

Stereo Receiver  
**MODEL SA-2121H**

In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

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## SPECIFICATIONS

### ● GENERAL DESCRIPTION

|                    |   |
|--------------------|---|
| Power source:      | AC 110/220/240V, 50/60Hz  |
| Power consumption: | 460W  |
| Circuit            |   |
| Tuner:             | Superheterodyne system,<br>LW/MW/FM 3-bands tuner, with<br>P.L.L. stereo demodulation circuit,<br>FM muting circuit         |
| Main amplifier:    | Differential amplifier and all stage<br>direct coupled pure complimentary<br>O.C.L. (Output Capacitor-Less) cir-<br>cuitry. |
| Tone amplifier:    | "NF" type tone control circuit.   |
| Equalizer:         | Dual power supply IC amplifier<br>circuit   |
| Semiconductors:    | 7-IC (Integrated circuit)<br>28-transistor (1-FET)<br>31-diode (4-Zener diode)<br>2-LED                                     |
| Dimensions:        | Width . . . . . 550 mm<br>Height . . . . . 142 mm<br>Depth . . . . . 390 mm   |
| Weight:            | 14.5 kg   |

### ● FM SECTION

|                                     |   |
|-------------------------------------|---|
| Tuning range:                       | 87.6 ~ 108 MHz  |
| Intermediate frequency:             | 10.7 MHz  |
| Sensitivity:                        | 1.8 $\mu$ V (at S/N 26 dB, 40 kHz<br>deviation, antenna terminal voltage) |
| Distortion (40 kHz deviation)       |   |
| Mono:                               | 0.5%  |
| Stereo:                             | 0.8%  |
| Image rejection ratio:              | 50 dB   |
| I.F. rejection ratio:               | 70 dB   |
| Spurious frequency rejection ratio: | 60 dB   |
| AM suppression ratio:               | 40 dB (modulated by 30% AM<br>and 75 kHz deviation FM)                    |
| Selectivity:                        | 50 dB (IHF at 40 dB)  |
| Capture ratio:                      | 2 dB  |
| Stereo separation:                  | 34 dB (1 kHz)   |
| Antenna input:                      | 75 ohms unbalanced<br>240 ohms balanced                                   |

### ● AM SECTION

|               |                                       |
|---------------|---------------------------------------|
| Tuning range: | MW 520 ~ 1620 kHz<br>LW 150 ~ 370 kHz |
|---------------|---------------------------------------|

|                         |   |
|-------------------------|---|
| Intermediate frequency: | MW/LW 455 kHz   |
| Quieting Sensitivity:   | MW 400 $\mu$ V/m (at 1000 kHz)<br>LW 400 $\mu$ V/m (at 220 kHz) |
| Image rejection ratio:  | MW 34 dB (at 1400 kHz)<br>LW 30 dB (at 340 kHz)                 |
| I.F. rejection ratio:   | MW 49 dB (at 600 kHz)<br>LW 40 dB (at 340 kHz)                  |
| Distortion:             | LW/MW 1.6%  |
| Antenna:                | Built-in ferrite bar antenna and<br>external antenna terminal   |

### ● MAIN (POWER) AMPLIFIER

|                             |  |
|-----------------------------|--|
| Continuous power output:    | 2 x 45W/4-ohms, both channels<br>driven at 1 kHz, 0.1% distortion<br>2 x 30W/8-ohms, both channels<br>driven at 1 kHz, 0.1% distortion |
| Total harmonic distortion:  | 0.05% at 20W (AUX IN)  |
| Intermodulation distortion: | 0.1% at 20W (AUX IN)   |
| Damping factor:             | More than 20 (at 1 kHz, 4-ohms)  |
| Power bandwidth:            | 20 Hz ~ 20 kHz   |

### ● PRE-AMPLIFIER

|                                       |  |
|---------------------------------------|--|
| Input sensitivity and input impedance |  |
| PHONO 1:                              | 2.5 mV/50K ohms                                      |
| PHONO 2:                              | 2.5 mV/50K ohms                                      |
| AUX:                                  | 150 mV/50K ohms                                      |
| TAPE playback                         |  |
| 1 and 2:                              | 150 mV/50K ohms                                      |
| Output level and loaded impedance     |  |
| REC 1 and 2:                          | 150 mV/50K ohms                                      |
| REC 1 and 2 (DIN socket):             | 30 mV/80K ohms                                       |
| Phono overload:                       | 140 mV (R.M.S. 1 kHz,<br>0.1% T.H.D.)                |
| "RIAA" curve deviation (Phono):       | $\pm$ 1.5 dB (30 Hz ~ 15 kHz)                        |
| Frequency response:                   | 10 Hz ~ 50 kHz $\pm$ 1.5 dB (AUX.,<br>TAPE playback) |
| Tone control                          |  |
| Bass:                                 | $\pm$ 10 dB at 100 Hz                                |
| Treble:                               | $\pm$ 10 dB at 10 kHz                                |
| Low cut filter:                       | -3 dB at 30 Hz, 6 dB/oct                             |
| Audio muting:                         | -20 dB   |

## FEATURES

- 1) The equalizer amplifier that operates on dual power supply (plus and minus) to allow the maximum 140 mV phono input.
- 2) With a built-in protection circuit, the loudspeaker remains always safe even if the amplifier circuit gets in trouble and reversely the amplifier is protected against a possible short-circuit of the loudspeaker cord.
- 3) Power source/circuit protection indicator making use of 2-color LED element, which will light up in red if there is something abnormal in the internal circuitry. In a normal condition, it is lit green.
- 4) Because of the circuit being ITL (Input Transformerless), OTL (Output Transformerless), OCL (Output Capacitorless) and pure-complementary system, low-distortion characteristic is more assured.
- 5) FET and 3-gang variable capacitor adopted at the FM front-end circuit more improve overall characteristics.
- 6) The PLL (Phase Locked Loop) demodulator circuit assures a stabilized characteristic.

## PREPARATION FOR USE

### AC VOLTAGE SELECTION (Refer to Figure 1)

Check the preset voltage selector before inserting the mains plug to an mains outlet. If the voltage is different from your local voltage, change it in the following manner:

1. Disconnect the AC cord plug from the wall outlet in order to prevent an electric shock.
2. Loosen a screw and slide the cover as illustrated in Fig. 1.
3. Put a fuse in the fuse holder which has an indication of your local voltage.

In case the local voltage is 110V, two pieces of fuses should be used.

4. Replace the cover in its original position.

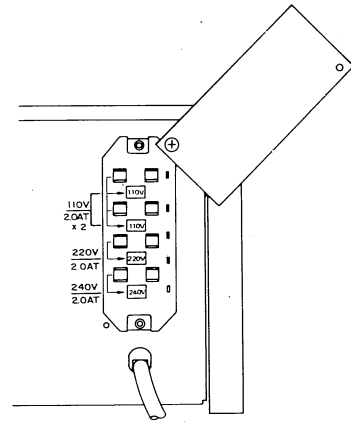


Figure 1

## DISASSEMBLY

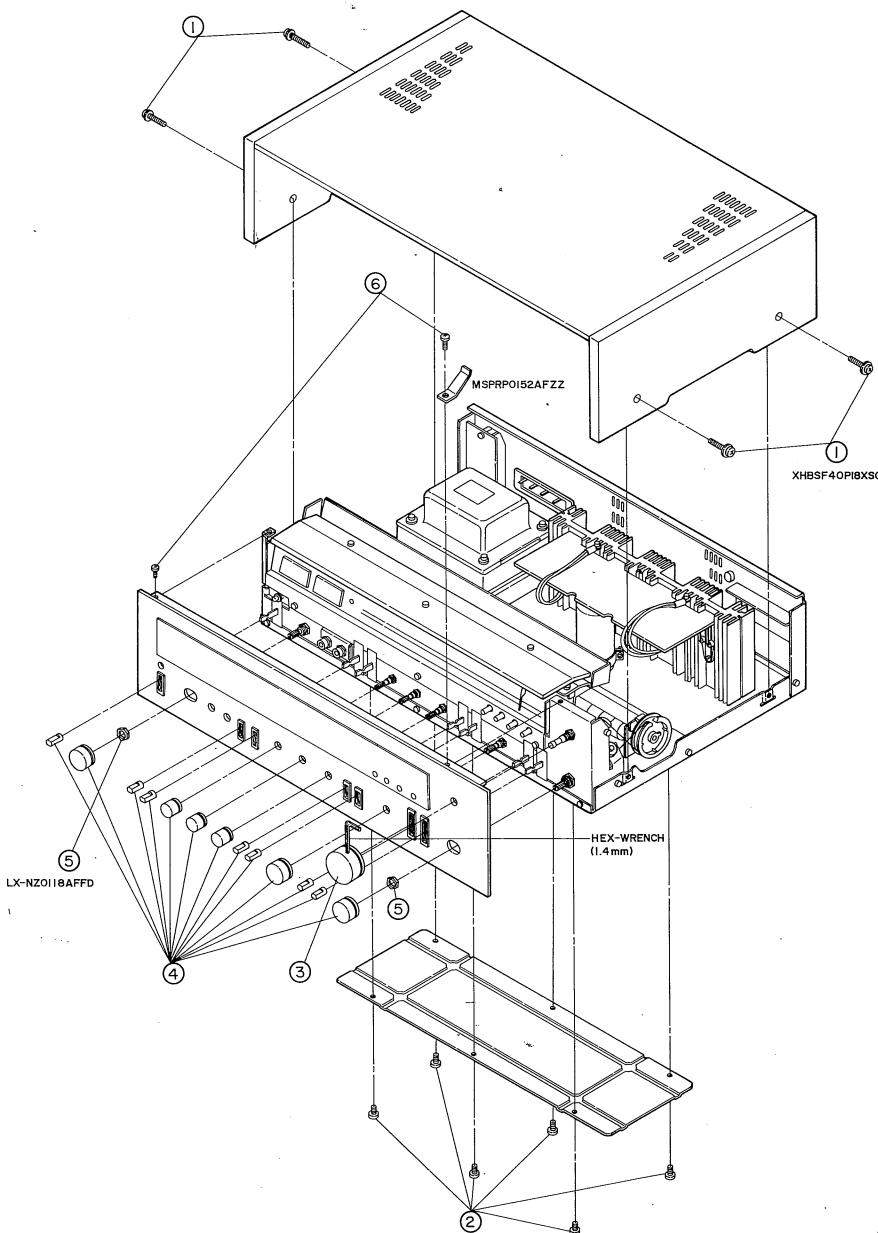
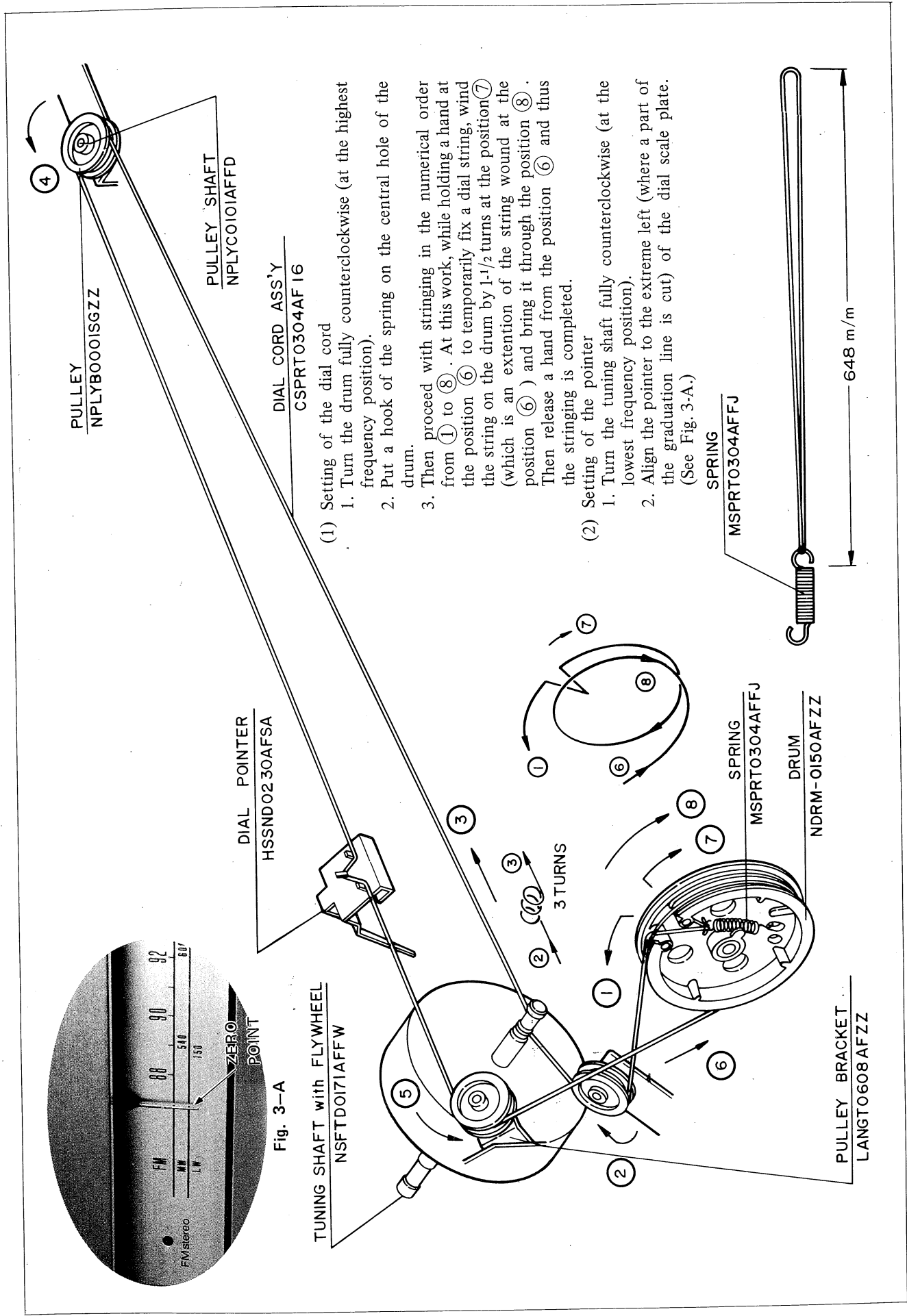


Figure 2 DISASSEMBLY

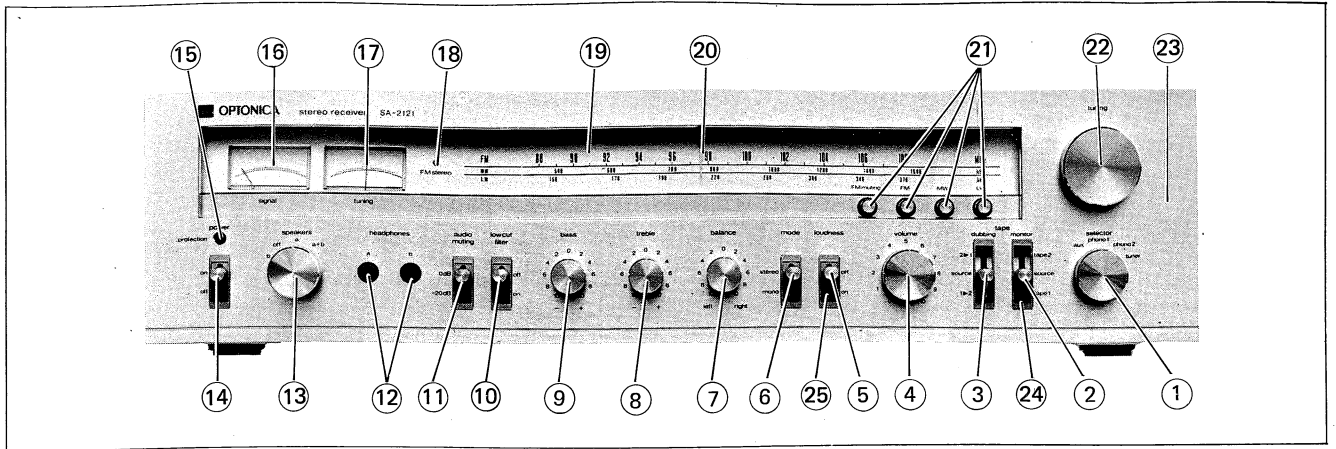
Prior to removing the chassis, be sure to draw the power supply plug from a wall outlet. Then, proceed with the removal work in the following order after disconnecting all of the connection cords at the rear of the set.

- 1) To remove the cabinet:  
Remove 4 screws ① retaining the cabinet (2 screws each for the right and left sides), then the cabinet can be detached.
- 2) To remove the bottom board:  
Turn over the set and remove 6 screws ② retaining the bottom board, then the bottom board can be detached.
- 3) To remove the front panel:
  - (1) Use a hexagonal wrench (1.4 mm) to loosen the screw retaining the tuning knob ③ at the front panel, and pull out the tuning knob.
  - (2) Pull out the remaining knobs ④ (13 knobs).
  - (3) Remove the nuts ⑤ retaining the speaker switch shaft and selector switch shaft.
  - (4) Finally remove 2 screws ⑥ retaining the front panel, then the front panel can be detached.



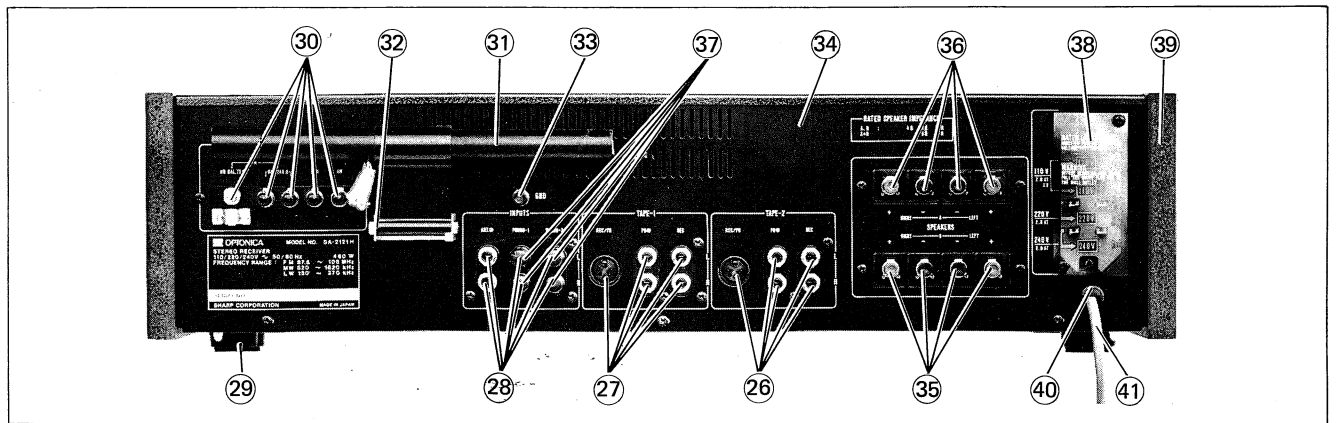
- (1) Setting of the dial cord
1. Turn the drum fully counterclockwise (at the highest frequency position).
  2. Put a hook of the spring on the central hole of the drum.
  3. Then proceed with stringing in the numerical order from ① to ⑧. At this work, while holding a hand at the position ⑥ to temporarily fix a dial string, wind the string on the drum by 1-1/2 turns at the position ⑦ (which is an extension of the string wound at the position ⑥) and bring it through the position ⑧. Then release a hand from the position ⑥ and thus the stringing is completed.
- (2) Setting of the pointer
1. Turn the tuning shaft fully counterclockwise (at the lowest frequency position).
  2. Align the pointer to the extreme left (where a part of the graduation line is cut) of the dial scale plate. (See Fig. 3-A.)

Figure 3 DIAL CORD STRINGING



- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>① Function selector knob (JKNBN0333AFSA)</li> <li>② Tape monitor switch knob (JKNBP0070AFSA)</li> <li>③ Tape dubbing switch knob (JKNBP0070AFSA)</li> <li>④ Volume control knob (JKNBN0333AFSA)</li> <li>⑤ Loudness switch knob (JKNBP0070AFSA)</li> <li>⑥ Mode selector knob (JKNBP0070AFSA)</li> <li>⑦ Balance control knob (JKNBN0334AFSA)</li> <li>⑧ Treble control knob (JKNBN0334AFSA)</li> <li>⑨ Bass control knob (JKNBN0334AFSA)</li> <li>⑩ Low cut filter switch knob (JKNBP0070AFSA)</li> <li>⑪ Audio muting switch knob (JKNBP0070AFSA)</li> <li>⑫ Headphone jacks (a, b) (QJAKJ0057AFZZ)</li> <li>⑬ Speakers selector knob (JKNBN0333AFSA)</li> <li>⑭ Power switch knob (JKNBP0070AFSA)</li> </ul> | <ul style="list-style-type: none"> <li>⑮ Power source/circuit protection indicator, LED (VHPGL-52RG/1F)</li> <li>⑯ Signal strength meter, ME801 (RMTRL0135AFSA)</li> <li>⑰ FM tuning (center) meter, ME802 (RMTRL0134AFSA)</li> <li>⑱ FM stereo indicator, LED (VHPSR105D //-1)</li> <li>⑲ Dial (HDALM0173AFSA)</li> <li>⑳ Dial pointer (HSSND0230AFSA)</li> <li>㉑ LW/MW/FM/FM muting knob (JKNBM0248AFSA)</li> <li>㉒ Tuning control knob (JKNBB0059AFSA)</li> <li>㉓ Front panel (HPNLC3276AFSA)</li> <li>㉔ Guide (Large), lever switch (GCOVA1070AFSC)</li> <li>㉕ Guide (Small), lever switch (GCOVA1071AFSC)</li> </ul> |
|--|---|

Figure 4 FRONT PARTS LAYOUT



- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>②⑥ Tape-2 (REC/PB) sockets and DIN (REC/PB) (QSOC22450AFZZ)</li> <li>②⑦ Tape-1 (REC/PB) sockets and DIN (REC/PB) (QSOC22450AFZZ)</li> <li>②⑧ Aux./Phono1/Phono2 input sockets (QSOCJ2660AFZZ) *</li> <li>②⑨ Leg (GLEGP0002SG00)</li> <li>③⑩ Antenna terminals (QTANN0453AFZZ)</li> <li>③① LW/MW bar antenna (RCILA0403AFZZ)</li> <li>③② Bracket of bar antenna (LANGQ0423AFZZ)</li> </ul> | <ul style="list-style-type: none"> <li>③③ Grounding (Earth) terminal (QTANN0150AFZZ)</li> <li>③④ Rear panel (LANGQ0508AFSA)</li> <li>③⑤ Speaker terminals-B (QTANN0454AFZZ)</li> <li>③⑥ Speaker terminals-A (QTANN0454AFZZ)</li> <li>③⑦ Short plug (QPLGS0102AGZZ)</li> <li>③⑧ Fuse cover (PCOVP1158AFZZ)</li> <li>③⑨ Cabinet (GCAB-5090AFSA)</li> <li>④⑩ Bushing, power supply cord</li> <li>④① Power supply cord</li> </ul> |
|--|---|

\* Short plug

For noise prevention, be sure to insert a furnished short plug into the socket PHONO when not in use.

Figure 5 REAR PARTS LAYOUT

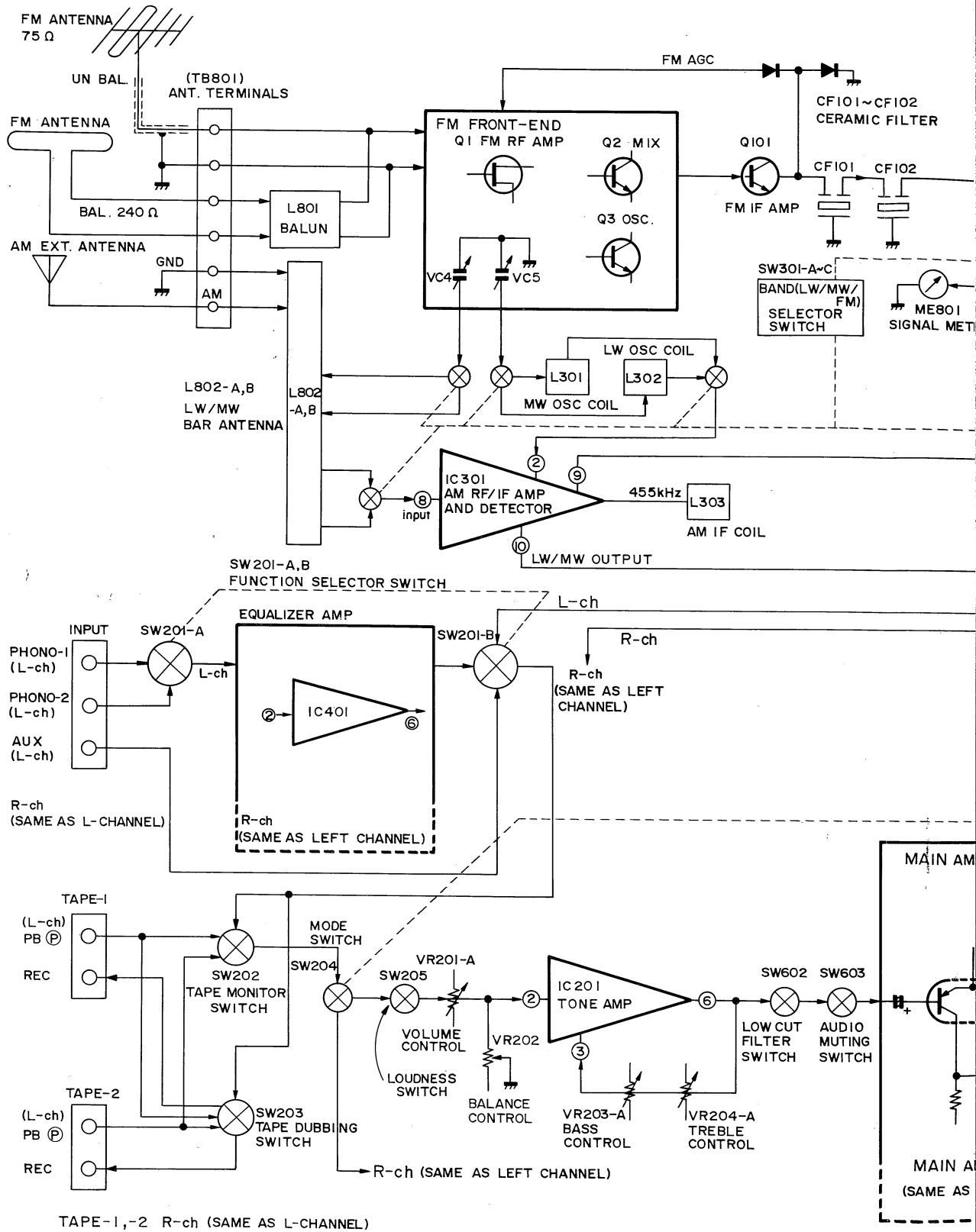
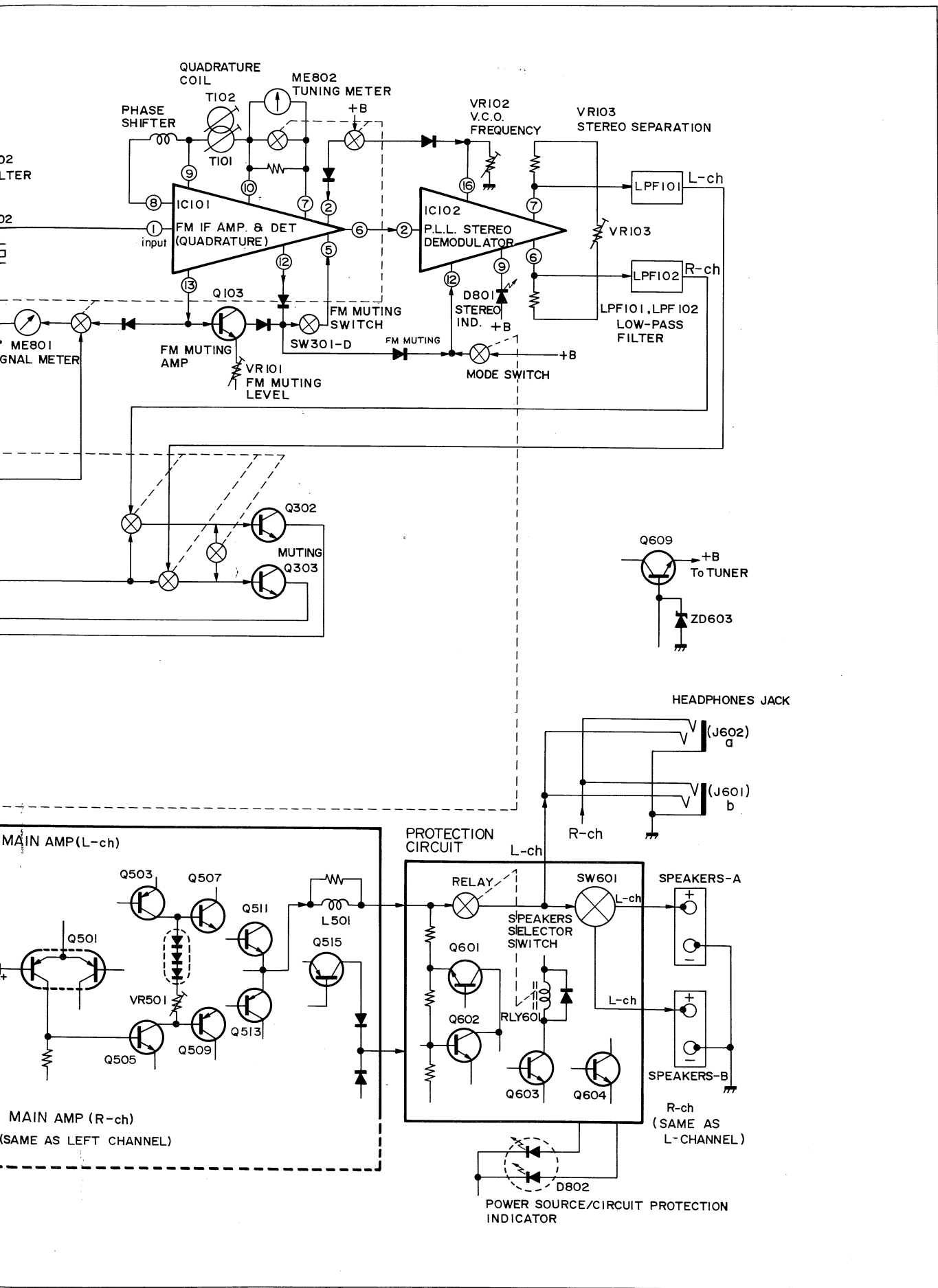


Figure 6 BLOCK DIAGRAM



WIRING DIAGRAM

AM

(1) B

(2)

FM

FM  
L801  
input  
circuit  
Transformer  
characteristics  
It is  
signal

ANTENNA  
TERMINATION  
TB8

UN  
75  
FM  
BAL  
240

AM

# CIRCUIT DESCRIPTION

## AM SECTION

(1) Block Diagram of IC301

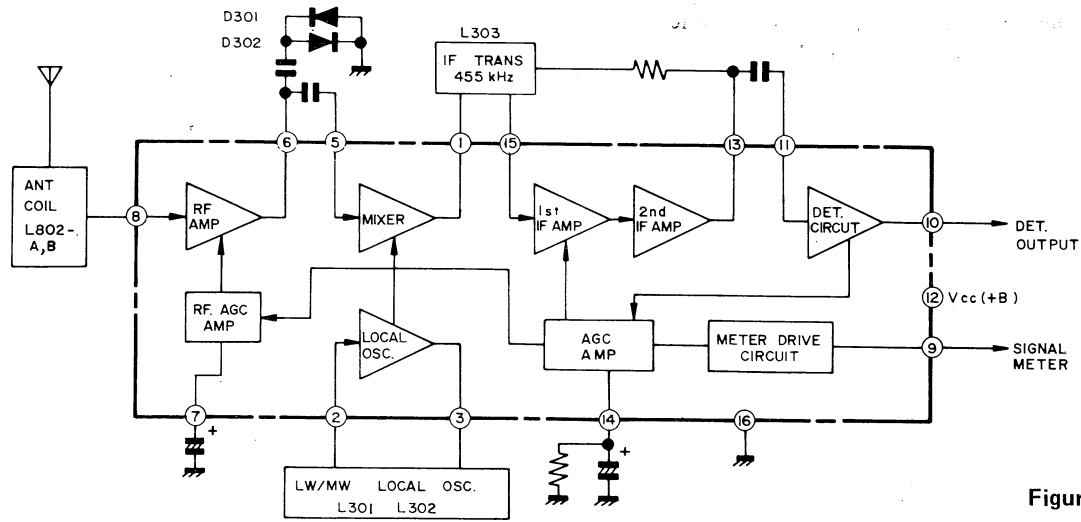


Figure 7

(2) Circuit Description

The block diagram of IC301 is indicated as above. AM broadcast signal caught by the antenna coil L802 enter the pin (8) of IC301 and is amplified by RF amplifier to be supplied to the mixer via the overload diodes D301 and D302. Intermediate frequency selection element making use of the ceramic filter L303 is employed as the load for the mixer. AM signal, after being amplified by 1st IF amplifier and 2nd IF amplifier, is detected by the detector circuit. Besides, this IC circuit IC301 incorporates signal meter drive circuit to facilitate the tuning and the output at the pin (9) of IC301 is connected to the signal meter (ME801).

