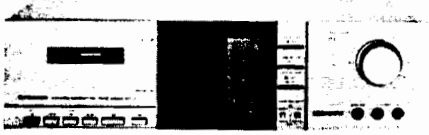
PIONEER

Service Manual

CIRCUIT & MECHANISM DESCRIPTIONS
REPAIR & ADJUSTMENTS



ORDER NO.
ARP-061-0

STEREO CASSETTE TAPE DECK

CT-3

Mechanik entspricht der Mechanik vom CT-4

MODEL CT-3 COMES IN SIX VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC120V only	U.S.A. model
KC	AC120V only	Canada model
D	AC120V, 220V and 240V (switchable)	General export model
HE	AC220V and 240V (switchable)	Europe model
HB	AC220V and 240V (switchable)	United Kingdom model
HP	AC220V and 240V (switchable)	Australia model

- **This service manual is applicable to the KU type. When repairing the KC and D types, please see page 23.**
- **When repairing the HE, HB and HP types, please see the additional service manual <ARP-060>.**
- **Ce manuel d'instruction se refère au mode de réglage, en français.**
- **Este manual de servicio trata del método de ajuste escrit en español.**

CONTENTS

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PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia

1. SPECIFICATIONS

Tape Deck Section

System	Compact cassette, 2-channel stereo
Motor	DC servo motor x 1
Heads	"Hard Permalloy" Recording/Playback head x 1 "Ferrite" Erasing head x 1
Fast Winding Time	Approximately 110 seconds (C-60 tape)
Wow and Flutter	No more than 0.05% (WRMS)
Frequency Response	
−20 dB recording:	
Normal, LH tapes	20 to 14,000 Hz (35 to 12,000 ±3 dB)
Chromium dioxide tape	20 to 16,000 Hz (35 to 15,000 Hz ±3 dB)
Metal tape	20 to 17,000 Hz (35 to 16,000 Hz ±3 dB)
0 dB recording:	
Chromium dioxide tape	35 to 8,000 Hz ±3 dB
Metal tape	35 to 13,000 Hz
Signal-to-Noise Ratio	
Dolby NR OFF	More than 58 dB
Dolby NR ON	More than 68 dB (at 5 kHz)
Harmonic Distortion	No more than 1.2% (0 dB)
Input (Sensitivity/Maximum allowable input/Impedance)	
Mic (L, R)	0.3 mV/57 mV/10 kΩ, 6 mm diam. jack
(Reference MIC impedance; 250 Ω to 10 kΩ)	
LINE (INPUT)	50 mV/25 V/75 kΩ, Pin jack
Output (Reference level/Load impedance)	
LINE (OUTPUT)	450 mV/50 kΩ, pin jack
HEADPHONES	65 mV/8 Ω, 6 mm

Subjunctions

Dolby NR system B type
Stand-by mechanism with unattended recording
REC muting function
Mechanical auto stop
3 position tape selector (NORM/CrO_2/METAL)
One Touch recording system
REC function with LED indicator lamp
Soft Lock mechanism
2 color digital level meter (6 seg LED Peak Meter)
MS (Music Search) system
MPX filter switch

Miscellaneous

Power Requirements	
KU (KC) type	AC120V, 60 Hz
Power Consumption	16 watts
Dimension	420 (W) x 120 (H) x 245 (D) mm 16-9/16 (W) x 4-3/4 (H) x 9-5/8 (D) in.
Weight (without package)	4.4 kg (9 lb 11 oz)

Furnished Parts

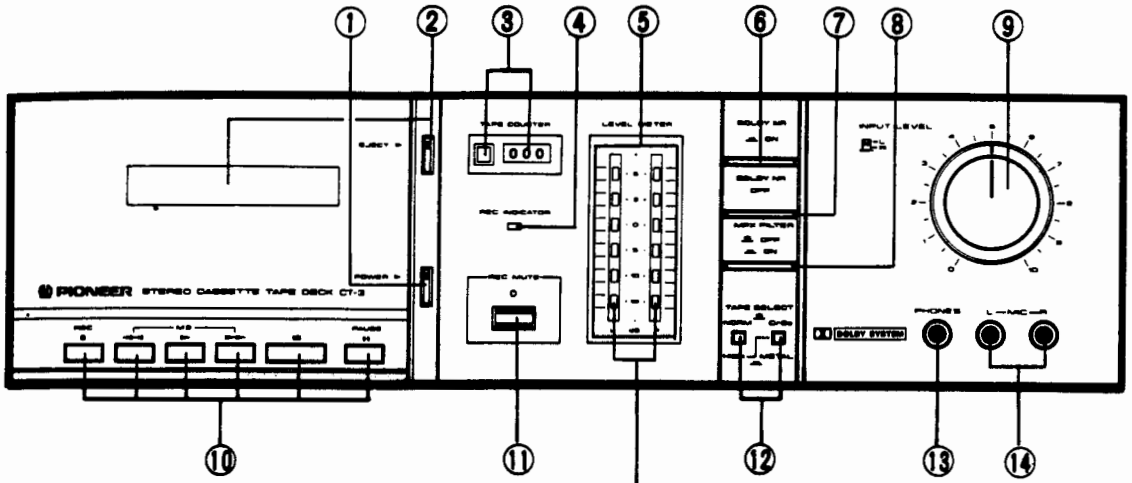
Connection cord with pin plugs	2
Operating instructions	1

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

NOTES:

1. Reference Tapes: Normal & LH: DIN 45513/BLATT6 or equiv.
   CrO_2 DIN 45513/BLATT7 (CrO_2) or equiv.
2. Reference Recording Level: Meter 0 dB indicating level (160 nwb/m magnetic level = Phillips cassette reference level)
3. Reference Signal: 333 Hz
4. Wow & Flutter: • JIS [3 kHz, with accustic compensation (weighted) rms value]
5. Frequency Response: • Measured at −20 dB level, DOLBY NR OFF, level deviation is ±6 dB without indication.
6. Signal to Noise Ratio: • Measured at the third harmonic distortion 3% level, weighted.
7. Sensitivity: Input level (mV) required or reference recording level with input (REC) controls set to maximum.
8. Maximum Allowable Input: While decreasing settings of input (REC) level controls and increasing level at input jacks, this is the maximum input level (mV) at the point where recording amplifier output waveform becomes clipped.
9. Reference Output Level: Playback output level when meter indicates 0 dB.

2. FRONT PANEL FACILITIES



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

① POWER switch

Depress this switch to turn on or turn off power. When the switch is depressed power is supplied and POWER indicator lights. When the switch is released power is turned off and POWER indicator is extinguished.

② EJECT button and cassette holder

The cassette tape is housed in this holder.

To open the holder: Depress the EJECT button.
To close the holder: Push the holder by hand.

③ TAPE COUNTER and reset button

The figures on the tape counter increase of decrease in line with the forward or rewind movement of the tape. If the counter is set to "000" at the start of recording, it will be easy to find the recording start position when you want to listen to the program again at a later date. (Rewind the tape to the "000" position on the counter.)

④ REC indicator

This lights when the REC switch is depressed.

⑤ Recording/playback level meter

This indicates the strength of the sound being played back or the sound about to be recorded.

⑥ DOLBY* NR ON switch

Depress this to the ON position when recording or playing back a tape with the Dolby noise reduction system.

⑦ DOLBY* NR OFF switch

Depress this to the OFF position.

⑧ MPX FILTER switch

Depress this when recording an FM program with the Dolby noise reduction system.

⑨ INPUT recording level controls

Rotate these controls while observing the level meter when adjusting the strength of the sound that is to be recorded. The strength is increased when the controls are rotated clockwise from the "0" minimum position.
Front control: For left channel adjustments
Back control: For right channel adjustments
The controls normally rotate together. To rotate only one control, hold the other so that it will not move.

⑩ Function switches

REC switch:
Depress to start the recording operations.

REWIND switch (◂◂):
Depress to rewind the tape.

PLAY switch (▸):
Depress to start tape play.
When using the Music Search (MS) function, operate the PLAY switch (▸) and REWIND switch (◂◂) or the FAST FORWARD switch (▸▸) in combination.

FAST FORWARD switch (▸▸):
Depress to fast forward the tape.

PAUSE switch:
Depress to temporarily suspend recording or to adjust the recording level.
Release the PAUSE switch to resume recording.
NOTE: The tape will not stop even if this switch is depressed when you are performing a rewind or fast forward operation.

STOP switch (■):
Depress to stop the playback, recording, fast forward and rewind operations.

⑪ REC MUTE switch

Depress to create unrecorded blanks between tape programs. When the switch is pushed during recording, no sound is recorded for as long as the switch is in the depressed position (thereby creating an unrecorded blank).

⑫ TAPE SELECTOR switches

Use these switches in line with the tapes being used.

For normal tapes:
- Set the left-side switch to the NORM ⎍ (out) position.
- The right-side switch position is not used.

For chrome tapes:
- Depress the left-side switch to the HIGH ⎍ (in) position.
- Set the right-side switch to the CrO_2 ⎍ (out) position.

For metal tapes:
- Depress the left-side switch to the HIGH ⎍ (in) position.
- Depress the right-side switch to the METAL ⎍ (in) position.

⑬ PHONES jack

Insert the plug of the stereo headphones into this jack.

⑭ MIC jacks

Insert the microphone plugs (L and R) into these jacks when recording with microphones.

3. DISASSEMBLY

NOTE:
Do not apply unnecessary force to hooks since this may result in damage.

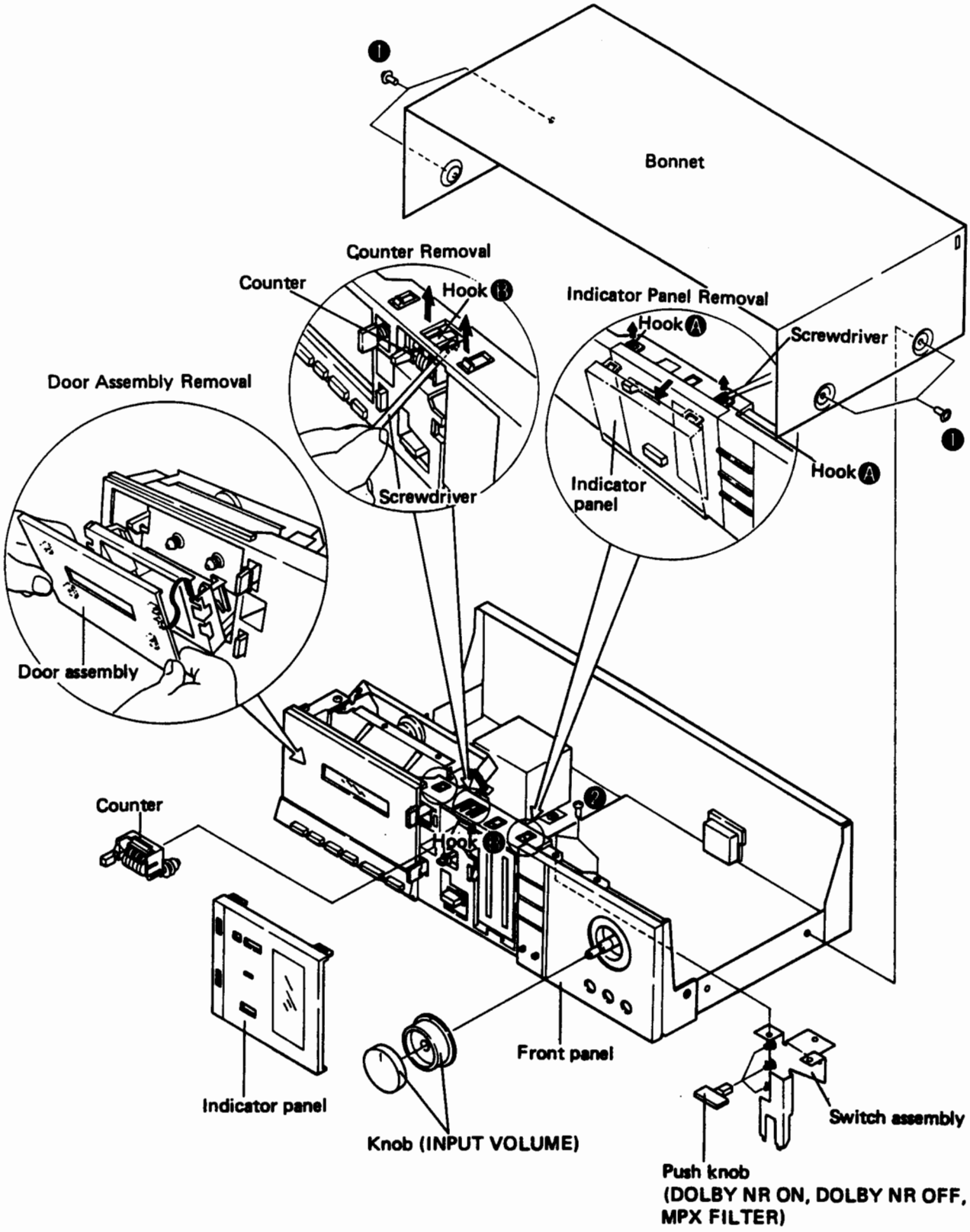


Fig. 3-1 Disassembly 1

Bonnet Removal

Remove the four screws ❶ on each side of the bonnet.

Indicator Panel Removal

1. Lift the hooks Ⓐ retaining the indicator panel using screwdriver.
2. Pull the indicator panel toward you and remove it.

Door Assembly Removal

1. Depress the EJECT button and open the cassette holder.
2. Pull up the door assembly and remove it.

Counter Removal

1. Gently raise the hook Ⓑ of the front panel with the small screwdriver.
2. Pull the counter toward you and remove it.

Switch Assembly Removal

Remove the two screws ❷.

Mechanism Assembly Removal

1. Remove the counter belt and the REC joint.
2. Remove the six screws ❸.

Meter Assembly Removal

Remove the hooks Ⓒ of the front panel and remove the meter assembly.

Indicator Assembly Removal

Remove the hooks Ⓓ of the front panel and remove the indicator assembly.

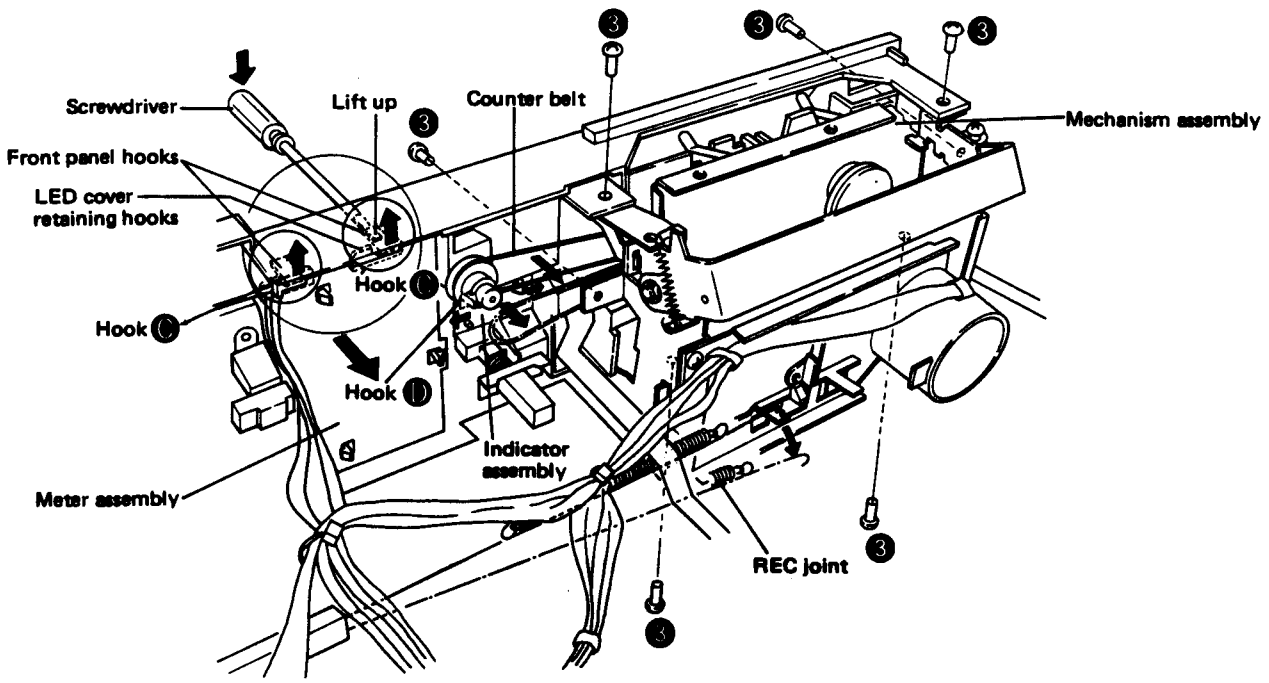


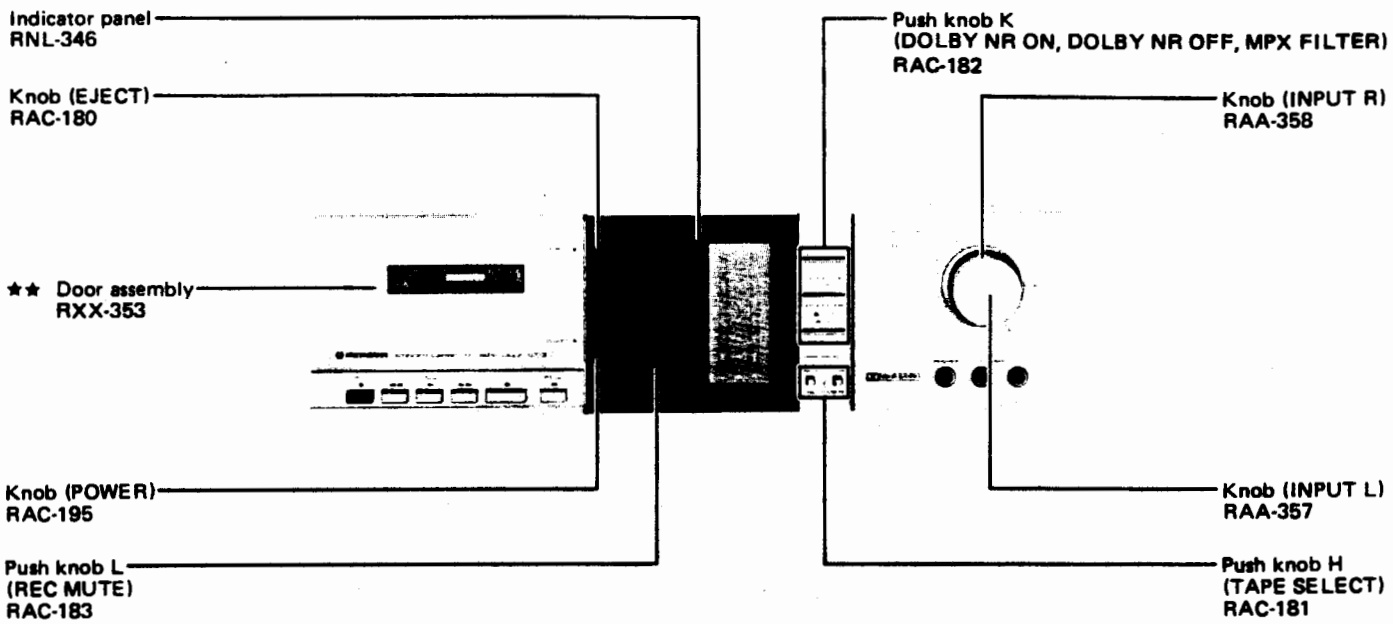
Fig. 3-2 Disassembly 2

4. PARTS LOCATION

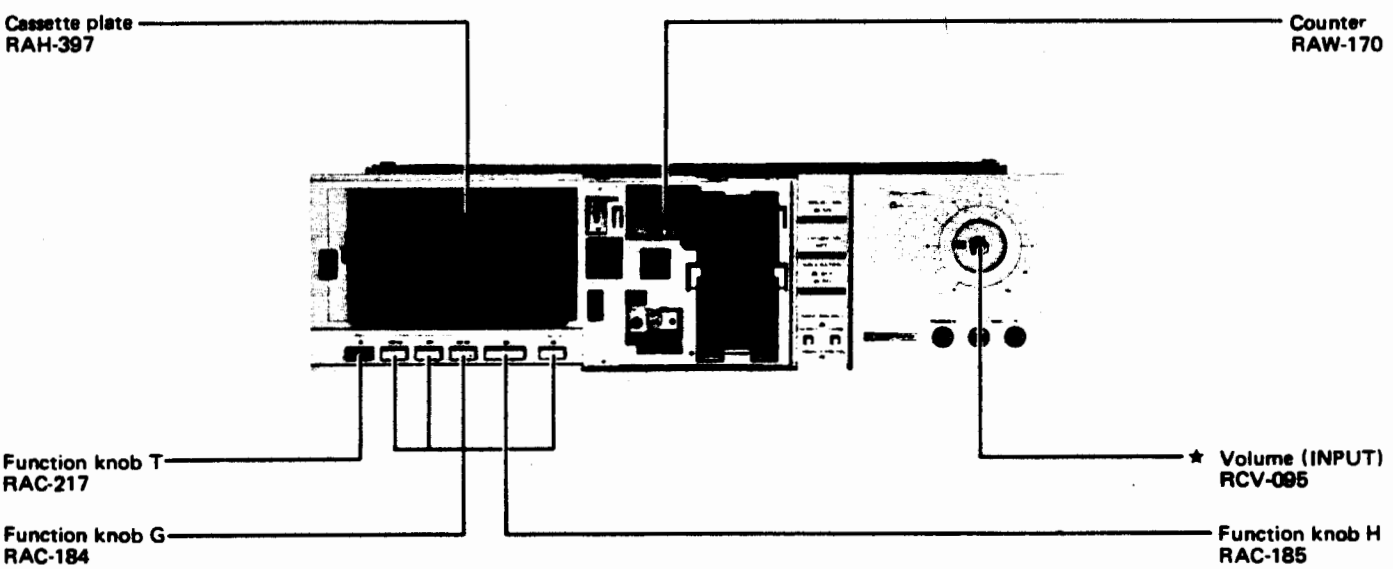
NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ 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.

