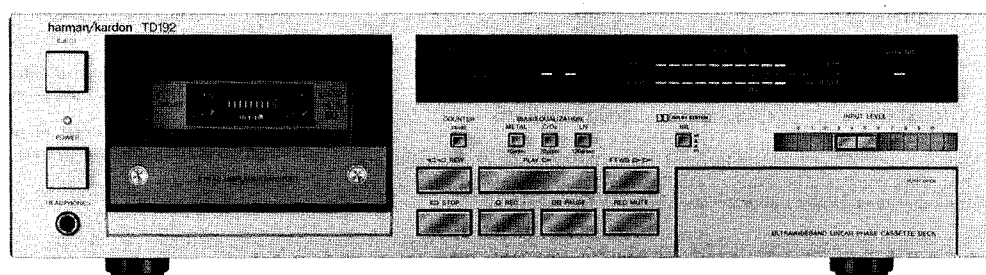


The Harman Kardon Model TD192

Manual 93A

ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK

Technical Manual



TD192

harman/kardon

240 Crossways Park West, Woodbury, N.Y. 11797
1112-H15293A7 P-088509 1250 Printed in Japan

SPECIFICATIONS

| | | |
|---------------------|---------------|------------------|
| | Nominal | Limit |
| 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% (CCIR) | ≤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 (C-60 Tape) | 90 sec. | ≤100 sec. |
| Motor | Direct Drive motor | |

● **AMPLIFIER SECTION**

| | | |
|--------------------------|-----------------------------------|------------|
| Bias Frequency | 105kHz ±5kHz | |
| Playback Output | 520mV ±1.5dB | |
| Signal-to-Noise Ratio | at Line Input (Input 1kHz, 100mV) | |
| IHF-A WTD at Dolby Level | | |
| Dolby* NR Off | LN | 51dB |
| | CrO ₂ | 54dB |
| | Metal | 54dB |
| Dolby NR On | LN | 61dB |
| | CrO ₂ | 64dB ≥60dB |
| | Metal | 64dB ≥60dB |
| Channel Separation | 45dB ≥35dB | |
| Crosstalk | 70dB ≥60dB | |

*Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

| | | |
|---|------------------|------------|
| Record/Playback Distortion (Input 1kHz) | Nominal | Limit |
| | LN | 1.0% ≤1.6% |
| | CrO ₂ | 1.8% ≤3.0% |
| | Metal | 1.0% ≤1.6% |

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

| | | |
|--------------------------|------|-------|
| Erase Ratio (Input 80Hz) | | |
| LN | 70dB | ≥60dB |
| Metal | 60dB | ≥56dB |

| | | |
|--|------|------------|
| Input Sensitivity (Input 1kHz) at Line Input | 23kΩ | 19(min)~30 |
| Input Impedance (Input 1kHz) at Line Input | | |

| | |
|---------------------------------|---------------------------------------|
| ● DIMENSIONS (W x H x D) | 17-7/16" x 4-13/16" (443 x 122 x 334) |
|---------------------------------|---------------------------------------|

| | |
|-----------------|---------------------|
| ● WEIGHT | 12lbs. 9oz. (5.7kg) |
|-----------------|---------------------|

| | |
|------------------------|-----------------------------|
| ● POWER SUPPLY | |
| U.S.A. & Canada models | AC120V, 60Hz |
| General model | AC100/120/220/240V, 50/60Hz |

| | |
|----------------------------|-----|
| ● POWER CONSUMPTION | |
| U.S.A. & Canada models | 18W |
| General model | 20W |

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

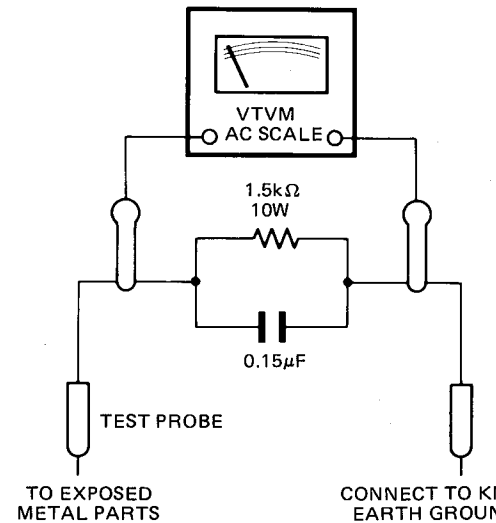
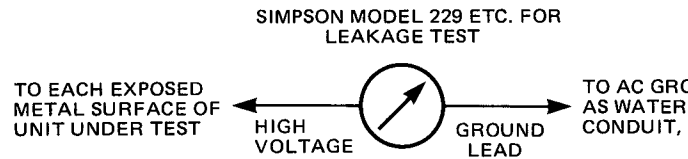
This specification is the target of servicing. But, there is no guarantee that this specification is not applicable to the measurement condition.

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



TD192

DISASSEMBLY PROCEDURES (REFER TO PAGES 5 AND 14)

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). (Refer to 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). (Refer to step 2.)
2. Disconnect the LCN201 connected to the Cassette Tape Recorder Mechanism Assembly (113).
3. From the Record/Playback Head and Erase Head, unsolder the lead wires connected to 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). (Refer to step 1.)

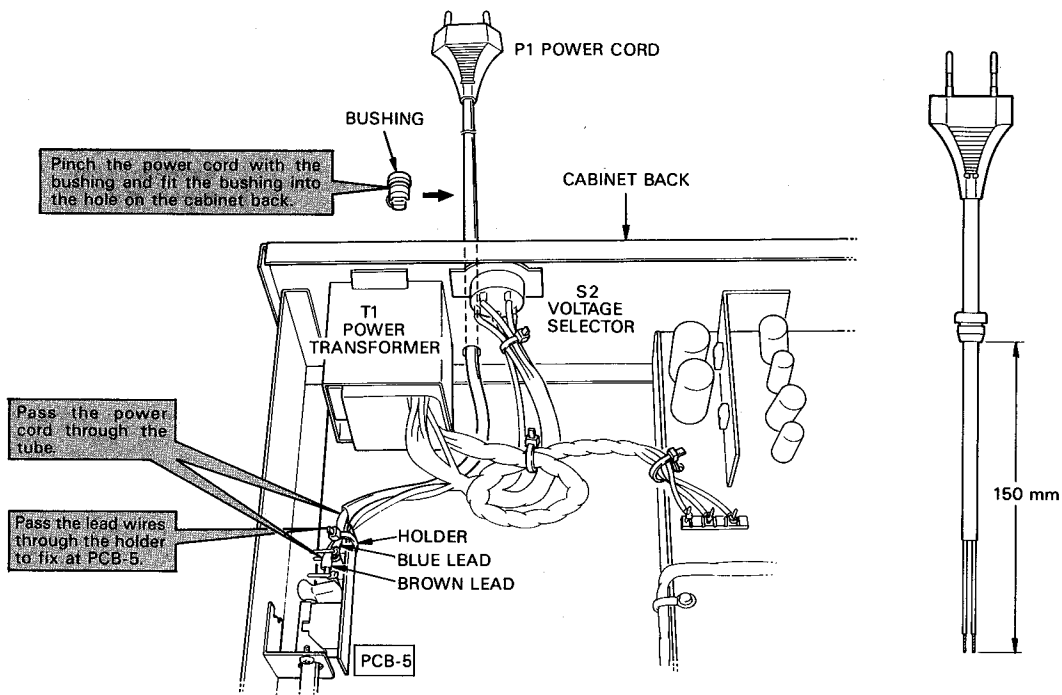
2. Disconnect the LCN201 and LCN202 connected to the Cassette Tape Recorder Mechanism Assembly (113) and Peak Level Meter (D401).
3. Open the lid of connectors (CN103 ~ CN108, CN111, CN301 and CN302) on the Main P. C. Board (PCB-1) and disconnect the lead wires.
4. Unsolder the lead wires connected to the Main P. C. Board (PCB-1).
5. Remove 7 screws **E** and then remove the Main P. C. Board (PCB-1).

5 OTHER P. C. BOARDS REMOVAL

1. Remove the Front Panel Assembly (102). (Refer to step 2.)
2. Remove the Belt (211) of the Tape Counter.
3. Remove screw **F** and then remove the Plate Assembly (105) with the Dolby NR Ind. P. C. Board (PCB-6) and Rec./Pause Ind. P. C. Board (PCB-7).
4. Remove screw **G** and then remove the Function Switch P. C. Board (PCB-2). If necessary, unsolder the lead wires connected to the PCB-2.
5. Remove 2 screws **H** and then remove the Input Level Control P. C. Board (PCB-4). If necessary, unsolder the lead wires connected to the PCB-4.
6. Remove 2 screws **I** 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 steps below to replace the parts with the standard supply parts.



GENERAL UNIT PARTS LIST

| Ref. No. | Part No. | Description |
|----------|--------------|---|
| 101 | A414-TD192A | Cabinet Top Ass'y |
| 102 | A443-TD192A | Front Panel Ass'y |
| 103 | A453-TD192A | Sub-Panel Lid Ass'y |
| 105 | A513-TD192B | Plate Ass'y |
| 106 | A514-TD192A | Dressing Plate Ass'y |
| 107 | A632-TD192A | Knob Ass'y |
| 108 | A642-TD192A | Knob Ass'y |
| 109 | A662-TD192A | Push Button Ass'y |
| 110 | A662-TD192B | Push Button Ass'y |
| 111 | A662-TD192C | Push Button Ass'y |
| 112 | B211-TD192A | Chassis Ass'y |
| 113 | 3112-12802 | Cassette Tape Recorder Mechanism Ass'y |
| 124 | 1319-0139 | Foot |
| 128 | 1423-02301 | Cabinet Bottom |
| 129 | 1424-15605 | Cabinet Back U A |
| 129 | 1424-15604 | Cabinet Back EW |
| 131 | 1442-10901 | Panel, Input Level |
| 139 | 1514-17002 | Dressing Plate |
| 143 | 1531-08501 | Door Cover |
| 154 | 1660-00401 | Push Button, Power |
| 155 | 1660-00501 | Push Button, Eject |
| 158 | 1660-00801 | Push Button, REC, FF, REW, Stop, Pause, REC Mute |
| 159 | 1660-00901 | Push Button, Play |
| 175 | 2114-01224 | Bushing |
| 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 |
| 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 | 2327-200429 | Screw (2 x 4mm) |
| 233 | 2343-300627 | Screw (3 x 6mm) |
| 235 | 2347-300842 | Screw (3 x 8mm) |
| 239 | 2347-300627 | Screw (3 x 6mm) |
| 243 | 2347-300827 | Screw (3 x 8mm) |
| 245 | 2347-300647 | Screw (3 x 6mm) |
| 247 | 2347-400647 | Screw (4 x 6mm) |
| 251 | 2440-7017 | Special Nut EW |
| 252 | 2132-01406 | Spacer EW |
| | 1111-J30215 | Owner Guide U |
| | 1111-J30216 | Owner Guide A EW |
| | 1221-737181 | Packing Box |
| | 1222-7284 | Packing Cushion |

CASSETTE TAPE RECORDER MECHANISM
PARTS LIST

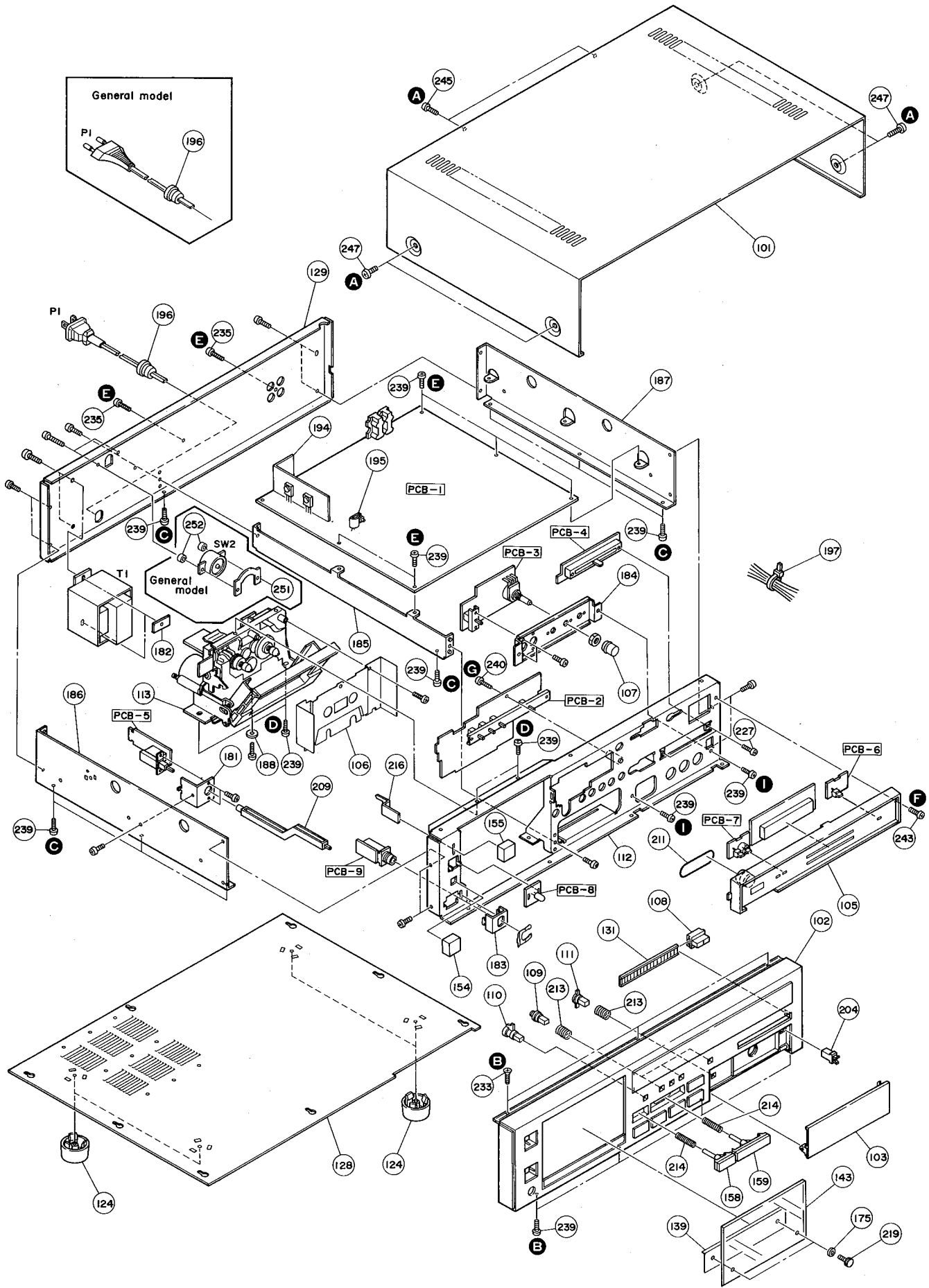
| Ref. No. | Part No. | Description |
|----------|----------|----------------------|
| 1 | F245-011 | Switch Arm, Pack |
| 2 | F244-011 | Switch Arm, REC |
| 3 | FD35C-11 | Cassette Support |
| 4 | FK568-11 | Spring, Door |
| 5 | EC30K-12 | Eject Lock Arm |
| 6 | FM296-11 | Spacer |
| 7 | KY130-11 | Connector, 8 Pos. |
| 8 | UE13K-11 | Switch |
| 9 | FU14K-11 | REC/PB Head |
| 10 | FU192-11 | Erase Head |
| 11 | FK572-11 | Spring, Azimuth |
| 12 | FD23C-15 | Head Spacer |
| 13 | F105-020 | Supply Reel Ass'y |
| 14 | F123-033 | Take-up Reel Ass'y |
| 15 | FC29K-11 | Spring Holder |
| 16 | FC29N-13 | Head Base |
| 17 | FD24H-12 | 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 | F011-163 | 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 |
| 46 | FD24G-12 | Collar |
| 47 | FK11F-51 | Spring, Flywheel |
| 48 | FR17E-11 | Flywheel Ass'y |
| 49 | UJ11S-11 | Spacer |
| 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 |

