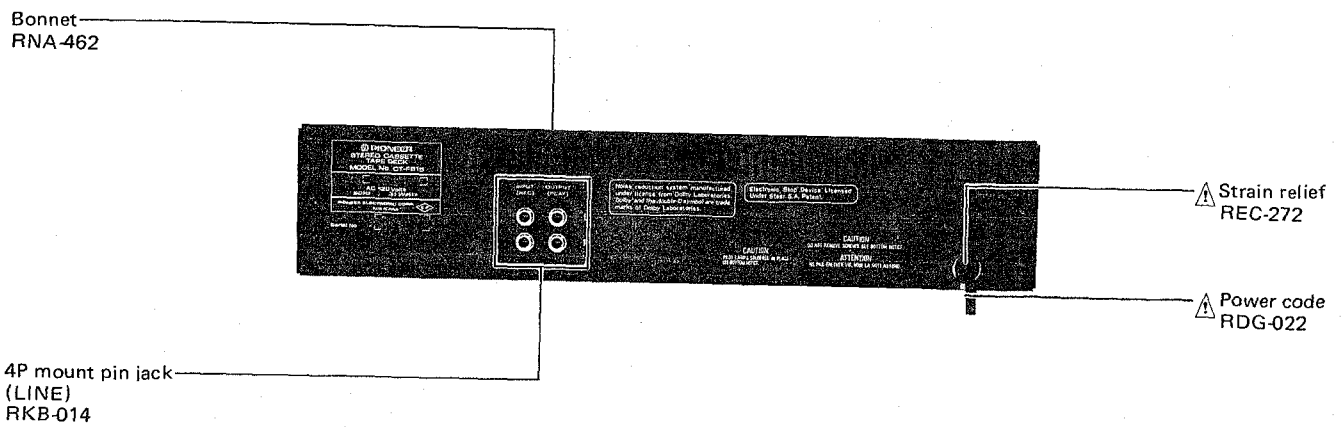
## Front View with Front Panel Removed



Top View with Bonnet Removed



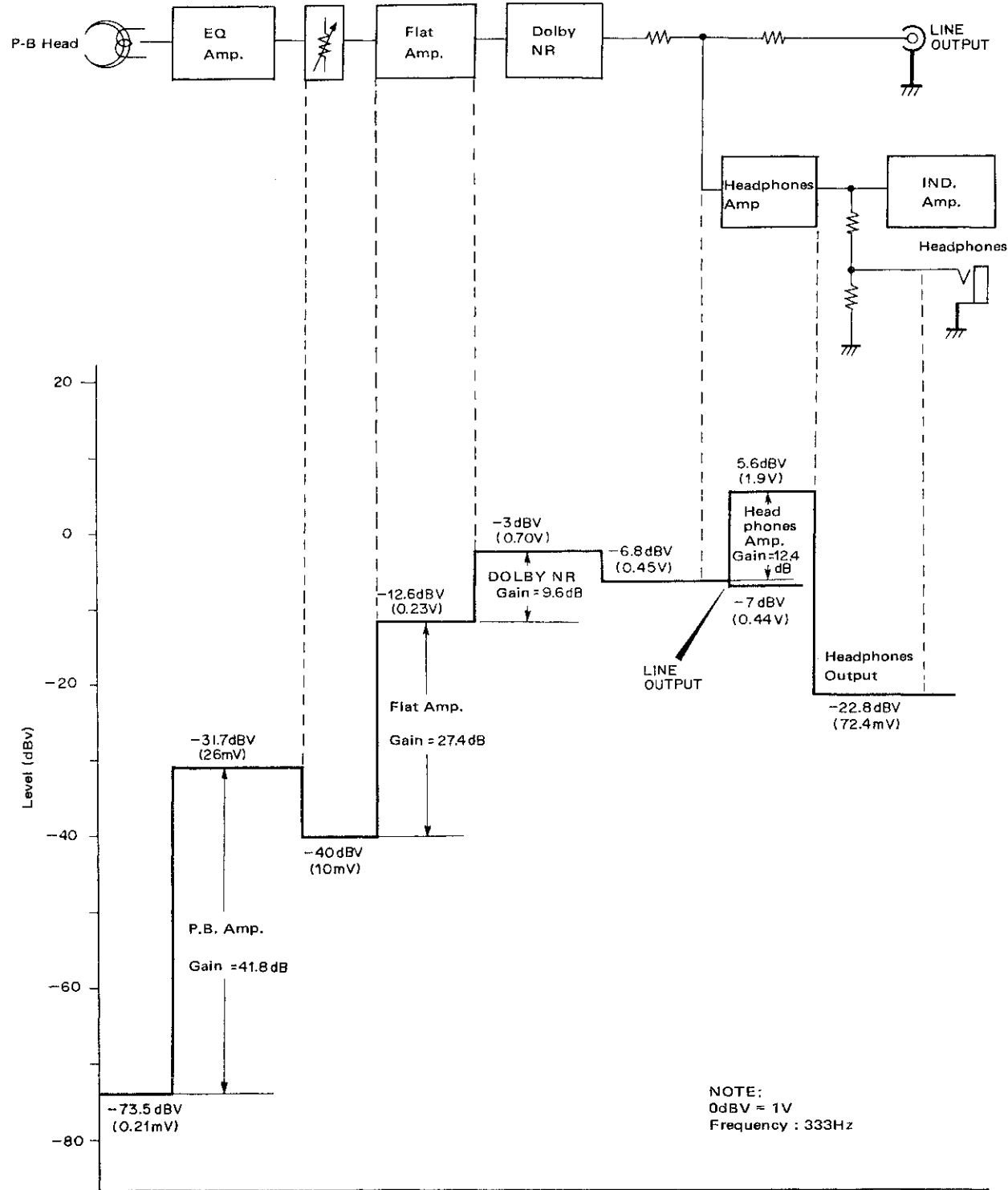
Rear Panel Removed



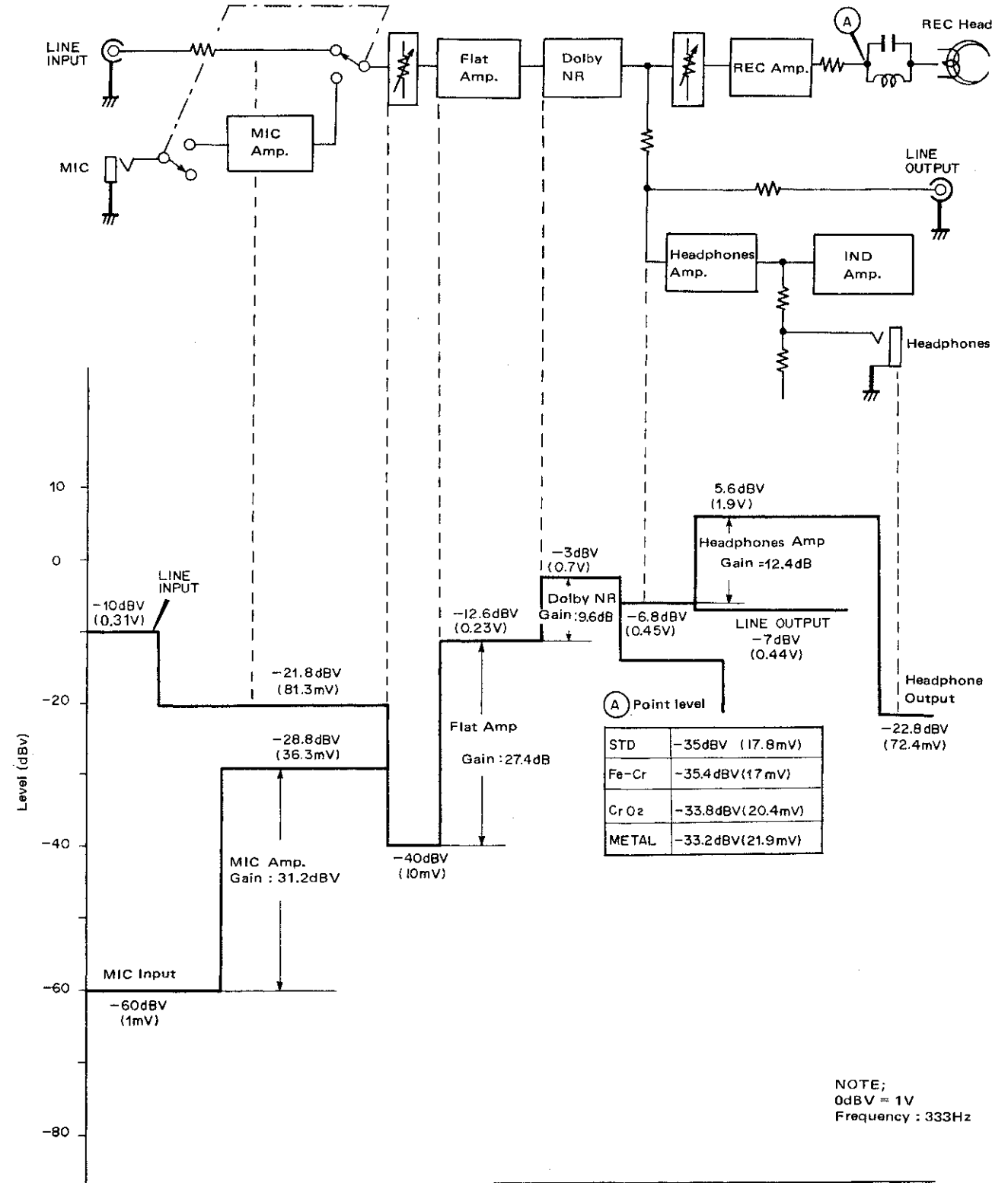


### 5. LEVEL DIAGRAM

#### Playback

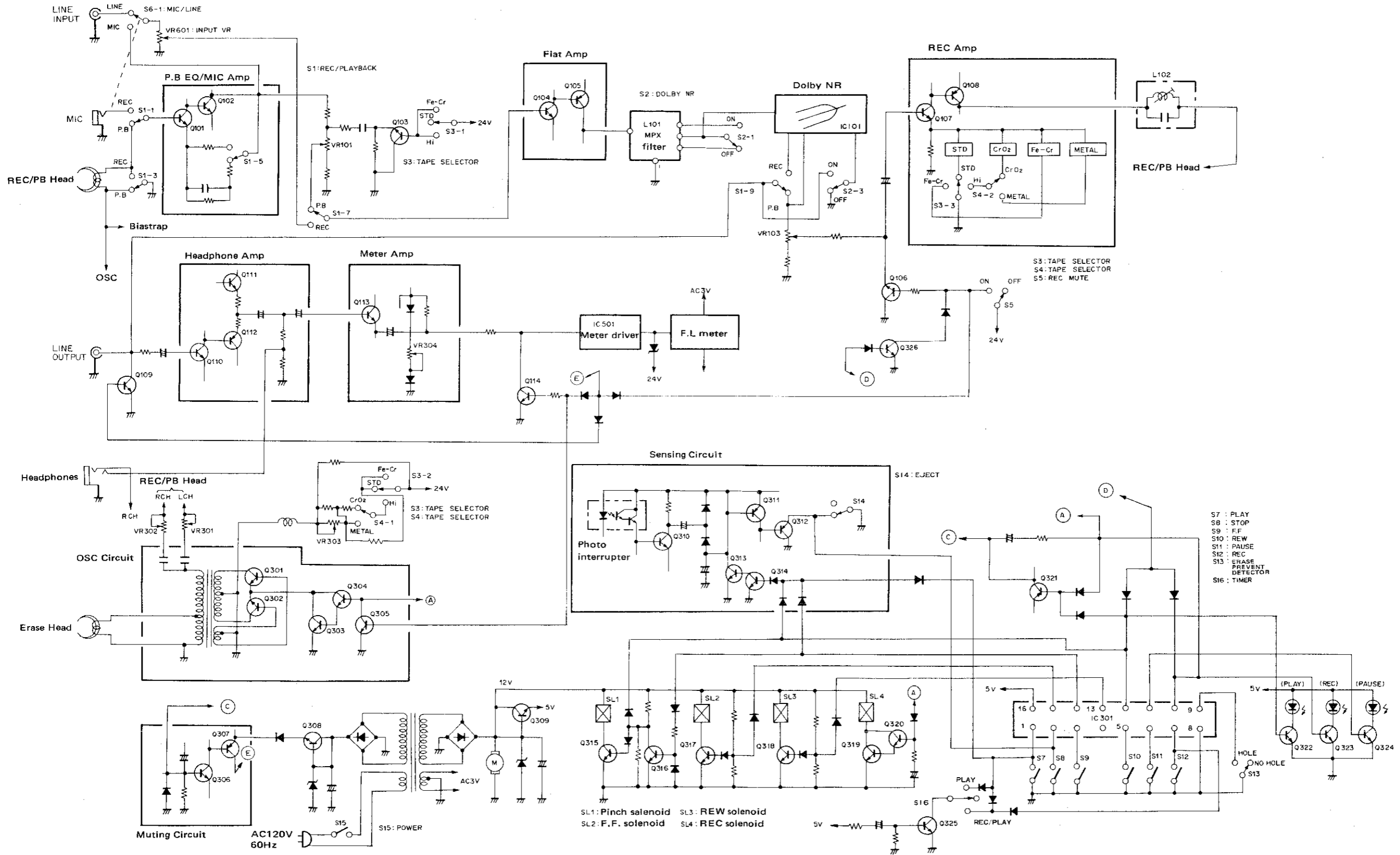


#### Recording



CT-F615

6. BLOCK DIAGRAM



## 7. CIRCUIT DESCRIPTIONS

### 7.1 SIGNAL PATHS

For an outline of the overall circuitry, see the block diagram on page 11.

#### Play Mode

The output signal from the playback head is first equalized in the playback equalizer amplifier (Q101, Q102) according to the type of tape being employed, and then passed to the flat amplifier (Q104, Q105) where it is amplified to a fixed level. The output of this stage is then applied to the LINE OUTPUT via the Dolby amplifier.

#### Recording Mode

The input signal from MIC is first amplified to a fixed level by the MIC amplifier (Q101, Q102), and then applied via the MIC position of the S6-1 MIC/LINE switch (MIC position switched in automatically when microphone plugged into the microphone jacks) to the INPUT volume control, flat amplifier, and Dolby amplifier. Part of the Dolby amplifier output is applied to the LINE OUTPUT, while the other part is applied to the recording amplifier via the REC LEVEL ADJ. VR103 control. After the frequency response has been equalized by the recording amplifier equalizer circuit (according to the type of tape being employed), the signal is applied to the recording head.

The input signal from the LINE INPUT is passed via S6-1 to the flat amplifier, MPX filter, and Dolby amplifier.

### 7.2 RECORDING AND PLAYBACK CIRCUITS

#### MIC/Equalizer Amplifier (Q101, Q102)

Consisting of 2 NPN transistors, this 2-stage direct-coupled NFB amplifier is used as the MIC amplifier (flat frequency response) during recording mode by switching out the NFB circuit. During playback mode, the NFB circuit is used as a time constant circuit for use as the playback equalizer amplifier.

#### Flat Amplifier (Q104, Q105)

The flat amplifier is also a 2-stage direct coupled amplifier, but consisting of one NPN and one PNP transistor. With flat frequency response, this line amplifier amplifies recording inputs and playback inputs prior to being applied to the Dolby amplifier.

#### Dolby Amplifier

The Dolby noise reduction system employed in the CT-F615 is the Dolby B circuit. In the mid and high frequency ranges where unwanted

noise is more prominent, the level of input signals whose input level is below a certain fixed level (the Dolby level) is boosted prior to recording, and automatically reduced again (by the same amount) during playback. Tape hiss is also reduced by the same amount, resulting in the S/N ratio being improved by up to 10dB in this region (above 5kHz).

The Dolby processor in the CT-F615 employs an IC (PA4005) developed by Pioneer. Unlike more conventional Dolby ICs which utilize variable resistance elements, the PA4005 employs a voltage controlled variable gain circuit (VCA).

#### Recording Amplifier (Q107, Q108)

This circuit is another 2-stage direct coupled amplifier consisting of an NPN and a PNP transistor. The input circuit has been equipped with a low end compensatory circuit, the emitter with a high end compensatory peaking circuit, and the output circuit with a recording bias trap to prevent flow back of recording bias.

#### HEADPHONE AMPLIFIER (Q107, Q108)

This SEPP circuit consisting of 2 NPN transistors and a PNP transistor divides the output signal by resistors in order to apply the same signal to both the headphone output and the meter amplifier.

#### Oscillator Circuit

An outline of the oscillator circuit is shown in Fig. 7-1. When the front panel REC and PLAY keys are pressed together, the IC301 REC output is switched to high (H) level, resulting in a signal being passed via R312, R309, Q304, and Q303, thereby turning these 2 transistors on to start up the oscillator.

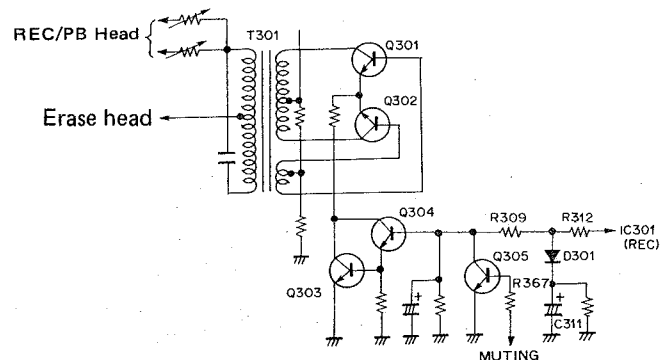


Fig. 7-1 Oscillator Circuit

### Meter Amplifier

The level meter circuit is outlined in Fig. 7-2. The headphone amplifier output is amplified by Q113 and rectified by D101, the resultant DC component then being applied to IC501 (meter drive).

This IC consists of 12 comparator elements used for level display purposes. +B is applied to the minus pole of the comparators to serve as the reference voltage for each element, these voltages being set at increasingly higher levels for each higher level display segment. DC components of the D101 rectified signal are compared with the comparator reference voltages, resulting in the lighting up of those segments where the DC component is higher than the reference voltage.

