Nikko RECEIVER

NR-819

AM/FM STEREO RECEIVER

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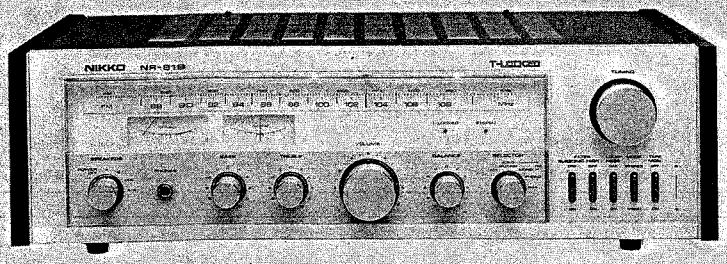

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TYPE AND VOLTAGE

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

SERVICE MANUAL

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SPECIFICATIONS

〈W, E & N–TYPE〉

FM TUNER SECTION

Usable Sensitivity: ..... better than 10 dBμ (3.16 μV)
50 dB Quieting Sensitivity:
..... better than 15 dBμ (5.6 μV)
Signal to Noise Ratio: ..... better than 65 dB
T. H. Distortion (1 KHz) Mono: ..... less than 0.3 %
Stereo: ..... less than 0.5 %
Alternate Channel Selectivity: ..... better than 35 dB
Sprious Response Rejection: ..... better than 70 dB
Image Frequency Rejection: ..... better than 42 dB
IF Rejection: ..... better than 70 dB
AM Rejection: ..... better than 40 dB
Capture Ratio: ..... better than 3 dB
Stereo Separation (100 Hz): ..... better than 30 dB
(1 KHz): ..... better than 35 dB
(10 KHz): ..... better than 30 dB
Subcarrier Suppression: ..... better than 40 dB
Muting Sensitivity: ..... 25 dBμ ±8 dB
FM Frequency Range: ..... 87.9 ~ 108.5 MHz
Antenna Impedance:
..... 300 ohms balanced & 75 ohms unbalanced
Output Level: ..... 550 mV ±2 dB

AM TUNER SECTION

Usable Sensitivity: ..... better than 42 dBμ (125.9 μV)
Signal to Noise Ratio: ..... better than 45 dB
Image Frequency Rejection (1000 KHz):
..... better than 30 dB
IF Rejection (1000 KHz): ..... better than 30 dB
Selectivity (±10 KHz): ..... better than 30 dB
AM Frequency Range: ..... 530 ~ 1630 KHz
Output Level: ..... 165 mV ±2 dB

AUDIO AMPLIFIER SECTION

Continuous Power Output per channel, 8 ohms:
20 Hz ~ 20 KHz ..... more than 45 Watts
1 KHz ..... more than 45 Watts
T.H. Distortion, 8 ohms:
Continuous Power Output ..... less than 0.05 %
1 Watt Power Output ..... less than 0.05 %
I.M. Distortion, 8 ohms:
Continuous Power Output ..... less than 0.05 %
1 Watt Power Output ..... less than 0.05 %
IHF Power Bandwidth, 8 ohms: ..... 20 Hz ~ 20 KHz
Damping Factor @ 1 KHz, 8 ohms: 40
Frequency Response:
PHONO → TAPE OUT (RIAA Equalization)
..... 30 Hz ~ 15 KHz ±1.5 dB
AUX, TAPE IN → SP. TER.
..... 20 Hz ~ 20 KHz ±1.5 dB
Input Sensitivity for 45 Watts Power Output:
PHONO ..... 2.5 mV ±2 dB
AUX, TAPE IN ..... 150 mV ±2 dB
Phono Max. Input Capability, @ 1 KHz:
..... more than 120 mV
Output Level, @ Continuous Power Output,
(Input: PHONO):
TAPE OUT ..... 150 mV ±2 dB
Tone Control:
BASS (70 Hz) Cut .....–10 dB ±3 dB
Boost ..... +10 dB ±3 dB
TREBLE (10 KHz) Cut .....–10 dB ±3 dB
Boost ..... +10 dB ±3 dB
Loudness Control (VOLUME: –30 dB):
70 Hz .....+9 dB ±3 dB
10 KHz .....+5 dB ±3 dB
Subsonic Filter, @ 20 Hz: ..... –3 dB ±2 dB
High Filter, @ 10 KHz: ..... –3 dB ±2 dB
Signal to Noise Ratio, IHF "A" Network:
PHONO ..... better than 80 dB
AUX, TAPE IN ..... better than 95 dB
Idling Current: ..... 20 mA ±10 mA
Midpoint Voltage: ..... 0V ±50 mV

〈D–TYPE〉 They were measured according to DIN standard

FM TUNER SECTION

Usable Sensitivity: . . . . . better than 6 dBμ (2.0 μV)
50 dB Quieting Sensitivity:
. . . . . better than 15 dBμ (5.6 μV)
Signal to Noise Ratio: . . . . . better than 58 dB
T.H. Distortion (1 KHz) Mono: . . . . . less than 0.3 %
Stereo: . . . . . less than 1.0 %
Alternate Channel Selectivity: . . . . . better than 35 dB
Sprious Response Rejection: . . . . . better than 70 dB
Image Frequency Rejection: . . . . . better than 42 dB
IF Rejection: . . . . . better than 70 dB
AM Rejection: . . . . . better than 40 dB

AM TUNER SECTION

Usable Sensitivity: . . . . . better than 42 dBμ (125.9 μV)
Signal to Noise Ratio: . . . . . better than 45 dB
Image Frequency Rejection (1000 KHz):
. . . . . better than 30 dB
IF Rejection (1000 KHz): . . . . . better than 30 dB

AUDIO AMPLIFIER SECTION

Continuous Power Output per channel, 4 ohms:
20 Hz ~ 20 KHz . . . . . more than 50 Watts
1 KHz . . . . . more than 70 Watts
T.H. Distortion, 4 ohms:
Continuous Power Output . . . . . less than 0.1 %
1 Watt Power Output . . . . . less than 0.1 %
I.M. Distortion, 4 ohms:
Continuous Power Output . . . . . less than 0.1 %
1 Watt Power Output . . . . . less than 0.1 %
IHF Power Bandwidth, 4 ohms: . . . . . 20 Hz ~ 20 KHz
Damping Factor @ 1 KHz, 4 ohms: 45
Frequency Response:
PHONO → TAPE OUT (RIAA Equalization)
. . . . . 30 Hz ~ 15 KHz ±1.5dB
AUX, TAPE IN → SP. TER.
. . . . . 20 Hz ~ 20 KHz ±1.5 dB
Input Sensitivity for 70 Watts Power Output:
PHONO: . . . . . 1.9 mV ±2 dB
AUX, TAPE IN: . . . . . 140 mV ±2dB
Phono Max. Input Capability, @ 1 KHz:
. . . . . more than 120 mV
Output Level, @ Continuous Power Output,
(Input: PHONO):
TAPE OUT (DIN): . . . . . 12 mV ±2 dB
Tone Control:
BASS (70 Hz) Cut: . . . . . –10 dB ±3 dB
Boost: . . . . . +10 dB ±3 dB
TREBLE (10 KHz) Cut: . . . . . –10 dB ±3 dB
Boost: . . . . . +10 dB ±3 dB

Capture Ratio: . . . . . better than 3 dB
Stereo Separation (100 Hz): . . . . . better than 30 dB
(1 KHz): . . . . . better than 35 dB
(10 KHz): . . . . . better than 20 dB
Subcarrier Suppression: . . . . . better than 35 dB
Muting Sensitivity: . . . . . 20 dBμ ±8 dB
FM Frequency Range: . . . . . 87.5 ~ 108.5 MHz
Antenna Impedance:
. . . . . 300 ohms balanced & 75 ohms unbalanced
Output Level: . . . . . 300 mV ±2 dB

Selectivity (±10 KHz): . . . . . better than 30 dB
AM Frequency Range: . . . . . 530 ~ 1630 KHz
Output Level: . . . . . 165 mV ±2 dB

Loudness Control (VOLUME: –30 dB):
70 Hz: . . . . . +9 dB ±3 dB
10 KHz: . . . . . +5 dB ±3 dB
Subsonic Filter, @ 20 Hz: . . . . . –3 dB ±2 dB
High Filter, @ 10 KHz: . . . . . –3 dB ±2 dB
Signal to Noise Ratio, DIN Filter:
PHONO: . . . . . better than 60 dB
AUX, TAPE IN: . . . . . better than 75 dB
Idling Current: . . . . . 20 mA ±10 mA
Midpoint Voltage: . . . . . 0V ±50 mV

GENERAL

Power Requirement:
W–TYPE: . . . . . AC 120V, 60 Hz
E, N & D–TYPE: . . . . . AC 220/240 V, 50/60 Hz
Power Consumption: . . . . . 230 Watts Max.
Dimensions,
(Width): . . . . . 19 4/5 inches
(Height): . . . . . 6 1/5 inches
(Depth): . . . . . 12 3/4 inches
Weight: . . . . . 10.3 Kg

Specifications subject to change without notice.

BLOCK DIAGRAM

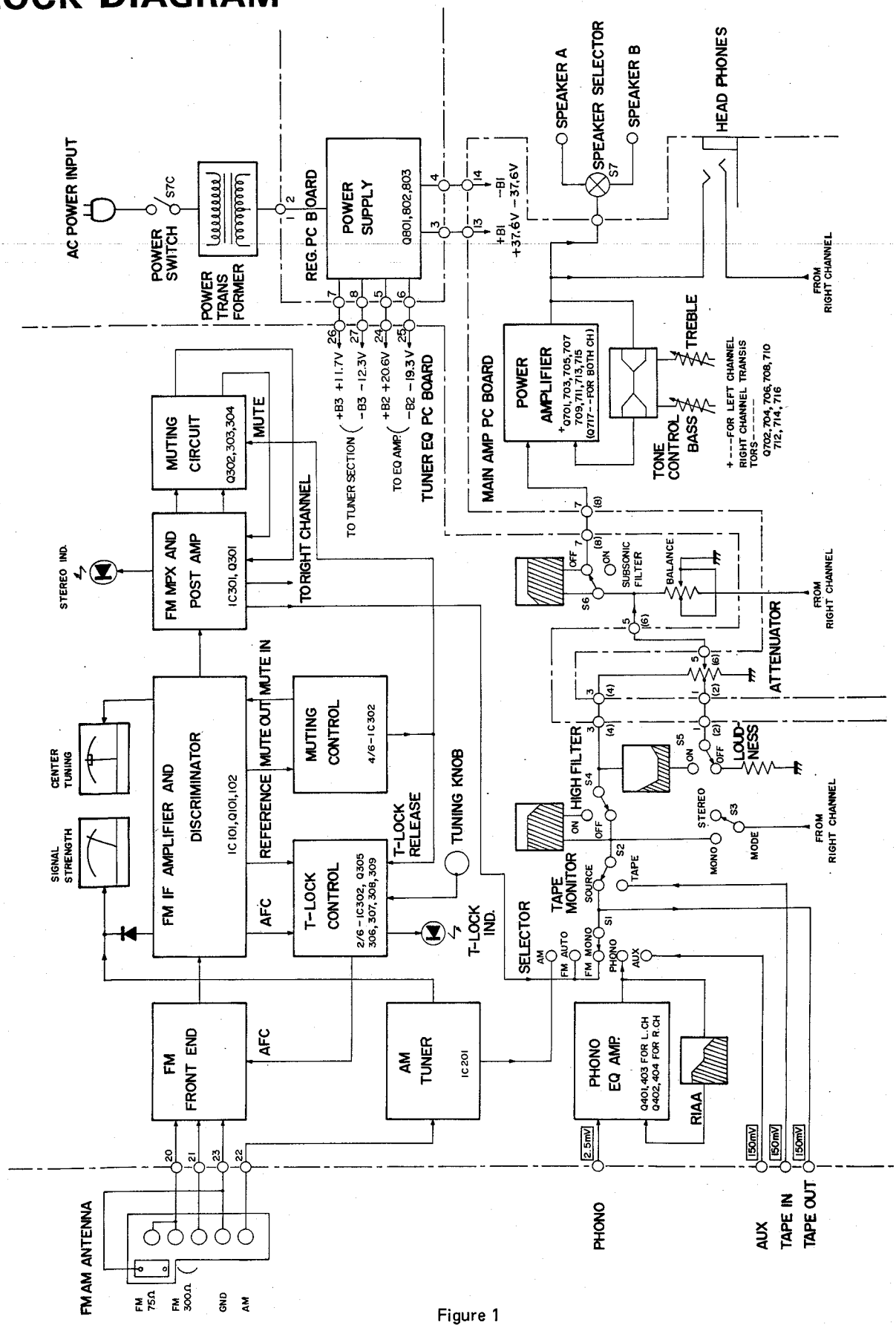


Figure 1

CIRCUIT DESCRIPTION

T-LOCKED (TUNE-LOCKED) SYSTEM

1. FUNCTION

The T-Locked system detects a frequency drift caused by temperature change or other reason during reception of FM broadcasting, and makes necessary compensation for minimizing the distortion due to such drift, thereby maintaining the optimum receiving state (locked-state). This locked state can be released automatically by touching the tuning knob with a finger. The locked state can also be attained automatically by releasing finger from the tuning knob after selecting a desired station. The locked state is indicated by an illuminated LED.

2. OPERATION

(a) Releasing of locked state

1. When a finger touches the tuning knob, the hum induced in the human body is applied to the IC302 (μPD4069C) pin #3, which operates as a high impedance amplifier and amplifies the hum by about 20 dB. The amplified signal, issued at the pin #4, flows through the resistor R342 and the diodes D304 and D305 where it is rectified to a DC voltage (approx. 3 ~ 6 V). This signal "H" is inverted by the IC302 (pin #5 → pin #6), thus a signal "L" (approx. 0 ~ 0.5 V) is obtained.

2. This signal cuts off the transistor Q305 (2SC945L), thereby turning off the T-Locked indicator (LED #2). At the same time, the transistor Q306 is also cut off by this signal, so that the transistor Q307 connected to the source of the Q306 is also cut off. The transistors Q308 and Q307 are functioning as a differential amplifier. The reference signal from the IC101 (HA11225) pin #10 is obtained at the collector of Q309, and this reference signal is fed back to the front end as the AFC signal. However, this signal cannot affect the local oscillation frequency. This means that the locked state has been released.

NOTE: When the FM signal is very weak, or when detuning, the mute output from IC101 pin #12 activates the Schmidt trigger circuit (IC302 pins #8, 9, 10, 11 and 1 meg. ohm) and releases the T-Lock. This signal passes through the diodes D302 and D311, in which it is also used as the muting signal.