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

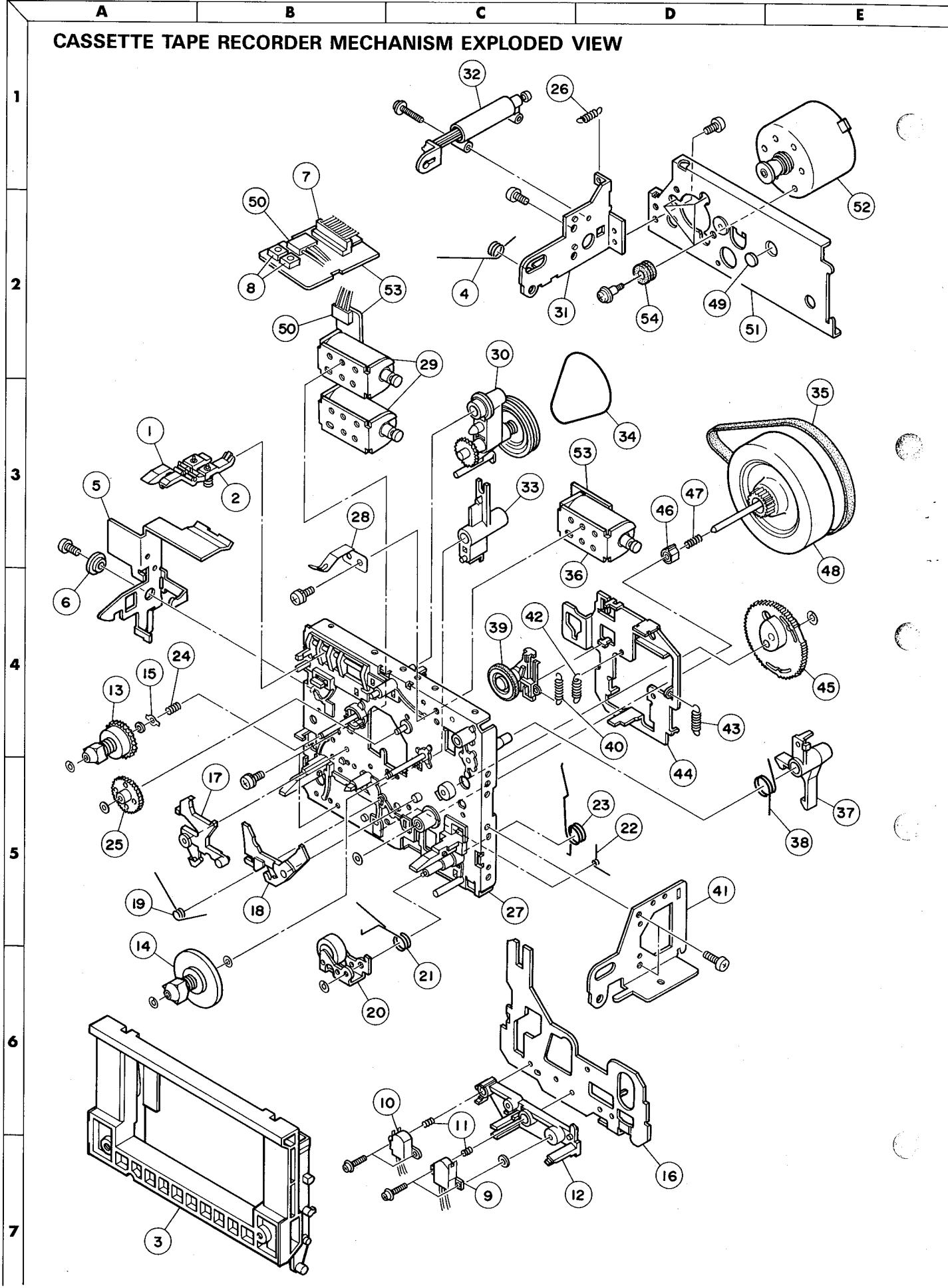
* The part with the above mark is used only in the model made for the particular market the mark indicates.

A B C D E
GENERAL UNIT EXPLODED VIEW

1
2
3
4
5
6
7



CASSETTE TAPE RECORDER MECHANISM EXPLODED VIEW



CIRCUIT DESCRIPTION

Playback Signal

The playback signal taken out of the playback head is amplified in the playback amplifiers Q101, Q103, Q105 (L ch.), Q102, Q104 and Q106 (R ch.) and it is input to ⑧ pin (L ch.), and ④ pin (R ch.) of the IC701.

The switching IC, IC701, becomes ON upon receipt of the control signal from the IC801, Q713 and Q714 when in the PLAY mode, and ⑧ and ⑨ pins (L ch.) as well as ③ and ④ pins (R ch.) are connected.

Then the signal is output through ⑨ pin (L ch.) and ③ pin (R ch.) of the IC701 and fed to the Dolby NR circuit consisting of the IC501 and IC502. The signal enters ④ pin of the IC501 (L ch.) and IC502 (R ch.) where it is encoded and output through ⑧ pin. The output signal is fed from ⑧ pin to the OUTPUT jack, IC301 (headphone amplifier) and METER.

The characteristics of the playback equalizer are specified by BIAS EQUALIZATION, and selected and specified in the Q107 (L ch.) and Q108 (R ch.).

Record Signal

The input signal coming through INPUT jack is adjusted by INPUT LEVEL and INPUT BALANCE and input to ⑪ pin (L ch.) and ① pin (R ch.) of the IC701.

The switching IC, IC701, becomes ON upon receipt of the control signal from the IC801, Q713 and Q714 when in the REC mode, and ⑩ and ⑪ pins (L ch.) as well as ① and ② pins (R ch.) are connected.

Then the signal is output through ⑩ pin (L ch.) and ② pin (R ch.) of the IC701 and fed to the Dolby NR circuit consisting of the IC501 and IC502. The signal enters ④ pin of the IC501 and IC502, is decoded by way of the MPX filter and output through ⑨ 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.

Muting Operation

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

The signal output through ⑨ pin of the IC801 turns Q804 and 805 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 Q711 (L ch.) and Q712 (R ch.) to short-circuit the output signal for muting.

Logic in Record Mode

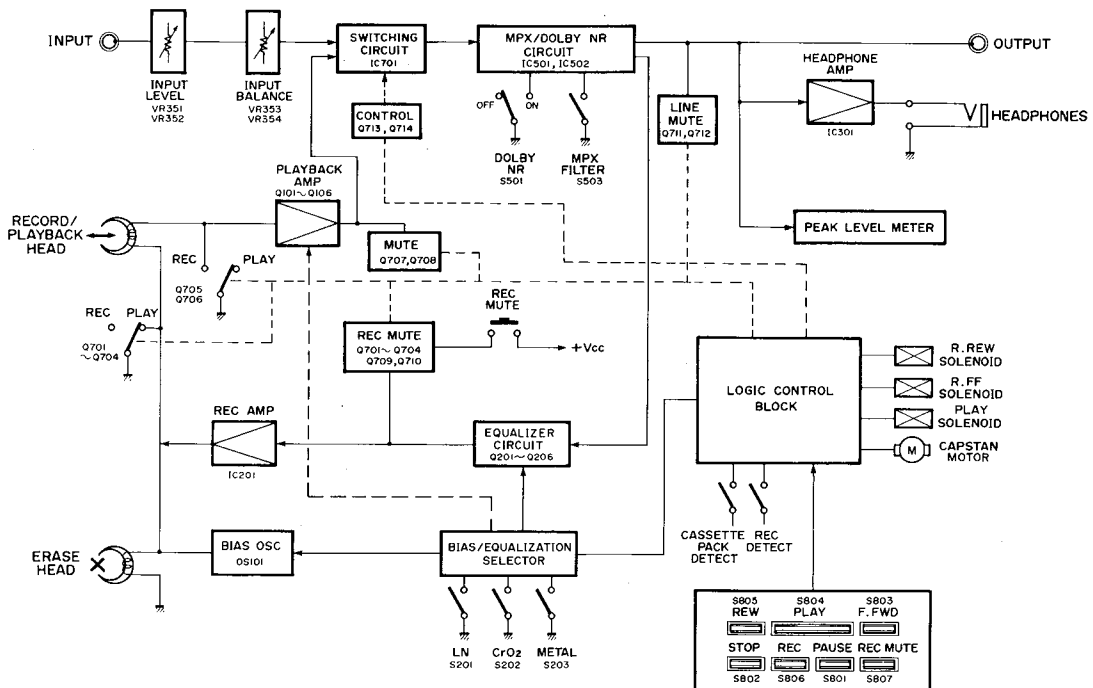
When the REC button is pressed, ⑬ pin of the IC801 becomes low level to cause the Q801 and Q802 to turn ON, and \overline{REC} and REC signals are output. The \overline{REC} signal causes the bias circuit to turn ON and the REC signal causes the Q705, 707 (L ch.) and Q706 and 708 (R ch.) to turn ON to short-circuit the input and output signals of the playback amplifiers.

Also, the REC signal causes the Q803 to turn OFF. As the PLAY signal turns OFF thereby, Q701, Q703 (L ch.), Q702, 704 (R ch.) and Q709 (L ch.), 710 (R ch.) turn off, resulting in the record mode.

Logic in Playback Mode

With the STOP, PAUSE or PLAY button pressed, the Q803 becomes ON (OFF when ⑬ pin of the IC801 is low level), the PLAY signal is output and the Q701, 703 (L ch.) and Q702, 704 (R ch.) turn ON. Then the output side of the IC201 is short-circuited and at the same time one side of the record/playback head is short-circuited to the ground. Also, the Q709 (L ch.), 710 (R ch.) are turned ON to short-circuit the input side of the IC201, resulting in the playback mode.

BLOCK DIAGRAM



TIMING CHART

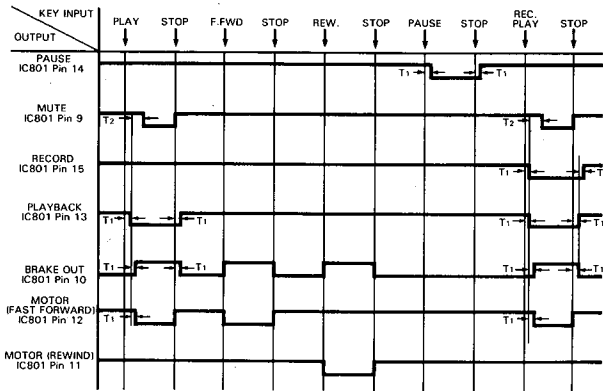


Fig. A

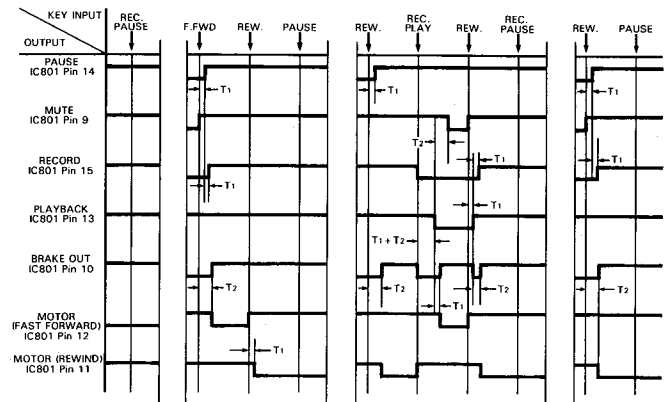


Fig. D

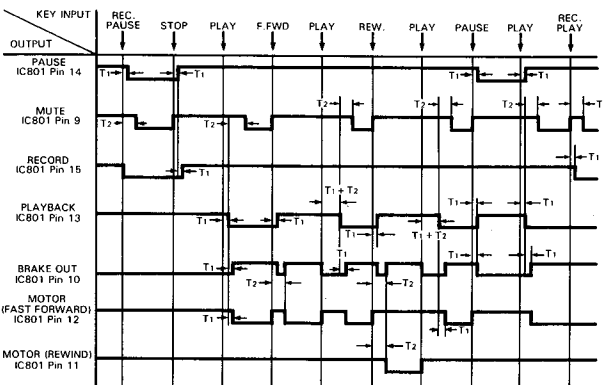


Fig. B

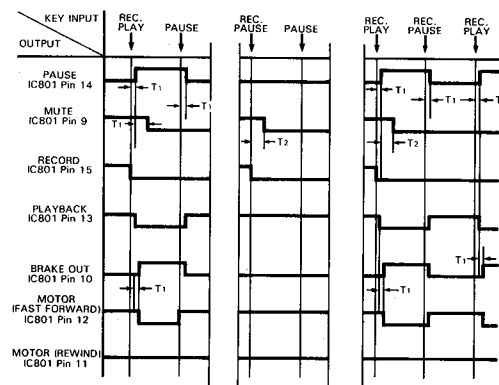


Fig. E

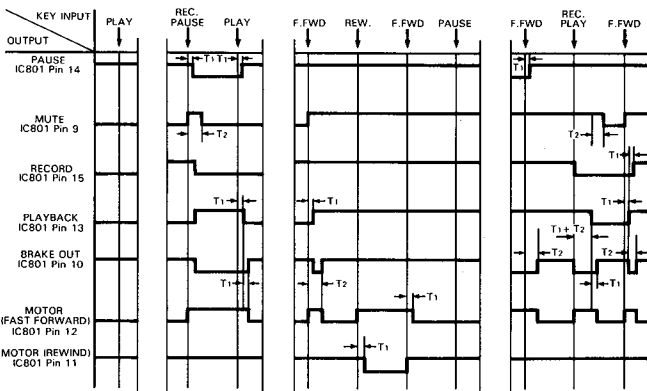


Fig. C

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)

ALIGNMENT PROCEDURES (REFER TO PAGES 11, 12 AND 13)

■ 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.)
- When the switch arm is moved back gradually from the ON position, the switch should turn OFF.

