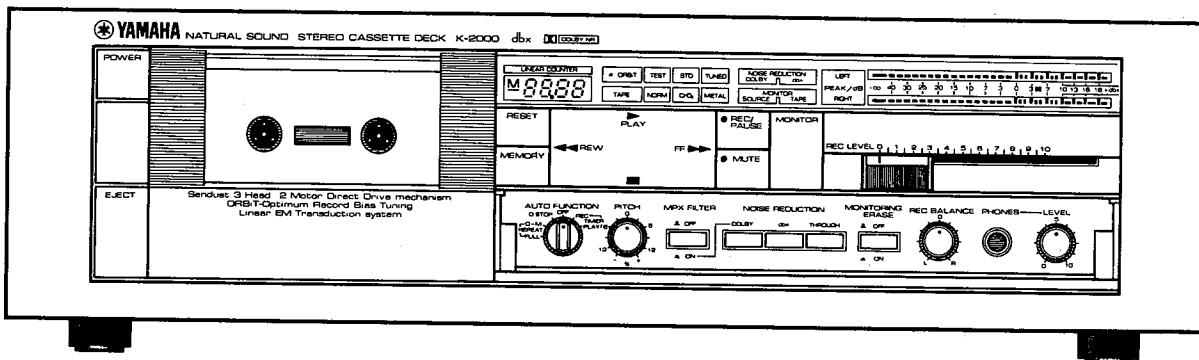


329

STEREO CASSETTE DECK K-2000

SERVICE MANUAL

FRONT PANEL



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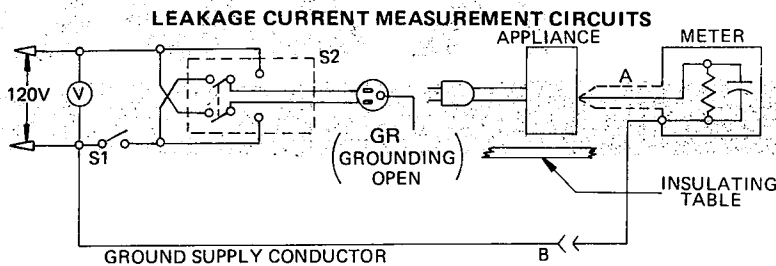


■ TO SERVICE PERSONNEL

(Prepared in accordance with UL Standard 1270)

Before service of this appliance by you, please carefully read this service manual.

Please make Leakage-current or Resistance measurements by suitable meter to determine that exposed parts are acceptably insulated from the supply circuit before returning the appliance to the customer.



Appliance intended for connection to a 120 volt power supply.

- A PROBE WITH SHIELDED LEAD.
 B SEPARATED AND USED AS CLIP WHEN MEASURING CURRENTS FROM ONE PART OF APPLIANCE TO ANOTHER.

Confirm that the leakage current is not more than 0.5mA AC.

■ SPECIFICATIONS

Track Configuration	4-track 2 channel Stereo Cassette Deck
Transport Controls	5-key feather touch full logic control
■ MECHANICAL SECTION	
Tape Speed	4.8 cm/sec
Wow & Flutter	less than 0.08% W. Peak less than 0.02% W. RMS
Rapid Transport (F. FWD/REW)	Within 75 seconds (for C-60 cassette)
Motor	1 Pulse Servo Brushless DD motor (Capstan) 1 Flat Torque DC motor (Reel)
Mechanism	2-motor, 2-solenoid mechanism
■ HEAD SECTION	
Recording/Playback Head	Combination, Low-Impedance Sendust 3 Laminate Core
Erase Head (Main, Sub)	Double Gap Sendust Clevite
■ AMPLIFIER SECTION	
REC/PB Frequency Response	
Normal tape (-20dB)	20Hz to 18kHz ± 3 dB
Chrome tape (-20dB)	20Hz to 20kHz ± 3 dB
Metal tape (-20dB)	20Hz to 20kHz ± 3 dB
(0dB)	30Hz to 15kHz ± 3 dB
Input Sensitivity/Impedance	LINE: 50mV/30k Ω
Maximum allowable input	LINE: 6V

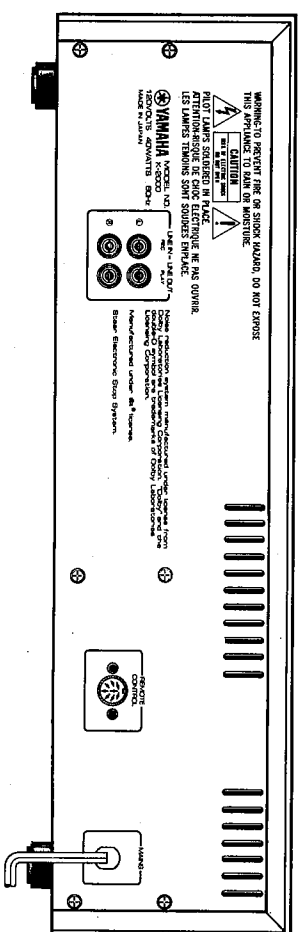
Output Level/Impedance	LINE: 500mV/30k Ω PHONES: 170mV/8 Ω
Signal-to-Noise Ratio	THROUGH more than 59dB DOLBY more than 68dB dbx more than 108 dB
Harmonic Distortion	Metal tape (315Hz) less than 0.8%
■ GENERAL	
Power Supplies	
U.S & Canadian Models	120V 60Hz
European Model	220V 50Hz
British & Australian Models	240V 50Hz
General Model	110/120/220/240V 50/60Hz
Power Consumption	40W
Dimensions (W x H x D)	435 x 122.5 x 346 (17-1/8x4-7/8x13-5/8")
Weight	9 kg (19.8 lbs)

Specifications subject to change without notice.

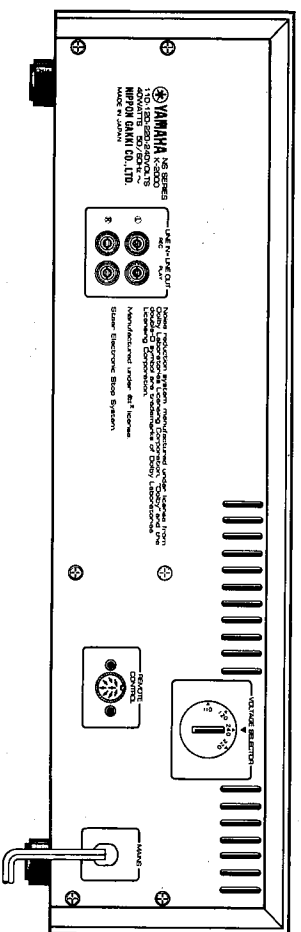
- (U) U.S.A. model
 (C) Canadian model
 (A) Australian model
 (G) European model
 (B) British model
 (R) General model

