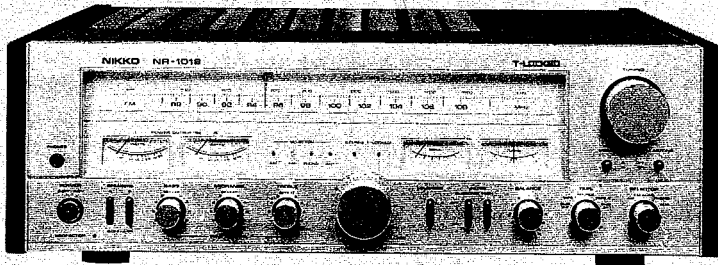


NR-1019

AM/FM STEREO RECEIVER



TYPE AND VOLTAGE

W-TYPE	UL and CSA type	120V AC
E-TYPE	NK-STD type	220/240V AC
N-TYPE	DEMKO and SEMKO type	

SERVICE MANUAL

CONTENTS

SPECIFICATIONS	1, 2
BLOCK DIAGRAM	3
CIRCUIT DESCRIPTION	4 ~ 8
DISASSEMBLY	9, 10
ALIGNMENT	11 ~ 15
P. C. BOARD	16 ~ 19
POWER TRANSISTORS MOUNTING ASSEMBLY	20
DIAL CORD INSTALLATION	21
PARTS LOCATION	22
PARTS LIST	23 ~ 28
SEMICONDUCTOR DATA,	
TRANSISTORS	29
FIELD EFFECT TRANSISTOR	29
DIODES, LED'S	29
ZENER DIODES	29
INTEGRATED CIRCUITS	30 ~ 33
CORRECTION OF SCHEMATIC DIAGRAM	34

SPECIFICATIONS

FM TUNER SECTION

Usable Sensitivity: better than 10 dB μ (3.16 μ V)

50 dB Quieting Sensitivity:
. better than 15 dB μ (5.6 μ V)

Signal to Noise Ratio

(MONO): better than 65 dB

(STEREO): better than 60 dB

T. H. Distortion at 1 kHz

(MONO): no more than 0.3 %

(STEREO): no more than 0.8 %

Alternate Channel Selectivity: better than 60 dB

Spurious Rejection Ratio: better than 80 dB

Image Frequency Rejection Ratio: better than 80 dB

IF Rejection Ratio: better than 80 dB

AM Suppression Ratio: better than 50 dB

AM TUNER SECTION

Usable Sensitivity, Ferrite Loopstick Antenna:

. better than 1000 μ V/m

Signal to Noise Ratio: better than 38 dB

Image Frequency Rejection Ratio: better than 30 dB

Capture Ratio: better than 4 dB

Stereo Separation

(100 Hz): better than 30 dB

(1 kHz): better than 35 dB

(10 kHz): better than 30 dB

Subcarrier Suppression Ratio: better than 58 dB

Muting Sensitivity: 30 dB μ $\pm$ 8 dB

T-LOCKED System

(Lock Range): 150 kHz $\pm$ 100 kHz

(Lock in Range): 50 kHz $\pm$ 20 kHz

FM Tuning Range: 87.9 ~ 108.5 MHz

Antenna Impedance

. 300 ohms balanced & 75 ohms unbalanced

Output Level: 550 mV $\pm$ 2 dB

IF Rejection Ratio: better than 25 dB

Selectivity ($\pm$ 10 kHz): better than 30 dB

AM Tuning Range: 530 ~ 1630 kHz

Output Level: 120 mV $\pm$ 3 dB

AUDIO AMPLIFIER SECTION

Continuous Power Output per channel

20 ~ 20000 Hz (8 ohms): . . . more than 70 Watts
 1000 Hz (8 ohms): more than 70 Watts
 1000 Hz (4 ohms): more than 80 Watts

T. H. Distortion, 8 ohms

at Continuous Power Output:
 no more than 0.03 %
 at 1 Watt Power Output: no more than 0.05 %

I. M. Distortion, 8 ohms

at Continuous Power Output:
 no more than 0.03 %
 at 1 Watt Power Output: no more than 0.05 %

IHF Power Bandwidth, 8 ohms: 20 ~ 30000 Hz

Damping Factor, at 1000 Hz, 8 ohms: 50

Frequency Response

PHONO → TAPE OUT (RIAA Equalization):
 30 ~ 15000 Hz $\pm$ 0.5 dB

AUX, TAPE IN → SPEAKER TERMINAL:
 10 ~ 40000 Hz $\pm$ 2 dB

Input Sensitivity for 100 Watts Power Output

PHONO 2.5 mV $\pm$ 2 dB
 AUX, TAPE IN 150 mV $\pm$ 2 dB
 MAIN IN 1000 mV $\pm$ 2 dB

PHONO Maximum Input Capability, at 1000 Hz:

. more than 160 mV

GENERAL

Power Requirement

W—TYPE: AC 120V, 60 Hz
 E and N—TYPE: AC 220/240V, 50/60 Hz

Power Consumption: 320 Watts

Specifications are subject to change without notice.

Output Level at Continuous Power Output,

(input: PHONO) TAPE OUT: 150 mV $\pm$ 2 dB

PRE OUT: 1000 mV $\pm$ 2 dB

Tone Control

BASS (70 Hz) Boost: + 10 dB $\pm$ 2 dB

Cut: -10 dB $\pm$ 2 dB

MID (1000 Hz) Boost: + 6 dB $\pm$ 2 dB

Cut: -6 dB $\pm$ 2 dB

TREBLE (10000 Hz) Boost: + 10 dB $\pm$ 2 dB

Cut: -10 dB $\pm$ 2 dB

Loudness Control (Volume control set at -30 dB position)

70 Hz: + 10 dB $\pm$ 2 dB

10000 Hz: + 6 dB $\pm$ 2 dB

Subsonic Filter, at 20 Hz: -3 dB $\pm$ 2 dB

High Filter, at 10000 Hz: -3 dB $\pm$ 2 dB

Signal to Noise Ratio, IHF "A" Network

PHONO: better than 82 dB

AUX, TAPE IN: better than 90 dB

Output Muting Delay Time: 6 Sec. $\pm$ 3 Sec.

Residual Hum and Noise, 8 ohms:

. no more than 1.5 mV

Idling Current: 40 mA $\pm$ 20 mA

Midpoint Voltage: 0 V $\pm$ 100 mV

Dimensions (Width): 556 mm (22 inches)

(Height): 179 mm (7 inches)

(Depth): 380 mm (15 inches)

Weight, without package: 15.5 Kg

BLOCK DIAGRAM

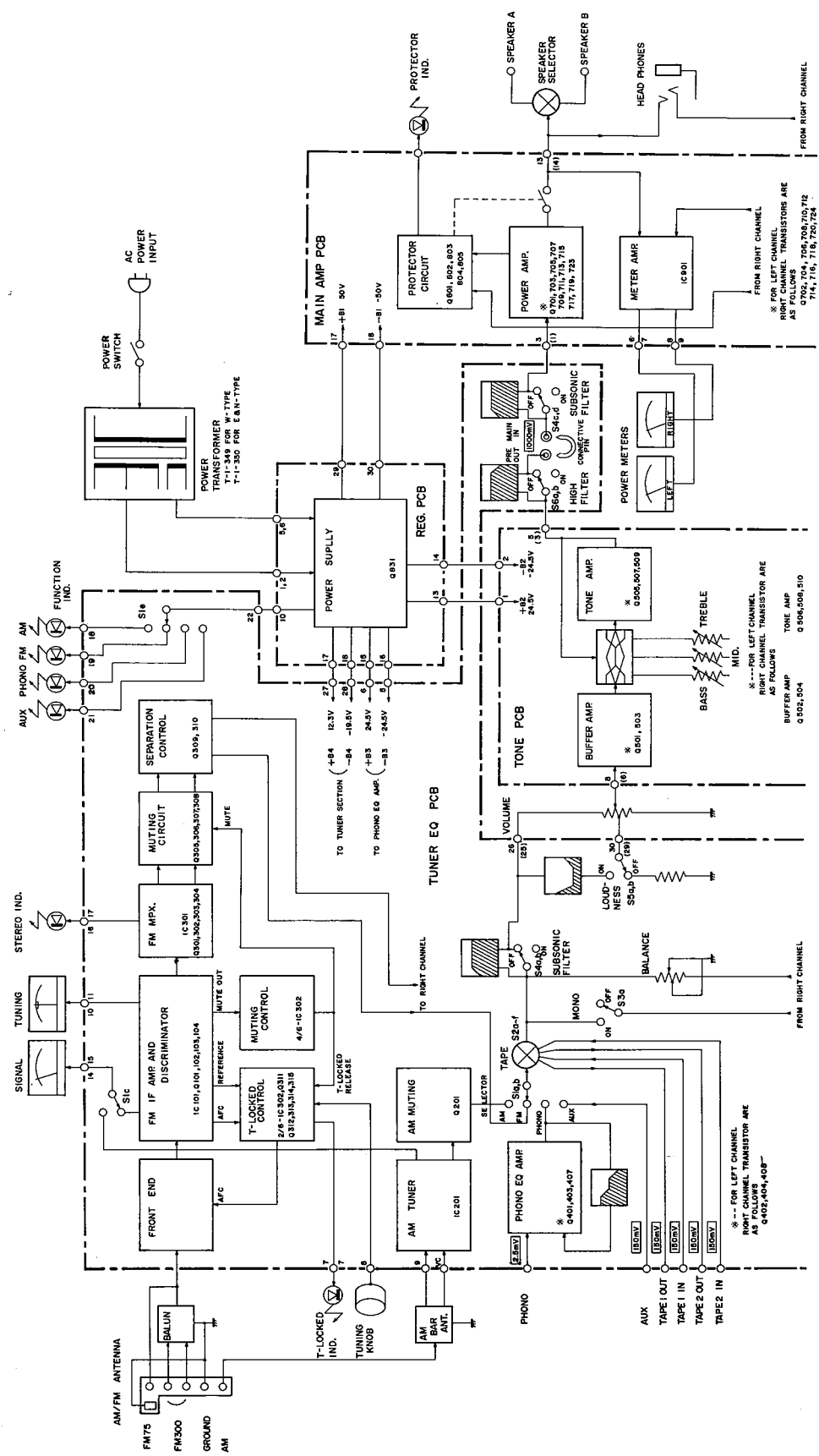


Figure 1

CIRCUIT DESCRIPTION

THE T-LOCKED (TUNE-LOCKED) SYSTEM

1. FUNCTION

The T-Locked System automatically detects and modifies frequency drifts due to changes in temperature or humidity when FM broadcast is received, controls the increase in the distortion due to drifts and keeps the receiver in the optimum condition. (in the lock condition)

Furthermore, this locked condition is cancelled automatically when the tuning knob is touched. After choosing the broadcasting station, taking finger away from the tuning knob, the circuit reoperates again and returns to the lock condition. The lock condition is shown by the emitting of the green LED.

2. ACTION

(a) Cancellation of the lock condition

1. On putting a finger on the tuning knob, the hum which induced in the human body is inputted to pin #13 of IC302 (μ PD4069C). Here this IC is used as a high impedance amplifier and outputs into pin #12 after an amplification of about 20 dB. This signal goes through the resistor R361 and is rectified by two diodes, D302 and D303, to produce direct current (approx. 3 ~ 6 V). This "H" signal is inverted between the #1 and the #2 pin of IC302 and then becomes the "L" signal.
2. This "L" signal turns off the T-Locked indicator (LED #5) in order to cut off the transistor Q311 (2SC945L). Simultaneously, as this signal also cuts off FET Q312 (2SK104), the transistor Q313 connected to the source of Q312 is also cut off. As the transistors, Q313 and Q314, are used as differential amplifier, only the reference signal from the #10 pin of IC101 (HA11225), which is inputted to the base of Q314 appears in the collector output of the transistor Q315. This signal is fed back to the front end as the AFC signal. However, this signal does not influence the local frequency in any way. Because of this, the lock is cancelled.

NOTE: Further, in the case when the input from the antenna is weak or detuned, the mute output from the #12 pin of IC101 triggers the schmidt trigger (which consists of the #3, 4, 5 and 6 pins of IC302 and the resistor R363), cancelling the T-Locked System. Also this signal goes through the diodes, D305 and D314, and is used as the muting signal.

(b) Lock action

1. Taking the finger away from the tuning knob, the input to the #13 pin of IC301 goes to zero, turning both Q311 and Q312 on and Q311 excites the T-Locked indicator (LED #5), while Q312 adds the AFC signal outputted from the #7 pin of IC101 to the base of Q313. As mentioned in the section on the lock cancellation, Q313 and Q314 are differential amplifier and after the AFC signal is added to the base of Q313 and the reference signal is added to the base of Q314, the difference of the two signals mentioned above appears at the collector of Q315. This signal is fed back to the Front End as the AFC signal controls. The AFC signal controls the local frequency oscillator in such a way that the difference between the reference signal and the AFC signal is minimized and the circuit becomes stable. Namely, this is the lock condition.

Further, in the actual movement, the LED #5 is not turned on immediately after the finger is taken away from the tuning knob, but its lighting depends on the time constant of C330 and R358 and thus the circuit gets into the lock condition a few seconds after the finger is taken away from it.

CIRCUIT SUPPLEMENTARY EXPLANATION

For the following explanation, refer to the block diagram on page 3 and the attached schematic diagram.

The electric circuit of this set is constructed of ten PCB (Printed Circuit Board), a power transformer, switches of many kinds, and other components.

There are four main PCB's: Tuner EQ (Equalizer) PCB, Tone PCB, Main Amp PCB and the Reg (Regulator) PCB. The outline of the circuits in each PCB and their action follows.

1. TUNER EQ PCB

This PCB contains the following circuit blocks: FM Front End FM IF Block, FM MPX (Multiplex) Block, T-Locked System Block, Muting Control Block, Muting Circuit Block, Separation Adjustment Block, AM Tuner Block, AM Muting Block, and Phono EQ Block.

1. FM Front End

The FM Front End uses four linked variable capacitor in the tuning circuit. In the RF amplifier, a dual gate MOS FET of high PG (Power Gain) low NF (Noise Figure) low feedback capacitance is used. For the local oscillator, a stable Clapp type-oscillating circuit having good stability has been used. The input of the

FM front end is a high stability RF amplifier and the mixer stage, the double-tuned circuit has been inserted. The RF signal which has passed through the double-tuned circuit is added to the base of the transistor, mixer, however, the oscillating output from the local oscillating circuit is also added to the base of this transistor through a small value capacitor and thus conversion of the frequency is performed. A varicap diode has been inserted to the resonance circuit of the local oscillator and by adding the AFC signal from the T-Locked System to this diode, the oscillating frequency can be varied within a small range.

2. FM IF Block

The FM IF block consists of four transistors, one IC and three ceramic filters chosen for the selection elements. The transistors, acting as two pairs of differential amplifiers, amplify the IF signal. On the other hand, the IC (HA11225) amplifies the IF signal, restricts the amplitude gain, recovers the quadrature type FM, detects the muting level and also, drives the signal meter and the tuning meter. In the case when the IF signal to the IC is too weak and goes down lower than the level which was set beforehand, the IC releases the mute signal and this is sent to the muting control block.

The three ceramic filters of the selection elements are inserted between each stage. Further, this set has FM DET OUT terminal. Adding an adaptor to this terminal, enables the receiver to receive FM 4 Channels broadcasting, the SCA signal etc.

3. FM MPX Block

The FM MPX block consists of four transistors and one IC. The transistor, Q301, works as a low cut filter, suppressing the noise in the very lower frequency bounds involved when the FM station is being chosen. IC (HA11223W) is a PLL (Phase Locked Loop) MPX IC and is an IC with high S/N and a low distortion rate. It contains the PLL VCO, MPX demodulator, pilot cancel circuit, the stereo/mono automatic switching circuit, and the stereo lamp driver.

The transistor Q302 stops the VCO of the IC, when the selector is not in the position of "FM AUTO". Q303 and Q304 do the switching of the stereo indicator. Switching of stereo/monoral is provided in this instrument and in the case of monoral, the stereo indicator does not turn on even though the broadcasting is in stereo. When the MONO switch on the front panel is turned "ON", Q304 is on, the base of Q303 becomes 0 volt, Q303 is cut off, and the stereo indicator is turned off. In the case when the MONO switch is "OFF", it responds according to the signal from the Muting Control Block.

4. T-Locked System Block

Refer to page 4.

5. Muting Control Block, and Muting Circuit Block

The muting control block consists of the C-MOS Digital IC (μ PD4069C) and RC parts. This IC contains six inverters, as shown in the semi-conductor data section at the end of the Service Manual. These inverters are mainly used in the two pairs of schmidt trigger circuits consisting of four out of the six inverters. The output of the schmidt trigger circuit switches "ON" or "OFF" the transistors of the muting circuit block is explained in the following. The muting circuit block contains four transistors. When they are on, they short the output of the FM MPX demodulator to ground and perform muting. In order to make the muting effective, Q307 and Q308 mute after Q305 and Q306 mute. When the FM signal gets weaker, the FM IF block sends the mute signal to the muting control block. This signal triggers one pair of the schmidt trigger circuits (IC302, Pin #3, 4 5 & 6). This output (IC302, Pin #6) goes through the diode, D305, then through the FM muting switch (S 11) and being added to the bases of the transistors, Q305 ~ Q308, mutes the FM output. Also, in the case when the mono switch is in the "OFF" position, this signal is added to the base of the transistor, Q304, and the stereo indicator is turned off because Q304 is on and Q303 is off. In the case when FM muting switch is off, obviously muting does not occur, so we can listen to the broadcasting even though the input of the antenna is weak.

The input (IC302 Pin #11) of the other pair of the schmidt trigger circuits in the Muting Control Block (IC302, Pin #11, 10, 9 & 8) is connected to the selector (S1d).

When the selector is in any position except the "FM AUTO" position, the DC power source is connected and the schmidt trigger circuit produces about 5.9V of output (IC302, Pin #8). This voltage goes through the diode D307 and the resistor R370 and turns on the transistors, Q305 ~ Q308, muting the FM output. When the selector is switched from "AM" to "FM AUTO", or from "PHONO" to "FM AUTO", the electric charge stored in the capacitor (C311) at the input of the schmidt trigger circuit does not discharge at once, but it is discharged slowly at a rate according to the resistor R366. Accordingly, until this voltage comes to the threshold voltage of the schmidt trigger circuit, the schmidt trigger circuit continues outputting, after triggering the output goes to 0 V and so the muting is cancelled a short time after the FM output has been switched in the selector.

In the case when the selector is switched from "FM AUTO" to "AM" or from "FM AUTO" to "PHONO",

the time constant of the charge of the capacitor C311, depends on the value of the capacitor C311 and the value of the resistor R367. As this time constant is small, the FM output is muted nearly immediately in this case.

6. Separation Adjustment Block

After the FM MPX demodulator output, the circuit consisting the two transistors, Q309 and Q310, is in the separation adjustment block. Generally the separation after output of the FM MPX demodulator is already enough in itself, however this receiver has this block designed into it to improve the separation. The circuit is a general emitter (grounded) amplifier, and it is connected by semi-fixed resistor between these emitters of the two channels. For example, if the crosstalk level of the left channel input is made to be ΔR . (the crosstalk level of the left channel input is the component which leaks from the right channel). Now, some part of the right channel is added to the emitter of the left channel and the level is controlled to be equal to ΔR component become equal and the input signal does not flow to the base.

This means that the ΔR component is not amplified, therefore this does not appear in the output, which means further that the separation has improved in the system. The improvement of the separation is performed in the right channel in the same way.

7. AM Tuner Block

The kernel of the AM Tuner Block is only one IC. This IC (HA1197) contains a RF amplifier, a frequency converter section, an IF amplifier section, a demodulation circuit and AGC circuit. It also performs all the necessary work of the AM tuner. Further, the antenna circuit incorporates the ferrite loop stick antenna, the tuning circuit equips two linked variable capacitor and the selection element equips two ceramic filters.

8. AM Muting Block

The transistor Q201 is this block. In all cases when the position of the selector is not in "AM" position, the power sources of the RF amplifier, and the frequency converter section are cutoff. So, when the selector is changed from "FM AUTO" to "AM", click noise at changing the source might occur. The transistor Q201, avoids this. When the selector is in "FM AUTO" the base of the transistor, Q201, is turned on as its power source is connected through the resistor R214, the output of the AM tuner shorts with ground, and the output is muted. At this time, the capacitor, C214, connected to the base of the transistor, Q201, is charged. When the selector is changed into the "AM" position, the power source

of the base of Q201 is cut off, but still the capacitor connected to the base, Q201, keeps "ON" for a while and then turns "OFF". In this way the click noise of the selector change is eliminated.