(b) Locking

1. Upon releasing a finger from the tuning knob, the input voltage applied to the IC302 pin #3 becomes zero, and the transistors Q305 and Q306 are turned on. The Q305 causes the T-Locked indicator (LED #2) to illuminate, and the Q306 allows the AFC signal issued from the IC101 #7 pin to be applied to the base of the transistor Q307. As has been mentioned in the paragraph (a) above, the transistors Q308 and Q307 function as a differential amplifier, and the AFC signal is applied to the base of Q307, while the reference signal is applied to the base of Q308. Difference between these two signals is obtained at the collector of Q309, and it is fed back to the front end for controlling the local oscillation frequency in such a manner that the difference between the reference signal and AFC signal can be minimized. As a result, a stabilized state, that is, the locked state is achieved. In actual receiver operation however, the LED #2 will not illuminate immediately after releasing finger from the tuning knob: it will illuminate after a certain period of delay. This because a time constant circuit consisting of a capacitor C328 and a resistor R339 is adopted in the circuit.

ADDITIONAL DESCRIPTION ON CIRCUIT

Please refer to page 3 on Block Diagram and page 14 on Schematic Diagram. The electric circuit of this unit consists of four PCB (Printed Circuit Board), a power transformer, various switches and so on. The main PCB are altogether, which are respectively called Tuner-EQ (Equalizer) PCB, Main Amp. PCB and REG (Regulator) PCB. The following are the outline of each PCB assembly.

Tuner-EQ PCB

This PCB incorporates the following circuit block, which are FM Front End, FM IF Block, FM MPX (Multiplex) Block, T-Locked System Block, Muting Control Block, Muting Circuit Block, AM Tuner Block and Phono EQ Block.

1. FM Front End

Using three staged variable capacitor, with 300 ohms Balanced Type and 75 ohms Unbalanced Type antenna inputs.

The top stage RF Amplifier incorporates high PG (Power Gain) and low NF (Noise Figure) FET. The clapp oscillator assures stable local oscillation. The resonance circuit of the local oscillator incorporates the varicap diode which enables to change the oscillation frequency by the AFC signal controlled by T-Locked System.

2. FM IF Block

It incorporates two transistors, one IC and two ceramic filters. The IC (HA11225) performs amplification, limitting, quadrature FM demodulation, muting level detection and operation of Tuning and Signal meters.

3. FM MPX Block

It incorporates one transistor and one IC. The transistor (Q301) suppresses the subsonic noise when de-tuned. The IC (TA7624P) is PLL (Phase Locked Loop) MPX IC. Which assures the high S/N and low distortion, incorporating PLL VCO Circuit, MPX Demodulator, Pilot Auto-cancel Circuit, Stereo/Monaural Automatic Switch Circuit, Stereo Lamp Driver, two Post Amplifiers and Stabilized Power Supply Circuit. It this block, the input signal is once demodulated to stereo and output from the IC, which is then input to the post amplifier of the same IC through the De-emphasis Circuit and Muting Circuit Block.

4. T-Locked System

Refer to Circuit Description on page 4.

5. Muting Control, Muting Circuit

The Muting Control Block consist of a C-MOS Digital IC (μPD4069C) which incorporates 6 inverters and CR parts. The main feature of this Block is the two Schmidt Trigger Circuits consisting of two inverters, which function is to switch on and off the transistor of the Muting circuit Block mentioned hereafter.

The Muting Circuit Block consists of three transistors and CR parts, of which two transistors (Q303, 304) short the demodulator output of FM MPX Block and ground to perform muting. The other transistor (Q302) shorts the operation signal of Q303 and 304 and ground so as muting is not performed when the switch is set ON. When the FM antenna input becomes weaker than a certain level, the FM IF Block outputs muting signal. This signal triggers one Schmidt Trigger Circuit, which output switches Q303 and 304 on to perform muting. This Schmidt Trigger Circuit output is also connected to the IC of FM IF Block. So muting is performed on the IC output as well. However, when the Selector Switch is set on FM MONO, muting is not performed since Q302 is set ON. Thus FM is still heard when the input signal is weak. The input of the other Schmidt Trigger Circuit is connected the Selector. When the Selector is set at AM, PHONO or AUX, the power supply is connected to the Schmidt Trigger Circuit through Selector, and makes Q303 and 304 on to perform muting over the FM output. When the Selector is set to FM AUTO instead of AM or FM MONO instead of PHONO, the output of the Schmidt Trigger Circuit is set off after certain interval which is determined by the value of the capacitor (C330) and the resister (R349) connected to its input. Therefore, muting is cancelled from the FM output a little after the Selector is switched. In the reverse operation of the Selector, the FM output immediately receives muting operation since there is little interval and AM or PHONO signal appears in the output stage. These circuits all function in order to eliminate the noise caused by switching the Selector.

6. AM Tuner Block

It incorporates two staged variable capacitor, one IC and one dual elements ceramic filter. The IC (IC201, HA1197) incorporates RF Amplifier, Converter, IF Amplifier, Detector and AGC Circuit.

7. Phono EQ Block

This is a two stage direct coupling amplifier, incorporating two transistors each in both channels. Carefully selected CR parts assures minimum deviation for the RIAA curve.

Main Amp PCB

This PCB consists of Power Amplifier and Tone Control Circuit. The Power amplifier has direct coupled pure complementary OCL circuit which incorporates the differential amplifier at the top stage. The dual transistor differential amplifier of the top stage amplifies the input signal and stabilizes the center voltage of the power stage. The next stage constructs Darlington Circuit with Q703 and Q707 (Q704, 708 = R ch.), functioning as a pre-driver and Q705 gives bias to the power stage. The semifixed resistor which is connected to the base determines the idling current. This transistor (Q705) which is thermally connected to the heat sink of the power transistor, also stabilizes the circuit operation. The final stage is the Darlington Pure Complementary OCL Circuit incorporating a mold package power transistor. Tone Control Circuit is incorporated in the Negative Feedback Circuit of the power amplifier and it aquires turn-over and roll-off characteristics respectively in high and low range by varying the negative feedback values of each range by BASS and TREBLE Controls.

REG PCB

This PCB consists of Rectifier Circuit and its regulation Circuit. The Rectifier Circuit is a bridge type full-wave rectifier circuit and provides direct current of "+" and "—" to the ground. The transistor Q801 and 803 are constant voltage power supply circuit and function also as a ripple filter. The Q802 is ripple filter.

Antenna Circuit

The coil (L201) and the capacitor (C119) are incorporated within the antenna circuit in order to utilize the signal which is caught by the FM antenna during AM reception. AM signal goes through AM Tuner because the impedance of capacitor is big while the impedance of coil is small. In FM, on the contrary the capacitor's impedance is small whereas the coil's impedance is big, which renders the FM signal go through the Front End. FM antenna, therefore, can be used for AM reception without giving interference to the FM reception.

DISASSEMBLY

1. SIDE WOODS REMOVAL
   a. Remove six screws from both sides of the wooden covers.

2. METAL COVER REMOVAL
   a. Remove wooden covers from both sides.
   b. Remove six tapping screws from the top of the metal cover.

3. BOTTOM PLATE REMOVAL
   a. Remove wooden covers from both sides.
   b. Remove thirteen tapping screws (# 1 ~ # 13) (Photo 1) from the bottom of the unit.

4. FRONT PANEL REMOVAL
   a. Remove wooden covers and the metal cover.
   b. Remove two tapping screws (#1 and #2) shown in Photo 2 and three tapping screws (#14 ~ #16) shown in Photo 1.
   c. Lift the front panel away from the unit.

5. PANEL WINDOW & SUB PANEL REMOVAL
   a. Remove the front panel.
   b. Remove six knobs (SPEAKERS, BASS, TREBLE, VOLUME, BALANCE, SELECTOR) from the front of the unit by pulling them forward.
   c. Remove four tapping screws (#1 ~ #4) shown in Photo 3.

6. REFLEX PLATE REMOVAL
   a. Remove four lamps in accordance with Photo 4.
   b. Remove two screws (#1 and #2) shown in Photo 4.

7. LED PC BOARD REMOVAL
   a. Push the center of push rivet (#1 and #2) (Photo 5) by small screw driver as shown Fig. 2.
   b. Pull the push rivet forward. LED PC board is now free to be pulled off.

8. METERS REMOVAL
   a. Remove two clamp springs (#3 and #4) and pull two meters (SIGNAL and TUNING) backward shown in Photo 5.

9. DIAL SCALE REMOVAL
   a. Remove the reflex plate, LED PC board and two meters.
   b. Remove four tapping screws (#5 ~ #8) shown in Photo 3.

10. POWER TRANSFORMER (WITH BRACKET AND FUSE) REMOVAL
    a. Disconnect all the power transformer cables.
    b. Remove three tapping screws (#5 ~ #7) (Photo 5) from the back plate.
    c. Remove two tapping screws (#8 and #9) (Photo 5) from the side angle.
    d. Lift the power transformer away from the unit.

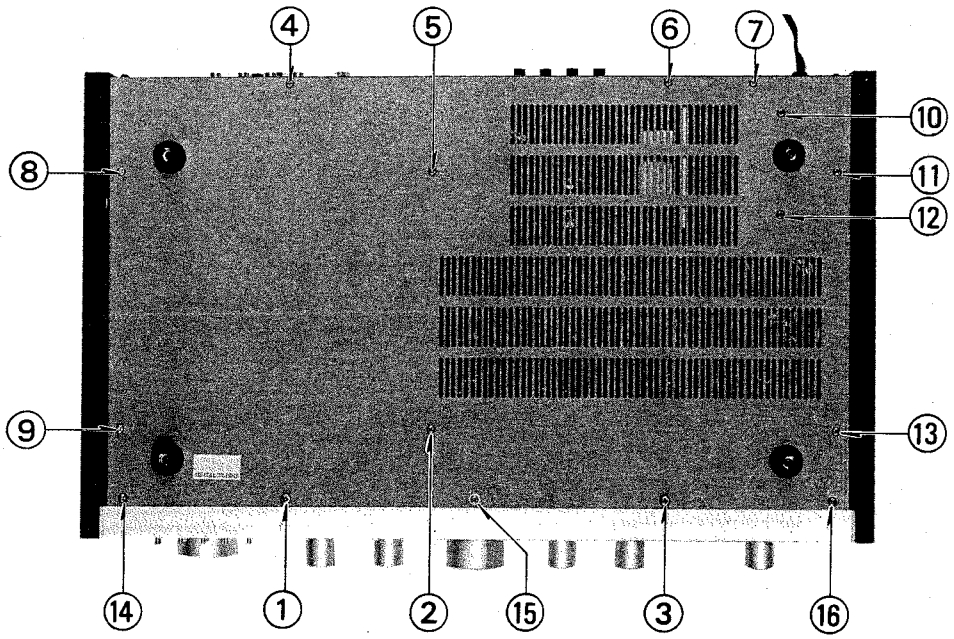


Photo 1

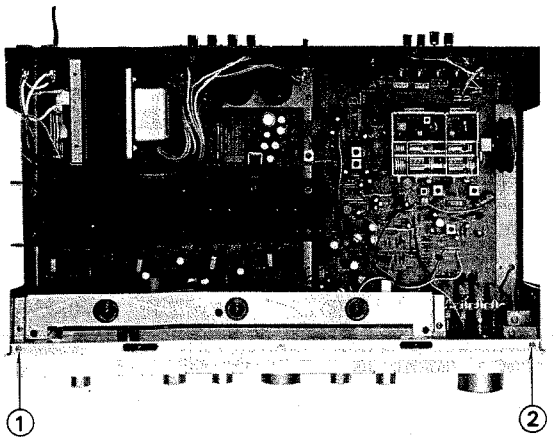


Photo 2

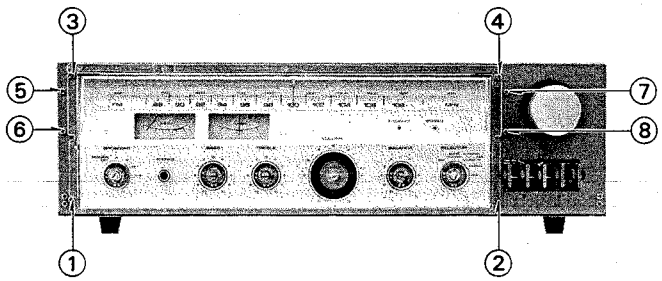


Photo 3

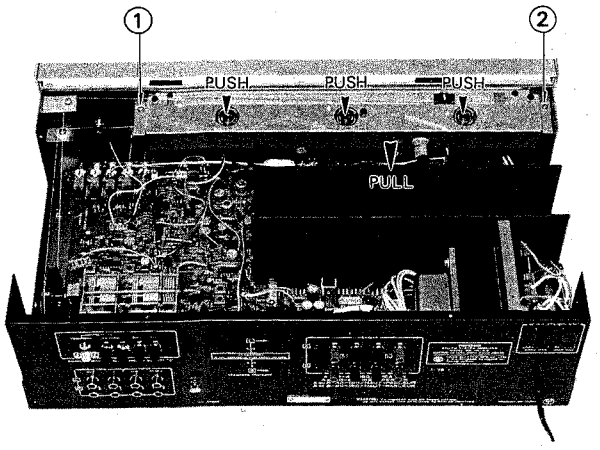


Photo 4

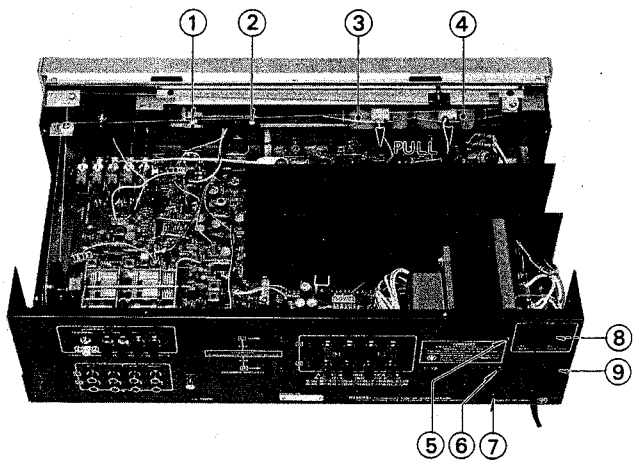


Photo 5

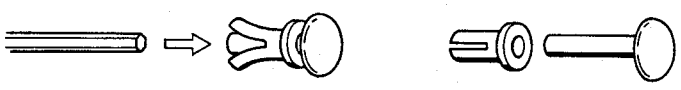


Figure 2 PUSH RIVET

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

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

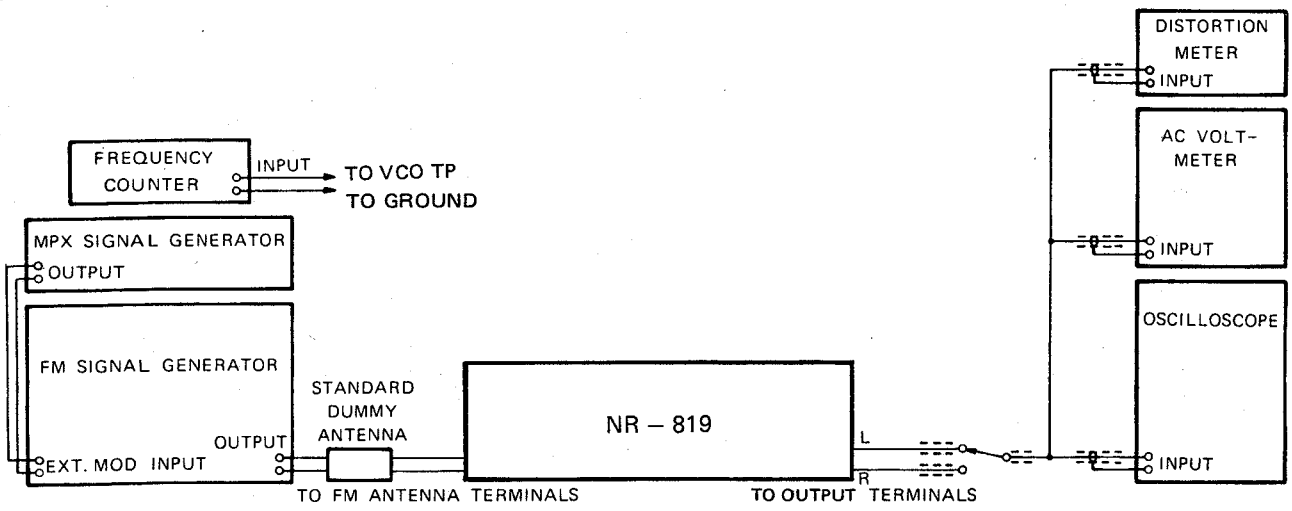


Figure 3. Test Equipment Hook-up

FM IF Alignment

STEP	FM SG FREQUENCY/ CALIBLATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE RECEIVER	DIAL POINTER POSITION	ADJUST-MENT POINT	PROCEDURE	REMARKS
1			A. POWER to "ON". B. SELECTOR to "FM MONO".			Temporarily connect the wiring terminal #18 of the Tuner EQ PCB and the wiring terminal #2 of the REG PCB by clip lead.	This is to prevent operation of T-Locked System.
2				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 Adjustment point
TUNER EQ PCB
(Top view)