REAR PANEL

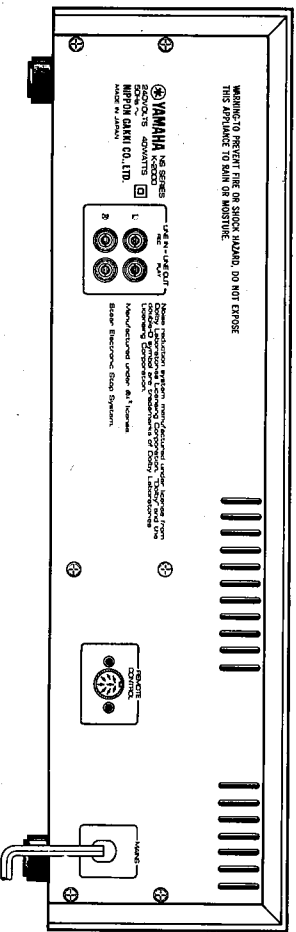
U.S.A. & Canadian models



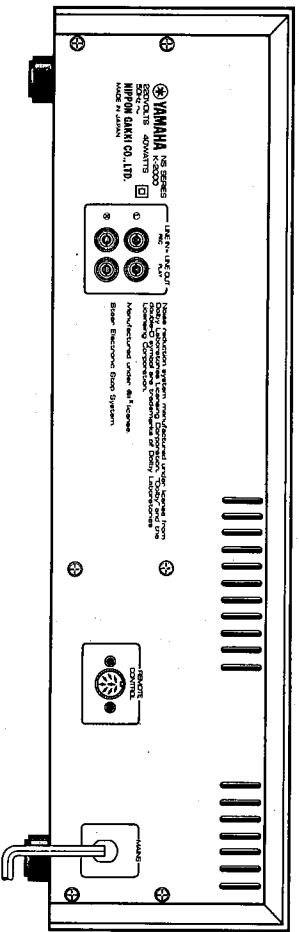
General model



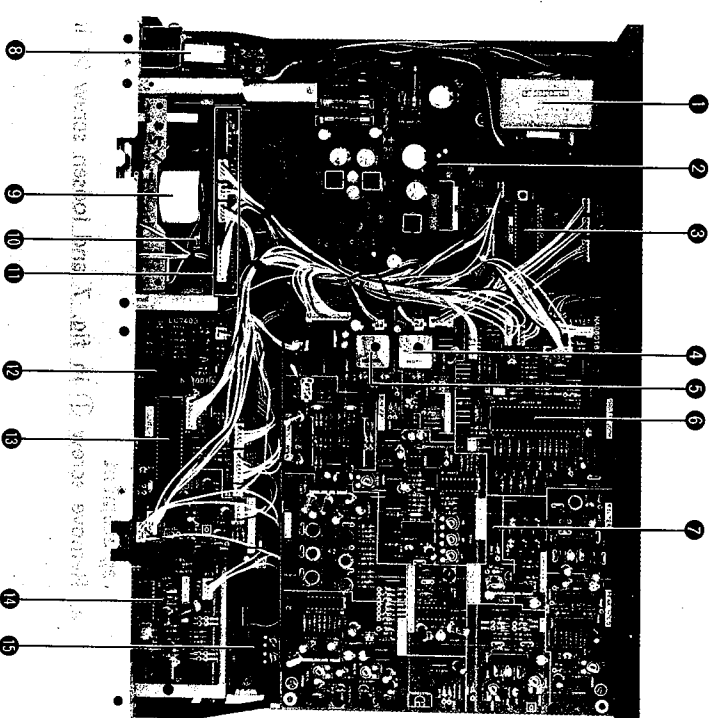
British & Australian Models



European model



INTERNAL VIEW



- 1 POWER TRANSFORMER
- U.S.A. & Canadian models: GA658850
- Australian & British models: GA658870
- European model: GA658840
- General model: GA658840
- 2 POWER CONTROL BOARD (1)
- 3 LOGIC CONTROL IC: μ PD554-083
- 4 BIAS OSC.: IG08970
- 5 BIAS OSC.: IG07600
- 6 α ORBIT IC: LM6405A-150
- 7 RECORDING AMP. CIRCUIT BOARD
- 8 POWER SWITCH
- 9 REEL MOTOR
- 10 CAPSTAN MOTOR (D.D. Motor)
- 11 RELAY CIRCUIT BOARD
- 12 COUNTER CIRCUIT BOARD (1)
- 13 COUNTER IC: LM6402A-108
- 14 COUNTER CIRCUIT BOARD (2)
- 15 MAIN CIRCUIT BOARD (1)

DISASSEMBLY PROCEDURES

DISASSEMBLY PROCEDURES OF CABINET PARTS

1. Top cover removal

Remove screws ① and ② of both left and right sides in fig. 1, and then remove the top cover.

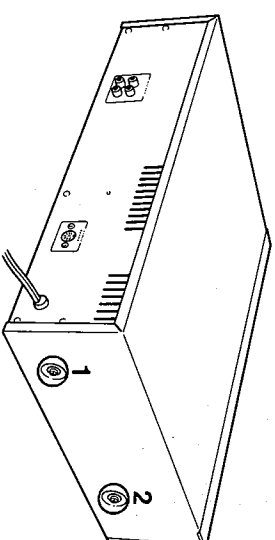


Fig. 1

2. Bottom cover removal

Remove screws ① through ⑧ in fig. 2 and then remove the bottom cover.

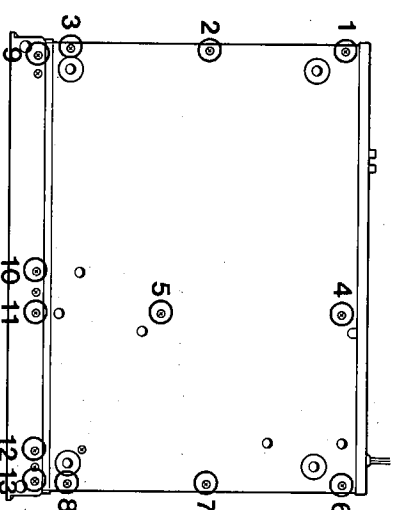


Fig. 2

3. Front panel removal

- a. Remove the top cover.
- b. Open two binding ties which tieup each connectors.
- c. Remove screws ① and ② in fig. 3 and pull the counter circuit board (1) backward gently (connected to the front panel by connectors.)
- d. Remove screws ③ and ④ in fig. 3 and pull the counter circuit board (2) backward gently (connected to the front panel as well as counter circuit board (1).)
- e. Remove connectors #12, #14, #15, #16, #17.
- f. Remove screws ⑨ through ⑬ (binding screws only) in fig. 2 and screws ⑤ through ⑧ (binding screws only) in fig. 3, and then pull the front panel forward gently.

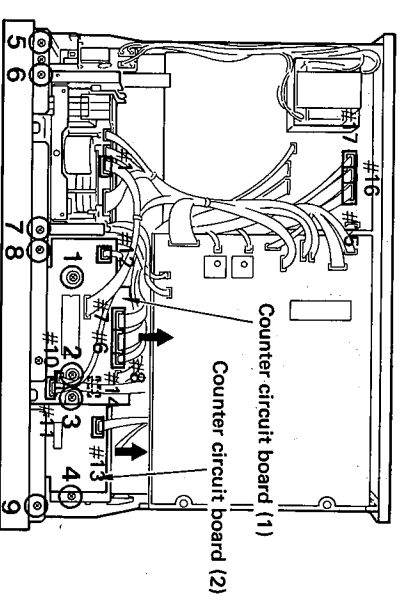


Fig. 3

DISASSEMBLY PROCEDURES OF CASSETTE MECHANISM

1. Cassette mechanism unit removal
 - a. Remove the top cover and front panel.
 - b. Disconnect the connectors (#1, #3, #4, #5) connected to the relay circuit board. (Refer to fig. 15)
 - c. Disconnect the head lead wire connectors #25, #26, #27, #28). (Refer to fig. 15)
 - d. Remove screws ① and ③ in fig. 4, and you can remove the cassette mechanism unit.

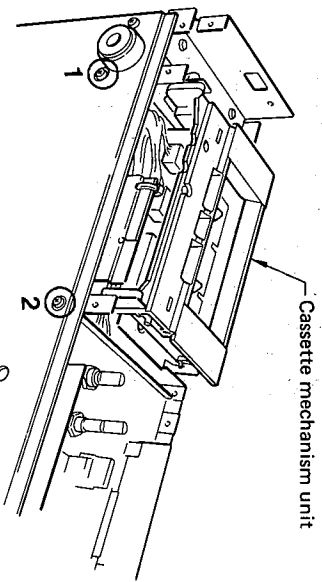


Fig. 4

2. Idler Ass'y replacement
 - a. Remove screw ① in fig. 5 and open the cassette holder.
 - * Be careful of the spring position when assembling unit. (Refer to fig. 5)
 - b. Loosen the lead wires (orange and white-colored) of LED on the blind plate.
 - c. Remove screws ② and ③ in fig. 5 and then remove the blind plate.

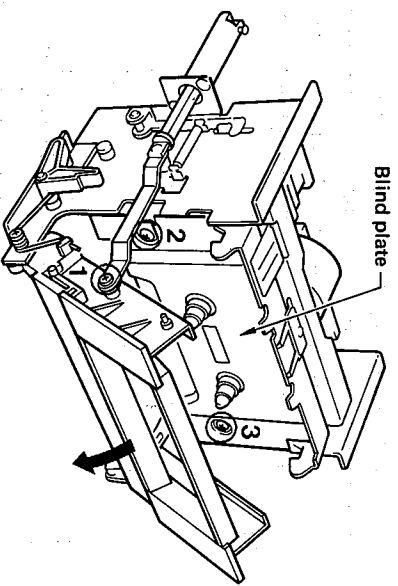


Fig. 5

- d. Remove screw ① and idler spring in fig. 6, and replace the idler ass'y.

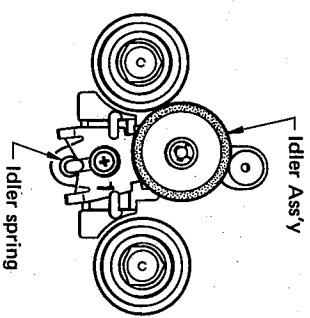


Fig. 6

3. Recording/playback combination head and erase head replacement
 - a. Remove screw ① in fig. 7 and loosen screw ② in fig. 7, and then remove the M circuit board plate.
 - b. Remove screw ③ in fig. 7 and open the cassette holder.
 - c. Unsolder the lead wires of heads.
 - * Refer to fig. 9 when connecting them.
 - d. Remove screws ① and ② in fig. 8 and then replace the recording/playback combination head.
 - e. Remove screws ③ and ④ in fig. 8 and then replace the erase head.
 - * Check head azimuth adjustment when replacing the recording/playback head.
 - * Check height adjustment of erase head guide when replacing the erase head.
 - f. Remove screw ⑤ in fig. 8 and then replace the sub erase head.