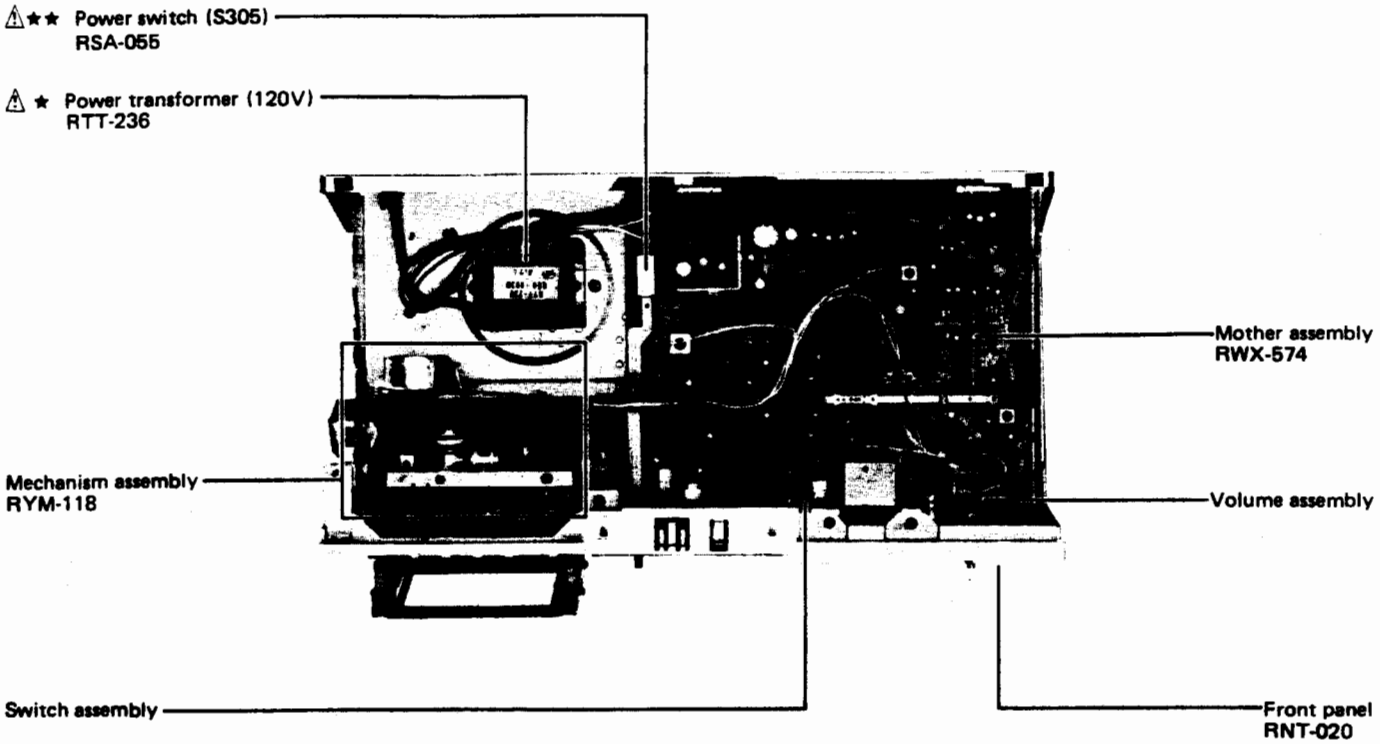
Front Panel View



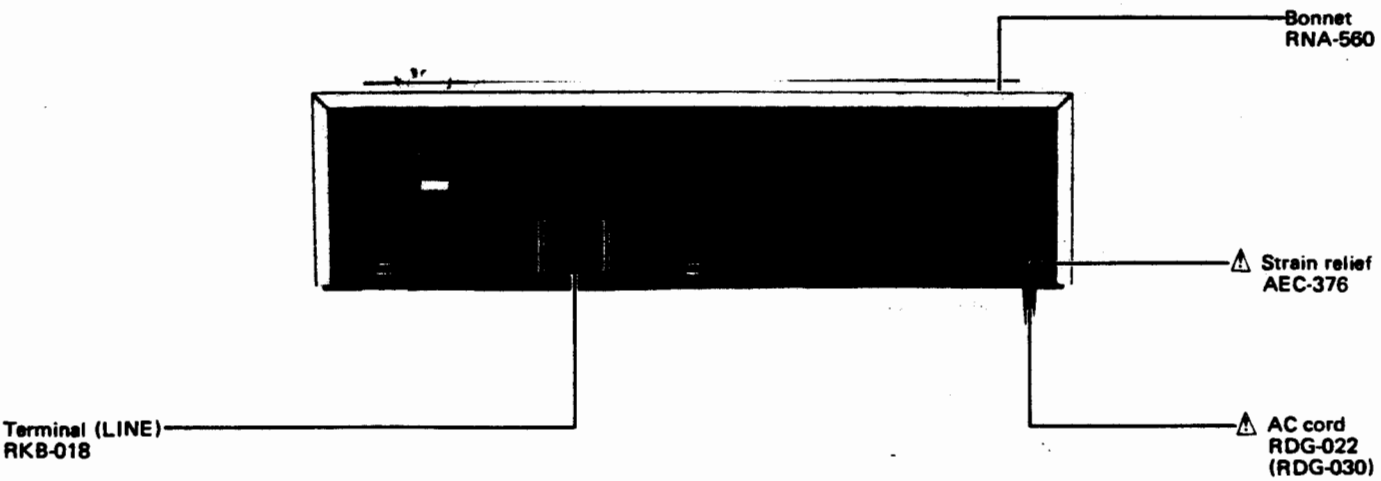
Front View with Panel Removed



Top View with Bonnet Removed



Rear Panel View



5. EXPLODED VIEWS AND PARTS LIST

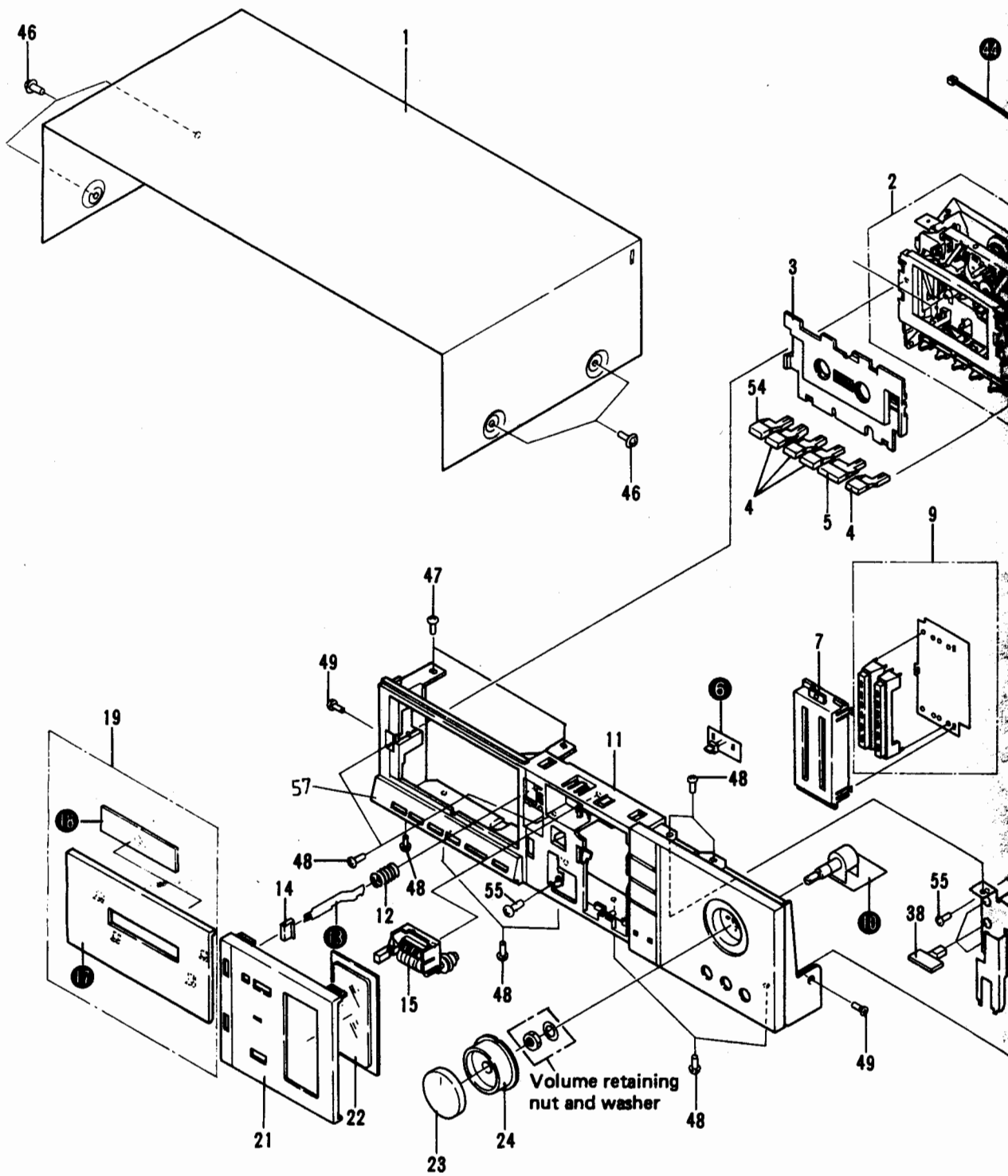
NOTES:

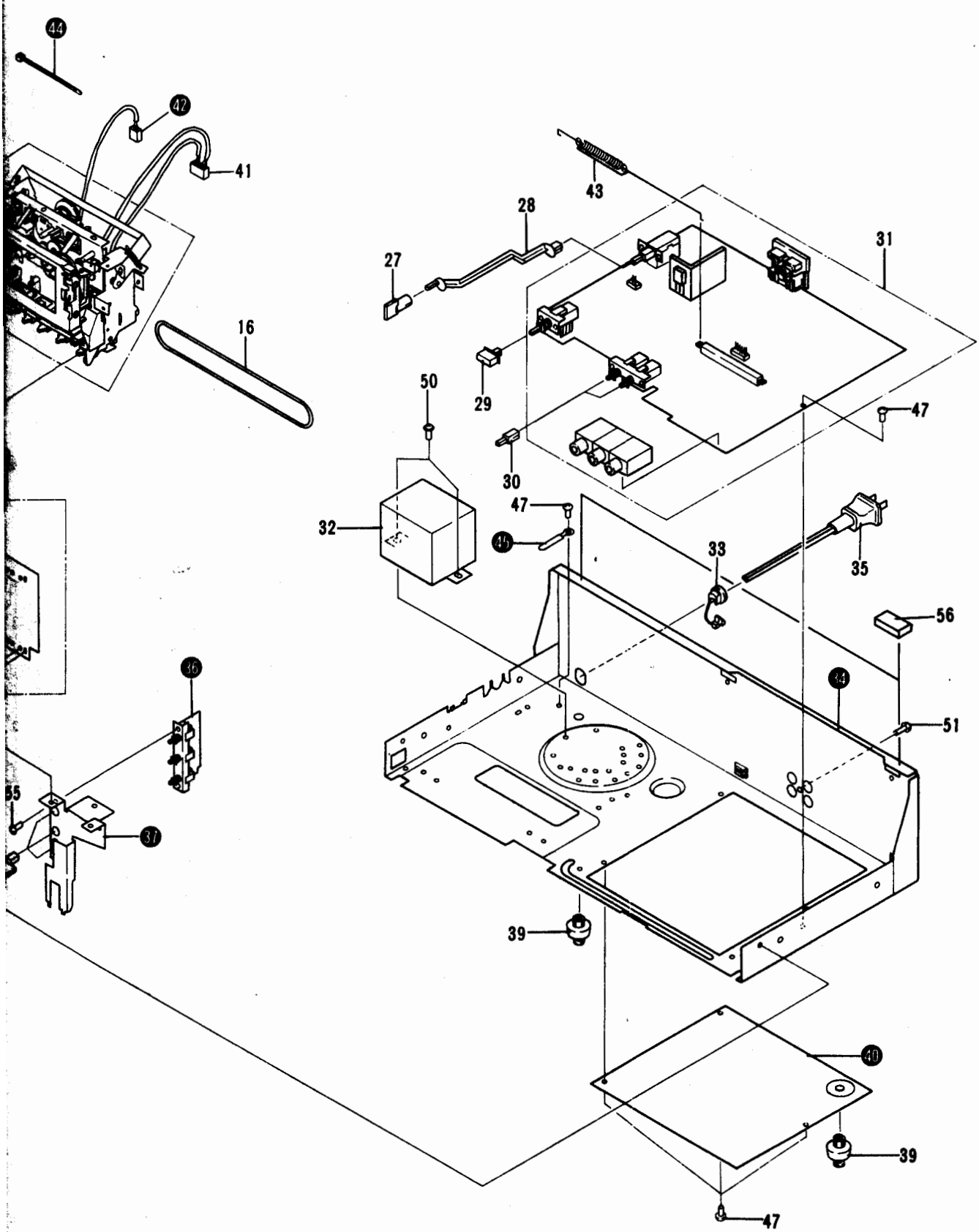
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ *GENERALLY MOVES FASTER THAN* ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List

Mark	No.	Part No.	Description
	1.	RNA-560	Bonnet
185,90	2.	RYM-118	Mechanism assembly
	3.	RAH-397	Cassette plate
1,70	4.	RAC-184	Function knob G
1,79	5.	RAC-185	Function knob H
	6.		Indicator assembly
	7.	RNL-348	LED cover
	8.		. . . . .
	9.	RWX-571	Meter assembly
	10.		Volume assembly
	11.	RNT-020	Front panel
	12.	RBH-894	Eject spring
	13.		Eject plate
	14.	RAC-180	Knob (EJECT)
	15.	RAW-170	Counter
★	16.	REB-459	Counter belt
	17.		Door
	18.		Door lens
★★	19.	RXX-353	Door assembly
	20.		. . . . .
	21.	RNL-346	Indicator panel
	22.	RNL-350	Indicator lens
	23.	RAA-357	Knob (INPUT L)
	24.	RAA-358	Knob (INPUT R)
	25.		. . . . .
	26.		. . . . .
	27.	RAC-195	Knob (POWER)
	28.	RNL-349	Power joint
	29.	RAC-183	Push knob L (REC MUTE)
	30.	RAC-181	Push knob H (TAPE SELECT)
	31.	RWX-574	Mother assembly
⚠ ★	32.	RTT-236	Power transformer (120V)
⚠	33.	REC-376	Strain relief
	34.		Main chassis

Mark	No.	Part No.	Description
⚠	35.	RDG-022 (RDG-030)	AC cord
	36.		Switch assembly
	37.		Switch bracket
	38.	RAC-182	Push knob K (DOLBY NR ON, DOLBY NR OFF, MPX FILTER)
	39.	REC-369	Foot assembly
	40.		Bottom plate
	41.	RKP-296	Connector assembly 6P
	42.		Connector assembly 2P
	43.	RBH-924	REC joint C
	44.		Binder
	45.		UL cord clamper B
	46.	ACT40P080FNi	Screw 4x8
	47.	VCZ30P060FMC	Screw 3x6
	48.	VCZ30P080FMC	Screw 3x8
	49.	CMZ30P050FMC	Screw 3x5
	50.	ATZ40P080FMC	Screw 4x8
	51.	VBZ30P080FMC	Screw 3x8
	52.	. . . . .	
	53.	. . . . .	
	54.	RAC-217	Function knob T
	55.	BMZ30P060FMC	Screw 3x6
	56.	REB-268	Cushion
8,95	57.	RNL-359	