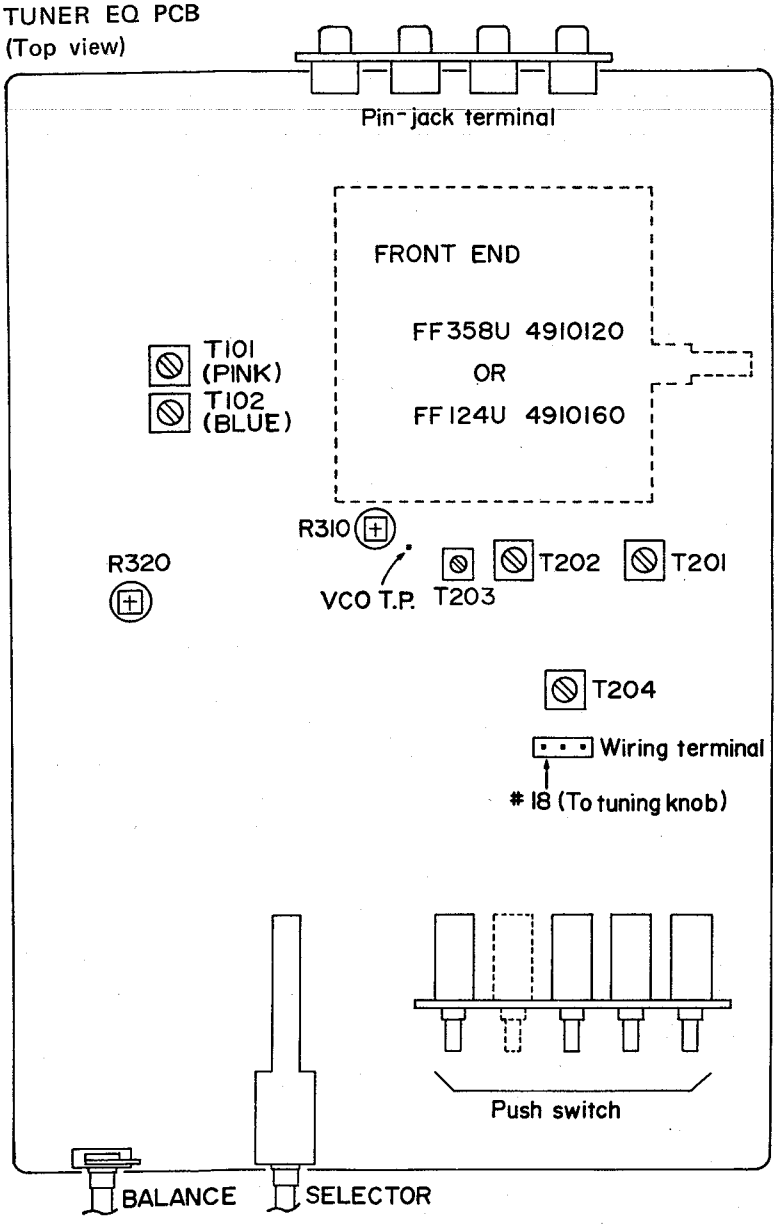


Figure 5-a
FRONT END FF358U P#4910120

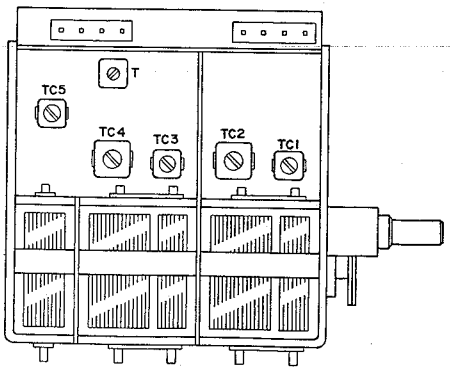
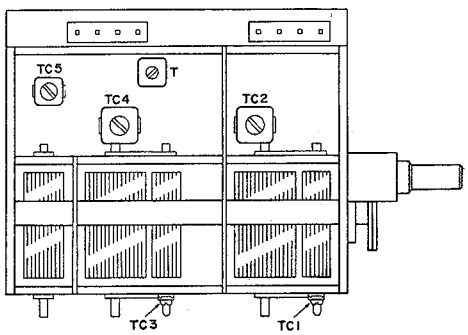


Figure 5-b
FRONT END FF124U P#4910160



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/ CALIBLATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE TUNER	DIAL POINTER POSITION	ADJUST-EMNT POINT	PROCEDURE	REMARKS
1			A. POWER to "ON". B. SELECTOR to "FM MONO".			Temporarily connect the wiring terminal #18 of the Tuner EQ PCB and the wiring terminal #2 of the REG PCB by clip lead.	This is to prevent operation of T-Locked System.
	108 MHz/10 dBμ	400 Hz/mono [±75 KHz]		108 MHz	TC5 (Figure 5)	Adjust for maximum AC Voltmeter deflection and for mid-scale tuning meter indication.	
3	87.4 MHz ±500 KHz/10 dBμ			Low frequency end of the Dial Scale.		Make sure that FM SG signal can be received at this dial pointer position. (Change the FM SG frequency and confirm that it indicates 87.4 MHz ±500 KHz when the signal is received.)	Do not move the Dial pointer.
4	108 MHz/ Attenuate for response with 3% distortion.			108 MHz	TC1 TC3 (Figure 5)	Adjust for maximum output.	
5						Remove the clip lead which was temporarily connected in the step 1.	

Table 1 – 2

FM MPX Alignment

STEP	FM SG FREQUENCY/ CALIBLATION	MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE TUNER	DIAL POINTER POSITION	ADJUST-MENT POINT	PROCEDURE	REMARKS
1	98 MHz/60 dBμ	(Unmodulated carrier)	A. POWER to "ON" B. SELECTOR to "FM AUTO"	98 MHz (Set so that tuning meter indicates mid-scale)	R310 (Figure 4)	Adjust for 76 ± 0.2 kHz.	Both the separations (both the outputs of right and left channel) should be equal.
2		1000 Hz/stereo [main (L) & sub (L): ±67.5 kHz/ pilot signal: ±7.5 kHz]			R320 (Figure 4)	Adjust for maximum separation (or minimum output of right channel).	
3		1000 Hz/stereo [main (R) & sub (–R): ±67.5 kHz/ pilot signal: ±7.5 kHz]				Adjust for maximum separation (or minimum output of left channel).	

Table 1 – 3

AM SECTION

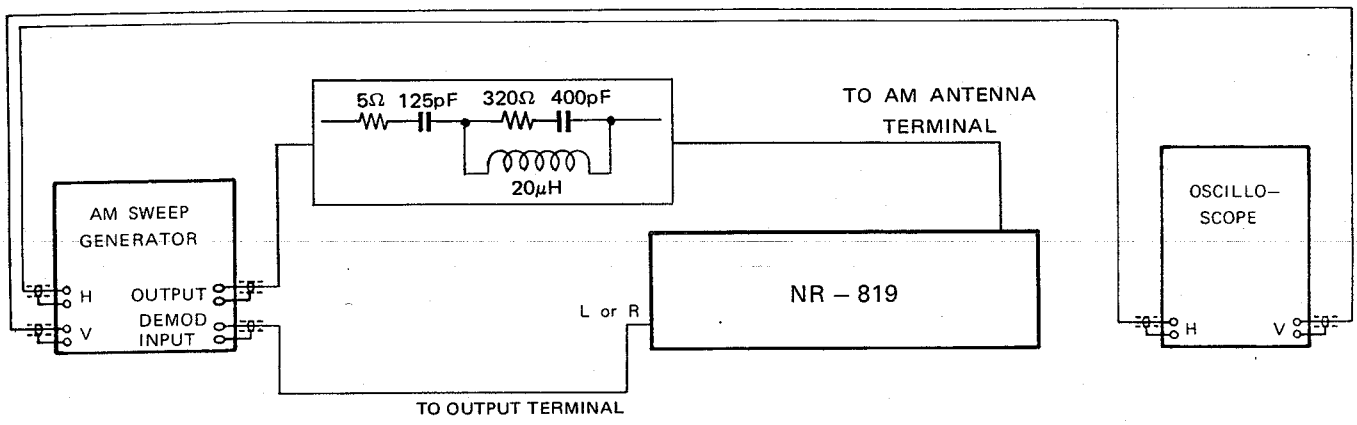


Figure 6. Test Equipment Hook-up

AM IF Alignment

STEP	AM SG FREQUENCY/ CALIBLATION		MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE TUNER	DIAL POINTER POSITION	ADJUST FOR MAX. SCOPE INDICATION	REMARKS
1	50 dBμ	Set AM SG IF/ RF switch to "IF" position.	(Unmodulated carrier)	A. POWER to "ON" B. SELECTOR to "AM"	High frequency end of the dial scale.	T203 (Figure 4, 7)	Repeat steps 1 and 2 until response curve on oscilloscope indicates maximum waveform.
2						T204 (Figure 4, 7)	

Table 2 – 1

AM Frequency Covorage and AM Tracking Alignment

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

STEP	AM SG FREQUENCY/ CALIBLATION		MODULATING FREQUENCY/ DEVIATION	SWITCHES OF THE TUNER	DIAL POINTER POSITION	ADJUST FOR MAX. SCOPE INDICATION	REMARKS
1	520 kHz/ 50 dBμ	Set AM SG IF/ RF switch to RF position.	400 Hz/30%	A. POWER to "ON" B. SELECTOR to "AM"	Low frequency end of the dial scale.	T202 (Figure 4, 8)	Repeat steps 1 and 2 several times.
2	1650kHz/ 50 dBμ				High frequency end of the dial scale.	TC4 (Figure 4, 8)	
3	600 kHz/ 50 dBμ				600 kHz	TC2 (Figure 4)	
4	1400kHz/ 50 dBμ				1400 kHz	T201 (Figure 4)	

Table 2 – 2

PARTS LOCATION

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

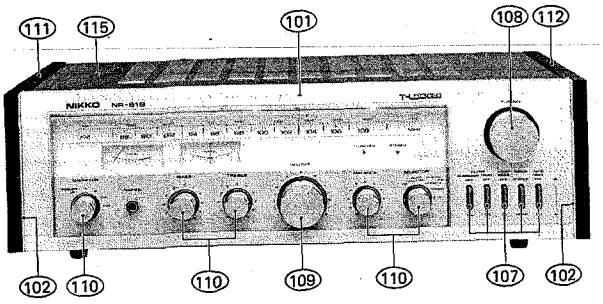


Photo 6

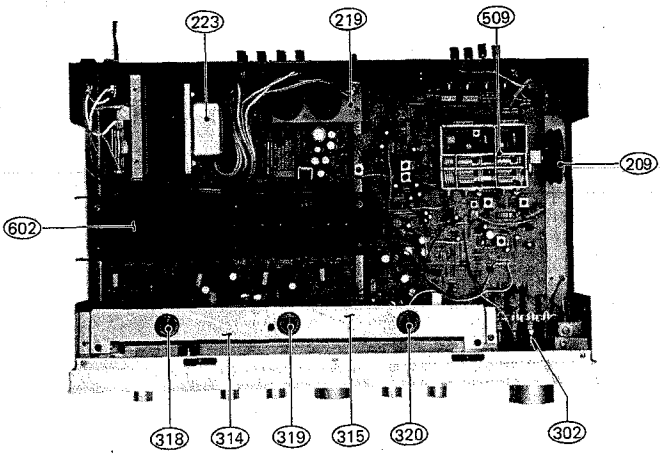


Photo 9

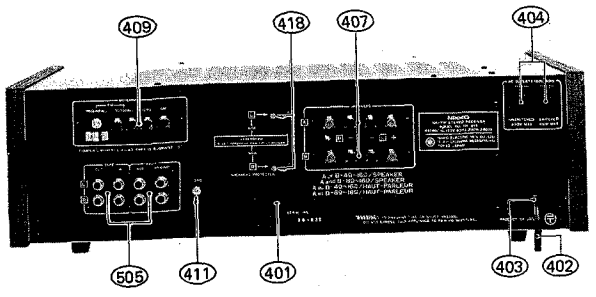


Photo 7

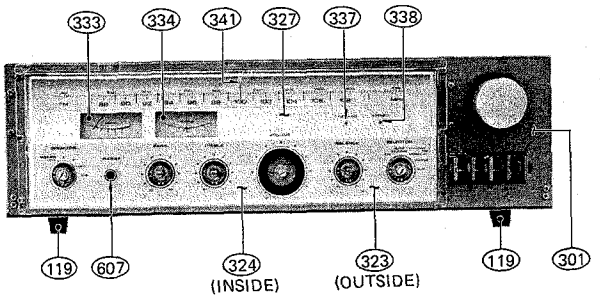


Photo 10

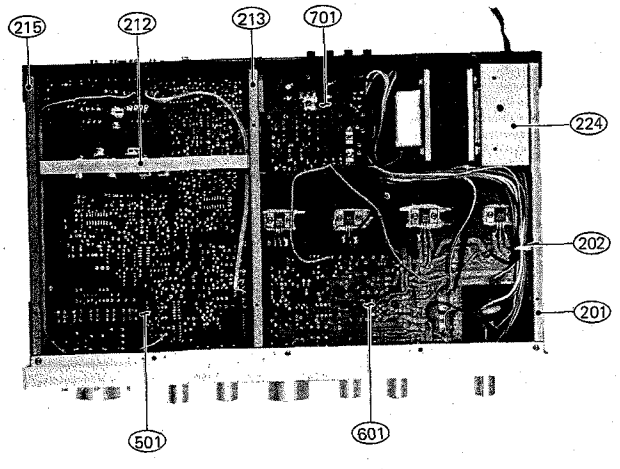


Photo 8

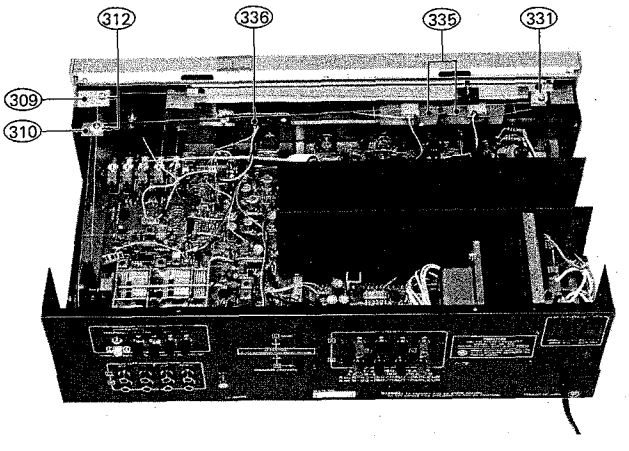


Photo 11

PARTS LIST

NOTES:

