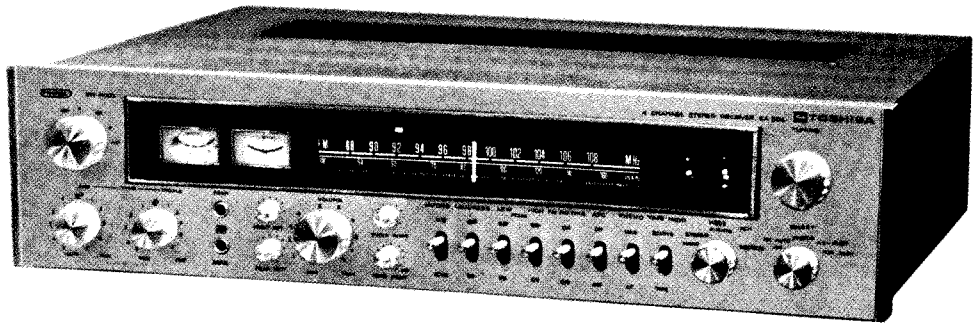
# TOSHIBA 4 CHANNEL STEREO RECEIVER

# SERVICE DATA

## MODEL SA-504

FILE NO. 170-006

REVISED EDITION



## SPECIFICATIONS

### ■ TUNER SECTION

**■ FM Part**

| | |
|---|---|
| Frequency range: | 88～108 MHz |
| Usable sensitivity (IHF): | 1.8μV |
| 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 ±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) 15μV (IHF) |
| Distortion factor: | 1% |
| Image rejection ratio: | 70 dB |
| IF rejection ratio: | 65 dB |
| Signal to noise ratio: | 50 dB |
| Selectivity: | 25 dB (±10 kHz) |

### ■ AUDIO SECTION

| | | | |
|---|---|---|---|
| IHF music power: | 200W 4Ω (at 0.4% distortion) | | |
| | 180W 8Ω (at 0.4% distortion) BTL | | |
| r.m.s (continuous) output: | | | |
| At each channel driven: | 35W x 4 8Ω (less than 0.4% distortion 1 kHz) | | |
| | 70W x 2 8Ω (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 kΩ) | |
| | CC | 30 mV (70 kΩ) | |
| | AUX 1.2 (4CH) | 150 mV (47 kΩ) | |
| | TAPE PLAY | 150 mV (47 kΩ) | |
| | MAIN IN | 550 mV (47 kΩ) | |
| 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: | 4～16Ω | | |
| BASS (100 Hz): | ±10 dB | | |
| TREBLE (10 kHz): | ±10 dB | | |
| LOUNDNESS control: | + 10 dB (100 Hz at VR 20%) | | |
| | + 4 dB (10 kHz at VR 20%) | | |
| Damping factor: | 20 (8Ω) | | |

### ■ Power source and Others

| | |
|---|---|
| Power source: | 100V/120V/220V/240V, 50 Hz/60 Hz |
| Power consumption: | 150W |
| Dimensions: | 500 (W) x 380 (D) x 115 (H) (mm) (19½" W x 15" D x 4½" 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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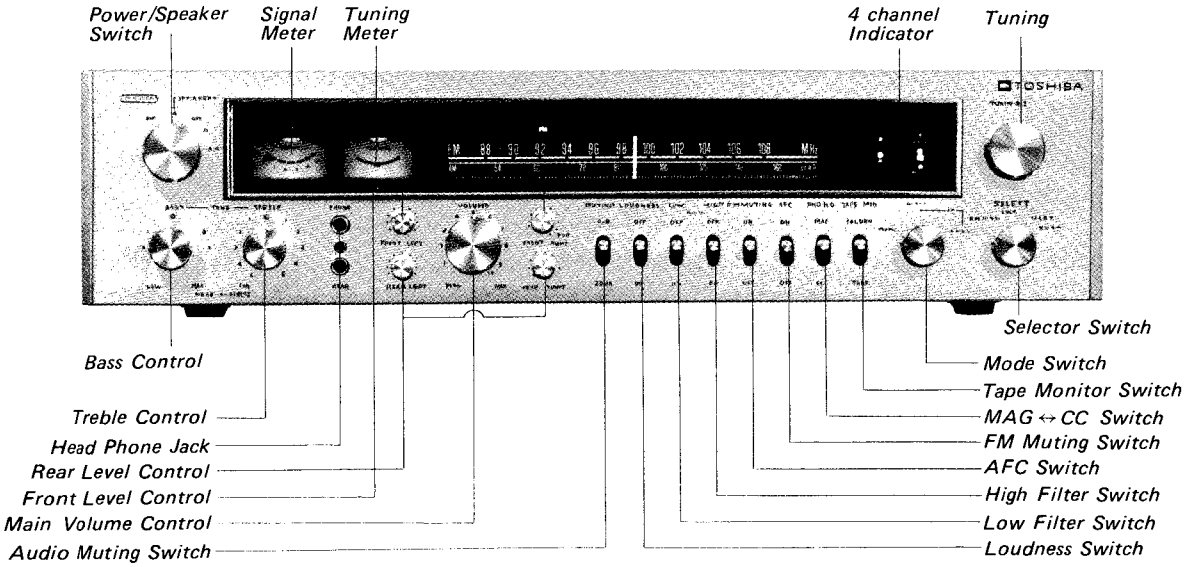
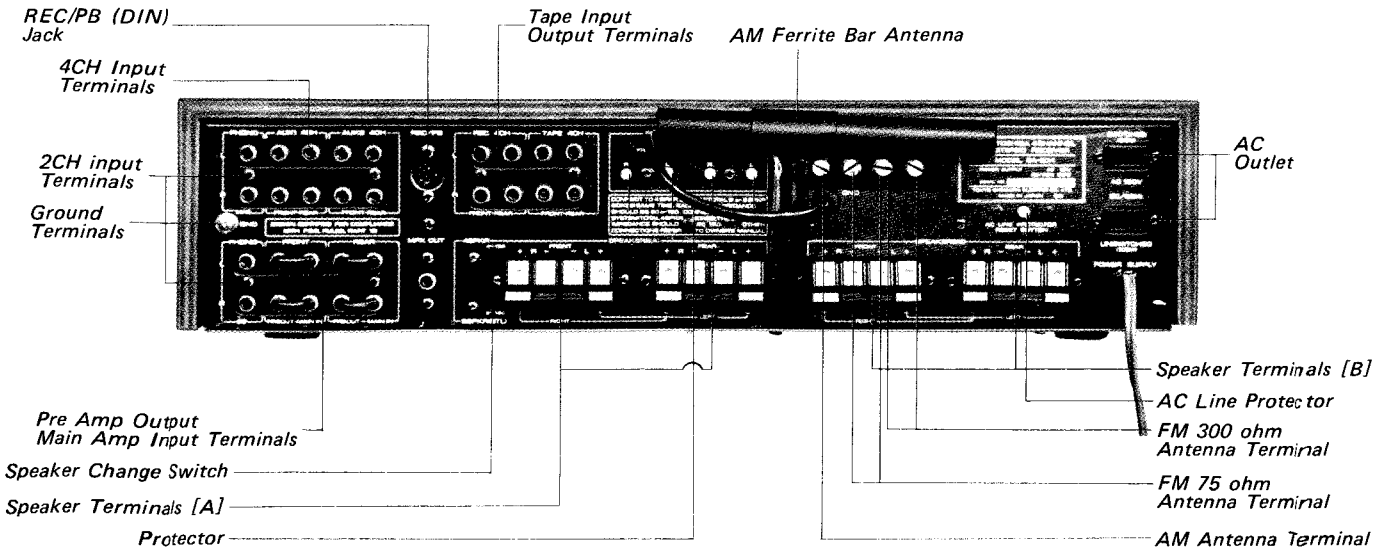
# 1. OPERATING CONTROLS

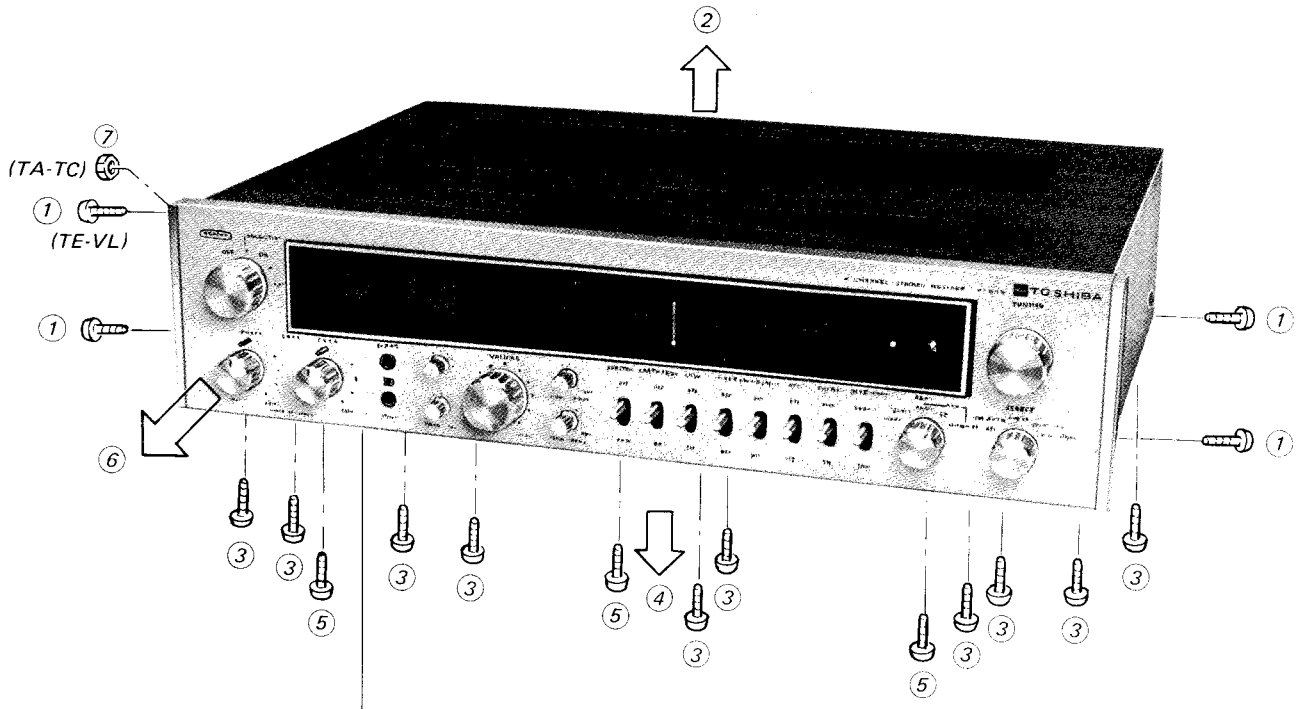
## 1-1 FRONT VIEW

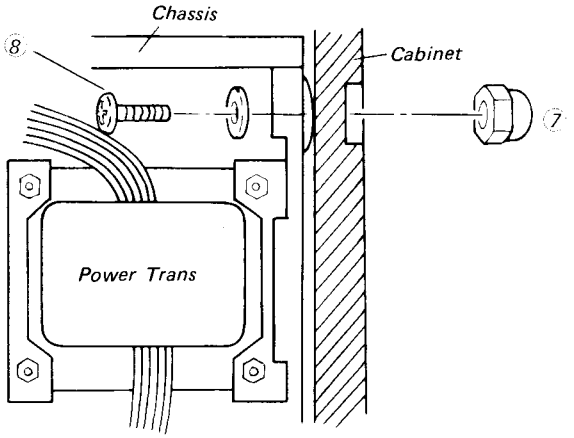



## 1-2 REAR VIEW



# 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

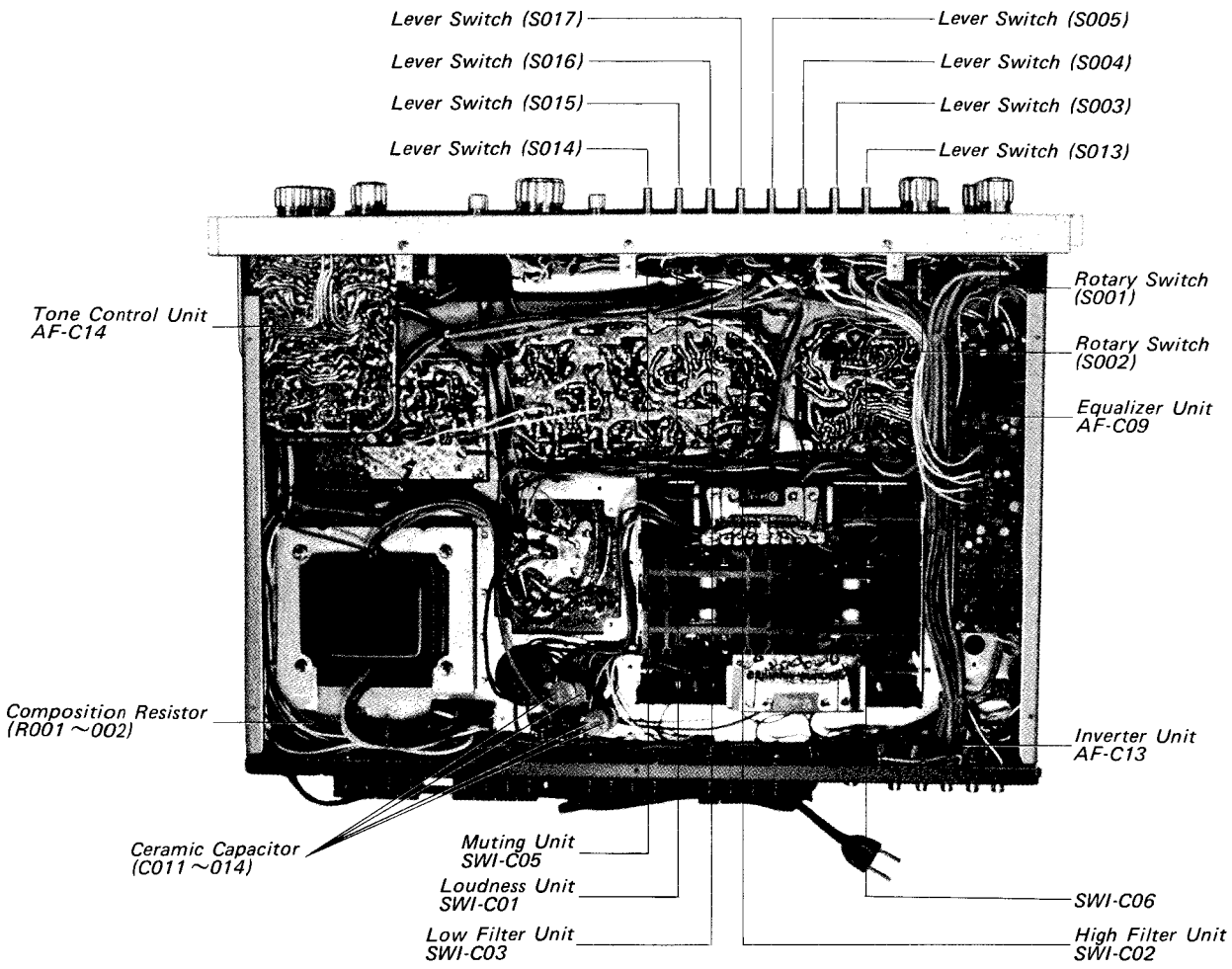
1. Remove three screws ( ① ) and a nut ( ⑦ ).
2. Pull out the Cabinet.