## FM RF SECTION

FM antenna input circuit has two input terminals (75 ohms and 240 ohms) thanks to impedance converter (balun), coil L801. The 75 ohms input terminal is used when FM antenna is connected to the unit by using a coaxial cable. The 240 ohms input terminal is used when FM antenna is connected to the unit by using a balanced feeder. Fig. 8 shows FM Front-End circuit. RF amplifying section consists of 1 FET and 2 transistors.

Transistor Q1 is FET and its function is nearly the same as of vacuum tube. Due to the adoption of FET, crossmodulation characteristic and spurious characteristic are remarkably improved compared with conventional transistor type.

It is so devised that AGC voltage is applied to the terminal [K3] of FM Front-End circuit ..... this results in that when input signal to FM antenna is strong, amplification degree of transistor Q1 is lowered so as to stabilize FM reception.

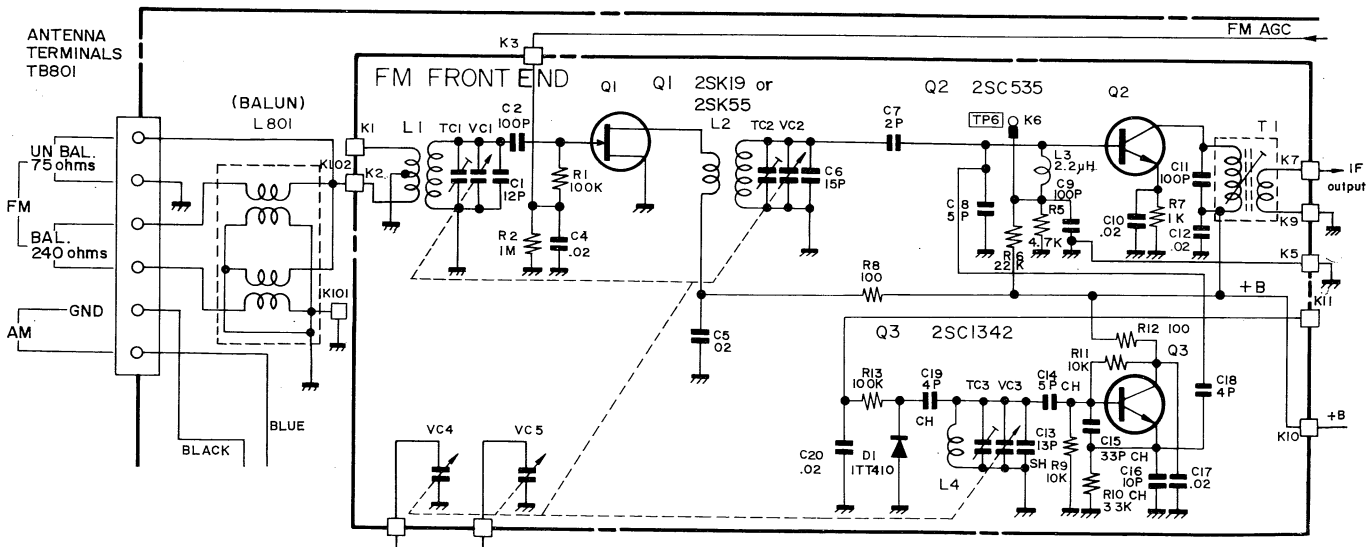


Figure 8 FM FRONT-END CIRCUIT



FET Q1 is FM high frequency amplifier. Transistor Q2 works as frequency mixer, in which high frequency signal coming from the FET Q1 and local oscillation frequency coming from the transistor Q3 are mixed to produce 10.7 MHz IF signal which will enter IF tuning transformer T1. The transistor Q3 is for the local oscillation and it applies oscillation voltage to the base of transistor Q2 via capacitor C18 (4pF).

Therefore, coil L1 is for antenna tuning, coil L2 is for FM RF amplification and tuning and coil L4 is for local oscillation.

### FM IF SECTION

FM IF section consists of 1 IC (integrated circuit), 1 transistor and 2 ceramic filters. Transistor Q101 is FM IF amplification and AGC amplification transistor, which is to amplify IF signal which has been converted into 10.7 MHz signal at FM front end section. This 10.7 MHz IF signal is given a higher selectivity since it runs through the concentrated selective elements, that is, ceramic filters CF101 and CF102. These filters function to amplify IF (intermediate frequency) signals giving no distortion and to assure a necessary selectivity. The IF signal is further supplied to the terminal ① of IC101, in which the gain of this signal is increased by about 66 dB by the three-stage differential amplifier thus being subjected to an appropriate limiter function.

### FM DETECTION SECTIONS (Quadrature Detector Circuit)

#### (1) FM Detector Circuit

This unit employs "Quadrature Detector" based on newly developed IC (Integrated Circuit), which is substituted for ratio detector and Foster-Sceley's detector that have been so far used. The basic structure of quadrature detector circuit is as shown in Fig. 9.

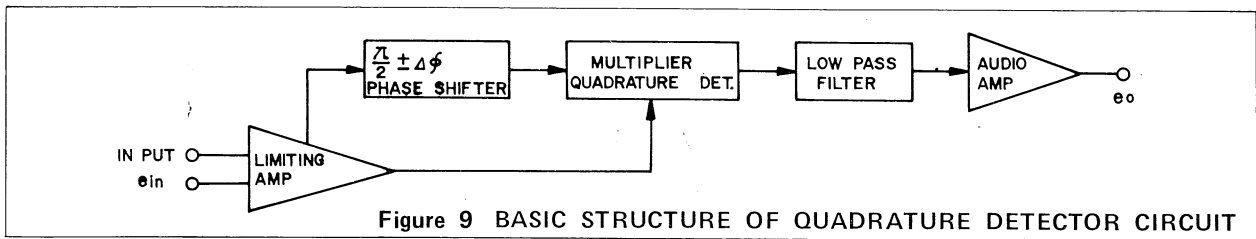


Figure 9 BASIC STRUCTURE OF QUADRATURE DETECTOR CIRCUIT

With this detection system, the multiplier (quadrature detector) circuit receives two types of input signals, one is the signal which has been amplified by the limiting amplifier and another which has passed through the phase shift circuit. (about  $\pi/2$ ). Thus, the quadrature detector circuit produces demodulation signal.

The term "quadrature" is resulted from that the phase difference between these two signal is  $\pi/2$ . The multiplier consists of doubly balance circuit as shown in the following circuit drawing. Phase characteristic of the phase shift circuit is as shown in Fig. 11.

This circuit is featured by:

- (1) Good linearity and low distortion.
- (2) Operates on small signal and less higher harmonics.
- (3) Wide-band detection of as much as 1.2 MHz.

Therefore, this circuit assures low distortion even with the overmodulation of more than 100% thereby reproducing high quality sound.

Actually saying, the detecting circuit SA-2121H uses L104 as phase-shift coil. T101 and T102 are 10.7MHz tuning quadrature coil.

Detection output appears at the terminal ⑥ of IC101 and it is supplied to the terminal ② of P.L.L. multiplex integrated circuit IC102.

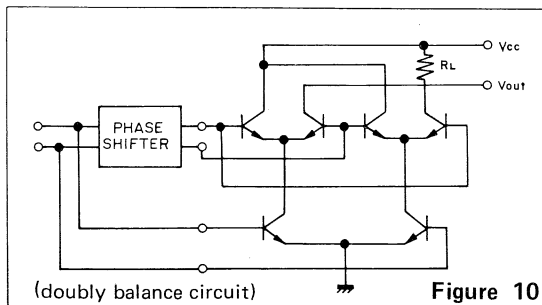


Figure 10

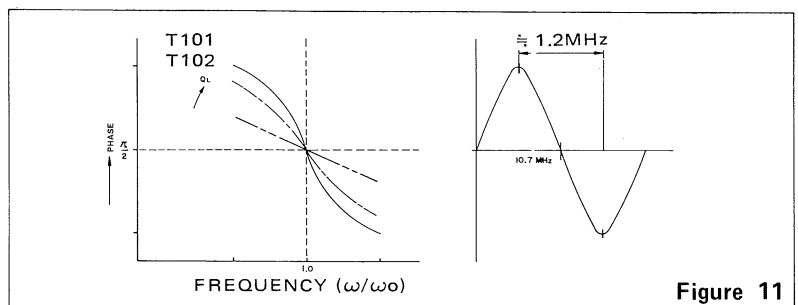


Figure 11

## FM STEREO DEMODULATOR SECTION

### 1) Features of P.L.L. stereo demodulator circuit.

This set incorporates a stereo demodulator circuit that comprises IC's with the PLL (Phase Locked Loop) system applied. The PLL (Phase Locked Loop) FM demodulator circuit is provided with such characteristics as mentioned below.

In order to demodulate stereo composite signals, it is necessary to take a 19kHz pilot signal out of the stereo composite signals and to make it a 38kHz signal.

Most of the conventional methods to obtain such a 38kHz signal are frequency doubling ones which utilize a nonlinearity of the elements. Compared with the conventional type, the recently developed IC-ed demodulator provides more sufficient separation effects. However, since it also requires 2 or 3 coils like the conventional one, if even one of them is dislocated from the initially adjusted point due to a secular change the separation effects will be deteriorated. Moreover there is such a contradiction that the more the efficiencies of the coils are increased enough to withstand the outer pulse signals like automobil ignition noises, the more the coils suffer secular changes.

To eliminate such disadvantages as above, PLL (Phase Locked Loop) system is employed in the method to make a 38kHz signal using a 19kHz pilot signal.

The PLL system stereo demodulator gives such three merits as:

1. Since the phases of a pilot signal and a 38kHz signal are automatically made the same with each other, the deterioration of separation effect is strongly minimized.
2. Since only one of variable resistor, being newly employed, plays the role of 2 to 3 pieces of conventional coils, troubles of the parts due to secular changes are decreased. In addition, even if this variable resistor is slightly dislocated, the separation effect will never be deteriorated because of the merit as mentioned in 1 by which the automatic phase adjustment is assured.
3. Compared with the conventional one, the PLL system demodulator shows a more noise withstanding characteristic since it has such performances as the selection of frequencies and the continuity of oscillation frequencies (short-time memory), thus assuring a stable stereo demodulation.

### 2) FM stereo demodulator circuit of SA-2121H.

IC102 is an integrated circuit for P.L.L. stereo demodulation and its block diagram is as shown in Fig. 12. V.C.O. free-running frequency is to be adjusted to 76 kHz by adjusting semi-fixed resistor VR102 (10K ohm). TP107 is the test point for frequency observation. (See the paragraph "Adjustment" described later.) During LW/MW reception, +B voltage is supplied to the terminal (16) of IC102 through diode D106 and resistor R138 so that oscillation frequency of V.C.O. will be stopped. Semi-fixed resistor VR103 (220K ohm) aims at the adjustment of stereo separation and with this resistor it is possible to minimize crosstalk to the opposite channel. +B voltage is supplied to the terminal (12) to force stereo signals to become monaural ones.

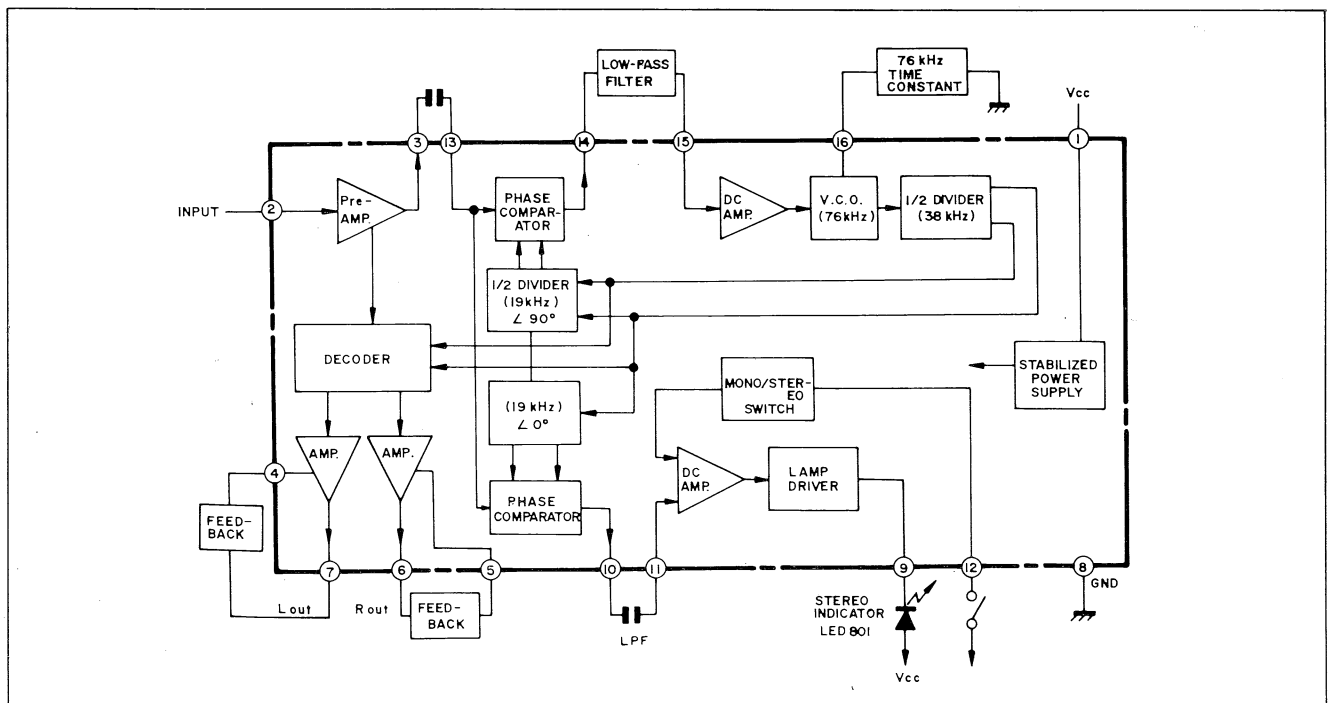


Figure 12

## MUTING CIRCUIT

SA-2121H, IC101 incorporates muting circuit and this circuit is so designed that if FM input signal to the antenna becomes about 20 dB when the muting switch (SW301-D) is kept at "ON", the muting is released and the signal appears at the output without undergoing muting. The muting release signal is produced by addition of two signals, one is the output signal at the pin (12) of IC101 and another is signal meter signal at pin (13) which will undergo polarity inversion by the transistor Q103. These two signals are applied to the pin (5) of IC101 via the muting switch (SW301-D).

Variable resistor VR101 is adjustable to release the muting when the input signal from the antenna terminal becomes about 20 dB.

Figure 13 shows the output voltage of two outputs, one is at the pin (12) of IC101 and another, at the collector of transistor Q103, to be added together.

The signal (to release the muting) is then supplied to the terminal (12) of the stereo multiplex demodulator integrated circuit IC102 to make the stereo signal be forced to monaural signal.

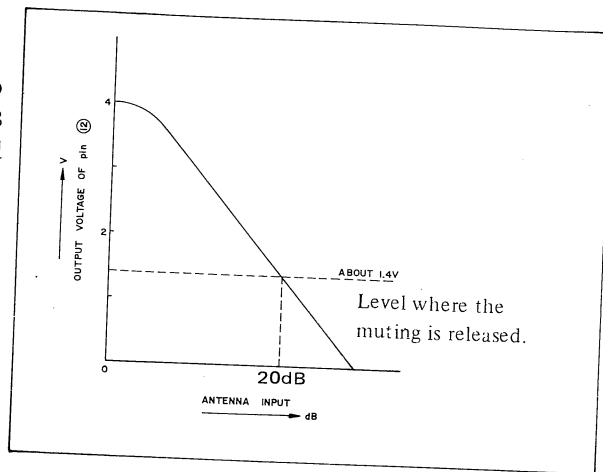


Figure 13

## LOW-PASS FILTER

LPF101 and LPF102 are low-pass filters to remove carrier signals (19 kHz and 38 kHz) leaking from the stereo multiplex IC102. The characteristic is as shown in the Figure 14.

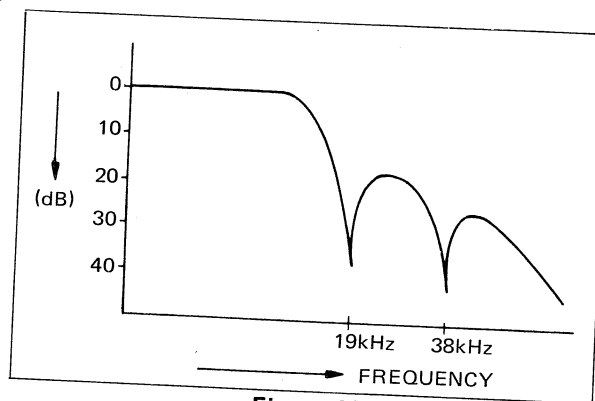


Figure 14

## TONE A

The tone control circuit is a differential amplifier in which both higher and lower frequencies are amplified. The power supply is 12V and the output is 10V. The designated level for the reduction of the output signal is 10V. The condition for the control is in particular, the condition for the control can be minimized.

## EQUALIZER

The equalizer circuit is a 1-stage and differential amplifier with higher gain and lower noise. The power supply is 12V and the output is 10V. The designated level for the reduction of the output signal is 10V. Signal coming from the function section is applied to the capacitor C401. The function of IC401 is to be a buffer out of the terminal. The capacitor C415 is connected to the switch (SW201-D) and is applied to the circuit used for the equalizer. Composed of resistors which are precisely aimed at "RIAA" deviation to  $\pm 1\%$ . Resistor R417 is connected from discharging at the time of the signal. Capacitors C407 and C408 are used for interference noise.

## tone amplifier circuit

The tone amplifier circuit is an integrated circuit (IC) of differential 1-stage and directly-coupled 3-stage, which assures both higher gain and lower distortion factor.

The power supply is of 2-power (positive and negative) system, in which the voltage at the input and output terminals is designated to be 0V. The coupling capacitor used for input and output signals is of the low leak type which enables reduction of residual noises. The variable resistor aimed to control bass and treble is able to control the resistance in particular when the set is kept in "mechanical center" condition so that beat characteristic at the tone flat mode can be minimized.

Signal coming from the function selector switch is once supplied to the tape monitor switch, mode switch, loudness switch, volume control (VR201-A, B) and balance control (VR202), and then to the terminal ② of IC201 via the capacitor C205. The signal is amplified in the IC201 to come out of the terminal ⑥ and it is applied to the filter circuit via the capacitor C217.

A part of the output signal of the coupling capacitor C217 is applied to the terminal ③ of IC201 through the tone NF circuit. The tone NF circuit consists of the bass control (VR203-A, B) and the treble control (VR204-A, B) which are to carry out intensification or attenuation respectively of bass and treble ranges. Each of the controls is adjustable every 2 dB.

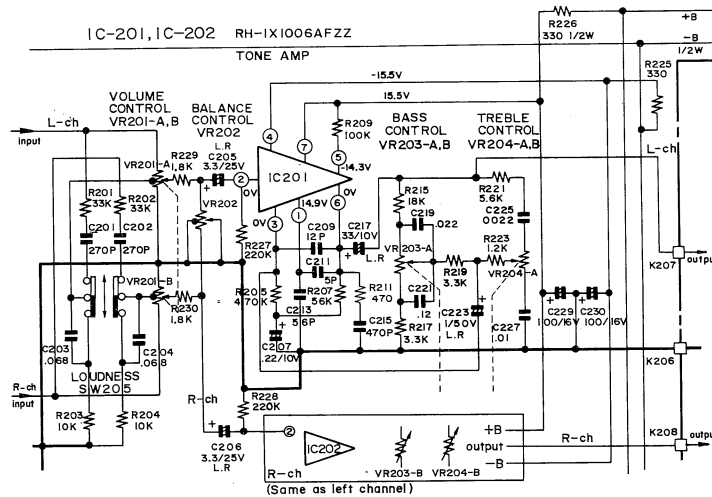


Figure 15

## equalizer amplifier circuit

The equalizer circuit is an integrated circuit of differential 1-stage and directly-coupled 3-stage, which assures both higher gain and lower distortion factor.

The power supply is of 2-power (positive and negative) system, in which the voltage at the input and output terminals is designated to be 0V. The coupling capacitor used for input and output signals is of the low leak type which enables reduction of residual noises.

Signal coming from the terminal PHONO is applied, via the function selector switch (SW201-B), resistor R401 and capacitor C401, to the terminal ② of the integrated circuit IC401 to be amplified. The signal thus amplified comes out of the terminal ⑥ of IC401 and it will be applied, via the capacitor C415 and resistor R415, to the function selector switch (SW201-A). By the way, a part of such output signal is applied to the terminal ③ of IC401 through the NF circuit used for increase of "RIAA" characteristic.

Composed of resistor R413 and capacitors C411 and C413 which are precision parts having too small error. NF element aiming at "RIAA" characteristic is able to restrict "RIAA" deviation to  $\pm 1.5$  dB.

Resistor R417 is respectively to prevent capacitor C415 from discharging and to eliminate noise generation caused at the time of selecting the switches.

Capacitors C407 and C409 are for the purpose to prevent interference noises due to SW broadcasts, etc.

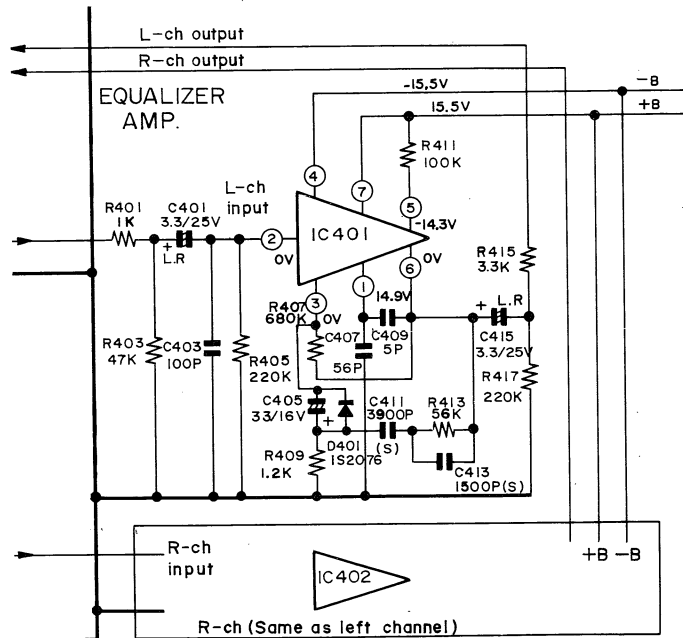


Figure 16

## MAIN AMPLIFIER SECTION

The main amplifier consists of all-stage direct-coupled pure complementary output capacitorless circuit.

This main amplifier is designed to operate on the 2-power (positive and negative) supply system and so the speaker terminal output voltage becomes earth potential (0V) in terms of DC component. Therefore, with this amplifier it is not necessary to use a coupling capacitor for cutting off DC component although it has so far been required when the speaker is connected to the amplifier. Besides, it enables the amplification in a wider range from lower frequency to higher frequency. This is an origin of the term OCL (Output Capacitor-Less).

### FEATURE OF PURE COMPLEMENTARY OCL CIRCUIT

Since this circuit is not using output capacitor, the frequency characteristic is kept uniform even at very low frequency band and the output impedance is low in any of frequency bands resulting in that the value of damping factor is made larger so that the braking efficiency of speaker is increased. With this circuit, since a 100 percent NF is assured when the frequency of signal is zero and the value of NF is determined at only one place when the frequency of signal is at low band, the function of circuit is stabilized.

### MAIN AMPLIFIER

The main amplifier is OCL (Output Capacitor-Less) circuit in which the class "A" drive circuit consists of 1-stage differential amplifier circuit.

The signal coming from the filter circuit is amplified by differential amplifier Q501 (or Q502) via resistor R503 (or R504) and capacitor C501 (or C502). The transistor used in this differential amplifier is a PNP type low noise dual transistor (2SA798 ©) the characteristic of which is almost not affected by fluctuations of temperature so that the voltage resulted in the speaker terminal is protected against such fluctuations and it is kept always to minimized.

Signal thus amplified by the differential amplifier is further amplified by the class "A" audio amplifier Q505 (or Q506). Moreover, the signal is amplified for the half cycle at the driver amplifier stage consisting of NPN type transistor Q507 (or Q508) and PNP type transistor Q509 (or Q510). Then, the signal is further amplified for the half cycle at NPN type transistor Q511 (or Q512) and PNP type transistor Q513 (or Q514) to be supplied to the speaker. Transistor Q503 (or Q504) is constant-current circuit and its amperage is determined by D503. Transistor Q503 (or Q504) is constant-current circuit to supply constant current so that the load applied to the class "A" driver Q505 (or Q506) will be reduced thus the gain being increased. As a result of the gain of Q505 (or Q506) being increased by Q503 (or Q504), plenty of NF is produced and so that distortion is lessened. NF factor of NF circuit is determined by resistors R513 (or R514) and R521 (or R522), and the higher NF factor, the higher is the gain. NF factor at the low frequency band is determined by capacitor C507 and resistor R513.

Transistor Q503 (or Q504) and Diode D503 (or D504) are to cause the bias of class "B" drive stage and to produce idling current of 33 ~ 100 mA so that cross-over distortion due to class "B" operation is eliminated. The idling current is to be adjusted by semi-variable resistor VR501 (or VR502).

Resistor R553 (or R554) and capacitor C513 (or C514) are to keep the power amplifier stabilized when given no load. Coil L501 (or L502) functions to prevent of high-frequency oscillation. Transistor Q515 (or Q516) works as protection circuit.

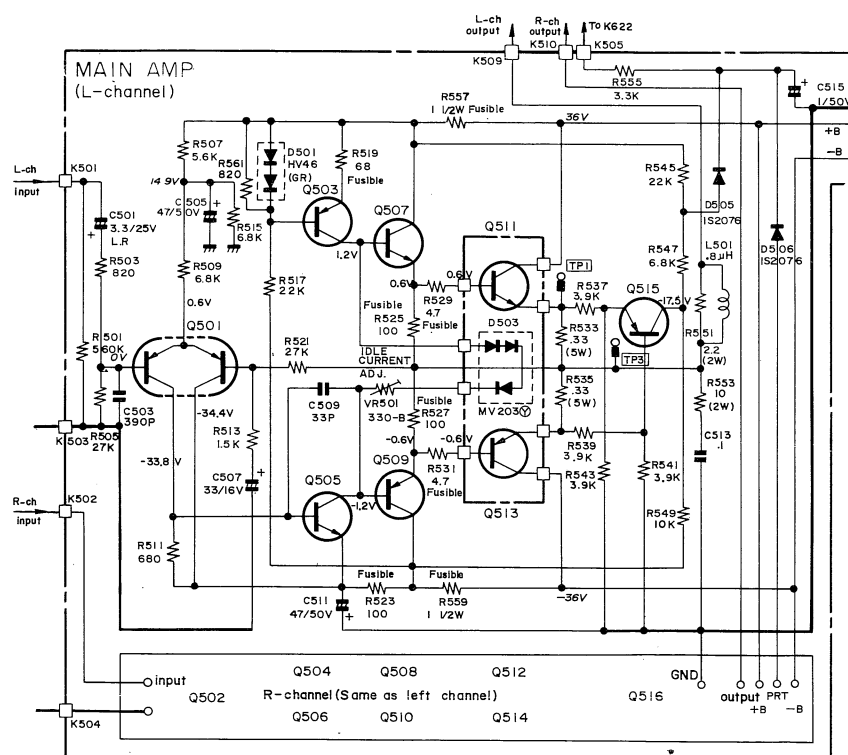


Figure 17 MAIN AMPLIFIER CIRCUIT

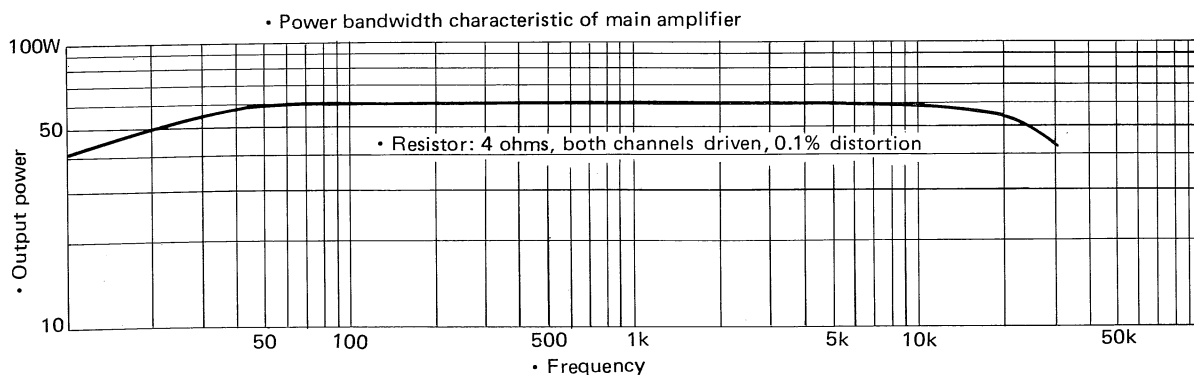


Figure 18

### PROTECTION CIRCUIT (RELAY CIRCUIT)

The protection circuit used in this set is so designed as to function in the following instances:

- (1) It protects the speaker against possible shock noise caused when the power switch is turned on.
- (2) It protects the speaker against possible shock noise caused when the power switch is turned off.
- (3) It functions when DC voltage is generated at the speaker terminal (for instance, when DC voltage gets unbalanced due to a trouble inside the amplifier.)
- (4) It functions when the speaker terminals are shorted and the load impedance is lowered (for instance, when several speakers are connected in parallel to the amplifier.)