1. ★ The KEY NUMBER (#) marked with a (★) on parts list relate to number of three digits with a (◯). (Photo 6 ~ 11)
2. + Numberals 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 : Aluminium electrolytic capacitor
   M-CAP : Polyester film capacitor
   S-CAP : Polystyrene film capacitor
   T-CAP : Tantalum electrolytic capacitor
   BP-CAP : Bipolar electrolytic
   LC-CAP : Low current leakage electrolytic capacitor.
4. Assemblies and parts are subject to charge 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+ WEND	DESCRIPTION++	PART NO.
			PACKING MATERIALS & ACCESSORIES	
001		1111	Carton box	9825510
002		2222	Pad	9840800
003		1111	Sack, polyethylen cloth	9640600
004		1111	Cloth, polishing	9690040
005		111–	Sack, polyethylen cloth – #13	9640320
006		———1	Envelope – G	9690170
007a		1———	Manual, instruction – E	960270E
007b		1———	Manual, instruction – F, CANADA only	960293F
007c		–11–	Manual, instruction – K	960271K
007d		———1	Manual, instruction – G	960288G
008		1———	List, service stations	9690180
009a		1———	Card, warranty	967007A
009b		1———	Card, warranty – CANADA only	967028E
010		1———	Post card	967008A
011		1111	Drier – Silica gel	9690010
012		1111	Antenna, FM – Q-MATCH	4581360
			CABINET ASSEMBLY	
★101		1111	Panel, front	7884380
★102		2222	Panel, both sides	7870370
103		2222	Guide – P1320BK, for push buttons	7401670
104		1111	Guide – P3320BK, for push buttons	7401680
105		2222	Spacer, panel – P630	7401660
106		5555	Screw – PTS 3φx6	814306S
★107		5555	Button, push – P320GL – subsonic/ hi-filter/loudness/mode/tape monitor	7852020
★108		1111	Knob – 19SL-42R – tuning	7841230
★109		1111	Knob – 19SL-38DR – volume	7841240
★110		5555	Knob – 19SL-19DR – others	7841250
★111a		111–	Side wood – L	7831470
★112a		111–	Side wood – R	7831480
★111b		———1	Side wood – L, black	7831530
★112b		———1	Side wood – R, black	7831540
113		8888	Screw – TFTS 4φx16	887416W
114		8888	Washer – 5φ	893105W
★115a		111–	Cover, metal	7820920
★115b		———1	Cover, metal, black	7820980
116		4444	Screw – PTS 3φx6	814306W
117		2222	Screw – PTS 3φx8	814308W
118		1111	Plate, bottom	7325420
★119		4444	Foot, polyethylen	7901170
120		4444	Screw – PTS WH3φx6	7121130
121		11111111	Screw – PTS 3φx6	814306S

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION++	PART NO.
			CHASSIS ASSEMBLY	
★201		3333	Angle	7226790
★202		1111	Clip, wire	7401340
203		1111	(FRONT PLATE ASSEMBLY)	
204		6666	Screw – PTS 3φx6	814306S
205		1111	(BACK PLATE ASSEMBLY)	
206		6666	Screw – PTS 3φx6	814306S
207		1111	(TUNER-EQ PCB ASSEMBLY)	
208		4444	Screw – PTS 3φx6	814306S
★209		1111	Dial drum – 50φ	7401020
210		1111	Spring, dial drum – (J)	7440290
211		1111	Cord, dial	4581870
★212		1111	Angle, for variable capacitor	7032690
★213		1111	Bracket, for PCB	7032310
214		5555	Screw – PTS 3φx6	814306S
★215		1111	Bracket, for PCB – R	7226870
216		1111	(MAIN AMP PCB ASSEMBLY)	
217		4444	Screw – PTS 3φx6	814306S
218		1111	(REGULATOR PCB ASSEMBLY)	
★219		1111	Holder, for regulator PCB	7032470
220		3333	Screw – PTS 3φx6	814306S
221		1111	Washer – TW(I) 3φ	893403U
222		1111	Lug, ground – 4P WP	4400100
★223a		1———	Transformer, power – T-1-341 – 120V only	1103410
★223b		–111	Transformer, power – T-1-342 – 220/240V class II	1103420
★224		1111	Holder, power transformer	7226800
225		4444	Washer – IN 4φ	892014S
226		4444	Washer – TW(I) 4φ	893404U
227		2222	Screw – PTS 3φx6	814306S
228a		1———	Fuse – 4A 250V MGC	4700550
229a		1———	Holder, fuse – 1P	4581840
230		1———	Screw – PTS 3φx8	814308S
228b		–111	Midget fuse – (S) 2AT 250V	4720370
229b		–111	Holder, midget fuse – 1P	4581430
231		–111	Screw – PTS 3φx6	814306S
232		1111	Tye, nylon	7401880
			FRONT PLATE ASSEMBLY	
★301		1111	Plate, front	7325410
★302		1111	Dial shaft, with fly wheel	7152410
303		1111	Holder, dial shaft	7401700
304		3333	Screw – PTS 3φx6	814306S

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 that order.)

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION ++	PART NO.
305		1111	Washer – SN 9φ	892249S
306		1111	Washer – TW(I) 9φ	893409U
307		1111	Washer – 9φ	893109S
308		1111	Lug – 9S	7032320
★309		1111	Bracket, pulley – (T)	7032440
★310		1111	Bracket, pulley – (B)	7032450
311		2222	Screw – PTS 3φx6	814306S
★312		2222	Pulley – 9φ	7400790
313		2222	Shaft, pulley – 4L	7120980
★314		1111	Reflex plate	7870330
★315		1111	Holder, reflex plate	7227010
316		3333	Rivet, push – 3φx6.5	7401850
317		2222	Screw – PTS 3φx6	814306S
★318		2222	Lamp – 8V 0.3A 200L	5808140
★319		1111	Lamp – 8V 0.3A 300L	5808120
★320		1111	Lamp – 8V 0.3A 400L	5808150
321		2222	Tye, nylon	7401880
322		1111	Spacer, panel window	7870390
★323		1111	Window, panel	7870390
★324		1111	Panel, sub	7802390
325		4444	Screw – BLTS 3φx6	874306S
326		2222	Cushion, sub panel	7002140
★327a		1–––	Dial scale (OLD)	7802400
★327b		1111	Dial scale (NEW)	7802450

CAUTION: Dial scale and Front End are related to each other. Each production lot has different Front End for this model. The units of the following serial numbers incorporate the old type Front End, FF358U and also the old type Dial Scale.

Serial # D8910001 – – D8913000

Serial # A8913001 – – A8913700

The rest of the units all have the new type Front End, FF124U and the new type Dial Scale. Pay good attention when changing parts.

328		1111	Holder, dial scale	7226880
329		2222	Rivet, push – 3φx3.5	7401190
330		4444	Screw – PTS 3φx6	814306S
★331		1111	Pulley – 9φ	7400790
332		1111	Shaft, pulley – 4L	7120980
★333		1111	Meter, signal	4582490
★334		1111	Meter, tuning	4582500
★335		2222	Clamp spring, for meter	7440410
★336		1111	(LED PCB SUB ASSEMBLY)	
337		1111	LED GL-2PG1 – green – T-Lock indicator	5060080
338		1111	LED GL-2AR1 – red – STEREO indicator	5060090
339		2222	Spacer, LED	7903140
340		2222	Rivet, push – 3φx4.5	7401240
★341		1111	Needle – dial pointer	7050510
342		1111	Slider, needle	7401630
343a	S1	1–––	Switch, rotary – SR26FN 2-4-5 20KC TV-5 – power/speaker	4051230
343b	S1	–111	Switch, rotary – SRY2054 class II – power/speaker	4051250
344a	C1	1–––	C-CAP 0.0047uf AC125V	239472C
344b	C1,C2	–222	C-CAP 0.0047uf AC250V	239472E
345	R2,R3	2222	MO-RES 10ohm 5% 2W	362100F
			BACK PLATE ASSEMBLY	
★401a		1–––	Plate, back – W	7325430
★401b		–111	Plate, back – E	7325520
★402a		1–––	Plug/Cord – DP-70	606007A
★402b		–111	Plug/Cord – CEE-2T	600510A
★403a		1–––	Stopper, cord – SR-3P-4	7400620
★403b		–111	Stopper, cord – SR-4N-4	7400690
★404		2–––	Socket, AC outlet	4500150
405	R1	1–––	RES 2.2 meg. ohm 5% ½W	325225K
406		1–––	Lug, ground	4400000
★407		2222	Terminal, speaker – screw type – HB	4450470
408		4444	Screw – PTS 3φx8	814308W
★409a		111–	Terminal, antenna	4450520
★409b		———1	Terminal, antenna	4450560
410		2222	Screw – PMS 3φx6	810306W
★411		1111	Nut, GND terminal	4400050
412		1111	Screw – PMS 3φx12	810312S
413		1111	Washer – IN 3φ	892013S
414		2222	Washer – TW(I) 3φ	893403U
415		1111	Lug, ground	4400000
416		–111	Connector, DIN type 5P	4530220
417		–222	Screw – PTS 3φx6	814306S
★418		2–––	Circuit breaker – NW-2S(N) 4.0A	4900880
419		1–––	Bracket, circuit breaker	7032480
			TUNER-EQUALIZER PC BOARD ASSEMBLY	
★501a		1–––	TUNER-EQ PCB ASSEMBLY – FM de-emphasis 75us	9460090
★501b		–11–	TUNER-EQ PCB ASSEMBLY – FM de-emphasis 50us	9460100
★501c		———1	TUNER-EQ PCB ASSEMBLY – D-type only	9460150
502	S1	1111	Switch, rotary slide – SRZ-W45 – selector	4055170
503	S2~S6	1111	Switch, penta push – tape monitor/mode/ loudness/subsonic/hi-filter	4041060
504	R511	1111	VR VM10E093C – 250kohm – balance	4310560
505		2222	Terminal, RCA phono pin jack –2Px2	4444070
506		1111	Flat cable – 9-60	606212E
507		3333	Lug, ground	4400000
508		1111	Screw – PMS 3φx6	810306W
★509a		1111	Front end – FF124U	4910160
★509b		1–––	Front end – FF358U	4910120

CAUTION: Dial scale and Front End are related to each other. Each production lot has different Front End for this model. The units of the following serial numbers incorporate the old type Front End, FF358U and also the old type Dial Scale.

Serial # D8910001 – – D8913000

Serial # A8913001 – – A8913700

The rest of the units all have the new type Front End, FF124U and the new type Dial Scale. Pay good attention when changing parts.

			(FM IF SECTION)	
	T101	1111	Transformer, FM descriminator – (1)	1240340
	T102	1111	Transformer, FM descriminator – (2)	1240350
	L101	1111	Inductor – 22uh	1210930
	L102	1111	Inductor – 2.2uh	1210860
	CF101,102	222–	Celamic filter – CFM-107S-12H	128053A
	CF101	———1	Celamic filter – CFM-107S-12C	128056A

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 that order.)

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION ++	PART NO.
	CF102,103	---2	Celamic filter – CFM-107M-12C	128057A
	IC101	1111	IC HA11225	518070S
	Q101,102	2222	TR 2SC1675 (L or M)	515082S
	D101	1111	Diode 1SS53	501023S
	C101 ~ C107	7776	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C108	1111	C-CAP 100pf 10% 50V SL	232101K
	C109	1111	E-CAP 4.7uf 25V	211315Q
	C110 ~ C115	6666	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C116	1111	E-CAP 10uf 16V	211220Q
	C117	1111	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C118	1111	E-CAP 1uf 50V	211510Q
	C119	1111	C-CAP 220pf 10% 50V SL	232221K
	C120	1111	E-CAP 10uf 16V	211220Q
	C121 ~ C124	4444	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	R101	1111	RES 33ohm 5% ¼W	328330J
	R102,103	2222	RES 330ohm 5% ¼W	328331J
	R104		– DELETED –	
	R105	1111	RES 330ohm 5% ¼W	328331J
	R106,107	2222	RES 5.6kohm 5% ¼W	328562J
	R108	1111	RES 470ohm 5% ¼W	328471J
	R109	1111	RES 47kohm 5% ¼W	328473J
	R110	1111	RES 10kohm 5% ¼W	328103J
	R111		– DELETED –	
	R112	1111	RES 15kohm 5% ¼W	328153J
	R113	1111	RES 2.2kohm 5% ¼W	328222J
	R114	1111	RES 220ohm 5% ¼W	328221J
	R115	1111	RES 12kohm 5% ¼W	328123J
	R116	1111	RES 18kohm 5% ¼W	328183J
	R117	1111	RES 4.7kohm 5% ¼W	328472J
			(MPX SECTION)	
	L301,302	2222	Inductor – 39mh	1260130
	IC301	1111	IC TA-7624P (Y or G or W)	518071S
	IC302	1111	IC uPD4069C	518072S
	Q301 ~ Q305	5555	TR 2SC945L (P or Q)	515077S
	Q306	1111	FET 2SK104 (F)	516026S
	Q307,308	2222	TR 2SC945L (P or Q)	515077S
	Q309	1111	TR 2SA733 (P or Q)	514074S
	D301 ~ D313	1313131313	Diode 1SS53	501023S
	ZD301	1111	Zener diode RD2.2EC	502056S
	ZD302	1111	Zener diode RD6.2EB1	502048S
	C301,302	2222	E-CAP 0.47uf 50V	211505Q
	C303,304	2222	E-CAP 10uf 16V	211220Q
	C305,306	2---	M-CAP 0.027uf 5% 50V	222273J
	C305,306	–222	M-CAP 0.018uf 5% 50V	222183J
	C307	1111	M-CAP 0.0047uf 5% 50V	222472J
	C308	1111	E-CAP 10uf 16V	211220Q
	C309,310	2222	E-CAP 1uf 50V	211510Q
	C311,312	2222	S-CAP 470pf 5% 50V	223471J
	C313,314	2222	M-CAP 0.001uf 5% 50V	222102J
	C315,316	2222	E-CAP 1uf 50V	211510Q
	C317	1111	S-CAP 470pf 5% 50V	223471J
	C318	1111	M-CAP 0.01uf 5% 50V	222103J
	C319	1111	M-CAP 0.033uf 5% 50V	222333J
	C320	1111	E-CAP 4.7uf 25V	211315Q
	C321	1111	LC-CAP 0.47uf 50V	211505L
	C322	1111	E-CAP 10uf 16V	211220Q