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.

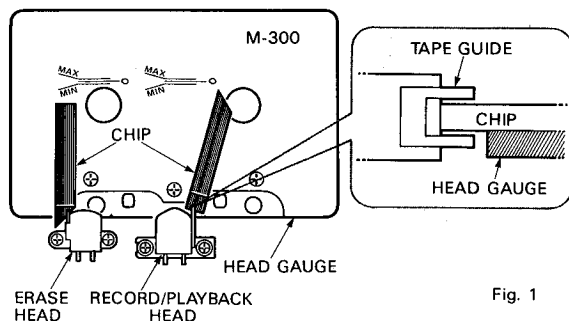


Fig. 1

● 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.

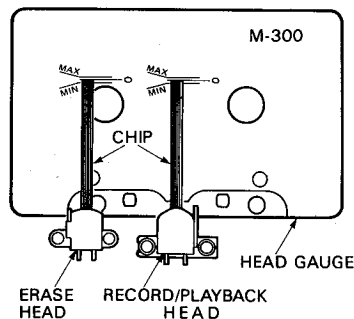


Fig. 2

■ 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 MTT-114 or TCC-153
- 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
- Reference tapes
 LN SCC-502
 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 |
| Input Level | Maximum |
| MPX Filter | Off |
| Input Balance | Center |

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.

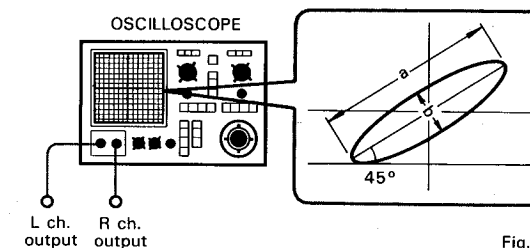


Fig. 3

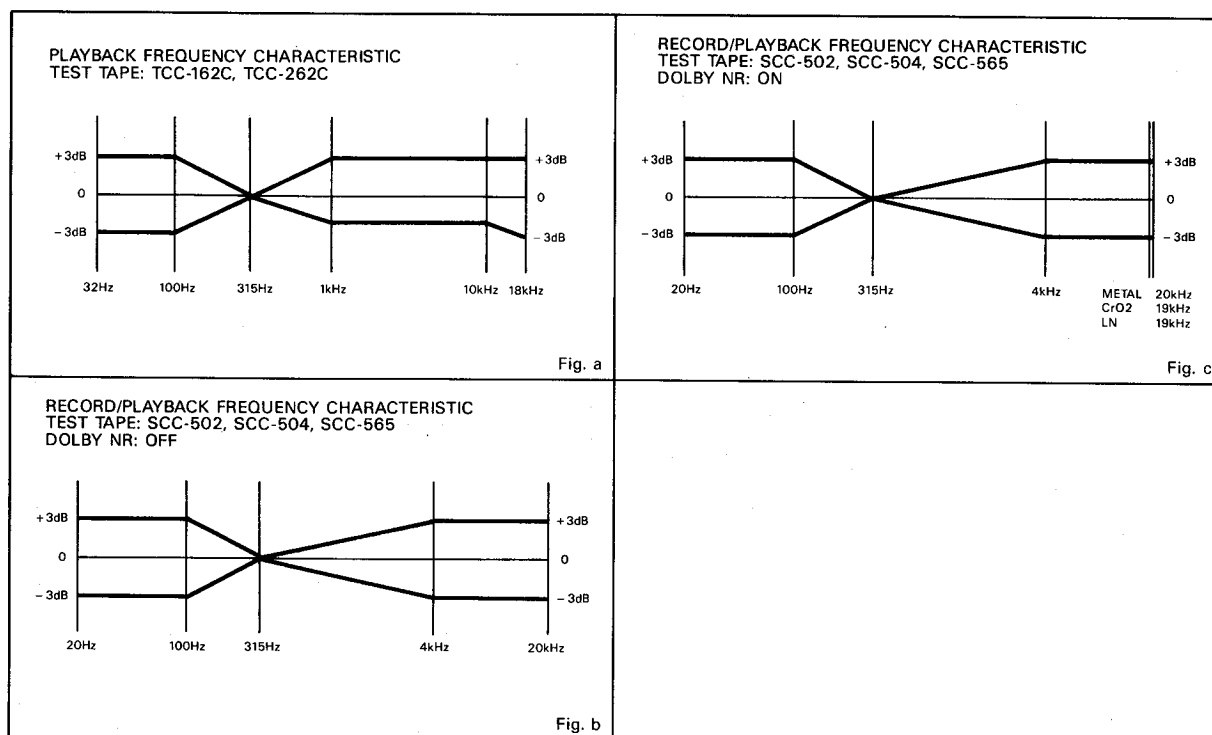


Fig. a

Fig. c

Fig. b

ALIGNMENT PROCEDURES (REFER TO PAGES 11, 12 AND 13)

■ 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.)
- When the switch arm is moved back gradually from the ON position, the switch should turn OFF.

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.

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- The cassette compartment opens smoothly and no abnormal noise should be heard while opening and closing.
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- 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.

● 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.

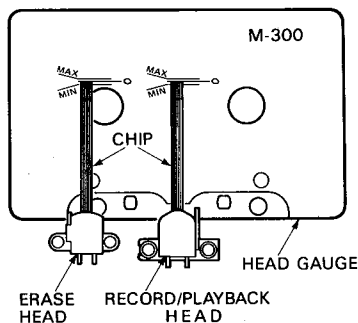


Fig. 2

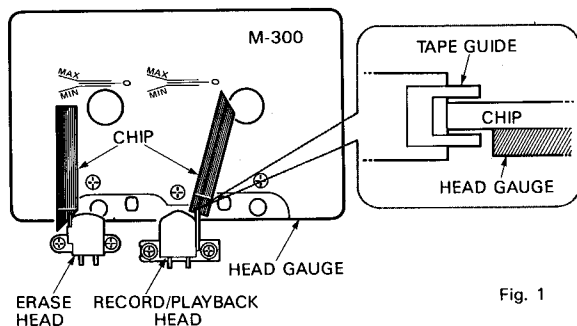


Fig. 1

■ 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 MTT-114 or TCC-153
- 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
- Reference tapes
LN SCC-502
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 |
| Input Level | Maximum |
| MPX Filter | Off |
| Input Balance | Center |

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.

- a) Connect L channel tape out to "X (or V)" and R channel to "Y (or H)". Observe the lissajous waveform.
- 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.

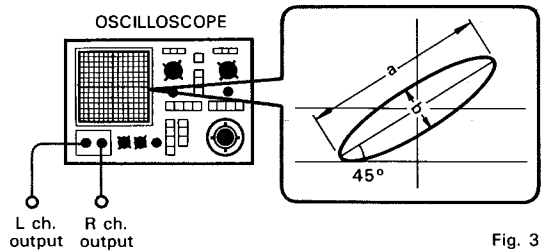
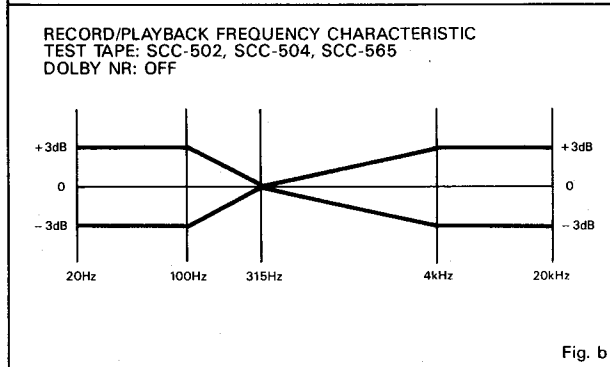
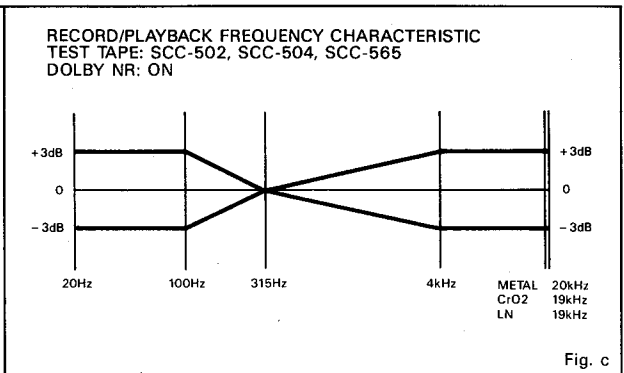
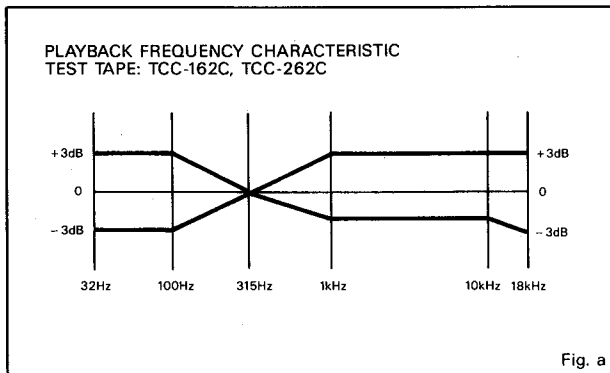


Fig. 3

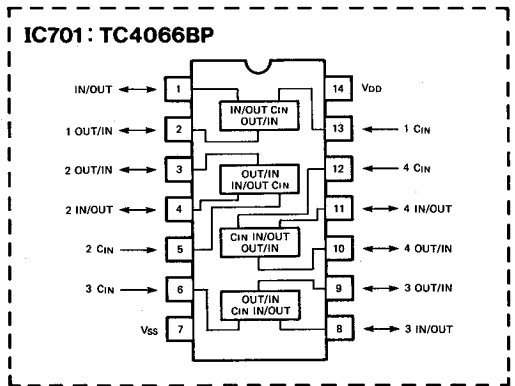
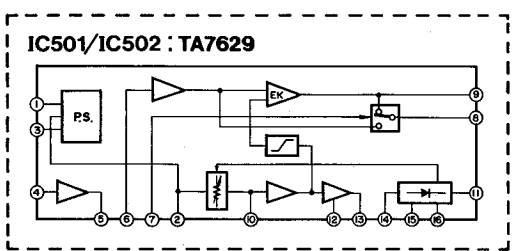
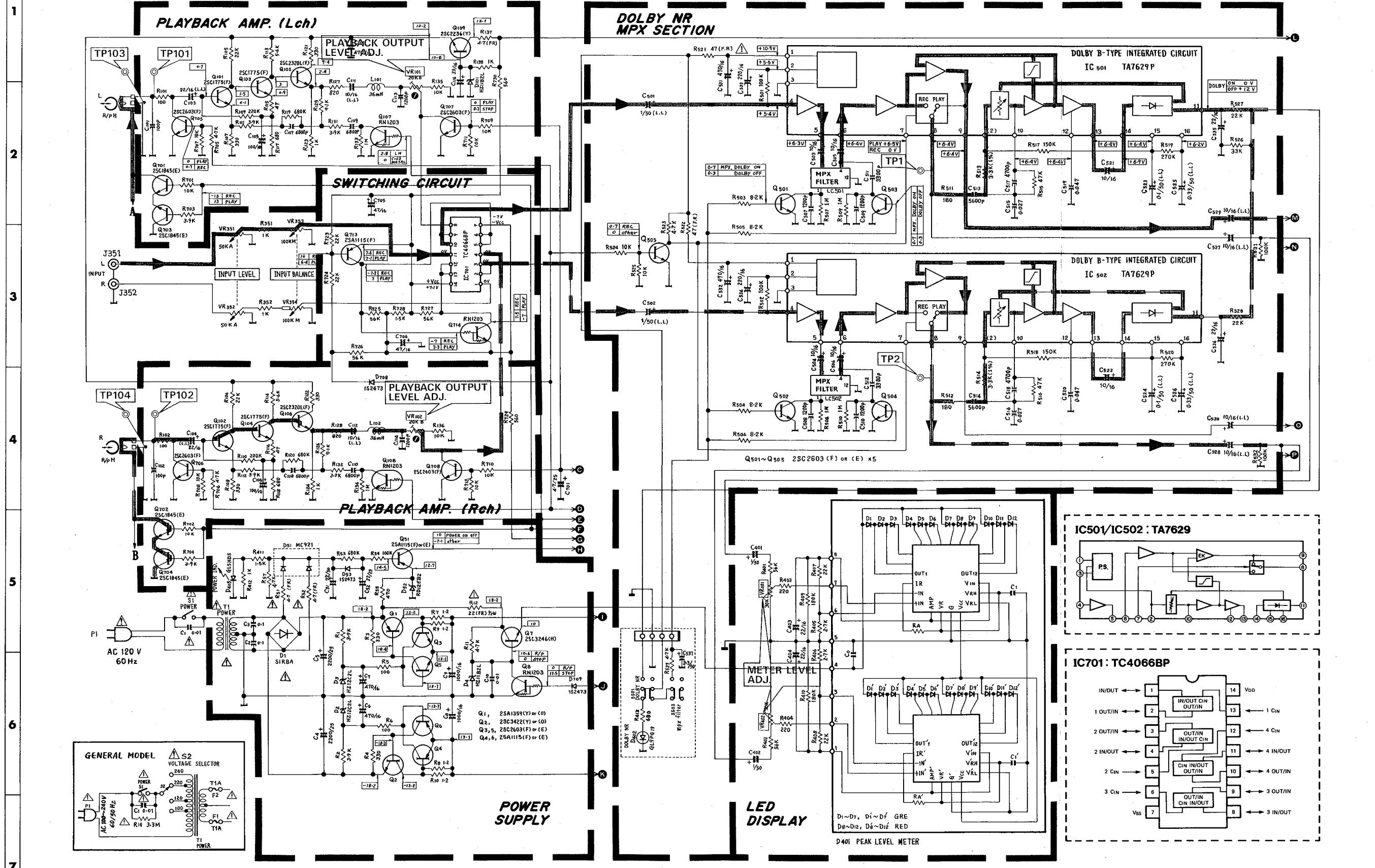


