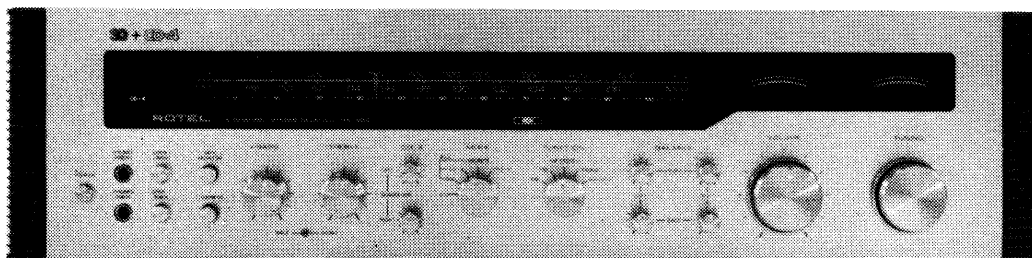


# ROTEL®

## RX-254

4-CHANNEL STEREO RECEIVER



### TABLE OF CONTENTS

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# TECHNICAL MANUAL

## PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.
3. Replacement for output and driver transistors, if necessary, must be made from the same beta group as the original type.
4. If one output transistor burns out (open or short), always remove all output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohm-meter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.
5. When mounting a replacement power transistor, be sure the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, for they may cause transistors failure.
6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

## MAIN AMPLIFIER ADJUSTMENT

- A. DC Balance Adjustment (adjust at 4-ch. driven mode)
  1. Set MODE SWITCH to DISCRETE, TAPE MONITOR SWITCH to SOURCE and FUNC. SELECTOR to AUX 4-CH positions.
  2. Connect 8-ohm 20W resistor dummy-load across each of Front and Back (Left and Right) speaker terminals, and connect an oscilloscope to Front-Left channel in parallel.
  3. Connect\* an audio signal generator to AUX terminal and apply 1000Hz (sine wave) signals. (\*Connect so that signals are applied simultaneously to each AUX terminal.)
  4. Connect power cord and rotate Volume Control fully clockwise. Adjust generator output until sine wave on oscilloscope just starts clipping. (See Figure 1)
  5. Adjust potentiometer VR901 for equal clipping at the top and bottom of sine wave on oscilloscope.
  6. Reconnect oscilloscope to Front-Right channel and repeat the adjustment as step 5 above with VR903. Also with each Back channel, repeat the same adjustment as step 5 with VR905 and VR907.
- B. Bias (Idling Current) Adjustment [no signal input]
  1. Set Volume Control to minimum position (rotate fully counterclockwise).
  2. Connect plus lead of DC milli-volt meter to Test Point P and minus lead to chassis ground. (See Figure 2). Rotate Potentiometer VR902 to obtain a 7.5mV reading on DC milli-volt meter.
  3. Repeat step 2 above for Front-Right channel and each of Back channels with VR904, VR906 and VR908.

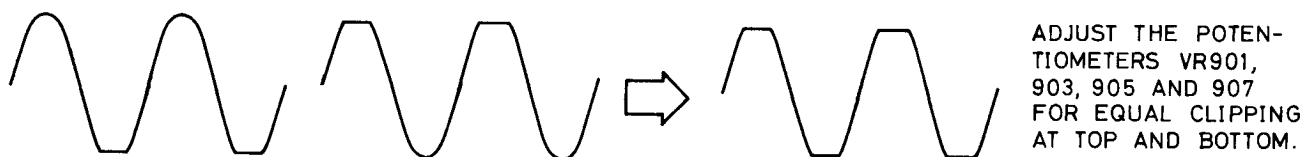


Figure 1. DC BALANCE WAVEFORMS

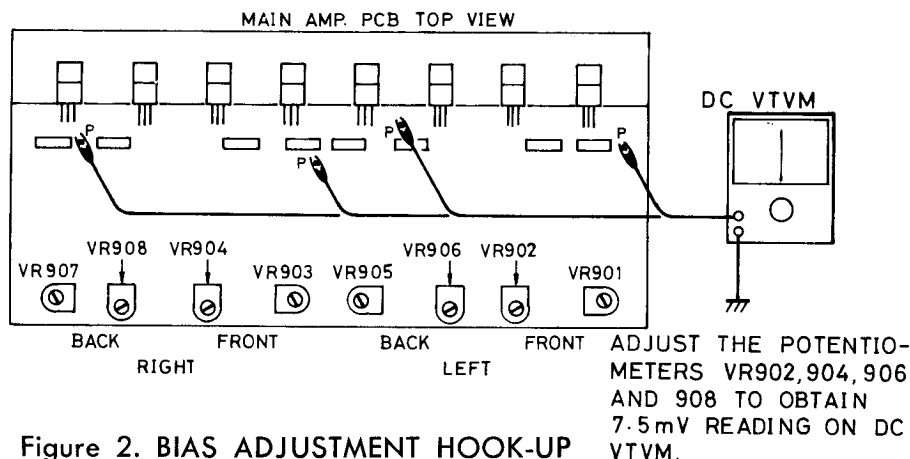


Figure 2. BIAS ADJUSTMENT HOOK-UP

# AM ALIGNMENT PROCEDURE

**Instruments:** AM Signal Generator, AC VTVM and Oscilloscope.

Set Function Selector Switch to AM position.

Set VR101 (on IF Board) to mid-position before starting this procedure.

**NOTE:** Input signal must be kept as low as possible to avoid AVC action.

| Step | Generator                                                                                                               |                          | Tuning Dial Setting                  | Output Indicator Connected to                   | Adjust                                  | Adjust for               |
|------|-------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------|-------------------------------------------------|-----------------------------------------|--------------------------|
|      | Coupling                                                                                                                | Frequency                |                                      |                                                 |                                         |                          |
| 1    | Q102 Base (on IF board ... Pin No.3 ) Through a 0.01 mfd capacitor.                                                     | 455KHz (400Hz 30% Mod.)  | Non interfering at low end of scale. | AC VTVM to TAPE OUT jack (Front L-ch. or R-ch.) | L102, 103 and 104 (on IF board)         | Maximum reading on VTVM. |
| 2    | Loop Antenna (see Fig. 3)                                                                                               | 600KHz (400Hz 30% Mod.)  | 600KHz                               |                                                 | L101 (OSC) (on IF board) and L001 (ANT) |                          |
| 3    |                                                                                                                         | 1400KHz (400Hz 30% Mod.) | 1400KHz                              |                                                 | CT5 (OSC) and CT4 (ANT) (on Front end)  |                          |
| 4    | Repeat steps 2 and 3 until no further improvement is noticed.                                                           |                          |                                      |                                                 |                                         |                          |
| 5    | Same as Step 2 above: Adjust Signal Generator output so that input level of AM Antenna terminal comes to 100 $\mu$ V/m. | 1000KHz (400Hz 30% Mod.) | 1000KHz                              | Same as Step 1 above.                           | VR101                                   | Same as Step 1 above.    |

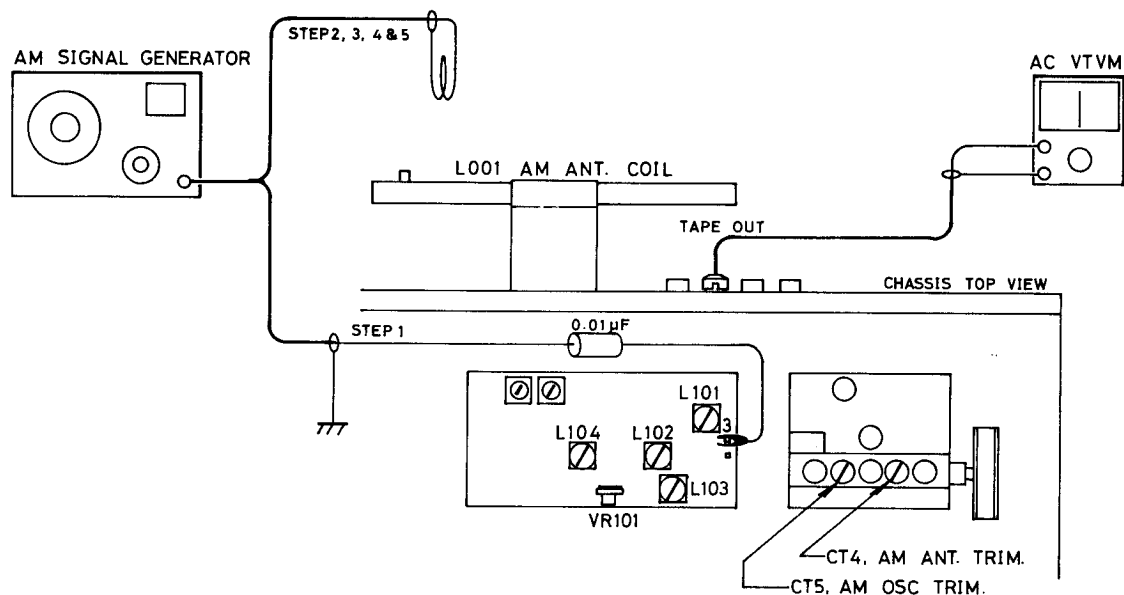


Figure 3. AM IF AND RF ALIGNMENT HOOK-UP

# FM IF & RF ALIGNMENT PROCEDURE

**Instruments:** FM Signal Generator, Oscilloscope and H.D. Analyzer

- Set Function Selector to FM position.
- Connect FM Signal Generator (FMSG) to FM Antenna Terminals.
- Connect Oscilloscope and H.D. Analyzer to Tape Out (Front) jack.

## A. FM IF Alignment

1. Rotate the tuning knob of the receiver to a point where there is no signal, and adjust FM IFT, L106 (on IF board) so that the pointer of FM Tuning Meter deflects to the center (zero point).
  2. Set frequency of FMSG at 98MHz (400Hz, 100% modulated) and while receiving FMSG signals, rotate the tuning knob so the FM Tuning Meter indicates zero point. (At this condition, output level of the receiver is not necessarily maximum.)  
Next, adjust IFT T1 of Front-end so that output level of the receiver is maximum.
  3. Adjust FM IFT L105 to obtain minimum reading on H.D. Analyzer.
- If indication at FM Tuning Meter is off zero point due to this alignment, slightly adjust IFT L106 for zero point.

## B. FM RF Alignment

1. Set frequency of FMSG at 106MHz and tune the receiver to 106MHz reading.

2. Adjust FM OSC trimmer CT3 of Front-end to obtain maximum Output at 106MHz.
  3. Set frequency of FMSG at 90MHz. Then tune the receiver and make certain that signals of FMSG can be received at  $90\text{MHz} \pm 150\text{KHz}$  reading on the dial scale.
  4. Reset frequency of FMSG at 106MHz and tune the receiver to 106MHz reading again, then adjust FM RF and Antenna trimmers (CT2 and CT1) to obtain maximum sensitivity.
- If there is a large difference between sensitivities at 106MHz and 90MHz, readjust trimmers slightly to balance them.