Next, we will explain the basic operations of the protection circuit.

The protection circuit is made of two circuits, namely.

Schmitt trigger circuit consisting of transistors Q603 and Q604 and abnormality detection circuit consisting of transistors Q601, Q602, Q515 and Q516.

As to Schmitt trigger circuit, when the base voltage of the transistor Q603 is lower, the transistor Q603 does not function; in other words, the relay does not function since it is given no current so that the speaker circuit is shut off. D802 is 2-color LED (Light Emitting Diode) and it is so designed that it will light up green when the relay is turned on and red when the it is turned off.

Transistors Q601 and Q602 are detection circuits respectively of negative signal and positive signal and each of the two is turned on when given the signal to discharge the potential charged in the capacitor C605, so that the base voltage of the transistor Q603 is decreased and the relay is turned off.

Capacitors C603 and C604 and resistors R606 and R605 are a low-pass filter which prevents mis-operation of the relay due to sound signal. And diode D603 is to absorb the voltage possibly induced when the relay turns on or off.

The above will be further described in detail:

- (1) When the power switch SW801 is set to "on" position, the base voltage of Schmitt trigger transistor Q603 is increased by means of resistors R609 and R608 to have the transistor Q603 be turned on, and thus the relay starts to function. During this process, it is so designed that: since capacitor C605 is being inserted to the base of the transistor Q603, the base voltage of Q603 is kept lower than its emitter voltage until the power supply voltage to the protection circuit will become stabilized and so, during that time, the transistor Q603 is kept off so that the relay does not function since it is given no current. Thus time constant of the relay is determined so that the relay begins to function about 3 to 5 seconds after the power switch is turned on --- in a while the circuits are stabilized to make alive the speakers' connection.

Simultaneously with the above operation, another Schmitt trigger transistor Q604 is turned on and a current runs in the direction which makes the light emitting diode D802 be lit in red.

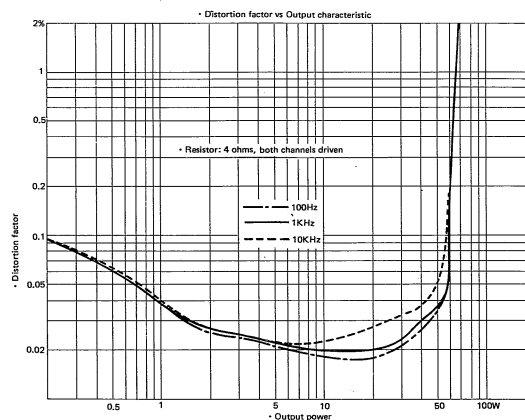


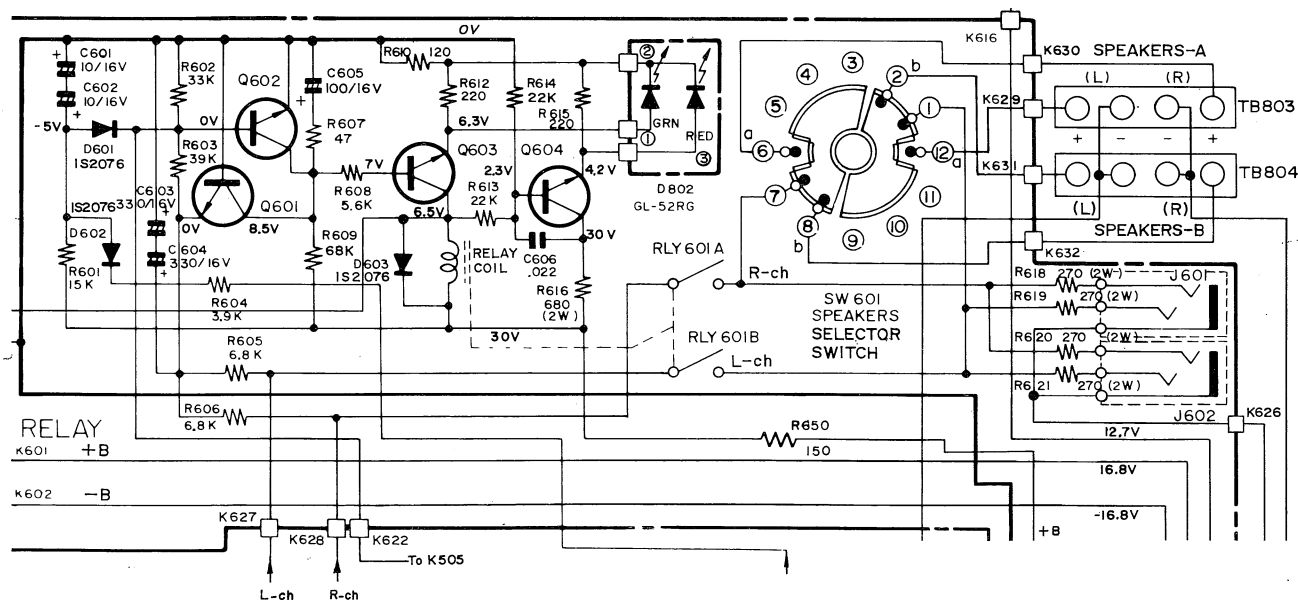
Figure 19

**POWER**  
 Power  
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 of dio  
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 Capac  
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When the power supply voltage is thus stabilized, voltage is charged in the capacitor C605 via resistors R609 and R607 to make the base voltage of the transistor Q603 reach the working point so that the transistor Q603 becomes turned on (at the time, the transistor Q604 is turned off.) A current runs in the relay and the relay begins the operation so that amplifier output will be connected to the speaker terminal. At the time, a current coming from the transistor Q603 runs in the direction which makes the light emitting diode D802 be lit in green.

- (2) The protection circuit is so designed that when the power switch is kept at "on" position, the transistor Q602 is unable to be turned on because a negative voltage coming from the negative rectifier circuit composed of diode D602 and resistor R604 is balanced to a positive voltage coming from the resistor R601. Contrary to the above, when the power switch is set to "off" position, the protection circuit is so designed that: a negative voltage is attenuated faster than a positive one as result of the determination of time constant and so the positive voltage is supplied to the base of transistor Q602 and thus the transistor Q602 is turned on. Then the capacitor C605 begins to discharge so that the base voltage of transistor Q603 is decreased and the transistor Q603 is turned off --- no current runs in the relay and connection of the amplifier output to the speaker terminal is cut off. In short, the protection circuit functions to cut off connection between the amplifier output and the speaker terminal as soon as the power switch is switched off.
- (3) If there appears DC voltage (positive or negative) at the speaker terminal, positive or negative voltage is applied to the transistors Q601 and Q602 through the resistors R605 and R606. As to the positive voltage, it is applied to the base of transistor Q602 via the resistor R603 to have the transistor Q602 be turned on. As to the negative voltage, the emitter voltage of transistor Q601 becomes lower than its base voltage to make the transistor Q601 be turned on. This results in that no current runs in the relay so that connection of the amplifier output to the speaker terminal will be cut off.
- (4) If the speaker terminals are shorted or the load impedance is lowered (for instance, due to connection of the speakers of less than 4 ohms), this can cause a large current to run through the power transistor to be damaged. This trouble can also be avoided by the protection circuit.

If it is supposed that a current of more than the rated value runs in the power transistor, the protection circuit tends to detect abnormal voltage caused at the emitter resistors R533 and R535 (R534 and R536) of the power transistor so that the transistor Q515 (or Q516) is turned on. The voltage thus produced is applied to the base of transistor Q602 via the diode D505 (or D506) and resistor R555 and so the transistor Q602 is turned on. In this way, the protection circuit provides the same effect as said hereinbefore.



**Figure 20 PROTECTION CIRCUIT (RELAY CIRCUIT)**

# POWER SUPPLY CIRCUIT

Power supply to the main amplifier section is depended upon the 2-power supply system. With this 2-power supply system, AC voltage coming from the power transformer T801 is subjected to rectification by the bridge full-wave rectifier circuit consisting of diodes D507, D508, D509 and D510 and then be smoothed by the low impedance dual-capacitor C520 and C521 to become DC voltage to finally be supplied to the main amplifier circuit section. The DC voltage thus smoothed is further applied to the ripple filter circuit to become stabilized so that it will be supplied to the tone circuit and equalizer circuit. Besides, to both the FM circuit section and AM circuit section is also supplied the power voltage thus smoothed after it has been stabilized by the ripple filter circuit (transistor Q609). Capacitors C516 to C519 are for the purpose to eliminate noise possibly caused with switching of the diodes D507 to D510 and that arising from the power transformer primary side.

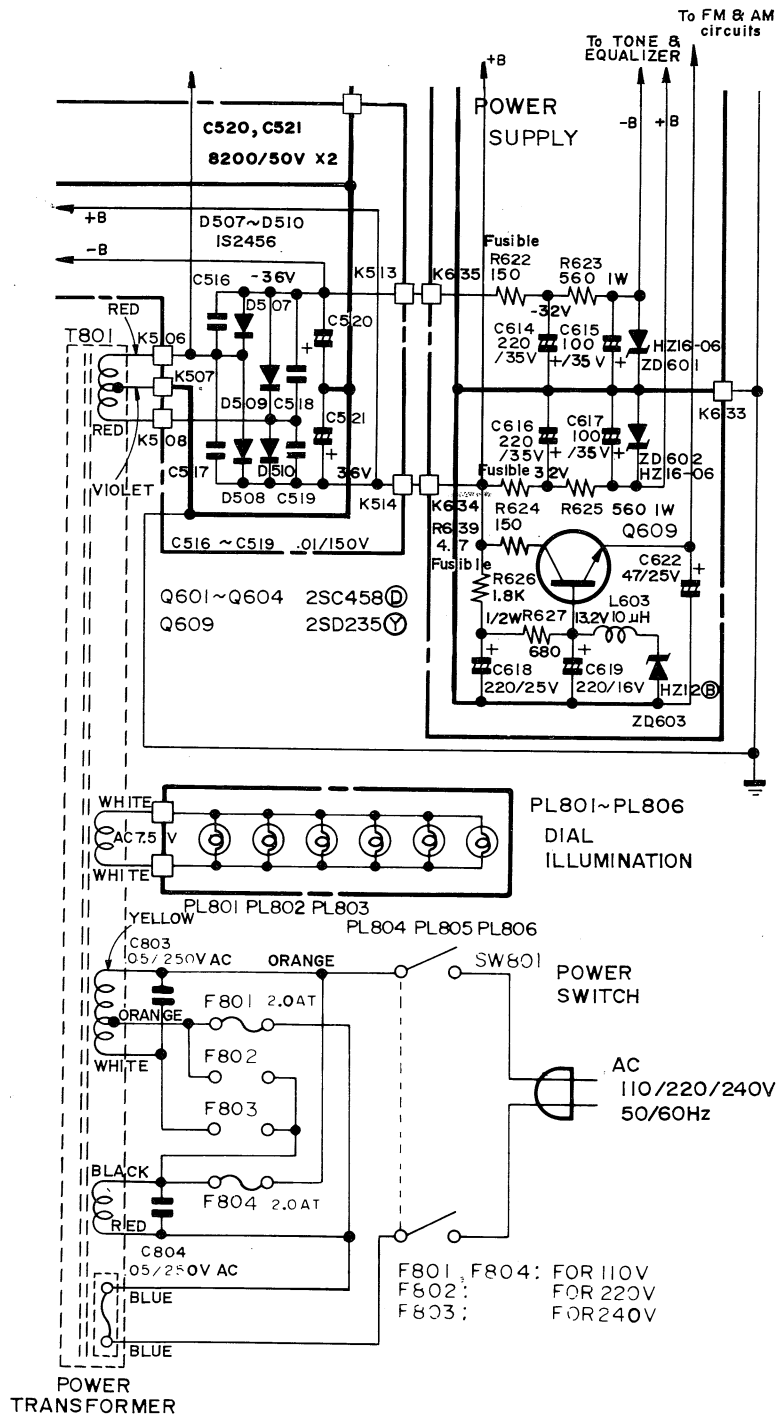


Figure 21 POWER SUPPLY CIRCUIT



## ALIGNMENT INSTRUCTIONS

Alignment is an exacting procedure and should be undertaken only when necessary. If alignment of AM (LW, MW) and FM is required, either section may be done first. The FM stereo section, however, should be done only if the FM monaural section is properly adjusted.

### REQUIRED EQUIPMENT

1. Signal generator with a frequency range of 145 kHz to 1650 kHz; AM (MW, LW)
2. Signal generator with a frequency range of 86.1 MHz to 109.2 MHz; FM
3. Signal generator with a frequency output of 10.7 MHz  $\pm$ 0.5 MHz; FM
4. Vacuum tube voltmeter (AC-VTVM)
5. Sweep signal generator with a sweep range of at least 500 kHz and center frequency of 10.7 MHz with at least a 10.7 MHz marker may be used.
6. Oscilloscope with a wide range amplifier of approximately 100 kHz.
7. Test loops, a coil of any size wire, one turn or more; AM (MW, LW)
8. Vacuum tube voltmeter (DC-VTVM)
9. FM stereo signal generator.
10. Audio signal generator with a frequency range of 20 Hz to 100 kHz.
11. Frequency counter with a frequency range of approximately 100 kHz.

**Notes:** Allow the set at least five minutes to warm up before attempting alignment. During alignment keep the signal generator output at the lowest level that will maintain a usable output from the set.

For the adjustment of stereo separation, the FM stereo generator output is usually 1,000 $\mu$ V. Incorrect grounding to the metal chassis may pick up an unwanted 10.7 MHz signal from the final IF stage, which will cause a regenerative sweep response on the sweep curve and result in misalignment.

Therefore always connect a ground to point.

|                                       |  |
|---------------------------------------|--|
| Ground connection of signal generator | Chassis ground                         |
| Generator modulation (AM)             | 30%, 400 Hz                            |
| Generator modulation (FM)             | 40 kHz, 400 Hz                         |
| Generator modulation (FM stereo)      | Ch. L. or Ch. R. 40 kHz, 1,000 Hz Mod. |

### THE INSTRUCTION OF FM FREQUENCY ADJUSTMENT

In order to comply with FTZ rule: Nr. 358 S757, please fix the low end of dial frequency (87.5 MHz) and high end of dial frequency (107.9 MHz) on FM band, by adjusting oscillation coil (L4) and oscillation trimmer (TC3), respectively, as illustrated in Figure 22.

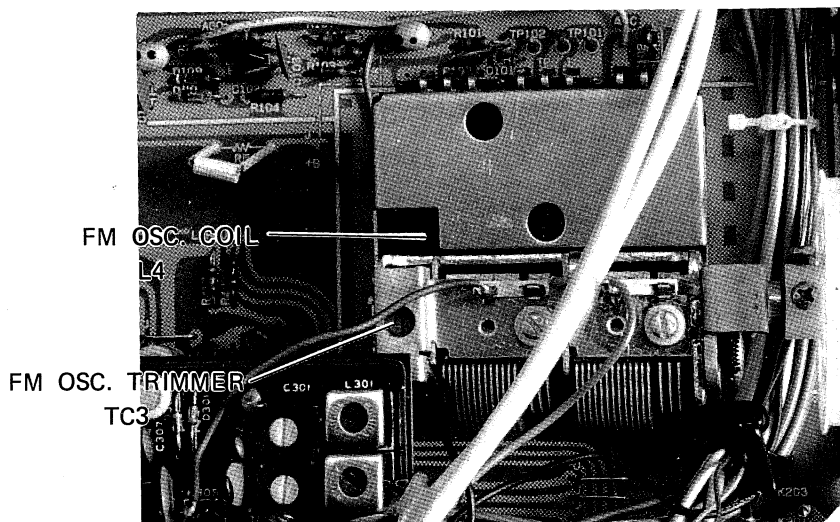


Figure 22 FM FRONT-END

## AF ALIGNMENT

- 1) Set the volume control to the position "minimum" and other switches to the position "normal".
- 2) Turn on the power switch of the set.
- 3) Use DC VTVM to make sure that the voltage between TP3 and K515 (ground) and that between TP4 and K515 (ground) are within the range of  $\pm 30\text{mV}$ .
- 4) Only after the above check, it is possible to proceed with the next adjustments.

| PROCEDURE NUMBER | ALIGNMENT    | METER       | OUTPUT INDICATOR   | SETTING   | ADJUSTMENT    | REMARKS |
|------------------|--------------|-------------|--|---|---------------|---------|
| 1                | Idle Current | DC V.T.V.M. | DC V.T.V.M. is connected between TP1 (TP2) and TP3 (TP4) | Volume is minimum position. Other knobs are normal position | VR501 (VR502) | 15 mV   |

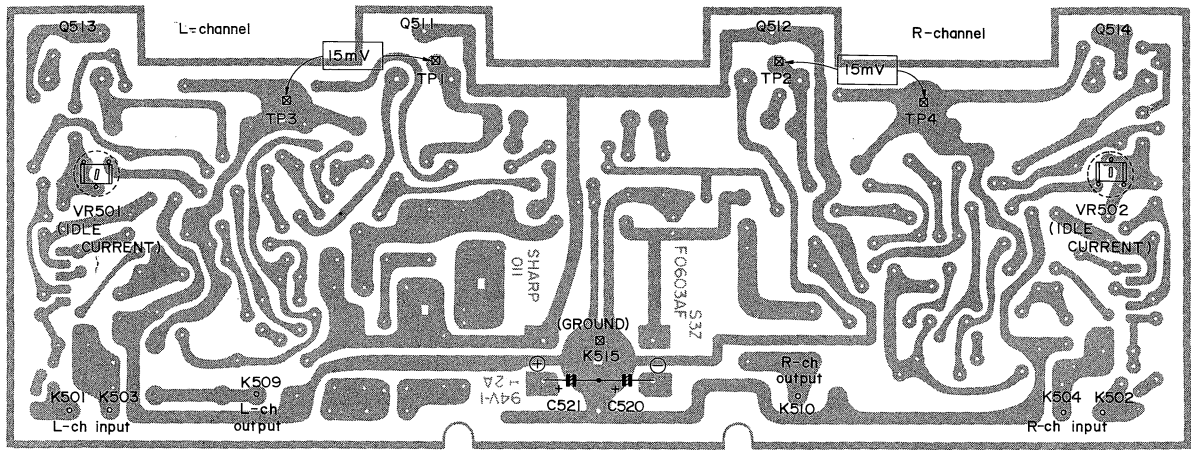


Figure 23 ALIGNMENT POINTS OF POWER AMP. BOARD

### AM IF ALIGNMENT (MW,LW)

| PROCEDURE NUMBER | SWEEP GENERATOR  |           | DIAL POINTER SETTING | SELECTOR SETTING   | SCOPE CONNECTION   | ADJUSTMENT | REMARKS   |
|------------------|--|-----------|----------------------|--------------------|--|------------|---|
|                  | CONNECTION   | FREQUENCY |                      |                    |  |            |   |
| 1                | Connect AM sweep generator to the test point TP303 (VC4) and variable capacitor case (ground). Keep the input be closed as much as possible. | 455 kHz   | High end of Dial     | Band Selector (MW) | Oscilloscope is connected between TP301 and TP302 (ground) | L303       | Maximum response at 455 kHz<br>Repeat 2 or 3 times. |

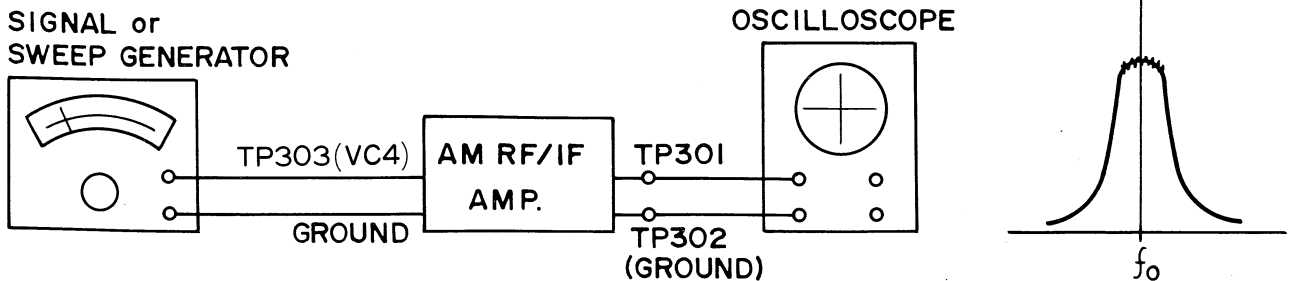


Figure 24 AM IF ALIGNMENT EQUIPMENT CONNECTIONS

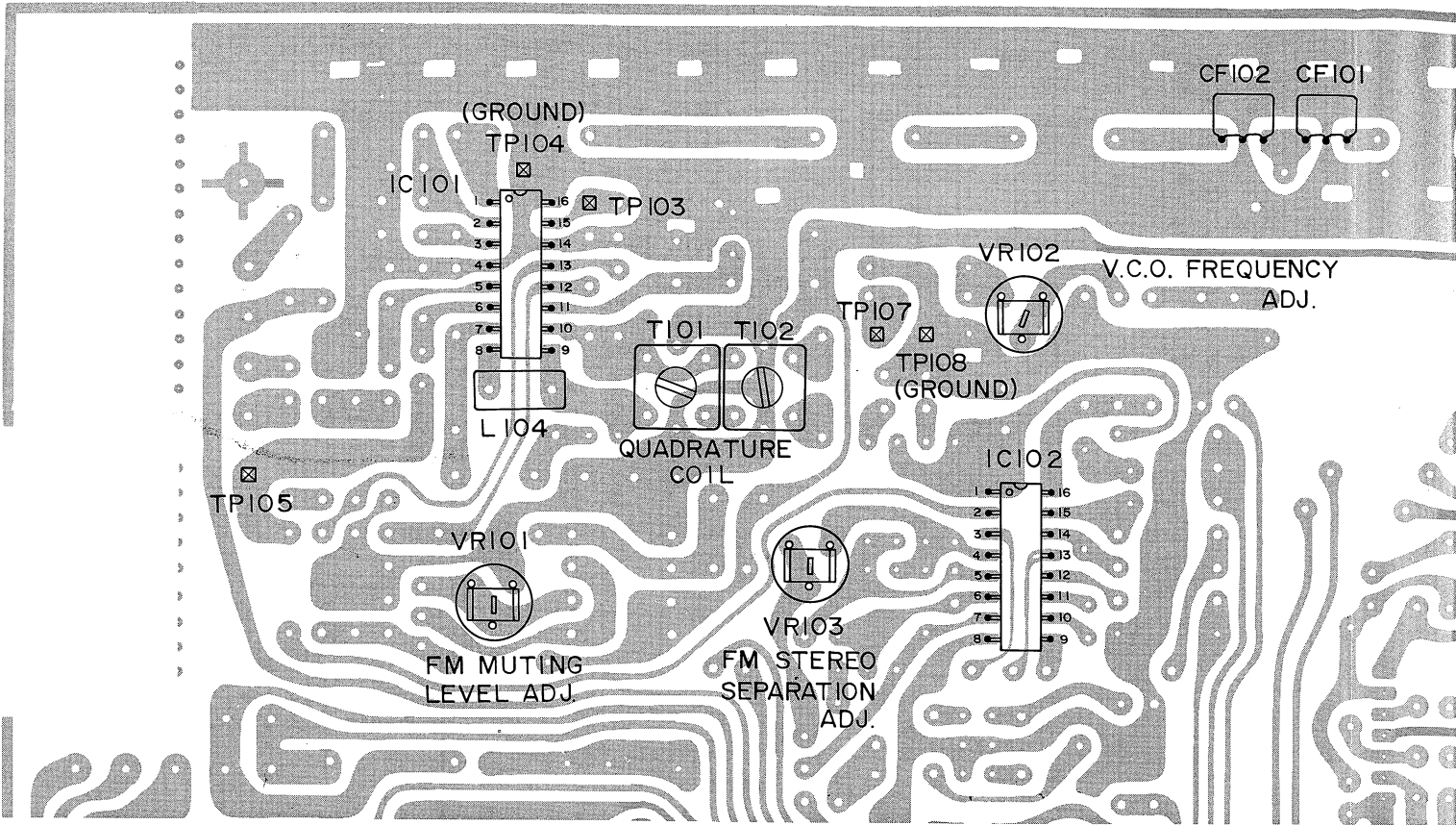


Figure 25 ALIGNMENT POINTS OF FM RF/IF

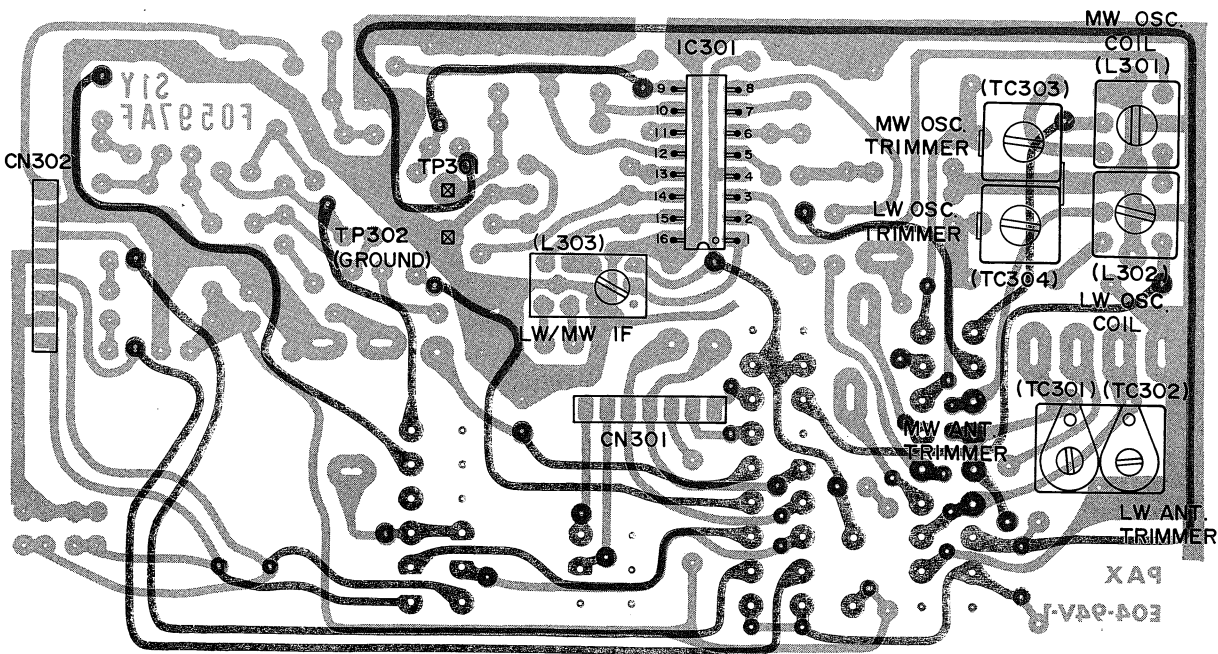
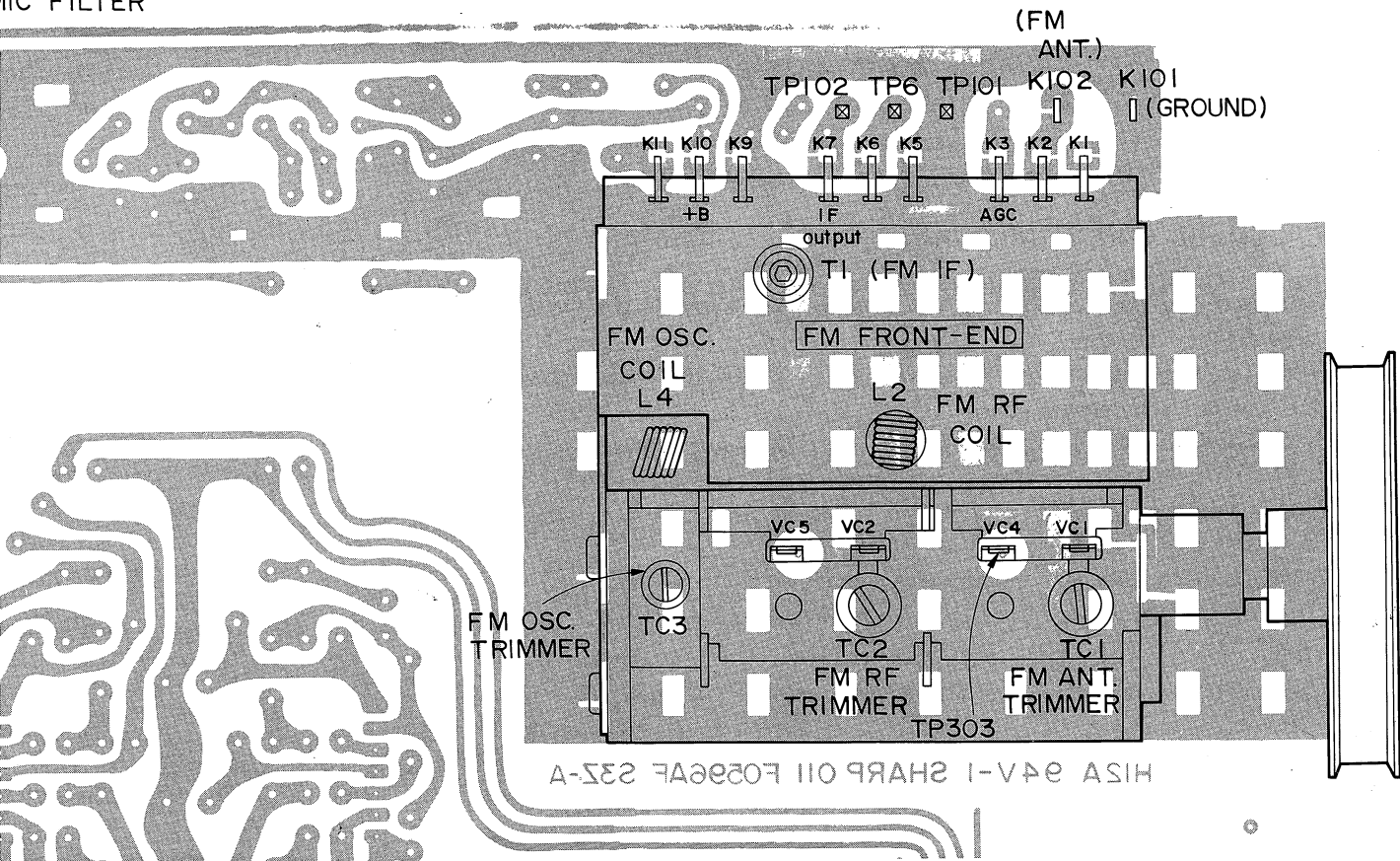


Figure 26 ALIGNMENT POINTS OF AM RF/IF BOARD

| Rotat | PROC | DURE | NUM |
|-------|------|------|-----|
|       |      |      | 1   |
|       |      |      | 2   |
|       |      |      | 3   |
|       |      |      | 4   |



FM RF/IF, EQUALIZER BOARD

### MW RF ALIGNMENT

Rotate the core of LW oscillation coil L302 fully clockwise.