| Step | Alignment | Instrument Require | Input Signal | Mode | Test Point | Adjustment | For |
|-------|--|--|--|---------------|------------------------------|------------------------|--|
| 1 | Azimuth | VTVM Oscilloscope Test tape (MTT-114 or TCC-153) | | PB | TP1 TP2 | Azimuth screw | Maximum output Refer to "Azimuth Adjustment" on page 9. |
| 2 | Tape speed | Frequency counter Test tape (MTT-111 or MTT-111D) | | PB | TP1 TP2 | VR (built in motor) | 3000Hz \pm 10Hz Adjust at the center of test tape. |
| 3 | Playback output level | VTVM Test tape (MTT-150 or TCC-130) | | PB | TP1 TP2 | 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 | Bias trap | VTVM | | REC- PAUSE | TP253 TP254 | L203 L204 | Minimum output |
| 6 | Bias level (pre-adjustment) | VTVM | | REC- PAUSE | TP101, TP103 TP102, TP104 | VR251 VR252 | 100mV Tape selector is metal position. |
| | | | | | TP102, TP104 | VR254 | 52mV Tape selector is CrO ₂ position. |
| | | | | | TP102, TP104 | VR253 | 32mV Tape selector is LN position. |
| 7 | Bias frequency | Frequency counter | | REC- PAUSE | TP251 TP252 | | 105kHz \pm 5kHz Tape selector is metal position. |
| 8 | Record level (pre-adjustment) | VTVM Blank tape (SCC-504 or AC-512) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV in REC-PAUSE mode. | REC/PB | TP1 TP2 | VR201 VR202 | 580mV Tape selector is CrO ₂ position. |
| 9 | Peaking coil (pre-adjustment) | VTVM Blank tape (SCC-565 or AC-712) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP101 and TP102 voltage is 580mV - 25dB in REC mode. | REC- PAUSE | TP101 TP102 | L201 L202 | So that output becomes maximum at 20kHz input. Short the TP251 and TP252. Tape selector is metal position. |
| 10 | Record/playback equalizer frequency characteristic (pre-adjustment) | VTVM Blank tape (SCC-565 or AC-712) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal. | REC/PB | OUTPUT jack | VR253 VR254 | So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is metal 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) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal. | REC/PB | OUTPUT jack | VR251, L202 | So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is CrO ₂ position. |
| | | | | | | VR253, L201 | |
| | | | | | | VR252 | So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is LN position. |
| | | | | | | check | Tape selector is metal position. |
| VR253 | Tape selector is LN position. So that the record/playback frequency response of L ch. at metal position and that of L ch. at LN position are balanced. | | | | | | |
| 12 | Record level | VTVM Blank tape (SCC-504 or AC-512) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV in REC-PAUSE mode. | REC/PB | TP1 TP2 | VR201 VR202 | 580mV Tape selector is CrO ₂ position. |
| 13 | Record level | VTVM Blank tapes (metal SCC-565 or AC-712) (LN SCC-502) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV in REC-PAUSE mode. | REC/PB | TP1 TP2 | | 580mV \pm 1dB This confirmation should be done at each tape selector position. |
| 14 | 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) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 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. If it is not within the specification, redo the adjustment and confirmation in steps 10, 11 and 12. This confirmation should be done at each tape selector position. Dolby NR switch is on position. |
| 15 | Meter level | VTVM | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV - 0.5dB in REC-PAUSE mode. | REC- PAUSE | PEAK LEVEL METER | VR401 VR402 | Adjust to the point where the 0 dB of the peak level meter lights. |
| 16 | MPX filter characteristic confirmation | VTVM | Apply 19kHz and 15kHz signal to INPUT jack. Set INPUT LEVEL knob so that TP1 and TP2 voltage is 580mV in REC-PAUSE mode. | REC- PAUSE | OUTPUT jack | | Confirm that attenuation of 15kHz and 19kHz is within the specification when MPX filter on. |

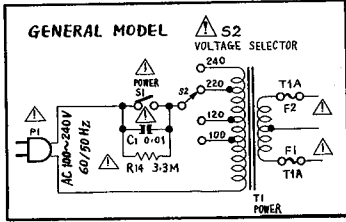
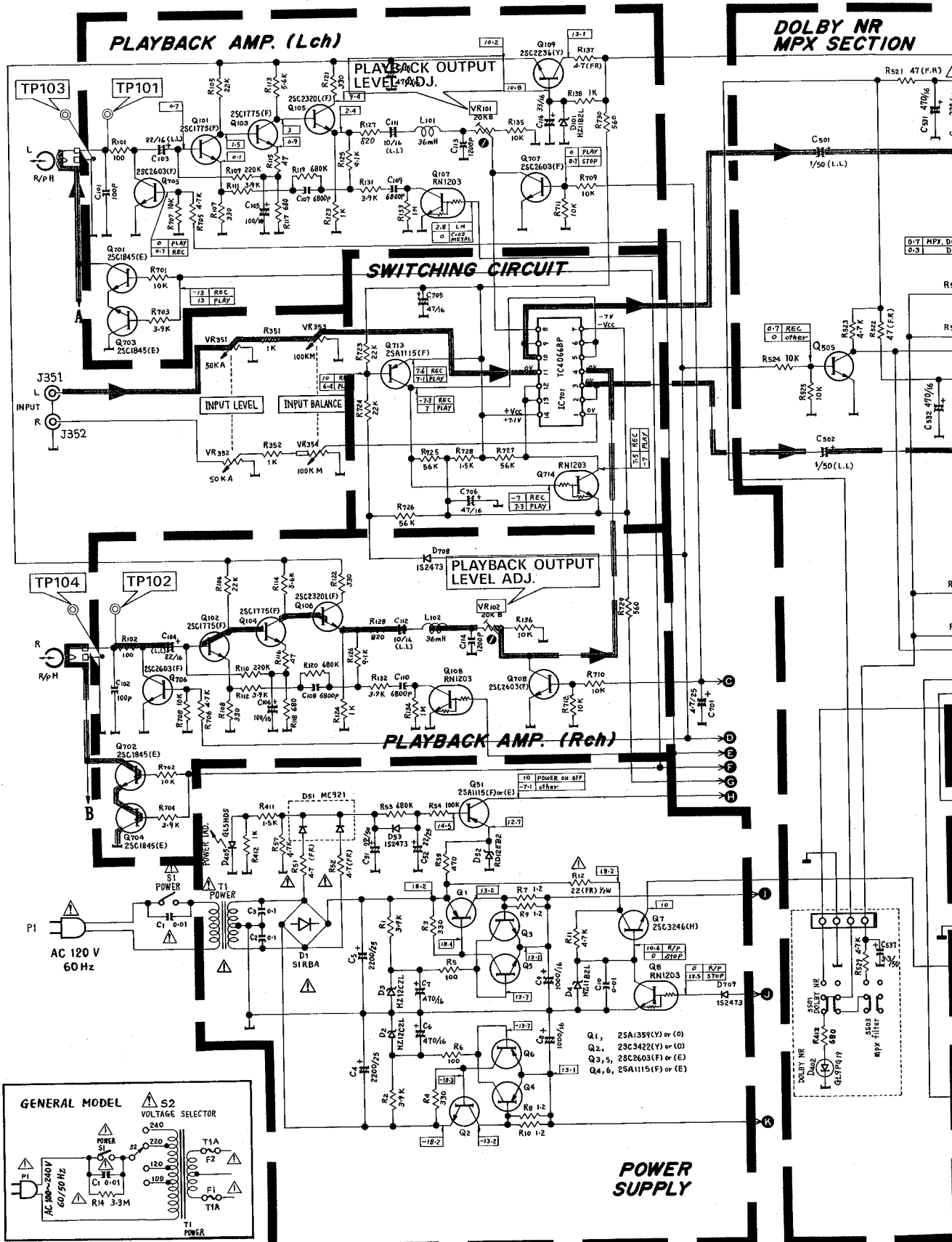
| Step | Alignment | Instrument Require | Input Signal | |
|------|---|--|---|---|
| 1 | Azimuth | VTVM Oscilloscope Test tape (MTT-114 or TCC-153) | | |
| 2 | Tape speed | Frequency counter Test tape (MTT-111 or MTT-111D) | | |
| 3 | Playback output level | VTVM Test tape (MTT-150 or TCC-130) | | |
| 4 | Playback frequency characteristic confirmation | VTVM Test tape (TCC-288H or TCC-162C and TCC-262C) | | |
| 5 | Bias trap | VTVM | | |
| 6 | Bias level (pre-adjustment) | VTVM | | |
| | | | | 1 |
| | | | | 2 |
| 3 | | | | |
| 7 | Bias frequency | Frequency counter | | |
| 8 | Record level (pre-adjustment) | VTVM Blank tape (SCC-504 or AC-512) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV in REC-PAUSE mode. | |
| 9 | Peaking coil (pre-adjustment) | VTVM Blank tape (SCC-565 or AC-712) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP101 and TP102 voltage is 580mV - 25dB in REC-PAUSE mode. | |
| 10 | Record/playback equalizer frequency characteristic (pre-adjustment) | VTVM Blank tape (SCC-565 or AC-712) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal. | |
| 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) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal. | |
| | | | | 1 |
| | | | | 2 |
| | | | | 3 |
| 4 | | | | |
| 12 | Record level | VTVM Blank tape (SCC-504 or AC-512) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV in REC-PAUSE mode. | |
| 13 | Record level | VTVM Blank tapes (metal SCC-565 or AC-712) (LN SCC-502) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV in REC-PAUSE mode. | |
| 14 | 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) | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV - 25dB in REC-PAUSE mode. Then adjust with a 20Hz to 30kHz sweep signal. | |
| 15 | Meter level | VTVM | Apply 400Hz signal to INPUT jack. Set INPUT LEVEL and TP2 voltage is 580mV - 0.5dB in REC-PAUSE mode. | |
| 16 | MPX filter characteristic confirmation | VTVM | Apply 19kHz and 15kHz signal to INPUT jack. Set so that TP1 and TP2 voltage is 580mV in REC-PAUSE mode. | |

| | Mode | Test Point | Adjustment | For |
|---|---------------|------------------------------|--|--|
| | PB | TP1 TP2 | Azimuth screw | Maximum output Refer to "Azimuth Adjustment" on page 9. |
| | PB | TP1 TP2 | VR (built in motor) | 3000Hz \pm 10Hz Adjust at the center of test tape. |
| | PB | TP1 TP2 | VR101 VR102 | 580mV |
| | PB | OUTPUT jack | | Confirm that the frequency response is within the range in Fig. a. |
| | REC- PAUSE | TP253 TP254 | L203 L204 | Minimum output |
| | REC- PAUSE | TP101, TP103 TP102, TP104 | VR251 VR252 | 100mV Tape selector is metal position. |
| | | TP102, TP104 | VR254 | 52mV Tape selector is CrO ₂ position. |
| | | TP102, TP104 | VR253 | 32mV Tape selector is LN position. |
| | REC- PAUSE | TP251 TP252 | | 105kHz \pm 5kHz Tape selector is metal position. |
| LEVEL knob so that TP1 level. | REC/PB | TP1 TP2 | VR201 VR202 | 580mV Tape selector is CrO ₂ position. |
| LEVEL knob so that REC mode. | REC- PAUSE | TP101 TP102 | L201 L202 | So that output becomes maximum at 20kHz input. Short the TP251 and TP252. Tape selector is metal position. |
| LEVEL knob so that TP1 USE mode. level. | REC/PB | OUTPUT jack | VR253 VR254 | So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is metal position. |
| LEVEL knob so that TP1 USE mode. level. | REC/PB | OUTPUT jack | VR251, L202 | So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is CrO ₂ position. |
| | | | VR253, L201 | |
| | | | VR252 | So that the record/playback frequency response is flat (at least within the range in Fig. b). Tape selector is LN position. |
| | | | check | Tape selector is metal position. |
| | | VR253 | Tape selector is LN position. So that the record/playback frequency response of L ch. at metal position and that of L ch. at LN position are balanced. | |
| LEVEL knob so that TP1 level. | REC/PB | TP1 TP2 | VR201 VR202 | 580mV Tape selector is CrO ₂ position. |
| LEVEL knob so that TP1 level. | REC/PB | TP1 TP2 | | 580mV \pm 1dB This confirmation should be done at each tape selector position. |
| LEVEL knob so that TP1 USE mode. level. | REC/PB | OUTPUT jack | | Confirm that the record/playback frequency response is within the range in Fig. c. If it is not within the specification, redo the adjustment and confirmation in steps 10, 11 and 12. This confirmation should be done at each tape selector position. Dolby NR switch is on position. |
| LEVEL knob so that TP1 USE mode. | REC- PAUSE | PEAK LEVEL METER | VR401 VR402 | Adjust to the point where the 0 dB of the peak level meter lights. |
| Set INPUT LEVEL knob REC-PAUSE mode. | REC- PAUSE | OUTPUT jack | | Confirm that attenuation of 15kHz and 19kHz is within the specification when MPX filter on. |

SCHEMATIC DIAGRAM (1)



SCHEMATIC DIAGRAM (1)



POWER SUPPLY

DOLBY NR MPX SECTION

SWITCHING CIRCUIT

PLAYBACK AMP. (Lch)

PLAYBACK OUTPUT LEVEL ADJ.

PLAYBACK OUTPUT LEVEL ADJ.

PLAYBACK AMP. (Rch)

POWER IND.