**Caution:** Center frequencies of bandpass filters (X101 and X102) are divided into five groups, so be sure to use those consisting of the same frequencies. The frequencies are classified as the table below and identified with color dots marked on filter head.

| COLOR  | CENTER FREQ. | TOLERANCE          |
|--------|--------------|--------------------|
| Red    | 10.70MHz     | $\pm 30\text{KHz}$ |
| Blue   | 10.67MHz     | $\pm 30\text{KHz}$ |
| Orange | 10.73MHz     | $\pm 30\text{KHz}$ |
| Black  | 10.64MHz     | $\pm 30\text{KHz}$ |
| White  | 10.76MHz     | $\pm 30\text{KHz}$ |

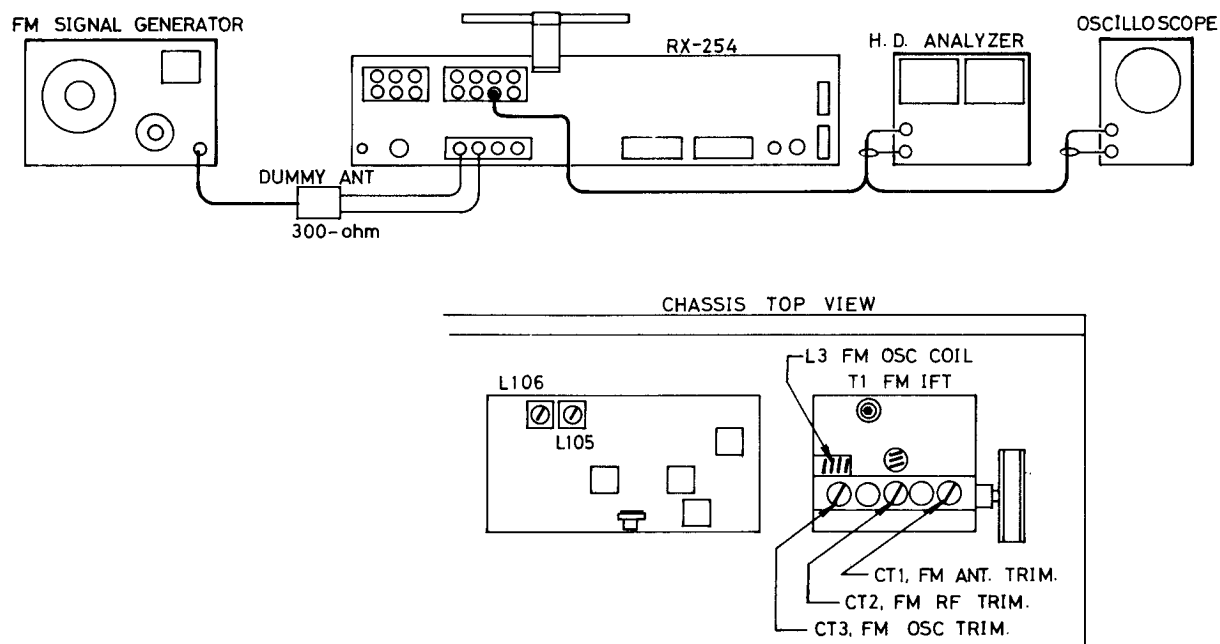


Figure 4. FM IF AND RF ALIGNMENT HOOK-UP

# FM MPX ALIGNMENT PROCEDURE

**NOTE:** The FM IF Alignment must be completed before attempting this FM—MPX Alignment.

Poor IF alignment will result in poor FM—MPX Alignment.

Set Function Selector Switch to FM STEREO.

Connect FM Stereo Generator to FM antenna terminals.

Set Separation Adj. VR301 (on MPX board) to mid-position before starting this procedure.

| Step | Stereo Generator                                              |                         | Output Indicator<br>Connected to                        | Adjust     | Adjust for                                        |
|------|---------------------------------------------------------------|-------------------------|---------------------------------------------------------|------------|---------------------------------------------------|
|      | Modulation                                                    | RF Deviation            |                                                         |            |                                                   |
| 1    | 19 KHz<br>Pilot only                                          | 1 – 2%                  | VTVM &<br>Oscilloscope to<br>Test Point<br>(See Fig. 5) | L302, L303 | Maximum reading<br>on VTVM.                       |
| 2    | Composite<br>1 KHz signal<br>to Left chan-<br>nel only.       | Pilot 10%<br>Signal 70% | VTVM & Oscillo-<br>scope to Front<br>Tape Out (L-ch.)   | L302       | Maximum and<br>undistorted sine<br>wave on scope. |
| 3    | Composite<br>1 KHz signal<br>to Right<br>channel only.        |                         |                                                         | VR301      | Minimum reading<br>on VTVM.                       |
| 4    | Same as in<br>Step 2                                          |                         | VTVM & Oscillo-<br>scope to Front<br>Tape Out (R-ch.)   |            |                                                   |
| 5    | Repeat steps 3 and 4 until no further improvement is noticed. |                         |                                                         |            |                                                   |

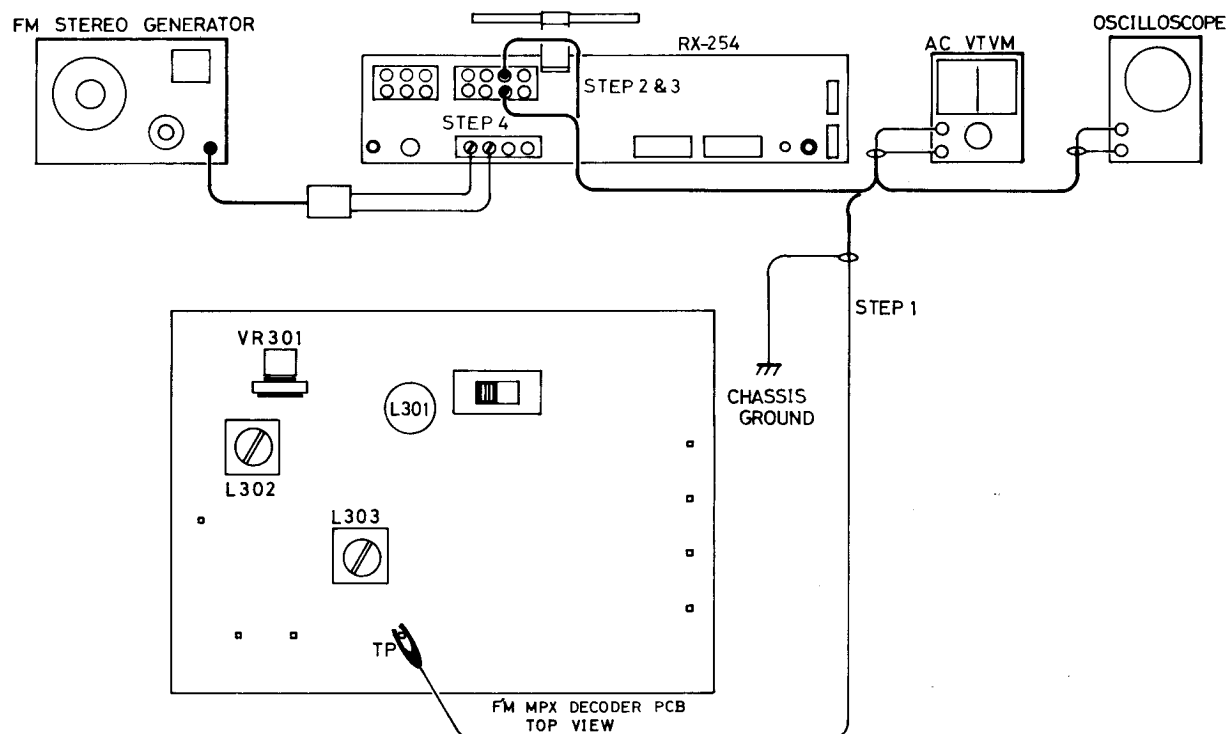


Figure 5. FM MPX DECODER ALIGNMENT HOOK-UP

# SQ MATRIX DECODER CHECKING METHOD

**Instruments:** Audio Generator Oscilloscope and AC VTVM.

Set TONE & BALANCE Controls to mid-position and VOLUME Control to maximum.

Set SQ DECODER switch to ON and SELECTOR switch to AUX position.

Turn speaker switch ON.

1. Connect 8-ohm, 20 watts load resistor to each output terminal of Front-Right, Front-Left, Back-Right and Back-Left channels.
2. Connect Oscilloscope and AC VTVM to Front-Left output terminal in parallel with load resistor.
3. Connect Audio Generator to Front-Left AUX terminal and apply 1000Hz (sine wave) frequencies.
4. Turn POWER switch ON and adjust Audio Generator until amplifier output comes to 0.775V (0 dB).
5. Measure the output level reading on AC VTVM at each terminal when connecting AC VTVM to output terminals of Front-Right, Back-Left and Back-Right channels successively under the same input. Each output being checked can be determined to be normal if the result of each output difference with respect to Front-Left output of 0.775V (0 dB) satisfies the following conditions.
  - a. Front-Right channel output — -13dB
  - b. Back-Right channel output — -5 ~ -6dB
  - c. Back-Left channel output — -5 ~ -6dB

6. Connect Audio Generator to Front-Right AUX terminal and adjust Audio Generator until Front-Right channel output comes to 0.775V (0 dB).

(Connect Oscilloscope and AC VTVM to Front-Right output terminal).

7. Measure the output level reading on AC VTVM at each terminal when connecting AC VTVM to output terminals of Front-Left, Back-Left and Back-Right channels successively under the same input. Each output being checked can be determined to be normal if the result of each output difference with respect to Front-Right output of 0.775V (0 dB) satisfies the following conditions.
  - a. Front-Left channel output — -13dB
  - b. Back-Left channel output — -5 ~ -6dB
  - c. Back-Right channel output — -5 ~ -6dB
8. Measure amplifier output when applying Audio Generator output to AUX Front terminal of Left and Right channels simultaneously. Output difference between Front and Back channels should be within the range of —5 —6dB and output difference between Back-Left and Back-Right channels should be within 2dB.
9. Check the frequency characteristic of each channel under the same input as that of step 8.  
When switching the frequency on Audio Generator from 1000Hz to 100Hz, then 10KHz, the output level on amplifier for the respective frequency should be within the range of  $\pm 2$ dB at each channel.

## CD-4 DEMODULATOR CHECKING METHOD AND ALIGNMENT PROCEDURE

### A. Instruments:

1. Audio Generator: from 20Hz to 50KHz, capable of oscillation
2. FM Signal Generator for CD-4: can use CD-4 test record in place
3. Oscilloscope: input impedance of 500K $\Omega$  or more, frequency bandwidth of 100KHz or more from DC
4. AC VTVM: input impedance 1M $\Omega$ , capable of reading -60dB
5. Attenuator: frequency bandwidth — 100KHz or more
6. Test Record: RG - 1256/1257

### B. Test Record Specifications

RG1256 (33 1/3 rpm.)

- |        |                                                                                                                                               |                                                                                         |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Band 1 | CH-1 warble tone                                                                                                                              | } warble tone on every channel, usable for adjustment and checking of channel crosstalk |
| Band 2 | CH-2 warble tone                                                                                                                              |                                                                                         |
| Band 3 | CH-3 warble tone                                                                                                                              |                                                                                         |
| Band 4 | CH-4 warble tone                                                                                                                              |                                                                                         |
| Band 5 | channel identification, announce channel and 700Hz signals repeatedly from CH-1 to CH-4 in that order, usable for identification of channels. |                                                                                         |

- Band 6 CH-1 + CH-3, 700Hz, identification of center of Front Channels
- Band 7 CH-2 + CH-4, 700Hz, identification of center of Back channels
- Band 8 difference signal 700Hz, a reference signal (zero VU) symmetrical in right and left channels, for setting of expander input level.
- Band 9 30KHz non-modulation carrier, for checking demodulation circuit operation.

RG1257(33 1/3 rpm.)

- |                                                                                                                     |                                                                          |                                                            |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------|
| Band 1                                                                                                              | CH-1 + CH-3 frequency spot                                               | } signal for checking outline of frequency characteristics |
| Band 2                                                                                                              | CH-2 + CH-4 frequency spot                                               |                                                            |
| spot frequencies are as follows:                                                                                    |                                                                          |                                                            |
| 1KHz, Break, 12KHz, 10KHz, 8KHz, 6KHz, 4KHz, 2KHz, Break, 1KHz, 700Hz, 400Hz, 200Hz, Break, 100Hz, 70Hz, 50Hz, 30Hz |                                                                          |                                                            |
| Band 3                                                                                                              | difference signal 700Hz, reference signal (0VU) same as Band 8 in RG1256 |                                                            |
| Band 4                                                                                                              | difference signal 400Hz, 4KHz modulation (L+R)                           | } used for testing 30KHz carrier level                     |
| Band 5                                                                                                              | difference signal 400Hz, 8KHz modulation (L+R)                           |                                                            |

### C. 1/2 Equalizer Characteristic Checking

#### 1. By Audio Generator

- Connect Audio Generator output to phono input terminal and apply -55dBm signal.
- Measure by connecting AC VTVM to Pin3 (R-ch. Pin4) of equalizer amp. PCB. Typical values are shown in the table below.

0dBm = 0.775V

| 100Hz | 1KHz  | 10KHz | 30KHz |
|-------|-------|-------|-------|
| 8dBm  | 22dBm | 23dBm | 27dBm |

#### 2. By Test Record

- Use Band 1 or 2 of test record RG1257 and Band 9 of RG1256.

- Use CD-4 discrete type cartridge (preferable with Shibata stylus).
- Measure by connecting AC VTVM to Pin9 of equalizer amp. PCB except for 30KHz which is measured with Pin3 (R-ch. Pin4) resulting in a large error.

| 100Hz | 1KHz  | 10KHz | 30KHz |
|-------|-------|-------|-------|
| 5dBm  | 19dBm | 20dBm | 22dBm |

Note: In test record procedure, there are some errors in values measured depending on cartridges used. Errors are especially large in values measured at 10KHz and 30KHz.