| PROCEDURE NUMBER | TEST STAGE    | SIGNAL GENERATOR                     |                    | DIAL POINTER SETTING | SELECTOR SETTING   | SCOPE CONNECTION   | ADJUSTMENT               | REMARKS   |
|------------------|---------------|--------------------------------------|--------------------|----------------------|--------------------|--|--------------------------|---|
|                  |               | CONNECTION                           | FREQUENCY          |                      |                    |  |                          |   |
| 1                | Band Coverage | Radiated signal as small as possible | 515 kHz Modulated  | Low end of Dial      | Band Selector (MW) | Oscilloscope is connected between TP301 and TP302 (ground) | Oscillator Coil L301     | Adjust for maximum output                         |
| 2                |               | Radiated signal as small as possible | 1650 kHz Modulated | High end of Dial     | Same as above      | Same as above  | Oscillator Trimmer TC303 | Same as above Repeat steps 1 and 2, 2 or 3 times. |
| 3                | Tracking      | Radiated signal as small as possible | 1400 kHz Modulated | 1400 kHz             | Same as above      | Same as step 1   | Antenna Trimmer TC301    | Same as step 1                                    |
| 4                |               | Radiated signal as small as possible | 600 kHz Modulated  | 600 kHz              | Same as above      | Same as step 1   | Antenna Coil L802-B      | Same as above Repeat steps 3 and 4, 2 or 3 times. |

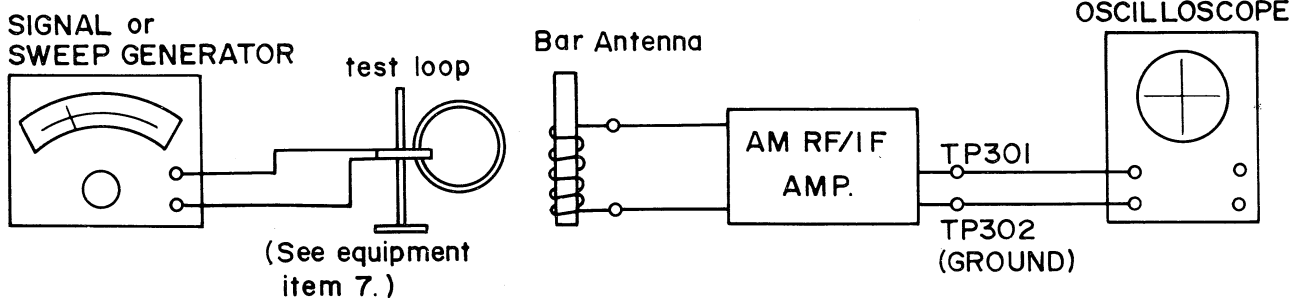


Figure 27 MW/LW RF ALIGNMENT EQUIPMENT CONNECTIONS

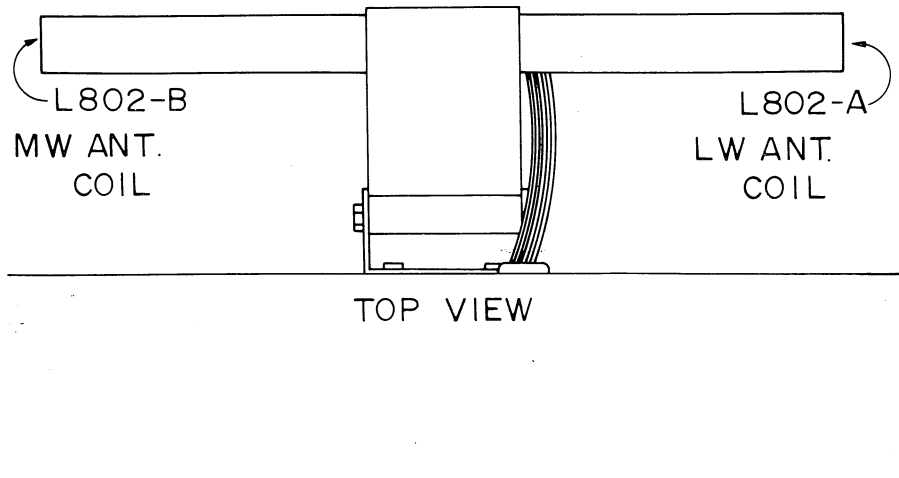


Figure 28 LW/MW BAR ANTENNA

### LW RF ALIGNMENT

| PROCEDURE NUMBER | TEST STAGE    | SIGNAL GENERATOR                     |                   | DIAL POINTER SETTING | SELECTOR SETTING   | SCOPE CONNECTION   | ADJUSTMENT               | REMARKS   |
|------------------|---------------|--------------------------------------|-------------------|----------------------|--------------------|--|--------------------------|---|
|                  |               | CONNECTION                           | FREQUENCY         |                      |                    |  |                          |   |
| 1                | Band Coverage | Radiated signal as small as possible | 145 kHz Modulated | Low end of Dial      | Band Selector (LW) | Oscilloscope is connected between TP301 and TP302 (ground) | Oscillator Coil L302.    | Adjust for maximum output                         |
| 2                |               | Radiated signal as small as possible | 385 kHz Modulated | High end of Dial     | Same as above      | Same as above  | Oscillator Trimmer TC304 | Same as above Repeat steps 1 and 2, 2 or 3 times. |
| 3                | Tracking      | Radiated signal as small as possible | 340 kHz Modulated | 340 kHz              | Same as above      | Same as step 1   | Antenna Trimmer TC302    | Same as step 1                                    |
| 4                |               | Radiated signal as small as possible | 170 kHz Modulated | 170 kHz              | Same as above      | Same as step 1   | Antenna Coil L802-A      | Same as above Repeat steps 3 and 4, 2 or 3 times. |
| 5                |               | Same as above                        | 145 kHz Modulated | 145 kHz              | Same as above      | Same as step 1   | Same as above            | Same as above                                     |

## FM ALIGNMENT

Set the FM Muting switch (SW301-D) at "OFF" position.

| PROCEDURE NUMBER | TEST STAGE                | SIGNAL GENERATOR  |   | DIAL POINTER SETTING | SELECTOR SETTING            | METER CONNECTION   | ADJUSTMENT                             | REMARKS   |
|------------------|---------------------------|---|---|----------------------|-----------------------------|--|--|---|
|                  |                           | CONNECTION  | FREQUENCY                               |                      |                             |  |  |   |
| 1                | IF<br>(NOTE 1 and 2)      | Connect FM sweep generator, through 6PF capacitor, to the test point TP6. Connect the ground to the test point TP101.   | 10.7MHz±500 kHz as small as possible.   | High end of dial     | Band Selector(FM), and mono | Connect an oscilloscope to the test points TP103 and TP104 (ground). | T1                                     | Rotate the core of T1 to adjust so that the waveform becomes symmetrical in right and left and attains the maximum in height and width. |
| 2                | Detector                  | Connect FM sweep generator, through 6PF capacitor, to the test point TP102. Connect the ground to the test point TP101. | Same as above                           | Same as above.       | Band Selector(FM) and mono  | Connect an oscilloscope to the test points TP105 and TP104 (ground). | T101, T102                             | Rotate the core to adjust so that the waveform (Fig. 31) becomes symmetrical in the upper and lower with the best linearity.            |
| 3                | Band Coverage<br>(NOTE 1) | FM Antenna  | 88MHz as small as possible (Modulated)  | Low end of dial.     | Band Selector(FM) and mono  | Connect VTVM to the test points TP105 and TP104 (ground)             | Oscillator coil L4                     | Adjust for maximum output.  |
| 4                |                           | FM Antenna  | 108MHz (Modulated) as small as possible | High end of dial.    | Band Selector(FM) and mono  | Same as above  | Oscillator trimmer TC3.                | Same as above 3~4. Repeat 2 or 3 times.   |
| 5                | Tracking<br>(NOTE 1)      | FM Antenna  | 90MHz (Modulated) as small as possible  | 90MHz                | Band Selector(FM) and mono  | Same as step 3   | Antenna coil L1 and RF coil L2         | Same as step 3  |
| 6                |                           | FM Antenna  | 106MHz (Modulated) as small as possible | 106MHz               | Band Selector(FM) and mono  | Same as step 3   | Antenna trimmer TC1 and RF trimmer TC2 | Same as above 5~6. Repeat 2 or 3 times.   |

**Note 1**

As to FM high frequency section (front-end section), there is no need to readjust the coil and trimmer since it has been factory-adjusted. It is allowed to readjust them only when there occurs a significant deviation about the preadjustment.

SIGNAL OR SWEEP GENERATOR  
10.7MHz, ±500kHz

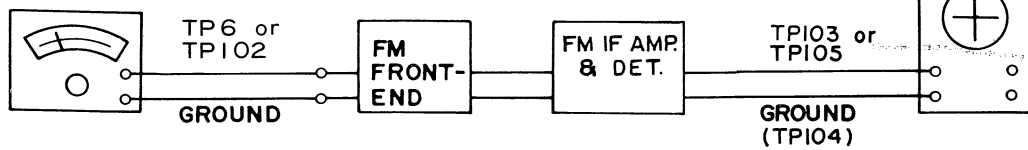


Figure 30 "IF" curve

SIGNAL OR SWEEP GENERATOR  
10.7MHz, ±500kHz

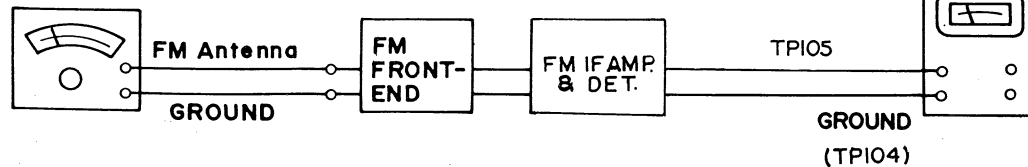


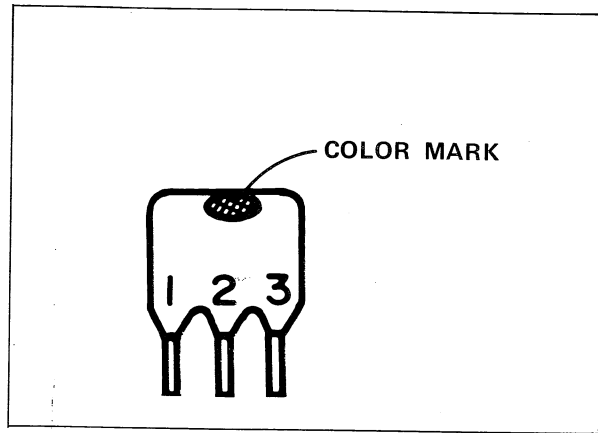
Figure 31 "S" curve

Figure 29 FM ALIGNMENT EQUIPMENT CONNECTIONS

**Note 2**

The ceramic filter used for this set is available in 5 types and each of them is given a color indication to differentiate the central frequency from that of the others, as described below. In the actual use, be sure to make 2 ceramic filters of the same type (the same color) as a pair to put them in the set. When other ceramic filters than that given a red color indication (with the central frequency of 10.7 MHz) are used, note that with such filters the marker (10.7 MHz) of FM sweep generator will be deviated; therefore be sure to cut off the marker at the time of the adjustment.

|                           |        |                        |
|---------------------------|--------|------------------------|
| Central<br>Frequency (fo) | Green  | 10.60 MHz $\pm$ 30 kHz |
|                           | Black  | 10.65 MHz $\pm$ 30 kHz |
|                           | Red    | 10.70 MHz $\pm$ 30 kHz |
|                           | White  | 10.75 MHz $\pm$ 30 kHz |
|                           | Yellow | 10.80 MHz $\pm$ 30 kHz |



**Figure 32**

**FM TUNING METER ADJUSTMENT AND DISTORTION FACTOR ADJUSTMENT**

- 1) Set the frequency of FM signal generator to 98 MHz (75 kHz deviation), fully close the output and connect such signal to the FM antenna terminal of the set through a dummy resistor of 240 ohms.
- 2) Connect a dummy resistor of 4 ohms to the speaker terminal of the set.
- 3) Set the switches and controls of the set to the respective positions shown below and turn on the power switch. (Audio muting—0dB, Low cut filter—off, Bass, Treble and Balance controls—center (zero), Mode—mono, Loudness—off, Volume control—min., Tape (monitor/dubbing)—source, Function selector—tuner, Band selector—FM, FM muting—off)
- 4) Keeping the output of FM signal generator be fully closed (that is, with no signal given), rotate the core of T101 to have the pointer of the tuning meter indicate the center (around "98 MHz" position.)
- 5) Adjust the output of FM signal generator to 60 dB, make the set be tuned to this signal so that the tuning meter indicates its center and under the condition, adjust the core of T102 so that the distortion will be minimized.
- 6) Fully close the output of FM signal generator and make sure the pointer of the tuning meter is at the center.
- 7) Repeat the steps 1) to 6) until the best point will be found.

FM M  
1) Co  
2) As  
MI  
3) Se  
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so  
5) Se  
"st  
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FM  
Mo

## FM MUTING ADJUSTMENT AND FM STEREO V.C.O., SEPARATION ADJUSTMENT

- 1) Connect FM signal generator, through a dummy resistor of 240 ohms, to the FM antenna terminal of the set.
- 2) As to setting of the switches and controls, take the same procedures as in the step 3 "FM TUNING METER ADJUSTMENT AND DISTORTION FACTOR ADJUSTMENT".
- 3) Set the frequency of FM signal generator to 98 MHz (40 kHz deviation, 400 Hz) and the output to 20 dB.
- 4) Have the set be tuned in 98 MHz signal, turn on FM muting switch, rotate the semi-fixed resistor VR101 to adjust so that the muting is able to be cleared with the output of FM signal generator being 20 dB.
- 5) Set the output of FM signal generator to 60 dB (mono signal), place the mode switch of the set to the position "stereo" and let the set be exactly tuned to such signal. (FM muting switch is kept to the position "muting off".)
- 6) Connect VTVM between the test points TP107 and TP108 (ground) and further connect a frequency counter to output terminal of the said VTVM.

Make the test points TP105 and TP104 (ground) of the set be connected (shorted). Rotate the semi-fixed resistor VR102 to adjust so that the frequency counter will read 76.00 kHz  $\pm$  200 Hz. (After the adjustment; reset the connection between the test points TP105 and TP104.)

- 7) Connect FM stereo modulator to FM signal generator. At the time, the following should be set: modulation frequency; 1kHz (L + R; 20kHz, L-R; 20kHz, pilot (19kHz); 6kHz deviation).
- 8) Set the frequency of FM signal generator to 98 MHz and its output to 60 dB, tune the set in such signal so that the tuning meter will indicate the position "center". Set the modulator so as to cause modulation only in L-channel and consider the output of L-channel as 0 dB. Connect VTVM to the output terminal (R-channel side only) of the set and adjust semi-fixed resistor VR103 so that the separation becomes maximum (the output leaking to the opposite channel is minimized.)

Take the above procedures also for checking the separation of R-channel, then, adjust so that the separations of both channels will be equal to each other.

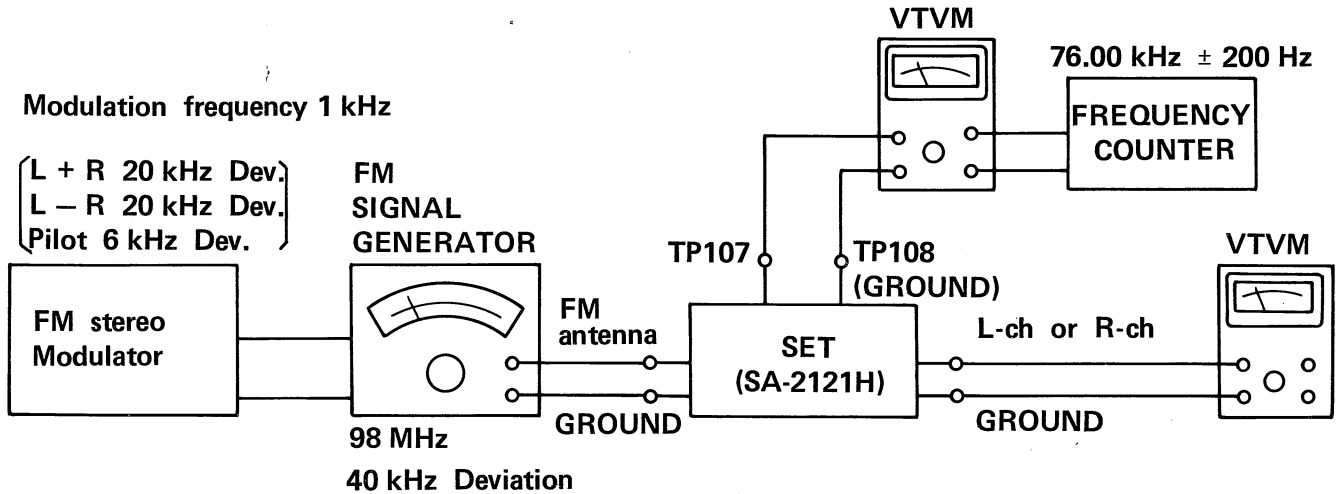


Figure 33 FM STEREO ALIGNMENT EQUIPMENT CONNECTIONS



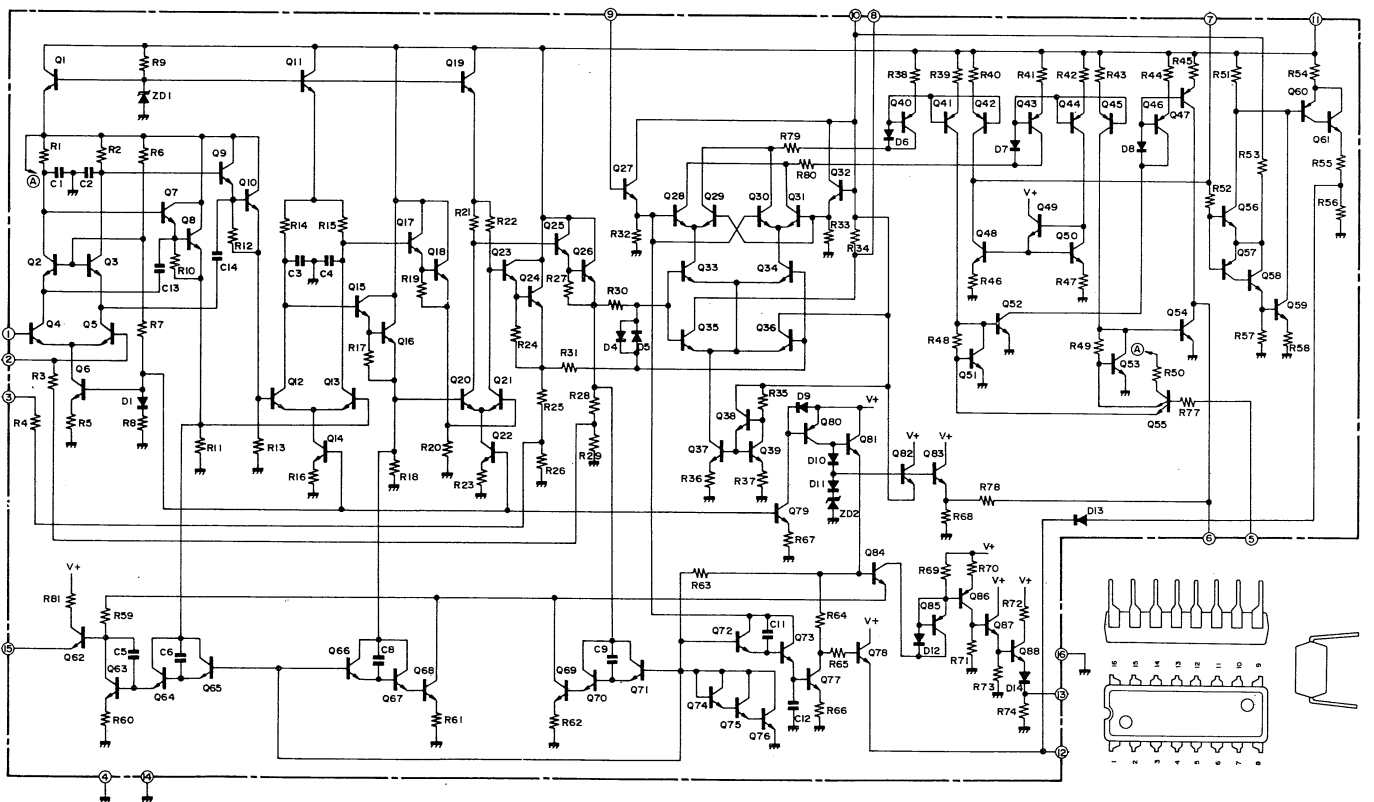
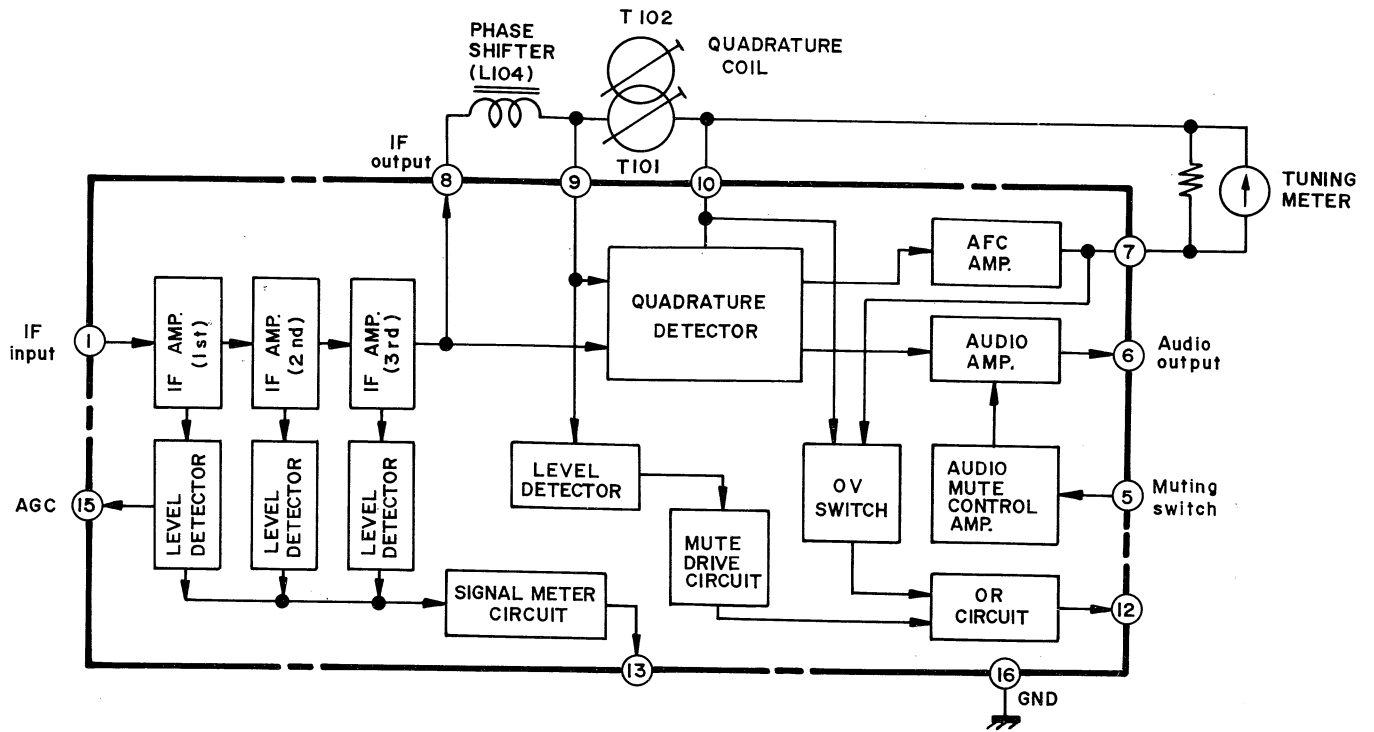


Figure 34 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC101)

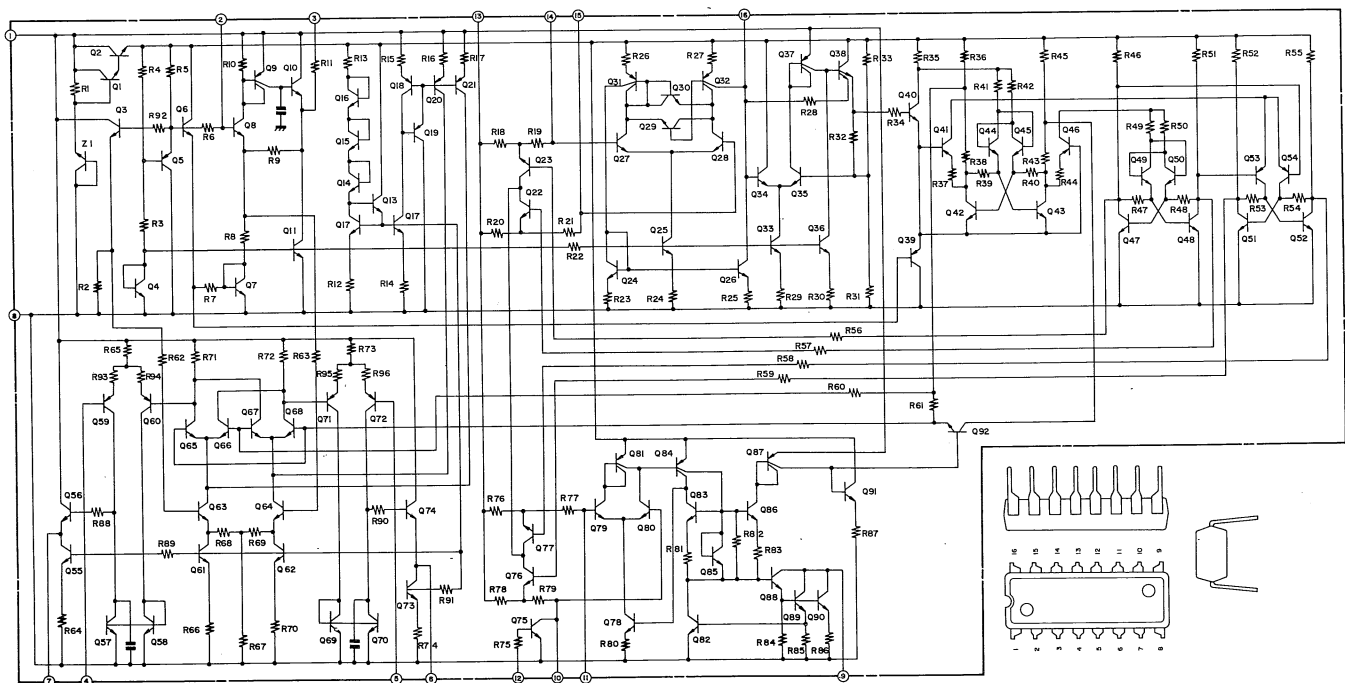
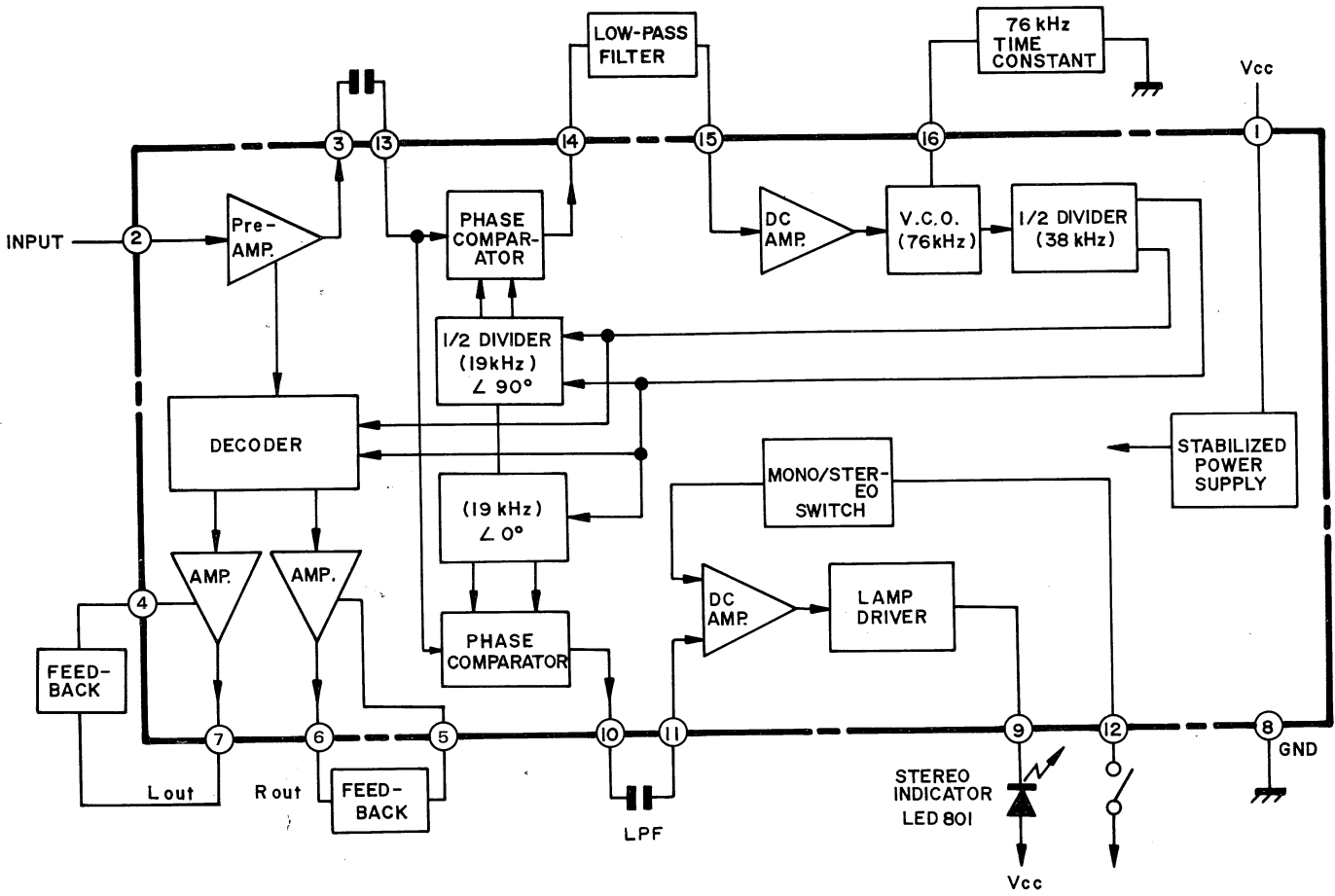


Figure 35 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC102)