9. Phono EQ Block

The EQ amplifier is a three stage direct coupled circuit and uses three silicon transistors per channel.

All the transistors used in this block are high breakdown voltage, low noise types in order to get the high ratio of S/N and the wide dynamic range. As the equalizing capacitors and resistors with very small errors have been used in the NF circuit, the deviation to the RIAA curve is very small.

2. TONE PCB

This PCB consists of a buffer amplifier and NF type tone control amplifier. The buffer amplifier is a two stage direct coupled circuit with two silicon transistors per channel. Care has been taken to eliminate effects of the impedance of the previous stage on the tone control frequency characteristic. The tone control amplifier is of the NF type. It is made to have the frequency characteristic depending on the resistor and the capacitor inside of the NF loop. This amplifier also adopts a two stage direct coupled circuit, but the first stage is a differential amplifier. The special characteristic of this receiver is the addition of the control of the mid-range which controls ordinary bass as well as the treble control. The flexibility to control the quality of sound is made large by this three system tone control.

3. MAIN AMP PCB

This PCB contains the following circuit block: Power Amplifier Block, Protector Block and Meter Amplifier Block.

1. Power Amplifier Block

This circuit is a DC amplifier which does not have the coupling capacitor connected at the input section or the NF loop (when the subsonic filter is off) and not only the music signal but also the direct current can be amplified with flat gain. So for this reason the speaker can be damped effectively to the ultra low frequency range.

Also, as it does not have the coupling capacitor, the S/N ratio and the distortion ratio are improved. The circuit is composed of two main sections. They are the voltage amplification section and the power amplification section.

This receiver has three stages of voltage amplification. Also, for the power amplification stage, a Darlington Pure Complementary OCL Circuit is used.

The first stage is a differential amplifier using dual transistors. Generally this transistor (2SA798) is a mold of two low-noise transistors and as a special characteristic, the difference of each h_{fe} is very small and its thermal condition is balanced.

For this reason the stability of the mid-point of the voltage drift of the power amplifier stage is high. Also, when this transistor does not have any signal, a circuit is equipped inside such that the base current is cancelled and the voltages of the input and the output maintain zero voltage. In the second stage, similar PNP transistors Q703 and Q705 (R ch. = Q704, 706) form the differential amplifier such that it drives the third stage. The transistor, Q707 and Q709 (R ch. = Q708, 710) composed the third stage of the voltage amplification section and drive the power stage. Most of the open loop gain is developed by this third stage.

Q721 (R ch. = Q722) is thermal coupled with the heat sink and makes the idle current of the power stage stable. In the case of no-signal, the idle current is gained by controlling R753 (R ch. = R754).

For the power stage, the Darlington Pure Complementary OCL Circuit is used. For the power transistor, the mold package type transistor is used.

2. Protector Circuit Block

The protector circuit block consists of five transistors (Q801 ~ Q805). Also, the transistors Q723 and Q724 which belong to the power amplifier block belong to this block. This can be seen from the examination of their functions. When the circuit is turned on, the excessive current which is output and at the same time occurs due to the shorting of the load circuit and the change of the mid-point voltage occurring due to abnormal inputs are detected. In these cases the speaker is cut off from the power amplifier block and the circuit and speakers are protected.

(a) The output muting action

Consider when the power source is turned on. The transistors, Q801 ~ Q803, are cut off. The positive voltage through R807 to the base of Q804 and the negative voltage through R807 are added, so these voltages cancel each other, then consequently the voltage becomes about -4.3 V and Q804 is cut off. Though the positive voltage is pressed to the base of Q805 through R809, the base current does not flow until the capacitor, C804, is charged, and then it also is cut off. The AC voltage is also added to the collector of Q805 through the diode, D802, but as it does not flow to Q805, this voltage flows to the LED through the diodes, D804 and D805 and the protect indicator is emitted.

As the times goes on, the voltage of the capacitor, C804, rises and after it rises higher than the Zener voltage of the zener diode, the base current flow in Q805 so that it is "ON" and the Relay LY801 starts to work. As the current flows through the collector of Q805 and through the diode D802, the voltage drops due to the resistor R813 and the protect indicator is turned off. Further, at this time, the voltage taken to C804 (zener voltage) + (V_{be}) , is about $12.6\text{ V} - 13\text{ V}$ and it does not rise more than this value. Also, if it drops even a little less than this value, Q805 is made to cut off.

Inversely, when the power switch is turned off, the negative voltage impressing on Q804 becomes 0 V immediately since the capacity of the filter capacitor is very small. As the positive voltage does not drop down to 0 V immediately, the base of Q804 has the positive voltage and Q804 is turned on. Then the voltage charged in to the capacitor C804, is discharged through Q804. Therefore, Q805 is turned off and the relay stops working. This action is rather fast.

(b) The protect action to the load short

When the load shorts, excessive current flows through the power transistor of the output stage. Even when the circuit and the load are normal, a great amount of current flows in the case when a great amount of output is acting, but in this case the current varies due to the signal, so it is distinct from the case of the load short.

In this receiver, the excessive current is detected by the drops of voltage occurring in the resistors R767 and R781 (R768 and R782 for the right channel) connected to the emitter of the power transistor.

When excessive current flows and the voltage of this section is higher than about 0.6 V , then Q723 (Q724) is turned on. The current flows from the base of Q803 to the collector through the diode D711 (D712), and Q803 is turned on, so the current flows from the emitter to the collector, then the collector, then the positive voltage of the base of Q803 is raised.

Therefore, as Q804 is turned on and the capacitor C804 is discharged, Q805 is cut off, the relay stops pulling and the protect indicator is turned on. The capacitor C725 (C726) of the base of Q723 (Q724) is a time-constant circuit for the high frequency range signal and the capacitor C803 of the base of Q803 is a time-constant circuit for the lower frequency range signal. These are designed to stop the protect circuit in the case of great amount of output in the normal condition.

- (c) The examination of the direct current and the protect action

When the signal, including the component of the power amplifier the extreme low frequency signal is added, or on the rare occasion when the DC ballance of the amplifier is destroyed, the DC voltage signal and the ultra low frequency signal appear at the output of the amplifier. This is not favorable to the speaker.

Examination of the DC voltage of the output is done by Q801 and Q802, and the protect action is performed when the DC voltage is more than +1.5 V or less than -1.5 V. When more than +1.5 V of DC voltage occurs at the output of the amplifier, this voltage turns on Q801 through R801 (R802). Then as Q801 discharges the capacitor C804, Q805 is cut off the relay stops pulling and the protect indicator is emitted. In the case when less than -1.5 V DC voltage occurs at the output of the amplifier, Q802 is turned on and shorts the negative voltage added to the base of Q804 with the ground. Therefore, the base of Q804 is a positive voltage and Q804 is turned on. Q805 is cut off as the capacitor C804 is discharged through Q804, the relay stops pulling and the protect indicator is emitted. The capacitors, C801 and C802, of the bases of Q801 and Q802 are the time-constants and are designed such as to stop the protect circuit from acting for the AC signal. Therefore, the polarities of these two capacitors are connected oppositely and are used as non-polar capacitors.

3. Meter Amplifier Block

The meter amplifier block is a circuit which used only one IC. This IC (TA7318P) has a demodulate circuit,

a 1/4 power compressor and a DC drive amplifier (the hold action is included) for each of the two channels. Due to passing through the 1/4 power compressor the meter can be ranged widely and it is possible to display from a small amount of the output power without changing the range of the meter. The capacitors at pin #3 of the IC and pin #7, C903 and C904, are set for the recovery time of the meter.

4. REG PCB

Each block of this instrument works by receiving the supply of DC power source only from the Reg PCB. The kinds of source voltage supplied from the Reg PCB are many, but these sources are very stable, except of course for the supply to the main amplifier PCB, the lamps, and the indicators. The main electric sources are from a large capacity silicon diode bridge type rectifier that gives the positive and the negative voltages. Then they get smoothed going through the large capacity of the filter capacitor and are finally sent to the main amplifier PCB.

Except for the lamp use and the indicator use all the sources are supplied from this source. The tone PCB use and the Phono EQ use are stabilized by one-watt type zener diodes and the negative voltage of the electric source of the tuner section use is stabilized by the 400 mW-type zener diode before they are transmitted. The positive voltage source of the tuner section use is sent through the constant voltage circuit of the ripple filter.

The sources for lamp use in used for the lighting of the LED of the mode indicator and for the illumination of the dial; Also it flows to the small capacity of the diode and is used as the negative voltage source of the protector circuit.

DISASSEMBLY

1. SIDE WOODS REMOVAL

- Remove eight screws from both sides of the wooden covers.

2. METAL COVER REMOVAL

- Remove wooden covers from both sides.
- Remove three tapping screws (#1 ~ #3) from the back plate as shown in Photo 1.
- Slide the metal cover back slightly and lift it up.

3. BOTTOM PLATE REMOVAL

- Remove wooden covers from both sides.
- Remove fourteen tapping screws (#1 ~ #14) (Photo 2) from the bottom of the unit.

4. FRONT PANEL REMOVAL

- Remove wooden covers and the metal cover.
- Using the hexagonal wrench, remove the VOLUME knob.
- Disconnect the LED socket connecting to LED as shown in Photo 6.
- Remove five tapping screws (#1, 3, 5, 15 and 16) from the bottom of the unit as shown in Photo 2.
- Remove three tapping screws (#1 ~ #3) from the top of the unit (Photo 3).
- Lift the front panel away from the unit.

5. POWER TRANSFORMER REMOVAL

- Disconnect all the wires from the power transformer.
- Remove four screws (#4 ~ #7) as shown in Photo 3.
- Lift the power transformer away from the unit.

6. REFLEX PLATE REMOVAL

- Remove three lamps by pushing them downward. (Refer to Photo 4)
- Push the center of push rivet (#1 and #2) (Photo 4) by small screw driver as shown in Fig. 2.
- Pull the push rivet upward, small printed circuit board (#5) (Photo 4) is now free to be pulled off.
- Similarly, remove two push rivets (#3 and #4) as shown in Photo 4.

7. METER REFLEX PLATE REMOVAL

- Remove the lamp by pushing it downward. (Refer to Photo 5).
- Remove two screws (#1 and #2/#3 and #4) as shown in Photo 5.

8. METER REMOVAL

- Remove the meter bracket by removing two tapping screws (#5 and #6/#7 and #8) as shown in Photo 5.
- Remove the meter by pulling it backward.

9. LED PC BOARD REMOVAL

- Disconnect all the cables from the LED PC board.
- Remove two tapping screws (#9 and #10) as shown in Photo 5.

10. DIAL SCALE REMOVAL

- Remove all the parts from the back of the dial scale according to the paragraph 6 ~ 9.
- Remove the dial cord from the slider of the dial pointer.
- Remove the head phones jack by removing two screws (#1 and #2) as shown in Photo 6.
- Remove five tapping screws (#3 ~ #7) (Photo 6) and lift the dial scale away from the unit.



Figure 2 PUSH RIVET

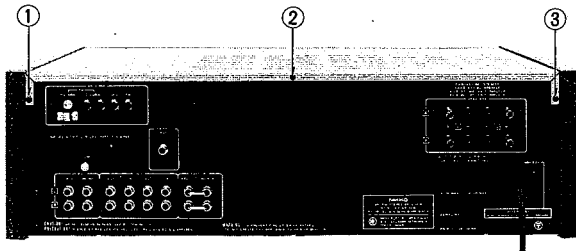


Photo 1

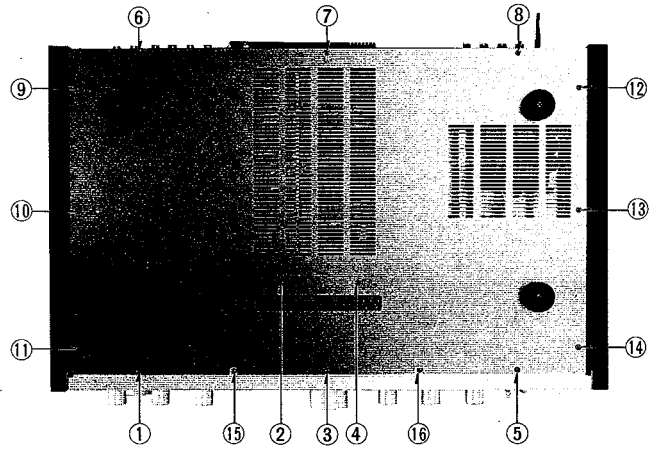


Photo 2

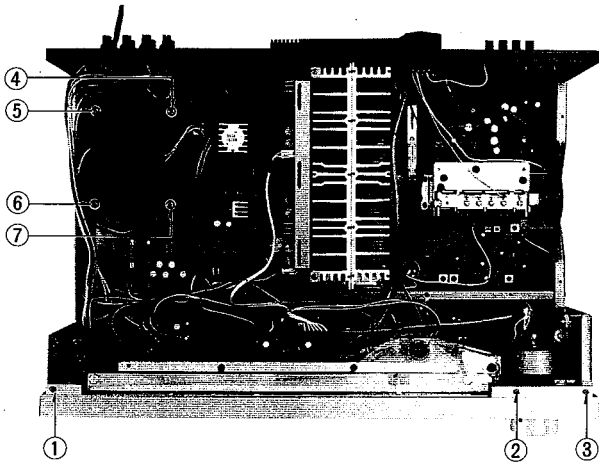


Photo 3

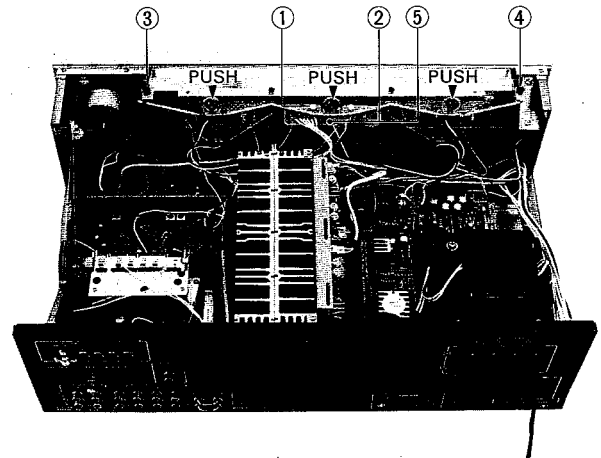


Photo 4

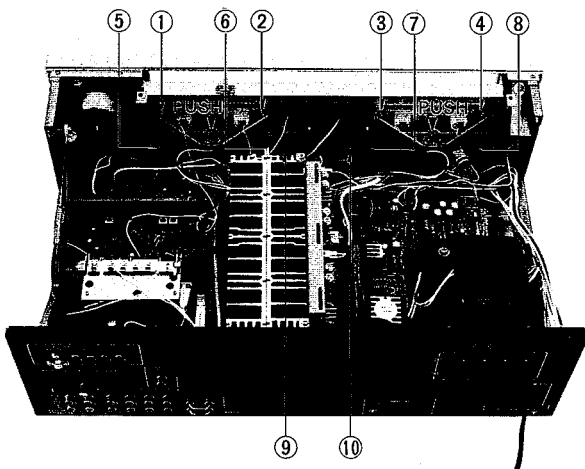


Photo 5

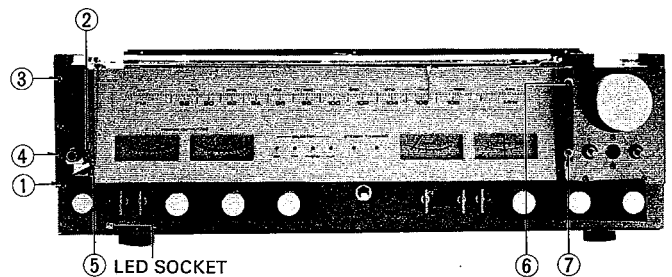


Photo 6

ALIGNMENT

TEST EQUIPMENT

Allow a minimum of 10 minutes warm-up for test equipment and the receiver to be tested.

Maintain rated line voltage.

FM Signal Generator (FM SG)
Oscilloscope
AC Voltmeter
Distortion Meter
MPX Signal Generator (MPX SG)
Frequency Counter
AM Sweep Generator (AM SG)
DC Voltmeter
Audio Frequency Generator
2-Dummy Load Resistor, 8 ohms, 250W

GENERAL ALIGNMENT INSTRUCTION

Always observe response curve on oscilloscope during alignment procedure:

1. Do not apply signal from FM or AM stations. Apply signals only.
2. Use of excessive signal from FM SG or AM SG can cause overloading of the tuner circuits. To properly align the receiver, adjust FM SG or AM SG output level control so that response curve on oscilloscope is not distorted.
3. Turn the volume controls down to the fully counter clockwise when the dummy load resistors or speakers are not connected to the speaker terminal.

FM SECTION

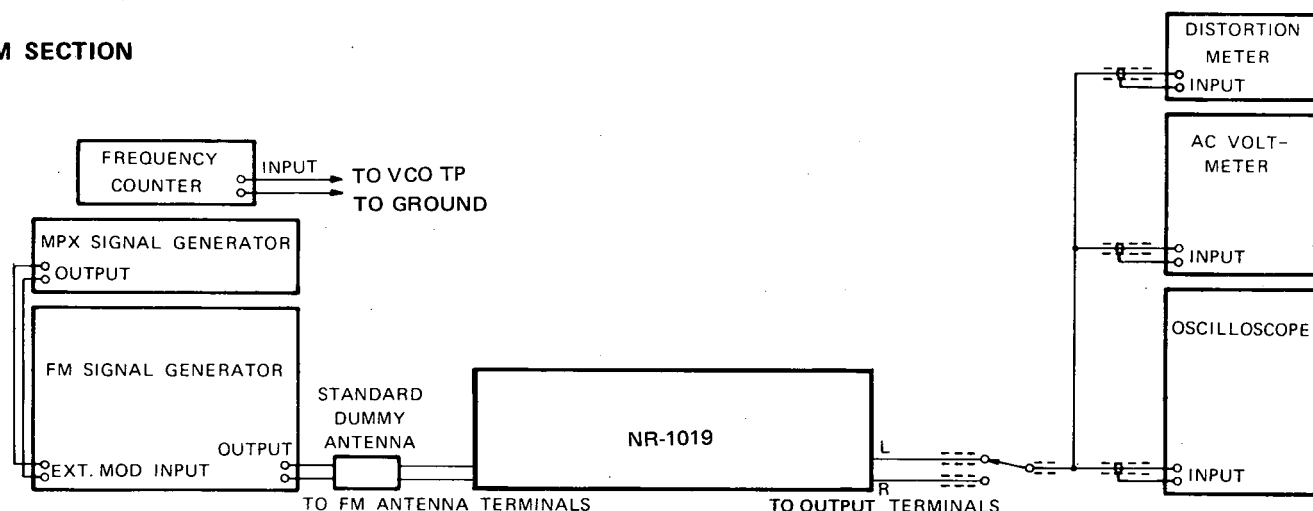


Figure 3. Test Equipment Hook-up

FM IF Alignment

STEP	FM SG FREQUENCY/CALIBRATION	MODULATING FREQUENCY/DEVIATION	SWITCHES OF THE RECEIVER	DIAL POINTER POSITION	ADJUSTMENT POINT	PROCEDURE	REMARKS
1			A. POWER to "ON". B. SELECTOR to "FM AUTO".			Temporarily connect the wiring terminal #8 of the Tuner EQ PCB and the wiring terminal #8 of the REG PCB by clip lead.	This is to prevent operation of T-Locked System.
2			C. MONO SW. to "ON".	Where no signal is tuned.	T101 (Figure 4)	Adjust until tuning meter indicates mid-scale.	Repeat steps 2 and 3 until distortion can no longer be minimized.
3	98 MHz/60 dBμ	400 Hz/mono [±75 KHz]		98 MHz	T102 (Figure 4)	Adjust for minimum distortion.	
4						Remove the clip lead which was temporarily connected in the step 1. Confirm that T-Locked Indicator is lighted and Tuning Meter indicates mid-scale.	Do not touch the Tuning Knob.