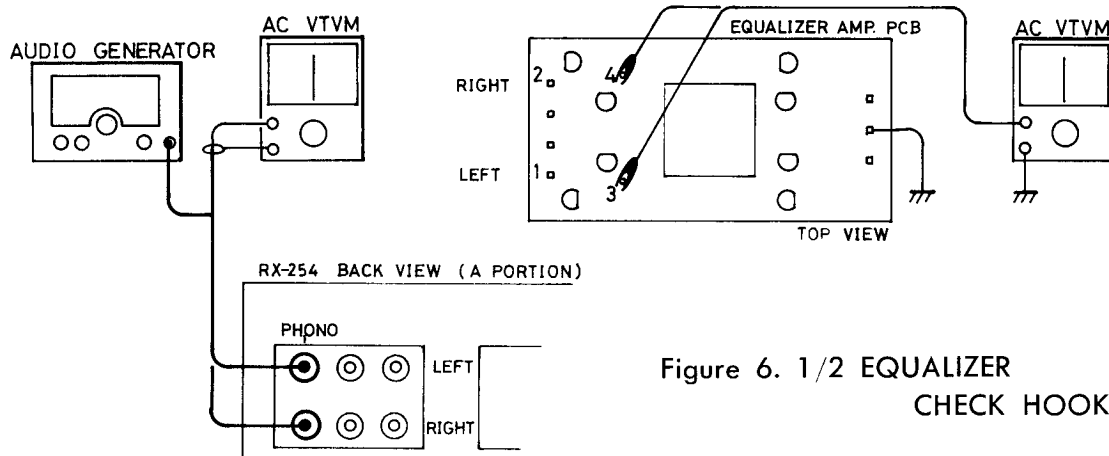


Figure 6. 1/2 EQUALIZER CHECK HOOK-UP

### D. 2/2 Equalizer Characteristic Checking

#### 1. By Audio Generator

- Connect Audio Generator output to Pin3 of equalizer amp. PCB and apply -25dBm signal.
- Measure by connecting AC VTVM to Pin11 (R-ch. Pin12) of equalizer amp. output terminal. Typical values are shown in the table below.

0dBm = 0.775V

| 100Hz | 1KHz  | 10KHz  |
|-------|-------|--------|
| -7dBm | -8dBm | -21dBm |

\* Set CD-4 separation VR to maximum (full clockwise)

#### 2. By Test Record

This procedure requires that 1/2 equalizer should be checked beforehand since it is required to be normal at any time. Test records are the same as those used in item C2.

- Measure by connecting AC VTVM to Pin11 (R-ch. Pin12) of equalizer amp. output. Set CD-4 separation to maximum.

0dBm = 0.775V

| 100Hz | 1KHz | 10KHz |
|-------|------|-------|
| 6dBm  | 3dBm | -8dBm |

Note: Since there are differences in values measured, depending upon cartridges used, check deflection at 100Hz and 10KHz for 1KHz.

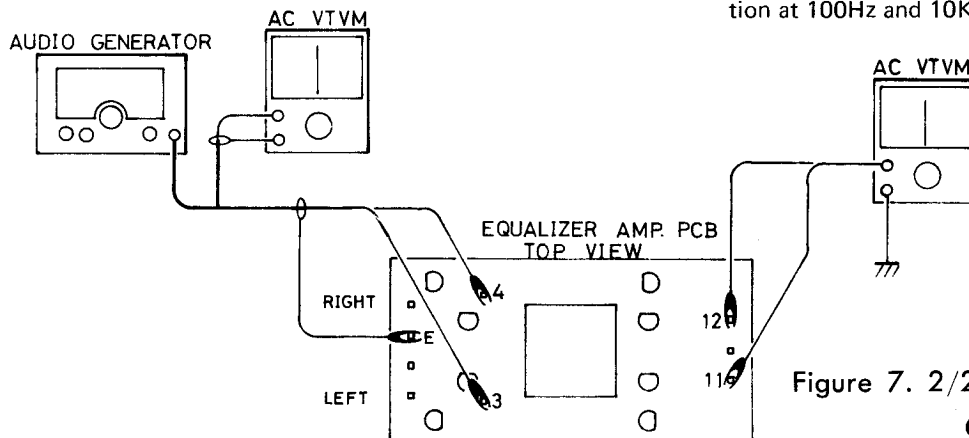


Figure 7. 2/2 EQUALIZER CHECK HOOK-UP

## E. Demodulation Circuit Checking and Alignment

1. Demodulation Circuit Checking is made by checking waveforms in each section with the 30KHz signal applying to it. Figure 8 shows waveforms in each section

when applying 30KHz of -50dBm to phono input terminal. The above is almost the same as in case of performing test record RG1256 Band 9.

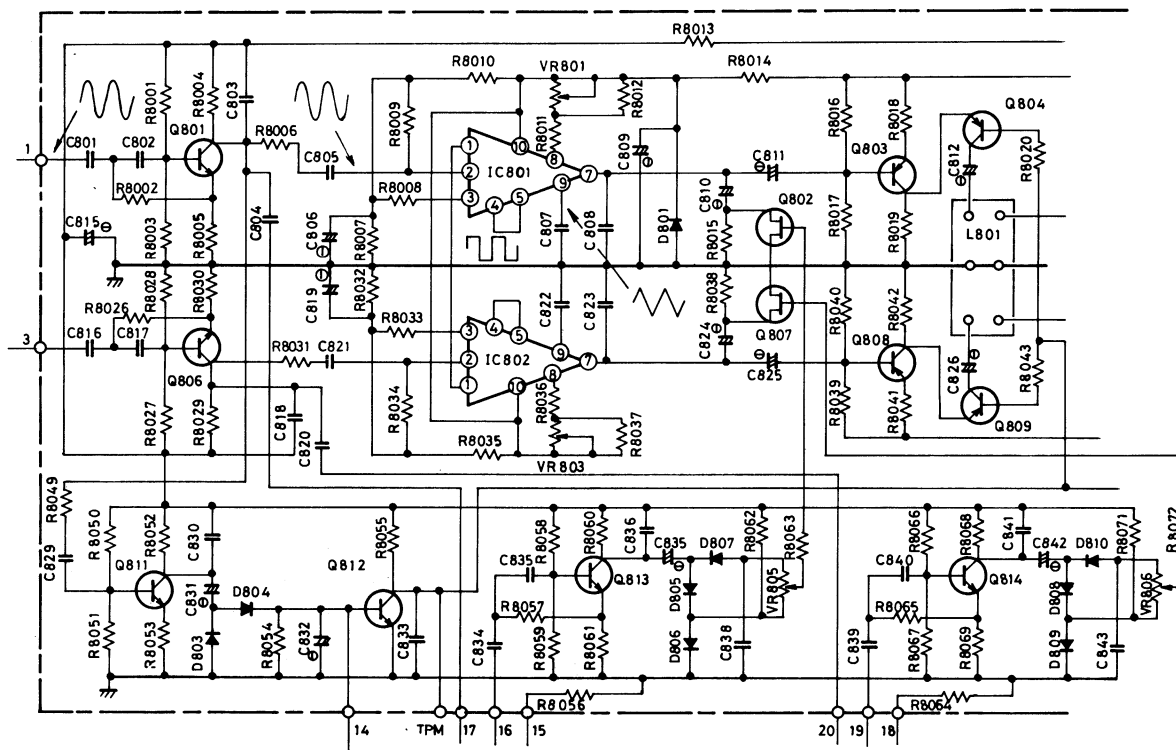


Figure 8. CD-4 DEMODULATOR CIRCUIT DIAGRAM

2. VCO (Voltage Controlled Oscillator) Frequency Alignment

Free-running oscillation frequency of VCO should be properly adjusted to 30KHz. Therefore, readjustment should be made when IC and nearby circuits are serviced.

- a. Connect Audio Generator output to input terminal (Pin1 and 3) of sub-channel and apply exact 30KHz signal. Set input level from -60dBm to 65 dBm.

- b. Connect oscilloscope to test point TP1 (R-ch. TP2) and adjust for zero beat by rotating VR801(R-ch. 803) observing beats on oscilloscope. (See Figure 9) TPM is required to have been grounded before this adjustment.

Input signal is desirable to be applied to both channels simultaneously.

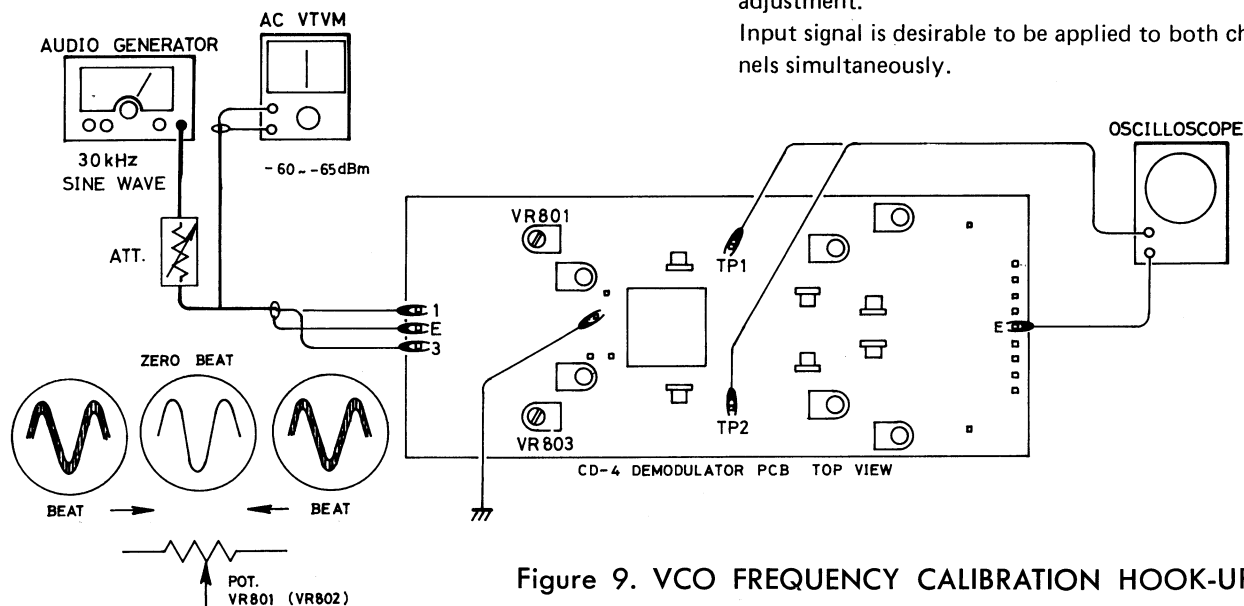


Figure 9. VCO FREQUENCY CALIBRATION HOOK-UP



## F. Lock Range Adjustment

### 1. Alignment by CD-4 FM Signal Generator

- Connect CD-4 FM signal generator output to input terminal 1 (R-ch. 3) of sub-channel and apply 30KHz FM signal (100Hz,  $\pm 10$ KHz deviation). Set applying level to -20dBm.
- Rotate carrier level control VR003 (at the rear panel) fully clockwise beforehand.
- Connect oscilloscope to test point TP1 (R-ch. TP2) and adjust VR805 (VR806) so that one or

two beards appear on sine waves by rotating it while observing sine waves. (See Figure 10-1)

- Make sure that the beard vanishes when input level is increased by 1dB. (= input level -19dBm)
- Align level control VR003 as follows by performing Band 5 in test record RG1257.

- Rotate VR003 counterclockwise to the point where one or two beards appear on sine waves, then put it back clockwise by one point. See Figure 10-1.