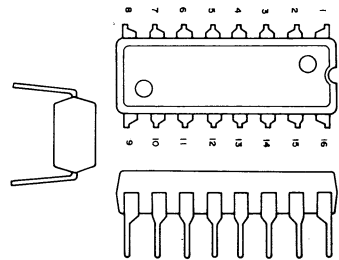
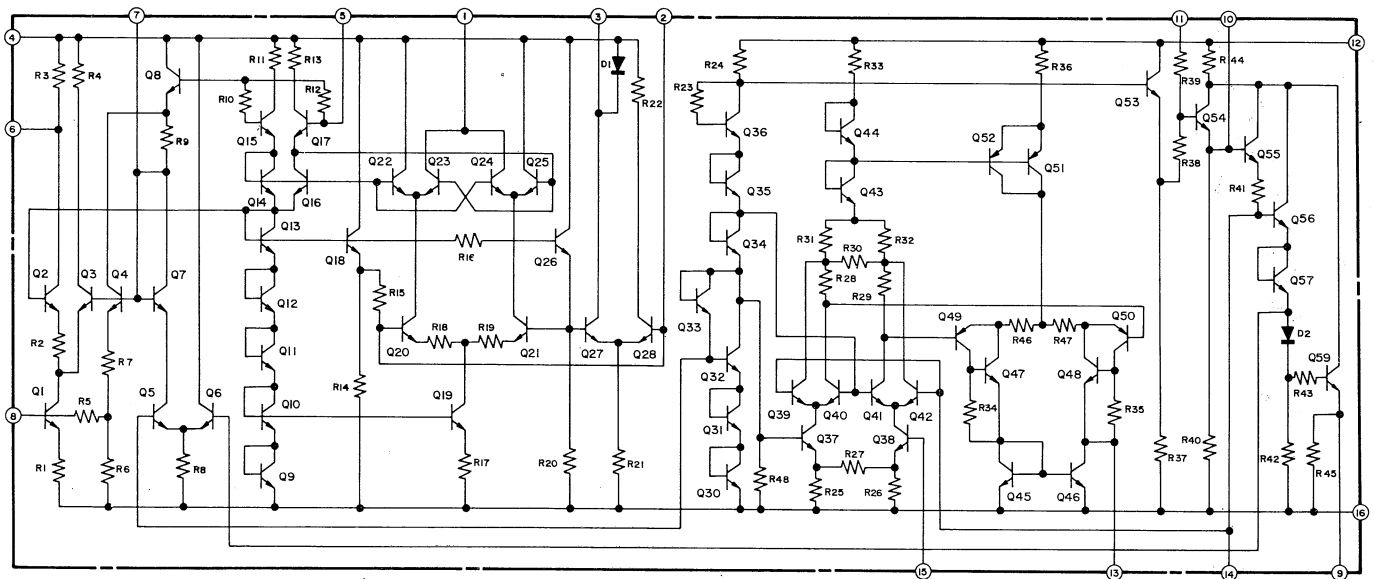
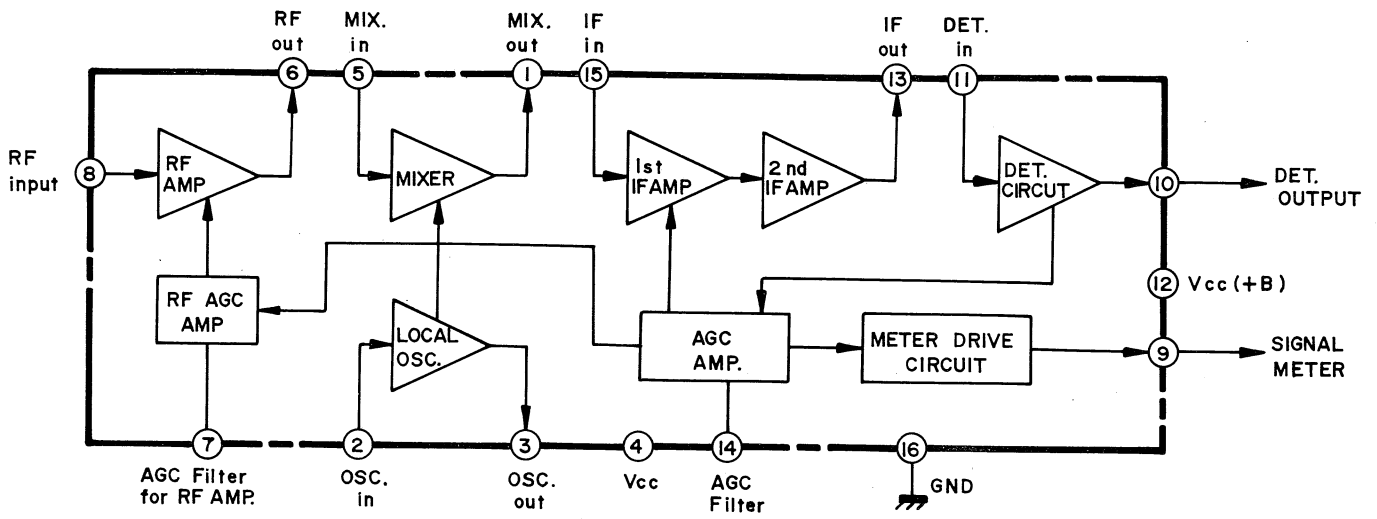


Figure 36 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC301)

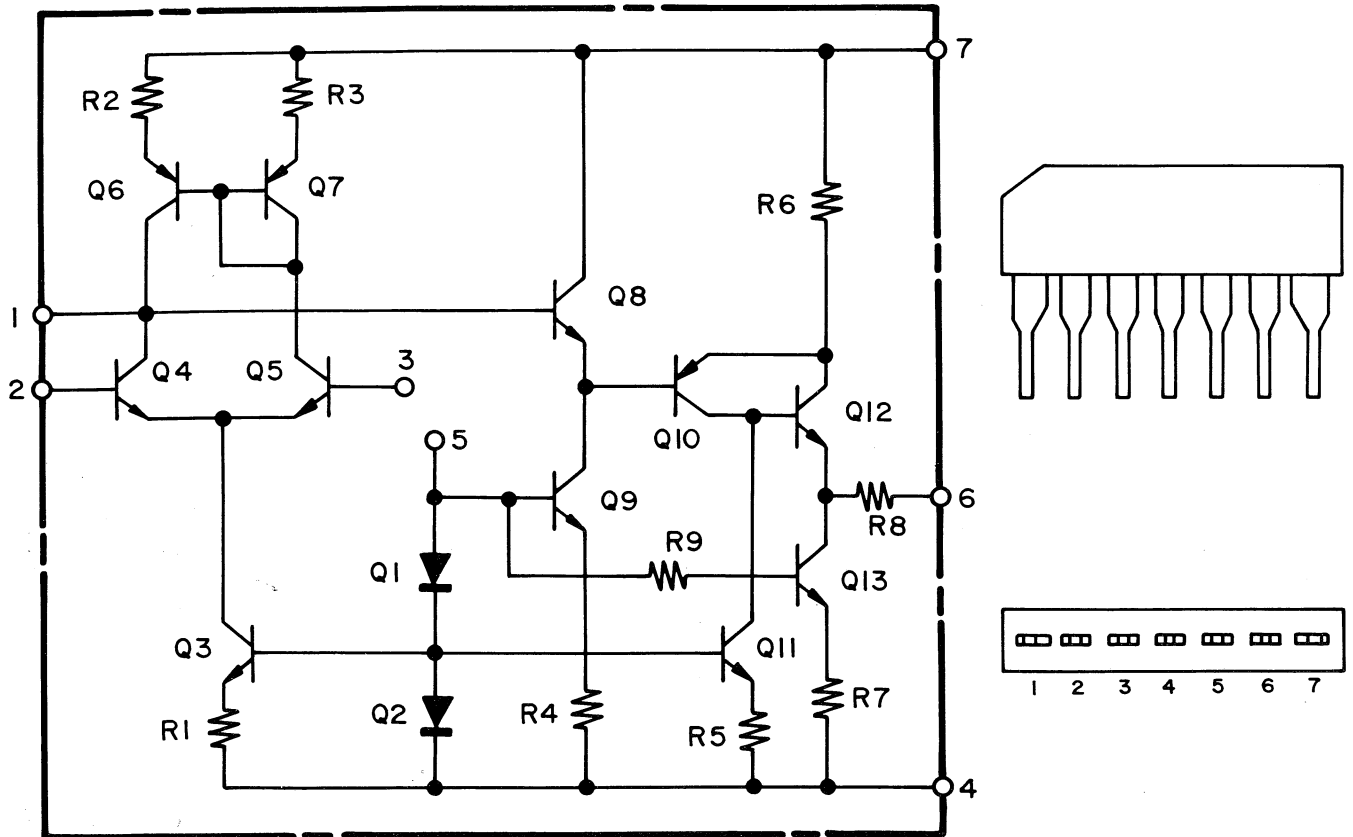
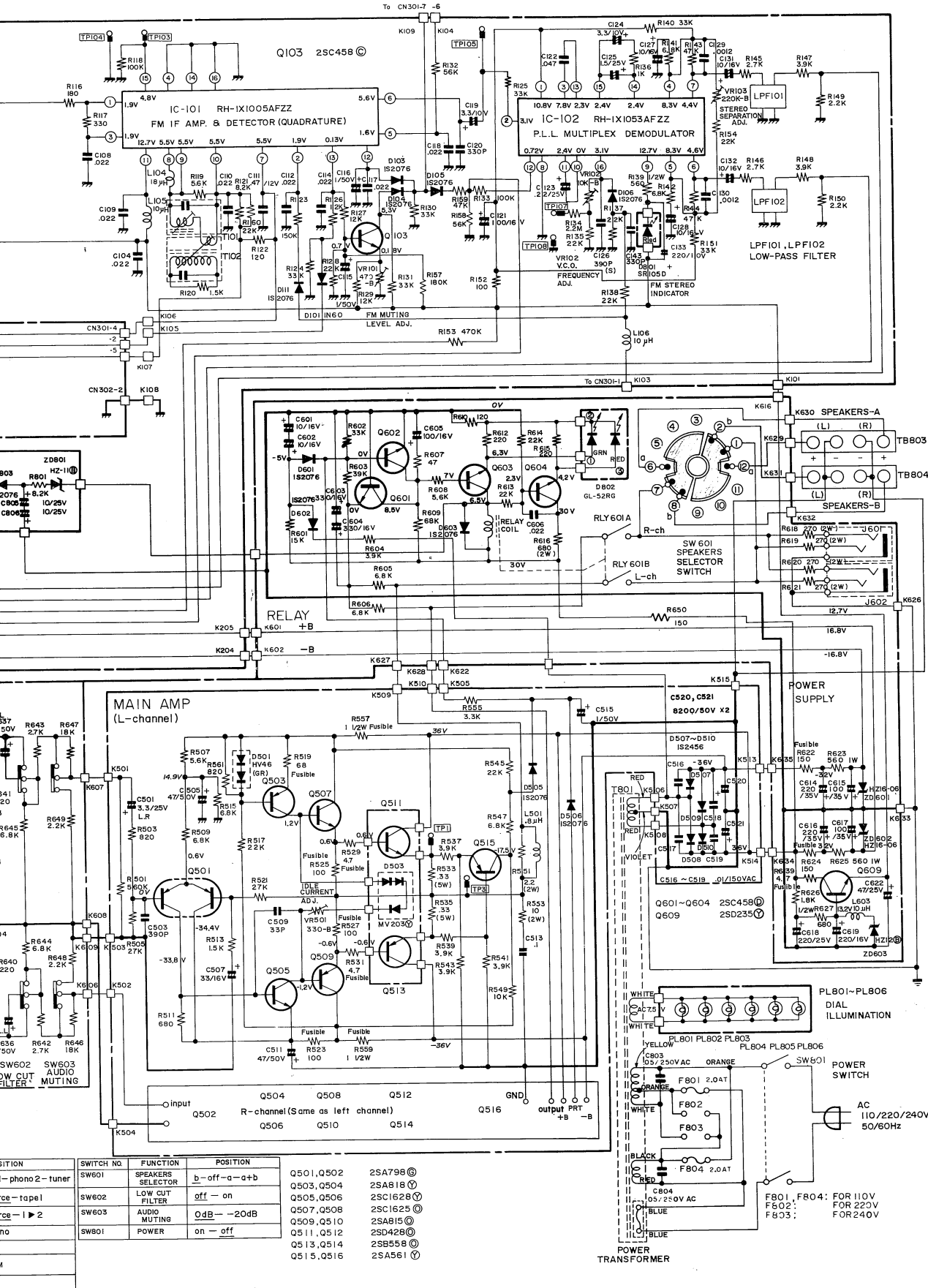


Figure 37 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC 201, IC202, IC401 and IC402)

#### NOTES ON SCHEMATIC DIAGRAM

1. Frequency range: FM; 76.5 to 108 MHz  
MW; 520 to 1620 kHz  
LW; 150 to 370 kHz
2. IF: FM 10.7 MHz, MW/LW 455 kHz
3. Resistor: To differentiate the units of resistors, such symbols as K and M are used: the symbol K means  $K\Omega$  and the symbol M means  $M\Omega$  and the resistor without any symbol is  $\Omega$ -type resistor. Besides, the one with "Fusible" is a fuse type.
4. Capacitor: To indicate the unit of capacitor, a symbol P is used; this symbol P means pF and the unit of the capacitor without such symbol is  $\mu F$ . As to electrolytic capacitor, the expression "capacitance/withstand voltage" is used. The symbols LL and LR for the electrolytic capacitor respectively mean low-leak type.
5. SW 201: It is Function selector (aux./phono-1/phono-2/tuner) switch ("aux." position)
6. SW 202: It is Tape monitor (tape 2/source/tape 1) switch ("source" position)
7. SW 203: It is Tape dubbing (2  $\rightarrow$  1/source/1  $\rightarrow$  2) switch ("source" position)
8. SW 204: It is Mode (stereo/mono) switch ("stereo" position)
9. SW 205: It is Loudness (off/on) switch ("off" position)
10. SW 301-A ~ C  
(interlocked): It is Band selector (LW/MW/FM) switch ("MW" position)  
SW 301-D: It is FM muting switch ("off" position)
11. SW 601: It is Speakers selector (b/off/a/a+b) switch ("b" position)
12. SW 602: It is Low cut filter (off/on) switch ("off" position)
13. SW 603: It is Audio muting (0 dB/-20 dB) switch ("0dB" position)
14. SW 801: It is Power (on/off) switch ("off" position)
15. The indicated voltage in each section is the one measured by VTVM between such a section and the chassis with no signal being given.

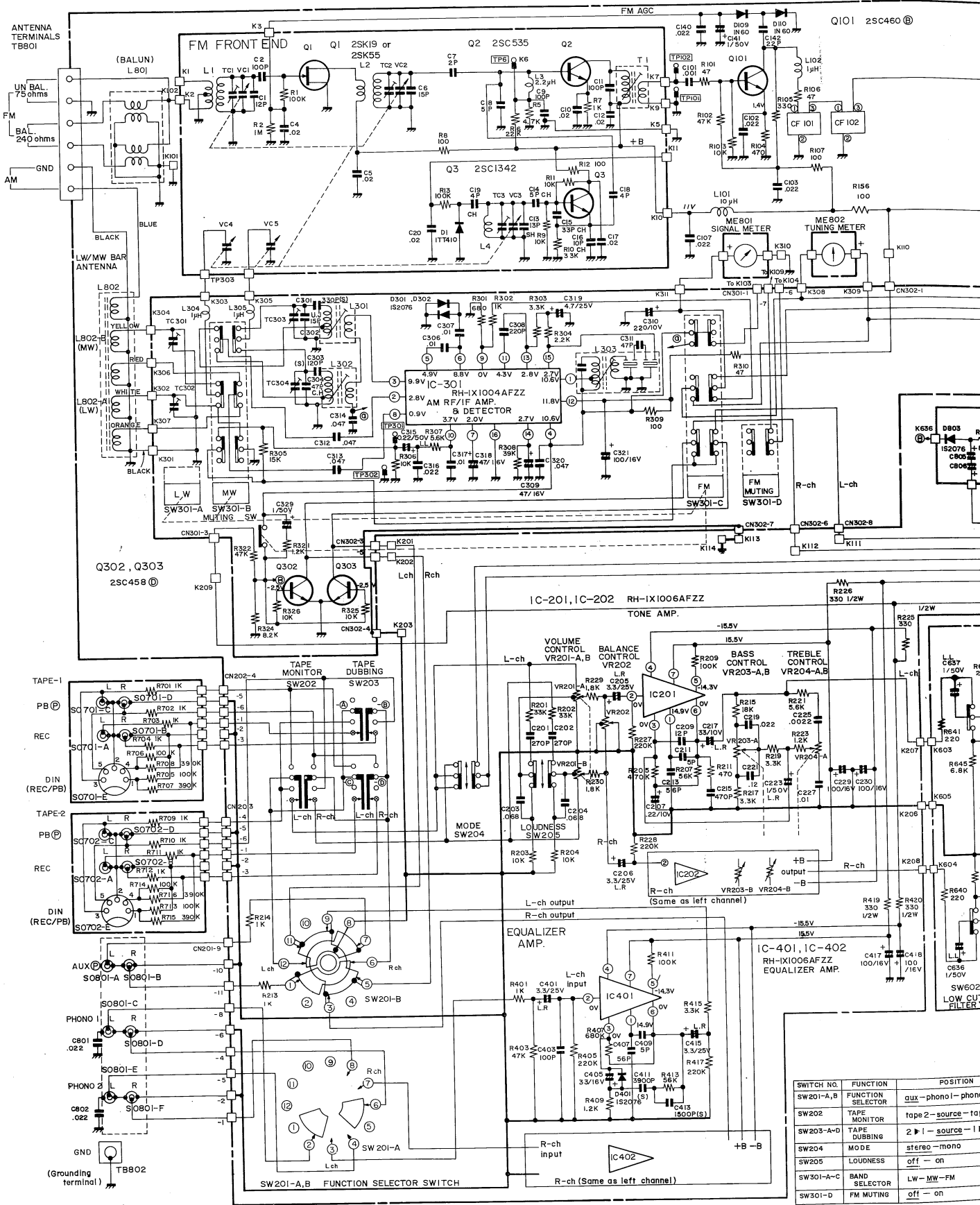


| POSITION           | SWITCH NO. | FUNCTION          | POSITION            |
|--------------------|------------|-------------------|---------------------|
| no phono 2 - tuner | SW601      | SPEAKERS SELECTOR | b - off - a - a + b |
| ce - tape 1        | SW602      | LOW CUT FILTER    | off - on            |
| ce - 1   2         | SW603      | AUDIO MUTING      | 0dB - -20dB         |
| no                 | SW801      | POWER             | on - off            |

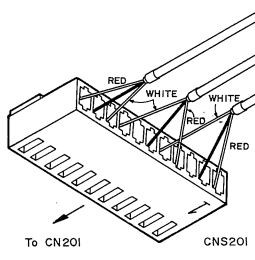
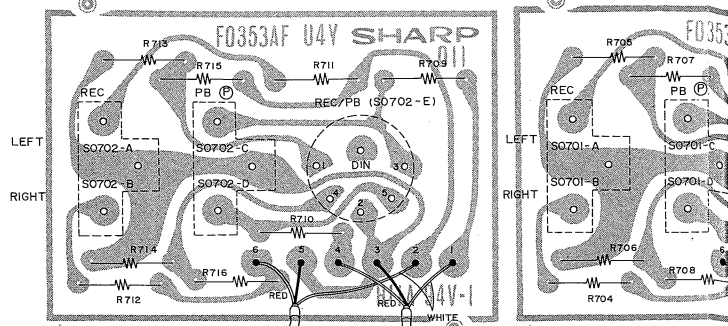
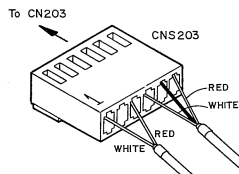
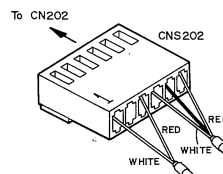
  

|            |           |
|------------|-----------|
| Q501, Q502 | 2SA798 Ⓞ  |
| Q503, Q504 | 2SA818 Ⓢ  |
| Q505, Q506 | 2SC1628 Ⓢ |
| Q507, Q508 | 2SC1625 Ⓞ |
| Q509, Q510 | 2SA815 Ⓞ  |
| Q511, Q512 | 2SD428 Ⓞ  |
| Q513, Q514 | 2SB558 Ⓞ  |
| Q515, Q516 | 2SA561 Ⓢ  |

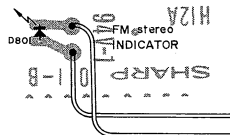
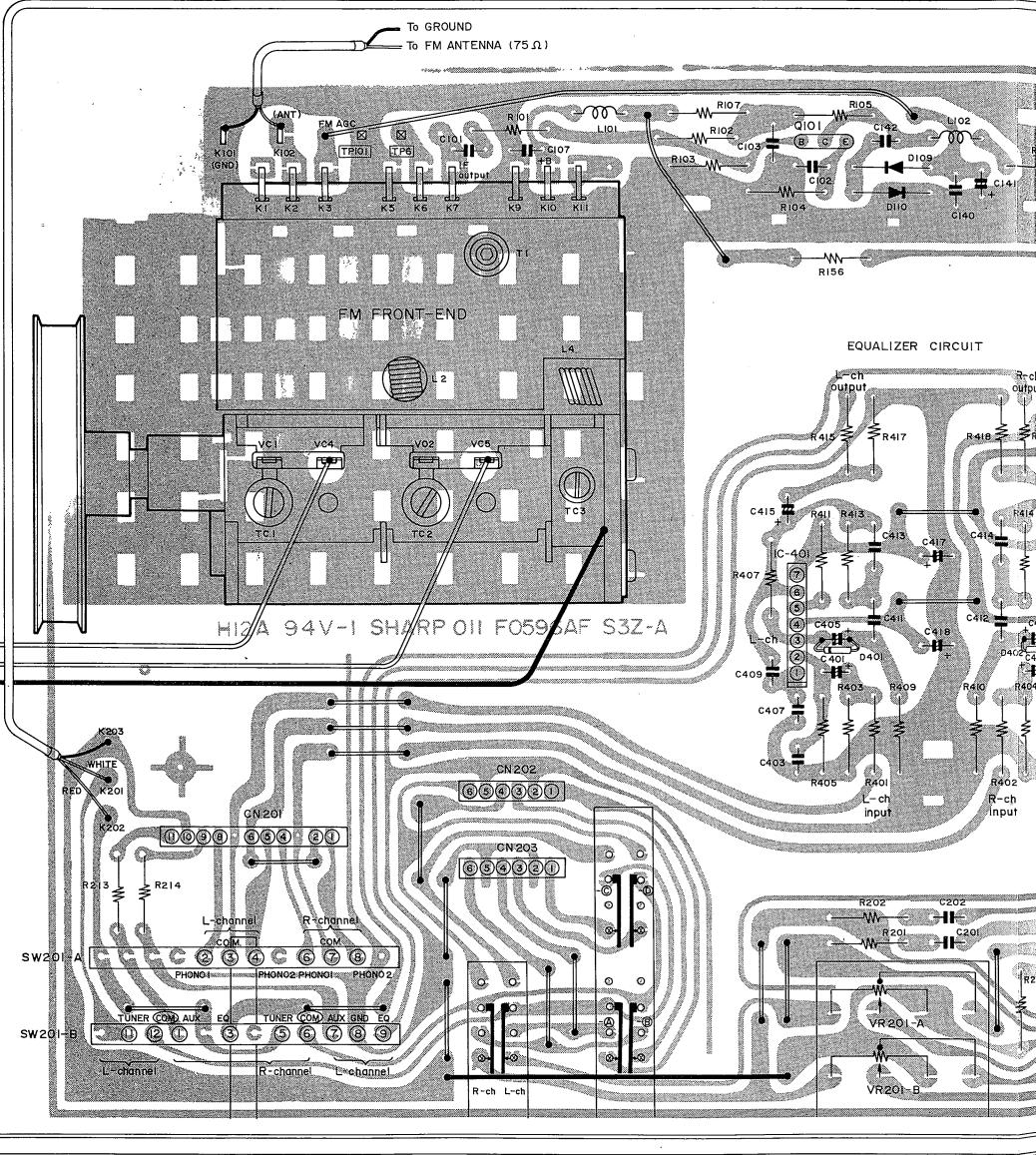
(notice.)  
C DIAGRAM



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice) Figure 38 SCHEMATIC D



(AM CIRCUIT P.W. BOARD)  
To K303  
To K305  
To K301 (GROUND)

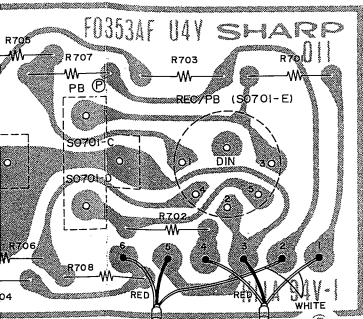


- function selector switch  
SW201-A, B
- monitor switch  
SW202
- dubbing switch  
SW203 (A-D)
- volume control  
VR201-A, B

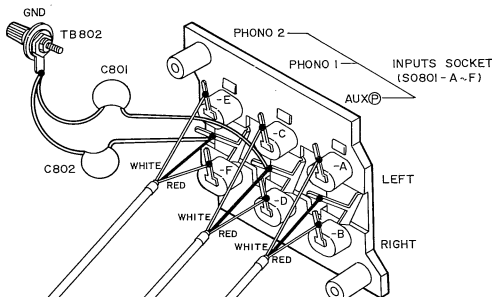
tape

Figure 39 WIRING SIDE OF FM RF/IF CIRCUIT, EC

TAPE - 1  
S0701-A~E (REC/PB SOCKET AND DIN)



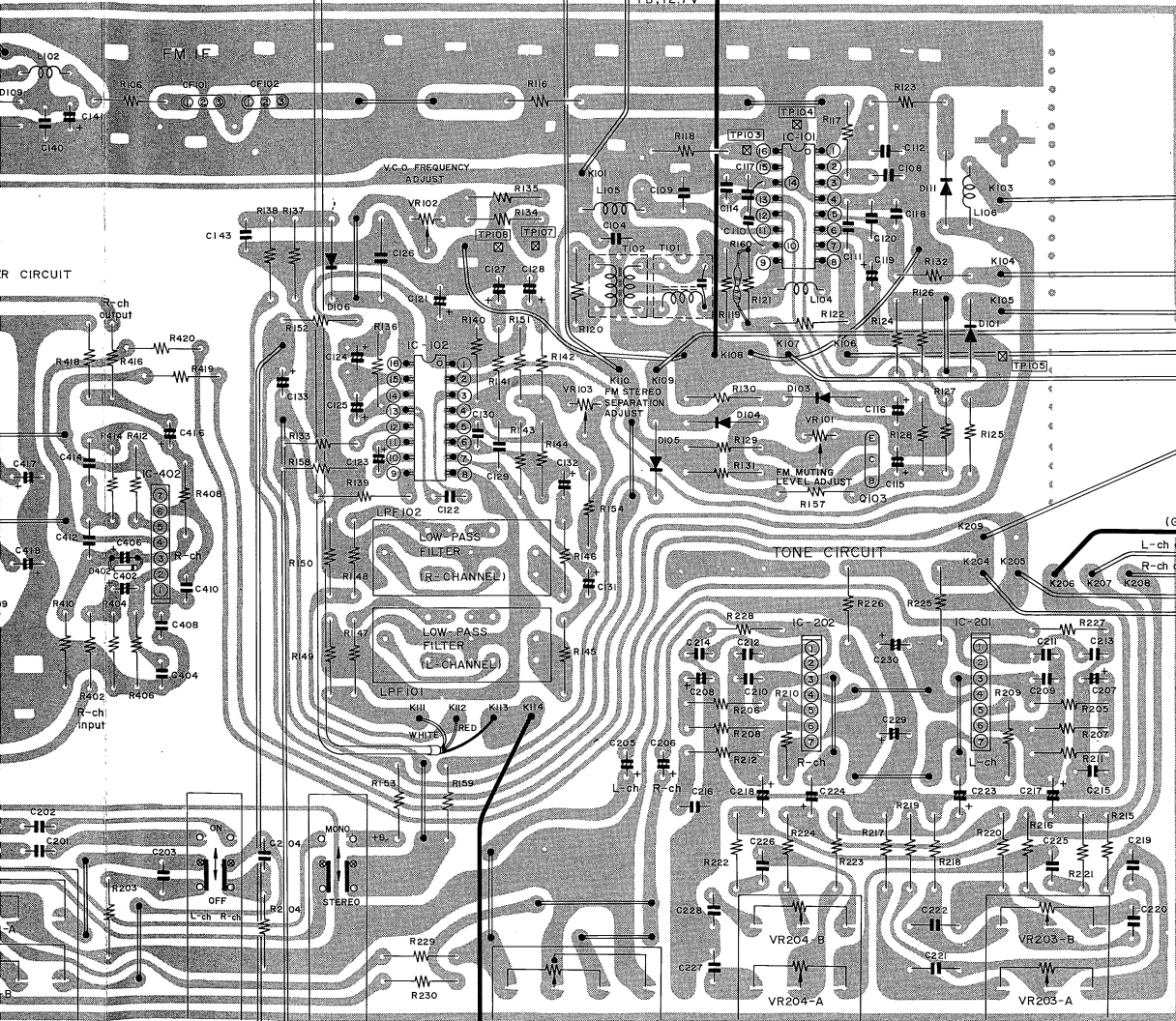
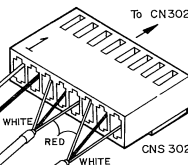
GROUND (EARTH) TERMINAL



To CN301



To CN302



To K616 (Emitter of Q609)  
+B, 12.7V

(GROUND) To K605  
L-ch output To K603 FILTER CIRCUIT  
R-ch output To K604  
To K601(+B, 16.8V)  
To K602(-B, 16.8V)

To CHASSIS GROUND (LUG, GROUND)

- control switch SW205
- mode switch SW204
- balance control VR202
- treble control VR204 - A, B
- bass control VR203 - A, B

CIRCUIT, EQUALIZER CIRCUIT, TONE CIRCUIT AND TAPE BOARDS



| POWER SUPPLY CORD                | BUSHING       |
|----------------------------------|---------------|
| QACCN0001AGZZ                    | LBSHC0004AGZZ |
| QACCS9001SE00<br>(QPLGA0205AGZZ) | LBSHC0007AFZZ |
| QACCV0001AGZZ                    | LBSHC0004AGZZ |
| QACCZ0002TA0F                    | LBSHC0007AFZZ |
| QACCZ0002AG08<br>(QPLGA0201AGZZ) | LBSHC0007AFZZ |