### 2-6 FRONT PANEL REMOVAL

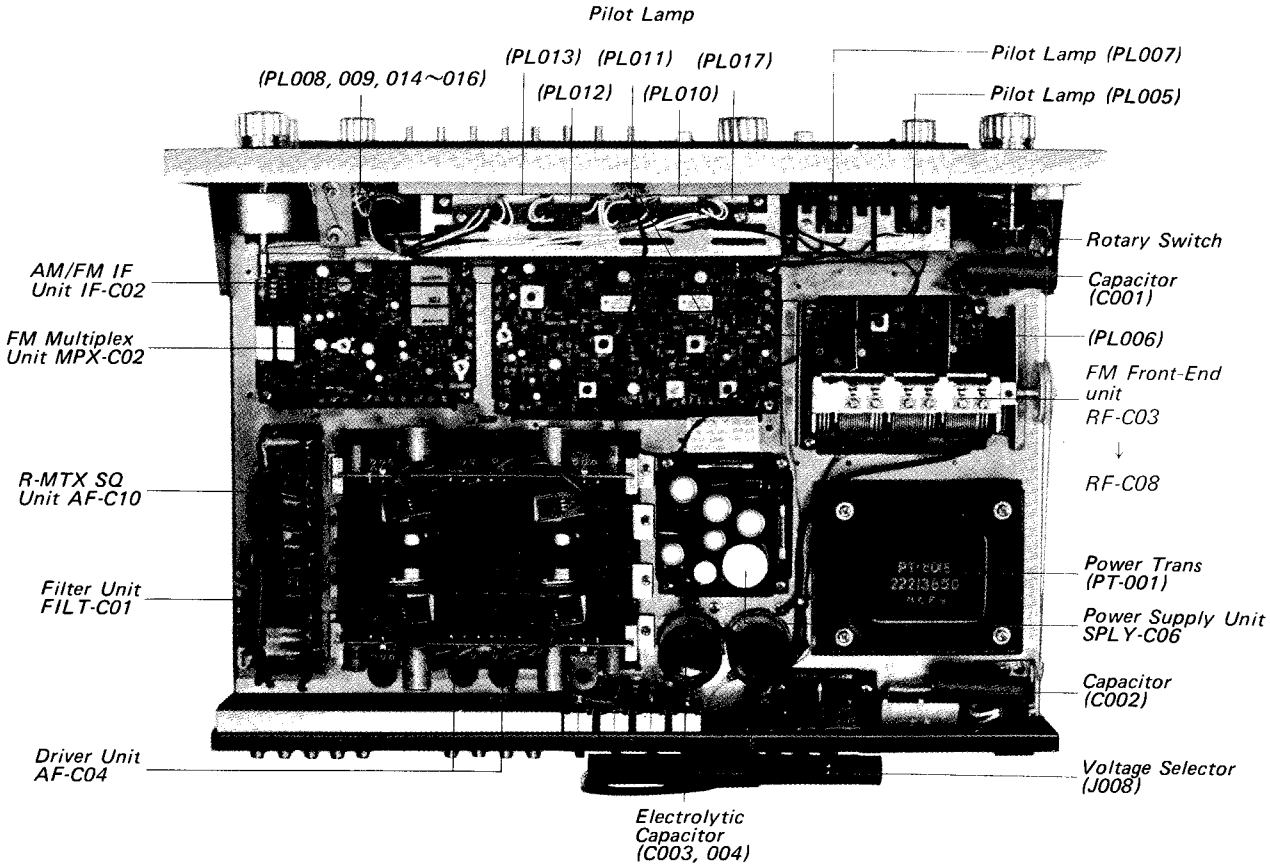
1. Pull out all knobs.
2. Remove three screws ( ⑤ ).
3. Pull out the Panel ( ⑥ ).

# 3. PARTS LOCATIONS

## 3-1 CHASSIS BOTTOM VIEW

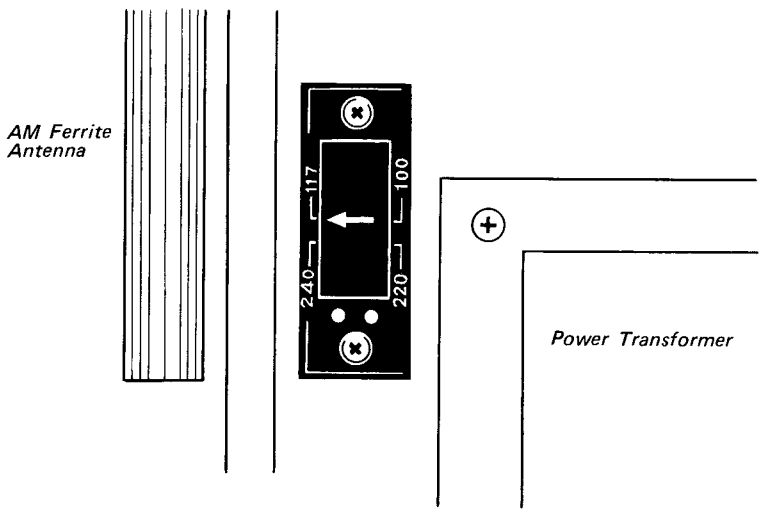


## 3-2 CHASSIS TOP VIEW




## 3-3 VOLTAGE ADJUSTMENT

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



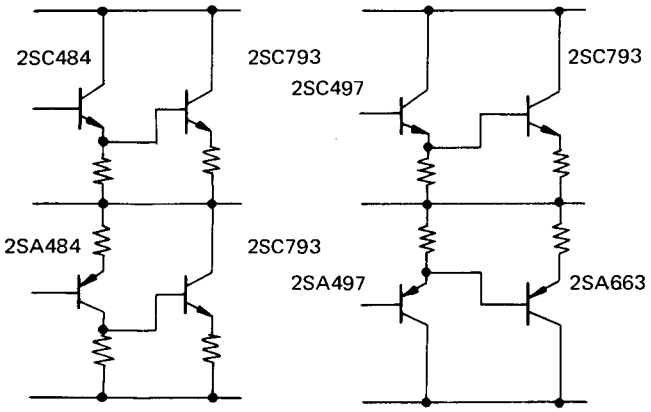
# 4. TECHNICAL POINTS

## 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-power 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: *14 dB between front left and front right channels.
*6 dB between front and rear channels.
*6 dB 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.

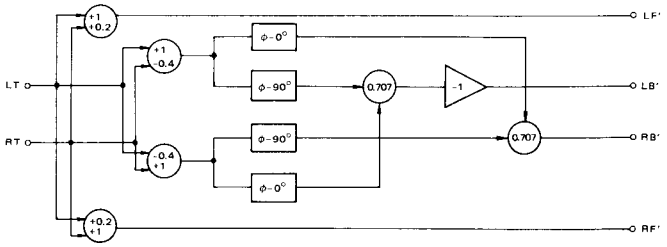
Circuit shown in Fig. 4-a has a phase characteristic in Fig. 4-b. Low Frequency signal output is almost the same phase as the input. As frequency becomes higher, output phase negatively shifts. Combination of such two circuits, one shifts 90 degrees at F1 and the other 90 degrees at F2, makes 90 degrees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

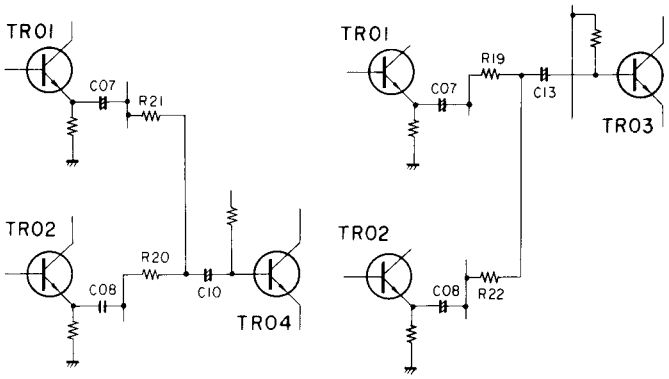
R-MTX circuit mixes front-left and front-right signals in the same proportion as SQ to improve front and rear channel separation.

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




80° ~ 100° phase difference at approx. 100 ~ 760 Hz

*Fig. 2*



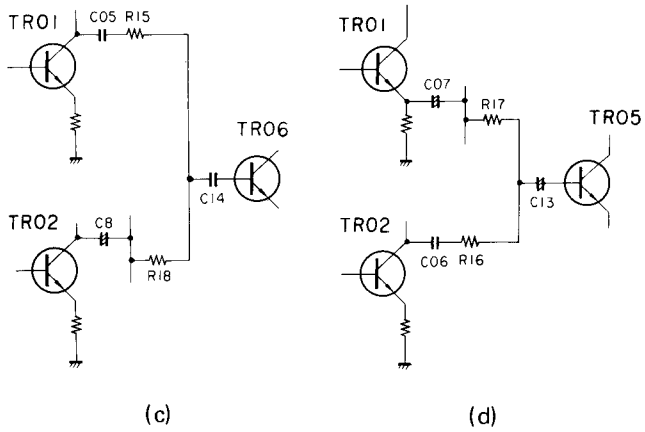




*Fig. 3*

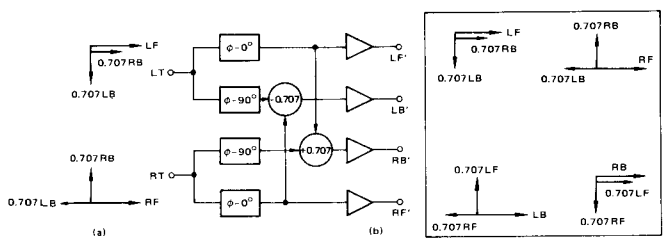



*Fig. 1*

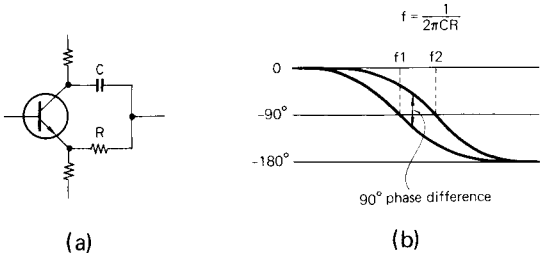
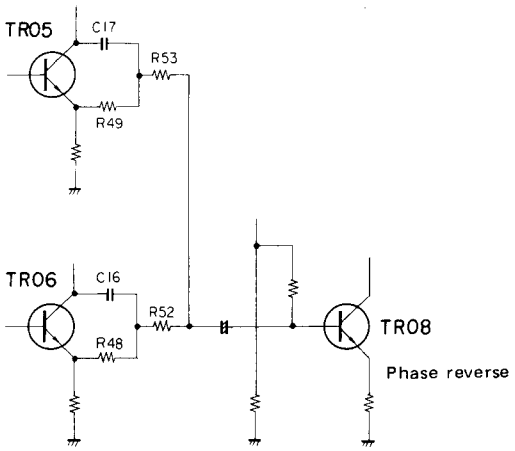
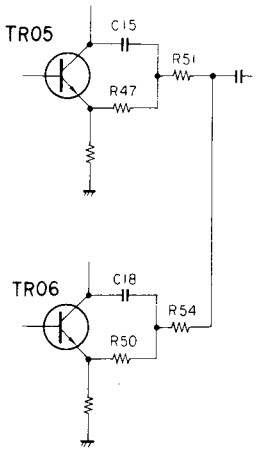



*Fig. 4*


TR05
C17
R53
R49
TR06
C16
R52
R48
TR08
Phase reverse

(a)


TR05
C15
R51
R47
TR06
C18
R54
R50

(b)

*Fig. 5*

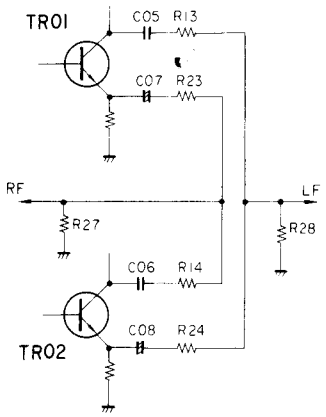

TR01
C05
R13
C07
R23
RF
LF
R27
R28
C06
R14
C08
R24
TR02

*Fig. 6*

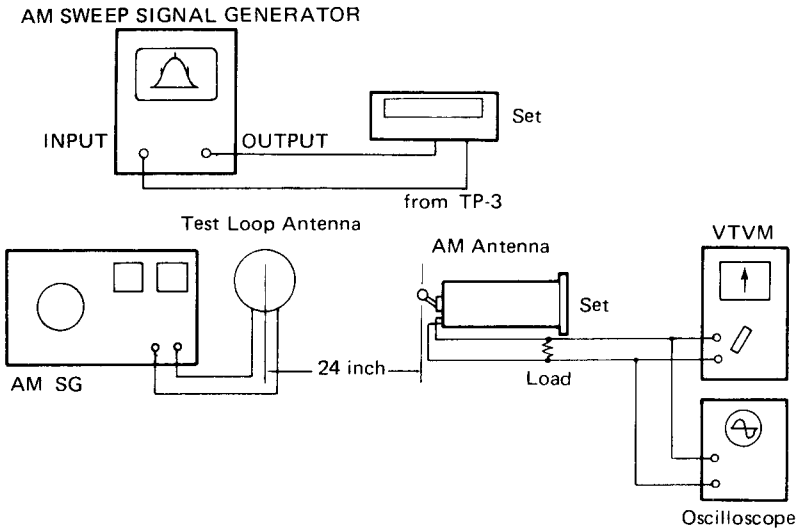
# 5. ADJUSTMENTS

## 5-1 AM TUNER ADJUSTMENT

Equipment:

1. SG (Signal Generator)
2. SG (Sweep Generator)
3. Test loop antenna (50 ohm)
4. Load (dummy load 8ohm or speaker 8ohm)
5. VTVM (AC)
6. Adjusting screw driver
7. Adjusting screw driver (use to antenna core)
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 455k Hz as its range is determined by the ceramic filter used. Center frequency is within 455 ±2k Hz.