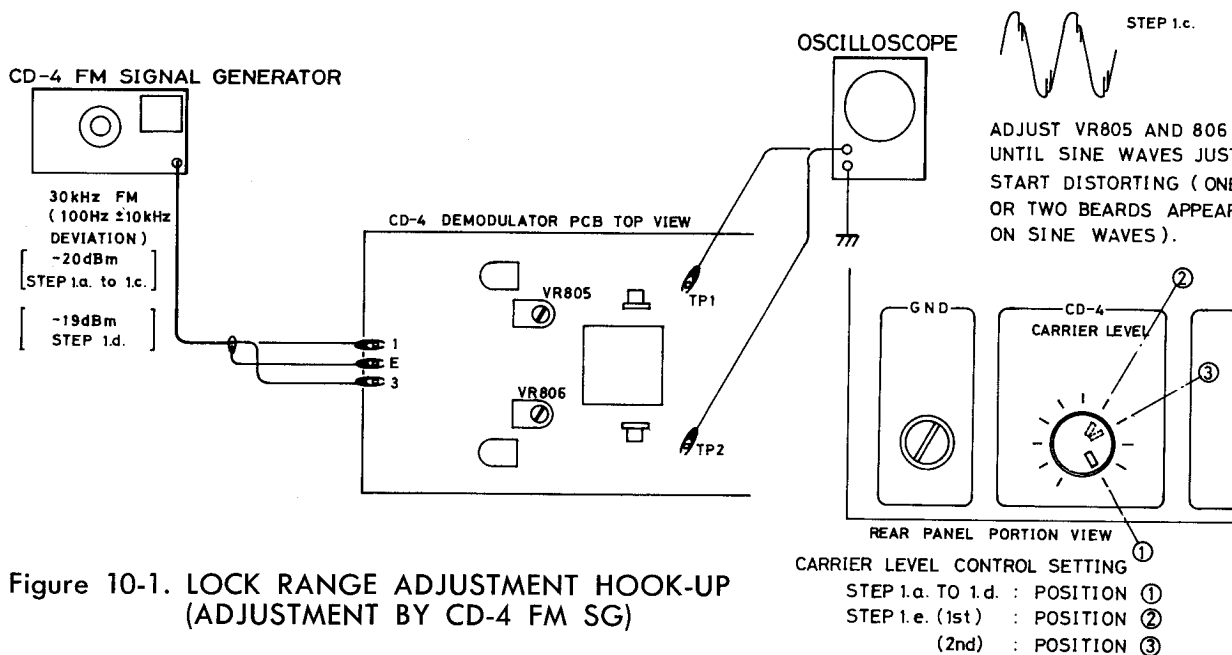


Figure 10-1. LOCK RANGE ADJUSTMENT HOOK-UP (ADJUSTMENT BY CD-4 FM SG)

### 2. Alignment by Test Record

- Rotate carrier level control VR003 fully clockwise, then put it back counterclockwise by 4 points in reading.
- Connect oscilloscope to test point TP1 (R-ch. TP2) and adjust VR805 (R-ch. VR806) so that one or two beards appear on sine waves (See Figure 10-2) by playing Band 5 of test record RG1257.

- Make sure that beards on sine waves just vanish if VR003 is rotated clockwise by one point during playing Band 5.
- Make sure that beards do not appear on sine waves during playing Band 4 (VR003 is in original position [a]).

#### CARRIER LEVEL CONTROL SETTING

- STEP 2.a. : POSITION ③  
STEP 2.c. : POSITION ②  
STEP 2.d. : POSITION ③

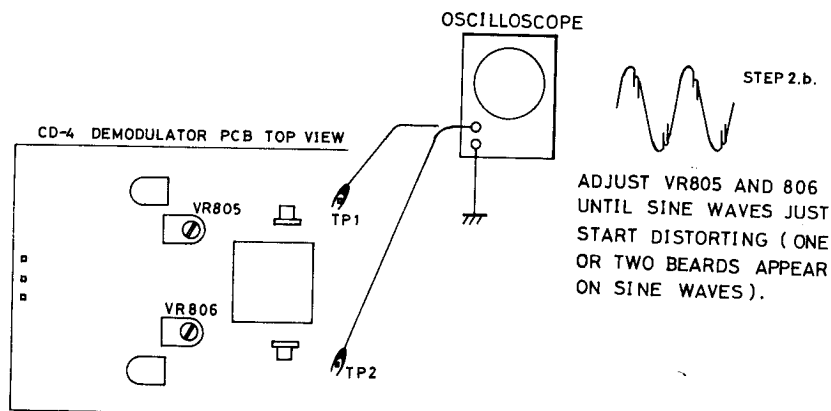
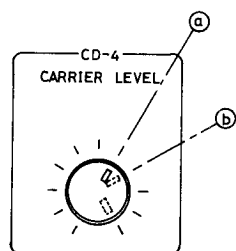


Figure 10-2. LOCK RANGE ADJUSTMENT BY TEST RECORD

## G. Expander Input Level Alignment

1. Alignment by CD-4 FM Signal Generator
  - a. Apply 30KHz FM signal (1KHz,  $\pm 1.3$ KHz Devi.) to sub-channel input. Set applying level to 200dBm. See Figure 11.
  - b. Connect AC VTVM to test point TP1 (R-ch. TP2) and adjust VR802 (R-ch. VR804) to obtain -15dBm on meter reading.

## 2. Alignment by Test Record

- a. Play Band 8 of test record RG1256. Use CD-4 cartridge, such as Rotel 4CR-1.
- b. Connect AC VTVM to test point TP1 (R-ch. TP2) and adjust VR802 (R-ch. VR804) so that the meter reading is -15dBm.

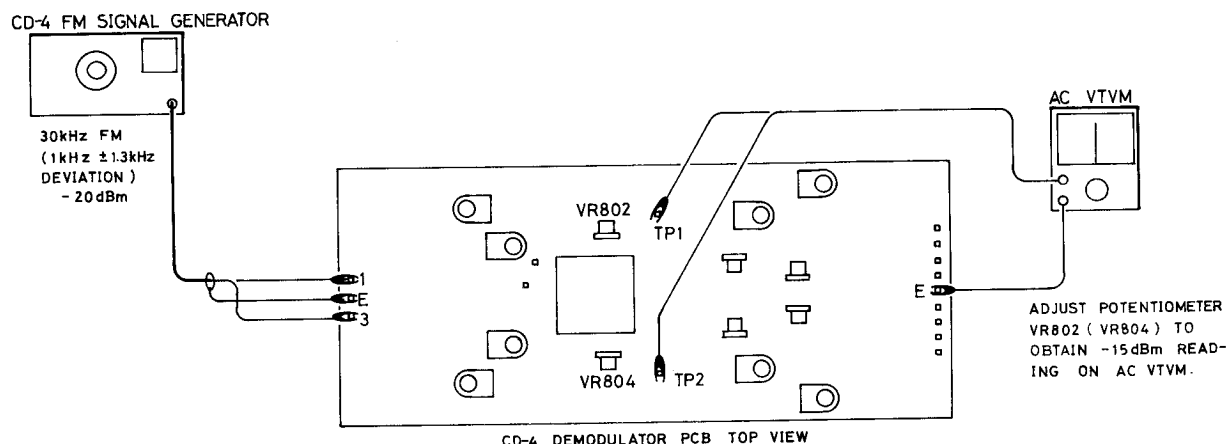


Figure 11. EXPANDER INPUT LEVEL ADJUSTMENT HOOK-UP

## H. Check and Alignment of Expander Characteristics.

1. Connect Audio Generator to test point TP1 (R-ch. TP2) and apply a designated signal. See Figure 12. Then make sure that output levels on TP3 (R-ch. TP4) are just as described in table below. Measure output level with AC VTVM.

| Input Signal Frequency | Input Level | Output Level         |
|------------------------|-------------|----------------------|
| high band 15KHz        | -15 dBm     | -10 dBm $\pm$ 3dB    |
|                        | -25 dBm     | -25.5 dBm            |
|                        | -40 dBm     | -49.5 dBm $\pm$ 3 dB |
| low band 600Hz         | -15 dBm     | -7 dBm $\pm$ 3 dB    |
|                        | -25 dBm     | -22.5 dBm            |
|                        | -35 dBm     | -39.5 dBm $\pm$ 3 dB |

2. Readjust according to following procedures only for channels in which the above values cannot be obtained.
  - a. Set input frequency at 15KHz and apply -25dBm signal. Adjust VR809 and 810 (R-ch. VR811 and 812) so that the output is minimized.
  - b. Adjust VR810 (R-ch. VR812) so that output increases by 0.5 dB.
  - c. Then adjust VR809 (R-ch. VR811) to obtain -25.5 dBm output.

- d. Make sure that values of output level coincide respectively with those of the above table when input levels are only varied to -15dBm and -40dBm with signal frequency leaving as it is.
- e. Set input frequency at 600Hz (input level is -25dBm) and adjust VR807 and 808 (R-ch. VR813 and 814) so that output is minimized.
- f. Adjust VR810 (R-ch. VR814) so that output increases by 0.5dB.
- g. Adjust VR807 (R-ch. VR813) so that output level is -22.5dBm.
- h. Make sure that values of output level coincide respectively with those of above table when input levels are only varied to -15dBm and -35dBm with signal frequency leaving as it is.

Note 1: If -25dBm input is not adjustable, the control amplifiers — Q810 or Q820(Q825 or Q823) etc. — may be faulty.

Note 2: If output values corresponding to input values do not vary as in table above, Q801 or Q802(Q826 or Q824) and bias circuits may be faulty.

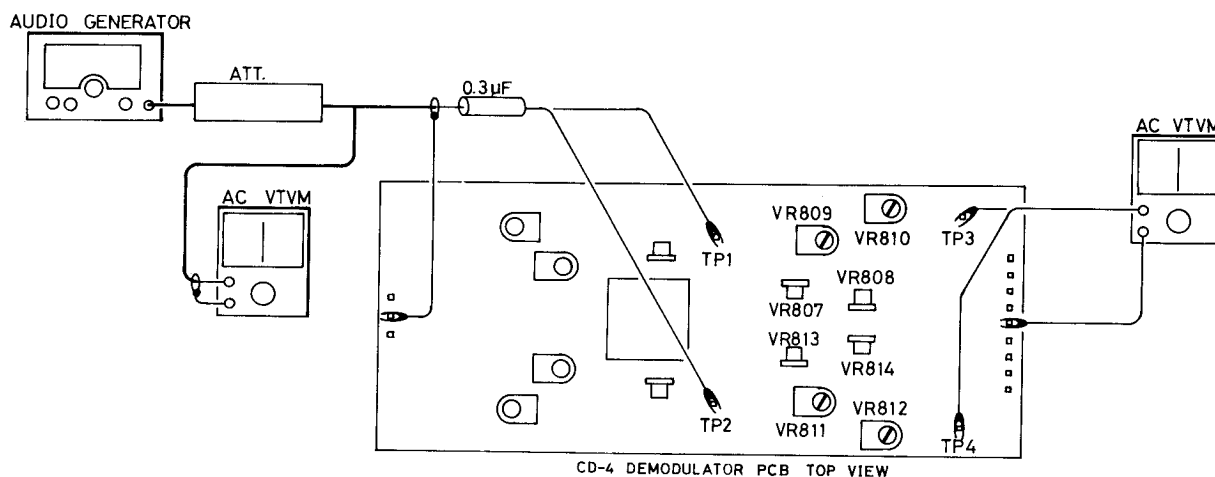
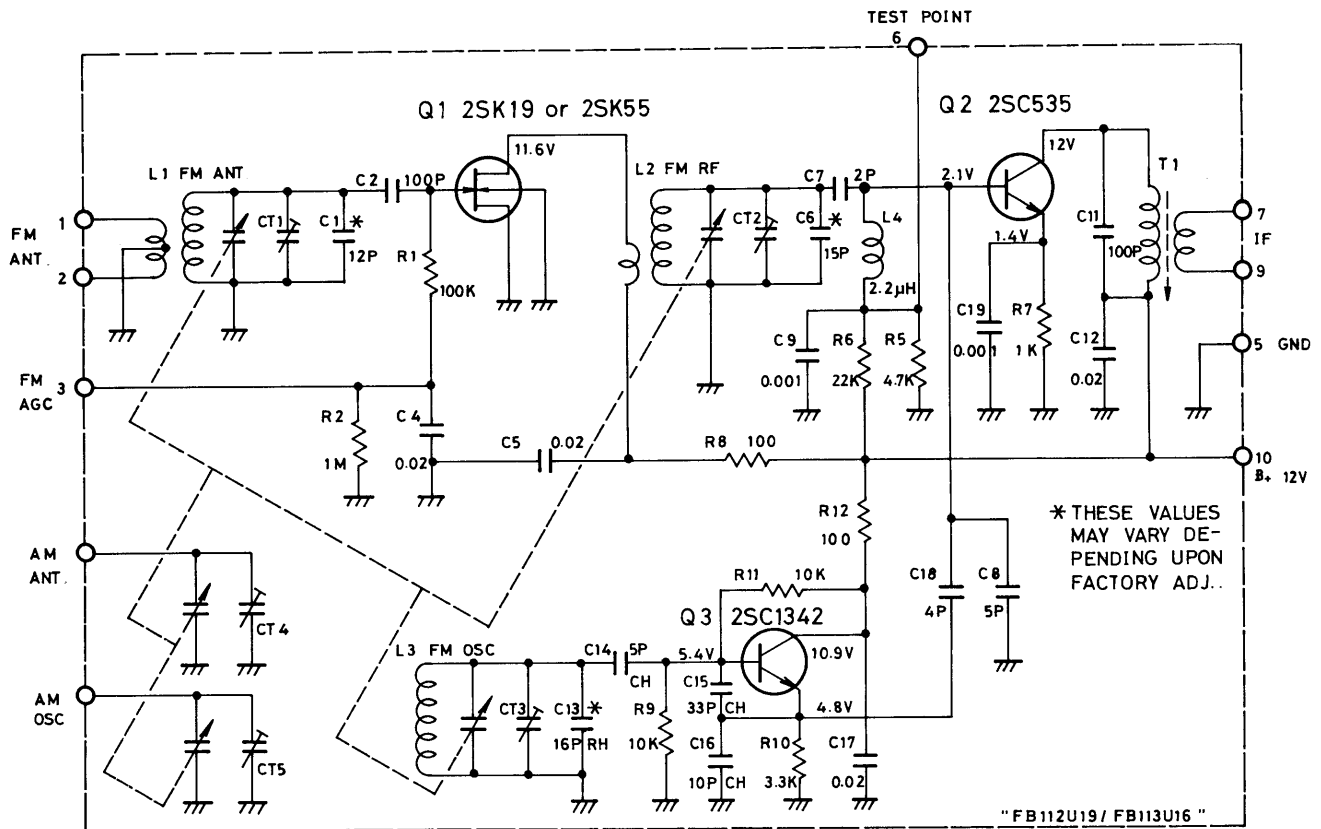