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION ++	PART NO.
	C323	1111	LC-CAP 0.47uf 50V	211505L
	C324,325	2222	M-CAP 0.001uf 5% 50V	222102J
	C326	1111	E-CAP 10uf 16V	211220Q
	C327	1111	M-CAP 0.047uf 10% 50V	222473K
	C328	1111	E-CAP 0.47uf 50V	211505Q
	C329	1111	C-CAP 0.001uf +80, –20% 50V YG	231102Z
	C330	1111	E-CAP 0.47uf 50V	211505Q
	C331	1111	M-CAP 0.01uf 5% 50V	222103J
	C332	1111	LC-CAP 1uf 50V	211510L
	C333	1111	E-CAP 3.3uf 35V	211413Q
	C334	1111	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C335,336	2222	E-CAP 220uf 16V	211332Q
	R310	1111	Potentiometer – SR19R B10kohm	4300510
	R320	1111	Potentiometer – SR19R B22kohm	4301170
	R301	1111	RES 82kohm 5% ¼W	328823J
	R302	1111	RES 330kohm 5% ¼W	328334J
	R303	1111	RES 5.6kohm 5% ¼W	328562J
			NOTE: R304 is related to the rank of IC301 (TA-7624P). (See schematic diagram.)	
	R304	1111	RES 220kohm 5% ¼W	328224J
	R304	1111	RES 330kohm 5% ¼W	328334J
	R304	1111	RES 680kohm 5% ¼W	328684J
	R305,306	2222	RES 3.3kohm 5% ¼W	328332J
	R307		– DELETED –	
	R308	1111	RES 100kohm 5% ¼W	328104J
	R309	1111	RES 47kohm 5% ¼W	328473J
	R310		(Potentiometer)	
	R311	1111	RES 18kohm 5% ¼W	328183J
	R312	1111	RES 12kohm 5% ¼W	328123J
	R313	1111	RES 6.8kohm 5% ¼W	328682J
	R314	1111	RES 2.2kohm 5% ¼W	328222J
	R315	1111	RES 3.3kohm 5% ¼W	328332J
	R316	1111	RES 1.5kohm 5% ¼W	328152J
	R317,318	2222	RES 47kohm 5% ¼W	328473J
	R319	1111	RES 10kohm 5% ¼W	328103J
	R320		(Potentiometer)	
	R321	1111	RES 470ohm 5% ¼W	328471J
	R322	1111	RES 2.2kohm 5% ¼W	328222J
	R323	1111	RES 3.3kohm 5% ¼W	328332J
	R324,325	1111	RES 15kohm 5% ¼W	328153J
	R326,327	1111	RES 4.7kohm 5% ¼W	328472J
	R328	1111	RES 10kohm 5% ¼W	328103J
	R329	1111	RES 22kohm 5% ¼W	328223J
	R330	1111	RES 100kohm 5% ¼W	328104J
	R331	1111	RES 470ohm 5% ¼W	328471J
	R332	1111	RES 2.2kohm 5% ¼W	328222J
	R333,334	2222	RES 10kohm 5% ¼W	328103J
	R335,336	2222	RES 100kohm 5% ¼W	328104J
	R337	1111	RES 1 meg. ohm 5% ¼W	328105J
	R338	1111	RES 10kohm 5% ¼W	328103J
	R339	1111	RES 2.2meg. ohm 5% ¼W	328225J
	R340	1111	RES 1kohm 5% ¼W	328102J
	R341	1111	RES 100kohm 5% ¼W	328104J
	R342	1111	RES 1kohm 5% ¼W	328102J
	R343	1111	RES 10meg. ohm 5% ¼W	328106J
	R344	1111	RES 1 meg. ohm 5% ¼W	328105J
	R345	1111	RES 22kohm 5% ¼W	328223J
	R346	1111	RES 1 meg. ohm 5% ¼W	328105J
	R347	1111	RES 10kohm 5% ¼W	328103J
	R348,349	2222	RES 2.2meg. ohm 5% ¼W	328225J
	R350,351	2222	RES 1kohm 5% ¼W	328102J
	R352	1111	RES 1.5kohm 5% ¼W	328152J
	R353	1111	RES 330kohm 5% ¼W	328334J
	R354,355	2222	RES 8.2kohm 5% ¼W	328822J
	R356	1111	RES 33kohm 5% ¼W	328333J
	R357	1111	RES 1.2kohm 5% ¼W	328122J
	R358	1111	RES 15kohm 5% ¼W	328153J
	R359	1111	RES 33kohm 5% ¼W	328333J
	R360	1111	RES 330ohm 5% ¼W	328334J
	R361	1111	RES 100kohm 5% ¼W	328104J

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 that order.)

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION ++	PART NO.
	R362,363	2222	RES 47kohm 5% ¼W	328473J
	R364,365	2222	RES 1kohm 5% ¼W	328102J
	R366	1111	RES 10meg. ohm 5% ¼W	328106J
			(AM SECTION)	
	T201	1111	Coil, AM antenna	1200390
	T202	1111	Coil, AM oscillator	1220060
	T203	1111	Transformer, AM IF	1230160
	T204	1111	Coil, AM descriminator	1230110
	L201	1111	Inductor – 2.2uh	1210860
	CF201	1111	Celamic filter – SFZ455A	1280310
	IC201	1111	IC HA1197	518044S
	C201	1111	C-CAP 10pf 10% 50V SL	232100K
	C202	1111	C-CAP 15pf 10% 50V SL	232150K
	C203	1111	S-CAP 360pf 2% 50V	223361G
	C204	1111	C-CAP 0.001uf +80, –20% 50V YG	231102Z
	C205 ~ C207	3333	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C208	1111	C-CAP 68pf 10% 50V SL	232680K
	C209,210	2222	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C211	1111	E-CAP 4.7uf 25V	211315Q
	C212	1111	E-CAP 3.3uf 35V	211413Q
	C213	1111	C-CAP 0.001uf +80, –20% 50V YG	231102Z
	C214	1111	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C215	1111	E-CAP 100uf 16V	211230Q
	C216	1111	E-CAP 220uf 16V	211232Q
	C217	1111	M-CAP 0.022uf 10% 50V	222223K
	C218	1111	LC-CAP 0.47uf 50V	211505L
	R201	1111	RES 1.5kohm 5% ¼W	328152J
	R202,203	2222	RES 10kohm 5% ¼W	328103J
	R204	1111	RES 330ohm 5% ¼W	328331J
	R205	1111	FP-MO-RES 47ohm 5% ½W	360470L
	R206	1111	RES 1.5kohm 5% ¼W	328152J
	R207	1111	FP-MO-RES 150ohm 5% ½W	360151L
	R208	1111	RES 1kohm 5% ¼W	328102J
	R209	1111	RES 10kohm 5% ¼W	328103J
			(EQ AMP SECTION)	
	Q401,402	2222	TR 2SA991 (E or F)	510104S
	Q403,404	2222	TR 2SC945L (P or Q)	515077S
	C401,402	2222	LC-CAP 0.47uf 50V	211505L
	C403,404	2222	C-CAP 100pf 10% 50V SL	232101K
	C405,406	2222	E-CAP 10uf 16V	211220Q
	C407,408	2222	E-CAP 220uf 6.3V	211032Q
	C409,410	2222	M-CAP 0.0068uf 5% 50V	222682J
	C411,412	2222	M-CAP 0.022uf 5% 50V	222223J
	C413,414	2222	C-CAP 10pf 10% 50V SL	232100K
	C415,416	2222	E-CAP 220uf 6.3V	211032Q
	C417,418	2222	LC-CAP 0.47uf 50V	211505L
	C419	1111	E-CAP 47uf 25V	211325Q
	C420	1111	C-CAP 0.01uf +80, –20% 50V YG	231103Z
	R401,402	2222	RES 100kohm 5% ¼W	328104J
	R403 404	2222	RES 150ohm 5% ¼W	328150J
	R405,406	2222	RES 10kohm 5% ¼W	328104J
	R407,408	2222	RES 10kohm 5% ¼W	328103J
	R409,410	2222	RES 15kohm 5% ¼W	328153J
	R411,412	2222	RES 100kohm 5% ¼W	328104J
	R413,414	2222	RES 220ohm 5% ¼W	328221J
	R415,416	2222	RES 12kohm 5% ¼W	328123J
	R417,418	2222	RES 220kohm 5% ¼W	328224J
	R419,420	2222	FP-MO-RES 3.3kohm 5% ½W	360332L
	R421,422	2222	RES 330ohm 5% ¼W	328331J
	R423,424	2222	RES 470ohm 5% ¼W	328471J
	R425,426	2222	RES 100kohm 5% ¼W	328104J

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION ++	PART NO.
			(PUSH SWITCH SECTION)	
	C501,502	2222	C-CAP 470pf 10% 50V SL	232471K
	C503,504	2222	M-CAP 0.0022uf 10% 50V	222222K
	C505,506	2222	C-CAP 150pf 10% 50V SL	232151K
	C507,508	2222	M-CAP 0.047uf 10% 50V	222473K
	C509,510	2222	M-CAP 0.056uf 10% 50V	222563K
	R501,502	2222	RES 3.3kohm 5% ¼W	328332J
	R503,504	2222	RES 2.2kohm 5% ¼W	328222J
	R505,506	2222	RES 1 meguohm 5% ¼W	328105J
	R507,508	2222	RES 15kohm 5% ¼W	328153J
	R509,510	2222	RES 12kohm 5% ¼W	328123J
	R511,512	2222	RES 2.2kohm 5% ¼W	328222J
	R513,514	–222	RES 330kohm 5% ¼W	328334J
	R515,516	–222	RES 100kohm 5% ¼W	328104J
			MAIN AMP PC BOARD ASSEMBLY	
★601a		1–––	MAIN AMP PCB ASSEMBLY	9430730
★601b		–111	MAIN AMP PCB ASSEMBLY	9430740
★602		1111	Heat sink	7280340
603		1111	Washer – TW(I) 3φ	893403U
604		1111	Screw – PTS 3φx6	810306S
605		3333	Screw – PTS 3φx8	814308S
606		1111	Lug, ground	4400000
★607		1111	Jack, head phones	4550260
608	R521,522	2222	VR GM80E722A – 250kohm Bx2 – volume	4320960
609	R531,532	1111	VR GM70E533C – 100kohm x2 – bass	4320900
610	R537,538	1111	VR GM70E533C – 100kohm x2 – treble	4320900
611	F701,702	–222	Midget fuse – (S) 4AT 250V	4720400
		–444	Holder, midget fuse	7050430
			(MAIN AMP SECTION)	
	Q701,702	2222	TR 2SA798 (F or G)	514086S
	Q703 ~ Q706	4444	TR 2SC945L (P or Q)	515077S
	Q707,708	2222	TR 2SD666A (C or D)	511020S
	Q709,710	2222	TR 2SD667A (B or C)	511022S
	Q711,712	2222	TR 2SB647A (B or C)	510046S
	Q713,714	2222	TR 2SD588 (Q or R)	513109S
	Q715,716	2222	TR 2SB618 (Q or R)	511109S
	Q717	1111	TR 2SC1627 (Q or Y)	511017S
	ZD 701	1111	Zener diode RD13EB3	502063S
	L701,702	2222	Coil, choke	1210830
	C701,702	2222	LC-CAP 0.47uf 50V	211505L
	C703,704	2222	C-CAP 68pf 10% 50V SL	232680K
	C705,706	2222	C-CAP 15pf 10% 50V SL	232150K
	C707,708	2222	E-CAP 100uf 6.3V	211030Q
	C709,710	2222	E-CAP 47uf 50V	211525Q
	C711,712	2222	C-CAP 22pf 10% 50V SL	232220K
	C713,714	2222	C-CAP 0.022uf +80, –20% 50V YG	231223Z
	C715,716	2222	C-CAP 220pf 10% 50V SL	232221K
	C717,718	2222	M-CAP 0.1uf 10% 50V	222104K
	C719,720	2222	E-CAP 47uf 50V	211525Q
	C721,722	2222	E-CAP 47uf 50V	211525Q
	C723,724	2222	C-CAP 220pf 10% 50V SL	232221K
	C725,726	2222	M-CAP 0.01uf 10% 50V	222103K
	R727,728	2222	Potentiometer – SR19R B470ohm	4300640
	R701,702	2222	RES 1kohm 5% ¼W	328102J
	R703,704	2222	RES 150kohm 5% ¼W	328154J
	R705,706	2222	RES 22kohm 5% ¼W	328223J
	R707,708	2222	RES 2.2kohm 5% ¼W	328222J
	R709,710	2222	RES 1kohm 5% ¼W	328102J
	R711,712	2222	RES 820ohm 5% ¼W	328821J
	R713,714	2222	RES 150kohm 5% ¼W	328154J

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 that order.)

