

Service Manual

**CIRCUIT & MECHANISM
DESCRIPTIONS
REPAIR & ADJUSTMENTS**



**ORDER NO.
ARP-215-0**

STEREO CASSETTE TAPE DECK

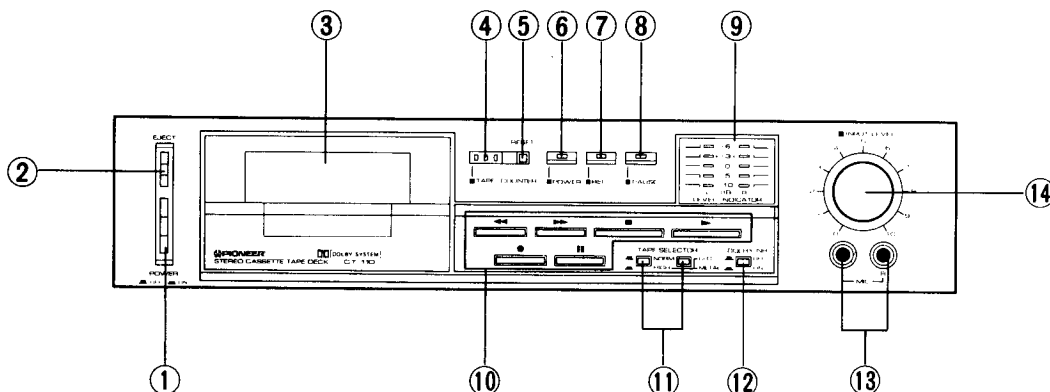
CT-110

- This service manual is applicable to the ZE type.
- Ce manuel d'instruction se réfère au mode de réglage, en français.
- Este manual de servicio trata del método de ajuste escrito en español.

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2. FRONT PANEL FACILITIES



① POWER SWITCH

Pushing this switch turns on the power and causes the power indicator to light. Push the switch again to release it when switching off the power to the unit.

- The muting circuit is activated after the POWER switch has been set to ON and the unit will not operate for about 4 seconds. This is not a failure or malfunction.
- When the POWER switch is set to OFF while the unit is operating, the unit's operation is released and the stop mode is established.

② EJECT BUTTON

Push this button to open the cassette holder. To close the cassette holder, push the top back until it locks.

- Do not press this button while the tape is moving.

③ CASSETTE DOOR

④ TAPE COUNTER

This shows the position of the tape by means of a 3-digit meter.

⑤ COUNTER RESET BUTTON

Push this button to reset the tape counter display to 000.

⑥ POWER INDICATOR

⑦ REC INDICATOR

This lights during the recording mode.

⑧ PAUSE INDICATOR

This lights during the pause mode.

⑨ LEVEL INDICATORS

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

⑩ FUNCTION SWITCHES

- **(REC)** : Push this switch to start recording. When depressed to the ON position, the REC indicator lights. The switch does not work when a cassette is not loaded or when the erasure prevention tabs of a loaded cassette have been broken off.
- ◀◀ **(REW)** : Push this switch to rewind the tape at high speed (from right to left).
- ▶ **(Play)** : Push this switch to start tape playback.
- ▶▶ **(FF)** : Push this switch to send the tape forward at high speed (from left to right).

- **(STOP)** : Push this switch to stop the tape travelling and to release the function switches.

- ▬ **(Pause)** : Push this switch to stop the tape temporarily during recording or playback. Release it to allow the tape to resume traveling. The tape does not stop during fast forward or rewind operations even when the ▬ (pause) switch is pushed.

⑪ TAPE SELECTOR SWITCHES

These selectors allow the tape's bias and equalization characteristics to be selected during recording and the equalization characteristics during playback, in line with the type of tape being used.

Normal tape : Release the left switch to the "out" (■) position.

Chrome tape : Push the left switch to the "in" (◼) position and release the right switch to the "out" (■) position.

Metal tape : Push both left and right switches to the "in" position (◼).

⑫ DOLBY* NR SWITCH


Push this switch to ON when recording with the built-in Dolby noise reduction system and when playing back tapes which have been recorded using the system. For other tapes, do not push this switch.

⑬ 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.

⑭ INPUT LEVEL CONTROL

Use this to adjust the level of the input signals from the MIC jacks or from the rear panel LINE INPUT terminals. Rotating this control clockwise increases the level. For further details, refer to SETTING THE RECORDING LEVEL.

* The word "Dolby" and  are trademarks of Dolby Laboratories Licensing Corporation.

Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation.

3. CIRCUIT DESCRIPTIONS

3.1 PLAYBACK CIRCUIT

The signal from the playback head is amplified by the Q102/Q103 2-stage direct-coupled amplifier. In the NORM position, the playback equalization (120μs) compensation is achieved by the NF circuit between the Q103 collector and Q102 emitter. In the METAL and CrO₂ positions, Q104 is turned on, and the equalization characteristics switched from 120μs to 70μs to compensate the frequency response. The level of the EQ AMP output is set by a variable resistor, and further amplified by the Q401 flat amplifier before being passed through the MPX filter and applied to pin 2 of the Dolby IC.

This Dolby circuit consists of IC401 (HA11226), and the Dolby ON/OFF switch is linked to the MPX filter ON/OFF switch. When the Dolby switch is OFF, the 19kHz filter is bypassed. The Dolby circuit output appears at pin 8 of IC401, and is passed to LINE OUTPUT via a switching IC (IC402).

3.2 RECORDING CIRCUIT

The input signal from the microphone jack is amplified by the microphone amplifier IC101, and passed via the MIC/LINE selector switch to the INPUT volume control where the input level is adjusted. This adjusted signal is passed via IC103 to flat amplifier Q401. D313 and D314 in the stage before IC103 form a protector circuit designed to protect IC103 from large input signals. The signal amplified by the flat amplifier is passed via the MPX filter to pin 2 of the Dolby IC, the output appearing at pin 8. The level of this output is adjusted by variable resistor. Then after equalization in the REC AMP (Q106) in accordance to the type of tape being used, the signal is passed to the recording head.

3.3 CONTROL CIRCUIT

The control circuit in this deck utilizes a one-chip IC (PM9002B) which enables feather-touch operations. In addition to mechanism control, this IC also includes auto-stop function. And due to the digital counter frequency divider system employed in timing settings for the mechanism control, all operational timing discrepancies have been eliminated. The PM9002B pin layout is shown in Fig. 3-3, the functional block diagram in Fig. 3-2, and the output pin time charts during different modes in Figs. 3-4 and 3-5. For inter-relations between circuits, see the block diagram on page 10, 11 and in Fig. 3-1.

Operations during Each Mode

The mechanical operations effected by the following circuit changes are described in the next chapter (see page 7).

1. When the POWER Switch is Switched ON

When the POWER switch is switched on, +5V is applied to pin 1 (Vcc) of IC102. During the initial period when pin 1 voltage is being increased from 0V to 5V (approximately from 0.6V to 2.4V) the IC's internal reset circuit is activated, putting the IC into stop status which is maintained for about four seconds after the power switch is switched ON. During this time, no change can be effected by pressing any of the other operation control buttons.

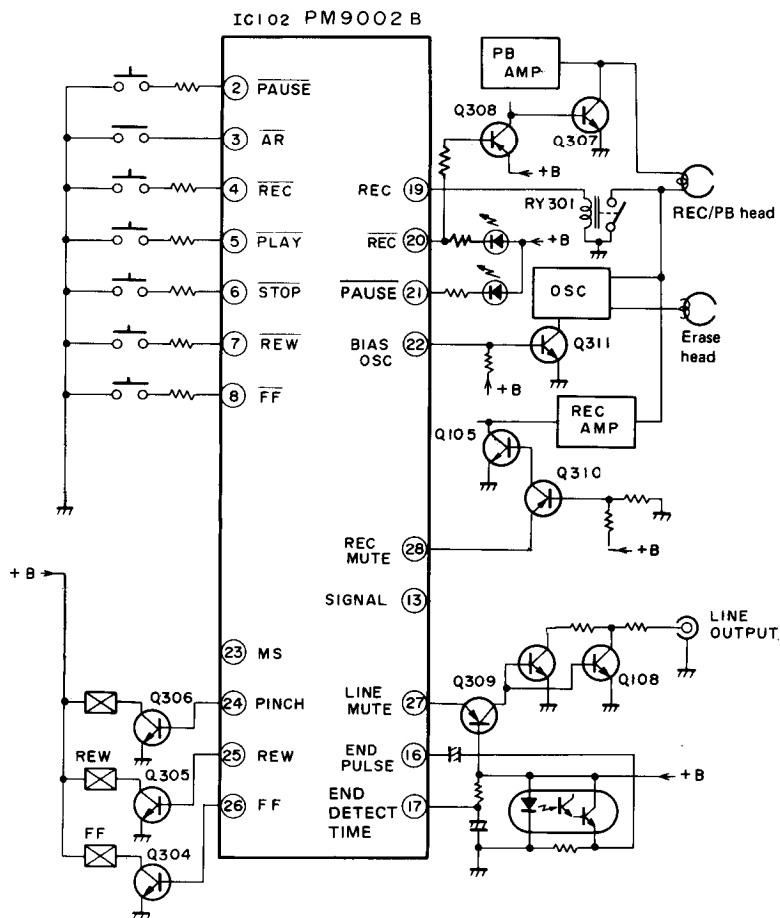


Fig. 3-1 Control system block diagram

2. Play Mode

When the PLAY button is pressed, the level of pin 5 ($\overline{\text{PLAY}}$) of IC102 is switched to "L" level, and the level of pin 24 (PINCH SOL) to "H" level. Q306 is turned on and the pinch roller activated. In addition, IC102 pin 27 (LINE MUTE) is opened 416ms after the PLAY button is pressed, thereby releasing the line mute status to enable play mode operations to commence.

3. Recording Mode

When a cassette half with its erasure prevention tabs intact is loaded in the deck, pin 3 ($\overline{\text{AR}}$) of IC102 is switched to "H" level, thereby enabling the deck to be switched to recording mode.

When the REC button is pressed, IC102 pin 4 ($\overline{\text{REC}}$) is changed to "L" level. Pin 20 ($\overline{\text{REC}}$) is also changed to "L" while pin 19 ($\overline{\text{REC}}$) is open. As a result, the REC indicator lights up and the reed relay (RY301) is switched off, thereby switching the signal path to the recording circuit. And the IC102 pin 24 (PINCH SOL) changed to "H" level, tape transport is commenced. Pin 22 (BIAS OSC) is opened 52ms after the REC button is pressed, thereby activating the bias oscillator. Pin 27 (LINE MUTE) and pin 28 (REC MUTE) are opened 416ms after the REC button is pressed, thereby releasing the line mute and recording mute status to permit recording to start.

4. Fast Forward Mode

When the FF button is pressed, IC102 pin 8 ($\overline{\text{FF}}$) is changed to "L" level, followed by pin 26 (FF SOL) being changed to "H" level 416ms later. Q304 is thus turned on, activating the FF solenoid to start fast forward operation.

5. Rewind Mode

When the REW button is pressed, IC102 pin 7 ($\overline{\text{REW}}$) is changed to "L" level, followed by pin 25 (REW SOL) being changed to "H" level 416ms later. Q305 is thus turned on, activating the REW solenoid to start rewind operation.

6. Pause Mode

The pause mode in this deck is released by pressing the PAUSE button. The pause mode is not released by pressing the PLAY button during play/pause mode, or the REC button during recording/pause mode. Note, however, that pressing the PLAY button during recording/pause mode switches the deck to play/pause mode, and pressing the REC button during play/pause mode switches the deck to recording/pause mode.

If the PAUSE button is pressed during stop mode, pin 2 ($\overline{\text{PAUSE}}$) and pin 21 ($\overline{\text{PAUSE}}$) of IC102 are both changed to "L" level, thereby lighting up the PAUSE indicator. When both the PLAY and

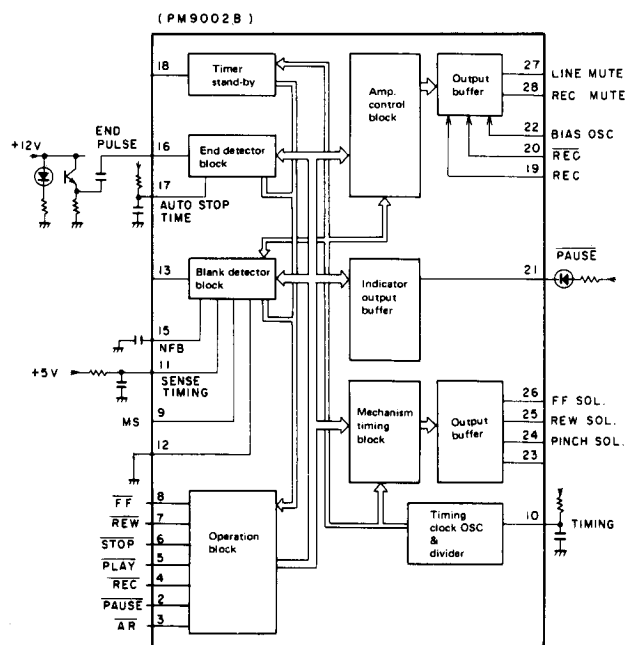


Fig. 3-2 PM9002B internal block diagram

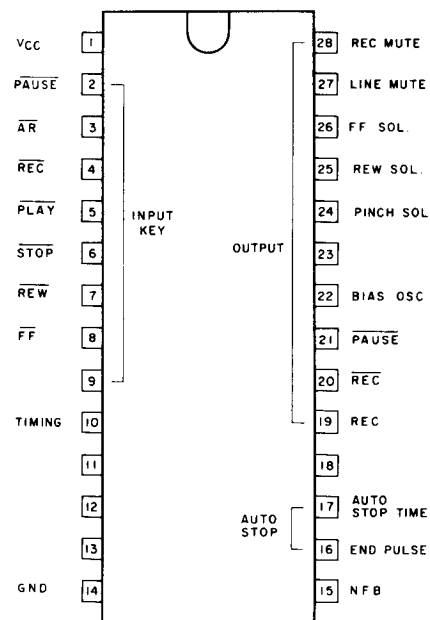


Fig. 3-3 PM9002B pin layout

PAUSE buttons are pressed, IC102 pin 21 is changed to "L" level, and the PAUSE indicator lights up. And since pin 27 (LINE MUTE) of this IC is changed to "H" level, the signal circuit is muted. If the REC and PAUSE buttons are both pressed, IC102 pin 20 (REC) and pin 21 (PAUSE) are changed to "L" level, resulting in both the REC and PAUSE indicators lighting up, and the signal circuit being switched to recording circuit. Furthermore, pin 27 is opened, permitting output of the signal to LINE OUTPUT, but since pin 28 has been changed to "H" level, recording mute mode is maintained.