Figure 12. EXPANDER CHECK AND ALIGNMENT HOOK-UP

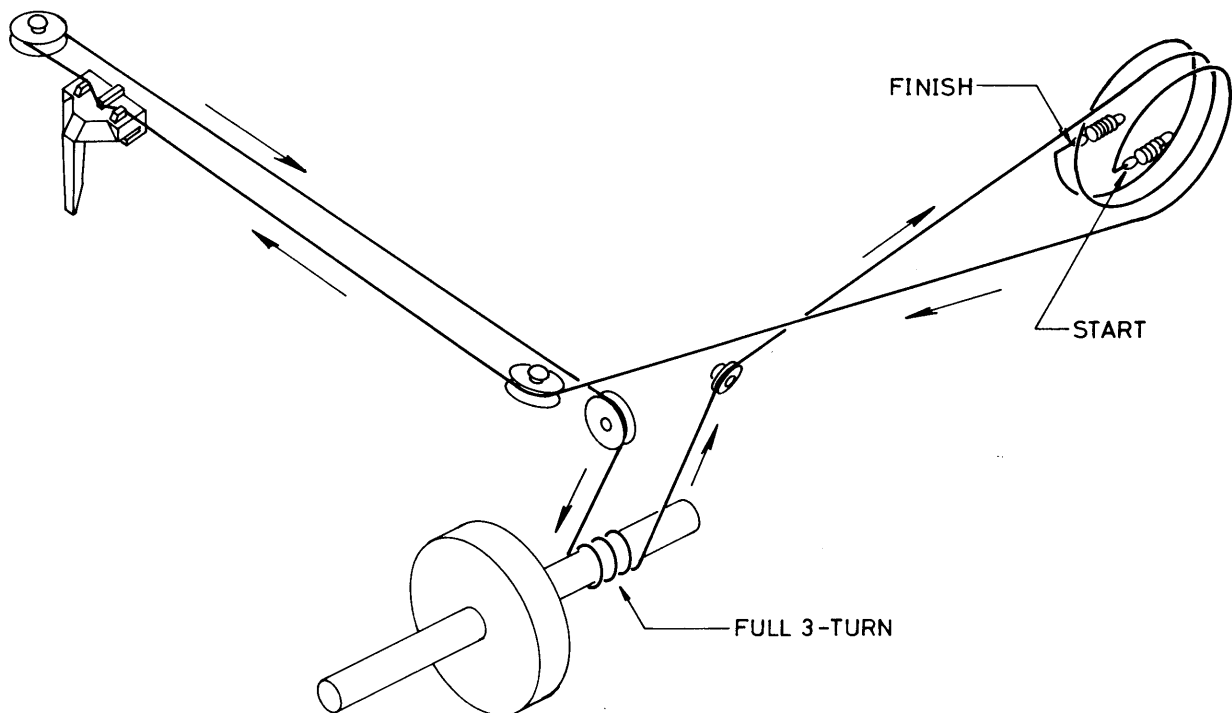
## TROUBLE SHOOTING

- I. Unit inoperative
  - A. If the pilot lamp does not light, check AC fuse, and
    1. If AC fuse is OK,
      - a. Primary winding of the Power Transformer may be broken, or
      - b. Power Switch may be faulty.
    2. If AC fuse is blown,
      - a. Primary or secondary winding of the Power Transformer may be shorted, or
      - b. Rectifier Circuit (e.g., power diodes or capacitors) may be faulty.
  - B. If DC fuse is OK, check to see if there is signal at the Input Terminal of Main Amp. PCB, and
    1. If there is signal, first stage of Main Amp. or Pre-drive Circuit (transistor or capacitor) may be faulty.
    2. If there is no signal,
      - a. Volume Control Amp. Circuit may be faulty, or
      - b. Tape Monitor Switch may be faulty, or
      - c. Connection of Function Selector Switch may be faulty.
- II. CD-4 Front channel and Back channel do not separate
  - A. CD-4 Indicator does light
    1. Check waveform, connecting Pin 9 of IC801 (802) to oscilloscope, and
      - a. If there is no triangular wave,
        - 1) IC801(802) may be faulty.
      - b. If there is triangular wave, check following items.
    2. Check if there is signal on TP1(TP2), and
      - a. If there is no signal,
        - 1) Loop Gain Control Circuit (FET, transistor or diode) may be faulty, or
        - 2) Q803(808) may be faulty, or
        - 3) transistor or diode in Muting Circuit may be faulty.
      - b. If there is signal, check to see following items.
    3. Check if there is signal on TP<sub>3</sub>(TP<sub>4</sub>), and
      - a. If there is no signal
        - 1) Q805 or 816 (Q810 or 827) may be faulty.
      - b. If there is signal
        - 1) Matrix Circuit may be faulty.
  - B. CD-4 Indicator does not light
    1. If there is no signal on Pin3(Pin4) of ½ Equalizer Amp. Output terminal,
      - a. Q201 or 202(Q203 or 204) may be faulty.
    2. If there is signal on Output signal
      - a. Q801(Q806) may be faulty.
  - C. If there is annoying sound,
    1. VCO oscillator frequency of Demodulator may be improper, or
    2. revolution of record player may be improper, or
    3. phono disc may be worn out.

# FRONT-END SCHEMATIC DIAGRAM



# DIAL STRINGING DIAGRAM



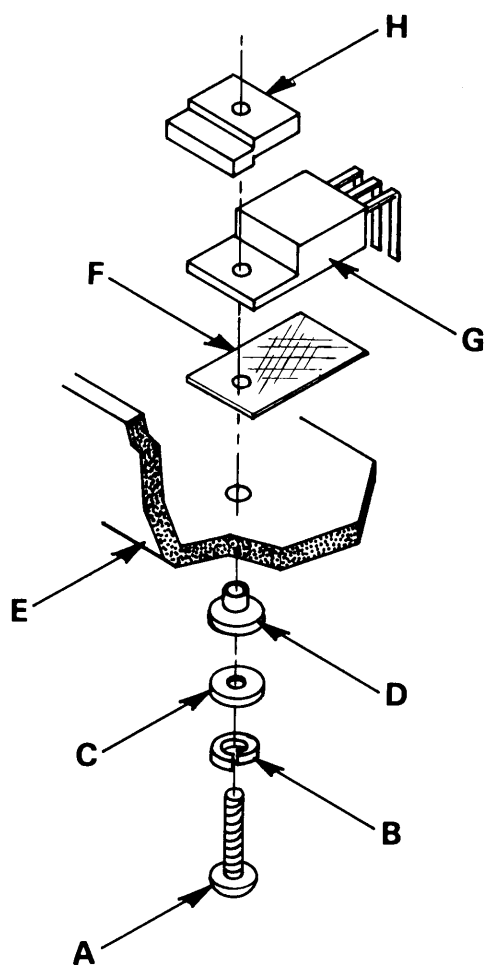
# INSTALLATION OF POWER TRANSISTOR

When changing power transistor, give much consideration to the following points.

1. When bending transistor's leg, do so at the mid-section of it as shown in figure B (1), adding no excessive force to a joint of the leg.  
Pulling the leg strongly towards axis, or moving the leg so that the joint of leg suffers strong stress upwards and downwards or right and left may result in damage of transistor.
2. When fixing power transistor on the Heat Sink, do it in correct way as shown in figure C (1).

Incorrect installation as shown in figure C (2) may cause above troubles by adding excessive force to the leg of transistor.

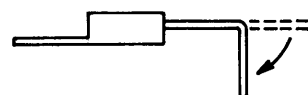
3. Power transistor is required to be fixed firmly on the Heat Sink. It is necessary to fasten screws securely by moderate force, because too much fastening of screws by extremely strong force may cause distortion on surface installed, and result in deterioration of power transistor.  
\* Fastening torque ..... from 4kg to 5kg is sufficient.
4. Watch for precautions from Nos.3 to 6.



|   |                        |   |                  |
|---|------------------------|---|------------------|
| A | Screw, $\oplus$ 3x12mm | E | Heat Sink        |
| B | Spring Washer, 3mm dia | F | Mica Film        |
| C | Washer, 3mm dia        | G | Power Transistor |
| D | Spacer (992001111)     | H | Nut (761911144)  |

Figure A. Transistor Installation Exploded View

(1) Desirable Bending



(2) Undesirable Bending

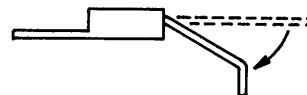


Figure B. Bending of Power Transistor Leg

(1) Correct Installation

(2) Incorrect Installation

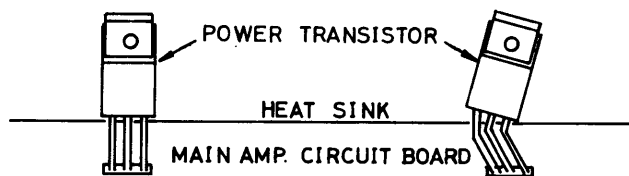


Figure C. Installation of Power Transistor

# REPAIR PARTS LIST

| Schematic Location            | Part No.  | Description                                                      |
|-------------------------------|-----------|------------------------------------------------------------------|
| <b>COILS and TRANSFORMERS</b> |           |                                                                  |
| L101                          | 223301124 | AM OSC Coil                                                      |
| L102,103                      | 225301125 | AM IFT, 1st and 2nd                                              |
| L104                          | 225301127 | AM IFT, 3rd                                                      |
| L105                          | 225501125 | FM IFT, Ratio (Pri.)                                             |
| L106                          | 225501126 | FM IFT, Ratio (Sec.)                                             |
| L201,801                      | 220401121 | Low Pass Filter                                                  |
| L301                          | 228641116 | MPX Coil, SCA Filter                                             |
| L302                          | 225601130 | MPX Coil, 19KHz Tune                                             |
| L303                          | 225601131 | MPX Coil, 38KHz Tune                                             |
| L601,002                      | 220001121 | RF Choke, 47 $\mu$ H                                             |
| L802,803                      | 220401122 | Choke Coil, 100mH                                                |
| L901,902                      | 220401120 | Anti-parasitic Coil                                              |
| L001                          | 222391121 | AM Antenna Coil                                                  |
| T001                          | 205001363 | Power Transformer<br>(Multivoltage Type)                         |
|                               | 201001363 | Power Transformer<br>(117V only, CSA approved)                   |
| <b>TRANSISTORS and DIODES</b> |           |                                                                  |
| Q101,102 }<br>Q104,105 }      | 301201117 | 2SC829(C), FM IF Amp, etc.                                       |
| Q103,301 }<br>Q302,811 }      | 301201115 | 2SC828(R), FM MPX Amp. etc.                                      |
| Q812,817 }                    |           |                                                                  |
| Q820,822 }                    |           |                                                                  |
| Q823,825 }                    | 301201134 | 2SC1327, $\frac{1}{2}$ Equalizer Amp.                            |
| Q201,202 }                    |           |                                                                  |
| Q203,204 }                    |           |                                                                  |
| Q816,819 }                    | 301201114 | 2SC644(S), $\frac{1}{2}$ Equalizer Amp.,<br>SQ Matrix Amp., etc. |
| Q827,828 }                    |           |                                                                  |
| Q205,206 }                    |           |                                                                  |
| Q207,208 }                    | 301201113 | 2SC1384, Driver, Pre-driver,<br>Amp., etc.                       |
| Q304,305 }                    |           |                                                                  |
| Q501,502 }                    |           |                                                                  |
| Q701,702 }                    | 301201142 | 2SC789, Power Amp., etc.                                         |
| Q703,704 }                    |           |                                                                  |
| Q705,706 }                    |           |                                                                  |
| Q707,801 }                    | 302001111 | 2SK30(Y), Expander, etc.                                         |
| Q805,806 }                    |           |                                                                  |
| Q810,813 }                    |           |                                                                  |
| Q814,901 }                    | 301201132 | 2SC1384, Driver, Pre-driver,<br>Amp., etc.                       |
| Q908 }                        |           |                                                                  |
| Q303,902 }                    |           |                                                                  |
| Q904,909 }                    | 301201142 | 2SC789, Power Amp., etc.                                         |
| Q911 }                        |           |                                                                  |
| Q601,906 }                    |           |                                                                  |
| Q907,913 }                    | 302001111 | 2SK30(Y), Expander, etc.                                         |
| Q914 }                        |           |                                                                  |
| Q802,807 }                    |           |                                                                  |
| Q818,821 }                    | 302001111 | 2SK30(Y), Expander, etc.                                         |
| Q824,826 }                    |           |                                                                  |