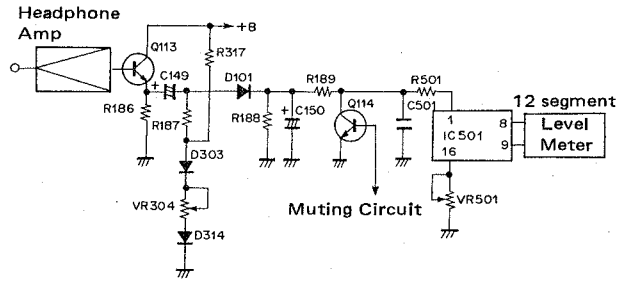


Fig. 7-2 Level Meter Circuit

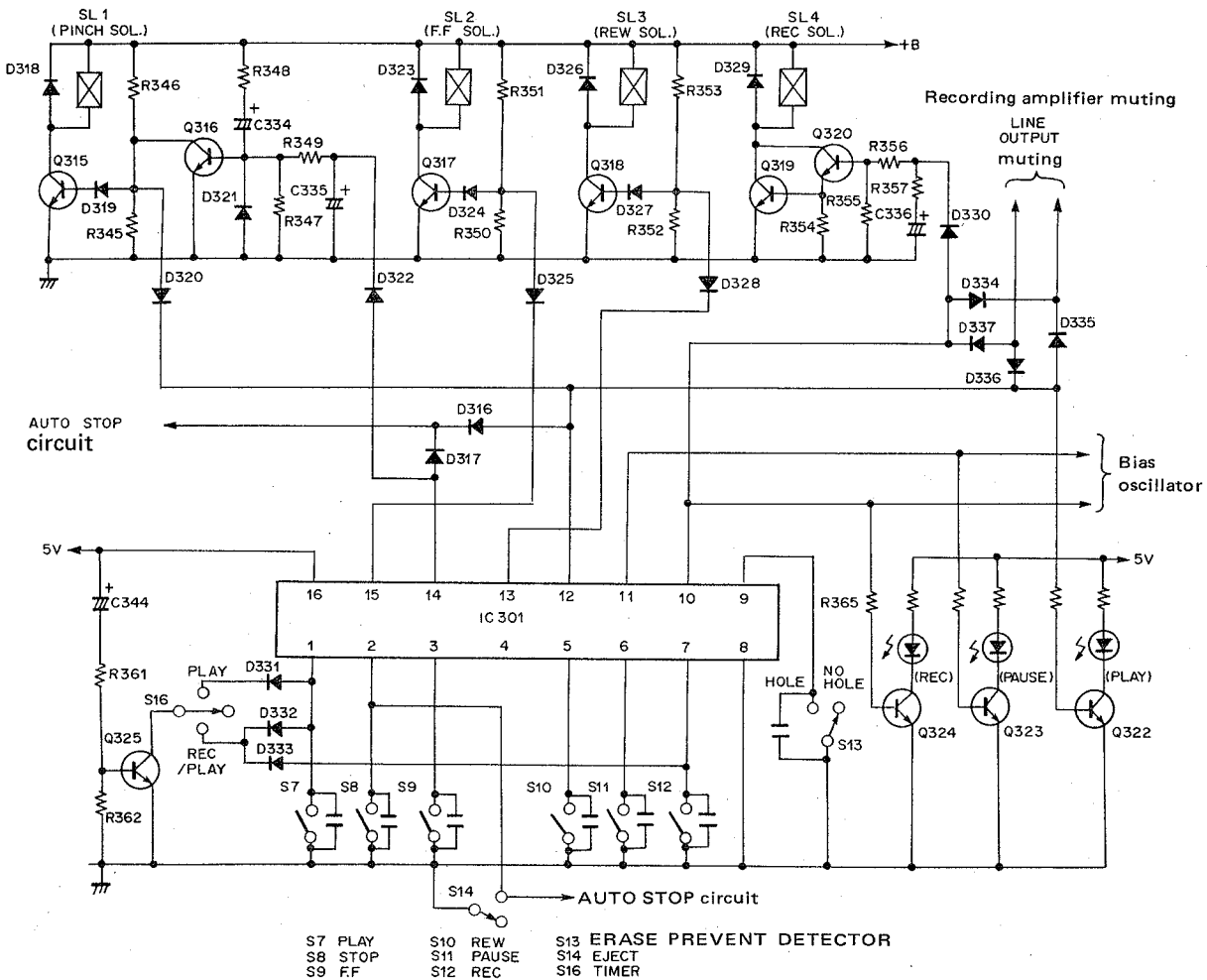


Fig. 7-3 Control Circuit

### 7.3 CONTROL CIRCUIT

See Fig. 7-3 for an outline of the control circuit.

#### Play Mode

1. When the PLAY switch S7 is turned on, pin 12 of IC301 is switched to H level, resulting in +B being applied to Q315 via R346 and D319, thereby turning the transistor on.
2. The pinch solenoid SL1 is thus activated to commence play mode.

#### Recording Mode

1. Load a cassette half with the erasure prevention tabs still intact (in which case the erasure prevention switch S13 will be in the NO HOLE position). When the PLAY switch S7 and REC switch S12 are turned on together, pins 12 and 10 of IC301 are switched to H level.
2. Due to the H level on pin 10, a current flows via D330, R356, Q320 and Q319, thereby turning these two transistors on. The REC solenoid SL4 is thus activated, and the REC/PB selector switch set to the REC position.
3. And as has already been described under "Oscillator circuit", the bias oscillator circuit is also activated when pin 10 of this IC is switched to H level.
4. As a result of pin 12 being switched to H level, pinch solenoid SL1 is activated as was described above under "Play Mode".
5. If the erasure prevention tabs of the loaded cassette have been broken off (and S13 thus switched to the HOLE position), pin 9 of IC301 will be shorted to ground, thereby preventing pin 10 from being switched to H level. Recording mode will therefore not be possible.

#### Fast Forward (Rewind) Mode

1. When the FF switch S9 is turned on, pin 15 of IC301 is switched to H level, resulting in +B being applied to Q317 via R351 and D324 to subsequently turn the transistor on.
2. The FF solenoid SL2 is then activated to start fast forward mode.
3. The operation is basically the same during rewind mode. Pin 13 of IC301 is switched to H level when the REW switch S10 is turned on, resulting in the activation of the REW solenoid SL3.

#### Pause Mode

1. If the PAUSE switch S11 is turned on during playback or recording mode, pin 12 of IC301 is switched from H to L level, resulting in Q315 being turned off.

2. Pinch solenoid SL1 will thus be released, thereby temporarily stopping tape transport.

#### Timer Start

##### • Play Mode

1. The timer switch S16 is in the PLAY position when the power switch is turned on by timer.
2. At the same time that the power supply voltage rises, Q325 is turned on by the C344 charging current.
3. And since pin 12 of IC301 is at H level, current will be applied to the base of Q315. However, because of the time constant circuit consisting of R348, C334 and R347, Q316 will be turned on for 2 to 3 seconds, consequently keeping Q315 turned off during this period.
4. Once C334 is fully charged up, Q316 is turned off and Q315 turned on. Pinch solenoid SL1 is then activated to start playback mode.

##### • Recording Mode

1. The timer switch S16 is in the REC position when the power switch is turned on by timer.
2. Pin 12 and 10 of IC301 are both switched to H level at the initial onset of power. The REC solenoid is thereby activated (since pin 10 is at H level) and the bias oscillator started.
3. And as was described above for "Timer Play Mode", the pinch solenoid SL1 is activated some 2 to 3 seconds after the power switch is turned on.

#### Timing for Direct Switching Operations

To enable the CT-F615 to be switched directly from fast forward or rewind mode to playback mode without generating tape slack or other mechanical trouble, tape transport has been designed to stop for fixed period of times during such switching operations.

#### Direct Switching from Fast Forward (Rewind) Mode to Playback Mode

1. Since pin 14 of IC301 is at H level during fast forward (or rewind) mode, a charging current is applied to C355 via D322. At the same time, a current is also applied to Q316 via D322 and R349, thereby maintaining Q316 on.
2. When the PLAY switch S7 is turned on, pin 12 of IC301 is switched to H level, and pin 14 to L level. The C355 discharge current, however, is applied to Q316 via R349 for about 0.3 seconds longer, thereby keeping this transistor turned on for that extra time. Activation of pinch solenoid SL1 is thus delayed by that same period of time.

## Auto Stop Circuit

When tape transport stops, IC301 is put into STOP mode, and the mechanism brought to a stop by this auto stop circuit (see Fig. 7-4). Tape transport detection involves a photo-interrupter system — a runner (which cuts across a light beam) coupled by belt to the take-up reel base.

1. During tape transport, the photo-interrupter generates pulse signals by means of the rotating runner. Consequently, Q310 is turned on and off repeatedly, and C332 charged up and discharged with equal frequency.
2. When tape transport stops and the runner ceases to rotate, the photo-interrupter stops generating pulse signals, and the Q310 switching action stops. +B is then applied to C332 via R334 and R335 to charge up the capacitor.
3. Charging up of C332 is also accompanied by an increase in the Q311 base potential, resulting in the transistor being turned off. Q312 is then turned on, and IC301 put into STOP mode. Note that the auto stop circuit involving Q313 and Q314 is activated during playback, fast forward and rewind modes only.

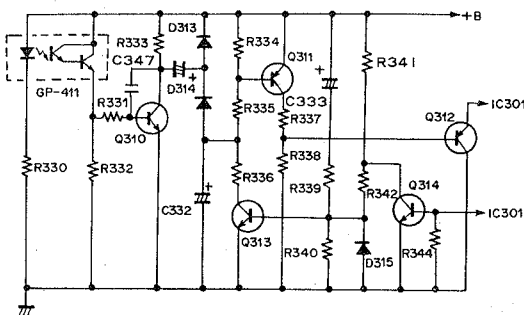


Fig. 7-4 Auto Stop Circuit

## 7.4 MUTING CIRCUIT

See Fig. 7-5.

### When Power Switch is Turned On

1. When the power switch is turned on, +B is applied Q306 via R321 and C318. However, Q306 does not turn on until C318 is charged up about 3 seconds later.
2. Since Q307 is turned on at this time, +B is applied to Q109 (Q209) via D316, Q307, D302, and R170 (R270). And once Q109 (Q209) is turned on, the LINE OUTPUT is muted.
3. +B is also applied via Q307 and D305 to Q114 (Q214) to mute the level meter. Furthermore, by applying +B to Q106 (Q206) via Q307, D306, and R146 (R246), the recording amplifier is also muted.

### Muting During Fast Forward, Rewind and Stop Modes

1. Since both pin 10 and pin 12 of IC301 are switched to L level during fast forward, rewind and stop modes, the Q321 base potential is dropped, resulting in this transistor being turned on.
2. +B is then applied to Q306 via R358 and Q321 to turn Q306 on, resulting in the LINE OUTPUT, recording amplifier and level meter being muted in the same way as when the power switch is turned on.

### When Switching from Stop to Recording Mode

This muting circuit mutes the noise generated when the REC selector is switched, and therefore prevents this noise from being recorded during "after recording".

Although pin 10 of IC301 is kept at H level during recording mode, current continues to pass via R366, C345 and Q306 until C345 is fully charged (taking about 0.3 seconds). So while Q306 remains on, the LINE OUTPUT, recording amplifier and level meter are muted.

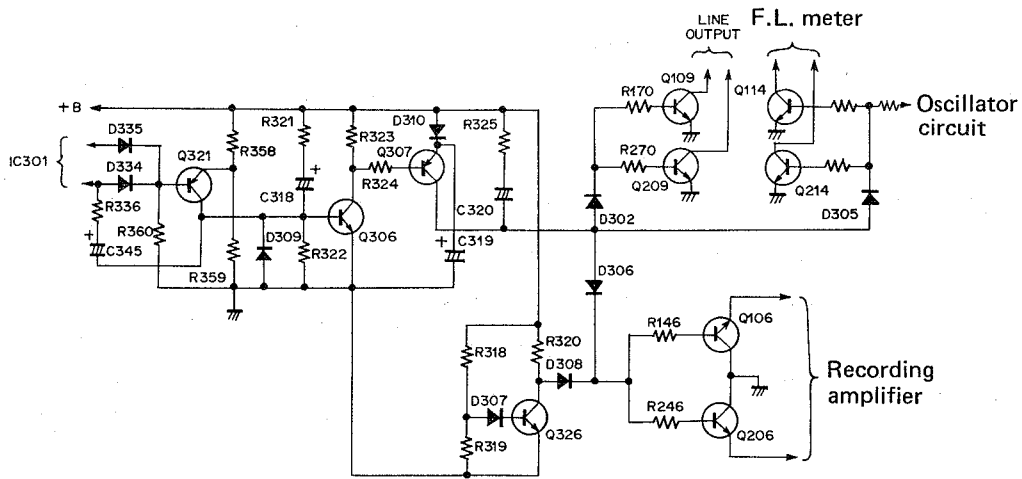
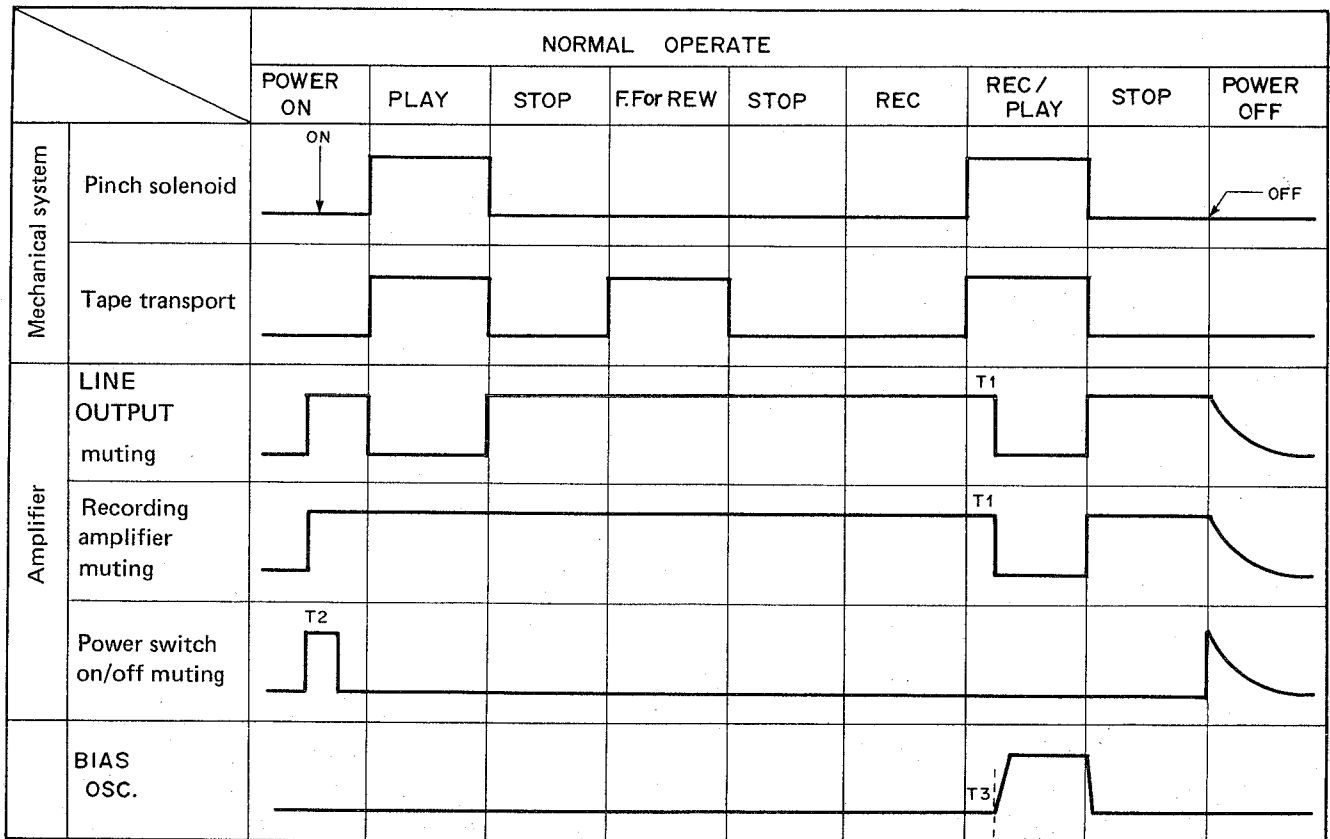


