



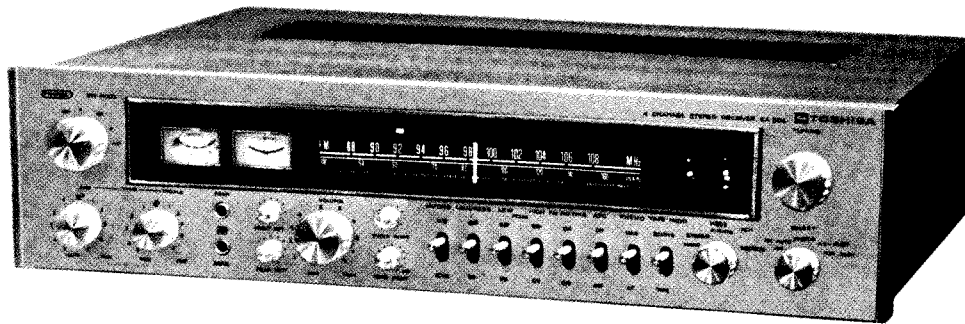
# TOSHIBA 4 CHANNEL STEREO RECEIVER

## SERVICE DATA

### MODEL SA-504

FILE NO. 170-006

REVISED EDITION



### SPECIFICATIONS

#### ■ TUNER SECTION

##### ■ FM Part

Frequency range: 88 ~ 108 MHz  
 Usable sensitivity (IHF): 1.8  $\mu$ V  
 Distortion factor: MONO 0.3% (400 Hz 100%)  
 STEREO 0.5% (400 Hz 100%)  
 Signal to noise ratio: 66 dB  
 Frequency response: 20 Hz ~ 15 kHz  $\pm$ 1 dB  
 Selectivity (IHF): 80 dB  
 Image rejection ratio: 80 dB  
 IF rejection ratio: 80 dB  
 Capture ratio: 1.5 dB  
 Spurious rejection ratio: 100 dB  
 AM suppression ratio: 46 dB  
 FM stereo separation: 35 dB (400 Hz)

##### ■ AM Part

Frequency range: 530 ~ 1,605 kHz  
 Usable sensitivity: 48 dB/m  
 (S/N 20 dB)  
 15  $\mu$ V (IHF)  
 Distortion factor: 1%  
 Image rejection ratio: 70 dB  
 IF rejection ratio: 65 dB  
 Signal to noise ratio: 50 dB  
 Selectivity: 25 dB ( $\pm$ 10 kHz)

#### ■ AUDIO SECTION

IHF music power: 200W 4  $\Omega$  (at 0.4% distortion)  
 180W 8  $\Omega$  (at 0.4% distortion) BTL  
 r.m.s (continuous) output:  
 At each channel driven: 35W x 4 8  $\Omega$  (less than 0.4% distortion 1 kHz)  
 70W x 2 8  $\Omega$  (less than 0.4% distortion 1 kHz) BTL  
 Harmonic distortion: 0.4% or less (35W at 1 kHz)  
 Inter modulation distortion: 0.4% or less  
 Frequency response: 10 Hz ~ 55 kHz + 1/-3 dB  
 IHF power band with: 10 Hz ~ 40 kHz  
 Input sensitivity and impedance:  
 PHONO MAG 2.5 mV (47 k $\Omega$ )  
 CC 30 mV (70 k $\Omega$ )  
 AUX 1.2 (4CH) 150 mV (47 k $\Omega$ )  
 TAPE PLAY 150 mV (47 k $\Omega$ )  
 MAIN IN 550 mV (47 k $\Omega$ )  
 Recording output level:  
 TAPE REC 150 mV  
 DIN 30 mV  
 Signal-to-noise ratio:  
 PHONO (2.5 mV) 65 dB  
 CC (30 mV) 70 dB  
 AUX 1.2 (4CH) (150 mV) 75 dB  
 Residual noise: 1.5 mV or less  
 Speaker impedance: 4 ~ 16  $\Omega$   
 BASS (100 Hz):  $\pm$ 10 dB  
 TREBLE (10 kHz):  $\pm$ 10 dB  
 LOUDNESS control:  
 + 10 dB (100 Hz at VR 20%)  
 + 4 dB (10 kHz at VR 20%)  
 Damping factor: 20 (8  $\Omega$ )

#### ■ Power source and Others

Power source: 100V/120V/220V/240V, 50Hz/60Hz  
 Power consumption: 150W  
 Dimensions: 500 (W) x 380 (D) x 115 (H) (mm)  
 (19 1/2" W x 15" D x 4 1/2" H)  
 Weight: 13 kg  
 (28.8 Lbs)

#### ■ Semiconductors

Transistor: 75  
 FET: 3  
 Diode: 34  
 IC: 3

**TOKYO SHIBAURA ELECTRIC CO., LTD.**

2-1, 5-CHOME, GINZA, CHUO-KU, TOKYO, JAPAN

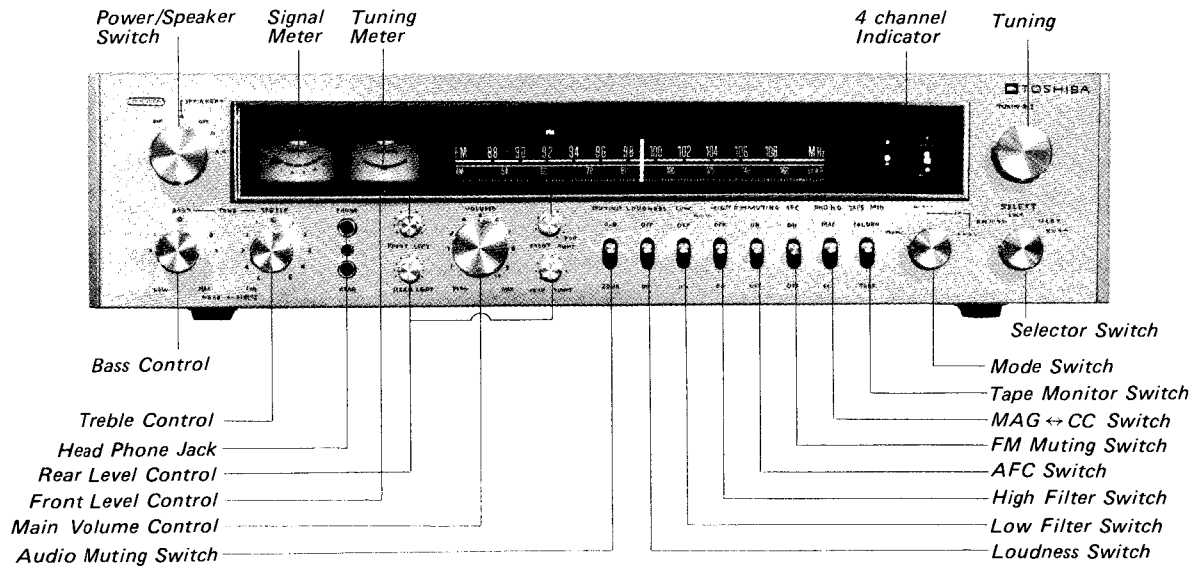


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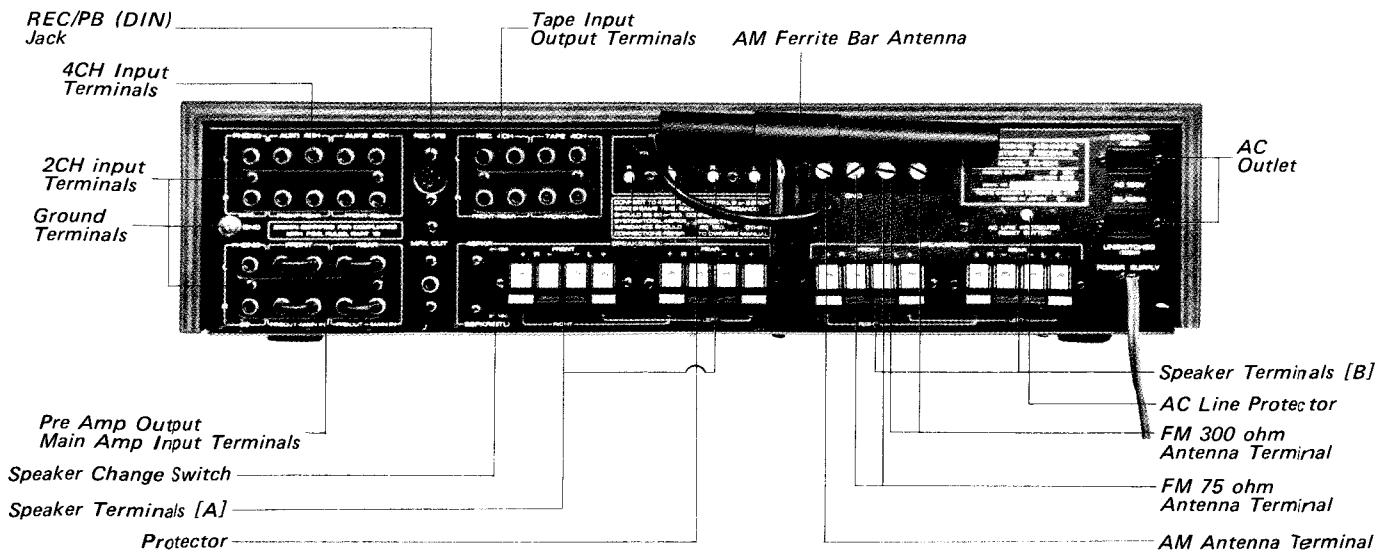
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# 1. OPERATING CONTROLS

## 1-1 FRONT VIEW

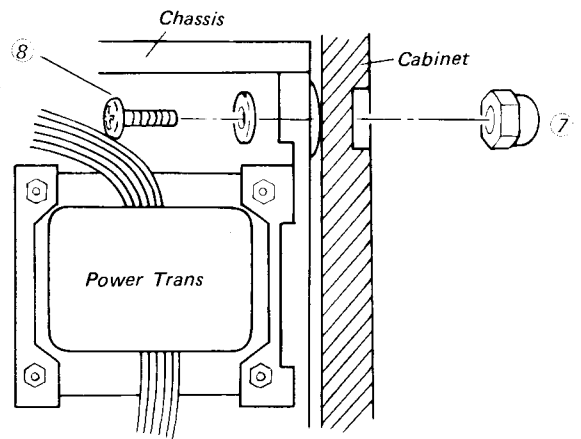
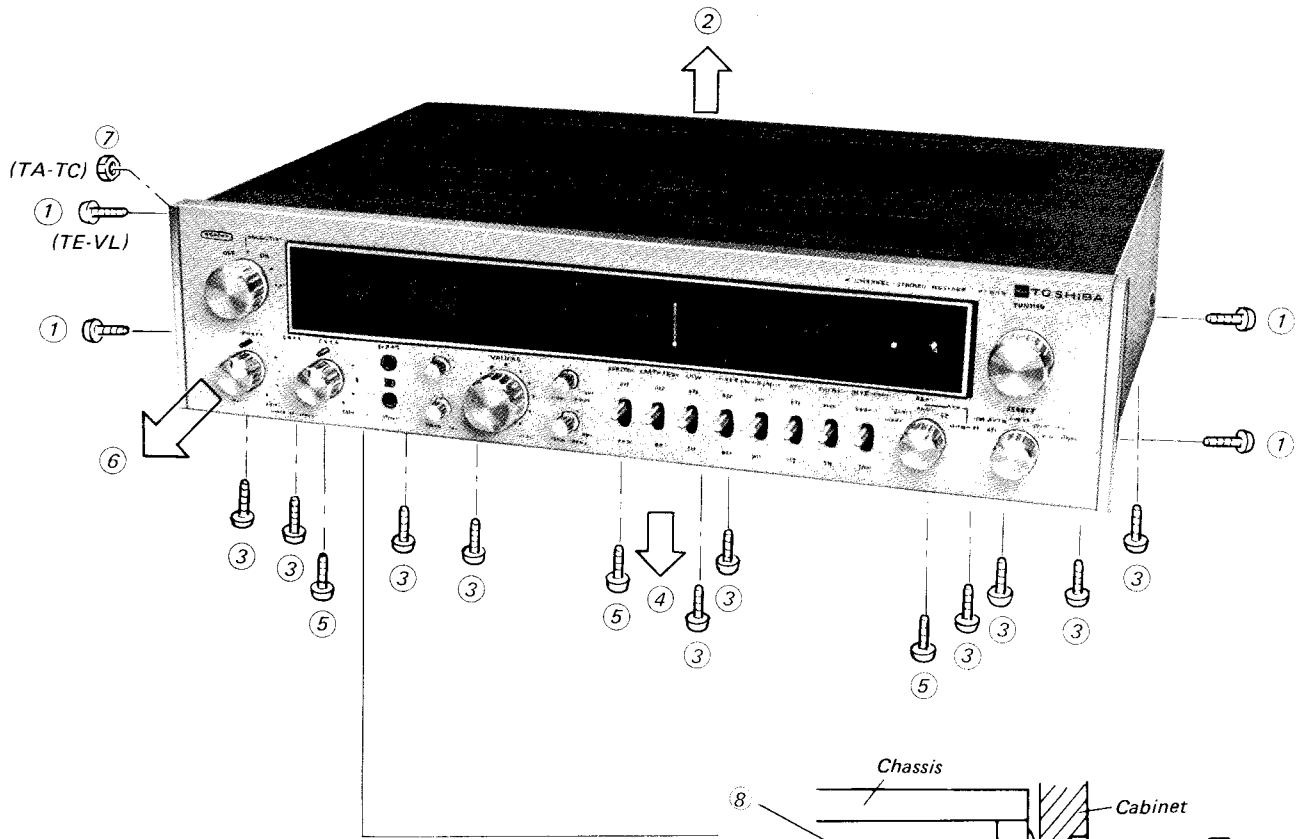


## 1-2 REAR VIEW





## 2. DISASSEMBLIES



Cabinet Removal (TA-TC)

### TE-VL MODEL

#### 2-1 CABINET REMOVAL

1. Remove four screws ( ① ).
2. Pull out the Cabinet ( ② ).

#### 2-2 BOTTOM COVER REMOVAL

1. Remove ten screws ( ③ ).
2. Pull out the Bottom Plate ( ④ ).

#### 2-3 FRONT PANEL REMOVAL

1. Pull out all knobs.
2. Remove three screws ( ⑤ ).
3. Pull out the Panel ( ⑥ ).

### TA-TC MODEL

#### 2-4 BOTTOM COVER REMOVAL

1. Remove ten screws ( ③ ).
2. Pull out the Bottom Plate ( ④ ).

#### 2-5 CABINET REMOVAL

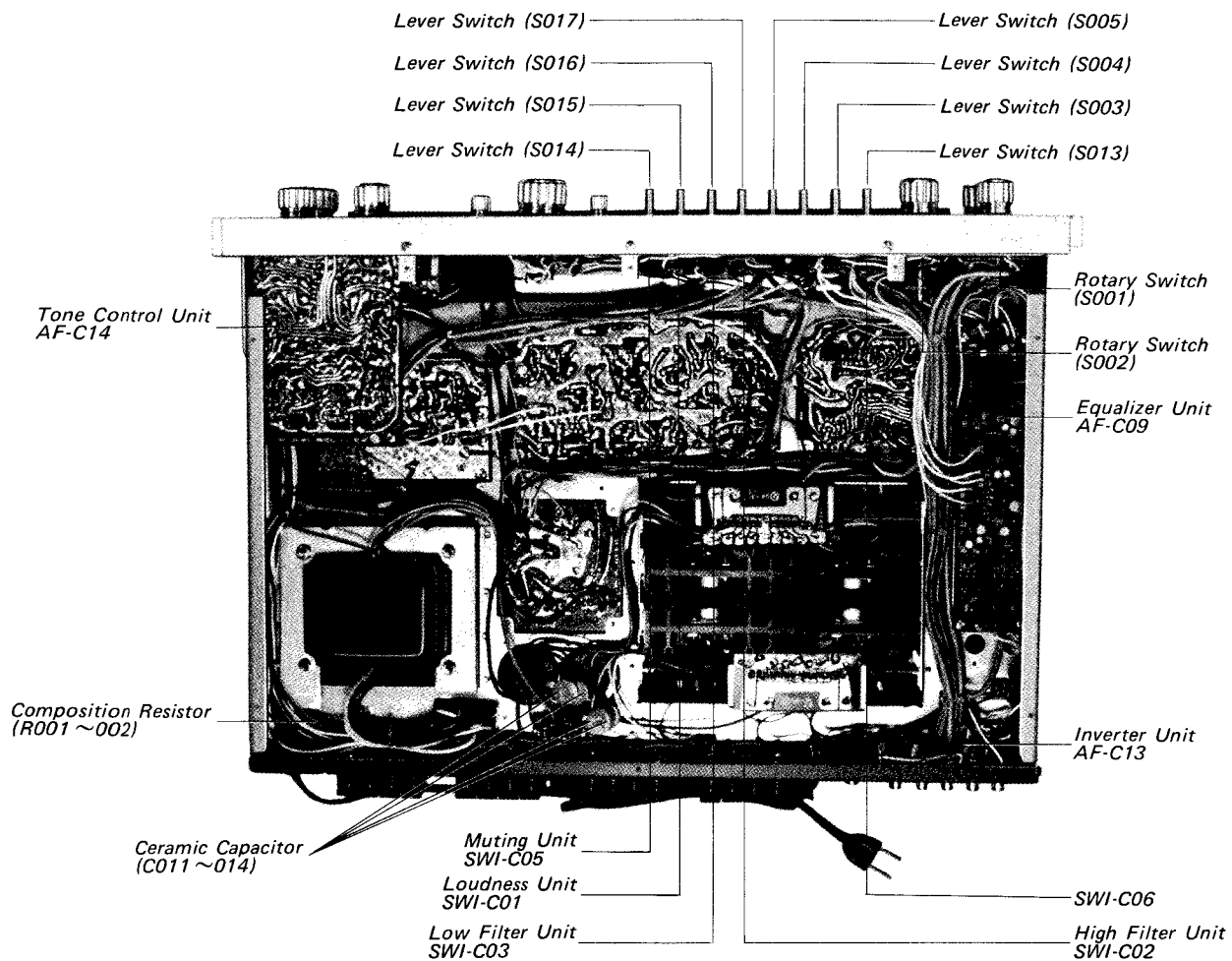
1. Remove three screws ( ① ) and a nut ( ⑦ ).
2. Pull out the Cabinet.