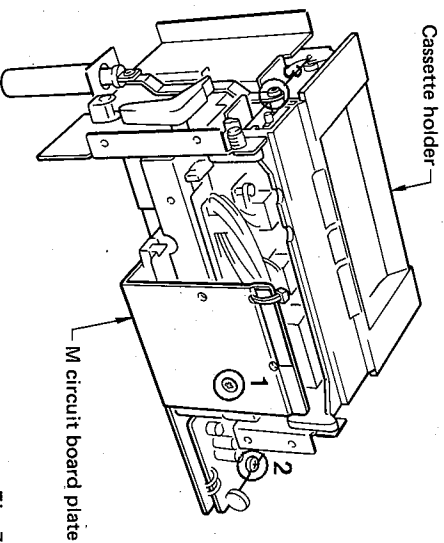


Fig. 7

4. Pinch roller replacement
 - a. Open the cassette holder.
 - b. Remove the washer ① in fig. 10 and then replace the pinch roller arm ass'y.
 - * Refer to fig. 10 as to the position of pinch roller spring.

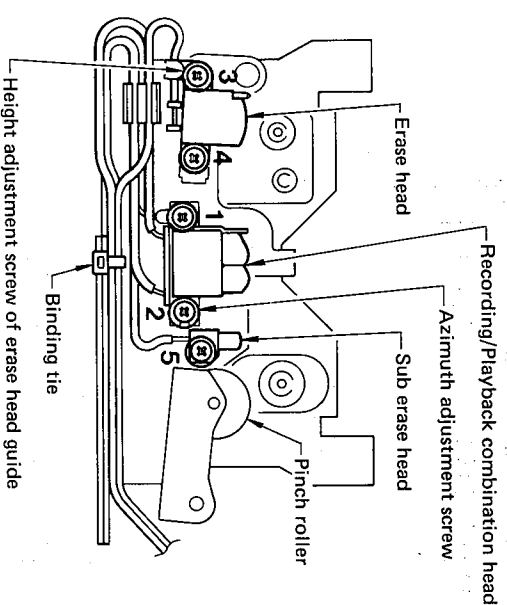


Fig. 8

• WIRE COLOR ABBREVIATIONS

BL ▶ Black	VI ▶ Violet
BR ▶ Brown	GY ▶ Gray
RE ▶ Red	WH ▶ White
OR ▶ Orange	GG ▶ Light Green
YE ▶ Yellow	SB ▶ Light Blue
GR ▶ Green	PK ▶ Pink
BE ▶ Blue	TR ▶ Transparent