| Schematic Location                                                                                                                                                    | Part No.  | Description                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------------|
| Q803,804 }<br>Q808,809 }                                                                                                                                              | 301001117 | 2SA564A(P), Difference Signal Amp., etc. |
| Q905,912                                                                                                                                                              | 301001123 | 2SA684, Driver Amp.                      |
| IC101                                                                                                                                                                 | 303452148 | LA1201, AM/FM IF Amp.                    |
| IC801,802                                                                                                                                                             | 303452149 | CD-894A, CD-4 Demodulator                |
| D101,102 }<br>D103,104 }<br>D105,106 }<br>D107,108 }<br>D301,302 }<br>D303,304 }<br>D305,306 }<br>D803,804 }<br>D811,812, }<br>D813,814 }<br>D815,816 }<br>D817,818 } | 300111008 | 1K188, FM Det. FM MPX<br>Dec. etc.       |
| D601                                                                                                                                                                  | 300313004 | BZ-120, Zener Regulator, 12V             |
| D602                                                                                                                                                                  | 300313006 | BZ-270, Zener Regulator, 27V             |
| D603                                                                                                                                                                  | 300919012 | ESACO-2C, Rectifier ⊕                    |
| D604                                                                                                                                                                  | 300919013 | ESACO-2N, Rectifier ⊖                    |
| D805,806 }<br>D807,808 }<br>D809,810 }                                                                                                                                | 300111009 | 1S990, ALGC                              |
| D901,903                                                                                                                                                              | 300313014 | WZ-090, Zener Regulator, 9V              |
| D902,904                                                                                                                                                              | 300212004 | KB-269, Bias Compensator                 |
| VARIABLE RESISTORS                                                                                                                                                    |           |                                          |
| VR101,301 }<br>VR808,814 }                                                                                                                                            | 510502125 | 10KB, IF Bias Adj., FM Separation Adj.   |
| VR401,402                                                                                                                                                             | 525101129 | 50KA x 4, Bass & Treble Control          |
| VR501                                                                                                                                                                 | 525121124 | 100KAT x 4, Volume Control               |
| VR801,803                                                                                                                                                             | 510502128 | 5KB, Free-running Freq. Adj.             |
| VR802,804                                                                                                                                                             | 510502121 | 5KB, Expander Input Level Adj.           |
| VR805,806 }<br>VR810,812 }<br>VR902,904 }                                                                                                                             | 510502126 | 10KB, Lock Range Adj., etc.              |
| VR807,813                                                                                                                                                             | 510502132 | 100KB, M.F. Expansion Level Adj.         |
| VR809,811                                                                                                                                                             | 510502130 | 100KB, H.F. Expansion Level Adj.         |
| VR901,903                                                                                                                                                             | 510502127 | 250KB, Main Amp. DC Balance Adj.         |
| VR001,002                                                                                                                                                             | 515321117 | 10KB, CD-4 Separation Adj.               |
| VR003                                                                                                                                                                 | 525321115 | 50KB x 2, CD-4 Carrier Level Adj.        |
| VR004,005 }<br>VR006,007 }                                                                                                                                            | 525321118 | 100KC, Balance Control                   |
| MISCELLANEOUS                                                                                                                                                         |           |                                          |
| PL001-007                                                                                                                                                             | 352063025 | 6.3V, 0.25A, Dial Light                  |
| PL008-010                                                                                                                                                             | 351080015 | 8V, 0.15A, Mode Indicator                |
| PL011,012                                                                                                                                                             | 351140008 | 14V, 80mA, FM Stereo, CD-4 Indicator     |
| M001                                                                                                                                                                  | 231310030 | FM Tuning Meter                          |
| M002                                                                                                                                                                  | 231310028 | Signal Strength Meter                    |
|                                                                                                                                                                       | 321304368 | AM/FM Front-end                          |

| Schematic Location | Part No.  | Description                           |
|--------------------|-----------|---------------------------------------|
|                    | 614010107 | Switch, Power Supply                  |
|                    | 614020402 | Switch, Push 2-key, Speakers          |
|                    | 614020404 | Switch, Push 2-key, Tape & Loudness   |
|                    | 601011258 | Switch, Function Selector             |
|                    | 601011257 | Switch, Mode Selector                 |
|                    | 613000024 | Switch, De-emphasis                   |
|                    | 613000021 | Switch, Quad-Stereo                   |
|                    | 141311357 | AM/FM IF Amp. Circuit Assembly        |
|                    | 141411442 | FM MPX Decoder Circuit Assembly       |
|                    | 141510141 | Phono Equalizer Amp. Circuit Assembly |
|                    | 141710249 | Volume Control Amp. Circuit Assembly  |
|                    | 141710250 | Tone Control Amp. Circuit Assembly    |
|                    | 141810596 | SQ 4-ch. Matrix Circuit Assembly      |
|                    | 141810595 | CD-4 Demodulator Circuit Assembly     |
|                    | 141610254 | Main Amp. Circuit Assembly            |
|                    | 141810597 | Quad-Stereo Switch Circuit Assembly   |
|                    | 141810598 | Distributing Circuit Assembly         |
|                    | 141810599 | Rectifier Circuit Assembly            |

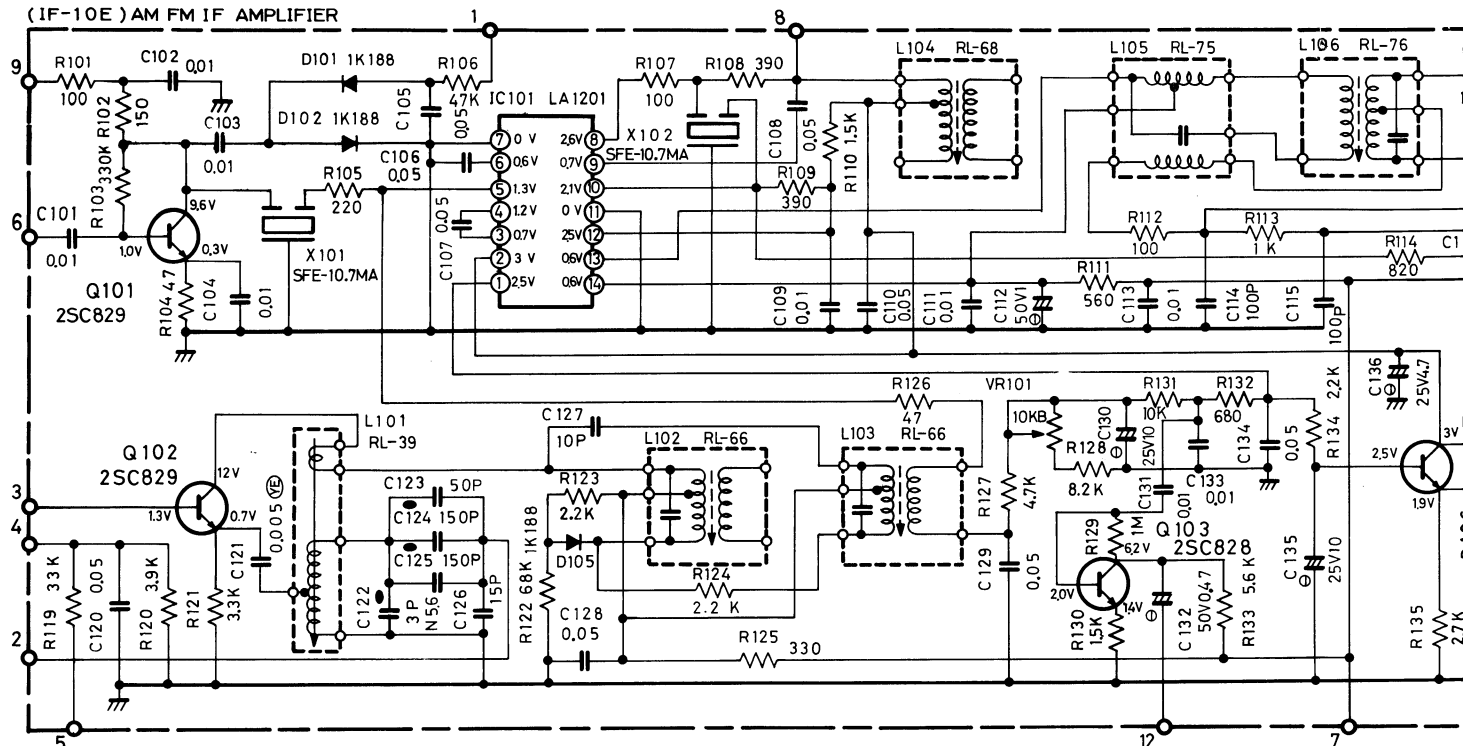
ROLAND ELECTRONICS CO., LTD.  
 ROTEL ELECTRONICS CO., LTD.  
 ROTEL OF AMERICA, INC.

1-36-8 OHOKAYAMA, MEGURO-KU, TOKYO, JAPAN  
 310 SEC. 5, NANKING E. ROAD, TAIPEI, TAIWAN  
 2642 CENTRAL PARK AVE., YONKERS, N.Y. 10710, U.S.A.