### 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.

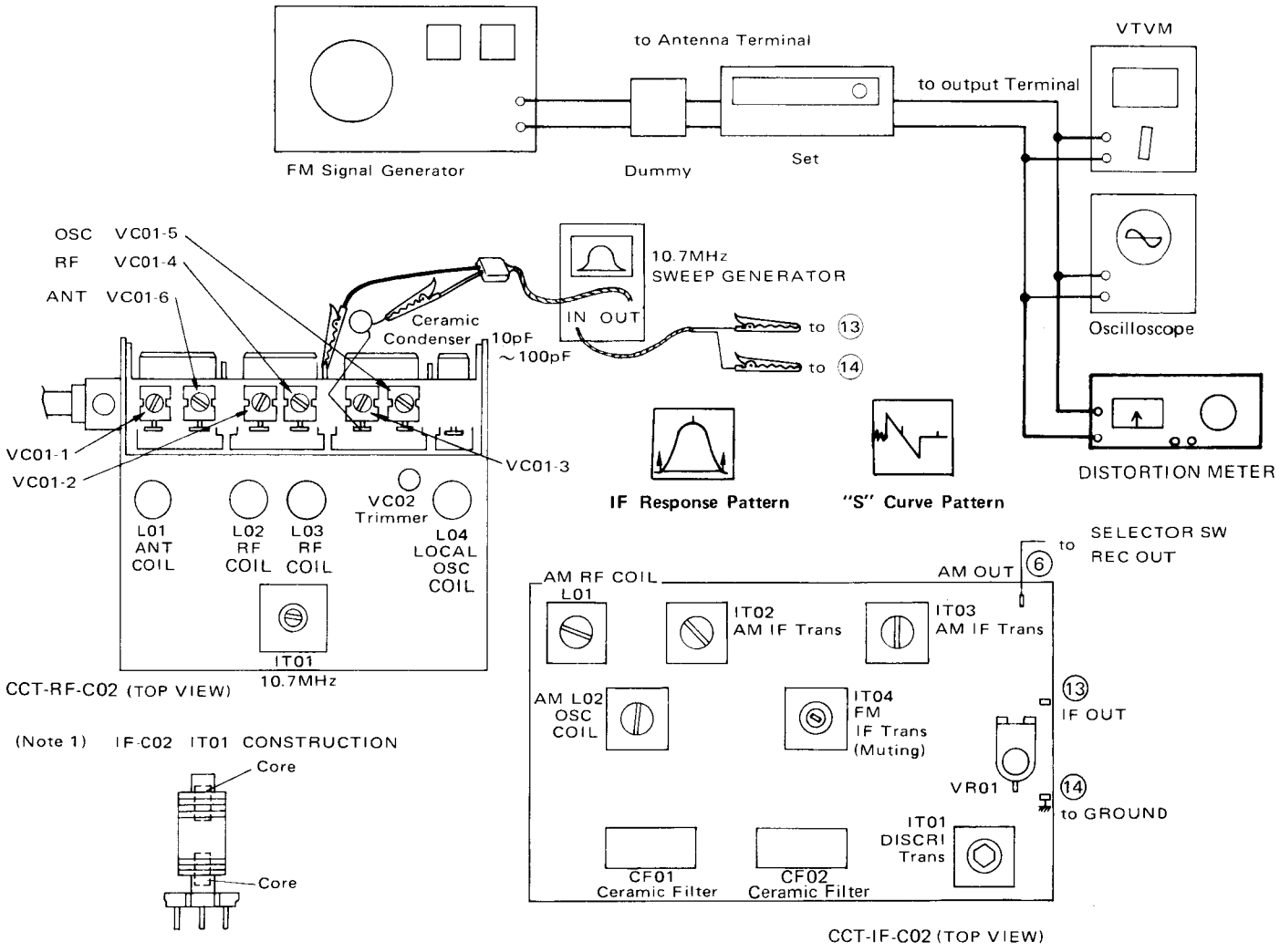
| STEP | GENERATOR CONNECTION | GENERATOR FREQUENCY | POSITION OF TUNING GANG | METERS | ADJUSTMENT | REMARKS |
|---|---|---|---|---|---|---|
| 1 | Connect loop antenna to signal generator and 24 inch away from the ferrite antenna. | | | | | |
| 2 | Loop antenna | 540kHz | Set the tuning gang at 540kHz. | 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)
2. SG (Sweep Marker Generator)
3. Dummy Antenna
4. Load (dummy load 8ohm or speaker 8ohm)
5. VTVM (AC)
6. Adjusting driver
7. Oscilloscope
8. Distortion meter

### FM ADJUSTMENT SETUP




(Note 1) IF-C02 IT01 CONSTRUCTION




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

## FM RF ADJUSTMENT PROCEDURE

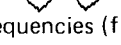
Adjust the tuning gang to be able to deflect from 0 through 100 indication on the meter.

| STEP | GENERATOR FREQUENCY | POSITION OF TUNING GANG | ADJUSTMENT | REMARKS |
|---|---|---|---|---|
| 1 | 88MHz | Set the tuning gang at 88MHz. | CCT-RF-C03<br>L04 (Local Osc.) | Adjust for maximum deflection on VTVM |
| 2 | 108MHz | Set the tuning gang at 108MHz. | CCT-RF-C03<br>VC02 (Trimmer) | as Step 1 |
| 3 | 88MHz | 88MHz | CCT-RF-C03<br>L01 (Ant Coil)<br>L02 (RF Coil)<br>L03 (RF Coil) | as Step 1 |
| 4 | 108MHz | 108MHz | CCT-RF-C03<br>VC01-1<br>VC01-2<br>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

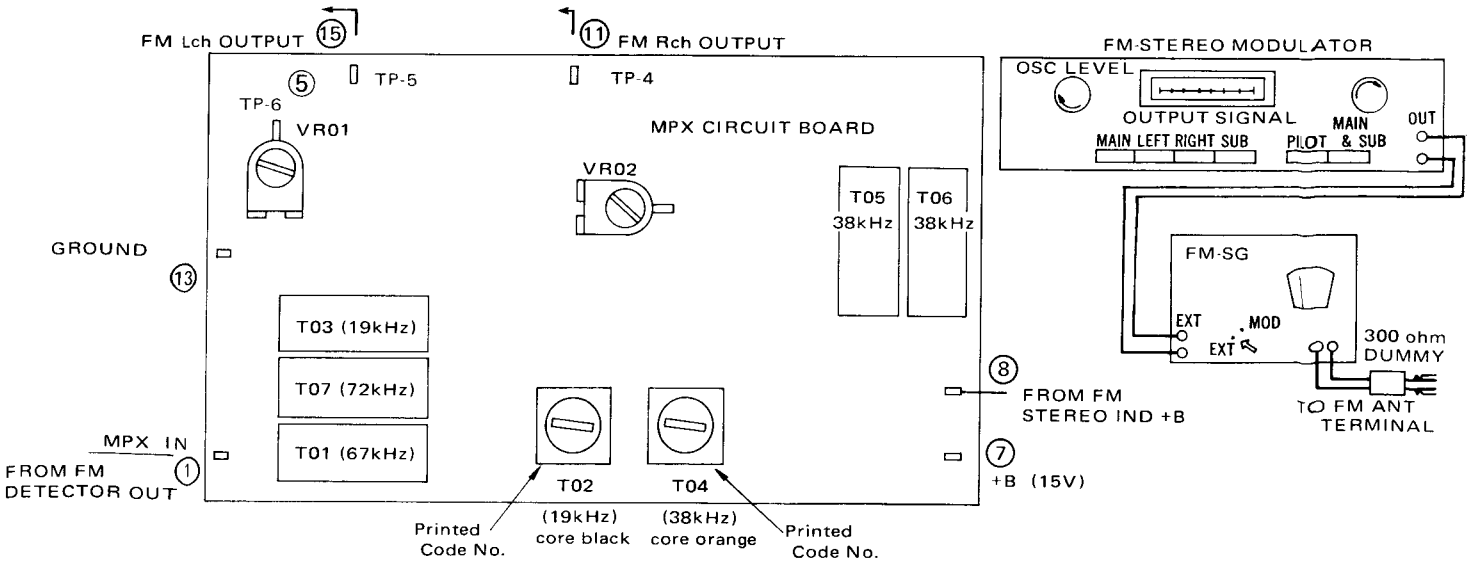
Equipment:

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

### FM STEREO MULTIPLEX ADJUSTMENT PROCEDURE

| | ITEM | STEP | GENERATOR | REMARKS |
|---|---|---|---|---|
| 1 | 19kHz Trap<br>67kHz, 72kHz<br>SCA Rejection<br>38kHz Trap | | | None Adjust<br>19kHz T03<br>67kHz T01, 72kHz T07<br>38kHz T05, T06. |
| 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<br>19kHz 10% modulation<br>sub channel 45% modulation | Adjust T02 (19kHz Transformer) to T04 (38kHz Transformer). 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<br>19kHz 10% modulation<br>(L+R) + 19kHz 30% modulation<br>L=R=400Hz or 1kHz | |
| | | 4 | Set right channel to zero. | Adjust T04 (38kHz Transformer) a little to obtain minimum VTVM deflection.<br>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.



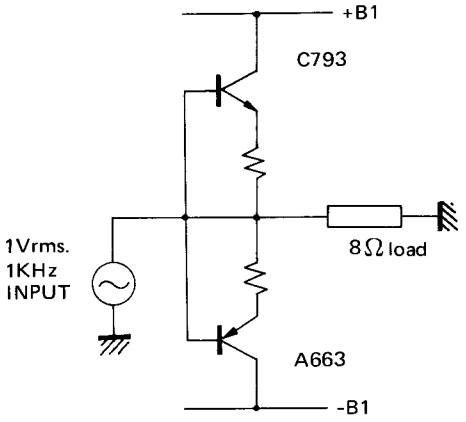
## 6. TROUBLE SHOOTING HINTS

**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.

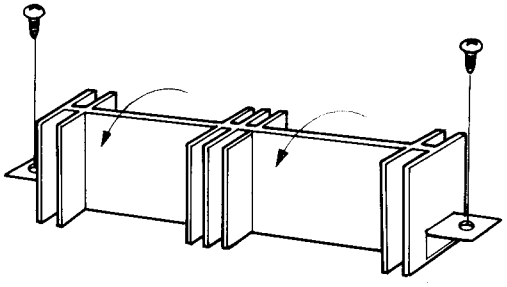
Step 2. Measure the voltage at the speaker output terminal or terminals 13 & 14 using a tester, with the power switch on.
OV (± 0.3V) indication is normal.

Step 3. Waveforms observation. Normal waveform illustrated below.

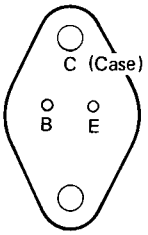



**Replacement of defective power transistors:**

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:**

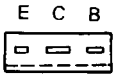
Note: If it is likely to break the power transistors during examination, disconnect the leads to the bases of 2SC793 and 2SA663.

**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)

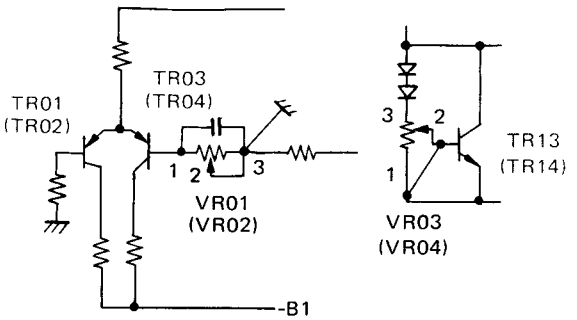
Step 2. OK ..... Normal
Adjust IC idle by VR03, VR04 with power transistors connected.
NO ..... 2SC496 is defective.

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.



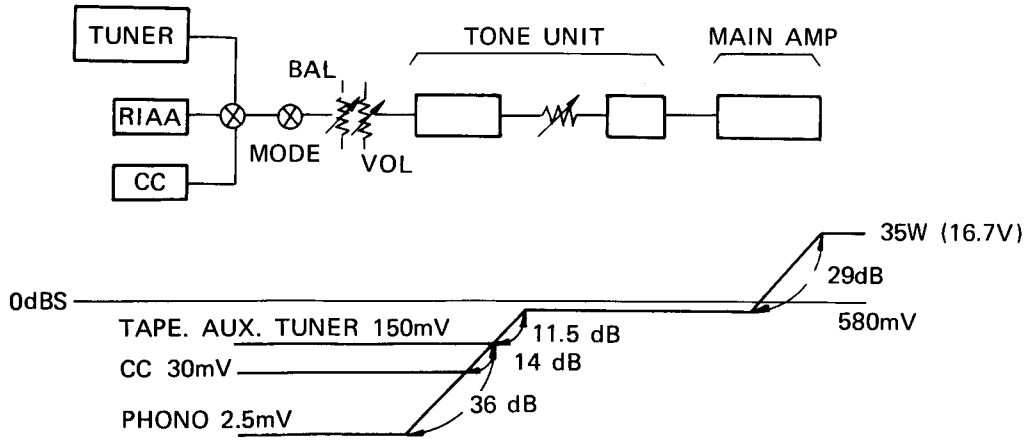

Step 5. As shown above, connect the terminal 3 of VR01 to the ground, where TR09 and TR11 are kept removed and VR01 fully turned to the terminal 3 side. Short-circuit the base with emitter.

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.)

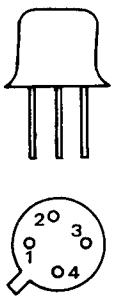
If NOT ..... Check the transistors, TR01, TR03, TR05 and TR06.

## 7. LEVEL DIAGRAM



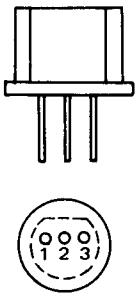

## 8. TRANSISTOR BASE DIAGRAMS

3SK35



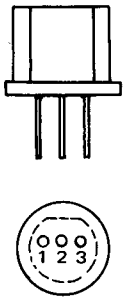
1. Drain
2. Gate 2
3. Gate 1
4. Source (Case)

2SA561
2SC373
2SC734
2SC785
2SC380A
2SC371
2SC372
2SC1000



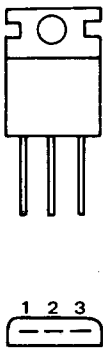
1. Emitter
2. Collector
3. Base

2SK19



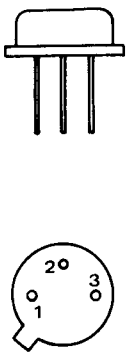
1. Drain
2. Source
3. Gate

2SD235



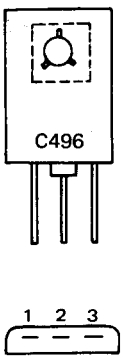
1. Base
2. Collector (Radiation Board)
3. Emitter

2SA497
2SC497



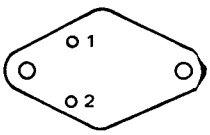
1. Emitter
2. Base
3. Collector (Case)