#### 2-6 FRONT PANEL REMOVAL

1. Pull out all knobs.
2. Remove three screws ( ⑤ ).
3. Pull out the Panel ( ⑥ ).

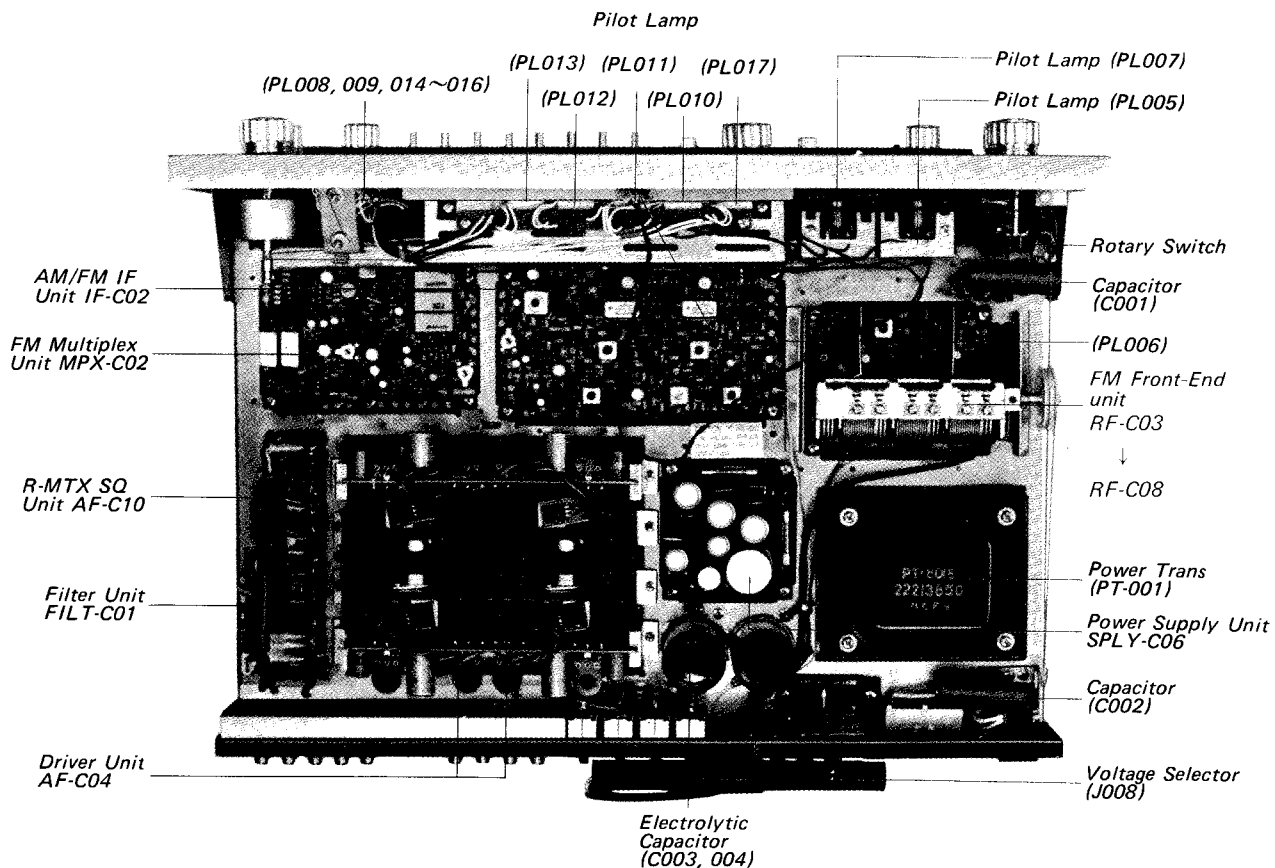
## 3. PARTS LOCATIONS

## 3-1 CHASSIS BOTTOM VIEW



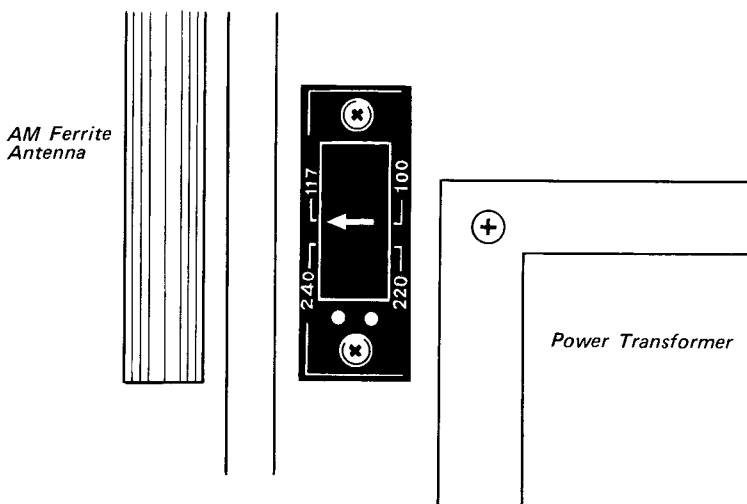


### 3-2 CHASSIS TOP VIEW



### 3-3 VOLTAGE ADJUSTMENT

Insert the pin, adjusting the arrow in the direction of the power supply voltage applied.

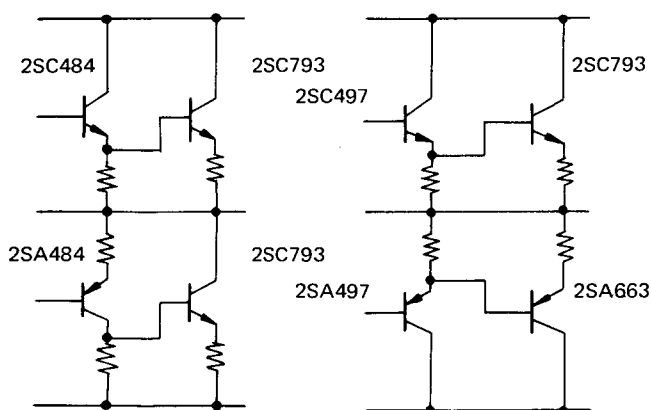


## 4. TECHNICAL POINTS

### 1. PURE COMPLEMENTARY CIRCUIT SYSTEM

The difference between the Pure Complementary Circuit and the Quasi Complementary Circuit is that the Darlington connections in the lower part are, as shown in the figure below, connected to PNP-NPN for the Quasi Complementary Circuit and to PNP-PNP for the Pure Complementary Circuit. This difference results in the cross-over distortion in the unit. Although the switching distortion is inevitable with B class P-P amplifier, the Pure Complementary Circuit, where both upper and lower transistors are symmetrical each other, these distortions are canceled each other and the action similar to A class action is provided.

This can be afforded only with the newly developed PNP transistors, 2SA663, which are produced by the Toshiba's semiconductor manufacturing technology. The distortion can be kept under 0.1% even with 10kHz at rated output and PBW is also greatly improved with the use of this transistor.



Quasi Complementary Circuit  
(SA-20, SA-15)

Pure Complementary Circuit  
(SA-500, SA-504)

### 2. DIRECT-COUPLING OUTPUT CAPACITOR LESS CIRCUIT SYSTEM

The following features are available by adopting the Output Capacitor Less of the direct-coupling two-source system:

- (1) Stable extension of frequency characteristic to the ultra low frequency range becomes possible.
- (2) The output impedance (Damping Factor) does not vary even in the ultra low frequency range.

This feature together with the Pure Complementary Circuit system mentioned above is regarded as the

one for the most ultimate and perfect amplifier today.

The most serious problems with the direct-coupling amplifier are the DC drift due to the temperature variation and the possibility of the occurrence of excess direct current to the speaker, which is caused by the transient shock at the moment of switching on the power supply and the unlikely break of the power transistors. In the model SA-504, these problems are resolved in such ways as follows: A differential amplifier consisting of the transistors of high current amplification factor, HFE, is incorporated in this unit in order to raise its DC stability. This shock at the moment of supply of power is reduced to some extent by inserting the twin-T type filter in the unit.

The speaker is safely protected against unlikely accident of transistor break by incorporating the circuit breaker between the speaker terminal and output circuit. On the contrary, in the case of shorting of the speaker terminal, the output circuit is protected by the circuit breaker built-in.

### 3. BUILT-IN SPECIAL AMPLIFIER FOR CONDENSER-CARTRIDGE

There are two types of cartridge, the velocity proportional type (MM, MC, etc.) and the amplitude proportional type (photoelectric cartridge, etc.).

The condenser-cartridge belongs to the latter type and a special correction curve different from the conventional one is necessary. The power for the ICs in the cartridge is supplied through the ground of the input terminal R channel. This amplifier can be directly connected with the condenser-cartridge (This is not the case for the photoelectric cartridge).

### 4. BTL CIRCUIT

When the four channel amplifier is used for reproduction with two speakers, this circuit is used in order to operate the four amplifiers effectively. The output voltage of two factors of magnitude can be supplied between the output terminals of each amplifier when the one speaker is operated in phase and the other out of phase with the use of the phase reverse circuit. Although the output power is theoretically of the four factors of magnitude from the relation,  $(2V)^2/R = 4V^2/R$ , that is in practice reduced to about two factors of magnitude due to losses such as the regulation of the transformer, the emitter resistance, etc.

### 5. MATRIX DECODER

All the two channel program sources (record, open reel, cassette, cartridge tape, FM broadcasting, etc.)

can be reproduced in the four channel fashion with the built-in MATRIX Decoder.

6. SQ

Fig. 1 shows signal components LT and RT recorded on SQ record disc. Decoder shown in Fig. 1-b changes composite two-channel signals into four-channel stereo signals FL, RL, FR and RR. Such a decoder produces sound field extended in right and left directions but not so extended in front and rear directions.

To improve front and rear channel separation, SQ decoder mixes LT and RT signals in proper proportion as shown in Fig. 2.

- Note: \*14dB between front left and front right channels.
- \*6dB between front and rear channels.
- \*6dB between rear left and rear right channels.

Matrix circuits shown in Fig. 3-a, 3-b, 3-c and 3-d mixes  $LT + 0.2RT$ ,  $RT + 0.2LT$ ,  $LT - 0.4RT$  and  $RT - 0.4LT$  signals respectively. TR04, TR03, TR06 and TR05 amplifies signals attenuated by matrix circuits.

Circuit shown in Fig. 4-a has a phase characteristic in Fig. 4-b. Low Frequency signal output is almost the same phase as the input. As frequency becomes higher, output phase negatively shifts. Combination of such two circuits, one shifts 90 degrees at F1 and the other 90 degrees at F2, makes 90 degrees phase difference in some range. This circuit is called phase-shifter.

RL' and RR' signals are mixed through phase-shifter in Fig. 5-a and 5-b and amplified by TR09 and TR07 respectively to set the levels.

7. R-MTX

R-MTX circuit mixes front-left and front-right signals in the same proportion as SQ to improve front and rear channel separation.

Rear channel signals are mixed in the proportions such as  $RR = R - 0.4L$  and  $RL = L - 0.4R$  as shown in Fig. 6.

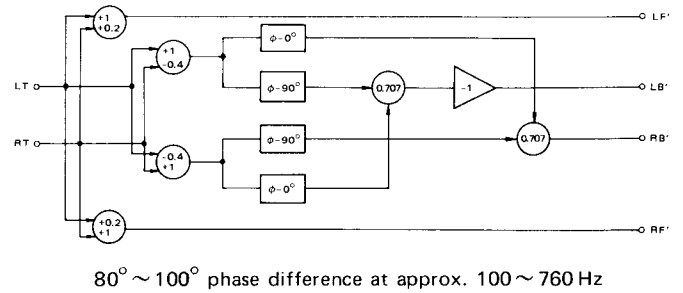


Fig. 2

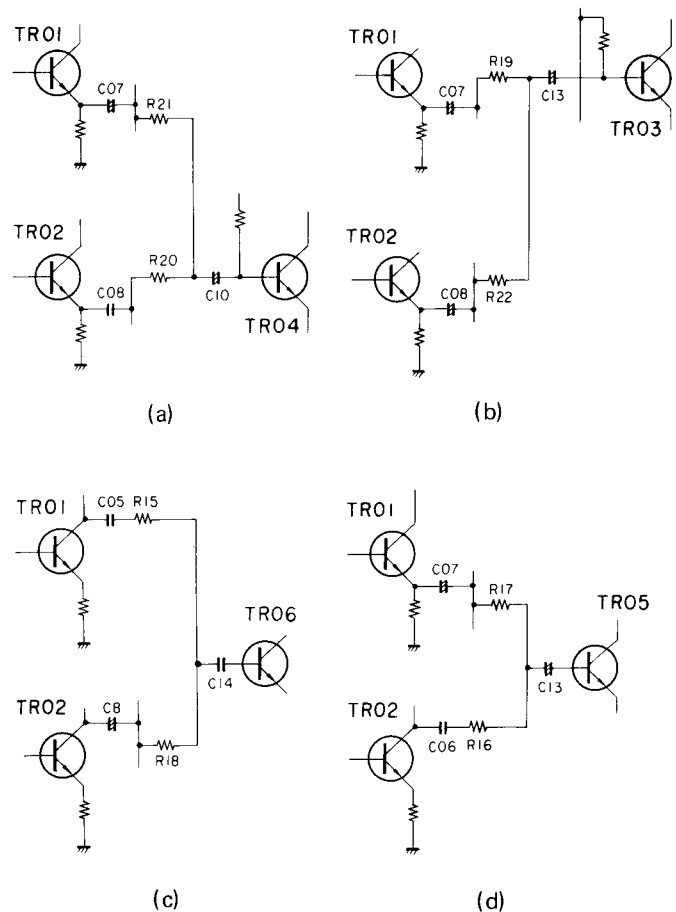


Fig. 3

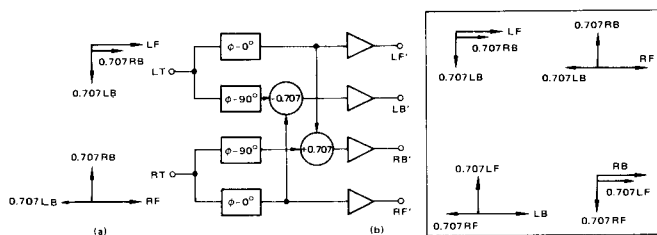


Fig. 1

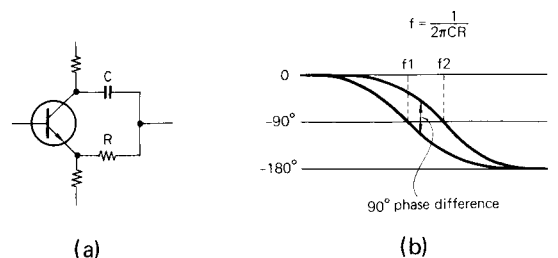


Fig. 4



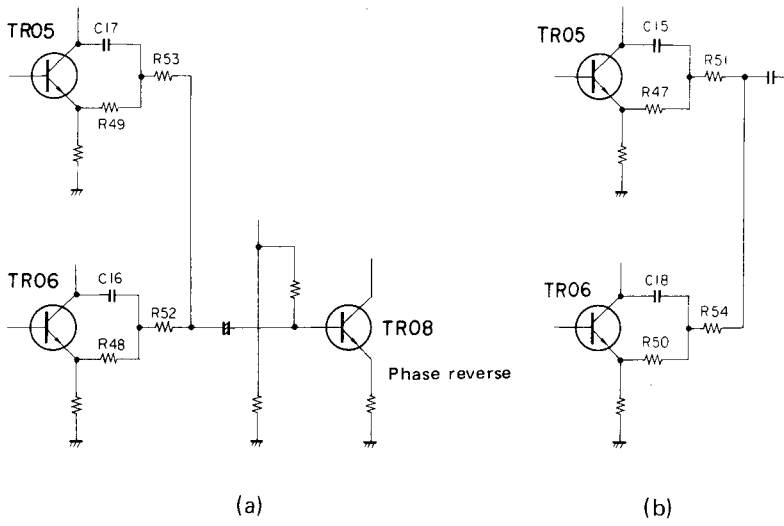


Fig. 5

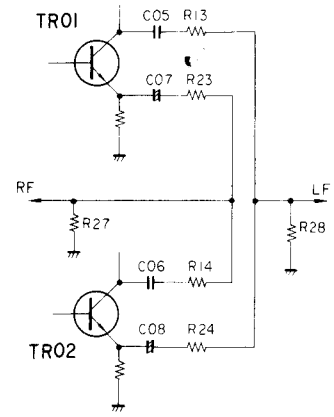


Fig. 6

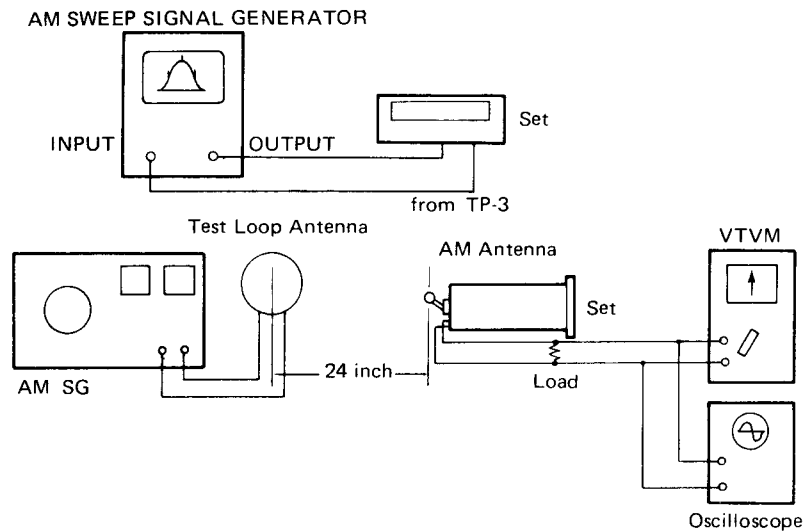
## 5. ADJUSTMENTS

### 5-1 AM TUNER ADJUSTMENT

Equipment:

- |   |   |
|---|---|
| 1. SG (Signal Generator)                  | 5. VTVM (AC)                                    |
| 2. SG (Sweep Generator)                   | 6. Adjusting screw driver                       |
| 3. Test loop antenna (50 ohm)             | 7. Adjusting screw driver (use to antenna core) |
| 4. Load (dummy load 8ohm or speaker 8ohm) | 8. Oscilloscope                                 |

#### AM ADJUSTMENT SET UP



Note 1. Make adjustment of the AM tuner section with the minimum input signal possible to the set.

Note 2. It is not always necessary to set the IF center

frequency to 455kHz as its range is determined by the ceramic filter used. Center frequency is within  $455 \pm 2\text{kHz}$ .

#### AM IF ADJUSTMENT PROCEDURE

STEP	ADJUSTMENT	REMARKS
IF Response	IF-C02 IT02, IT01 IF Transformer	Adjust for scope pattern with specified marker (455kHz) as illustrated in Fig

#### AM ADJUSTMENT PROCEDURE

Adjust the tuning gang to be able to deflect from 0 through 100 indication on the meter.