Fig. 7-5 Muting Circuit

7.5 TIMING CHART



T1; 0.28sec T2; 3.1sec T3; 0.31sec

Fig. 7-6 Time Chart

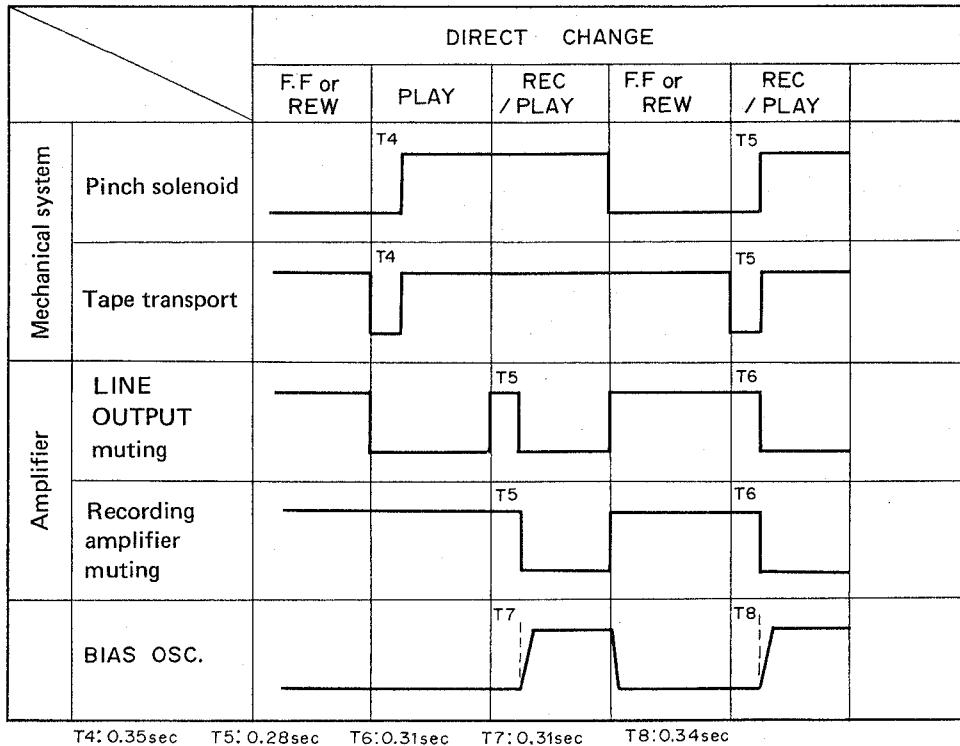


Fig. 7-7 Time Chart

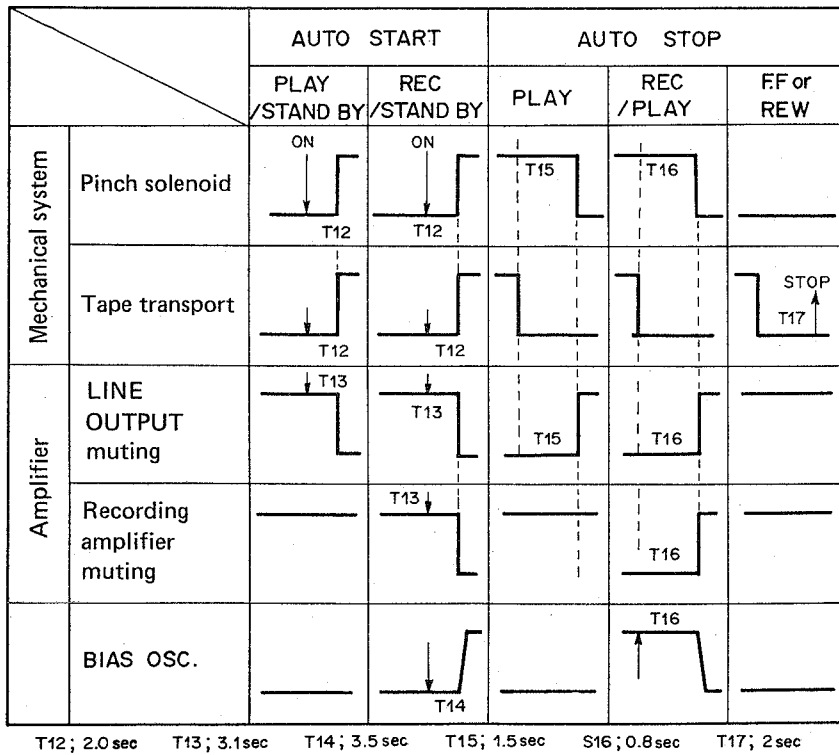


Fig. 7-8 Time Chart



## 8. MECHANICAL ADJUSTMENTS

### 8.1 PINCH ROLLER PRESSURE ADJUSTMENT

1. Put the deck into playback mode.
2. Gently push against the pinch roller arm with a tension gauge (spring balance of approximately 500g full scale) and separate the pinch roller slightly from the capstan.
3. Then ease the pinch roller back onto the capstan, and read off the value when the pinch roller starts to rotate. If the reading fails to lie within 240 to 350g, replace the pinch roller pressure spring (RBH-651).

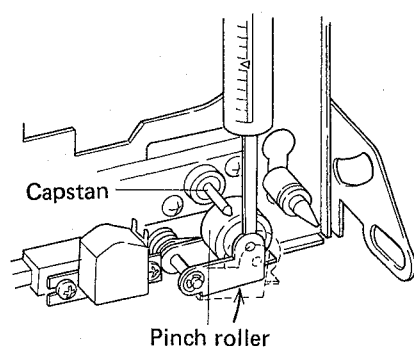


Fig. 8-1 Pinch Roller Pressure Adjustment

### 8.2 REEL BASE TORQUE ADJUSTMENT

#### Prior to Adjusting

Wipe both reel bases, the capstan shaft and the pinch roller with Daiflon dipped in a little anhydrous alcohol.

#### Adjustment

Measure the torque with a torque meter during playback, fast forward and rewind modes. The measured values should normally lie within the allowable ranges listed in the following table. If the measured values lie outside the relevant ranges, replace the take-up reel base ass'y (RXB-272) and/or the drive arm ass'y (RXB-274).

	Take-up reel base	Supply reel base
Playback mode	35~55g·cm	*2~6g·cm
F.F mode	70~120g·cm	*2~6g·cm
REW mode	*2~6g·cm	70~120g·cm

\* denotes back tension torque

### 8.3 TAPE SPEED ADJUSTMENT

1. Connect a frequency counter to the output terminals.
2. Playback the 3kHz portion of the STD-301 test tape. At the beginning, the frequency should lie within the 2995 to 3010Hz range, and may be adjusted by turning the semi-fixed resistor located in the capstan motor adjustment hole (using a suitable size screw-driver). (See Fig.8-2).
3. Tape speed is increased by turning the resistor clockwise, and decreased by turning counter clockwise.

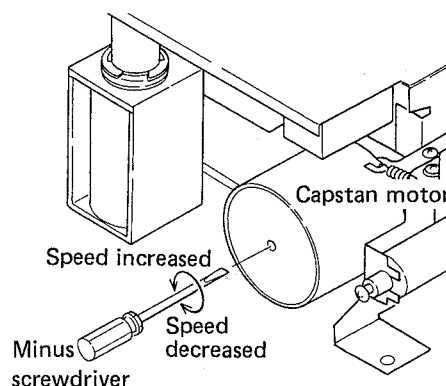


Fig. 8-2 Tape Speed Adjustment

### 8.4 PLAY SOLENOID ADJUSTMENT

1. Put the deck into playback mode.
2. Loosen screws ① and adjust the mounting position of the play solenoid so that the square hole of the head chassis ass'y fits flush against the shaft bearing holder (i.e. 0 separation), as shown in Fig.8-3.

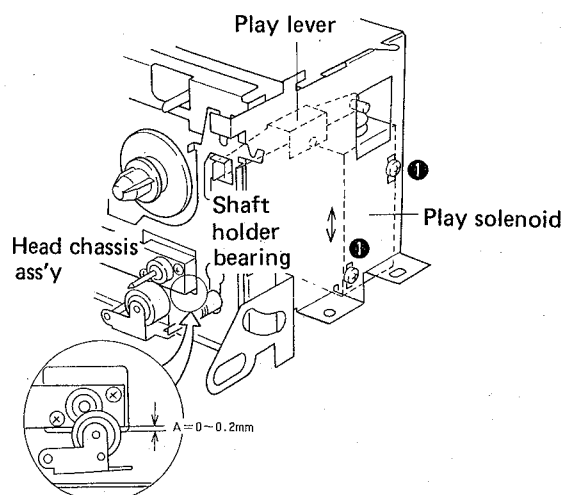


Fig. 8-3 Play Solenoid Adjustment

### 8.5 F.F SOLENOID ADJUSTMENT

1. Put the deck into fast forward mode.
2. Loosen screws ② and adjust the fast forward solenoid mounting position so that the square hole of the reel base ass'y is flush against the boss of the drive arm ass'y (i.e. 0 separation) as shown in Fig.8-4.

### 8.6 REW SOLENOID ADJUSTMENT

1. Put the deck into rewind mode.
2. Loosen screws ① and adjust the rewind solenoid mounting position so that the boss of the drive arm ass'y fits flush against the square hole of the reel base ass'y (i.e. 0 separation) as shown in Fig.8-4.

### 8.7 REC SOLENOID ADJUSTMENT

1. Put the deck into recording mode.
2. Loosen screws ① and adjust the recording solenoid mounting position so that the recording spring is stretched by 0.5 to 1mm as shown in Fig.8-5.

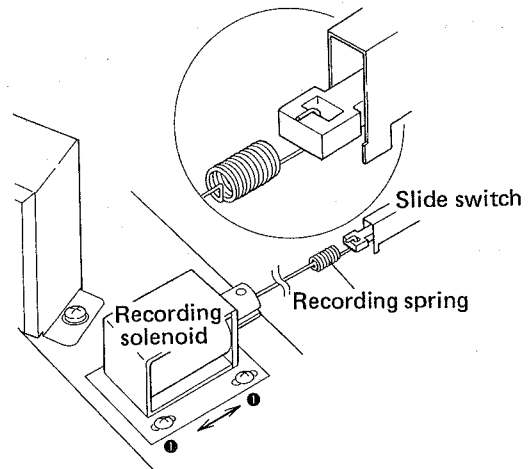


Fig. 8-5 Recording Solenoid Adjustment

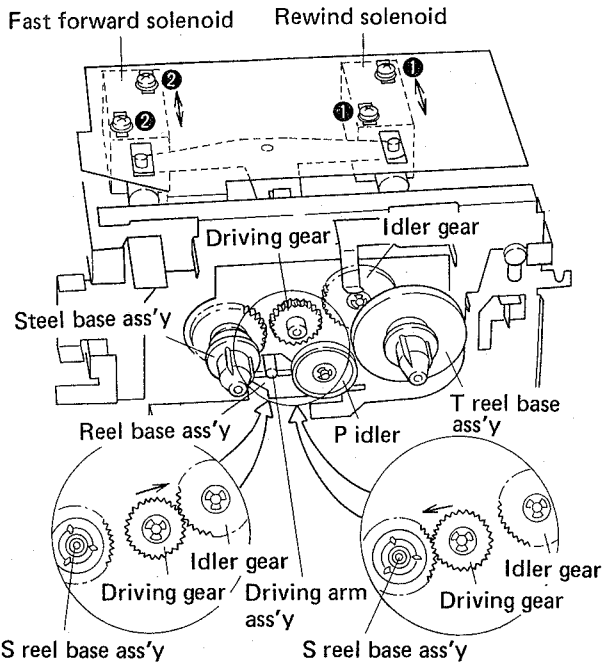


Fig. 8-4 Fast Forward and Rewind Solenoid Adjustment

## 9. ELECTRICAL ADJUSTMENTS

**Before Starting Any Electrical Adjustments, First Check Through the Following List of Preparatory Items.**

1. Electrical adjustments should only be commenced after all mechanical adjustments have been completed.
2. Levels during measurements are based on  $0\text{dBv} = 1\text{V}$ . Connect a  $50\text{k}\Omega$  ( $47 \sim 52\text{k}\Omega$ ) dummy resistor to the OUTPUT terminals.
3. Designated test tapes must be used for all relevant adjustments. Although both side A and B of the test tapes have been prepared, it is recommended that only side A (the side with the label) be used.

STD-331A: general purpose during playback mode.

STD-341A: adjustments during playback mode.

STD-601: STD blank tape.

STD-603:  $\text{CrO}_2$  blank tape.

STD-604: METAL blank tape.

SONY DUAD C-60: Fe-Cr blank tape

4. Prepare the following measuring apparatus. AC millivoltmeter, low frequency oscillator, attenuator, oscilloscope.
5. Unless otherwise specified, all adjustments are for both left and right channels.
6. Clean and demagnify the head.
7. Leave the DOLBY NR switch off unless directed otherwise.
8. Let the deck warm up (aging) for a few minutes before proceeding with the adjustments. Before starting the recording and playback frequency response adjustments, wait for about 3 to 5 minutes.

9. Proceed with each adjustment in the specified order. Altering the order can hinder proper adjustment, resulting in loss of performance.

### Adjustment Order

1. Head azimuth adjustment
2. Playback equalizer check
3. Playback level adjustment
4. F.L. meter adjustment
5. Recording rough adjustment
6. Erasure current adjustment
7. Bias trap adjustment
8. Recording bias rough adjustment
9. Recording/playback frequency response adjustment/check
10. Recording level adjustment

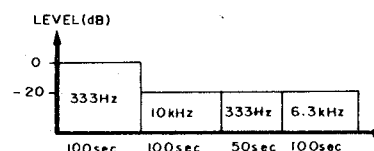


Fig. 9-1 Test tape STD-341A

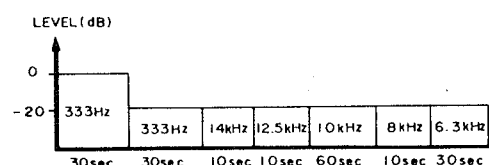


Fig. 9-2 Test tape STD-331A

### 9.1 HEAD AZIMUTH ADJUSTMENT

1. Connect the AC millivoltmeter to the OUTPUT terminals.
2. Turn up the OUTPUT level control to maximum position, and set the TAPE switch to the STD position. Then turn VR101 (Lch) and VR201 (Rch) up to maximum positions.
3. Play the 10kHz/-20dB portion of the STD-331A test tape, and turn the head azimuth adjustment screw so as to obtain maximum output levels in both left and right channels.
4. After completing this adjust, lock the screw with "screw lock".

### 9.2 PLAYBACK EQUALIZER CHECK

1. Again connect the AC millivoltmeter to the OUTPUT terminals, and set the TAPE switch to STD.
2. Play the 333Hz (-20dB) and 6.3kHz portions of the STD-341A test tape, and check that the difference in output level between the two is  $+0.5 \pm 1\text{dB}$ .
3. Next set the TAPE switch to the Fe-Cr position (or the  $\text{CrO}_2$  or METAL position), and repeat step 2. In this case, the 6.3kHz output should differ from the 333Hz output level by  $-3.5 \pm 1\text{dB}$ .

### 9.3 PLAYBACK LEVEL ADJUSTMENT

1. Connect the AC millivoltmeter to TP3 (Lch) and TP4 (Rch) of the mother ass'y. (The OUTPUT level control may be set to any position).
2. Play the 333 Hz/0dB portion of the STD-341A test tape, and adjust VR101(Lch) and VR201 (Rch) so that the AC millivoltmeter reads 1 dBv (1.1V).

### 9.4 F.L METER ADJUSTMENT

1. Apply a 333Hz/-10dBv (316mV) signal to the INPUT terminals with the deck in recording mode.
2. Connect the AC millivoltmeter to TP1(Lch) and TP2(Rch) of the mother ass'y, and adjust the INPUT level control to obtain a millivoltmeter reading of -23dBv (70mV).
3. Once the above settings have been completed, turn VR304 (mother ass'y) counter clockwise to the point where the -20dB segment of the F.L meter goes out (i.e. at the very instant).
4. Then adjust the INPUT level control to obtain a millivoltmeter reading of -3dBv (700mV), and adjust VR501(Lch) and VR502(Rch) on the F.L meter ass'y so that the F.L meter reads 0dB (turn VR501 and VR502 around clockwise and stop at the point where the 0dB segment lights up).
5. While turning the INPUT level control up gradually from minimum position, check that the AC millivoltmeter gives the following reading at the corresponding F.L meter positions.

F.L Meter Reading	AC mV Meter Reading
-20dB	$-23 \pm \frac{4}{2}$ dBv (56mV~112mV)
+5dB	$+2 \pm 2$ dBv (1V~1.58V)

Note: If the above ranges are not satisfied, repeat steps 3 and 4 several times to readjust.

### 9.5 RECORDING ROUGH ADJUSTMENT

1. Apply a 333Hz/-10dBv (316mV) signal to the INPUT terminals with the deck in recording mode. (Since the bias oscillator becomes operable during recording mode, short circuit the base of Q304 to ground).
2. Connect the AC millivoltmeter to TP1 (Lch) and TP2 (Rch) of the mother ass'y, and adjust the INPUT level control so that the millivoltmeter reads -3dBv (700mV).

3. Then set the TAPE switch to the STD position, and connect the AC millivoltmeter to terminals no.69 and no.70 (and then no.78 and no.79) on the mother ass'y.
4. Adjust VR103 (Lch) and VR203 (Rch) so that the millivoltmeter reads 0.34mV (34μA).

### 9.6 ERASURE CURRENT ADJUSTMENT

1. Adjust VR303 on the mother ass'y to the mechanical center position, and put the deck into recording mode.
2. Turn the INPUT level control down to minimum position (but without short circuiting the base of Q304 to ground).
3. Next set the TAPE switch to the METAL position, and connect the AC millivoltmeter to terminals no.41 and no.37 (ground) on the mother ass'y. Adjust VR303 until the millivoltmeter reads 180mV (180mA).

### 9.7 BIAS TRAP ADJUSTMENT

1. Put the deck into recording mode, and turn the INPUT level control down to minimum position.
2. With the TAPE switch still in the METAL position, connect the AC millivoltmeter to TP3 (Lch) and TP4 (Rch) on the mother ass'y. Adjust L102 (Lch) and L202 (Rch) to obtain minimum millivoltmeter reading.

### 9.8 RECORDING BIAS ROUGH ADJUSTMENT

1. Put the deck into recording mode and turn the INPUT level control down to minimum position.
2. Set the TAPE switch to the STD position, and connect the AC millivoltmeter to the mother ass'y terminals no.71 and no.72 (and then no.76 and no.77). Adjust VR301 (Lch) and VR302 (Rch) to obtain a millivoltmeter reading of 3.4mV (340μA).

### 9.9 RECORDING/PLAYBACK FREQUENCY RESPONSE CHECK AND ADJUSTMENT

1. Connect the AC millivoltmeter to the OUTPUT terminals, set the TAPE switch to STD, and turn the DOLBY NR switch off.
2. Apply a 333Hz/-30dB (31.6mV) signal to the INPUT terminals, and adjust the INPUT level control to obtain a millivoltmeter reading of -27dBv (44.6mV).
3. Record and then play back the 333Hz and 6.3kHz signal in the STD-601 test tape, and adjust VR301 (Lch) and VR302 (Rch) to obtain a difference in output level of +0.5dB.

4. Also record and playback the 12kHz signal, and check that the results satisfy the specifications. If it becomes necessary to readjust VR301 and VR302 due to the specifications not being satisfied, or after checking the frequency response of other tapes (CrO<sub>2</sub>, METAL, Fe-Cr), adjust these 2 VRs so as to obtain a playback output difference of  $0_{-0.5}^{+1}$  dB with the 6.3kHz signal.
5. Next set the TAPE switch to the Fe-Cr, CrO<sub>2</sub>, and METAL positions in turn, and record and play back the prescribed frequencies in the Duad C-60, STD-603 and STD-604 test tapes respectively, checking that the specified ratings are satisfied in each case.