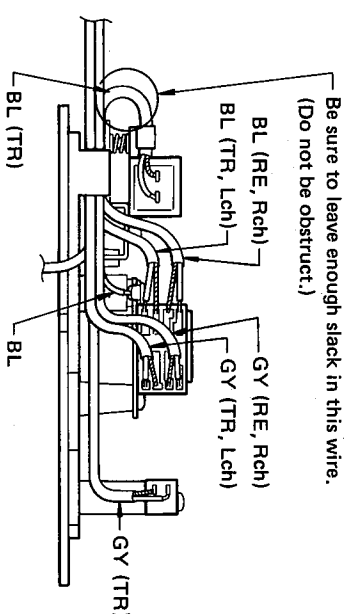


Fig. 9

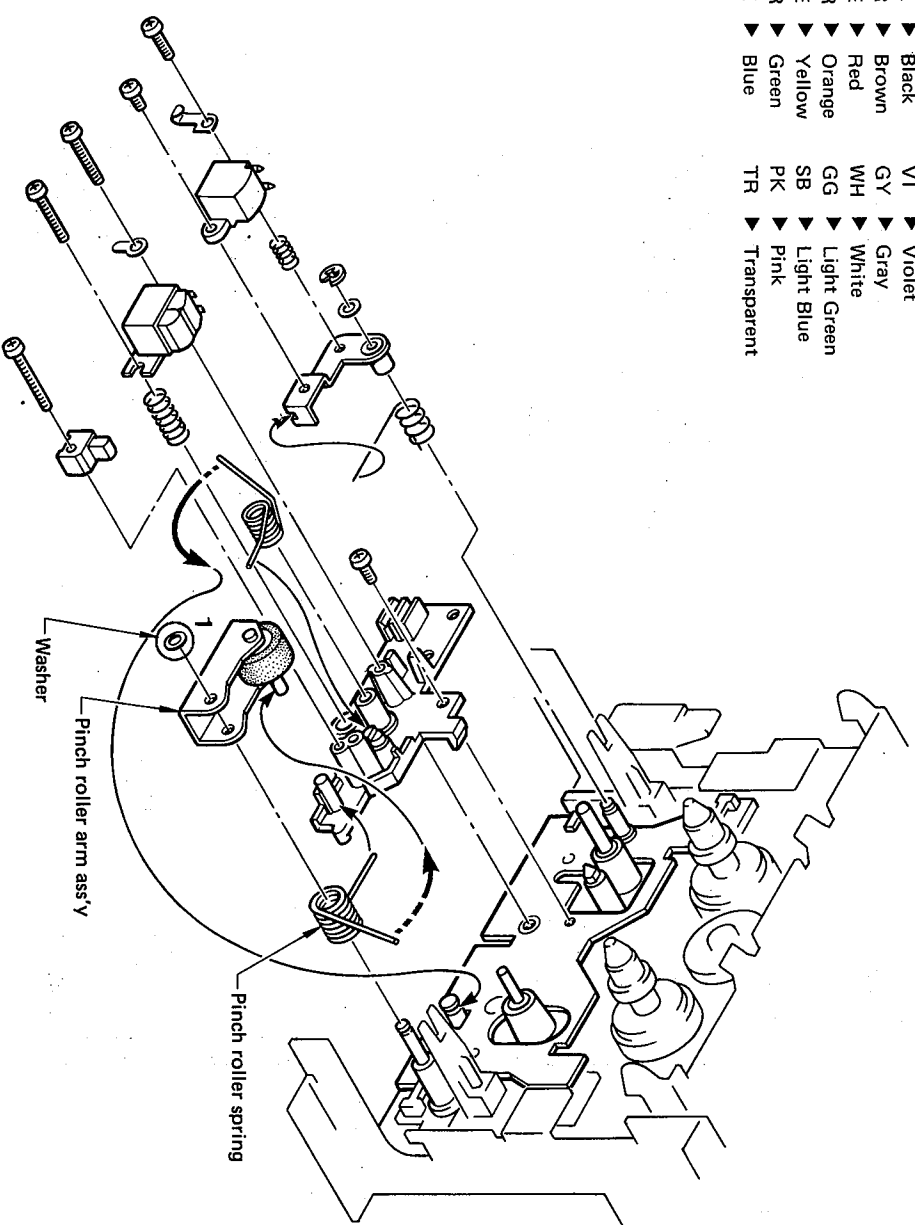


Fig. 10

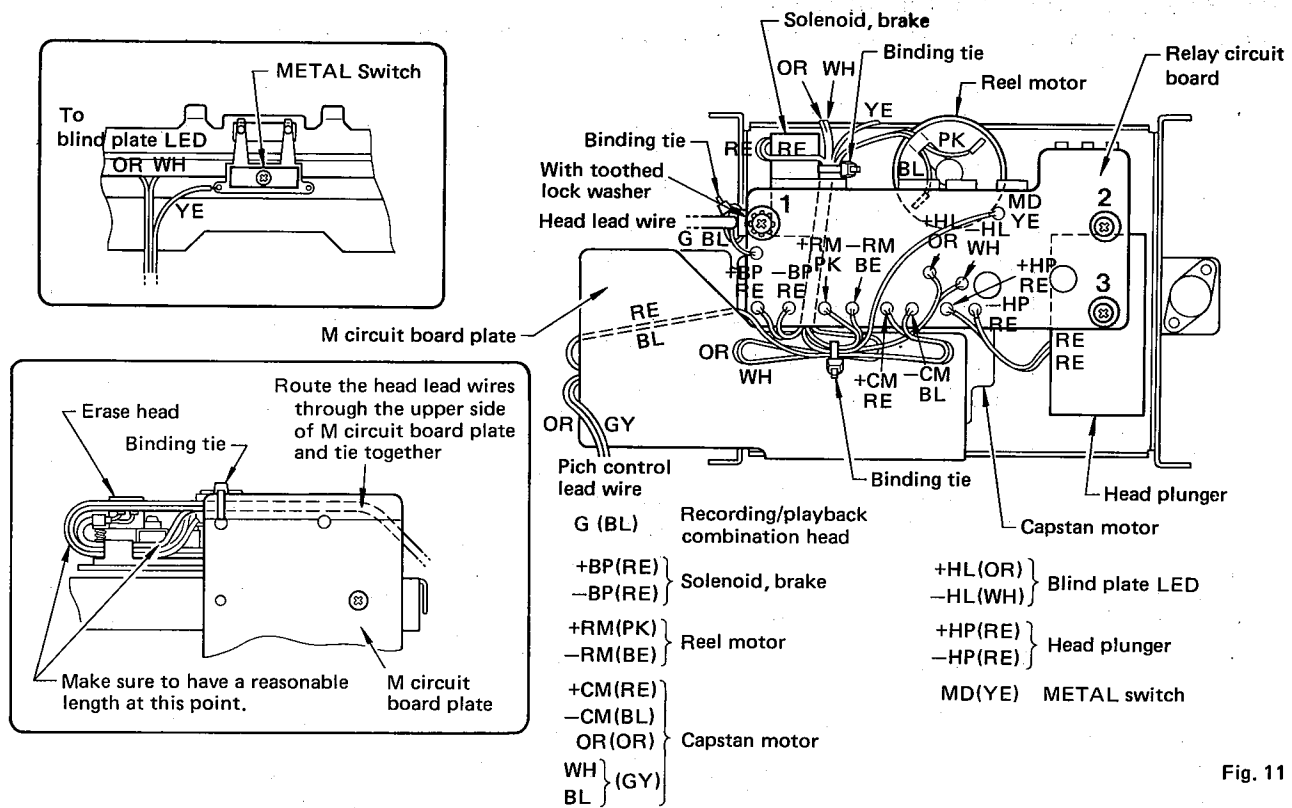


Fig. 11

5. Reel motor replacement

- a. Removing the reel motor with idler ass'y is impossible, so first remove the idler ass'y according to procedure 2 on P4.
 - b. Remove screws ① through ③ in fig. 11 and then remove the relay circuit board.
 - c. Remove screw ① in fig. 12 and then remove the reel motor unit.
- * At this time, if the idler ass'y has not been removed, you will be not able to remove the reel motor unit.

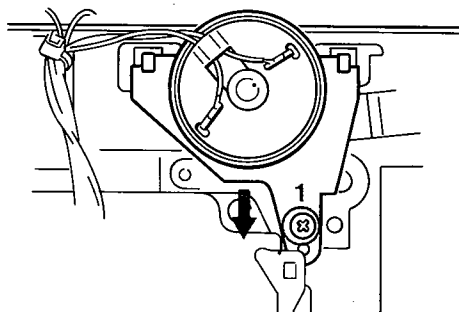


Fig. 12

- d. When installing relay circuit board, make sure that acrylic fibers are securely fitted into acrylic fiber holders (2 locations).

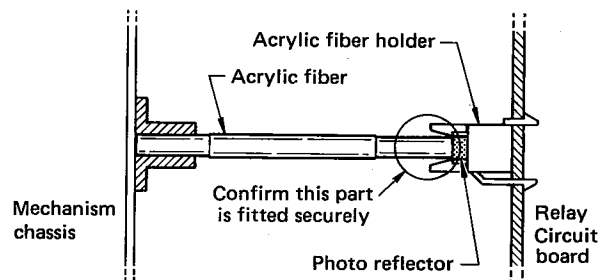


Fig. 13

6. Capstan motor replacement

- a. Remove the relay circuit board.
- b. Remove the M circuit board plate.
- c. Remove screws ① through ③ in fig. 14 and then replace the capstan motor.

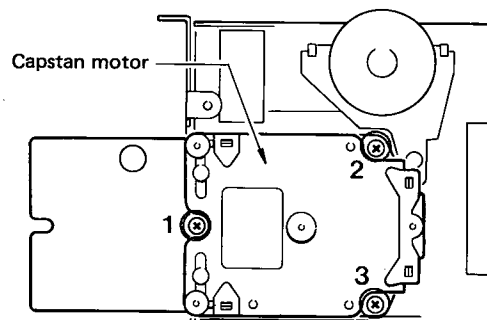


Fig. 14

PARTS OF EACH CIRCUIT BOARD REPLACEMENT

* Replacement of the parts of most circuit boards in this unit is possible by removing the top and bottom cover.

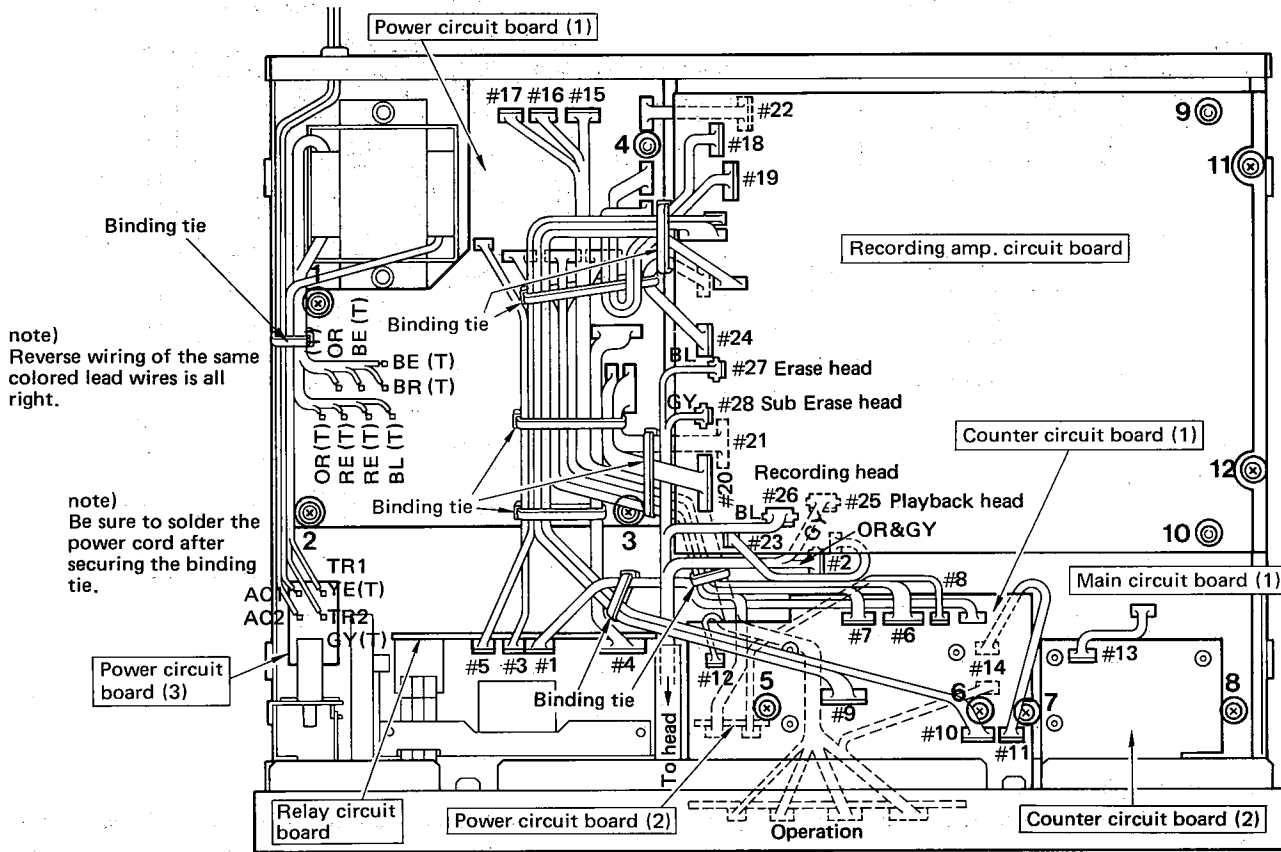


Fig. 15

1. Counter circuit board (1) removal

Remove screws ⑤ and ⑥ in fig. 15 and then pull out the counter circuit board (1) by sliding it backward.

* This circuit board is connected to the front panel with connectors.

2. Counter circuit board (2) removal

Remove screws ⑦ and ⑧ and then pull out the counter circuit board (2) by sliding it backward.

* This circuit board is connected to the front panel with connectors.

3. Recording amp. circuit board replacement

Remove plastic rivets ⑨ and ⑩ in fig. 15 and then rotate the recording amp. circuit board upward. (Refer to fig. 16)

In this way, you can replace the parts.

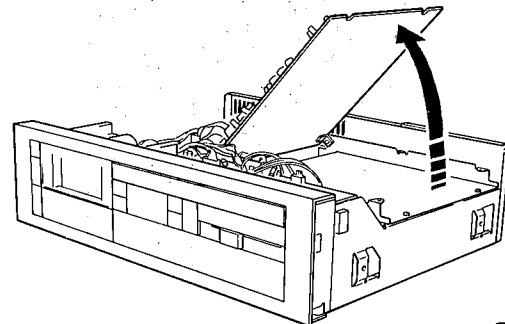


Fig. 16

4. Adjustment and parts replacement of main circuit board

Remove screws ⑪ and ⑫ (don't remove plastic rivets ⑨ and ⑩) in fig. 15 and then rotate the recording amp. unit upward.

In this way, you can perform adjustments and parts replacement on main circuit board.

ADJUSTMENTS

1. Before adjustment

- Since head magnetization, dust accumulations, etc. are likely to introduce error in the various characteristics, it is very important that the heads are properly demagnetized and cleaned.
- Proceed with the recording section adjustment after having finished the playback section adjustment.

