

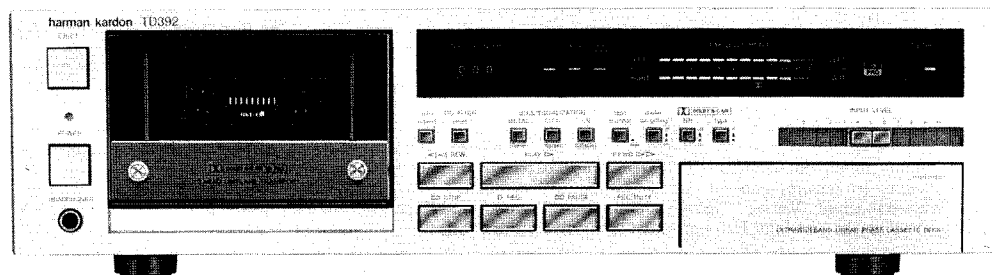
The Harman Kardon Model TD392

Manual 98A

ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK

TD392

Technical Manual



harman/kardon

240 Crossways Park West, Woodbury, N.Y. 11797
1112-H15298A2 P-088509 1850 Printed in Japan

SPECIFICATIONS

Track Configuration 4-track 2 Channel Stereo
Cassette Deck

● **MECHANICAL SECTION**

Record/Playback Tape Speed
Deviation 4.75 cm/sec. 0.05% ±1.5%
Drift 4.75 cm/sec. 0.2% ±1.5%
Wow and Flutter 0.05%(NAB) ≤0.08%
0.08%(CCR) ≤0.14%
Take Up Torque 50gr. cm 35 ~ 70gr. cm
Back Tension 4gr. cm 2 ~ 6gr. cm
F.FWD Torque 100gr. cm 70 ~ 150gr. cm
REW. Torque 100gr. cm 70 ~ 150gr. cm
F.FWD/REW. Time 90 sec. ≤100 sec.
(C-60 Tape)
Motor Direct Drive motor

● **AMPLIFIRE SECTION**

Bias Frequency 105kHz ±5kHz
Playback Output 500mV ±1.5dB
Signal-to-Noise Ratio
at Line Input (Input 1kHz,100mV)
IHF-A WTD at Dolby Level
Dolby* NR-Off LN 51dB
CrO₂ 54dB
Metal 54dB
Dolby B NR LN 61dB
CrO₂ 64dB ≥60dB
Metal 64dB ≥60dB
Dolby C NR LN 66dB
CrO₂ 70dB ≥66dB
Metal 70dB ≥66dB

*Dolby noise reduction and HX PRO headroom extension manufactured under license from Dolby Laboratories Licensing Corporation. HX PRO originated by Bang and Olufsen. "Dolby", the double-D symbol and "HX PRO" are trademarks of Dolby Laboratories Licensing Corporation.

Channel Separation 43dB ≥35dB
Crosstalk 70dB ≥60dB
Record/Playback Distortion (Input 1kHz)
LN 1.1% ≤2.0%
CrO₂ 1.8% ≤3.0%
Metal 1.1% ≤2.0%

MPX Filter Attenuation
at 15kHz 0.3dB ≤1dB
at 19kHz 35dB ≥30dB

Erase Ratio (Input 80Hz)
LN 70dB ≥60dB
Metal 55dB ≥52dB

Input Sensitivity (Input 1kHz) at Line Input 60mV 40(min) ~ 100(max)mV
Input Impedance (Input 1kHz) at Line Input 24kΩ 19(min) ~ 30(max)kΩ

● **DIMENSIONS (W x H x D)** 17-7/16" x 4-13/16" x 13-1/8"
(443 x 122 x 334 mm)

● **WEIGHT** 12lbs. 13oz. (5.8kg)

● **POWER SUPPLY**

U.S.A. & Canada models AC 120V, 60Hz
General model AC 100/120/220/240V,
50/60Hz

● **POWER CONSUMPTION**

U.S.A. & Canada models 30W
General model 35W

Specifications and components subject to change without notice. Overall performance will be maintained or improved.

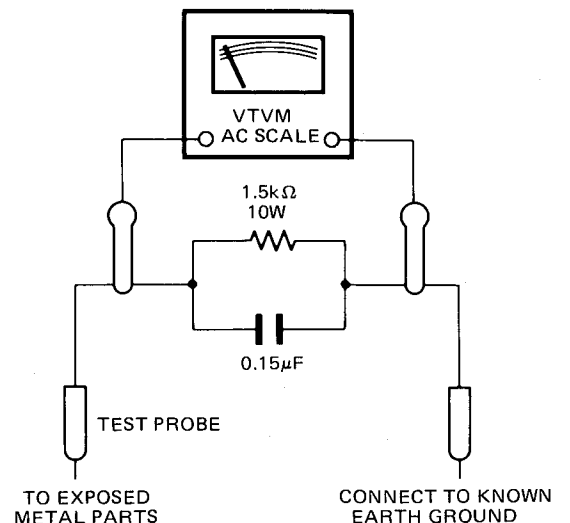
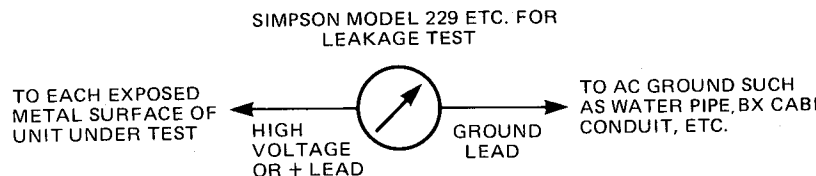
This specification is the target of servicing. But, there is a case that the specification is not applicable to the measurement condition and instrument.

LEAKAGE TEST (FOR SERVICE ENGINEERS IN THE U.S.A.)

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment cover or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows:
Plug the power cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 Ohm, 10-watt resistor paralleled by a 0.15 μF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 Ohms per volt, or higher, sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.)

A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.



DISASSEMBLY PROCEDURES (REFER TO PAGES 5 AND 17)

1 CABINET TOP ASSEMBLY (101) REMOVAL

Remove 6 screws **A** and then remove the Cabinet Top Assembly (101).

2 FRONT PANEL ASSEMBLY (102) REMOVAL

1. Remove the Cabinet Top Assembly (101), referring to the previous step **1**.
2. Remove 7 screws **B** and then remove the Front Panel Assembly (102).

3 CASSETTE TAPE RECORDER MECHANISM ASSEMBLY (113) REMOVAL

1. Remove the Front Panel Assembly (102), referring to the previous step **2**.
2. Disconnect the LCN201 connected to the Cassette Tape Recorder Mechanism Assembly (113).
3. Disconnect the LCN401, LCN402 and LCN403 from the CN401, CN402 and CN403 on the Main P. C. Board (PCB-1).
4. Loosen 8 screws **C** and then remove the Cabinet Bottom (128).
5. Remove the Belt (211) of the Tape Counter.
6. Remove 4 screws **D** and then remove the Cassette Tape Recorder Mechanism Assembly (113).

4 MAIN P. C. BOARD (PCB-1) REMOVAL

1. Remove the Cabinet Top Assembly (101), referring to the previous step **1**.
2. Disconnect the LCN201 and LCN202 connected to the Cassette Tape Recorder Mechanism Assembly (113) and Peak Level Meter (D401).
3. Disconnect the LCN401, LCN402 and LCN403 from the CN401, CN402 and CN403 on the Main P. C. Board (PCB-1).

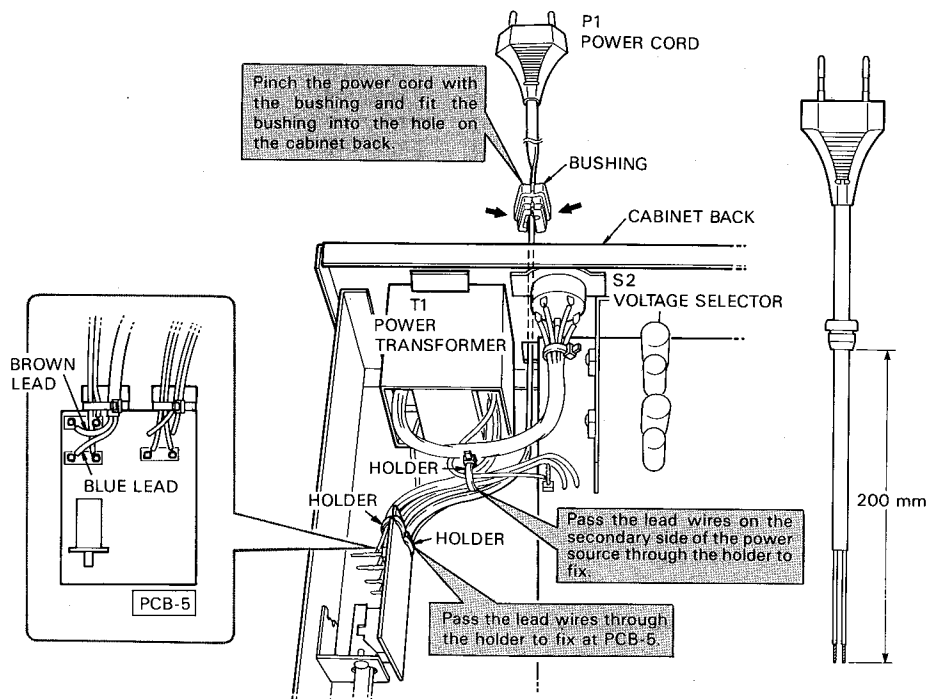
4. Open the lid of connectors (CN101, CN105~CN111, CN301~CN305) on the Main P. C. Board (PCB-1) and then disconnect the lead wires.
5. Unsolder the lead wires connected to the Main P. C. Board (PCB-1).
6. Remove 7 Screws **E** and Rivet **F** then remove the Main P. C. Board (PCB-1).

5 OTHER P. C. BOARDS REMOVAL

1. Remove the Front Panel Assembly (102), referring to the previous step **2**.
2. Remove the Belt (211) of the Tape Counter.
3. Disconnect the LCN202 connected to the Main P. C. Board (PCB-1).
4. Open the lid of connectors (CN106~CN110) on the Main P. C. Board (PCB-1) and then disconnect the lead wires.
5. Remove screw **G** and then remove the Plate Assembly (105) with the Dolby NR Ind. P. C. Board (PCB-6) and Rec/Pause/Tape Monitor Ind. P. C. Board (PCB-7).
6. Remove screw **H** and then remove the Function Switch P. C. Board (PCB-2). If necessary, unsolder the lead wires connected to the PCB-2.
7. Remove 2 screws **I** and then remove the Input Level Control P. C. Board (PCB-4). If necessary, unsolder the lead wires connected to the PCB-4.
8. Open the lid of connectors (CN101, CN303, CN304 and CN305) on the Main P. C. Board (PCB-1) and then disconnect the lead wires.
9. Remove 2 screws **J** and then remove the VR P. C. Board (PCB-3) with the Bracket (184). If necessary, unsolder the lead wires connected to the PCB-3.

POWER CORD REPLACEMENT (FOR SERVICE ENGINEERS OTHER THAN NORTH AMERICA)

In order to prevent fire or shock hazard when replacing the power cord, follow the procedure below to replace the parts with the standard supply parts.



GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A414-TD392A	Cabinet Top Ass'y
102	A443-TD392A	Front Panel Ass'y
103	A453-TD392A	Sub-Panel Lid Ass'y
105	A513-TD392B	Plate Ass'y
106	A514-TD392A	Dressing Plate Ass'y
107	A632-TD392A	Knob Ass'y
108	A642-TD392A	Knob Ass'y
109	A662-TD392A	Push Button Ass'y
110	A662-TD392B	Push Button Ass'y
111	A662-TD392C	Push Button Ass'y
112	B219-TD392A	Bracket Ass'y U A
112	B219-TD392B	Bracket Ass'y EW
113	3112-12803	Cassette Tape Recorder Mechanism Ass'y
124	1319-0139	Foot
128	1423-02301	Cabinet Bottom
129	1424-15601	Cabinet Back U A
129	1424-15602	Cabinet Back EW
131	1442-10901	Panel, Input Level
139	1514-17001	Dressing Plate
143	1531-08401	Door Cover
154	1660-00401	Push Button, Power
155	1660-00501	Push Button, Eject
158	1660-00601	Push Button, REC, FF, REW, Stop, Pause, REC Mute
159	1660-00701	Push Button, Play
175	2114-01224	Bushing
178	2218-5003	Bracket
180	2211-7268	Chassis
181	2215-7005	Bracket
182	2219-7091	Bracket
183	2219-8048	Bracket
184	2219-8049	Bracket
185	2219-8050	Bracket
186	2219-8051	Bracket
187	2219-8052	Bracket
188	2219-7755	Bracket
193	2222-7190	Heat Sink
194	2222-7186	Heat Sink
195	2222-7067	Heat Sink
196	2240-364	Holder
197	2240-7120	Holder
204	2430-7008	Special Fastener
209	2601-7156	Shaft, Power Switch
211	2642-01440	Belt
213	2651-210189	Spring
214	2651-2101721	Spring
216	2674-7020	Slider
219	2310-7025	Special Screw
227	2327-200329	Screw (2 x 3mm)
233	2343-300627	Screw (3 x 6mm)
235	2347-300846	Screw (3 x 8mm)
239	2347-300626	Screw (3 x 6mm)
243	2347-300826	Screw (3 x 8mm)
245	2347-300646	Screw (3 x 6mm)
247	2347-400646	Screw (4 x 6mm)
249	2459-3004511	Rivet
251	2440-7017	Special Nut EW
252	2132-01406	Spacer
	1111-J30219	Owner Guide U
	1111-J30220	Owner Guide A EW
	1221-727181	Packing Box
	1222-7284	Packing Cushion

CASSETTE TAPE RECORDER MECHANISM PARTS LIST

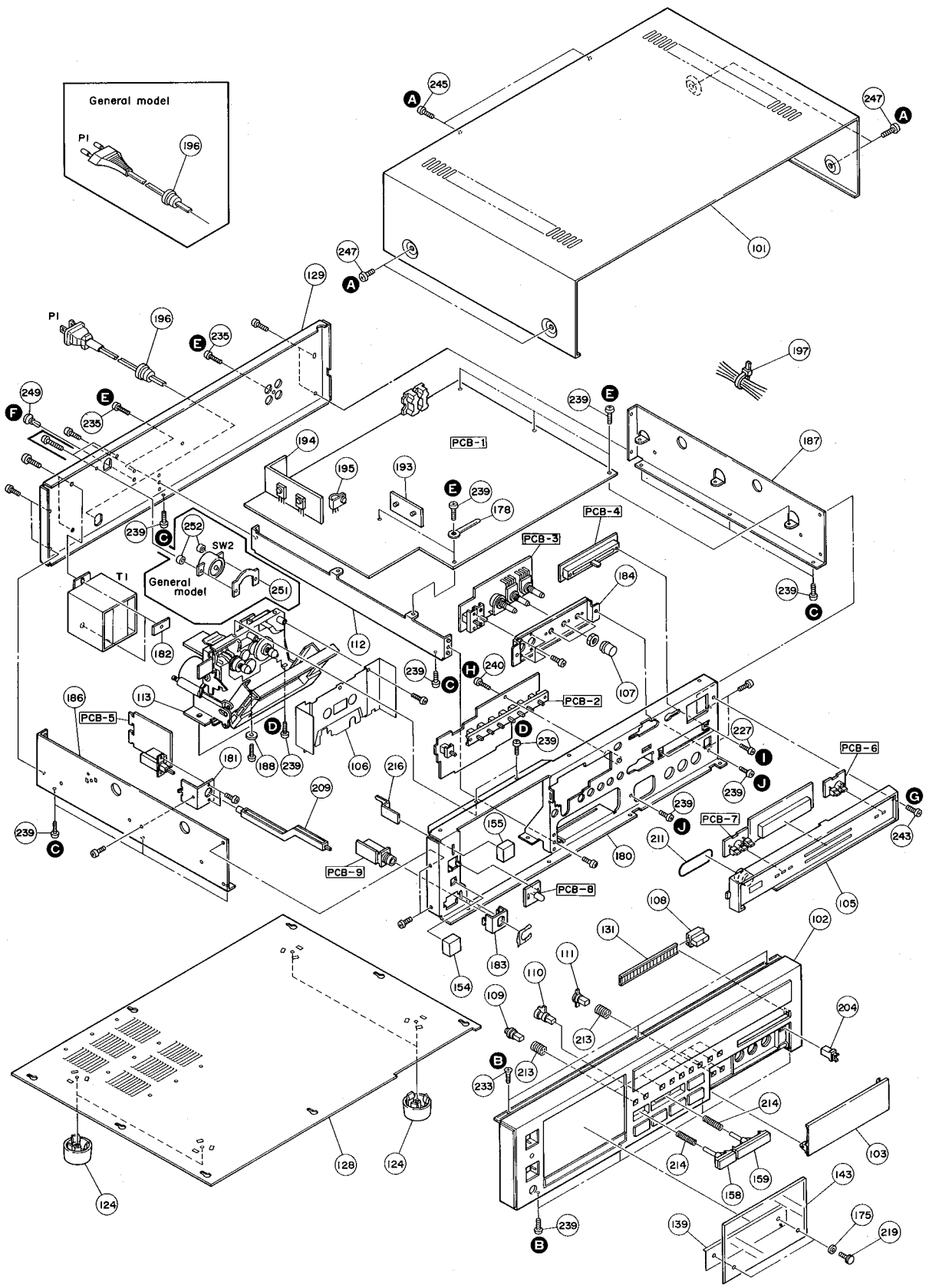
Ref. No.	Part No.	Description
1	F245-011	Switch Arm, Pack
2	F244-011	Switch Arm, REC
3	FD35C-11	Cassette Support
4	FK568-11	Spring, Door
5	FC30K-12	Eject Lock Arm
6	FM296-11	Spacer
7	KY130-11	Connector, 8 Pos.
8	UE13K-11	Switch
9	FU14S-11	REC/PB Head
10	FU163-13	Erase Head
11	FK572-11	Spring, Azimuth
12	FD29H-11	Head Spacer
13	F105-020	Supply Reel Ass'y
14	F123-042	Take-up Reel Ass'y
15	FC29K-11	Spring Holder
16	FC34F-12	Head Base
17	FD29G-11	Brake Arm (L)
18	FD24K-12	Brake Arm (R)
19	FK18U-11	Spring, Brake
20	F014-075	Pinch Roller
21	FK18S-11	Spring, Pinch Roller
22	FK18V-11	Spring, Solenoid Arm
23	FK18T-14	Spring, Assist
24	FK11F-47	Spring, Back Tension
25	FN14B-12	Idler Gear
26	FK18M-11	Spring, Eject Arm
27	F011-177	Chassis Ass'y
28	FC29E-11	Spring, Cassette
29	F265-216	Solenoid, FF, REW
30	FR17M-13	Clutch Ass'y
31	FC29F-11	Bracket, Dumper
32	FP472-11	Dumper Ass'y
33	FD23B-12	FF/REW Solenoid Arm
34	FP463-11	Sub Belt
35	FF14A-11	Main Belt
36	F265-217	Solenoid, PB
37	FD23E-12	PB Arm
38	FK18W-12	Spring, PB Arm
39	FR17N-11	Idler Ass'y
40	FK18R-12	Spring, Idler
41	FC29G-14	Bracket, Door
42	FK18N-11	Spring, Head Base
43	FK18P-11	Spring, Assist Base
44	FC29M-12	Assist Base
45	FN14C-13	PB Gear
48	FR17E-11	Flywheel Ass'y
50	WH20C-01	Connector, 4 Pos.
51	FC29H-15	Bracket, Motor
52	F064-179	Motor
53	FP12T-12	Connector Panel
54	FJ115-12	Cushion, Motor
55	FR18C-11	Tension Arm Ass'y
56	FK11F-23	Spring, Tilt

U : U.S.A. model
A : Canada model
EW : General model

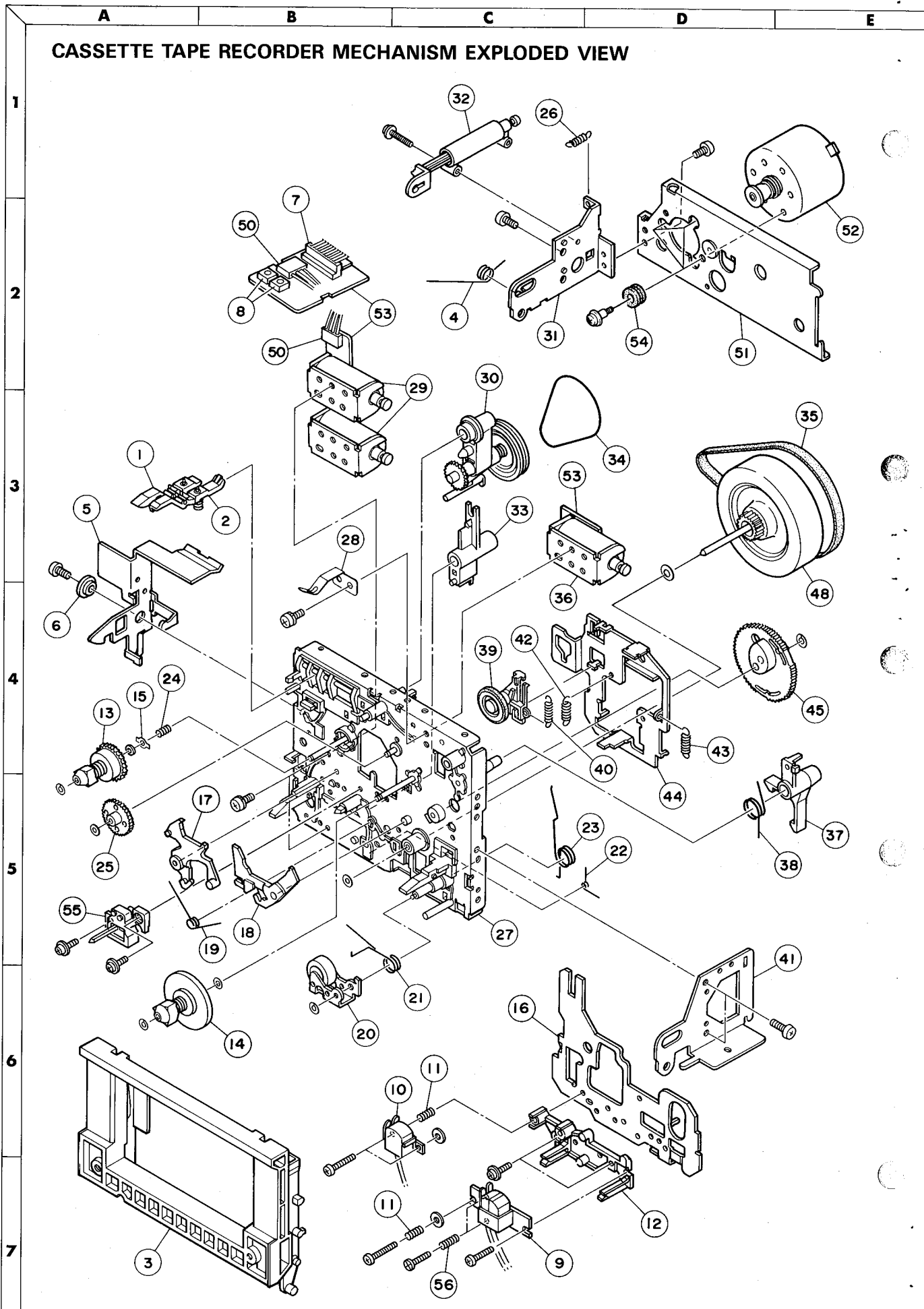
* The part with the above mark is used only in the model made for the particular market the mark indicates.