2SC496




1. Emitter
2. Collector
3. Base

2SA663
2SC793

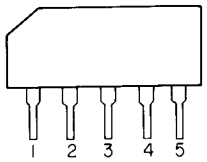


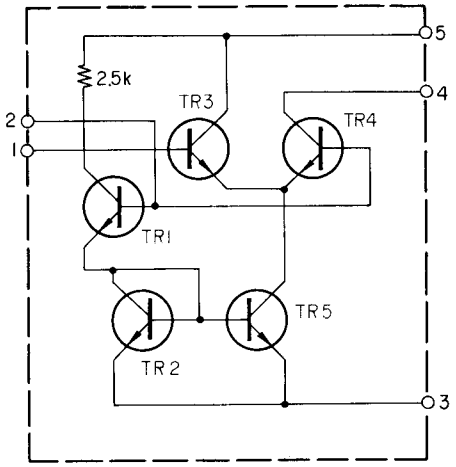
1. Emitter
2. Base
3. Case Collector

## 9. INTEGRATED CIRCUIT BASE DIAGRAM

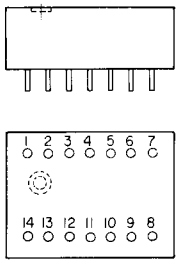
### EQUALIZER CIRCUIT

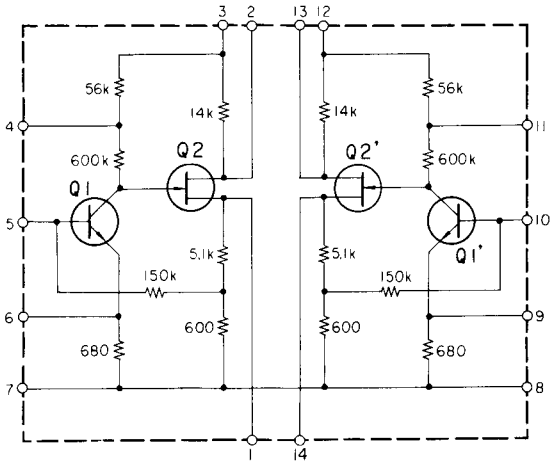
**TA7060P**



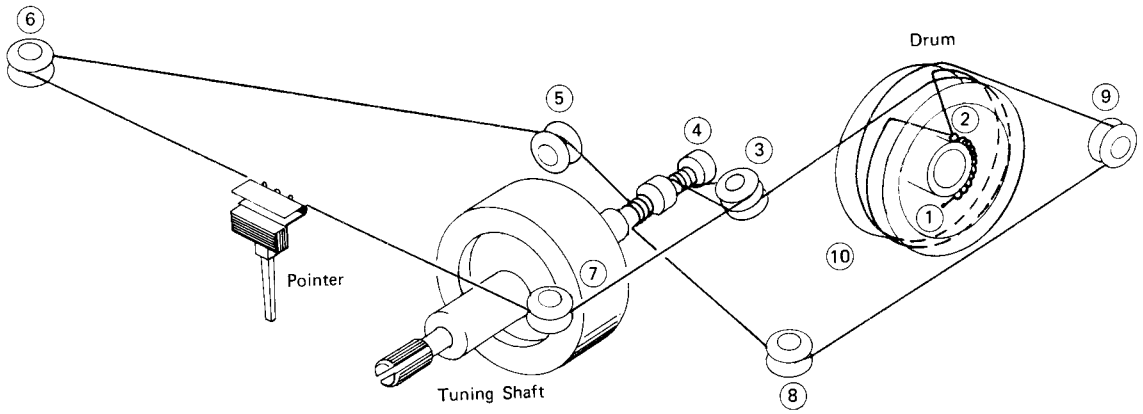




**TH9014P**



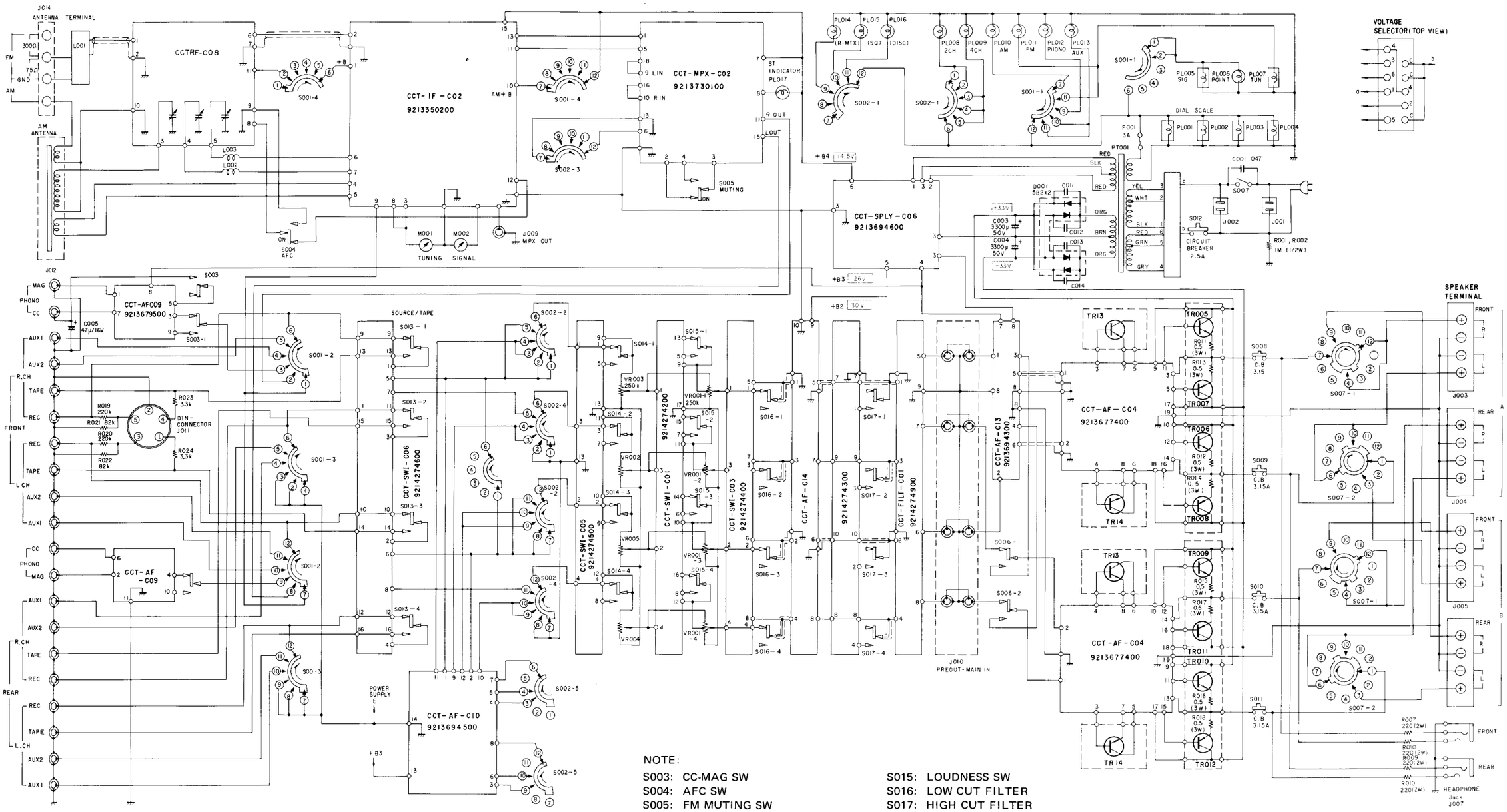

## 10. DIAL STRINGING DIAGRAM




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 = uuF)
4. SELECTOR SWITCH IN AM POSITION.
   ※1 1,000p is available only for TA, TC and VL models.

NOTE:

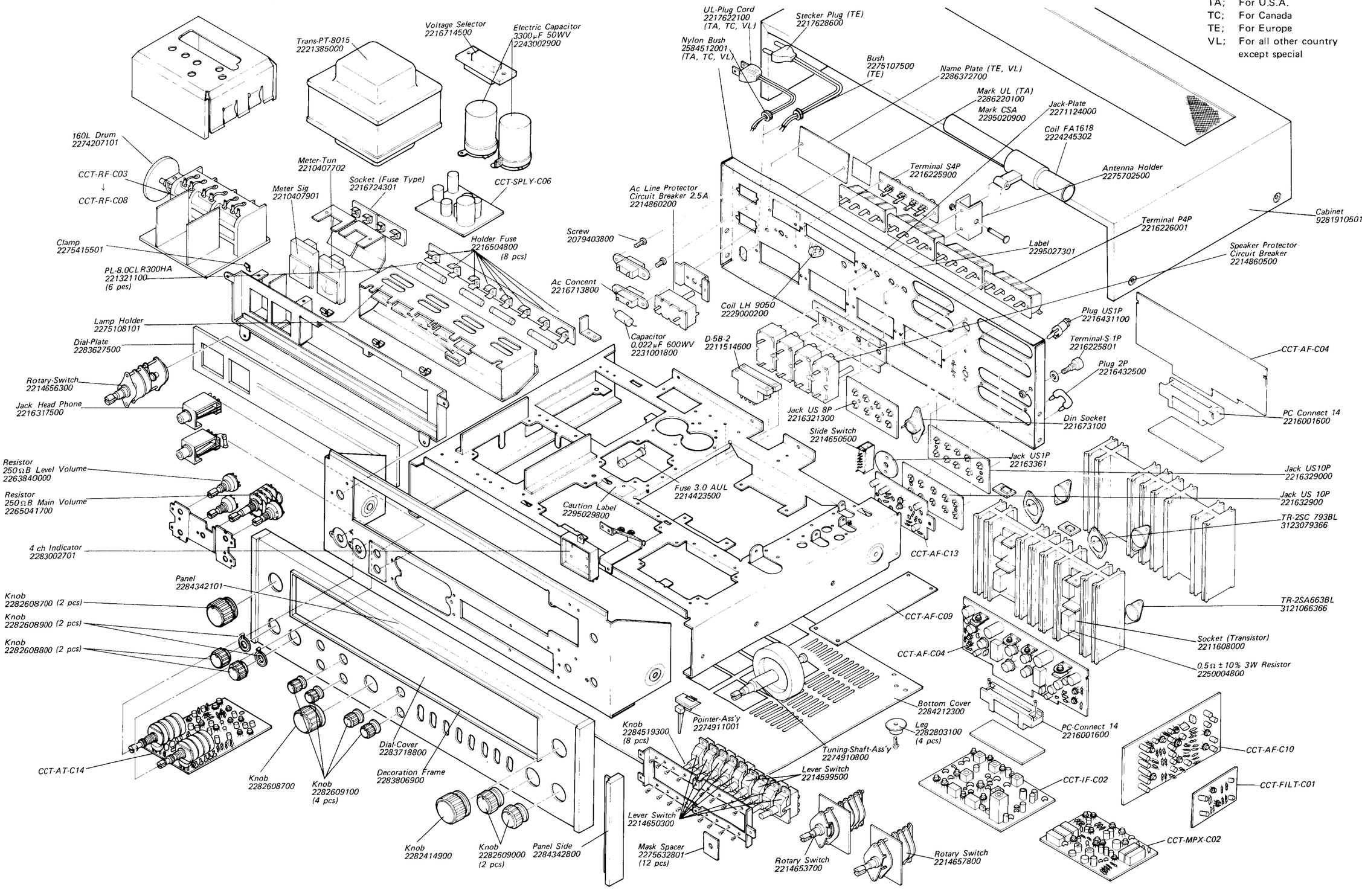
S003: CC-MAG SW
S004: AFC SW
S005: FM MUTING SW
S006: 2SP-4SP SW
S008～S011: SPEAKER PROTECTOR
S012: AC LINE PROTECTOR
S013: TAPE MONITOR SW
S014: MUTING SW
S015: LOUDNESS SW
S016: LOW CUT FILTER
S017: HIGH CUT FILTER

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

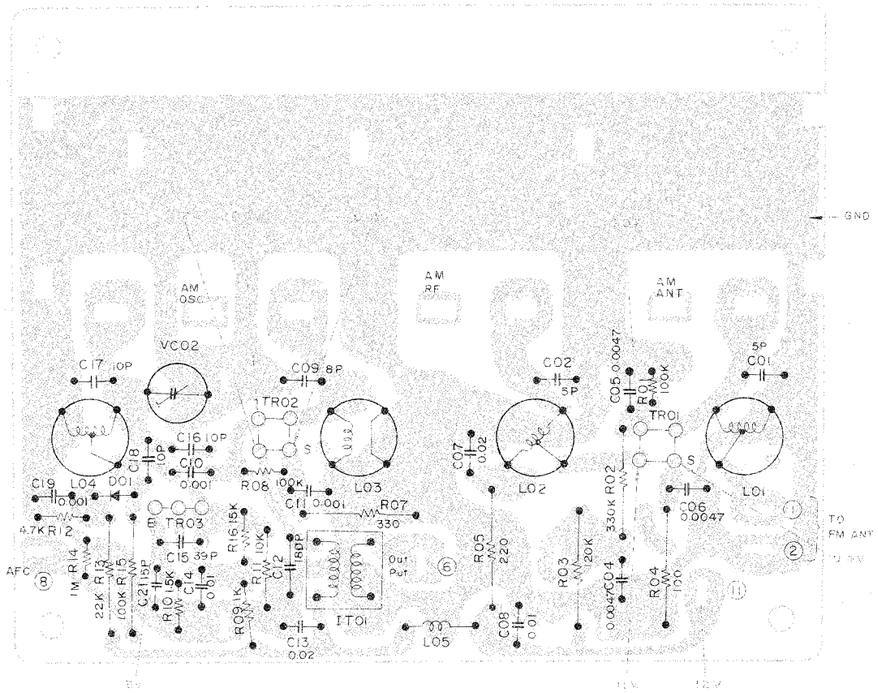
TA; For U.S.A.
TC; For Canada
TE; For Europe
VL; For all other country except special

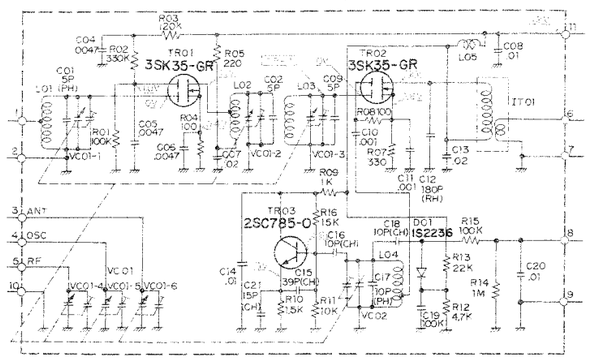


## 13. PRINTED CIRCUIT DIAGRAMS

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

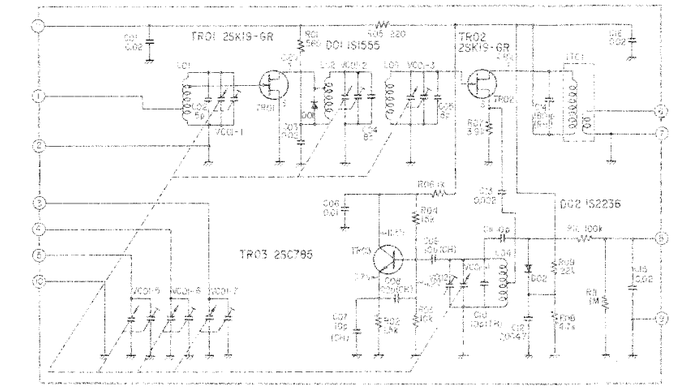
FM FRONT-END CIRCUIT BOARD (CCT-RF-C03)