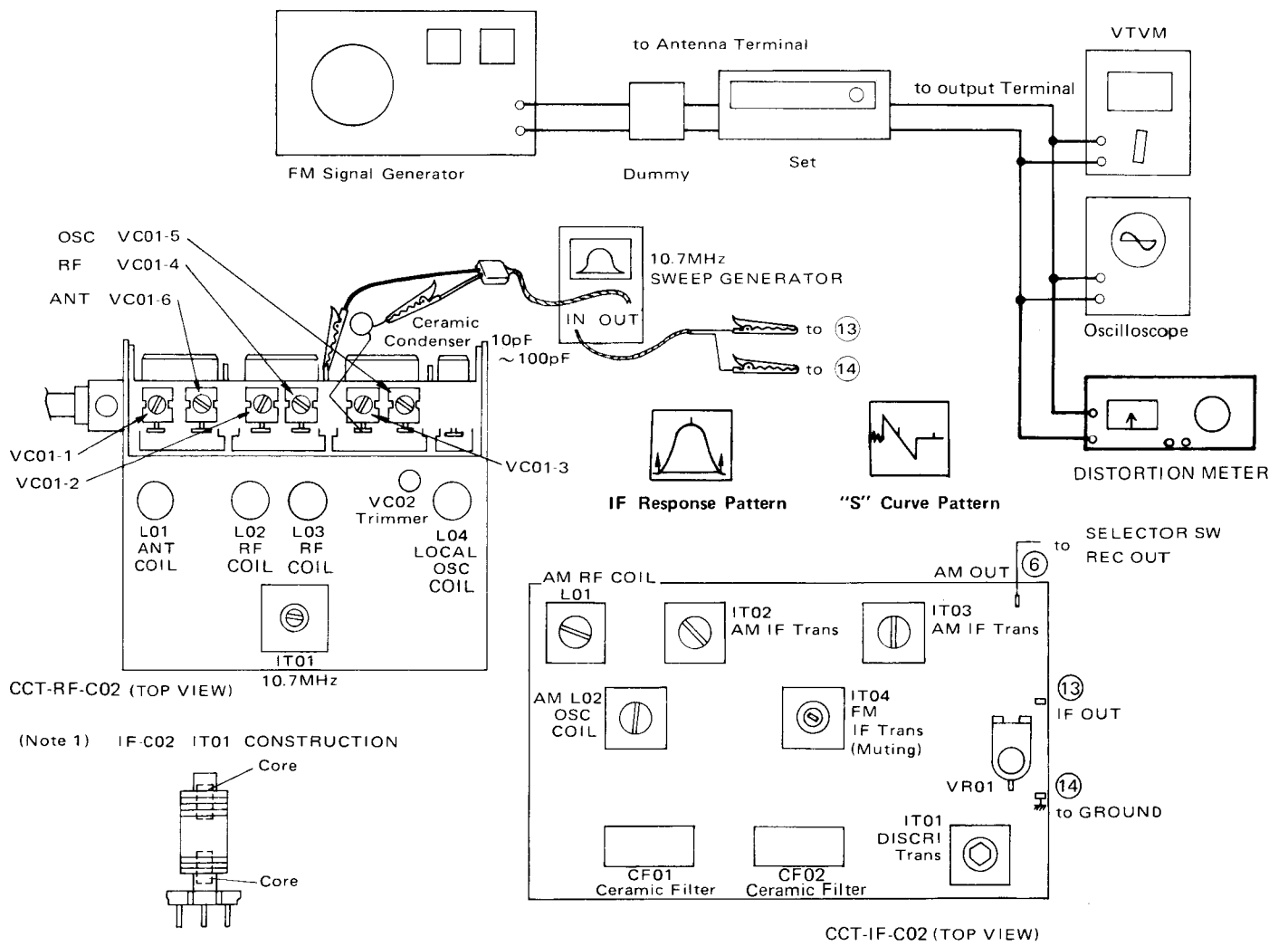
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	POSITION OF TUNING GANG	METERS	ADJUSTMENT	REMARKS
1	Connect loop antenna to signal generator and 24 inch away from the ferrite antenna.					
2	Loop antenna	540kHz	Set the tuning gang at 540kHz.	Connect to output terminals	CCT-IF-C02 L02 (OSC)	Adjust for max deflection on VTVM.
3	same	1600kHz	Set the tuning gang at 1600kHz.	same	CCT-RF-C03 VC01-5 (Trimmer)	same
4	Repeat steps 3 and 4 until no further improvement is noticed.					
5	Loop antenna	1400kHz	1400kHz	Connect to output terminals	CCT-RF-C03 VC01-4, VC01-6 (Trimmer)	Adjust for max deflection on VTVM.
6	same	600kHz	600kHz	same	CCT-IF-C02 L01 (RF) L001 (Ferrite Antenna)	same
7	Repeat steps 5 and 6 until no further improvement is attained					

## 5-2 FM TUNER ADJUSTMENT

### Equipment:

- |   |                     |
|---|---------------------|
| 1. SG (Signal Generator)                  | 5. VTVM (AC)        |
| 2. SG (Sweep Marker Generator)            | 6. Adjusting driver |
| 3. Dummy Antenna                          | 7. Oscilloscope     |
| 4. Load (dummy load 8ohm or speaker 8ohm) | 8. Distortion meter |

### FM ADJUSTMENT SETUP



(Note 2) CF Marking

red	10.70MHz	black	10.64MHz
blue	10.67MHz	white	10.76MHz
orange	10.73MHz		

### FM IF ADJUSTMENT PROCEDURE

STEP	ADJUSTMENT	REMARKS
1	IF Response CCT-RF-C03 IT01, CCT-IF-C02 IT01 (lower) IF Transformers	Adjust for scope pattern with specified marker (10.7MHz) as illustrated in Fig. Note 1. Keep the upper core of IF C02 IT01 in the top position. Note 2. Set the semi-fixed volume of IF C02 VR01 to the mid-position.
2	"S" Curve CCT-IF-C02 IT01 Detector	Adjust for symmetrical "S" curve as illustrated in Fig.

**FM RF ADJUSTMENT PROCEDURE**

Adjust the tuning gang to be able to deflect from 0 through 100 indication on the meter.

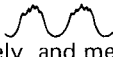

STEP	GENERATOR FREQUENCY	POSITION OF TUNING GANG	ADJUSTMENT	REMARKS
1	88MHz	Set the tuning gang at 88MHz.	CCT-RF-C03 L04 (Local Osc.)	Adjust for maximum deflection on VTVM
2	108MHz	Set the tuning gang at 108MHz.	CCT-RF-C03 VC02 (Trimmer)	as Step 1
3	88MHz	88MHz	CCT-RF-C03 L01 (Ant Coil) L02 (RF Coil) L03 (RF Coil)	as Step 1
4	108MHz	108MHz	CCT-RF-C03 VC01-1 VC01-2 VC01-3	as Step 1
5	Repeat steps 3 and 4 until no further improvement is attained.			

**Note:**

The Receiver Frequency Range should not be below 87.5 MHz owing to the FTZ regulation.

If the above condition were not satisfied, adjust the Local Oscillator Coil L04 at the FM front end by turning it in the clockwise direction.

**FM DISTORTION ADJUSTMENT**

1. Set the SG at 98 MHz (400 Hz 100% modulation), output 60 dB.
2. Connect it to the antenna terminal of the set and tune in 98 MHz signal.
3. Increase and decrease the SG frequency for output waveforms, upper clip  and lower clip , respectively, and measure the SG frequencies ( $f_1$  and  $f_2$ ) obtained.

Set the SG at the frequency  $\frac{f_1 + f_2}{2}$

4. Adjust the discrete transformer T01 upper and lower cores of Unit PCB CCT-IF-C02 to obtain the minimum distortion value.

**FM TUNING METER ADJUSTMENT**

1. This adjustment should be made immediately after the FM distortion adjustment.
2. Adjust VR01 of CCT-IF-C02 so that the tuning gang remains in the mid-position on the meter.
3. Check the distortion value again. If still maladjusted, readjust the cores of IT01, monitoring on the tuning meter.

**FM MUTING ADJUSTMENT**

1. Set the SG at 98 MHz, output 60 dB.
2. Connect it to the antenna terminal of the set and tune in 98 MHz.
3. Adjust IT04 of Unit PCB CCT-IF-C02 so that the maximum DC voltage can be obtained at TP-6. Never leave VR01 of CCT-MPX-C02 fully turned to the clockwise direction during this operation.

### 5-3 FM MPX ADJUSTMENT

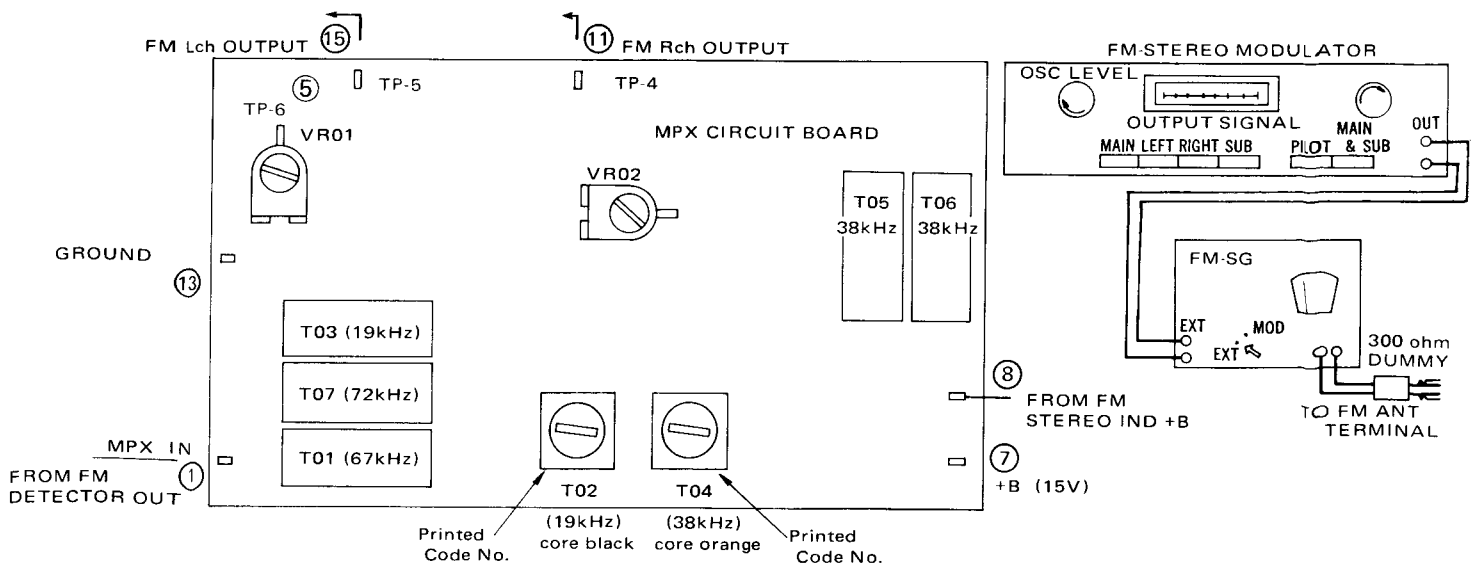
Equipment:

1. FM Signal Generator
2. FM Stereo Modulator
3. VTVM (AC)
4. Oscilloscope

#### FM STEREO MULTIPLEX ADJUSTMENT PROCEDURE

ITEM	STEP	GENERATOR	REMARKS	
1			19kHz Trap	
			67kHz, 72kHz SCA Rejection	
2	19kHz, 38kHz AMP	1	For adjustment set-up, see Fig.	
		2	Connect VTVM to TP-4 (or TP-5) or REC OUT.	
		3	FMSG 98MHz INPUT 60dB 19kHz 10% modulation sub channel 45% modulation	Adjust T02 (19kHz Transformer) to obtain maximum VTVM deflection.
3	Separation Control	1	For adjustment set-up, see Fig.	
		2	Connect VTVM to TP-4 (Rch) or REC OUT (R).	
		3	FM SG 98MHz INPUT 60dB 19kHz 10% modulation (L+R) + 19kHz 30% modulation L=R=400Hz or 1kHz	
		4	Set right channel to zero.	Adjust T04 (38kHz Transformer) a little to obtain minimum VTVM deflection. Adjust VR02 to obtain good separation
		5	Connect VTVM to TP-5 or REC OUT (L).	
		6	Same as step 3	
		7	Set left channel to zero.	Same as step 4.
		8	Repeat steps 4 and 7.	

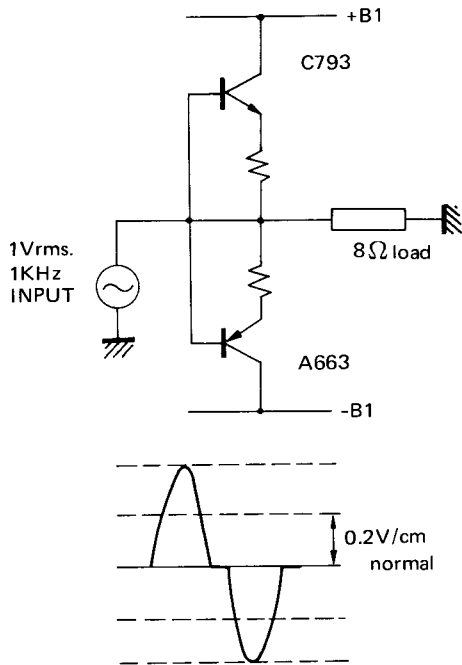
Note: Preset the semi-fixed resistor VR02 to the midposition.



**6. TROUBLE SHOOTING HINTS**

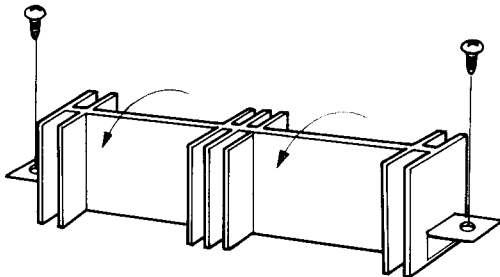
**How to examine the output power transistors:**

- Step 1. Remove the driver unit (AF-C04) from the connector. Also TR13 and TR14 (2SC496) are to be removed.
- Step 2. Measure the voltage at the speaker output terminal or terminals 13 & 14 using a tester, with the power switch on.  
OV ( $\pm 0.3V$ ) indication is normal.
- Step 3. Waveforms observation. Normal waveform illustrated below.

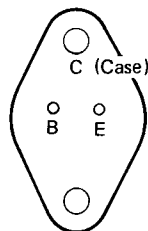


**Replacement of defective power transistors:**

- Step 1. Remove the self-tap screws on both sides of the transistor and incline it forward as illustrated below.



- Step 2. Remove the mounting screws securing the collector of the power transistor and pull out the transistor. (This is easily replaceable because TR socket is in use.)

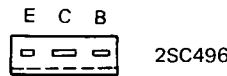


**How to examine the drive unit:**

Note: If it is likely to break the power transistors during examination, disconnect the leads to the bases of 2SC793 and 2SA663.

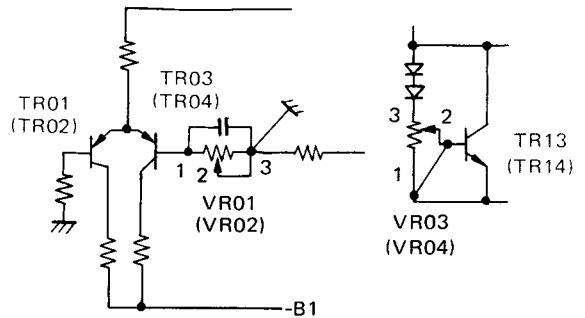
**Can one get correct mid-voltage?**

- Step 1. If OK ..... Does the voltage between the collector and the emitter of TR13 or TR14 (2SC496) change with variation of VR03 or VR04 (500 ohm)? (1.9V-3.5V)
- Step 2. OK ..... Normal  
Adjust IC idle by VR03, VR04 with power transistors connected.  
NO ..... 2SC496 is defective.
- Step 3. If NOT .... If perfect adjustment to zero voltage is not possible (normally this is variable to both + and -, but in this case it is impossible), this is due to the rank difference between  $h_{FE}$ s of TR01/03 or TR02/04. Adjust the rank.



Check if the correct mid-voltage is obtainable or not.

- Step 4. Examine TR, removing TR09 and TR11 (TR10 and TR12).  
(Note) In many cases one meets troubles with TR09 and TR11.



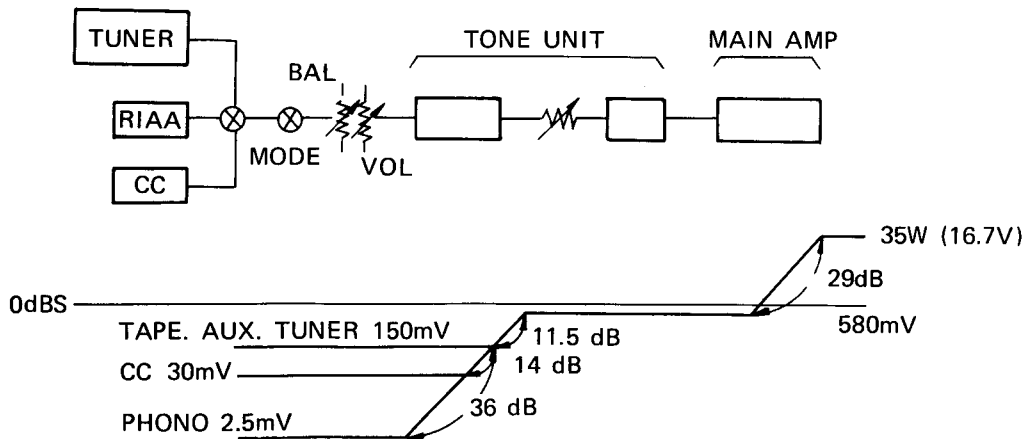
- Step 5. As shown above, connect the terminal 3 of VR01 to the ground, where TR09 and TR11 are kept removed and VR01 fully turned to the terminal 3 side. Short-circuit the base with emitter.

Examine if collector voltage of TR05 (TR06) is adjustable to zero voltage with the power switch on.

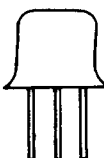
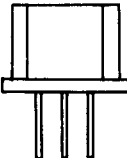
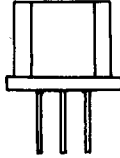



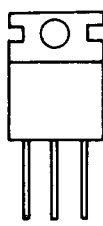
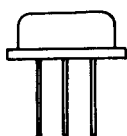
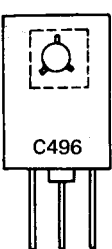
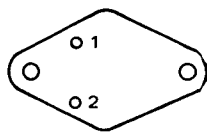
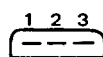

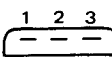
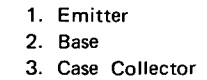
- If OK ..... Examine if the voltage between collector and emitter of TR13 changes with variation of the semi-fixed VR03 (VR04) when the short-circuit between the base and the emitter of TR13 is released. (Step 1.)