Volume retaining
nut and washer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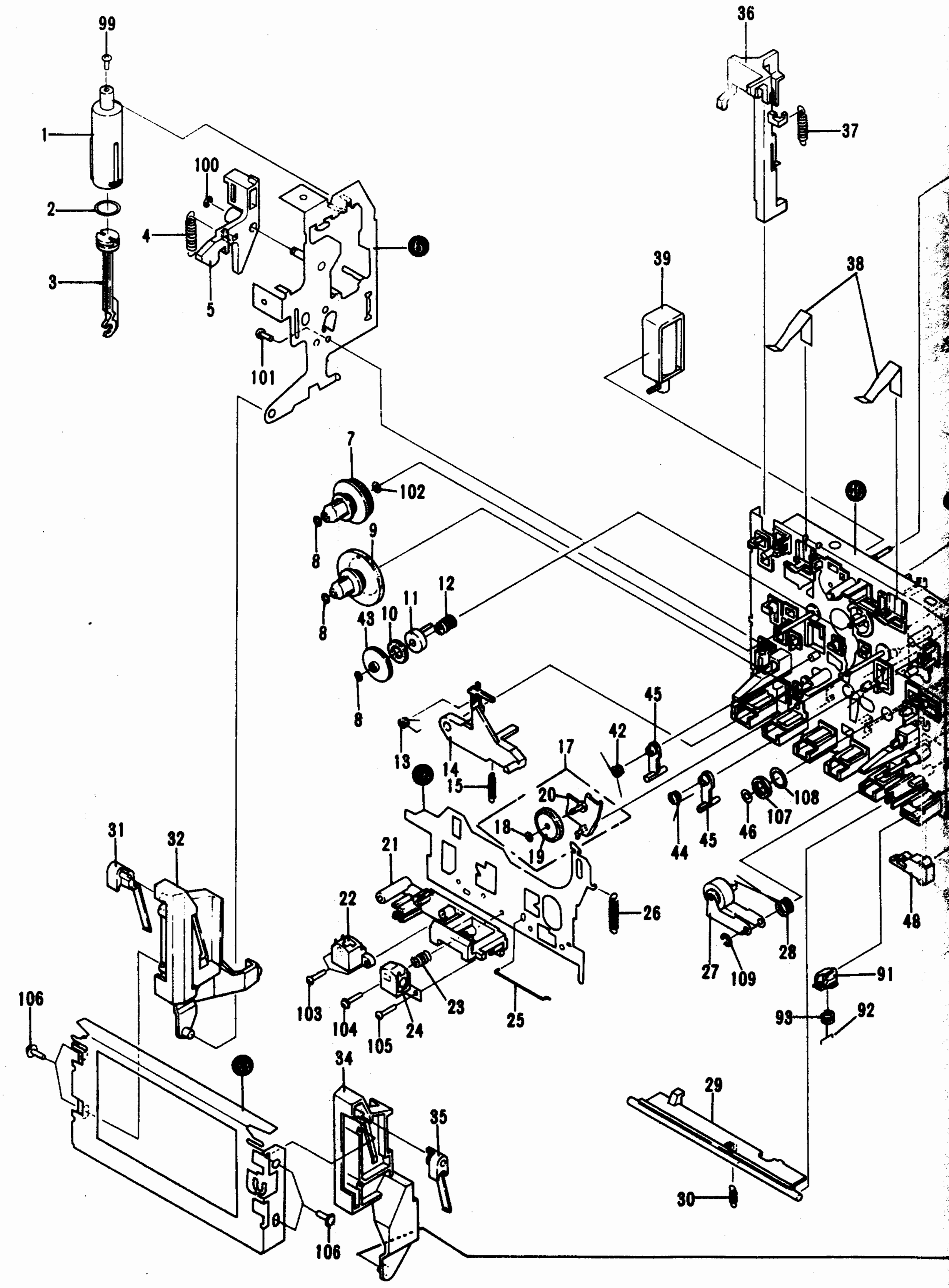
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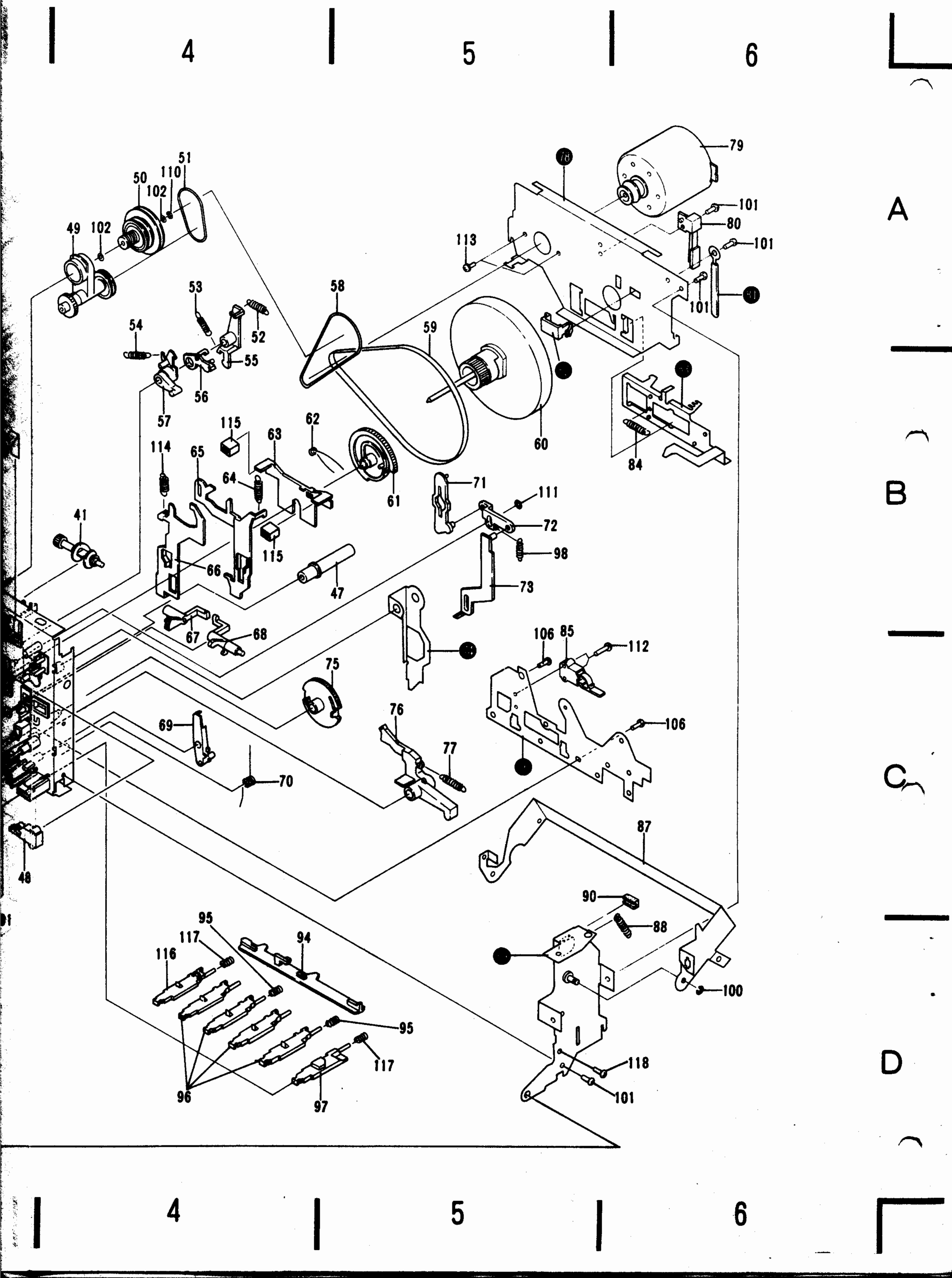
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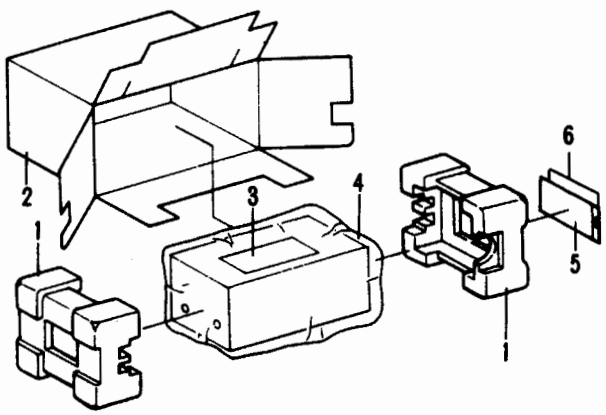
Parts List

Mark	No.	Part No.	Description
	1.	RNK-995	Cylinder
	2.	REB-447	O ring
	3.	RNL-329	Piston
	4.	RBH-871	Pocket return spring
	5.	RNL-291	Eject lever
	6.		Side plate L assembly A
★★	7.	RXB-377	Supply reel base assembly
	8.	RBF-057	Washer
★★	9.	RXB-360	TU reel base assembly
	10.	RED-194	Detector felt
	11.	RNL-318	Detector disk
	12.	RBH-885	Detector spring
	13.	RBH-873	Idler pressure spring
	14.	RNL-298	Action lever
	15.	RBH-875	Action lever spring
	16.		Head base
	17.	RXB-579	Idler arm full assembly
	18.	WA17D040D025	Washer
★★	19.	RNL-337	TU idler
	20.		Idler arm assembly
	21.	RNL-050	Sub head base
15,12 ★	22.	RPB-085	Erase head
15,82		(RPB-096)	
	23.	RBH-723	Head adjust spring
38,87 ★★	24.	RPB-091	REC/PB head
38,87		(RPB-097)	
	25.	RBH-782	HB drive spring
	26.	RBH-874	HB return spring
4,95 ★★	27.	RXB-495	Pinch arm assembly
0,68	28.	RBH-890	Pinch pressure spring
	29.	RNL-303	Lock plate
	30.	RBH-922	Lock plate spring
	31.	RNL-057	Pocket spring L
	32.	RNL-332	Pocket L
	33.		Pocket frame A
	34.	RNL-333	Pocket R
	35.	RNL-058	Pocket spring R
	36.	RNL-284	REC detector arm
	37.	RBH-883	Detector arm spring
	38.	RBK-166	Half set spring
★	39.	RXP-112	Plunger solenoid
	40.		Chassis assembly
	41.	RNL-322	Cam gear
	42.	RBH-905	Lock lever spring L
	43.	RNK-998	Idler gear
	44.	RBH-908	Lock lever spring R
	45.	RNL-285	HB lock lever
	46.	RBF-030	Oil stopper
	47.	RXB-582	Metal holder assembly
★★	48.	RSN-034	Lever switch
	49.	RXB-577	Drive arm full assembly
	50.	RXB-580	Drive pulley assembly
★★	51.	REB-455	Drive belt B
	52.	RBH-876	Gear lever spring A
	53.	RBH-877	Gear lever spring B
	54.	RBH-878	Gear lever spring C
	55.	RNL-297	Gear lever A
	56.	RNL-282	Gear lever B
	57.	RNL-296	Gear lever C
★★	58.	REB-454	Drive belt A
★★	59.	REB-453	Capstan belt
	60.	RXB-576	Flywheel assembly
	61.	RNL-288	Cam gear
	62.	RBH-879	Trigger spring
	63.	RNL-280	Brake plate
	64.	RBH-884	Action plate spring
	65.	RNL-292	FF action plate
	66.	RNL-290	REW action plate
	67.	RNL-277	Joint L
	68.	RNL-276	Joint R
	69.	RNL-281	Gear lever R
	70.	RBH-881	Trigger spring R
	71.	RNL-274	Detector lever
	72.	RNL-275	Link
	73.	RNL-289	Stop lever
	74.		REC action lever
	75.	RNL-294	Cam gear R
	76.	RNL-295	Pause lever
	77.	RBH-880	Pause lever spring
	78.		Flywheel receptacle
33,18 ★★	79.	RXM-088 = RXM-075	Motor assembly
★★	80.	RSN-025	Leaf switch
	81.		UL cord clamper
	82.		Thrust receptacle
	83.		REC action plate
	84.	RBH-882	REC return spring
★★	85.	RSN-033	Lever switch
	86.		Plate
	87.		Eject action plate
	88.	RBH-872	Eject action spring
	89.		Side plate R assembly
	90.	REB-437	Plate stopper
	91.	RNL-334	Ratchet holder
	92.	RBH-870	Ratchet pin
	93.	RBH-888	Ratchet spring
	94.	RNL-293	REC connection arm
	95.	RBH-889	Button return spring
	96.	RNL-287	Function button
	97.	RNL-279	Pause button
	98.	RBH-886	Link return spring
	99.	VCZ26P090FMC	Screw
	100.	YE25FUC	Washer

Mark	No.	Part No.	Description
	101.	VCZ26P060FMC	Screw
	102.	WA21D040D25	Washer
	103.	PMZ20P130FMC	Screw
	104.	iMZ20Y120FMC	Screw
	105.	PMZ20P120FMC	Screw
	106.	ATZ26P060FZK	Screw
	107.	NK90FUC	Nut
	108.	RBE-021	Washer
	109.	YE20FUC	Washer
	110.	YE15FUC	Washer
	111.	YS20FBT	Washer
	112.	PMZ20P080FMC	Screw
	113.	PMA26P040FMC	Screw
	114.	RBH-916	Action plate spring L
	115.	REB-466	Brake shoe
	116.	RNL-384	REC button
	117.	RBH-909	Pause button spring
	118.	VCZ26P040FMC	Screw

6. PACKING



Mark	No.	Part No.	Description
	1.	RHA-235	Pad
	2.	RHG-502	Packing case
	3.	RRB-176	Operating instructions (English)
	4.	RHX-031	Sheet C
	5.	RDE-010	Connection cord
	6.	REA-030	Stopper assembly

7. 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 x 10¹*	*561*	*RD¼PS 5 6 1 J*
47kΩ	*47 x 10³*	*473*	*RD¼PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

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

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

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- *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

P.C. BOARD ASSEMBLIES

Mark	Part No.	Symbol & Description
	RWX-574	Mother assembly
	RWX-571	Meter assembly

OTHERS

Mark	Part No.	Symbol & Description
⚠ ★	RTT-236	Power transformer (120V)
⚠	RDG-022 (RDG-030)	AC cord
★★	RXM-088	Motor assembly
★★	RPB-085 (RPB-096)	Erase head
★★	RPB-091 (RPB-097)	REC/PB head
★	RXP-112	Plunger solenoid
★★	RSN-025	Leaf switch (S8)
★★	RSN-033	Lever switch (S7)
★★	RSN-034	Lever switch (S6)

Mother Assembly (RWX-574)

CAPACITORS

Mark	Part No.	Symbol & Description
	CCDSL 471K 50	C102, C136, C202, C236
	CEANL 100M 16	C105, C205
	CEA R10M 50	C124, C126, C224, C226, C322
	CEA R22M 50	C142, C242
	CEA R33M 50	C123, C127, C223, C227
	CEA R47M 50	C129, C229
	CEA 010M 50	C132, C232, C318, C320
	CEA 101M 10	C306
	CEA 100M 16	C109, C110, C113, C115, C117, C119, C125, C130, C131, C137–C139, C209, C210, C213, C215, C217, C219, C225, C230, C231, C237–C239, C323, C307
	CEA 220M 16	C324, C325, C330
	CEA 330M 16	C108, C208, C319, C326
	CEA 470M 16	C103, C118, C140, C203, C218, C240, C316
	CEA 101M 16	C304
	CEA 221M 16	C328
	CEA 471M 16	C305, C331
	CEA 101M 25	C303, C329
	CEA 471M 25	C301
	CEA 102M 25	C302
	CQMA 104K 50	C321
	CQMA 393J 50	C135, C235
	CQMA 273J 50	C133, C134, C233, C234
	CQMA 153J 50	C112
	CQMA 103J 50	C111, C211
	CQMA 153J 50	C212
	CQMA 223K 50	C311
	CQMA 153K 50	C120, C122, C220, C222
	CQMA 103K 50	C317
	CQMA 472K 50	C121, C221
	CQMA 332K 50	C116, C216
	CQMA 182K 50	C310
	CQMA 102K 50	C308, C309
	CQPA 332J 100	C312
	CKDYF 473Z 50	C313–C315, C327
	CCDSL 181K 50	C104, C204
	CCDSL 101K 50	C114, C214
	CCDSL 220K 50	C107, C207
	CCDSL 101K 500	C141, C241
⚠	RCG-006	C332 (0.01/AC125V)

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 Semifixed (22k-B)
★	RCP-149 (RCP-193)	VR102, VR202, VR301 Semifixed (10k-B)
★	RCP-155 (RCP-200)	VR103, VR203 Semifixed (150k-B)
⚠	RD¼PSF □□□J	R301, R318
⚠	RD¼PM □□□J	R103, R203, R317
	RD¼PM □□□ JNL	R104, R204
	RD¼PM □□□J	R101, R102, R105–R158, R201, R202, R205–R258, R302, R303, R305–R315, R319–R322, R336

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SC2240	Q101, Q102, Q201, Q202
★★	2SC1740LN (2SC1815) (2SC2634NC) (2SC2021)	Q103–Q109, Q203–Q209, Q305, Q306, Q308, Q309
⚠ ★★	2SD837 (2SD686) (2SD1031)	Q301
★★	2SC1740LN	Q302–Q304
⚠ ★★	2SC2060 (2SC2673) (2SC1383NC)	Q307
★★	2SA933LN (2SA937) (2SA1015) (2SA1127NC)	Q310
★★	HA11226	IC301

Mark	Part No.	Symbol & Description
★★	BA336	IC302
★★	M5218L	IC303
★	1K34A (1K60A) (OA90)	D101, D201
★	1S2473 (US1040)	D102, D202, D306–D314
⚠ ★	S1BV10	D301, D302
⚠ ★	W03B (W03C)	D303, D305
	W03B (W03C)	D304
★	WZ-135	ZD301
★	WZ-073	ZD302
★	WZ-044	ZD303
★	BZ-140	ZD304

SWITCHES AND COILS

Mark	Part No.	Symbol & Description
★★	RSH-049	S301-1–S301-12 Slide switch (REC/P.B SELECTOR)
★★	RSG-118	S302-1 – S302-4, S303-1, S303-3 Push switch assembly B (TAPE SELECTOR)
★★	RSG-119	S304 Push switch assembly C (REC MUTE)
⚠ ★★	RSA-055	S305 Power switch
	RTF-089	L101, L201, MPX filter
	RTF-084	L102, L202 Trap coil
	RTF-085	L103, L203 Peaking coil (3.9mH)
	RTD-026	L301 OSC coil
	RTF-057	L302 Line coil

OTHERS

Mark	Part No.	Symbol & Description
	RKB-018	Terminal (LINE)
	RKN-074	S101, S201 Jack assembly
	RBA-039	Tapping screw
	RBF-041	Ceramic tube

Meter Assembly (RWX-571)

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA 100M 16	C701, C702
	CKDYF 473Z 50	C703

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
⚠	RD½PSF680J	R701, R702
	RD¼PM□□□J	R703-R708

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	BA6124	IC701, IC702
★	LN12156P	LED701, LED702

Indicator Assembly

Mark	Part No.	Symbol & Description
	RD¼PM122J	R401
★	LN217RP	LED401

Volume Assembly

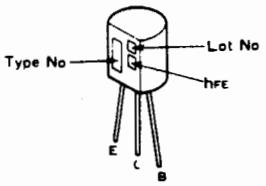
Mark	Part No.	Symbol & Description
★	RCV-095	VR501-1, VR501-2 Volume (INPUT)

Switch Assembly

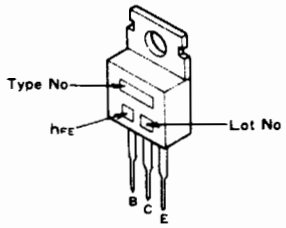
Mark	Part No.	Symbol & Description
	RD¼PM125J	R601, R602
12,45 ★★	RSG-133	S601-1, S601-2, S603-1, S603-2 Push switch (DOLBY NR. MPX)