2. Instruments required

- Audio frequency oscillator
- ACVM or 2 channel ACVM
- Wow/flutter meter
- Oscilloscope
- Torque meter
- DCVM

MECHANICAL ADJUSTMENT

"CONFIRMATION OF TORQUES"

Confirm that torques are within the following ratings;

Adjustment item	Ratings	Measurement conditions
TAKE UP torque	35 ± 10 g.cm	Couple the Torque Meter (SRK CT-100M) to the deck in play mode, and read the torque of take up reel's. (While in play, read the center of deflection.)
FF torque	More than 80 g.cm	Set the Torque Meter (SRK CT-100M) to the FF mode, and when it was wound completely, read the torque of take up reel's.
REW torque	More than 80 g.cm	Set the Torque Meter (SRK CT-100M) to the REW mode, and when winding is over, read the torque of supply reel's.
BACK TENSION torque	$2.5^{+1.5}_{-0.5}$ g.cm $2.5^{+1.5}_{-0.5}$ g.cm	Measure the back tension torque with the Torque Meter (CT-W) in play mode.
Pinch roller pressure	460 ± 50 g	Measure the pinch roller pressure to the capstan in play mode.
Tape tension	More than 150 g (Referential rating)	Set the power torque meter and measure the tape tension of pinch roller and capstan in play mode.

● CHECK OF FAST FORWARD AND FAST REWIND TIMES.

Insert a C-60 tape and check to ensure that time of fast forward and fast rewind is less than 75 seconds and that the tape is transported at a constant speed all the way.

● MECHANICAL ADJUSTMENT

Step	Adjustment item	Tape	Instrument required	Mode	Adjustment part	Rating	Remarks
1	Tape speed	MTT-111 3kHz, -10dB (250nwb/m)	Wow/flutter meter or Frequency counter	PB	Semi fixed variable resistor in circuit board of the D.D capstan motor.	3000 +10 Hz PITCH knob → center (0)	This adjustment is possible through the bottom cover (Fig. 17) *Perform adjustment at the center of the test tape length if possible.
2	Wow/flutter	MTT-111 3kHz, -10dB (250nwb/m)	Wow/flutter meter	PB		Less than 0.035% (JIS WRMS)	After the test tape has run about 30 seconds, check that the meter deflects less than 0.035%.
3	Azimuth	MTT-114 10kHz, -10dB (250nwb/m)	ACVM	PB	Azimuth adjustment screw of REC/PB combination head. (Fig. 18)	Set both channel levels to maximum output level and the phase difference between the left and right channels to minimum.	After the adjustment, make sure to apply screw lock paint.
4	Height of erase head guide	Mirror cassette (MC-09)		PB	Height adjustment screw of erase head. (Fig. 18)	Adjust the height position so that the tape runs smoothly.	

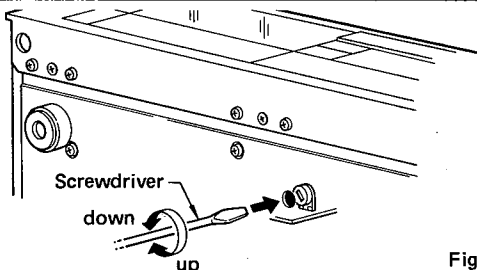


Fig. 17

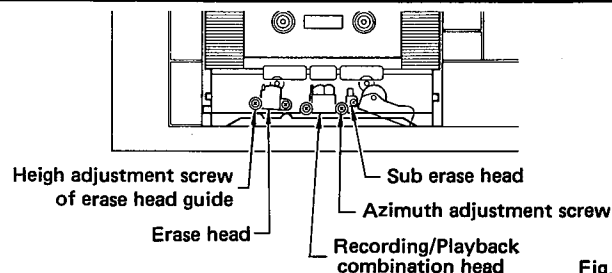


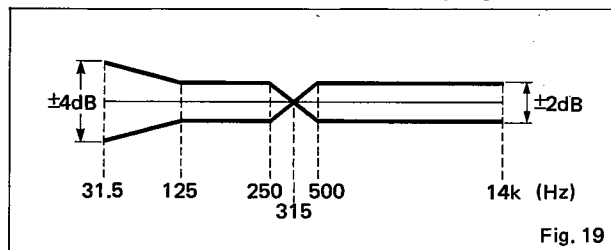
Fig. 18

ELECTRICAL ADJUSTMENT

Perform each adjustment or measurement at THROUGH position of NOISE REDUCTION.

Step	Adjustment item	Tape	Instrument required	Mode	Measurement conditions	Point of measurement	Adjustment part	Rating
1	Playback Amp. offset		DCVM			TP11(Lch) ~E TP12(Rch) ~E	VR119(Lch) VR120(Rch) (OFFSET)	0V \pm 100mV
2	Playback level	MTT-212C 315Hz, 160nwb/m or MTT-212 315Hz, 250nwb/m	ACVM	PB TAPE		LINE OUT	VR113(Lch) VR114(Rch) (PBL)	-6dBV \pm 0.5dBV (500mV \pm 30mV) -2dBV \pm 0.5dBV (794mV \pm 30mV)
3	Playback frequency	Test tape for frequency check. 3180 μ s+120 μ s (LH) 315Hz, -10dB 10kHz, -10dB or MTT-256	ACVM	PB TAPE		LINE OUT	VR111(Lch) VR112(Rch) (PBF)	Check that the 10kHz playback level lies within 0 \pm 1dB of the 315Hz playback level.
4	Playback frequency response confirmation	Test tape for frequency check. 3180 μ s+120 μ s (LH) (MTT-256) 3180 μ s+70 μ s (CrO ₂) (MTT-356)	ACVM	PB TAPE		LINE OUT		Check that the 14kHz playback level lies within 0 \pm 2dB of the 315Hz playback level. (Refer to Fig. 19)
5	Meter		ACVM	REC SOURCE	Apply a 1kHz signal to LINE IN terminals. Set the REC LEVEL knob so that LINE OUT voltage is -6dBV (500mV)		VR117(Lch) VR118(Rch) (METER)	Adjust VR117 and VR118 to the lowest level where the 0dB display part of the level meter light up.
6	Record level	YAMAHA CR60 (CrO ₂)	ACVM	REC	Apply a 1kHz signal to LINE IN terminals Short TP1 (AUTO OFF) terminals.	LINE OUT	VR805(Lch) VR806(Rch) (REC-L, R)	-6dBV \pm 0.5dBV (500mV \pm 30mV)
7	Record bias	YAMAHA CR60 (CrO ₂)	ACVM	REC TAPE	Apply 1kHz and 15kHz signal to LINE IN terminals at the same interval. Short TP1 terminals.	LINE OUT (-26 dBV)	VR808 (BIAS CR) VR810 (BIAS BALANCE)	15kHz record and playback level lies within 0 \pm 2dB of the 1kHz record and playback level.
		YAMAHA NR60 (LH)	ACVM	REC TAPE	Apply 1kHz and 14kHz signal to LINE IN terminals at the same interval. Short TP1 terminals.	LINE OUT (-26dBV)	VR809 (BIAS-LH)	14kHz record and playback level lies within 0 \pm 2dB of the 1kHz record and playback level.
		YAMAHA MR60 (METAL)	ACVM	REC TAPE	Apply 1kHz and 17kHz signal to LINE IN terminals at the same interval. Short TP1 terminals.	LINE OUT (-26dBV)	VR807 (BIAS-ME)	17kHz record and playback level lies within 0 \pm 2dB of the 1kHz record and playback level.
8	Channel balance		ACVM	REC	Apply a 1kHz, -10dBV signal to LINE IN terminals.	LINE OUT	VR115 (R-GAIN)	When center of REC LEVEL within 0.2dB.