7. Auto-stop Mode

A photo-interrupter output is applied to pin 16 (END PAUSE) of IC102 during tape transport, resulting in the capacitor connected to pin 17 (C312) being charged up and discharged repeatedly. The potential at pin 17 is thus kept below the threshold voltage, and prevents activation of the auto-stop mechanism.

When tape travel stops and the take-up reel stops turning, the photo-interrupter output is no longer applied to pin 16, and the potential on the capacitor connected to pin 17 (C312) continues to increase until it exceeds the threshold voltage. The IC is thus switched to stop mode, thereby stopping tape mechanisms.

• Timing Chart

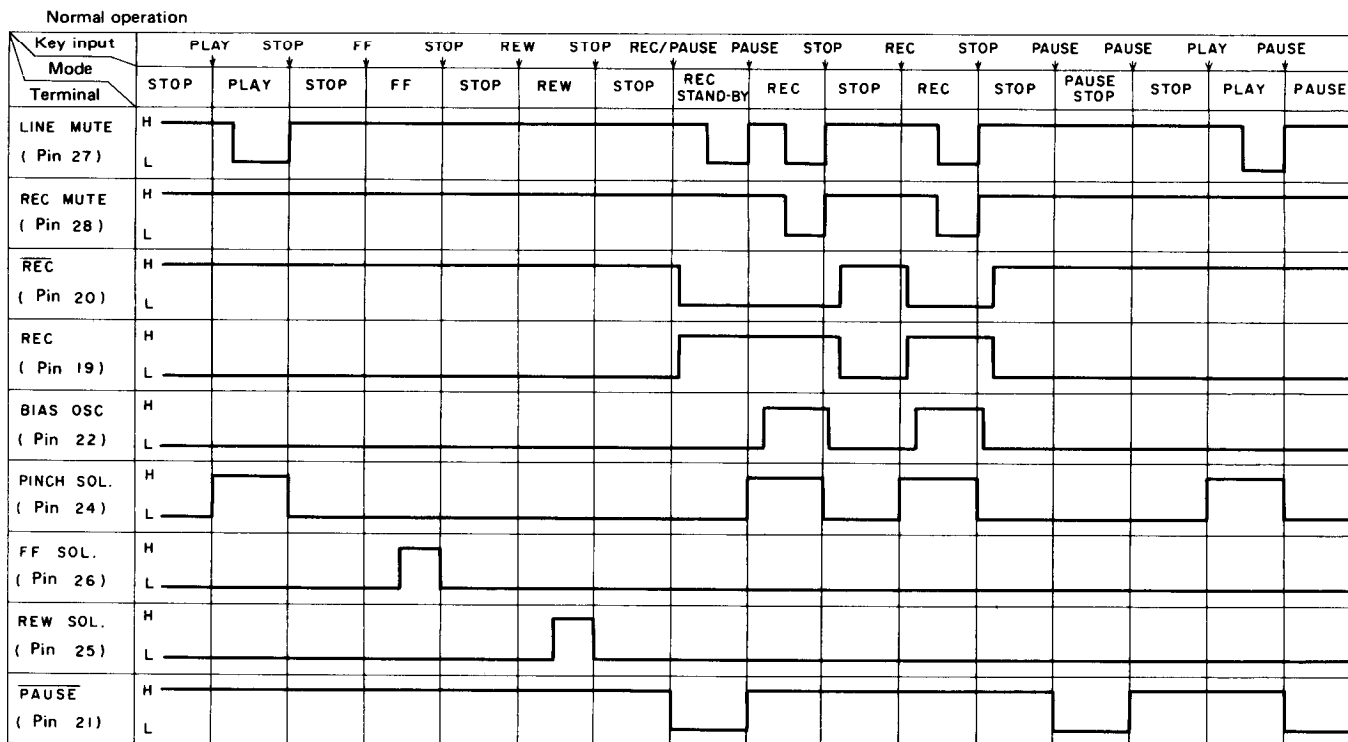


Fig. 3-4 PM9002B time chart

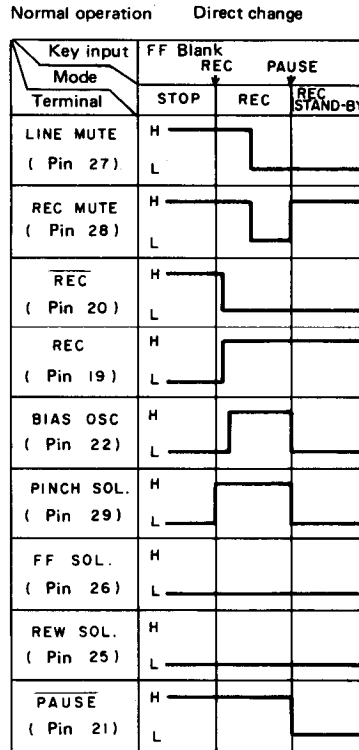


Fig. 3-5 PM9002B time chart

3.4 MECHANICAL OPERATIONS

Playback Mode

The CT-110 makes use of the capstan torque when shifting the head base during playback mode. (Both the recording/playback and erase heads are mounted on the head base).

- **Stop Mode** (see Fig. 3-6)

The head base shift mechanism during stop mode is shown in Fig. 3-6. Operating lever (A) presses down towards cam (C) due to operating lever spring (B). With cam (C) combined with cam gear (D), clockwise torque is applied to this cam gear. Solenoid P is inactive, and the hook of gear lever (F) is kept against stopper (G) of cam gear (D) by the cam gear return spring (E), thereby keeping cam gear (D) stationary. The flywheel is belt-driven by the capstan motor, and rotates counterclockwise together with the capstan gear.

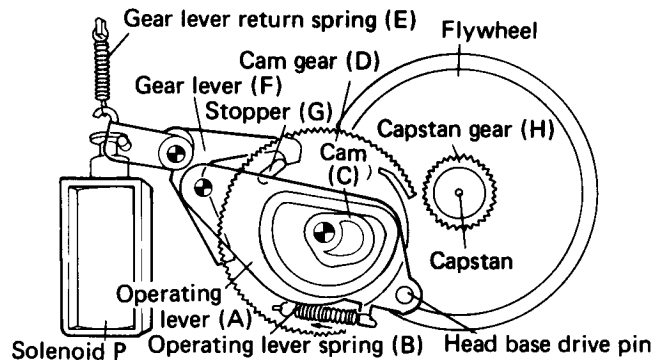


Fig. 3-6 STOP operation

● **Switch to Playback Mode from Stop Mode**
 (see Fig. 3-7)

1. Solenoid P is activated ① , and the hook of gear lever (F) is released from stopper (G) ② .
2. Operating lever (A) is pressed down onto cam (C) by operating lever spring (B) ③ , cam gear (D) rotates ④ and engages capstan gear (H) ⑤ .

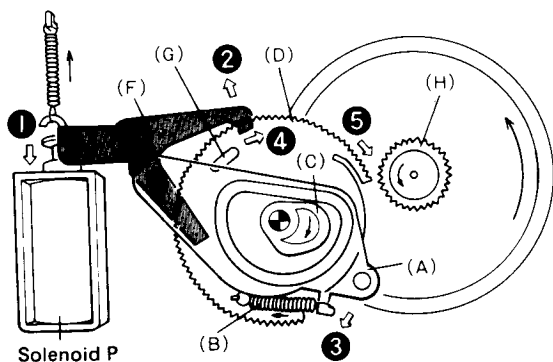


Fig. 3-7 STOP → PLAY operation 1

● **Switch to Playback Mode from Stop Mode**
 (see Fig. 3-8)

3. Cam gear (H) continues rotating due to capstan gear (H) ⑥ , and cam (C) pushes operating lever (A) up ⑦ .
4. After cam (C) passes the point of maximum lift, cam gear (D) disengages capstan gear (H) ⑧ .

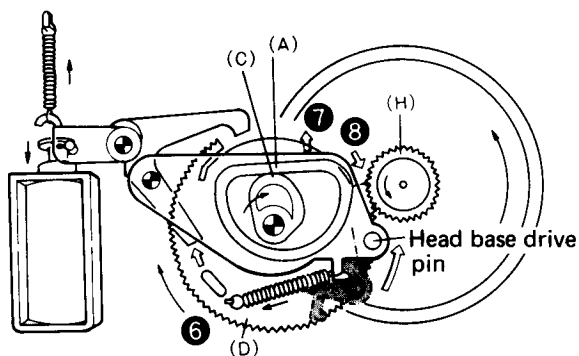


Fig. 3-8 STOP → PLAY operation 2

● **Switch to Playback Mode from Stop Mode**
 (see Fig. 3-9)

5. Operating lever spring (B) forces operating lever (A) to press against cam (C) ⑨ , thereby tending to continue the rotary motion of cam gear (D), but since stopper (G) catches the arm of gear lever (F) ⑩ , cam gear (D) stops rotating and operating lever (A) becomes stationary (playback mode).

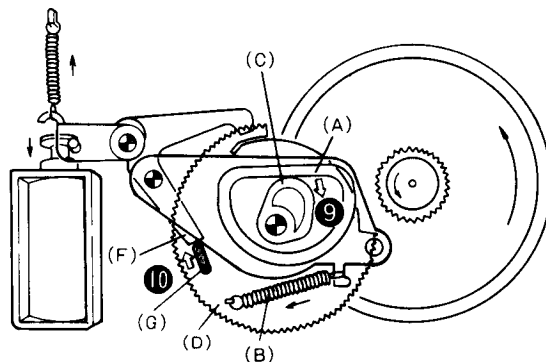


Fig. 3-9 STOP → PLAY operation 3

● **Operation of Different Parts**

As can be seen in Fig. 3-9, the head base drive pin of operating lever (A) rises during playback mode. This pin forces the head base up through the action of the HB drive spring. The pinch presser spring is also lifted at the same time, forcing the pinch roller into close contact with the capstan. Furthermore, the brake plate is lifted to release the reel brake. Pressure is also applied to the idler arm, resulting in the TU idler transmitting drive gear rotation to the TU reel base (the drive gear being belt-driven by the capstan motor). (see Fig. 3-10).

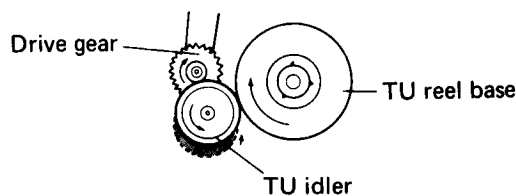


Fig. 3-10 Generation of take-up torque

- **Switch to Stop Mode from Playback Mode** (see Fig. 3-11)
 1. When solenoid P is deactivated ⑪, the arm of gear lever (F) is disconnected from stopper (G) by the action of gear lever return spring (E) ⑫.
 2. Operating lever spring (B) forces operating lever (A) against cam (C) ⑬, resulting in rotation of cam gear (D) ⑭ and lowering of the head base drive pin ⑮.
 3. Stopper (G) catches the hook of gear lever (F), stopping the mechanism in the condition shown in Fig. 3-6 (stop mode).

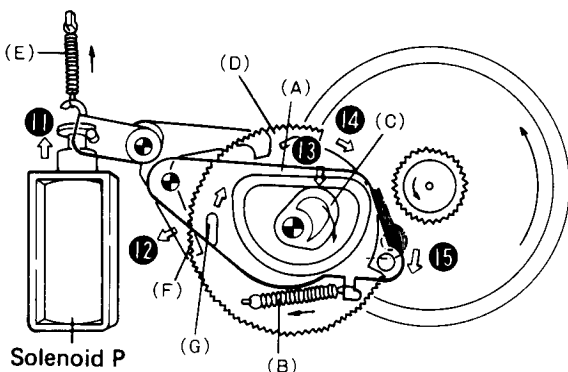


Fig. 3-11 PLAY → STOP operation

Fast Forward Operation

When solenoid F is activated, the drive arm is moved to the right, and the drive gear on the arm engages the idler gear, resulting in rotation of the TU reel base as shown in Fig. 3-12 (the drive gear being belt-driven by the capstan motor). At the same time, the pin on the branch of the drive arm pushes the brake plate up, thereby releasing the reel brake.

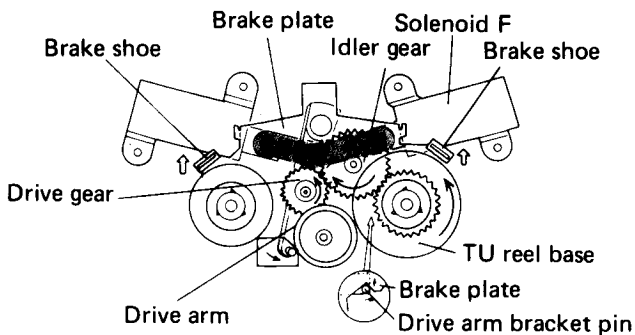


Fig. 3-12 Fast forward operation

Rewind Operation

When solenoid R is activated (see Fig. 3-13), the drive arm is moved to the left, and the drive gear on the arm engages the supply reel gear resulting in rotation of the supply reel base. At the same time, the pin at the tip of the drive arm pushes the brake plate up, thereby releasing the reel brake.