A B C D E
GENERAL UNIT EXPLODED VIEW

1
2
3
4
5
6
7



CASSETTE TAPE RECORDER MECHANISM EXPLODED VIEW



ALIGNMENT PROCEDURES (REFER TO PAGES 14, 15, 16 AND 18)

■ CASSETTE MECHANISM CONFIRMATION

Make sure to confirm conditions of the cassette mechanism as follows before adjustment.

1. Confirmation of erroneous erase preventive function

- The switch should turn ON when a tape with erroneous erase preventive pawl is inserted. (Use a tape which is 0.2mm smaller than the minimum size of 62.9mm or a MAZ-0184-C gauge one.)

2. Confirmation of cassette pack detection function

- The switch should turn ON when a tape is inserted. (Use a tape whose minimum size is 63.5mm or a MAZ-0184-C gauge one.)
- When the switch arm is moved back gradually from the ON position, the switch should turn OFF.

3. Confirmation of eject function

- The cassette compartment opens smoothly and no abnormal noise should be heard while opening and closing.
- The eject lock arm opens smoothly without contacting the chassis and damper.
- The eject button can not be pressed during playback.

4. Confirmation of playback, fast forward and rewind functions

- The torque used in each of the playback, fast forward and rewind modes should be within specification.
 - Playback 35gr. cm ~ 70gr. cm
 - Fast Forward 70gr. cm ~ 150gr. cm
 - Rewind 70gr. cm ~ 150gr. cm
- No abnormal noise should be heard during operation in any mode. The solenoid switching sound should not be considered as a noise.

5. Confirmation of positions of record/playback head and erase head

● Head height

- Set the M-300 head gauge.
- Set the unit in the playback mode and place the adjustment chip on the head gauge as shown in the Fig. 1.
- The adjustment chip should not contact the tape guide of both record/playback head and erase head.

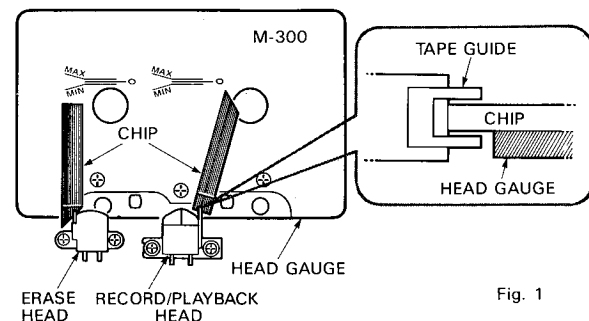


Fig. 1

● Head position

- Set the M-300 head gauge.
- Set the unit in the playback mode and place the adjustment chip on the head gauge as shown in the Fig. 2.
- With both record/playback head and erase head, the adjustment chip should be between MIN and MAX of the M-300 head gauge.

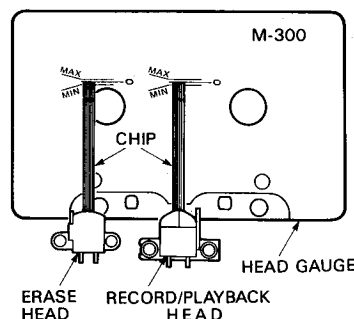


Fig. 2

■ ELECTRICAL ADJUSTMENT AND CONFIRMATION

1. Before adjustment

- Before electrical adjustment, make sure that confirmations of the cassette mechanism are all completed.
- After the power switch is pushed on, wait for 10 minutes before measuring to be sure of the most stable operation.
- Since head magnetization, dust accumulations, etc. are likely to introduce errors in the various characteristics, it is very important that the heads are properly demagnetized and cleaned before commencing any adjustment, particularly frequency response and head azimuth adjustment.

2. Instruments required

- Low frequency oscillator
- AC VTVM or dual channel AC VTVM
- Oscilloscope
- Wow/flutter meter
- Frequency counter

3. Test tapes

- Azimuth adjustment TCC-153 or MTT-114
- Tape speed adjustment MTT-111 or MTT-111D
- Playback output level adjustment MTT-150 or TCC-130
- Playback frequency characteristic confirmation TCC-288H or TCC-162C, TCC-262C
- Wow and flutter confirmation MTT-111 or MTT-111D
- Reference tapes
 - LN SCC-502 or XL-1
 - CrO₂ SCC-504 or AC-512
 - METAL SCC-565 or AC-712

Note:

C-90 differs with C-60 in the thickness and bias is of unequal, so adjust with the tape whose bias is of specified value.

4. General conditions (unless otherwise noted)

Controls and Switches	Settings
Dolby NR	Off
Tape Monitor	Source
Input Level	Maximum
MPX Filter	Off
Bias Fine Trim	Center
Input Balance	Center
Output Level	max

Azimuth Adjustment

When the maximum level point of R channel does not equal that L channel, connect the oscilloscope as shown in Fig. 3 and proceed with azimuth adjustment so that L and R channels are in phase.

- Connect L channel tape out to "X (or V)" and R channel to "Y (or H)". Observe the lissajous waveform.
- Set L and R channels to monaural. Adjust vertical and horizontal gain so that the waveform becomes 45 degree.
- Adjust azimuth so that the measurement of "a" becomes maximum and the measurement of "b" becomes minimum against the 45 degree line.

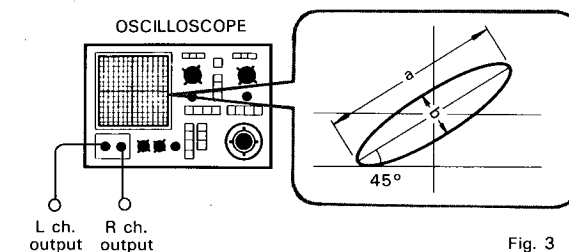
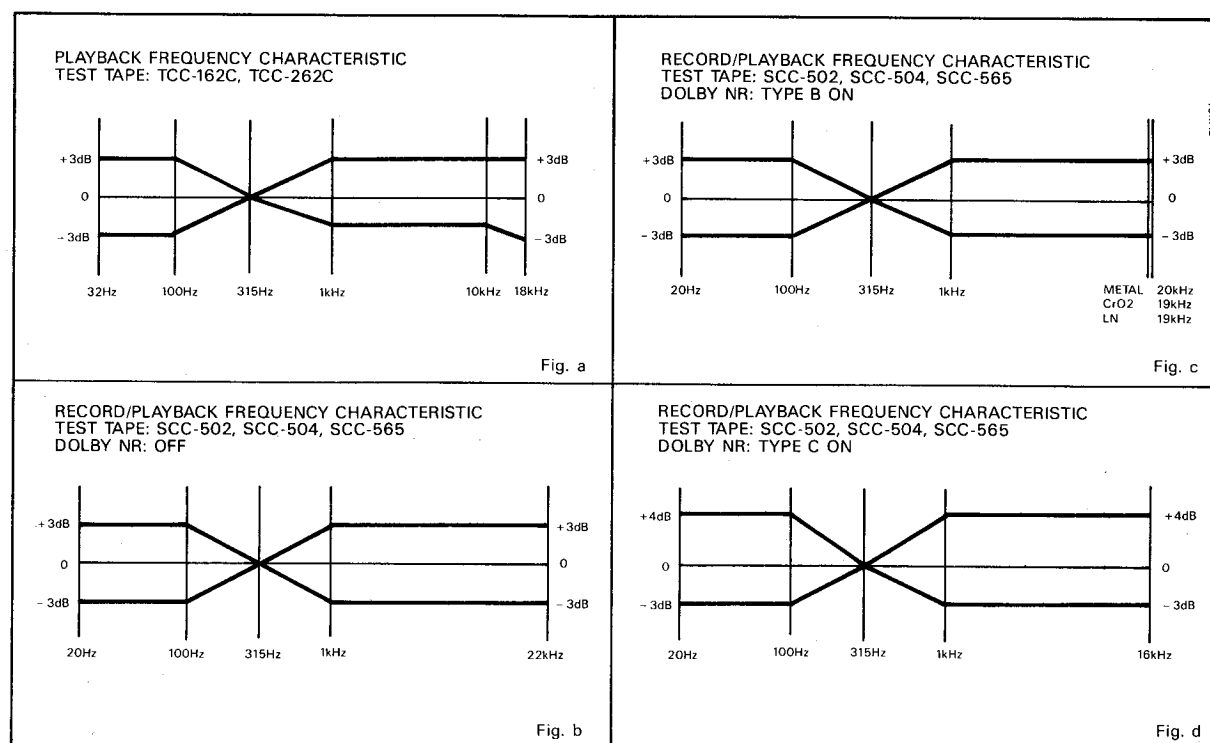


Fig. 3



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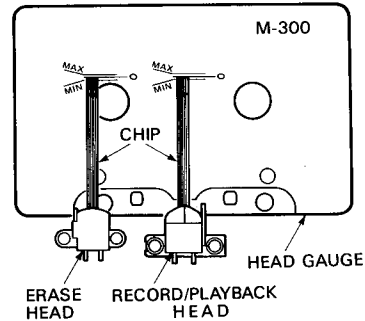


Fig. 2

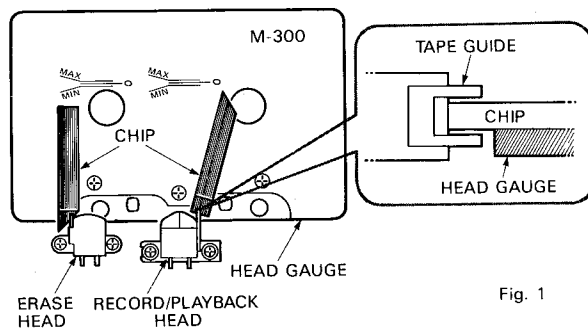


Fig. 1

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- Playback output level adjustment
..... MTT-150 or TCC-130
- Playback frequency characteristic confirmation
..... TCC-288H or TCC-162C, TCC-262C
- Wow and flutter confirmation
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- b) Set L and R channels to monaural. Adjust vertical and horizontal gain so that the waveform becomes 45 degree.
- c) Adjust azimuth so that the measurement of "a" becomes maximum and the measurement of "b" becomes minimum against the 45 degree line.

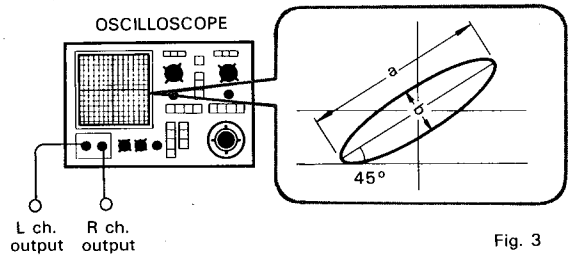
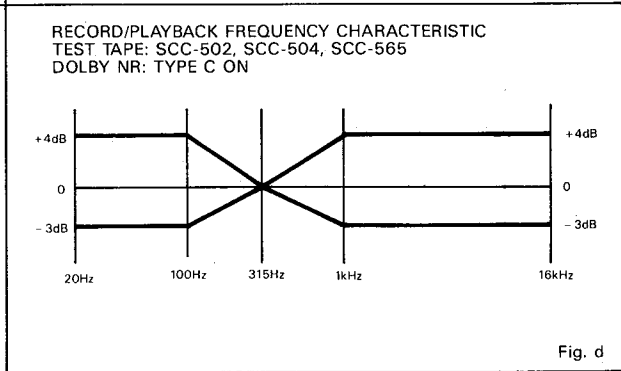
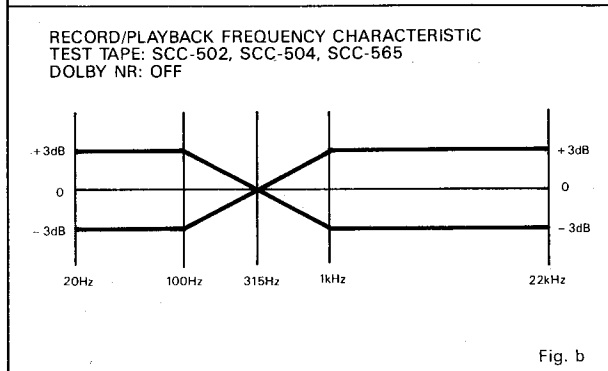
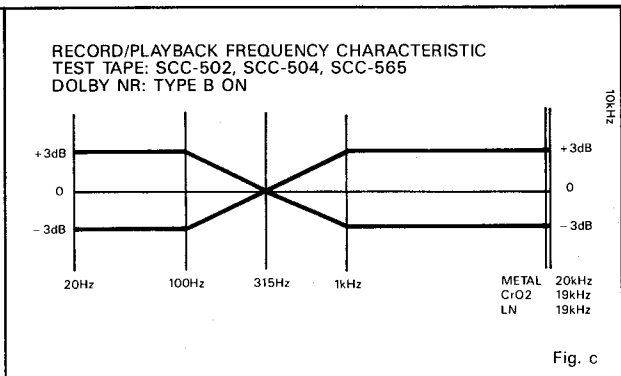
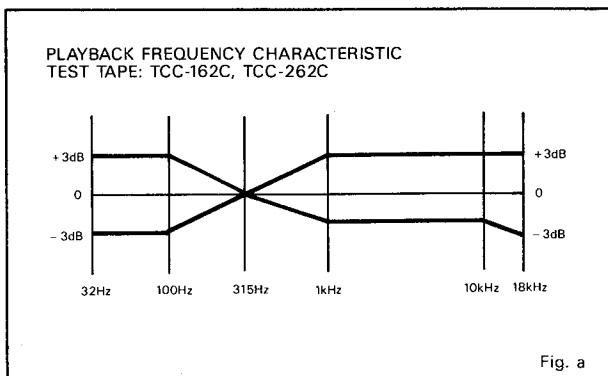


Fig. 3



Step	Alignment	Instrument Required	Input Signal	Mode	Test Point	Adjustment	For
1	Azimuth	VTVM Oscilloscope Test tape (TCC-153 or MTT-114)		PB	TP561 TP562	Azimuth screw	Maximum output Refer to "Azimuth adjustment" on page 7.
2	Tape speed	Frequency counter Test tape (MTT-111 or MTT-111D)		PB	TP561 TP562	VR built in motor	3000Hz $\pm \frac{30}{15}$ Hz Adjust at the center of test tape.
3	Playback output level	VTVM Test tape (MTT-150 or TCC-130)		PB	TP561 TP562	VR101 VR102	580mV
4	Playback frequency characteristic confirmation	VTVM Test tape (TCC-288H or TCC-162C and TCC-262C)		PB	OUTPUT jack		Confirm that the frequency response is within the range in Fig. a.
5	Wow and flutter confirmation	Wow/flutter meter Test tape (MTT-111 or MTT-111D)		PB	OUTPUT jack		Confirm that the wow and flutter is within the specification.
6	Bias frequency confirmation	Frequency counter		REC/PB	TP261 TP262 (GND)		105.4kHz Tape selector is metal position.
7	Step up trans	VTVM Blank tape (SCC-565 or AC-712)		REC/PB	TP204 TP205 TP203 (GND)	L651 L652	Maximum output Set the Bias Fine Trim to the "hi cut" position. Set the VR256 all the way to counterclockwise. Set the VR257 all the way to clockwise. Tape selector is metal position.
8	Bias trap	VTVM Blank tape (SCC-565 or AC-712)		REC/PB	TP201 TP202 TP203 (GND)	L203 L204	Minimum output Set the Bias Fine Trim to the "hi cut" position. Set the VR256 all the way to counterclockwise. Set the VR257 all the way to clockwise. Tape selector is metal position.
9	Bias level (pre-adjustment)	VTVM Blank tapes metal (SCC-565 or AC-712) CrO ₂ (SCC-504 or AC-512) LN (SCC-502 or XL-1)		REC/PB	TP204 TP205 TP203 (GND)	VR256 VR257	50mV Tape selector is metal position.
						VR254 VR255	20mV Tape selector is CrO ₂ position.
						VR252 VR253	13mV Tape selector is LN position.
10	Record level (pre-adjustment)	VTVM Blank tape (SCC-504 or AC-512)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV in REC-PAUSE mode.	REC/PB	TP561 TP562	VR201 VR202	580mV Tape selector is CrO ₂ position.
11	Record/Playback equalizer frequency characteristic	VTVM Blank tapes metal (SCC-565 or AC-712) CrO ₂ (SCC-504 or AC-512) LN (SCC-502 or XL-1)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.	REC/PB	OUTPUT jack	VR257 L201	So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is metal position.
						VR255 L201	So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is CrO ₂ position.
						VR254 L202	Tape selector is LN position. So that the record/playback frequency response is flat (at least within the range in Fig. b).
						L201 L202	So that the record/playback frequency is balanced at each position of metal, CrO ₂ and LN.
12	Record level	VTVM Blank tape (SCC-504 or AC-512)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.	REC/PB	TP561 TP562	VR201 VR202	580mV Tape selector is CrO ₂ position.
13	Record level confirmation	VTVM Blank tapes metal (SCC-565 or AC-712) LN (SCC-502 or XL-1)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.	REC/PB	TP561 TP562		580mV \pm 0.5dB This confirmation should be done at each tape selector position.
14	Playback trap	VTVM Blank tape (SCC-565 or AC-712)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode.	REC/PB	TP561 TP562	L101 L102	Obtain the maximum output point (around 250Hz) while varying the input signal frequency between 100Hz and 400Hz and adjust so that the output becomes minimum.
15	Record/Playback equalizer frequency characteristic confirmation	VTVM Blank tapes metal (SCC-565 or AC-712) CrO ₂ (SCC-504 or AC-512) LN (SCC-502 or XL-1)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.	REC/PB	OUTPUT jack		Confirm that the record/playback frequency response is within the range in Fig. c and Fig. d. If it is not within the specification, redo the adjustment and confirmation in steps 11, 12 and 13. This confirmation should be done at each tape selector position under each of the following conditions, Dolby NR B type on and Dolby NR C type on.
16	Meter level	VTVM	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 0.5dB in REC-PAUSE mode.	REC-PAUSE	PEAK LEVEL METER	VR401 VR402	Adjust to the point where the 0dB LED of the peak level meter lights. Set the Tape Monitor switch to source position (button out).
17	Bias tone	VTVM			TP511 TP512	VR451 VR452	580mV - 20dB
18	MPX filter characteristic confirmation	VTVM	Apply 19kHz and 15kHz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV in REC-PAUSE mode.	REC/PB	OUTPUT jack		Confirm that attenuation of 15kHz and 19kHz is within the specification when MPX filter on.
19	Anti skwing level confirmation	VTVM	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode.	REC/PB	TP201 TP202		Confirm that attenuation of 19.9kHz is maximum. Dolby NR C type is on.
20	Skwing level confirmation	VTVM	Apply 400Hz signal to TP101 and TP102. Set INPUT LEVEL knob so that TP561 and TP562 voltage is 580mV - 25dB in REC-PAUSE mode.	REC/PB	TP561 TP562		Confirm that boost at 19.9kHz is maximum.

Step	Alignment	Instrument Required	Input Signal
1	Azimuth	VTVM Oscilloscope Test tape (TCC-153 or MTT-114)	
2	Tape speed	Frequency counter Test tape (MTT-111 or MTT-111D)	
3	Playback output level	VTVM Test tape (MTT-150 or TCC-130)	
4	Playback frequency characteristic confirmation	VTVM Test tape (TCC-288H or TCC-162C and TCC-262C)	
5	Wow and flutter confirmation	Wow/flutter meter Test tape (MTT-111 or MTT-111D)	
6	Bias frequency confirmation	Frequency counter	
7	Step up trans	VTVM Blank tape (SCC-565 or AC-712)	
8	Bias trap	VTVM Blank tape (SCC-565 or AC-712)	
9	Bias level (pre-adjustment)	VTVM Blank tapes	
		metal (SCC-565 or AC-712)	
		CrO ₂ (SCC-504 or AC-512) LN (SCC-502 or XL-1)	
10	Record level (pre-adjustment)	VTVM Blank tape (SCC-504 or AC-512)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV in REC-PAUSE mode.
11	Record/Playback equalizer frequency characteristic	VTVM Blank tapes	
		metal (SCC-565 or AC-712)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.
		CrO ₂ (SCC-504 or AC-512)	
		LN (SCC-502 or XL-1)	
12	Record level	VTVM Blank tape (SCC-504 or AC-512)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.
13	Record level confirmation	VTVM Blank tapes metal (SCC-565 or AC-712) LN (SCC-502 or XL-1)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.
14	Playback trap	VTVM Blank tape (SCC-565 or AC-712)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode.
15	Record/Playback equalizer frequency characteristic confirmation	VTVM Blank tapes metal (SCC-565 or AC-712) CrO ₂ (SCC-504 or AC-512) LN (SCC-502 or XL-1)	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal.
16	Meter level	VTVM	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 0.5dB in REC-PAUSE mode.
17	Bias tone	VTVM	
18	MPX filter characteristic confirmation	VTVM	Apply 19kHz and 15kHz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV in REC-PAUSE mode.
19	Anti skwing level confirmation	VTVM	Apply 400Hz signal to LINE INPUT. Set INPUT LEVEL knob so that TP511 and TP512 voltage is 580mV - 25dB in REC-PAUSE mode.
20	Skwing level confirmation	VTVM	Apply 400Hz signal to TP101 and TP102. Set INPUT LEVEL knob so that TP561 and TP562 voltage is 580mV - 25dB in REC-PAUSE mode.