### 9.10 RECORDING LEVEL ADJUSTMENT

1. Connect the AC millivoltmeter to TP1 (Lch) and TP2 (Rch) on the mother ass'y.
2. Set the TAPE switch to the STD position, and turn the DOLBY NR switch off. Then apply a 333Hz/-10dBv (316mV) signal to the INPUT terminals.

3. Adjust the INPUT level control to obtain a millivoltmeter reading of -3dBv (700mV).
4. Next turn the DOLBY NR switch on, and record the 333Hz signal onto the STD-601 test tape.
5. Play back the signal and adjust VR103(Lch) and VR203 (Rch) so that the millivoltmeter reads -3dBv (700mV).
6. Then switch the TAPE switch to the CrO<sub>2</sub> position and turn the DOLBY NR switch on. Record the 333Hz/-10dBv (316mV) signal onto the STD-603 test tape, and then while playing it back check that a millivoltmeter reading of -3dBv (700mV)  $\pm 1.5$ dB is obtained.
7. Finally set the TAPE switch to the METAL position and record the same signal used in step 6 above onto the STD-604 test tape. Play this signal back in the same way again, and check that a millivoltmeter reading of -3dBv (700mV)  $\pm 1.5$ dB is obtained in this case also.

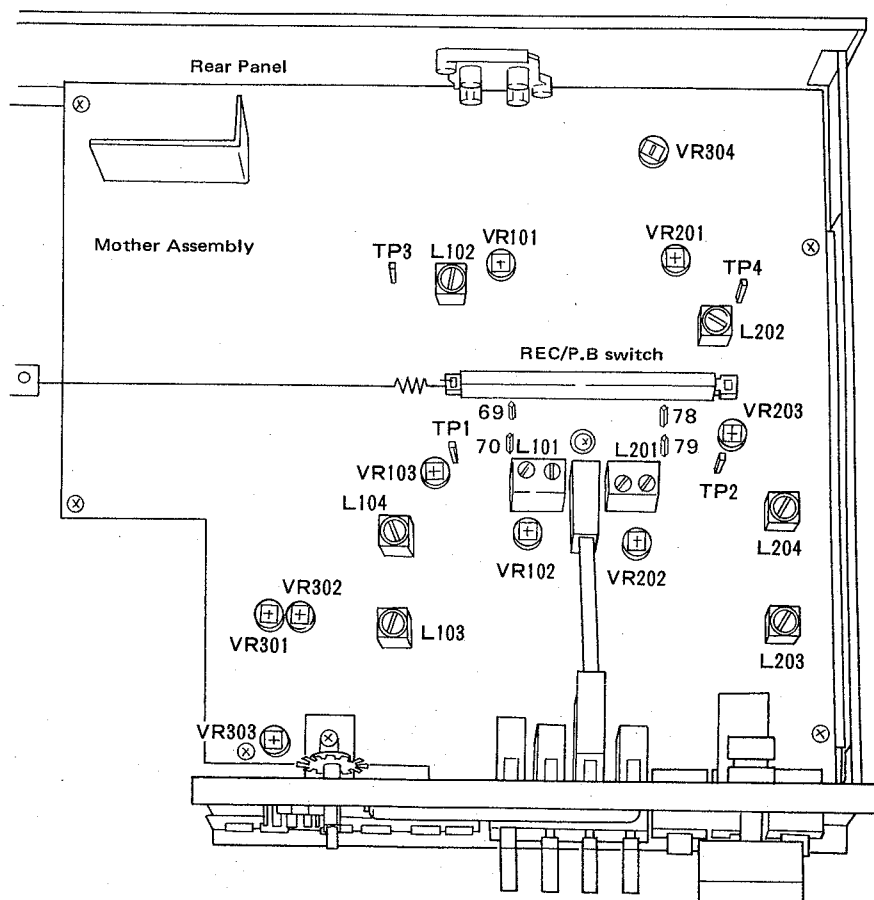


Fig. 9-3 Adjustment Points

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

## 10.1 MISCELLANEA

**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

- The  $\Delta$  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.

### Miscellaneous Parts

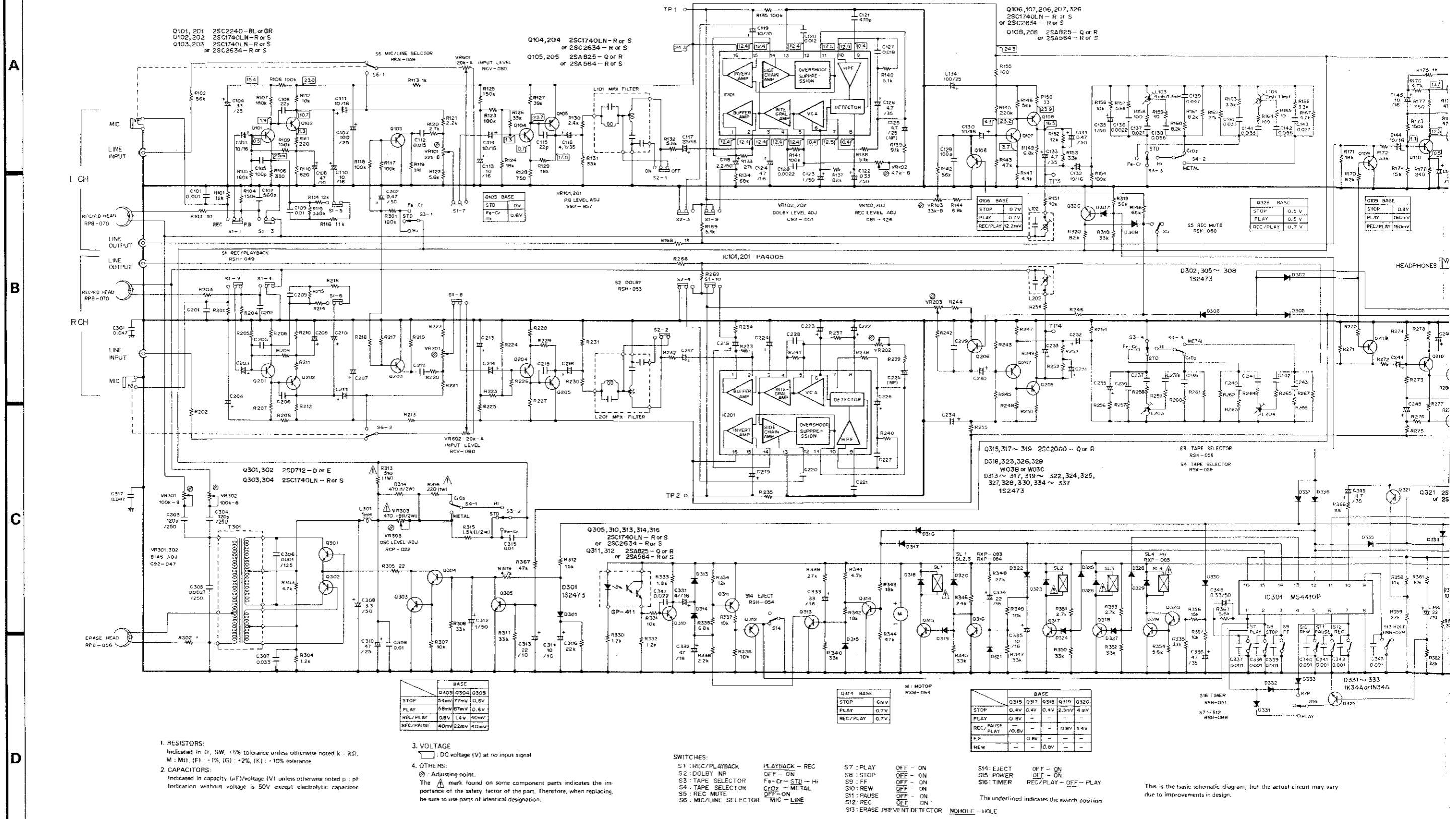
Part No.	Symbol & Description
$\Delta$ RTT-207	T1 Power transformer
$\Delta$ RCG-006	C1 Capacitor
$\Delta$ RSA-039	S15 Power switch
$\Delta$ RXP-085	SL4 Solenoid
$\Delta$ RDG-022	Power code
REC-297	Capacitor cover
RMB-004	Wire nut
RXX-285	Front panel sub assembly
RWX-351	Mother assembly
RWX-352	F.L. meter assembly
RWS-081	Function switch assembly
RWX-354	Sensor assembly
RWS-082	Timer switch assembly
RWX-353	Volume assembly
RBM-004	Wire nut

### List of Changed Parts for Factory Modification

List of changed parts information will be furnished whenever necessary and you are requested to amend parts number in this parts list.

Symbol	Part No.	Description

# 10.2 SCHEMATIC DIAGRAM



Q101, 201 2SC2240-BL or GR  
 Q102, 202 2SC1740LN-R or S  
 Q103, 203 2SC1740LN-R or S  
 or 2SC2634-R or S

Q104, 204 2SC1740LN-R or S  
 or 2SC2634-R or S  
 Q105, 205 2SA825-Q or R  
 or 2SA564-R or S

Q106, 107, 206, 207, 326  
 2SC1740LN-R or S  
 or 2SC2634-R or S  
 Q108, 208 2SA825-Q or R  
 or 2SA564-R or S

Q301, 302 2SD712-D or E  
 Q303, 304 2SC1740LN-R or S

Q305, 310, 313, 314, 316  
 2SC1740LN-R or S  
 or 2SC2634-R or S  
 Q311, 312 2SA825-Q or R  
 or 2SA564-R or S

Q315, 317 ~ 319 2SC2060-Q or R  
 D316, 323, 326, 329  
 W03B or W03C  
 D313 ~ 317, 319 ~ 322, 324, 325,  
 327, 328, 330, 334 ~ 337  
 1S2473

1. RESISTORS:  
 Indicated in Ω, kΩ, ±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 μ: μF  
 Indication without voltage is 50V except electrolytic capacitor.

BASE	Q301	Q304	Q305
STOP	54mV/7mV	12.6V	-
PLAY	58mV/7mV	2.6V	-
REC/PLAY	3.8V	1.4V	40mV
REC/PAUSE	40mV/22mV	40mV	-

Q314 BASE	M: MOTOR RXM-054
STOP	6mV
PLAY	0.7V
REC/PLAY	0.7V

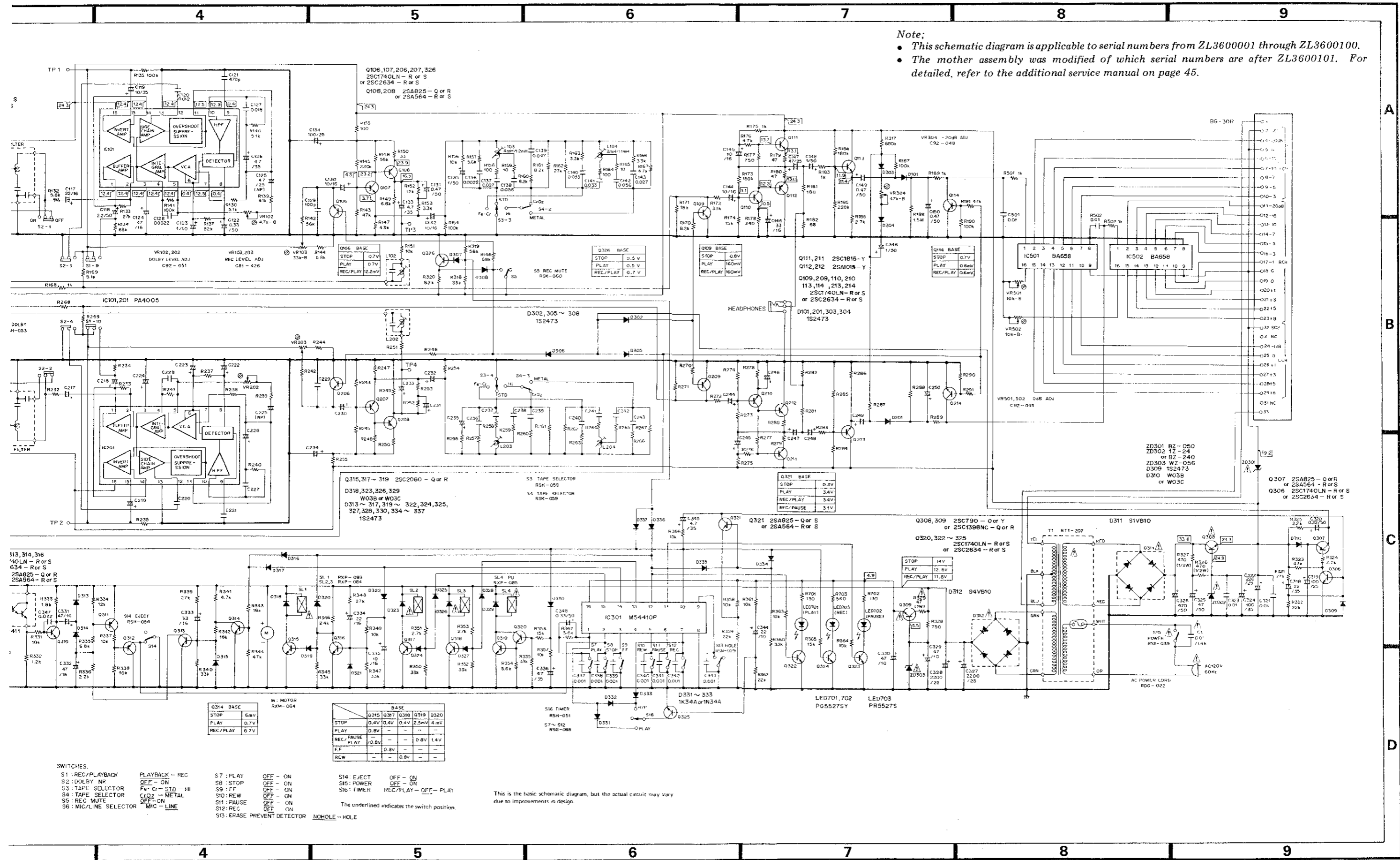
BASE	Q315	Q317	Q318	Q319	Q320
STOP	0.4V	0.4V	0.4V	2.5mV	4 mV
PLAY	0.8V	-	-	-	-
REC/PAUSE	0.8V	-	-	0.8V	1.4V
F.F.	0.8V	-	-	-	-
REW	-	-	-	0.8V	-

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

4. OTHERS:  
 ⊗: Adjusting point.  
 The  $\Delta$  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:  
 S1: REC/PLAYBACK  
 S2: DOLBY NR  
 S3: TAPE SELECTOR  
 S4: TAPE SELECTOR  
 S5: REC MUTE  
 S6: MIC/LINE SELECTOR
- PLAYBACK - REC  
 OFF - ON  
 Fe - Cr - STD - HI  
 CLO2 - METAL  
 OFF - ON
- S7: PLAY OFF - ON  
 S8: STOP OFF - ON  
 S9: FF OFF - ON  
 S10: REW OFF - ON  
 S11: PAUSE OFF - ON  
 S12: REC OFF - ON  
 S13: ERASE PREVENT DETECTOR NOHOLE - HOLE
- S14: EJECT OFF - ON  
 S15: POWER OFF - ON  
 S16: TIMER REC/PLAY - OFF - PLAY
- The underlined indicates the switch position.

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



Note:  
 • This schematic diagram is applicable to serial numbers from ZL3600001 through ZL3600100.  
 • The mother assembly was modified of which serial numbers are after ZL3600101. For detailed, refer to the additional service manual on page 45.

Q314 BASE

STOP	6mV
PLAY	0.7V
REC/PLAY	0.7V

BASE

STOP	Q315	Q317	Q318	Q319	Q320
PLAY	0.4V	0.4V	0.4V	2.5mV	4mV
REC/PAUSE	0.8V	-	-	-	-
FF	-	-	-	-	-
RLW	-	-	-	-	-

- SWITCHES:
- S1: REC/PLAYBACK      PLAYBACK - REC
  - S2: DOLBY NR          OFF - ON
  - S3: TAPE SELECTOR    Fx-C-STD - HI
  - S4: TAPE SELECTOR    C-Q2 - METAL
  - S5: REC MUTE          OFF - ON
  - S6: MIC/LINE SELECTOR MIC - LINE
  - S7: PLAY              OFF - ON
  - S8: STOP              OFF - ON
  - S9: FF                OFF - ON
  - S10: REW             OFF - ON
  - S11: PAUSE          OFF - ON
  - S12: REC             OFF - ON
  - S13: ERASE PREVENT DETECTOR NOHOLE - HOLE
  - S14: EJECT          OFF - ON
  - S15: POWER         OFF - ON
  - S16: TIMER          REC/PLAY - OFF - PLAY

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

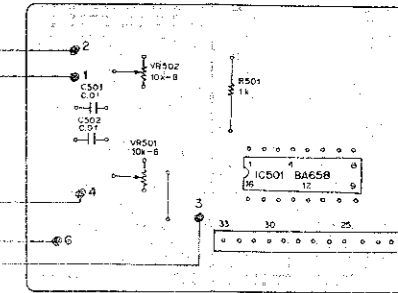


10.3 P.C. BOARD CONNECTION DIAGRAM

F.L. METER Ass'y (RWX-352)

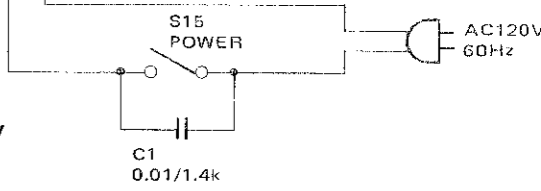
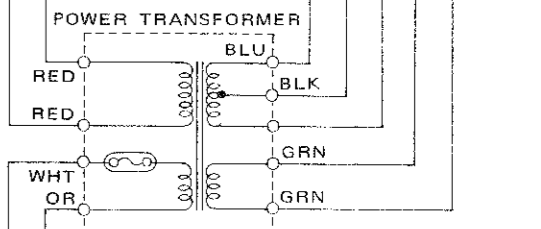
A

MOTHER Ass'y (RWX-351)



B

SENSOR Ass'y (RWX-354)

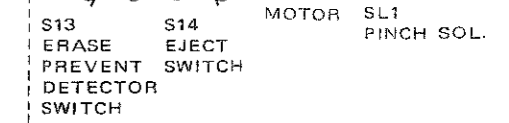


TIMER SWITCH Ass'y (RWS-082)

C

SL4 REC. SOL.