- If NOT ..... Check the transistors, TR01, TR03, TR05 and TR06.

7. LEVEL DIAGRAM



8. TRANSISTOR BASE DIAGRAMS

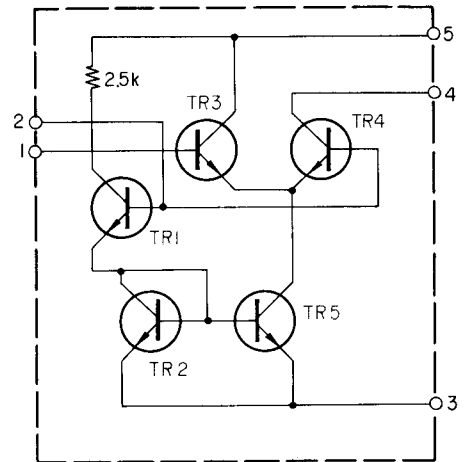
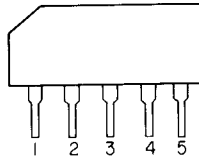
	2SA561 2SC373 2SC734 2SC785 2SC380A 2SC371 2SC372 2SC1000		
3SK35		2SK19	
			
			
1. Drain 2. Gate 2 3. Gate 1 4. Source (Case)	1. Emitter 2. Collector 3. Base	1. Drain 2. Source 3. Gate	
2SD235	2SA497 2SC497	2SC496	2SA663 2SC793
			
			
1. Base 2. Collector (Radiation Board) 3. Emitter	1. Emitter 2. Base 3. Collector (Case)	1. Emitter 2. Collector 3. Base	1. Emitter 2. Base 3. Case Collector



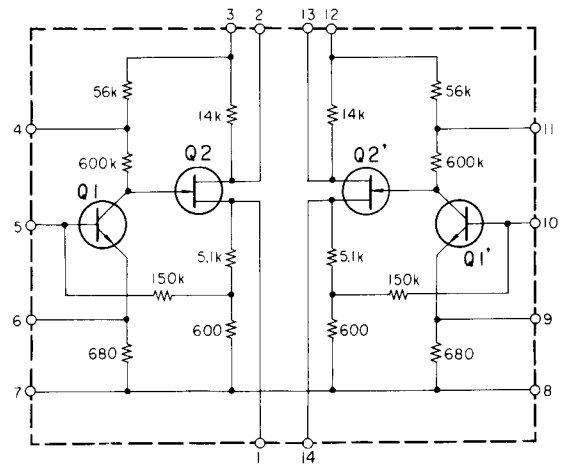
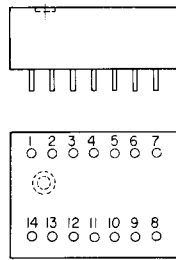
### 9. INTEGRATED CIRCUIT BASE DIAGRAM

#### EQUALIZER CIRCUIT

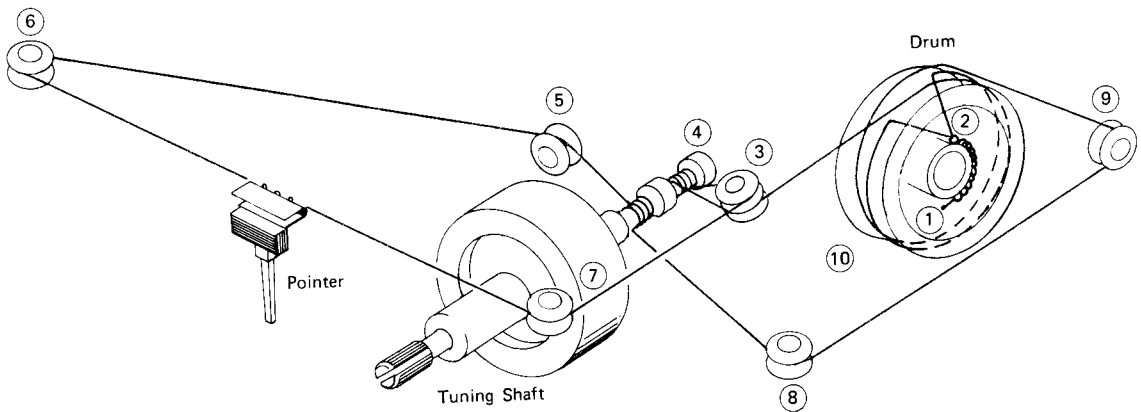
TA7060P



TH9014P



### 10. DIAL STRINGING DIAGRAM

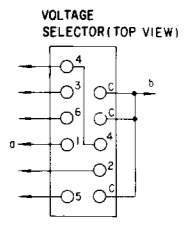
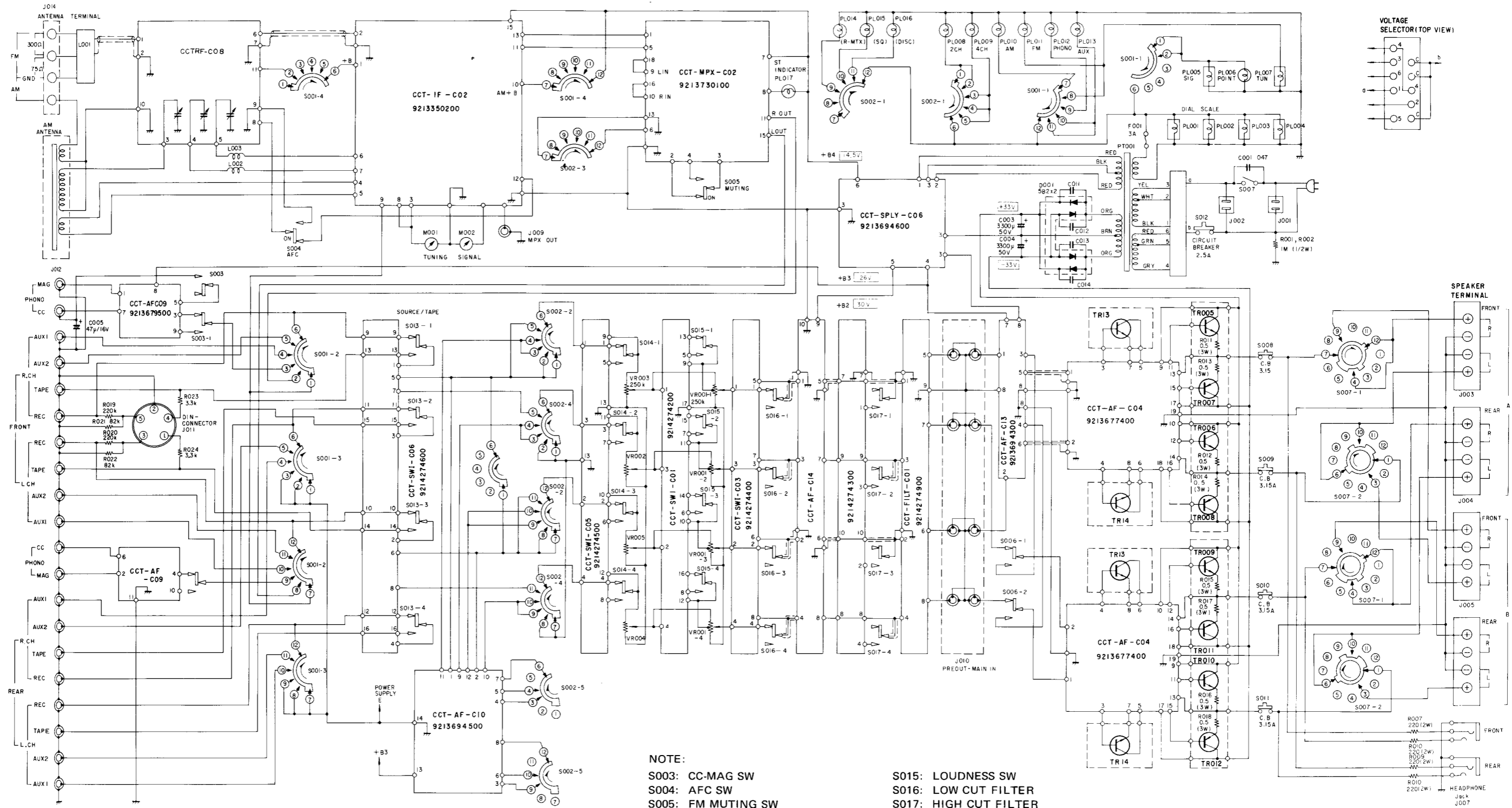


#### Dial Stringing Block Diagram

Load the dial cord as shown in the figure above. Get the cord through the eyelet as shown right. Give tension on the dial cord by tension-spring action. Then squash the eyelet and fix it by the aid of a small amount of cement not to loosen the cord.



12. SCHEMATIC DIAGRAM



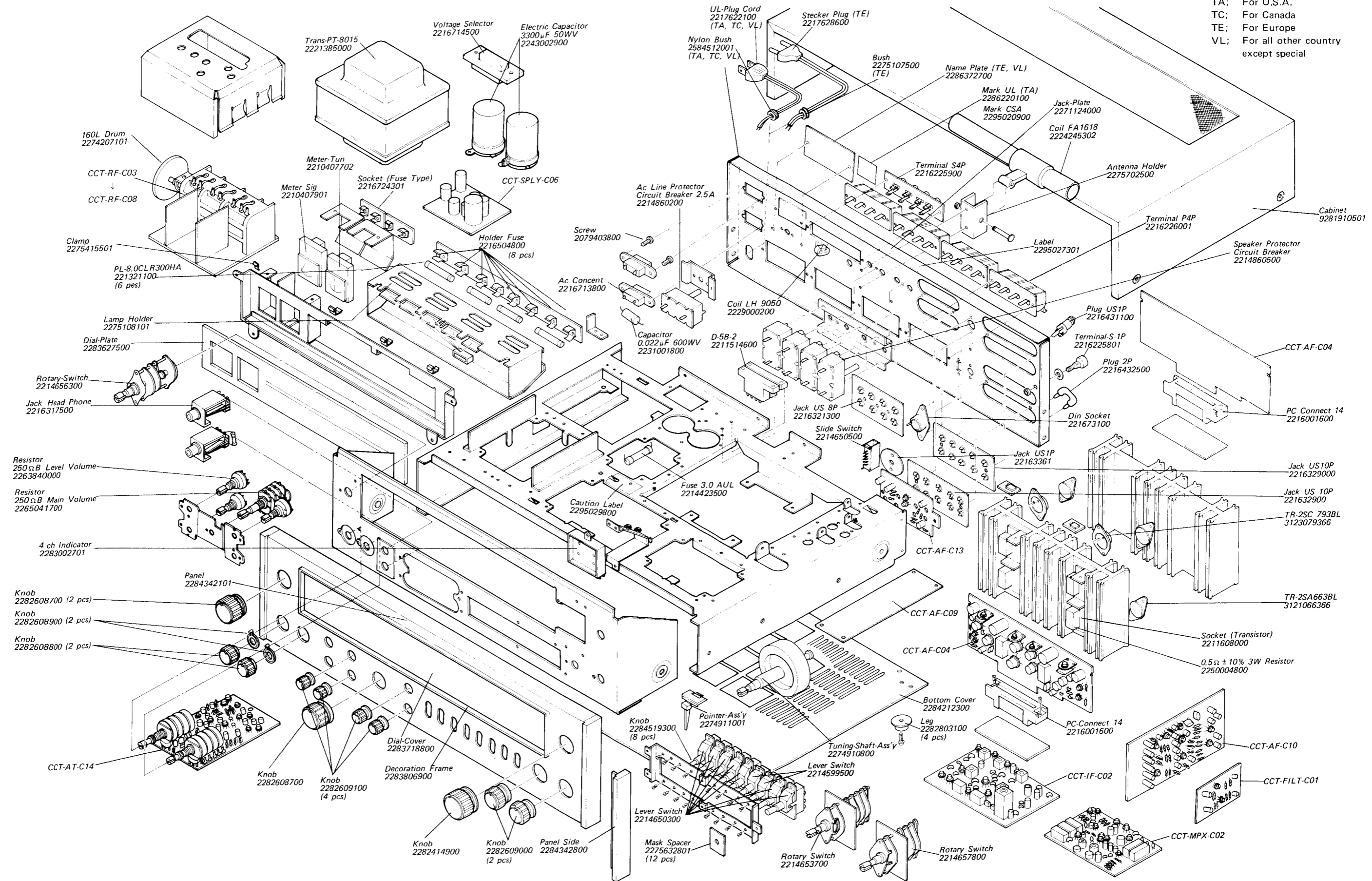
NOTE:  
 1. VOLTAGE MEASUREMENTS ARE UNDER NO SIGNAL CONDITION.  
 2. ALL RESISTOR VALUES IN OHMS. (K = 1,000Ω)  
 3. ALL CAPACITOR VALUES IN MICROFARADS. (P = μF)  
 4. SELECTOR SWITCH IN AM POSITION.  
 \* 1 1,000p is available only for TA, TC and VL models.

NOTE:  
 S003: CC-MAG SW  
 S004: AFC SW  
 S005: FM MUTING SW  
 S006: 2SP-4SP SW  
 S008~S011: SPEAKER PROTECTOR  
 S012: AC LINE PROTECTOR  
 S013: TAPE MONITOR SW  
 S014: MUTING SW  
 S015: LOUDNESS SW  
 S016: LOW CUT FILTER  
 S017: HIGH CUT FILTER

SELECTOR SW: AM, FM, PHONO, AUX1 (4CH), AUX2 (S001)  
 MODE SW: MONO, STEREO, R-MTX, SQ, DISCRETE (S002)  
 SELECTOR SW: AM, FM, PHONO, AUX1 (4CH), AUX2 (4CH) (S001)  
 MODE SW: MONO, STEREO, R-MTX, SQ, DISCRETE (S002)



11. CABINET EXPLODED VIEW

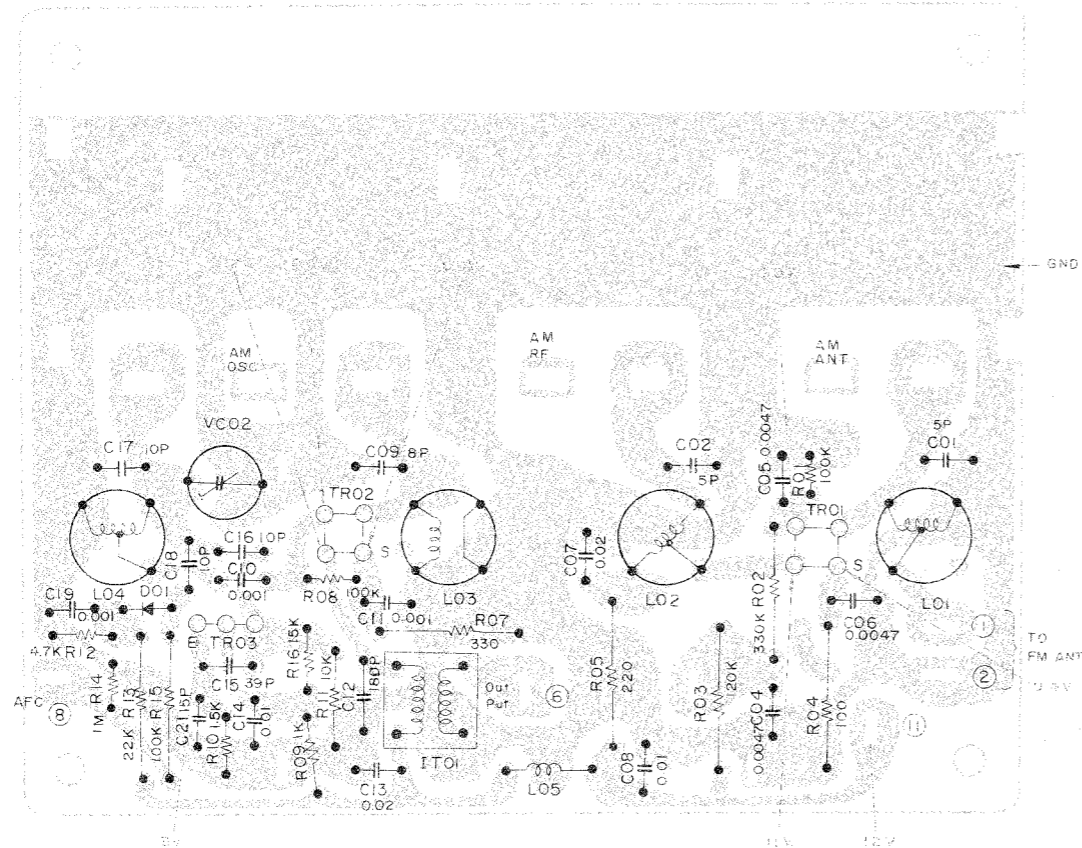


TA; For U.S.A.  
 TC; For Canada  
 TE; For Europe  
 VL; For all other country except special

13. PRINTED CIRCUIT DIAGRAMS

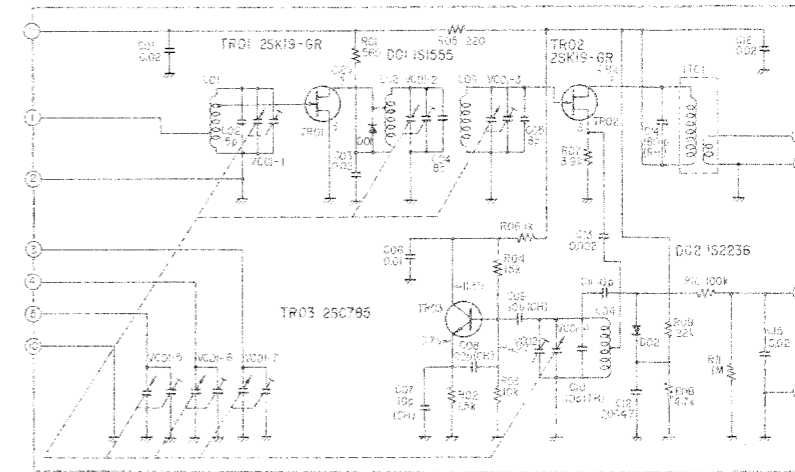
This PC Board had been changed as right-hand side figure.