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION++	PART NO.
	R715,716	2222	FP-MO-RES 3.9kohm 5% ½W	360392L
	R717,718	2222	RES 680ohm 5% ¼W	328681J
	R719	1111	FP-MO-RES 3.3kohm 5% ½W	360332L
	R720	1111	RES 33kohm 5% ¼W	328333J
	R721,722	2222	FP-MO-RES 2.2kohm 5% ½W	360222L
	R723,724	2222	FP-MO-RES 3.3kohm 5% ½W	360332L
	R725,726	2222	RES 2.7kohm 5% ¼W	328272J
	R727,728		(Potentiometer)	
	R729,730	2222	RES 1kohm 5% ¼W	328102J
	R731,732	2222	FP-MO-RES 220ohm 5% ½W	360221L
	R733,734	2222	FP-MO-RES 220ohm 5% ½W	360221L
	R735,736	2222	CEM-RES 0.47ohm 5% 5W	384479W
	R737,738	2222	CEM-RES 0.47ohm 5% 5W	384479W
	R739,740	2222	FP-MO-RES 10ohm 5% 2W	362100L
	R741,742	2222	FP-MO-RES 10ohm 5% 2W	362100L
	R743,744	2222	FP-MO-RES 330ohm 5% 2W	362331L
	R745	1111	FP-MO-RES 47ohm 5% ½W	360470L
	R746		– DELETED –	
	R747,748	2222	RES 1kohm 5% ¼W	328102J
			(TONE SECTION)	
	C521,522	2222	E-CAP 10uf 16V	211220Q
	C523,524	2222	E-CAP 10uf 16V	211220Q
	C525,526	2222	M-CAP 0.027uf 10% 50V	222273K
	C527,528	2222	M-CAP 0.22uf 10% 50V	222224K
	C529,530	2222	M-CAP 0.0027uf 10% 50V	222273K
	C530,532	2222	M-CAP 0.033uf 10% 50V	222333K
	R523,524	2222	RES 6.8kohm 5% ¼W	328682J
	R525,526	2222	RES 6.8kohm 5% ¼W	328682J
	R527,528	2222	RES 12kohm 5% ¼W	328123J
	R529,530	2222	RES 120kohm 5% ¼W	328124J
	R531,532		(TONE VR – bass)	
	R533,534	2222	RES 1.8kohm 5% ¼W	328182J
	R535,536	2222	RES 2.2kohm 5% ¼W	328222J
	R537,538		(TONE VR – treble)	
	R539,540	2222	RES 820ohm 5% ¼W	328821J
	R541,542	2222	RES 1 meg.ohm 5% ¼W	328105J

KEY NO.	SYMBOL NO.	TYPE+ WEND	DESCRIPTION++	PART NO.
			REGULATOR PC BOARD ASSEMBLY	
★701a		1–––	REGULATOR PCB ASSEMBLY	9450860
★701b		–111	REGULATOR PCB ASSEMBLY	9450870
702		1111	Heat sink – S10, for Q803	7081820
703		1111	Screw – PMS 3φx6	810306S
704a	F801	1–––	Fuse – 2A 250V MGC	4700620
705		2–––	Holder, fuse	7050420
704b	F801	–111	Midget fuse – (S) 2AT 250V	4720370
706		–222	Holder, midget fuse	7050430
	Q801	1111	TR 2SC2002 (L or M)	512113S
	Q802	1111	TR 2SA953 (L or M)	510109S
	Q803	1111	TR 2SD288 (L or M)	513036S
	D801 ~ D804 ZD801,	4444	Diode GP30D	560059S
	ZD802	2222	Zener diode RD13EB3	502063S
	ZD803	1111	Zener diode RD22EB4	502059S
	C801,802	2222	E-CAP 6800uf 50V	217547Q
	C803	1111	E-CAP 470uf 25V	211335S
	C804	1111	E-CAP 47uf 25V	211325Q
	C805,806	2222	E-CAP 47uf 25V	211325Q
	C807,808	2222	E-CAP 100uf 16V	211230Q
	C809	1111	E-CAP 220uf 16V	211232Q
	C810	1111	C-CAP 0.01uf +80, –20% 500V YG	238103P
	R801	1111	FP-MO-RES 4.7kohm 5% ½W	360472L
	R802	1111	RES 18kohm 5% ¼W	328183J
	R803		– DELETED –	
	R804	1111	RES 22kohm 5% ¼W	328223J
	R805	1111	FP-MO-RES 150ohm 5% 3W	363151L
	R806	1111	RES 6.8kohm 5% ¼W	328682J
	R807	1111	FP-MO-RES 1.5kohm 5% 1W	361152L
	R808	1111	FP-MO-RES 4.7kohm 5% 1W	361472L

SEMICONDUCTOR DATA

TRANSISTORS

† NOTES Ge: Germanium Si: Sillicon
A: Alloy B: Base D: Diffused Dd: Double-diffused
Df: Drift-field E: Epitaxial G: Grown J: Junction
M: Mesa P: Planer Pc: Point-contact Td: Triple-diffused

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
			Collector-to-Base Voltage V_{CBO} (V)	Emitter-to-Base Voltage V_{EBO} (V)	Collector Current I_C (mA)	Collector Dissipation P_C (mW)	Junction Temperature T_J (°C)	Collector Cutoff Current I_{CBO} (uA)	V_{CB} (V)	Static Forward-Current Transfer Ratio h_{FE}	V_{CE} (V)	I_C (mA)	Collector-Emitter Saturation Voltage $V_{CE(sat)}$ (V)	I_C (mA)	I_B (mA)	Gain-Bandwidth Product f_T f_{ob}* (MHz)	V_{CE} V_{CB}* (V)	I_E I_C* (mA)	Output Capacitance C_{ob} (pF)	Base Spreading Resistance $r_{bb'}$ h_{ie} (real) (Ω)	V_{CE} V_{CB}* (V)	I_E (mA)	
2SA733A (P, Q)	AF	PNP Si–E	–60	–5	–100	250	125	–0.1	–60	135 ~ 400	–6	–1	–0.3	–100	–10	180	–6	–10	6				NEC
2SA798 (F, G)	AF: Low noise differential amp.	PNP,Dual Si–EP	–70	–6	–100	200	125	–0.1	–50	250 ~ 800	–6	–1	–0.6 max.	–10	–1	100	–6	–1	3				MITSUBISHI
2SA953 (L, M)	AF, Driver	PNP Si–E	–60	–5	–300	600	150	–0.18	–60	90 ~ 270	–1	–50	–0.6 max.	–300	–30	100	–6	–10	25 max.				NEC
2SA991 (E, F)	AF: Low noise	PNP Si–E	–60	–5	–100	500	125	–0.05	–60	300 ~ 800	–6	–1	–0.5	–100	–10	90	–6	–1	10 max.				NEC
2SB618 (Q, R)	AF: Power amp.	PNP Si–Td	–150	–5	–7A	80W (Tc=25°C)	150	–50	–120	60 ~ 200	–5	–1A	–2 max.	–5A	–0.5A	14	–5	–0.2A*	340	Complementary to 2SD588			NEC
2SB647A (B, C)	AF	PNP Si–E	–120	–5	–1A	0.9W	150	–10	–100	60 ~ 200	–5	–150	–1	–500	–50	140	–5	–150*	20	Complementary to 2SD667A			HITACHI
2SC945L (P, Q)	AF	NPN Si–E	60	5	100	250	125	0.1	120	135 ~ 400	6	1	0.15	100	10	250	6	–10	3.5				NEC
2SC1627 (O, Y)	AF, Driver	NPN Si–E	80	5	300	600	150	0.1	50	70 ~ 240	2	50	0.5	200	10	100	10	10	2				TOSHIBA
2SC1675 (L, M)	RF, Mixer, Osc. (in FM/AM radio)	NPN Si–E	50	5	30	250	125	0.1	50	40 ~ 180	6	1	0.08	10	1	250	6	1	2	$C_c \cdot r_{bb'}$ = 10 pS	6*	–10	NEC
2SC2002 (L, M)	AF, Driver	NPN Si–E	60	5	300	600	150	0.1	60	90 ~ 270	1	50	0.6 max.	300	30	140	6	10	15 max.				NEC
2SD288 (L, M)	AF, Power amp.	NPN Si–Td	80	5	2A	20W (Tc=25°C)	150	10	50	40 ~ 120	5	0.5A	1	1A	0.1A								NEC
2SD588 (Q, R)	AF: Power amp.	NPN Si–Td	150	5	7A	80W (Tc=25°C)	150	50	120	60 ~ 200	5	1A	2 max.	5A	0.5A	15	5	0.2A*	190	Complementary to 2SB618			NEC
2SD666A (B, C)	AF	NPN Si–E	120	5	50	0.9W	150	10	100	60 ~ 200	5	10	2	30	3	140	10	10*	3				HITACHI
2SD667A (B, C)	AF	NPN Si–E	120	5	1A	0.9W	150	10	100	60 ~ 200	5	150	1	500	50	140	5	150*	12	Complementary to 2SB647A			HITACHI

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_{GDO} (V)	Gate-to-Source Voltage V_{GSO} (V)	Gate Current I_G (mA)	Drain Current I_D (mA)	Total Dissipation P_D (mW)	Channel Temperature T_{ch} (°C)	Gate Leak Current Test Conditions	I_{GSS} (nA)	Gate to Drain Breakdown Voltage Test Conditions	$V_{(BR)GDO}$ (V)	Drain Current Test Conditions	I_{DSS} (mA)	Gate to Source Cutoff Voltage Test Conditions	$V_{GS(off)}$ (V)	Forward Transfer Admittance Test Conditions	|Yfs| (mℑ)	Feed Back Capacitance Test Conditions	C_{rss} (pF)	Power Gain (Common Source) Test Conditions	G_{PS} (dB)	Noise Figure Test Conditions	NF (dB)	
2SK104 (F)	AF, RF General	Si N-channel junction	–30	–30	10	20	250	125	V_{GS} = –30V	10			V_{DS} = 5V	1~3	V_{DS} = 5V I_D = 10mA	–1.1	V_{DS} = 5V V_{GS} = 0 f = 1KHz	4.1	V_{DS} = 10V V_{GS} = 0 f = 1KHz	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 V_{Rsurge} (V)	Peak Reverse Voltage V_{RM} (V)	Reverse Voltage V_R (V)	Peak Forward Voltage V_{FM} (V)	Peak Forward Current I_{FM} (mA)	Average Rectified Current I_O (mA)	Forward Surge Current $I_{F\,surge}$ (A)	Junction Temperature T_J (°C)	Total Power Dissipation P_D (mW)	Forward Current I_{Fmin} (mA)	Test Condition V_F (V)	Forward Voltage V_{Fmax} (V)	Test Condition I_F (mA)	Reverse Current I_{Rmax} (uA)	Test Condition V_R (V)	Others	
1SS53	Detector, Medium Speed switching	Si–EP		35	30		300	100	2	200	500			0.8 1.0	1 30	0.1	30		NEC
GP30D	Rectifier	Si–DJ		200				3A	125	150				1.1	3A	5			GENERAL INSTRUMENT
GL–2PG1	Lamp (green)	GaP			5			I_F = 30mA		85	85			2.8	20	10	4	I_V = 0.3mcd (I_F = 20mA)	SHARP
GL–2AR1	Lamp (red)	GaAsP			4		200	I_F = 40mA		85	80			1.9	20	100	3	I_V = 0.6mcd (I_F = 20mA)	SHARP

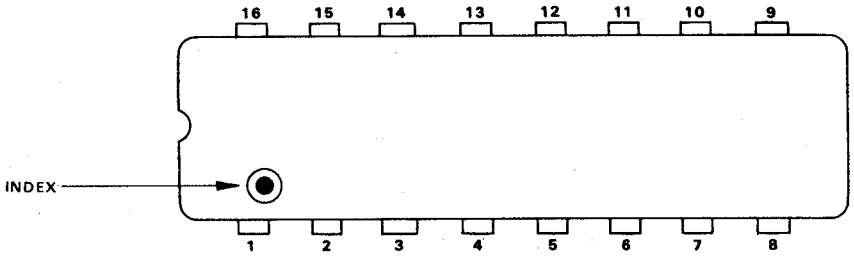
ZENER DIODES

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)														MANUFACTURER
			Total Power Dissipation P_D (mW)	Zener Current I_Z (A)	Junction Temperature T_J (°C)	Zener Voltage V_Z MIN (V)	V_Z TYP (V)	V_Z MAX (V)	Test Conditions I_Z (mA)	Differential Resistance r_Z TYP (Ω)	r_Z MAX (Ω)	Test Conditions I_Z (mA)	Temperature Coefficient γ_Z TYP (%/°C)	γ_Z MAX (%/°C)	Test Conditions I_Z (mA)	Reverse Current I_Z MAX (μA)	Test Conditions V_R (V)	Others	
RD2.2 EC		Si junction	400		175	2.2		2.45	20		120	20				120	0.7		NEC
RD6.2 EB1		Si junction	400		175	5.96		6.27	20		20	20				5	1.5		NEC
RD 13 EB1		Si junction	400		175	12.99		13.66	10		25	10				2	10		NEC
RD 22 EB4		Si junction	400		175	21.52		22.63	5		60	5				2	17		NEC

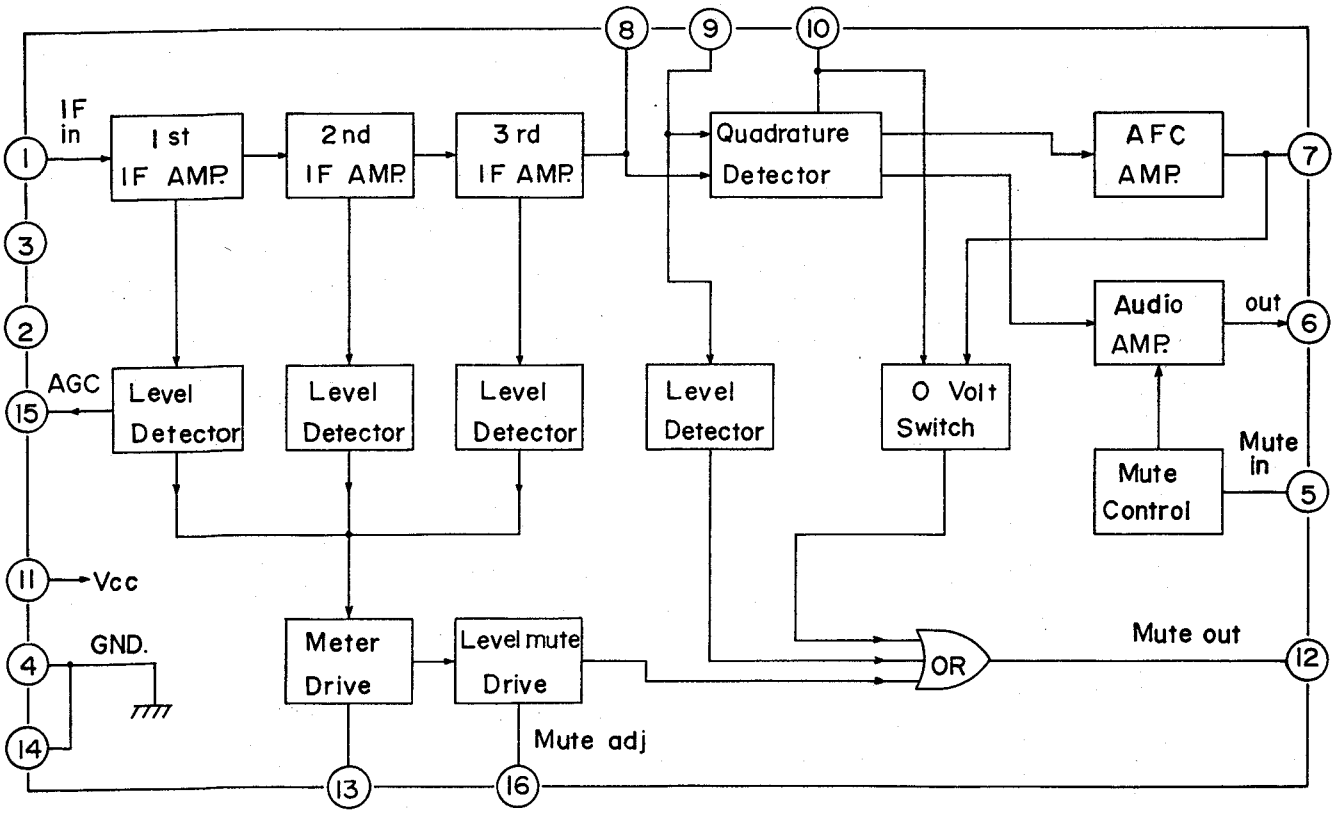
INTEGRATED CIRCUITS HA11225

DEVICE TYPE	APPLICATION	ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)				ELECTRICAL CHARACTERISTICS (T_A = 25°C) Typical Values							MANUFACTURER
		Supply Voltage Vcc (V)	Power Dissipation P_T (mW)	Operating Temperature Range Topr (°C)	Storage Temperature Range Tsig (°C)	Supply Current (mA)	Input Limiting Sensitivity Vin (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 (Ta=60°C)	−20～+70	−55～+125	33 max.	35 (−3dB point)	380	0.1 max.	84	54	158	HITACHI