CONTROL SWITCH Ass'y (RWS-081)



D

VR Ass'y (RWX-353)

	Q315	Q317	Q318	Q319	U370
STOP	0.4V	0.4V	0.4V	2.5mV	4mV
PLAY	-	-	-	-	-
REC/PAUSE	0.8V	-	-	0.8V	1.4V
FF	-	-	-	-	-
REW	-	-	-	10.5V	-

ERASE HEAD

CT-F615

4

5

6

7

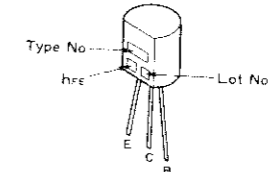
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9

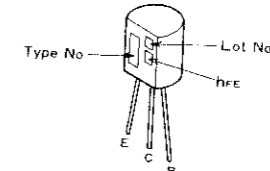
F.L. METER Ass'y (RWX-352)

Appearance of Transistors and ICs

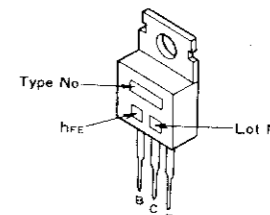
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2SA825  
2SC2634



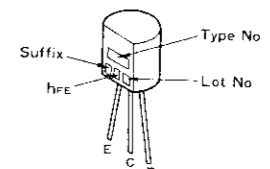
2SA1015  
2SC1815  
2SC2240



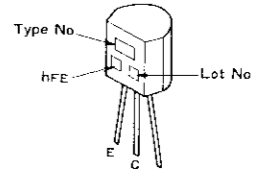
2SC790  
2SC1398  
2SD837



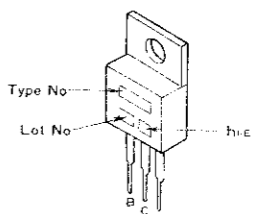
2SC1740LN



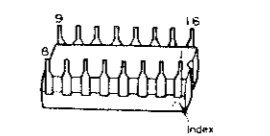
2SC2060



2SD712



BA658  
PA4005  
M54410P  
BA843

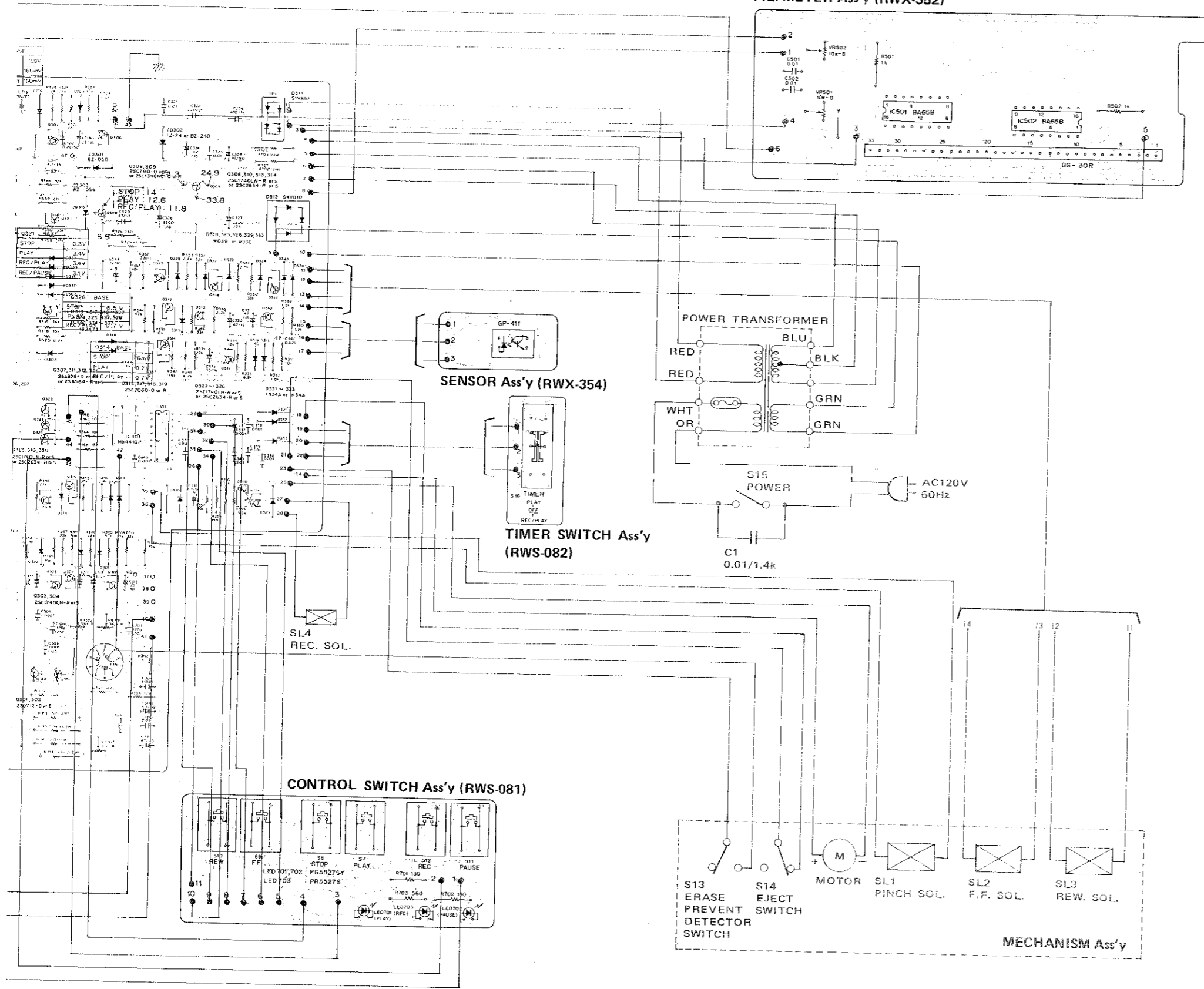


A

B

C

D



4

5

6

7

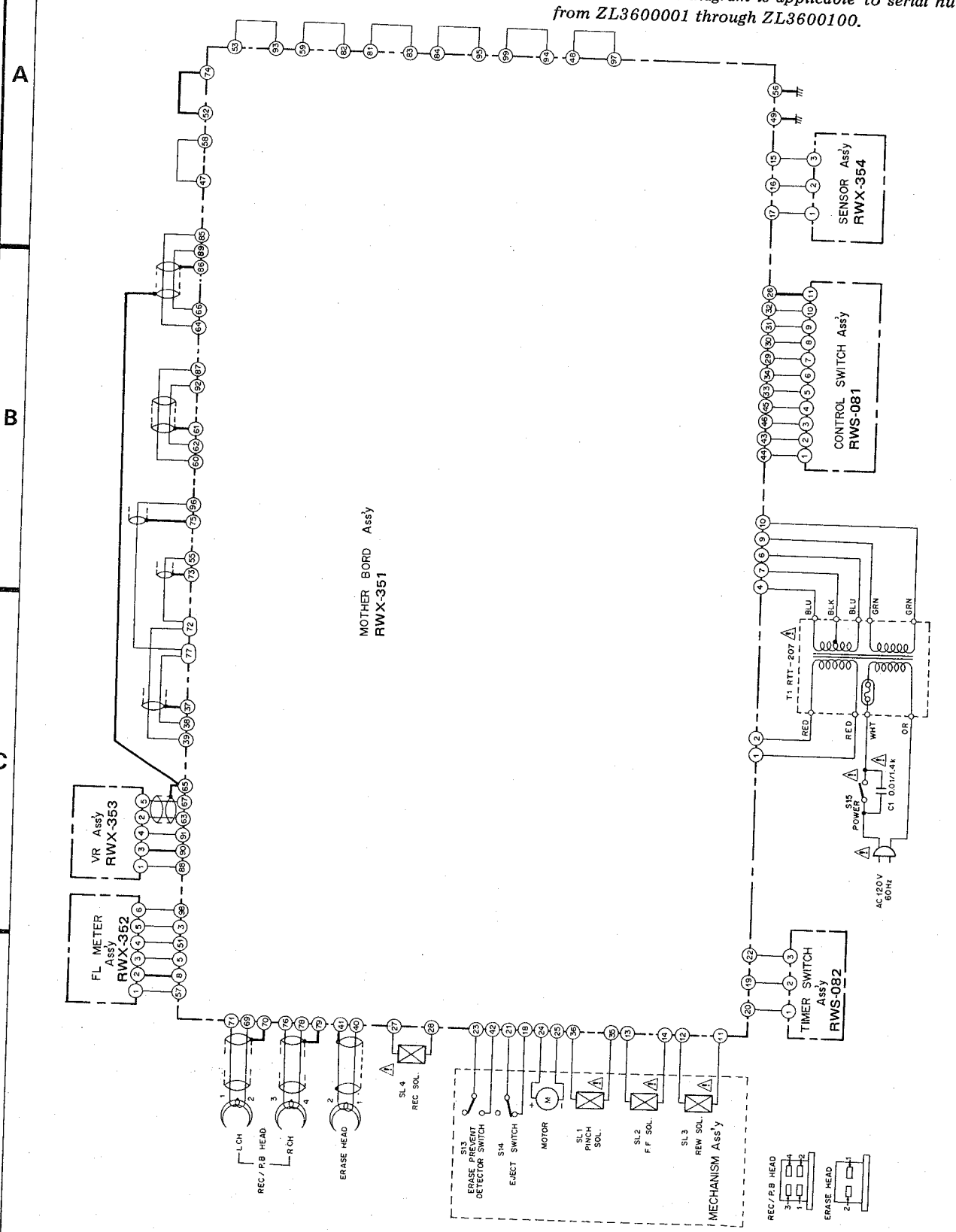
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9

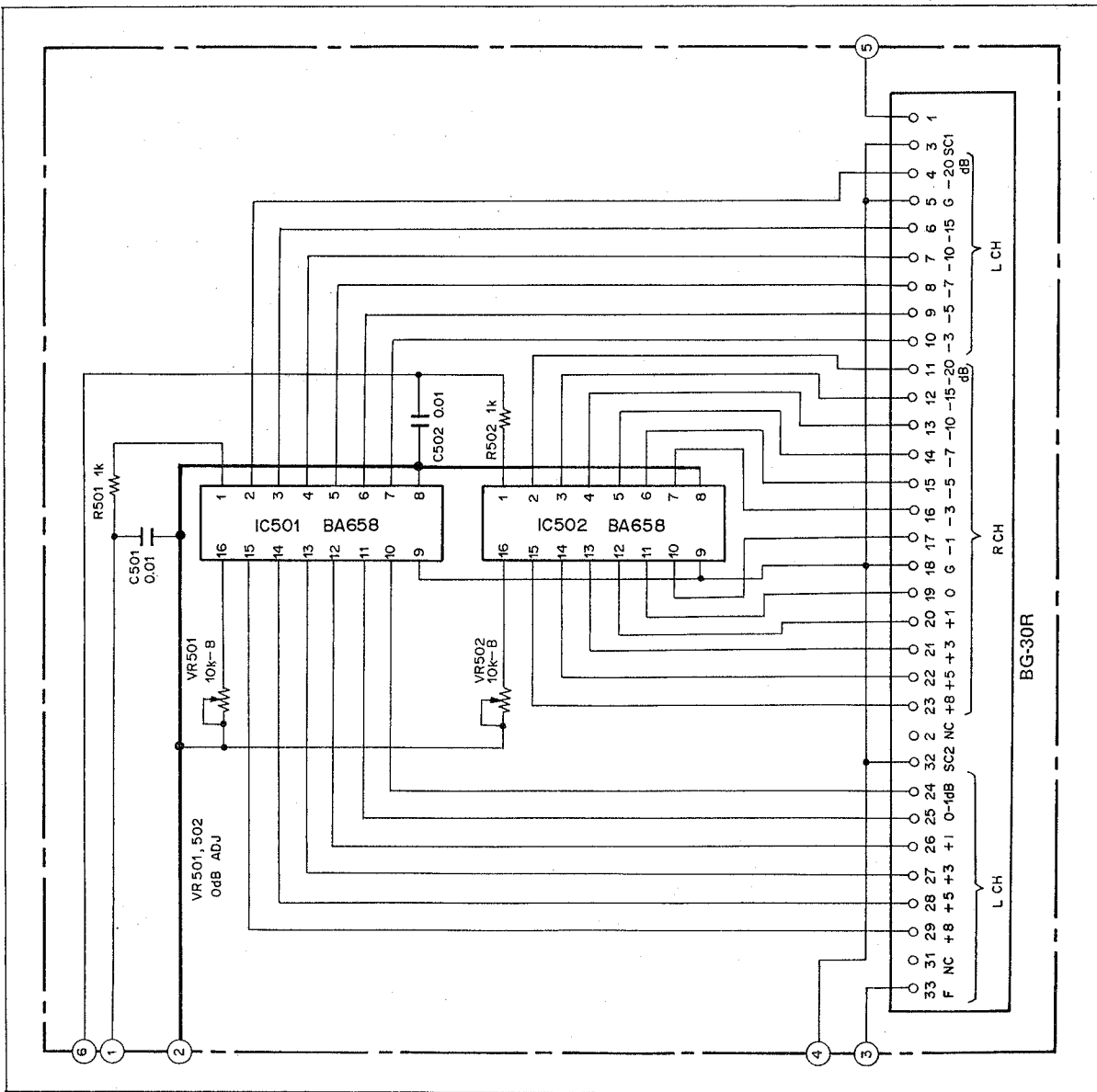
10.4 CONNECTION DIAGRAM

Note;

- This connection diagram is applicable to serial numbers from ZL3600001 through ZL3600100.



# 10.5 F.L. METER ASSEMBLY (RWX-352)



## Parts List

### CAPACITORS

Part No.	Symbol & Description
CKDYF 103Z 50	C501, C502

### SEMICONDUCTORS

Part No.	Symbol & Description
BA658	IC501, IC502

### RESISTORS

Part No.	Symbol & Description
C92-049	VR501, VR502
RD¼PS 102J	R501, R502

### OTHER

Part No.	Symbol & Description
BG-30R	Fluorescent indicator tube

10.6 MOTHER ASSEMBLY (RWX-351)

Parts List of Mother Assembly

SWITCHES

Part No.	Symbol & Description	
RSH-049	S1	Slide switch
RSH-053	S2	Slide switch W
RSK-058	S3	Lever switch A
RSK-059	S4	Lever switch B
RSK-060	S5	Lever switch C
RSK-061		Lever switch W

TRANSFORMERS AND COILS

Part No.	Symbol & Description	
RTF-040	L101, L201	MPX filter block
RTF-055	L102, L202	Trap coil
RTF-073	L103, L203	Peaking coil
RTF-074	L104, L204	Peaking coil
RTF-057	L301	Line coil
RTD-017	T301	Oscillation transformer

CAPACITORS

Part No.	Symbol & Description	
CQMA 102K 50	C101, C201	
CEA 471P 50	C326	
CEA 470P 50	C325	
CEA 010P 50	C135, C148, C235, C248, C312, C346	
CEA 3R3P 50	C308	
CEA 2R2P 50	C118, C218	
CEA R47P 50	C131, C149, C150, C231, C249, C250, C302	
CEA 101P 50	C324	
CEA 220P 35	C318	
CEA 100P 35	C116, C119, C216, C219, C233	
CEA 4R7P 35	C126, C226, C336, C345	
CEA 222P 25	C327, C328	
CEA 221P 25	C322	
CEA 101P 25	C107, C134, C207, C234, C319	
CEA 470P 25	C147, C247, C310	
CEA 330P 25	C104, C204	
CEA 470P 16	C124, C224, C331, C332	
CEA 330P 16	C146, C246, C333	
CEA 220P 16	C117, C217, C334	
CEA 100P 16	C110, C111, C113, C114, C130, C132, C144, C145, C210, C211, C213, C214, C230, C232, C244, C245, C345	
CEA 470P 10	C108, C208, C329, C330	
CEA 220P 10	C313, C344	
CEANL 100P 16	C103, C203	
CEA 100M 16	C335	
CEA R22M 50	C320	

Note;

This mother assembly is applicable to serial numbers from ZL3600001 through ZL3600100.