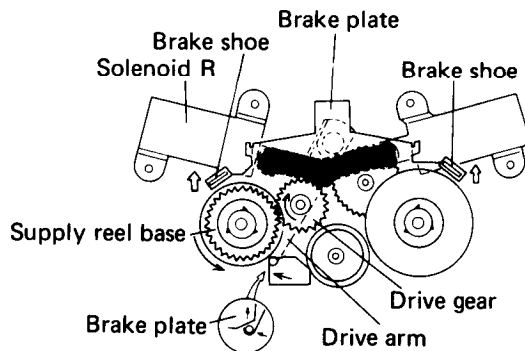
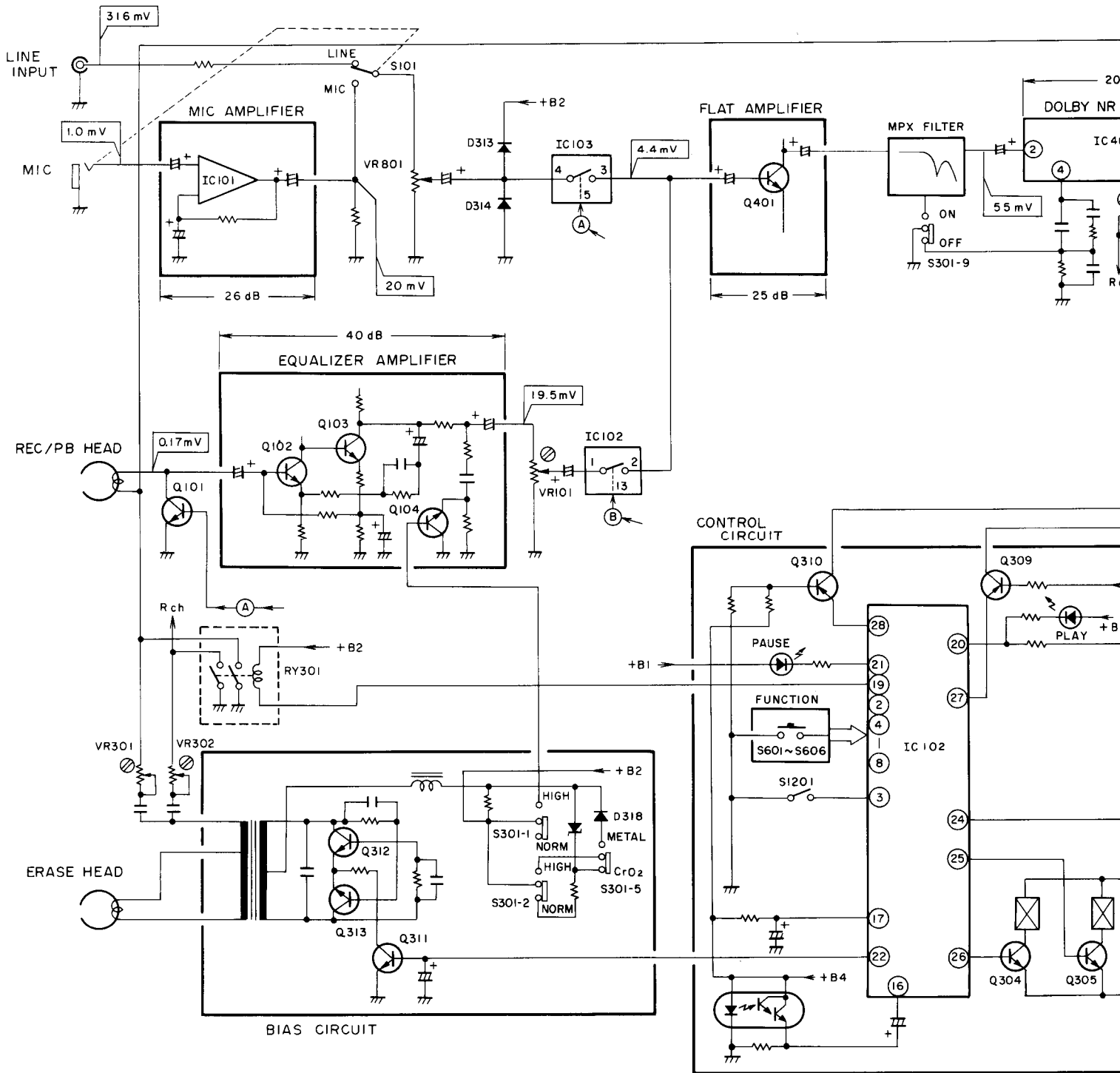
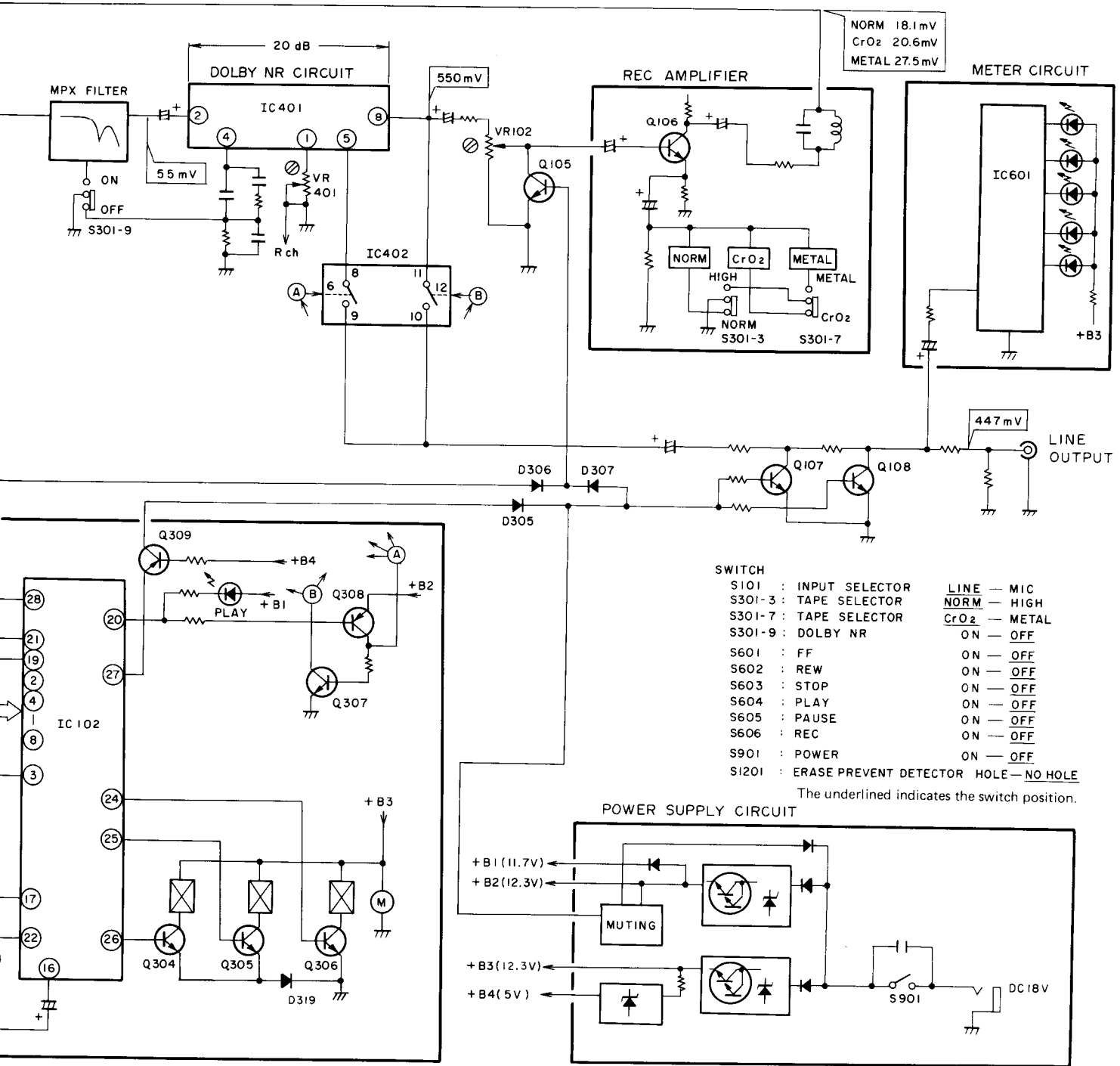


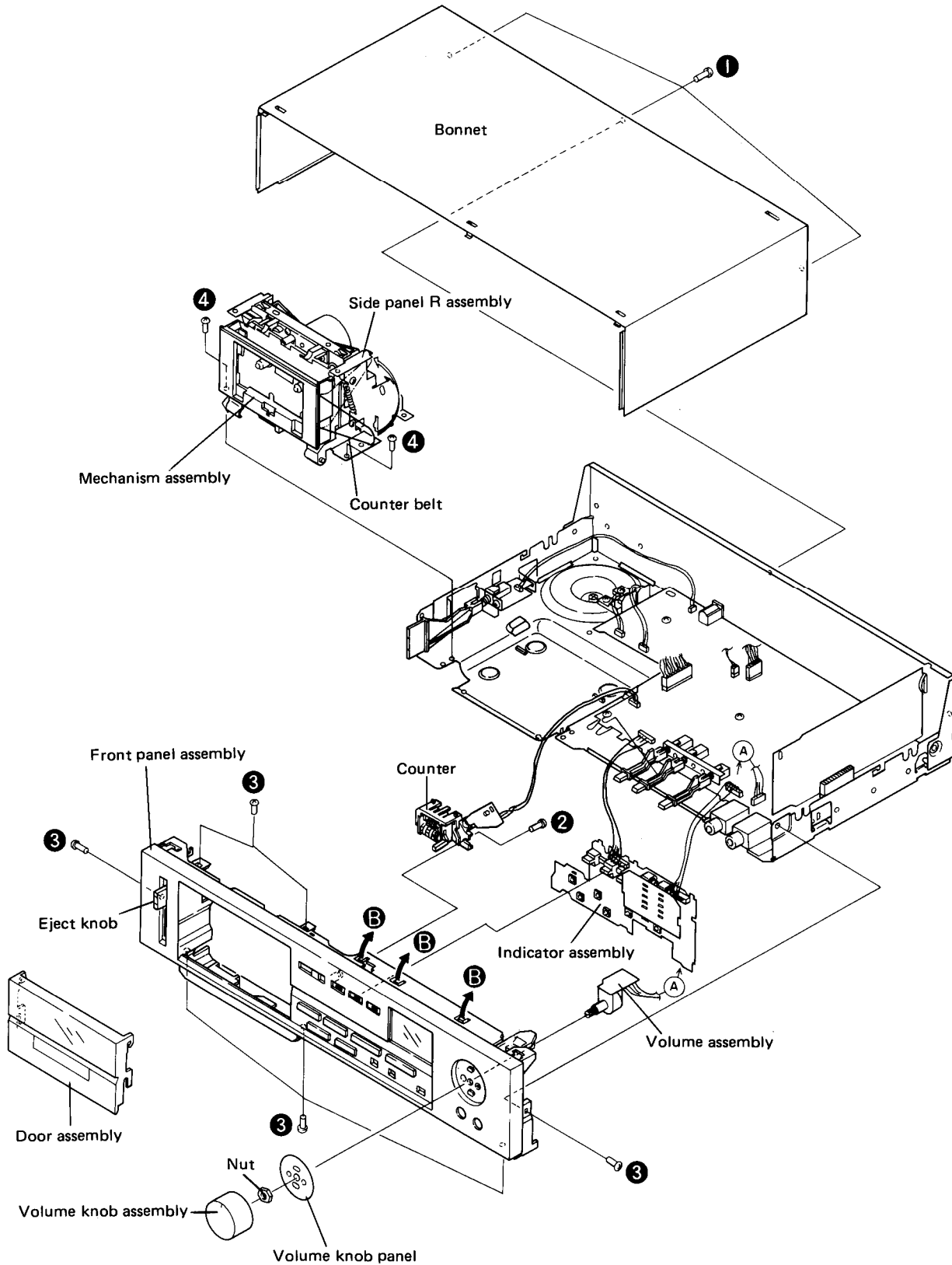
Fig. 3-13 Rewind operation

4. BLOCK DIAGRAM





5. DISASSEMBLY



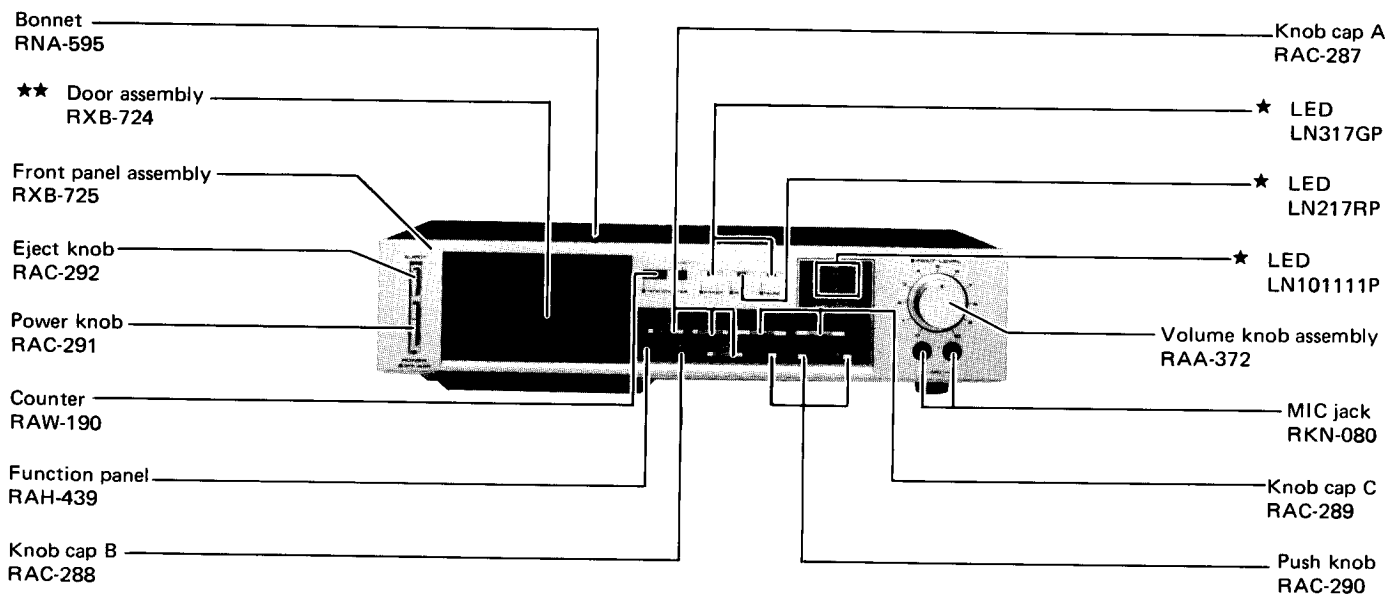
1. Remove the bonnet by undoing screws ① and lifting the back part of the bonnet up and pulling it to the rear.
 2. Remove the cassette door by pushing the eject button to open it and then pulling it up and out.
 3. The volume assembly can be removed along with the volume panel by pulling off the volume knob and then undoing the volume assembly's hexagonal nut.
 4. The counter is removed by undoing screws ② and slipping off the counter drive belt. The counter drive belt can be temporarily rested on the side panel R assembly of the mechanical assembly.
 5. The display assembly is removed by lifting up and releasing the three hooks on the top part of the front panel assembly ③, pushing down and releasing the two hooks on the center section, and pushing the top part of the display assembly to the rear.
 6. The front panel assembly is removed by undoing screws ③.
 7. The mechanical assembly is removed by undoing screws ④ and then sliding it to the rear.
- WARNING:**
When assembling, first attach the front panel assembly, then attach the display assembly. At this time be sure to connect the ground lead to the front panel.