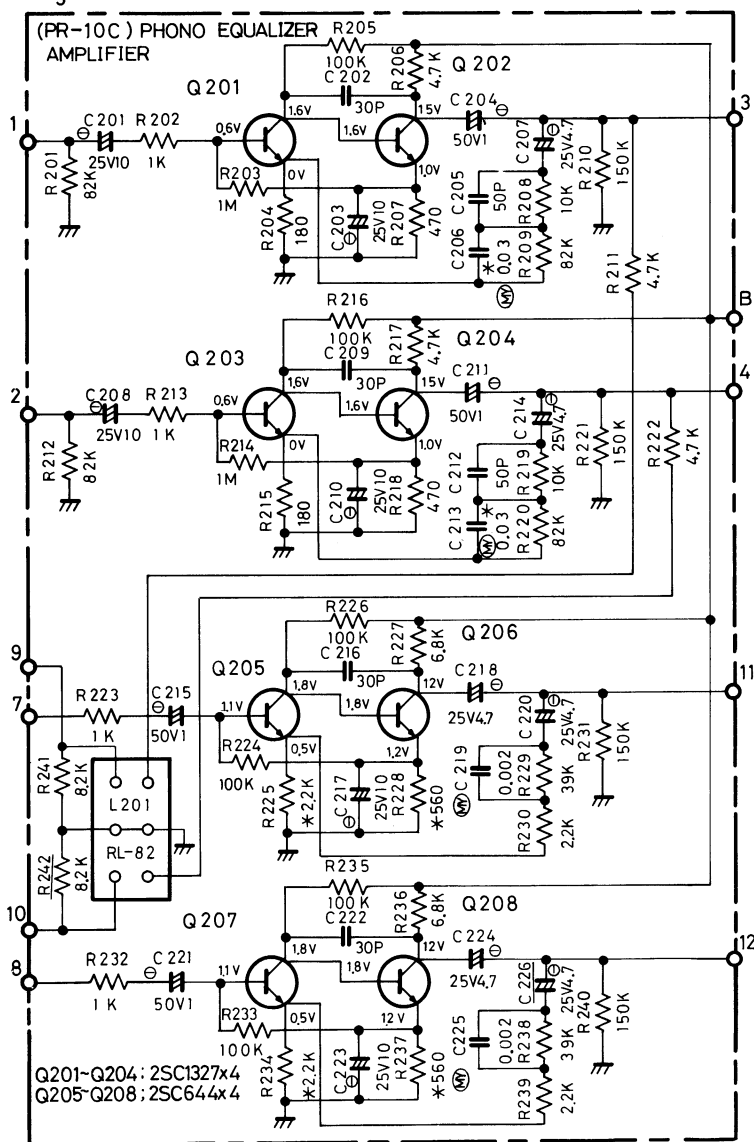
Printed in Japan, Dec. '74

# SCHEMATIC DIAGRAM RX-254

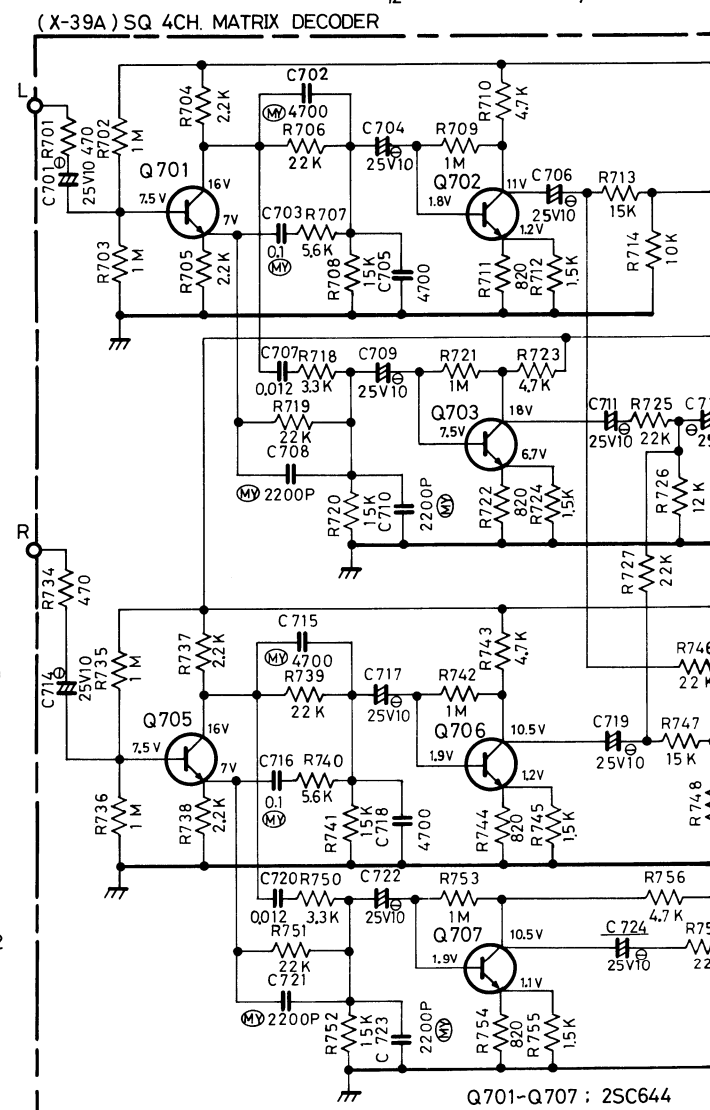
(IF-10E) AM FM IF AMPLIFIER



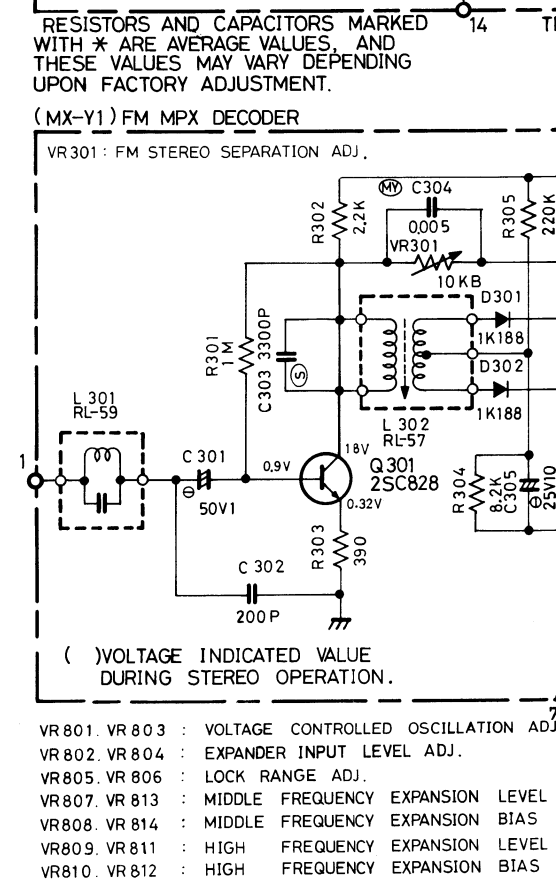
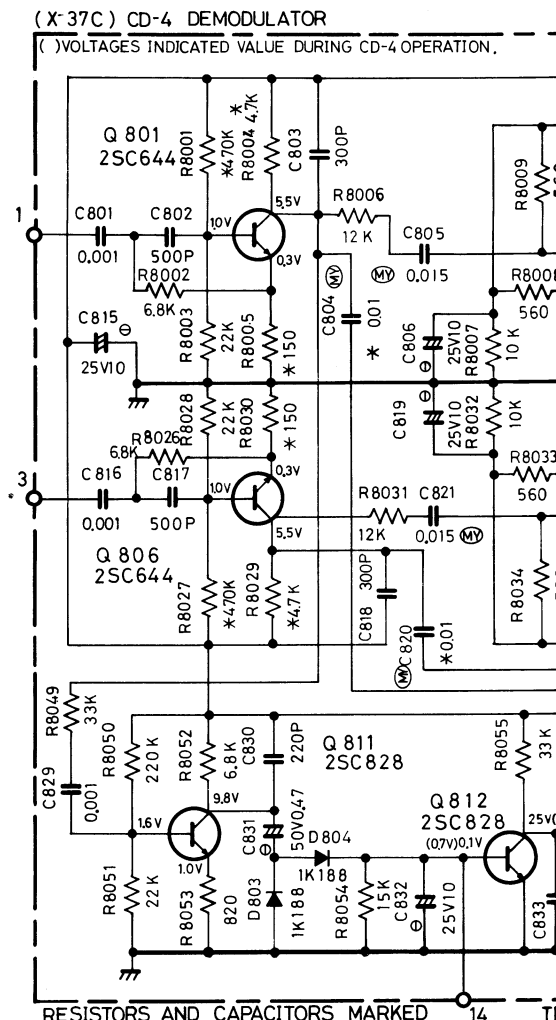
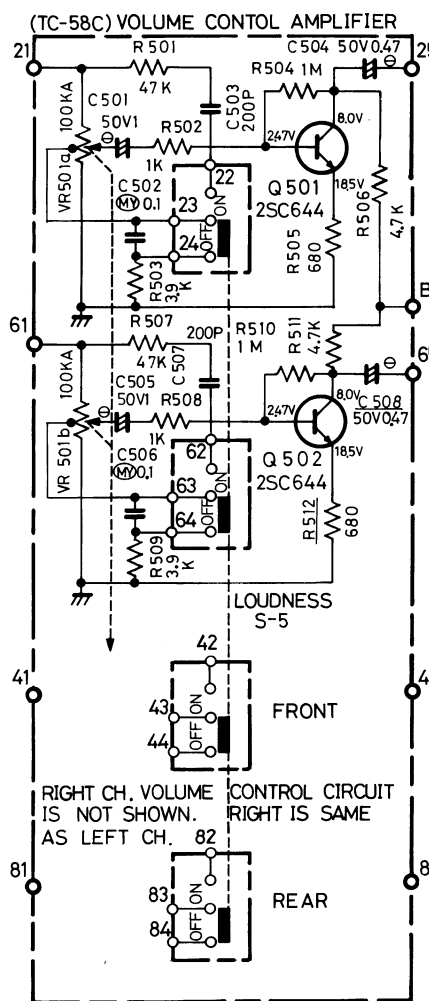
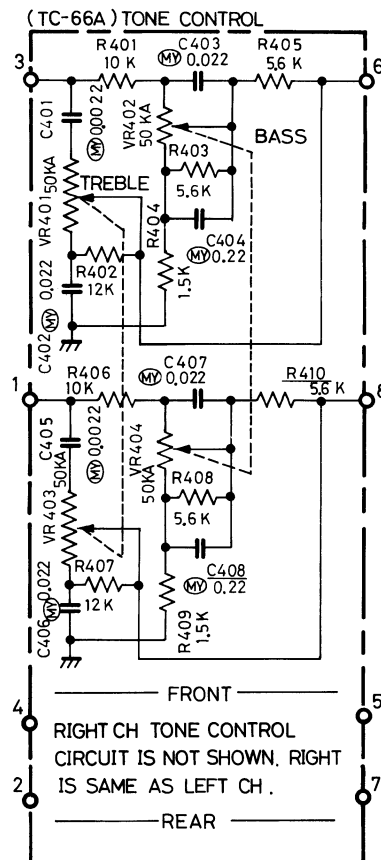
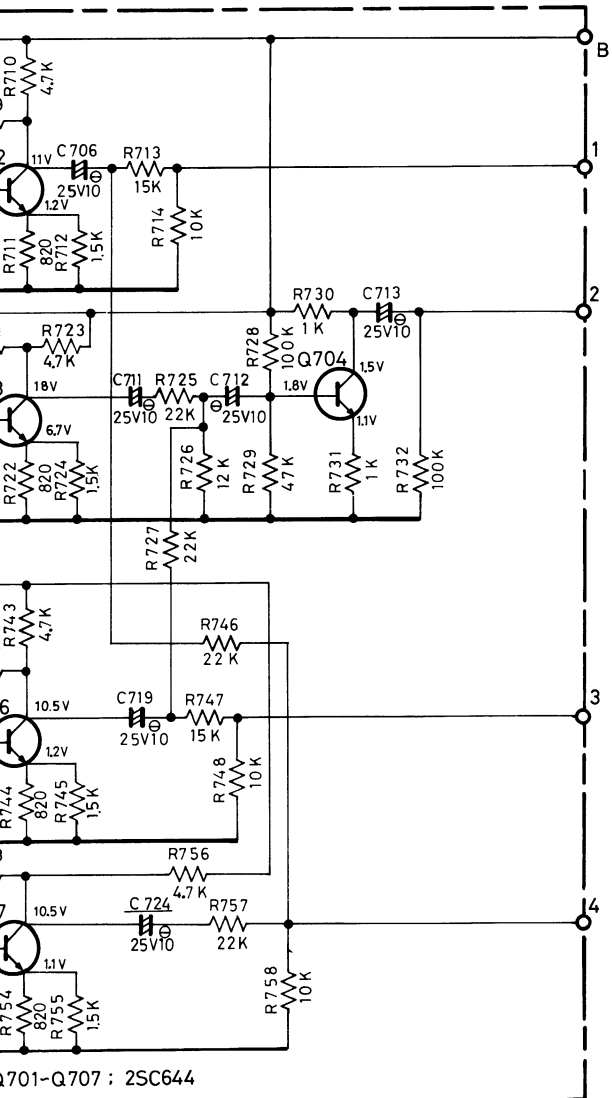
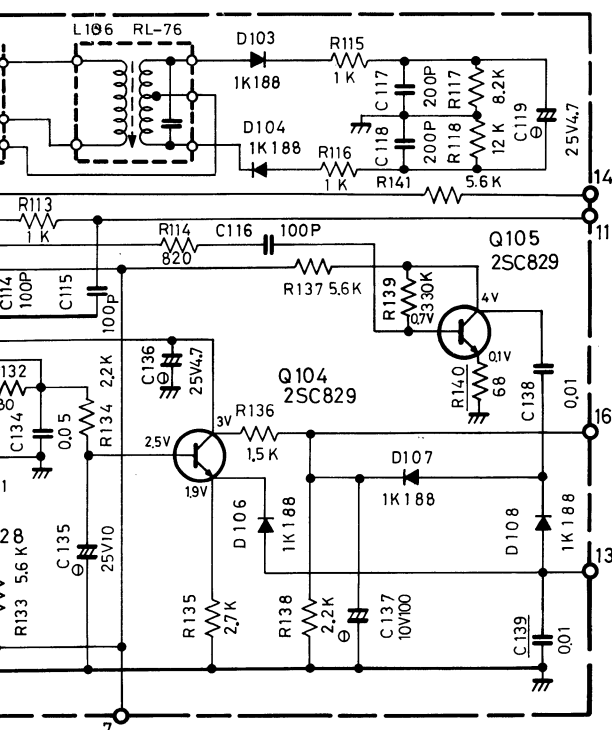
(PR-10C) PHONO EQUALIZER  
AMPLIFIER