TERMINAL GUIDE (TOP VIEW)



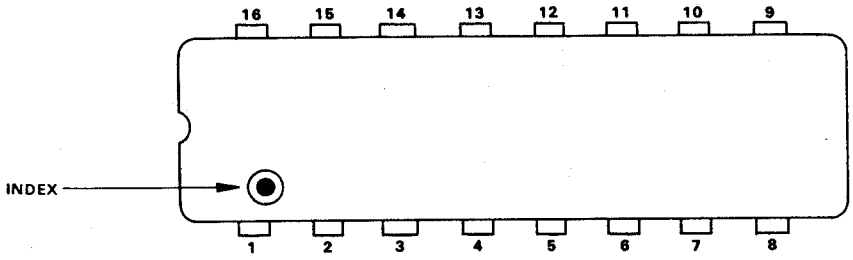
BLOCK DIAGRAM



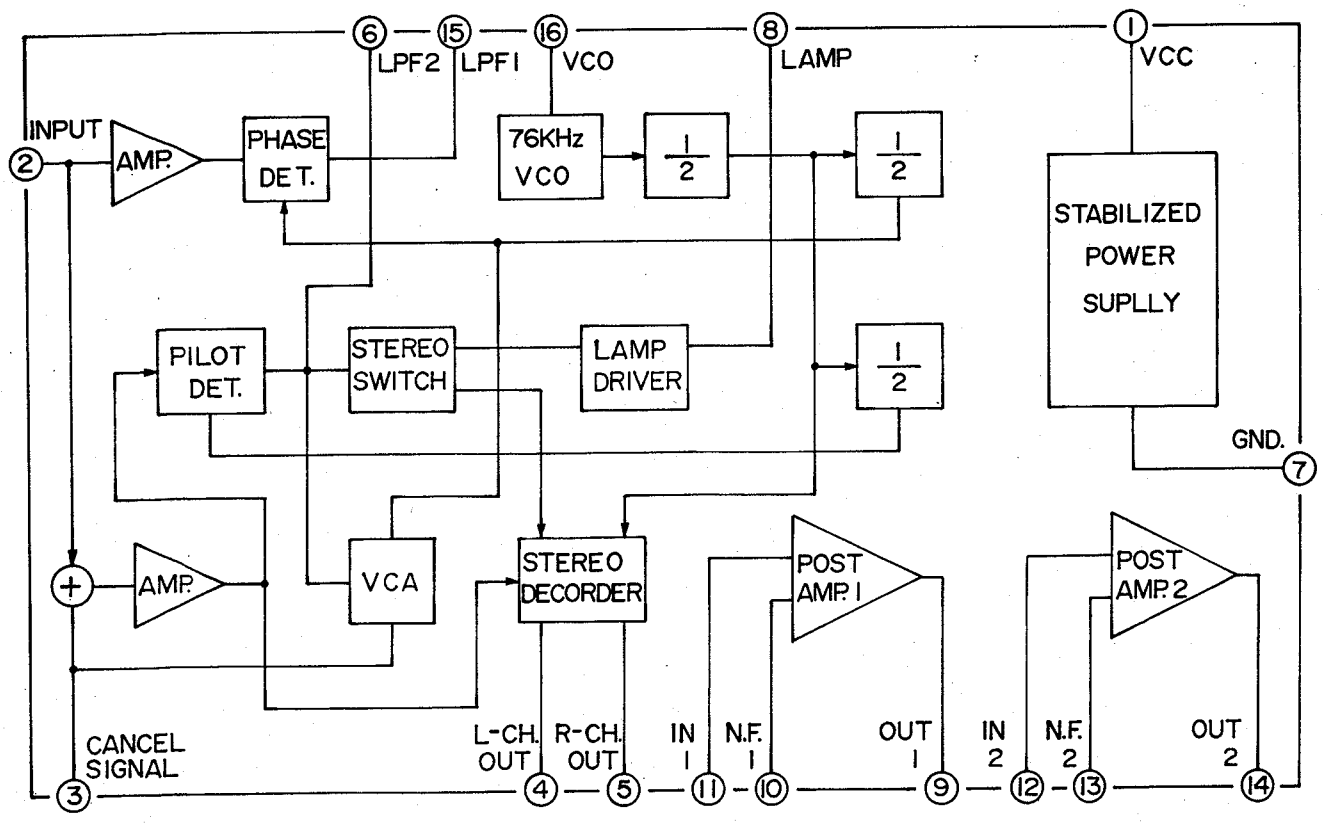
INTEGRATED CIRCUITS TA7624P

DEVICE TYPE	APPLICATION	MAXIMUM RATINGS Absolute – Maximum Values: (T_A = 25°C)				ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C)								MANUFACTURER
		Supply Voltage (V)	Power Dissipation (mW)	Operating Temperature Range (°C)	Lamp Current (mA)	Supply Current (mA)	Stereo Separation (dB)	Voltage Gain (dB)	Channel Balance dB)	T. H. D. (mono) (%)	T. H. D. (stereo) (%)	Signal to Noise Ratio (dB)	Lamp ON Sensitivity (mV)	
TA7624P	FM Stereo Demodulator	16	750	−30 ~ +75	45	21 max.	55 (f = 1 kHz)	11	1.5 max.	0.01	0.02	86	25 max. Pilot Input	TOSHIBA

TERMINAL GUIDE (TOP VIEW)



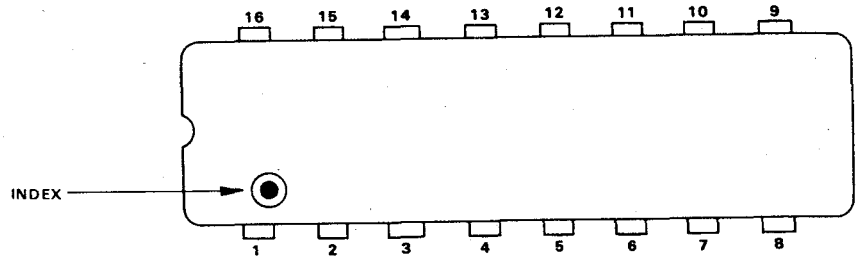
BLOCK DIAGRAM



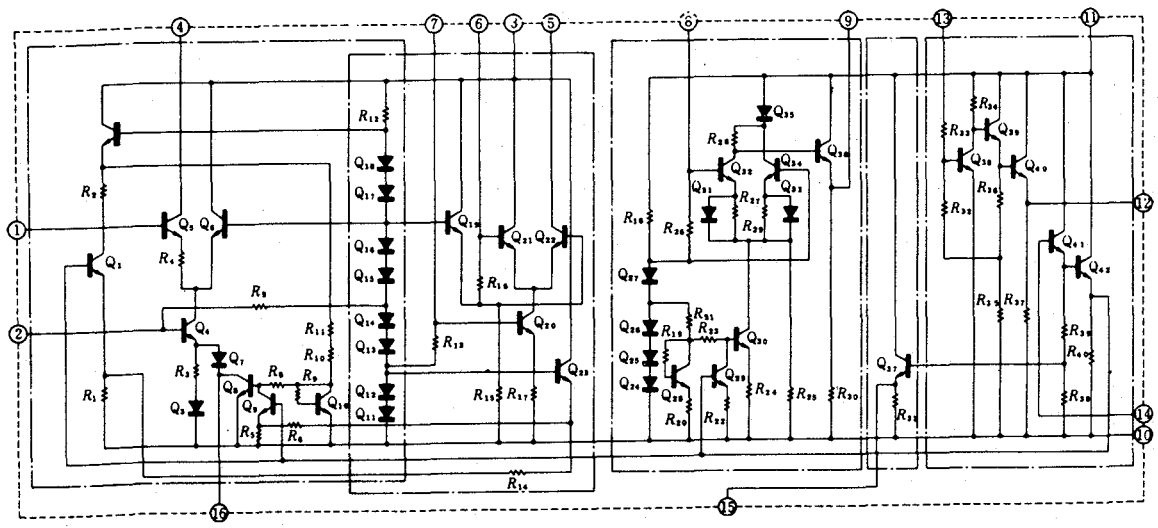
INTEGRATED CIRCUITS HA1197

DEVICE TYPE	APPLICATION	ABSOLUTE MAXIMUM RATING (T_A = 25°C)				ELECTRICAL CHARACTERISTICS (TYPICAL VALUES) T_A=25°C				MANUFACTURER
		Voltage Supply Vcc (V)	Power Dissipation Pd (mW)	Operating Temp Range Topt (°C)	Storage Temp Range Tstg (°C)	Signal to Noise Ratio Input=74dBμ Mod = 30% (dB)	Distortion Input=100dBμ Mod = 30% (%)	Output Voltage Input=74dBμ Mod = 30% (mV)	Quiescent Current (mA)	
HA1197	AM Radio	15	450 (Ta = 70°C)	−20 ~ +70	−55 ~ +125	53	0.4	212	14.5	HITACHI

TERMINAL GUIDE (TOP VIEW)



SCHEMATIC DIAGRAM



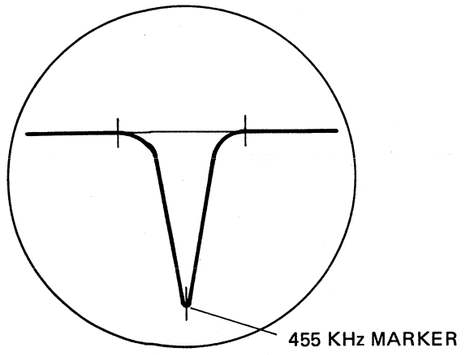


Figure 7. AM IF

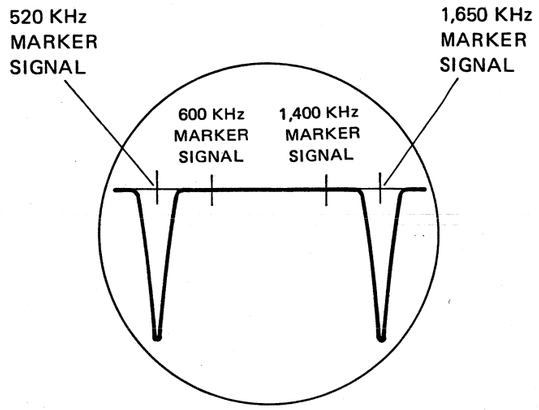


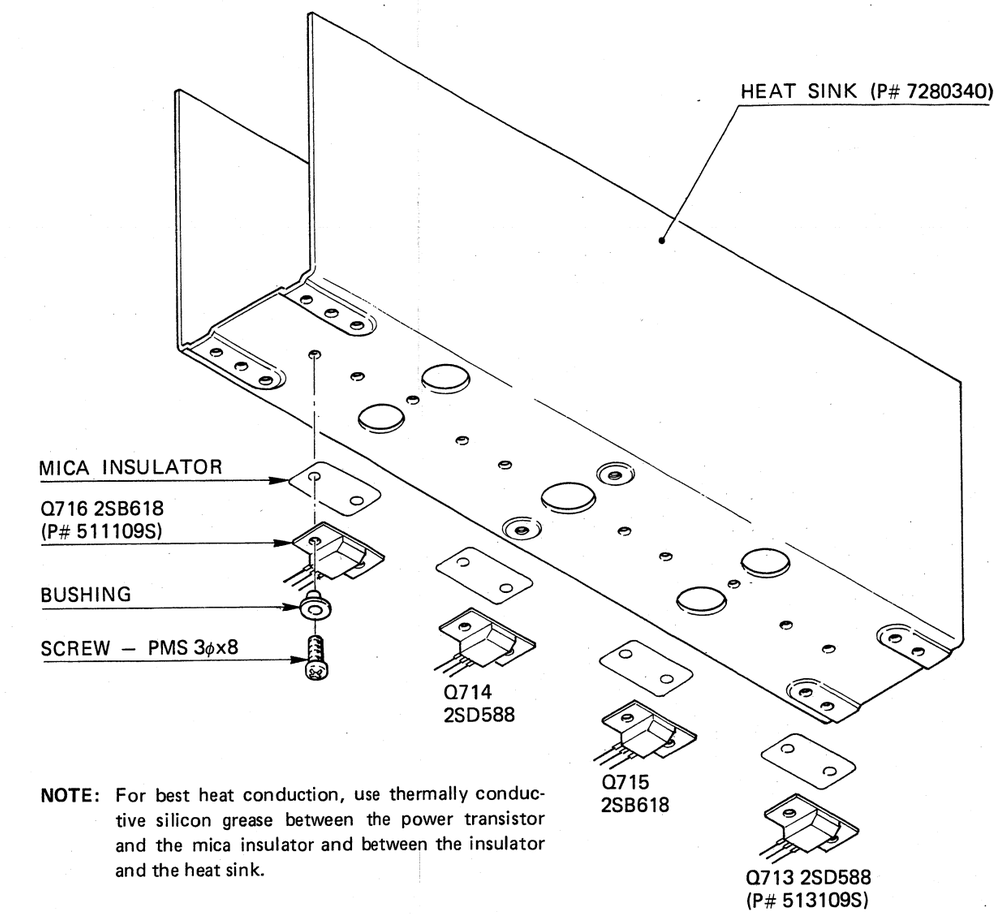
Figure 8. AM Frequency Coverage

MAIN AMP SECTION ADJUSTMENT

Idling Current Adjust

Connect 8 ohms dummy load to speaker terminals. Set volume controls to minimum (fully counterclockwise). Using high sensitivity DC voltmeter, adjust R727 so that the voltage difference between T. P. (near by Q713; 2SD588) and speaker terminal (left channel, + side) is 4.7 to 14.1 milivolts, or 9.4 milivolts average. Similarly, adjust R728 so that the voltage difference between T. P. (near by Q716; 2SB618) and speaker terminal (right channel, + side) is above value.