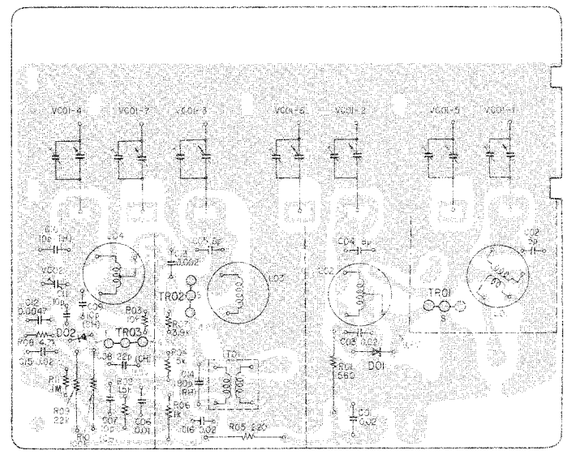




## FM FRONT END UNIT (CCT-RF-C08)

SCHEMATIC DIAGRAM




BOTTOM VIEW

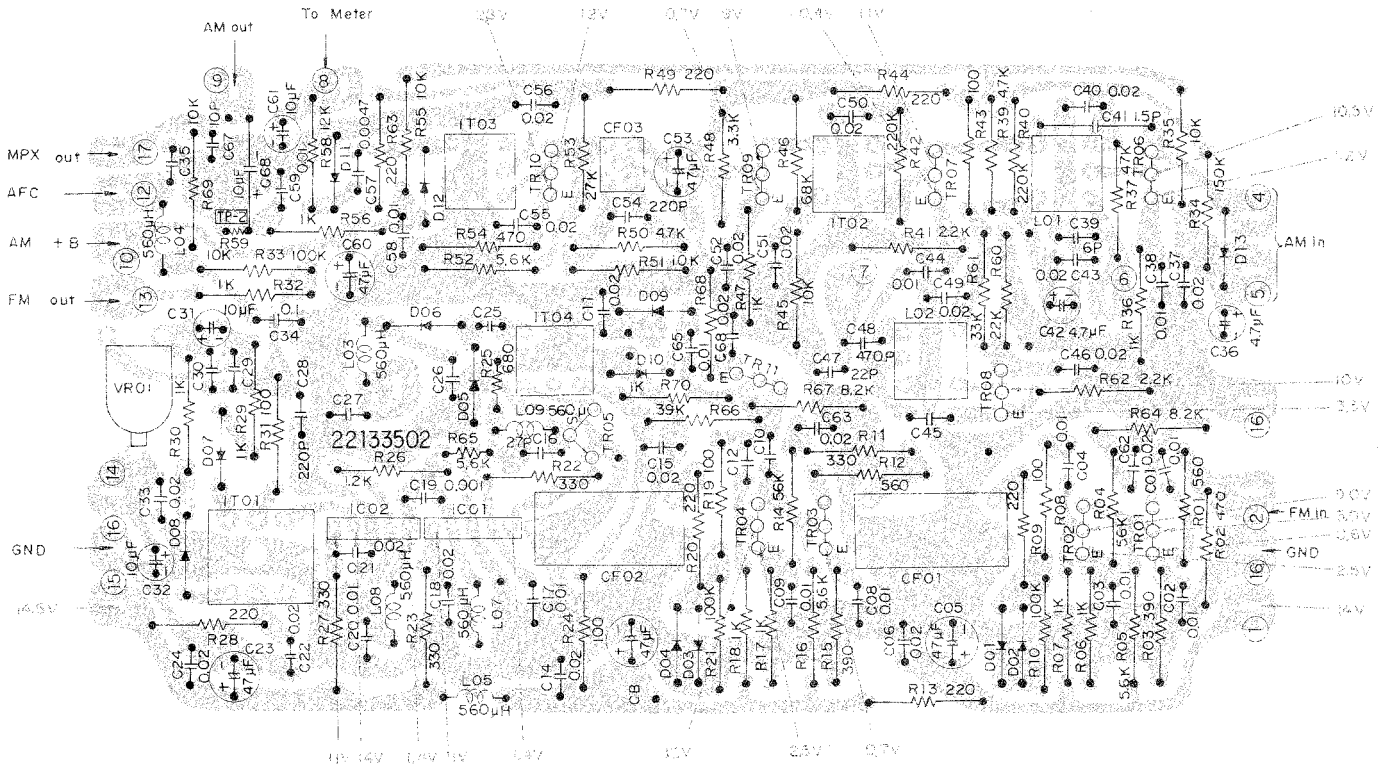


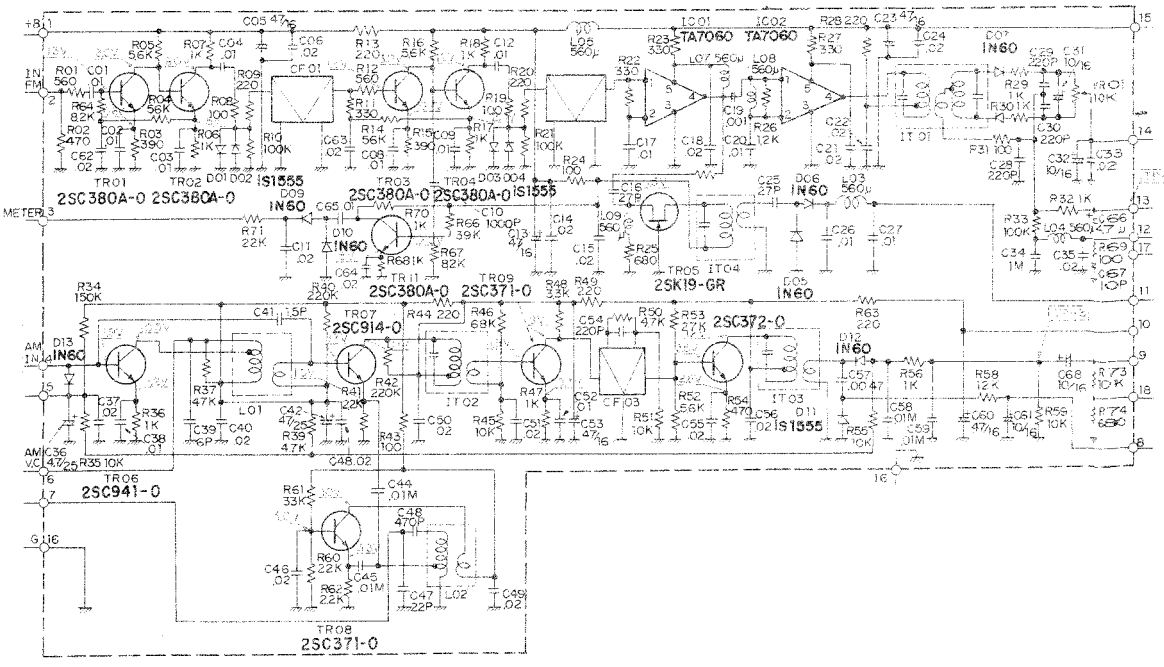
## PARTS LIST

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

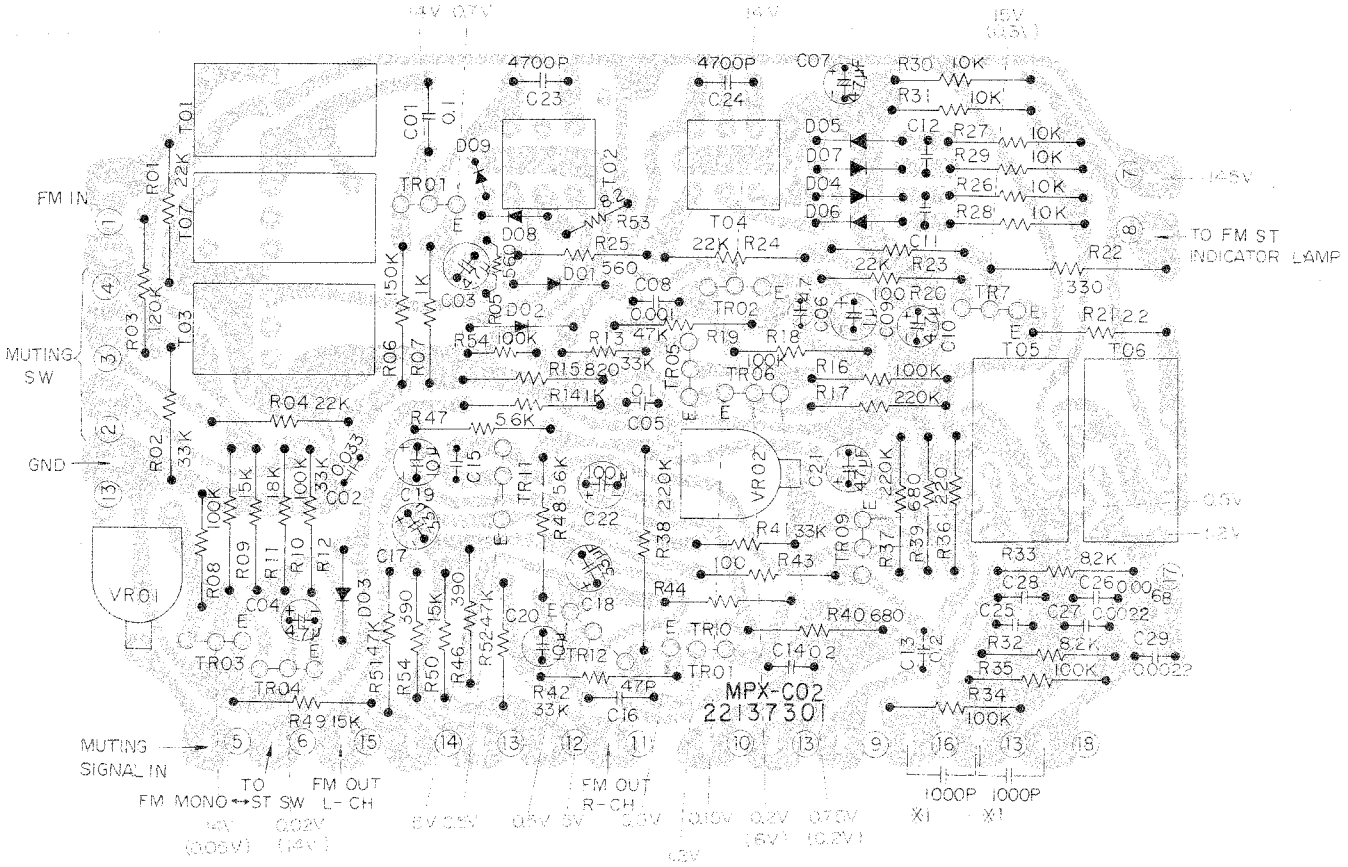
D=±1pF J=±5% K=±10%

## IF LIMIT CIRCUIT BOARD (CCT-IF-C02)



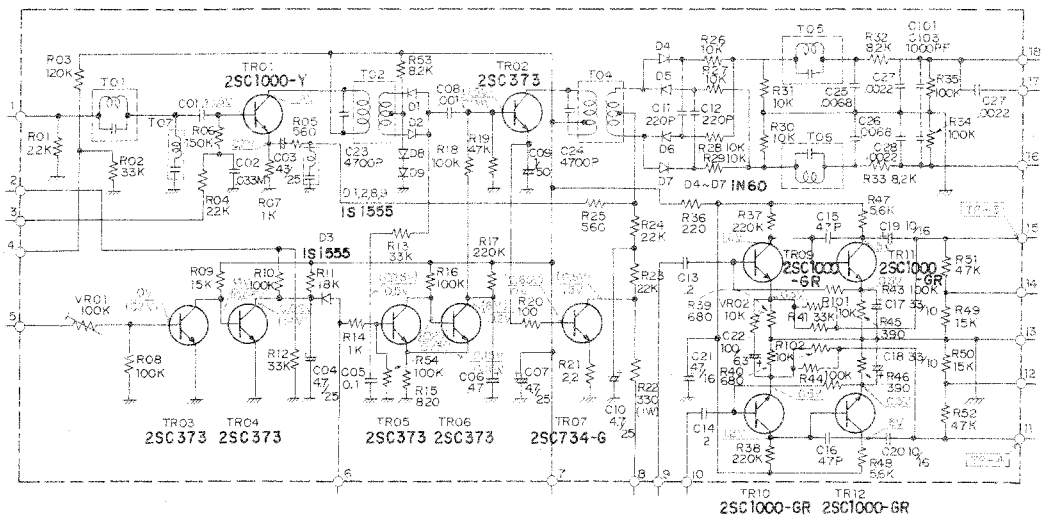



## FM MULTI CIRCUIT BOARD (CCT-MPX-C02)



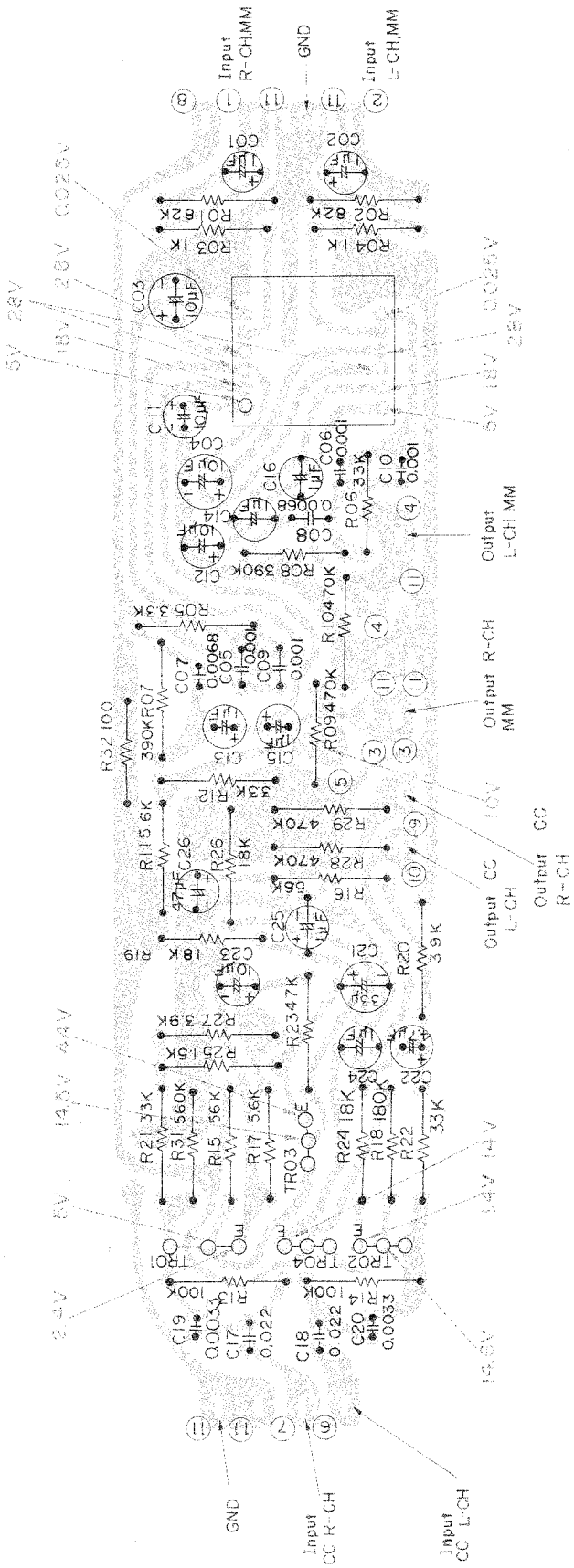

※1 Add 1,000p for 75μ sec de-emphasizing area.

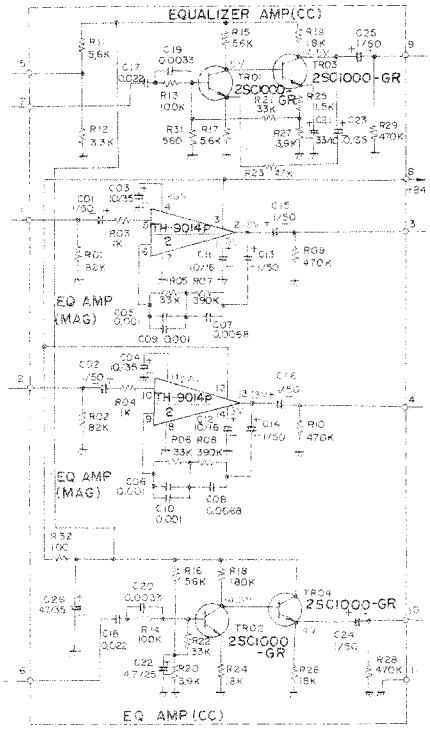
The voltage in bracket indicates the one measured with muting signal and stereo signal.