Part No.	Symbol & Description	
CEA R33M 50	C122, C222	
CEA 010M 50	C123, C223	
CEA 4R7M 25NP	C125, C225	
CQMA 563K 50	C138, C142, C238, C242	
CQMA 473K 50	C139, C239	
CQMA 333K 50	C140, C141, C240, C241, C307	
CQMA 273K 50	C137, C143, C237, C243	
CQMA 183K 50	C127, C227	
CQMA 153K 50	C112, C212	
CQMA 123K 50	C120, C220	
CQMA 103K 50	C109, C209	
CQMA 222K 50	C128, C136, C228, C236	
CQSA 272J 250	C305	
CQSA 102J 125	C306	
CQSA 121K 250	C303, C304	
RCE-021	C102, C202	
CKDYF 473Z 50	C301, C317	
CKDTF 103Z 50	C309, C314-C316, C321, C323	
CKDYF 102Z 50	C337-C343	
CCDSL 101K 50	C105, C129, C205, C229	
CCDSL 220K 50	C106, C115, C206, C215	
CKDYB 471K 50	C121, C221	

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

RESISTORS

Part No.	Symbol & Description	
C92-857	VR101, VR201	
		Semi-fixed 22k-B
C92-051	VR102, VR202	
		Semi-fixed 4.7k-B
C81-426	VR103, VR203	
		Semi-fixed 33k-B
C92-047	VR301, VR302	
		Semi-fixed 100k-B
C92-048	VR304	
		Semi-fixed 47k-B
RCP-022	VR303	
		Semifixed 470-B
RD%PM □□□J	R101-R135, R137-R191, R201-R235, R237-R291, R301-R309, R311, R312, R317-R325, R328, R330-R367	
△RS1PF □□□J	R331, R316, R329	
RD%PSF □□□J	R314, R315, R326, R327	

**SEMICONDUCTORS**

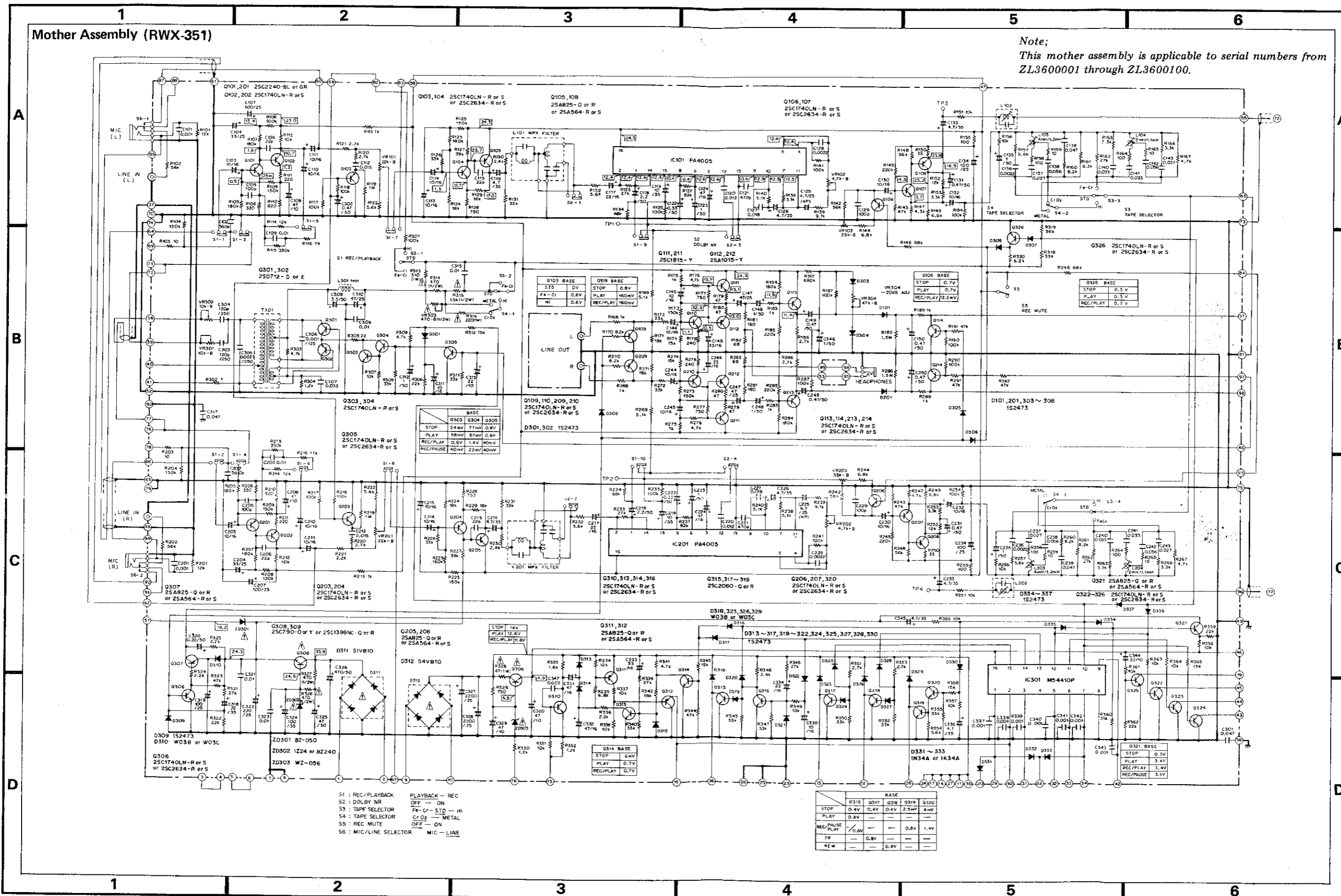
Part No.	Symbol & Description
2SC2240	Q101, Q201
△ 2SC1740LN	Q102, Q202, Q303, Q304
2SC1740LN (2SC2634)	Q103, Q104, Q106, Q107, Q109, Q110, Q113, Q114, Q203, Q204, Q206, Q207, Q209, Q210, Q213, Q214, Q305, Q306, Q310, Q313, Q314, Q316, Q320, Q322-Q326
2SC1815	Q111, Q211
2SA1015	Q112, Q212
2SA825	Q105, Q108, Q205, Q208, Q307, Q311, Q312, Q321
△ 2SC1398NC (2SC790)	Q308, Q309
2SD712	Q301, Q302
2SC2060	Q315, Q317-Q319
PA4005	IC101, IC201
M54410P	IC301
1S2473	D101, D201, D301-D309, D313-D317 D319-D322, D324, D325, D327, D328, D330, D334-D337
W03B (W03C)	D310, D318, D323, D326, D329
1N34A (1K34A)	D331-D333
△ S4VB10	D312
△ S1VB10	D311
△ BZ-050	ZD301
△ 1Z-24 (BZ-240)	ZD302
△ WZ-056	ZD303

**OTHERS**

Part No.	Symbol & Description
RKN-059	MIC jack
RKN-060	Headphones jack
RKB-014	4P mount pin jack
RSX-046	Flex wire

Mother Assembly (RWX-351)

Note;  
This mother assembly is applicable to serial numbers from  
ZL360001 through ZL3600100.

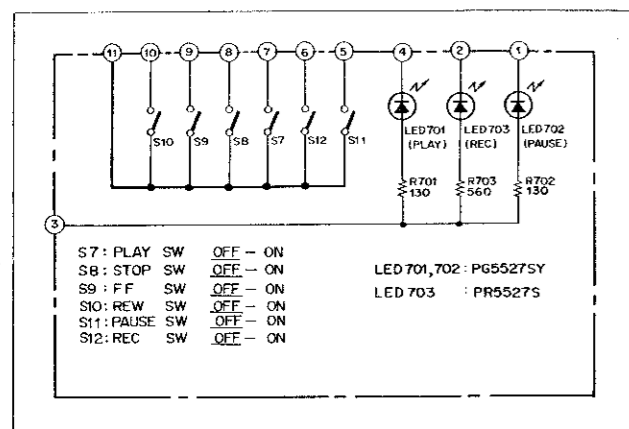


S1 : REC/PLAYBACK  
S2 : DOLBY NR  
S3 : TAPE SELECTOR  
S4 : TAPE SELECTOR  
S5 : REC MUTE  
S6 : MIC/LINE SELECTOR

PLAYBACK - REC  
OFF ON  
Fe - Cr - STD - HI  
Cr - Cr - METAL  
OFF - ON

Q315 BASE		Q317 BASE		Q319 Q320	
STOP	0.4V	0.4V	0.4V	2.5mV	4mV
PLAY	0.8V	—	—	—	—
REC/PAUSE	—	—	—	0.8V	1.4V
PLAY	—	—	—	—	—
FF	—	0.8V	—	—	—
REW	—	—	0.8V	—	—

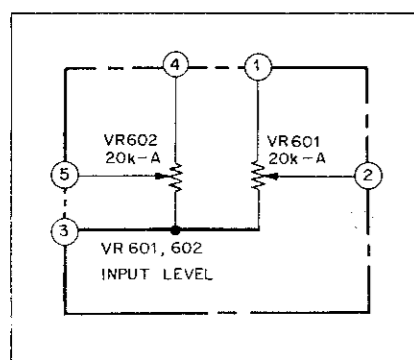
10.7 FUNCTION SWITCH ASSEMBLY (RWS-081)



Parts List

Part No.	Symbol & Description
RSG-088	S7-S12 Push switch
PG5227SY	LED701, LED702 Light emitting diode (green)
PR5227S	LED703 Light emitting diode (red)
RD ¼ 131J	R701, R702
RD ¼ PM 561J	R703

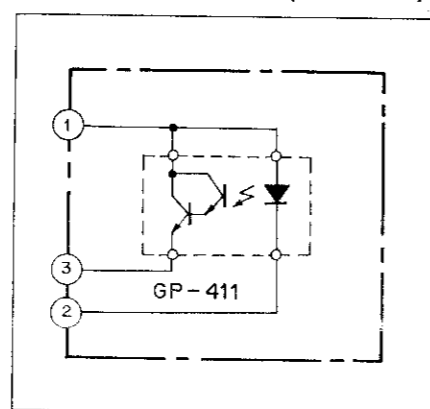
10.8 VOLUME ASSEMBLY (RWX-353)



Parts List

Part No.	Symbol & Description
RCV-080	VR601, VR602 Variable resistor

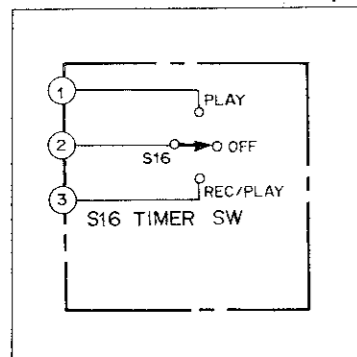
10.9 SENSOR ASSEMBLY (RWX-354)



Parts List

Part No.	Symbol & Description
	GP411

10.10 TIMER SWITCH ASSEMBLY (RWS-082)



Parts List

Part No.	Symbol & Description
RSH-051	S16 Slide switch

11. EXPLODED VIEWS AND PARTS LIST

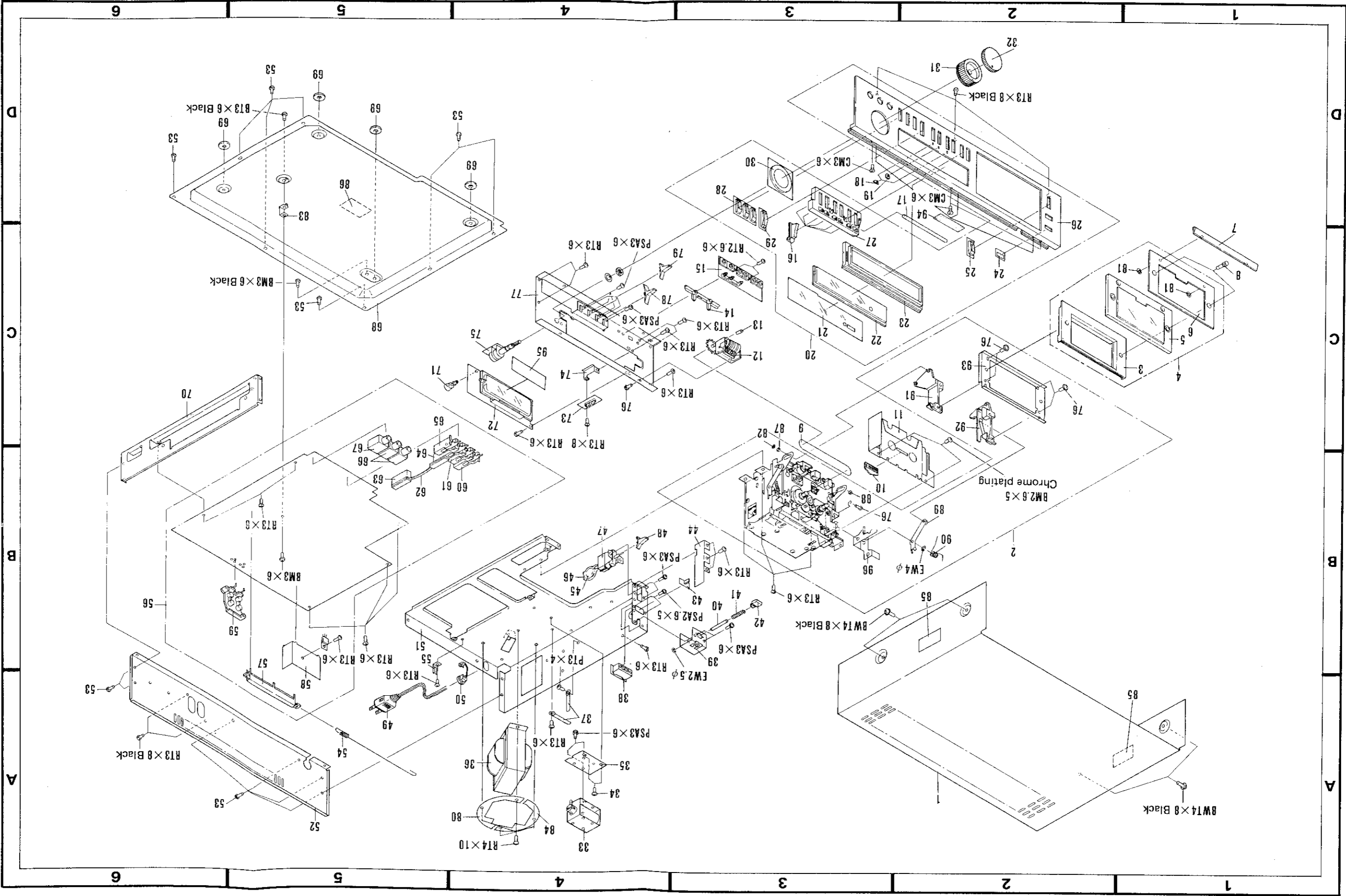
11.1 EXTERIOR COMPONENT NOTE:

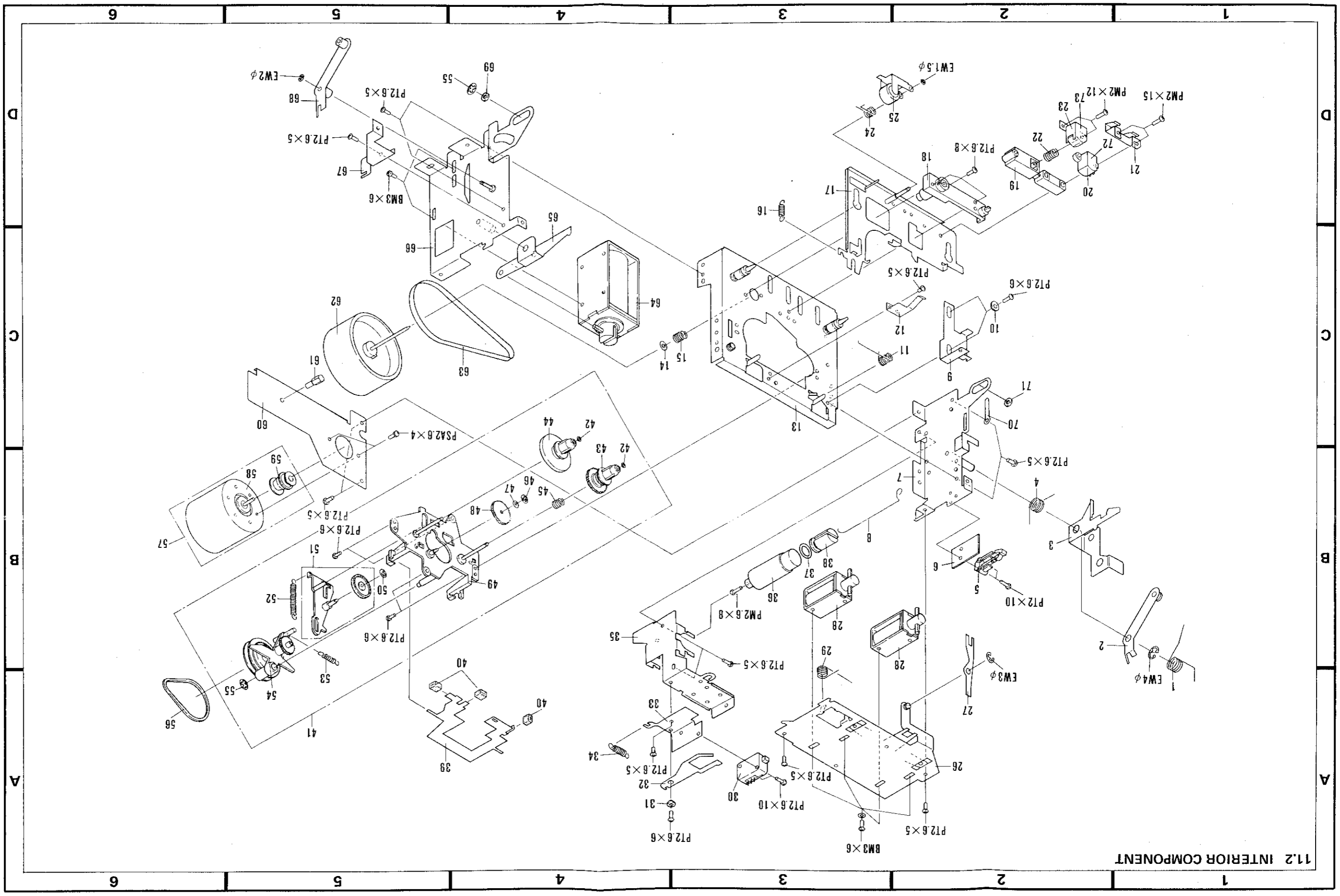
- Parts without part number cannot be supplied.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