FM FRONT-END CIRCUIT BOARD (CCT-RF-C03)

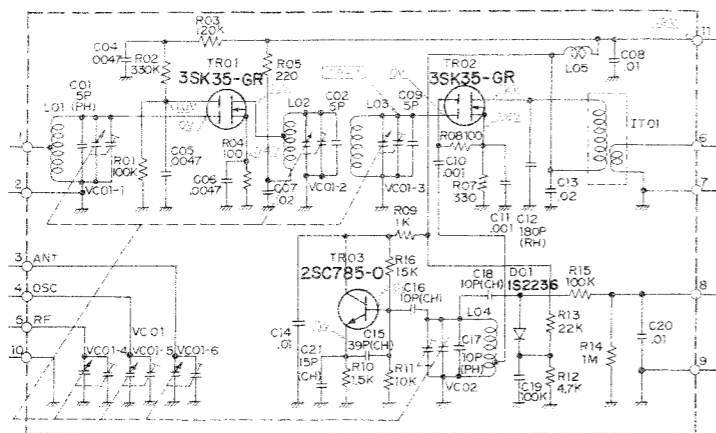
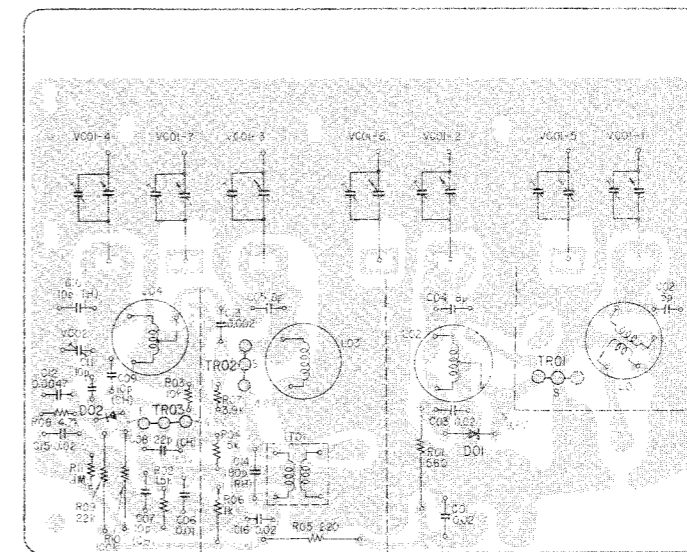


FM FRONT END UNIT (CCT-RF-C08)

SCHEMATIC DIAGRAM



BOTTOM VIEW



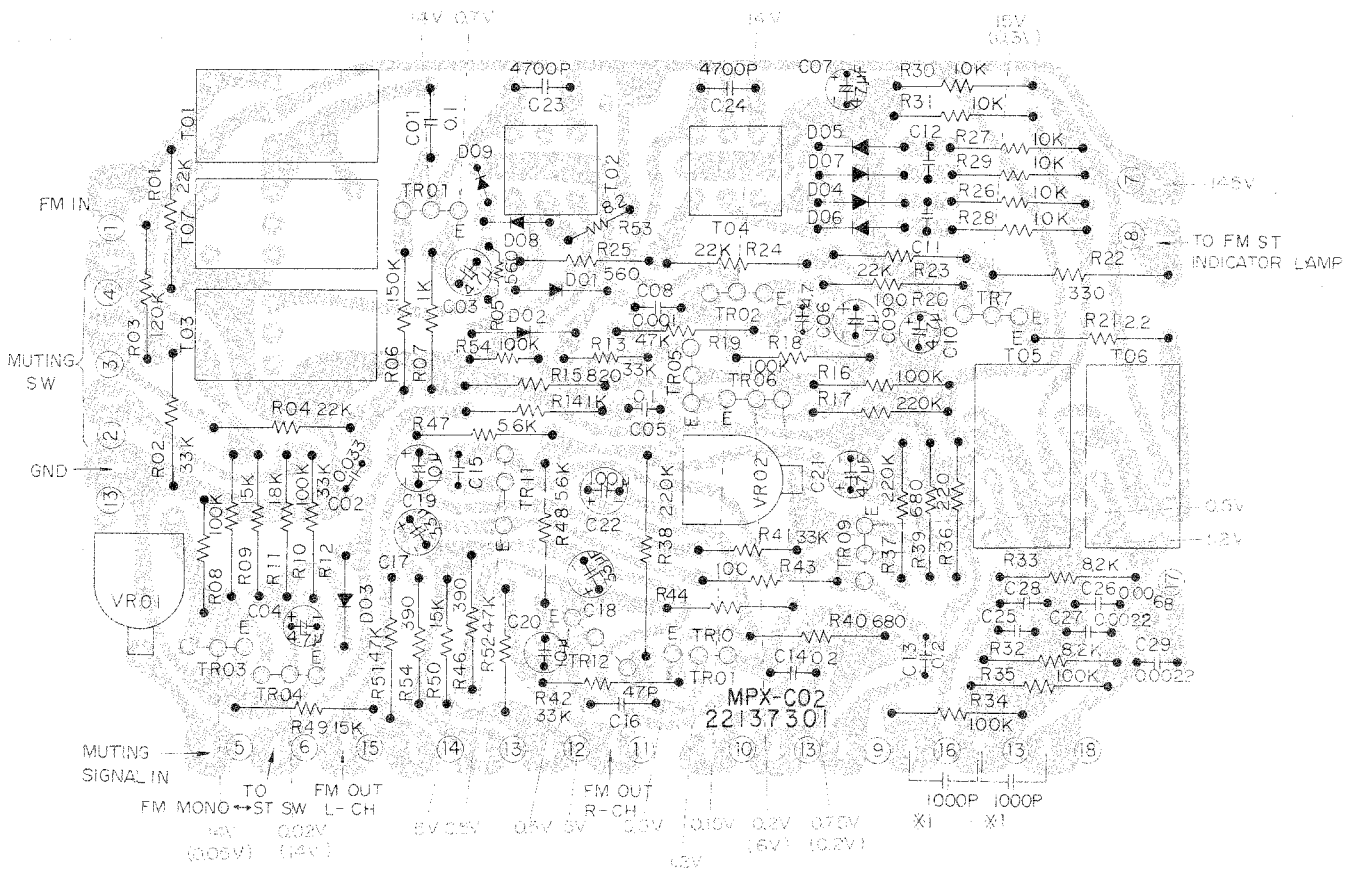
PARTS LIST

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
<b>SEMICONDUCTORS, COILS AND TRANSFORMER</b>					
TR01,TR02		Transistor 2SK19-GR	C10	22360060	Ceramic 50WV 10PFJ
TR03		Transistor 2SC785-0	C12	22341472	Ceramic 50WV 0.0047μF
D01		Diode 1S1555	C13	22341222	Ceramic 50WV 0.0022μF
D02		Diode 1S2236	C14	22360242	Ceramic 50WV 180PFK
L01	22292051	FM RF Coil RT81T	VC01	22307352	Variable Capacitor
L02	22294242	FM RF Coil RT81T	VC02	22309108	Semifixed Capacitor
L03	22294217	FM RF Coil RT8055	<b>RESISTORS</b>		
L04	22241009	FM RF Coil RT8057	R01	22544561	Carbon 1/8W 560Ω k
IT01	22265655	IF Transformer IT6478	R02	22544152	Carbon 1/8W 1.5kΩ k
<b>CAPACITORS</b>					
C01,C03, C16,C15	22341222	Ceramic 50WV 0.022μF	R03	22544103	Carbon 1/8W 10kΩ k
C02	22361509	Ceramic 50WV 5PFD	R04	22544153	Carbon 1/8W 15kΩ k
C04,C05	22361809	Ceramic 50WV 8PFD	R05	22544221	Carbon 1/8W 220Ω k
C06	22341103	Ceramic 50WV 0.01μF	R06	22544102	Carbon 1/8W 1kΩ k
C07,C09,C11	22360131	Ceramic 50WV 10PFJ	R07	22544392	Carbon 1/8W 3.9kΩ k
C08	22360134	Ceramic 50WV 22PFJ	R08	22544472	Carbon 1/8W 4.7kΩ k
			R09	22544223	Carbon 1/8W 22kΩ k
			R10	22544104	Carbon 1/8W 100kΩ k
			R11	22544105	Carbon 1/8W 1μΩ k

D=±1 pF J=±5% K=±10%

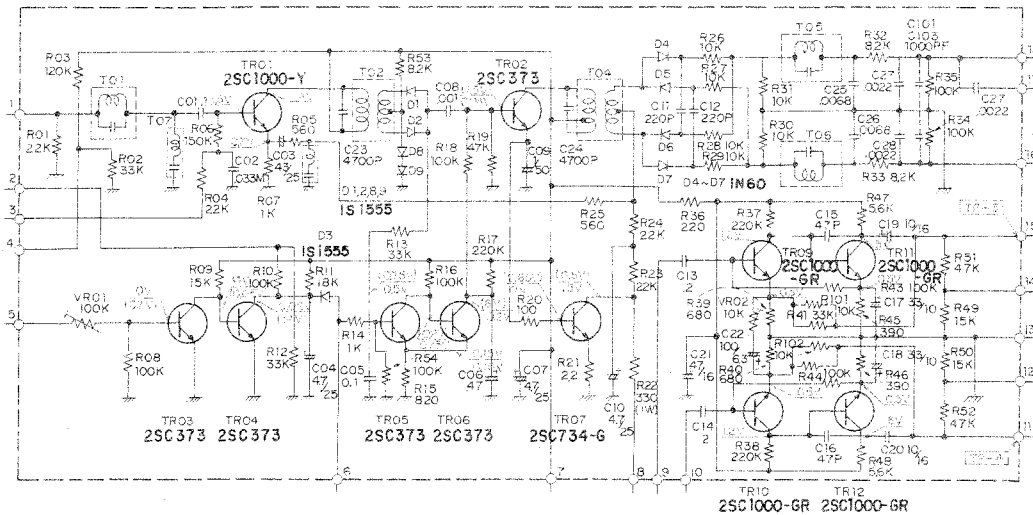


FM MULTI CIRCUIT BOARD (CCT-MPX-C02)



※ 1 Add 1,000p for 75μ sec de-emphasizing area.

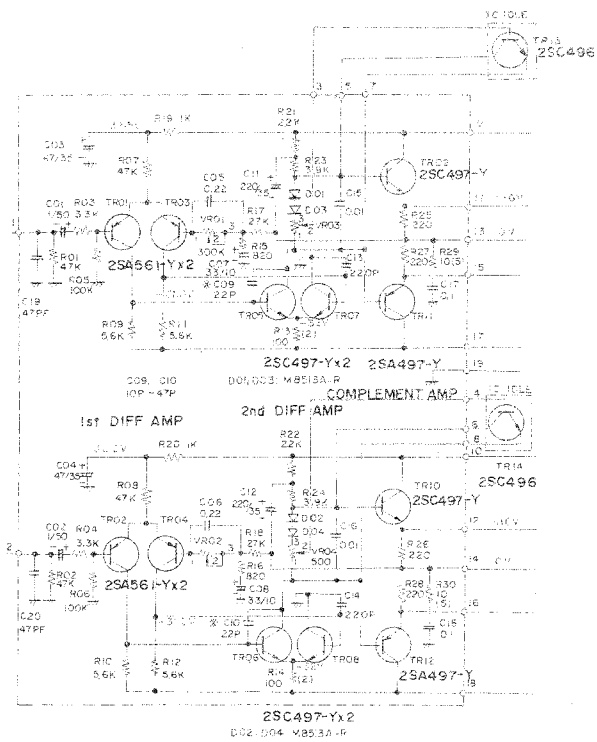
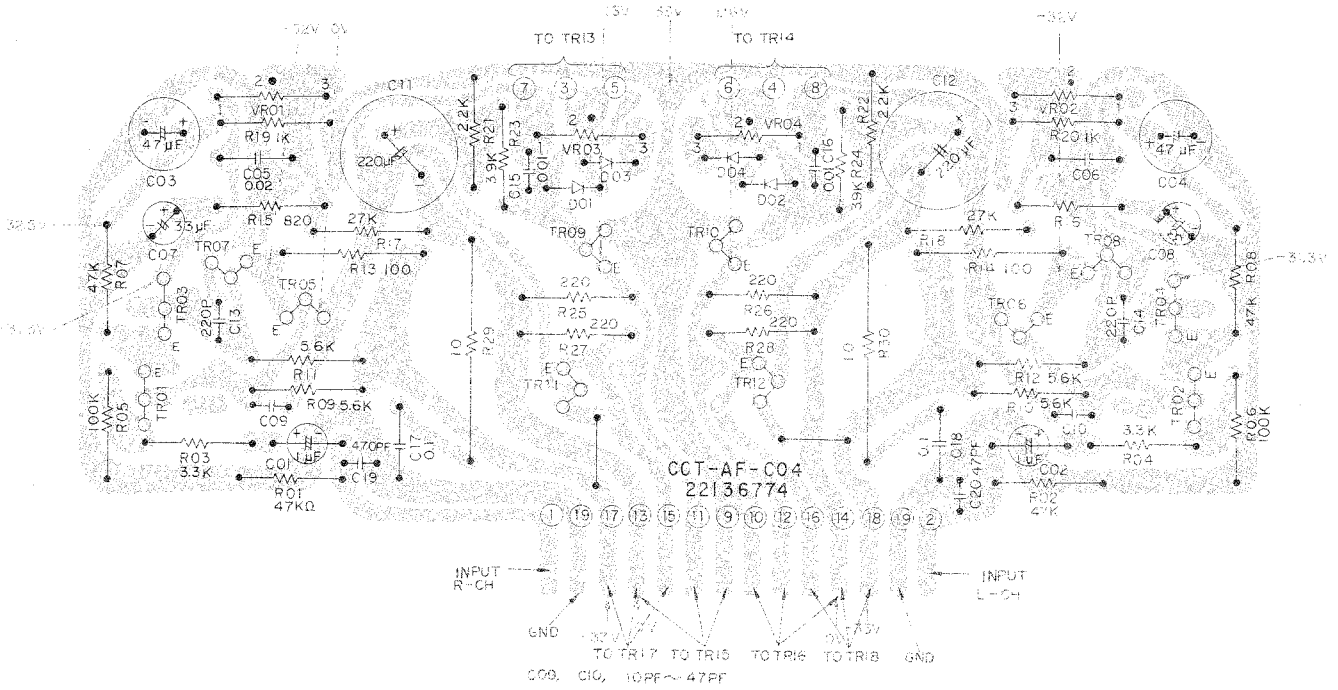
The voltage in bracket indicates the one measured with muting signal and stereo signal.



※ 1 1,000p (C101, C103) is available only for TA, TC and VL models.

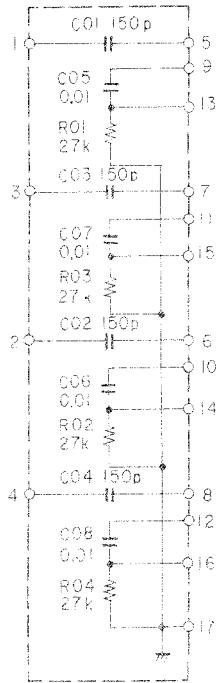


DRIVER CIRCUIT BOARD (CCT-AF-C04)



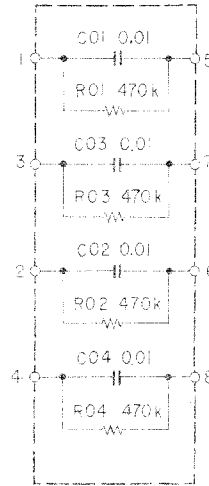
LOUDNESS CIRCUIT BOARD

(CCT-SWI-C01)

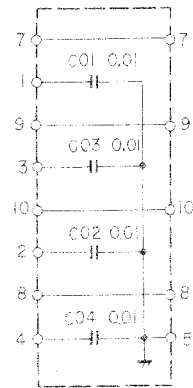


FILTER CIRCUIT BOARD

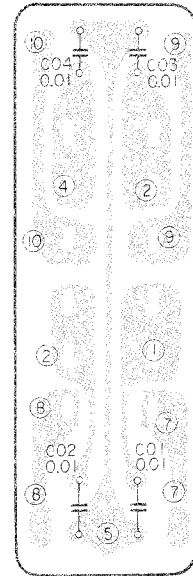
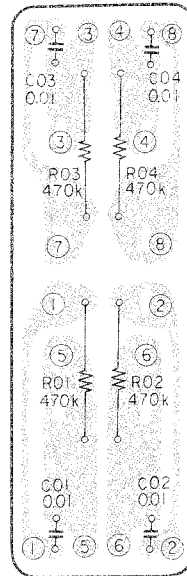
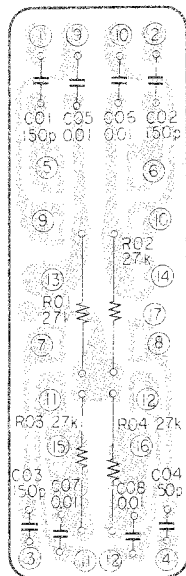
LOW (CCT-SWI-C03)



HIGH (CCT-SWI-C02)



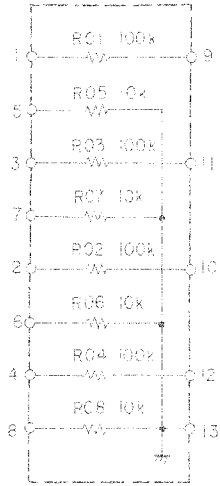
BOTTOM VIEW





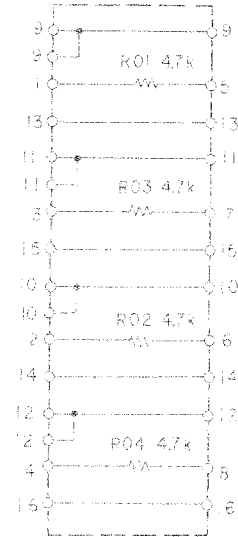
MUTING CIRCUIT BOARD

(CCT-SWI-C05)

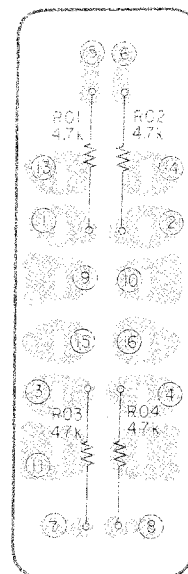
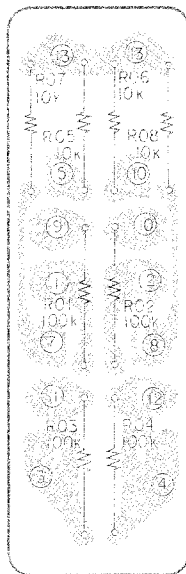


TAPE MONITOR CIRCUIT BOARD

(CCT-SWI-C06)