PLAYBACK FREQUENCY RESPONSE

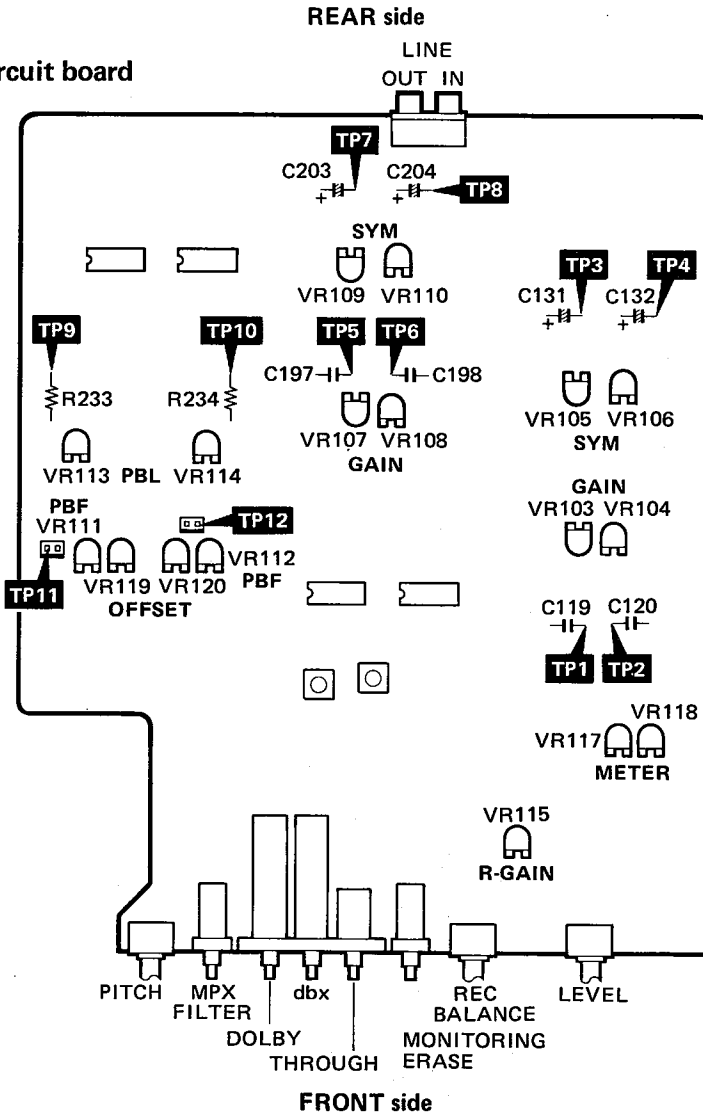


- 2dBV = 794mV = 0.2dBm
- 6dBV = 500mV = - 3.8dBm
- 10dBV = 316mV = - 7.8dBm
- 21dBV = 89mV = -18.8dBm
- 26dBV = 50mV = -23.8dBm

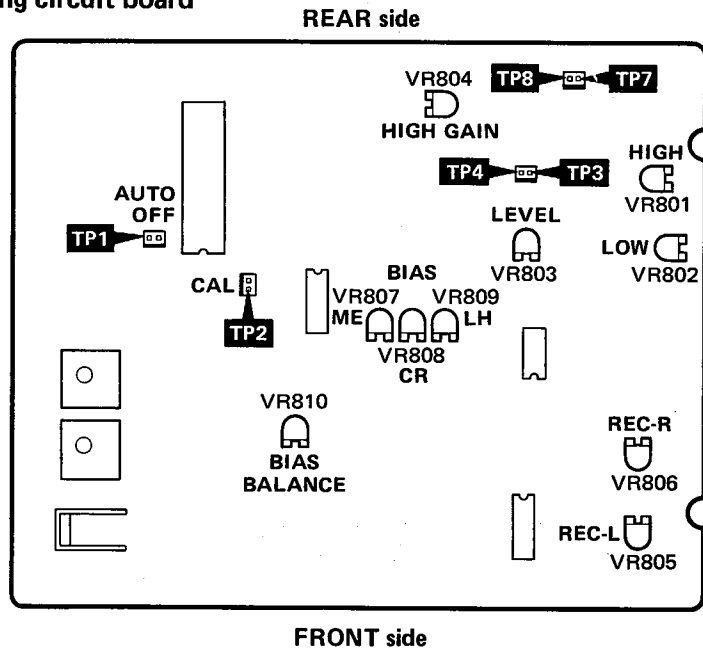
(0dBV = V)

• TEST POINT

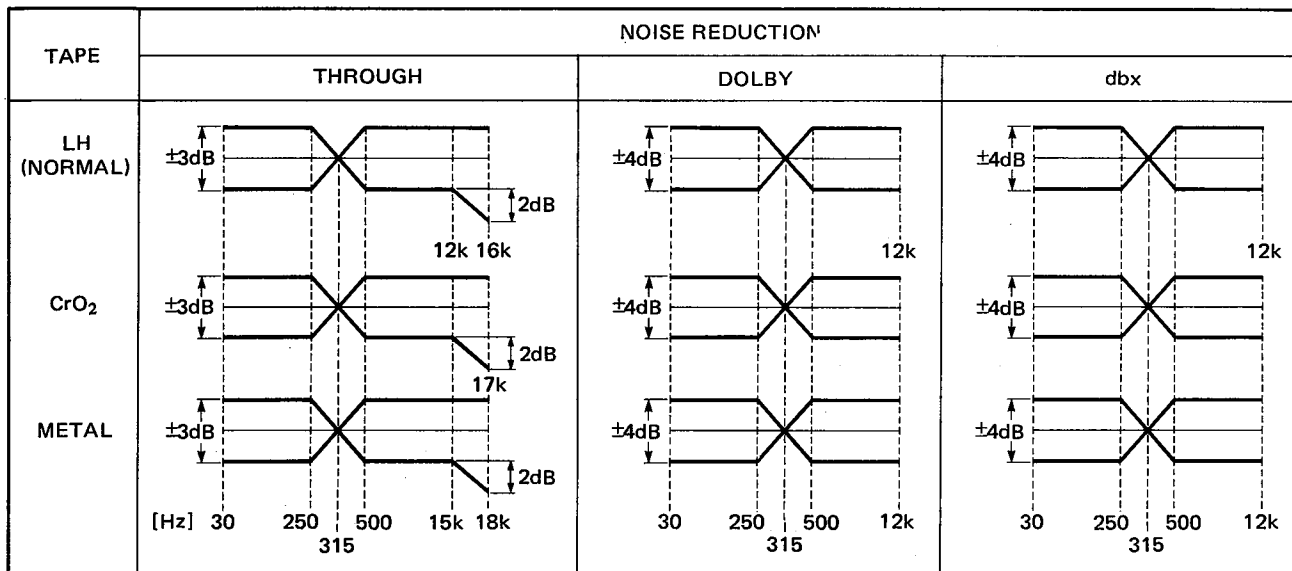
• Main circuit board



• Recording circuit board



TOTAL FREQUENCY RESPONSE



• dbx ADJUSTMENT

Perform this adjustment only when dbx system needs to be readjusted.

Step	Adjustment item	Input signal	Instrument required	Measurement conditions	Point of measurement	Adjustment part	Rating
1	dbx output offset (Playback)		DCVM	STOP mode REC LEVEL → Min	TP7 (Lch) TP8 (Rch)	VR109 (Lch) VR110 (Rch) (SYM)	0V ± 10mV
2	dbx gain at playback mode.	TP9 (Lch) TP10 (Rch) 100Hz	ACVM	Apply a 100Hz signal to TP9 and TP10 terminals so that the TP5 (Lch) and TP6 (Rch) becomes to 400mV.	TP7 (Lch) TP8 (Rch)	VR107 (Lch) VR108 (Rch) (GAIN)	400mV ± 10mV
3	dbx output offset (Record)		DCVM	STOP mode REC LEVEL → Min	TP3 (Lch) TP4 (Rch)	VR105 (Lch) VR106 (Rch) (SYM)	0V ± 10mV
4	dbx gain at record mode	LINE IN 100Hz	ACVM	Apply a 100Hz signal to LINE IN terminals so that the TP1 (Lch) and TP2 (Rch) becomes to 400mV	TP3 (Lch) TP4 (Rch)	VR103 (Lch) VR104 (Rch) (GAIN)	400mV ± 10mV

• ORBiT (Optimum Record Bias Tuning) ADJUSTMENT

Proceed with the ORBiT adjustments after having finished the total frequency response adjustment and confirmation.

Step	Adjustment item		Tape	Instrument required	Mode	Measurement conditions	Point of measurement	Adjustment part	Rating
1	OSC output	10kHz		ACVM Frequency counter	STOP	Short TP2 terminals one time.	TP3	VR801 (HIGH)	5V ± 0.1V (10kHz ± 2kHz)
		1kHz					TP4	VR802 (LOW)	5V ± 0.1V (1kHz ± 200Hz)
2	ORBiT	1kHz level	YAMAHA CR60 (CrO ₂)	ACVM			TP8	VR803 (LEVEL)	2.5V ± 50mV
		10kHz level					TP7	VR804 (HIGH GAIN)	2.5V ± 50mV

Adjusting ORBiT, TEST indicator continue to light. After the adjustment, once turn the power switch off and turn it on again. Confirm that the α ORBiT indicator changes TEST to TUNED when REC.

● ORBIT SELF TEST

The following items are set by SELF TEST movements. It is able to advance the steps with being shorted TP2 (CAL) terminals repeatedly.

(Note) Jumping may be occurred by chattering. In order to avoid the chattering it is recommended to provide the circuit like fig. 20 and to check the following items.