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

POWER

F

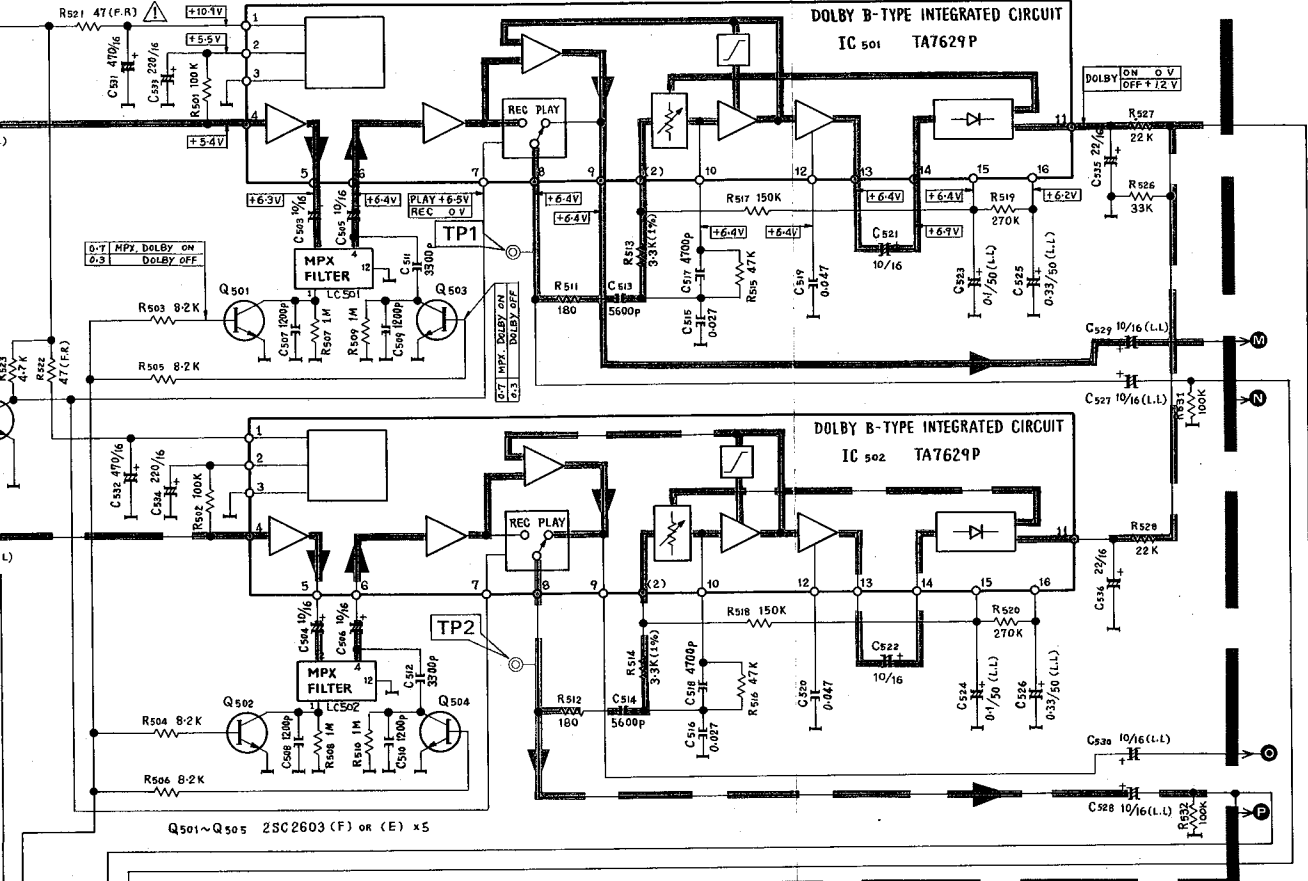
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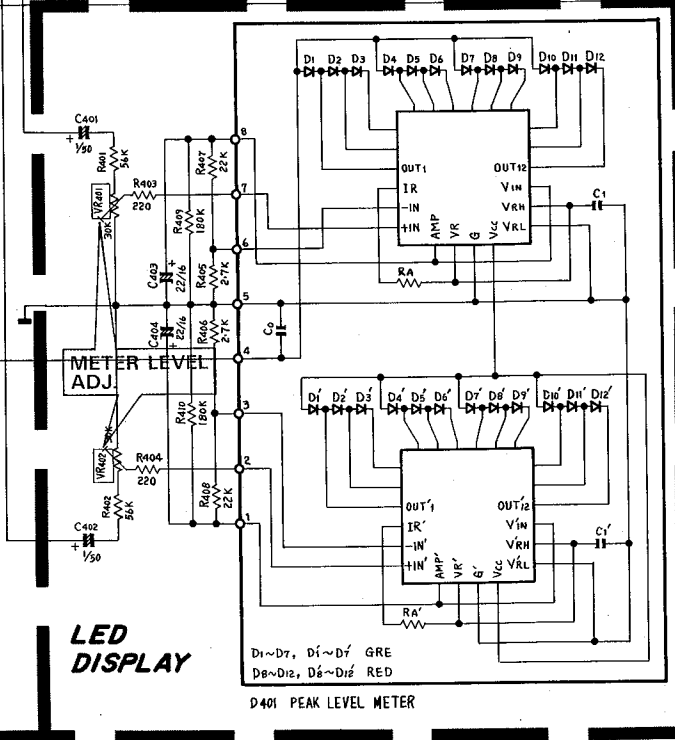
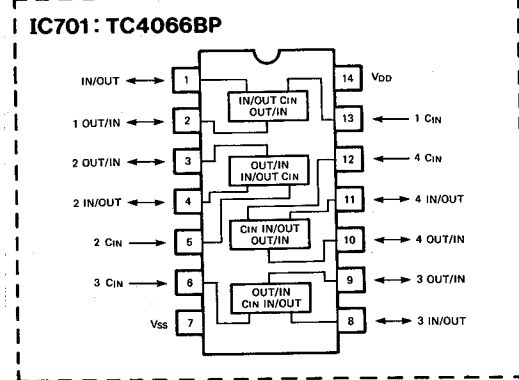
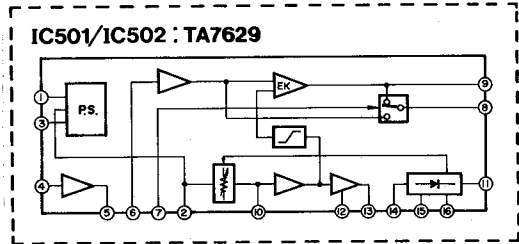
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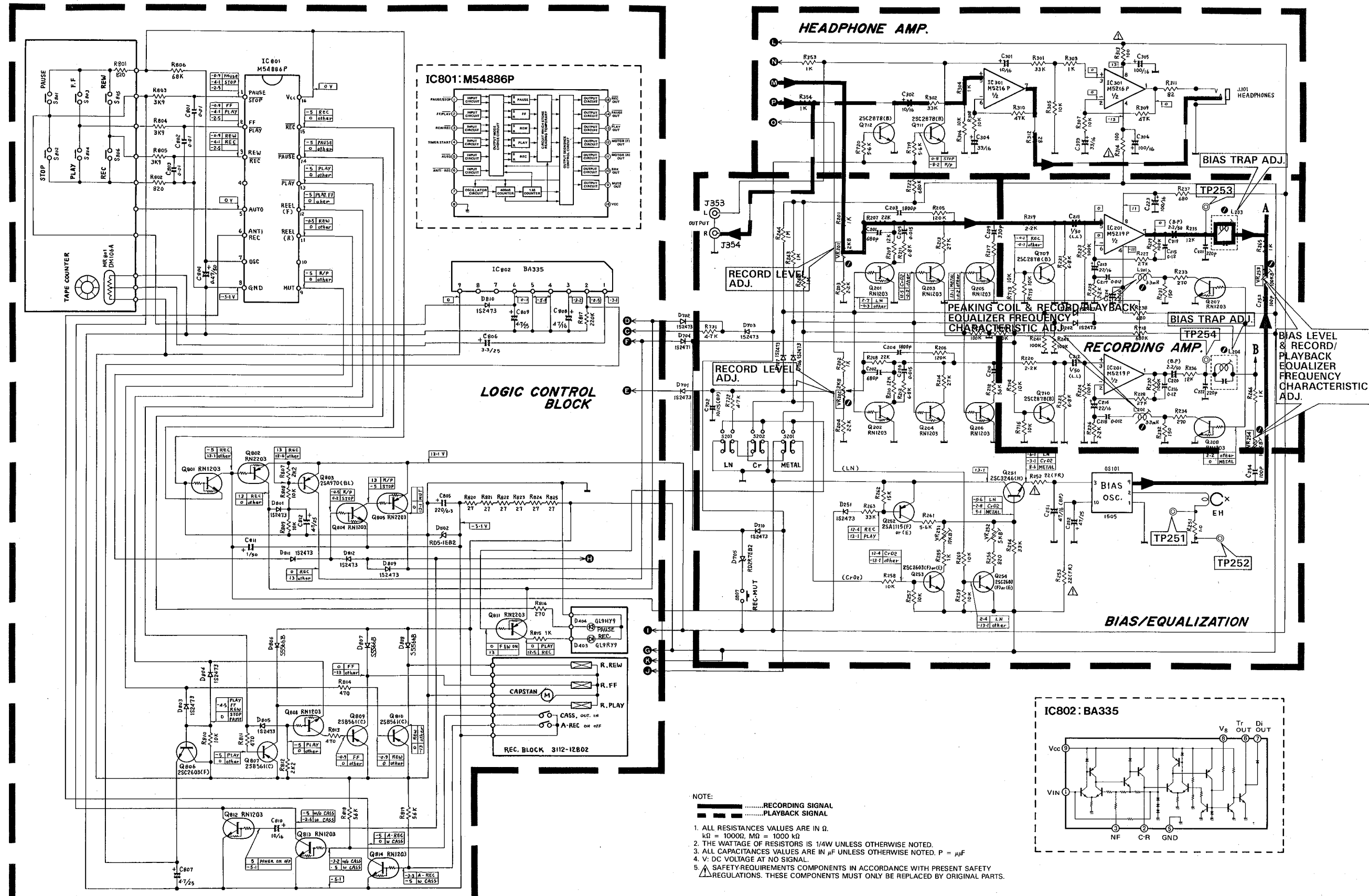
NR SECTION



Q501~Q505 2SC2603 (F) or (E) x5



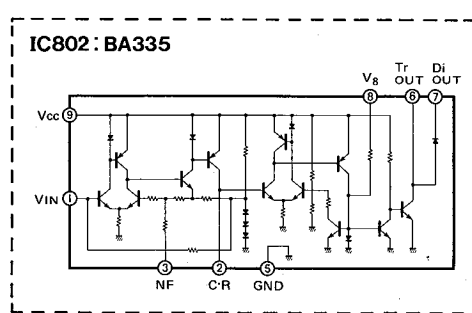
SCHEMATIC DIAGRAM (2)



NOTE:

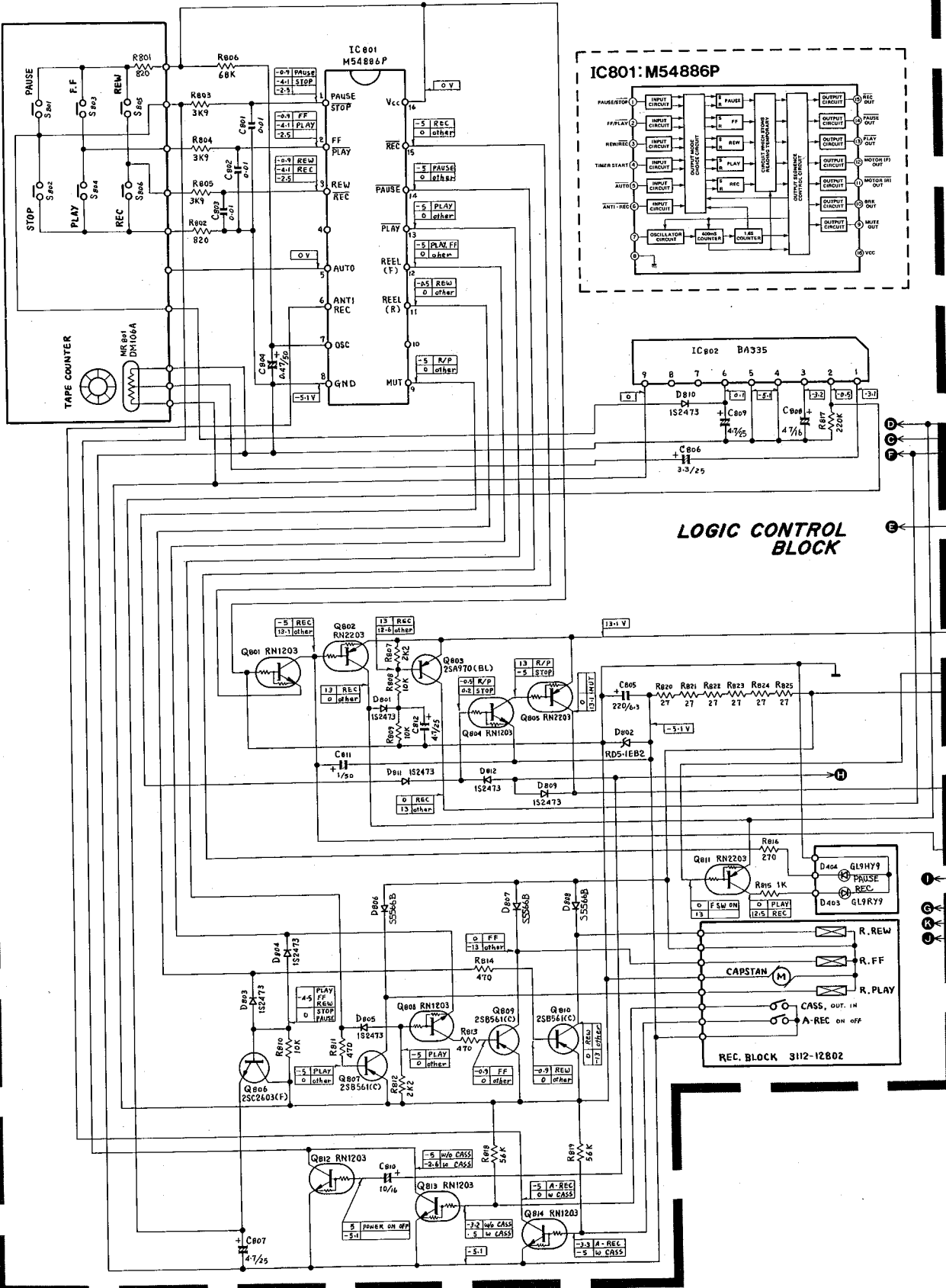
- RECORDING SIGNAL
- PLAYBACK SIGNAL

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



SCHEMATIC DIAGRAM (2)