Table 1 - 1

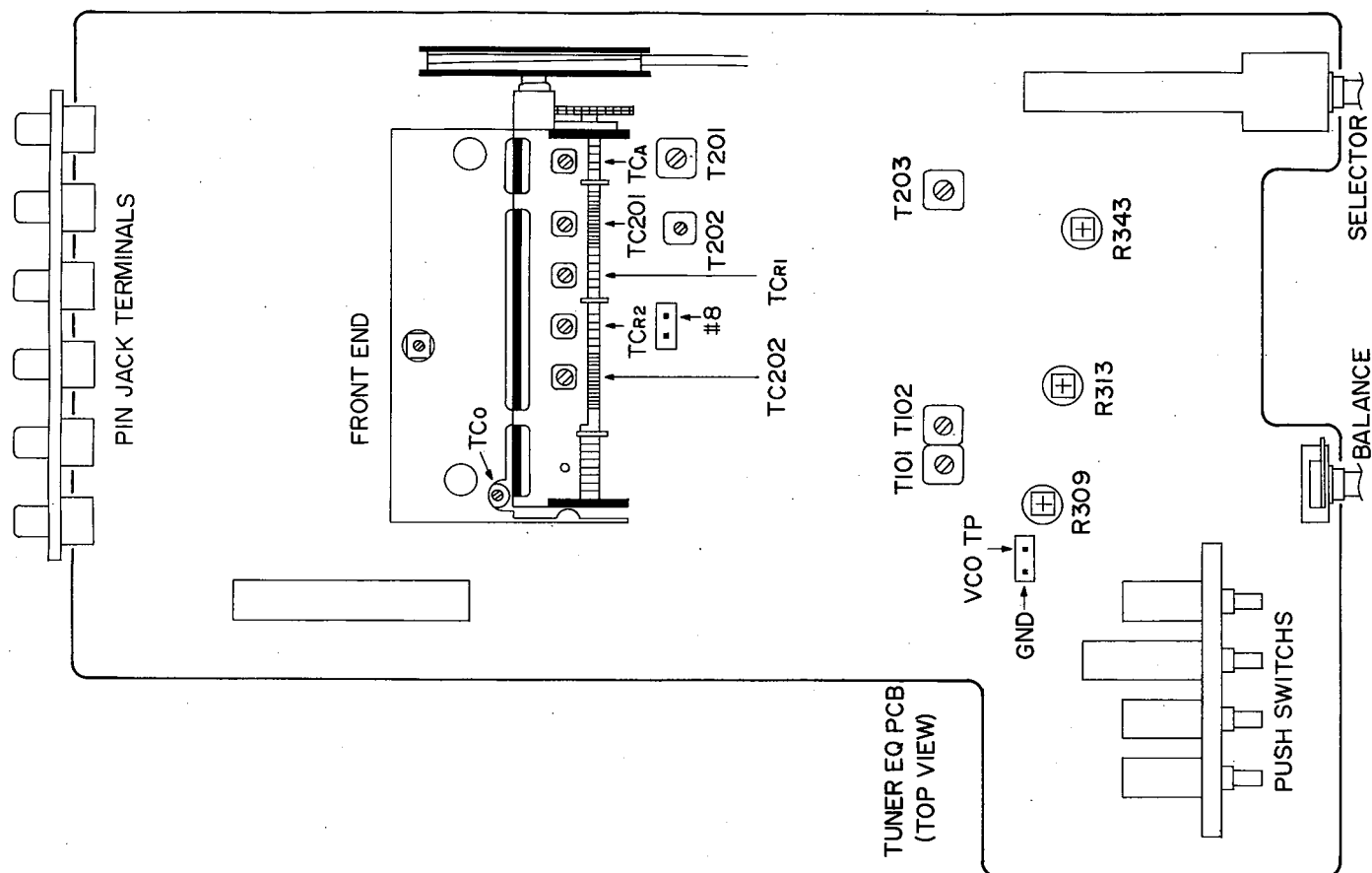


Figure 4. FM AM ADJUSTMENT POINT

FM Frequency Coverage and FM Tracking Alignments

These adjustments are factory preset and normally need no further adjustment. However, if necessary proceed as follows:

STEP	FM SG FREQUENCY/ CALIBRATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE RECEIVER	DIAL POINTER POSITION	ADJUST- MENT POINT	PROCEDURE	REMARKS
1			A. POWER			Temporarily connect the wiring terminal #8 of the Tuner EQ PCB and the wiring terminal #8 of the REG PCB by clip lead.	This is to prevent operation of T-Locked System.
2	87.4MHz/10dBμ	400 Hz/mono [±75 kHz]	A. POWER to "ON".	Low frequency end of the dial scale.	TC ₀ (Figure 4)	Adjust for maximum AC Voltmeter deflection and for mid-scale tuning meter indication.	
3	108 MHz/ Attenuate for response with 3 % distortion.		B. SELECTOR to "FM AUTO".	108 MHz	TCA TCR1 TCR2 (Figure 4)	Adjust for maximum output.	
4			C. MONO SW. to "ON".			Remove the clip lead which was temporarily connected in the step 1.	

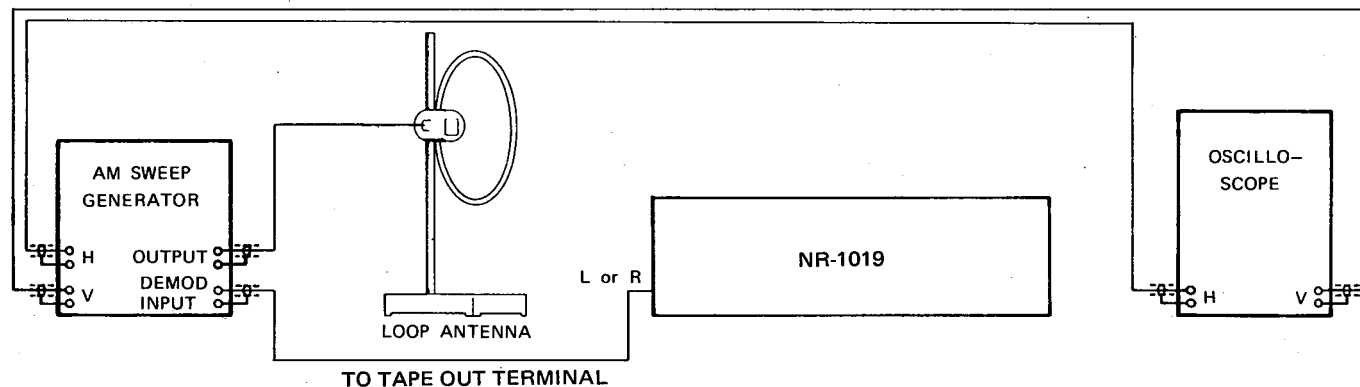
Table 1 - 2

FM MPX Alignment

STEP	FM SG FREQUENCY/ CALIBRATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE TUNER	DIAL POINTER POSITION	ADJUST- MENT POINT	PROCEDURE	REMARKS
1	98MHz/60dB μ	(Unmodulated carrier)	A. POWER to "ON". B. SELECTOR to "FM-AUTO". C. MONO SW. to "OFF".	98MHz (Set to that tuning meter indicates mid-scale.)	R309 (Figure 4)	Connect frequency counter to "VCO TP" (Figure 4) and adjust for 76kHz.	
2		Pilot signal only: ± 7.5 kHz			R313 (Figure 4)	Adjust for minimum AC voltmeter deflection. Check that stereo indicator lamp lights up.	Outputs of right and left channel should be equal.
3		1000Hz/stereo [main (L) & sub (L): ± 67.5 kHz/ pilot signal: ± 7.5 kHz]			R343 (Figure 4)	Adjust for maximum separation (minimum output of right channel)	Both the separations (both the outputs of right and left channel) should be equal.
4		1000Hz/stereo [main (R) & sub (-R): ± 67.5 kHz/ pilot signal: ± 7.5 kHz]				Adjust for maximum separation (minimum output of left channel)	

Table 1 – 3

AM SECTION



Figures 5 Test Equipment Hook-up

AM IF Alignment

STEP	AM SG FREQUENCY/ CALIBRATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE RECEIVER	DIAL POINTER POSITION	ADJUST FOR MAX. SCOPE INDICATION	REMARKS
1	455kHz/ 50dB μ	(Unmodulated carrier)	A. POWER to "ON" B. SELECTOR to "AM"	High frequency end of the dial scale.	T202 (Figure 4)	Repeat steps 1 and 2 until response curve on oscilloscope indicates maximum waveform. (See Figure 6)
2					T203 (Figure 4)	

Table 2 – 1

AM Frequency Coverage and AM Tracking Alignment

STEP	AM SG FREQUENCY/ CALIBRATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE RECEIVER	DIAL POINTER POSITION	ADJUST FOR MAX. SCOPE INDICATION	REMARKS
1	520 kHz/ 50 dBμ	400 Hz/30%	A. POWER to "ON" B. SELECTOR to "AM"	Low fre- quency end of the dial scale.	T201 (Figure 4, Figure 7)	Repeat steps 1 and 2 several times.
2	1650kHz/ 50 dBμ			High fre- quency end of the dial scale.	TC104 (Figure 4, Figure 7)	To check tracking errors, use an apparatus made of ferrite rod and copper wire (Figure 6). Move it toward the AM loopstick antenna gradually, while checking for the response curve on oscilloscope becoming smaller. If the response curve becomes larger, re- peat steps 3 and 4. (Figure 7).
3	600 kHz/ 50 dBμ			600 kHz	AM loopstick antenna core	
4	1400kHz/ 50 dBμ			1400 kHz	TC105 (Figure 4)	

Table 2 - 2

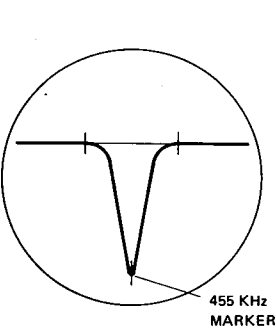


Figure 6 AM IF

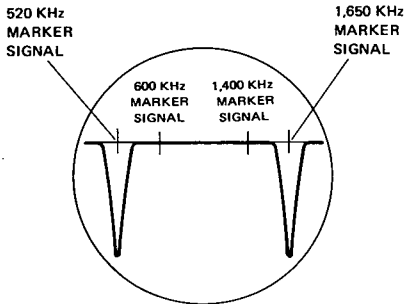


Figure 7 AM Frequency Coverage

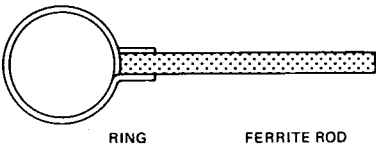


Figure 8 Apparatus

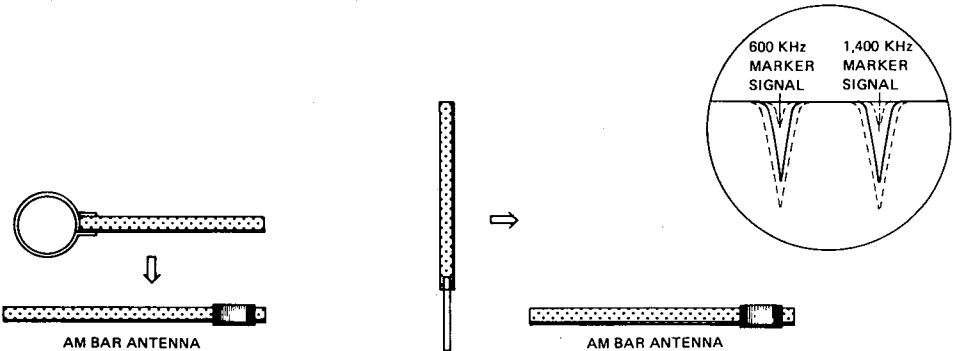


Figure 9 Tracking Errors

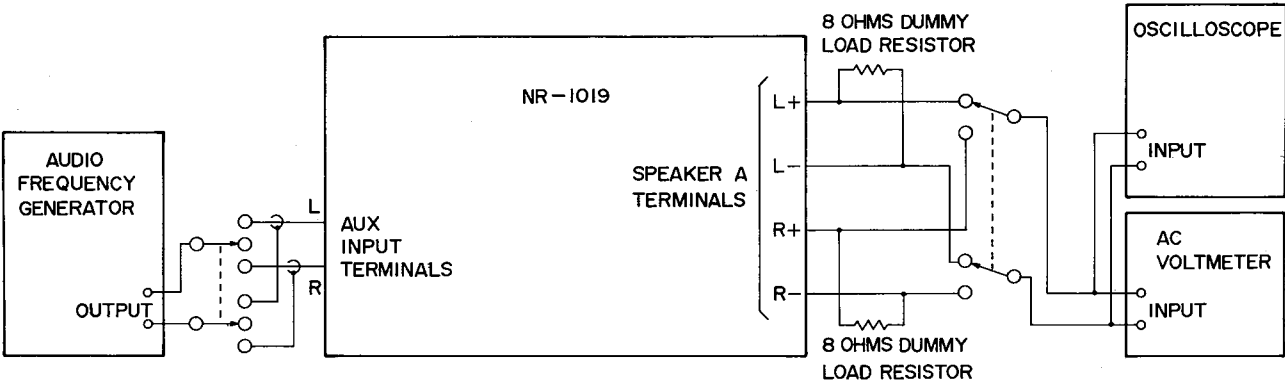


Figure 10 AMP SECTION TEST EQUIPMENT HOOK-UP

AUDIO SECTION

DC Balance Adjustment

See illustration, Figure 11, for test equipment hook-up.

1. Remove connective pin from PRE OUT and MAIN IN terminals.
2. Connect shorting pin plug to MAIN IN terminals. (Short MAIN IN terminals to chassis ground.)
3. Set the SUBSONIC FILTER switch to "ON" position. Adjust potentiometer R707 (left channel) R708 (right channel) on the MAIN AMP PC Board, for a 0 ± 20 mV DC voltmeter reading.
4. Set the SUBSONIC FILTER switch to "OFF" position. Adjust potentiometer R709 (left channel) R710 (right channel) on the MAIN AMP PC Board, for a 0 ± 20 mV DC voltmeter reading.
5. Repeat steps 3 and 4 until both the reading become 0 ± 10 mV.
6. Remove shorting pin plug. Remove DC voltmeter.
7. Insert connective pin to PRE OUT and MAIN IN terminals.

Idling Current Adjustment

See illustration, Figure 11, for test equipment hook-up.

1. Turn the VOLUME controls down to the fully counter clockwise. (No signal applied to the MAIN AMP circuit)
2. Adjust potentiometer R753 (left channel) R754 (right channel) on the MAIN AMP PC Board, for a $15 \sim 22$ mV DC voltmeter reading.
3. Remove DC voltmeter.

Power Meter Circuit Adjustment

See illustration, Figure 10, for test equipment hook-up.

1. Connect AC voltmeter and oscilloscope to left (right) speaker terminals. Connect generator to left (right) AUX input terminals.
2. Turn the VOLUME controls up to the fully clockwise. Set generator frequency to 1 kHz. Set generator output for a 15.5 V AC voltmeter reading. Adjust potentiometer R903 (left channel) R904 (right channel) on the MAIN AMP PC Board, so that the power meter indicates 30 W.
3. Remove AC voltmeter, oscilloscope and generator.

Output Mute Time Check

Relay must operate five to twelve second later after AC power is turned on.

Protection Circuit Check

See illustration, Figure 10, for test equipment hook-up.

1. Connect AC voltmeter to left (right) speaker terminals. Connect generator to left (right) AUX input terminal.
2. Turn the VOLUME controls up to the fully clockwise. Set generator frequency to 20 kHz. Set generator output for a 3 V AC voltmeter reading.
3. Short left (right) speaker terminals; Relay's contacts should open.
4. Remove all test equipment.

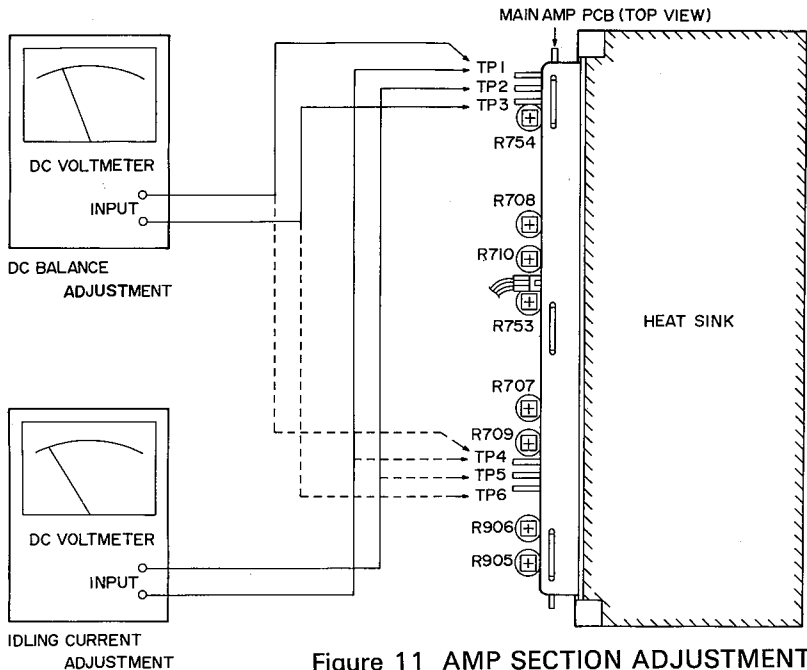
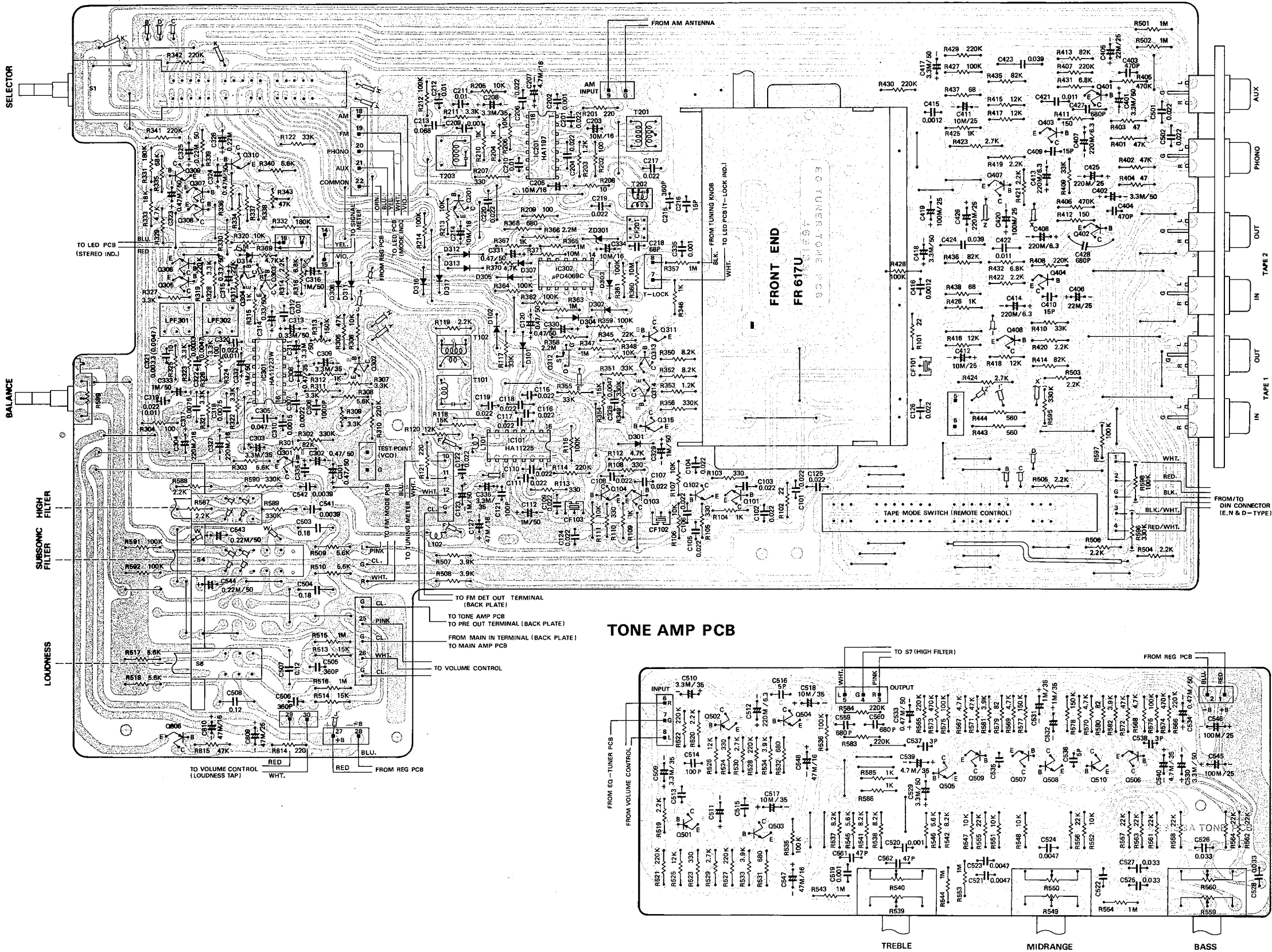