External Appearance of Transistors and ICs

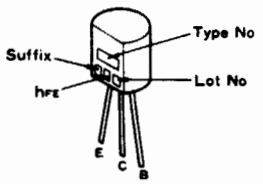
2SC1815
2SC2240
2SA1015



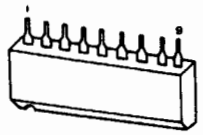
2SD837



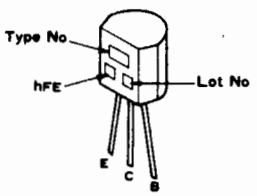
2SC1740LN
2SA933LN



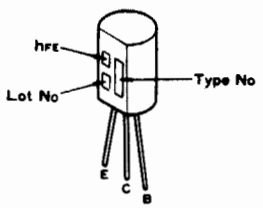
BA6124
BA336



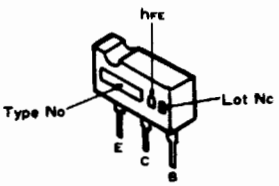
2SC2060



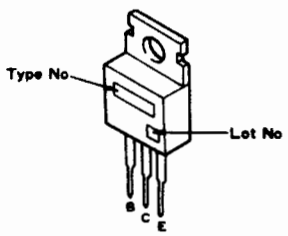
2SC1383NC



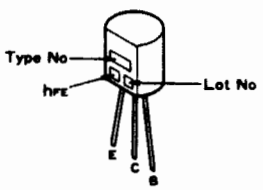
2SC2673



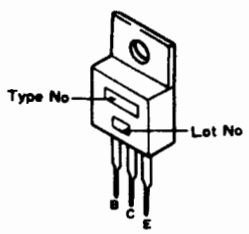
2SD686



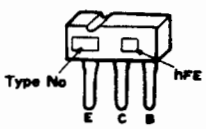
2SC2634NC
2SA1127NC



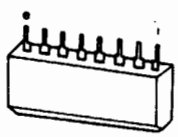
2SD1031



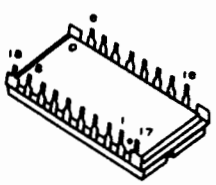
2SC2021
2SA937



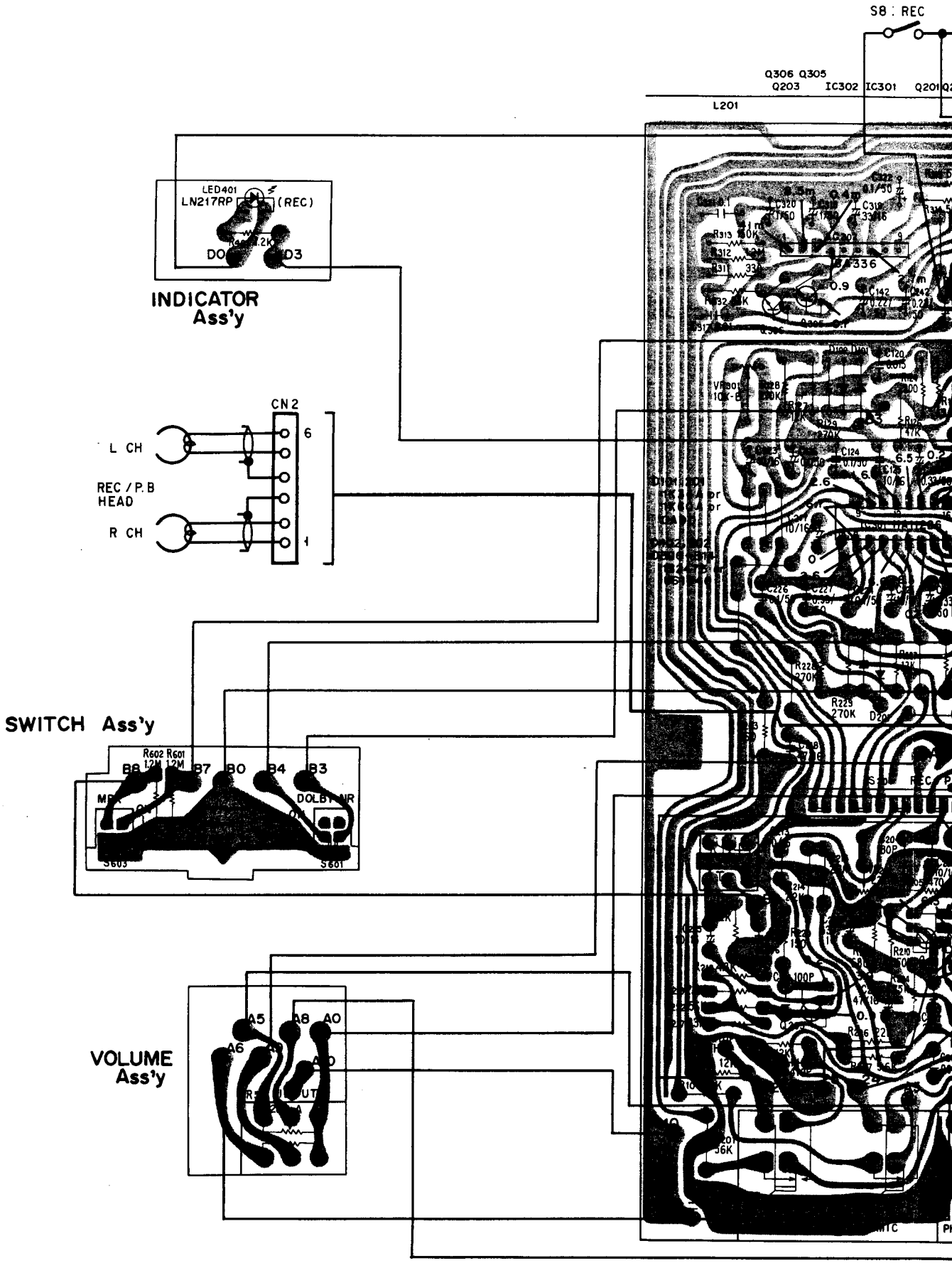
M5218L

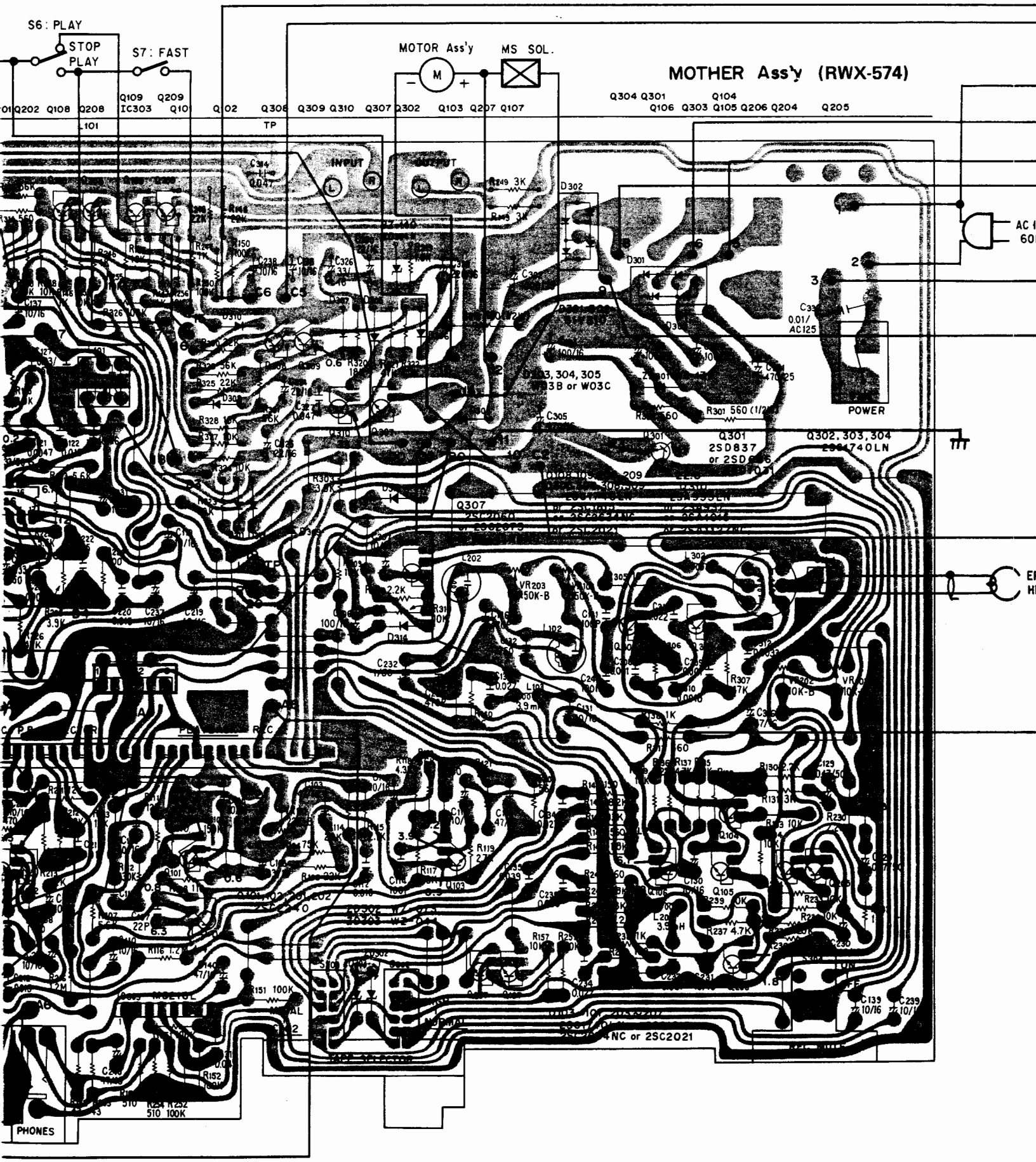


HA11226



8. P.C. BOARD CONNECTION DIAGRAM




MOTHER Ass'y (RWX-574)
S6 : PLAY
STOP
PLAY
S7 : FAST
MOTOR Ass'y
MS SOL.
INPUT
OUTPUT
POWER
PHONES
Q307
2SC2060
Q301
2SD837
or 2SD
Q302, 303, 304
2SC1740LN
VR203
50K-B
D302
D301
D316
D303, 304, 305
W03B or W03C
R301 560 (1/2W)
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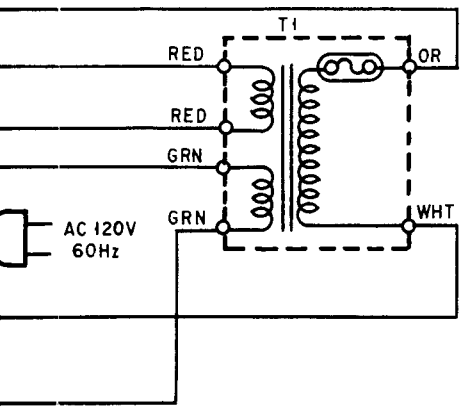
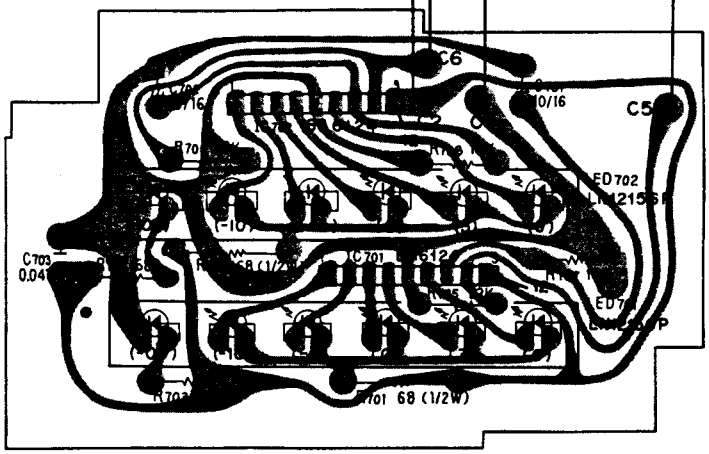
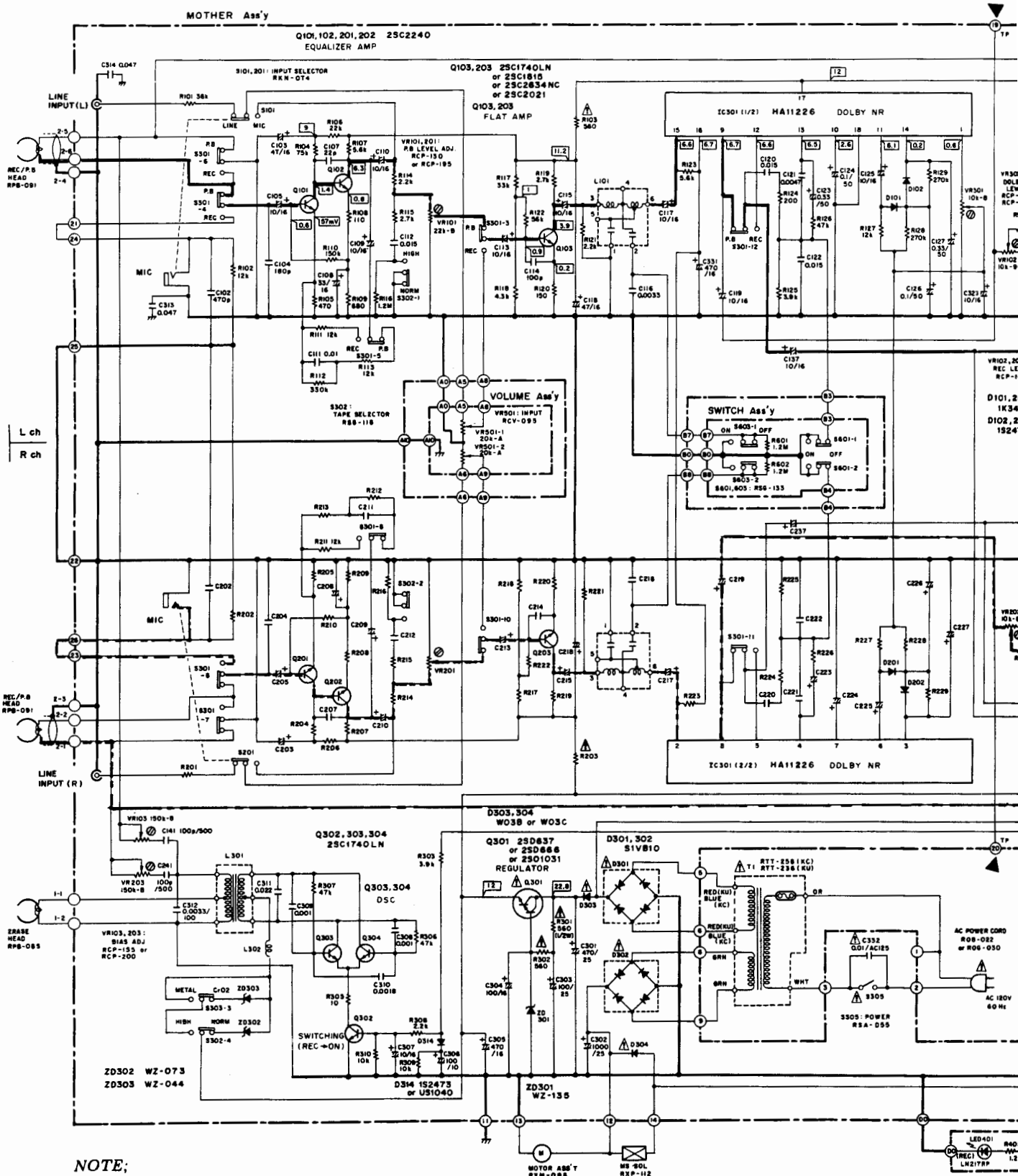


METER Ass'y (RWX-571)

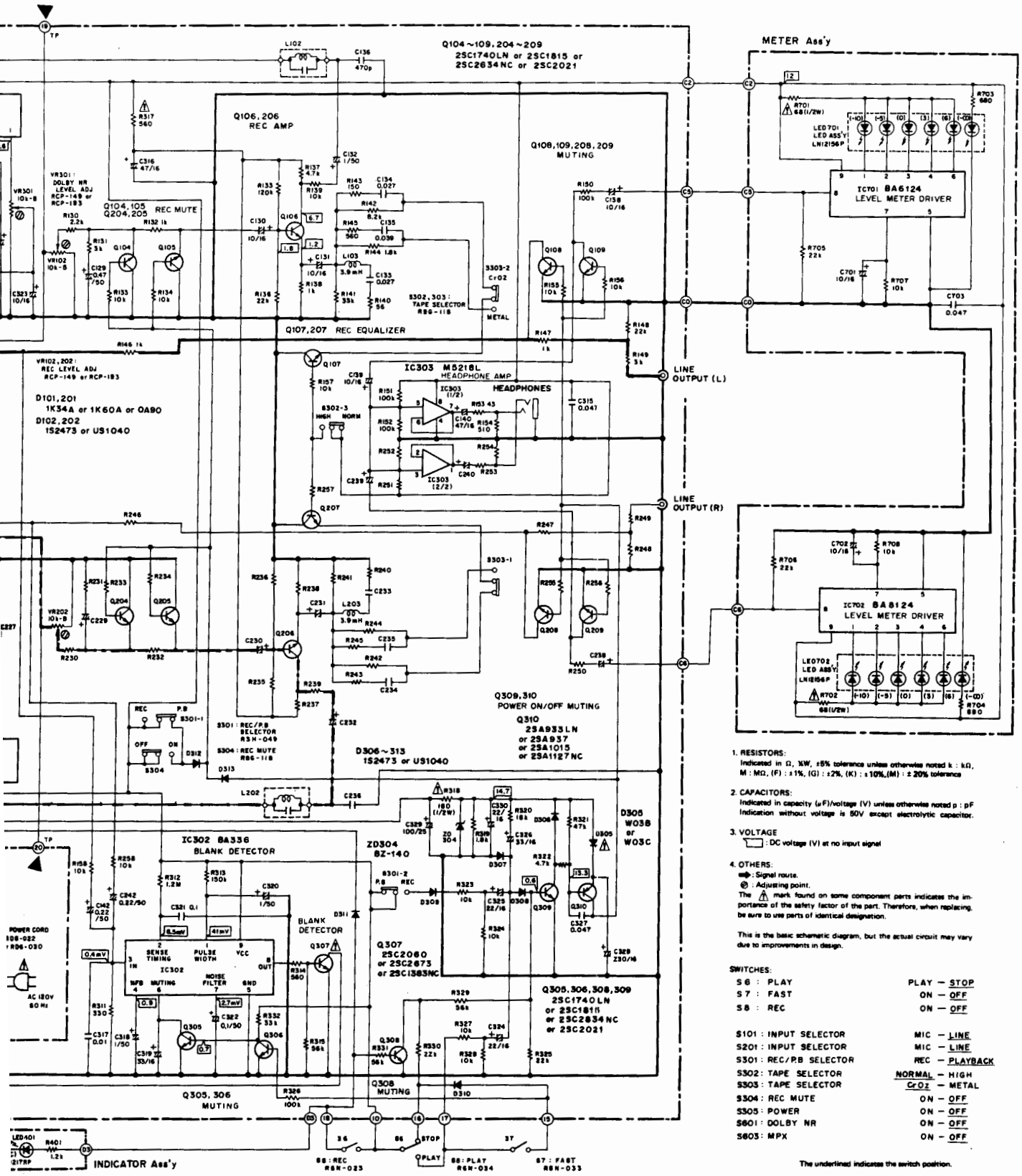


9. SCHEMATIC DIAGRAM

(KU AND KC TYPES)



NOTE;
Playback signal route ——————
Recording signal route —— - ——



1. RESISTORS:
Indicated in Ω, ¼W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10%, (M) : ±20% 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:
: Signal route.
: Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

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

SWITCHES:

S6 : PLAY	PLAY —	STOP
S7 : FAST	ON —	OFF
S8 : REC	ON —	OFF
S101 : INPUT SELECTOR	MIC —	LINE
S201 : INPUT SELECTOR	MIC —	LINE
S301 : REC/P.B SELECTOR	REC —	PLAYBACK
S302 : TAPE SELECTOR	NORMAL —	HIGH
S303 : TAPE SELECTOR	CrO2 —	METAL
S304 : REC MUTE	ON —	OFF
S305 : POWER	ON —	OFF
S601 : DOLBY NR	ON —	OFF
S603 : MPX	ON —	OFF

The underlined indicates the switch position.

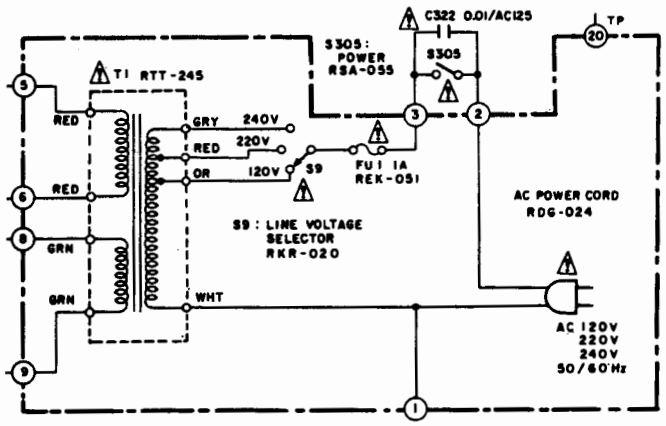
10. FOR KC AND D TYPES

Model CT-3 KC and D types are the same as the CT-3 KU type with the exception of following sections.

CONTRAST OF MISCELLANEOUS PARTS

Mark	Symbol & Description	Part No.			Remarks
		KU type	KC type	D type	
⚠ ★	Power transformer (120V)	RTT-236	RTT-256	–	
⚠ ★	Power transformer (120V, 220V and 240V)	–	–	RTT-245	
⚠	AC cord	RDG-022 (RDG-030)	RDG-022 (RDG-030)	RDG-024 –	
⚠	Line voltage selector socket	–	–	RKR-020	
⚠ ★★	Fuse (1A)	–	–	REK-051	
	Packing case	RHG-502	RHG-503	RHG-506	
	Operating instructions (English)	RRB-176	RRB-176	–	
	Operating instructions (English/Spanish)	–	–	RRE-020	

SCHEMATIC DIAGRAM
D type



SPECIFICATIONS

Power Requirements
D type . . . . . AC120V, 220V and 240V, 50/60Hz
Power Consumption
D type . . . . . 14 watts
Dimension
D type . . . . . 420 (W) x 120 (H) x 251.7 (D) mm
16-9/16 (W) x 4-3/4 (H) x 9-15/16 (D) in.

11. MECHANICAL ADJUSTMENTS

Prior to adjustment

Clean the both reel base, the capstan, belts and the pinch roller with an alcohol moistened swab.

11.1 PINCH ROLLER PRESSURE ADJUSTMENT

1. Put the tape deck into the playback mode.
2. Gently push against the pinch roller arm with the tension gauge and separate the pinch roller slightly from the capstan.
3. Then the pinch roller back onto the capstan, and read the value when the pinch roller starts to rotate. If the reading fails to lie within 300g ~ 400g, replace the pinch pressure spring.

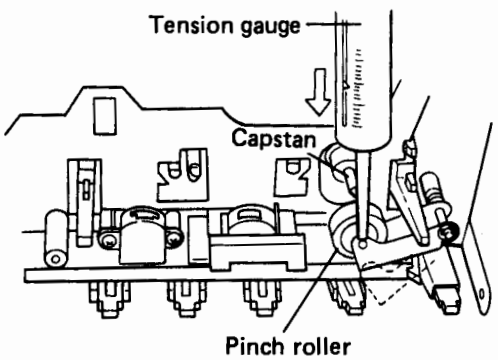


Fig. 11-1 Pinch roller pressure adjustment

11.2 REEL BASE TORQUE ADJUSTMENT

Measure the torque with the torque meter during playback, fast forward (FF) and rewind (REW) modes. The measured values should normally lie within the allowable ranges listed in the table 1.

If the measured values lie outside the relevant ranges, replace the TU (take-up) reel base assembly and/or supply reel base assembly, TU idler, or drive arm full assembly.

Table 1

	TU reel base	Supply reel base
Playback mode	35 – 55g.cm	* 2 – 5g.cm
FF mode	70 – 125g.cm	* 2 – 5g.cm
REW mode		70 – 125g.cm

** Do notes back tension torque*

11.3 TAPE SPEED ADJUSTMENT

1. Connect the frequency counter to the LINE OUTPUT terminals.
2. Play back the 3kHz portion of the STD-301 test tape. At the beginning, the frequency should be lie within the 3000Hz ~ 3010Hz range, and may be adjusted by turning the semi-fixed resistor located in the motor adjustment hole as shown in Fig. 11-2.

Tape speed is increased by turning the semi-fixed resistor clockwise, and decreased by turning counter-clockwise.

11.4 REC SWITCH ADJUSTMENT

1. Depress REC button. REC action plate moves to Ⓐ direction. At this time, check that REC switch is ON.
2. Depress the POWER switch to turn the unit OFF.
3. Depress STOP button. The REC action plate moves slightly to Ⓑ direction. At this time, bend and adjust the REC action plate so that a contact distance of REC switch is 0.2 ~ 0.5 mm.