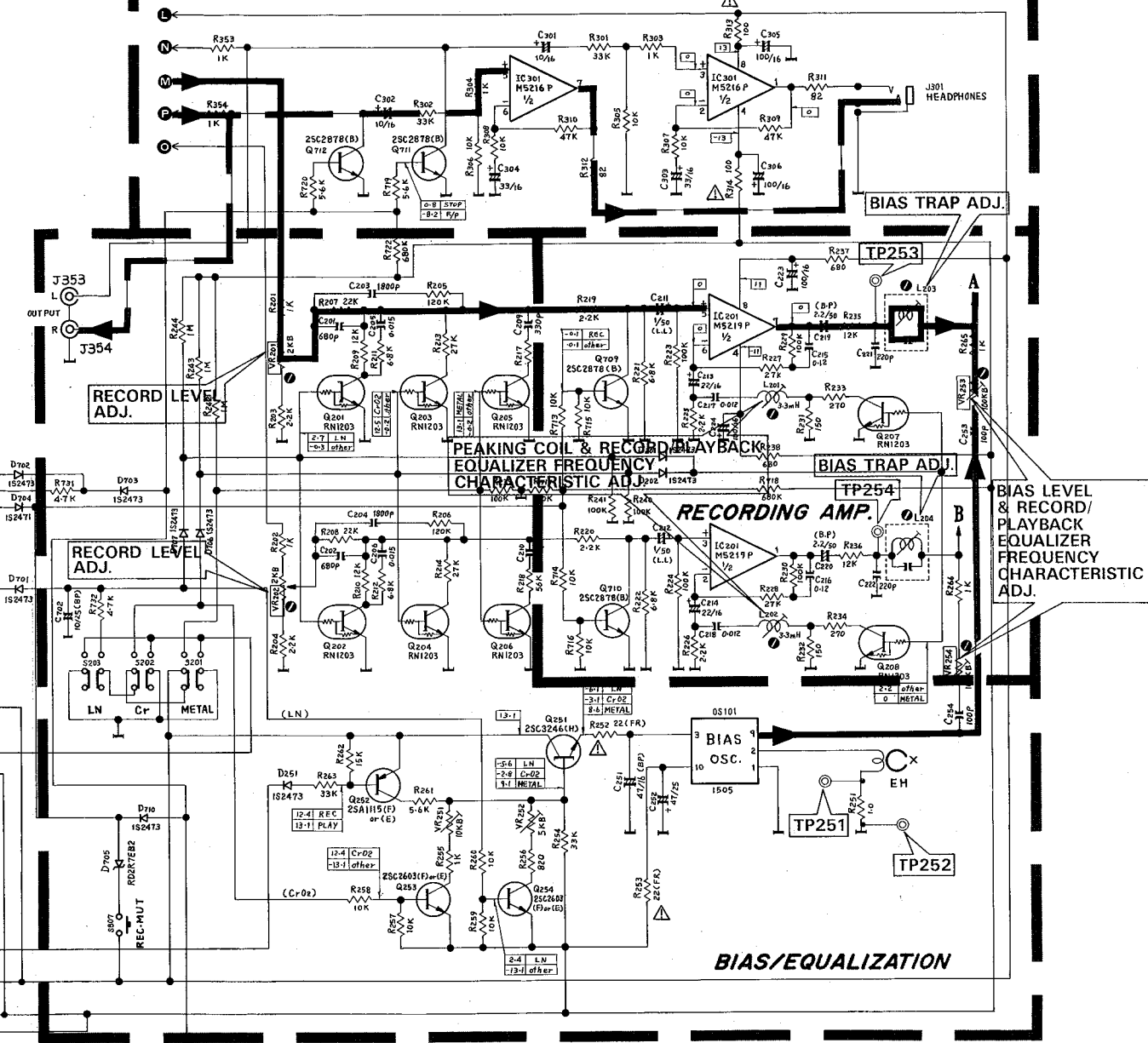
1
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7



LOGIC CONTROL BLOCK

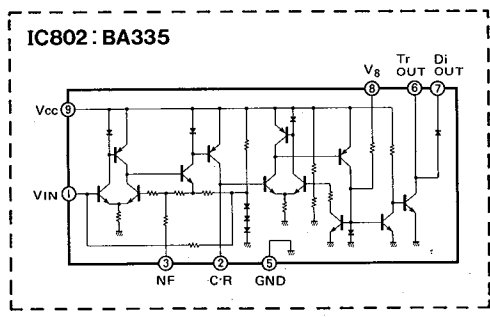
REC. BLOCK 3112-12802

HEADPHONE AMP.



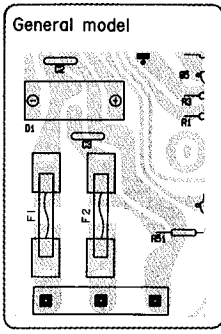
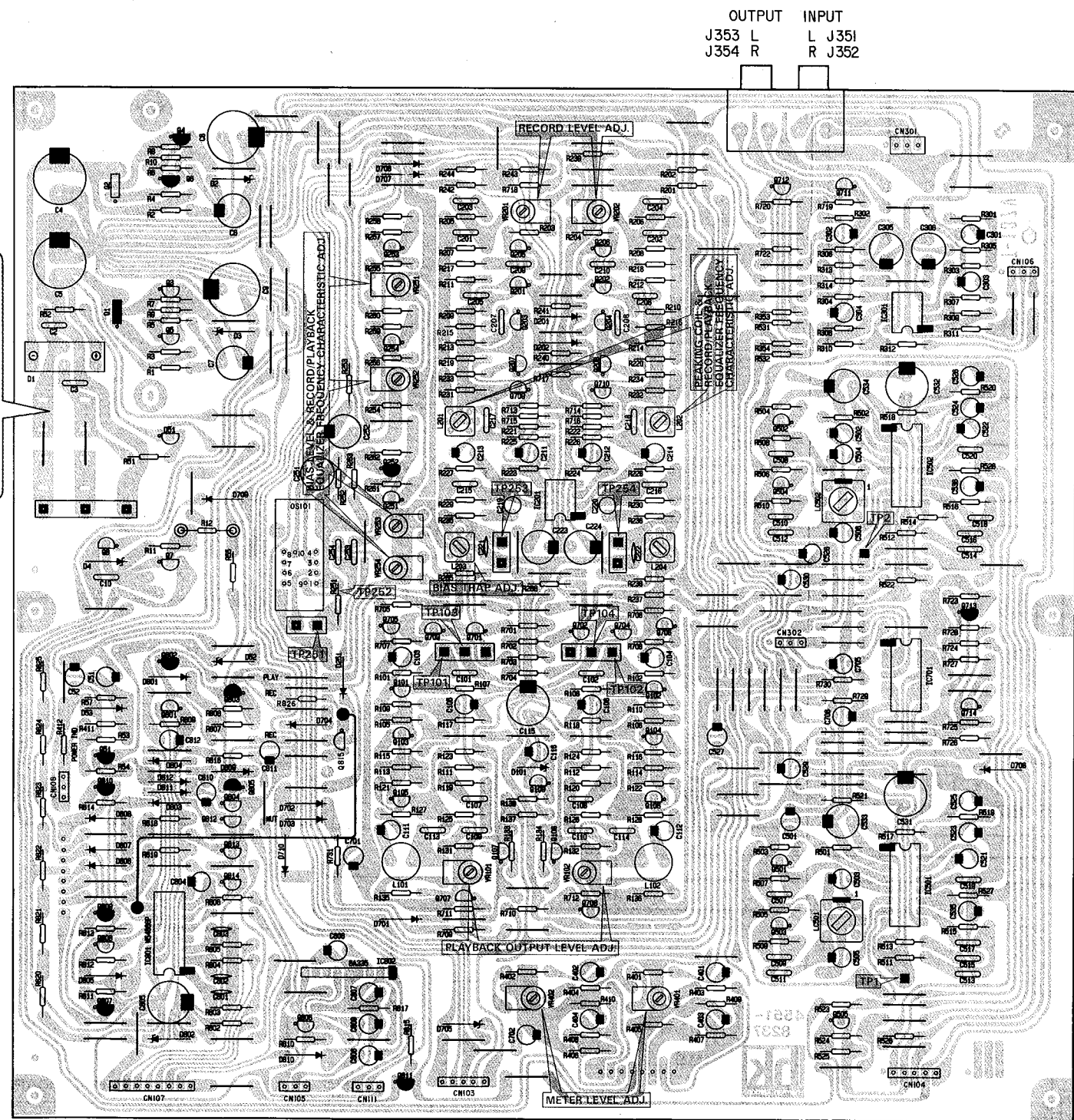
NOTE:
 ——— RECORDING SIGNAL
 - - - - - PLAYBACK SIGNAL

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 = μF
4. V: DC VOLTAGE AT NO SIGNAL.
5. SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

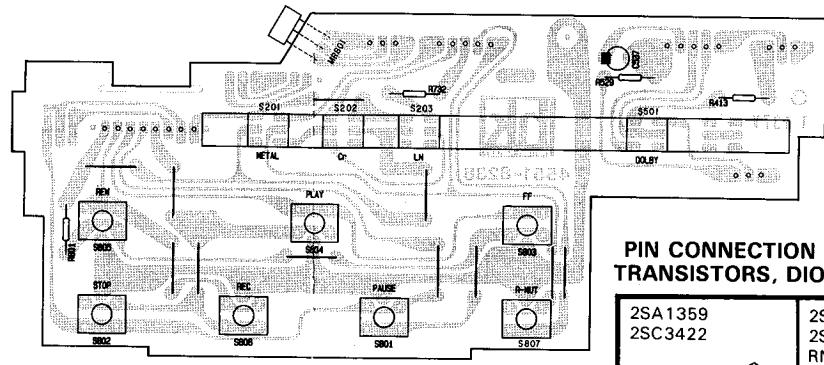


P. C. BOARDS

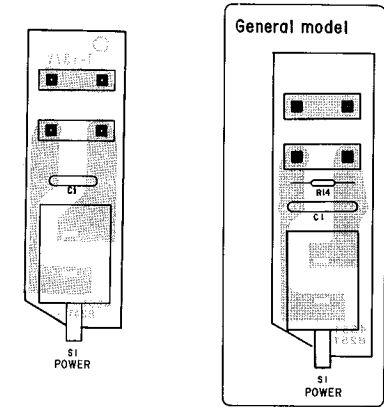
PCB-1 Main P. C. Board



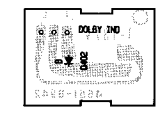
PCB-2 Function Switch P. C. Board



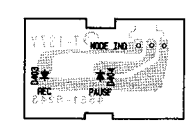
PCB-5 Power Switch P. C. Board



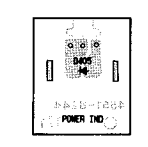
PCB-6 Dolby NR Ind. P. C. Board



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



PCB-8 Power Ind. P. C. Board



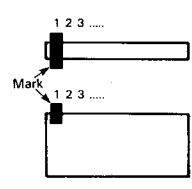
PCB-9 Headphones Jack P. C. Board



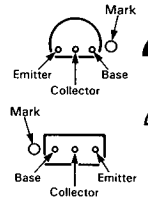
PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICs.

| | |
|--|--|
| <p>2SA 1359 2SC3422</p> | <p>2SC2603 2SA 1115 RN1203 RN2203</p> |
| <p>2SC3246 2SC1775 2SC2320L 2SC1845 2SC2878 2SB561</p> | <p>2SC2236 2SA970</p> |
| <p>S1RBA</p> | <p>HZ12C2L RD12EB2 1S2473 HZ11B2L RD2.7 EB2 RD5.1 EB2 S5566B</p> |
| <p>GL9PG19 GL9HY9 GL9PR9</p> | |
| <p>GL5HD5</p> | <p>MC921</p> |
| <p>TC4066BP</p> | <p>M5219P M5216P</p> |
| <p>M54886P TA7629P</p> | <p>BA335</p> |

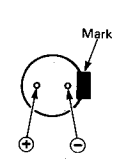
ICs



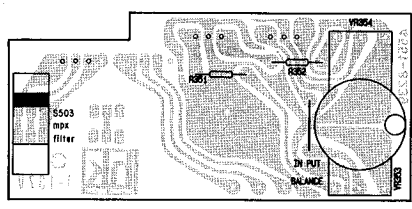
Transistors



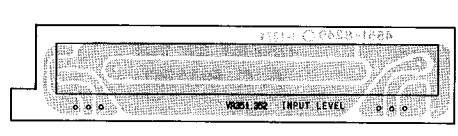
Electrolytic Capacitors



PCB-3 VR P. C. Board



PCB-4 Input Level Control P. C. Board

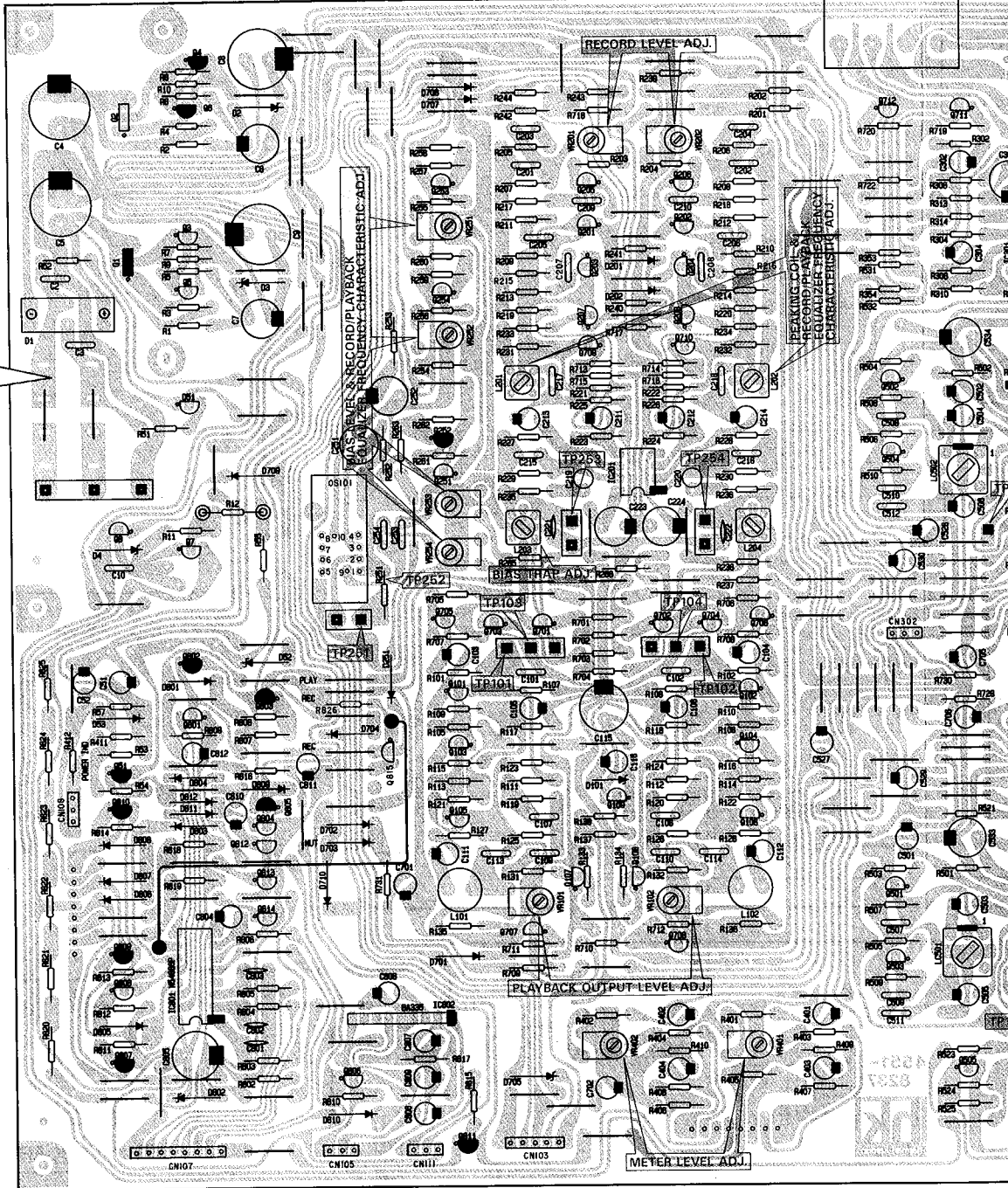
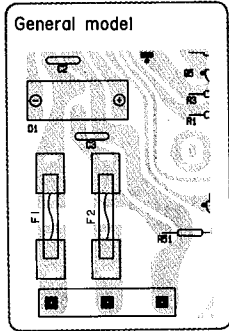