	Mode	Test Point	Adjustment	For
	PB	TP561 TP562	Azimuth screw	Maximum output Refer to "Azimuth adjustment" on page 7.
	PB	TP561 TP562	VR built in motor	3000Hz \pm_{15}^{30} Hz Adjust at the center of test tape.
	PB	TP561 TP562	VR101 VR102	580mV
	PB	OUTPUT jack		Confirm that the frequency response is within the range in Fig. a.
	PB	OUTPUT jack		Confirm that the wow and flutter is within the specification.
	REC/PB	TP261 TP262 (GND)		105.4kHz Tape selector is metal position.
	REC/PB	TP204 TP205 TP203 (GND)	L651 L652	Maximum output Set the Bias Fine Trim to the "hi cut" position. Set the VR256 all the way to counterclockwise. Set the VR257 all the way to clockwise. Tape selector is metal position.
	REC/PB	TP201 TP202 TP203 (GND)	L203 L204	Minimum output Set the Bias Fine Trim to the "hi cut" position. Set the VR256 all the way to counterclockwise. Set the VR257 all the way to clockwise. Tape selector is metal position.
	REC/PB	TP204 TP205 TP203 (GND)	VR256 VR257	50mV Tape selector is metal position.
VR254 VR255			20mV Tape selector is CrO2 position.	
VR252 VR253			13mV Tape selector is LN position.	
mV in	REC/PB	TP561 TP562	VR201 VR202	580mV Tape selector is CrO2 position.
mV	REC/PB	OUTPUT jack	VR257 L201	So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is metal position.
			VR256 L202	
			VR255 L201	So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is CrO2 position.
			VR254 L202	
			VR253 VR252	Tape selector is LN position. So that the record/playback frequency response is flat (at least within the range in Fig. b).
L201 L202	So that the record/playback frequency is balanced at each position of metal, CrO2 and LN.			
80mV	REC/PB	TP561 TP562	VR201 VR202	580mV Tape selector is CrO2 position.
80mV	REC/PB	TP561 TP562		580mV ± 0.5 dB This confirmation should be done at each tape selector position.
80mV	REC/PB	TP561 TP562	L101 L102	Obtain the maximum output point (around 250Hz) while varying the input signal frequency between 100Hz and 400Hz and adjust so that the output becomes minimum.
80mV	REC/PB	OUTPUT jack		Confirm that the record/playback frequency response is within the range in Fig. c and Fig. d. If it is not within the specification, redo the adjustment and confirmation in steps 11, 12 and 13. This confirmation should be done at each tape selector position under each of the following conditions, Dolby NR B type on and Dolby NR C type on.
80mV	REC- PAUSE	PEAK LEVEL METER	VR401 VR402	Adjust to the point where the 0dB LED of the peak level meter lights. Set the Tape Monitor switch to source position (button out).
		TP511 TP512	VR451 VR452	580mV - 20dB
1 knob	REC/PB	OUTPUT jack		Confirm that attenuation of 15kHz and 19kHz is within the specification when MPX filter on.
80mV	REC/PB	TP201 TP202		Confirm that attenuation of 19.9kHz is maximum. Dolby NR C type is on.
1 knob so mode.	REC/PB	TP561 TP562		Confirm that boost at 19.9kHz is maximum.

■ BIAS TONE AND BIAS FINE TRIM OPERATION CONFIRMATION

● Conditions (unless otherwise noted)

Output Level	max
Dolby NR	off
MPX Filter	off
Bias Fine Trim	Center
Tape Monitor	tape

Connect a 10k Ω load resistors to Line Output.

● Test tape

TCC-130

● Reference tapes

LN	SCC-502 or XL-1
CrO ₂	SCC-504 or AC-512
Metal	SCC-565 or AC-712

1. Dolby NR light level confirmation

Play back the test tape (TCC-130) and confirm that the LED display lights to 0 dB with the Tape Selector at both the LN position and the CrO₂ position. If the display does not operate as described above, make a readjustment by repeating steps 3 and 16 of Electrical Adjustment.

2. Bias Tone light level confirmation

- 1) Check to ensure that the LED display lights to 0 dB when the Bias Tone button is pressed. If the display does not operate as described above, make a readjustment by repeating steps 16 and 17 of Electrical Adjustment.
- 2) With the Tape Selector at the LN and then the Metal position, check to ensure that the LED display reading does not change when the buttons are pressed as in steps 1).

3. Recording/playback level and Recording/playback frequency characteristic confirmation of Bias Tone

With the Tape Selector set at the LN position, record the Bias Tone by pressing the Bias Tone button for more than 2 count indication of the counter and play it back. During playback, check to ensure that one of -1dB, 0dB and +1dB on the L channel of the LED display lights.

Repeat the same check with the Tape Selector set to the CrO₂ position and then the Metal position. The level difference with the R channel must be within 1dB.

If the display does not operate as described above, make a readjustment by repeating step 12 of Electrical Adjustment.

4. Recording/playback frequency characteristic correction confirmation by means of Bias Fine Trim

- 1) With the Dual Channel VTVM connected to the Output Jacks and Set the Tape Monitor switch to tape position.
- 2) Set the Tape Selector to CrO₂ position, record the Bias Tone by pressing the Bias Tone button and play it back. Note the output level of L channel and R channel when playing back and suppose it as 0dB.
- 3) Turn the Bias Fine Trim all the way to the Hi Boost side and confirm that the output level changes more than +2dB. Then turn it all the way to the Hi Cut side and confirm that the output level changes less than -2dB.
- 4) Repeat the same confirmation procedure as in steps 2) and 3) with the Tape Selector set to the LN position and the Metal position respectively. The amount of the output level change should be more than +2dB on the Hi Boost side and less than -2dB on the Hi Cut side.

5. Auto-Repeat operation confirmation

- 1) With the Auto Repeat switch in the off state (button out), load the tape and wind it up to the end by pressing the F.FWD key. Then confirm that the Auto-Stop operation. The unit must stop automatically about 3 seconds after the tape was wound fully and the reel stopped.
- 2) With the Auto Repeat switch on (button in), rewind the tape (for any length) by pressing the REW key and then play it back to the end. Then confirm that the Auto-Stop operates about 3 seconds after the tape was fully wound up and the reel stopped and at the same time the Rewind operates automatically.
- 3) Furthermore, press the REW key to rewind to the end of the tape and confirm that about 3 seconds after the tape was fully rewound and the tape stopped, the Auto-Stop operates and at the same time the Replay operates.

CIRCUIT DESCRIPTION

Playback Signal

The playback signal taken out of the playback head is amplified in the Q101, Q105 and Q111 (L ch.), Q102, Q106 and Q112 (R ch.) and it is fed to the Dolby NR circuit consisting of the IC561 and IC562.

Then the signals enter ④ pin of the IC561 (L ch.) and IC562 (R ch.) where they are decoded and output through ②④ pin. The output signal is fed to the monitor select circuit consisting of the IC351 and divided into monitor output and meter output, and the monitor output signal is fed to OUTPUT jack and the headphone amplifier of the IC301.

The characteristics of the playback equalizer are specified by tape selector (BIAS/EQUALIZATION), and selected and specified in the Q113 (L ch.) and Q114 (R ch.).

Record Signal

The input signal coming through INPUT jack is adjusted by INPUT LEVEL and INPUT BALANCE and fed to the Dolby NR circuit consisting of the IC511 and IC512.

Then the signal passes through the Q501 (L ch.) and Q502 (R ch.) and by way of the MPX filters of the L501 (L ch.) and L502 (R ch.), it enters ① pin of the IC511 (L ch.) and IC512 (R ch.) where it is encoded and output through ⑭ pin.

The output signal passes through the record equalizer circuit, amplified in the record amplifier of the IC201, combined with the bias signal and fed to the record head through HX-PRO circuit.

Muting Operation

In the Record/Playback mode, the switch control signal and mute signal are output from the IC801 of the logic control block.

In the Stop mode, the signal output through ⑨ pin of the IC801 turns Q804 ON, whereby the mute signal is output. At the power ON/OFF, however, the mute signal is output from Q51. When the STOP button is pressed, this mute signal is output to turn ON the Q707 (L ch.) and Q708 (R ch.) to short-circuit the output signal for muting.

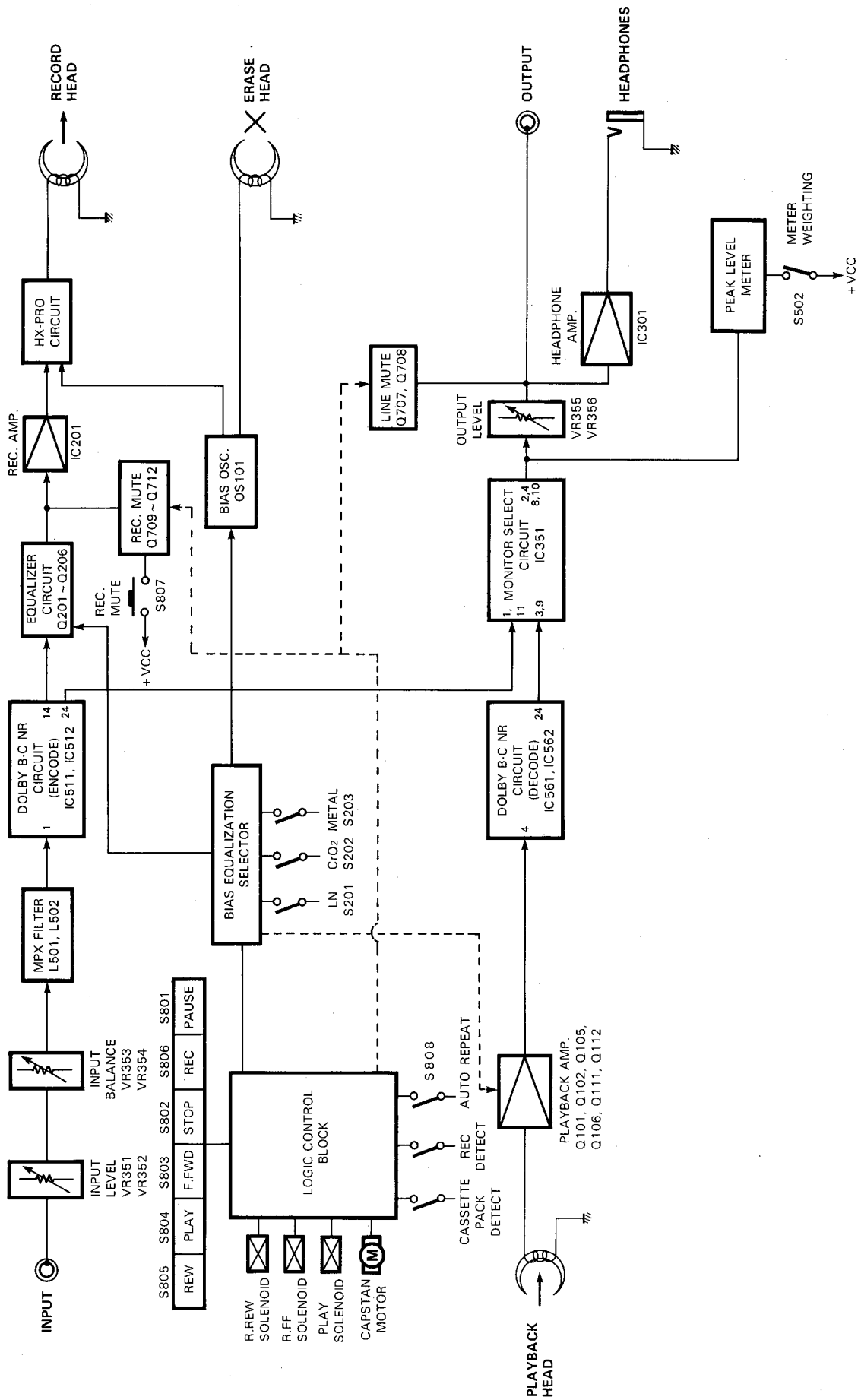
Logic in Record Mode

Pressing the REC key causes ⑮ pin of the IC801 to become low level and Q801, Q802 to turn ON, whereby the Q709, Q711 (L ch.) and Q710, Q712 (R ch.) turn OFF. Thus the Recording Amp. Mute state is released and results in the recording state. At the same time, as the Q814 turns ON, the Bias circuit starts to operate.

Logic in Playback Mode

Pressing the STOP, PAUSE or PLAY key causes the Q802 to turn ON (OFF when ⑮ pin of the IC801 is low level) and the PLAY signal is output. Then the Q709, Q711 (L ch.), Q710, Q712 (R ch.) turn ON to mute the recording amp., resulting in the playback mode.

BLOCK DIAGRAM



TIMING CHART

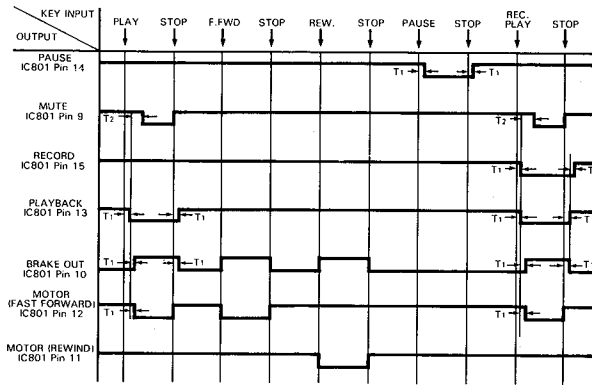


Fig. A

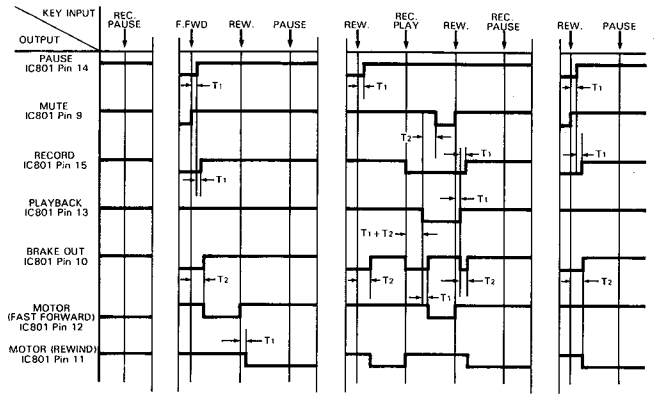


Fig. D

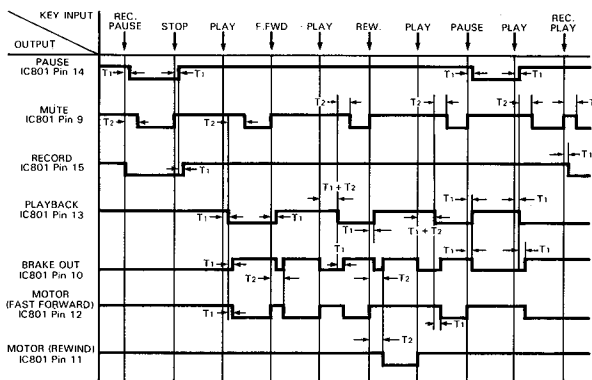


Fig. B

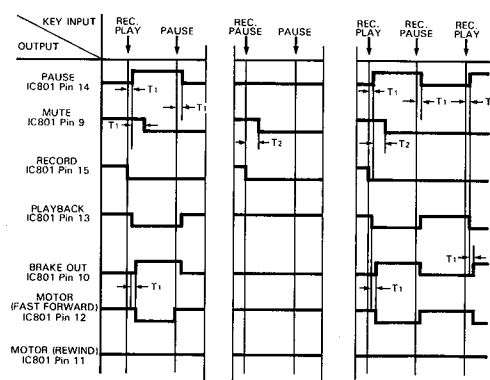


Fig. E

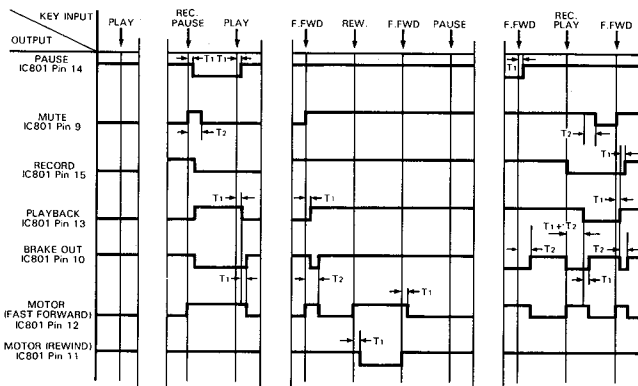


Fig. C

● AUTO REPEAT TIMING CHART

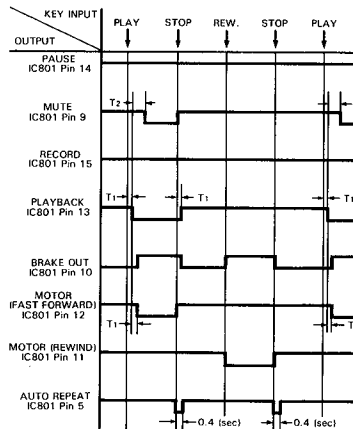


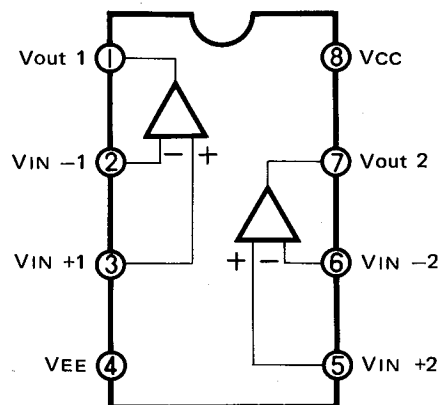
Fig. F

NOTE
After the power switch is pushed on, the unit remains in stop mode for about 1.6 second. After that, it operates according to each input key as shown figure. During this 1.6 second all input keys are ineffective.

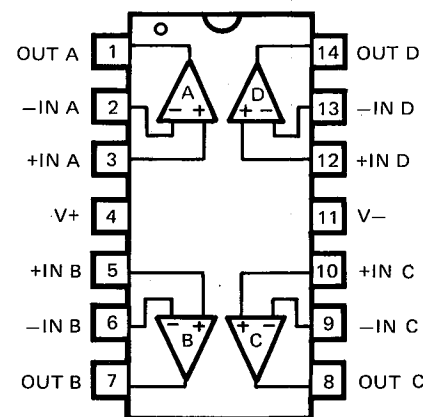
T1 = 61 (msec)
T2 = 400 (msec)

IC BLOCK DIAGRAM

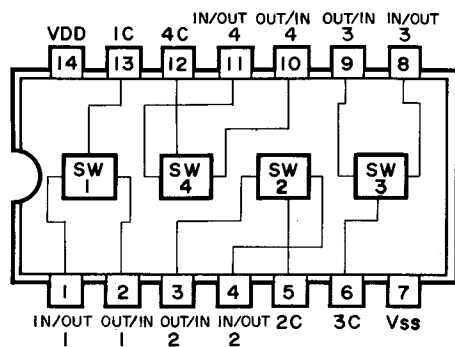
IC201 : M5220P
 IC301 : M5216P
 IC401, IC451, IC652 : M5218P