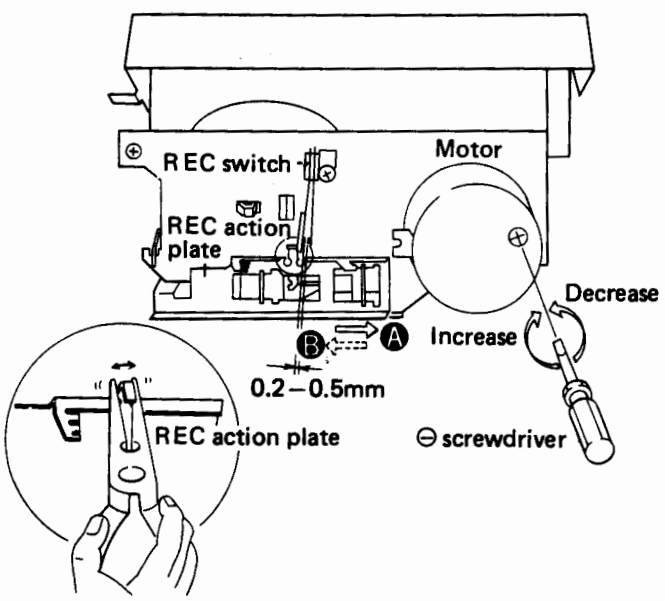


Fig. 11-2 Tape speed and REC switch adjustment

12. ELECTRICAL ADJUSTMENTS

Precaution

1. Mechanical adjustment should be completed.
2. Clean the following parts with an alcohol moistened swab: Record/Playback head, Pinch roller, Erase head, Rubber belts and Capstan.
3. Demagnetize record/playback head with a head demagnetizer.
4. Do not use magnetized screwdriver for adjustments.
5. Adjustments and measurements should be performed for both L ch and R ch with rated power supply voltage.
6. Adjustments should be performed in the order given in this service manual. Altering the order can hinder proper adjustments, resulting in loss of performance.
7. Level during measurements are based on 0dBv = 1V. Connect a 50kΩ (47 — 52kΩ) dummy resistor across the OUTPUT terminals.
8. Let the CT-3 warm up (aging) for a few minutes before proceeding with the adjustment.
9. Set the DOLBY NR switch to OFF and TAPE SELECTOR to the NORM position unless directed otherwise.

Test Equipments/Tools Required:

1. Test tape
   STD-341A ..... For playback adjustment
   STD-608A ..... NORMAL blank tape
   STD-603 ..... CrO_2 blank tape
   STD-604 ..... METAL blank tape
2. Audio oscillator
3. AC millivoltmeter (AC mV)
4. Attenuator
5. Oscilloscope
6. Resistor 50kΩ (47 — 52kΩ)

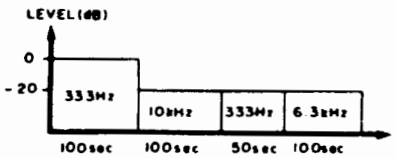


Fig. 12-1 Contents of the test tape STD-341A

12.1 DOLBY NR ADJUSTMENT

Setting

Mode ..... Record
AC mV meter ..... TP19 (L ch) and TP20 (R ch) of the mother assembly
Input Signal ..... 2kHz, -10dBv (316 mV) to LINE INPUT

Procedure

1. Adjust the INPUT level control so that the AC mV meter reads -2.2dBv (776 mV).
2. Next change the input signal level to -30dBv (31.6 mV) and DOLBY NR switch to the ON position.
3. Adjust the VR301 so that the AC mV meter reads -17.9dBv (127 mV).

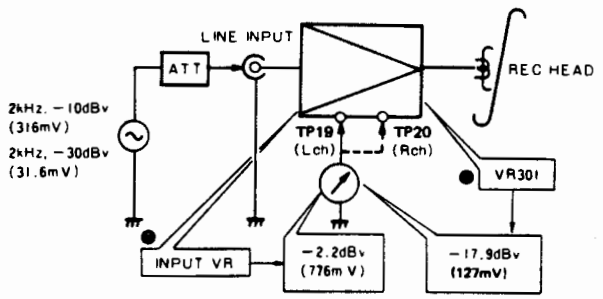


Fig. 12-2 Dolby NR adjustment

12.2 HEAD AZIMUTH ADJUSTMENT

Setting

Mode ..... Playback
Test Tape ..... STD-341A (10kHz, - 20dB)
AC mV meter ..... LINE OUTPUT
VR101, VR201 ..... Turn up to maximum position

Procedure

Adjust the azimuth adjusting screw for maximum AC mV meter readings for both L and R channels. After this adjustment, lock the screw with **screw lock**.

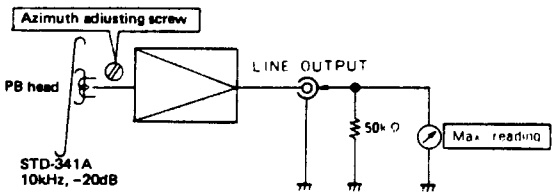


Fig. 12-3 Head azimuth adjustment

12.3 PLAYBACK EQUALIZER ADJUSTMENT

Setting

Mode ..... Playback
Test Tape ..... STD-341A (333Hz and 6.3kHz, - 20dB)
AC mV meter ..... LINE OUTPUT

Procedure

1. Set the TAPE SELECTOR to the NORM position. Play back the 333Hz and 6.3kHz portions of the STD-341A, and check that difference between the two output levels does not exceed 1.5dB $\pm^{1.5}_{1}$ dB.
2. Next set the TAPE SELECTOR to the HIGH position. Play back the 333Hz and 6.3kHz portions again, and check that the difference between the two output levels does not exceed - 2.5dB±1dB.

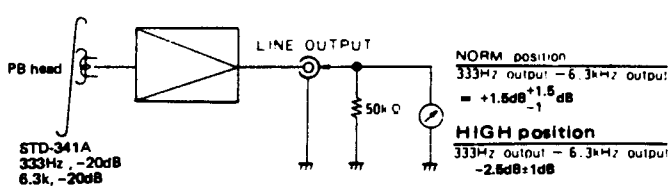


Fig. 12-4 Playback equalizer check

12.4 PLAYBACK LEVEL ADJUSTMENT

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

Setting

Mode ..... Playback
Test Tape STD-341A (333Hz, 0dB)
AC mV meter ..... TP19 (L ch) and TP20 (R ch)

Procedure

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

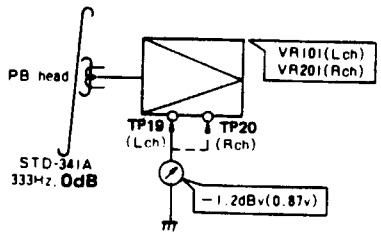


Fig. 12-5 Playback level adjustment

12.5 OVERALL FREQUENCY RESPONSE ADJUSTMENT

Setting

Mode ..... Record
Test Tape STD-608A
AC mV meter ..... LINE OUTPUT
Input Signal ..... 333Hz, - 30dBv (31.6mV) to LINE INPUT

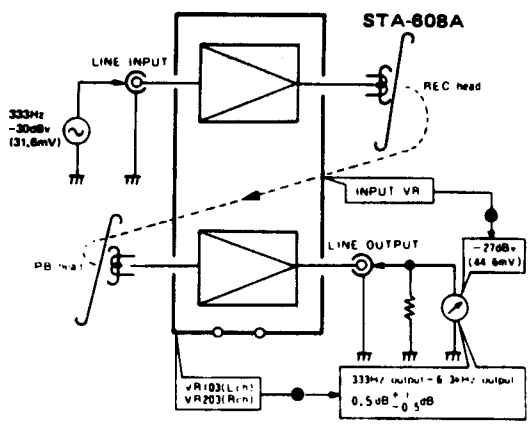


Fig. 12-6 Recording/Playback frequency response adjustment

Procedure

1. Set the TAPE SELECTOR to the NORM position.
2. Adjust the INPUT level control so that the AC mV meter reads - 27dBv (44.6 mV).
3. Record the 333Hz and 6.3kHz signals onto the STD-608A. Play back the tape and adjust the VR103 (L ch) and VR203 (R ch) so that the difference between two is 0.5dB $^{+1}_{-0.5}$ dB.

12.6 RECORD LEVEL ADJUSTMENT

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

Setting

Mode ..... Record
Test Tape STD-604, STD-608A, STD-603
AC mV meter ..... TP19 (L ch) and TP20 (R ch)
Input Signal ..... 333Hz, - 10dBv (316mV) to LINE INPUT

Procedure

1. Set the TAPE SELECTOR to the NORM position.
2. Adjust the INPUT level control so that the AC mV meter reads - 5.2dBv (0.54V).
3. Record the 333Hz signal onto the STD-608A. Play back the tape and adjust the VR102 (L ch) and VR202 (R ch) so that the AC mV meter reads - 5.2dBv (0.54V).
4. Set the TAPE SELECTOR to the CrO_2 position and record the 333Hz signal onto the STD-603. Play back the tape and check that the AC mV meter reads - 5.2dBv (0.54V) ±1.5dB.
5. Next set the TAPE SELECTOR to the METAL position and record the 333Hz signal onto the STD-604. Play back the tape and check that the AC mV meter reads - 5.2dBv (0.54V) ±1.5dB.

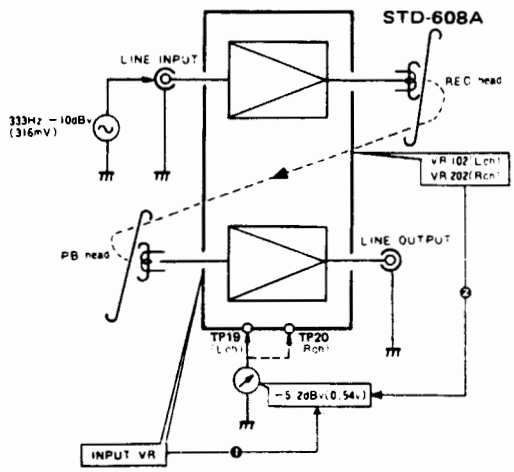
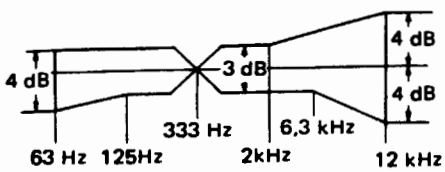


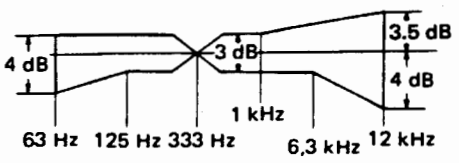
Fig. 12-7 Recording level adjustment

Overall Frequency Response

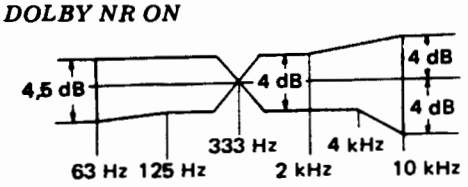
Using STD-608A and TAPE SELECTOR NORM position, with DOLBY NR OFF



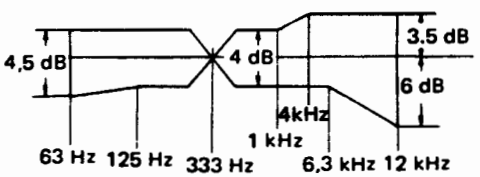
Using STD-603 and TAPE SELECTOR CrO_2 position, with DOLBY NR OFF



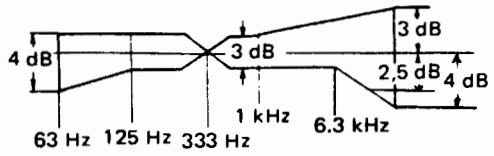
Using STD-608A and TAPE SELECTOR NORM position, with DOLBY NR ON



Using STD-603 and TAPE SELECTOR CrO_2 position, with DOLBY NR ON



Using STD-604 and TAPE SELECTOR METAL position, with DOLBY NR OFF



Using STD-604 and TAPE SELECTOR METAL position, with DOLBY NR ON

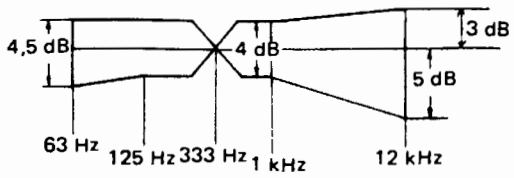


Fig. 12-8 Frequency response

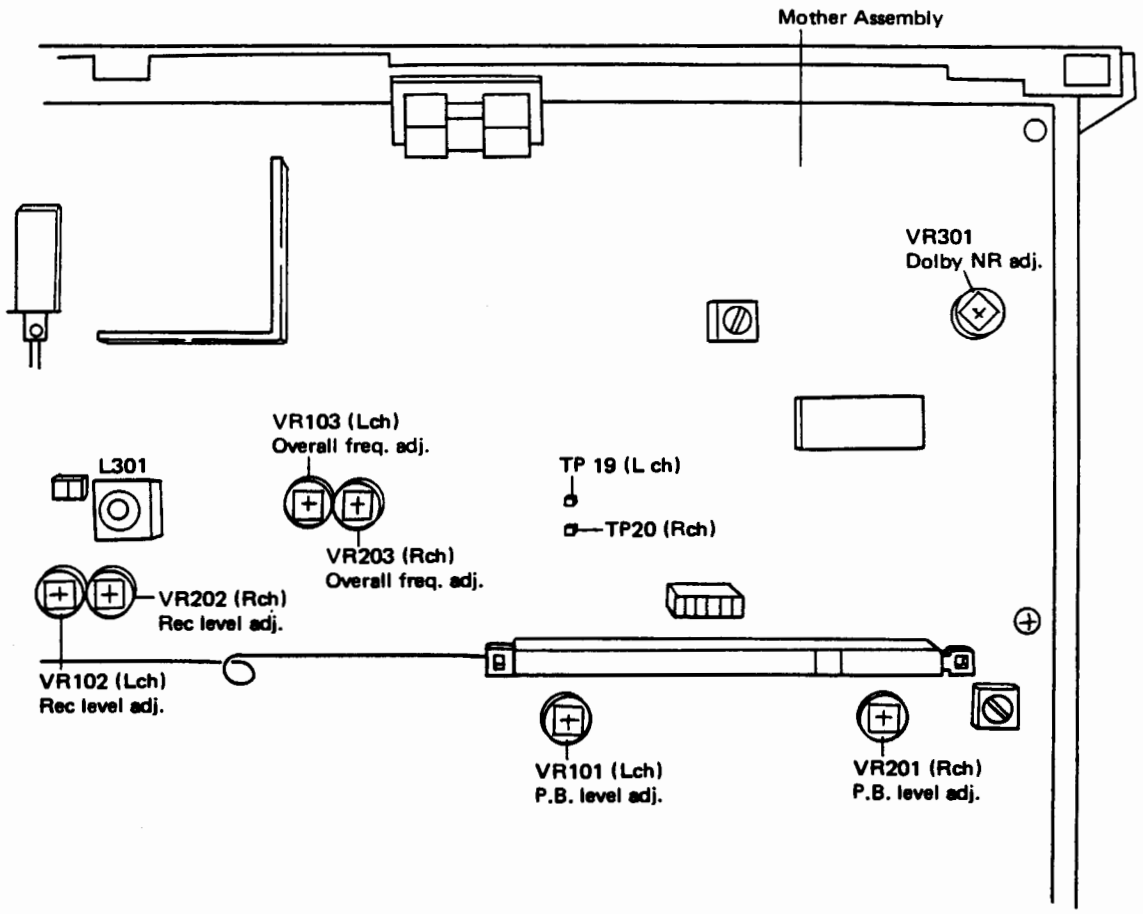
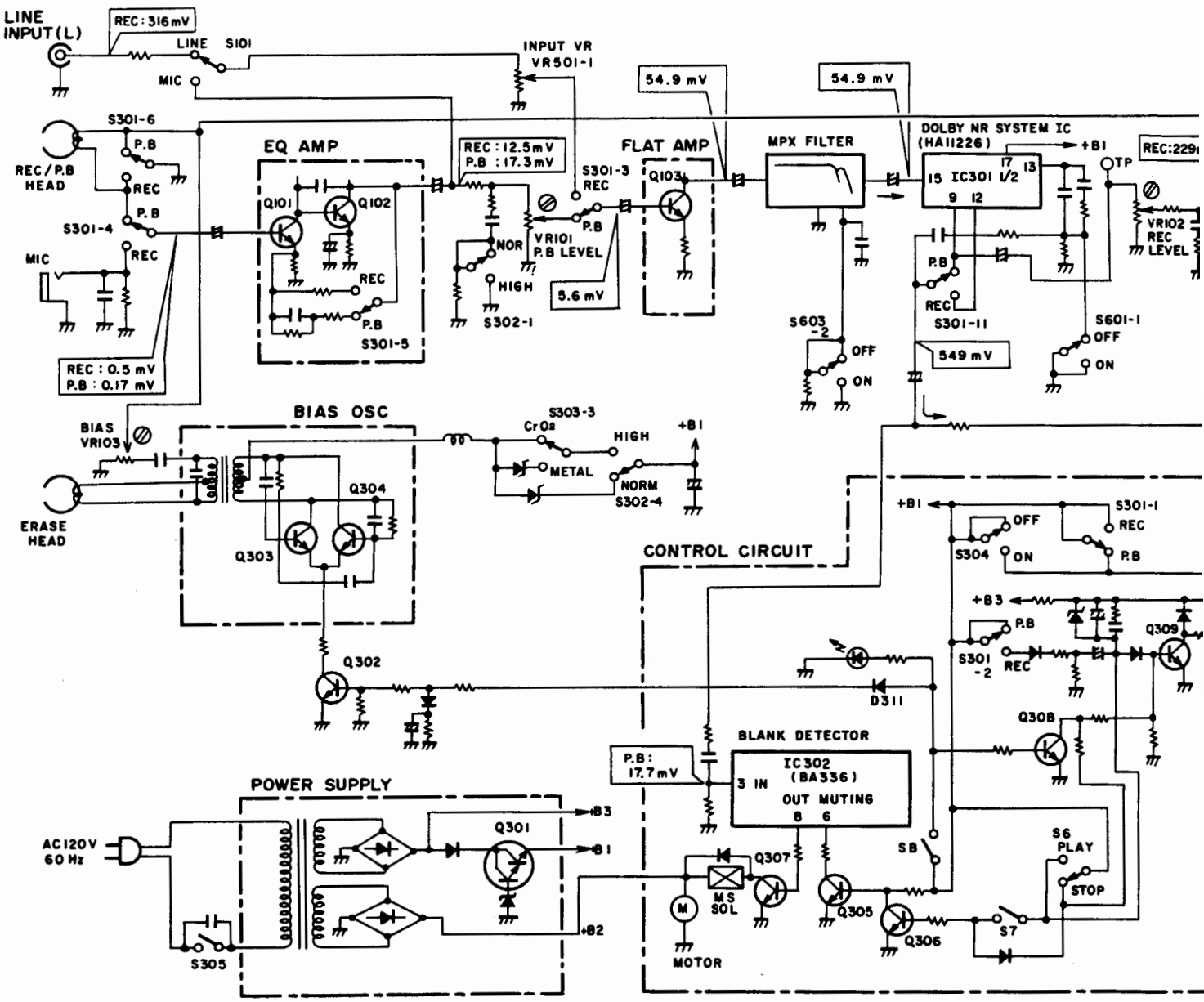


Fig. 12-9 Adjustment points

13. BLOCK DIAGRAM



SWITCHES

S101 : INPUT SELECTOR (MIC – LINE)
S301 : REC/PLAYBACK SELECTOR (REC – PLAYBACK)
S302 : TAPE SELECTOR (NORMAL – HIGH)
S303 : TAPE SELECTOR (CrO_2 – METAL)
S304 :
S305 :
S601 :
S603 :

14. CIRCUIT DESCRIPTIONS

A block diagram of the circuits described in this section can be found on page 39.

14.1 PLAYBACK SIGNAL PATH

The audio signal picked up by the playback head is amplified to a constant level by the playback equalizer amp (Q101, Q102), and flat amp (Q103). It then proceeds to the LINE OUTPUT terminal, passing through the MPX filter and Dolby amp (IC301) along the path.

14.2 RECORDING SIGNAL PATH

The recording signal applied to the LINE INPUT terminal passes first through the INPUT potentiometer (volume), and is then input to the flat amp (Q103). A recording signal input through the MIC jack is first amplified by Q101 and Q102, then passes through the INPUT potentiometer (volume) on its way to the flat amp (Q103) where it is amplified to a constant level. Turning the MPX switch ON eliminates the beat frequency (pilot) escaping from the tuner section prior to the signal reaching the Dolby amp (pin 15, IC 301).