6. PARTS LOCATION

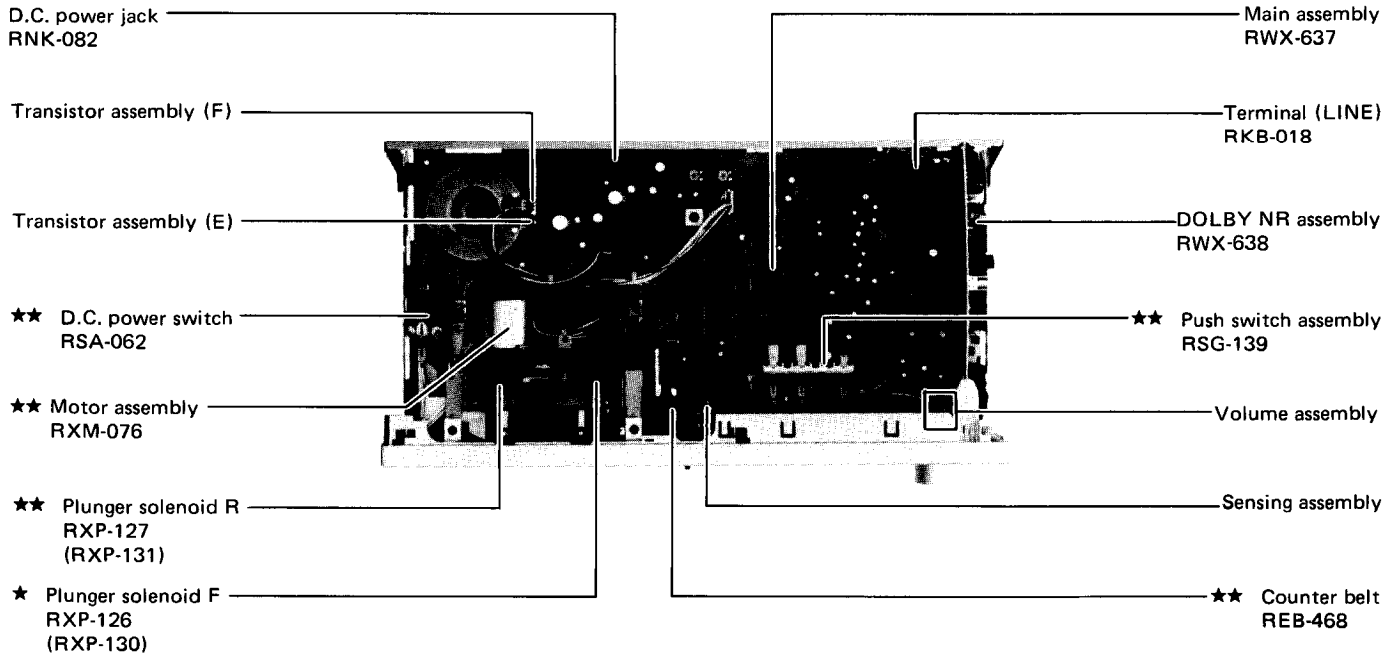
NOTES:

- Parts without part number cannot be supplied.
- The \triangle 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.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.
★★ GENERALLY MOVES FASTER THAN ★.
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