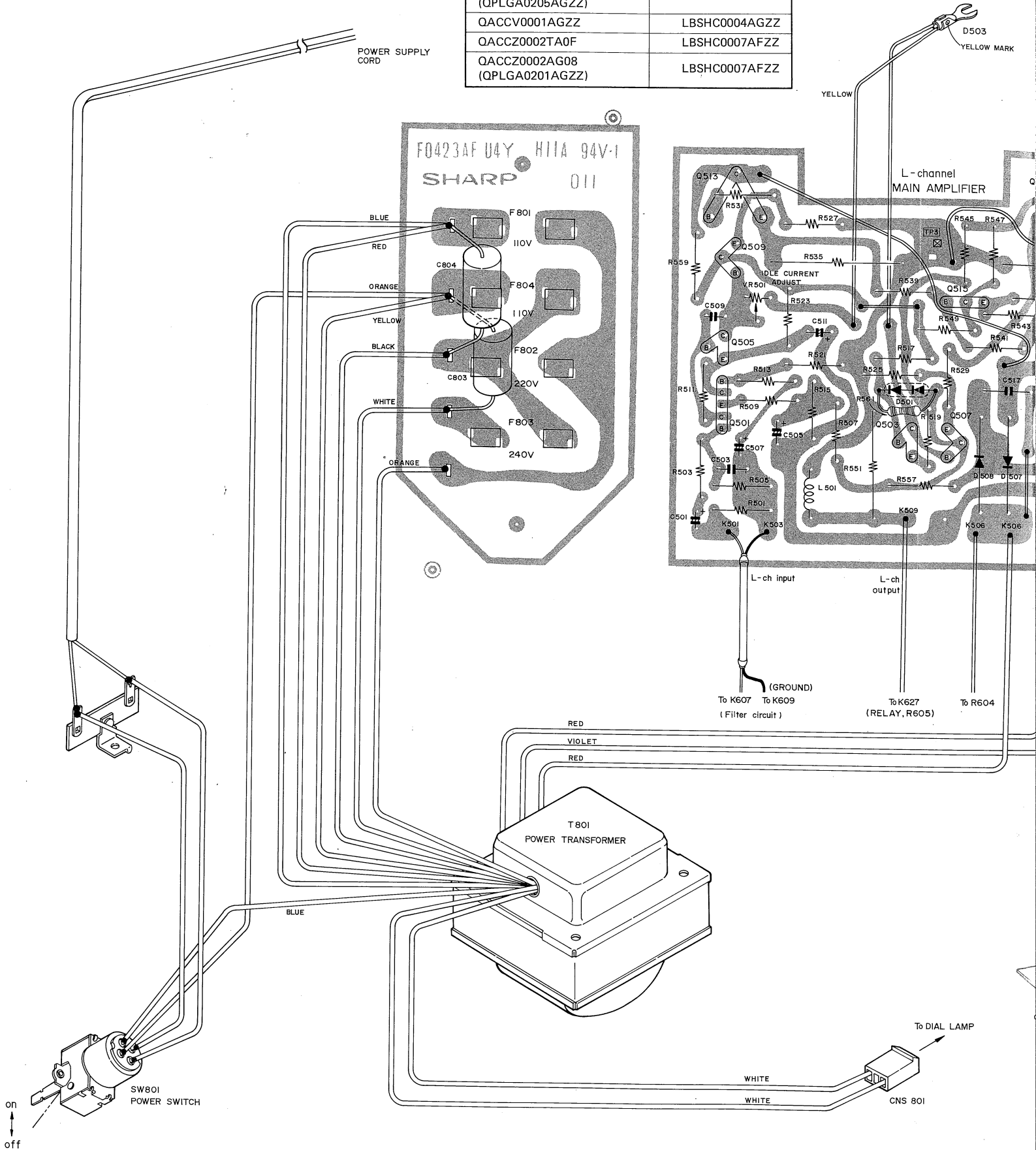
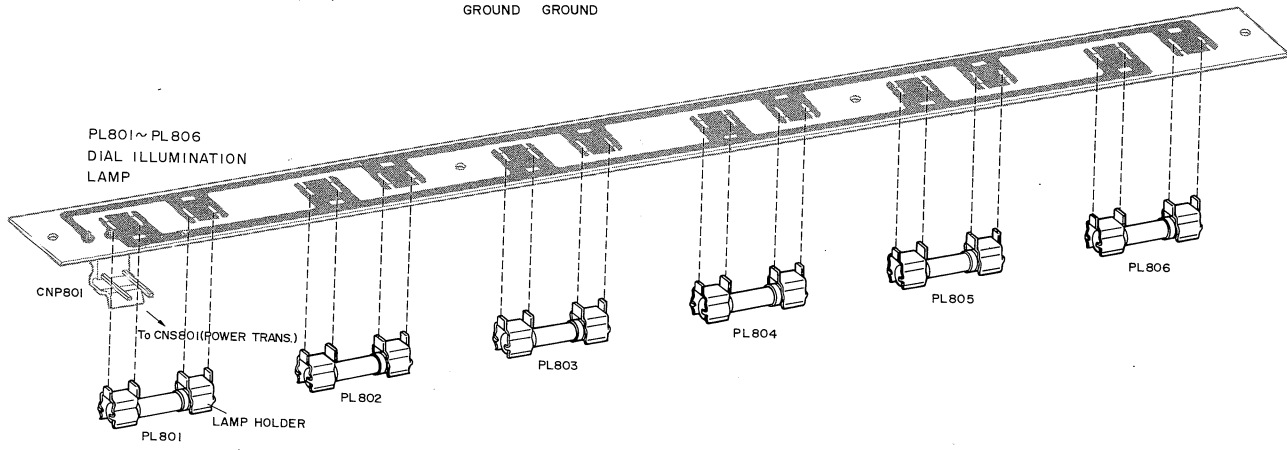
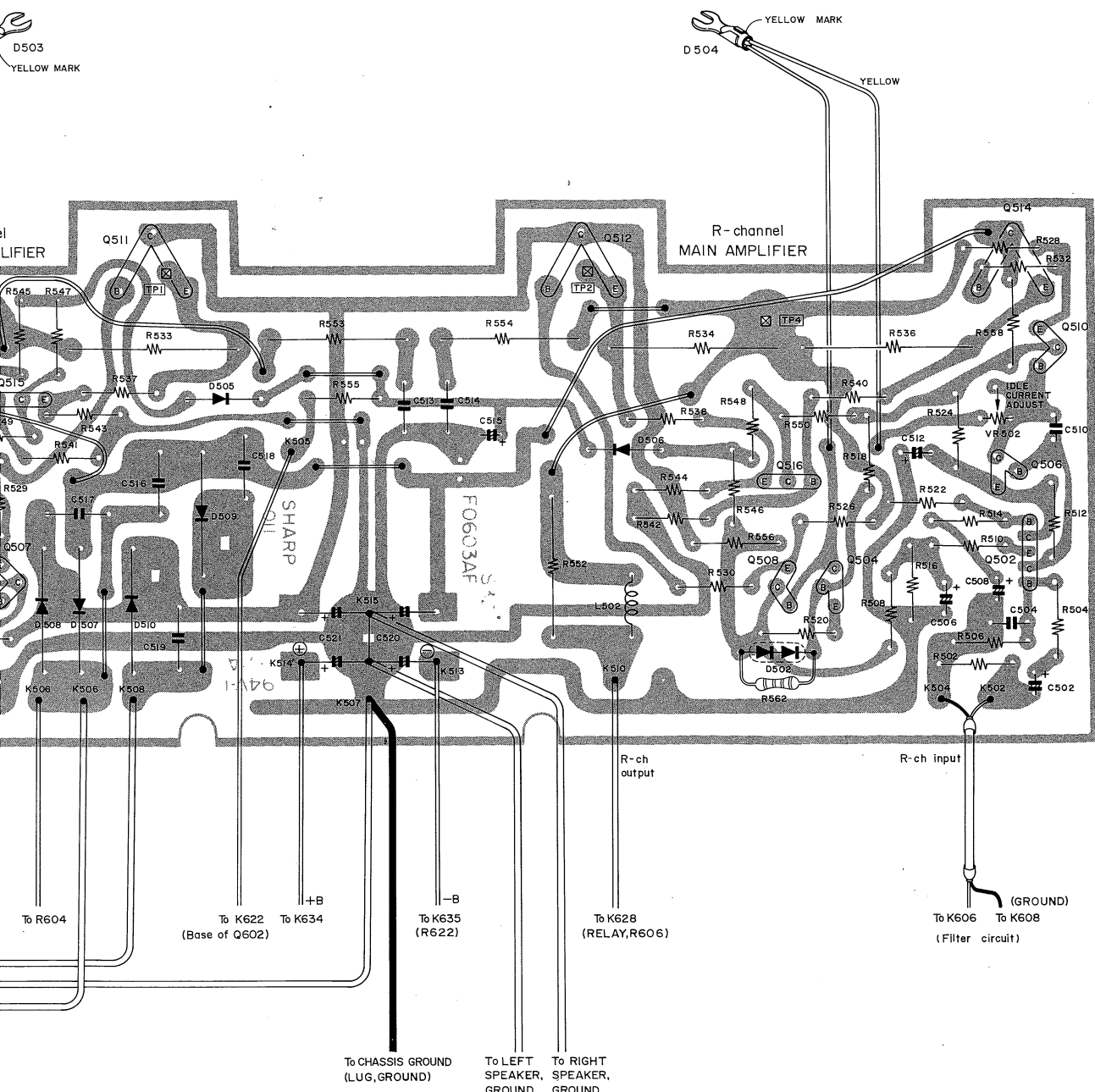


Figure 40 WIRING SIDE OF POWER AMP. AND L



AMP. AND LAMP BOARDS

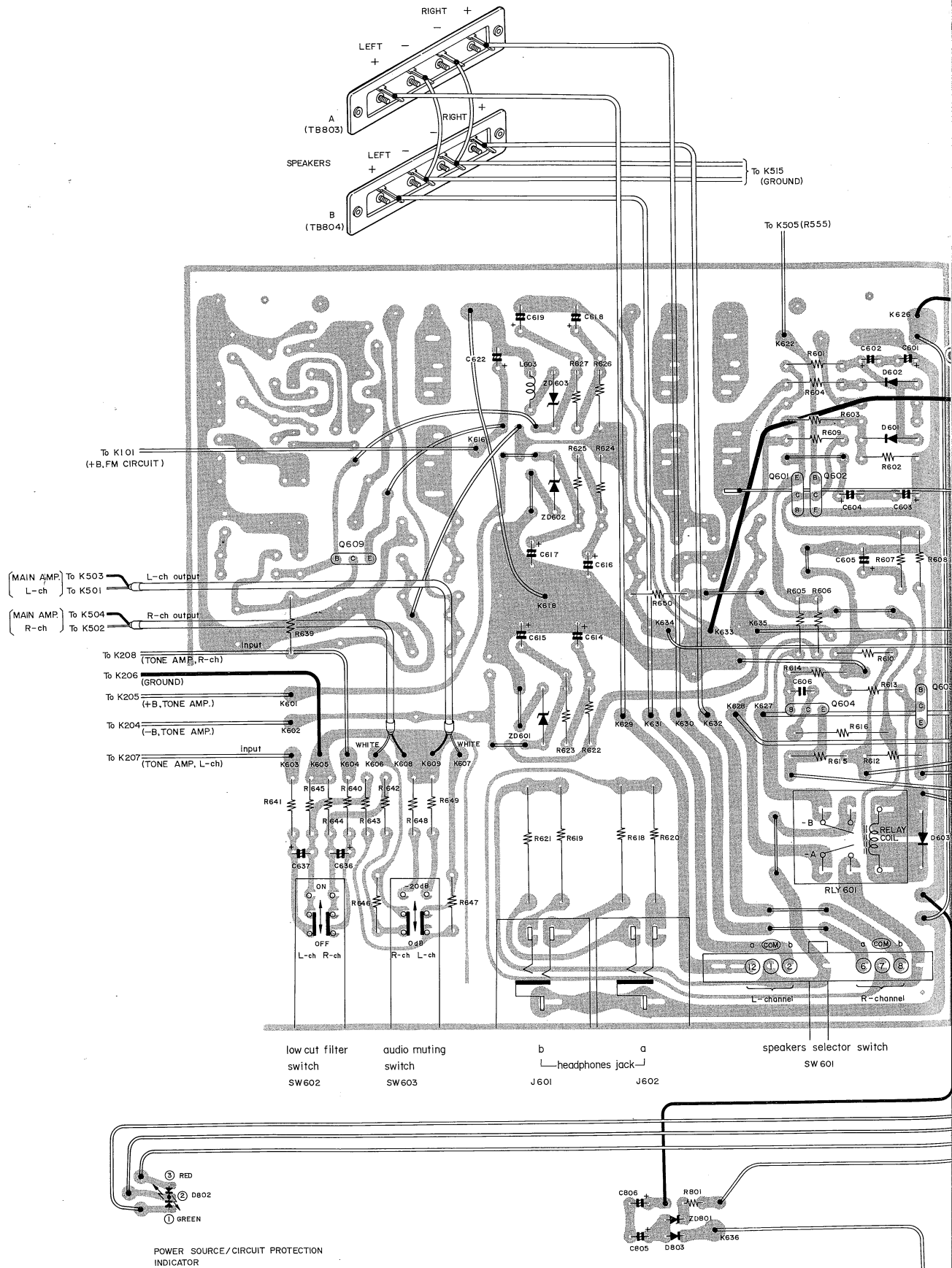
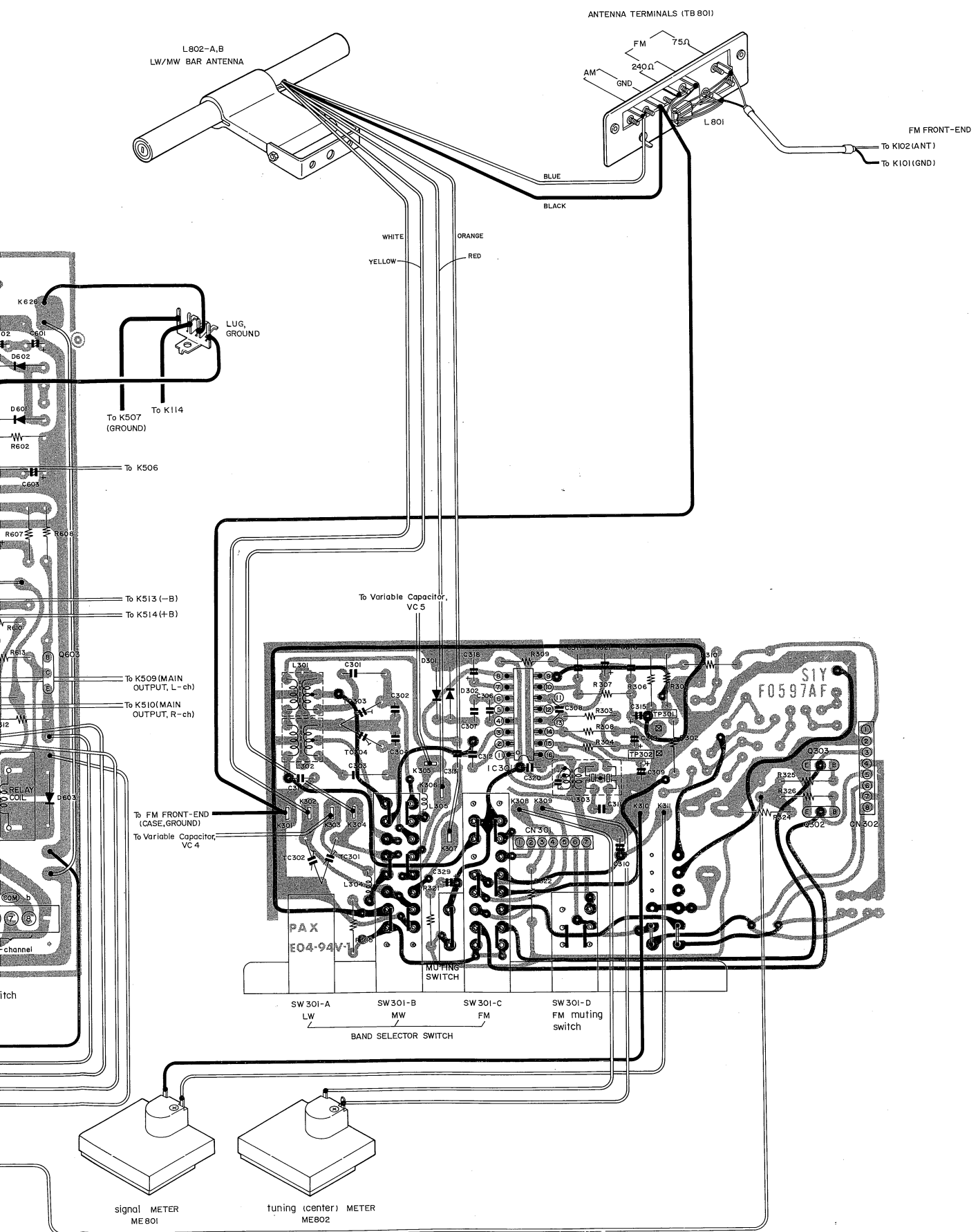


Figure 41 WIRING SIDE OF AM RF/IF



AM RF/IF CIRCUIT AND POWER SUPPLY BOARDS

## POWER TRANSISTOR REPLACEMENT

If it is necessary to replace audio output transistors, then follow these procedures to prevent reoccurrence of transistor failure.

1. Carefully remove transistor and mica insulator and clean all the silicone grease off the mica and the mounting area on the chassis. If the mica is damaged, then it must be replaced.
2. Remove the defective transistor and clean out the transistor mounting hole.
3. Put new silicone grease on the transistor mounting area of the chassis and on both side of the mica insulator. Mount the new transistor, being careful to tighten each transistor mounting screw evenly.  
Driving one screw tightly and then the other is likely to cause metal filings which may damage the mica or prevent necessary heat dissipation on chassis.
4. Before applying power to the new transistor, with an ohm meter check to see that there is no short between the transistor case and chassis.
5. As transistor VS2SB558-O/-1 and VS2SD428-O/-1 are almost similar in the shape. So pay attention to the mark of transistor when replacing the power transistor.

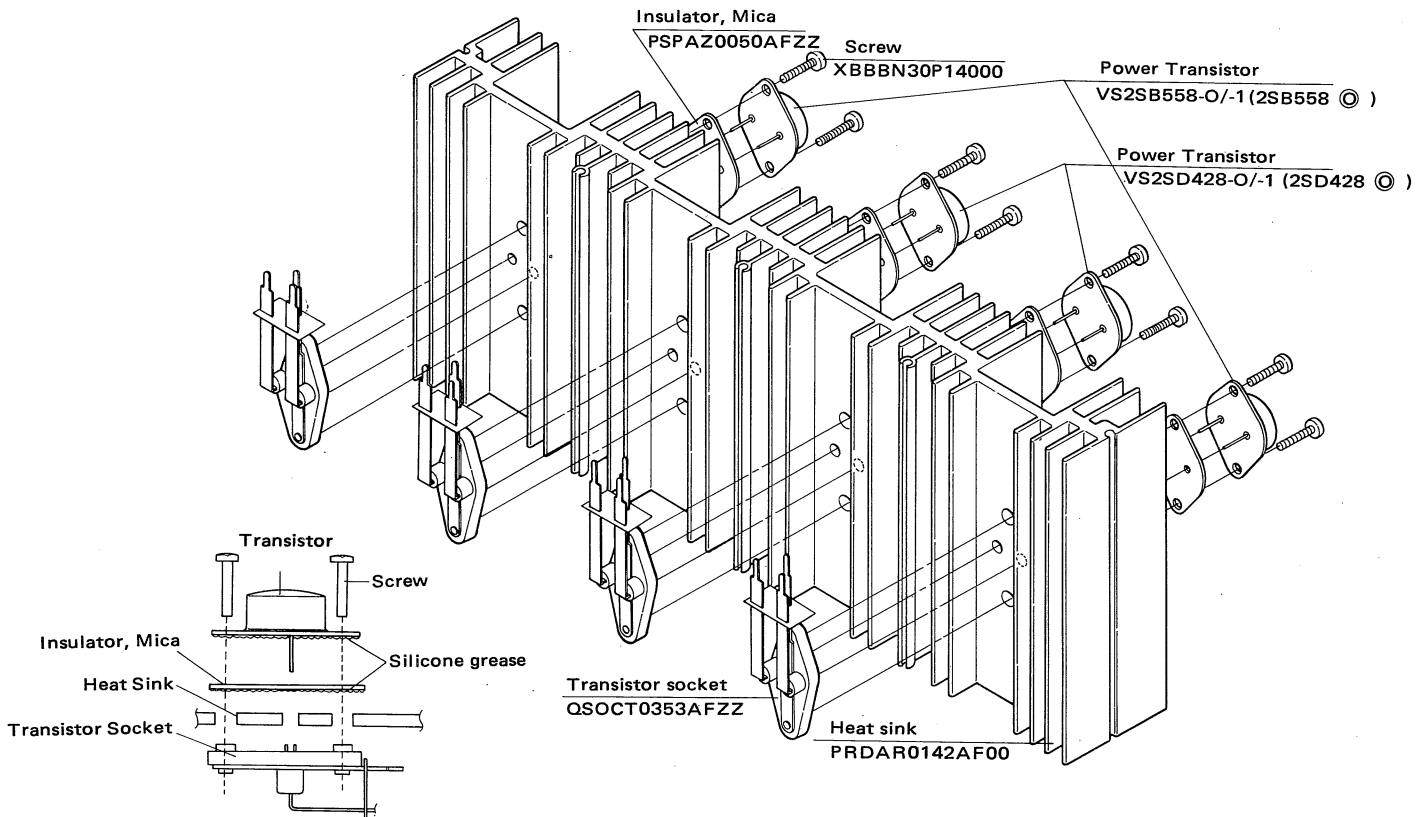
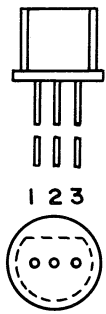
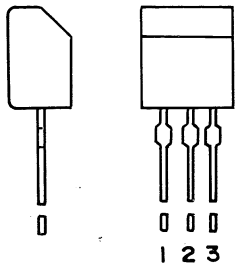


Figure 42 POWER TRANSISTOR REPLACEMENT



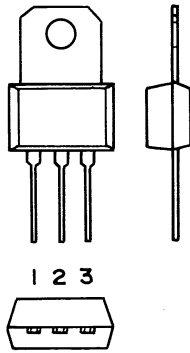
- 1. EMITTER
- 2. COLLECTOR
- 3. BASE

2SA561



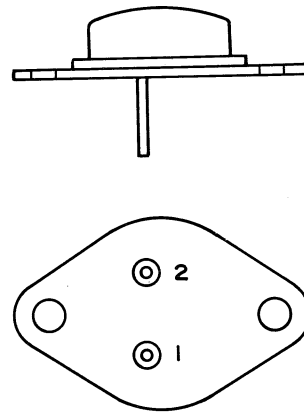
- 1. EMITTER
- 2. COLLECTOR
- 3. BASE

2SC460  
2SC458  
2SC535  
2SC1342



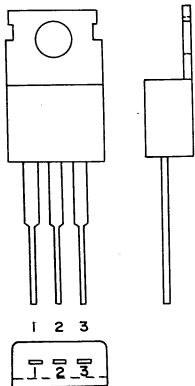
- 1. EMITTER
- 2. BASE
- 3. COLLECTOR

2SC1628  
2SA818



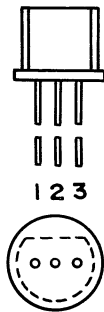
- 1. BASE
- 2. EMITTER  
COLLECTOR(CASE)

2SD428  
2SB558



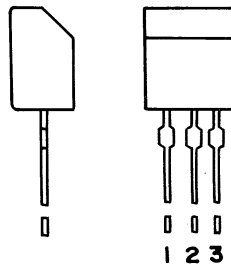
- 1. BASE
- 2. COLLECTOR (HEAT SINK)
- 3. EMITTER

2SC1625  
2SA815  
2SD235



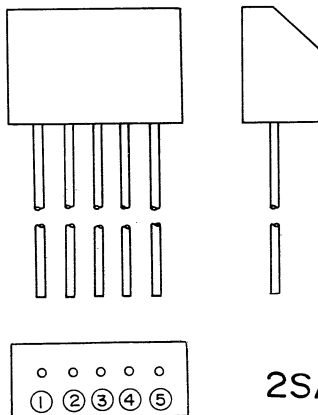
- 1. DRAIN
- 2. SOURCE
- 3. GATE

2SK19



- 1. DRAIN
- 2. SOURCE
- 3. GATE

2SK55

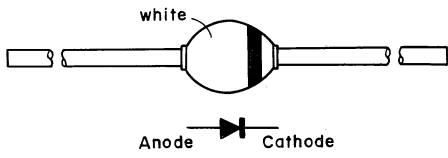


- ① BASE 1
- ② COLLECTOR 1
- ③ EMITTER
- ④ COLLECTOR 2
- ⑤ BASE 2

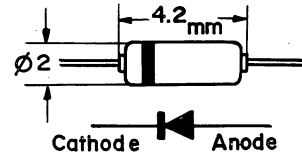
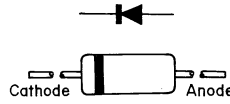
2SA798

Figure 43 TRANSISTOR TYPES

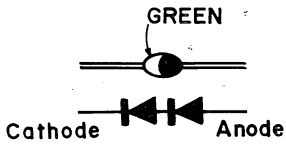
IS2456



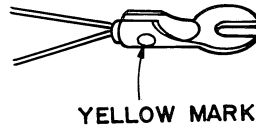
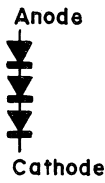
IN60



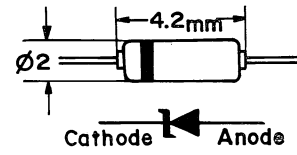
IS2076



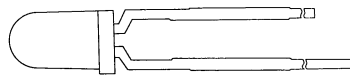
HV-46 (GR)



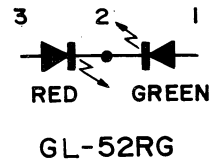
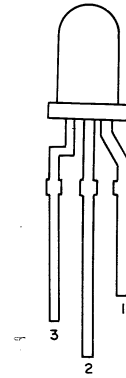
MV-203Y



HZ12 (B)  
 HZ16-06  
 HZ11 (B)

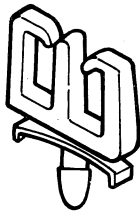


SR105D

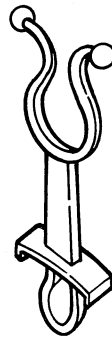


GL-52RG

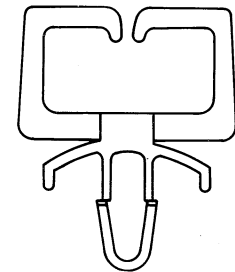
Figure 44 DIODE TYPES



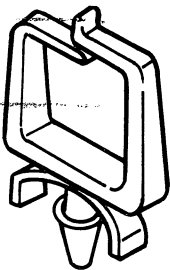
LHLDW1060AFZZ



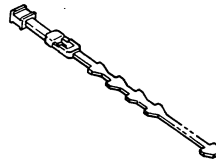
LHLDW1062AFZZ



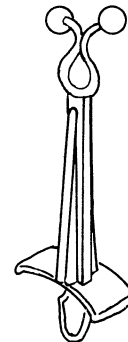
LHLDW1066AFZZ



LHLDW1050AFZZ



LHLDW1052AFZZ

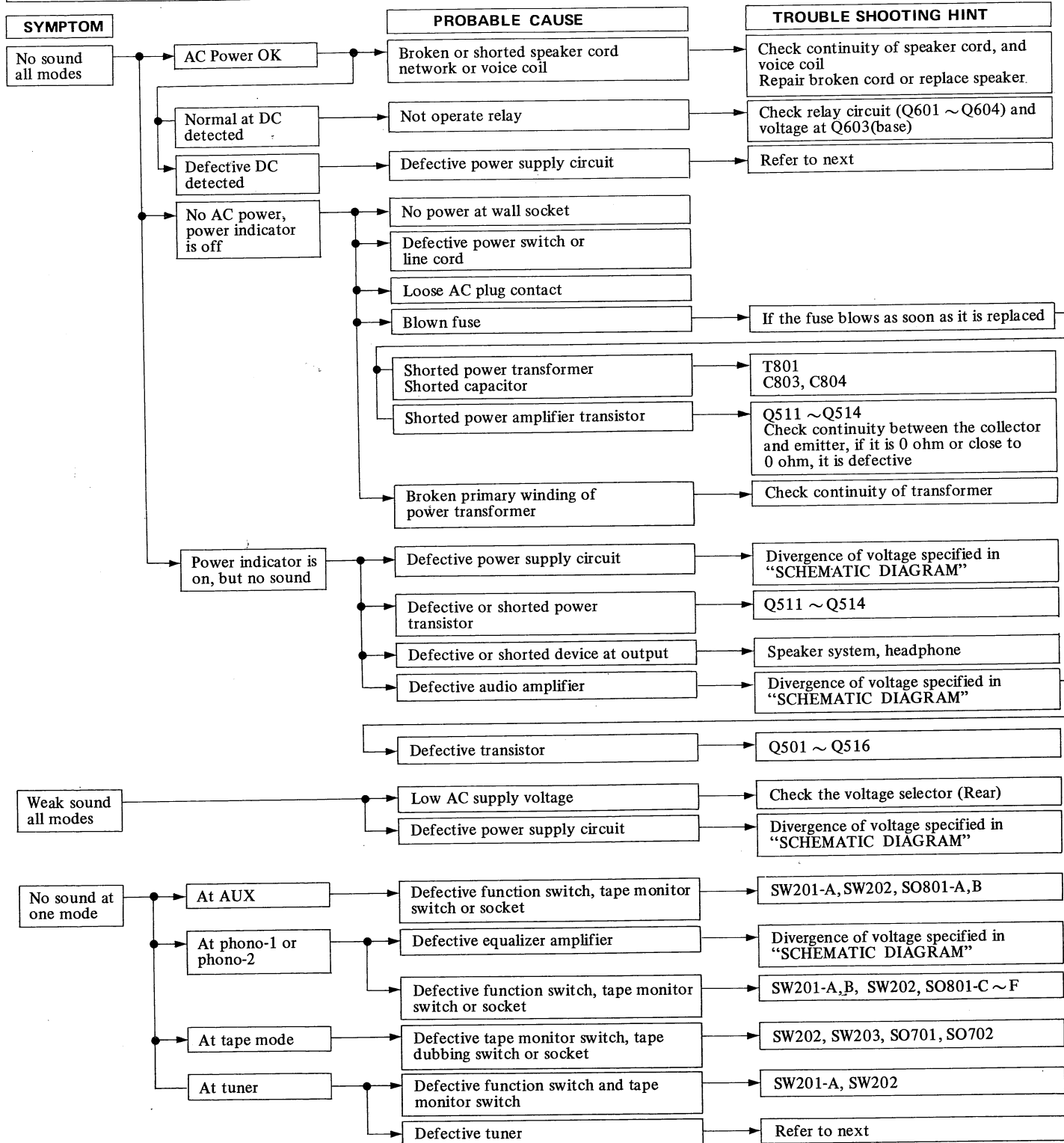


LHLDW1053AFZZ

Figure 45 WIRE CLIP

# TROUBLE SHOOTING GUIDE

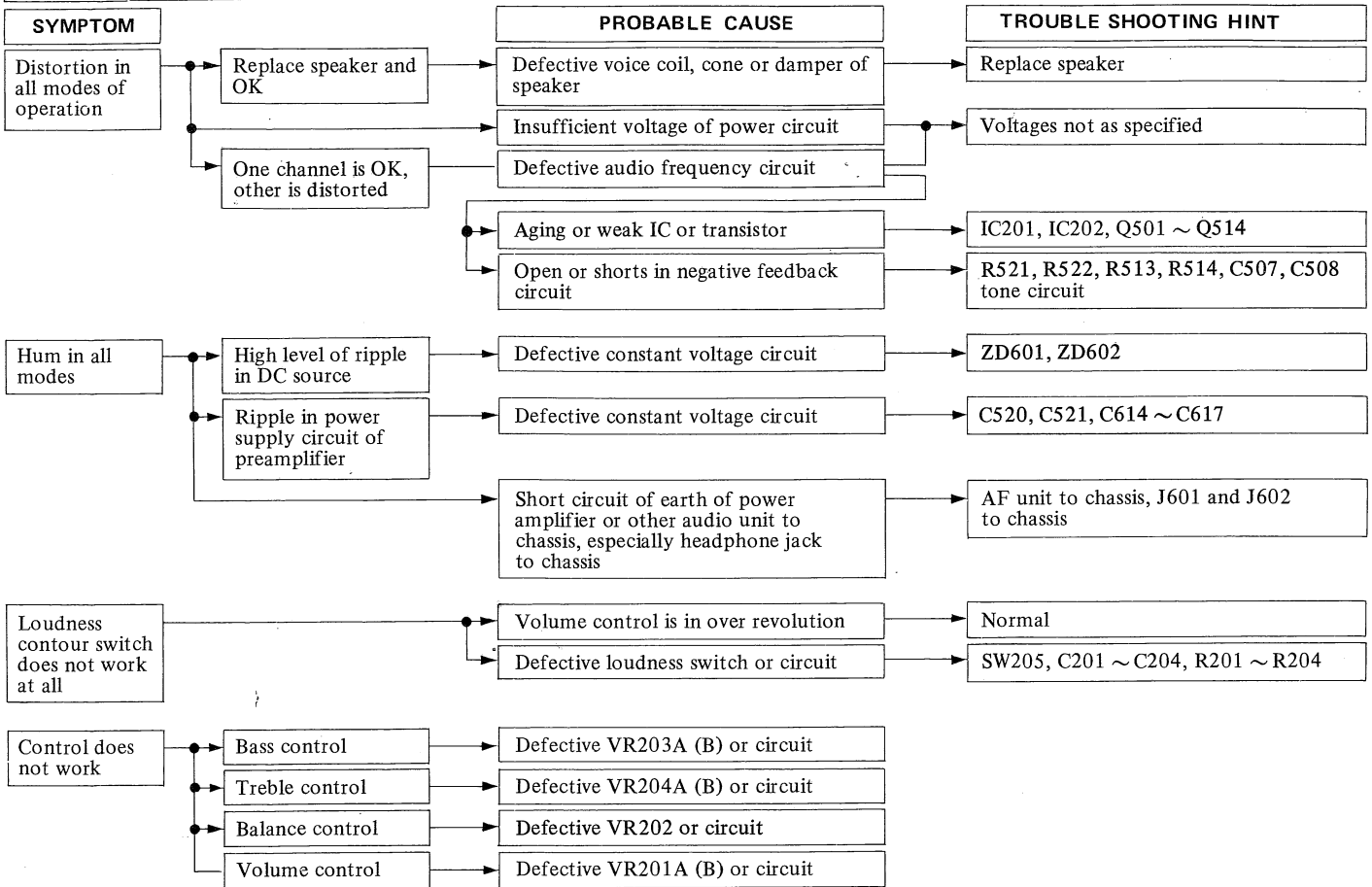
## ALL OPERATIONAL MODES (1)