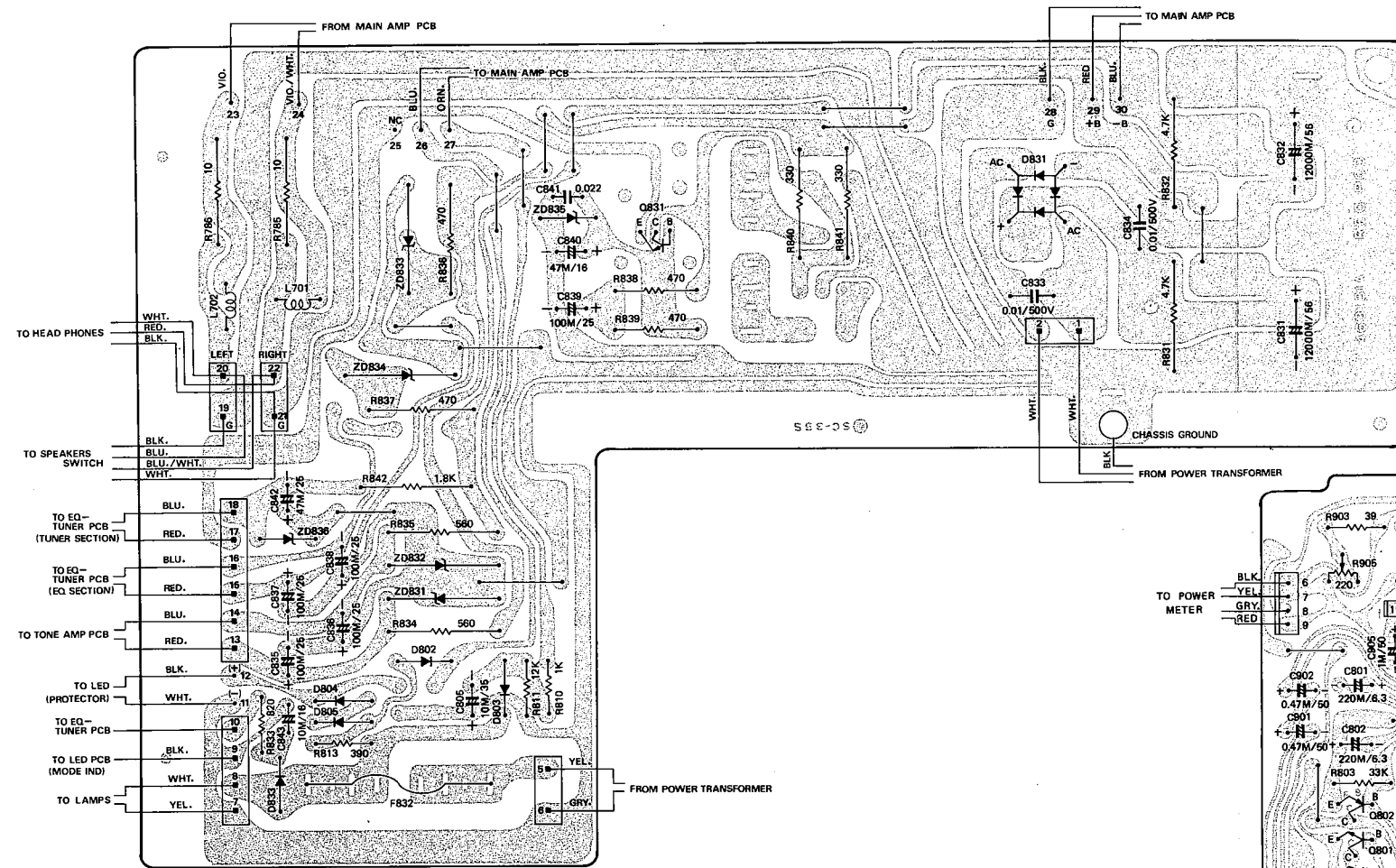
Figure 11 AMP SECTION ADJUSTMENT POINT

P. C. BOARD (BOTTOM VIEW)

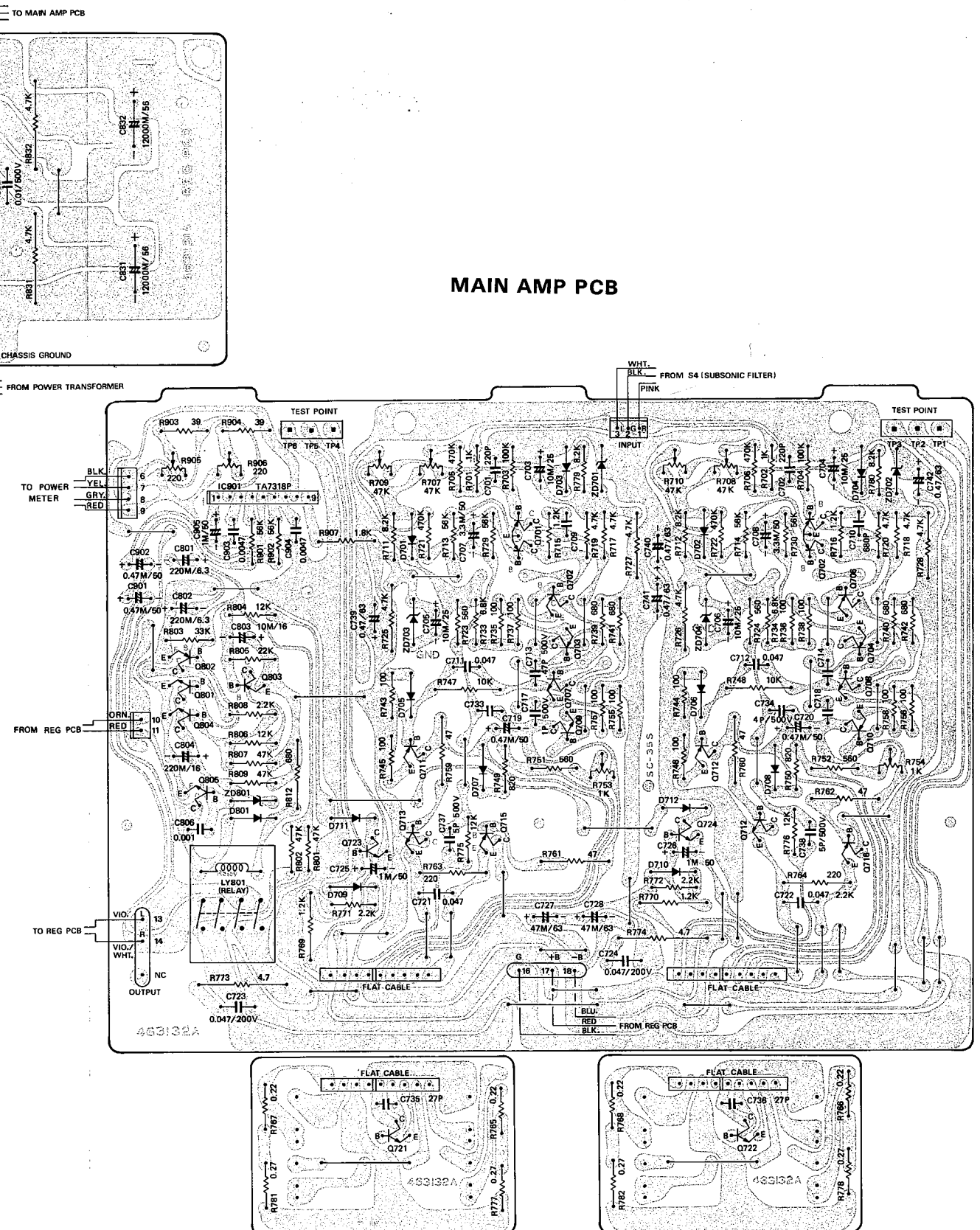
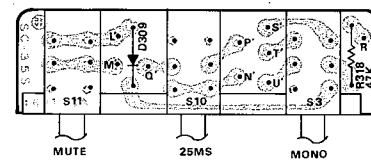
EQ-TUNER PCB



REGULATOR PCB



FM MODE PCB



POWER TRANSISTORS MOUNTING ASSEMBLY

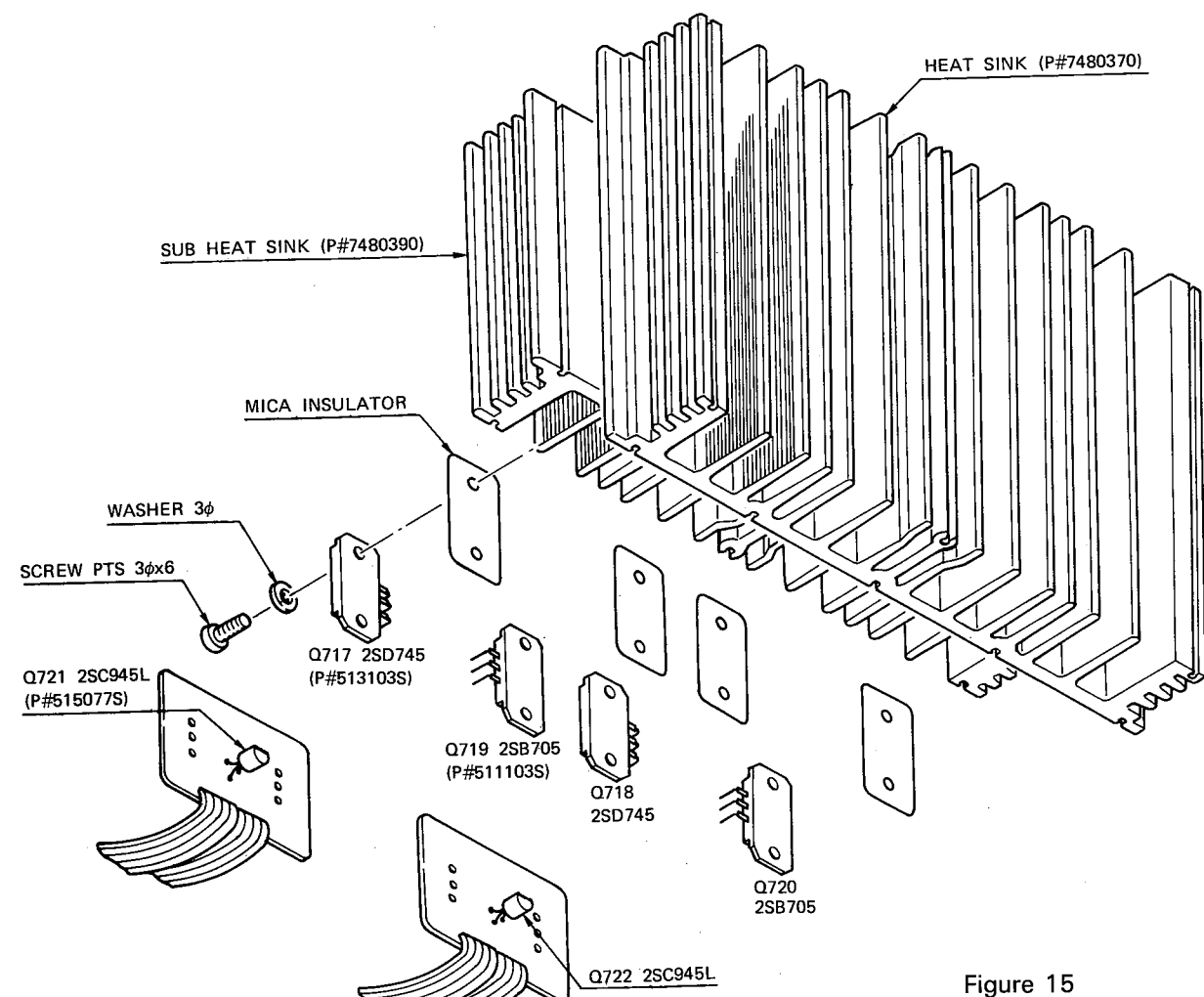


Figure 15

NOTE: For best heat conduction, use thermally conductive silicon grease between the power transistor and the mica insulator and between the insulator and the heat sink.

PRECAUTIONS FOR REPAIR SERVICE

Many of these items are included just as a reminder — they are normal procedures for experienced technicians. Short-cuts can be taken: but, often they cause additional damage to transistors, circuit components or the printed circuit board.

- 1. Do not bridge electrolytic capacitors with AC power. The resultant surges may damage solid state devices.
- 2. Do not bias the base of any transistor while voltage is being applied to its collector.
- 3. Replacements for output and driver transistors, if necessary, must be made from the same hfe group as the original type. Be sure to include this information when ordering replacement transistors.
- 4. If one output transistor burns out (open or shorts), always remove all output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All output transistors in one channel will be destroyed if the base biasing circuit is open in the emitter end.
- 5. Replacement of transistors and components in the front-end, IF stage and multiplex decoder will not normally require realignment of these circuits, unless absolutely necessary. Do not attempt a realignment unless the required test equipment is available and the alignment procedure is thoroughly understood.

DIAL CORD INSTALLATION

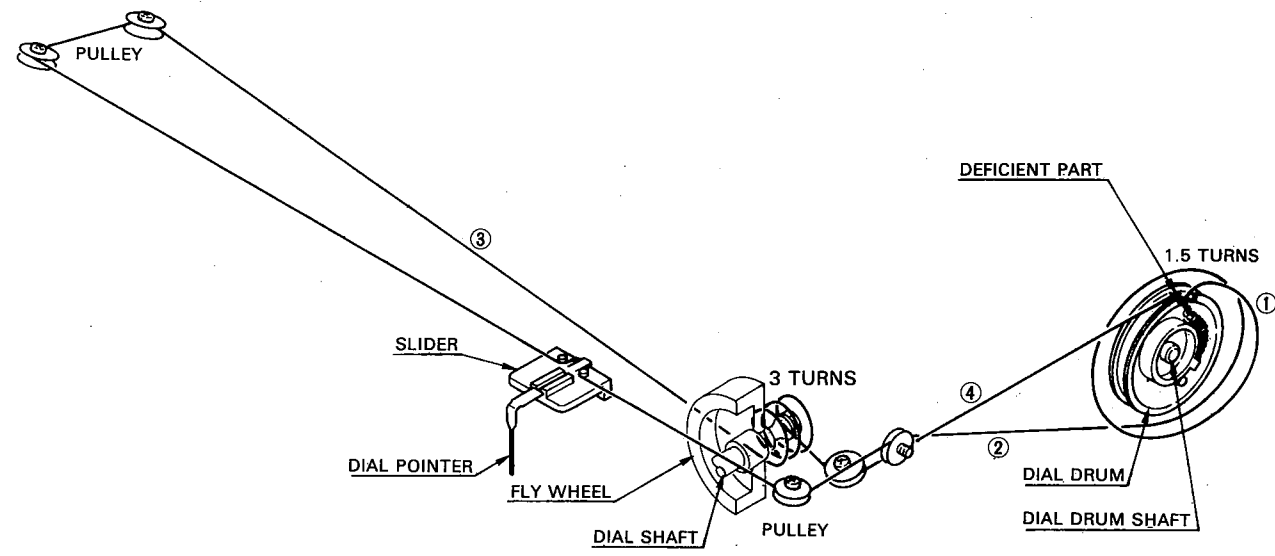


Figure 16

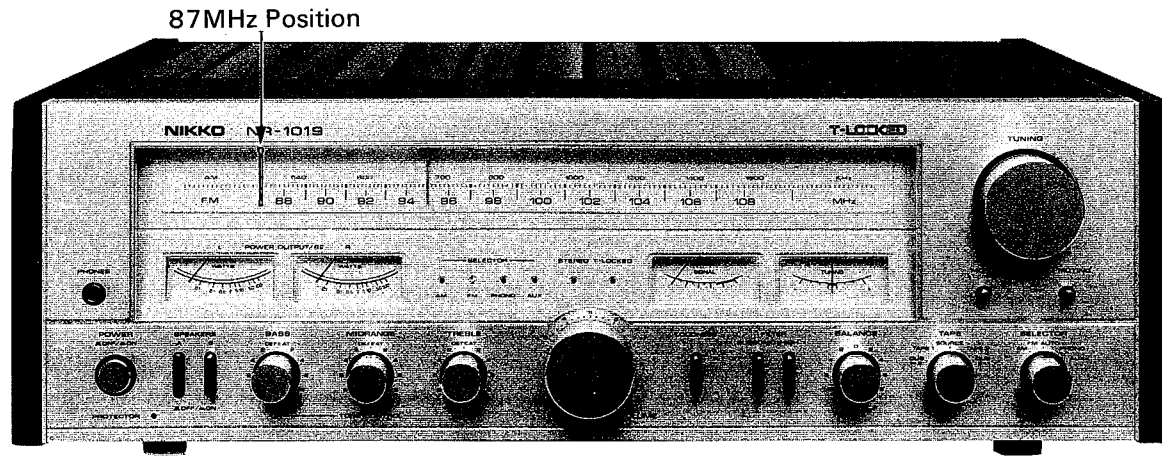


Photo 7

- 1. Remove an old dial cord.
- 2. Turn the dial drum shaft counter-clockwise until the rotor of the variable capacitor is completely out of the stator. If the deficient part of the dial drum is not in a straight line with the dial drum shaft (vertically), loosen the dial drum drive screws and adjust the dial drum to be placed on the top portion. Then re-tighten the dial drum screws.
- 3. String the dial drum and pulleys with a new dial cord in accordance with Fig. 16 (in circled numbered order).
- 4. Turn the dial shaft (Tuning knob) counter-clockwise until the rotor of the variable capacitor is fully rotated in the stator. Then fix the dial pointer to the string at a reading of 87 MHz on the dial scale. (See Photo 7)

PARTS LOCATION

NOTE: Numbers of three digits with a  are related to the KEY NUMBERS on parts list.