A B C D E

P. C. BOARDS

PCB-1 Main P. C. Board

OUTPUT INPUT
 J353 L L J351
 J354 R R J352



F

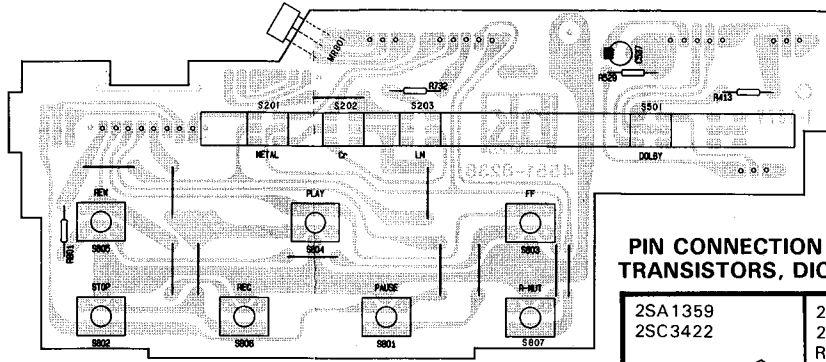
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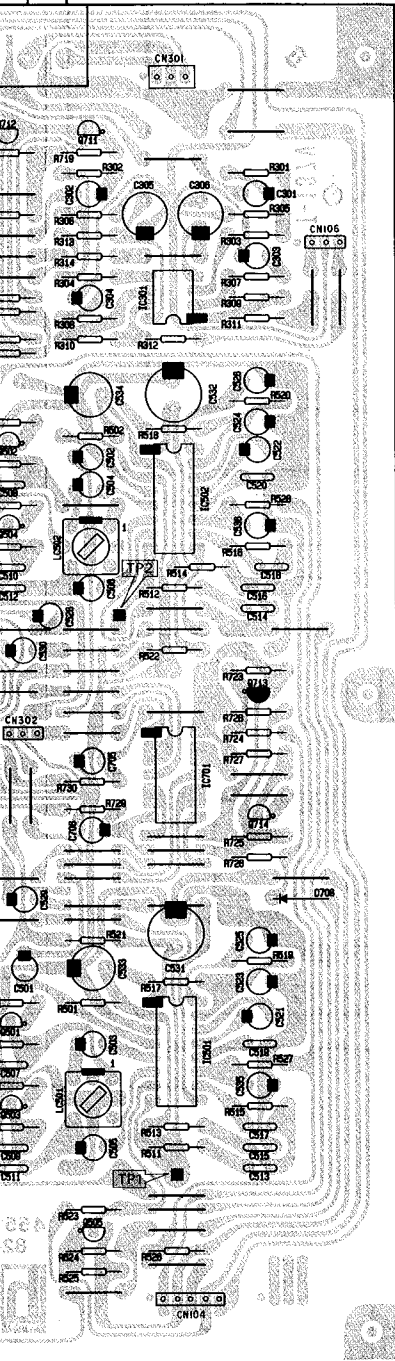
PCB-2 Function Switch P. C. Board



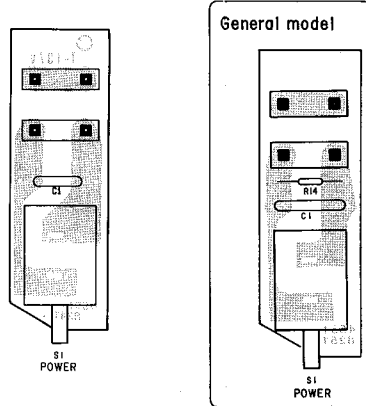
PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICs.

| | |
|--|--|
| <p>2SA1359 2SC3422</p> | <p>2SC2603 2SA1115 RN1203 RN2203</p> |
| <p>2SC3246 2SC1775 2SC2320L 2SC1845 2SC2878 2SB561</p> | <p>2SC2236 2SA970</p> |
| <p>S1RBA</p> | <p>HZ12C2L RD12EB2 1S2473 HZ11B2L RD2.7 EB2 RD5.1 EB2 S5566B</p> |
| <p>GL9PG19 GL9HY9 GL9PR9</p> | <p>MC921</p> |
| <p>GL5HD5</p> | |
| <p>TC4066BP</p> | <p>M5219P M5216P</p> |
| <p>M54886P TA7629P</p> | <p>BA335</p> |

INPUT
L J351
R J352



PCB-5 Power Switch P. C. Board



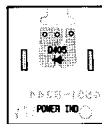
PCB-6 Dolby NR Ind. P. C. Board



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



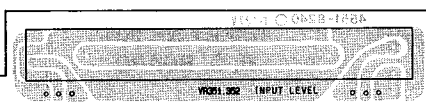
PCB-8 Power Ind. P. C. Board



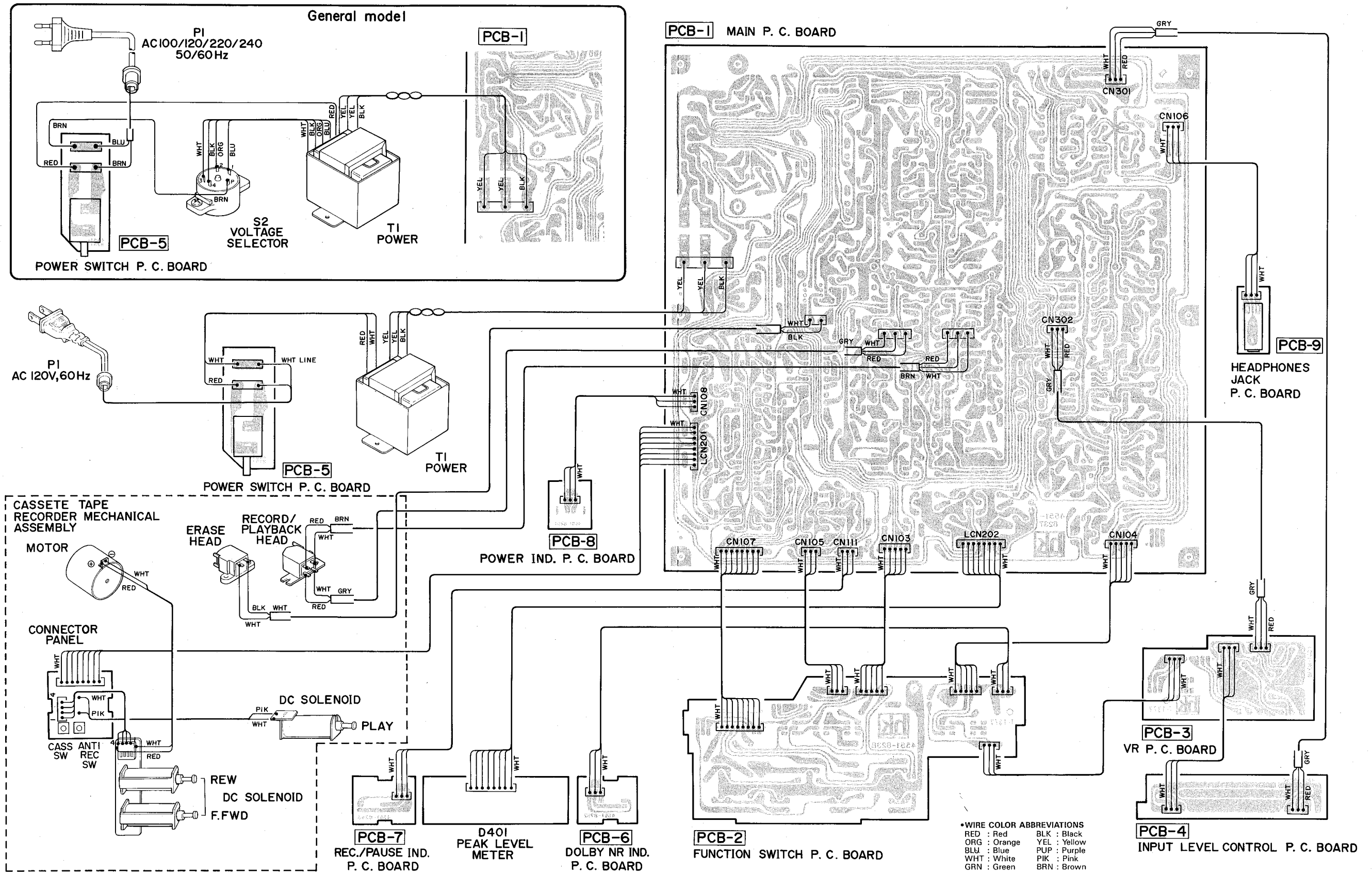
PCB-9 Headphones Jack P. C. Board



PCB-4 Input Level Control P. C. Board

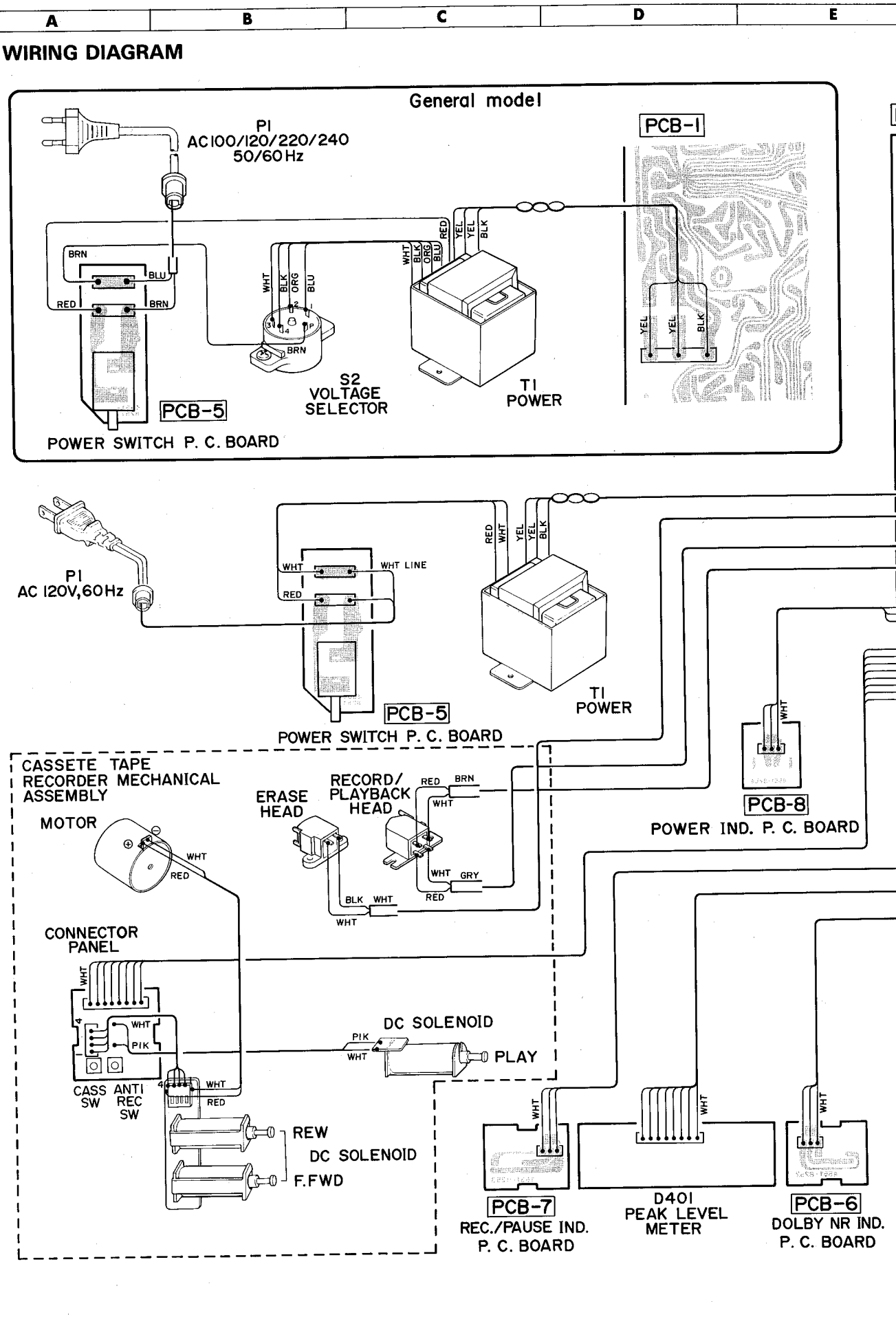


WIRING DIAGRAM



WIRING DIAGRAM

1
2
3
4
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ELECTRICAL PARTS LIST