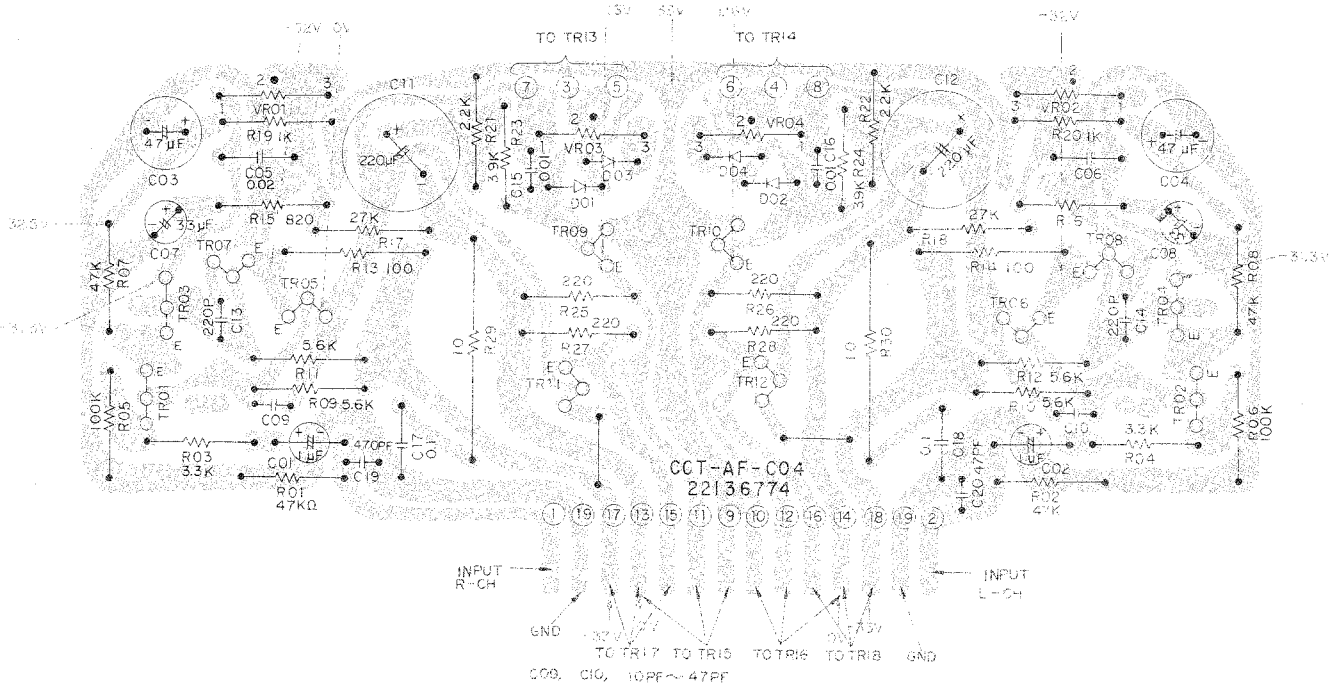

※1 1,000p (C101, C103) is available only for TA, TC and VL models.

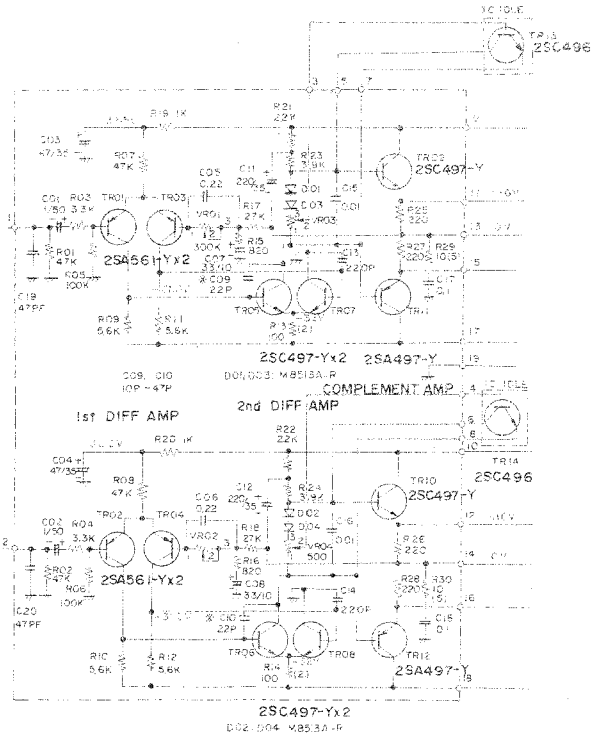
## EQUALIZER CIRCUIT BOARD (CCT-AF-C09)



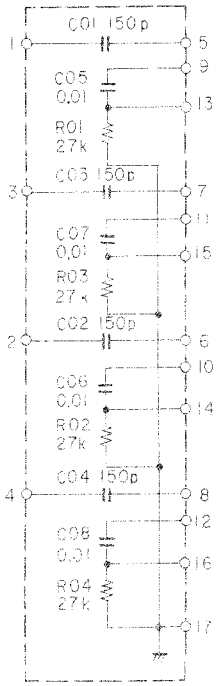
## DRIVER CIRCUIT BOARD (CCT-AF-C04)



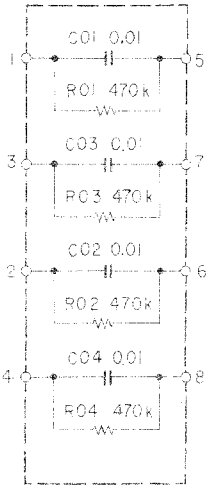
## LOUDNESS CIRCUIT BOARD

(CCT-SWI-C01)

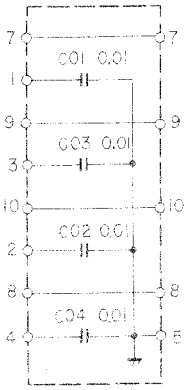



## FILTER CIRCUIT BOARD

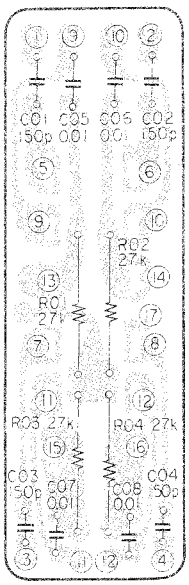
LOW (CCT-SWI-C03)

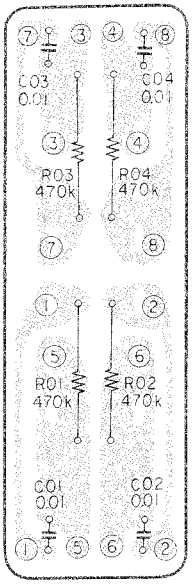


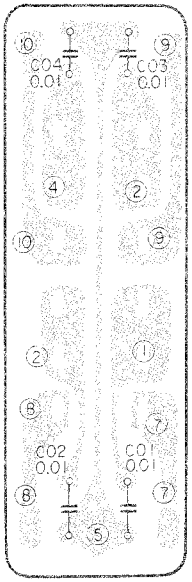

HIGH (CCT-SWI-C02)




BOTTOM VIEW

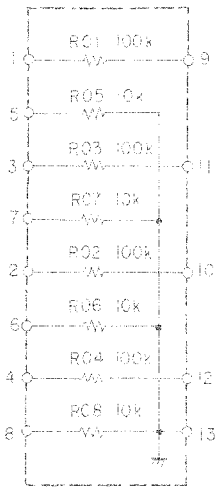


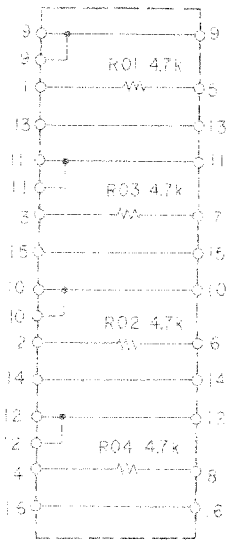
## MUTING CIRCUIT BOARD

(CCT-SWI-C05)

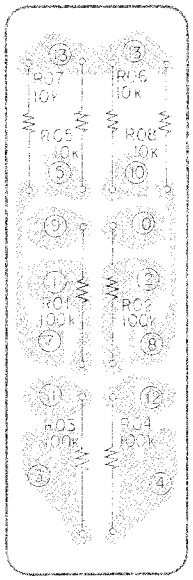


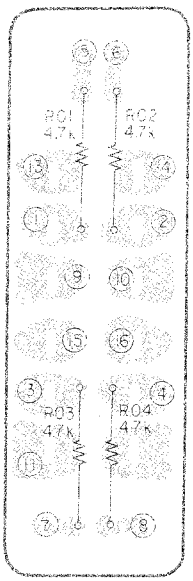

## TAPE MONITOR CIRCUIT BOARD

(CCT-SWI-C06)



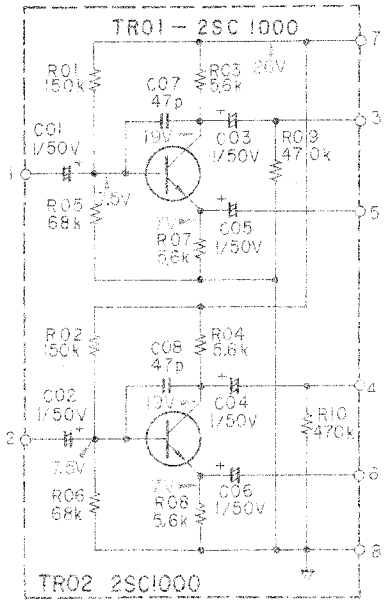

BOTTOM VIEW



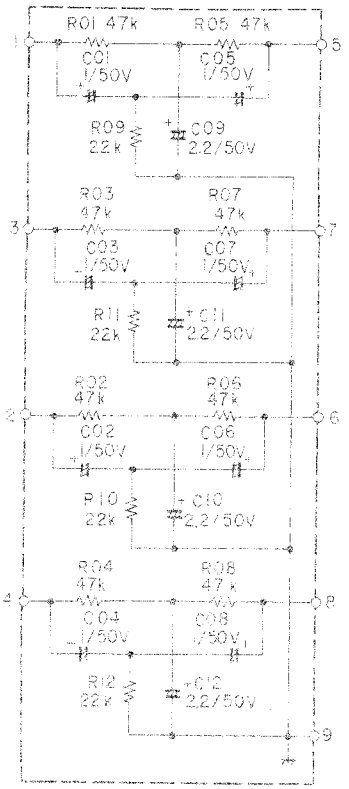
## PHASE INVERT CIRCUIT BOARD

(CCT-AF-C13)

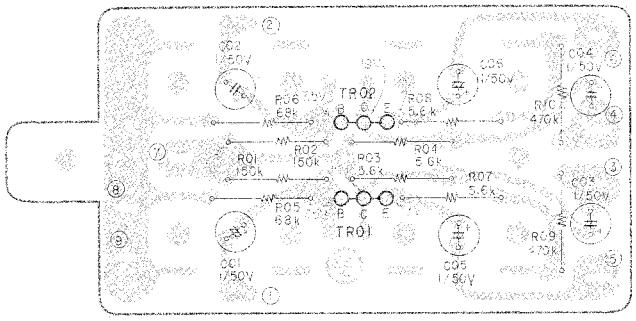


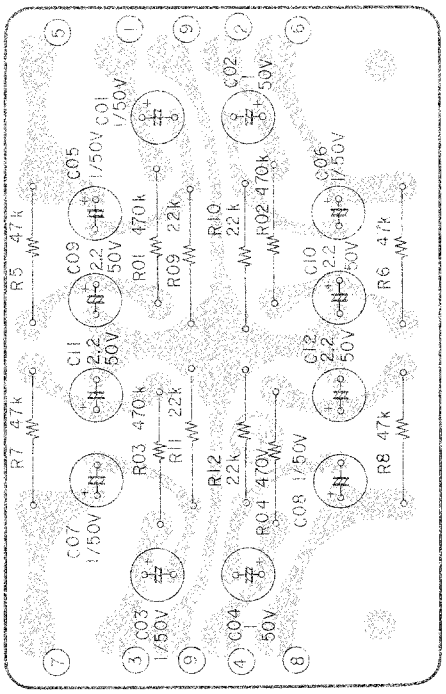

## FILTER CIRCUIT BOARD

(CCT-FILT-C01)