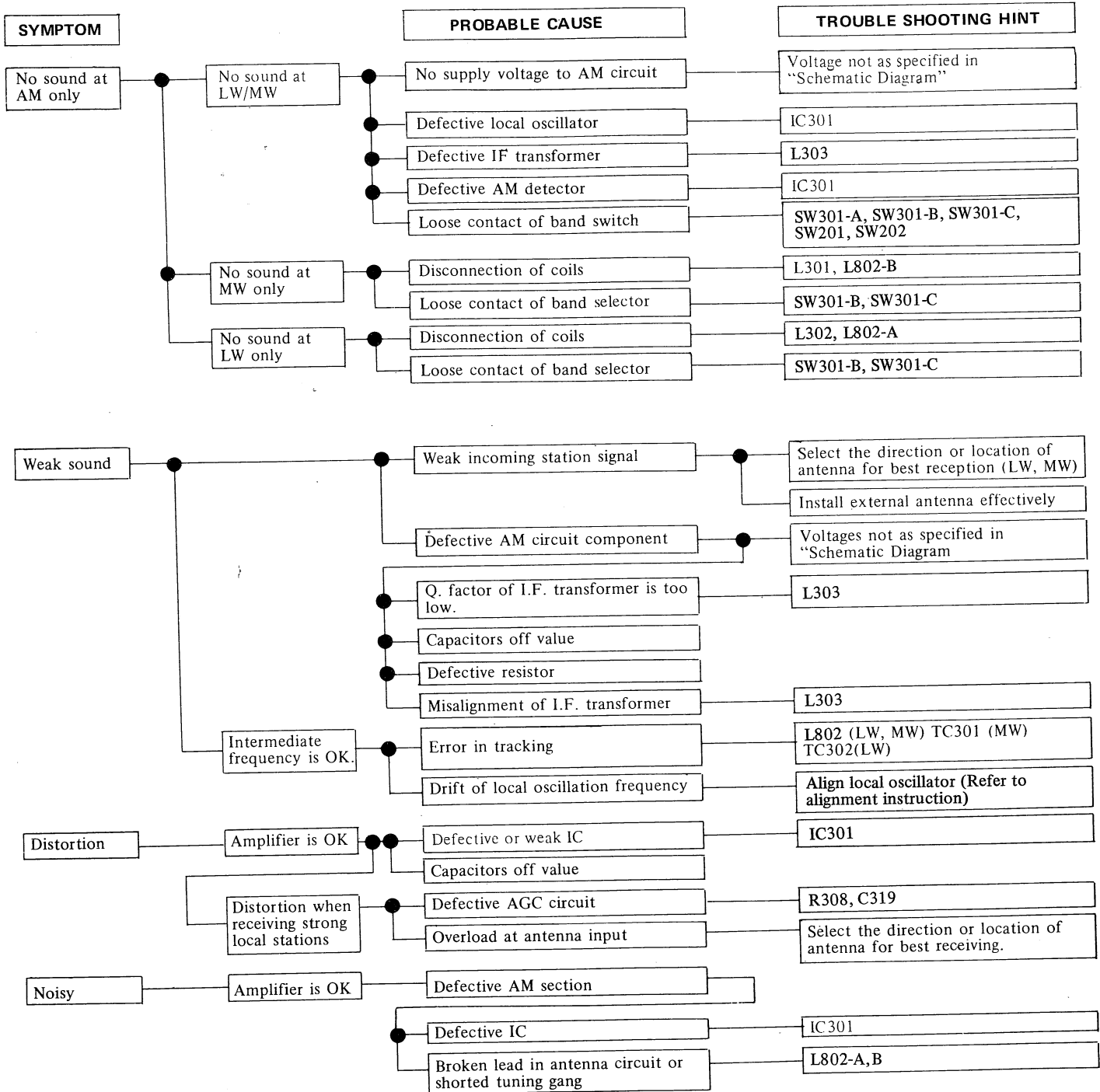
# TROUBLE SHOOTING GUIDE

## ALL OPERATIONAL MODES (2)



# TROUBLE SHOOTING GUIDE

## AM RECEPTION



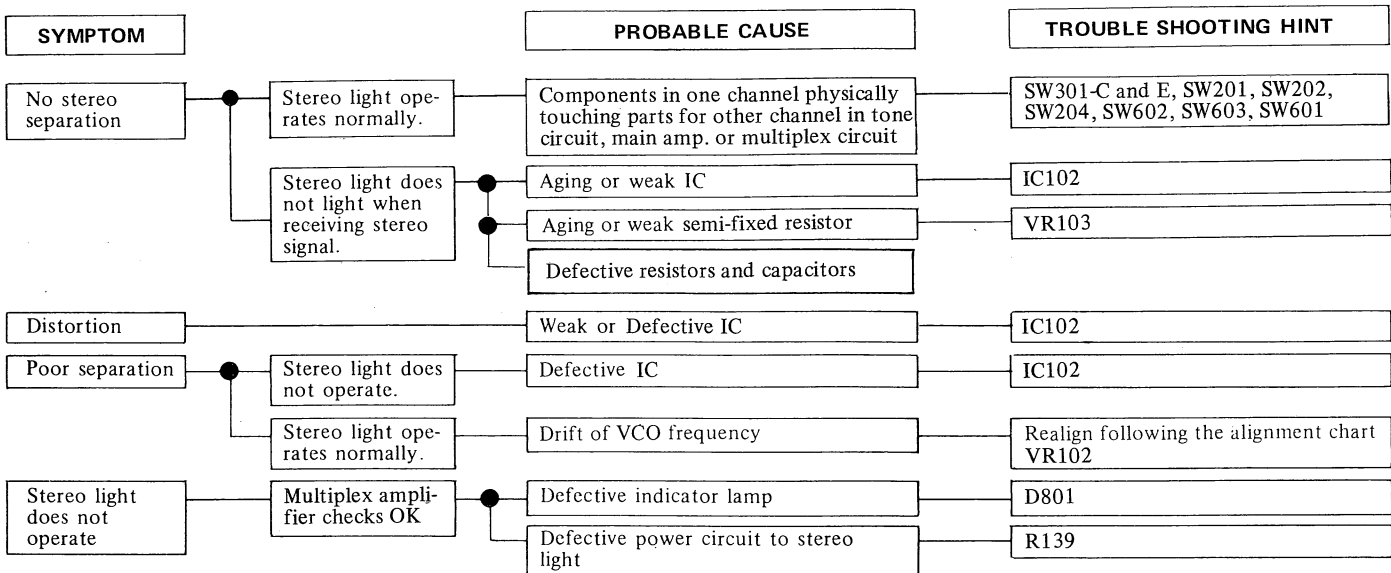
# TROUBLE SHOOTING GUIDE

## FM RECEPTION

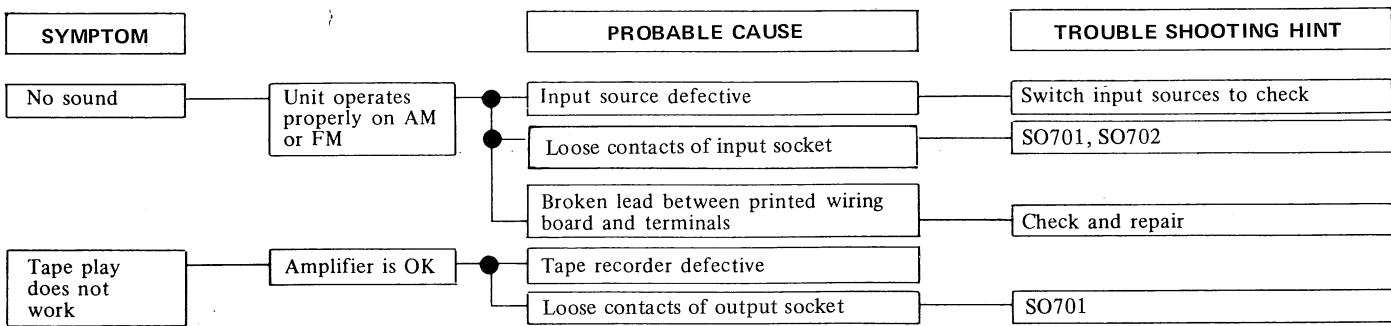
| SYMPTOM                                   | PROBABLE CAUSE                                 | TROUBLE SHOOTING HINT   |   |
|---|--|---|---|
| No sound in FM position                   | No sound in AM position, also                  | Defective power supply of IF stage                                  | Voltage not as specified in "Schematic Diagram"   |
|   | FM detected signal is OK at TP105              | Defective FM multiplex stage  | Refer to the guide for FM multiplex reception     |
|   | Weak or no voltage of FM power supply          | Open or defective circuit from power supply to FM tuner             | Check continuously between tuner and power supply |
|   |  | Poor contact of selector switch                                     | SW201, SW202, SW301-D                             |
|   | FM power supply is OK.                         | Defective FM IF circuit   |   |
|   |  | Low voltage in IF circuit   |   |
|   |  | Weak IC   | IC101, IC102                                      |
|   |  | Defective ceramic filter  | CF101, CF102                                      |
|   |  | Defective IF transformer  | T1, T101, T102                                    |
|   | FM IF is OK                                    | Defective resistors and capacitors                                  |   |
| Defective FM tune circuit                 |  | FM front-end circuit  |   |
| No signal but sufficient background noise | Defective power supply circuit to FM front end | Voltage not as specified in "Schematic Diagram"                     |   |
|   | Not tune in FM range                           | Local oscillator dead   | Q3, L4, TC3, C14                                  |
| Weak signal but loud background noise     | Weak station signal                            | Use more sensitive antenna  |   |
|   | Loose antenna connection                       |   |   |
|   | Open antenna circuit                           |   |   |
|   | Weak RF circuit                                | FM front-end  |   |
|   | Misadjustment of tracking or IF transformers   | Realign following the alignment chart                               |   |
| Distortion in FM                          | Defective IF stage or low voltage in IF stage  | Measure voltages in FM section and repair or replace defective part |   |
|   | Misalignment                                   | T101, T102, T1  |   |
|   | Weak integrated circuit                        | IC101, IC102  |   |
| Hum                                       | Ripple in FM power supply                      | Capacitor off value   | C618, C619  |
| Noisy                                     | Defective FM IF stage or FM tuner              | Voltage not as specified in "Schematic Diagram"                     |   |
|   | Aging or weak IC                               | IC101, IC102  |   |
| Dial calibration off                      | Pointer does not move smoothly.                | Pointer off of track or hits obstruction                            |   |
|   | Pointer runs over dial scale.                  | Pointer does not start at zero point of dial                        | Mechanically rese pointer at zero                 |

# TROUBLE SHOOTING GUIDE

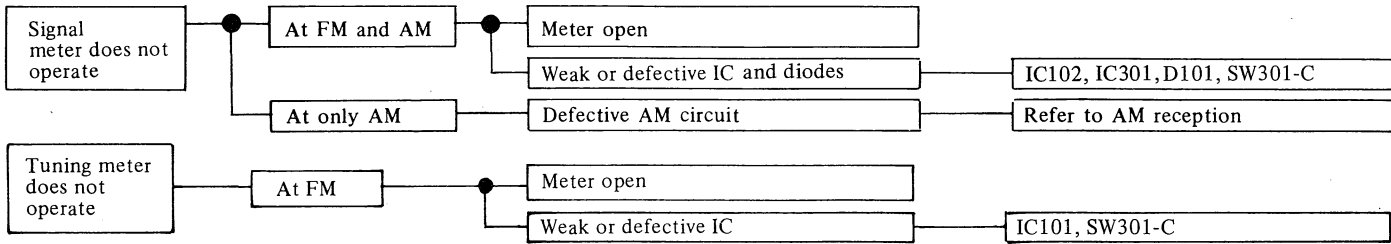
## FM MULTIPLEX RECEPTION



## USING WITH EXTERNAL INPUTS OR OUTPUTS (TAPE, ETC.)



## OTHER TROUBLES



# REPLACEMENT PARTS LIST

## "HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

| REF. NO.                   | PART NO.      | DESCRIPTION  | CODE | REF. NO.               | PART NO.      | DESCRIPTION   | CODE |
|----------------------------|---------------|--|------|------------------------|---------------|---|------|
| <b>INTEGRATED CIRCUITS</b> |               |  |      |                        |               |   |      |
| IC101                      | RH-IX1005AFZZ | FM IF Amplifier and Detector (Quadrature) (HA1137W)  | AT   | D109                   | VHD1N60///-1  | FM AGC (1N60)   | AC   |
| IC102                      | RH-IX1053AFZZ | P.L.L. Multiplex Stereo Demodulator (HA1196)         | AP   | D110                   | VHD1N60///-1  | FM AGC (1N60)   | AC   |
| IC201, IC202               | RH-IX1006AFZZ | Tone Amplifier (TA7136P)                             | AH   | D111                   | VHD1S2076//-1 | Voltage Detector (1S2076)   | AB   |
| IC301                      | RH-IX1004AFZZ | AM RF/IF Amplifier and Detector (HA1138)             | AS   | D301                   | VHD1S2076//-1 | Overload (1S2076)   | AB   |
| IC401, IC402               | RH-IX1006AFZZ | Equalizer Amplifier (TA7136P)                        | AH   | D302                   | VHD1S2076//-1 | Overload (1S2076)   | AB   |
| <b>TRANSISTORS</b>         |               |  |      |                        |               |   |      |
| Q101                       | VS2SC460-B/-1 | FM IF Amplifier (2SC460 (B))                         | AE   | D401, D402             | VHD1S2076//-1 | Speed-up  | AB   |
| Q103                       | VS2SC458-C/-1 | FM Muting Amplifier (2SC458 (C))                     | AE   | D501, D502             | VHVHV46-G//-1 | Varistor, Bias Stabilizer (HV-46 (GR))                                    | AD   |
| Q302                       | VS2SC458-D/-1 | Muting (2SC458 (D))                                  | AE   | D503, D504             | VHVMV203Y//-1 | Varistor, Bias Circuit (Idle Current) (MV-203 (Y))                        | AD   |
| Q303                       | VS2SC458-D/-1 | Muting (2SC458 (D))                                  | AE   | D505, D506             | VHD1S2076//-1 | Voltage Detector (1S2076)   | AB   |
| Q501, Q502                 | VS2SA798-G/-1 | Dual Transistor, Differential Amplifier (2SA798 (G)) | AF   | D507, D508, D509, D510 | VHD1S2456//1D | Power Rectifier (1S2456)  | AG   |
| Q503, Q504                 | VS2SA818-Y/-1 | Constant Current Circuit (2SA818 (Y))                | AH   | D601                   | VHD1S2076//-1 | Voltage Detector, Protection Circuit (1S2076)                             | AB   |
| Q505, Q506                 | VS2SC1628-Y-1 | Audio Amplifier, Class "A" (2SC1628 (Y))             | AH   | D602                   | VHD1S2076//-1 | Rectifier (1S2076)  | AB   |
| Q507, Q508                 | VS2SC1625-O-1 | Drive Amplifier (2SC1625 (O))                        | AH   | D603                   | VHD1S2076//-1 | Surge Current Prevention (1S2076)   | AB   |
| Q509, Q510                 | VS2SA815-O/-1 | Drive Amplifier (2SA815 (O))                         | AH   | D801                   | VHPSR105D//-1 | Light Emitting Diode, Stereo Indicator (SR105D)                           | AD   |
| Q511, Q512                 | VS2SD428-O/-1 | Power Amplifier (2SD428 (O))                         | AP   | D802                   | VHPGL-52RG/1F | Light Emitting Diode, Power Source/Circuit Protection Indicator (GL-52RG) | AH   |
| Q513, Q514                 | VS2SB558-O/-1 | Power Amplifier (2SB558 (O))                         | AR   | D803                   | VHD1S2076//-1 | Noise Prevention (1S2076)   | AB   |
| Q515, Q516                 | VS2SA561-Y/-1 | Voltage Detector, Protection Circuit (2SA561 (Y))    | AF   | ZD601                  | VHEHZ16-06/1F | Zener Diode, Voltage Regulator (16.1 ~ 17.1V) (HZ16-06)                   | AB   |
| Q601                       | VS2SC458-D/-1 | Protection Circuit, Voltage Detector (2SC458 (D))    | AE   | ZD602                  | VHEHZ16-06/1F | Zener Diode, Voltage Regulator (16.1 ~ 17.1V) (HZ16-06)                   | AB   |
| Q602                       | VS2SC458-D/-1 | Protection Circuit, Voltage Detector (2SC458 (D))    | AE   | ZD603                  | VHEHZ12-BBK-1 | Zener Diode, Voltage Regulator (12.7 ~ 13.5V) (HZ12 (B))                  | AD   |
| Q603                       | VS2SC458-D/-1 | Protection Circuit, Switching (2SC458 (D))           | AE   | ZD801                  | VHEHZ11B///-1 | Zener Diode, Noise Prevention (10.1 ~ 11.2V) (HZ11 (B))                   | AD   |
| Q604                       | VS2SC458-D/-1 | Protection Circuit, Switching (2SC458 (D))           | AE   | <b>COILS</b>           |               |   |      |
| Q609                       | VS2SD235-Y/-1 | Voltage Regulator, Ripple Filter (2SD235 (Y))        | AG   | L101                   | VP-LH100M0000 | 10μH, +B Choke  | AB   |
| <b>DIODES</b>              |               |  |      |                        |               |   |      |
| D101                       | VHD1N60///-1  | Signal Meter, FM (1N60)                              | AC   | L102                   | VP-LH1R0M0000 | 1μH, Phase Compensation   | AB   |
| D103                       | VHD1S2076//-1 | FM Muting (1S2076)                                   | AB   | L104                   | RCILZ0052AFZZ | 18μH, Phase Shifter   | AB   |
| D104                       | VHD1S2076//-1 | FM Muting (1S2076)                                   | AB   | L105                   | VP-LH100M0000 | 10μH, +B Choke  | AB   |
| D105                       | VHD1S2076//-1 | FM Muting (1S2076)                                   | AB   | L106                   | VP-LH100M0000 | 10μH, +B Choke  | AB   |
| D106                       | VHD1S2076//-1 | V.C.O. Stop (1S2076)                                 | AB   | L301                   | RCILB0395AFZZ | MW Oscillator   | AD   |
|                            |               |  |      | L302                   | RCILB0411AFZZ | LW Oscillator   | AD   |
|                            |               |  |      | L303                   | RCILIO209AFZZ | AM IF with Ceramic Filter   | AH   |
|                            |               |  |      | L304                   | VP-LH1R0M0000 | 1μH, Choke  | AB   |
|                            |               |  |      | L305                   | VP-LH1R0M0000 | 1μH, Choke  | AB   |
|                            |               |  |      | L501, L502             | RCILZ0050AFZZ | .8μH, Oscillation Prevention  | AC   |
|                            |               |  |      | L603                   | VP-LH100M0000 | 10μH, Choke   | AB   |
|                            |               |  |      | L801                   | RCILAO231AFZZ | Balun (Antenna Matching)  | AC   |

# PARTS LIST

| REF. NO.                       | PART NO.      | DESCRIPTION  | CODE | REF. NO.   | PART NO.      | DESCRIPTION                                   | CODE |
|--------------------------------|---------------|--|------|--|---------------|---|------|
| L802-<br>A, B }                | RCILA0403AFZZ | LW/MW Bar Antenna  | AS   | C217, }<br>C218 }  | VCEALU1AC336Y | 33μF, 10V, +50 -10%,<br>LR (Orange)           | AC   |
| <b>TRANSFORMERS</b>            |               |  |      | C223, }<br>C224 }  | VCEALU1HC105A | 1μF, 50V, +75 -10%,<br>LR (Orange)            | AC   |
| T101                           | RCILD0053AFZZ | Quadrature (10.7MHz)   | AE   | C229, }<br>C230 }  | VCEAAU1CW107Y | 100μF, 16V, +50 -10%                          | AC   |
| T102                           | RCILD0054AFZZ | Quadrature (10.7MHz)   | AE   | C309   | VCEAAU1CW476Y | 47μF, 16V +50 -10%                            | AB   |
| T801, }<br>CNS801 }            | RTRNP0478AFZZ | Power with Connecting<br>Socket  |      | C310   | VCEAAU1AW227Y | 220μF, 10V, +50 -10%                          | AC   |
| <b>FILTERS</b>                 |               |  |      | C315   | VCEALU1HW224M | .22μF, 50V, ±20%, LL<br>(Yellow)              | AB   |
| CF101, }<br>CF102 }            | RFILF0001AGZZ | FM IF, Ceramic   | AF   | C318   | VCEAAU1CW476Y | 47μF, 16V, +50 -10%                           | AB   |
| LPF101, }<br>LPF102 }          | RFILL0050AFZZ | Low Pass Filter  | AK   | C319   | VCEAAU1EW475A | 4.7μF, 25V, +75 -10%                          | AB   |
| <b>CONTROLS</b>                |               |  |      | C321   | VCEAAU1CW107Y | 100μF, 16V, +50 -10%                          | AC   |
| TC301, }<br>TC302 }            | RTO-H2033AGZZ | Trimmer Capacitors<br>TC301 : MW Antenna<br>Trimmer<br>TC302 : LW Antenna<br>Trimmer       | AD   | C329   | VCEAAU1HW105A | 1μF, 50V, +75 -10%                            | AB   |
| TC303, }<br>TC304 }            | RTO-H2051AFZZ | Trimmer Capacitors<br>TC303 : MW Oscillator<br>Trimmer<br>TC304 : LW Oscillator<br>Trimmer | AE   | C401, }<br>C402 }  | VCEALU1EC335A | 3.3μF, 25V, +75 -10%,<br>LR (Orange)          | AC   |
| VR101                          | RVR-M0140AFZZ | 470(B) ohm, FM Muting<br>Level Adjust  | AD   | C405, }<br>C406 }  | VCEAAU1CW336Y | 33μF, 16V, +50 -10%                           | AC   |
| VR102                          | RVR-M0078AGZZ | 10K(B) ohm, V.C.O.<br>Frequency Adjust   | AF   | C415, }<br>C416 }  | VCEALU1EC335A | 3.3μF, 25V, +75 -10%,<br>LR (Orange)          | AC   |
| VR103                          | RVR-M0145AFZZ | 220K(B) ohm, Stereo<br>Separation Adjust   | AD   | C417, }<br>C418 }  | VCEAAU1CW107Y | 100μF, 16V, +50 -10%                          | AC   |
| VR201-<br>A, B }               | RVR-B0148AFZZ | 100K ohm, Volume Control   | AM   | C501, }<br>C502 }  | VCEALU1EC335A | 3.3μF, 25V, +75 -10%,<br>LR (Orange)          | AC   |
| VR202                          | RVR-Z0061AFZZ | 100K ohm, Balance Control  |      | C505, }<br>C506 }  | VCEAAU1HW476Y | 47μF, 50V, +50 -10%                           | AC   |
| VR203-<br>A, B }               | RVR-C0066AFZZ | 100K ohm, Bass Control   | AL   | C507, }<br>C508 }  | VCEAAU1CW336Y | 33μF, 16V, +50 -10%                           | AC   |
| VR204-<br>A, B }               | RVR-C0066AFZZ | 100K ohm, Treble Control   | AL   | C511, }<br>C512 }  | VCEAAU1HW476Y | 47μF, 50V, +50 -10%                           | AC   |
| VR501, }<br>VR502 }            | RVR-M0139AFZZ | 330(B) ohm, Idle Current<br>Adjust   | AD   | C515   | VCEAAU1HW105A | 1μF, 50V, +75 -10%                            | AB   |
| <b>ELECTROLYTIC CAPACITORS</b> |               |  |      | C520, }<br>C521 }  | RC-EZ1009AFZZ | 8200μF x 2 (Dual Capacitor),<br>50V, +50 -10% | AB   |
| C115                           | VCEAAU1HW105A | 1μF, 50V, +75 -10%   | AB   | C601   | VCEAAU1CW106Y | 10μF, 16V, +50 -10%                           | AB   |
| C116                           | VCEAAU1HW105A | 1μF, 50V, +75 -10%   | AB   | C602   | VCEAAU1CW106Y | 10μF, 16V, +50 -10%                           | AB   |
| C119                           | VCAAAU1AB335M | 3.3μF, 10V, ±20%, Aluminum   | AD   | C603   | VCEAAU1CW337Y | 330μF, 16V, +50 -10%                          | AD   |
| C121                           | VCEAAU1CW107Y | 100μF, 16V, +50 -10%   | AC   | C604   | VCEAAU1CW337Y | 330μF, 16V, +50 -10%                          | AD   |
| C123                           | VCAAAU1EB224K | .22μF, 25V, ±10%, Aluminum   | AC   | C605   | VCEAAU1CW107Y | 100μF, 16V, +50 -10%                          | AC   |
| C124                           | VCAAAU1AB335M | 3.3μF, 10V, ±20%, Aluminum   | AD   | C614   | VCEAAU1VW227Y | 220μF, 35V, +50 -10%                          | AD   |
| C125                           | VCAAAU1EB155K | 1.5μF, 25V, ±10%, Aluminum   | AC   | C615   | VCEAAU1VW107Y | 100μF, 35V, +50 -10%                          | AD   |
| C127                           | VCEAAU1CW106Y | 10μF, 16V, +50 -10%  | AB   | C616   | VCEAAU1VW227Y | 220μF, 35V, +50 -10%                          | AD   |
| C128                           | VCEAAU1CW106Y | 10μF, 16V, +50 -10%  | AB   | C617   | VCEAAU1VW107Y | 100μF, 35V, +50 -10%                          | AD   |
| C131, }<br>C132 }              | VCEAAU1CW106Y | 10μF, 16V, +50 -10%  | AB   | C618   | VCEAAU1EW227Y | 220μF, 25V, +50 -10%                          | AC   |
| C133                           | VCEAAU1AW227Y | 220μF, 10V, +50 -10%   | AC   | C619   | VCEAAU1CW227Y | 220μF, 16V, +50 -10%                          | AC   |
| C141                           | VCEAAU1HW105A | 1μF, 50V, +75 -10%   | AB   | C622   | VCEAAU1EW476Y | 47μF, 25V, +50 -10%                           | AC   |
| C205, }<br>C206 }              | VCEALU1EC335A | 3.3μF, 25V, +75 -10%,<br>LR (Orange)   | AC   | C636, }<br>C637 }  | VCEALU1HW105M | 1μF, 50V, ±20%, LL (Yellow)                   | AD   |
| C207, }<br>C208 }              | VCAAAU1AB224M | .22μF, 10V, ±20%, Aluminum   | AC   | C805   | VCEAAU1EW106Y | 10μF, 25V, +50 -10%                           | AB   |
|                                |               |  |      | C806   | VCEAAU1EW106Y | 10μF, 25V, +50 -10%                           | AB   |
|                                |               |  |      | <b>CAPACITORS</b>  |               |   |      |
|                                |               |  |      | Unless otherwise specified capacitors are<br>50V, +80 -20%, Ceramic Type |               |   |      |
|                                |               |  |      | C101   | VCKZPU1HF102Z | .001μF  | AA   |
|                                |               |  |      | C102   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C103   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C104   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C107   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C108   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C109   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C110   | VCKZPU1HF223Z | .022μF  | AA   |
|                                |               |  |      | C111   | VCKZPU1ND474M | .47μF, 12V, ±20%, Ceramic                     | AD   |
|                                |               |  |      | C112   | VCKZPU1HF223Z | .022μF  | AA   |