POWER TRANSISTORS MOUNTING ASSEMBLY



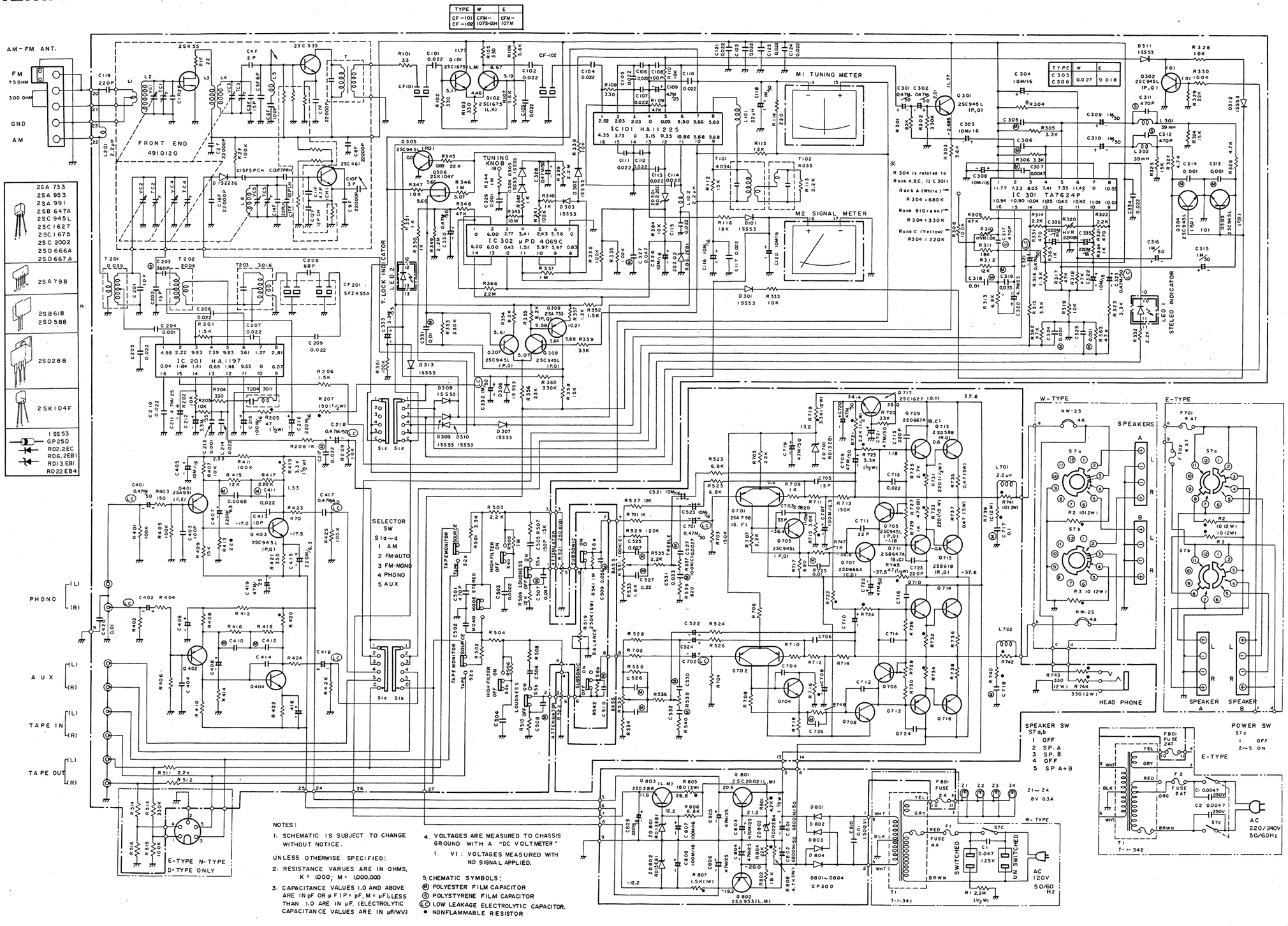
NOTE: For best heat conduction, use thermally conductive silicon grease between the power transistor and the mica insulator and between the insulator and the heat sink.

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.

SCHEMATIC DIAGRAM



NOTES:

1. SCHEMATIC IS SUBJECT TO CHANGE WITHOUT NOTICE.

UNLESS OTHERWISE SPECIFIED:

2. RESISTANCE VARUES ARE IN OHMS. K = 1,000; M = 1,000,000
3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN pF OR μF (P = pF, M = μF), LESS THAN 1.0 ARE IN μF. (ELECTROLYTIC CAPACITANCE VALUES ARE IN μF/WV)
4. VOLTAGES ARE MEASURED TO CHASSIS GROUND WITH A "DC VOLTMETER"
   (V): VOLTAGES MEASURED WITH NO SIGNAL APPLIED.

5. CHEMATIC SYMBOLS:
   - (M) POLYESTER FILM CAPACITOR
   - (S) POLYSTYRENE FILM CAPACITOR
   - (LC) LOW LEAKAGE ELECTROLYTIC CAPACITOR.
   - ● NONFLAMMABLE RESISTOR

Figure 10

P.C. BOARD (BOTTOM VIEW)

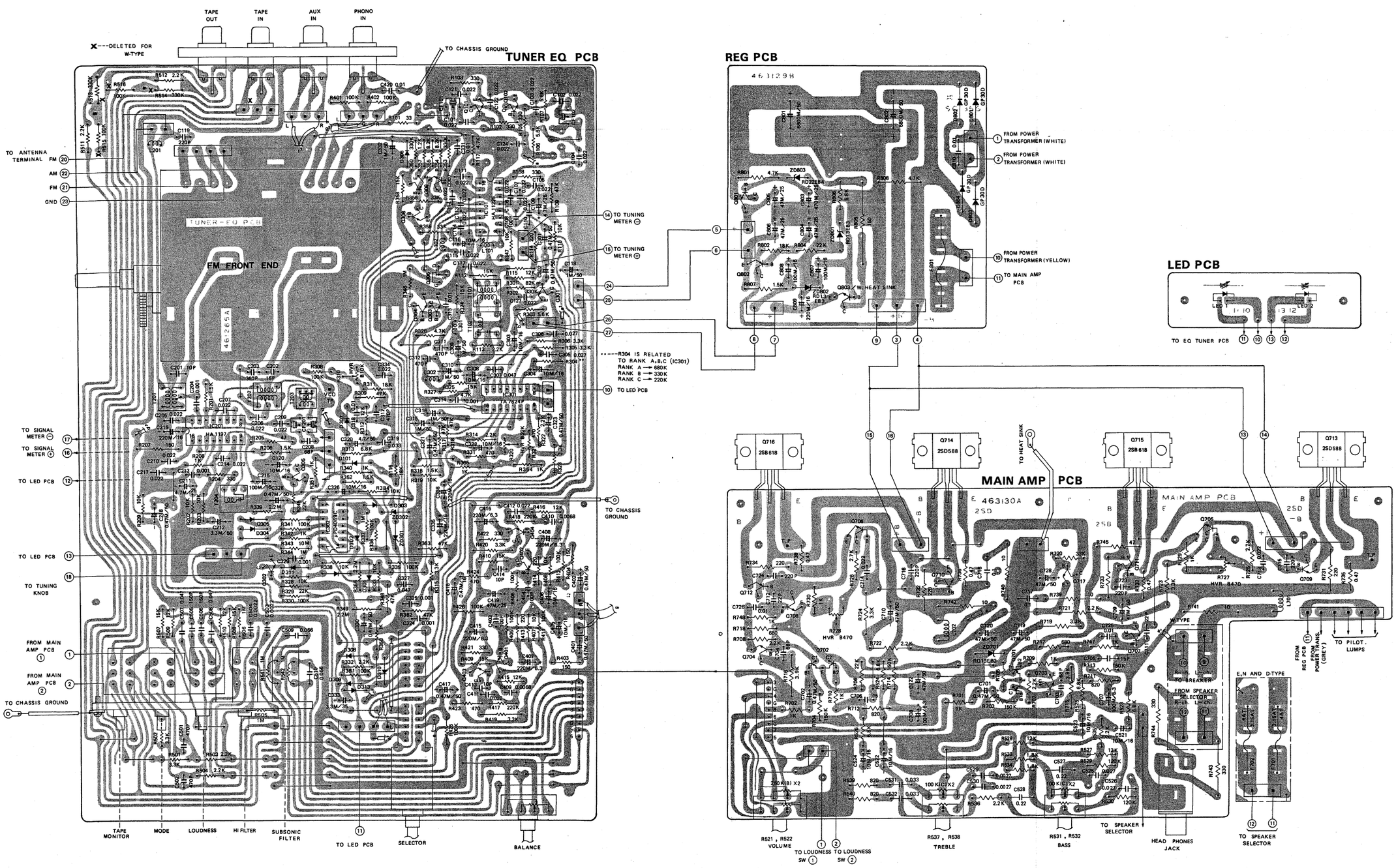


Figure 11

NOTICE

FRONT END

The circuit of new type front end, as follows.

FF124U

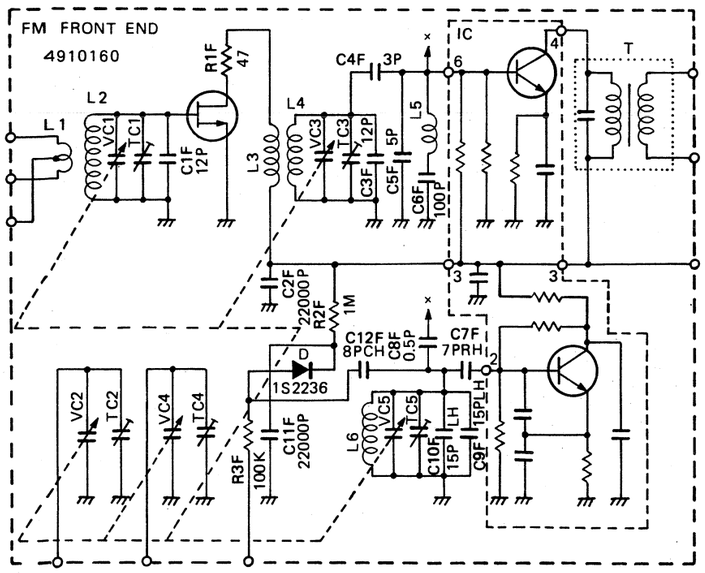


Figure 12

D–TYPE

The circuit and the parts of D–type are to be changed as follows.

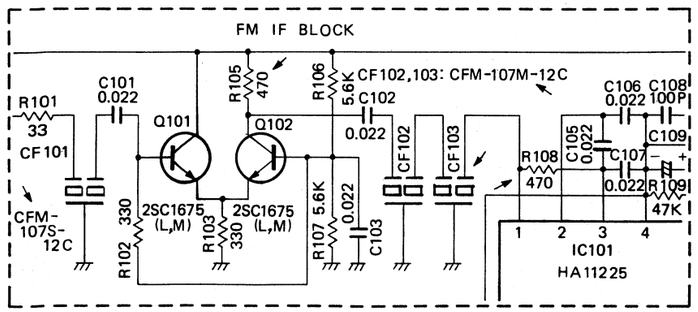


Figure 13

	SYMBOL No.	D – TYPE	W, E & N – TYPE
CERAMIC FILTER	CF 101	CFM – 107S – 12C	CFM – 107S – 12H
	CF 102		
	CF 103		NONE
CAPACITOR	C 104	NONE	C–CAP. 0.022
RESISTOR	R 105	470 OHMS	330 OHMS
	R 108		

DIAL CORD INSTALLATION

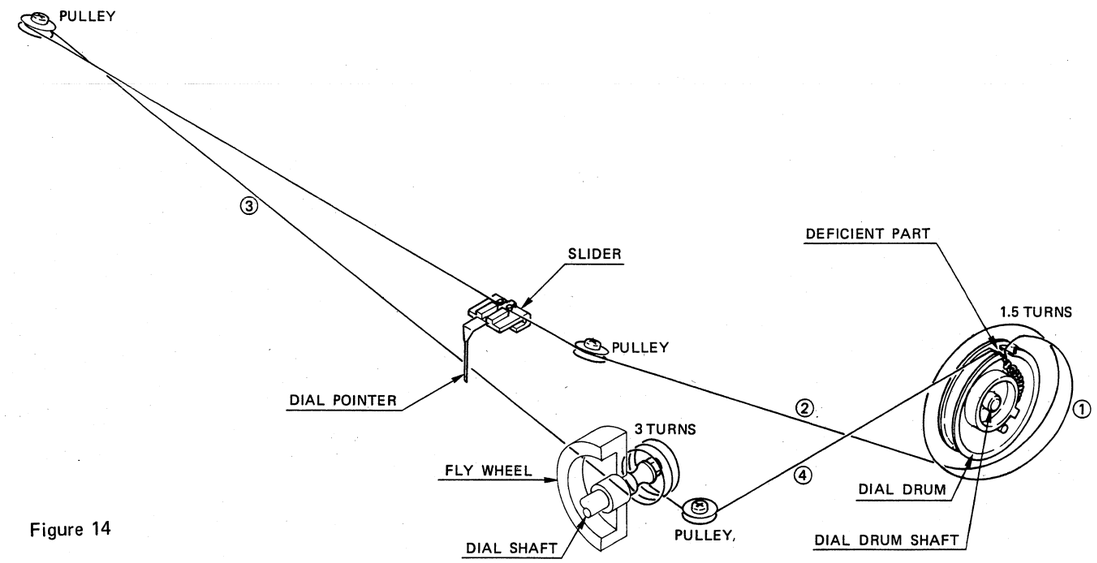


Figure 14

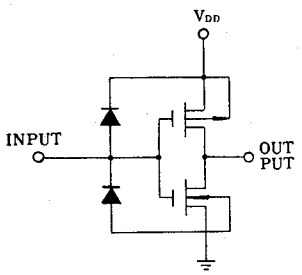
1. Remove an old dial cord.
2. Turn the dial drum shaft counter-clockwise until the rotor of the variable capacitor is completely out of the stator. If the deficient part of the dial drum is not in a straight line with the dial drum shaft (vertically), loosen the dial drum drive screws and adjust the 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. 14 (in circled numbered order).
4. Fix the dial pointer to the string and adjust to high frequency end (approx. 109.65 MHz) position when the rotor of the variable capacitor is completely out of the stator.

INTERGRATED CIRCUITS μPD4069C

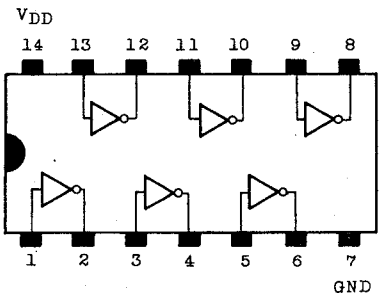
FUNCTION/MANUFACTURER

- Hex Inverter/NEC

EQUIVALENT CIRCUIT AND CONNECTION INFORMATION



(1/6 CIRCUIT SHOWN)



TOP VIEW

MEMO