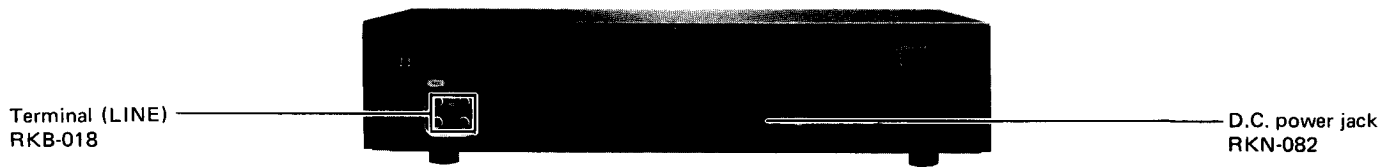
Front Panel View

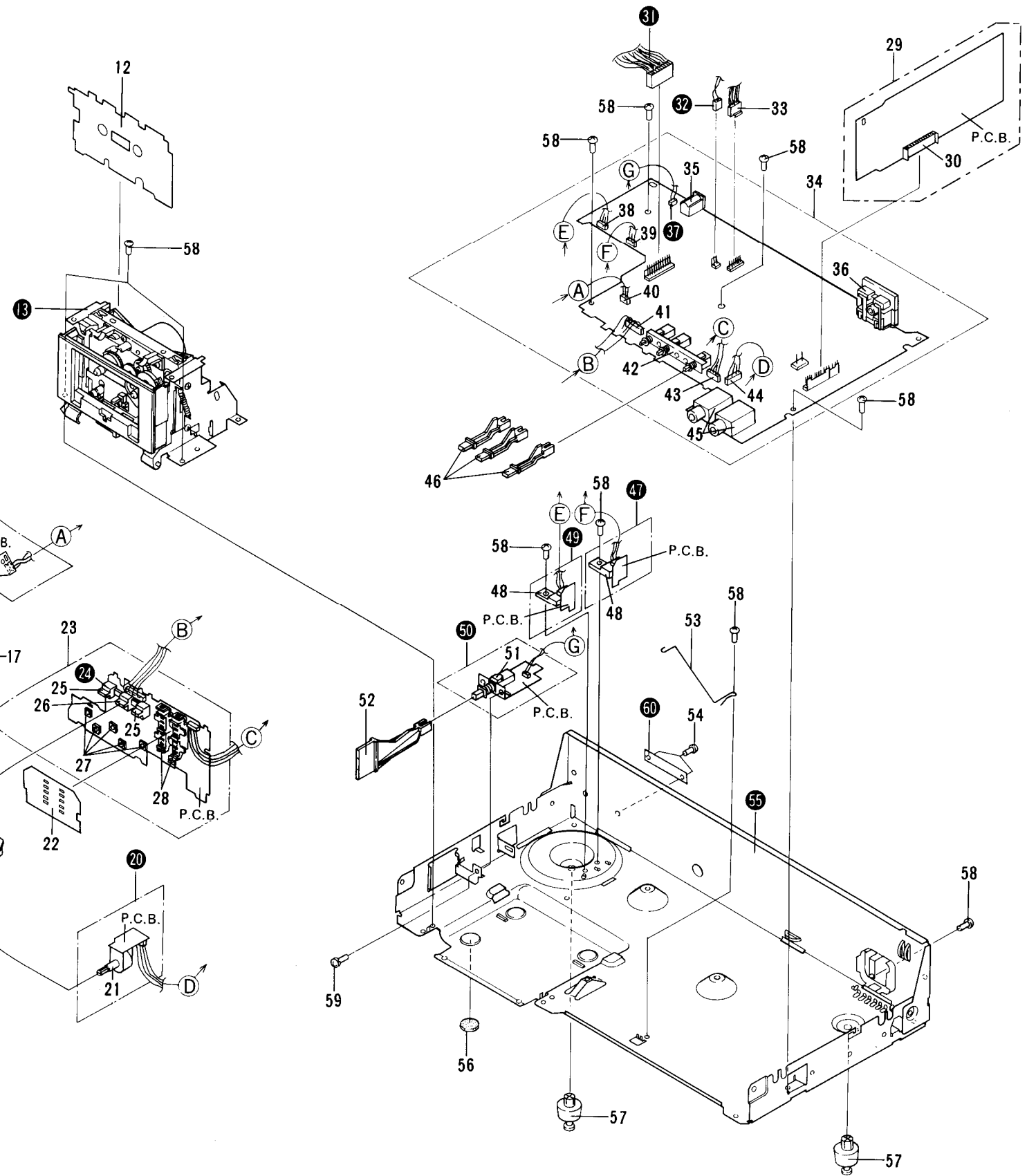


Top View with Bonnet Removed



Rear Panel View



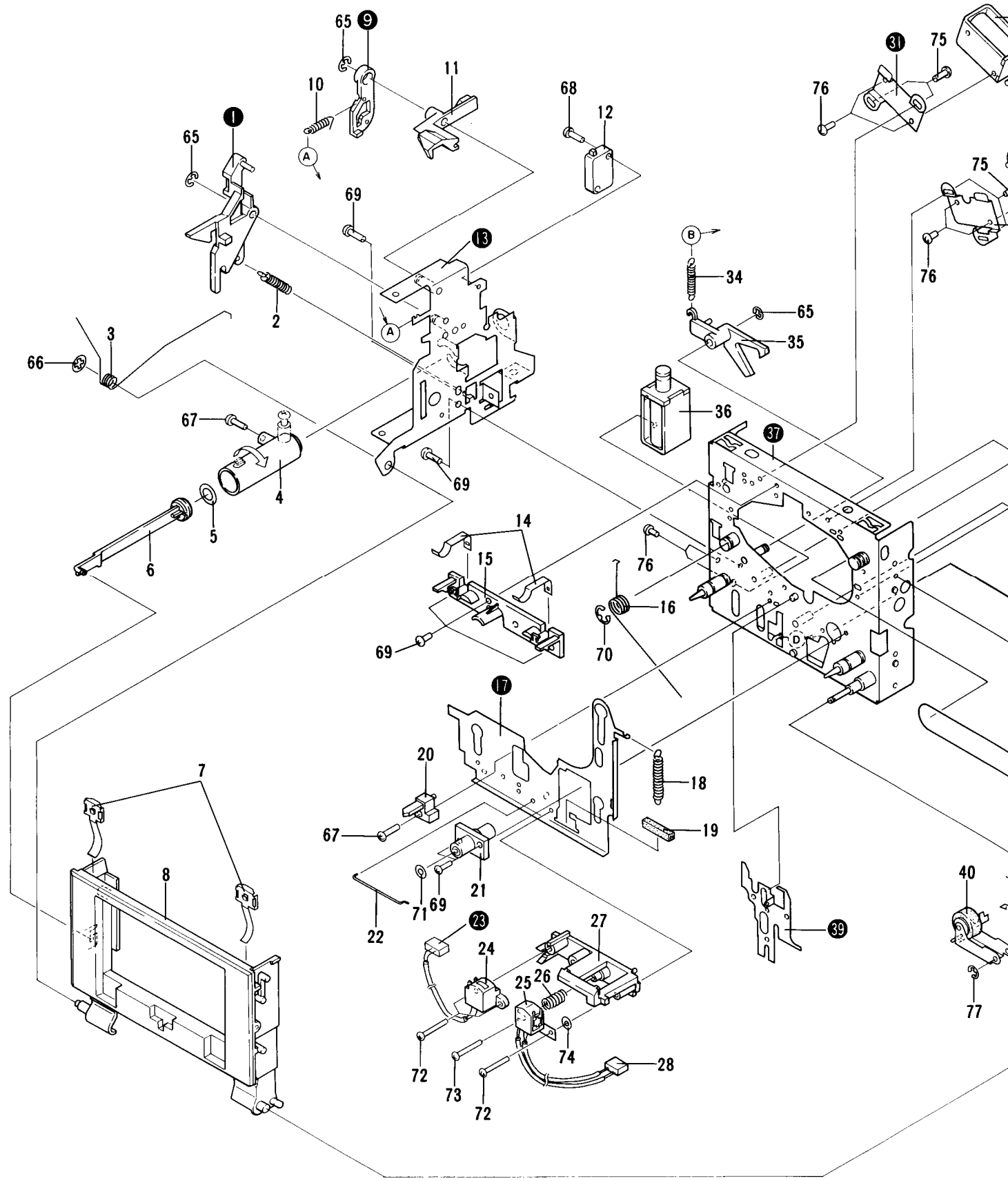


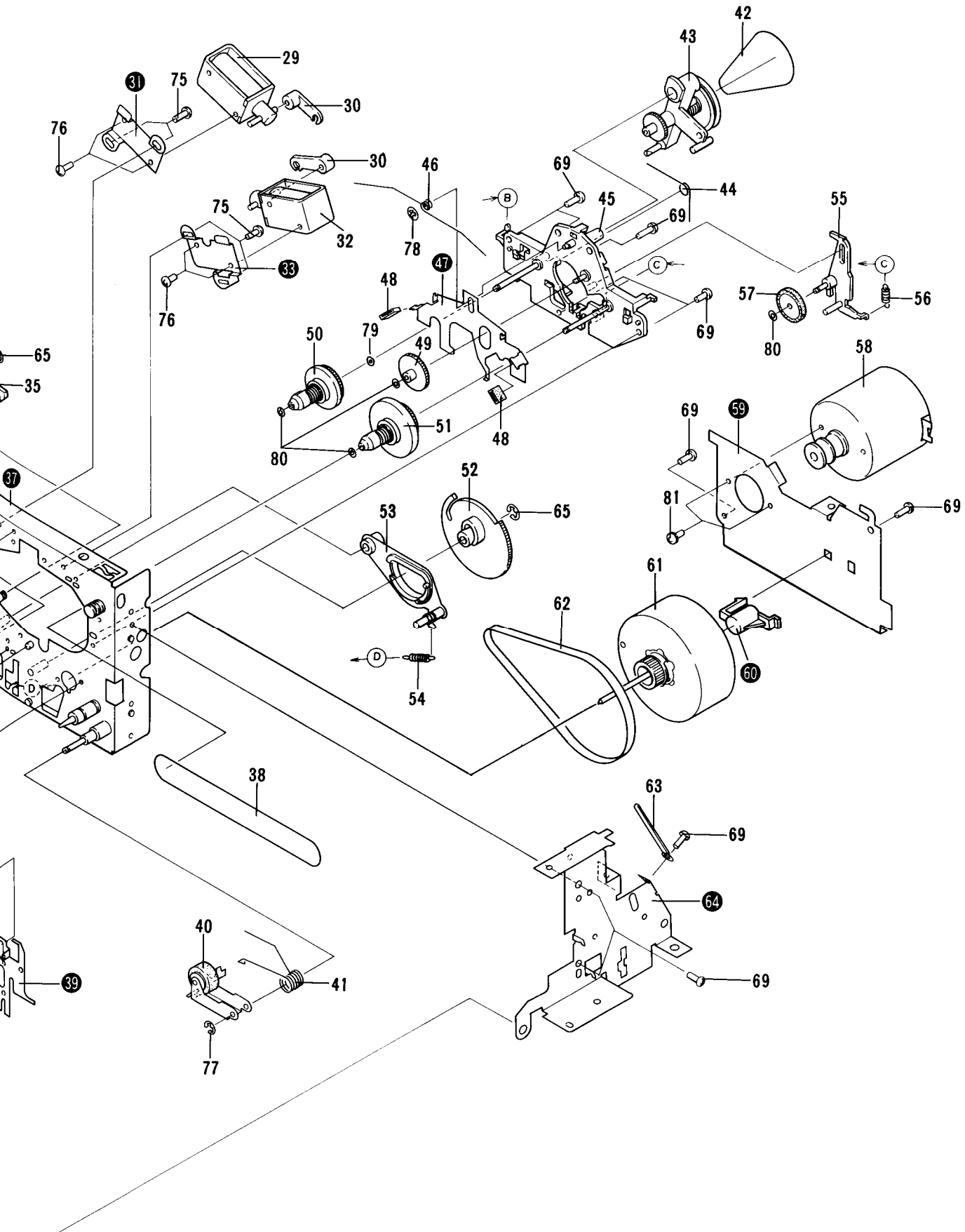
NOTES:

- *Parts without part number cannot be supplied.*
- *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.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ****** and *****.*
**** GENERALLY MOVES FASTER THAN ***
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Part List

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	RNA-595	Bonnet		41.	RKP-624	Connector 10P
	2.	RBH-956	Eject spring	**	42.	RSG-139	Push switch assembly
	3.	RAC-292	Eject knob		43.	RKP-625	Connector 4P
	4.	RXB-725	Front panel assembly		44.	RKP-626	Connector 6P
	5.	RXB-724	Door assembly		45.	RKN-080	MIC jack
	6.	RAC-287	Knob cap A		46.	RAC-290	Push knob
	7.	RAC-288	Knob cap B		47.		Transistor assembly (F)
	8.	RAC-289	Knob cap C	**	48.	2SD1276	Transistor
	9.	RAH-439	Function panel		49.		Transistor assembly (E)
	10.	RAA-372	Volume knob assembly		50.		Power switch assembly
	11.	RAH-437	Volume panel		51.	RSA-062	D.C. power switch
	12.	RAH-436	Cassette plate		52.	RAC-291	Power knob
	13.		Mechanism assembly		53.	RBH-955	Earth spring
	14.		Sensing assembly		54.	RBM-001	Rivet
*	15.	GP-411B	Photo interruptor		55.		Main chassis
	16.	RNL-536	Counter holder		56.	REC-355	Sliding stopper
**	17.	REB-468	Counter belt		57.	REC-369	Foot assembly
	18.	RAW-190	Counter		58.	BBZ30P080FZK	Screw
	19.		P.C.B. holder		59.	PMA30P060FMC	Screw
	20.		Volume assembly		60.		Plate
	21.	RCV-104	Variable resistor (20k)				
	22.	RAH-438	Meter panel				
	23.	RWX-639	Indicator assembly				
	24.		LED holder				
*	25.	LN317GP	LED				
*	26.	LN217RP	LED				
**	27.	RSG-143	Push switch				
*	28.	LN101111P	LED				
	29.	RWX-638	DOLBY NR assembly				
	30.	RKP-606	Connector socket 14P				
	31.		Connector socket 10P				
	32.		Connector assembly 2P				
	33.	RKP-663	Connector assembly 6P				
	34.	RWX-637	Main assembly				
	35.	RKN-082	D.C. power jack				
	36.	RKB-018	Terminal (LINE)				
	37.		Connector 2P				
	38.	RKP-629	Connector 3P (B)				
	39.	RKP-630	Connector 3P (C)				
	40.	RKP-628	Connector 3P (A)				





Part List

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description	
	1.		Eject lever		51.	RXB-715	TU reel base assembly	
	2.	RBH-949	Eject lever spring		52.	RNL-059	Cam gear	
	3.	RBH-951	Eject spring		53.	RXB-723	Lever assembly	
	4.	RNL-261	Cylinder		54.	RBH-842	Lever spring	
	5.	REB-447	O ring		55.	RXB-374	Idler arm assembly	
	6.	RNL-534	Piston		56.	RBH-724	Idler pressure spring	
	7.	RBK-175	Pocket spring		57.	RNK-999	TU idler	
	8.	RNL-525	Pocket	★★	58.	RXM-076	Motor assembly	
	9.		Lock lever		59.		Flywheel holder	
	10.	RBH-948	Lock lever spring		60.		Thrust receptacle	
	11.	RNL-529	Detector lever		61.	RXB-717	Flywheel assembly	
	12.	RSH-058	Slide switch	★★	62.	REB-483	Capstan belt	
	13.		Side plate L assembly		63.	RNE-513	Cord clammer	
	14.	RNH-219	Half spring		64.		Side plate R	
	15.	RNL-524	Half receptacle		65.	YS30FUC	Washer	
	16.	RBH-778	Return spring		66.	YS30FBT	Washer	
	17.		Head base		67.	VCZ26P090F	MC Screw	
	18.	RBH-865	HB return spring		68.	PMZ26P100FMC	Screw	
	19.	REB-416	Shaft stopper		69.	VCZ26P060FMC	Screw	
	20.	RNL-527	Reference pin		70.	YE40FUC	Washer	
	21.	RXB-716	Metal holder assembly		71.	RBH-050	Oil stop washer	
	22.	RBH-794	HB drive spring		72.	PMZ20P150FMC	Screw	
	23.		Connector assembly 2P		73.	IMZ20Y150FMC	Screw	
★	24.	RPB-096 (RPB-085)	Erase head		74.	RNF-989	Spacer (0.1)	
★★	25.	RPB-089	REC/PB head		75.	PMZ26P060FMC	Screw	
	26.	RBH-723	Head adjust spring		76.	PMZ26P030FMC	Screw	
	27.	RNL-523	Sub head base		77.	YE20FUC	Screw	
	28.	RKP-663	Connector assembly 6P		78.	YS20FBT	Screw	
⚠	★	29.	RKP-127 (RKP-131)	Plunger solenoid R		79.	WA21D040D025	Washer
	30.	RNL-047	Solenoid arm		80.	WA17D032D025	Washer	
	31.		Solenoid bracket R		81.	PMA26P040FMC	Screw	
⚠	★	32.	RXP-126 (RXP-130)	Plunger solenoid F				
	33.		Solenoid bracket F					
	34.	RBH-722	Gear lever return spring					
	35.	RNL-051	Gear lever					
⚠	★	36.	RXP-125 (RXP-129)	Plunger solenoid P				
	37.		Chassis assembly					
★★	38.	REB-468	Counter belt					
	39.		PMS plate					
★★	40.	RXB-720	Pinch arm assembly					
	41.	RBH-890	Pinch pressure spring					
★★	42.	REB-446	Drive belt					
	43.	RXB-376	Drive arm full assembly					
	44.	RBH-725	FR spring					
	45.	RXB-721	Reel base assembly					
	46.	RBH-727	Brake spring					
	47.		Brake plate					
★	48.	REB-187	Brake shoe					
	49.	RNK-998	Idler gear					
	50.	RXB-714	Supply reel base assembly					

8. ELECTRICAL PARTS LIST

NOTES:

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

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω 56 × 10¹ 561 RD½PS 561J
 47kΩ 47 × 10³ 473 RD½PS 473J
 0.5Ω 0R5 RN2H 0R5K
 1Ω 010 RS1P 010K

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

5.62kΩ 562 × 100 5621 RN¼SR 5621F

- 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.

- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.

★★ GENERALLY MOVES FASTER THAN ★.

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Miscellaneous Parts List

P.C. BOARD ASSEMBLIES

Mark	Part No.	Symbol & Description
	RWX-637	Main assembly
	RWX-638	DOLBY NR assembly
	RWX-639	Indicator assembly
		Volume assembly
		Sensing assembly
		Power switch assembly
		Transistor assembly (E)
		Transistor assembly (F)

Mark	Part No.	Symbol & Description
	CQMA 102K 50	C317, C318
	CQMA 182K 50	C319
	CQMA 103J 50	C113, C213
	CQMA 153J 50	C117, C217
	CQMA 223J 50	C316
	CQMA 273J 50	C124, C125, C224, C225
	CQMA 393J 50	C126, C226
	CQMA 473J 50	C310
	CQPA 332J 100	C315
	CCPSL 220J 50	C105, C112, C205, C212
	CCPSL 101J 50	C103, C111, C203, C211
	CCDSL 151K 500	C332, C333
	CKPYB 471K 50	C123, C223
	CKDYF 103Z 50	C314
	CKDYF 473Z 50	C323, C324

Main Assembly (RWX-637)

CAPACITORS

Mark	Part No.	Symbol & Description
	CKPYB 102K 50	C101, C201
	CEANL 100M 16	C102, C109, C202, C209
	CEA R47M 50	C119, C219
	CEA 010M 50	C118, C120, C121, C127, C218, C220, C221, C227, C311
	CEA R10M 50	C321, C322
	CEA 4R7M 50	C304
	CEA 100M 16	C104, C106, C114, C115, C122, C204, C206, C214, C215, C222, C312, C313, C330
	CEA 330M 16	C107, C207, C327
	CEA 470M 16	C307, C308
	CEA 470M 10	C116, C216, C309
	CEA 101M 16	C303, C325, C326, C328, C329
	CEA 221M 6.3	C320
	CEA 331M 16	C305
	CEA 331M 25	C302
	CEA 102M 35	C301, C306

RESISTORS

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

Mark	Part No.	Symbol & Description
★	RCP-150 (RCP-195)	VR101, VR201 Semi-fixed (22k-B)
★	RCP-149 (RCP-193)	VR102, VR202 Semi-fixed (10k-B)
★	RCP-155 (RCP-200)	VR301, VR302 Semi-fixed (150k-B)

Mark	Part No.	Symbol & Description
	RM5-104JB	R304
⚠	RS1LF □□□J	R340, R341, R347, R348
⚠	RD½PMF □□□J	R339, R343
	RD¼PM □□□J	Other resistors

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	BA328	IC101
★★	PM9002B	IC102
★★	TC4066BP (HD14066B) (MB84066BM)	IC103
★★	2SC1815 (2SC1740LN) (2SC2634NC)	Q101, Q104—Q108, Q201, Q204—Q208, Q307
★★	2SC1740 (2SC1740LN)	Q311—Q313
★★	2SC2240	Q102, Q103, Q202, Q203
★★	2SA1015 (2SA933LN) (2SA1127NC)	Q303, Q308—R310
⚠	★★ 2SC2060 (2SC2673) (2SC1383NC)	Q304—Q306
⚠	★ 1SR35-100	D301, D302, D304, D308—D310, D318, D319
	★ 1S2473 (US1040)	D303, D305—D307, D311—D317
⚠	WZ-135	ZD301
⚠	BZ-135	ZD302
⚠	BZ-050	ZD303
⚠	WZ-044	ZD304

SWITCHES

Mark	Part No.	Symbol & Description
★★	RKN-080	S101, S201 Mic jack
★★	RSG-139	S301 Push switch assembly
★★	RKB-018	S302 Terminal (LINE)
★★	RKN-082	S303 DC power jack

COILS AND TRANSFORMERS

Mark	Part No.	Symbol & Description
	RTF-123	L101, L201 Coil (3.9mH)
	RTF-084	L102, L202 Trap coil
	RTF-057	L301 Line coil
	RTD-026	T301 Osc coil

OTHERS

Mark	Part No.	Symbol & Description
	RSR-035	RY301 Reed relay
	RKP-624	Connector 10P
	RKP-625	Connector 4P
	RKP-626	Connector 6P
	RKP-628	Connector 3P (A)
	RKP-629	Connector 3P (B)
	RKP-630	Connector 3P (C)

DOLBY NR Assembly (RWX-638)

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA 010M 50	C401, C501
	CEA R10M 50	C410, C413, C510, C513
	CEA R33M 50	C408, C414, C508, C514
	CEA 100M 16	C403, C405, C411, C412, C415, C416, C503, C505, C511, C512, C515
	CEA 470M 16	C417
	CEA 471M 16	C418
	CQMA 332K 50	C404, C504
	CQMA 472J 50	C407, C507
	CQMA 153J 50	C406, C409, C506, C509
	CCPSL 101J 50	C402, C502

RESISTORS

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

Mark	Part No.	Symbol & Description
★	RCP-149 (RCP-193)	VR401 Semi-fixed (10k-B)
⚠	RD½PMF471J RD¼PM □□□J	R417 Other resistors