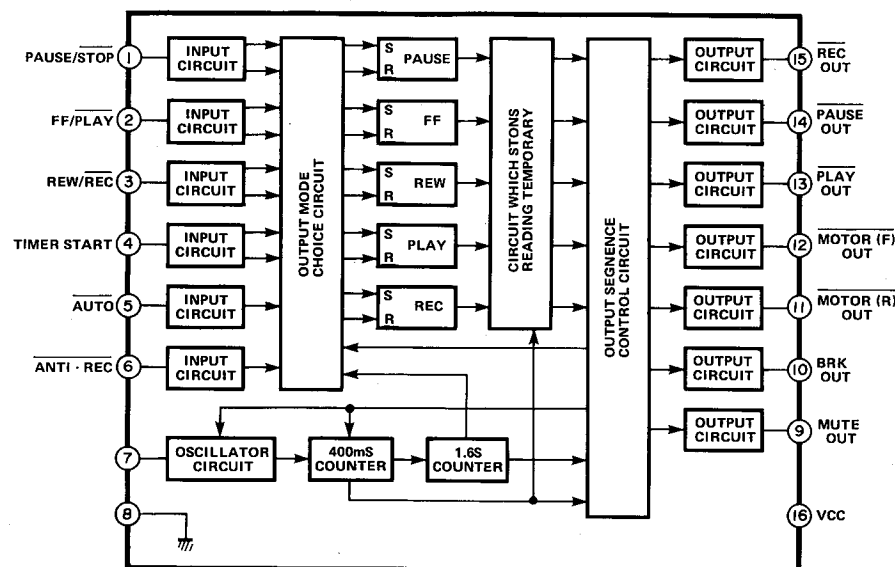
IC651 : HA17084P



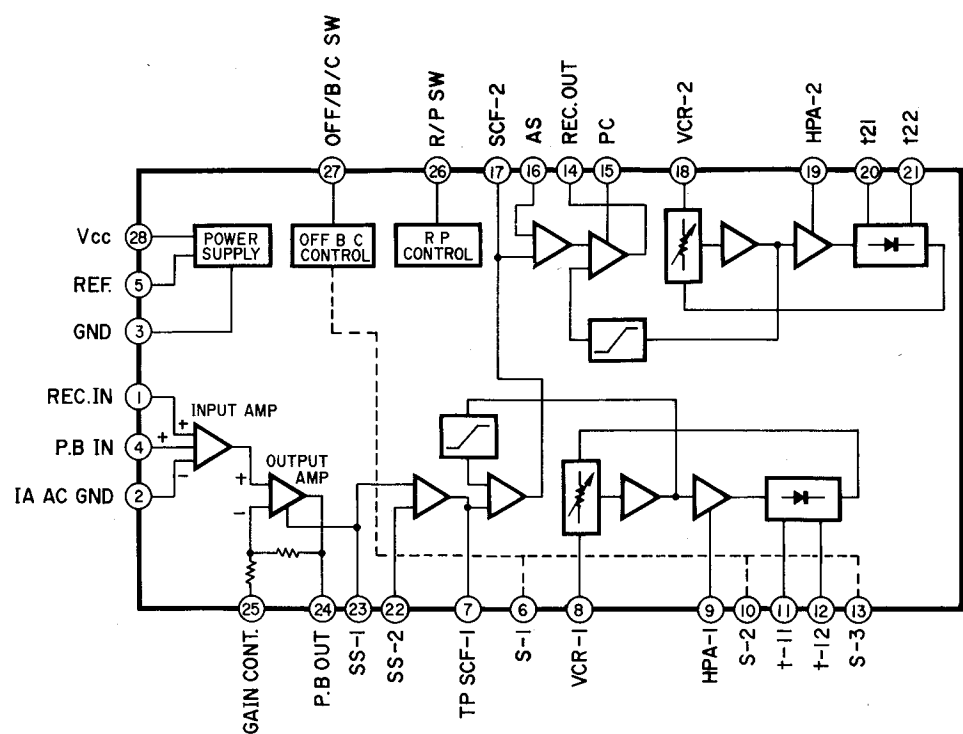
IC351 : TC4066BP



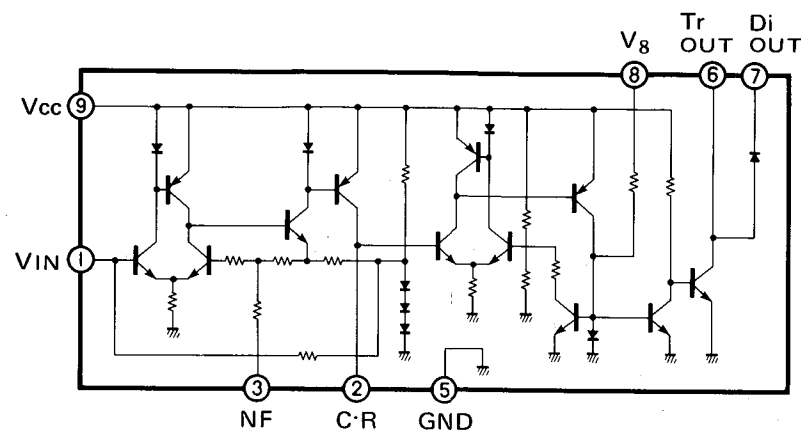
IC801 : M54886P



IC511, IC512, IC561, IC562 : HA12058-01

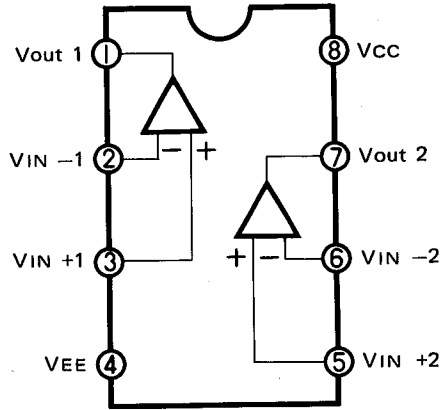


IC802 : BA335

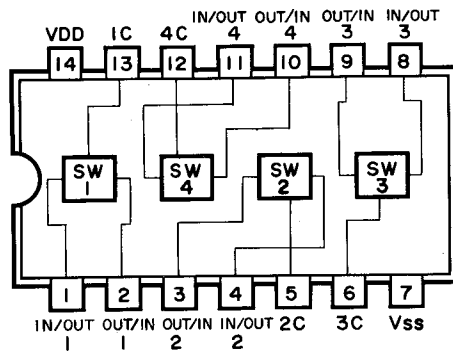


IC BLOCK DIAGRAM

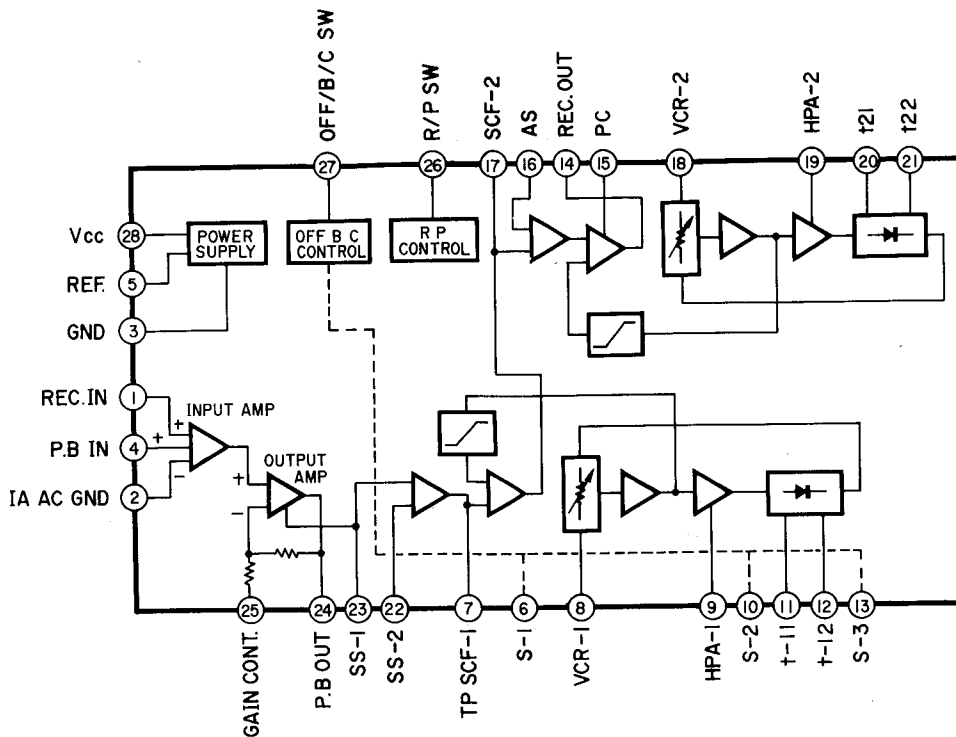
IC201:M5220P
 IC301:M5216P
 IC401, IC451, IC652:M5218P



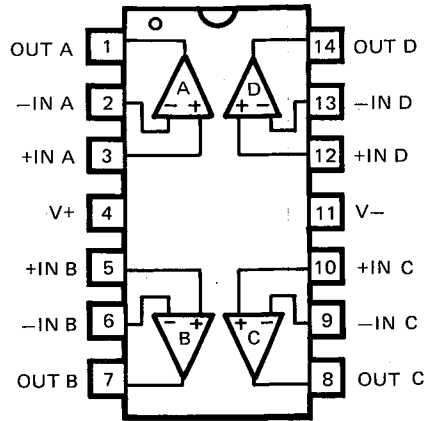
IC351:TC4066BP



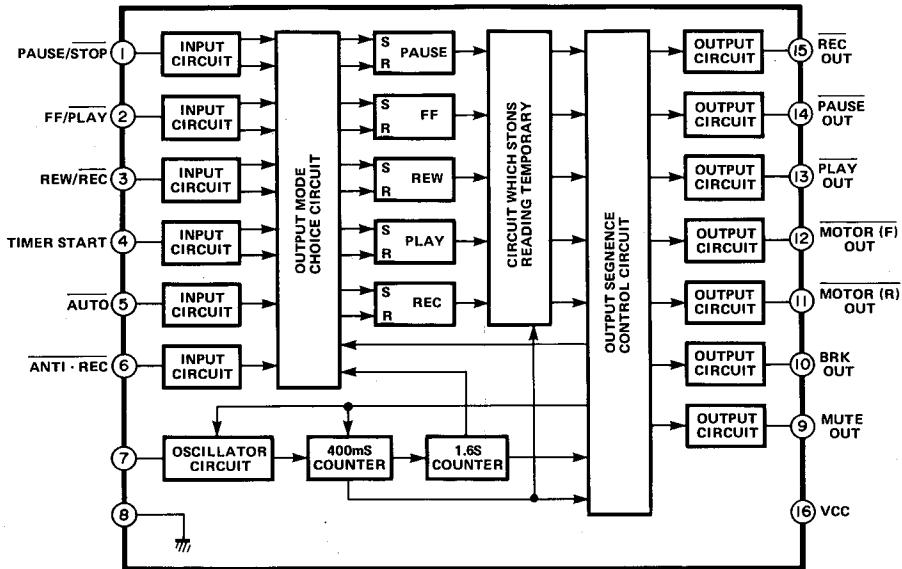
IC511, IC512, IC561, IC562:HA12058-01



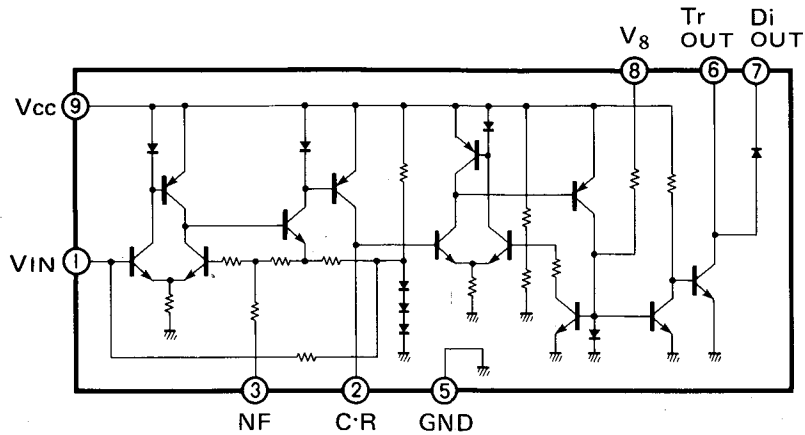
IC651 : HA17084P



IC801 : M54886P



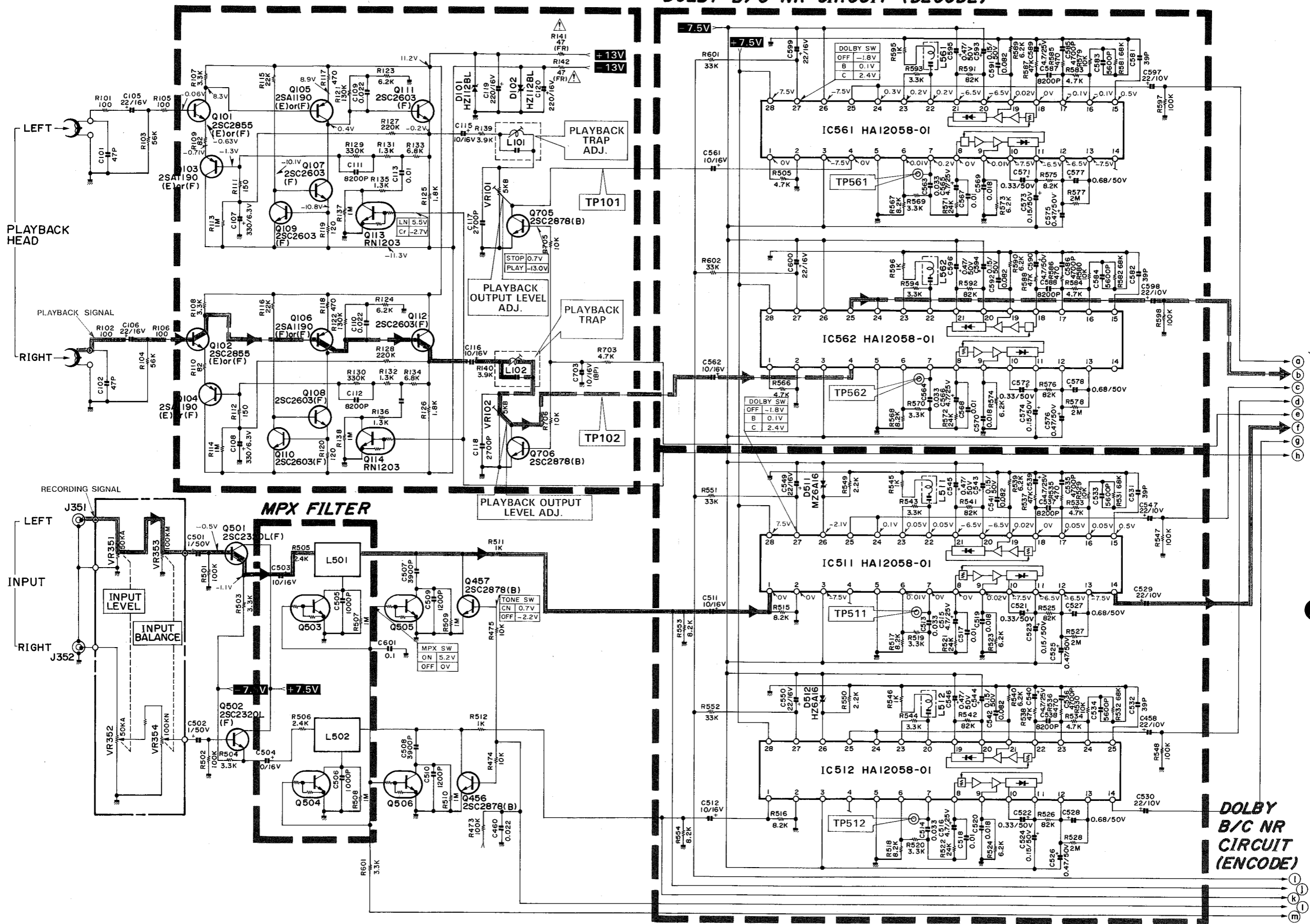
IC802 : BA335



SCHEMATIC DIAGRAM (1)

PLAYBACK AMP.

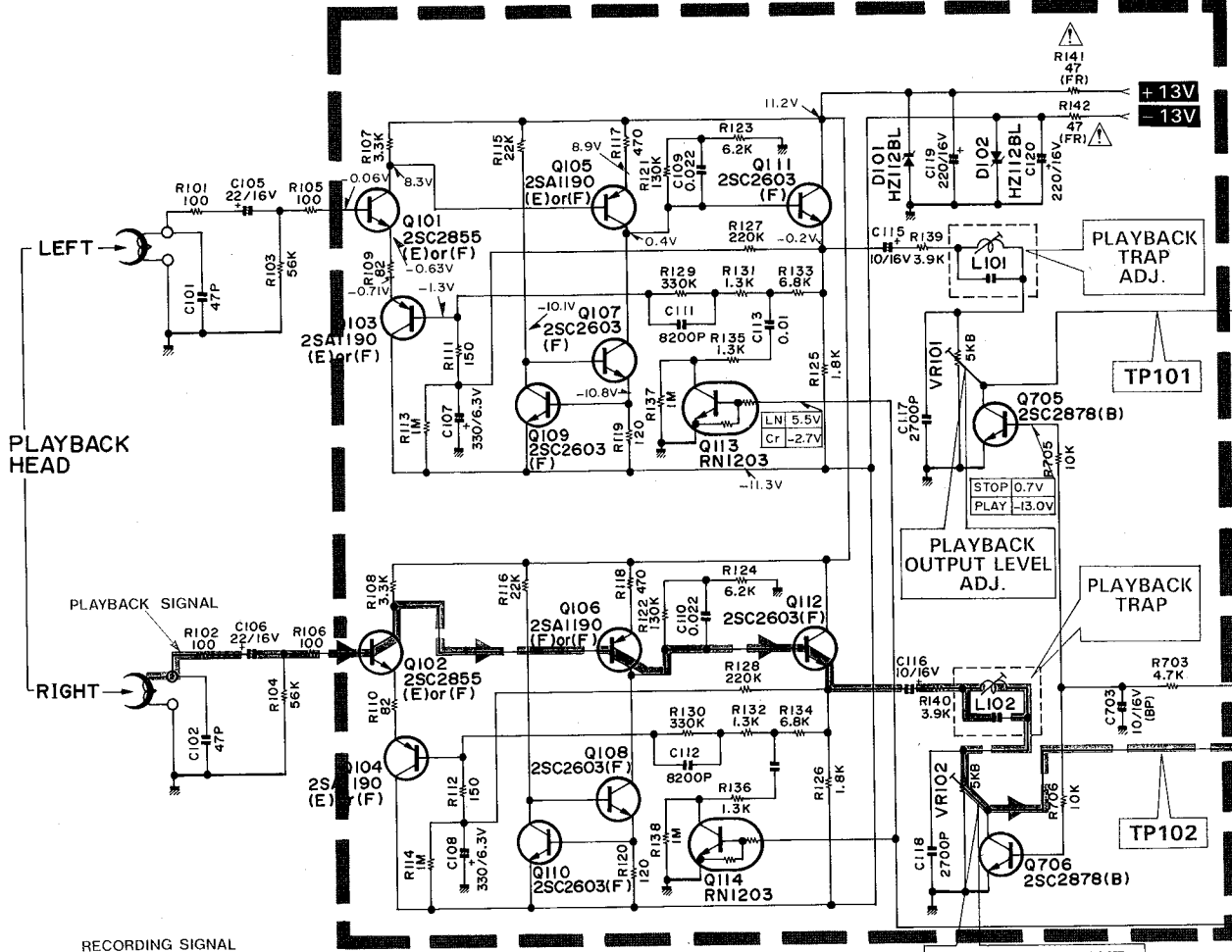
DOLBY B/C NR CIRCUIT (DECODE)



SCHMATIC DIAGRAM (1)

1

PLAYBACK AMP.



2

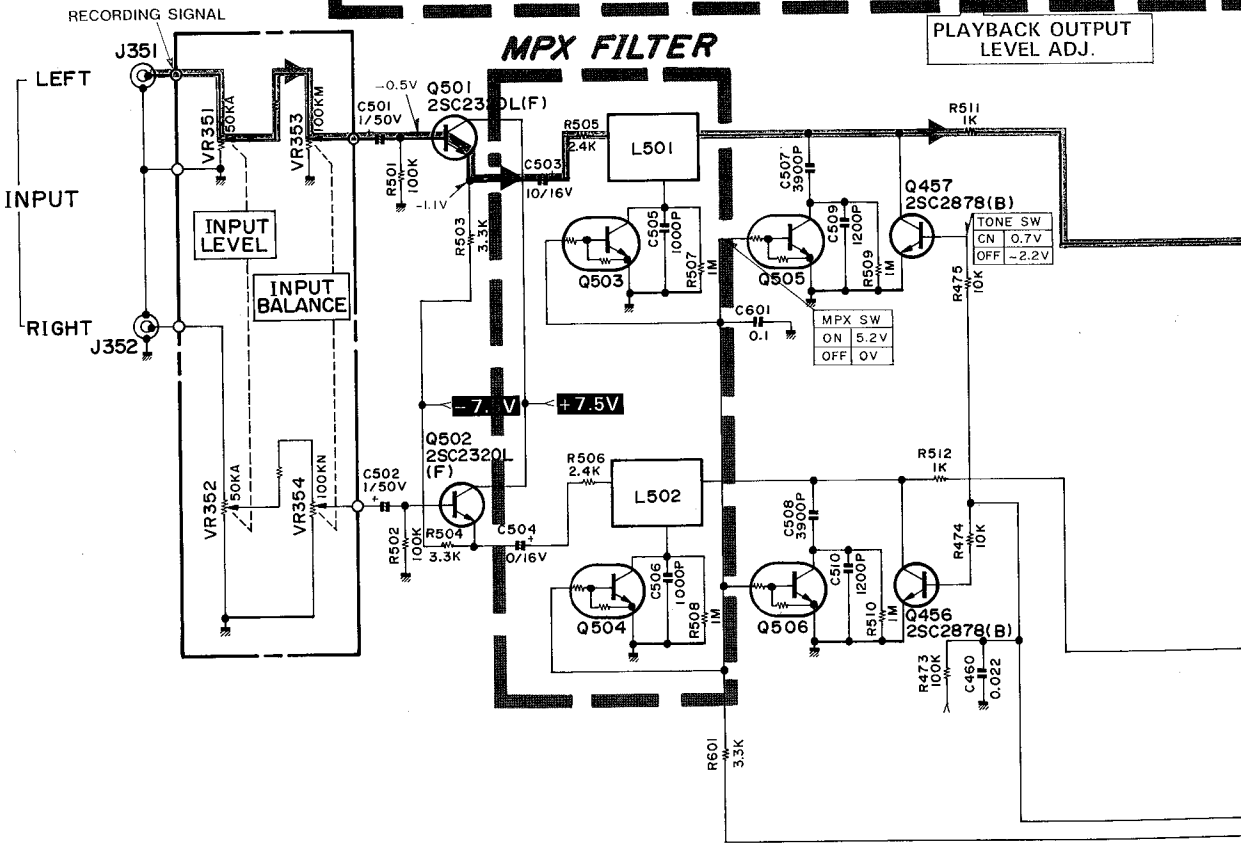
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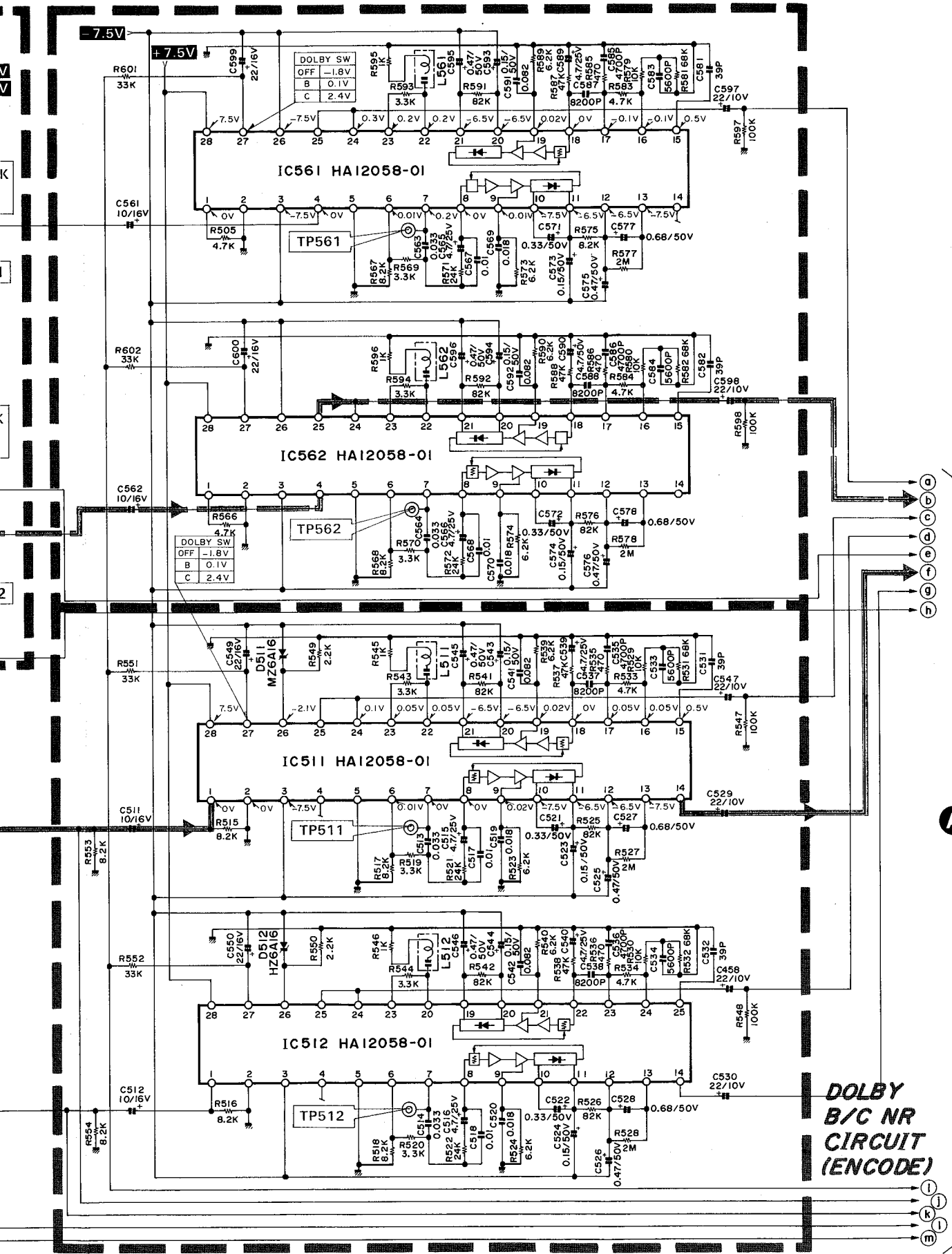
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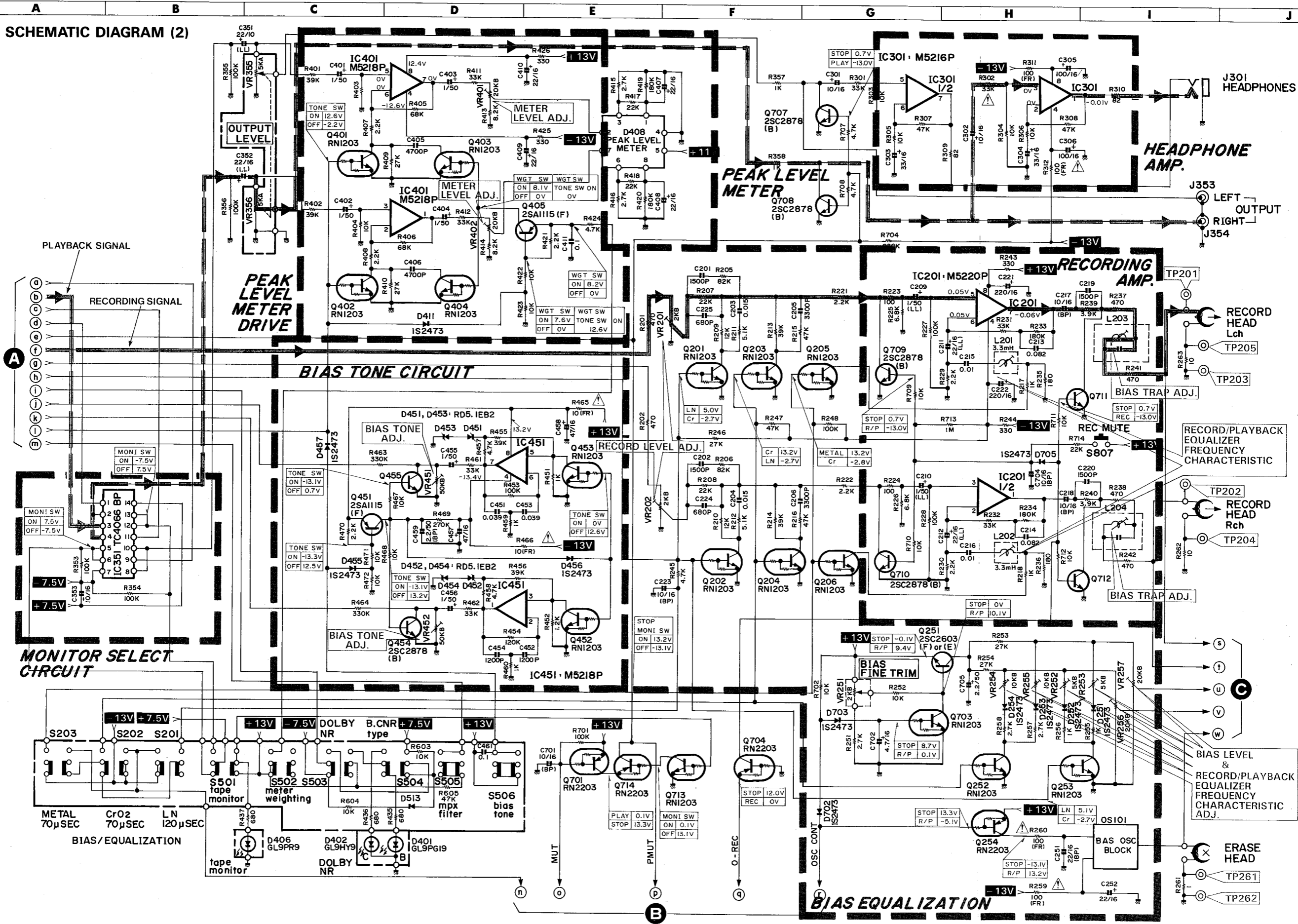
DOLBY B/C NR CIRCUIT (DECODE)