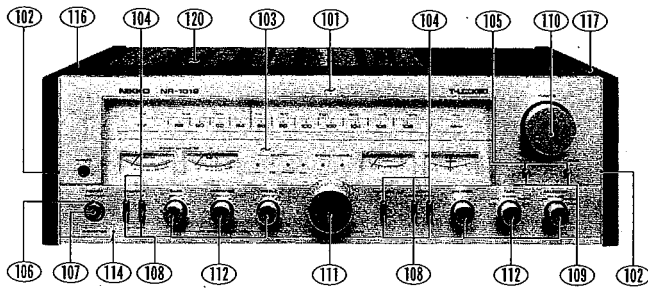


Photo 8

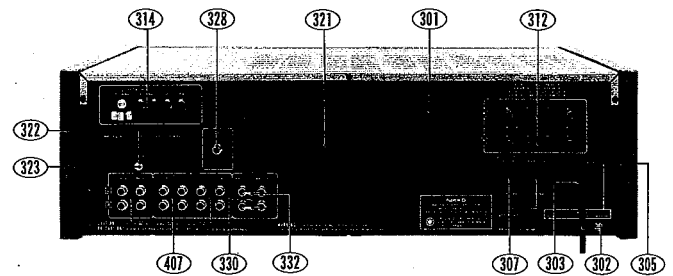


Photo 9

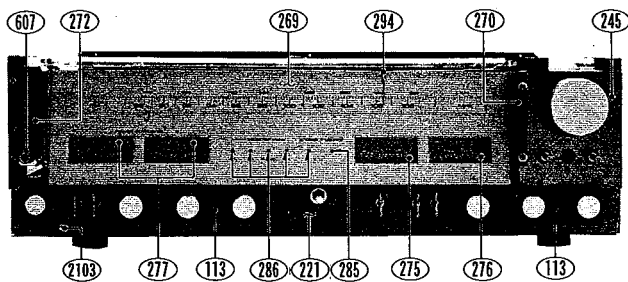


Photo 10

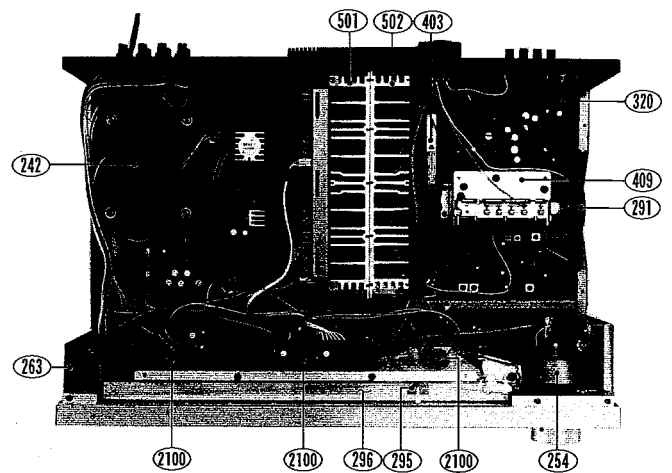


Photo 11

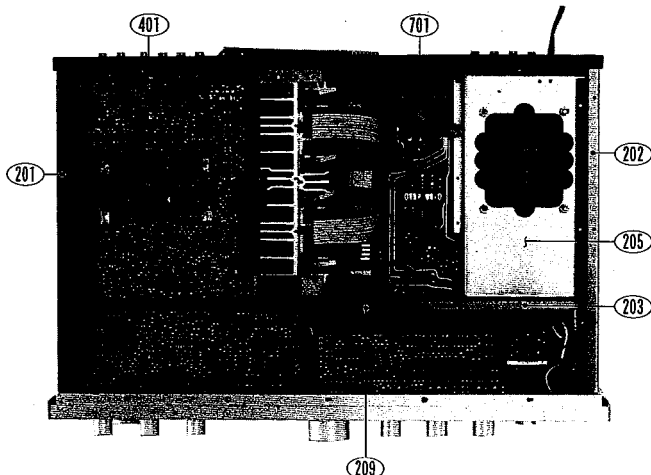


Photo 12

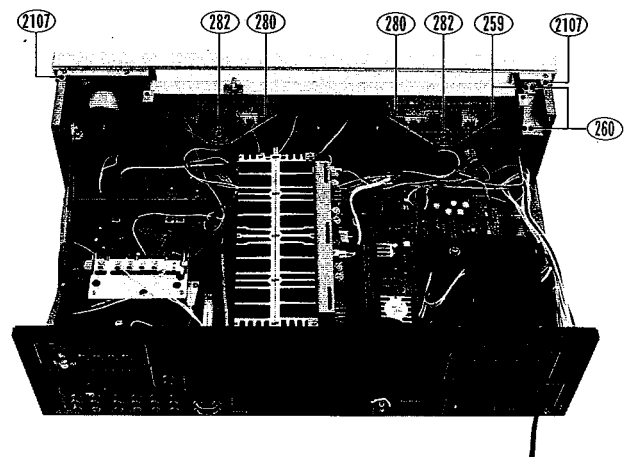


Photo 13

PARTS LIST

NOTES:

1. ★ The KEY NUMBER (#) marked with a (★) on parts list relate to number of three digits with a (○). (Photo 8-13)
2. + Numerals in file indicate the quantity of parts used in one type.
3. ++ TR : Transistor
FET : Field effect transistor
VR : Volume control (Variable resistor)
RES : Carbon film fixed resistor
MO-RES : Metal oxide film fixed resistor
CEM-RES : Cemented wirewound fixed resistor
FP : Flame proof
C-CAP : Ceramic capacitor
E-CAP : Aluminum electrolytic capacitor
M-CAP : Polyester film capacitor
S-CAP : Polystyrene film capacitor

T-CAP : Tantalum electrolytic capacitor
BP-CAP : Bipolar electrolytic capacitor
LC-CAP : Low current leakage electrolytic capacitor.

4. Assemblies and parts are subject to change without notice.
5. Parts ordering procedure:
 - A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only)
 - B. Include in any order
 - a. Part number.
 - b. Part description.
 - c. Model number.

(any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE + WEN	DESCRIPTION ++	PART NO.
PACKING MATERIALS & ACCESSORIES				
	001	1 1 1	Carton box	9825540
	002	2 2 2	Pad	9840820
	003	1 1 1	Sack, polyethylen cloth	9640670
	004	1 1 1	Cloth, polishing	9690040
	005	1 1 1	Sack, polyethylen cloth - #13	9640320
	006a	1 - -	Manual, instruction - E	960276E
	006b	1 - -	Manual, instruction - F, CANADA only	960311F
	006c	- 1 1	Manual, instruction - H	960314H
	007	1 - -	List, service stations	9690180
	008a	1 - -	Card, warranty	967007A
	008b	1 - -	Card, warranty - CANADA only	967028E
	009	1 - -	Post card	967008A
	010	1 1 1	Drier - Silica gel	969001A
	011	1 1 1	Antenna, FM - Q-MATCH	4581360
CABINET ASSEMBLY				
★101		1 1 1	Panel, front	7884460
★102		2 2 2	Panel, both sides	7870400
★103		1 1 1	Window, panel	7802430
★104		5 5 5	Guide - P1320BK, for push button	7401670
★105		2 2 2	Guide - 1P5, for push button	7401710
★106		1 1 1	Guide - 1P16, for push button	7401720
★107		1 1 1	Button, push - M16SL - power	7852050
★108		5 5 5	Button, push - P320GL - speakers/ loudness/filter	7852020
★109		2 2 2	Button, push - P5x15 SLII - FM muting/mono	7852080
★110		1 1 1	Knob - 19SL-47R - tuning	7841260
★111		1 1 1	Knob - 19SL-42DR - volume	7841270
★112		6 6 6	Knob - 19SL-19DR - others	7841250
★113		2 2 2	Dust cover, for knob	7002120
★114		1 1 1	LED GL-2PR1 - red - protector	5060210
115		1 1 1	Spacer, LED	7002130
★116		1 1 1	Side wood - L	7831490
★117		1 1 1	Side wood - R	7831520
118		8 8 8	Screw - TFTS 4φx16	887416W
119		8 8 8	Washer - 5φ	893105W
★120		1 1 1	Cover, metal	7820940
121		3 3 3	Screw - PTS 3φx6	814306W
122		1 1 1	Plate, bottom	7325590
123		4 4 4	Foot, polyethylen - 30φx14	7400780
124		4 4 4	Screw - PMS 5φx16	810516S
125		11 11 11	Screw - PTS 3φx6	814306S
126		3 3 3	Screw - PTS 3φx8	814308S
CHASSIS ASSEMBLY				
★201		1 1 1	Angle, right side	7226920

KEY NO.	SYMBOL NO.	TYPE + WEN	DESCRIPTION ++	PART NO.
★202		1 1 1	Angle, left side	7226930
★203		1 1 1	Angle, center	7226940
204		5 5 5	Screw - PTS 3φx6	814306S
★205		1 1 1	Chassis, for power transformer	7226950
206		6 6 6	Screw - PTS 3φx8	814308S
207		1 1 1	Bracket, for heat sink	7032510
208		2 2 2	Screw - PTS 3φx8	814308S
209		1 1 1	Stud, for chassis	7031270
210		2 2 2	Screw - PTS 3φx6	814306S
★211		1 1 1	Angle, fornt	7226960
212		4 4 4	Screw - PTS 3φx6	814306S
213		1 1 1	Holder, tuner PCB	7031140
214		1 1 1	(TONE AMP PCB ASSEMBLY)	
215a		1 - -	Switch, push - SDV1P TV-5 - power	4041140
215b		- 1 1	Switch, push - SDG5P class-II - power	4040980
216a		1 - -	C-CAP 0.01uf AC125V	239103C
216b		- 2 2	C-CAP 0.0047uf AC250V	239472E
217		- 2 2	Cover, C-CAP - (M)	7400980
218		1 1 1	(PUSH SWITCH PCB ASSEMBLY)	
219		1 1 1	Holder, push switch PCB	7032710
220		4 4 4	Screw - PTS 3φx6	814306S
221		2 2 2	Screw - PTS 3φx6	814306S
222		1 1 1	VR GJ70A 100kohm Bx2 - volume	4320950
223		1 1 1	Switch, rotary ESA-33427B - tape, remote control	4051240
224		1 1 1	(EQ/TUNER-TONE PCB ASSEMBLY)	
225		2 2 2	Screw - PTS 3φx6	814306S
226		5 5 5	Screw - PTS 3φx8	814308S
227		1 1 1	Bracket, for front end	7032540
228		3 3 3	Screw - PTS 3φx6	814306S
229		1 1 1	Holder, PCB	7032550
230		3 3 3	Screw - PTS 3φx8	814308S
231		1 1 1	(BACK PLATE ASSEMBLY)	
232		4 4 4	Screw - PTS 3φx6	814306W
233		8 8 8	Screw - PTS 3φx8	814308W
234		1 1 1	(MAIN AMP ASSEMBLY)	
235		4 4 4	Screw - PTS 3φx8	814308S
236		1 1 1	Bracket, ground	7032870
237		1 1 1	(REGULATOR PCB ASSEMBLY)	
238		4 4 4	Screw - PTS 3φx8	814308S
239		1 1 1	Lug, ground - 2P	4400070
240		2 2 2	Washer - TW (I) 3φ	893403U
241		1 1 1	Screw - PTS 3φx10	814310S
★242a		1 - -	Transformer, power - T-1-349 - 120V only	1103490
★242b		- 1 1	Transformer, power - T-1-350 - 220/240V class II	1103500

PART ORDERING PROCEDURE ----- DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

KEY	SYMBOL	TYPE +	DESCRIPTION ++	PART	KEY	SYMBOL	TYPE +	DESCRIPTION ++	PART
NO.	NO.	WEN		NO.	NO.	NO.	WEN		NO.
243		4 4 4	Washer - IN 5φ	892015S					
244		4 4 4	Washer - TW (I) 5φ	893405U	2103		1 1 1	Socket, LED - 3021-N-2	4510090
★245		1 1 1	Bracket, front	7226970	2104		- 1 1	Midget fuse - (S) 3.15AT 250V	4720390
246		4 4 4	Screw - PTS 3φx6	814306S	2105		- 1 1	Holder, midget fuse - 1P	4581430
247		1 1 1	Bracket, pulley - A	7032560	2106		- 1 1	Screw - PTS 3φx8	814308S
248		2 2 2	Screw - PTS 3φx6	814306S	★2107		2 2 2	Spacer, panel	7002220
249		1 1 1	Bracket, pulley - B	7032570					
250		2 2 2	Screw - PTS 3φx6	814306S					
251		1 1 1	Holder, dial shaft	7401820				BACK PLATE ASSEMBLY	
252		3 3 3	Screw - PTS 3φx8	814308W	★301a		1 - -	Plate, back - W	7325610
253		3 3 3	Washer - 3φ	893103W	★301b		- 1 1	Plate, back - E	7325630
★254		1 1 1	Dial shaft, with fly wheel	7152310	★302a		1 - -	Plug/cord - DP-70	606007A
255		1 1 1	Plate, ground	7032630	★302b		- 1 1	Plug/cord - CEE-2T	600510A
256		1 1 1	Washer - SN9φ	892249S	★303a		1 - -	Stopper, cord - SR-3P-4	7400620
257		1 1 1	Washer - TW (I) 9φ	893409U	★303b		- 1 1	Stopper, cord - SR-4N-4	7400690
258		1 1 1	Washer - 9φ	893109U	304a		1 - -	Bracket, cord	7031010
★259		3 3 3	Pulley - 9φ	7400790	304b		- 1 1	Bracket, cord - EH	7029800
★260		3 3 3	Shaft, pulley - 4L	7120980	★305		1 - -	Circuit breaker - NW-2S(N) 6.3A	4900900
261		1 1 1	Holder, push switch	7032620	306		2 - -	Screw - PTS 3φx6	814306W
262		2 2 2	Screw - PMS 3φx6	810306S	★307		2 - -	Socket, AC outlet	4500150
★263		1 1 1	Plate, side	7032580	308		1 - -	RES 2.2meg-ohm 10% ½W	325225K
264		2 2 2	Screw - PTS 3φx6	814306S	309		1 - -	Lug, ground	4400000
265		1 1 1	Bracket, pulley - C	7032590	310		1 - -	Screw - PTS 3φx6	814306S
266		2 2 2	Screw - PTS 3φx6	814306S	311		1 - -	Washer - TW (I) 3φ	893403U
267		2 2 2	Pulley - 9φ	7400790	★312		2 2 2	Terminal, speaker - screw type - 4P (NK)	4450480
268		2 2 2	Shaft, pulley - 4L	7120980	313		4 4 4	Screw - PTS 3φx8	814308W
269		1 1 1	Dial scale	7884480	★314		1 1 1	Terminal, antenna	4450520
270		1 1 1	Blind, dial - right	7401740	315		2 2 2	Screw - PMS 3φx6	810306W
271		1 1 1	Plate, dial blind	7002100	316		1 1 1	Lug, ground	4400000D
272		1 1 1	Bracket, dial scale	7226980	317		1 1 1	Screw - PMS 3φx6	810306W
★273		1 1 1	(HEAD PHONES PCB ASSEMBLY)		318		1 1 1	Washer - IN 3φ	892013S
★274		2 2 2	Screw - PMS 3φx6	810306S	319		1 1 1	Washer - TW (I) 3φ	893403U
★275		1 1 1	Meter, signal	4582490	★320		1 1 1	Balun	1210420
★276		1 1 1	Meter, tuning	4582500	★321		1 1 1	Bar antenna, AM	1200400
★277		2 2 2	Meter, power	4582530	★322		1 1 1	Nut, GND terminal - MK2	7152060
278		1 1 1	Connector, 4 pin female - MC-4PF	4570270	★323		1 1 1	Shaft, GND terminal - MK3	7152050
279		2 2 2	Bracket, meter	7032600	324		1 1 1	Washer - 3φ	893203D
★280		2 2 2	Reflex plate, meter	7401580	325		1 1 1	Washer - IN 3φ	892013S
281		4 4 4	Screw - PTS 3φx10	814310S	326		1 1 1	Washer - TW (I) 3φ	893403U
★282		2 2 2	Lamp - 8V 0.3A 300L	5808120	327		1 1 1	Lug, ground	4400000D
283		4 4 4	Screw - PTS 3φx8	814308S	★328		1 1 1	Terminal, RCA phono pin jack - 1P - FM DET. OUT	4440190
284		1 1 1	(LED PCB ASSEMBLY)		329		2 2 2	Screw - PTS 3φx8	814308W
★285		1 1 1	LED GL-2PG1 - green - T-Lock indicator	5060080	★330		1 1 1	Terminal, RCA phono pin jack - 2Px2 - ADAPTOR	4444010
★286		5 5 5	LED GL-2PR1 - red - function/ stereo indicator	5060210	331		2 2 2	Screw - PTS 3φx8	814308W
287		6 6 6	Spacer, LED	7903140	★332		2 2 2	Connective pin	4581660
288		1 1 1	Bracket, LED PCB	7032610	333		- 1 1	Connector, DIN type 5P	4530220
289		2 2 2	Rivet, push - 3φx4.5	7401240	334		- 2 2	Screw - PTS 3φx6	814306W
290		2 2 2	Screw - PTS 3φx8	814308S	335		1 1 1	Bracket, heat sink	7032510
★291		1 1 1	Dial drum - 54φ	7401570	336		2 2 2	Screw - PTS 3φx8	814308W
292		1 1 1	Spring, dial drum - (J)	7440290	337		2 2 2	Washer - TW (I) 3φ	893403U
293		1 1 1	Cord, dial	4581870	338		1 1 1	Holder, tuner PCB	7031140
★294		1 1 1	Needle - dial pointer	7050520	339		2 2 2	Screw - PTS 3φx6	814306W
★295		1 1 1	Slider, needle	7401780					
★296		1 1 1	Reflex plate	7401620					
297		1 1 1	Stay, reflex plate	7227020					
298		2 2 2	Rivet, push - 4φx7	7401840					
299		2 2 2	Rivet, push - 3φx6.5	7401850					
★2100		3 3 3	Lamp - 8V 0.3A 300L	5808120					
2101		1 1 1	(LAMP PCB ASSEMBLY)						
2101		2 2 2	Rivet, push - 3φx8	7401430					