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	HA11226	IC401
★★	TC4066BP (HD14066B) (MB84066BM)	IC402
★★	2SC1815 (2SC1740LN) (2SC2634NC)	Q401, Q501
★	1S2473 (US1040)	D401, D501
★	1M60	D402, D502

OTHERS

Mark	Part No.	Symbol & Description
	RTF-138	L401, L501 MPX filter
	RKP-606	Connector socket (14P)

Indicator Assembly (RWX-639)

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA 100M 16	C601-C604
	CEA 470M 16	C605

RESISTORS

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

116, Mark	Part No.	Symbol & Description
⚠	RD¼PM □□□J	R601-R606, R609
	RD¼PMF680J	R607, R608

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	BA6124	IC601, IC602
★	LN101111P	LED601, LED602
★	LN317GP	LED603, LED605
★	LN217RP	LED604

SWITCHES

Mark	Part No.	Symbol & Description
★★	RSG-143	S601-S606 Push switch

Volume Assembly

Mark	Part No.	Symbol & Description
★	RCV-104	VR801 Volume (20k-A)

Sensing Assembly

RESISTORS

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

Mark	Part No.	Symbol & Description
	RD¼PM □□□J	R701, R702

SEMICONDUCTOR

Mark	Part No.	Symbol & Description
★★	GP-411B	RTR701 Photo interrupter

Power Switch Assembly

CAPACITOR

Mark	Part No.	Symbol & Description
	CKDYF 473Z 50	C901 Capacitor

SWITCH

Mark	Part No.	Symbol & Description
⚠ ★★	RSA-062	S901 Switch

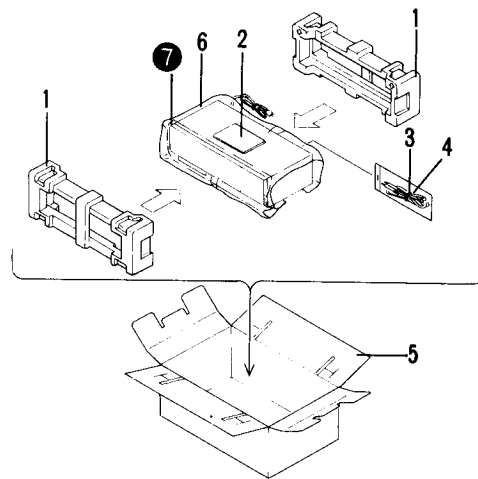
Transistor Assembly (E)

Mark	Part No.	Symbol & Description
⚠ ★★	2SD1276	Q1001 Transistor

Transistor Assembly (F)

Mark	Part No.	Symbol & Description
⚠ ★★	2SD1276	Q1101 Transistor

9. PACKING

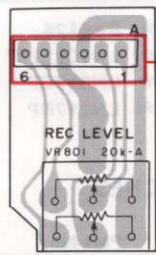
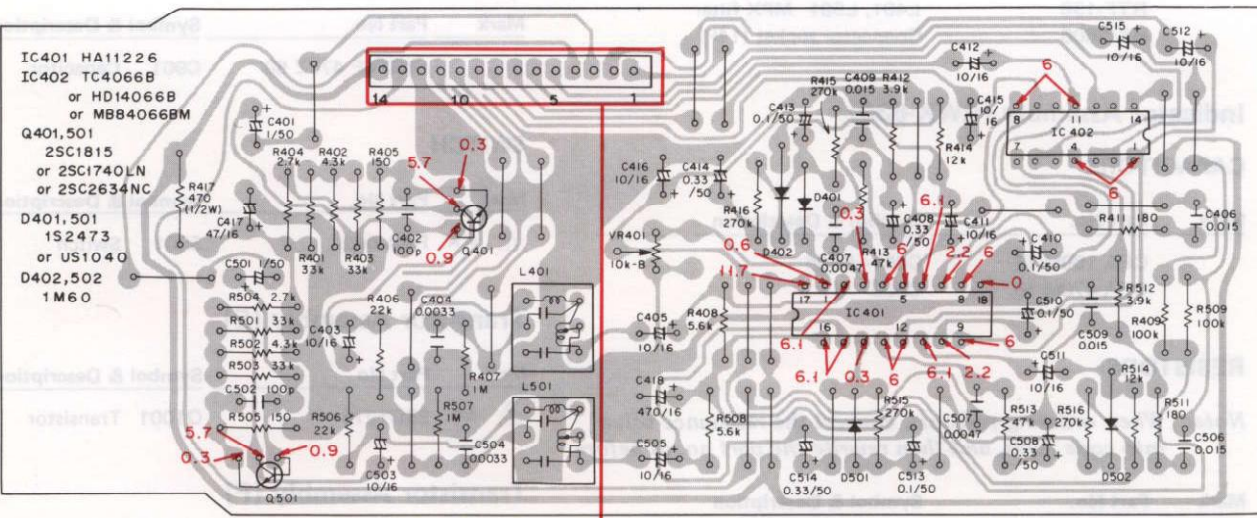


Parts List

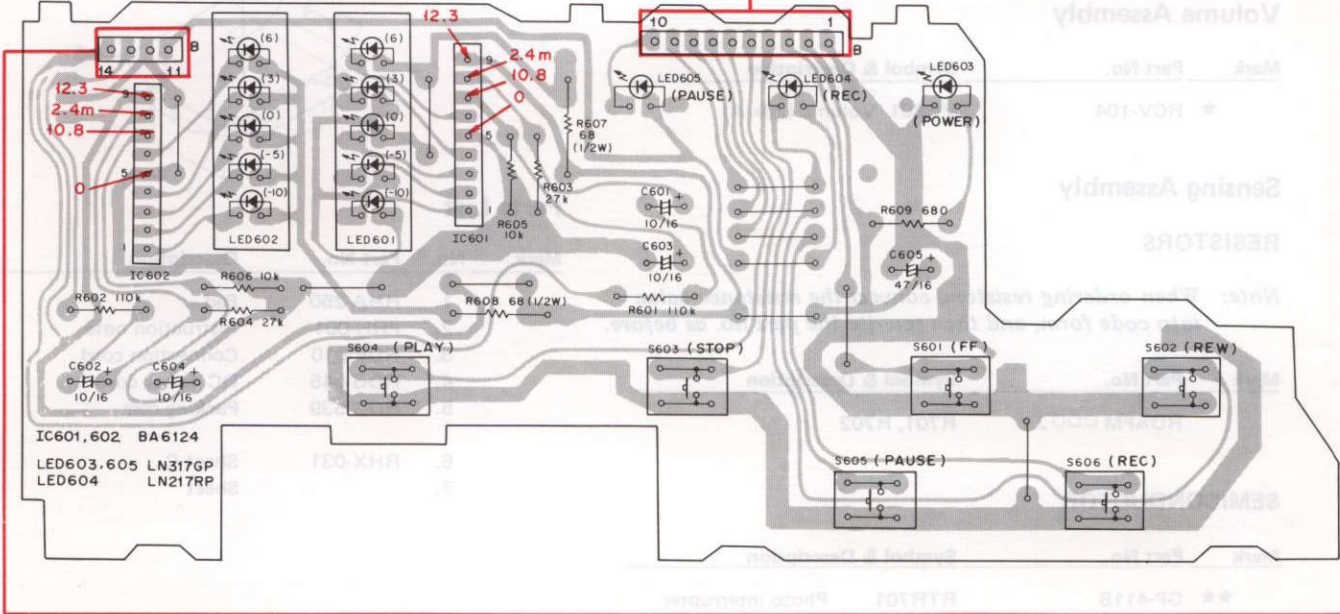
Mark	No.	Part No.	Description
	1.	RHA-250	Pad
	2.	PRH-001	Instruction note
	3.	RDE-010	Connection cord
	4.	RDG-045	DC power cord
	5.	RHG-539	Packing case
	6.	RHX-031	Sheet C
	7.		Sheet

10. P.C. BOARDS CONNECTION DIAGRAM

DOLBY Ass'y RWX-638



INDICATOR Ass'y RWX-639



A

B

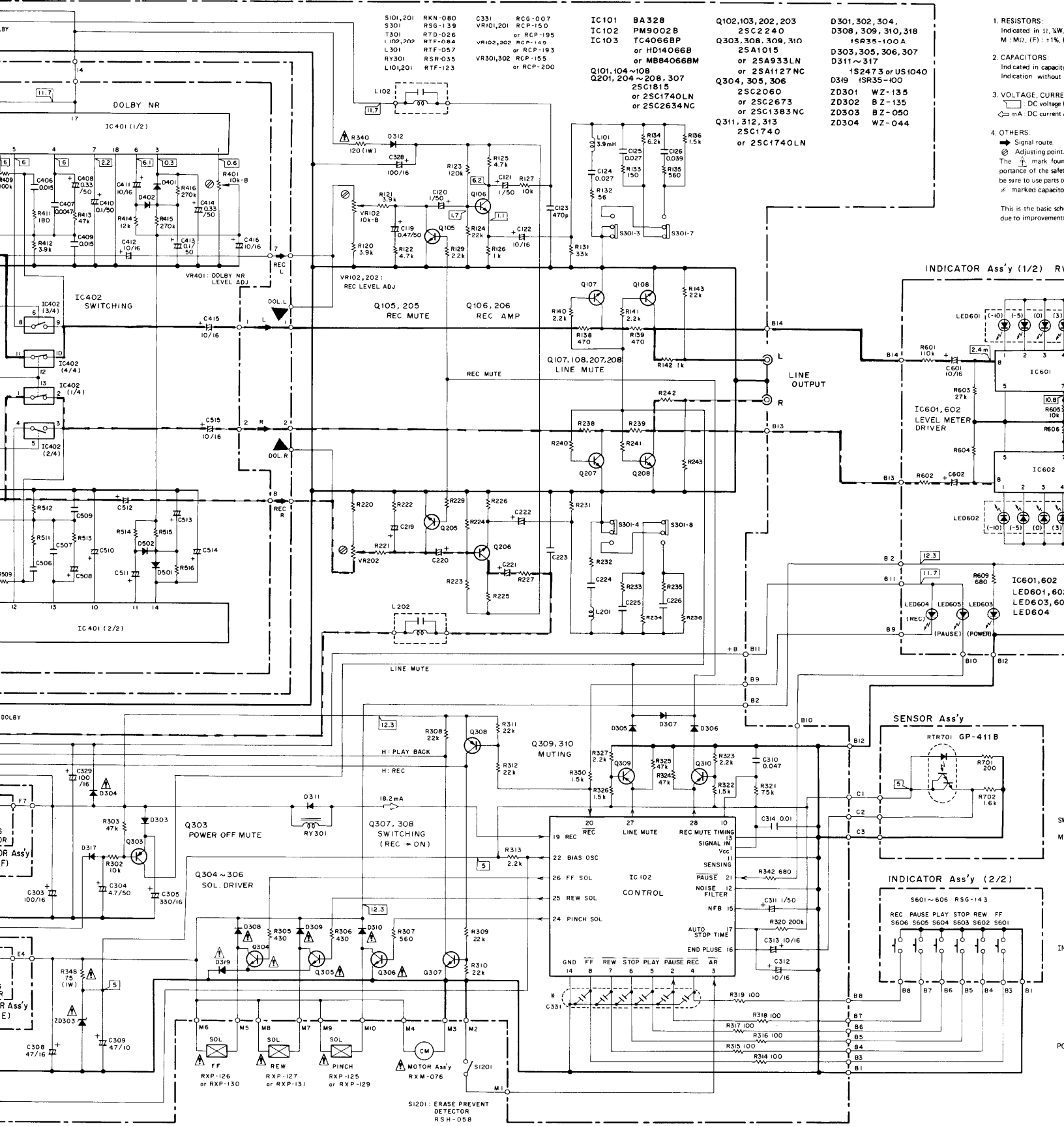
C

D

D301,302,303
D308,309,310
1SR35-10
D303,305,317
D311 ~ 317
1S2473 or
ZD301 WZ
ZD302 BZ
ZD303 BZ
ZD304 WZ
D319 1SR

Q101,104 ~
Q201,204 ~
25C1815
or 25C174
or 25C26
Q102,103,2
25C2240

NOTE:
The indicated semiconductors are only. Other alternative semiconductors are listed in the parts list.



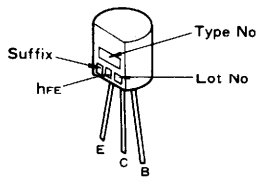
External Appearance of Transistors and ICs

ated semiconductors are representative ones
 or alternative semiconductors may be used and
 n the parts list.