**DOLBY
B/C NR
CIRCUIT
(ENCODE)**

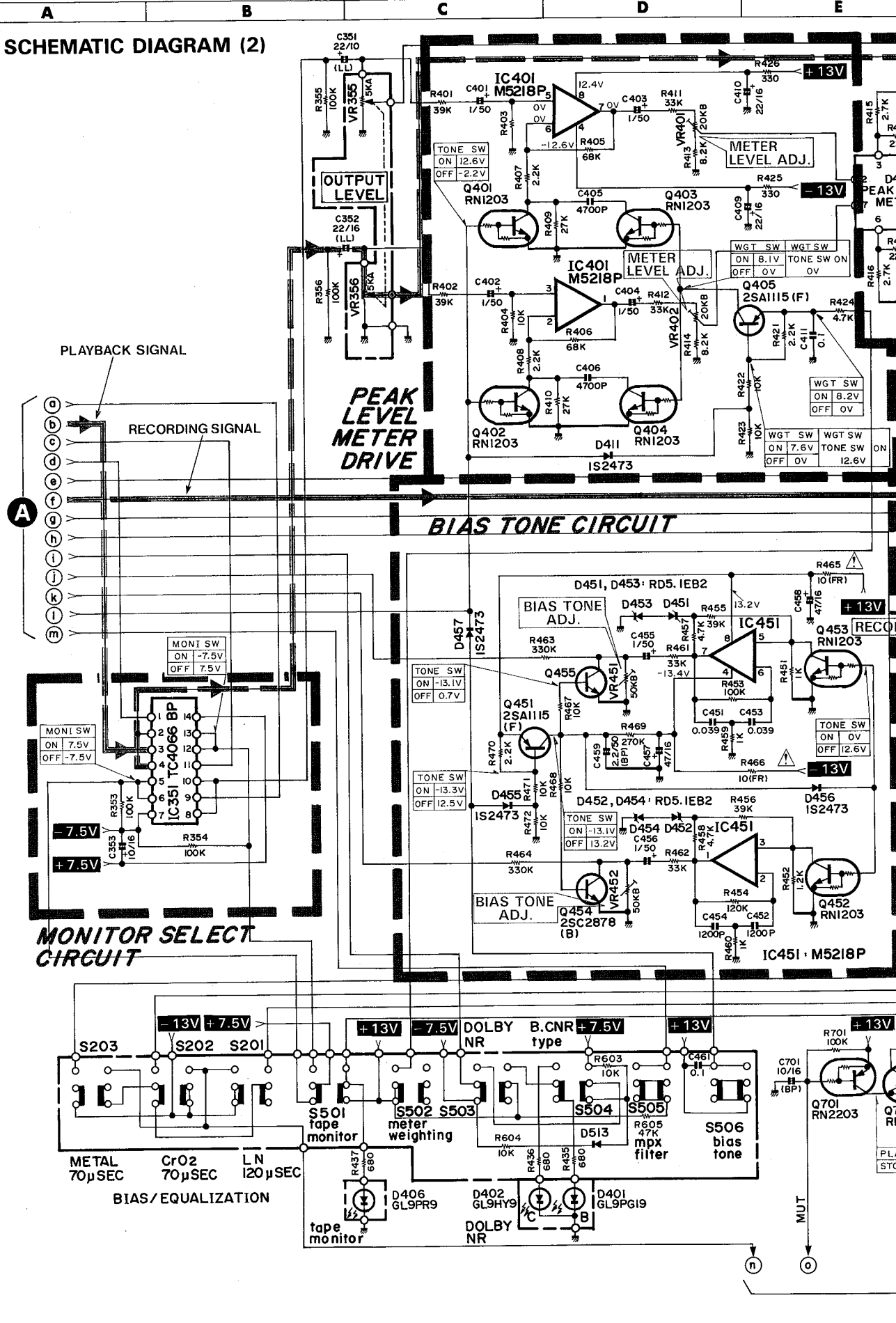
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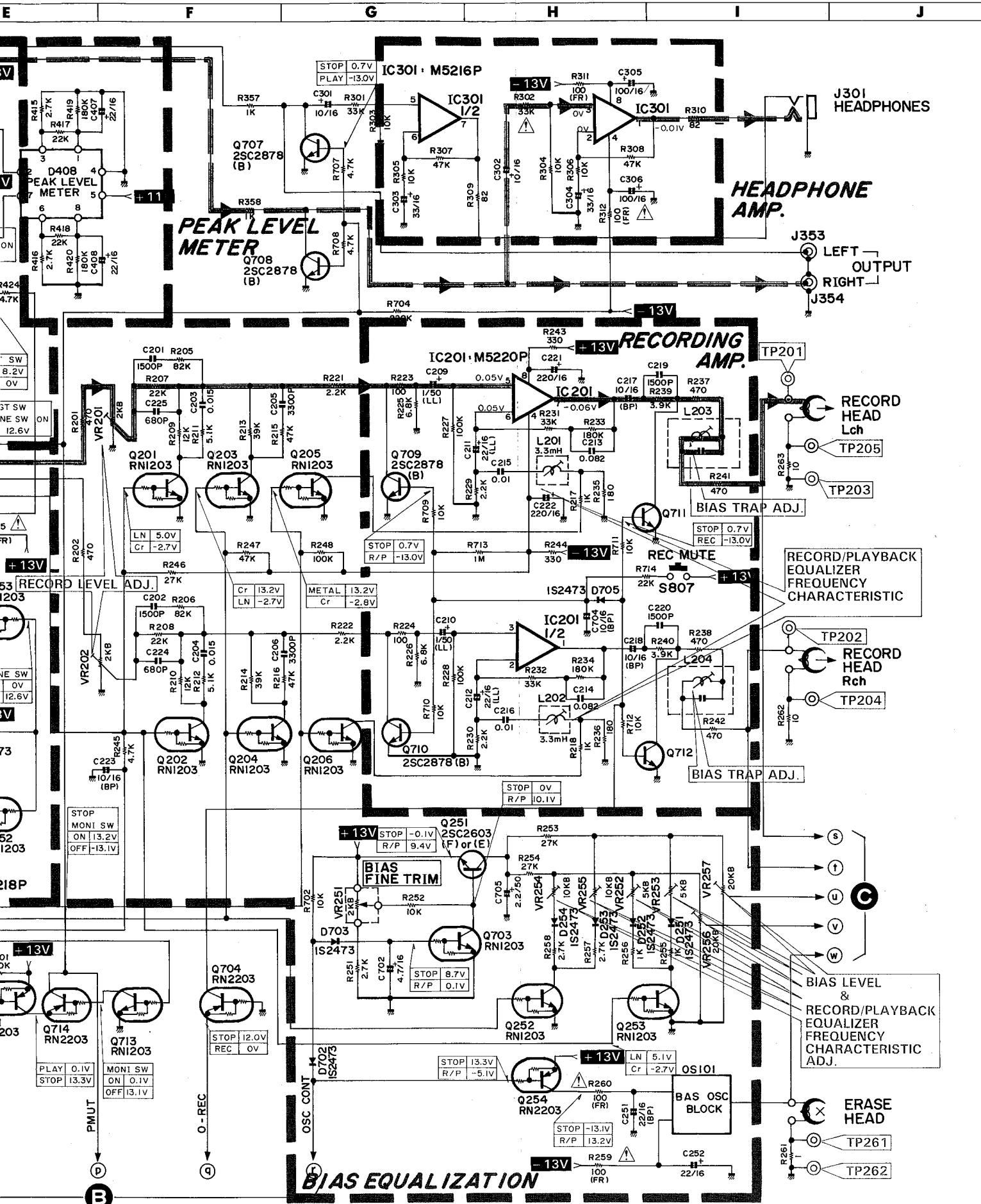
SCHMATIC DIAGRAM (2)



SCHEMATIC DIAGRAM (2)

1
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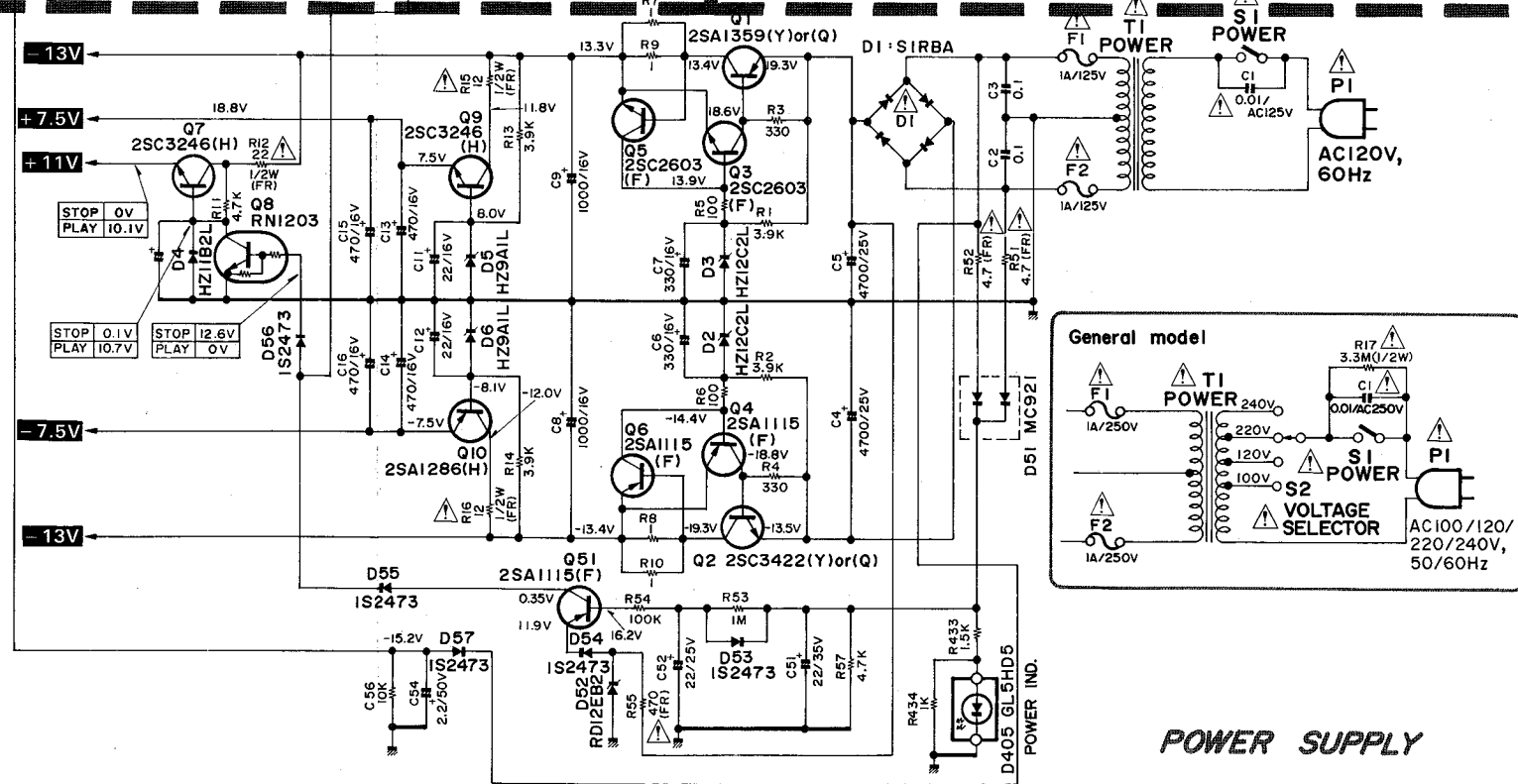
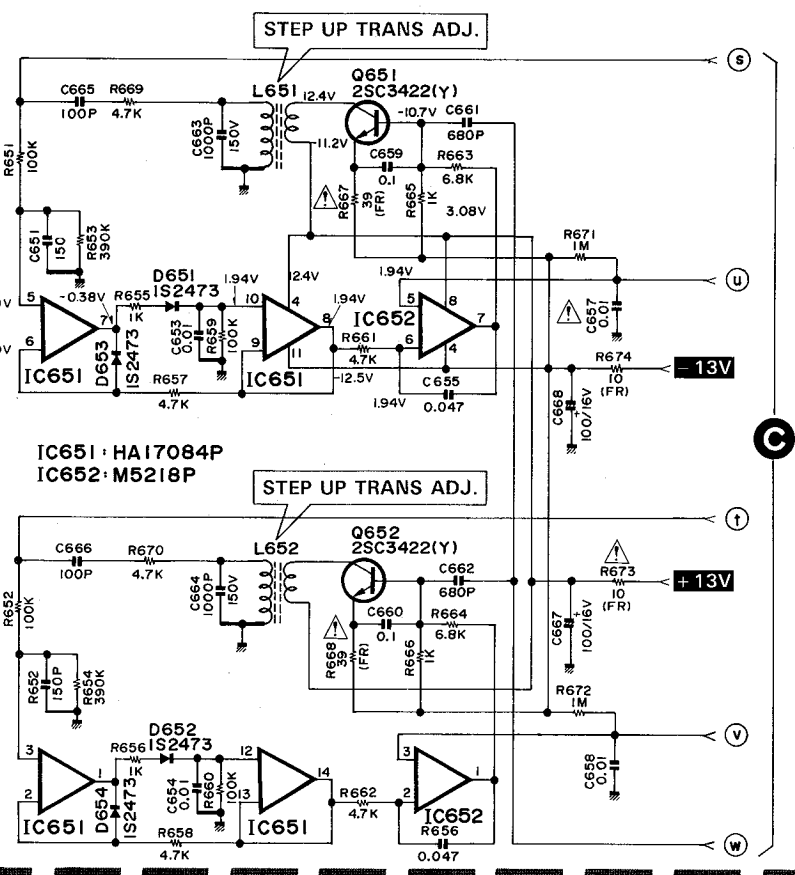
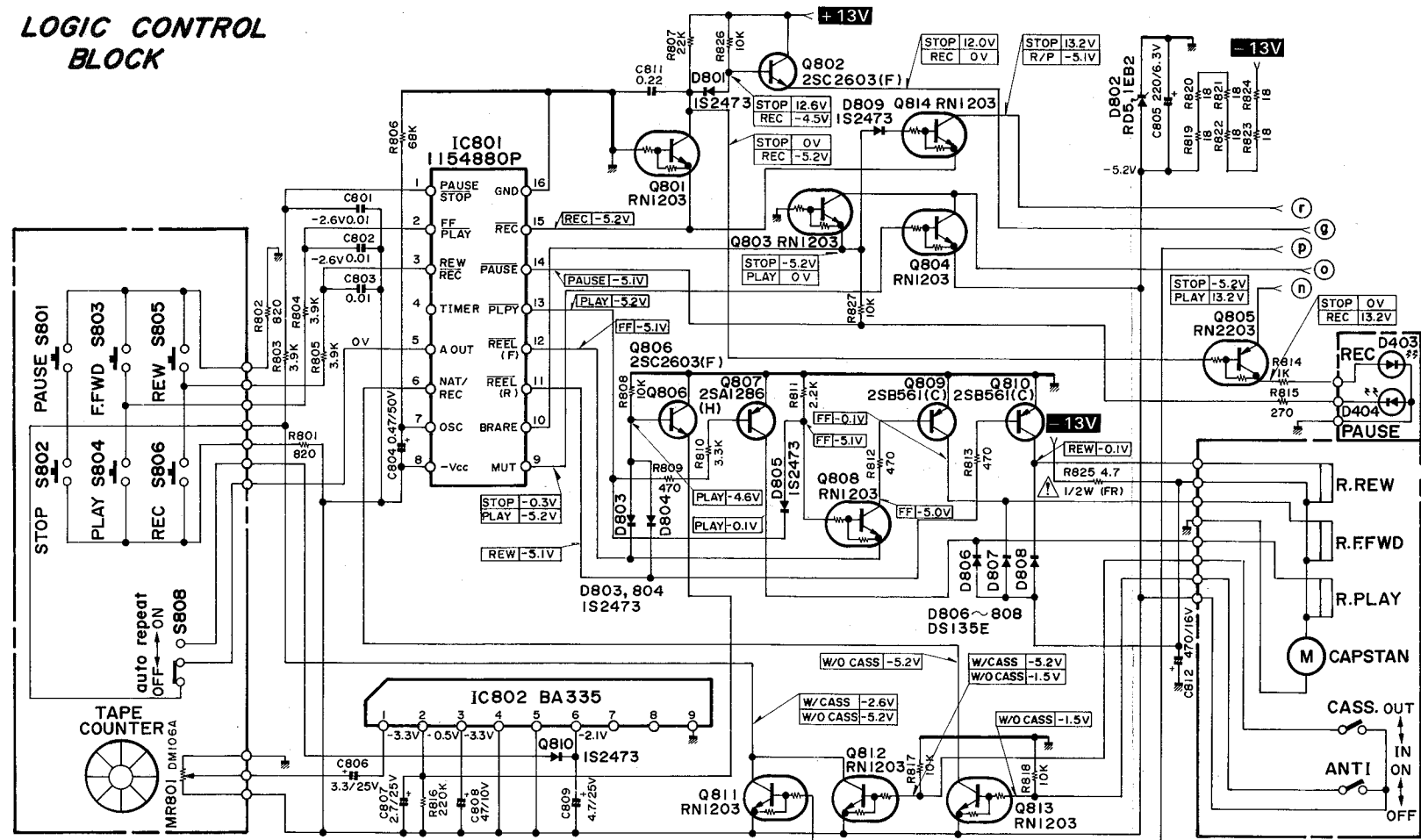




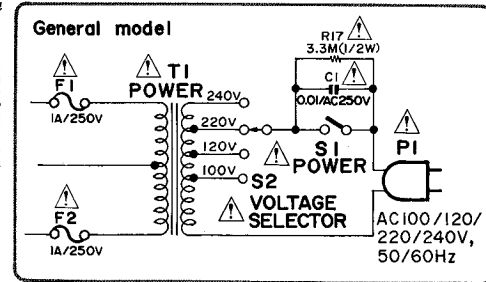
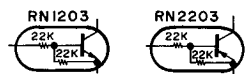
SCHEMATIC DIAGRAM (3)