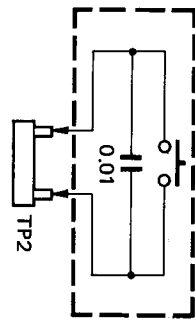
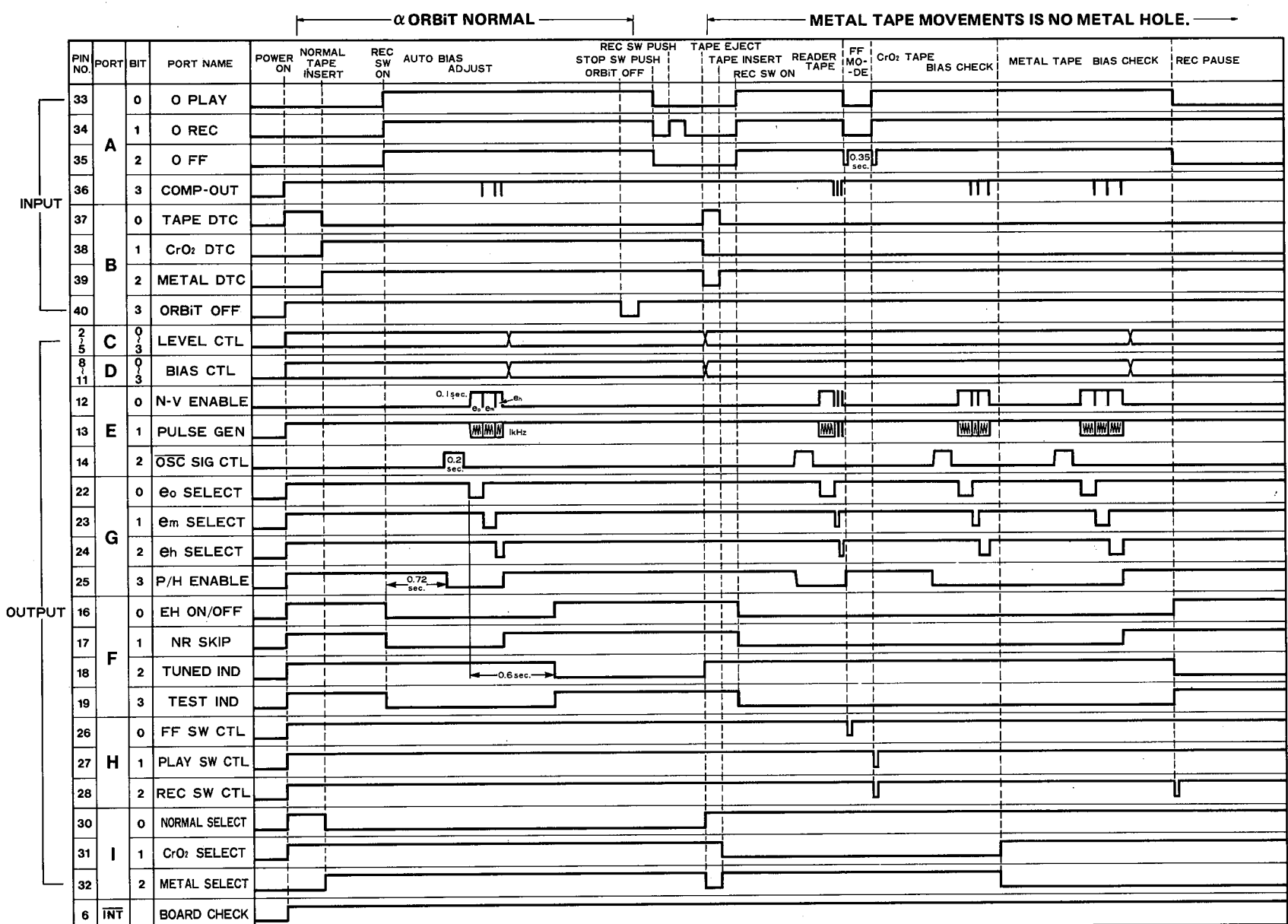


Fig. 20

SELF TEST STEP	ITEM CHECKED	POINT OF MEASUREMENT	RATING	IC OUTPUT	REMARKS
1	Ref Volt	TP9	DC +3.5V ± 0.1V (E ₀)	REC C → ON ("L") OSC → ON ("H")	Load a YAMAHA CR60 (CR02 tape). In REC PLAY mode.
	Select : E ₀			EH, NR, PH, E ₀ → ON ("L")	
2	Select : E _m	TP10	DC +3.5V ± 0.5V	E ₀ → OFF ("H") E ₀ → ON ("L")	
	Select : E _h	TP10	DC +3.5V ± 0.5V		
3	Level : STD	TP11, 12	AC 82mV ± 5mV (Recording level of test signal.)	E _m → OFF ("H") E _h → ON ("L")	
4	Level : Min	TP11, 12	-2.7 ± 0.3dB (Level : Level ratio of STD)	L (0 ~ 3) = 111	
5	Level : Max	TP11, 12	+1.8 ± 0.3dB (Level : Level ratio of STD)	L (0 ~ 3) = 0000	
6	Level : STD	TP11, 12	AC 82mV ± 5mV	L (0 ~ 3) = 1001	Condition is back to STEP 3.
7	Bias : Max	TP14	+0.8 ± 0.1dB (Level : Level ratio of STD)	B (0 ~ 3) = 1111	
8	Bias : Min	TP14	-1.7 ± 0.2dB (Bias : Level ratio of STD)	B (0 ~ 3) = 0000	
9	Bias : STD	TP14	AC 1V ± 0.3V	B (0 ~ 3) = 1010 E _h → OFF ("H") E ₀ → ON ("L") N-V → ON ("H") PLS → ON (f=1kHz)	f = 200kHz
10	A-D Conv Check & FF Check			FF, C → ON ("L") REC C } → ON ("L") PLAY C }	Output level from PLS is decided by E ₀ level.
11	TUNED		TEST → OFF OPT → ON	REC C → ON ("L") TUNED → lights ("L")	SELF TEST is completed. (In REC PAUSE mode.)
12	NORMAL MODE				Getting out of SELF TEST routine, normal movements is active.

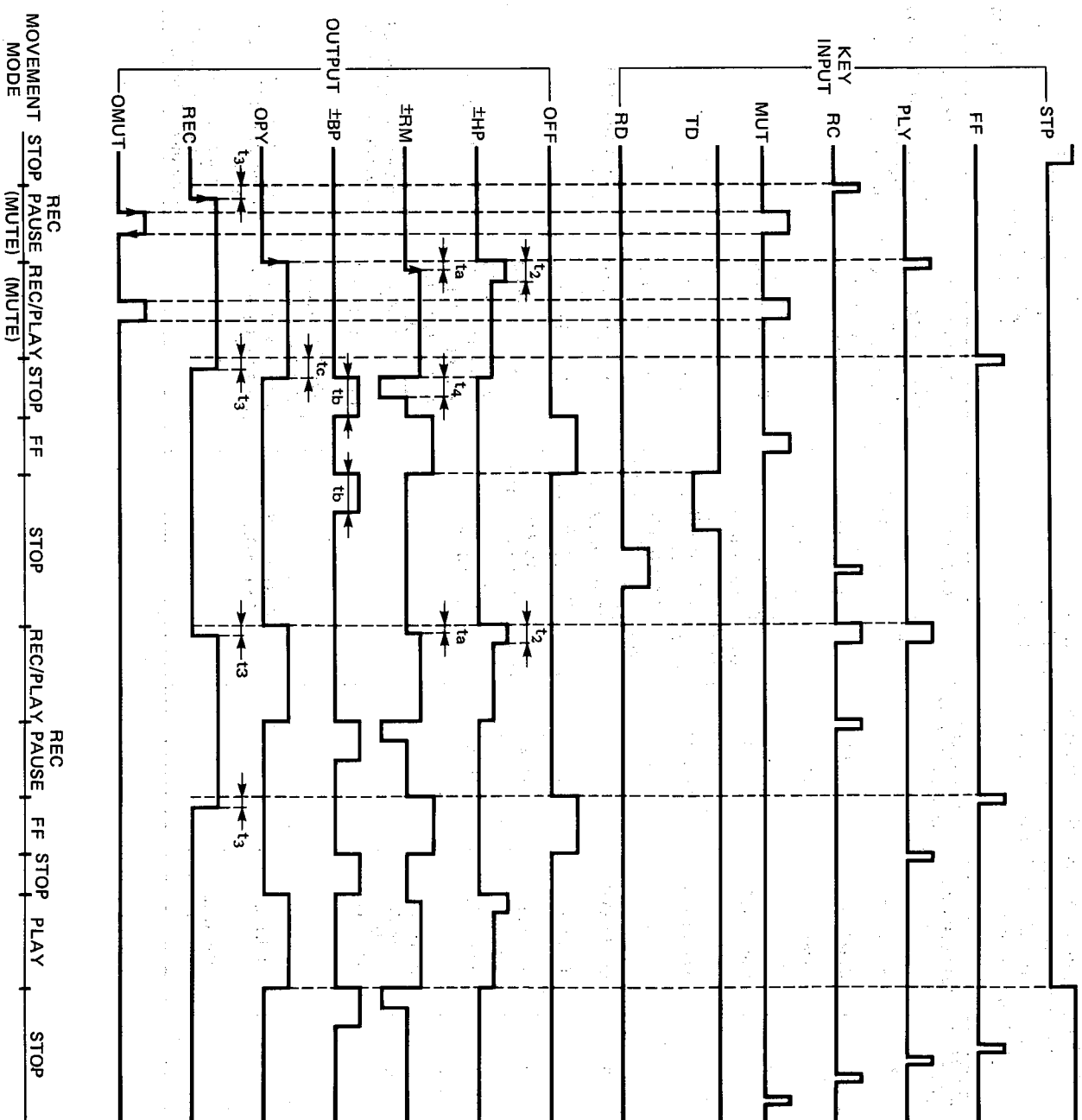
■ TIMING CHART

● AUTO BIAS TIMING CHART (IC811: LM6405-150)



P/H : Peak hold
 N-V : Pulse count-Voltage
 COMP : Comparator

● FOUNDATION MOVEMENTS
 Set the AUTO FUNCTION to OFF position.