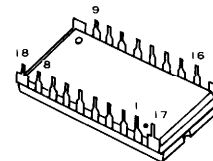
4,
 10,318
 20A
 06,307
 US1040
 100
 135
 135
 050
 044

- RESISTORS:**
 Indicated in Ω , $\%W$, $\%W$; $\pm 5\%$ tolerance unless otherwise noted k: k Ω , M: M Ω , (F): $\pm 1\%$, (G): $\pm 2\%$, (K): $\pm 10\%$ (M): $\pm 20\%$ tolerance
 - CAPACITORS:**
 Indicated in capacity (μ F)/voltage (V) unless otherwise noted p: pF
 Indication without voltage is 50V except electrolytic capacitor.
 - VOLTAGE, CURRENT:**
 DC voltage (V) at no input signal
 DC current at no input signal
 - OTHERS:**
 Signal route.
 Adjusting point.
 The $\frac{1}{2}$ 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.
 * marked capacitors and resistors have parts numbers.
- This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

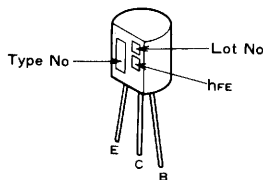
2SA933LN
 2SC1740LN



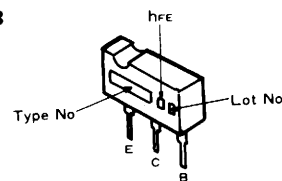
HA11226



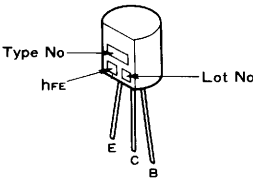
2SA1015
 2SC1815
 2SC2240



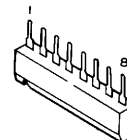
2SC2673



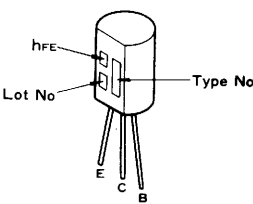
2SA1127NC
 2SC2634NC
 2SC1740



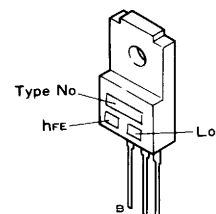
BA328



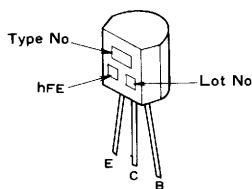
2SC1383NC



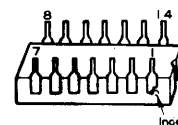
2SD1276



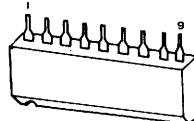
2SC2060



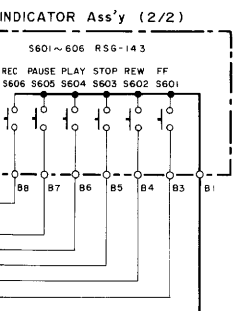
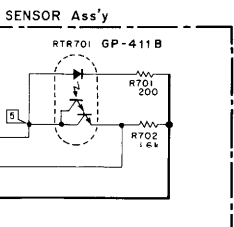
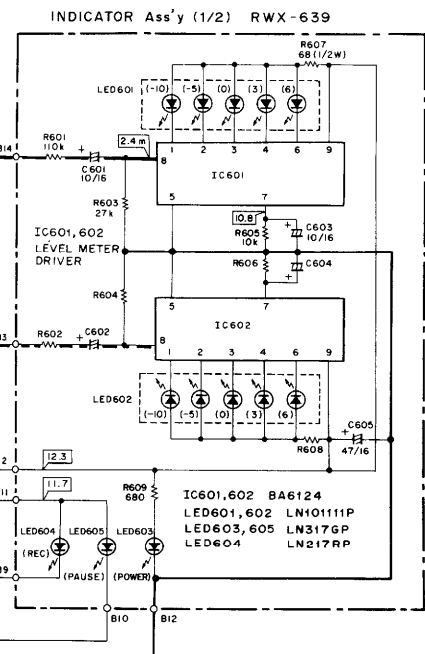
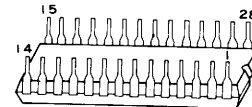
TC4066BP
 HD14066B
 MB84066BM



BA6124



PM9002B



- SWITCHES:**
- MAIN Ass'y**
- S101,201: MIC/LINE SELECTOR
 MIC — LINE
 - S301-1~4: TAPE SELECTOR
 HIGH — NORM
 - S301-5~8: TAPE SELECTOR
 METAL — CrO2
 - S301-9,10: DOLBY
 ON — OFF
- INDICATOR Ass'y**
- S601: FF ON — OFF
 - S602: REW ON — OFF
 - S603: STOP ON — OFF
 - S604: PLAY ON — OFF
 - S605: PAUSE ON — OFF
 - S606: REC ON — OFF
- POWER SWITCH Ass'y**
- S901: POWER ON — OFF
- S1201: ERASE PREVENT DETECTOR
HOLE — NOHOLE

The underlined indicates the switch position.

- Measurement point
- Playback signal route
- Recording signal route

12. ADJUSTMENTS

12.1 MECHANICAL ADJUSTMENTS

Prior to starting mechanical adjustments, clean the capstan, pinch roller, idler and belt with an alcohol moistened swab.

12.1.1 Pinch Roller Pressure Adjustment

1. Put the tape deck into playback mode without loading a cassette half.
2. Gently push against the pinch roller arm with a tension gauge (service part no. GGK-047) and separate the pinch roller slightly from the capstan. (See Fig. 12-1).
3. Then ease the pinch roller back onto the capstan, and read the value when the pinch roller starts to rotate. If the reading fails to lie between 200g and 350g, replace the pinch pressure spring (part no. RBH-890).

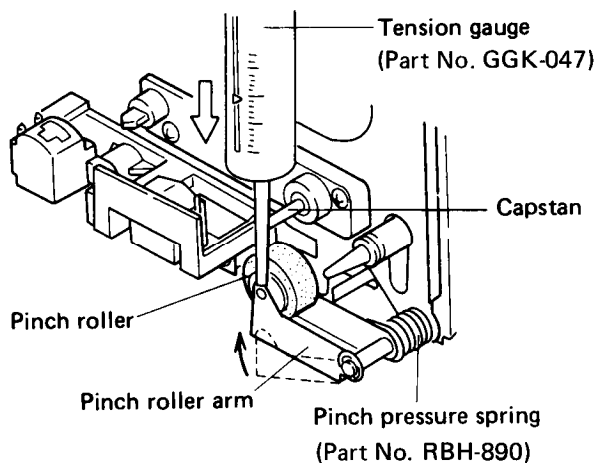


Fig. 12-1 Pinch roller pressure adjustment

12.1.2 Reel Base Torque Adjustment

Measure the reel base torque during playback, fast forward and rewind modes with a cassette type torque meter (service part no. GGK-056). The measured values should lie within the ranges listed below in Table 1. If the measured values lie outside these ranges, replace the supply reel assembly (part no. RXB-714), take-up reel assembly (part no. RXB-715) or the drive arm full assembly (part no. RXB-376).

Table 1

	TU reel base ass'y	Supply reel base ass'y
Playback mode	36 - 60g.cm	* 2 - 5g.cm
Fast forward mode	85 - 125g.cm	* 2 - 5g.cm
Rewind mode	* 2 - 5g.cm	85 - 125g.cm

NOTE:

* denotes back tension torque.

12.1.3 Tape Speed Adjustment

1. Connect a frequency counter to the LINE OUTPUT terminals.
2. Playback the 3kHz portion of the STD-301 test tape. At the beginning of the tape, the frequency should lie between 2995Hz~3010 Hz, and may be adjusted by turning the variable resistor located in the capstan motor adjustment hole shown in Fig. 12-2. Turning clockwise increases tape speed, while turning counterclockwise decreases the speed.

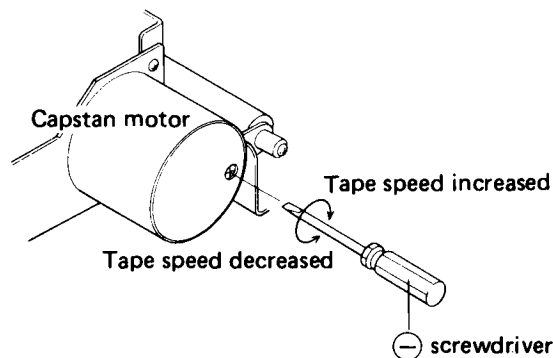


Fig. 12-2 Tape speed adjustment

12.1.4 FF Solenoid Adjustment

1. Put the deck into fast forward mode.
2. Loosen screw ① and adjust the mounting position of the FF solenoid (plunger solenoid F) so that the square hole in the full reel base assembly is flush against the boss of the drive arm full assembly. (See Fig. 12-3)

12.1.5 REW Solenoid Adjustment

1. Put the deck into rewind mode.
2. Loosen screw ② and adjust the mounting position of the REW solenoid (plunger solenoid R) so that the square hole in the full reel base assembly is flush against the boss of the drive arm full assembly. (See Fig. 12-3).

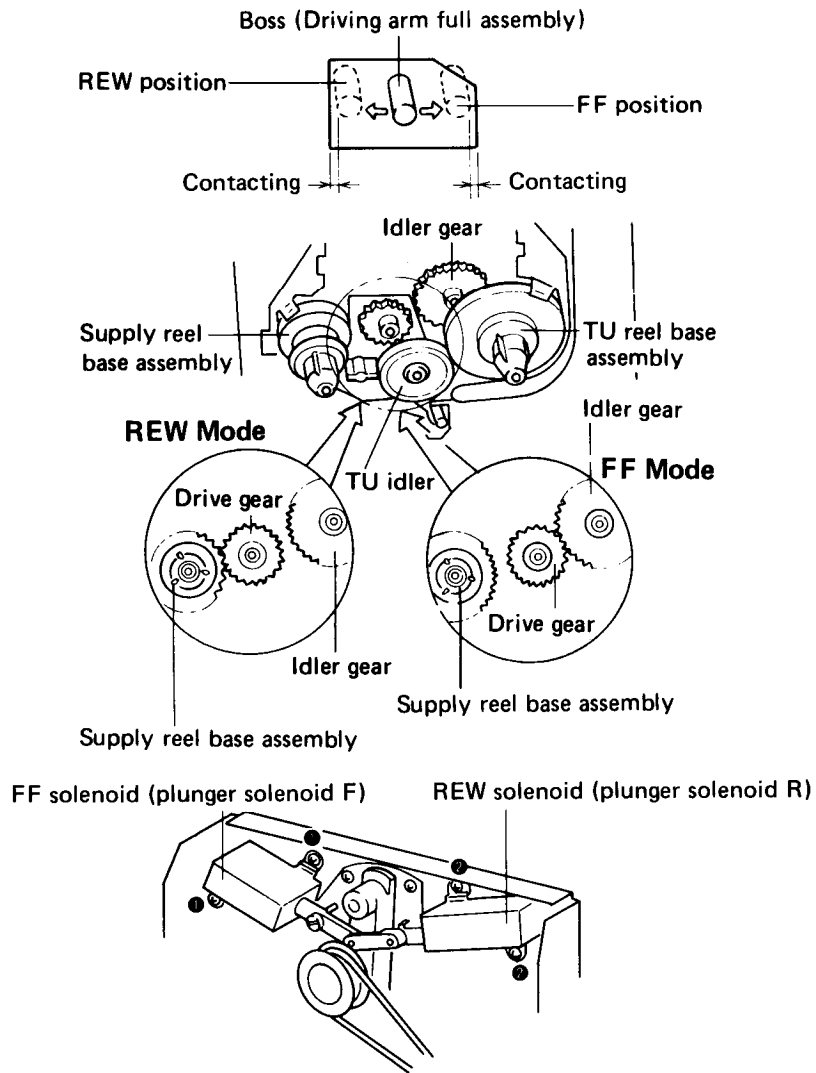


Fig. 12-3 FF and REW solenoid adjustment

12.2 ELECTRICAL ADJUSTMENT

- Check the following points before starting any electrical adjustments.

1. All mechanical adjustments must be completed.
2. Clean the heads and demagnetize the erase head.
3. Level measurements are based on $0\text{dBv} = 1\text{V}$. Connect a $50\text{k}\Omega$ dummy resistor ($47\text{k}\sim 52\text{k}\Omega$) across the OUTPUT terminals.
4. Use the specified test tapes for each adjustment. Although test tapes have both A and B sides, use the side with the lable (side A).

STD-341A : Playback adjustments

STD-608A : NORMAL blank tape

STD-603 : CrO_2 blank tape

STD-604 : METAL blank tape

5. Prepare the following measuring equipment. AC millivoltmeter, audio oscillator, attenuator, and oscilloscope.
6. Unless otherwise specified, always adjust for both left and right channels.
7. Unless otherwise specified, adjust with the DOLBY NR switch in the OFF position.
8. Let the deck warm up for a few minutes before starting adjustments. Also leave the deck in playback and recording mode respectively for 3 to 5 minutes before starting playback and recording frequency response adjustments.

9. Proceed according to the specified adjustment sequence. Changing the sequence can prevent proper adjustments from being carried out, and subsequently result in loss of performance.

Adjustment sequence

1. DOLBY NR level.
2. Head azimuth
3. Playback level
4. Playback equalization check
5. Level meter check
6. Record/playback frequency response
7. Recording level

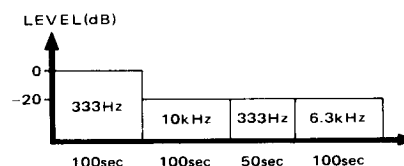


Fig. 12-4 STD-341A test tape

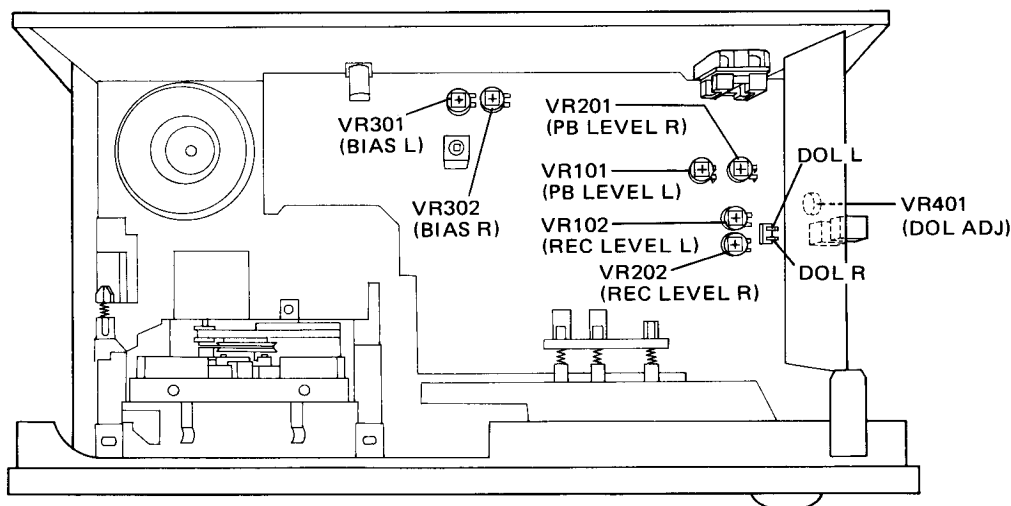


Fig. 12-5 Adjustment points

12.2.1 DOLBY NR Level Adjustment

Settings

AC mV meter Connect to DOL L (L ch)
 and DOL R (R ch)
 Input signal 2kHz, -10dBv (316mV) to
 LINE INPUT
 Tape selector NORM
 Mode Record

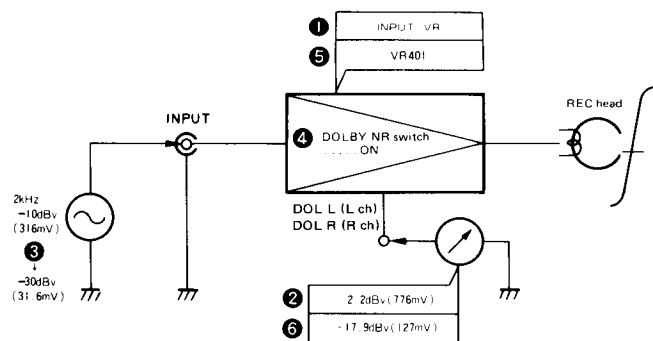


Fig. 12-6 DOLBY NR level adjustment

Procedure

1. Adjust the INPUT level control so that the AC mV meter reads -2.2dBv (776mV).
2. Drop the input signal level to -30dBv by attenuator, and switch the Dolby NR switch ON.
3. Adjust VR401 so that the meter reads -17.9 dBv (127mV).