Parts List

Key No.	Part No.	Description	Key No.	Part No.	Description
1.	RNA-462	Bonnet	48.	RAC-124	Lever knob A
2.		Mechanism assembly	$\Delta$ 49.	RDG-022	Power code
3.		Frame cover	$\Delta$ 50.	REC-272	Strain relief
4.	RXX-274	Pocket door assembly	51.		Chassis
5.		Pocket door	52.		Rear panel
6.		Door panel	53.	RBA-057	Screw
7.		Door emblem	54.	RBH-664	REC spring
8.	RLB-213	Door fastener	55.		2P terminal (GND)
9.	REB-240	Sensing belt	56.	RWX-351	Mother assembly
10.	RNK-866	Indicator lens	57.	RSH-049	Slide switch
11.	RAH-325	Cassette plate	58.		Heat sink
12.	RAW-130	Counter	59.	RKB-014	4P mount pin jack
13.	RAC-129	Counter cap	60.	RSK-058	Lever switch A
14.		Stud	61.	RSK-059	Lever switch B
15.	RWS-081	Function switch assembly	62.	RSX-046	Flex wire
16.	RAC-126	Control knob	63.	RSH-053	Slide switch W
17.		Knob shaft	64.	RSK-061	Lever switch W
18.		LED cap G	65.	RSK-060	Lever switch C
19.		LED cap R	66.	RKN-059	MIC jack
20.	RXX-285	Front panel sub assembly	67.	RKN-060	Headphones jack
21.		Meter lens	68.		Bottom plate
22.	RNK-902	Front cover	69.	REC-291	Stopper
23.		Escutcheon	70.		Slide frame
24.		Eject knob guide	71.		T type rivet
25.		Knob escutcheon B	72.	RWX-352	F.L. meter assembly
26.		Front panel	73.	RWX-354	Sensor assembly
27.		Control knob holder	74.		Sensor bracket
28.		Escutcheon A	75.	RWX-353	VR assembly
29.		Escutcheon B	76.		TP screw 2.6 x 6
30.		VR plate	77.		Panel stay
31.	RAA-319	Knob B	78.	RAC-125	Lever knob B
32.	RAA-318	Knob A	79.	RAC-124	Lever knob A
$\Delta$ 33.	RXP-085	Solenoid	80.		Transformer plate R
34.			81.		CS type stopper ring 2 $\phi$
35.		Solenoid plate	82.		CS type stopper ring 3 $\phi$
$\Delta$ 36.	RTT-207	Power transformer	83.		P.C.B. holder
37.		UL cord clammer	84.		Transformer plate L
38.	RWS-082	Timer switch assembly	85.	RRW-112	UL caution label A
39.		Eject bracket	86.		UL caution label B
40.		Eject rod	87.		Collar
41.	RBH-665	Eject spring	88.		Collar
42.	RAC-128	Eject knob	89.		Door arm (III) assembly
43.	RAC-127	Stand-by knob	90.	RBH-660	Spring
44.		Plate	91.	RXB-277	Cassette holder R assembly
$\Delta$ 45.	RCG-006	Capacitor	92.	RXB-276	Cassette holder L assembly
46.	REC-297	Capacitor cover	93.	RNA-456	Pocket frame
$\Delta$ 47.	RSA-039	Power switch	94.	REB-394	Cover cushion H
			95.	REB-397	Cover cushion M
			96.		Eject lever







11.2 INTERIOR COMPONENT

CT-F615

1 2 3 4 5 6

A B C D

1 2 3 4 5 6

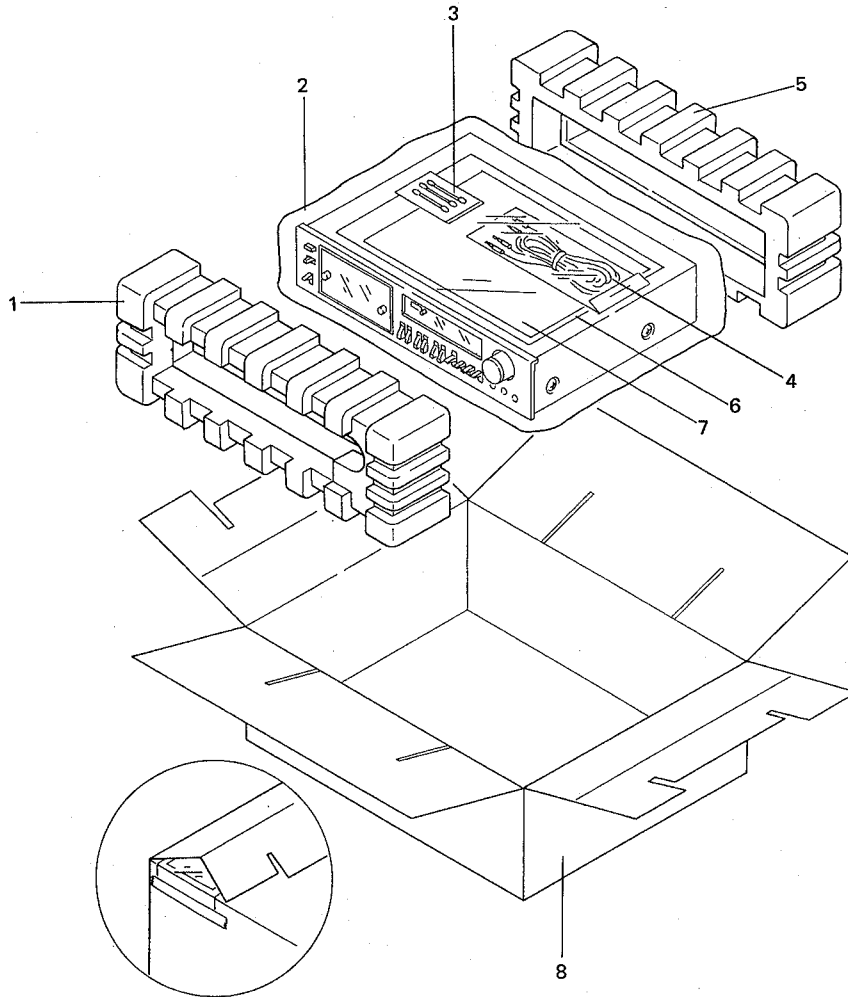
A B C D

## Parts List

Key No.	Part No.	Description	Key No.	Part No.	Description
1.	RBH-660	Coil spring	51.	RXB-273	Idler arm assembly
2.		Door arm (II) assembly	52.	RBH-655	Tension coil spring
3.		Eject lever	53.		Tension coil spring
4.	RBH-653	Coil spring	54.	RXB-274	Drive arm assembly
5.	RSN-029	Switch	55.		CS type stopper
6.		Switch sheet	56.	REB-378	Belt
7.		Side plate L assembly	57.	* RXB-279	Motor assembly
8.	RBH-662	Joint bar	58.		Motor
9.		REC plate assembly	59.		Motor pulley
10.		Pause lever collar B	60.		Motor holder
11.	RBH-657	Torsion coil spring	61.		Thrust screw
12.	RBK-145	Cassette holder	62.	RNG-243	Fly wheel
13.		Main chassis assembly	63.	REB-377	Belt
14.			△ 64.	RXP-083	Solenoid
15.	RBH-659	T tension spring	65.		Play lever
16.	RBH-652	Tension coil spring	66.		Side plate R assembly
17.		Head chassis assembly	67.		Mount plate A
18.	RXB-262	Bearing assembly	68.		Door arm (I) assembly
19.	RNK-884	Head plate	69.		Collar
20.	PPB-056	Erase head	70.		UL cord clamper
21.		Wire holder	71.		Collar
22.	RBH-650	Compression coil spring	72.	RRW-081	E head label
23.	RPB-070	REC/P.B. head	73.	PRW-109	R/P head label
24.	RBH-651	Torsion coil spring			
25.	RXB-264	Pinch arm assembly			
26.		Solenoid chassis assembly			
27.		FR lever			
△ 28.	RXP-084	Solenoid			
29.	RBH-658	Torsion coil spring			
30.	RSH-054	Slide switch			
31.	RLB-210	Collar			
32.		Lock lever			
33.		Switch mount plate			
34.	RBH-663	Tension coil spring			
35.		Mount plate B			
36.	RNK-897	Cylinder			
37.	REB-379	O ring			
38.	RNK-898	Piston			
39.		Brake plate			
40.	REB-380	Brake rubber			
41.	RXB-269	Reel assembly			
42.					
43.	RXB-271	S reel base assembly			
44.	RXB-272	T reel base assembly			
45.	RBH-654	S brake spring			
46.		CS ring			
47.		Washer			
48.	RNK-887	Idler gear			
49.		Reel base assembly			
50.		CS ring			

\* Motor pulley can not be remove from the motor. The motor and motor pulley can be supplied as motor assembly.

## 12. PACKING



### Parts List

Key No.	Part No.	Description
1.	RHA-199	Front pad
2.	RHL-050	Vinyl bag
3.	REA-021	Head cleaning assembly
4.	RDE-032	Connection code assembly
5.	RHA-200	Rear pad
6.	RHL-018	Vinyl bag (for operating instructions)
7.	RRB-127	Operating instructions (Serial No. ZL3600001~ZL3600100)
	RRB-130	Operating instructions (Serial No. ZL3600101~ )
8.	RHG-333	Packing case

ADDITIONAL

 PIONEER®

# Service Manual

CASSETTE TAPE DECK

# CT-F615

KU

**NOTE;**

- This additional service manual is applicable to the CT-F615 of which serial numbers are after ZL3600101.
- As improvement, the mother assembly was modified, the circuitry of other assemblies, circuit descriptions, exploded views and adjustment are same as the CT-F615 of which serial numbers from ZL3600001 through ZL3600100.
- The assemblies before the modification and after modification are interchangeable.

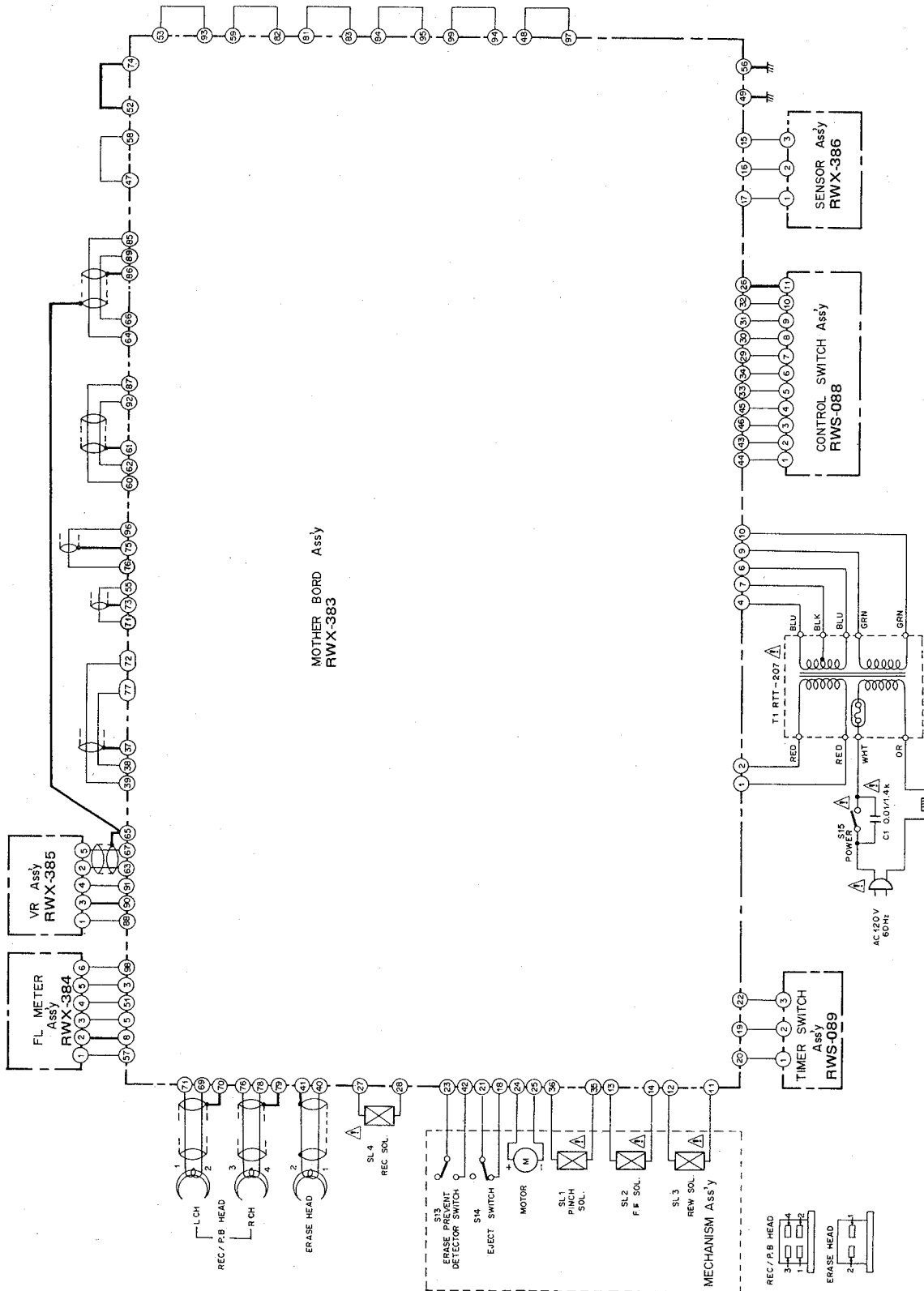
**Contrast Parts List of Assembly**

Description	Part No.		Remarks
	Serial No. ZL 3600001 ~ ZL3600100	Serial No. ZL 3600101 ~	
Mother assembly	RWX-351	RWX-383	
F.L. meter assembly	RWX-352	RWX-384	
Function switch assembly	RWS-081	RWS-088	
Sensor assembly	RWX-354	RWX-386	
Timer switch assembly	RWS-082	RWS-089	
Volume assembly	RWX-353	RWX-385	

# 1. CONNECTION DIAGRAM

Note;

- This connection diagram is applicable to serial numbers after ZL3600101.



## 2. MOTHER ASSEMBLY

### Part List of Mother Assembly (RWX-383)

#### SWITCHES

Part No.	Symbol & Description	
RSH-049	S1	Slide switch
RSH-053	S2	Slide switch W
RSK-058	S3	Lever switch A
RSK-059	S4	Lever switch B
RSK-060	S5	Lever switch C
RSK-061		Lever switch W

#### TRANSFORMERS AND COILS

Part No.	Symbol & Description	
RTF-040	L101, L201	MPX filter block
RTF-055	L102, L202	Trap coil
RTF-073	L103, L203	Peaking coil
RTF-074	L104, L204	Peaking coil
RTF-057	L301	Line coil
RTD-017	T301	Oscillation transformer

#### CAPACITORS

Part No.	Symbol & Description	
CQMA 102K 50	C101, C201	
CEA 471P 50	C326	
CEA 470P 50	C325	
CEA 010P 50	C135, C148, C235, C248, C312, C346	
CEA 2R2P 50	C118, C218	
CEA R47P 50	C131, C149, C150, C231, C249, C250, C302	
CEA 101P 50	C324	
CEA 220P 35	C318	
CEA 100P 35	C119, C219, C310	
CEA 4R7P 35	C116, C126, C133, C216, C226, C233, C308, C336, C345	
CEA 222P 25	C327, C328	
CEA 221P 25	C322	
CEA 101P 25	C107, C134, C207, C234, C319, C314, C316	
CEA 470P 25	C147, C247	
CEA 330P 25	C104, C204	
CEA 470P 16	C124, C224, C331, C332	
CEA 330P 16	C146, C246, C333	
CEA 220P 16	C117, C217, C334	
CEA 100P 16	C110, C111, C113, C114, C130, C132, C144, C145, C210, C211, C213, C214, C230, C232, C244, C245, C311	
CEA 470P 10	C108, C208, C329, C330	
CEA 220P 10	C313, C344	
CEANL 100P 16	C103, C203	
CEA 100M 16	C335	
CEA R22M 50	C320	

Note:

- This mother assembly is applicable to serial numbers after ZL3600101.

Part No.	Symbol & Description	
CEA R33M 50	C122, C222	
CEA 010M 50	C123, C223	
CEA 4R7M 25NP	C125, C225	
CQMA 563K 50	C138, C142, C238, C242	
CQMA 473K 50	C139, C239	
CQMA 333K 50	C140, C141, C240, C241, C307	
CQMA 273K 50	C137, C143, C237, C243	
CQMA 183K 50	C127, C227	
CQMA 153K 50	C112, C212	
CQMA 123K 50	C120, C220	
CQMA 103K 50	C109, C209	
CQMA 222K 50	C128, C136, C228, C236	
CQSA 272J 250	C305	
CQSA 102J 125	C306	
CQSA 121K 250	C303, C304	
RCE-018	C102, C202	
CKDYF 473Z 50	C301, C317	
CKDTF 103Z 50	C309, C315, C321, C323	
CKDYF 102Z 50	C337-C343	
CCDSL 101K 50	C105, C129, C205, C229	
CCDSL 220K 50	C106, C115, C206, C215	
CKDYB 471K 50	C121, C221	

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

#### RESISTORS

Part No.	Symbol & Description	
C92-857	VR101, VR201	
	Semi-fixed	22k-B
C92-051	VR102, VR202	
	Semi-fixed	4.7k-B
C81-426	VR103, VR203	
	Semi-fixed	33k-B
C92-047	VR301, VR302	
	Semi-fixed	100k-B
C92-048	VR304	
	Semi-fixed	47k-B
RCP-022	VR303	
	Semifixed	470-B
RD $\frac{1}{2}$ PM □□□J	R101-R135, R137-R191, R201-R235, R237-R291, R301-R309, R311, R312, R317-R326, R328, R330-R367	
△ RS1PF □□□J	R313, R316, R329	
RD $\frac{1}{2}$ PSF □□□J	R314, R315, R326	
△ RD $\frac{1}{2}$ PSF □□□J	R155, R255	
△ RD $\frac{1}{2}$ PSF □□□J	R327	

## SEMICONDUCTORS

Part No.	Symbol & Description
2SC2240	Q101, Q201
△ 2SC1740LN	Q102, Q202, Q303, Q304, Q327
2SC1740LN (2SC2634)	Q103, Q104, Q106, Q107, Q109, Q110, Q113, Q114, Q203, Q204, Q206, Q207, Q209, Q210, Q213, Q214, Q305, Q306, Q310, Q313, Q314, Q316, Q320, Q322 Q326
2SC1815	Q111, Q211
2SA1015	Q112, Q212
2SA825 (2SA564)	Q105, Q108, Q205, Q208, Q307, Q311, Q312, Q321
△ 2SC1398NC (2SC790)	Q309
2SD712	Q301, Q302
2SC2060	Q315, Q317-Q319
△ 2SD837	Q308
PA4005	IC101, IC201
BA843	IC301
1S2473	D101, D201, D301-D309, D313-D317 D319-D322, D324, D325, D327, D328, D330, D334-D339
W03B (W03C)	D310, D318, D323, D326, D329
1N34A (1K34A)	D331-D333
△ S3VB10	D312
△ S1VB10	D311
△ BZ-050	ZD301
△ WZ-250	ZD302
△ WZ-056	ZD303