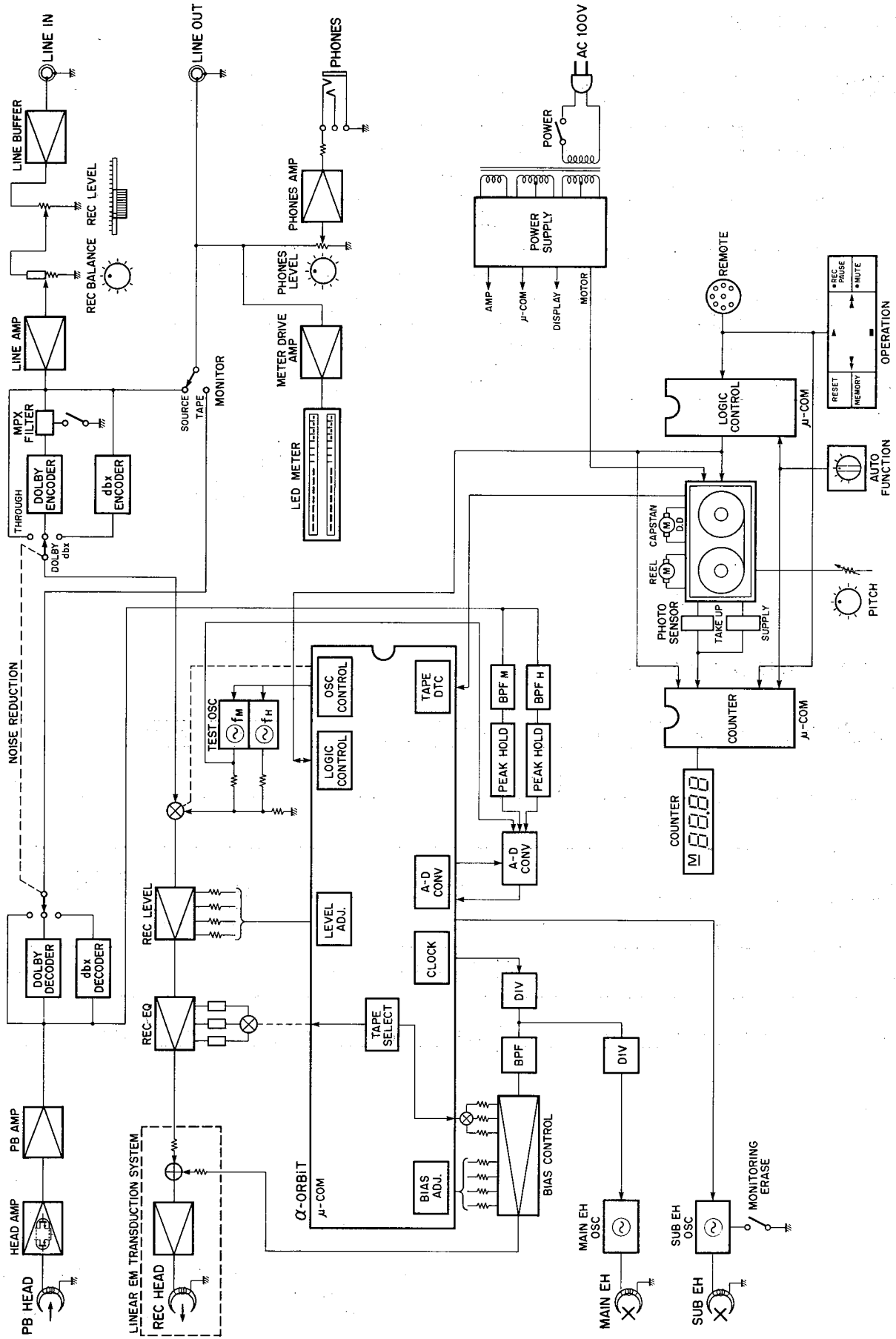


Terms and symbols
 STP : Stop
 FF : Fast forward
 PLY : Play
 RC : Recording
 MUT : Muting
 TD : Tape detector
 RD : Record inhibit detector

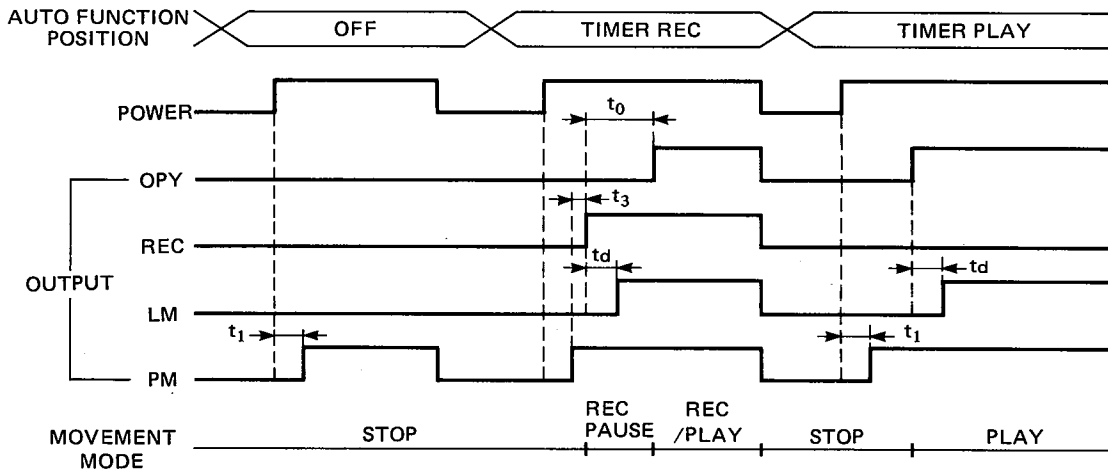
HP : Head plunger
 RM : Rec mute
 BP : Brake plunger
 OPY : Play out
 OMUT : Muting out
 LM : Line mute
 MEM : Memory
 INT : Interrupt
 ORW : Rewind out

t₁ : 0.1 sec.
 t₂ : 0.3 sec.
 t₃ : 0.01 sec.
 t₄ : 0.04 sec.
 t_a : 0.1 sec.
 t_b : 0.2 sec.
 t_c : 0.05 sec.

BLOCK DIAGRAM

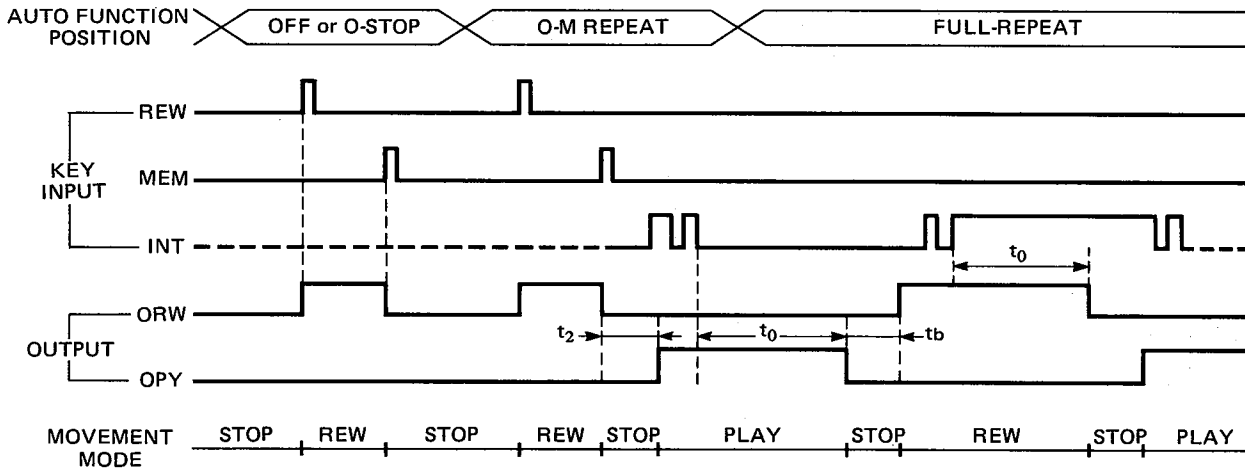


● **TIMER MOVEMENT**



- t_0 : 2 sec.
- t_1 : 0.1 sec.
- t_3 : 0.01 sec.
- t_d : 0.15 sec.

● **MEMORY & REPEAT MOVEMENT**



- t_0 : 2 sec.
- t_2 : 0.3 sec.
- t_b : 0.2 sec.

Note) AUTO STOP and AUTO REPEAT act after 2 second (t_0) when INT signal changes last.
(Cycle of INT signal's repeat should be more than 12 msec.)