BOTTOM VIEW





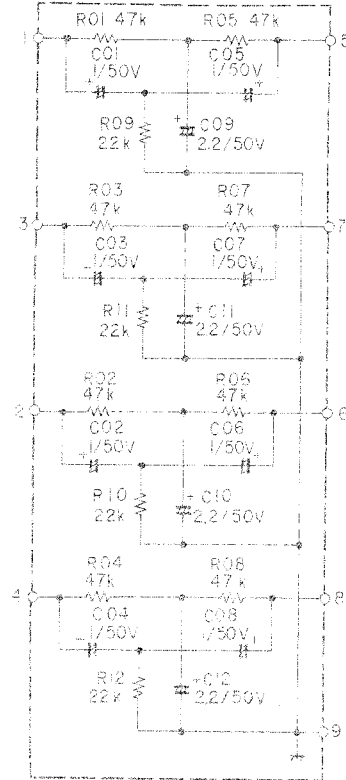
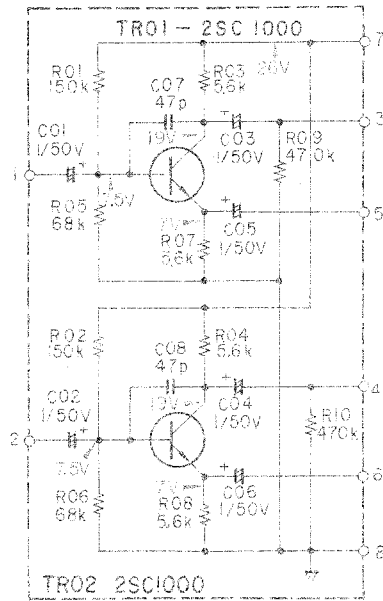
SA-304

PHASE INVERT CIRCUIT BOARD

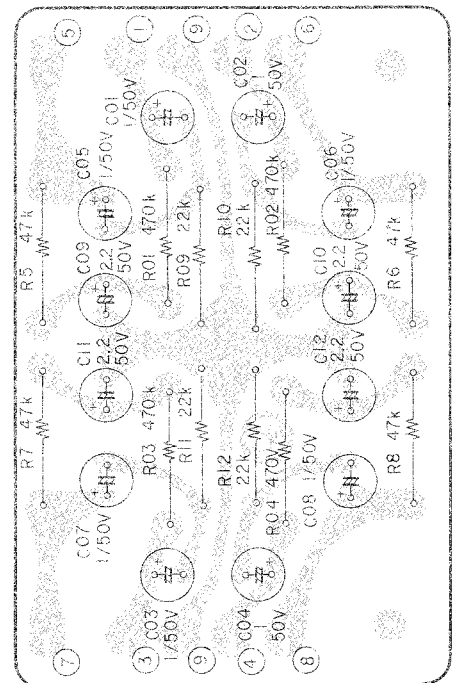
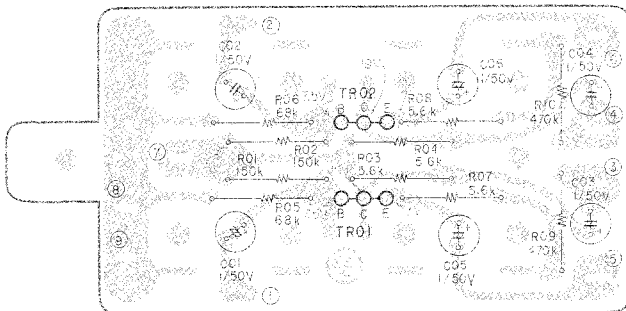
FILTER CIRCUIT BOARD

(CCT-AF-C13)

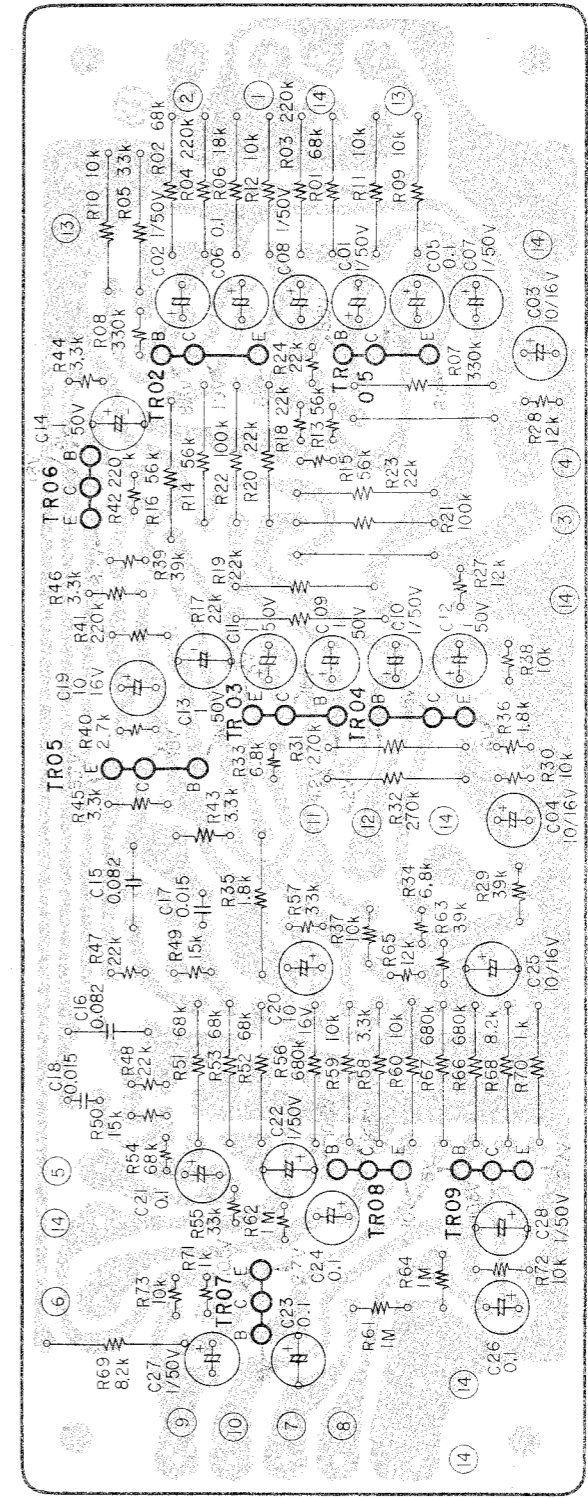
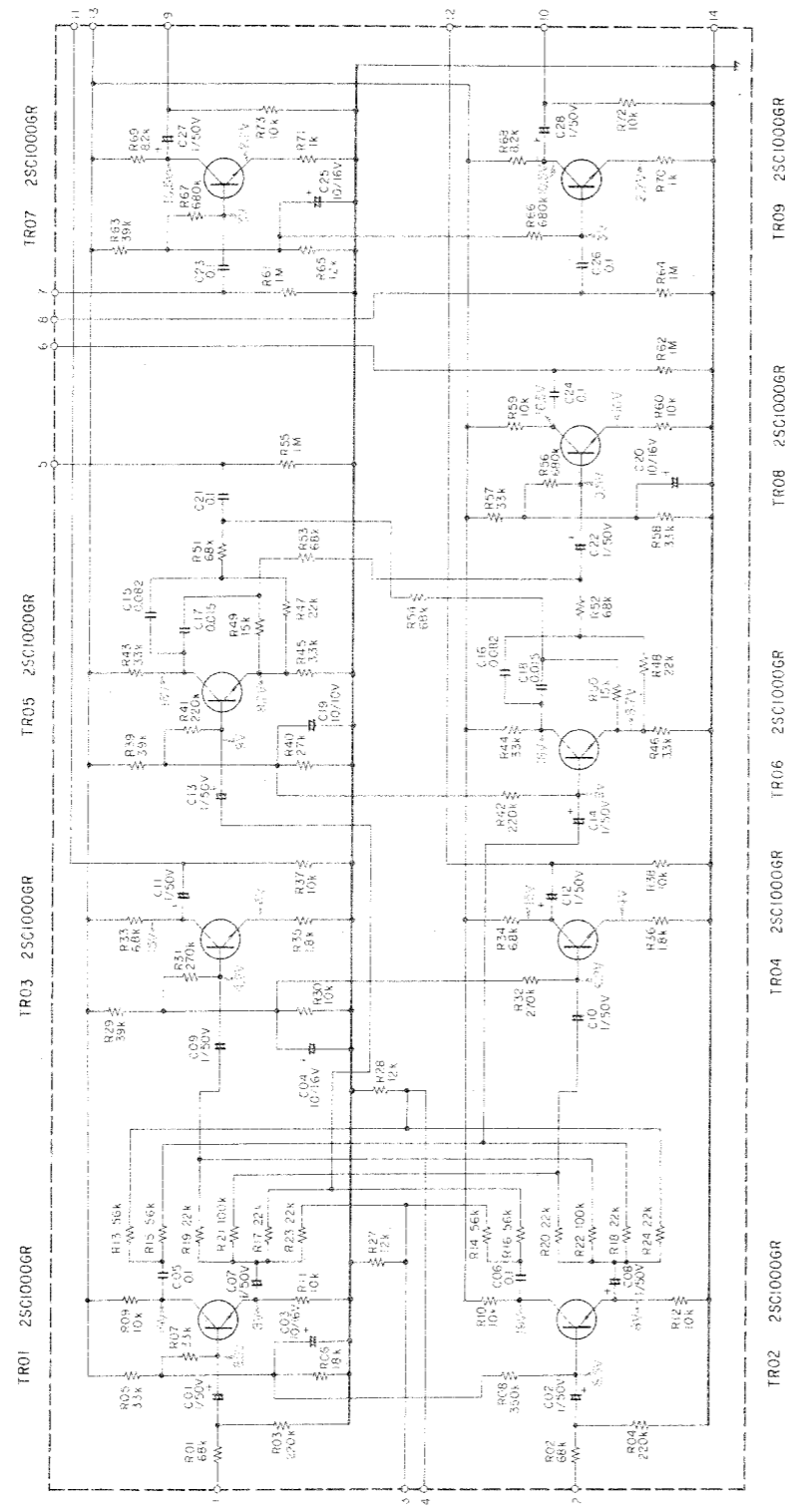
(CCT-FILT-C01)



BOTTOM VIEW

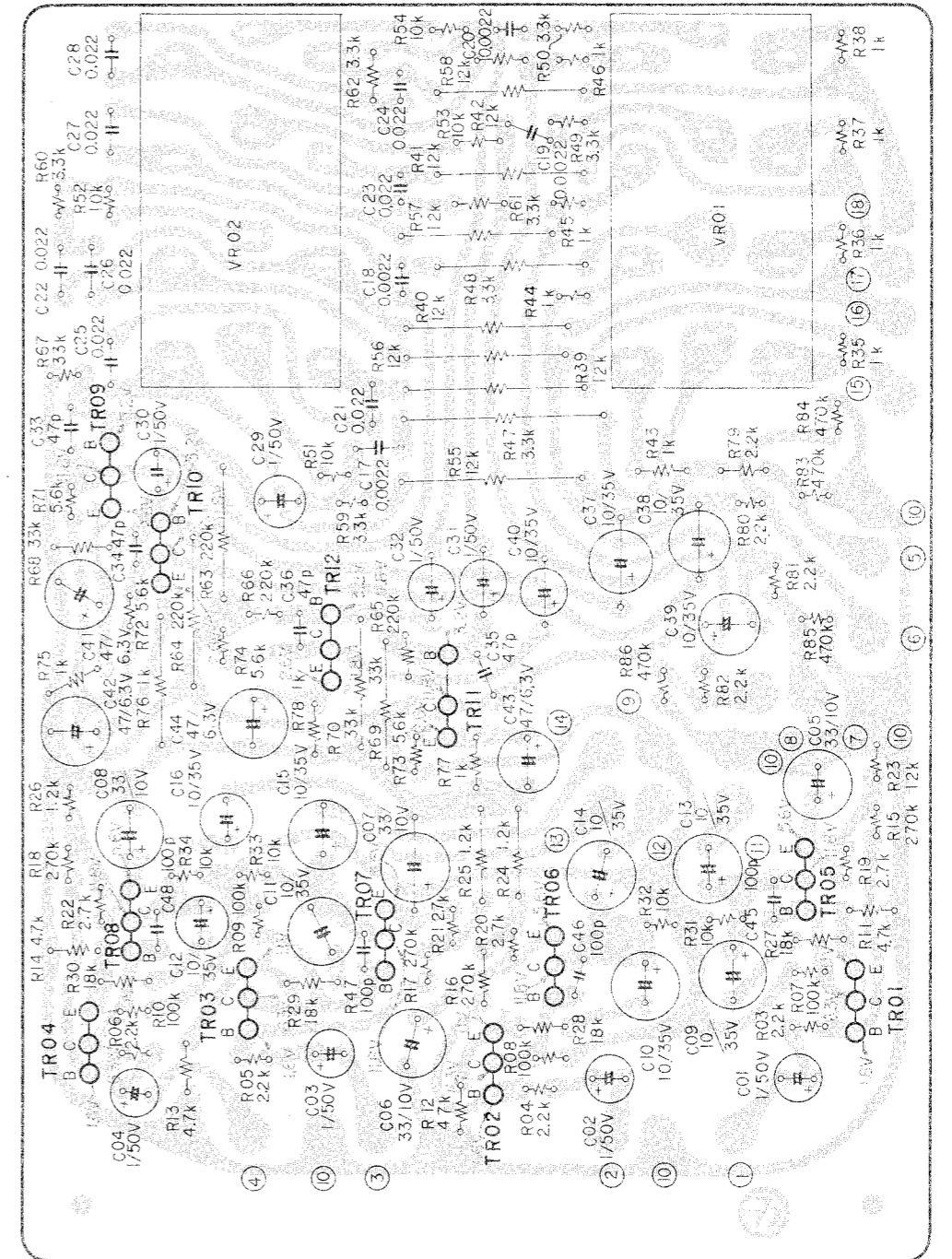
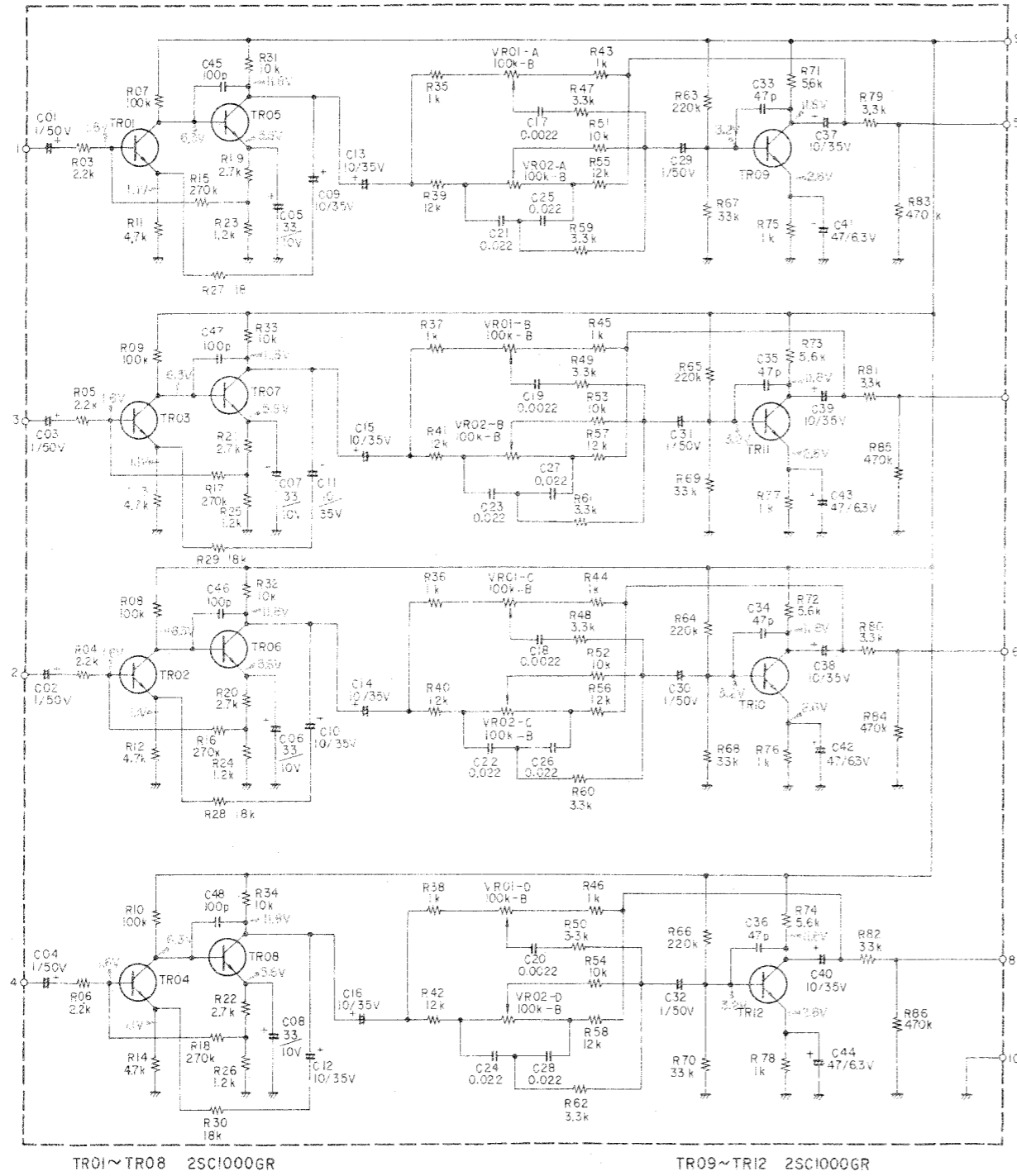


MATRIX CIRCUIT BOARD (CCT-AF-C10)

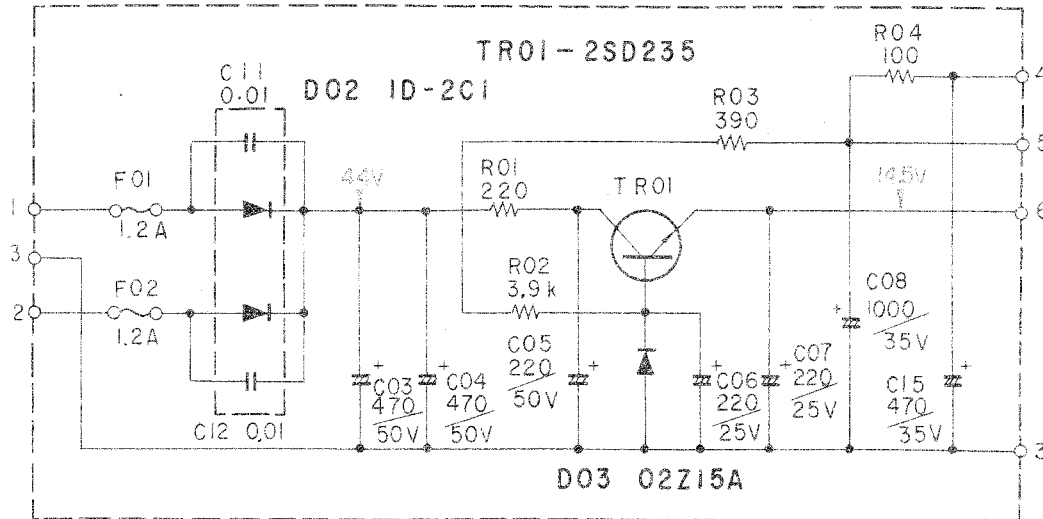


TONE CIRCUIT BOARD (CCT-AF-C14)