12.2.2 Head Azimuth Adjustment

Settings

AC mV meter Connect to OUTPUT
 terminals
 Test tape STD-341A
 (10kHz, -20dB)
 Tape selector NORM
 Mode Playback
 VR101 and VR201 .. Turn clockwise to maxi-
 mum position

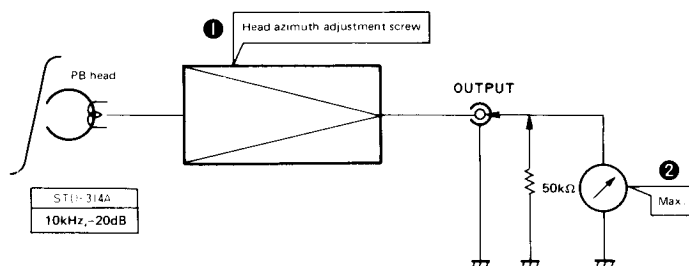


Fig. 12-7 Head azimuth adjustment

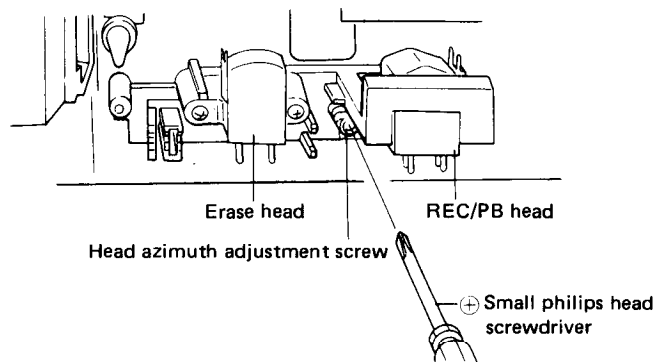


Fig. 12-8 Head azimuth adjustment

Procedure

Adjust the azimuth adjustment screw for maximum AC mV meter reading. (Lock the screws with screw lock after completing the adjustment).

12.2.3 Playback Level Adjustment

Since this adjustment determines the DOLBY NR level during playback, it should be performed precisely.

Settings

AC mV meter Connect to DOL L (Lch)
 and DOL R (R ch)
 Test tape STD-341A (333Hz, 0dB)
 Tape selector NORM
 Mode Playback

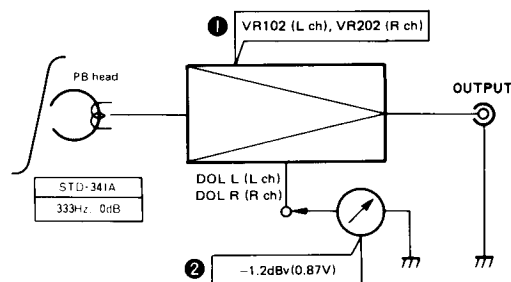


Fig. 12-9 Playback level adjustment

Procedure

Adjust VR101 (L ch) and VR201 (R ch) so that the meter reads -1.2dBv (0.87V).

12.2.4 Playback Equalization Check

Settings

- AC mV meter Connect to OUTPUT terminals
- Test tape STD-341A (333Hz, -20dB) (6.4kHz, -20dB)
- Tape selector NORM
- Mode Playback

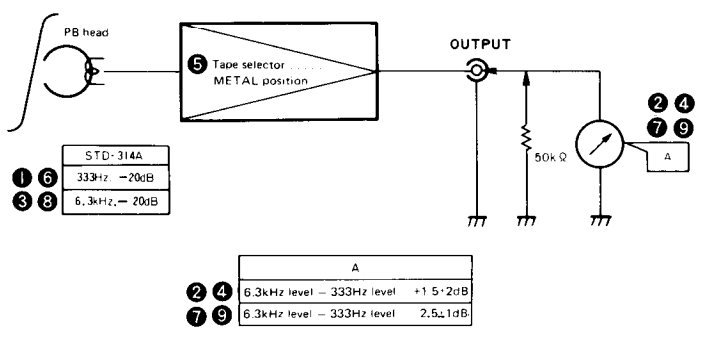


Fig. 12-10 Playback equalization check

Procedure

1. Play the 333Hz, -20dB portion and record the AC mV meter reading.
2. Then play the 6.3kHz, -20dB portion, and check that the meter reading lies within +1.5±2dB of the reading obtained in step 1 above.
3. Switch the tape selector to METAL, play the 333Hz, -20dB portion again, and record the meter reading.
4. Then play the 6.3kHz, -20dB portion again, and check that the meter reading lies within -2.5±1dB of the reading obtained in step 3.

12.2.5 Level Meter Check

Settings

- AC mV meter Connect to DOL L (L ch) and DOL R (R ch)
- Input signal 333Hz, -10dBv (316mV) to INPUT terminals
- Mode Record

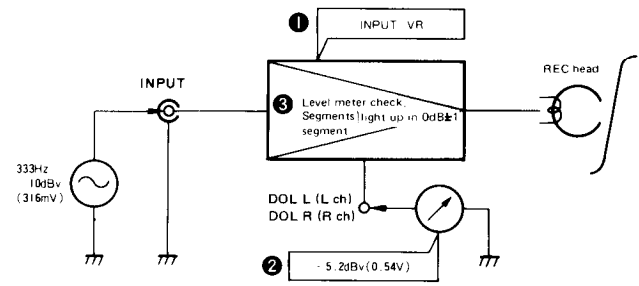


Fig. 12-11 Level meter check

Procedure

Adjust the INPUT level control so that the meter reads -5.2dBv (0.54V), and check that the level meter segments light up in a 0dB±1 segment range.

12.2.6 Record/Playback Frequency Response Adjustment

Settings

- AC mV meter Connect to OUTPUT terminals
- Input signal 333Hz, -30dBv (31.6mV) to LINE INPUT terminals
- Test tape STD-608A (STD-603, STD-604)
- Tape selector NORM (CrO₂, METAL)
- Mode Record

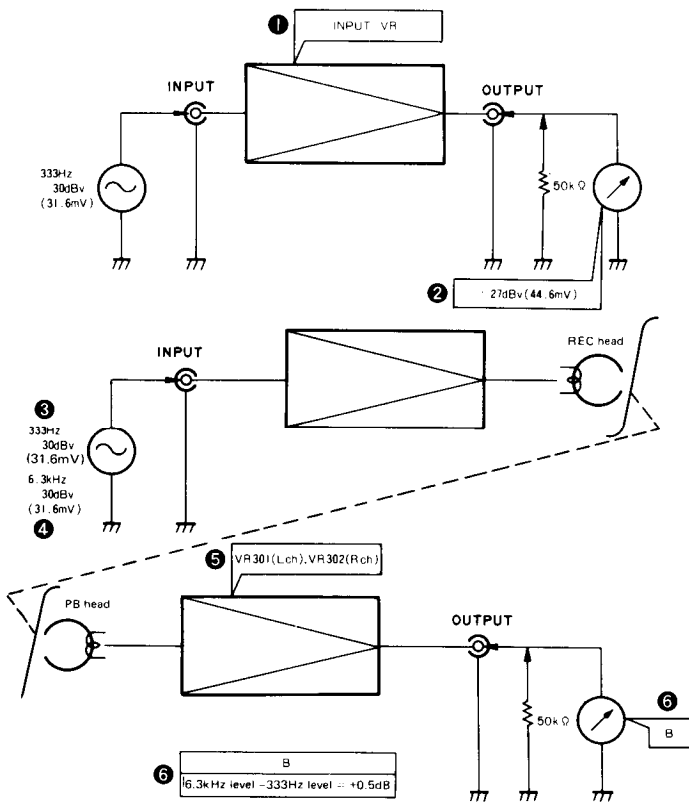


Fig. 12-12 Record/playback frequency response adjustment

Procedure

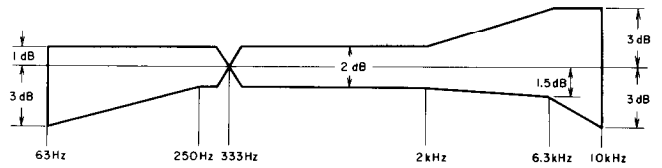
1. Adjust the INPUT level control so that the meter reads 27dBv (44.6mV).
2. Record the 333Hz, -30dBv and 6.3kHz, -30dBv signals, and adjust VR301 (L ch) and VR302 (R ch) so that the difference in the playback output signal level with the 333Hz level as the reference level is +0.5dB.
3. Change the tape selector and DOLBY NR switch positions (See Fig. 12-13, 14), and check that the frequency response is satisfactory.

Playback Frequency Response

- Test tape STD-341A
- Tape selector NORM
- Dolby NR switch OFF

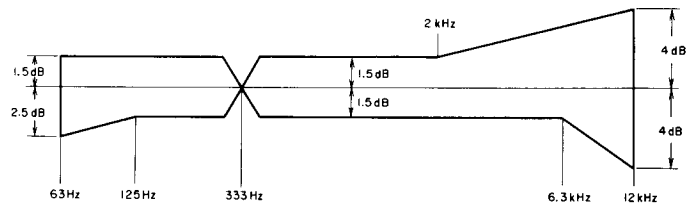
NOTE:

Due to "edge effect", compensate the right channel by -0.5dB at 125Hz and -1dB at 63Hz.

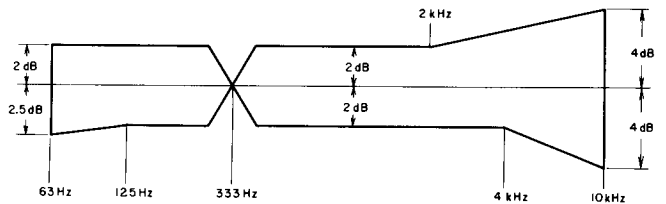


Overall Frequency Response

- Test tape STD-608A
- Tape selector NORM
- DOLBY NR switch OFF



- Test tape STD-608A
- Tape selector NORM
- DOLBY NR switch ON



- Test tape STD-603
- Tape selector CrO₂
- DOLBY NR switch OFF

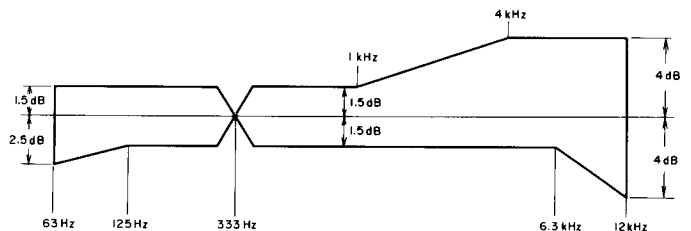


Fig. 12-13 Frequency response

12.2.4 Playback Equalization Check

Settings

- AC mV meter Connect to OUTPUT terminals
- Test tape STD-341A (333Hz, -20dB) (6.4kHz, -20dB)
- Tape selector NORM
- Mode Playback

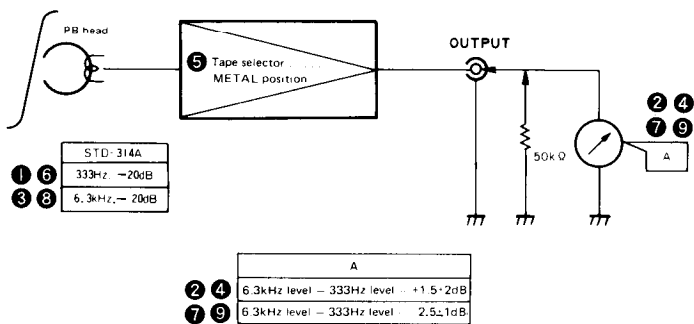


Fig. 12-10 Playback equalization check

Procedure

1. Play the 333Hz, -20dB portion and record the AC mV meter reading.
2. Then play the 6.3kHz, -20dB portion, and check that the meter reading lies within $\pm 1.5 \pm 2\text{dB}$ of the reading obtained in step 1 above.
3. Switch the tape selector to METAL, play the 333Hz, -20dB portion again, and record the meter reading.
4. Then play the 6.3kHz, -20dB portion again, and check that the meter reading lies within $-2.5 \pm 1\text{dB}$ of the reading obtained in step 3.

12.2.5 Level Meter Check

Settings

- AC mV meter Connect to DOL L (L ch) and DOL R (R ch)
- Input signal 333Hz, -10dBv (316mV) to INPUT terminals
- Mode Record

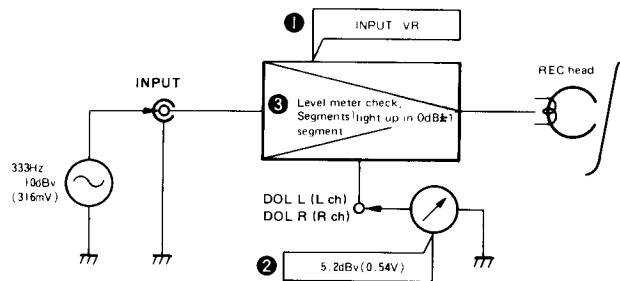


Fig. 12-11 Level meter check

Procedure

Adjust the INPUT level control so that the meter reads -5.2dBv (0.54V), and check that the level meter segments light up in a $0\text{dB} \pm 1$ segment range.