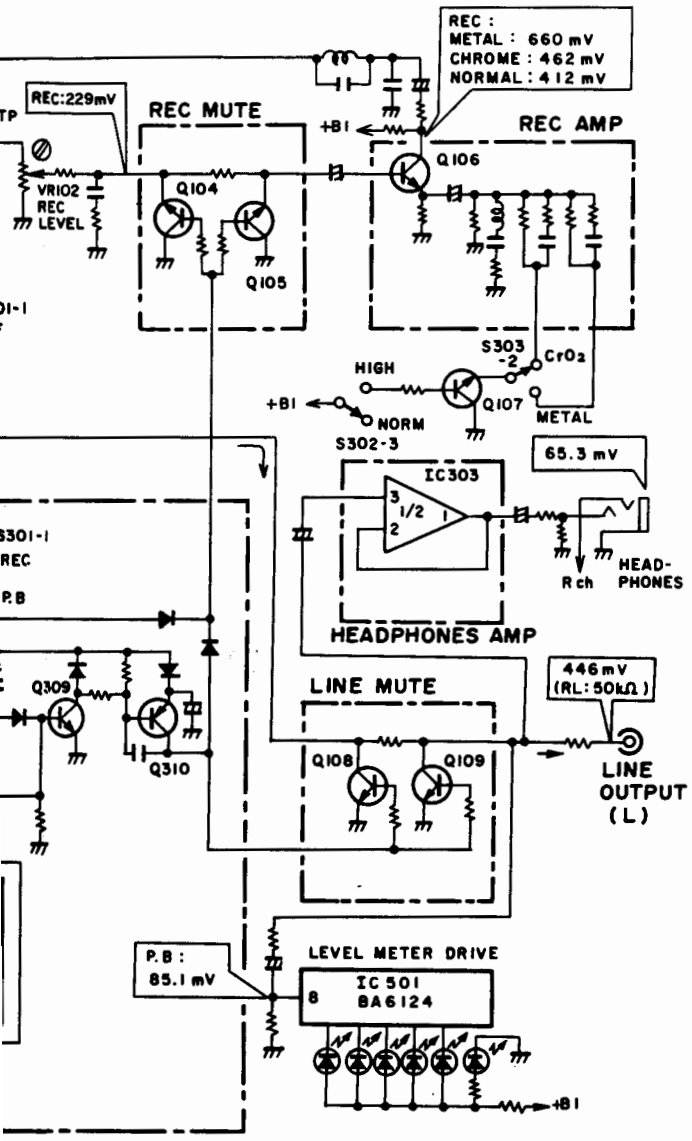
When the Dolby NR switch is placed ON, the portion of the signal processed through the Dolby circuit is combined with the original signal and output from pin 9 of IC301. It then passes through the recording level adjustment potentiometer and into the recording amp (Q106). Signals not processed through the Dolby NR circuit are output from pin 12 of IC301.

After frequency response characteristics are adjusted by the equalizer circuit in the recording amp to conform with the type of tape being used, the signal is then passed to the recording head.

When the recording mode is selected, S8 goes ON, causing +B to pass through D311 and be input to Q302, turning it ON. As Q302 goes active, the bias oscillator (Q303, Q304) commences operation, and at the same time that erase current is fed to the erase head, bias current is also passed through the bias adjustment potentiometer and fed to the recording head.

14.3 MUTING CIRCUIT (Refer to Fig. 14-1)

The muting circuit functions to prevent transient noise (occuring when the power switch is turned ON, or when the various mode switches are operated) from being output from the LINE OUTPUT terminal. It also prevents these noises from being recorded onto the tape.



S304 : REC MUTE (ON – OFF)
S305 : POWER (ON – OFF)
S601 : DOLBY NR (ON – OFF)
S603 : MPX (ON – OFF)

S6 : PLAY (PLAY – STOP)
S7 : FAST (FF – OFF)
S8 : REC (ON – OFF)

- **Power switch ON muting**

1. When the power switch is turned ON, current flows from the power transformer secondary following the path D301 → R318 → C326 → D308, and as long as C326 is in a charged status, Q309, is ON.
2. When Q309 comes ON, the base potential of Q310 drops, turning Q310 ON.
3 Q310 going ON causes Q108 and Q109 to come ON, eliminating any chance of noise output from the LINE OUTPUT terminal.

- **Power switch ON → OFF muting**

1. When the power switch (S305) is changed from the ON to OFF status, the charged stored in C328 is discharged following the path Q310 → R322 → D306, causing Q310 to the ON.
2. When Q310 comes ON, Q108 and Q109 also come ON effecting the muting status, and preventing any noise output through the LINE OUTPUT terminal.

- **STOP → PLAY mode muting**

1. When the PLAY switch is depressed, the mechanism goes from a STOP to a PLAY status, and S6 is thrown to the PLAY side.
2. +B is then present at S6, and this current follows the path R327 → C324 → D308. In this case, Q309 is held in an ON status for as long as C324 is charging.
3. During the interval Q309 is ON, Q310 is also ON, and as occured during power switch ON muting, Q108 and Q109 are ON, cancelling any signal output from the LINE OUTPUT terminal.

- **STOP mode muting**

1. When the mechanism goes into the STOP mode, +B current is present at S6, and flows through the path R330 → R329, turning Q309 ON.
2. When Q309 goes ON, Q310 also goes ON, triggering Q108 and Q109 ON and muting LINE OUTPUT. Also, as the current passes through D313 and turns Q104 and Q105 ON, RECORD mode muting is also effected.

- **STOP → REC mode muting**

1. When the mechanism goes from the STOP to the REC mode, S6 is thrown to the PLAY side, and S301-1 and S301-2 are thrown to the REC side.
2. When S6 is at the PLAY side, the muting time applied to the LINE OUTPUT terminal (noted in STOP → PALY mode muting) is extended. Then as S301-2 goes to the REC side, +B current is applied to D309, flowing through the path R323 → C325 → D308. The ON time of Q309 is extended while C325 is being charged, thus delaying the muting lift time.
3. During the interval Q309 and Q310 are ON, Q104 and Q105 also remain ON (via D313). Thus, in the time period prior to tape travel becoming stable, or when one of the mode switches is operated, any transient occuring will not be recorded onto the tape.

- **MUSIC SEARCH (MS) mode muting**

1. When the PLAY switch (S6) and FAST switch (S7) are depressed together, the MS mode is entered and S6 is thrown to the PLAY side, and S7 to ON.

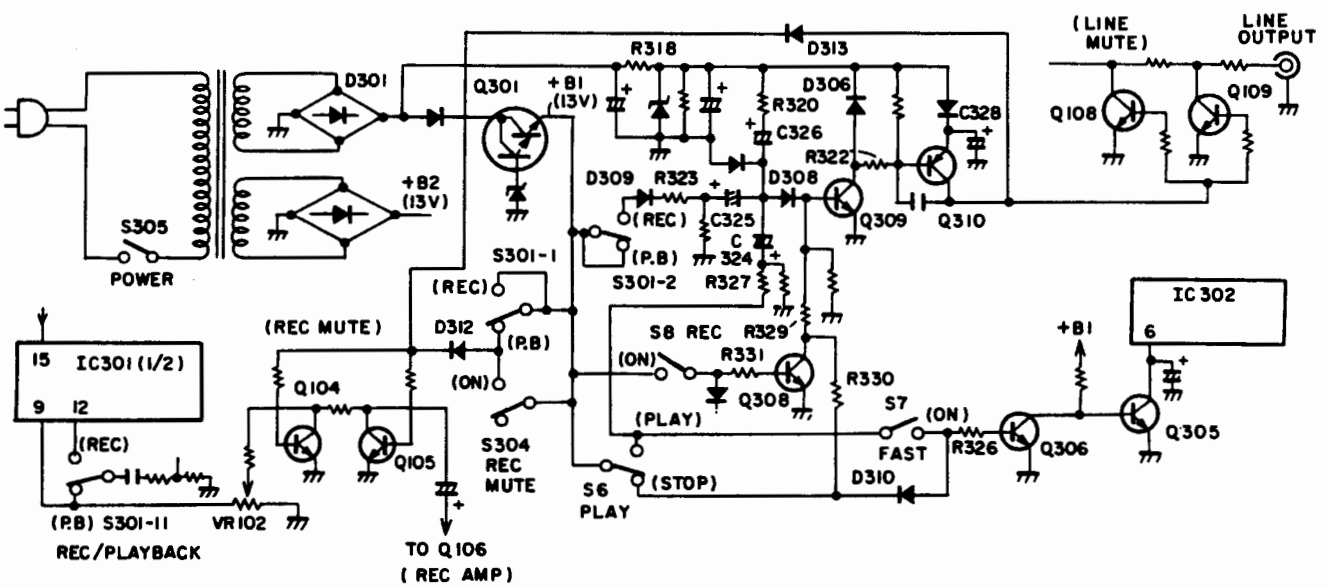


Fig. 14-1 Muting ciruit

2. +B current is present at S6 and flows through the path S7 → D310 → R330 → R329, turning Q309 ON. Also, Q310, Q108, and Q109 are ON until the tape stops between music selections, thus muting LINE.

- **Muting lift during REC PAUSE**

1. When the PAUSE button is pressed while the unit is in the REC mode, S6 is thrown to the STOP side, however, since S8 is still in an ON status, +B remains present at S8 and through R331, turn Q308 ON.
2. When Q308 is ON, both Q309 and Q310 remain in an OFF status, lifting LINE muting during this interval.

14.4 MUSIC SEARCH (MS) OPERATION (Refer to Figs 14-2 and 14-3)

The MS mode functions to locate music selections by locating non-recorded sections of over 4 seconds duration in the tape. MS operation is controlled by IC302 (BA336).

1. The MS mode is entered when the PLAY switch (S6) and FAST switch (S7) are depressed together. This causes S6 to be thrown to the PLAY side and S7 to be thrown ON. +B1 is applied to Q306 (via R326), turning Q306 ON. As Q306 comes ON, the base potential of Q305 drops turning it OFF, and the muting is lifted from the 6 pin of IC302. As muting is lifted, MS commences its operation.
2. The audio signal picked up from the playback head travels the path EQ amp → flat amp → MPX filter → IC301 pin 15 → IC301 pin 9, and is input to pin 3 of IC302. (The operation of IC302 will be covered later.)
3. When the audio signal at pin 3 of IC302 is below the input decision level, a pulse is output from pin 8 of IC302 and Q307 goes instantly ON. When Q307 goes ON, the MS solenoid is activated and the FAST travel mechanism is released (by S7 going OFF), and the PLAY mode is re-entered.
4. As S7 goes OFF, so does Q306. Q305 goes ON, and muting is applied to pin 6 of IC302 ending MS operations.

IC302 (BA336) Blank Detector Operation

BA336 is the IC performing the tape blank detection function. It consists of a preamp (with limiter circuit), comparator, flip-flop, and driver. (Refer to the block diagram and timing chart in Figs. 14-3 and 14-4 respectively.)

1. In the FAST mode, the audio signal enters pin 3 of BA336. After amplification by the preamp, it is compared with the reference voltage (Vref) by comparator I. If the signal is below the input decision level (in which case the tape is not recorded, or is recorded with an extremely low level signal), the potential at pin 2 begins to rise according to the time constant set by C321 and R312 (this C/R time constant also determines blank detection time), and when it reaches 1/2 Vcc, the output of the blank detection time setting comparator (comparator II) is triggered to the opposite

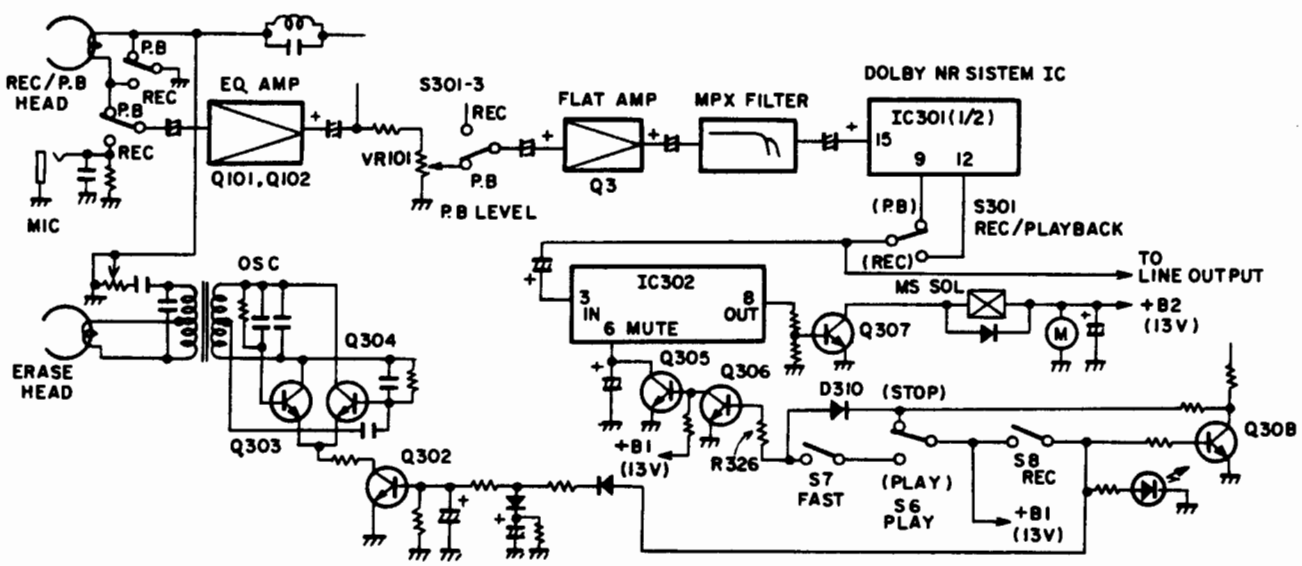


Fig. 14-2 MS operation

state. (Blank detection time is determined from the point the input signal dropped below the input decision level to the point when the output pulse is produced.)

2. From this point, the potential at pin 1 (output pulse width set by C/R time constant) begins to rise in accordance with the time constant of C320 and R313. When it reaches 1/2 Vcc, the pulse width setting comparator (comparator III) is triggered to the opposite state. Thus, during the interval between the point where the blank detection time setting comparator (comparator II) is reversed and the pulse width setting comparator (comparator III) is reversed, output is at a HIGH level.
   This HIGH level output turns Q307 ON, operating the MS solenoid.
3. When the power switch is turned ON, or when muting is OFF, a fixed-time interval reset pulse is generated resetting the internal flip-flop circuit, and no output pulse is produced. (Capacitor C319 connected to pin 6 serves to prevent the song finder function from until the circuits have stabilized after power has been turned ON.) After this, the input signal sets the flip-flop circuit, and the song finder function enters into a waiting status, and an output pulse is produced at each blank between music selections.

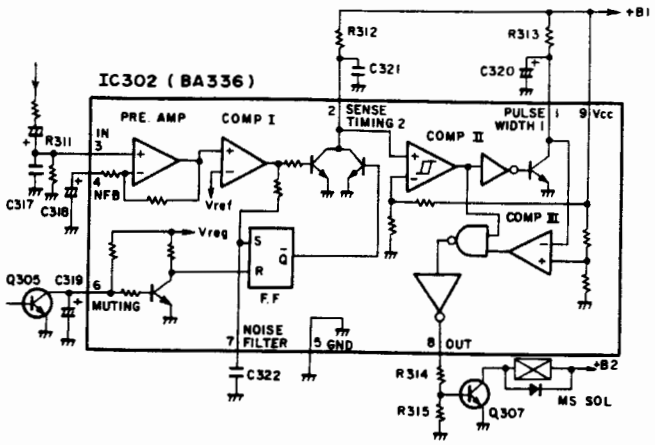


Fig. 14-3 BA336 Block diagram

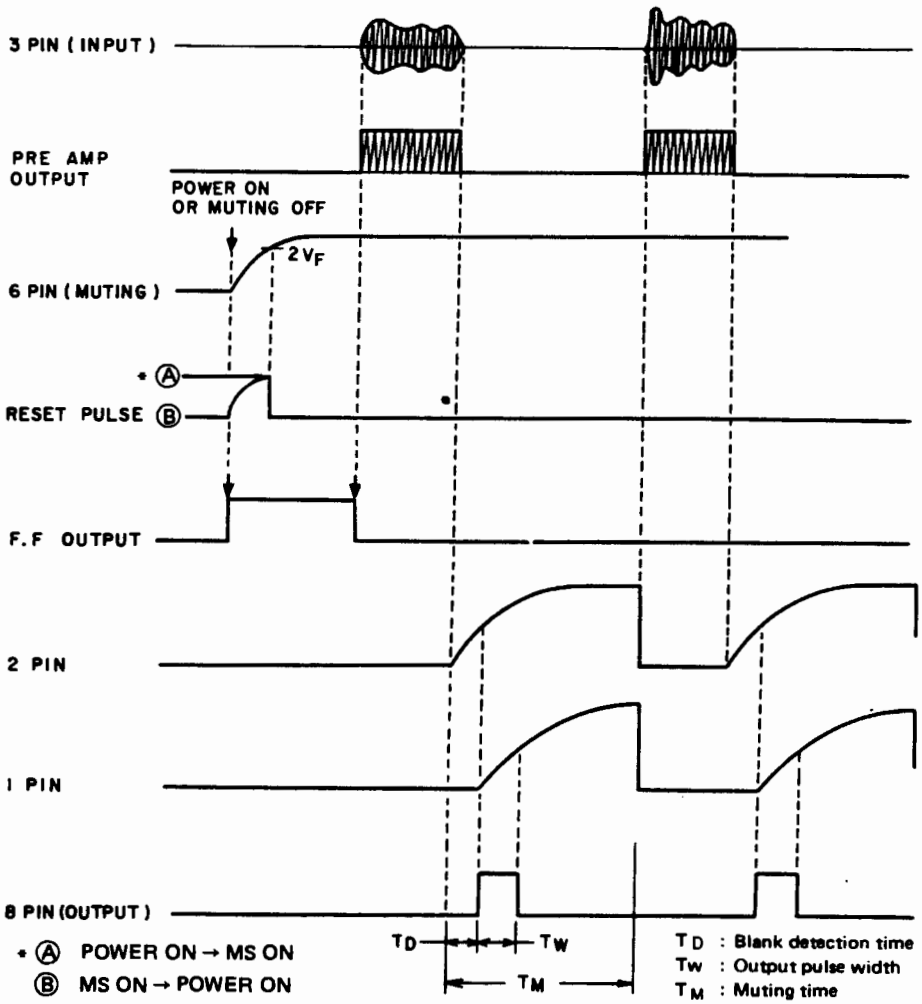


Fig. 14-4 BA336 Timing chart

15. CASSETTE DECK MECHANICAL OPERATIONS (SIMPLIFIED DESCRIPTION)

The mechanical portion of the CT-3 uses separate power assist mechanisms for the PLAY and REC system for light-touch operation. A mechanical auto-stop and MS (Music Search) function is also built-in.

15.1 STOP MODE

Fig. 15-1 shows the PLAY and REC power assist mechanisms in the stop mode. In this status, the cam gear stopper A is making contact with gear lever A, so the cam gear and capstan gear (flywheel) are not meshed. (When the power switch is ON, the motor continues rotating, driving the capstan gear via the belt).

15.2 PLAY OPERATIONS (Fig. 15-2, 15-3)

1. When the PLAY button is pressed down, the shape of the button forces gear lever A in the ① direction. Also, at the same time, gear lever B travels in the ① direction, and gear lever A and cam gear stopper A are disengaged.
2. The cam gear is forced in the direction ② by the trigger spring. Consequently, it starts rotating in the direction ② (CCW) and meshes with the capstan gear (flywheel).
3. As the capstan gear and cam gear are now engaged, the force transmitted by the motor and flywheel rotate the cam gear further, until stopper C makes contact with gear lever B. It stops in that position. At this point, the capstan gear and cam gear are no longer meshed. (See right side of Fig. 15-2).
4. Now, the projection on the cam gear boss is forcing the brake-plate down in the direction ③ , and braking force is released from the reel base.
5. Also, the cam shape of the cam gear is moving the action lever in the ④ direction.
6. The head base is lifted by the action of this action lever, placing it in the PLAY position and throwing the PLAY switch to the PLAY side. (See Fig. 15-3). This action also presses down on the pinch roller pressure spring causing pressure contact between the pinch roller and capstan, and starting tape travel.
7. At the same time, the TU (take-up) idler is forced up into contact with the take-up reel base to start it rotating, and the PLAY mode is entered.