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KEY	SYMBOL	TYPE ⁺	DESCRIPTION ⁺⁺	PART	KEY	SYMBOL	TYPE ⁺	DESCRIPTION ⁺⁺	PART
NO.	NO.	WEN		NO.	NO.	WEN			NO.
EQUALIZER-TUNER-TONE PC BOARD ASSEMBLY					R122	1 1 1	RES	33kohm 5% 1/4W	328333J
*401a	1	—	EQ-TUNER-TONE PCB ASSEMBLY — FM de-emphasis 75us	9492800	(MPX SECTION)				
*401b	— 1 1		EQ-TUNER-TONE PCB ASSEMBLY — FM de-emphasis 50us	9492810	LPF301				
402	S1	1 1 1	Switch, rotary slide — SRZW-V064 — selector	4055190	LPF302	2 2 2	Low pass filter — KM10DB 3803		1270140
*403	S2	1 1 1	Switch, slide — ESA-2634 — tape	4020540	IC301	1 1 1	IC HA11223W		518054S
404	S4,5,6	1 1 1	Switch, tri push — SUE-32 — loudness/filter	4041310	IC302	1 1 1	IC uPD4069C		518072S
405	S3,9	1 1 1	Switch, twin push — SUE-24 — FM mono/muting	4041110	Q301				
406	R599	1 1 1	VR VM10E 250kohm — balance	4320930	~ Q306	6 6 6	TR 2SC945L (P or Q)		515077S
407		3 3 3	Terminal, RCA phono pin jack — 2Px2 — input/tape	4444070	Q307,308	2 2 2	TR 2SD655 (E or F)		513115S
408		1 —	Connector, with wires — 3 pin female — MC-3PF	4570280	Q309				
*409		1 1 1	Front end — FR-617U	4910140	~ Q311	3 3 3	TR 2SC945L (P or Q)		515077S
			(FM IF SECTION)		Q312	1 1 1	FET 2SK104 (F)		516026S
T101	1 1 1		Transformer, FM discriminator — (1)	1240340	Q313,314	2 2 2	TR 2SC945L (P or Q)		515077S
T102	1 1 1		Transformer, FM discriminator — (2)	1240350	D301				
L101	1 1 1		Inductor — 22uh	1210930	~ D316	141414	Diode 1SS53		501023S
L102	1 1 1		Inductor — 2.2uh	1210860	ZD301	1 1 1	Zener Diode RD6.2EB1		502048S
CF101,102	2 2 2		Celamic filter — SFE10.7MM	128033A	C301,302	2 2 2	E-CAP 0.47uf 50V		211505Q
CF103	1 1 1		Celamic filter — SFE10.7ML	128032A	C303	1 1 1	E-CAP 3.3uf 35V		211413Q
IC101	1 1 1		IC HA11225	518070S	C304	1 1 1	E-CAP 220uf 16V		211232Q
Q101					C305	1 1 1	M-CAP 0.047uf 5% 50V		222473J
~ Q104	4 4 4		TR 2SC1675 (L or M)	515082S	C306	1 1 1	S-CAP 1000pf 5% 50V		223102V
D101,102	2 2 2		Diode 1SS53	501023S	C307	1 1 1	M-CAP 0.0022uf 5% 50V		222222J
C101					C308	1 1 1	T-CAP 0.47uf 35V		252405M
~ C111	11 11 11		C-CAP 0.022uf +80, -20% 50V YG	231223Z	C309	1 1 1	T-CAP 3.3uf 10V		252113M
C112	1 1 1		E-CAP 1uf 50V	211510Q	C310	1 1 1	M-CAP 0.0015uf 5% 50V		222152J
C113,114			— DELETED —		C311	1 1 1	E-CAP 3.3uf 35V		211413Q
C115					C312	1 1 1	M-CAP 0.01uf 5% 50V		222103J
~ C119	5 5 5		C-CAP 0.022uf +80, -20% 50V YG	231223Z	C313,314	2 2 2	E-CAP 0.33uf 50V		211503S
C120	1 1 1		E-CAP 0.47uf 50V	211505Q	C315,316	2 2 2	E-CAP 1uf 50V		211510Q
C121	1 1 1		C-CAP 100pf 10% 50V SL	232101K	C317,318	2 2 2	M-CAP 0.0075uf 5% 100V		228752J
C122	1 1 1		C-CAP 0.022uf +80, -20% 50V YG	231223Z	C319,320	1 —	M-CAP 0.022uf 5% 50V		222223J
C123	1 1 1		E-CAP 1uf 50V	211510Q	C319,320	— 1 1	M-CAP 0.01uf 5% 50V		222103J
C124					C321,322	1 —	M-CAP 0.0033uf 5% 50V		222332J
~ C126	3 3 3		C-CAP 0.0022uf +80, -20% 50V YG	231223Z	C321,322	— 1 1	M-CAP 0.0047uf 5% 50V		222472J
C127	1 1 1		E-CAP 47uf 16V	211225Q	C323,324	2 2 2	E-CAP 0.47uf 50V		211505Q
C128	1 1 1		C-CAP 0.0022uf +80, -20% 50V YG	231223Z	C325,326	2 2 2	E-CAP 0.22uf 50V		211502S
R101,102	2 2 2		RES 22ohm 5% 1/4W	328220J	C327	1 1 1	E-CAP 220uf 16V		211232Q
R103	1 1 1		RES 330ohm 5% 1/4W	328331J	C328	1 1 1	M-CAP 0.01uf 5% 50V		222103J
R104	1 1 1		RES 1kohm 5% 1/4W	328102J	C329	1 1 1	E-CAP 1uf 50V		211510Q
R105	1 1 1		RES 330 ohm 5% 1/4W	328331J	C330,331	2 2 2	E-CAP 0.47uf 50V		211505Q
R106,107	2 2 2		RES 10kohm 5% 1/4W	328103J	C334	1 1 1	E-CAP 10uf 16V		211220Q
R108	1 1 1		RES 330ohm 5% 1/4W	328331J	C335		— DELETED —		
R109	1 1 1		RES 1kohm 5% 1/4W	328102J	C336	1 1 1	E-CAP 3.3uf 35V		211413Q
R110	1 1 1		RES 330ohm 5% 1/4W	328331J	R309	1 1 1	Potentiometer — RG10B 3.3kohm		4300820
R111	1 1 1		RES 10kohm 5% 1/4W	328103J	R313	1 1 1	Potentiometer — SR19R B150kohm		4300520
R112	1 1 1		RES 4.7ohm 5% 1/4W	328472J	R343	1 1 1	Potentiometer — SR19R B47kohm		4300730
R113	1 1 1		RES 330ohm 5% 1/4W	328331J	R301	1 1 1	RES 82kohm 5% 1/4W		328823J
R114	1 1 1		RES 220kohm 5% 1/4W	328224J	R302	1 1 1	RES 330kohm 5% 1/4W		328334J
R115	1 1 1		RES 100kohm 5% 1/4W	328104J	R303	1 1 1	RES 5.6kohm 5% 1/4W		328562J
R116			— DELETED —		R304	1 1 1	RES 100ohm 5% 1/4W		328101J
R117	1 1 1		RES 33kohm 5% 1/4W	328333J	R305	1 1 1	RES 47kohm 5% 1/4W		328473J
R118	1 1 1		RES 15kohm 5% 1/4W	328153J	R306	1 1 1	RES 10kohm 5% 1/4W		328103J
R119	1 1 1		RES 2.2kohm 5% 1/4W	328222J	R307	1 1 1	RES 3.3kohm 5% 1/4W		328332J
R120	1 1 1		RES 12kohm 5% 1/4W	328123J	R308	1 1 1	RES 5.6kohm 5% 1/4W		328562J
R121	1 1 1		RES 220ohm 5% 1/4W	328221J	R309		(Potentiometer)		
					R310	1 1 1	RES 220kohm 5% 1/4W		328224J
					R311	1 1 1	RES 33kohm 5% 1/4W		328333J
					R312	1 1 1	RES 1kohm 5% 1/4W		328102J
					R313		(Potentiometer)		
					R314	1 1 1	RES 2.2kohm 5% 1/4W		328222J
					R315	1 1 1	RES 1kohm 5% 1/4W		328102J
					R316	1 1 1	RES 6.8kohm 5% 1/4W		328682J
					R317	1 1 1	RES 22kohm 5% 1/4W		328223J
					R318	1 1 1	RES 47kohm 5% 1/4W		328473J
					R319	1 1 1	RES 220kohm 5% 1/4W		328224J
					R320	1 1 1	RES 10kohm 5% 1/4W		328103J
					R321,322	2 2 2	RES 3.3kohm 5% 1/4W		328332J
					R323,324	2 2 2	RES 100ohm 5% 1/4W		328101J
					R325				
					~ R328	4 4 4	RES 3.3kohm 5% 1/4W		328332J

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KEY NO.	SYMBOL NO.	TYPE WEN	DESCRIPTION ++	PART NO.
	R329,330	2 2 2	RES 4.7kohm 5% ¼W	328472J
	R331,332	2 2 2	RES 180kohm 5% ¼W	328184J
	R333,334	2 2 2	RES 18kohm 5% ¼W	328183J
	R335,336	2 2 2	RES 68kohm 5% ¼W	328683J
	R337,338	2 2 2	RES 680ohm 5% ¼W	328681J
	R339,340	2 2 2	RES 5.6kohm 5% ¼W	328562J
	R341,342	2 2 2	RES 220kohm 5% ¼W	328224J
	R343		(Potentiometer)	
	R345	1 1 1	RES 22kohm 5% ¼W	328223J
	R346	1 1 1	RES 1kohm 5% ¼W	328102J
	R347	1 1 1	RES 1meg-ohm 5% ¼W	328105J
	R348	1 1 1	RES 33kohm 5% ¼W	328103J
	R349	1 1 1	RES 330kohm 5% ¼W	328334J
	R350	1 1 1	RES 8.2kohm 5% ¼W	328822J
	R351	1 1 1	RES 33kohm 5% ¼W	328333J
	R352	1 1 1	RES 8.2kohm 5% ¼W	328822J
	R353	1 1 1	RES 1.2kohm 5% ¼W	328122J
	R354	1 1 1	RES 15kohm 5% ¼W	328153J
	R355	1 1 1	RES 33kohm 5% ¼W	328333J
	R356	1 1 1	RES 330kohm 5% ¼W	328334J
	R357	1 1 1	RES 1meg-ohm 5% ¼W	328105J
	R358	2 2 2	RES 2.2meg-ohm 5% ¼W	328225J
	R359	1 1 1	RES 100kohm 5% ¼W	328104J
	R360	1 1 1	RES 10meg-ohm 5% ¼W	328106J
	R361,362	2 2 2	RES 100kohm 5% ¼W	328104J
	R363	1 1 1	RES 1meg-ohm 5% ¼W	328105J
	R364	1 1 1	RES 100kohm 5% ¼W	328104J
	R365	1 1 1	RES 1meg-ohm 5% ¼W	328105J
	R366	1 1 1	RES 2.2meg-ohm 5% ¼W	328225J
	R367	1 1 1	RES 1kohm 5% ¼W	328102J
	R368	1 1 1	RES 680ohm 5% ¼W	328681J
	R369,370	2 2 2	RES 4.7kohm 5% ¼W	328472J
	R371	1 1 1	RES 10meg-ohm 5% ¼W	328106J
(AM SECTION)				
	T201	1 1 1	Coil, AM oscillator	1220060
	T202	1 1 1	Transformer, AM IF	1230160
	T203	1 1 1	Coil, AM discriminator	1230110
	CF201	1 1 1	Celamic filter — SFZ455A	1280310
	IC201	1 1 1	IC HA1197	518044S
	Q201	1 1 1	TR 2SC945L (P or Q)	515077S
	C201	1 1 1	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	C202	1 1 1	C-CAP 0.001uf +80, -20% 50V YG	231102Z
	C203	1 1 1	E-CAP 10uf 16V	211220Q
	C204	1 1 1	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	C205	1 1 1	E-CAP 10uf 16V	211220Q
	C206	1 1 1	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	C207	1 1 1	E-CAP 4.7uf 25V	211315Q
	C208	1 1 1	E-CAP 3.3uf 35V	211413Q
	C209	1 1 1	C-CAP 0.001uf +80, -20% 50V YG	231102Z
	C210			
	~ C212	3 3 3	M-CAP 0.01uf 5% 50V	222103J
	C213	1 1 1	M-CAP 0.068uf 5% 50V	222683J
	C214	1 1 1	E-CAP 10uf 16V	211220Q
	C215	1 1 1	S-CAP 360pf 2% 50V	223361G
	C216	1 1 1	C-CAP 15pf 50V N750	232150U
	C217	1 1 1	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	C218	1 1 1	C-CAP 68pf 10% 50V SL	232680K
	C219,220	2 2 2	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	R201	1 1 1	RES 220ohm 5% ¼W	328221J
	R202	1 1 1	RES 100ohm 5% ¼W	328101J
	R203	1 1 1	RES 1.5kohm 5% ¼W	328152J
	R204	1 1 1	RES 1kohm 5% ¼W	328102J
	R205,206	2 2 2	RES 10kohm 5% ¼W	328103J
	R207	1 1 1	RES 330ohm 5% ¼W	328331J
	R208	1 1 1	RES 10ohm 5% ¼W	328100J
	R209	1 1 1	RES 100ohm 5% ¼W	328101J
	R210	1 1 1	RES 1kohm 5% ¼W	328102J
	R211	1 1 1	RES 3.3kohm 5% ¼W	328332J
	R212	1 1 1	RES 100kohm 5% ¼W	328104J

KEY NO.	SYMBOL NO.	TYPE WEN	DESCRIPTION ++	PART NO.
	R213	1 1 1	RES 10kohm 5% ¼W	328103J
	R214	1 1 1	RES 100kohm 5% ¼W	328104J
(EQ AMP SECTION)				
	Q401,402	2 2 2	TR 2SA991 (E or F)	510104S
	Q403,404	2 2 2	TR 2SC1845 (E or F)	512115S
	Q405,406	2 2 2	TR 2SA992 (E or F)	510110S
	C401,402	2 2 2	E-CAP 3.3uf 50V	211513Q
	C403,404	2 2 2	C-CAP 470pf 10% 50V SL	232471K
	C405,406	2 2 2	E-CAP 22uf 25V	211322Q
	C407,408	2 2 2	E-CAP 220uf 6.3V	211032Q
	C409,410	2 2 2	C-CAP 15pf 10% 50V SL	232150K
	C411,412	2 2 2	E-CAP 10uf 25V	211320Q
	C413,414	2 2 2	E-CAP 220uf 6.3V	211032Q
	C415,416	2 2 2	M-CAP 0.0012uf 10% 50V	222122K
	C417,418	2 2 2	E-CAP 3.3uf 50V	211513Q
	C419,420	2 2 2	E-CAP 100uf 35V	211430Q
	C421,422	2 2 2	M-CAP 0.011uf 2% 50V	228113G
	C423,424	2 2 2	M-CAP 0.039uf 2% 50V	228393G
	C425,426	2 2 2	E-CAP 220uf 25V	211332S
	C427,428	2 2 2	C-CAP 680pf 10% 50V SL	232681K
	R401,402	2 2 2	RES 47kohm 5% ¼W	328473J
	R403,404	2 2 2	RES 47ohm 5% ¼W	328470J
	R405,406	2 2 2	RES 470kohm 5% ¼W	328474J
	R407,408	2 2 2	RES 220kohm 5% ¼W	328224J
	R409,410	2 2 2	RES 33kohm 5% ¼W	328333J
	R411,412	2 2 2	RES 150ohm 5% ¼W	328151J
	R413,414	2 2 2	RES 82kohm 5% ¼W	328823J
	R415			
	~ R418	4 4 4	RES 12kohm 5% ¼W	328123J
	R419			
	~ R422	4 4 4	RES 2.2kohm 5% ¼W	328222J
	R423,424	2 2 2	FP-MO-RES 2.7kohm 5% ¼W	360272L
	R425,426	2 2 2	RES 1kohm 5% ¼W	328102J
	R427,428	2 2 2	RES 100kohm 5% ¼W	328104J
	R429,430	2 2 2	RES 220kohm 5% ¼W	328224J
	R431,432	2 2 2	RES, metal film 6.8kohm 2% ¼W	304682G
	R433,434		— DELETED —	
	R435,436	2 2 2	RES, metal film 82kohm 2% ¼W	304823G
	R437,438	2 2 2	RES 68ohm 5% ¼W	328680J
	R443,444	2 2 2	FP-MO-RES 560ohm 5% ¼W	360561L
(PUSH SWITCH SECTION & OTHERS)				
	Q806	1 1 1	TR 2SA733A (P or Q)	514074S
	C501,502	2 2 2	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	C503,504	2 2 2	M-CAP 0.18uf 5% 50V	222184J
	C505,506	2 2 2	S-CAP 360pf 10% 50V	223361V
	C507,508	2 2 2	M-CAP 0.12uf 5% 50V	222124J
	C541,542	2 2 2	M-CAP 0.0039uf 5% 50V	222392J
	C543,544	2 2 2	E-CAP 0.22uf 10% 50V	211502W
	C809	1 1 1	E-CAP 47uf 25V	211325Q
	C810	1 1 1	E-CAP 47uf 16V	211225Q
	R501,502	2 2 2	RES 1meg-ohm 5% ¼W	328105J
	R503			
	~ R506	4 4 4	RES 2.2kohm 5% ¼W	328222J
	R507,508	2 2 2	RES 3.9kohm 5% ¼W	328392J
	R509,510	2 2 2	RES 5.6kohm 5% ¼W	328562J
	R511,512		— DELETED —	
	R513,514	2 2 2	RES 15kohm 5% ¼W	328153J
	R515,516	2 2 2	RES 1meg-ohm 5% ¼W	328105J
	R517,518	2 2 2	RES 5.6kohm 5% ¼W	328562J
	R595,596	— 2 2	RES 330kohm 5% ¼W	328334J
	R597,598	— 2 2	RES 100kohm 5% ¼W	328104J
	R815	1 1 1	RES 33kohm 5% ¼W	328333J
(TONE AMP SECTION)				
410	R559,560	1 1 1	VR V24L5G4 B100kohmx2 — bass	4320630

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411	R549,550	1 1 1	VR V24L5G4 B100kohmx2 — mid range	4320940
412	R539,540	1 1 1	VR V24L5G4 B100kohmx2 — treble	4320640
	Q501,502	2 2 2	TR 2SA992 (E or F)	510110S
	Q503			
	~ Q508	6 6 6	TR 2SC1845 (E or F)	512115S
	Q509,510	2 2 2	TR 2SA992 (E or F)	510110S
	C509,510	2 2 2	E-CAP 3.3uf 50V	211513Q
	C511,512	2 2 2	E-CAP 220uf 6.3V	211032Q
	C513,514	2 2 2	C-CAP 100pf 10% 50V SL	232101K
	C515,516	2 2 2	C-CAP 5pf ±0.5pf 50V SL	232509D
	C517,518	2 2 2	E-CAP 10uf 35V	211420Q
	C519,520	2 2 2	M-CAP 0.001uf 5% 50V	222102J
	C521			
	~ C524	4 4 4	M-CAP 0.0047uf 5% 50V	222472J
	C525			
	~ C528	4 4 4	M-CAP 0.033uf 5% 50V	222333J
	C529,530	2 2 2	E-CAP 3.3uf 50V	211513Q
	C531,532	2 2 2	E-CAP 1uf 50V	211510Q
	C533,534	2 2 2	E-CAP 0.47uf 50V	211505Q
	C535,536	2 2 2	C-CAP 5pf ±0.5pf 50V SL	232509D
	C537,538	2 2 2	C-CAP 3pf ±0.5pf 50V SL	232309D
	C539,540	2 2 2	E-CAP 4.7uf 35V	211415Q
	C545,546	2 2 2	E-CAP 100uf 25V	211330Q
	C547,548	2 2 2	E-CAP 47uf 16V	211225Q
	C559,560	2 2 2	S-CAP 680pf 10% 50V	223681V
	C561,562	2 2 2	C-CAP 47pf 10% 50V SL	232470K
	R519,520	2 2 2	RES 2.2kohm 5% 1/4W	328222J
	R521,522	2 2 2	RES 220kohm 5% 1/4W	328224J
	R523,524	2 2 2	RES 330kohm 5% 1/4W	328331J
	R525,526	2 2 2	RES 22kohm 5% 1/4W	328223J
	R527,528	2 2 2	RES 120kohm 5% 1/4W	328124J
	R529,530	2 2 2	RES 2.7kohm 5% 1/4W	328272J
	R531,532	2 2 2	RES 680ohm 5% 1/4W	328681J
	R533,534	2 2 2	RES 3.9kohm 5% 1/4W	328392J
	R535,536	2 2 2	RES 100kohm 5% 1/4W	328104J
	R537,538	2 2 2	RES 8.2kohm 5% 1/4W	328822J
	R539,540		(TONE VR — treble)	
	R541,542	2 2 2	RES 8.2kohm 5% 1/4W	328822J
	R543,544	2 2 2	RES 1meg-ohm 5% 1/4W	328105J
	R545,546	2 2 2	RES 5.6kohm 5% 1/4W	328562J
	R547,548	2 2 2	RES 10kohm 5% 1/4W	328103J
	R549,550		(TONE VR — mid range)	
	R551,552	2 2 2	RES 10kohm 5% 1/4W	328103J
	R553,554	2 2 2	RES 1meg-ohm 5% 1/4W	328105J
	R555			
	~ R558	4 4 4	RES 22kohm 5% 1/4W	328223J
	R559,560		(TONE VR — bass)	
	R561			
	~ R564	4 4 4	RES 22kohm 5% 1/4W	328223J
	R565,566	2 2 2	RES 220kohm 5% 1/4W	328224J
	R567			
	~ R570	4 4 4	RES 4.7kohm 5% 1/4W	328472J
	R571,572	2 2 2	RES 47kohm 5% 1/4W	328473J
	R573,574	2 2 2	RES 470kohm 5% 1/4W	328474J
	R575,576	2 2 2	RES 100kohm 5% 1/4W	328104J
	R577,578	2 2 2	RES 150kohm 5% 1/4W	328154J
	R579,580	2 2 2	RES 82ohm 5% 1/4W	328820J
	R581,582	2 2 2	RES 3.9kohm 5% 1/4W	328392J
	R583,584	2 2 2	RES 220kohm 5% 1/4W	328224J
	R585,586	2 2 2	RES 1kohm 5% 1/4W	328102J
	R587,588	2 2 2	RES 2.2kohm 5% 1/4W	328222J
	R589,590	2 2 2	RES 330kohm 5% 1/4W	328334J
(SPEAKERS SWITCH SECTION)				
*413	S7,8	1 1 1	Switch, twin push — SUE-22	4041170
MAIN AMP ASSEMBLY				
*501		1 1 1	Heat sink	7480370
*502		1 1 1	Heat sink, sub	7480390
503		6 6 6	Screw — PTS 3φx12	814312S