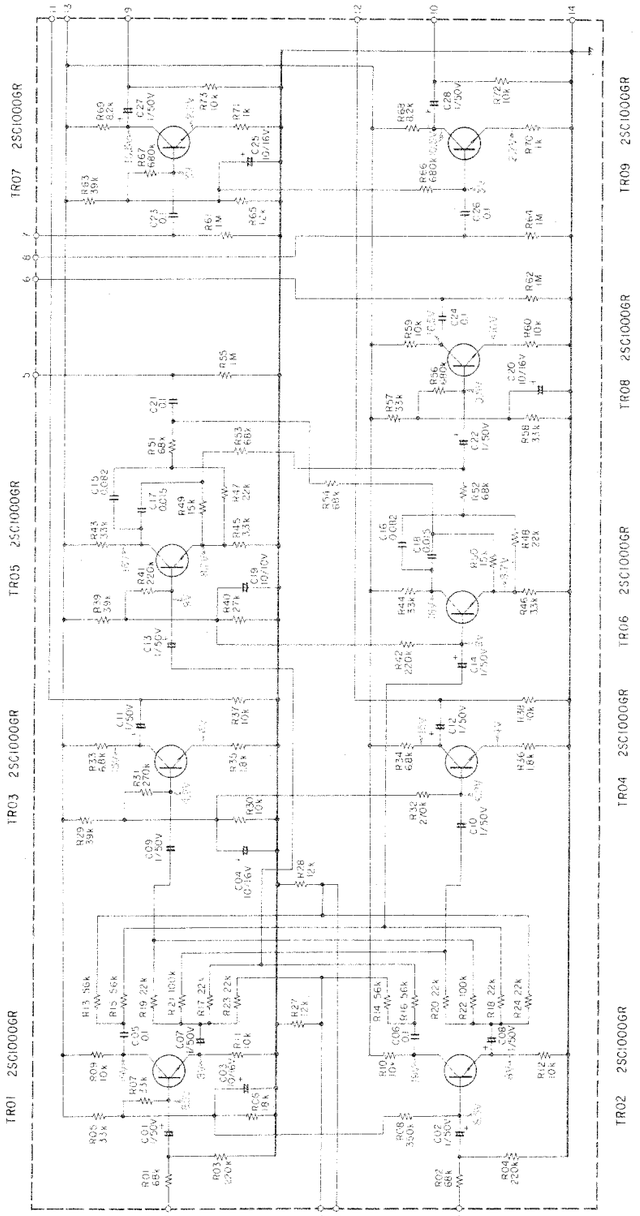



## BOTTOM VIEW

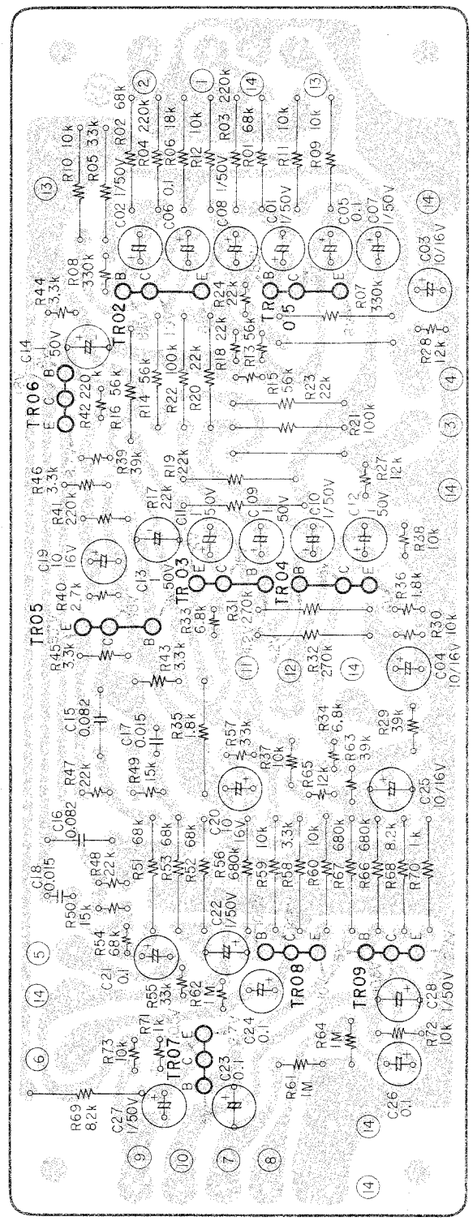


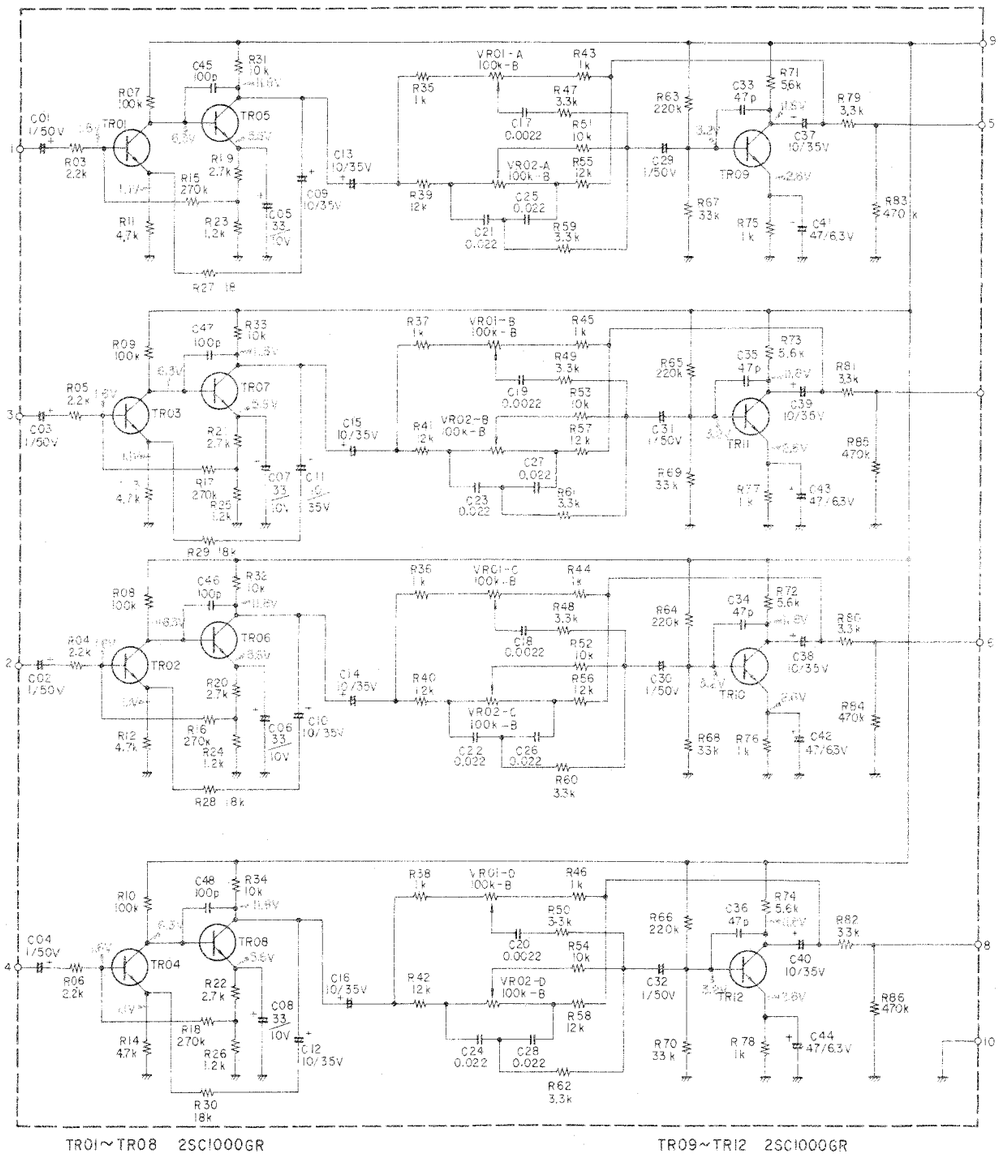
## MATRIX CIRCUIT BOARD (CCT-AF-C10)



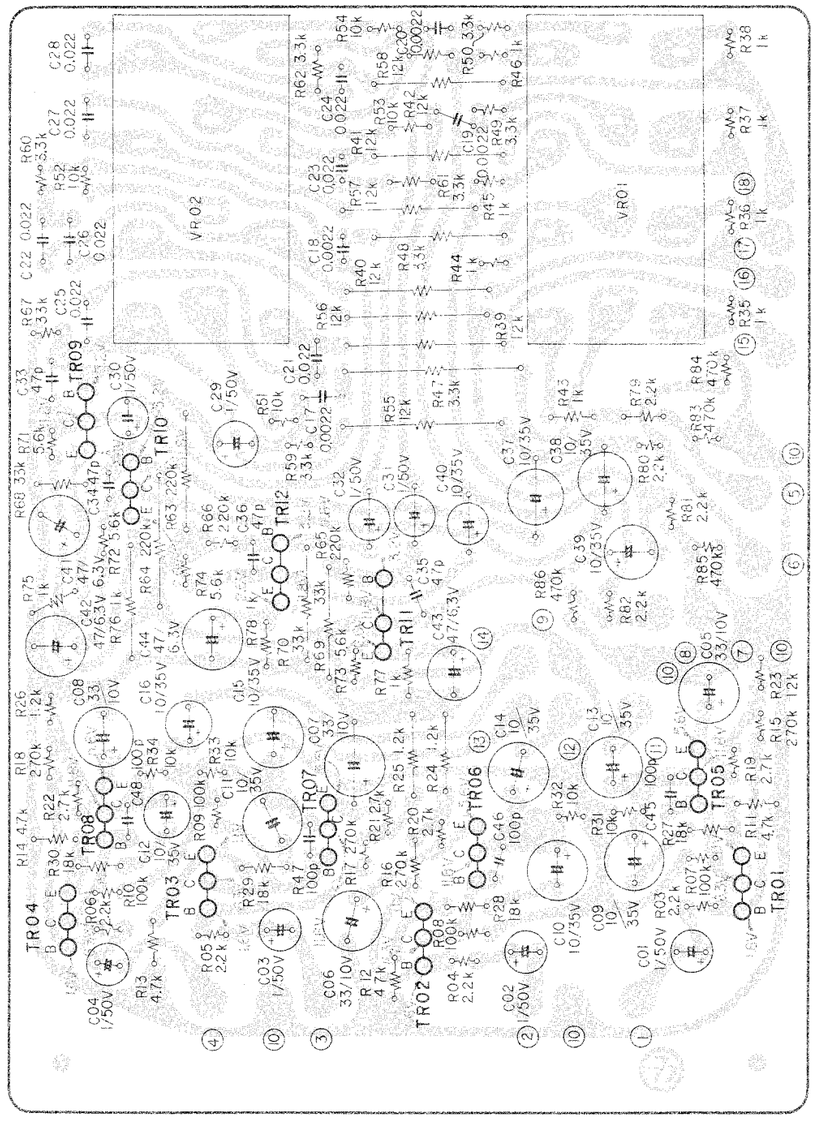


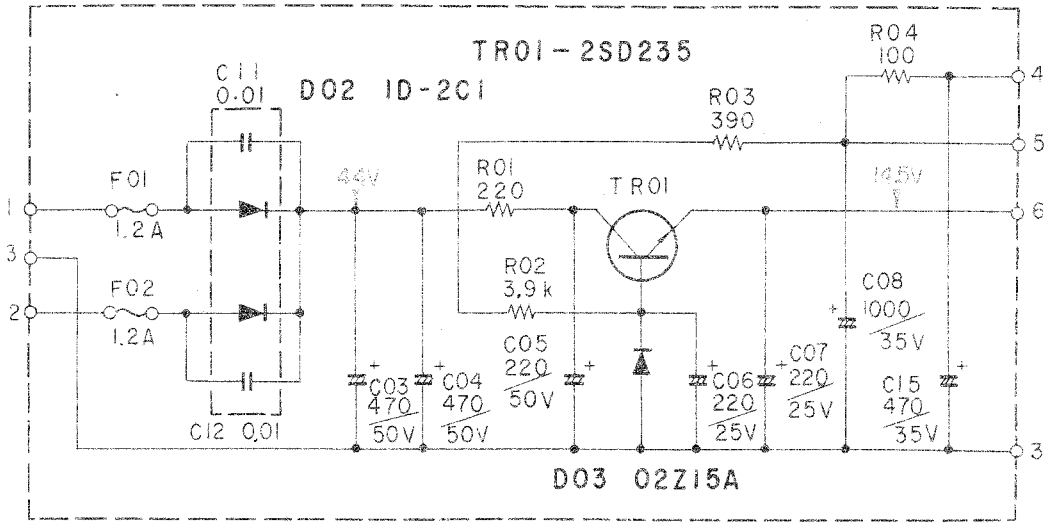
TONE CIRCUIT BOARD (CCT-AF-C14)



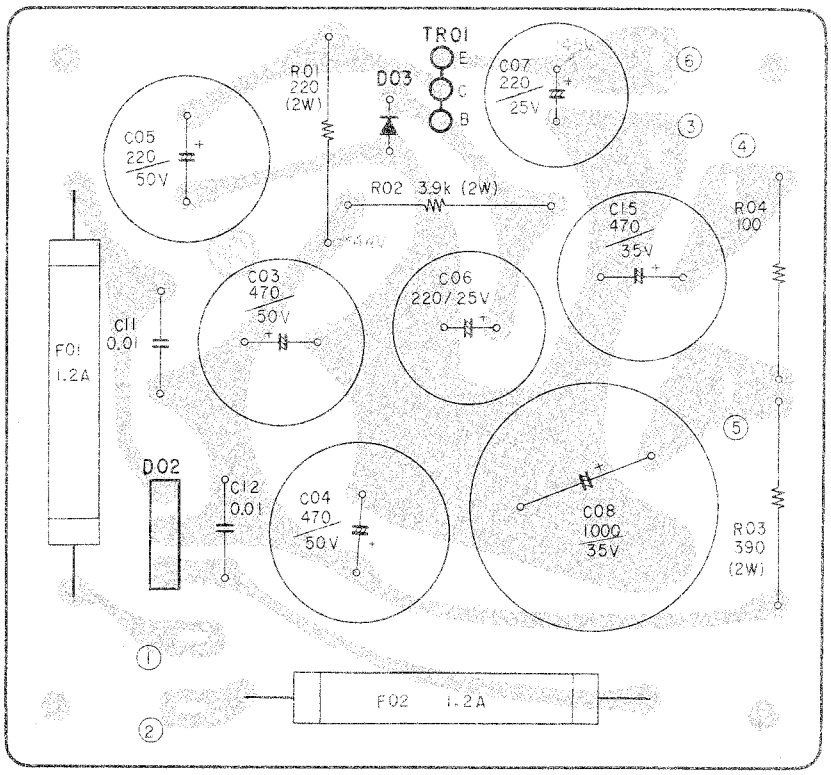

BOTTOM VIEW



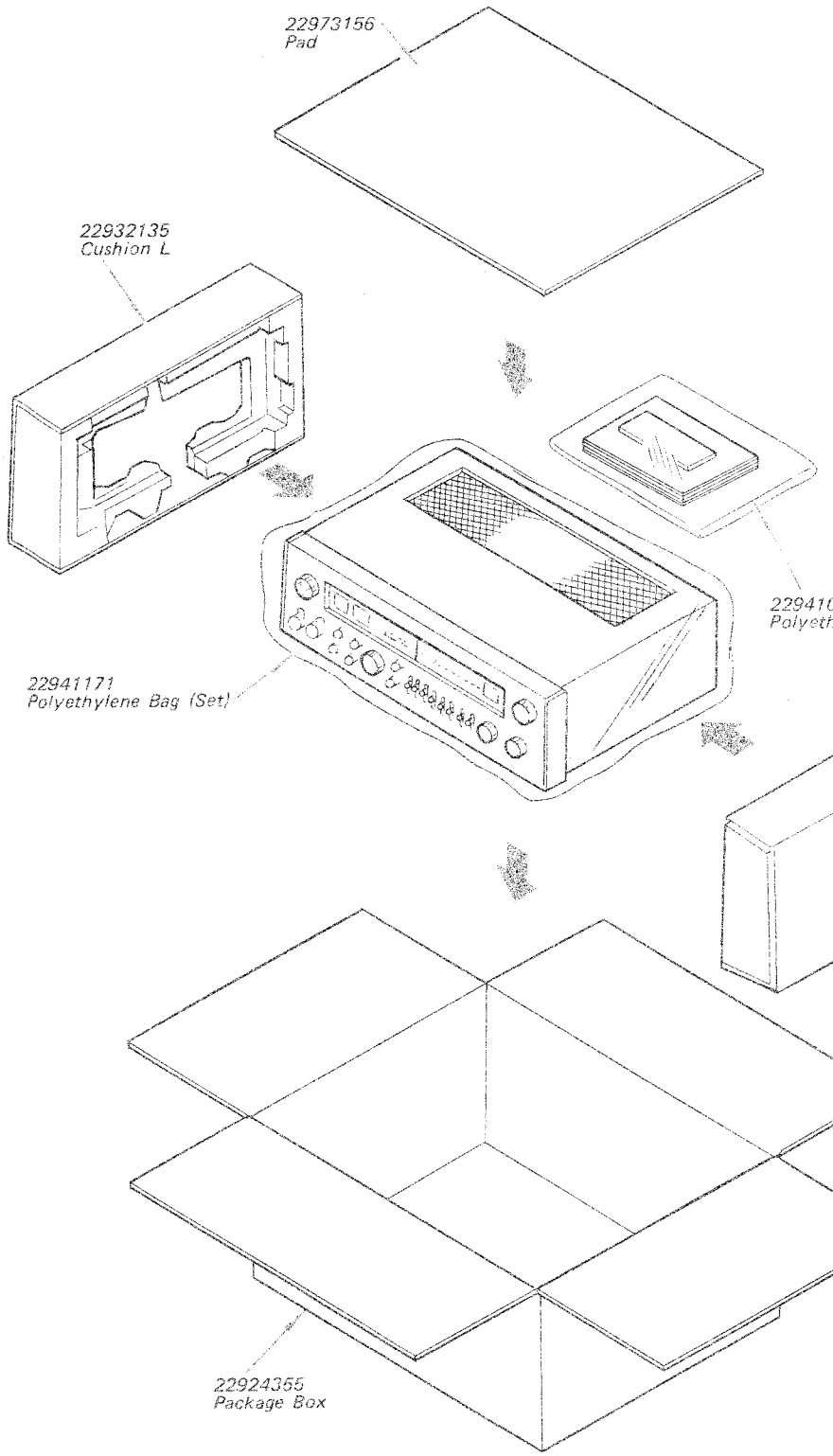
## POWER SUPPLY CIRCUIT BOARD (CCT-SPLY-C06)