HX-PRO CIRCUIT

LOGIC CONTROL BLOCK



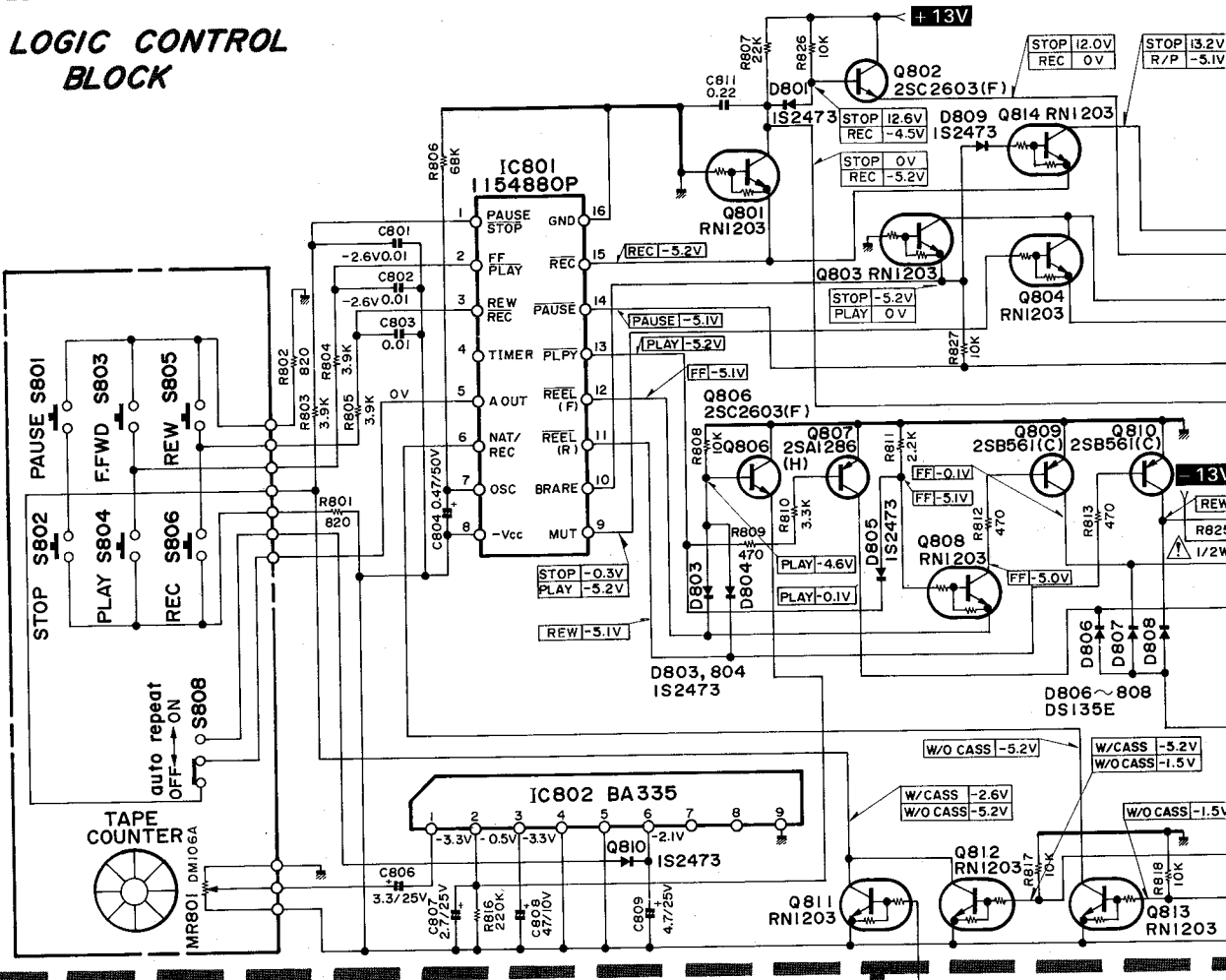
- NOTE:
1. ALL RESISTANCES VALUES ARE IN Ω .
K Ω = 1000 Ω , M Ω = 1000K Ω .
 2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
 3. ALL CAPACITANCES VALUES ARE IN μ F UNLESS OTHERWISE NOTED. P = μ F.
 4. V: DC VOLTAGE AT NO SIGNAL UNLESS OTHERWISE NOTED.
 5. SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.



POWER SUPPLY

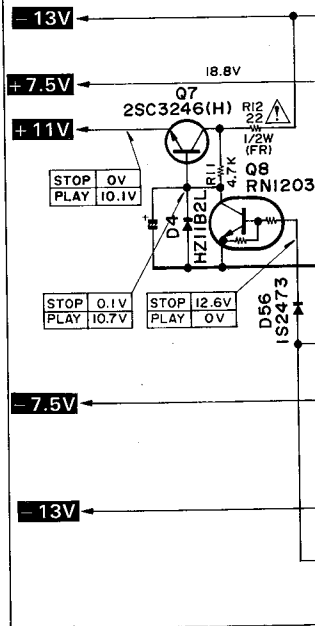
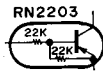
SCHMATIC DIAGRAM (3)

LOGIC CONTROL BLOCK

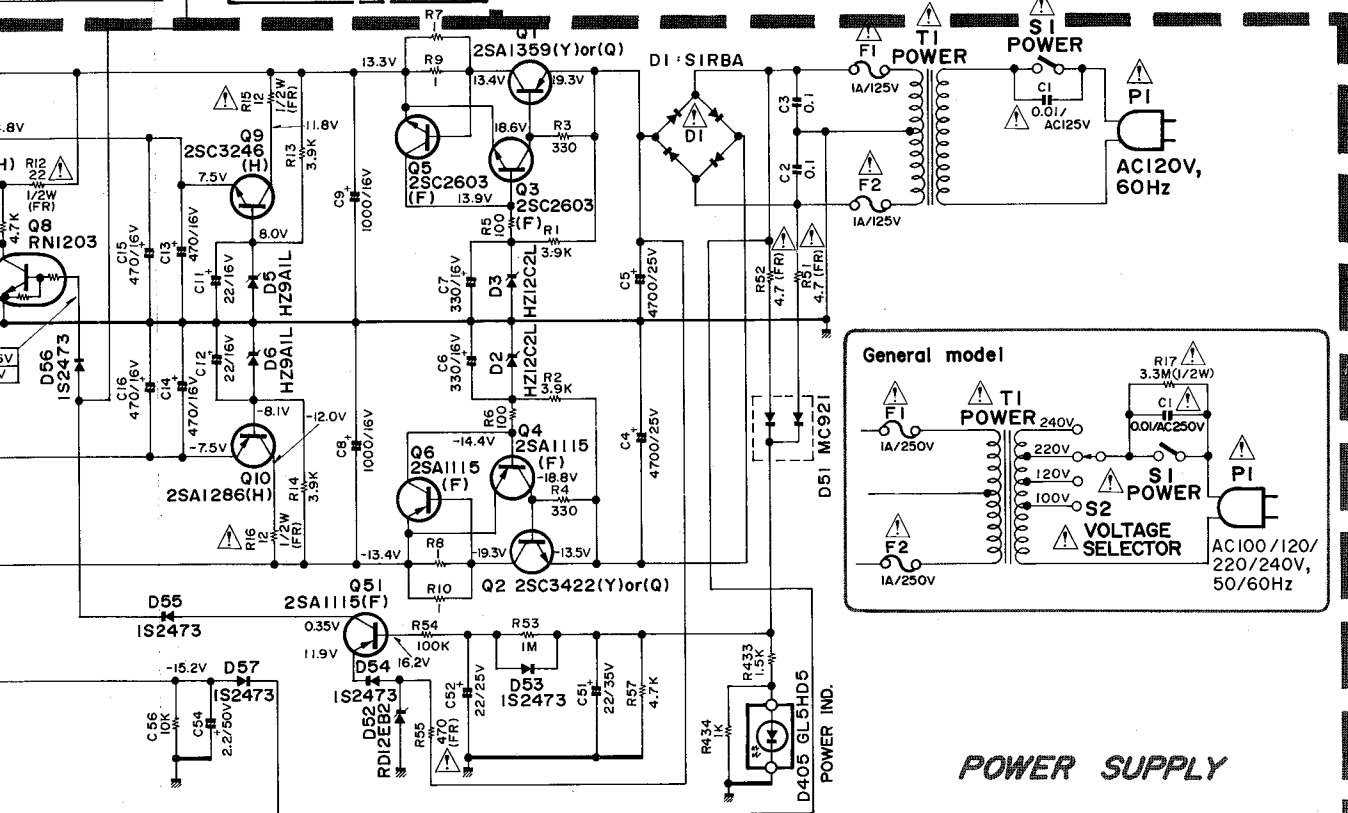
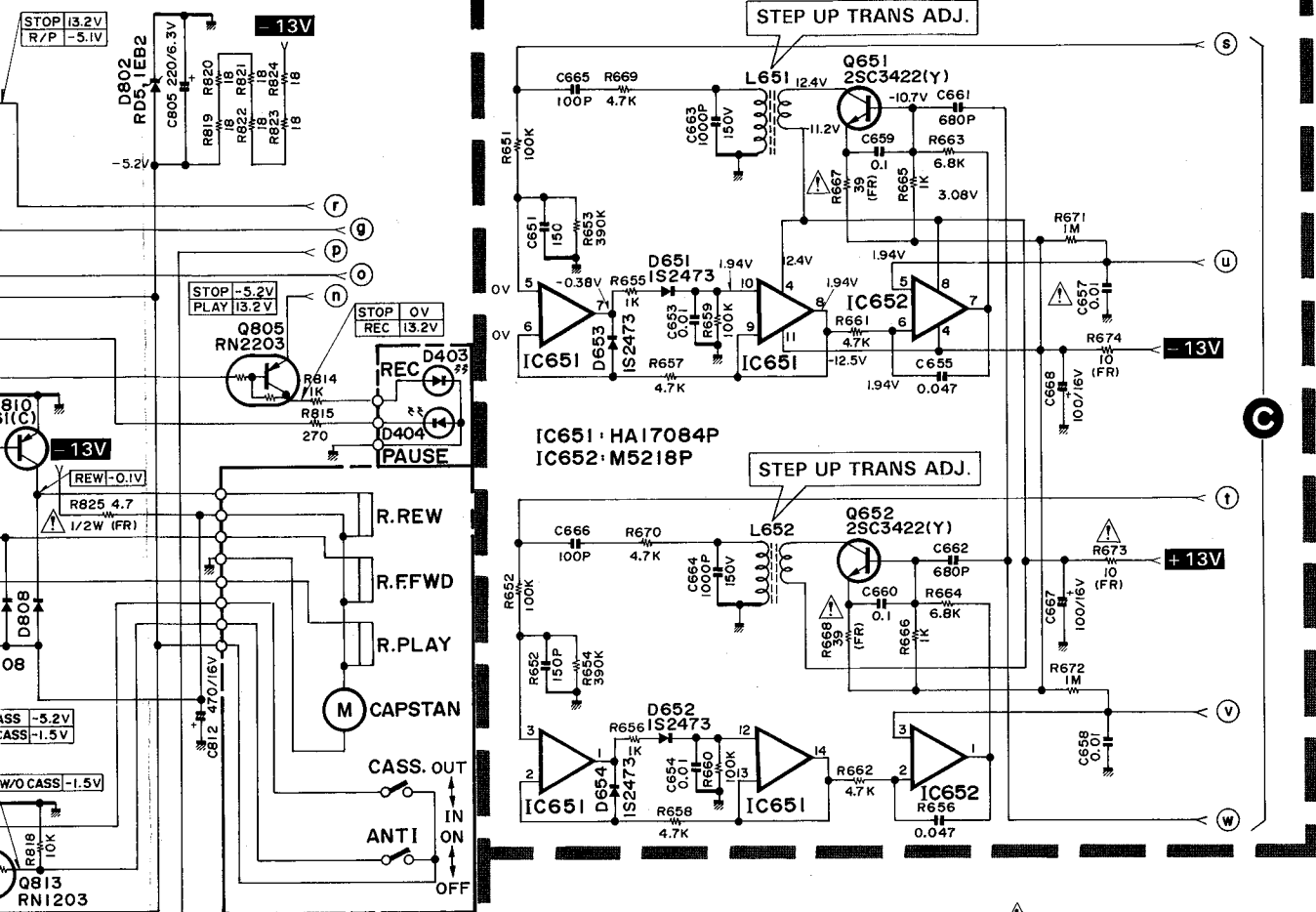


NOTE:

1. ALL RESISTANCES VALUES ARE IN Ω .
 $K\Omega = 1000\Omega$, $M\Omega = 1000K\Omega$.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. $P = \mu\mu F$.
4. V: DC VOLTAGE AT NO SIGNAL UNLESS OTHERWISE NOTED.
5. SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

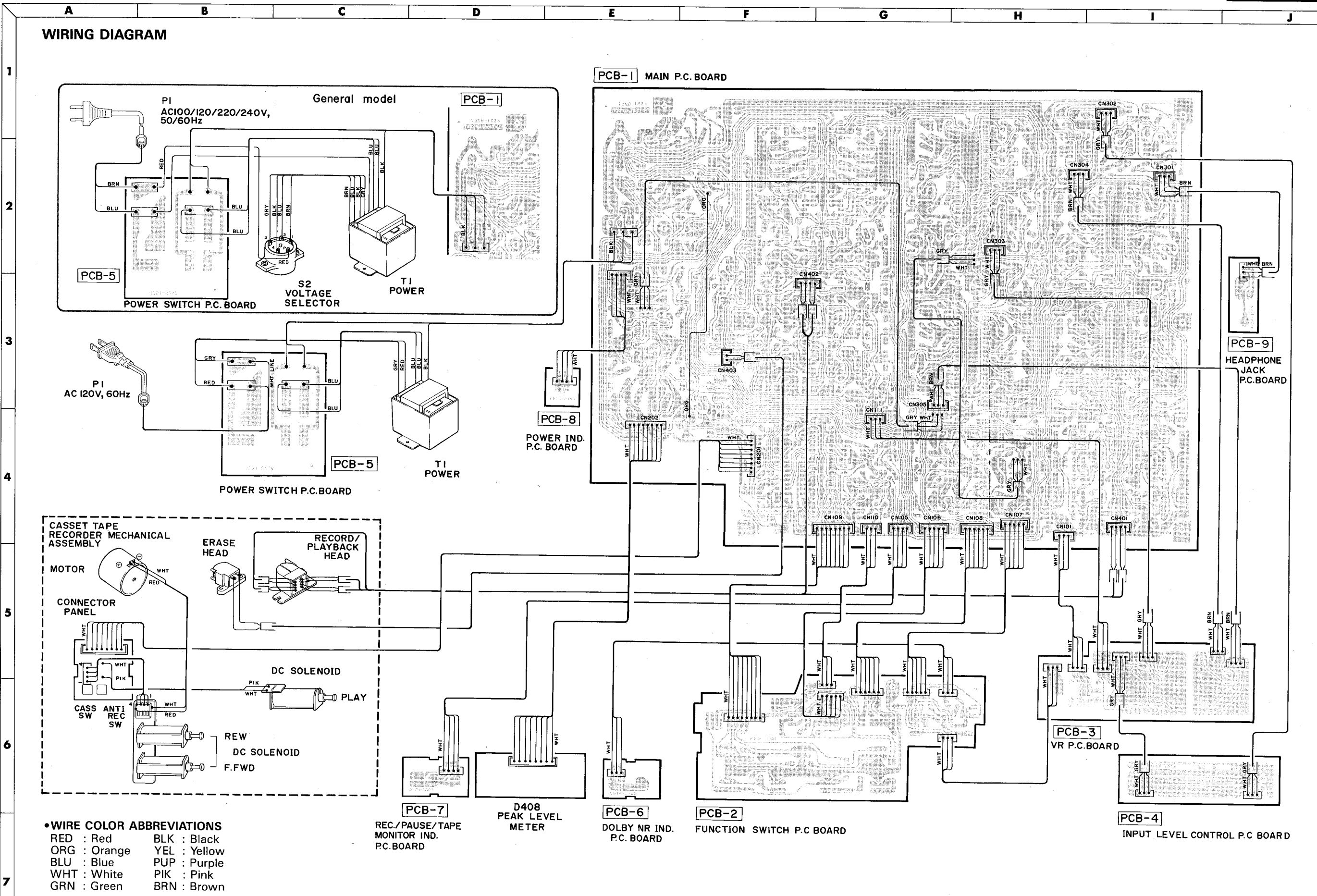


HX-PRO CIRCUIT



POWER SUPPLY

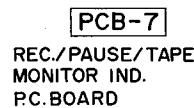
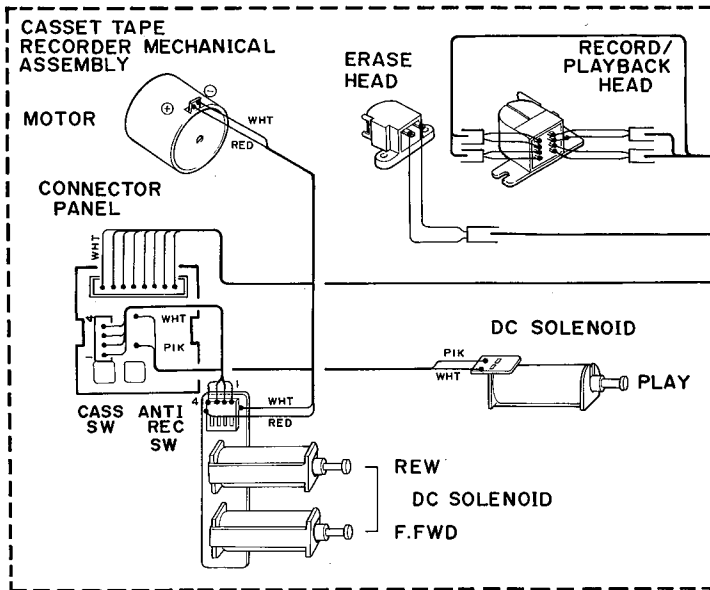
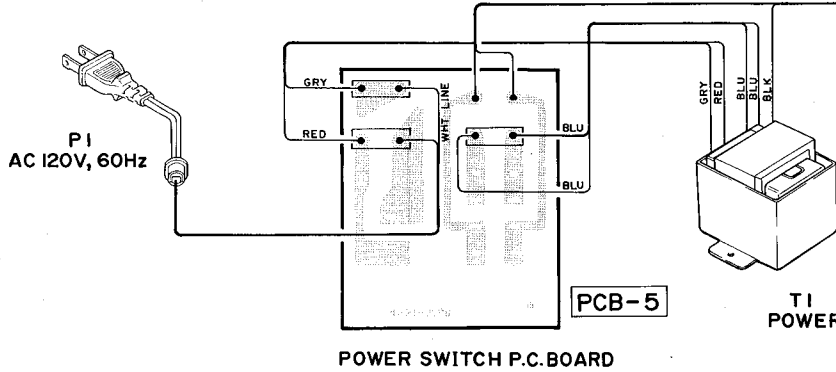
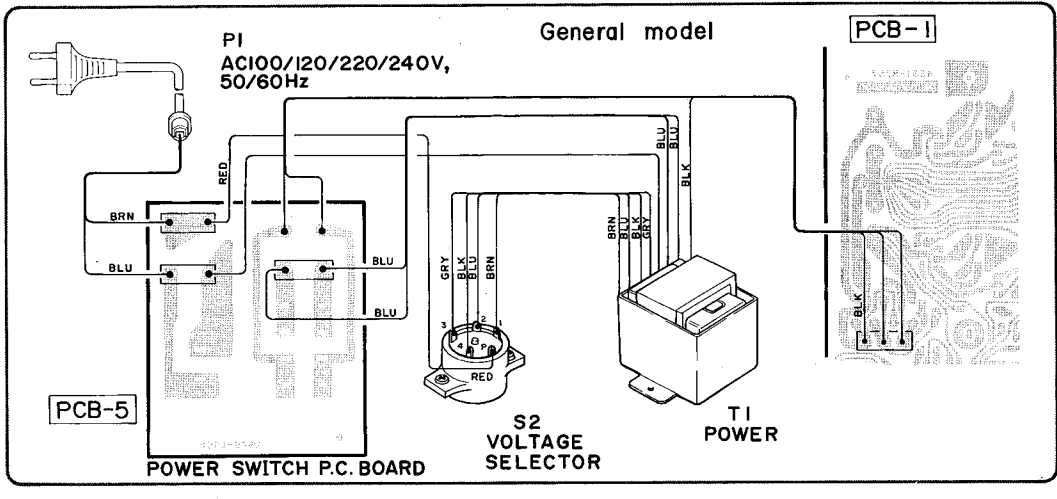
WIRING DIAGRAM



- WIRE COLOR ABBREVIATIONS**
- | | |
|--------------|--------------|
| RED : Red | BLK : Black |
| ORG : Orange | YEL : Yellow |
| BLU : Blue | PUP : Purple |
| WHT : White | PIK : Pink |
| GRN : Green | BRN : Brown |

7

WIRING DIAGRAM

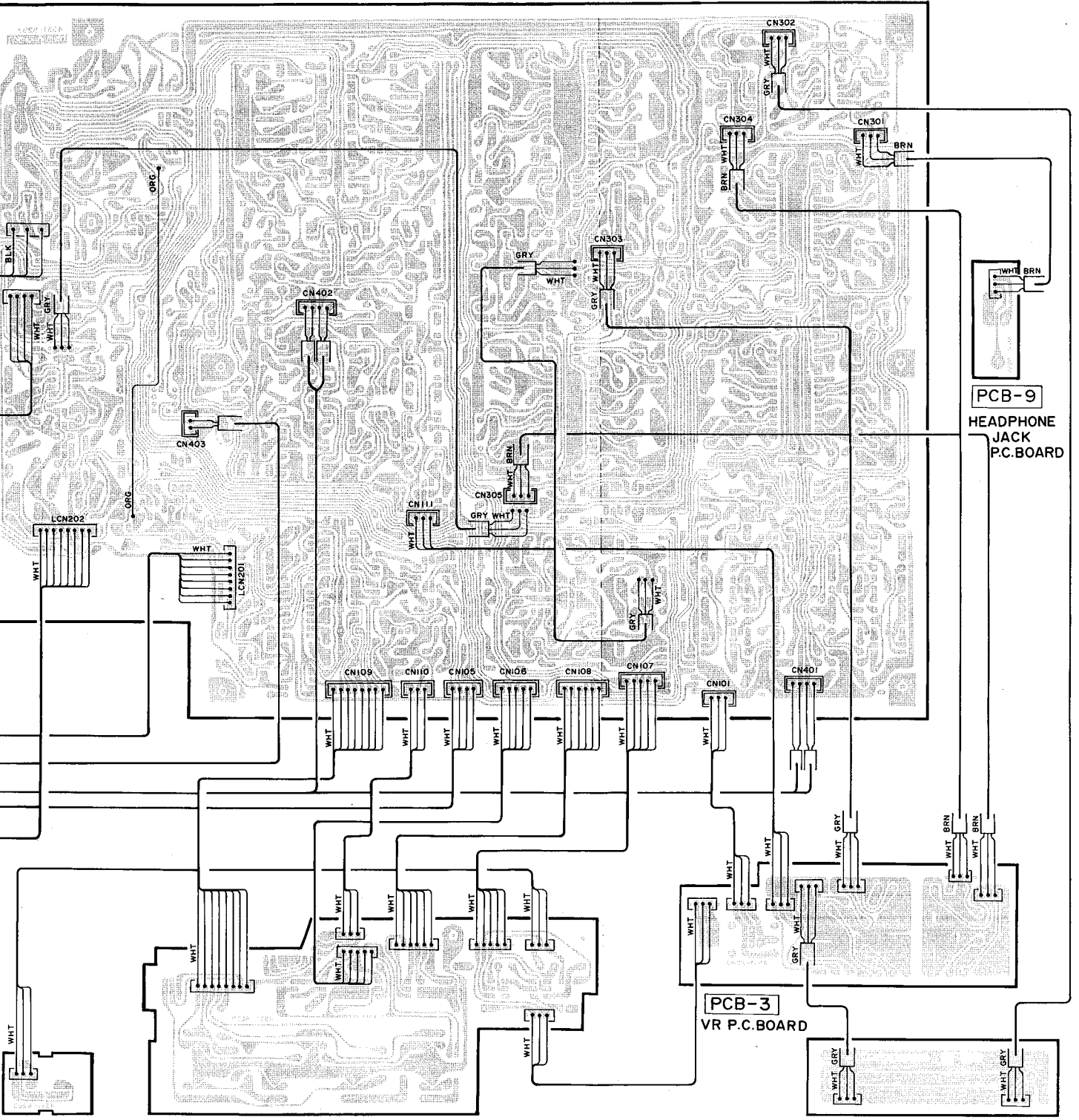


• WIRE COLOR ABBREVIATIONS

RED : Red	BLK : Black
ORG : Orange	YEL : Yellow
BLU : Blue	PUP : Purple
WHT : White	PIK : Pink
GRN : Green	BRN : Brown