KEY NO.	SYMBOL NO.	TYPE WEN	DESCRIPTION ++	PART NO.
	Q717,718	2 2 2	TR 2SD745 (Q or R)	513103S
	Q719,720	2 2 2	TR 2SB705 (Q or R)	511103S
504		1 1 1	Holder, main amp PCB	7226990
505		1 1 1	Stay, main amp PCB	7032640
506		4 4 4	Screw — PTS 3φx8	814308S
MAIN AMP PC BOARD ASSEMBLY				
601		1 1 1	MAIN AMP PCB ASSEMBLY	9430890
602		1 1 1	Connector, 2 pin male — MC-2PM	4570240
603		1 1 1	Connector, 3 pin male — MC-3PM	4570250
604		1 1 1	Connector, 4 pin male — MC-4PM	4570260
605		2 2 2	Plug, connector — 3P	4570120
(MAIN AMP SECTION)				
	Q701,702	2 2 2	TR 2SA798 (F or G)	514086S
	Q703			
	~ Q706	4 4 4	TR 2SA733A (P or Q)	514074S
	Q707			
	~ Q710	4 4 4	TR 2SC1941 (L or K)	512112S
	Q711,712	2 2 2	TR 2SA916 (L or K)	510108S
	Q713,714	2 2 2	TR 2SD669 (B or C)	513104S
	Q715,716	2 2 2	TR 2SB649 (B or C)	511104S
	Q721,722	2 2 2	TR 2SC945L (P or Q)	515077S
	Q723,724	2 2 2	TR 2SC1845 (E or F)	512115S
	D701			
	~ D706	6 6 6	Diode 1SS53	501023S
	D707,708	2 2 2	Diode VD1212	505016S
	D709,710	2 2 2	Diode 1SS55	501024S
	D711,712	2 2 2	Diode 1SS53	501023S
	ZD701			
	~ ZD704	4 4 4	Zener Diode RD24EB4	502057S
	C701,702	2 2 2	C-CAP 220pf 10% 50V SL	232221K
	C703			
	~ C706	4 4 4	E-CAP 10uf 25V	211320Q
	C707,708	2 2 2	E-CAP 3.3uf 50V	211513Q
	C709,710	2 2 2	C-CAP 680pf 10% 50V SL	232681K
	C711,712	2 2 2	M-CAP 0.047uf 10% 50V	222473K
	C713,714	2 2 2	C-CAP 47pf 10% 500V SL	234470K
	C715,716		— DELETED —	
	C717,718	2 2 2	C-CAP 1pf ±0.5pf 500V SL	234109D
	C719,720	2 2 2	E-CAP 0.47uf 50V	211505Q
	C721,722	2 2 2	M-CAP 0.047uf 10% 50V	222473K
	C723,724	2 2 2	M-CAP 0.047uf 10% 200V	222473K
	C725,726	2 2 2	E-CAP 1uf 50V	211510Q
	C727,728	2 2 2	E-CAP 47uf 63V	211625Q
	C733,734	2 2 2	C-CAP 4pf ±0.5pf 500V SL	234409D
	C735,736	2 2 2	C-CAP 27pf 10% 50V SL	232270K
	C737,738	2 2 2	C-CAP 5pf ±0.5pf 500V SL	234509D
	C741			
	~ C744	4 4 4	E-CAP 0.47uf 63V	211605S
	R707			
	~ R710	4 4 4	Potentiometer — SR29R 207 B47kohm	4301190
	R753,754	2 2 2	Potentiometer — SR29R 207 B1kohm	4300620
	R701,702	2 2 2	RES 1kohm 5% 1/4W	328102J
	R703,704	2 2 2	RES 100kohm 5% 1/4W	328104J
	R705,706	2 2 2	RES 470kohm 5% 1/4W	328474J
	R707			
	~ R710		(Potentiometer)	
	R711,712	2 2 2	RES 8.2kohm 5% 1/4W	328822J
	R713,714	2 2 2	RES 56kohm 5% 1/4W	328563J
	R715,716	2 2 2	RES 1.2kohm 5% 1/4W	328122J
	R717			
	~ R720	4 4 4	RES 4.7kohm 5% 1/4W	328472J
	R721,722	2 2 2	RES 470kohm 5% 1/4W	328474J
	R723,724	2 2 2	RES 560ohm 5% 1/4W	328561J
	R725			
	~ R728	4 4 4	FP-MO-RES 4.7kohm 5% 1/4W	360472L

PART ORDERING PROCEDURE ----- DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

KEY	SYMBOL	TYPE ⁺	DESCRIPTION ⁺⁺	PART
NO.	NO.	WEN		NO.
	R729,730	2 2 2	RES 56kohm 5% ¼W	328563J
	R731,732		— DELETED —	
	R733,734	2 2 2	RES 6.8kohm 5% ¼W	328682J
	R735			
	~ R738	4 4 4	RES 100ohm 5% ¼W	328101J
	R739			
	~ R742	4 4 4	RES 680ohm 5% ¼W	328681J
	R743			
	~ R746	4 4 4	RES 100ohm 5% ¼W	328101J
	R747,748	2 2 2	FP-MO-RES 10kohm 5% ¼W	360103L
	R749,750	2 2 2	RES 820ohm 5% ¼W	328821J
	R751,752	2 2 2	RES 560ohm 5% ¼W	328561J
	R753,754		(Potentiometer)	
	R755			
	~ R758	4 4 4	RES 100ohm 5% ¼W	328101J
	R759			
	~ R762	4 4 4	FP-MO-RES 47ohm 5% ¼W	360470L
	R763,764	2 2 2	FP-MO-RES 220ohm 5% ¼W	360221L
	R765			
	~ R768	4 4 4	CEM-RES 0.22ohm 10% 5W	384229W
	R769,770	2 2 2	FP-MO-RES 1.2kohm 5% ¼W	360122L
	R771,772	2 2 2	RES 2.2kohm 5% ¼W	328222J
	R773,774	2 2 2	FP-MO-RES 4.7ohm 5% 2W	362478L
	R775,776	2 2 2	RES 12kohm 5% ¼W	328123J
	R777,778	2 2 2	CEM-RES 0.27ohm 10% 5W	384279W
	R779,780		— DELETED —	
	R781,782	2 2 2	CEM-RES 0.27ohm 10% 5W	384279W
			(PROTECTOR SECTION)	
606	LY801	1 1 1	Relay MY4-02-US-40L — DC24V	1700220
	Q801	1 1 1	TR 2SC945L (P or Q)	515077S
	Q802	1 1 1	TR 2SA733A (P or Q)	514074S
	Q803	1 1 1	TR 2SA992 (E or F)	510110S
	Q804	1 1 1	TR 2SA945L (P or Q)	515077S
	Q805	1 1 1	TR 2SC2003 (L or M)	512114S
	D801	1 1 1	Diode 1SS55	501024S
	ZD801	1 1 1	Zener Diode RD12EB3	502058S
	C801,802	2 2 2	E-CAP 220uf 6.3V	211032Q
	C803	1 1 1	E-CAP 10uf 16V	211220Q
	C804	1 1 1	E-CAP 220uf 16V	211232Q
	C806	1 1 1	M-CAP 0.001uf 10% 50V	222102K
	R801,802	2 2 2	RES 47kohm 5% ¼W	328473J
	R803	1 1 1	RES 33kohm 5% ¼W	328333J
	R804	1 1 1	RES 12Kohm 5% ¼W	328123J
	R805	1 1 1	RES 27kohm 5% ¼W	328223J
	R806	1 1 1	RES 12kohm 5% ¼W	328123J
	R807	1 1 1	RES 47kohm 5% ¼W	328473J
	R808	1 1 1	RES 2.2kohm 5% ¼W	328222J
	R809	1 1 1	RES 47kohm 5% ¼W	328473J
	R812	1 1 1	FP-MO-RES 680ohm 5% 2W	362681L
			(METER DRIVER SECTION)	
	IC901	1 1 1	IC TA7318P	518067S
	C901,902	2 2 2	E-CAP 0.47uf 50V	211505Q
	C903,904	2 2 2	M-CAP 0.0047uf 10% 50V	222472K
	C905	1 1 1	E-CAP 1uf 50V	211510Q
	R905,906	2 2 2	Potentiometer — SR29R 207 — B220ohm	4301200
	R901,902	2 2 2	RES 56kohm 5% ¼W	328563J

KEY	SYMBOL	TYPE ⁺	DESCRIPTION ⁺⁺	PART
NO.	NO.	WEN		NO.
	R903,904	2 2 2	RES 39ohm 5% ¼W	328390J
	R905,906		(Potentiometer)	
	R907	1 1 1	FP-MO-RES 1.8kohm 5% ¼W	360182L
			(HEAD PHONES SECTION)	
607		1 1 1	Jack, head phones — JL3A	4550260
	R783,784	2 2 2	FP-MO-RES 330ohm 5% 2W	362331L
			REGULATOR PCB ASSEMBLY	
701a		1 — —	REGULATOR PCB ASSEMBLY	9450940
701b		— 1 1	REGULATOR PCB ASSEMBLY	9450950
702		1 1 1	Connector assembly — 3 pin	4570210
703		1 1 1	Connector assembly — 3 pin x 2	4570290
704		1 1 1	Connector, 2 pin female — MC-2PF	4570220
705a	F832	1 — —	Fuse — 3A 250V	4700630
706a		2 — —	Holder, fuse	7050420
705b	F832	— 1 1	Midget fuse — (S) 3.15AT 250V	4720390
706b		2 — —	Holder, midget fuse	7050430
707		1 1 1	Heat sink, for D831	7480350
708		1 1 1	Screw — PTS 3φx12	814312S
709		1 1 1	Heat sink, for Q831	7480270
710		2 2 2	Screw — PMS 3φx6	810306S
712		2 2 2	Washer — TW (I) 3φ	893403U
	Q831	1 1 1	TR 2SD880 (Y or GR)	513106S
	D802	1 1 1	Diode 1SS55	501024S
	D803			
	~ D805	3 3 3	Diode 1SS53	501023S
	D831	1 1 1	Diode M4C51	560057S
	D833	1 1 1	Diode 1SS53	501023S
	ZD831			
	~ ZD834	4 4 4	Zener Diode RD22FC	502070S
	ZR835	1 1 1	Zener Diode RD13EB1	502049S
	ZD836	1 1 1	Zener Diode RD20EB3	502069S
	L701,702	2 2 2	Coil, choke	1210830
	C805	1 1 1	E-CAP 10uf 35V	211420Q
	C831,832	2 2 2	E-CAP 1200uf 56V	2100050
	C833,834	2 2 2	C-CAP 0.01uf 500V	238103P
	C835,836	2 2 2	E-CAP 100uf 25V	211330Q
	C839	1 1 1	E-CAP 100uf 25V	211330Q
	C840	1 1 1	E-CAP 47uf 16V	211225Q
	C841	1 1 1	C-CAP 0.022uf +80, -20% 50V YG	231223Z
	C842	1 1 1	E-CAP 47uf 25V	211325Q
	C843	1 1 1	E-CAP 10uf 16V	211220Q
	C844,845	2 2 2	E-CAP 100uf 25V	211330Q
	R785,786	2 2 2	FP-MO-RES 10ohm 5% 2W	362100L
	R810	1 1 1	RES 1kohm 5% ¼W	328102J
	R811	1 1 1	RES 12kohm 5% ¼W	328123J
	R813	1 1 1	RES 390ohm 5% ¼W	328391J
	R831,832	2 2 2	FP-MO-RES 4.7kohm 5% 2W	362472L
	R833	1 1 1	RES 820ohm 5% ¼W	328821J
	R834,835	2 2 2	FP-MO-RES 560ohm 5% 2W	362561L
	R836,837	2 2 2	FP-MO-RES 470ohm 5% 2W	362471L
	R838,839	2 2 2	FP-MO-RES 470ohm 5% ¼W	360471L
	R840,841	2 2 2	FP-MO-RES 330ohm 5% 2W	362331L
	R842	1 1 1	FP-MO-RES 1.8kohm 5% 2W	362182L

SEMICONDUCTOR DATA

† NOTES Ge : Germanium
Si : Silicon

A : Alloy B : Base D : Diffused Dd : Double-diffused
E : Epitaxial G : Grown J : Junction
M : Mesa P : Planar Pc : Point-contact Td : Triple-diffused

TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUC- TURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T _A = 25°C unless otherwise specified)					ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)													MANU- FACTURER
			Collector-to-Base Voltage V _{CB0} (V)	Emitter-to-Base Voltage V _{EB0} (V)	Collector Current I _C (mA)	Collector Dis- sipation P _C (mW)	Junction Temperature T _J (°C)	Collector Cutoff Current I _{CB0} (μA)	V _{CB} (V)	h _{FE}	V _{CE} (V)	I _C (mA)	V _{CE(sat)} (V)	I _C (mA)	I _B (mA)	f _T f _β * (MHz)	V _{CE} V _{CB} * (V)	I _C I _C * (mA)	Output Capaci- tance C _{ob} (pF)	Others	
2SA733A (P, Q)	AF	PNP Si-E	-60	-5	-100	250	125	-0.1 max.	-60	135 ~400	-6	-1	-0.3 max.	-100	-10	450 max.	-6	10	6 max.		NEC
2SA798 (F, G)	AF, Low noise differential amp.	PNP, Dual Si-EP	-70	-5	-100	200	125	-0.1 max.	-50	250 ~800	-6	-1	-0.6 max.	-10	-1	100	-6	1	3		MITSUBISHI
2SA916 (L, K)	AF	PNP Si-E	-160	-5	-50	800	150	-0.1 max.	-160	135 ~400	-10	-10	-0.6 max.	-20	-2	80	-10	10	3.5 max.	Complementary to 25C 1941	NEC
2SA991 (E, F)	AF, Low noise	PNP Si-E	-60	-5	-100	500	125	-0.05 max.	-60	300 ~800	-6	-1	-0.5 max.	-100	-10	90	-6	1	10 max.		NEC
2SA992 (E, F)	AF, Low noise	PNP Si-E	-120	-5	-50	500	125	-0.05 max.	-120	300 ~800	-6	-1	-0.3 max.	-10	-1	100	-6	1	3 max.	Complementary to 25C 1845	NEC
2SB648 (B, C)	AF, Driver	PNP Si-E	-180	-5	-1.5A	20W (T _C =25°C)	150	-10 max.	-160	60 ~200	-5	-150	-1 max.	-500	-50	140	-5	-150*	27	Complementary to 25D 669	HITACHI
2SB705 (Q, R)	AF, Power amp.	PNP Si-Td	-140	-5	-10A	120W (T _C =25°C)	150	-50 max.	-140	60 ~200	-5	-2A	-1.5 max.	-5A	-0.5A	17	-5	-0.2A*	430	Complementary to 25D 745	NEC
2SC945L (P, Q)	AF	NPN Si-E	60	5	100	250	125	0.1 max.	60	135 ~400	6	1	0.3 max.	100	10	450 max.	6	-10	5 max.		NEC
2SC1875 (L, M)	RF, Mixer, Osc. (in FM/AM radio)	NPN Si-E	50	5	30	250	125	0.1 max.	50	40 ~120	6	1	0.3 max.	10	1	250	6	-1	2.2 max.		NEC
2SC1845 (E, F)	AF, Low noise	NPN Si-E	120	5	50	500	125	0.05 max.	120	300 ~800	6	1	0.3 max.	10	1	110	6	-1	2.5 max.	Complementary to 25A 992	NEC
2SC1841 (L, K)	AF	NPN Si-E	160	5	50	800	150	0.1 max.	160	135 ~400	10	10	0.6 max.	20	2	120	10	-10	3 max.	Complementary to 25A 916	NEC
2SC2003 (L, M)	AF	NPN Si-E	80	5	300	600	150	0.1 max.	80	90 ~270	1	50	0.6 max.	300	30	140	6	-10	15 max.		NEC
2SD655 (E, F)	AF	NPN Si-E	30	5	700	500	150	1	20	400 ~1200	1	150	0.5 max.	500	50	250	1	150*			HITACHI
2SD669 (B, C)	AF, Driver	NPN Si-E	180	5	1.5A	20W (T _C =25°C)	150	10 max.	160	60 ~200	5	150	1 max.	500	50	140	5	150*	14	Complementary to 25B 649	HITACHI
2SD745 (Q, R)	AF, Power amp.	NPN Si-Td	140	5	10A	120W (T _C =25°C)	150	50 max.	140	60 ~200	5	2A	1.5 max.	5A	-0.5A	15	5	0.2A*	270	Complementary to 25B 705	NEC
2SD880 (Y, GR)	AF, Power amp.	NPN Si-Td	60	7	3A	30W (T _C =25°C)	150	100 max.	60	100 ~300	5	0.5A	1 max.	3A	0.3A	3	5	-0.5A	70		TOSHIBA

FIELD EFFECT TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T _A = 25° C unless otherwise specified)						ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25° C unless otherwise specified)													MANUFACTURER	
			Gate-to-Drain Voltage V _{SD0} (V)	Gate-to-Source Voltage V _{GS0} (V)	Gate Current I _G (mA)	Drain Current I _D (mA)	Total Dissipation P _D (mW)	Channel Temperature T _{ch} (°C)	Gate Leak Current		Gate to Drain Breakdown Voltage		Drain Current I _{DSS} (mA)	Gate to Source Cutoff Voltage V _{GS(off)} (V)	Forward Transfer Admittance Y _{fs} (mS)	Feed Back Capacitance		Power Gain (Common Source)		Noise Figure			
									Test Conditions	I _{GSS} (nA)	Test Conditions	V _{BRD} (V)				Test Conditions	Test Conditions	Test Conditions	C _{rss} (pF)	Test Conditions	G _{PS} (dB)		Test Conditions
2SK104 (F)	AF, RF General	Si N-channel junction	-30	-30	10	20	250	125	V _{GS} = -30V	10		V _{DS} = 5V I _D = 10mA	V _{DS} = 5V I _D = 10mA	-1.1	4.1	V _{DS} = 10V V _{GS} = 0 V f = 1 kHz	0.9						NEC

DIODES, LED'S

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T _A = 25°C unless otherwise specified)									ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)							MANUFACTURER
			Reverse Surge Voltage	Peak Reverse Voltage	Reverse Voltage	Peak Forward Voltage	Peak Forward Current	Average Rectified Current	Forward Surge Current	Junction Temperature	Total Power Dissipation	Forward Current	Forward Voltage	Reverse Current	Others				
			V _{RS} (V)	V _{RM} (V)	V _R (V)	V _{FM} (V)	I _{FM} (mA)	I _O (mA)	I _F surge (A)	T _J (°C)	P _D (mW)	I _F min (mA)	Test Condition V _F (V)	V _{FM} max (V)		Test Condition I _F (mA)	I _R max (μA)	Test Condition V _R (V)	
M4C51	Rectifier	Si-DJ Bridge	300	200				5A (T _A =30°C)	210	150			0.95 (Peak)	2.5A	50 (Peak)	200		HITACHI	
1SS55	Detector, Medium speed switching	Si-EP		100	75		300	100	2	200	500		0.8: 1.0	1.0: 30	0.1	75		NEC	
1SS53	Detector, Medium speed switching	Si-EP		35	30		300	100	2	200	500		0.8: 1.0	1.0: 30	0.1	30		NEC	
GL-2PG1	Lamp (green)	GaP			5			I _F = 30 mA		85	85		2.8	20	10	4	I _V = 0.3 mcd (I _F = 20 mA)	SHARP	
GL-2PR1	Lamp (red)	GaP			5			I _F = 10 mA		85	23		2.3	5	10	4	I _V = 0.3 mcd (I _F = 5 mA)	SHARP	

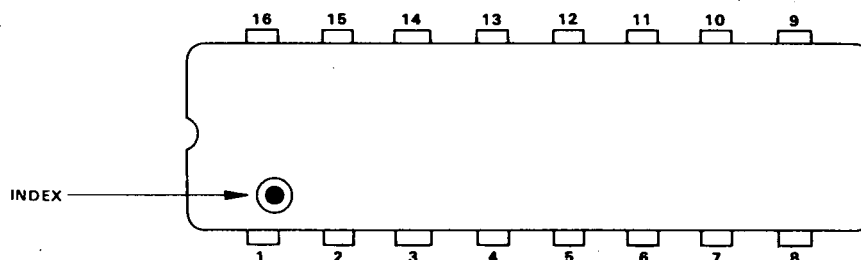
ZENER DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T _A = 25°C unless otherwise specified)			ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)												MANU-FACTURER	
			Total Power Dissipation P _D (mW)	Zener Current I _Z (A)	Junction Temperature T _J (°C)	Zener Voltage			Differential Resistance		Temperature Coefficient		Reverse Current		Others				
						MIN (V)	TYP (V)	MAX (V)	I _Z (mA)	r _Z (Ω)	I _Z (mA)	Test Conditions	γ _Z (%/°C)	MAX (%/°C)		I _Z (mA)	MAX (μA)		V _R (V)
RD6.2-EB1	Regulator	Si-J	400			5.78		6.09	20		20	20				5	1.5		NEC
RD12-EB3	Regulator	Si-J	400			11.74		12.35	10		20	10				2	9		NEC
RD13-EB1	Regulator	Si-J	400			12.99		13.66	10		25	10				2	10		NEC
RD20-EB3	Regulator	Si-J	400			19.23		20.22	10		55	10				2	15		NEC
RD24-EB4	Regulator	Si-J	400			23.63		24.85	5		95	5				2	19		NEC
RD33-EB3	Regulator	Si-J	400			30.9		32.5	5		160	5				2	25		NEC
RD22-FC	Regulator	Si-J	1000			22.0		24.5	10		14	10				10	17		NEC