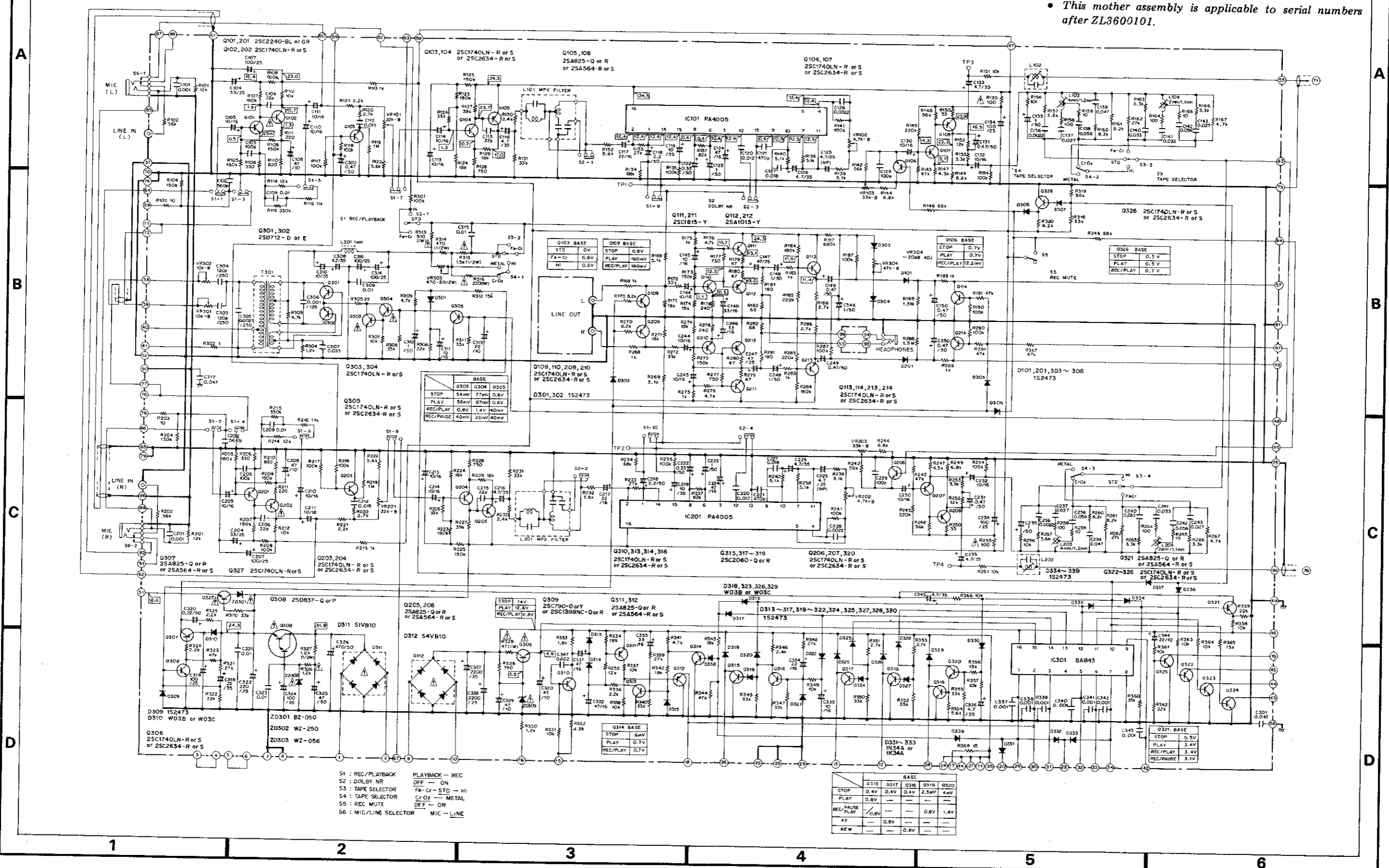
## OTHERS

Part No.	Symbol & Description
RKN-059	MIC jack
RKN-060	Headphones jack
RKB-014	4p mount



Mother Assembly (RWX-383)

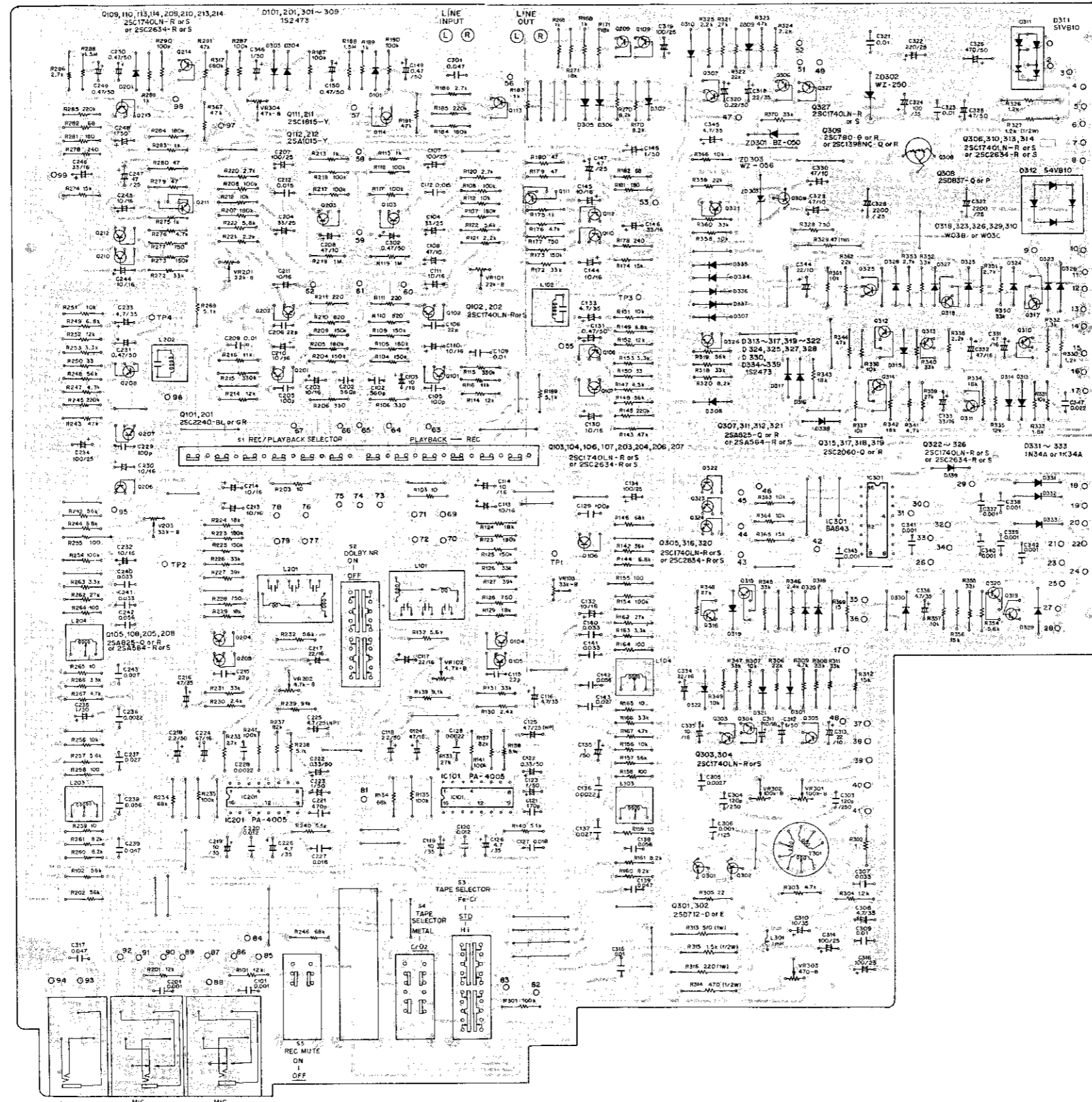
Note:
This mother assembly is applicable to serial numbers after ZL360101.



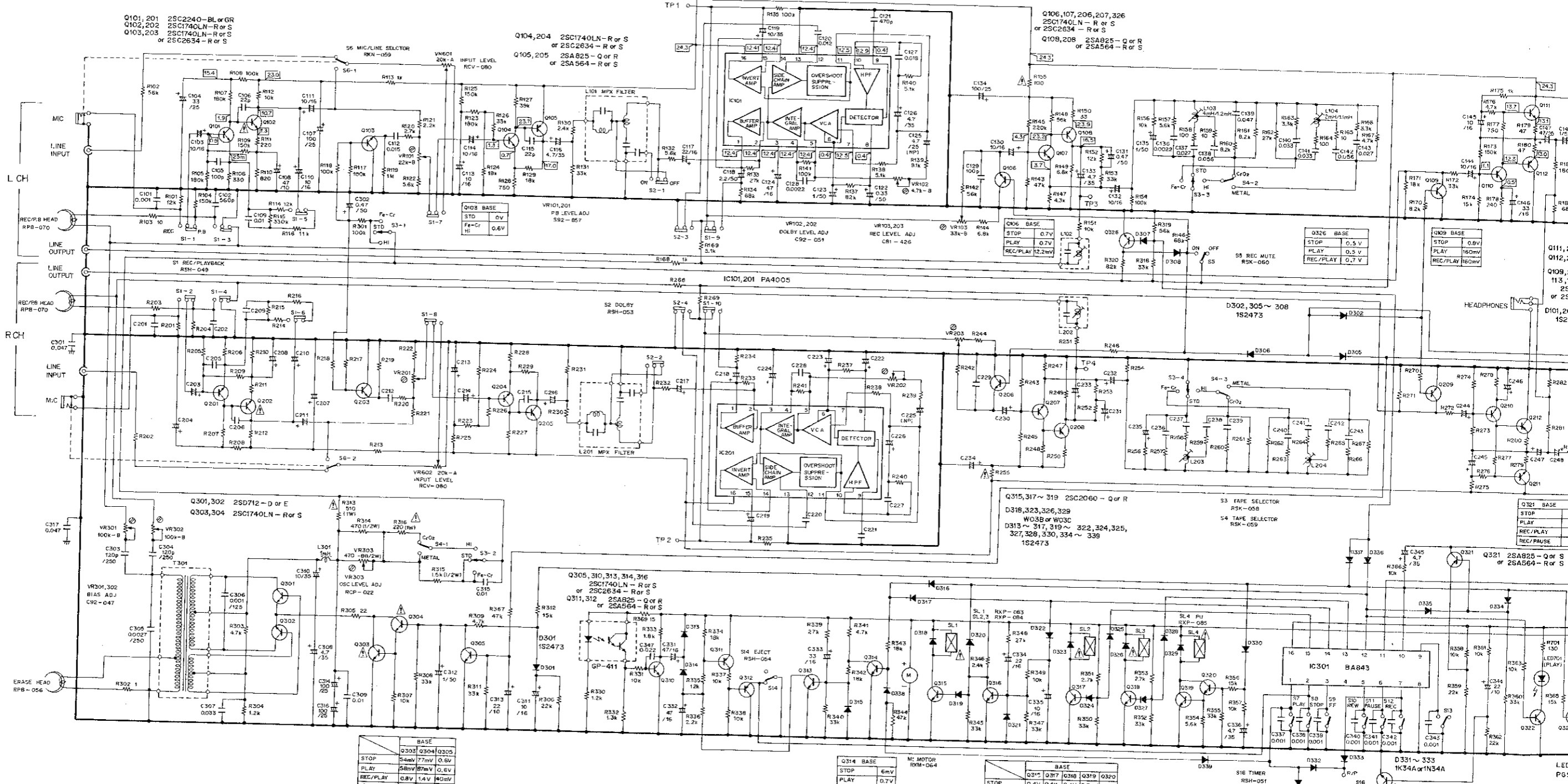
CT-F615

Mother Assembly (RWX-383)

Foil Side



# 3. SCHEMATIC DIAGRAM



- 1. RESISTORS:**  
Indicated in Ω, kΩ, MΩ, ±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**  
□: DC voltage (V) at no input signal
- 4. OTHERS:**  
⊙: Adjusting point.  
The **A** 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:**
- |                       |                          |                             |               |
|-----------------------|--------------------------|-----------------------------|---------------|
| S1: REC/PLAYBACK      | PLAYBACK - REC           | S7: PLAY                    | OFF - ON      |
| S2: DOLBY NR          | OFF - ON                 | S8: STOP                    | OFF - ON      |
| S3: TAPE SELECTOR     | Fe-Cr - STD - HI         | S9: FF                      | OFF - ON      |
| S4: TAPE SELECTOR     | CrO <sub>2</sub> - METAL | S10: REW                    | OFF - ON      |
| S5: REC MUTE          | OFF - ON                 | S11: PAUSE                  | OFF - ON      |
| S6: MIC/LINE SELECTOR | MIC - LINE               | S12: REC                    | OFF - ON      |
|                       |                          | S13: ERASE PREVENT DETECTOR | NOHOLE - HOLE |
- The underlined indicates the switch position.

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

4

5

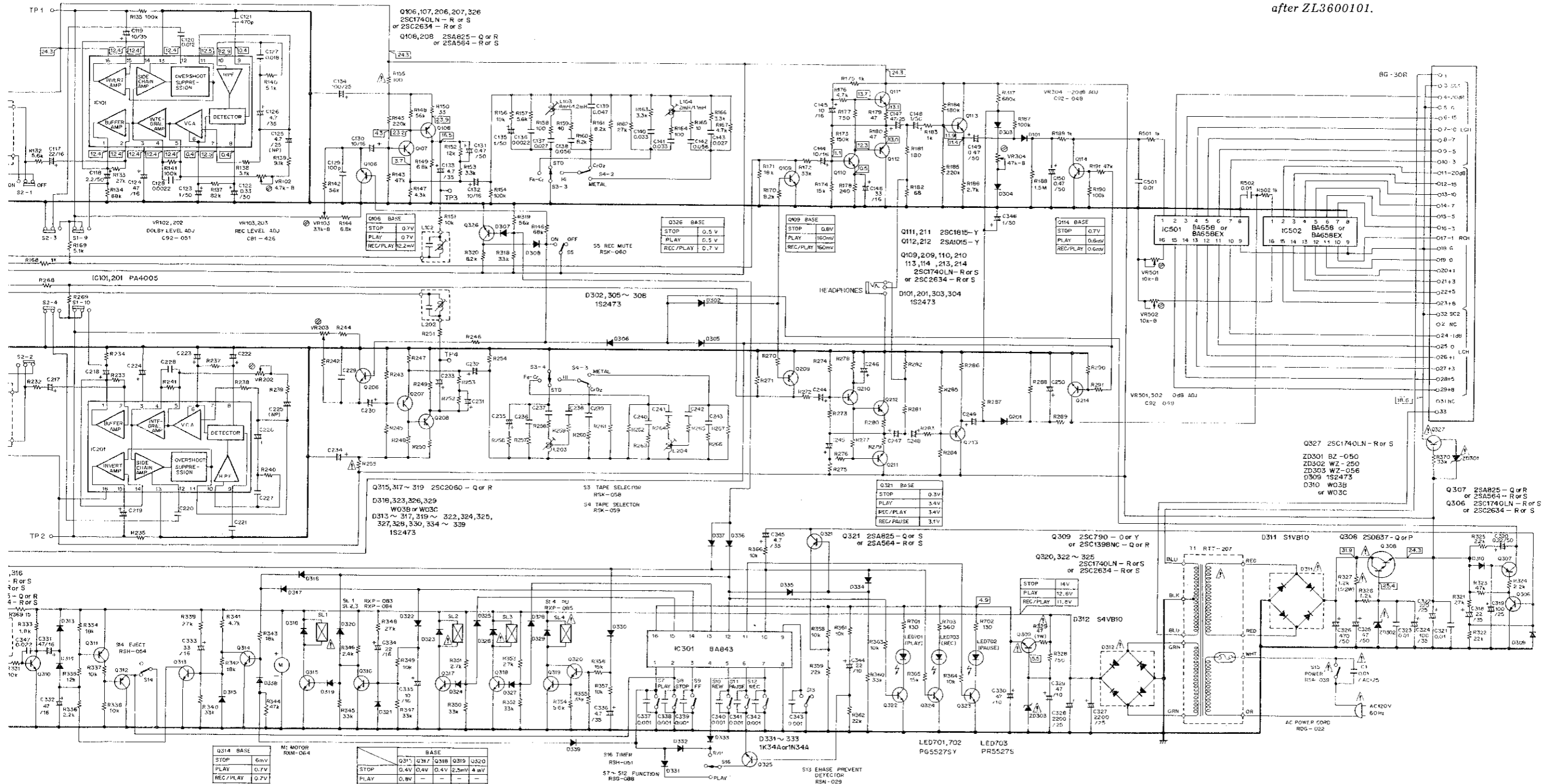
6

7

8

9

Note:  
• This schematic diagram is applicable to serial numbers after ZL3600101.



- SWITCHES:
- S1 : REC/PLAYBACK      FLAYBACK - REC
  - S2 : DOLBY NR          OFF - ON
  - S3 : TAPE SELECTOR    Fc - Cr - STD - HI
  - S4 : TAPE SELECTOR    CrO2 - METAL
  - S5 : REC MUTE          OFF - ON
  - S6 : MIC/LINE SELECTOR MIC - LINE
  - S7 : PLAY              OFF - ON
  - S8 : STOP              OFF - ON
  - S9 : FF                OFF - ON
  - S10 : REW              OFF - ON
  - S11 : PAUSE            OFF - ON
  - S12 : REC              OFF - ON
  - S13 : ERASE PREVENT DETECTOR NOHOLE - HOLE
  - S14 : EJECT            OFF - ON
  - S15 : POWER           OFF - ON
  - S16 : TIMER            REC/PLAY - OFF - PLAY
- The underlined indicates the switch position.

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

A  
B  
C  
D

4

5

6

7

8

9