E F G H I J

CB-1 MAIN P.C. BOARD



PCB-6
DOLBY NR IND.
P.C. BOARD

PCB-2
FUNCTION SWITCH P.C. BOARD

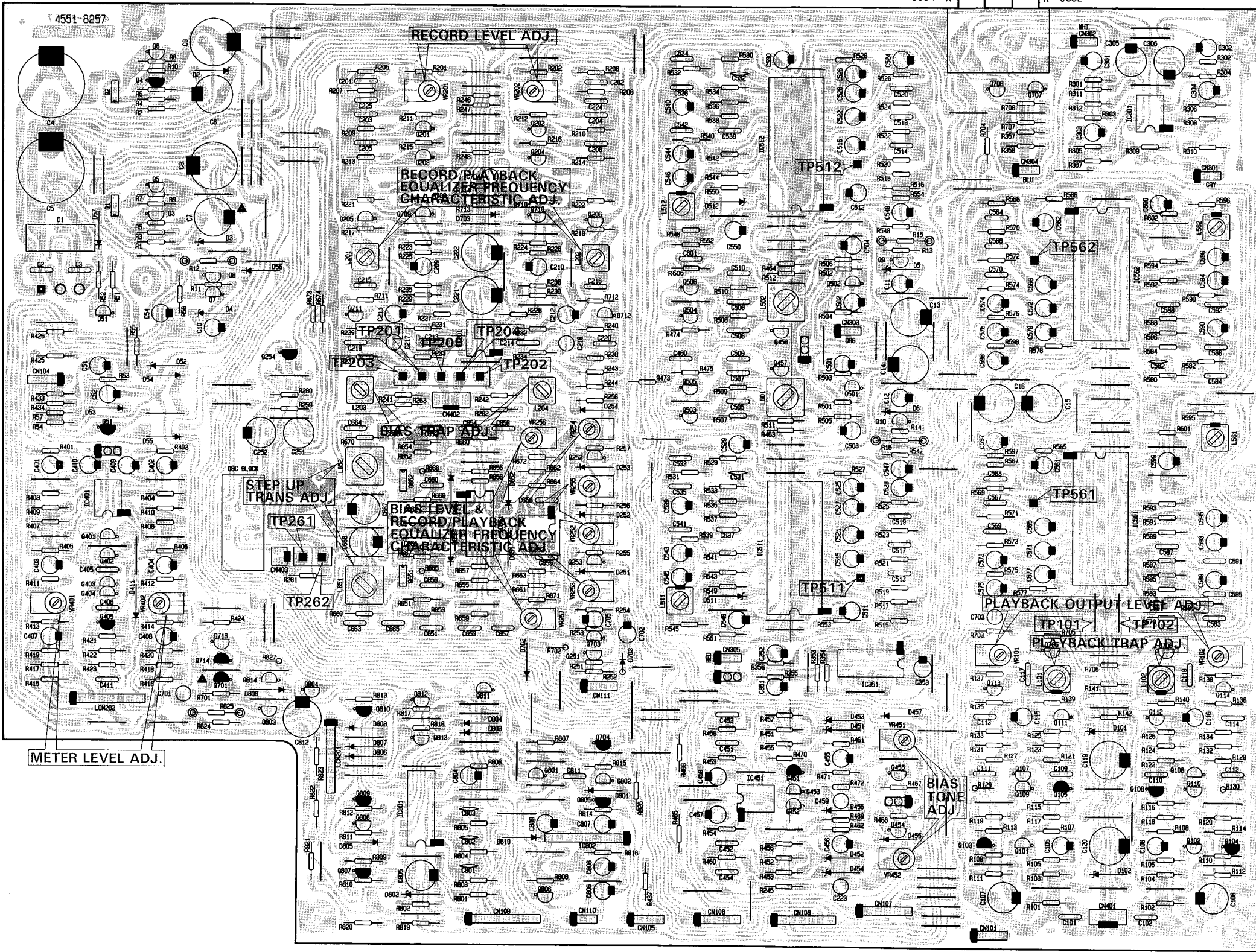
PCB-3
VR P.C. BOARD

PCB-4
INPUT LEVEL CONTROL P.C. BOARD

PCB-9
HEADPHONE JACK
P.C. BOARD

P. C. BOARDS (1)

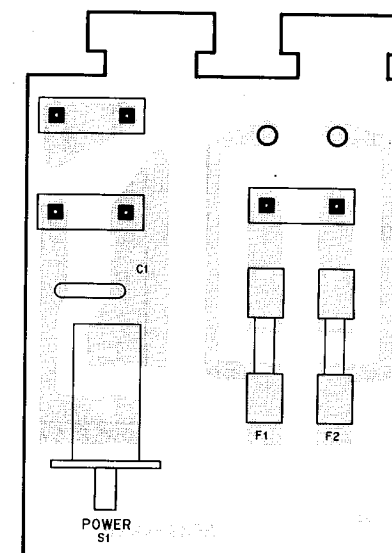
PCB-1 Main P.C. Board



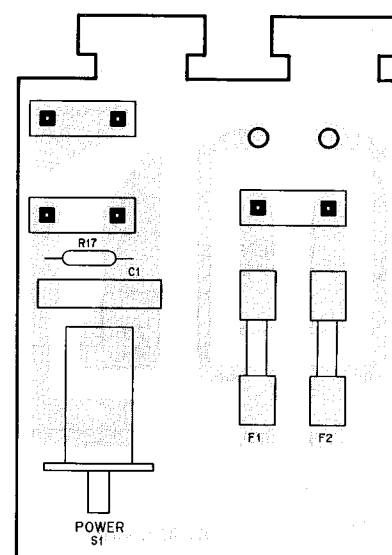
OUTPUT
L J353
R J354

INPUT
L J351
R J352

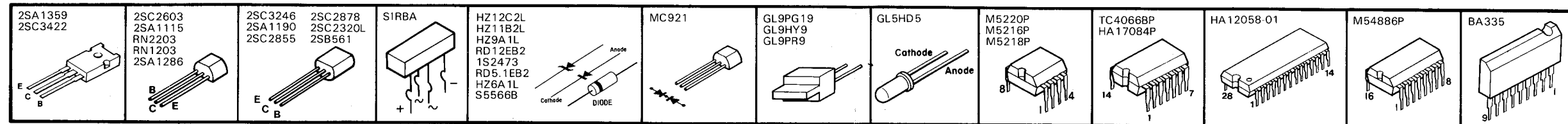
PCB-5 Power Switch P.C. Board



General model

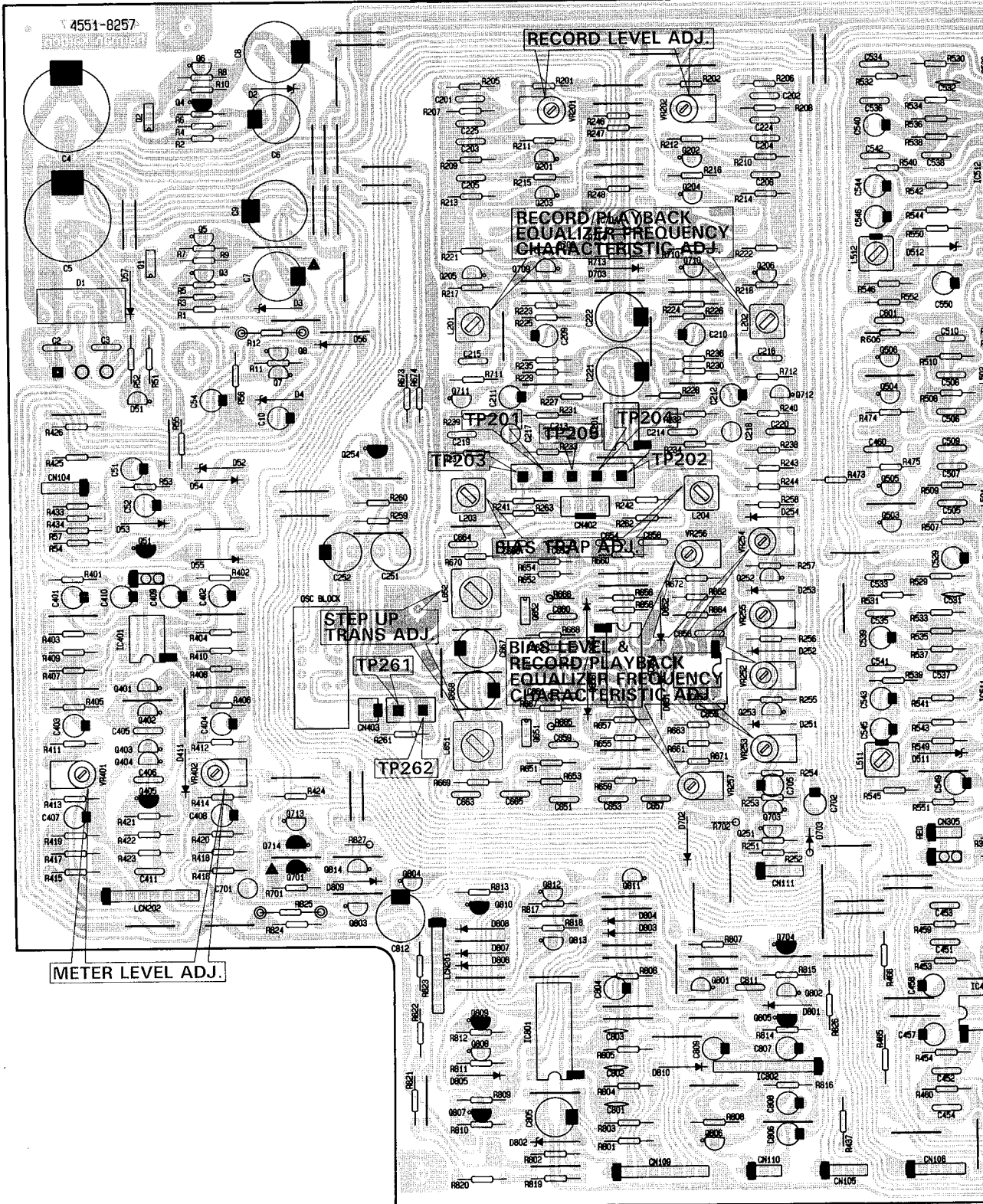


PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICs.

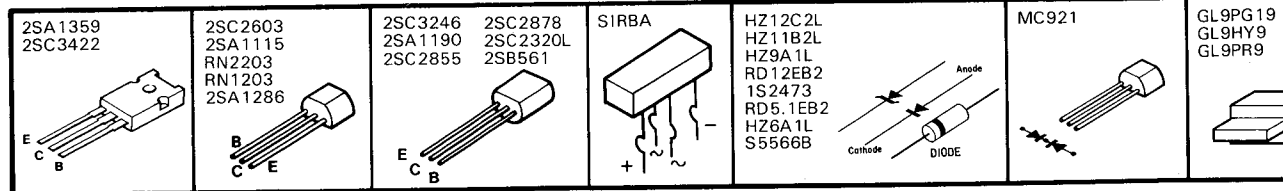


P. C. BOARDS (1)

PCB-1 Main P.C. Board



PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.



F

G

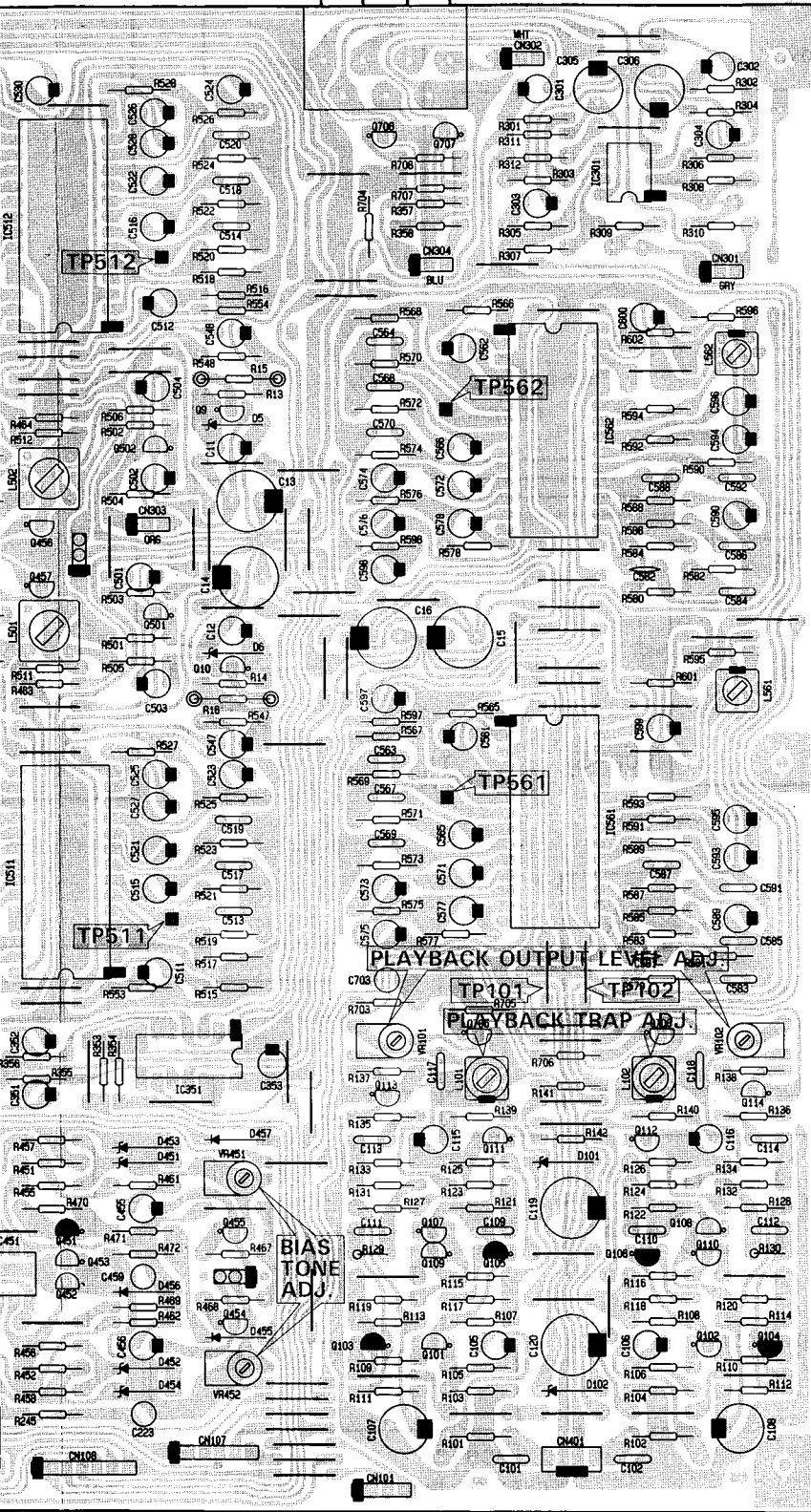
H

I

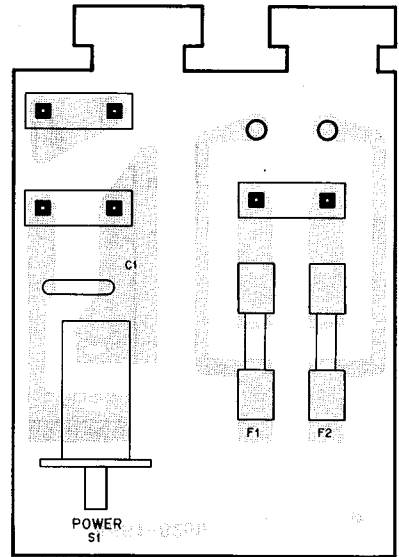
J

OUTPUT
J353 L
J354 R

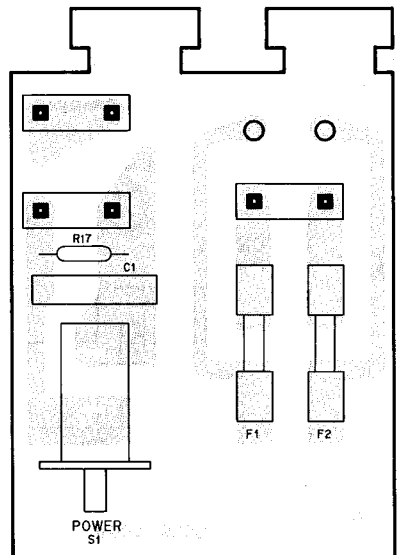
INPUT
L J351
R J352



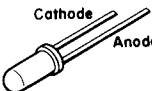
PCB-5 Power Switch P.C. Board



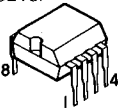
General model



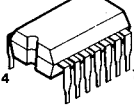
GL5HD5



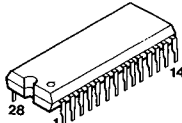
M5220P
M5216P
M5218P



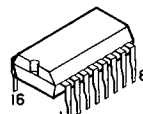
TC4066BP
HA17084P



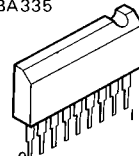
HA12058-01



M54886P

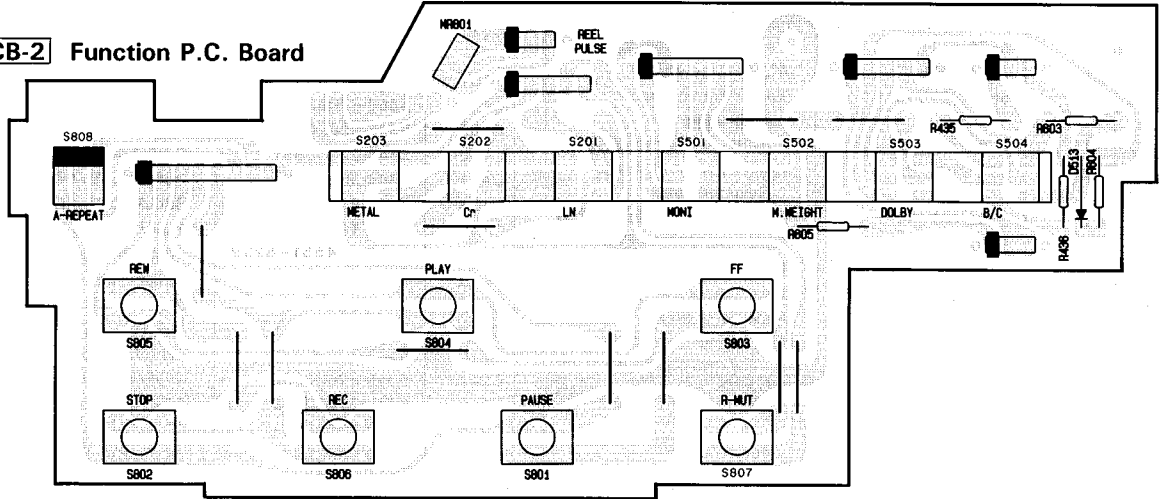


BA335

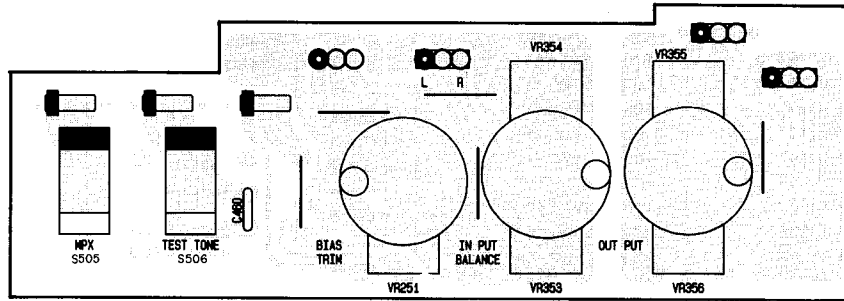


P. C. BOARDS (2)

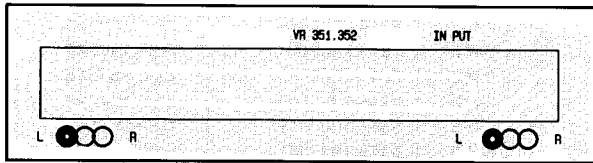
PCB-2 Function P.C. Board



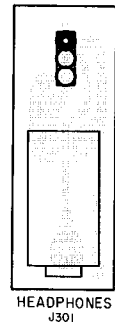
PCB-3 VR P.C. Board



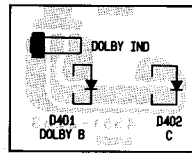
PCB-4 Input Level Control P.C. Board



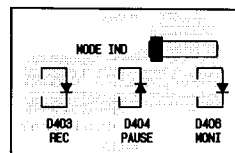
PCB-9 Headphone Jack P.C. Board



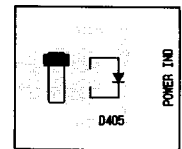
PCB-6 Dolby NR Ind. P.C. Board



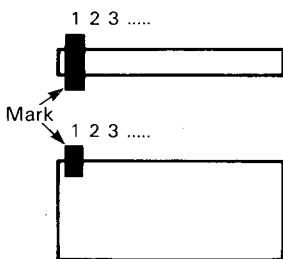
PCB-7 Rec/Pause/Tape Monitor Ind. P.C. Board