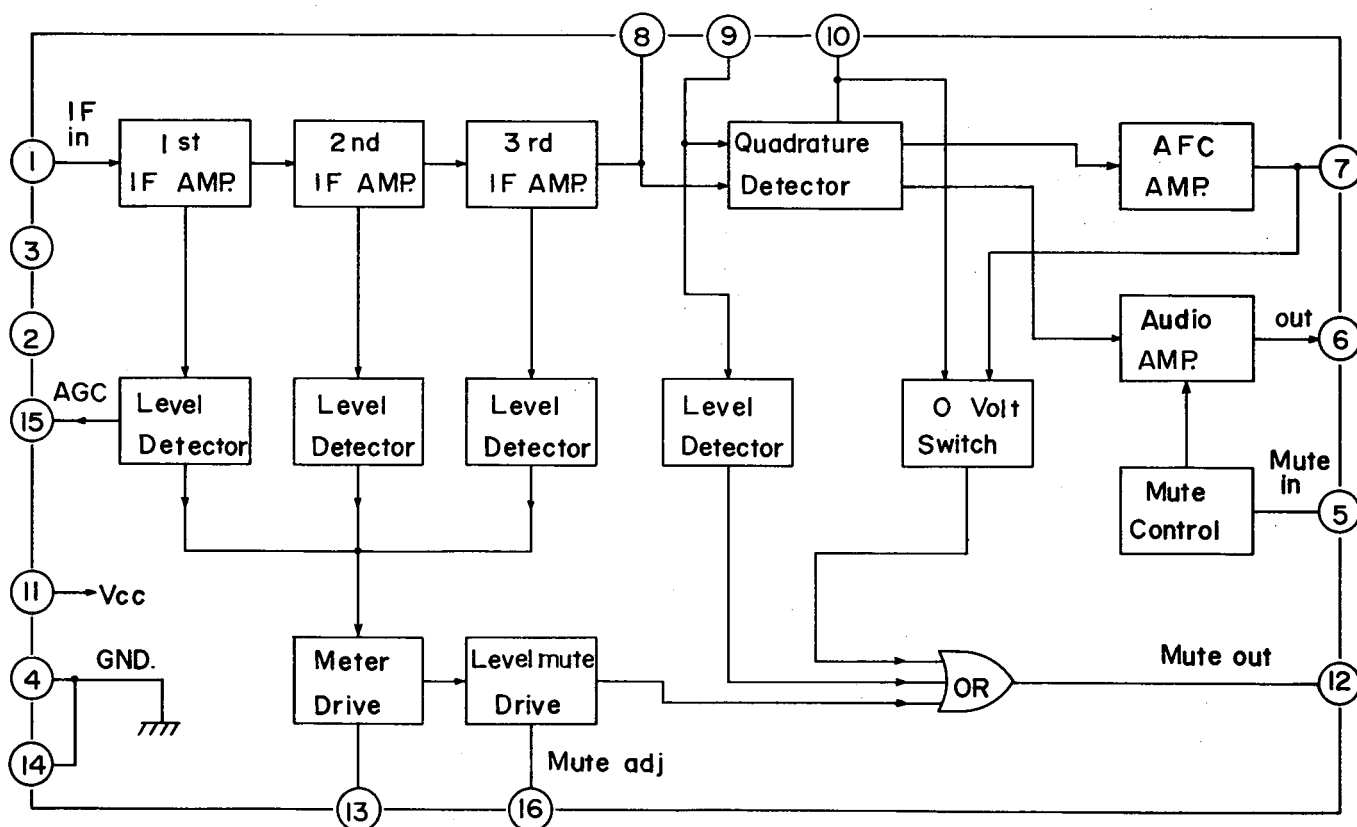
INTEGRATED CIRCUITS HA11225

DEVICE TYPE	APPLICATION	ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)				ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$) Typical Values							MANUFACTURER
		Supply Voltage V_{CC} (V)	Power Dissipation P_T (mW)	Operating Temperature Range T_{opr} ($^\circ\text{C}$)	Storage Temperature Range T_{sig} ($^\circ\text{C}$)	Supply Current (mA)	Input Limiting Sensitivity V_{in} (lim) (μV)	AF Voltage (mVrms)	Total Harmonic Distortion (%)	Signal to Noise Ratio (dB)	AM Rejection (dB)	Muting Sensitivity (μV)	
HA11225	FM IF Amplifier, Quadrature Detector	14	590 ($T_A = 60^\circ\text{C}$)	$-20 \sim +70$	$-55 \sim +125$	33 max.	35 (-3dB point)	380	0.1 max.	84	54	158	HITACHI

TERMINAL GUIDE (TOP VIEW)



BLOCK DIAGRAM



INTEGRATED CIRCUIT HA11223W**ABSOLUTE MAXIMUM RATINGS** ($T_a = 25^\circ\text{C}$)

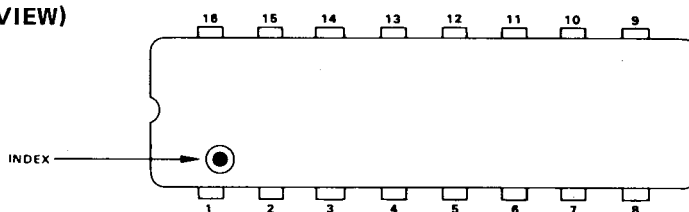
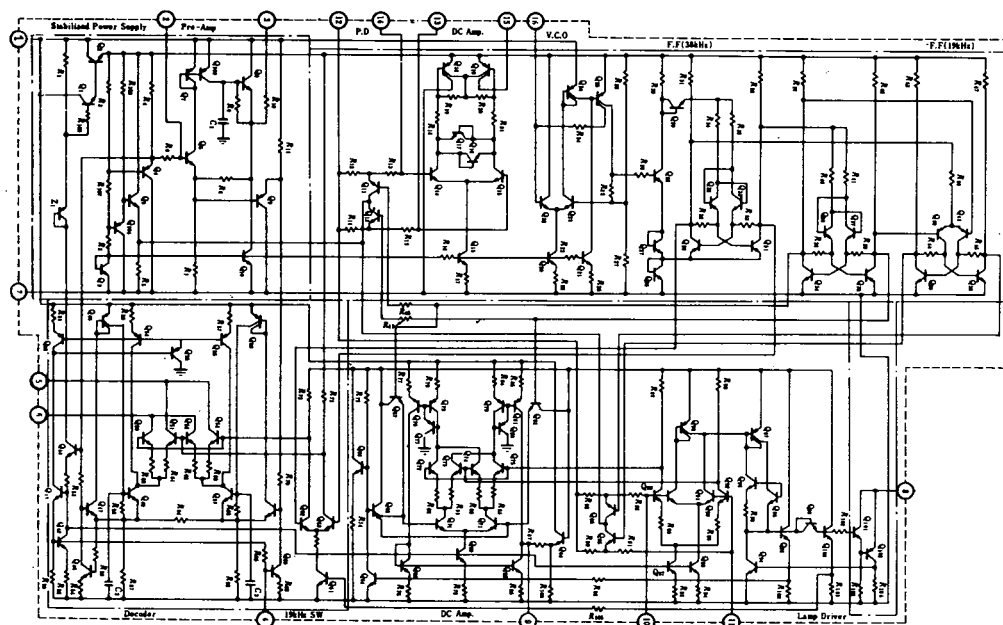
APPLICATION/MANUFACTURER:

FM STEREO DEMODULATOR/HITACHI

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	16	V
Power Dissipation*	P_T	500	mW
Operating Temperature	T_{opr}	-20 to +75	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +125	$^\circ\text{C}$
Lamp Drive Current	Continuous	75	mA
	Peak	100	

* Value at $T_a = 75^\circ\text{C}$ **ELECTRICAL CHARACTERISTICS** ($V_{CC} = 13\text{V}$, $f = 1\text{kHz}$, $T_a = 25^\circ\text{C}$ unless otherwise noted)

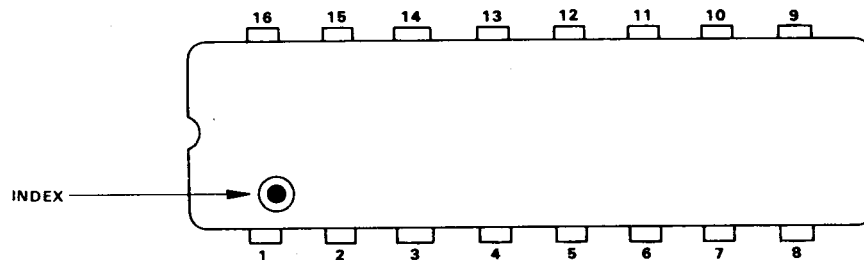
Item	Symbol	Test Condition	min	typ	max	Unit
Input Impedance	Z_{in}		30	75	—	k Ω
Channel Separation	Sep	$P = 30\text{mV}$, $L + R = 270\text{mV}$	100Hz	—	40	dB
			1kHz	35	45	
			10kHz	—	40	
Stereo Total Harmonic Distortion	ST, T.H.D	$P = 30\text{mV}$, $L + R = 270\text{mV}$	100Hz	—	0.04	%
			1kHz	—	0.02	
			10kHz	—	0.05	
Output Voltage	V_{out}	$V_{in} = 300\text{mV}$	185	240	310	mV
Channel Balance	C.B	$V_{in} = 300\text{mV}$	—	0	—	dB
Monaural Total Harmonic Distortion	$M_{ono}, T.H.D$	$V_{in} = 300\text{mV}$	—	0.01	0.08	%
Pilot Level for Lamp ON	L_{LON}		8	11.5	15	mV
Stereo Lamp Hysteresis			—	4	—	dB
Carrier Leak	C.L	$P = 30\text{mV}$, $L + R = 270\text{mV}$	19kHz	55	60	dB
			38kHz	—	35	
SCA Rejection Ratio	SCA R_{s1}	$P = 30\text{mV}$, $L + R = 270\text{mV}$; $SCA = 30\text{mV}$, $f_{SCA} = 67\text{kHz}$	—	80	—	dB
Signal-to-noise Ratio	S/N	$V_{in} = 300\text{mV}$, $R_0 = 4.7\text{k}\Omega$	80	86	—	dB
Capture Range	C.R	$P = 30\text{mV}$	—	± 3.5	—	%
Max Input Signal	V_{in}	$P = 10\%$, $L + R = 90\%$, $T.H.D \leq 0.5\%$	—	1.2	—	V
Total Current Drain	I_T		—	17	—	mA

TERMINAL GUIDE (TOP VIEW)**SCHEMATIC DIAGRAM**

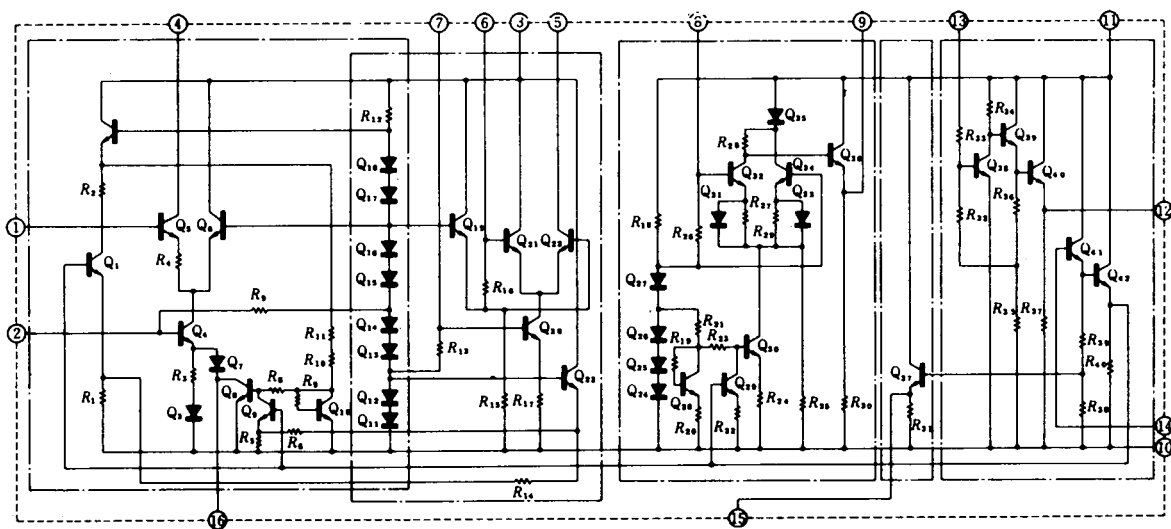
INTEGRATED CIRCUITS HA1197

DEVICE TYPE	APPLICATION	ABSOLUTE MAXIMUM RATING ($T_A = 25^\circ\text{C}$)				ELECTRICAL CHARACTERISTICS (TYPICAL VALUES) $T_A = 25^\circ\text{C}$				MANUFACTURER
		Voltage Supply V_{CC} (V)	Power Dissipation P_d (mW)	Operating Temp Range T_{opt} ($^\circ\text{C}$)	Storage Temp Range T_{stg} ($^\circ\text{C}$)	Signal to Noise Ratio Input=74dB μ Mod = 30% (dB)	Distortion Input=100dB μ Mod = 30% (%)	Output Voltage Input=74dB μ Mod = 30% (mV)	Quiescent Current (mA)	
HA1197	AM Radio	15	450 ($T_a = 70^\circ\text{C}$)	$-20 \sim +70$	$-55 \sim +125$	53	0.4	212	14.5	HITACHI

TERMINAL GUIDE (TOP VIEW)



SCHEMATIC DIAGRAM

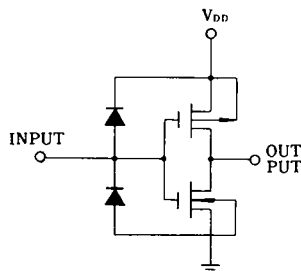


INTERGRATED CIRCUITS μ PD4069C

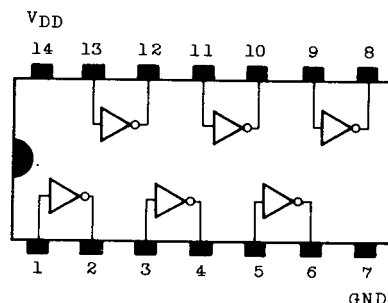
FUNCTION/MANUFACTURER

- Hex Inverter/NEC

EQUIVALENT CIRCUIT AND CONNECTION INFORMATION



(1/6 CIRCUIT SHOWN)



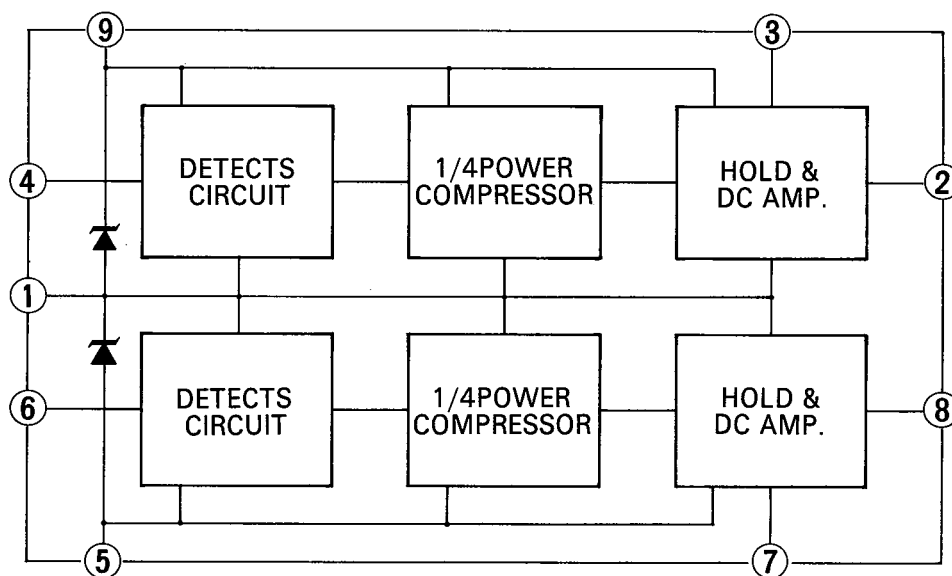
TOP VIEW

INTERGRATED CIRCUITS TA-7318P

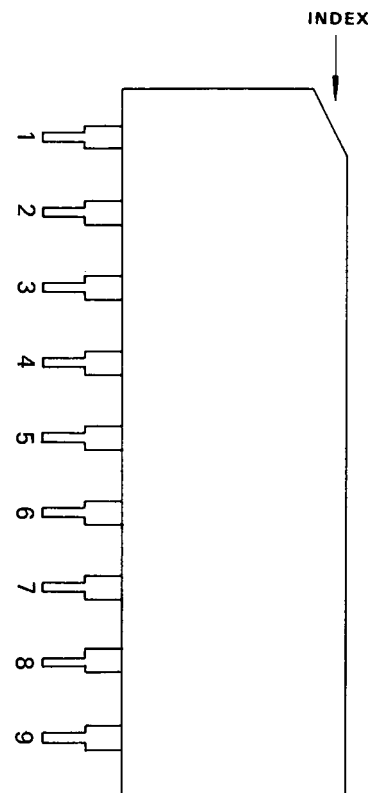
FUNCTION/MANUFACTURER

- Dual Linear-to-Log Converter for Peak Power Meter/Toshiba

BLOCK DIAGRAM AND CONNECTION INFORMATION



BLOCK DIAGRAM



TERMINAL GUIDE (SIDE VIEW)

CORRECTION OF SCHEMATIC DIAGRAM

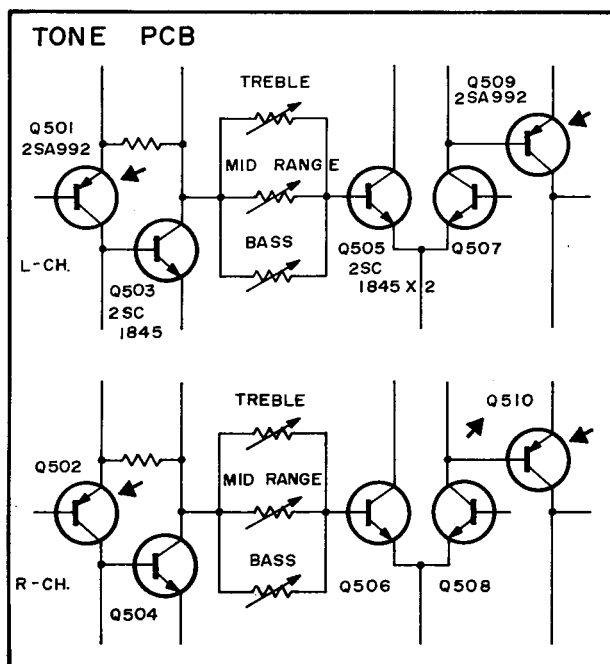
There are mistakes in the schematic diagram. Please make corrections as follows:

1. Tone Control Section

- (a) The symbol number of the transistor in the final stage of right channel should be:

Q501 → Q510

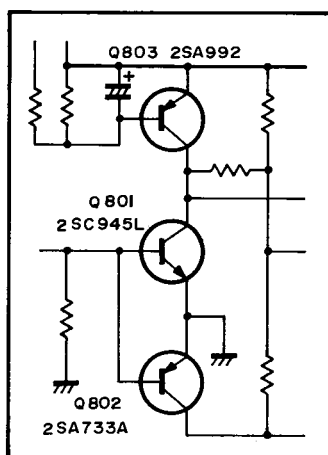
- (b) Make correction of emitter marks of Q501, Q509 of left channel and Q502, Q510 of right channel as in the following diagram:



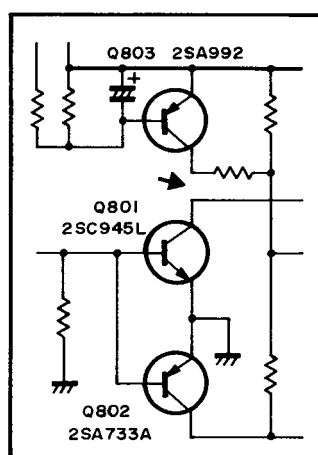
2. Protector Circuit

The collector of transistors Q801 and Q803 is connected with each other, but that is a mistake. See the following diagram:

PREVIOUS DIAGRAM



CORRECTED DIAGRAM



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