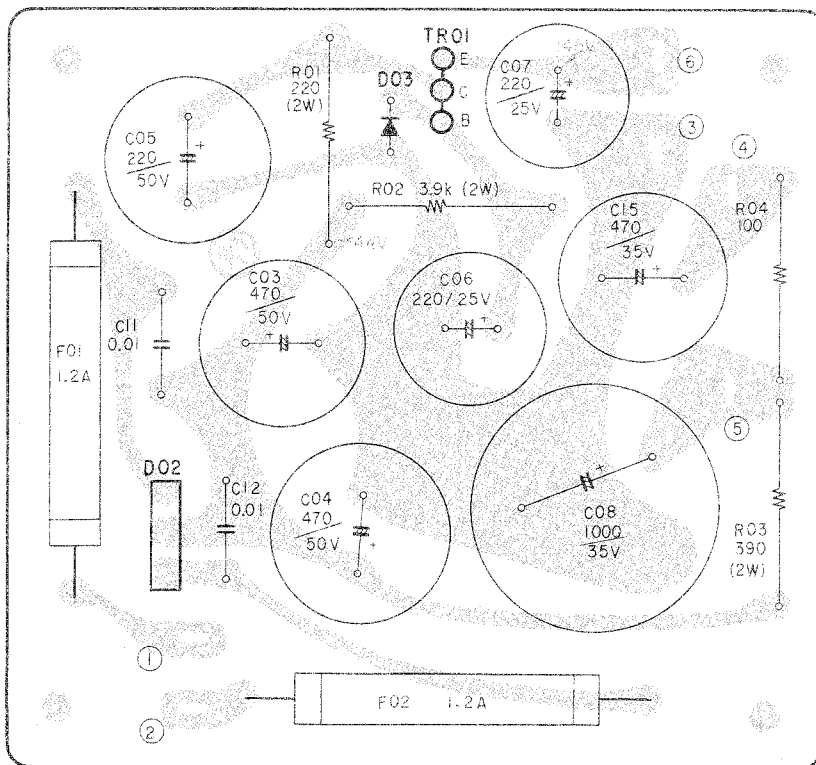
BOTTOM VIEW



POWER SUPPLY CIRCUIT BOARD (CCT-SPLY-C06)



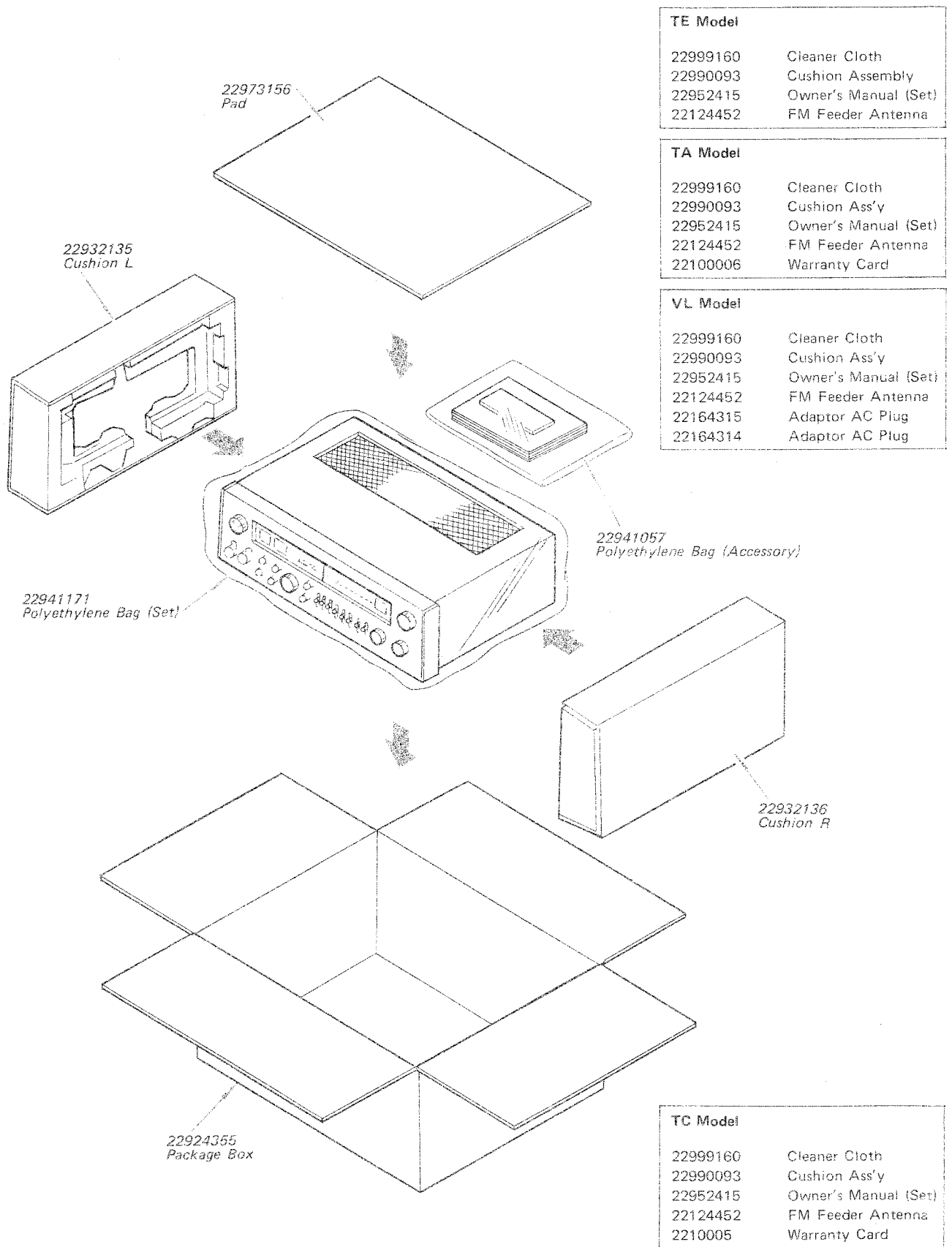
BOTTOM VIEW





SA-504

### 14. PACKING



## 15. PARTS LISTS

SYMBOL No.	PART No.	DESCRIPTION	SYMBOL No.	PART No.	DESCRIPTION
<b>ELECTRICAL PARTS</b>					
F001	22144235	FUSE 3.0A UL	R019,020	22544224	220 kohm 1/8W ±10% Carbon Resistor
S001	22146578	Rotary-Switch (Select)	R021,022	22544823	82 kohm 1/8W ±10% Carbon Resistor
S002	22146537	Rotary-Switch (Mode)	R023,024	22544332	3.3 kohm 1/8W ±10% Carbon Resistor
S003,013,014	22146502	Lever-Switch	R025,026	22544103	10 kohm 1/8W ±10% Carbon Resistor
S015,016,017			R027		
S004,005	22145995	Lever-Switch	L001	22290002	Coil-LH9050 (Balumn, trans)
S006	22146505	Slide-Switch	L002,003	22211144	Coil-LH10S 1μH
S007	22146563	Rotary-Switch		22242453	Coil-FA1618 Ferrite Antenna
S008,009	22148605	Circuit Breaker 3.15A Speaker Protector		22160016	PC CONNECTOR-1
S010,011				22167243	Socket (Fuse type)
S012	22148602	Circuit Breaker 2.5A Speaker Protector		22162258	TERMINAL-S1P (Ground)
J001,002	22167138	AC Conccent		22164311	PLUG US1P
J003,004	22162260	TERMINAL-P4P (SPEAKER)		22164325	PLUG-2P
J005,006				25845120	NY. BUSH-SR3P4 (for TA, TC, VL)
J007,015	22163175	JACK (Head Phone)		22751075	BUSH (for TE)
J008	22167145	Voltage Selector		22757025	ANTENNA Holder
J009	22163361	Jack-US1P (MPX OUT)		22862201	MARK-UL-R (for TA)
J010,012	22163290	Jack-US10P (PHONO-AUX PREOUT-MAIN IN)		22863727	NAME-PLATE (for TE, VL)
J011	22167138	DIN Socket (REC/PB)		22702113	HEXAGON CAP-NUT (for TA, TC)
J013	22163213	Jack-US8P		22703123	W4 2SS1.2 (for TA, TC)
J014	22162259	TERMINAL-S4P (ANTENNA)		22382102	0.001μF 50V ±10% (PS)(for TA,TC, VL)
PT-001	22213850	TRANS-PT8015 (Power TRANS)		22176286	STECKER-PLG (for TE)
VR001	22650417	250 kohm B MAIN Volume		22176221	VL-PLG-CORD (for TA, TC, VL)
VR002,003	22638400	250 kohm B Level Volume		22165048	Holder Fuse
VR004,005				22116086	Socket (Transistor)
PL001,002,	22113211	PL-8.0CLR 300HA		22751081	LAMP Holder
PL003,004				22163106	Jack, DIN
PL005,007				(Addition)	
PL006,008	22113239	PL-8.0 CLR 50LT5	<b>MECHANISM &amp; CABINET PARTS</b>		
PL009,110				22845193	KNOB
PL011,012				20794038	SCREW
PL013,014				22711240	JACK PLATE
PL015,016				22742071	16 OL DRUM
(PL008,009	22830027	4 CH Indicator		22749108	Tuning Shaft Assembly B
PL014,015				22749110	POINTER ASSY
PL016)				22754155	CLAMP
PL017	22113238	PL-6.0 CLR 30LT5		22828031	Leg
M001	22104077	METER-TUN		22836275	DIAL PLATE
M002	22104079	METER-SIG		22842123	BOTTOM COVER
D001	22115140	D-5B-2 diode		22863698	CAUTION PLATE
	To 22115146	Diode, 5B2		22950273	LABEL (3.15A Breaker)
	(Modification)			22950297	CAUTION LABEL (2A Fuse)
TR005,006	31210663	TR-2SA663-BL Transistor		22950298	CAUTION LABEL (1.2A Fuse)
TR009,010				22950316	CAUTION LABEL (2.5A Breaker)
TR007,008	31230793	TR-2SC793-BL Transistor		22826090	KNOB (SELECTOR, MODE)
TR011,012				22956328	MASK SPACER
C001,002	22321201	0.022μF ±20% 2500F/m Capacitor UL		22819105	CABINET
C003,004	22430029	3300μF 50WV Electric Capacitor		22824149	KNOB (TUNING)
C005	22445470	47μF 10WV Electric Capacitor		22826087	KNOB (Power Volume)
C006	22382222	2200pF 50V ±10% PS (Capacitor)		22826088	KNOB (TONE)
C007,008	22362101	100pF 50V ±10% CC (SC) (Capacitor)		22826089	KNOB (TONE)
C009,010				22826091	KNOB (Level)
C011,012	22340030	0.01μF 500V ±100% CK (Capacitor)		22837188	DIAL COVER
C013,014				22838069	DECORATION FRAME
R001,002	22563105	1 Mohm 1/2W ±10% Solid Resistor		22843421	PANEL ASSY
R007,008	22570022	220 ohm 2W ±10% Metalized film Resistor		22843428	SIDE-PANEL
R009,010					
R011,012	22500048	0.5 ohm 3W ±10% Cement type Resistor	<b>RF UNIT ASSEMBLY (CCT-RF-C03)</b>		
R013,014			TR01,02		Transistor 3SK35-GR
(R015,016			TR03		Transistor 2SC785-0
R017,018			D01		Diode 1S2236



SYMBOL No.	PART No.	DESCRIPTION	SYMBOL No.	PART No.	DESCRIPTION
L01	22292019	FMRF Coil RT-8054	CF01,02	22153017	FM Ceramic Filter SFG-10.7MA
L02	22292020	FMRF Coil RT-8053	CF03	22153009	AM Ceramic Filter SF-455D
L03	22294217	FMRF Coil RT-8055	VR01	22658177	Semifixed Resistor VR103 10 kohm
L04	22295016	FMRF Coil RT-8057	<b>CAPACITORS</b>		
L05	22241009	Choke Coil LH-9046	C01~04	22341103	Ceramic 50WV 0.01 $\mu$ F
IT01	22265655	IF Transformer IT-6478	C08,09,12		
VC01	22307352	Semifixed Capacitor	C05,13	22445470	Electrolytic 16WV 47 $\mu$ F
VC02	22309108		C06,11	22341203	Ceramic 50WV 0.02 $\mu$ F
<b>CAPACITORS</b>			C14,15		
C1,02	22361509	Ceramic 50WV 5pFD	C10,19	22341102	Ceramic 50WV 0.001 $\mu$ F
C04,05,06	22341472	Ceramic 50WV 0.0047 $\mu$ F	C16,25	22362270	Ceramic 50WV 27pF
C07,13	22341203	Ceramic 50WV 0.02 $\mu$ F	C17,18,20	22341203	Ceramic 50WV 0.02 $\mu$ F
C08,14,20	22341103	Ceramic 50WV 0.01 $\mu$ F	C21,22,24	22381471	Polystyrene 50WV 470pF
C09	22360140	Ceramic 50WV 18PFJ	C23	22445470	Electrolytic 16WV 47 $\mu$ F
C10,11,19	22341102	Ceramic 50WV 0.001 $\mu$ F	C38,52	22341203	Ceramic 50WV 0.02 $\mu$ F
C12	22360242	Ceramic 50WV 180PFK	C26,27		
C15	22360137	Ceramic 50WV 39PFJ	C54	22362221	Ceramic 50WV 220pF
C16,18	22360131	Ceramic 50WV 10PFJ	C28~30		
C17	22360138	Ceramic 50WV 10PFJ	C31,32,61	22445100	Electrolytic 16WV 10 $\mu$ F
C21	22360132	Ceramic 50WV 15PFJ	C33,35,37	22381471	Polystyrene 50WV 470pF
<b>RESISTORS</b>			C40,43		
R01,08	22554104	Film, 1/8SZ 100 kohm	C34	22373104	Mylar 50WV 0.1 $\mu$ F
R02	22544334	Film, 1/8PK 330 kohm	C36,42,54	22446479	Electrolytic 25WV 4.7 $\mu$ F
R03	22544124	Film, 1/8PK 120 kohm	C39	22361609	Ceramic 50WV 0.6pF
R04	22544101	Film, 1/8PK 100 ohm	C41	22360007	50WV 1.5pF
R05	22544221	Film, 1/8PK 220 ohm	C44,45	22373103	Mylar 50WV 0.01 $\mu$ F
R07	22544331	Film, 1/8PK 330 ohm	C58,59		
R09	22554102	Film, 1/8SZ 1 kohm	C46,48,50	22381471	Polystyrene 50WV 470pF
R10	22554152	Film, 1/8SZ 1.5 kohm	C51,55,56		
R11	22554103	Film, 1/8SZ 10 kohm	C47	22362220	Ceramic 50W 22pF
R12	22554472	Film, 1/8SZ 4.7 kohm	C53,60	22445470	Electrolytic 16WV 47 $\mu$ F
R13	22544223	Film, 1/8PK 22 kohm	C57	22341472	Ceramic 50WV 0.0047 $\mu$ F
R14	22554105	Film, 1/8SZ 1 Mohm	C62~64	22381471	Polystyrene 50WV 470pF
R15	22544104	Film, 1/8PK 100 kohm	C65	22341103	Ceramic 50WV 0.01 $\mu$ F
R16	22554153	Film, 1/8PK 15 kohm	C67	22362100	Ceramic 50WV 10pF
R17	22544563	Film, 1/8PK 56 kohm	<b>RESISTORS</b>		
<b>IF UNIT ASSEMBLY (CCT-IF-C02)</b>					
TR01~04	2SC380AO	Transistor 2SC380A-0	R01,12	22544561	Film, 1/8PK 560 ohm
TR11			R02,54	22544471	Film, 1/8PK 470 ohm
TR05	2SK19GR	Transistor 2SK19-GR	R03,15	22544391	Film, 1/8PK 390 ohm
TR06,07	2SC9410	Transistor 2SC941-0	R04,14	22544563	Film, 1/8PK 56 kohm
TR08,09	2SC3710	Transistor 2SC371-0	C05,16,52	22544562	Film, 1/8PK 5.6 kohm
TR10	2SC3720	Transistor 2SC372-0	C06,07	22544102	Film, 1/8PK 1 kohm
D01~04	IS1555	Diode IS1555	C17,18		
D11			C08,19,24	22544101	Film, 1/8PK 100 ohm
D05,06,09	IN60	Diode IN60	C31,43		
D07,08,09	IN60PR	Diode IN60 PAIR	C09,13	22544221	Film, 1/8PK 220 ohm
D12,13			C20,28		
IC01,02	TA7060P	IC, TA7060P	C10,21,33	22544104	Film, 1/8PK 100 kohm
L01	22244046	AMRF Coil RT-6064	C11,22	22544331	Film, 1/8PK 330 ohm
L02	22245232	AM Generator Coil, RT-7288	C23,27		
L03~06	22241009	Choke Coil, LH-9046	C25	22554681	Film, 1/8SZ 680 ohm
IT01	22267306	FMIF Transformer IT-8475	C26	22544122	Film, 1/8PK 1.2 kohm
IT02	22264626	AMIF Transformer IT-5477	C29,30,32	22544102	Film, 1/8PK 1kohm
IT03	22266308	AMIF Transformer IT-5476	C36,41,47		
IT04	22265654	FMIF Transformer IT-6479	C34	22544823	Film, 1/8PK 82 kohm
			C35,45	22544103	Film, 1/8PK 10 kohm
			C37	22544473	Film, 1/8PK 47 kohm
			C38,53	22544123	Film, 1/8PK 12 kohm