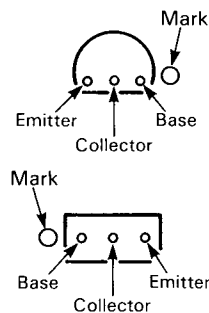
PCB-8 Power Ind. P.C. Board



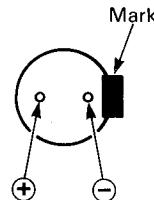
ICs



Transistors



Electrolytic Capacitors



ELECTRICAL PARTS LIST

CASSETTE MECHANISM PARTS LIST

Ref. No.	Part No.	Description
CHASSIS MISCELLANEOUS		
△ P1	4161-71151	Power Cord U A
△ P1	4161-7256	Power Cord EW
△ T1	5584-701508	Power Transformer U A
△ T1	5584-701509	Power Transformer EW
△ S2	4411-104736	Rotary Switch, Voltage Selector EW
△ F1	5732-102031	Fuse, 1A, 125V U A
△ F1	5732-102052	Fuse, 1A, 250V EW
△ F2	5732-102031	Fuse, 1A, 125V U A
△ F2	5732-102052	Fuse, 1A, 250V EW
D408	5623-LT1151	Peak Level Meter
	4161-71184	Connection Cord (Accessory)
PCB-1 MAIN P. C. BOARD		
RESISTORS		
△ R12	5102-2205114	22Ω, 1/2W, FR
△ R15	5102-1205114	12Ω, 1/2W, FR
△ R16	5102-1205114	12Ω, 1/2W, FR
△ R51	5102-4R74715	4.7Ω, 1/4W, FR
△ R52	5102-4R74715	4.7Ω, 1/4W, FR
△ R55	5102-4714715	470Ω, 1/4W, FR
△ R141	5102-4704715	47Ω, 1/4W, FR
△ R142	5102-4704715	47Ω, 1/4W, FR
△ R259	5102-1014715	100Ω, 1/4W, FR
△ R260	5102-1014715	100Ω, 1/4W, FR
△ R311	5102-1014715	100Ω, 1/4W, FR
△ R312	5102-1014715	100Ω, 1/4W, FR
△ R465	5102-1004715	10Ω, 1/4W, FR
△ R466	5102-1004715	10Ω, 1/4W, FR
R519	5174-332381	3.3kΩ, 1/4W, MR
R520	5174-332381	3.3kΩ, 1/4W, MR
R537	5174-473381	47kΩ, 1/4W, MR
R538	5174-473381	47kΩ, 1/4W, MR
R569	5174-332381	3.3kΩ, 1/4W, MR
R570	5174-332381	3.3kΩ, 1/4W, MR
R587	5174-473381	47kΩ, 1/4W, MR
R588	5174-473381	47kΩ, 1/4W, MR
△ R667	5102-3904713	39Ω, 1/4W, FR
△ R668	5102-3904713	39Ω, 1/4W, FR
△ R673	5102-1004715	10Ω, 1/4W, FR
△ R674	5102-1004715	10Ω, 1/4W, FR
△ R825	5102-4R75114	4.7Ω, 1/2W, FR
CONTROLS		
VR101	5101-50371920	50kΩ
VR102	5101-50371920	50kΩ
VR201	5101-20271920	2kΩ
VR202	5101-20271920	2kΩ
VR252	5101-50271920	5kΩ
VR253	5101-50271920	5kΩ
VR254	5101-10371920	10kΩ
VR255	5101-10371920	10kΩ
VR256	5101-20371920	20kΩ
VR257	5101-20371920	20kΩ
VR401	5101-20371920	20kΩ
VR402	5101-20371920	20kΩ
VR451	5101-50371920	50kΩ
VR452	5101-50371920	50kΩ
CAPACITORS		
C4	5345-478D0962	4700μF/25V, EC
C5	5345-478D0962	4700μF/25V, EC
C6	5345-337C041	330μF/16V, EC
C7	5345-337C041	330μF/16V, EC
C8	5345-108C041	1000μF/16V, EC
C9	5345-108C041	1000μF/16V, EC
C10	5345-226C041	22μF/16V, EC
C11	5345-226C041	22μF/16V, EC
C12	5345-226C041	22μF/16V, EC
C13	5345-477C041	470μF/16V, EC
C14	5345-477C041	470μF/16V, EC
C15	5345-477C041	470μF/16V, EC
C16	5345-477C041	470μF/16V, EC

Ref. No.	Part No.	Description
C51	5345-226E041	22μF/35V, EC
C52	5345-226D041	22μF/25V, EC
C54	5345-225F041	2.2μF/50V, EC
C101	5353-470534	47pF/500V, MC
C102	5353-470534	47pF/500V, MC
C105	5345-226C0951	22μF/16V, EC
C106	5345-226C0951	22μF/16V, EC
C107	5345-337A0952	330μF/6.3V, EC
C108	5345-337A0952	330μF/6.3V, EC
C115	5345-106C0951	10μF/16V, EC
C116	5345-106C0951	10μF/16V, EC
C119	5345-227C041	220μF/16V, EC
C120	5345-227C041	220μF/16V, EC
C209	5345-105F0951	1μF/50V, EC
C210	5345-105F0951	1μF/50V, EC
C211	5345-226C0952	22μF/16V, EC
C212	5345-226C0952	22μF/16V, EC
C217	5342-106C0951	10μF/16V, EC
C218	5342-106C0951	10μF/16V, EC
C221	5345-227C041	220μF/16V, EC
C222	5345-227C041	220μF/16V, EC
C223	5342-106C0951	10μF/16V, EC
C224	5359-2715851	270pF/100V, PC
C225	5359-2715851	270pF/100V, PC
C251	5342-226C0951	22μF/16V, EC
C252	5345-226C041	22μF/16V, EC
C301	5345-106C041	10μF/16V, EC
C302	5345-106C041	10μF/16V, EC
C303	5345-336C041	33μF/16V, EC
C304	5345-336C041	33μF/16V, EC
C305	5345-107C041	100μF/16V, EC
C306	5345-107C041	100μF/16V, EC
C351	5345-226B0951	22μF/10V, EC
C352	5345-226B0951	22μF/10V, EC
C353	5345-106C041	10μF/16V, EC
C401	5345-105F041	1μF/50V, EC
C402	5345-105F041	1μF/50V, EC
C403	5345-105F041	1μF/50V, EC
C404	5345-105F041	1μF/50V, EC
C407	5345-226C041	22μF/16V, EC
C408	5345-226C041	22μF/16V, EC
C409	5345-226C041	22μF/16V, EC
C410	5345-226C041	22μF/16V, EC
C455	5345-105F041	1μF/50V, EC
C456	5345-105F041	1μF/50V, EC
C457	5345-476C041	47μF/16V, EC
C458	5345-476C041	47μF/16V, EC
C459	5342-225F0951	2.2μF/50V, EC
C501	5345-105F0951	1μF/50V, EC
C502	5345-105F0951	1μF/50V, EC
C503	5345-106C0951	10μF/16V, EC
C504	5345-106C0951	10μF/16V, EC
C511	5345-106C0951	10μF/16V, EC
C512	5345-106C0951	10μF/16V, EC
C513	5359-333741	0.033μF/100V, PC
C514	5359-333741	0.033μF/100V, PC
C515	5345-475D0952	4.7μF/25V, EC
C516	5345-475D0952	4.7μF/25V, EC
C521	5345-334F0952	0.33μF/50V, EC
C522	5345-334F0952	0.33μF/50V, EC
C523	5345-154F0952	0.15μF/50V, EC
C524	5345-154F0952	0.15μF/50V, EC
C525	5345-474F0952	0.47μF/50V, EC
C526	5345-474F0952	0.47μF/50V, EC
C527	5345-684F0952	0.68μF/50V, EC
C528	5345-684F0952	0.68μF/50V, EC
C529	5345-226B0951	22μF/10V, EC
C530	5345-226B0951	22μF/10V, EC
C539	5345-475D0952	4.7μF/25V, EC
C540	5345-475D0952	4.7μF/25V, EC
C543	5345-154F0952	0.15μF/50V, EC
C544	5345-154F0952	0.15μF/50V, EC
C545	5345-474F0952	0.47μF/50V, EC
C546	5345-474F0952	0.47μF/50V, EC
C547	5345-226B0951	22μF/10V, EC
C548	5345-226B0951	22μF/10V, EC

Ref. No.	Part No.	Description
C549	5345-226C041	22μF/16V, EC
C550	5345-226C041	22μF/16V, EC
C561	5345-106C0951	10μF/16V, EC
C562	5345-106C0951	10μF/16V, EC
C563	5359-333741	0.033μF/100V, PC
C564	5359-333741	0.033μF/100V, PC
C565	5345-475D0952	4.7μF/25V, PC
C566	5345-475D0952	4.7μF/25V, EC
C571	5345-334F0952	0.33μF/50V, EC
C572	5345-334F0952	0.33μF/50V, EC
C573	5345-154F0952	0.15μF/50V, EC
C574	5345-154F0952	0.15μF/50V, EC
C575	5345-474F0952	0.47μF/50V, EC
C576	5345-474F0952	0.47μF/50V, EC
C577	5345-684F0952	0.68μF/50V, EC
C578	5345-684F0952	0.68μF/50V, EC
C589	5345-475D0952	4.7μF/25V, EC
C590	5345-475D0952	4.7μF/25V, EC
C593	5345-154F0952	0.15μF/50V, EC
C594	5345-154F0952	0.15μF/50V, EC
C595	5345-474F0952	0.47μF/50V, EC
C596	5345-474F0952	0.47μF/50V, EC
C597	5345-226B0951	22μF/10V, EC
C598	5345-226B0951	22μF/10V, EC
C599	5345-226C041	22μF/16V, EC
C600	5345-226C041	22μF/16V, EC
C651	5359-1515851	150pF/100V, PC
C652	5359-1515851	150pF/100V, PC
C661	5359-6815851	680pF/100V, PC
C662	5359-6815851	680pF/100V, PC
C665	5353-101534	100pF/500V, MC
C666	5353-101534	100pF/500V, MC
C667	5345-107C041	100μF/16V, EC
C668	5345-107C041	100μF/16V, EC
C701	5342-106C0951	10μF/16V, EC
C702	5345-475F0951	4.7μF/25V, EC
C703	5342-105C0951	1μF/16V, EC
C704	5342-105C0951	1μF/16V, EC
C705	5345-225D0951	2.2μF/25V, EC
C804	5345-474F041	0.47μF/50V, EC
C805	5345-227A041	220μF/6.3V, EC
C806	5345-335D041	3.3μF/25V, EC
C807	5345-475D041	4.7μF/25V, EC
C808	5345-476B041	47μF/10V, EC
C809	5345-475D041	4.7μF/25V, EC
C812	5345-477C041	470μF/16V, EC
INTEGRATED CIRCUITS		
IC201	5652-M5220P	M5220P
IC301	5652-M5216P	M5216P
IC351	5654-TC4066BP	TC4066BP
IC401	5652-M5218P	M5218P
IC451	5652-M5218P	M5218P
IC511	5652-12058-01	HA12058-01
IC512	5652-12058-01	HA12058-01
IC561	5652-12058-01	HA12058-01
IC562	5652-12058-01	HA12058-01
IC651	5652-HA17084P	HA17084P
IC652	5652-M5218P	M5218P
IC801	5654-M54886P	M54886P
IC802	5652-BA335	BA335
TRANSISTORS		
Q1	5611-1359(Y)	2SA1359(Y) or (O)
Q2	5613-3422(Y)	2SC3422(Y) or (O)
Q3	5613-2603(F)	2SC2603(F)
Q4	5611-1115(F)	2SA1115(F)
Q5	5613-2603(F)	2SC2603(F)
Q6	5611-1115(F)	2SA1115(F)
Q7	5613-3246(H)	2SC3246(H)
Q8	5613-RN1203	RN1203
Q9	5613-3246(H)	2SC3246(H)
Q10	5611-1286(H)	2SA1286(H)
Q51	5611-1115(F)	2SA1115(F)
Q101	5613-2855(E)	2SC2855(E)
Q102	5613-2855(E)	2SC2855(E)

Ref. No.	Part No.	Description
Q103	5611-1190(E)	2SA1190(E)
Q104	5611-1190(E)	2SA1190(E)
Q105	5611-1190(E)	2SA1190(E)
Q106	5611-1190(E)	2SA1190(E)
Q107	5613-2603(F)	2SC2603(F)
Q108	5613-2603(F)	2SC2603(F)
Q109	5613-2603(F)	2SC2603(F)
Q110	5613-2603(F)	2SC2603(F)
Q111	5613-2603(F)	2SC2603(F)
Q112	5613-2603(F)	2SC2603(F)
Q113	5613-RN1203	RN1203
Q114	5613-RN1203	RN1203
Q121	5613-RN1203	RN1203
Q202	5613-RN1203	RN1203
Q203	5613-RN1203	RN1203
Q204	5613-RN1203	RN1203
Q205	5613-RN1203	RN1203
Q206	5613-RN1203	RN1203
Q251	5613-2603(F)	2SC2603(F) or (E)
Q252	5613-RN1203	RN1203
Q253	5613-RN1203	RN1203
Q254	5611-RN2203	RN2203
Q401	5613-RN1203	RN1203
Q402	5613-RN1203	RN1203
Q403	5613-RN1203	RN1203
Q404	5613-RN1203	RN1203
Q405	5611-1115(F)	2SA1115(F)
Q451	5611-1115(F)	2SA1115(F)
Q452	5613-RN1203	RN1203
Q453	5613-RN1203	RN1203
Q454	5613-2878(B)	2SC2878(B)
Q455	5613-2878(B)	2SC2878(B)
Q456	5613-2878(B)	2SC2878(B)
Q457	5613-2878(B)	2SC2878(B)
Q501	5613-2320L(F)	2SC2320L(F)
Q502	5613-2320L(F)	2SC2320L(F)
Q503	5613-RN1203	RN1203
Q504	5613-RN1203	RN1203
Q505	5613-RN1203	RN1203
Q506	5613-RN1203	RN1203
Q651	5613-3422(Y)	2SC3422(Y)
Q652	5613-3422(Y)	2SC3422(Y)
Q701	5611-RN2203	RN2203
Q703	5613-RN1203	RN1203
Q704	5611-RN2203	RN2203
Q705	5613-2878(B)	2SC2878(B)
Q706	5613-2878(B)	2SC2878(B)
Q707	5613-2878(B)	2SC2878(B)
Q708	5613-2878(B)	2SC2878(B)
Q709	5613-2878(B)	2SC2878(B)
Q710	5613-2878(B)	2SC2878(B)
Q711	5613-2878(B)	2SC2878(B)
Q712	5613-2878(B)	2SC2878(B)
Q713	5613-RN1203	RN1203
Q714	5611-RN2203	RN2203
Q801	5613-RN1203	RN1203
Q802	5613-2603(F)	2SC2603(F)
Q803	5613-RN1203	RN1203
Q804	5613-RN1203	RN1203
Q805	5611-RN2203	RN2203
Q806	5613-2603(F)	2SC2603(F)
Q807	5611-1286(H)	2SA1286(H)
Q808	5613-RN1203	RN1203
Q809	5612-561(C)	2SB561(C)
Q810	5612-561(C)	2SB561(C)
Q811	5613-RN1203	RN1203
Q812	5613-RN1203	RN1203
Q813	5613-RN1203	RN1203
Q814	5613-RN1203	RN1203
DIODES		
D1	5685-1F	Bridge Silicon, SIRBA
D2	5635-HZ12C2L	ZD, HZ12C2L
D3	5635-HZ12C2L	ZD, HZ12C2L
D4	5635-HZ11B2L	ZD, HZ11B2L
D5	5635-HZ9A1L	ZD, HZ9A1L

Ref. No.	Part No.	Description
D6	5635-HZ9A1L	ZD, HZ9A1L
D51	5636-MC921	MC921
D52	5635-RD12EB2	ZD, RD12EB2
D53	5631-1S2473	1S2473
D54	5631-1S2473	1S2473
D55	5631-1S2473	1S2473
D56	5631-1S2473	1S2473
D57	5631-1S2473	1S2473
D101	5635-HZ11B2L	ZD, HZ11B2L
D102	5635-HZ11B2L	ZD, HZ11B2L
D251	5631-1S2473	1S2473
D252	5631-1S2473	1S2473
D253	5631-1S2473	1S2473
D254	5631-1S2473	1S2473
D411	5631-1S2473	1S2473
D451	5635-RD5R1EB2	ZD, RD5.1EB2
D452	5635-RD5R1EB2	ZD, RD5.1EB2
D453	5635-RD5R1EB2	ZD, RD5.1EB2
D454	5635-RD5R1EB2	ZD, RD5.1EB2
D455	5631-1S2473	1S2473
D456	5631-1S2473	1S2473
D457	5631-1S2473	1S2473
D511	5635-HZ6A1L	ZD, HZ6A1L
D512	5635-HZ6A1L	ZD, HZ6A1L
D651	5631-1S2473	1S2473
D652	5631-1S2473	1S2473
D653	5631-1S2473	1S2473
D654	5631-1S2473	1S2473
D702	5631-1S2473	1S2473
D703	5631-1S2473	1S2473
D705	5631-1S2473	1S2473
D801	5631-1S2473	1S2473
D802	5635-RD5R1EB2	ZD, RD5.1EB2
D803	5631-1S2473	1S2473
D804	5631-1S2473	1S2473
D805	5631-1S2473	1S2473
D806	5632-S5566B	S5566B
D807	5632-S5566B	S5566B
D808	5632-S5566B	S5566B
D809	5631-1S2473	1S2473
D810	5631-1S2473	1S2473
	COILS	
L101	5932-70115	
L102	5932-70115	
L201	5932-70223	3.3mH
L202	5932-70223	3.3mH
L203	5932-70116	
L204	5932-70116	
L501	5214-51	
L502	5214-51	
L511	5932-70215	
L512	5932-70215	
L561	5932-70215	
L562	5932-70215	
L651	5933-70123	
L652	5933-70123	
	MISCELLANEOUS	
OS101	6171-1507	Bias Osc.
J351/	4484-45	4-Pin Jack, Input, Output
J352/		
J353/		
J354		
LCN201	4163-0820029	CLW, 8 Pos.
LCN202	4163-0830029	CLW, 8 Pos.
CN101	4443-030185	Connector, 3 Pos.
CN103	4443-0201102	Connector, 2 Pos.
CN104	4443-030185	Connector, 3 Pos.
CN105	4443-040185	Connector, 4 Pos.
CN106	4443-050185	Connector, 5 Pos.
CN107	4443-050185	Connector, 5 Pos.
CN108	4443-060185	Connector, 6 Pos.
CN109	4443-080185	Connector, 8 Pos.
CN110	4443-030185	Connector, 3 Pos.
CN111	4443-030185	Connector, 3 Pos.

Ref. No.	Part No.	Description
CN301	4443-030185	Connector, 3 Pos.
CN302	4443-030185	Connector, 3 Pos.
CN303	4443-030185	Connector, 3 Pos.
CN304	4443-030185	Connector, 3 Pos.
CN305	4443-030185	Connector, 3 Pos.
CN401	4443-0401102	Connector, 4 Pos.
CN402	4443-0401102	Connector, 4 Pos.
	2132-7048	Spacer,R12,R15,R16,R825
PCB-2 FUNCTION P. C. BOARD		
	DIODES	
D513	5631-1S2473	1S2473
	MISCELLANEOUS	
MR801	5193-DM106A	Magnet Resistor
S201/	4431-0714715	Push Switch, LN,
S202/		CrO ₂ ,
S203/		Metal,
S501/		Tape Monitor,
S502/		Meter Weighting,
S503/		Dolby NR,
S504		NR Type
S801	4431-A010131	Push Switch, Pause
S802	4431-A010131	Push Switch, Stop
S803	4431-A010131	Push Switch, F.FWD
S804	4431-A010131	Push Switch, Play
S805	4431-A010131	Push Switch, REW
S806	4431-A010131	Push Switch, Rec
S807	4431-A010131	Push Switch, Rec Mute
S808	4431-A027136	Push Switch, Auto Repeat
PCB-3 VR P. C. BOARD		
VR251	5113-20271159	Control, 2kΩB, Bias Fine Trim
VR353/	5113-10471158	Control, 10kΩMN, Input Balance
VR354		
VR355/	5113-50272158	Control, 5kΩA, Output Level
VR356		
S505	4431-A027136	Push Switch, MPX Filter
S506	4431-A027436	Push Switch, Bias Tone
PCB-4 INPUT LEVEL CONTROL P. C. BOARD		
VR351/	5224-503719	Control, 50kΩA, Input Level
VR352		
PCB-5 POWER SWITCH P. C. BOARD		
△ R17	RESISTORS 5135-335583	3.3MΩ, 1/2W, CAR EW
△ C1	CAPACITORS 5361-1030419	0.01μF/AC125V, CC U A
△ C1	5352-1030958	0.01μF/AC250V, MPC EW
△ S1	MISCELLANEOUS 4431-A01056 4472-0131	Push Switch, Power Holder, Fuse
PCB-6 DOLBY NR IND. P. C. BOARD		
D401	5637-GL9PG19	L.E.D., GL9PG19, Green, Dolby B NR
D402	5637-GL9HY9	L.E.D., GL9HY9, Amber, Dolby C NR
PCB-7 REC/PAUSE/TAPE MONITOR IND. P. C. BOARD		
D403	5637-GL9PR9	L.E.D., GL9PR9, Red, Rec.
D404	5637-GL9HY9	L.E.D., GL9HY9, Amber, Pause
D406	5637-GL9PR9	L.E.D., GL9PR9, Red, Tape Monitor

Ref. No.	Part No.	Description
PCB-8 POWER IND. P. C. BOARD		
D405	5637-GL5HD5	L.E.D., GL5HD5, Red, Power
PCB-9 HEADPHONE JACK P. C. BOARD		
J301	4451-00159	Jack, Headphones


KEY TO ABBREVIATIONS




FR : Fuse Resistor
 MR : Metal Resistor
 CR : Cement Resistor
 CAR : Carbon Resistor

EC : Electrolytic Capacitor
 PC : Polypropylene Capacitor
 MC : Mica Capacitor
 CC : Ceramic Capacitor
 MPC : Metalized Polyester Capacitor

ZD : Zener Diode

CLW : Connector with Lead Wire

 SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

 : U.S.A. model
 : Canada model
 : General model

* The part with the above mark is used only in the model made for the particular market the mark indicates.