# PARTS LIST

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|----------|---------------|----------------------------------|------|---|---------------|-------------------------------------|------|
| C114     | VCKZPU1HF223Z | .022μF                           | AA   | C516,   | VCKZPU2TE103Z | .01μF, 150VAC, +80 -20%,<br>Ceramic | AB   |
| C117     | VCKZPU1HF223Z | .022μF                           | AA   | C517,   |               |                                     |      |
| C118     | VCKZPU1HF223Z | .022μF                           | AA   | C518,   |               |                                     |      |
| C120     | VCCSPU1HL331K | 330pF, 50V, ±10%, Ceramic        | AB   | C519  |               |                                     |      |
| C122     | VCQYKU1HM473K | .047μF, 50V, ±10%, Mylar         | AC   | C606  |               |                                     |      |
| C126     | VCQSMT1HS391J | 390pF, 50V, ±5%, Styrol          | AB   | C801,   | VCKZPU1HF223Z | .022μF                              | AA   |
| C129     | VCQYKU1HM122J | .0012μF, 50V, ±5%, Mylar         | AB   | C802  | VCKZPU1HF223Z | .022μF                              | AA   |
| C130     | VCQYKU1HM122J | .0012μF, 50V, ±5%, Mylar         | AB   | C803,   | RC-PZ061CAFZZ | .05μF, 250VAC, ±20%,<br>Oil         | AF   |
| C140     | VCKZPU1HF223Z | .022μF                           | AA   | C804  |               |                                     |      |
| C142     | VCCSPU1HL220K | 22pF, 50V, ±10%, Ceramic         | AA   | <b>RESISTORS</b>  |               |                                     |      |
| C143     | VCCSPU1HL331K | 330pF, 50V, ±10%, Ceramic        | AB   | Unless otherwise specified resistors are 1/4W, ±5%,<br>Carbon Type. |               |                                     |      |
| C201,    | VCCSPU1HL271K | 270pF, 50V, ±10%, Ceramic        | AB   | R101  | VRD-ST2EE470J | 47 ohm                              | AA   |
| C202     |               |                                  |      |   |               |                                     |      |
| C203,    | VCQYKU1HM683J | .068μF, 50V, ±5%, Mylar          | AC   | R102  | VRD-ST2EE473J | 47K ohm                             | AA   |
| C204     |               |                                  |      |   |               |                                     |      |
| C209,    | VCCSPU1HL120K | 12pF, 50V, ±10%, Ceramic         | AA   | R103  | VRD-ST2EE103J | 10K ohm                             | AA   |
| C210     |               |                                  |      |   |               |                                     |      |
| C211,    | VCCSPU1HL5R0C | 5pF, 50V, ±0.25pF, Ceramic       | AA   | R104  | VRD-ST2EE471J | 470 ohm                             | AA   |
| C212     |               |                                  |      |   |               |                                     |      |
| C213,    | VCCSPU1HL560K | 56pF, 50V, ±10%, Ceramic         | AA   | R105  | VRD-ST2EE331J | 330 ohm                             | AA   |
| C214     |               |                                  |      |   |               |                                     |      |
| C215,    | VCCSPU1HL471K | 470pF, 50V, ±10%, Ceramic        | AB   | R106  | VRD-ST2EE470J | 47 ohm                              | AA   |
| C216     |               |                                  |      |   |               |                                     |      |
| C219,    | VCQYKU1HM223J | .022μF, 50V, ±5%, Mylar          | AB   | R107  | VRD-ST2EE101J | 100 ohm                             | AA   |
| C220     |               |                                  |      |   |               |                                     |      |
| C221,    | VCQYKU1HM124J | .12μF, 50V, ±5%, Mylar           | AE   | R116  | VRD-ST2EE181J | 180 ohm                             | AA   |
| C222     |               |                                  |      |   |               |                                     |      |
| C225,    | VCQYKU1HM222J | .0022μF, 50V, ±5%, Mylar         | AB   | R117  | VRD-ST2EE331J | 330 ohm                             | AA   |
| C226     |               |                                  |      |   |               |                                     |      |
| C227,    | VCQYKU1HM103J | .01μF, 50V, ±5%, Mylar           | AB   | R118  | VRD-ST2EE104J | 100K ohm                            | AA   |
| C228     |               |                                  |      |   |               |                                     |      |
| C301     | VCQSMT1HS331J | 330pF, 50V, ±5%, Styrol          | AB   | R119  | VRD-ST2EE562J | 5.6K ohm                            | AA   |
| C302     | VCCUPU1HJ150K | 15pF (UJ), 50V, ±10%,<br>Ceramic | AB   | R120  | VRD-ST2EE152J | 1.5K ohm                            | AA   |
| C303     | VCQSMT1HS121J | 120pF, 50V, ±5%, Styrol          | AB   | R121  | VRD-ST2EE822J | 8.2K ohm                            | AA   |
| C304     | VCCCPU1HH470J | 47pF(CH), 50V, ±5%, Ceramic      | AB   | R122  | VRD-ST2EE121J | 120 ohm                             | AA   |
| C306     | VCKZPU1HF103P | .01μF, 50V, +100 -0%,<br>Ceramic | AE   | R123  | VRD-ST2EE154J | 150K ohm                            | AA   |
| C307     | VCKZPU1HF103P | .01μF, 50V, +100 -0%,<br>Ceramic | AE   | R124  | VRD-ST2EE333J | 33K ohm                             | AA   |
| C308     | VCCSPU1HL221K | 220pF, 50V, ±10%, Ceramic        | AB   | R125  | VRD-ST2EE333J | 33K ohm                             | AA   |
| C311     | VCCSPU1HL470K | 47pF, 50V, ±10%, Ceramic         | AA   | R126  | VRD-ST2EE123J | 12K ohm                             | AA   |
| C312     | VCQYKU1HM473K | .047μF, 50V, ±10%, Mylar         | AC   | R127  | VRD-ST2EE123J | 12K ohm                             | AA   |
| C313     | VCKZPU1HF473Z | .047μF                           | AB   | R128  | VRD-ST2EE223J | 22K ohm                             | AA   |
| C314     | VCKZPU1HF473Z | .047μF                           | AB   | R129  | VRD-ST2EE123J | 12K ohm                             | AA   |
| C316     | VCQYKU1HM223K | .022μF, 50V, ±10%, Mylar         | AB   | R130  | VRD-ST2EE333J | 33K ohm                             | AA   |
| C317     | VCQYKU1HM103K | .01μF, 50V, ±10%, Mylar          | AB   | R131  | VRD-ST2EE333J | 33K ohm                             | AA   |
| C320     | VCKZPU1HF473Z | .047μF                           | AB   | R132  | VRD-ST2EE563J | 56K ohm                             | AA   |
| C403,    | VCCSPU1HL101K | 100pF, 50V, ±10%, Ceramic        | AA   | R133  | VRD-ST2EE104J | 100K ohm                            | AA   |
| C404     |               |                                  |      |   |               |                                     |      |
| C407,    | VCCSPU1HL560K | 56pF, 50V, ±10%, Ceramic         | AA   | R134  | VRD-ST2EE225J | 2.2 Meg ohm                         | AA   |
| C408     |               |                                  |      |   |               |                                     |      |
| C409,    | VCCSPU1HL5R0C | 5pF, 50V, ±0.25pF, Ceramic       | AA   | R135  | VRD-ST2EE223J | 22K ohm                             | AA   |
| C410     |               |                                  |      |   |               |                                     |      |
| C411,    | VCQSMU1HS392J | 3900pF, 50V, ±5%, Styrol         | AC   | R136  | VRD-ST2EE102J | 1K ohm                              | AA   |
| C412     |               |                                  |      |   |               |                                     |      |
| C413,    | VCQSMU1HS152J | 1500pF, 50V, ±5%, Styrol         | AB   | R137  | VRD-ST2EE223J | 22K ohm                             | AA   |
| C414     |               |                                  |      |   |               |                                     |      |
| C503,    | VCCSPU1HL391J | 390pF, 50V, ±5%, Ceramic         | AB   | R138  | VRD-ST2EE223J | 22K ohm                             | AA   |
| C504     |               |                                  |      |   |               |                                     |      |
| C509,    | VCCSPU1HL330K | 33pF, 50V, ±10%, Ceramic         | AA   | R139  | VRD-ST2HD561J | 560 ohm, 1/2W, ±5%, Carbon          | AA   |
| C510     |               |                                  |      |   |               |                                     |      |
| C513,    | VCQYKU1HM104K | .1μF, 50V, ±10%, Mylar           | AC   | R140  | VRD-ST2EE333J | 33K ohm                             | AA   |
| C514     |               |                                  |      |   |               |                                     |      |
|          |               |                                  |      | R141,   | VRD-ST2EE682J | 6.8K ohm                            | AA   |
|          |               |                                  |      | R142  |               |                                     |      |
|          |               |                                  |      | R143,   | VRD-ST2EE473J | 47K ohm                             | AA   |
|          |               |                                  |      | R144  |               |                                     |      |
|          |               |                                  |      | R145,   | VRD-ST2EE272J | 2.7K ohm                            | AA   |
|          |               |                                  |      | R146  |               |                                     |      |
|          |               |                                  |      | R147,   | VRD-ST2EE392J | 3.9K ohm                            | AA   |
|          |               |                                  |      | R148  |               |                                     |      |
|          |               |                                  |      | R149,   | VRD-ST2EE222J | 2.2K ohm                            | AA   |
|          |               |                                  |      | R150  |               |                                     |      |
|          |               |                                  |      | R151  | VRD-ST2EE333J | 33K ohm                             | AA   |
|          |               |                                  |      | R152  | VRD-ST2EY101J | 100 ohm                             | AA   |
|          |               |                                  |      | R153  | VRD-ST2EE474J | 470K ohm                            | AA   |
|          |               |                                  |      | R154  | VRD-ST2EE223J | 22K ohm                             | AA   |
|          |               |                                  |      | R156  | VRD-ST2EY101J | 100 ohm                             | AA   |
|          |               |                                  |      | R157  | VRD-ST2EE184J | 180K ohm                            | AA   |
|          |               |                                  |      | R158  | VRD-ST2EE563J | 56K ohm                             | AA   |
|          |               |                                  |      | R159  | VRD-ST2EE473J | 47K ohm                             | AA   |
|          |               |                                  |      | R160  | VRD-ST2EE223J | 22K ohm                             | AA   |

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|------------|---------------|----------------------------|------|------------------------|--------------------------------|----------------------------------|------|----|
| R201, R202 | VRD-ST2EE333J | 33K ohm                    | AA   | R501, R502             | VRD-ST2EE564J                  | 560K ohm                         | AA   |    |
| R203, R204 | VRD-ST2EE103J | 10K ohm                    | AA   | R503, R504             | VRD-ST2EE821J<br>VRD-ST2EY821J | 820 ohm<br>820 ohm               |      |    |
| R205, R206 | VRD-ST2EE474J | 470K ohm                   | AA   | R505, R506             | VRD-ST2EE273J                  | 27K ohm                          |      |    |
| R207, R208 | VRD-ST2EE563J | 56K ohm                    | AA   | R507, R508             | VRD-ST2EE562J                  | 5.6K ohm                         |      |    |
| R209, R210 | VRD-ST2EE104J | 100K ohm                   | AA   | R509, R510             | VRD-ST2EE682J                  | 6.8K ohm                         |      |    |
| R211, R212 | VRD-ST2EE471J | 470 ohm                    | AA   | R511, R512             | VRD-ST2EY681J                  | 680 ohm                          |      |    |
| R213, R214 | VRD-ST2EE102J | 1K ohm                     | AA   | R513, R514             | VRD-ST2EE152J                  | 1.5K ohm                         |      |    |
| R215, R216 | VRD-ST2EE183J | 18K ohm                    | AA   | R515, R516             | VRD-ST2EE682J                  | 6.8K ohm                         |      |    |
| R217, R218 | VRD-ST2EE332J | 3.3K ohm                   | AA   | R517, R518             | VRD-ST2EE223J                  | 22K ohm                          |      |    |
| R219, R220 | VRD-ST2EE332J | 3.3K ohm                   | AA   | R519, R520             | VRG-ST2EA680J                  | 68 ohm, 1/4W, ±5%, Fusible       |      | AB |
| R221, R222 | VRD-ST2EE562J | 5.6K ohm                   | AA   | R521, R522             | VRD-ST2EE273J                  | 27K ohm                          |      | AA |
| R223, R224 | VRD-ST2EE122J | 1.2K ohm                   | AA   | R523, R524             | VRG-ST2EA101J                  | 100 ohm, 1/4W, ±5%, Fusible      |      | AA |
| R225, R226 | VRD-ST2HD331J | 330 ohm, 1/2W, ±5%, Carbon | AA   | R525, R526             | VRG-ST2EA101J                  | 100 ohm, 1/4W, ±5%, Fusible      |      |    |
| R227, R228 | VRD-ST2EE224J | 220K ohm                   | AA   | R527, R528             | VRG-ST2EA101J                  | 100 ohm, 1/4W, ±5%, Fusible      |      | AA |
| R229, R230 | VRD-ST2EE182J | 1.8K ohm                   | AA   | R529, R530             | VRG-ST2EA4R7J                  | 4.7 ohm, 1/4W, ±5%, Fusible      |      |    |
| R301       | VRD-ST2EE681J | 680 ohm                    | AA   | R531, R532             | VRG-ST2EA4R7J                  | 4.7 ohm, 1/4W, ±5%, Fusible      | AB   |    |
| R302       | VRD-ST2EE102J | 1K ohm                     | AA   | R533, R534             | VRW-KT3HDR33K                  | .33 ohm, 5W, ±10%,<br>Wire Wound | AD   |    |
| R303       | VRD-ST2EE332J | 3.3K ohm                   | AA   | R535, R536             | VRW-KT3HDR33K                  | .33 ohm, 5W, ±10%,<br>Wire Wound | AD   |    |
| R304       | VRD-ST2EE222J | 2.2K ohm                   | AA   | R537, R538             | VRD-ST2EE392J                  | 3.9K ohm                         | AA   |    |
| R305       | VRD-ST2EE153J | 15K ohm                    | AA   | R539, R540             | VRD-ST2EE392J                  | 3.9K ohm                         |      |    |
| R306       | VRD-ST2EE103J | 10K ohm                    | AA   | R541, R542             | VRD-ST2EE392J                  | 3.9K ohm                         |      |    |
| R307       | VRD-ST2EE562J | 5.6K ohm                   | AA   | R543, R544             | VRD-ST2EE392J                  | 3.9K ohm                         |      |    |
| R308       | VRD-ST2EE393J | 39K ohm                    | AA   | R545, R546             | VRD-ST2EE223J                  | 22K ohm                          |      |    |
| R309       | VRD-ST2EY101J | 100 ohm                    | AA   | R547, R548             | VRD-ST2EE682J                  | 6.8K ohm                         |      |    |
| R310       | VRD-ST2EY470J | 47 ohm                     | AA   | R549, R550             | VRD-ST2EE103J                  | 10K ohm                          |      |    |
| R321       | VRD-ST2EE122J | 1.2K ohm                   | AA   | R551, R552             | VRW-KT3DD2R2K                  | 2.2 ohm, 2W, ±10%,<br>Wire Wound |      | AC |
| R322       | VRD-ST2EE473J | 47K ohm                    | AA   | R553, R554             | VRW-KT3DD100K                  | 10 ohm, 2W, ±10%,<br>Wire Wound  |      | AC |
| R324       | VRD-ST2EE822J | 8.2K ohm                   | AA   | R555                   | VRD-ST2EE332J                  | 3.3K ohm                         |      | AA |
| R325       | VRD-ST2EE103J | 10K ohm                    | AA   | R556, R557, R558, R559 | VRG-ST2HA1R0J                  | 1 ohm, 1/2W, ±5%,<br>Fusible     | AC   |    |
| R326       | VRD-ST2EE103J | 10K ohm                    | AA   | R561, R562             | VRD-ST2EE821J                  | 820 ohm                          | AA   |    |
| R401, R402 | VRD-ST2EE102J | 1K ohm                     | AA   | R601                   | VRD-ST2EE153J                  | 15K ohm                          |      |    |
| R403, R404 | VRD-ST2EE473J | 47K ohm                    | AA   | R602                   | VRD-ST2EE333J                  | 33K ohm                          |      |    |
| R405, R406 | VRD-ST2EE224J | 220K ohm                   | AA   | R603                   | VRD-ST2EE393J                  | 39K ohm                          |      |    |
| R407, R408 | VRD-ST2EE684J | 680K ohm                   | AA   | R604                   | VRD-ST2EE392J                  | 3.9K ohm                         |      |    |
| R409, R410 | VRD-ST2EE122J | 1.2K ohm                   | AA   |                        |                                |                                  |      |    |
| R411, R412 | VRD-ST2EE104J | 100K ohm                   | AA   |                        |                                |                                  |      |    |
| R413, R414 | VRD-ST2EE563J | 56K ohm                    | AA   |                        |                                |                                  |      |    |
| R415, R416 | VRD-ST2EE332J | 3.3K ohm                   | AA   |                        |                                |                                  |      |    |
| R417, R418 | VRD-ST2EE224J | 220K ohm                   | AA   |                        |                                |                                  |      |    |
| R419, R420 | VRD-ST2HD331J | 330 ohm, 1/2W, ±5%, Carbon | AA   |                        |                                |                                  |      |    |



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|------------------------|---------------|---------------------------------------|------|---------------|--|--|------|
| R605                   | VRD-ST2EE682J | 6.8K ohm                              | AA   |               | HSSND0230AFSA  | Dial Pointer   | AF   |
| R606                   | VRD-ST2EE682J | 6.8K ohm                              |      |               | JKNBB0059AFSA  | Knob, Tuning Control   | AP   |
| R607                   | VRD-ST2EE470J | 47 ohm                                |      |               | JKNBM0248AFSA  | Knob, LW/MW/FM/FM Muting   | AF   |
| R608                   | VRD-ST2EE562J | 5.6K ohm                              |      |               |  |  |      |
| R609                   | VRD-ST2EE683J | 68K ohm                               |      |               | JKNBN0334AFSA  | Knob, Bass, Treble, Balance  | AG   |
| R610                   | VRD-ST2EY121J | 120 ohm                               |      |               | JKNBN0333AFSA  | Knob, Speakers Selector, Volume Control, Function Selector   | AH   |
| R612                   | VRD-ST2EY221J | 220 ohm                               |      |               |  |  |      |
| R613                   | VRD-ST2EE223J | 22K ohm                               |      |               |  |  |      |
| R614                   | VRD-ST2EE223J | 22K ohm                               |      |               | JKNBP0070AFSA  | Knob, Power Switch, Audio Muting Switch, Low Cut Filter Switch, Mode Selector, Loudness Switch, Tape Dubbing Switch, Tape Monitor Switch | AH   |
| R615                   | VRD-ST2EY221J | 220 ohm                               |      |               |  |  |      |
| R616                   | VRS-PT3DB681K | 680 ohm, 2W, ±10%, Oxide Film         |      | AB            |  |  |      |
| R618, R619, R620, R621 | VRS-PT3DB271K | 270 ohm, 2W, ±10%, Oxide Film         |      | AB            | LANGQ0423AFZZ  | Bracket, LW/MW Bar Antenna   | AB   |
| R622                   | VRG-ST2EA151J | 150 ohm, 1/4W, ±5%, Fusible           |      | AB            | LANGQ0508AFSA  | Rear Panel   | AT   |
| R623                   | VRS-PT3AB561K | 560 ohm, 1W, ±10%, Oxide Film         |      | AB            | LANGQ0504AFZZ  | Bracket, Dial Lamp P.W. Board (Part of PREFL0061AFZZ)  | —    |
| R624                   | VRG-ST2EA151J | 150 ohm, 1/4W, ±5%, Fusible           | AB   | LANGR0414AFZZ | Bracket, Front Panel   | AP   |      |
| R625                   | VRS-PT3AB561K | 560 ohm, 1W, ±10%, Oxide Film         | AB   | LANGR0413AFZZ | Bracket, Power Transformer   | AH   |      |
| R626                   | VRD-ST2HD182J | 1.8K ohm, 1/2W, ±5%, Carbon           | AA   | LANGT0607AFZZ | Bracket, Dial  | AF   |      |
| R627                   | VRD-ST2EE681J | 680 ohm                               | AA   | LANGT0608AFZZ | Bracket, Pulley  | AB   |      |
| R639                   | VRG-ST2EA4R7J | 4.7 ohm, 1/4W, ±5%, Fusible           | AB   | LANGT0622AFZZ | Bracket, Heat Sink   | —  |      |
| R640, R641             | VRD-ST2EE221J | 220 ohm                               | AA   | LBSHC0002AGZZ | Bushing, LW/MW Bar Antenna Wire  | AB   |      |
| R642, R643             | VRD-ST2EE272J | 2.7K ohm                              | AA   | LBSHC0004AGZZ | Bushing, Power Supply Cord (SEMKO, KEMA)   | AC   |      |
| R644, R645             | VRD-ST2EE682J | 6.8K ohm                              | AA   | LBSHC0007AFZZ | Bushing, Power Supply Cord (SEV, A-club)   | AB   |      |
| R646, R647             | VRD-ST2EE183J | 18K ohm                               | AA   | LCHSM0257AFZZ | Chassis Assembly   | AW   |      |
| R648, R649             | VRD-ST2EE222J | 2.2K ohm                              | AA   | LHLDW1050AFZZ | Holder, Dial Lamp (Part of PREFL0061AFZZ)  | —  |      |
| R650                   | VRD-ST2EY151J | 150 ohm                               | AA   | LHLDW1052AFZZ | Wire Clip  | AA   |      |
| R701, R702, R703, R704 | VRD-ST2EY102J | 1K ohm                                | AA   | LHLDW1053AFZZ | Wire Clip  | AA   |      |
| R705, R706             | VRD-ST2EY104J | 100K ohm                              | AA   | LHLDW1053AFZZ | Wire Clip  | AB   |      |
| R707, R708             | VRD-ST2EY394J | 390K ohm                              | AA   | LHLDW1060AFZZ | Wire Clip  | AA   |      |
| R709, R710, R711, R712 | VRD-ST2EY102J | 1K ohm                                | AA   | LHLDW1062AFZZ | Wire Clip  | AA   |      |
| R713, R714             | VRD-ST2EY104J | 100K ohm                              | AA   | LHLDW1066AFZZ | Wire Clip  | AA   |      |
| R715, R716             | VRD-ST2EY394J | 390K ohm                              | AA   | LHLDW9050AFZZ | Wire Holder, AM Antenna Wire   | AD   |      |
| R801                   | VRD-SU2EY822J | 8.2K ohm                              | AA   | LPLTP0053AFZZ | Acryl, Dial Illumination (Part of PREFL0061AFZZ)                                       | —  |      |
|                        |               |                                       |      | LX-HZ0053AFFD | Flange Head Screw, P.W. Board  | AA   |      |
|                        |               |                                       |      | LX-NZ0006SGFD | Flange Nut, Antenna Terminals  | AA   |      |
|                        |               |                                       |      | LX-NZ0118AFFD | Nut, Speaker Selector Switch Shaft, Function Selector Switch Shaft and Headphone Jacks | AA   |      |
|                        |               |                                       |      | LX-NZ0119AFFW | Hexagon Head Cap Screw, Speaker Selector Switch and Function Selector Switch           | AD   |      |
|                        |               |                                       |      | LX-NZ0120AFFD | Flange Nut (5φ), Power Transformer   | AA   |      |
|                        |               |                                       |      | MSPRP0152AFZZ | Plate Spring, Grounding (Earth)  | AA   |      |
|                        |               |                                       |      | MSPRT0304AFFJ | Spring, Dial Cord  | AA   |      |
|                        |               |                                       |      | NDRM-0150AFZZ | Drum   | AF   |      |
|                        |               |                                       |      | NPLYB0001SGZZ | Pulley, Dial Cord  | AB   |      |
|                        |               |                                       |      | NPLYC0101AFFD | Shaft, Pulley  | AA   |      |
|                        |               |                                       |      | NSFTD0171AFFW | Tuning Shaft with Flywheel   | AN   |      |
|                        |               |                                       |      | PCOVP1158AFZZ | Cover, Fuse, Rear Panel  | AF   |      |
|                        |               |                                       |      | PCUSG0077AF00 | Cushion, AM P.W. Board   | —  |      |
|                        |               |                                       |      | PRDAR0142AF00 | Heat Sink, Power Transistor  | BA   |      |
| <b>MISCELLANEOUS</b>   |               |                                       |      |               |  |  |      |
|                        | CSPRT0304AF16 | Dial Cord Assembly                    | —    |               |  |  |      |
|                        | GCAB-5090AFSA | Cabinet                               | BF   |               |  |  |      |
|                        | GCOVA1070AFSC | Guide (Large), Lever Switch           | AD   |               |  |  |      |
|                        | GCOVA1071AFSC | Guide (Small), Lever Switch           | AD   |               |  |  |      |
|                        | GFTAU3065AFZZ | Plate, Bottom (Part of LCHSM0257AFZZ) | —    |               |  |  |      |
|                        | GLEGP0002SG00 | Leg                                   | AC   |               |  |  |      |
|                        | HDALM0173AFSA | Dial                                  | AY   |               |  |  |      |
|                        | HPNLC3276AFSA | Front Panel                           | BG   |               |  |  |      |

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|----------|---------------|-----------------------------|------|----------|---------------|-----------------------------|------|
|          | PRDAR0101AFFW | Heat Sink, Transistor Q609  | AB   |          | QPWBF0597AFZZ | Printed Wiring Board, AM    | AU   |
|          | PREFL0061AFZZ | Dial Illumination Assembly  | BA   |          |               | RF/IF Circuit               |      |
|          | PSHEF0110AFZZ | Felt (Long), Lever Switch   | AA   |          | QSOCT0353AFZZ | Socket, Power Transistor    | AD   |
|          | PSHEF0114AF00 | Felt (Short), Power Switch  | —    |          |               | TAPE-1 Socket,              |      |
|          | PSLDM3126AFZZ | Shield Plate                | AA   | SO701-}  |               | REC (SO701-A, B),           | AK   |
|          | PSPAS0053AFSA | Spacer, Push Knob           | AB   | A ~ E }  | QSOCZ2450AFZZ | PB (P) (SO701-C, D),        |      |
|          | PSPAS0054AFZZ | Spacer, Headphone Jack      | AC   |          |               | DIN(SO701-E)                |      |
|          | PSPAZ0050AFZZ | Insulator, Mica, Power      | AB   |          |               | TAPE-2 Socket,              |      |
|          |               | Transistor                  |      | SO702-}  |               | REC (SO702-A, B),           | AK   |
|          | PSPAZ0060AFZZ | Spacer, LED (D801)          | AA   | A ~ E }  | QSOCZ2450AFZZ | PB (P) (SO702-C, D),        |      |
|          | PZETF0128AFZZ | Insulator, Fuse P.W. Board  | —    |          |               | DIN (SO702-E)               |      |
|          | QACCN0001AGZZ | Power Supply Cord with      | AP   |          |               | Socket, Auxiliary Input     |      |
|          |               | Plug (SEMKO)                |      | SO801-}  |               | (SO801-A, B), PHONO-1       | AG   |
|          | QACCS9001SE00 | Power Supply Cord (SEV)     | AF   | A ~ F }  | QSOCJ2660AFZZ | Input (SO801-C, D),         |      |
|          | QPLGA0205AGZZ | Plug, Power Supply Cord     | AH   |          |               | PHONO-2 Input               |      |
|          |               | (SEV)                       |      |          |               | (SO801-E, F)                |      |
|          | QACCV0001AGZZ | Power Supply Cord with      | AN   | SW201-}  |               | Switch, Function Selector   | AR   |
|          |               | Plug (KEMA)                 |      | A, B }   | QSW-R0141AFZZ |                             |      |
|          | QACCC0002TA0F | Power Supply Cord with      | AF   | SW202    | QSW-B0073AFZZ | Switch, Tape Monitor        | AH   |
|          |               | Plug (USA type Plug)        |      | SW203-}  |               |                             | AK   |
|          | QACCC0002AG08 | Power Supply Cord           | AF   | A ~ D }  | QSW-B0054AFZZ | Switch, Tape Dubbing        |      |
|          | QPLGA0201AGZZ | Plug, Power Supply Cord     | AE   | SW204    | QSW-B0051AFZZ | Switch, Mode Selector       | AH   |
|          | QANTW0055AFZZ | FM Indoor Antenna, T-Shape  | AH   | SW205    | QSW-B0051AFZZ | Switch, Loudness            | AH   |
| CN201    | QCNCM135LAFZZ | Connecting Plug, 11-Pin     | AE   |          |               | Switch, Band (LW/MW/FM)     |      |
| CN202    | QCNCM132FAFZZ | Connecting Plug, 6-Pin      | AD   | SW301-}  |               | Selector (SW301-A~C),       | AS   |
| CN203    | QCNCM132FAFZZ | Connecting Plug, 6-Pin      | AD   | A ~ D }  | QSW-P0143AFZZ | FM Muting (SW301-D)         |      |
| CN301    | QCNCM133GAFZZ | Connecting Plug, 7-Pin      | AD   | SW601    | QSW-R0140AFZZ | Switch, Speakers Selector   | AN   |
| CN302    | QCNCM134HAFZZ | Connecting Plug, 8-Pin      | AD   | SW602    | QSW-B0051AFZZ | Switch, Low Cut Filter      | AH   |
| CNP801   | QCNCW108CAFZZ | Connecting Plug, 2-Pin      | —    | SW603    | QSW-B0051AFZZ | Switch, Audio Muting        | AH   |
|          |               | (Part of PREFL0061AFZZ)     |      | SW801    | QSW-B9059AFZZ | Switch, Power               | AQ   |
| CNS201   | QCNCW106LAFZZ | Connecting Socket, 11-Pin   | AC   | TB801    | QTANN0453AFZZ | Antenna Terminals, FM       | AH   |
| CNS202   | QCNCW103FAFZZ | Connecting Socket, 6-Pin    | AB   |          |               | (75 ohms and 240 ohms)      |      |
| CNS203   | QCNCW103FAFZZ | Connecting Socket, 6-Pin    | AB   |          |               | and AM                      |      |
| CNS301   | QCNCW104GAFZZ | Connecting Socket, 7-Pin    | AB   | TB802    | QTANN0150AFZZ | Terminal, Grounding (Earth) | AD   |
| CNS302   | QCNCW105HAFZZ | Connecting Socket, 8-Pin    | AB   | TB803    | QTANN0454AFZZ | Speaker Terminals-A         | AG   |
|          | QFS-C202CAGNI | Fuse, 2.0AT (250V)          | AE   | TB804    | QTANN0454AFZZ | Speaker Terminals-B         | AG   |
|          | QFSDH1001AGZZ | Holder, Fuse                | AA   | ME801    | RMTRL0135AFSA | Meter, Signal (Strength)    | AU   |
| J601     | QJAKJ0057AFZZ | Jack, Headphone-b           | AG   | ME802    | RMTRL0134AFSA | Meter, Tuning (Center)      | AU   |
| J602     | QJAKJ0057AFZZ | Jack, Headphone-a           | AG   | RLY601}  |               | Relay, DC24V, Protection    | AW   |
|          | QLUGL0250AFZZ | Terminal Strip, 2-Lug       | AC   | -A, B }  | RRLYZ0050AFZZ | Circuit                     |      |
|          | QLUGZ011AAFZZ | Lug, Ground (Earth)         | AA   |          | RTUNF0061AFZZ | FM Tuner (Front-end)        | BC   |
|          | QPLGS0102AGZZ | Plug, Short                 | AD   |          |               | Assembly                    |      |
|          | QPWBF0603AFZZ | Printed Wiring Board, Main  | AQ   | PL801,}  |               |                             |      |
|          |               | Amplifier Circuit           |      | PL802,}  |               |                             |      |
|          | QPWBF0353AFZZ | Printed Wiring Board, Tape  | AD   | PL803,}  | RLMPP0057AFZZ | Dial Illumination Lamp      | —    |
|          |               | Circuit                     |      | PL804,}  |               | (8V, 0.3A)                  |      |
|          | QPWBF0423AFZZ | Printed Wiring Board, Fuse  | AE   | PL805,}  |               | (Part of PREFL0061AFZZ)     |      |
|          |               | Circuit                     |      | PL806 }  |               |                             |      |
|          | QPWBF0593AFZZ | Printed Wiring Board, Dial  | —    |          | XBBS40P45000  | Screw, Bar Antenna Bracket  | AA   |
|          |               | Lamp Circuit                |      |          | XHBSF40P18XSO | Screw, Cabinet              |      |
|          |               | (Part of PREFL0061AFZZ)     |      |          | XHBS40P12000  | Screw, Leg                  |      |
|          | QPWBF0596AFZZ | Printed Wiring Board, FM    | AS   |          | XNESD40-32000 | Nut, Bar Antenna Bracket    | AA   |
|          |               | RF/IF, Equalizer and Tone   |      |          | XWHS91-10140  | Washer, Function Selector   |      |
|          |               | Circuits                    |      |          |               | Switch                      |      |
|          | QPWBF0595AFZZ | Printed Wiring Board, Power | AM   |          | XWUSE84-08000 | Shakeproof Lockwasher       | AA   |
|          |               | Supply and Relay Circuits   |      |          |               | Internal Type, Grounding    |      |
|          |               |                             |      |          |               | (Earth) Terminal            |      |