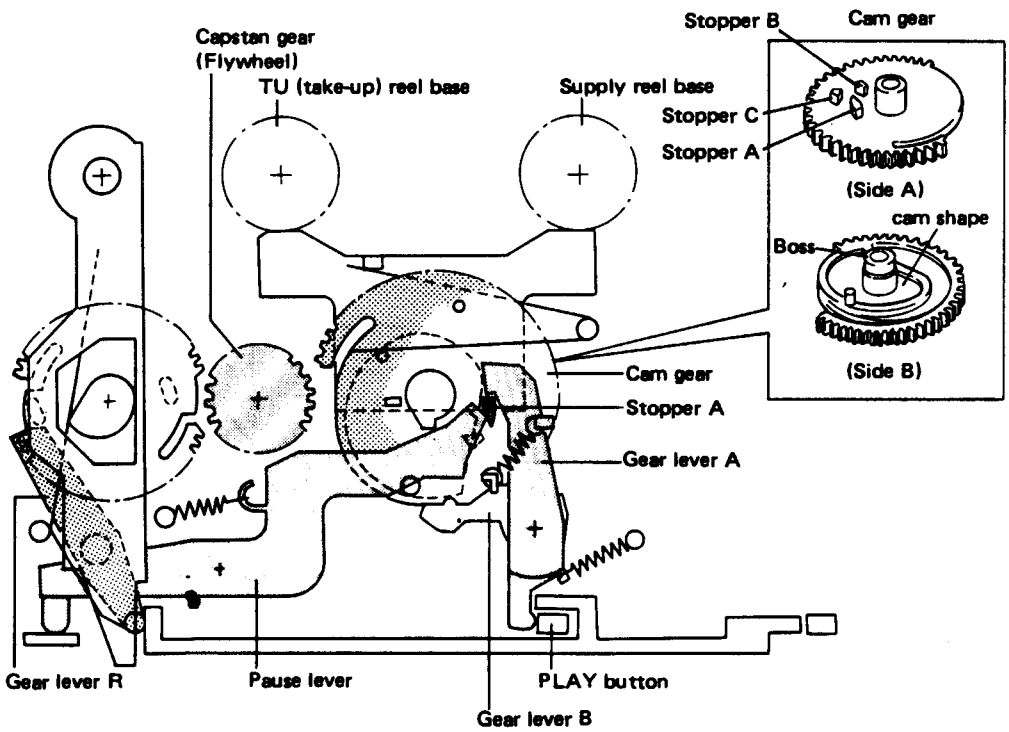


Fig. 15-1 Mechanism in STOP mode
(Rear View)

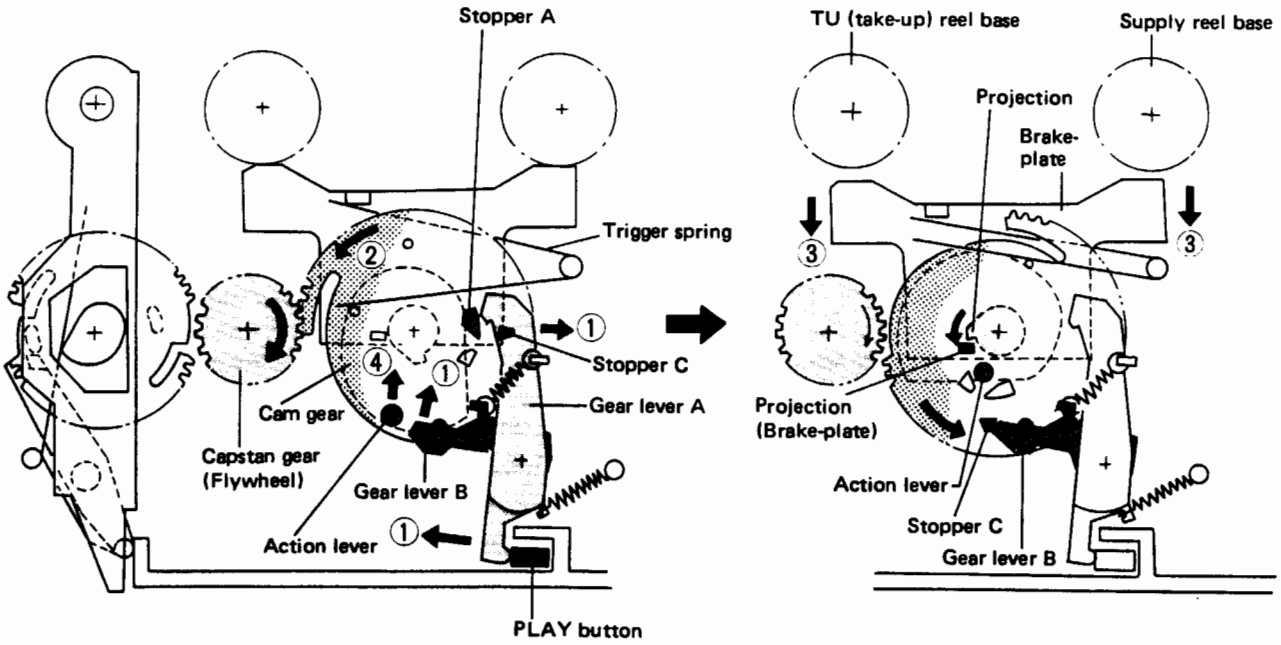


Fig. 15-2 STOP → PLAY operation

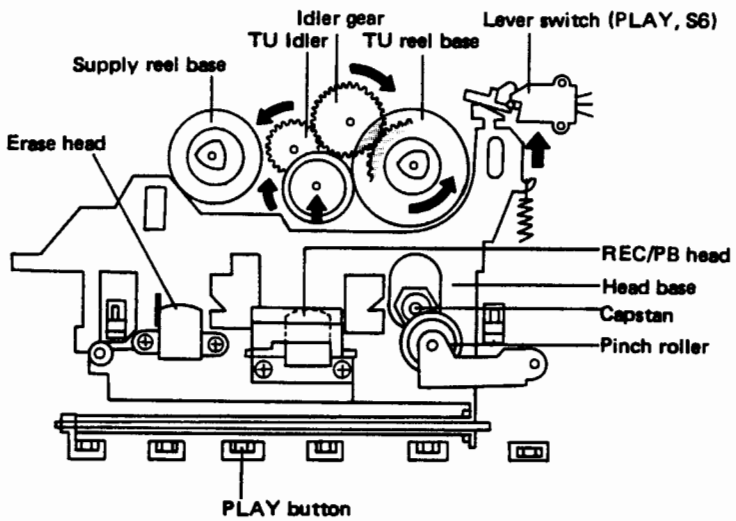


Fig. 15-3 PLAY operation

15.3 PLAY → STOP OPERATION (Fig. 15-4)

1. When the STOP button is pressed, the PLAY button lock is released, and the force of gear lever spring A returns gear lever A and B in the direction ⑤ . This action separates cam gear stopper C from gear lever B.
2. As cam gear stopper C moves away from gear lever B, the compression force of the trigger spring rotates the cam gear in the direction ② until stopped by contact between cam gear stopper A and gear lever A. (See the right side of Fig. 15-4).
3. This rotating action releases the brake-plate from the projection on the cam gear boss. The brake-plate is returned to its up position by the force of the trigger spring, stopping the rotation of the supply and take-up reel base.
4. At the same time, the shape of the cam (machined on the upper surface of the cam gear) returns the action lever in the ⑥ direction, releasing the pressure contact the pinch roller and TU idler are placing on the reel base. The head base also returns to the STOP position, and the PLAY switch is thrown to the STOP side, completing entry into the STOP mode.

15.4 PLAY → PAUSE OPERATION → PAUSE RELEASE (Fig. 15-5)

1. When the PAUSE button is pressed (unit in PLAY mode), the cam on the PAUSE button moves the pause lever in the ⑦ direction.
2. The pause lever pushes gear lever B up in the ⑧ direction, releasing the cam gear stopper C. The cam gear starts rotating in the ⑨ direction, stopping at the point cam gear stopper A makes contact with the pause lever tip.
3. The rotation of the cam gear causes the brake plate, pinch roller, TU idler, head base, and PLAY switch to all return to the STOP position (See 15.3, PLAY → STOP Operations), entering the PAUSE mode.

PAUSE Mode Release:

4. Once again pressing the PAUSE button releases the pause ratchet mechanism, and the pause button (presently in contact with the return spring) returns to its original position.
5. Since the pause lever is moved in the ⑩ direction by the pause lever return spring, stopper A on the cam gear is released from the pause lever.
6. The force of the trigger spring moves the cam gear in the ⑨ direction and starts meshing the cam gear with the capstan gear. From this point, all operations are the same as in the PLAY mode, and tape travel is re-started.

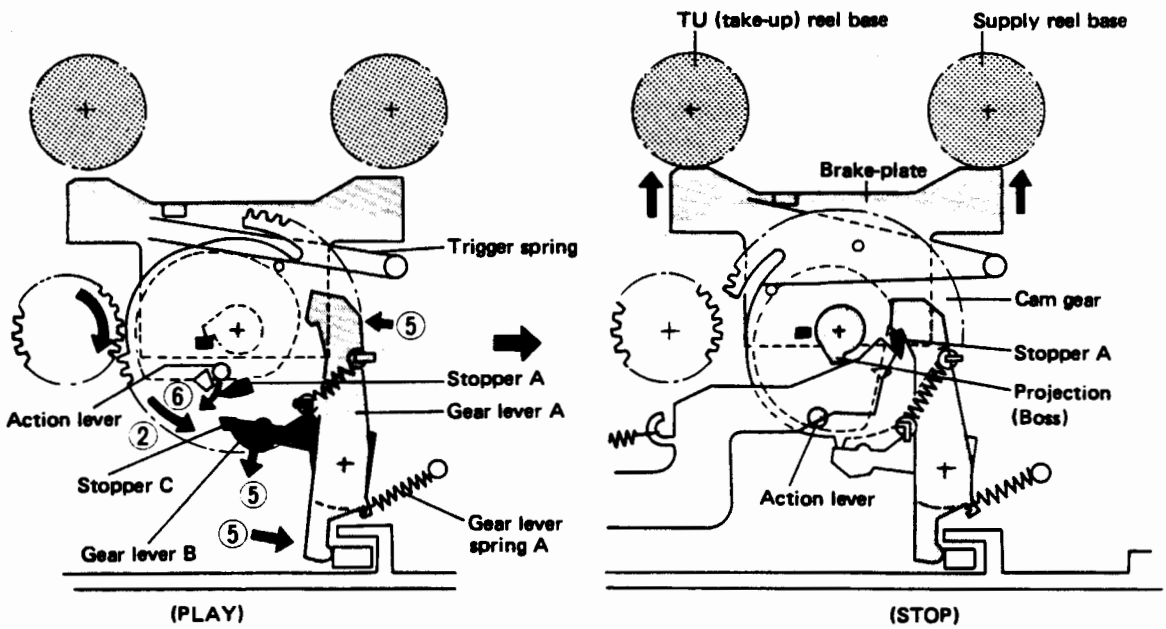


Fig. 15-4 PLAY → STOP operation

15.5 REC OPERATIONS (Fig. 15-6, 15-7)

1. When the REC button is pressed, the cam on the REC button moves the REC connection arm in the ① direction, gear lever R in the ② direction, and gear lever A in the ③ direction.
2. With the movement of gear lever R, stopper A on cam gear R is released from gear lever R, cam gear forced down by the pressure exerted by trigger spring R, and starts rotating in the ④ direction. It then commences to mesh with the capstan gear.
3. As cam gear R becomes meshed with the capstan gear, cam gear R continues rotating until stopper B (on cam gear R) makes contact with gear lever R, stopping it in that position.
4. At this time, the shape of the cam on cam gear R causes the REC action lever to move in the ⑤ direction, pressing on the REC action plate. (Fig. 15-7).
5. The function of the REC action plate is to throw the REC switch and REC/PLAY switch to the REC side.

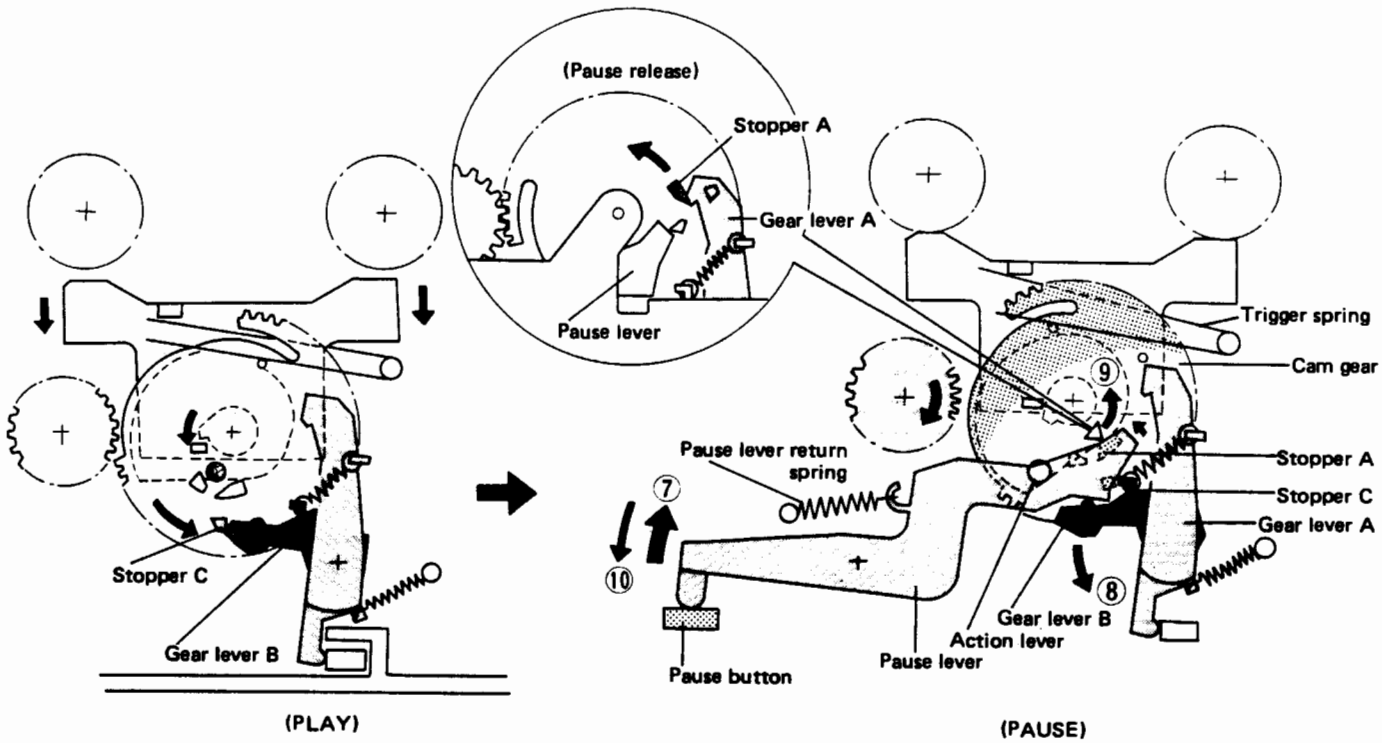


Fig. 15-5 PLAY → PAUSE operation

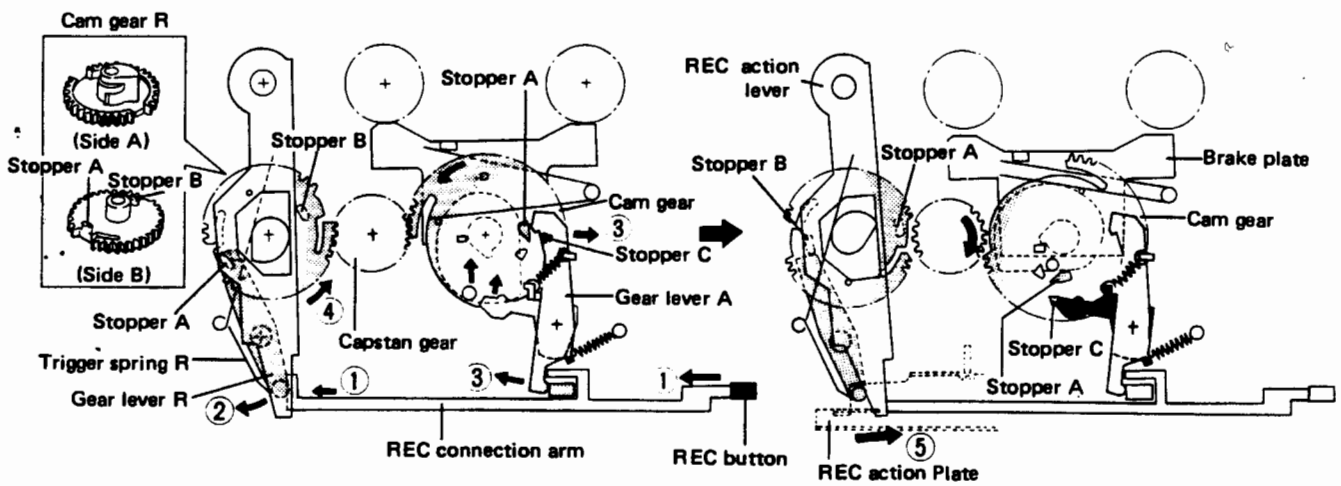


Fig. 15-6 STOP → REC operation

6. Also, as gear lever A becomes released from stopper A on the cam gear (noted in step 1. above), the cam gear meshes with the capstan gear to start tape travel, and as the PLAY switch is also thrown to the PLAY side (see 15.2, PLAY Operations), the REC mode is entered.

15.6 REC → PAUSE OPERATION → PAUSE RELEASE

1. In going from REC to PAUSE, all operations are as outlined in 15.4 PLAY → PAUSE Operation. In other words, when the REC switch and the REC/PLAY switch remain on the REC side, tape travel is stopped by only the PLAY switch being thrown to the STOP side.
2. PAUSE release also conforms to the operations outlined in 15.4 PLAY → PAUSE Operation → PAUSE Release. Here, the PLAY switch is thrown to the PLAY side, and re-starting tape travel causes entry into the REC mode.

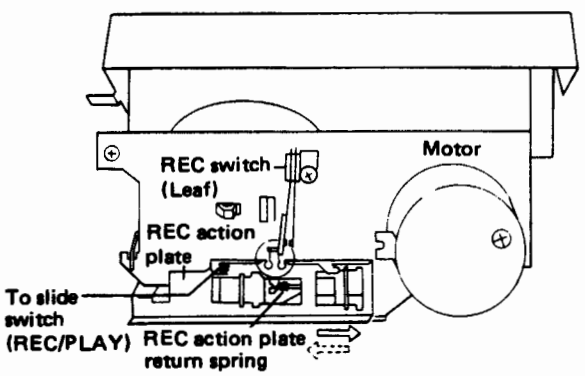


Fig. 15-7 STOP→REC operation
(REC switch ON)

15.7 REC → STOP MODE (Fig. 15-8)

1. When the STOP button is pressed releasing the REC button lock, the trigger spring R returns the REC connection arm and gear lever R in the ⑥ direction, breaking contact with stopper B on cam gear R.
2. The REC action plate return spring rotates cam gear R in the ⑦ direction, and starts meshing it with the capstan gear.
3. Cam gear R continues to rotate until stopper A (on cam gear R) makes contact with gear lever R, stopping it in the former position of stopper B.
4. The shape of the cam on cam gear R returns the REC action lever and REC action plate to the STOP position, and throws the REC switch and REC/PLAY switch to the PLAY side.
5. Also, the action of gear lever A returning to the STOP position throws the PLAY switch to the STOP side, halting tape travel. (Refer to 15.3 PLAY → STOP Operation).
   * In the REC → STOP cycle, cam gear R and the capstan gear are meshed to have the switch timing of the PLAY and REC/PLAY switches.

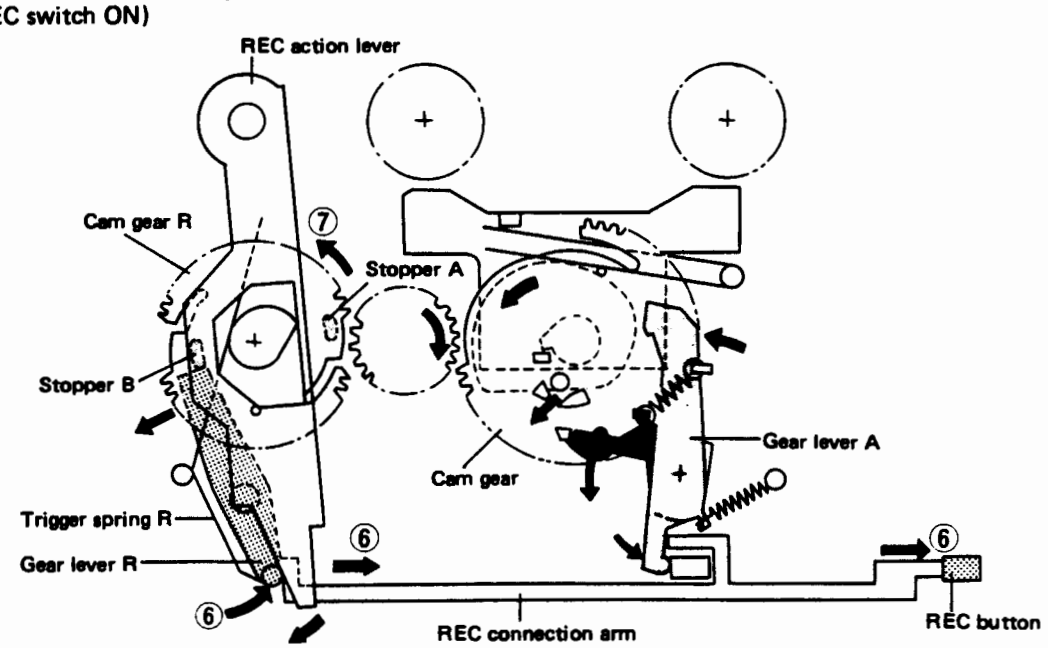


Fig. 15-8 REC → STOP operation

15.8 FF (Fast Forward) (or REW) OPERATIONS (Fig. 15-9 ~ 15-11)

1. When the FF (or REW) button is pressed, joint R (L) moves in the direction of ① , pressing down (① direction) on the FF (REW) action plate. At the same time, the lever switch is thrown to the ON position (Fig. 15-10, 15-9).
2. Next, the brake-plate is pressed down by the FF (REW) action plate, and at this time the driving arm is forced in the ③ (or ④) direction to start the reel base rotating in the FF (or REW) mode.
3. At the same time, gear lever C moves in the ⑤ direction and the head base (HB) lock lever moves in the ⑥ (or ⑦) direction. (This procedure also applies to MS operations).