| Ref. No. | Part No. | Description |
|------------------------------|---------------------------|--|
| CHASSIS MISCELLANEOUS | | |
| △ P1 | 4161-71151 | Power Cord U A |
| △ P1 | 4161-7256 | Power Cord EW |
| △ T1 | 5584-701376 | Power Trans. U A |
| △ T1 | 5584-702392 | Power Trans. EW |
| △ S2 | 4411-104736 | Rotary Switch, Voltage Selector |
| △ F1 | 5732-102052 | Fuse, T1A EW |
| △ F2 | 5732-102052 | Fuse, T1A EW |
| D401 | 5623-LT1151 4161-71184 | Peak Level Meter Connection Cord (Accessory) |
| PCB-1 MAIN P.C. BOARD | | |
| RESISTORS | | |
| △ R12 | 5102-2205114 | 22Ω, 1/2W, FR |
| △ R51 | 5102-4R74715 | 4.7Ω, 1/4W, FR |
| △ R52 | 5102-4R74715 | 4.7Ω, 1/4W, FR |
| △ R137 | 5102-4R74715 | 4.7Ω, 1/4W, FR |
| △ R252 | 5102-2204715 | 22Ω, 1/4W, FR |
| △ R253 | 5102-1004715 | 10Ω, 1/4W, FR |
| △ R313 | 5102-1014715 | 100Ω, 1/4W, FR |
| △ R314 | 5102-1014715 | 100Ω, 1/4W, FR |
| CONTROLS | | |
| VR101 | 5101-20371920 | 20kΩB |
| VR102 | 5101-20371920 | 20kΩB |
| VR201 | 5101-20271920 | 2kΩB |
| VR202 | 5101-20271920 | 2kΩB |
| VR251 | 5101-10371920 | 10kΩB |
| VR252 | 5101-50271920 | 5kΩB |
| VR253 | 5101-10471920 | 100kΩB |
| VR254 | 5101-10471920 | 100kΩB |
| VR401 | 5101-30371920 | 30kΩ |
| VR402 | 5101-30371920 | 30kΩ |
| CAPACITORS | | |
| C4 | 5345-228D041 | 2200μF/25V, EC |
| C5 | 5345-228D041 | 2200μF/25V, EC |
| C6 | 5345-477C041 | 470μF/16V, EC |
| C7 | 5345-477C041 | 470μF/16V, EC |
| C8 | 5345-108C041 | 1000μF/16V, EC |
| C9 | 5345-108C041 | 1000μF/16V, EC |
| C51 | 5345-226F041 | 22μF/50V, EC |
| C52 | 5345-226D041 | 22μF/25V, EC |
| C101 | 5353-101534 | 100pF/500V, MC |
| C102 | 5353-101534 | 100pF/500V, MC |
| C103 | 5345-226C0951 | 22μF/16V, EC |
| C104 | 5345-226C0951 | 22μF/16V, EC |
| C105 | 5345-107B041 | 100μF/10V, EC |
| C106 | 5345-107B041 | 100μF/10V, EC |
| C107 | 5359-6825851 | 6800pF/100V, PC |
| C108 | 5359-6825851 | 6800pF/100V, PC |
| C109 | 5359-6825851 | 6800pF/100V, PC |
| C110 | 5359-6825851 | 6800pF/100V, PC |
| C111 | 5345-106C0951 | 10μF/16V, EC |
| C112 | 5345-106C0951 | 10μF/16V, EC |
| C113 | 5359-1225851 | 1200pF/100V, PC |
| C114 | 5359-1225851 | 1200pF/100V, PC |
| C115 | 5345-477C041 | 470μF/16V, EC |
| C116 | 5345-336C041 | 33μF/16V, EC |
| C201 | 5359-6815851 | 680pF/100V, PC |
| C202 | 5359-6815851 | 680pF/100V, PC |
| C209 | 5359-3315851 | 330pF/100V, PC |
| C210 | 5359-3315851 | 330pF/100V, PC |
| C211 | 5345-105F0951 | 1μF/50V, EC |
| C212 | 5345-105F0951 | 1μF/50V, EC |
| C213 | 5345-226C0952 | 22μF/16V, EC |
| C214 | 5345-226C0952 | 22μF/16V, EC |
| C219 | 5342-225F0951 | 2.2μF/50V, EC |
| C220 | 5342-225F0951 | 2.2μF/50V, EC |
| C223 | 5345-107C041 | 100μF/16V, EC |
| C224 | 5345-107C041 | 100μF/16V, EC |
| C251 | 5342-476C0951 | 47μF/16V, EC |
| C252 | 5345-476D041 | 47μF/25V, EC |

| Ref. No. | Part No. | Description |
|---------------------------|---------------|-------------------|
| C253 | 5353-101534 | 100pF/500V, MC |
| C254 | 5353-101534 | 100pF/500V, MC |
| 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 |
| C401 | 5345-105-50 | 1μF/50V, EC |
| C402 | 5345-105-50 | 1μF/50V, EC |
| C403 | 5345-226C041 | 22μF/16V, EC |
| C404 | 5345-226C041 | 22μF/16V, EC |
| C501 | 5345-105F0951 | 1μF/50V, EC |
| C502 | 5345-105F0951 | 1μF/50V, EC |
| C503 | 5345-106C0952 | 10μF/16V, EC |
| C504 | 5345-106C0952 | 10μF/16V, EC |
| C505 | 5345-106C0952 | 10μF/16V, EC |
| C506 | 5345-106C0952 | 10μF/16V, EC |
| C511 | 5359-3325851 | 3300pF/100V, PC |
| C512 | 5359-3325851 | 3300pF/100V, PC |
| C521 | 5345-106C0952 | 10μF/16V, EC |
| C522 | 5345-106C0952 | 10μF/16V, EC |
| C523 | 5345-104F0952 | 0.47μF/50V, EC |
| C524 | 5345-104F0952 | 0.47μF/50V, EC |
| C525 | 5345-334F0952 | 0.33μF/50V, EC |
| C526 | 5345-334F0952 | 0.33μF/50V, EC |
| C527 | 5345-106C0951 | 10μF/16V, EC |
| C528 | 5345-106C0951 | 10μF/16V, EC |
| C529 | 5345-106C0951 | 10μF/16V, EC |
| C530 | 5345-106C0951 | 10μF/16V, EC |
| C531 | 5345-477C041 | 470μF/16V, EC |
| C532 | 5345-477C041 | 470μF/16V, EC |
| C533 | 5345-227C041 | 220μF/16V, EC |
| C534 | 5345-227C041 | 220μF/16V, EC |
| C535 | 5345-226C041 | 22μF/16V, EC |
| C536 | 5345-226C041 | 22μF/16V, EC |
| C537 | 5345-335F041 | 3.3μF/50V, EC |
| C701 | 5345-475D041 | 4.7μF/25V, EC |
| C702 | 5342-106D0921 | 10μF/25V, EC |
| C705 | 5345-476C041 | 47μF/16V, EC |
| C706 | 5345-476C041 | 47μF/16V, EC |
| C804 | 5345-474F041 | 0.47μF/50V, EC |
| C805 | 5345-227B041 | 220μF/10V, EC |
| C806 | 5345-335D041 | 3.3μF/25V, EC |
| C807 | 5345-475D041 | 4.7μF/25V, EC |
| C808 | 5345-476C041 | 47μF/16V, EC |
| C809 | 5345-475D041 | 4.7μF/25V, EC |
| C810 | 5345-106C041 | 10μF/16V, EC |
| C811 | 5345-105F041 | 1μF/50V, EC |
| C812 | 5345-475D041 | 4.7μF/25V, EC |
| INTEGRATED CIRCUIT | | |
| IC201 | 5652-M5219P | M5219P |
| IC301 | 5652-M5216P | M5219P |
| IC501 | 5652-TA7629P | TA7629P |
| IC502 | 5652-TA7629P | TA7629P |
| IC701 | 5654-TC4066BP | TC4066BP |
| 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 |
| Q51 | 5611-1115(F) | 2SA1115(F) |
| Q101 | 5613-1775(F) | 2SC1775(F) |
| Q102 | 5613-1775(F) | 2SC1775(F) |
| Q103 | 5613-1775(F) | 2SC1775(F) |
| Q104 | 5613-1775(F) | 2SC1775(F) |
| Q105 | 5613-2320L(F) | 2SC2320L(F) |
| Q106 | 5613-2320L(F) | 2SC2320L(F) |

| Ref. No. | Part No. | Description |
|----------|---------------|-----------------------|
| Q107 | 5613-RN1203 | RN1203 |
| Q108 | 5613-RN1203 | RN1203 |
| Q109 | 5613-2236(Y) | 2SC2236(Y) |
| Q201 | 5613-RN1203 | RN1203 |
| Q202 | 5613-RN1203 | RN1203 |
| Q203 | 5613-RN1203 | RN1203 |
| Q204 | 5613-RN1203 | RN1203 |
| Q205 | 5613-RN1203 | RN1203 |
| Q206 | 5613-RN1203 | RN1203 |
| Q207 | 5613-RN1203 | RN1203 |
| Q208 | 5613-RN1203 | RN1203 |
| Q251 | 5613-3246(H) | 2SC3246(H) |
| Q252 | 5611-1115(F) | 2SA1115(F) or (E) |
| Q253 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q254 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q501 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q502 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q503 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q504 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q505 | 5613-2603(F) | 2SC2603(F) or (E) |
| Q701 | 5613-1845(E) | 2SC1845(E) |
| Q702 | 5613-1845(E) | 2SC1845(E) |
| Q703 | 5613-1845(E) | 2SC1845(E) |
| Q704 | 5613-1845(E) | 2SC1845(E) |
| Q705 | 5613-2603(F) | 2SC2603(E) |
| Q706 | 5613-2603(F) | 2SC2603(E) |
| Q707 | 5613-2603(F) | 2SC2603(E) |
| Q708 | 5613-2603(F) | 2SC2603(E) |
| 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 | 5611-1115(F) | 2SA1115(F) |
| Q714 | 5613-RN1203 | RN1203 |
| Q801 | 5613-RN1203 | RN1203 |
| Q802 | 5611-RN2203 | RN2203 |
| Q803 | 5611-970(BL) | 2SA970(BL) |
| Q804 | 5613-RN1203 | RN1203 |
| Q805 | 5611-RN2203 | RN2203 |
| Q806 | 5613-2603(F) | 2SC2603(F) |
| Q807 | 5612-561(C) | 2SB561(C) |
| Q808 | 5613-RN1203 | RN1203 |
| Q809 | 5612-561(C) | 2SB561(C) |
| Q810 | 5612-561(C) | 2SB561(C) |
| Q811 | 5611-RN2203 | RN2203 |
| 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 |
| D51 | 5636-MC921 | MC921 |
| D52 | 5635-RD12EB2 | ZD, RD12EB2 |
| D53 | 5631-1S2473 | 1S2473 |
| D101 | 5635-HZ11B2L | ZD, HZ11B2L |
| D201 | 5631-1S2473 | 1S2473 |
| D202 | 5631-1S2473 | 1S2473 |
| D251 | 5631-1S2473 | 1S2473 |
| D701 | 5631-1S2473 | 1S2473 |
| D702 | 5631-1S2473 | 1S2473 |
| D703 | 5631-1S2473 | 1S2473 |
| D704 | 5636-1S2471 | 1S2471 |
| D705 | 5635-2R7EB2 | ZD, RD2.7EB2 |
| D706 | 5631-1S2473 | 1S2473 |
| D707 | 5631-1S2473 | 1S2473 |
| D708 | 5631-1S2473 | 1S2473 |
| D709 | 5631-1S2473 | 1S2473 |
| D710 | 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 |

| Ref. No. | Part No. | Description |
|---|----------------------|-----------------------------------|
| D806 | 5632-S5566B | S5566B |
| D807 | 5632-S5566B | S5566B |
| D808 | 5632-S5566B | S5566B |
| D809 | 5631-1S2473 | 1S2473 |
| D810 | 5631-1S2473 | 1S2473 |
| D811 | 5631-1S2473 | 1S2473 |
| D812 | 5631-1S2473 | 1S2473 |
| | COILS | |
| L101 | 5995-363156 | 36mH |
| L102 | 5995-363156 | 36mH |
| L201 | 5932-70223 | 3.3mH |
| L202 | 5932-70223 | 3.3mH |
| L203 | 5932-00224 | |
| L204 | 5932-00224 | |
| | MISCELLANEOUS | |
| LC501 | 5214-74 | LC Components |
| LC502 | 5214-74 | LC Components |
| OS101 | 6171-1505 | Bias Osc. |
| J351, | 4484-45 | 4-Pin Jack, Input, Output |
| J352, | | |
| J353, | | |
| J354 | | |
| LCN201 | 4163-08220029 | CLW, 8 Pos. |
| LCN202 | 4163-08150029 | CLW, 8 Pos. |
| CN103 | 4443-050185 | Connector, 5 Pos. |
| CN104 | 4443-050185 | Connector, 5 Pos. |
| CN105 | 4443-030185 | Connector, 3 Pos. |
| CN106 | 4443-030185 | Connector, 3 Pos. |
| CN107 | 4443-080185 | Connector, 8 Pos. |
| CN108 | 4443-030185 | Connector, 3 Pos. |
| CN111 | 4443-030185 | Connector, 3 Pos. |
| CN301 | 4443-030185 | Connector, 3 Pos. |
| CN302 | 4443-030185 | Connector, 3 Pos. |
| | 2132-7048 | Spacer, R12 |
| | 4472-0131 | Fuse Holder EW |
| PCB-2 FUNCTION SWITCH PC BOARD | | |
| | MISCELLANEOUS | |
| MR801 | 5193-DM106A | Magnet Resistor |
| S201 | 4431-04087171 | Push Switch, LN |
| S202 | 4431-04087171 | Push Switch, CrO ₂ |
| S203 | 4431-04087171 | Push Switch, Metal |
| S501 | 4431-04087171 | Push Switch, Dolby NR |
| 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 |
| PCB-3 VR PC BOARD | | |
| VR353 | 5113-10471158 | Control, 10kΩMN, Input |
| VR354 | | Balance |
| S503 | 4431-A027336 | Push Switch, MPX Filter |
| PCB-4 INPUT LEVEL CONTROL PC BOARD | | |
| VR351, | 5224-503719 | Control, 50kΩA, Input |
| VR352 | | Level |
| PCB-5 POWER SWITCH PC BOARD | | |
| △ C1 | 5361-1030419 | 0.01μF/AC 125V, CC |
| △ C1 | 5352-1030958 | U A 0.01μF/AC 250V, MPC |
| △ S1 | 4431-A01056 | EW Push Switch, Power |
| PCB-6 DOLBY NR IND. PC BOARD | | |
| D402 | 5637-GL9PG19 | LED, GL9PG19, Green, Dolby NR |

| Ref. No. | Part No. | Description |
|---|-------------|------------------------------|
| PCB-7 REC/PAUSE IND. P.C. BOARD | | |
| D403 | 5637-GL9PR9 | LED, GL9PR9, Red, REC |
| D404 | 5637-GL9HY9 | LED, GL9HY9, Amber, Pause |
| PCB-8 POWER IND. P.C. BOARD | | |
| D405 | 5637-GL5HD5 | LED, GL5HD5, Red, Power |
| PCB-9 HEADPHONES JACK P.C. BOARD | | |
| J301 | 4451-00159 | Jack, Headphones |

KEY TO ABBREVIATIONS

- FR : Fuse Resistor
- MR : Metal Resistor
- CR : Cement 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

- 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.

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