SYMBOL No.	PART No.	DESCRIPTION	SYMBOL No.	PART No.	DESCRIPTION
C39,60,71	22544223	Film, 1/8PK 22 kohm	<b>EQ UNIT ASSEMBLY (CCT-AF-C09)</b>		
C40	22544154	Film, 1/8PK 150 kohm	R01,02	22544823	82 kohm ±10% 1/8W RD
C42	22544224	Film, 1/8PK 220 kohm	R03,04	22544102	1 kohm ±10% 1/8W RD
C44,49,63	22544221	Film, 1/8PK 220 ohm	R05,06	22544333	33 kohm ±10% 1/8W RD
C46	22544683	Film, 1/8PK 68 kohm	R07,08	22544394	390 kohm ±10% 1/8W RD
C48	22544332	Film, 1/8PK 3.3 kohm	R09,10	22544474	470 kohm ±10% 1/8W RD
C50	22544472	Film, 1/8PK 4.7 kohm	R11	22544562	5.6 kohm ±10% 1/8W RD
C51,55,57, C69	22544103	Film, 1/8PK 10 kohm	R12	22544332	3.3 kohm ±10% 1/8W RD
C56,68,70	22544102	Film, 1/8PK 1 kohm	R13,14	22544104	100 kohm ±10% 1/8W RD
C58,64,67	22544822	Film, 1/8PK 8.2 kohm	R15	22544563	56 kohm ±10% 1/8W RD
C61	22544333	Film, 1/8PK 33 kohm	R16	22544563	56 kohm ±10% 1/8W RD
C62	22544222	Film, 1/8PK 2.2 kohm	R17	22544562	5.6 kohm ±10% 1/8W RD
C65	22544562	Film, 1/8SZ 5.6 k ohm	R18	22544184	180 kohm ±10% 1/8W RD
C66	22544393	Film, 1/8PK 39 kohm	R19	22544183	18 kohm ±10% 1/8W RD
<b>FM MPX UNIT ASSEMBLY (CCT-MPX-C02)</b>			R20	22544392	3.9 kohm ±10% 1/8W RD
TR01	2SC1000Y	Transistor 2SC1000-Y	R21	22544333	33 kohm ±10% 1/8W RD
TR02~06	2SC373	Transistor 2SC373	R22	22544333	33 kohm ±10% 1/8W RD
TR7	2SC734GR	Transistor 2SC734-GR	R23	22544473	47 kohm ±10% 1/8W RD
TR09~12	2SC1000G	Transistor 2SC1000-GR	R24	22544183	18 kohm ±10% 1/8W RD
D01~03	IS1555	Diode 1S1555	R25	22544152	1.5 kohm ±10% 1/8W RD
D04~07	IN60PR	Diode 1N60 PAIR	R26	22544183	18 kohm ±10% 1/8W RD
T01	22212026	Stereo Coil 67 kHz ST-3204	R27	22544392	3.9 kohm ±10% 1/8W RD
T02	22212029	Stereo Coil ST-1111 19 kHz	R28	22544474	470 kohm ±10% 1/8W RD
T03	22212028	Stereo Coil ST-1112 19 kHz	R29	22544474	470 kohm ±10% 1/8W RD
T04	22212030	Stereo Coil ST-2306 38 kHz	R30	—	—
T05,06	22212027	Stereo Coil ST-2307 38 kHz	R31	22544564	560 kohm ±10% 1/8W RD
T07	22212035	Stereo Coil ST-135 72 kHz	R32	22544101	100 ohm ±10% 1/8W RD
VR01	22658178	Semifixed Resistor R104 100 kohm	C01,02	22448109	1μF 50WV CE
<b>CAPACITORS</b>			C03,04	22447100	10μF 35WV CE
C01	22373104	Mylar 50WV 0.1μF	C05,06	22373102	0.001μF 50V ±20% MY
C02	22373333	Mylar 50WV 0.033μF	C07,08	22373682	0.0068μ 50V ±20% MY
C03,04,10	22446479	Electrolytic 25WV 4.7μF	C09,10	22373102	0.001μF 50V ±20% MY
C05,06	22373103	Mylar 50WV 0.01μF	C11,12	22445100	10μF 16WV CE
C07,21	22445470	Electrolytic 16WV 47μF	C13,14	22448109	1μF 50WV CE
C08	22373102	Mylar 50WV 1,000pF	C15,16	22448109	1μF 50WV CE
C09	22448109	Electrolytic 50WV 1μF	C17,18	22373223	0.022μF 50V ±20% MY
C11,12	22362221	Ceramic 50WV 220pF	C19,20	22373332	0.0033μF 50V ±20% MY
C13,14	22340001	Ceramic 0.2μFZ	C21	22443330	33μF 10WV CE
C15,16	22362470	50WV 47pF	C22	22446479	4.7μF 25WV CE
C17,18	22443330	Electrolytic 10WV 33μF	C23	22447100	10μF 35WV CE
C19,20	22445100	Electrolytic 16WV 10μF	C24	22448109	1μF 50WV CE
C22	22442101	Electrolytic 6WV 100μF	C25	22448109	1μF 50WV CE
C23,24	22382472	Polystyrene 50WV 0.0047μF	C26	22447470	47μF 35WV CE
C25,26	22371682	Mylar 50WV 0.0068μF	IC01	TH9014P	—
C27,28	22371222	Mylar 50WV 0.0022μF	TR01,02	2SC1000-GR	—
C29	22373222	Mylar 50WV 0.0022μFM	TR03,04	2SC1000-GR	—
<b>RESISTORS</b>			<b>TONE UNIT ASSEMBLY (CCT-AF-C14)</b>		
R01,04	22544223	Film, 1/8PK 22 kohm	TR01,02,03	31 231000	TR-2SC1000-GR Transistor
R23,24					
R02,41	22544333	Film, 1/8PK 33 kohm			
R12,13					
R03	22544124	Film 1/8PK 120 kohm	<b>CAPACITORS</b>		
R05	22544561	Film, 1/8SZ 560 ohm	C01,02,03,04	22448109	1μF 50WV Electric Capacitor
R06	22544154	Film, 1/8PK 150 kohm	C29,30,31,32		
			C05,06,07,08	22443330	33μF 10WV Electric Capacitor



SYMBOL No.	PART No.	DESCRIPTION		
C09,10,11,12 C13,14,15,16 C37,38,39,40	22447100	10 $\mu$ F	35WV	Electric Capacitor
C17,18,19,20	22373222	0.0022 $\mu$ F	50V	$\pm$ 20% MY
C21,22,23,24 C25,26,27,28	22373223	0.022 $\mu$ F	50V	$\pm$ 20% MY
C33,34,35,36	22362470	47pF	50V	$\pm$ 10% CC (SL)
C41,42,43,44	22442470	47 $\mu$ F	6.3WV	Electric Capacitor
C45,46,47,48	22362101	100pF	50V	$\pm$ 10% CC (SL)
<b>CARBON RESISTORS</b>				
R03,04,05,06	2254222	2.2 kohm	1/8W	$\pm$ 10% Single ended
R07,08,09,10	2254104	100 kohm	1/8W	$\pm$ 10% Single ended
R11,12,13,14	2254472	4.7 kohm	1/8W	$\pm$ 10% Single ended
R15,16,17,18	2254274	270 kohm	1/8W	$\pm$ 10% Single ended
R19,20,21,22	2254272	2.7 kohm	1/8W	$\pm$ 10% Single ended
R23,24,25,26	2254122	1.2 kohm	1/8W	$\pm$ 10% Single ended
R27,28,29,30	2254183	18 kohm	1/8W	$\pm$ 10% Single ended
R31,32,33,34 R51,52,53,54	2254103	10 kohm	1/8W	$\pm$ 10% Single ended
R35,36,37,38 R43,44,45,46 R75,77,78	2254102	1 kohm	1/8W	$\pm$ 10% Single ended
R39,40,41,42 R55,56,57	2254123	12 kohm	1/8W	$\pm$ 10% Single ended
R47,48	22544332	3.3 kohm	1/8W	$\pm$ 10% Single ended
R49,50,59,60 R61,62,79,80 R81,82	2254332	3.3 kohm	1/8W	$\pm$ 10% Single ended
R58	22544123	12 kohm	1/8W	$\pm$ 10% Single ended
R63,64	22544224	220 kohm	1/8W	$\pm$ 10% Single ended
R65,66	2254224	220 kohm	1/8W	$\pm$ 10% Single ended
R67,68	2254333	33 kohm	1/8W	$\pm$ 10% Single ended
R69,70	2254333	33 kohm	1/8W	$\pm$ 10% Single ended
R71,72,73,74	2254562	5.6 kohm	1/8W	$\pm$ 10% Single ended
R76	22544102	1 kohm	1/8W	$\pm$ 10% Single ended
R83,84,85,86	2254474	470 kohm	1/8W	$\pm$ 10% Single ended
VR01 A,B,C,D	22650406	100 kohm B	Bass	Variable Resistor
VR02 A,B,C,D	22650406	100 kohm B	Bass	Variable Resistor
<b>MATRIX UNIT ASSEMBLY (CCT-AF-C10)</b>				
TR01,02,03 TR04,05,06 TR07,08,09	31231000	TR-2SC1000-GR	Transistor	
<b>CAPACITORS</b>				
C01,02,07,08 C09,10,11,12 C13,14,22,27 C28	22448109	1 $\mu$ F	50WV	Electric Capacitor
C03,04,19,20 C25	22445100	10 $\mu$ F	16WV	Electric Capacitor
C05,06,21,23 C24,25	23373104	0.1 $\mu$ F	50V	$\pm$ 20% MY
C15,16	22373823	0.082 $\mu$ F	50V	$\pm$ 20% MY
C17,18	22373153	0.015 $\mu$ F	50V	$\pm$ 20% MY

SYMBOL No.	PART No.	DESCRIPTION		
<b>CARBON RESISTORS</b>				
R01,02 R51,52,53	22544683	68 kohm	1/8W	$\pm$ 10% Single ended
R03,04	22544224	220 kohm	1/8W	$\pm$ 10% Single ended
R05,58	22544333	33 kohm	1/8W	$\pm$ 10% Single ended
R06	22544183	18 kohm	1/8W	$\pm$ 10% Single ended
R07	22544334	330 kohm	1/8W	$\pm$ 10% Single ended
R08	22554334	330 kohm	1/8W	$\pm$ 10% Single ended
R09,10,11,12 R59,60	22544103	10 kohm	1/8W	$\pm$ 10% Single ended
R13,15	22554563	56 kohm	1/8W	$\pm$ 10% Single ended
R14,16	22544563	56 kohm	1/8W	$\pm$ 10% Single ended
R17,19,20,23	22544223	22 kohm	1/8W	$\pm$ 10% Single ended
R18,24,47,48	22544223	22 kohm	1/8W	$\pm$ 10% Single ended
R21,22	22544104	100 kohm	1/8W	$\pm$ 10% Single ended
R25,26	22544330	33 ohm	1/8W	$\pm$ 10% Single ended
R27,28	22554123	12 kohm	1/8W	$\pm$ 10% Single ended
R29,39,63	22554393	39 kohm	1/8W	$\pm$ 10% Single ended
R30,37,38,72 R73	22554103	10 kohm	1/8W	$\pm$ 10% Single ended
R31,32	22544274	270 kohm	1/8W	$\pm$ 10% Single ended
R33,34	22554682	6.8 kohm	1/8W	$\pm$ 10% Single ended
R35	22544182	1.8 kohm	1/8W	$\pm$ 10% Single ended
R36	22554182	1.8 kohm	1/8W	$\pm$ 10% Single ended
R40	22554273	27 kohm	1/8W	$\pm$ 10% Single ended
R41,42	22554224	220 kohm	1/8W	$\pm$ 10% Single ended
R43,44,45,46	22554332	3.3 kohm	1/8W	$\pm$ 10% Single ended
R49,50	22554153	15 kohm	1/8W	$\pm$ 10% Single ended
R54	22554683	68 kohm	1/8W	$\pm$ 10% Single ended
R55,61,62,64	22554105	1 Mohm	1/8W	$\pm$ 10% Single ended
R56	22544684	680 kohm	1/8W	$\pm$ 10% Single ended
R57	22554333	33 kohm	1/8W	$\pm$ 10% Single ended
R65	22554123	12 kohm	1/8W	$\pm$ 10% Single ended
R68,69	22544822	8.2 kohm	1/8W	$\pm$ 10% Single ended
R70	22544102	1 kohm	1/8W	$\pm$ 10% Single ended
R71	22554102	1 kohm	1/8W	$\pm$ 10% Single ended
<b>LOUDNESS UNIT ASSEMBLY (CCT-SWI-C01)</b>				
	22142731	SWI-C01-PCB PC BOARD		
<b>CAPACITORS</b>				
C01,02,03,04 C05,06,07,08	22362151	150pF	50V	$\pm$ 10% CC (SL)
	22373103	0.01 $\mu$ F	50V	$\pm$ 20% MY
<b>CARBON RESISTORS</b>				
R01,02,03,04	22544273	27 kohm	1/8W	$\pm$ 10%
<b>HIGH FILTER UNIT (CCT-SWI-C02)</b>				
	22142732	SWI-C02-PCB PC BOARD		
<b>CAPACITORS</b>				
C01,02,03,04	22373103	0.01 $\mu$ F	50V	$\pm$ 20% MY

SYMBOL No.	PART No.	DESCRIPTION	SYMBOL No.	PART No.	DESCRIPTION
<b>LOW FILTER UNIT ASSEMBLY (CCT-SWI-C03)</b>					
	22142733	SWI-C03-PCB PC BOARD	TR13,14 D01,02		2SC496 S3016-R To M8513A-R (Modification)
C01,02,03,04	<b>CAPACITORS</b>		D03,04		S3016-R To M8513A-R (Modification)
	22373103	0.01 $\mu$ F 50V $\pm$ 20% MY	<b>RESISTORS</b>		
R01,02,03,04	<b>CARBON RESISTORS</b>		22544474	47 kohm	$\pm$ 10% 1/8W RD
	22544474	470 kohm 1/8W $\pm$ 10%	R03,04	22544332	3.3 kohm $\pm$ 10% 1/8W RD
<b>MUTING UNIT ASSEMBLY (CCT-SWI-C05)</b>			R05,06	22544104	100 kohm $\pm$ 10% 1/8W RD
	22142735	SWI-C05-PCB PC BOARD	R07,08	22544473	47 kohm $\pm$ 10% 1/8W RD
R01,02,03,04	<b>CARBON RESISTORS</b>		R09,10	22544562	5.6 kohm $\pm$ 10% 1/8W RD
	22544103	10 kohm 1/8W $\pm$ 10%	R11,12	22544562	5.6 kohm $\pm$ 10% 1/8W RD
R05,06,07,08	22544104	100 kohm 1/8W $\pm$ 10%	R13,14	22570021	100 ohm $\pm$ 10% 2W RN
<b>TAPE MONITOR UNIT ASSEMBLY (CCT-SWI-C06)</b>			R15,16	22544821	820 ohm $\pm$ 10% 1/8W RD
	22142736	SWI-C06-PCB PC BOARD	R17,18	22544273	27 kohm $\pm$ 10% 1/8W RD
R01,02,03,04	<b>CARBON RESISTORS</b>		R19,20	22544102	1 kohm $\pm$ 10% 1/8W RD
	22544472	4.7 kohm 1/8W $\pm$ 10%	R21,22	22544222	2.2 kohm $\pm$ 10% 1/8W RD
<b>FILTER UNIT ASSEMBLY (CCT-FILT-C01)</b>			R23,24	22544392	3.9 kohm $\pm$ 10% 1/8W RD
<b>CAPACITORS</b>			R25,26	22544221	220 ohm $\pm$ 10% 1/8W RD
C01,02,03,04	22448109	1 $\mu$ F 50WV Electric Capacitor	R27,28	22544221	220 ohm $\pm$ 10% 1/8W RD
C05,06,07,08	22448229	2.2 $\mu$ F 50WV Electric Capacitor	R29,30	22500047	10 ohm $\pm$ 10% 5W RW
CC9,10,11,12				VR01,02	22658188
R01,02,03,04	<b>CARBON RESISTORS</b>		VR03,04	22658189	500 ohm Semifixed
	22544473	47 kohm 1/8W $\pm$ 10%	<b>CAPACITORS</b>		
R05,06,07,08	22544223	22 kohm 1/8W $\pm$ 10%	C01,02	22448109	1 $\mu$ F/50WV CE
R09,10,11,12				C03,04	22447470
<b>PHASE INVERTER UNIT ASSEMBLY (CCT-AF-C13)</b>			C05,06	22373224	0.22 $\mu$ F 50V $\pm$ 20% MY
TR01,02	31231000	TR-2SC1000-GR Transistor	C07,08	22443330	33 $\mu$ F/10WV
C01,02,03,04	<b>CAPACITORS</b>		C09,10	22362220	22pF 50V $\pm$ 10% CC (SL)
	22448109	1 $\mu$ F 50WV Electric Capacitor	C11,12	22447221	220 $\mu$ F/35WV CE
C05,06	22362470	47pF 50WV $\pm$ 10% CC (SL)	C13,14	22362221	220pF 50V $\pm$ 10% CC (SL)
C07,08				C15,16	22373103
R01,02	<b>CARBON RESISTORS</b>		C17,18	22373104	0.1 $\mu$ F 50V $\pm$ 20% MY
	22544154	150 kohm 1/8W $\pm$ 10%	C19,20	22362470	47pF 50V $\pm$ 10% CC (SL)
	22544562	5.6 kohm 1/8W $\pm$ 10%	<b>POWER SUPPLY UNIT ASSEMBLY (CCT-SPLY-C06)</b>		
	22544683	68 kohm 1/8W $\pm$ 10%	<b>TRANSISTOR &amp; DIODE</b>		
R05,06	22544474	470 kohm 1/8W $\pm$ 10%	TR01	31240235	TR-2SD235-0
R09,10			D02	37682020	D-1D-2C1
<b>DRIVER UNIT ASSEMBLY (CCT-AF-C04)</b>			D03	31112121	D-1S2121A
TR01,02		2SA561-Y	<b>CAPACITORS</b>		
TR03,04		2SA561-Y	C03,04	22448471	470 $\mu$ F 50WV Electric Capacitor
TR05,06		2SC497-Y	C05	22448221	220 $\mu$ F 50WV Electric Capacitor
TR07,08		2SC497-Y	C06,07	22446221	220 $\mu$ F 25WV Electric Capacitor
TR09,10		2SC497-Y	C08	22430019	1000 $\mu$ F 35WV Electric Capacitor
TR11,12		2SA497-Y	C11,12	22340030	0.01 $\mu$ F 500V $\pm$ 100% CK
			C15	22447471	470 $\mu$ F 35WV Electric Capacitor
			<b>CARBON RESISTORS</b>		
			R01	22570022	220 ohm $\pm$ 10% 2W Cement type
			R02	22570038	3.9 kohm $\pm$ 10% 2W Metalized film
			R03	22574391	390 ohm $\pm$ 10% 2W Metalized film
			R04	22570021	100 ohm $\pm$ 10% 2W Cement type
			F01,02	22144187	FUSE 1.2A UL Metalized film