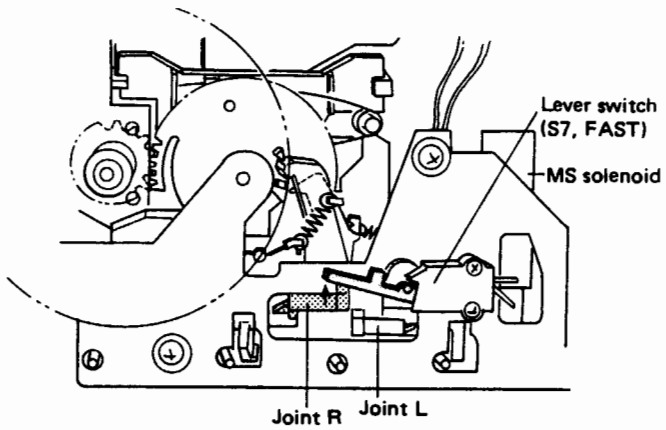


Fig. 15-9 FF (REW), MS operation I (Lever switch ON)

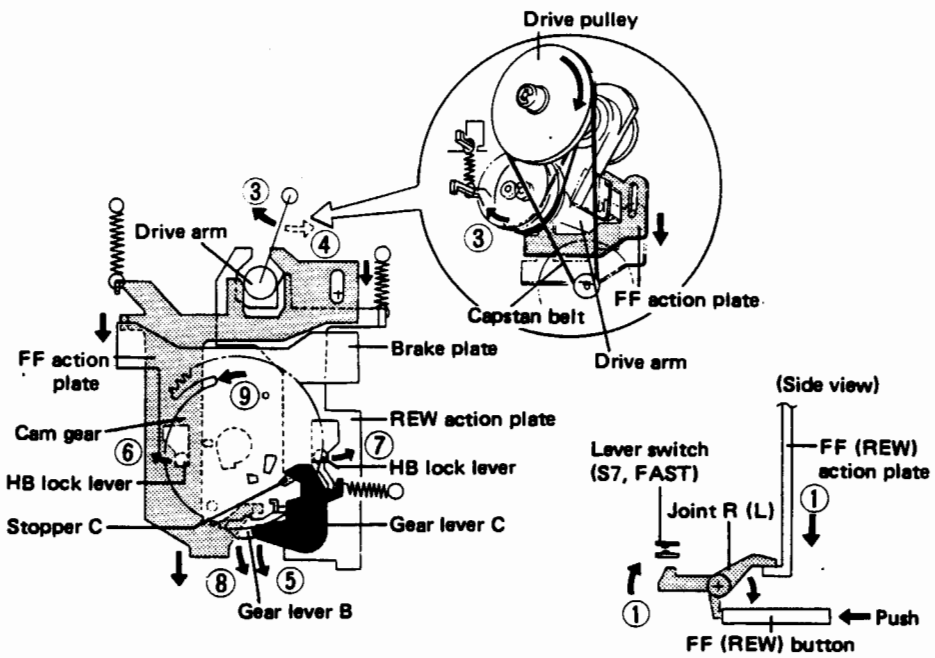


Fig. 15-10 FF (REW) operation, MS operation II

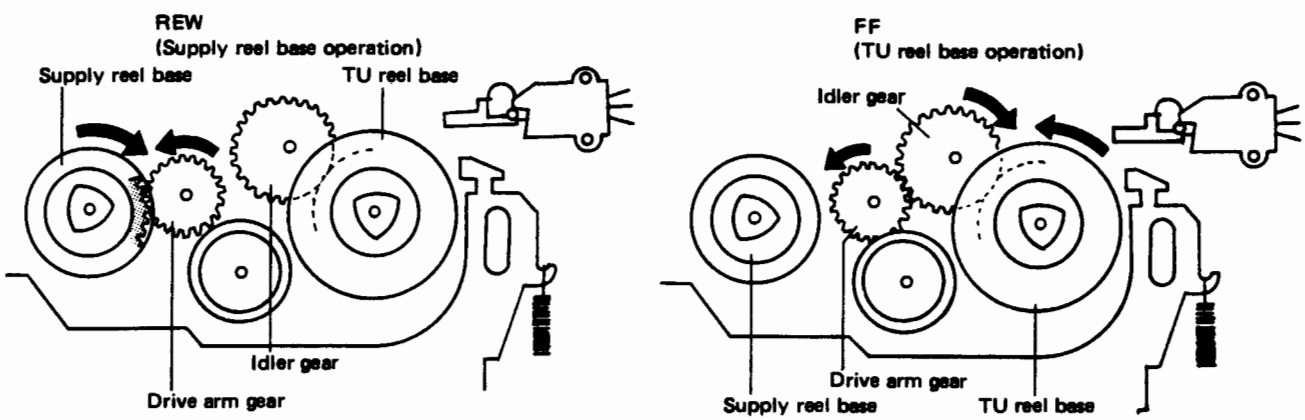


Fig. 15-11 FF, REW operation III

15.9 MS OPERATIONS (Figs. 15-10, 15-12)

1. When the FF (or REW) button is pressed in the PLAY mode, the action of gear lever C returns gear lever B in the ⑧ direction (Refer to 15.8 FF (or REW) Operations) to free stopper C on the cam gear.
2. The cam gear rotates in the ⑨ direction until stopped by cam gear stopper C making contact with gear lever C.
3. Also, the rotation of the cam gear causes the action lever to return to the STOP position, moving the pinch roller away from the capstan and releasing pressure contact from the TU idler.
4. At the same time, the head base returns toward the down position, but the HB lock lever acts as a stop, holding it half way between the PLAY and STOP position. At this time, the PLAY switch also remains in the PLAY position.
5. The action of joint R (L) throws the lever switch to the ON side, and the driving arm moving in the ③ (or ④) direction starts reel base rotation in the FF (or REW) mode. (See also 15.8, FF (or REW) Operation, step 3).
6. When the tape blank detector circuit locates a non-recorded section of the tape, the MS solenoid is activated, pulling the lock plate in the direction of ⑩ (Fig. 15-12).
7. The draw stroke of the MS solenoid is set so that only the FF (REW) button lock is released. The PLAY button remains in the locked position.
8. The above description covers the mechanical operations as the unit goes from MS detection mode to STOP to PLAY. MS operations are terminated when play begins again at the beginning of a music selection.

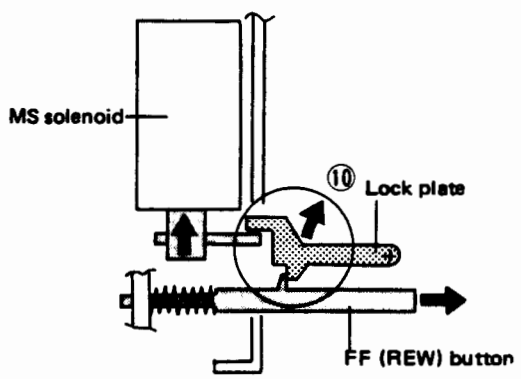


Fig. 15-12 FF (REW) button release

15.10 AUTO-STOP OPERATIONS (Fig. 15-13)

1. In each of the previously covered operation cycles, when the brake-plate is moved in the direction of ⑪ , the detector lever is pulled in the ⑫ direction by the force of the link return spring. As the cam gear rotates, pin (A) on the detector lever makes contact with cam (A) or cam (B) on the cam gear.
2. The cam gear normally turns with motor rotation, and with each revolution of the cam gear, the detector lever is moved to a center position relative to cam (A) (PLAY, REC, FF) or cam (B) (REW).
3. After the detector lever has been moved to the center position, if the reel base is still rotating, the friction torque of the detector disc again moves it to the right (in REW) or left (in PLAY, REC, FF). When the take-up reel base is rotating, the friction torque of the detector disc is generated by the rubbing action of the detector spring and detector felt placed between the idler gear and the detector disc, and this torque exerts its force in the opposite direction of take-up reel rotation. This friction torque is used to move the detector lever to the right (or left). As long as the reel base continues to rotate, the back and forth motion of the detector lever will also continue.
4. When the tape is fully taken up and the reel base stops, the shape of the cam (on the cam gear) and the friction torque of the detector disc act to position the detector lever in the center position.
5. Next, the cam gear continues to rotate, so pin (B) of the cam gear presses pin (A) of the detector lever.
6. The detector lever, being moved by the cam gear, moves the stop lever (via the coupling link) in the direction of ⑬ and pulls the lock plate in the ⑭ direction to release the button lock. All mechanisms are returned to STOP mode.

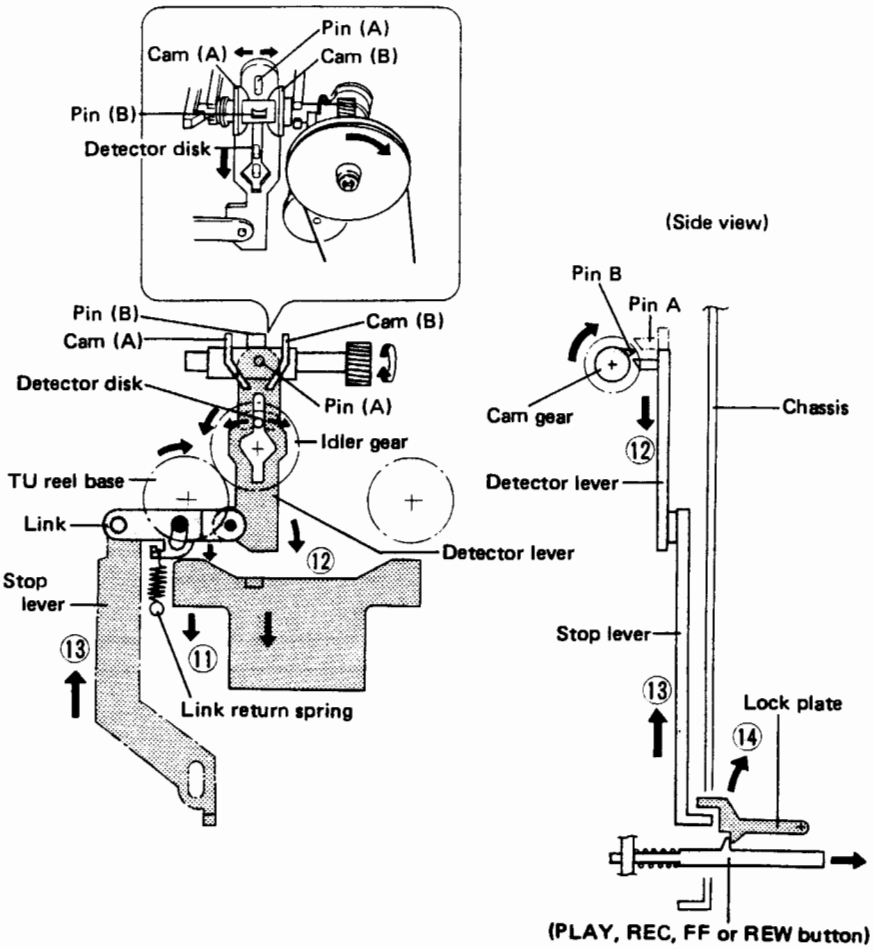
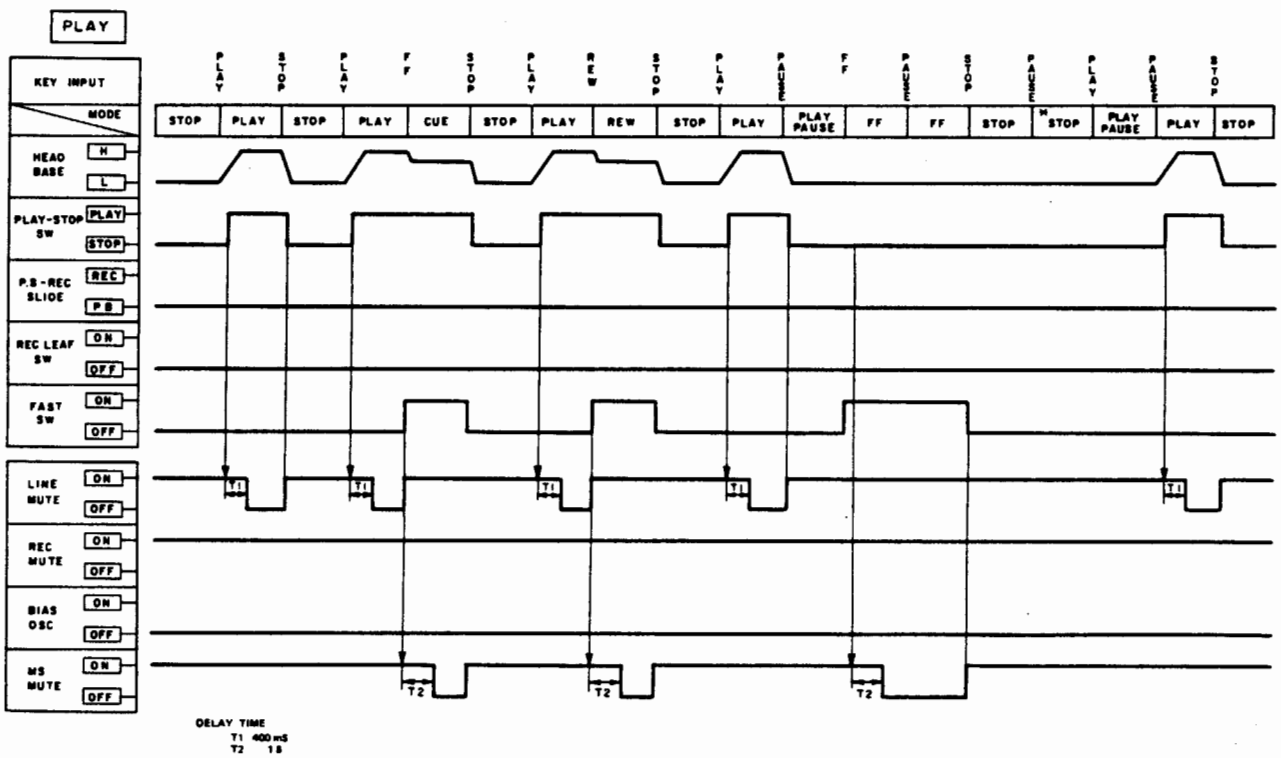
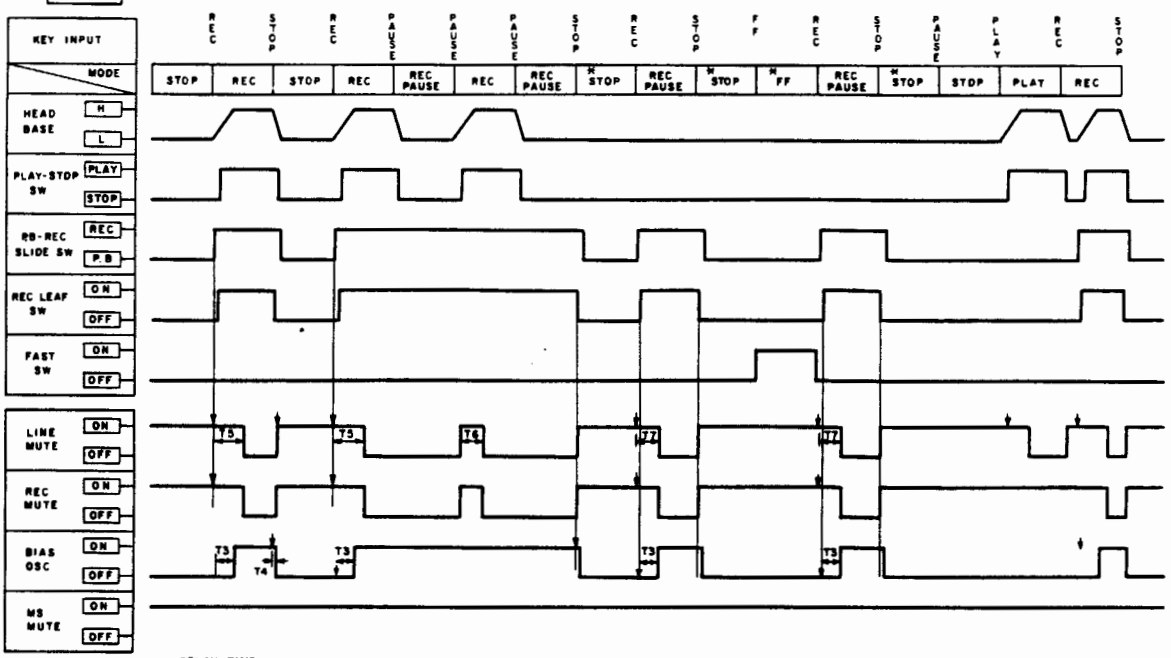


Fig. 15-13 AUTO-STOP operation

15.11 TIMING CHARTS

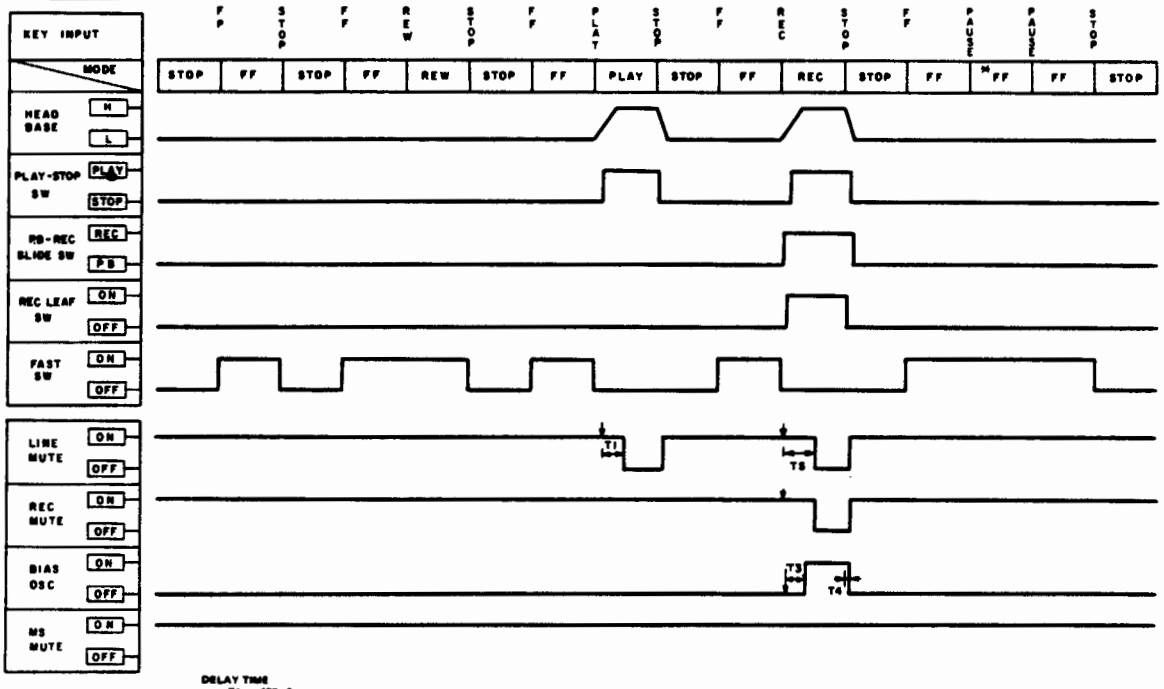


REC



DELAY TIME
T3 25 mS
T4 15 mS
T5 800 mS
T6 400 mS
T7 400 mS

FAST



DELAY Time
T1 400mS
T3 25mS
T4 15mS
T5 800mS