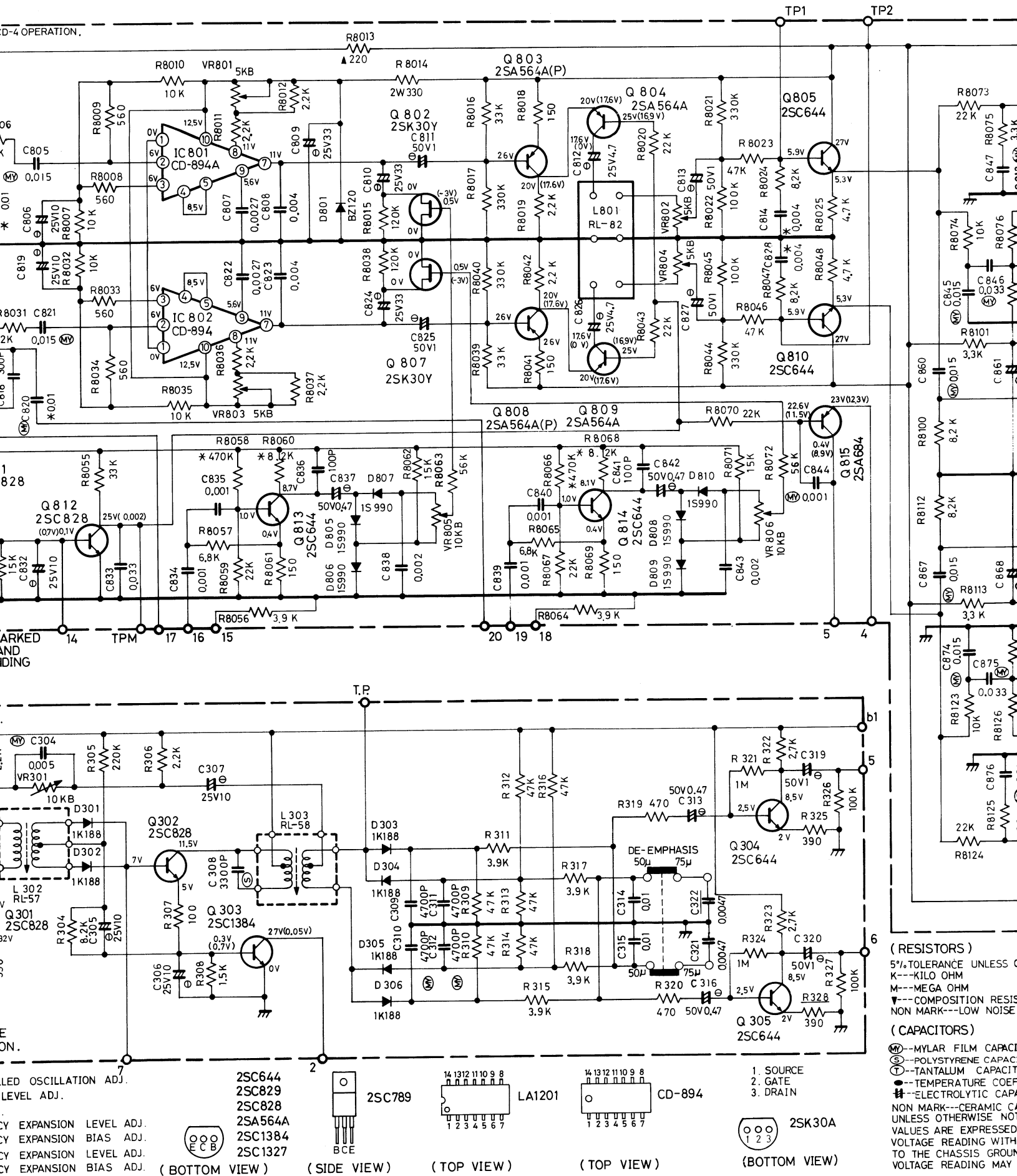
(X-39A) SQ 4CH. MATRIX DECODER

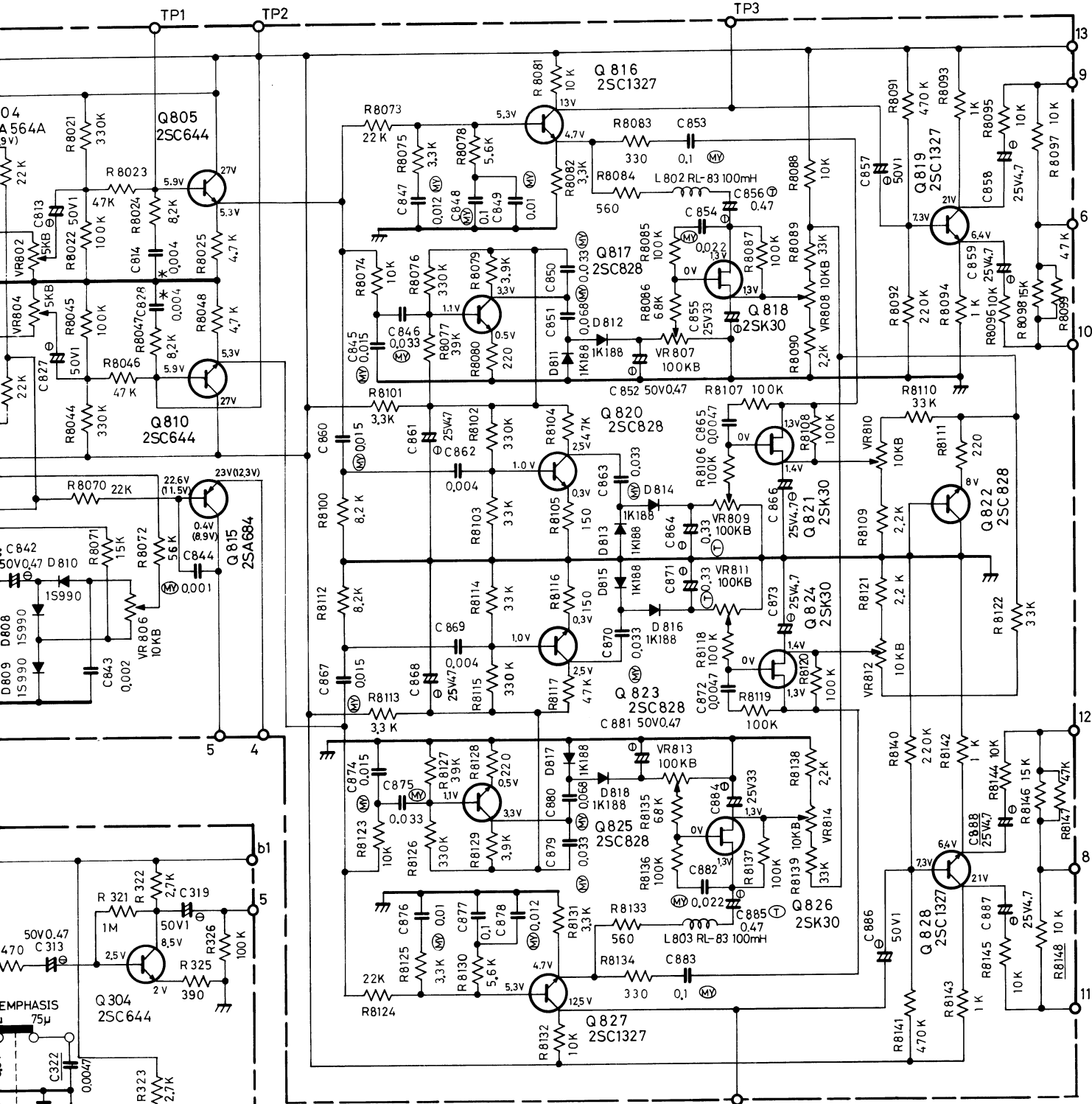






VR801. VR803 : VOLTAGE CONTROLLED OSCILLATION ADJ.  
 VR802. VR804 : EXPANDER INPUT LEVEL ADJ.  
 VR805. VR806 : LOCK RANGE ADJ.  
 VR807. VR813 : MIDDLE FREQUENCY EXPANSION LEVEL  
 VR808. VR814 : MIDDLE FREQUENCY EXPANSION BIAS  
 VR809. VR811 : HIGH FREQUENCY EXPANSION LEVEL  
 VR810. VR812 : HIGH FREQUENCY EXPANSION BIAS





# ( RESISTORS )

5% TOLERANCE UNLESS OTHERWISE NOTED

K---KILO OHM

M---MEGA OHM

▼---COMPOSITION RESISTORS 1/2 WATT

NON MARK---LOW NOISE TYPE CARBON RESISTORS 1/4WATT

# ( CAPACITORS )

Ⓜ---MYLAR FILM CAPACITORS

Ⓢ---POLYSTYRENE CAPACITORS

Ⓣ---TANTALUM CAPACITORS

Ⓢ---TEMPERATURE COEFFICIENT CAPACITORS

Ⓢ---ELECTROLYTIC CAPACITORS

NON MARK---CERAMIC CAPACITORS

UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE

VALUES ARE EXPRESSED IN MFD

VOLTAGE READING WITH VTVM FROM THE POINT SHOWN

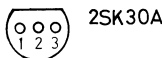
TO THE CHASSIS GROUND ( LINE VOLTAGE 120 VOLT )

VOLTAGE READING MAY VARY ±20%

| ITEM                     | SCHEMATIC LOCATION ( LAST ) |       |
|--------------------------|-----------------------------|-------|
| AM FM IF AMP             | R 140                       | C 139 |
| EQUALIZER AMP            | R 242                       | C 226 |
| FM MPX DECODER           | R 328                       | C 320 |
| TONE CONTROL             | R 410                       | C 408 |
| VOLUME CONTROL AMPLIFIER | R 512                       | C 508 |
| POWER SUPPLY             | R 614                       | C 607 |
| SQ 4CH MATRIX DECODER    | R 758                       | C 724 |
| CD-4 DEMODULATOR         | R 8148                      | C 888 |
| MAIN AMP                 | R 936                       | C 923 |
| CHASSIS                  | R 006                       | C 003 |

CD-894

- SOURCE
- GATE
- DRAIN



( BOTTOM VIEW )

(LEFT)

PHONO

FRONT  
AUX  
BACK

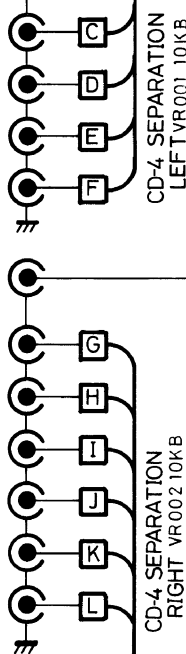
FRONT  
TAPE IN  
BACK

(RIGHT)

PHONO

FRONT  
AUX  
BACK

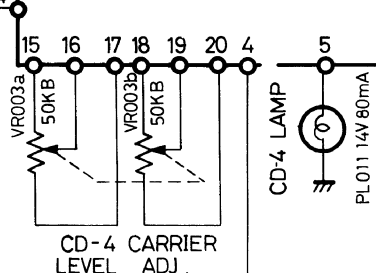
FRONT  
TAPE IN  
BACK



PHONO  
EQUALIZER  
AMPLIFIER  
(PR-10C)

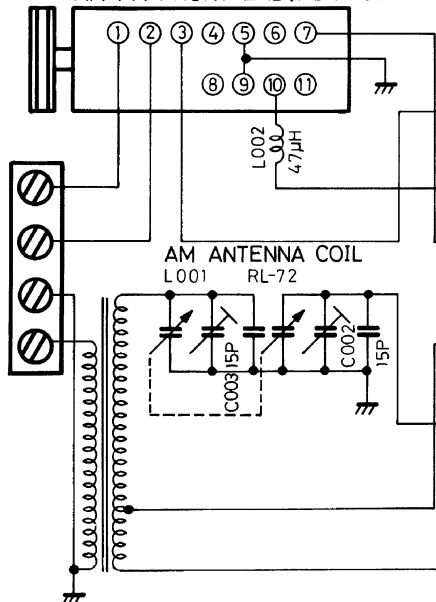
(X-37C)

CD-4 DEMODULATOR



AM FM FRONT END(FB-112U)

AM GND FM  
75 $\Omega$  300 $\Omega$



AM FM IF AMPLIFIER  
(IF-10E)

FM TUNING

SIGNAL

FUNC 4R S-9

FM MPX A  
(MX-Y1)

FUNC 3R S-8

STEREO LAMP