## BOTTOM VIEW



# 14. PACKING




| TE Model | |
|---|---|
| 22999160 | Cleaner Cloth |
| 22990093 | Cushion Assembly |
| 22952415 | Owner's Manual (Set) |
| 22124452 | FM Feeder Antenna |

| TA Model | |
|---|---|
| 22999160 | Cleaner Cloth |
| 22990093 | Cushion Ass'y |
| 22952415 | Owner's Manual (Set) |
| 22124452 | FM Feeder Antenna |
| 22100006 | Warranty Card |

| VL Model | |
|---|---|
| 22999160 | Cleaner Cloth |
| 22990093 | Cushion Ass'y |
| 22952415 | Owner's Manual (Set) |
| 22124452 | FM Feeder Antenna |
| 22164315 | Adaptor AC Plug |
| 22164314 | Adaptor AC Plug |

| TC Model | |
|---|---|
| 22999160 | Cleaner Cloth |
| 22990093 | Cushion Ass'y |
| 22952415 | Owner's Manual (Set) |
| 22124452 | FM Feeder Antenna |
| 2210005 | Warranty Card |

# 15. PARTS LISTS

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

| SYMBOL No. | PART No. | DESCRIPTION |
|---|---|---|
| L01 | 22292019 | FMRF Coil RT-8054 |
| L02 | 22292020 | FMRF Coil RT-8053 |
| L03 | 22294217 | FMRF Coil RT-8055 |
| L04 | 22295016 | FMRF Coil RT-8057 |
| L05 | 22241009 | Choke Coil LH-9046 |
| IT01 | 22265655 | IF Transformer IT-6478 |
| VC01 | 22307352 | |
| VC02 | 22309108 | Semifixed Capacitor |
| | **CAPACITORS** | |
| C1,02 | 22361509 | Ceramic 50WV 5pFD |
| C04,05,06 | 22341472 | Ceramic 50WV 0.0047μF |
| C07,13 | 22341203 | Ceramic 50WV 0.02μF |
| C08,14,20 | 22341103 | Ceramic 50WV 0.01μF |
| C09 | 22360140 | Ceramic 50WV 18PFJ |
| C10,11,19 | 22341102 | Ceramic 50WV 0.001μF |
| C12 | 22360242 | Ceramic 50WV 180PFK |
| C15 | 22360137 | Ceramic 50WV 39PFJ |
| C16,18 | 22360131 | Ceramic 50WV 10PFJ |
| C17 | 22360138 | Ceramic 50WV 10PFJ |
| C21 | 22360132 | Ceramic 50WV 15PFJ |
| | **RESISTORS** | |
| R01,08 | 22554104 | Film, 1/8SZ 100 kohm |
| R02 | 22544334 | Film, 1/8PK 330 kohm |
| R03 | 22544124 | FIlm, 1/8PK 120 kohm |
| R04 | 22544101 | Film, 1/8PK 100 ohm |
| R05 | 22544221 | Film, 1/8PK 220 ohm |
| R07 | 22544331 | Film, 1/8PK 330 ohm |
| R09 | 22554102 | Film, 1/8SZ 1 kohm |
| R10 | 22554152 | Film, 1/8SZ 1.5 kohm |
| R11 | 22554103 | Film, 1/8SZ 10 kohm |
| R12 | 22554472 | Film, 1/8SZ 4.7 kohm |
| R13 | 22544223 | Film, 1/8PK 22 kohm |
| R14 | 22554105 | Film, 1/8SZ 1 Mohm |
| R15 | 22544104 | Film, 1/8PK 100 kohm |
| R16 | 22554153 | Film, 1/8PK 15 kohm |
| R17 | 22544563 | Film, 1/8PK 56 kohm |
| **IF UNIT ASSEMBLY (CCT-IF-C02)** | | |
| TR01~04 TR11 | 2SC380AO | Transistor 2SC380A-0 |
| TR05 | 2SK19GR | Transistor 2SK19-GR |
| TR06,07 | 2SC9410 | Transistor 2SC941-0 |
| TR08,09 | 2SC3710 | Transistor 2SC371-0 |
| TR10 | 2SC3720 | Transistor 2SC372-0 |
| D01~04 D11 | IS1555 | Diode IS1555 |
| D05,06,09 | IN60 | Diode IN60 |
| D07,08,09 D12,13 | IN60PR | Diode IN60 PAIR |
| IC01,02 | TA7060P | IC, TA7060P |
| L01 | 22244046 | AMRF Coil RT-6064 |
| L02 | 22245232 | AM Generator Coil, RT-7288 |
| L03~06 | 22241009 | Choke Coil, LH-9046 |
| IT01 | 22267306 | FMIF Transformer IT-8475 |
| IT02 | 22264626 | AMIF Transformer IT-5477 |
| IT03 | 22266308 | AMIF Transformer IT-5476 |
| IT04 | 22265654 | FMIF Transformer IT-6479 |

| SYMBOL No. | PART No. | DESCRIPTION |
|---|---|---|
| CF01,02 | 22153017 | FM Ceramic Filter SFG-10.7MA |
| CF03 | 22153009 | AM Ceramic Filter SF-455D |
| VR01 | 22658177 | Semifixed Resistor VR103 10 kohm |
| | **CAPACITORS** | |
| C01~04 C08,09,12 | 22341103 | Ceramic 50WV 0.01μF |
| C05,13 | 22445470 | Electrolytic 16WV 47μF |
| C06,11 C14,15 | 22341203 | Ceramic 50WV 0.02μF |
| C10,19 | 22341102 | Ceramic 50WV 0.001μF |
| C16,25 | 22362270 | Ceramic 50WV 27pF |
| C17,18,20 | 22341203 | Ceramic 50WV 0.02μF |
| C21,22,24 | 22381471 | Polystyrene 50WV 470pF |
| C23 | 22445470 | Electrolytic 16WV 47μF |
| C38,52 C26,27 | 22341203 | Ceramic 50WV 0.02μF |
| C54 C28~30 | 22362221 | Ceramic 50WV 220pF |
| C31,32,61 | 22445100 | Electrolytic 16WV 10μF |
| C33,35,37 C40,43 | 22381471 | Polystyrene 50WV 470pF |
| C34 | 22373104 | Mylar 50WV 0.1μF |
| C36,42,54 | 22446479 | Electrolytic 25WV 4.7μF |
| C39 | 22361609 | Ceramic 50WV 0.6pF |
| C41 | 22360007 | 50WV 1.5pF |
| C44,45 C58,59 | 22373103 | Mylar 50WV 0.01μF |
| C46,48,50 C51,55,56 | 22381471 | Polystyrene 50WV 470pF |
| C47 | 22362220 | Ceramic 50W 22pF |
| C53,60 | 22445470 | Electrolytic 16WV 47μF |
| C57 | 22341472 | Ceramic 50WV 0.0047μF |
| C62~64 | 22381471 | Polystyrene 50WV 470pF |
| C65 | 22341103 | Ceramic 50WV 0.01μF |
| C67 | 22362100 | Ceramic 50WV 10pF |
| | **RESISTORS** | |
| R01,12 | 22544561 | Film, 1/8PK 560 ohm |
| R02,54 | 22544471 | Film, 1/8PK 470 ohm |
| R03,15 | 22544391 | Film, 1/8PK 390 ohm |
| R04,14 | 22544563 | Film, 1/8PK 56 kohm |
| C05,16,52 | 22544562 | Film, 1/8PK 5.6 kohm |
| C06,07 C17,18 | 22544102 | Film, 1/8PK 1 kohm |
| C08,19,24 C31,43 | 22544101 | Film, 1/8PK 100 ohm |
| C09,13 C20,28 | 22544221 | Film, 1/8PK 220 ohm |
| C10,21,33 | 22544104 | Film, 1/8PK 100 kohm |
| C11,22 C23,27 | 22544331 | Film, 1/8PK 330 ohm |
| C25 | 22554681 | Film, 1/8SZ 680 ohm |
| C26 | 22544122 | Film, 1/8PK 1.2 kohm |
| C29,30,32 C36,41,47 | 22544102 | Film, 1/8PK 1kohm |
| 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 |
|---|---|---|
| C39,60,71 | 22544223 | Film, 1/8PK 22 kohm |
| C40 | 22544154 | Film, 1/8PK 150 kohm |
| C42 | 22544224 | Film, 1/8PK 220 kohm |
| C44,49,63 | 22544221 | Film, 1/8PK 220 ohm |
| C46 | 22544683 | Film, 1/8PK 68 kohm |
| C48 | 22544332 | Film, 1/8PK 3.3 kohm |
| C50 | 22544472 | Film, 1/8PK 4.7 kohm |
| C51,55,57, C69 | 22544103 | Film, 1/8PK 10 kohm |
| C56,68,70 | 22544102 | Film, 1/8PK 1 kohm |
| C58,64,67 | 22544822 | Film, 1/8PK 8.2 kohm |
| C61 | 22544333 | Film, 1/8PK 33 kohm |
| C62 | 22544222 | Film, 1/8PK 2.2 kohm |
| C65 | 22554562 | Film, 1/8SZ 5.6 k ohm |
| C66 | 22544393 | Film, 1/8PK 39 kohm |
| **FM MPX UNIT ASSEMBLY (CCT-MPX-C02)** | | |
| TR01 | 2SC1000Y | Transistor 2SC1000-Y |
| TR02~06 | 2SC373 | Transistor 2SC373 |
| TR7 | 2SC734GR | Transistor 2SC734-GR |
| TR09~12 | 2SC1000G | Transistor 2SC1000-GR |
| D01~03 | IS1555 | Diode 1S1555 |
| D04~07 | IN60PR | Diode 1N60 PAIR |
| T01 | 22212026 | Stereo Coil 67 kHz ST-3204 |
| T02 | 22212029 | Stereo Coil ST-1111 19 kHz |
| T03 | 22212028 | Stereo Coil ST-1112 19 kHz |
| T04 | 22212030 | Stereo Coil ST-2306 38 kHz |
| T05,06 | 22212027 | Stereo Coil ST-2307 38 kHz |
| T07 | 22212035 | Stereo Coil ST-135 72 kHz |
| VR01 | 22658178 | Semifixed Resistor R104 100 kohm |
| | **CAPACITORS** | |
| C01 | 22373104 | Mylar 50WV 0.1μF |
| C02 | 22373333 | Mylar 50WV 0.033μF |
| C03,04,10 | 22446479 | Electrolytic 25WV 4.7μF |
| C05,06 | 22373103 | Mylar 50WV 0.01μF |
| C07,21 | 22445470 | Electrolytic 16WV 47μF |
| C08 | 22373102 | Mylar 50WV 1,000pF |
| C09 | 22448109 | Electrolytic 50WV 1μF |
| C11,12 | 22362221 | Ceramic 50WV 220pF |
| C13,14 | 22340001 | Ceramic 0.2μFZ |
| C15,16 | 22362470 | 50WV 47pF |
| C17,18 | 22443330 | Electrolytic 10WV 33μμF |
| C19,20 | 22445100 | Electrolytic 16WV 10μF |
| C22 | 22442101 | Electrolytic 6WV 100μF |
| C23,24 | 22382472 | Polystyrene 50WV 0.0047μF |
| C25,26 | 22371682 | Mylar 50WV 0.0068μF |
| C27,28 | 22371222 | Mylar 50WV 0.0022μF |
| C29 | 22373222 | Mylar 50WV 0.0022μFM |
| | **RESISTORS** | |
| R01,04 R23,24 | 22544223 | Film, 1/8PK 22 kohm |
| R02,41 R12,13 | 22544333 | Film, 1/8PK 33 kohm |
| R03 | 22544124 | Film 1/8PK 120 kohm |
| R05 | 22554561 | Film, 1/8SZ 560 ohm |
| R06 | 22544154 | Film, 1/8PK 150 kohm |

| SYMBOL No. | PART No. | DESCRIPTION |
|---|---|---|
| **EQ UNIT ASSEMBLY (CCT-AF-C09)** | | |
| R01,02 | 22544823 | 82 kohm ±10% 1/8W RD |
| R03,04 | 22544102 | 1 kohm ±10% 1/8W RD |
| R05,06 | 22544333 | 33 kohm ±10% 1/8W RD |
| R07,08 | 22544394 | 390 kohm ±10% 1/8W RD |
| R09,10 | 22544474 | 470 kohm ±10% 1/8W RD |
| R11 | 22544562 | 5.6 kohm ±10% 1/8W RD |
| R12 | 22544332 | 3.3 kohm ±10% 1/8W RD |
| R13,14 | 22544104 | 100 kohm ±10% 1/8W RD |
| R15 | 22544563 | 56 kohm ±10% 1/8W RD |
| R16 | 22544563 | 56 kohm ±10% 1/8W RD |
| R17 | 22544562 | 5.6 kohm ±10% 1/8W RD |
| R18 | 22544184 | 180 kohm ±10% 1/8W RD |
| R19 | 22544183 | 18 kohm ±10% 1/8W RD |
| R20 | 22544392 | 3.9 kohm ±10% 1/8W RD |
| R21 | 22544333 | 33 kohm ±10% 1/8W RD |
| R22 | 22544333 | 33 kohm ±10% 1/8W RD |
| R23 | 22544473 | 47 kohm ±10% 1/8W RD |
| R24 | 22544183 | 18 kohm ±10% 1/8W RD |
| R25 | 22544152 | 1.5 kohm ±10% 1/8W RD |
| R26 | 22544183 | 18 kohm ±10% 1/8W RD |
| R27 | 22544392 | 3.9 kohm ±10% 1/8W RD |
| R28 | 22544474 | 470 kohm ±10% 1/8W RD |
| R29 | 22544474 | 470 kohm ±10% 1/8W RD |
| R30 | | — |
| R31 | 22544564 | 560 kohm ±10% 1/8W RD |
| R32 | 22544101 | 100 ohm ±10% 1/8W RD |
| C01,02 | 22448109 | 1μF 50WV CE |
| C03,04 | 22447100 | 10μF 35WV CE |
| C05,06 | 22373102 | 0.001μF 50V ±20% MY |
| C07,08 | 22373682 | 0.0068μ 50V ±20% MY |
| C09,10 | 22373102 | 0.001μF 50V ±20% MY |
| C11,12 | 22445100 | 10μF 16WV CE |
| C13,14 | 22448109 | 1μF 50WV CE |
| C15,16 | 22448109 | 1μF 50WV CE |
| C17,18 | 22373223 | 0.022μF 50V ±20% MY |
| C19,20 | 22373332 | 0.0033μF 50V ±20% MY |
| C21 | 22443330 | 33μF 10WV CE |
| C22 | 22446479 | 4.7μF 25WV CE |
| C23 | 22447100 | 10μF 35WV CE |
| C24 | 22448109 | 1μF 50WV CE |
| C25 | 22448109 | 1μF 50WV CE |
| C26 | 22447470 | 47μF 35WV CE |
| IC01 | | TH9014P |
| TR01,02 | | 2SC1000-GR |
| TR03,04 | | 2SC1000-GR |
| **TONE UNIT ASSEMBLY (CCT-AF-C14)** | | |
| TR01,02,03 TR04,05,06 TR07,08,09 TR10,11,12 | 31231000 | TR-2SC1000-GR Transistor |
| | **CAPACITORS** | |
| C01,02,03,04 C29,30,31,32 | 22448109 | 1μF 50WV Electric Capacitor |
| 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 | 10μF 35WV Electric Capacitor |
| C17,18,19,20 | 22373222 | 0.0022μF 50V ±20% MY |
| C21,22,23,24 C25,26,27,28 | 22373223 | 0.022μF 50V ±20% MY |
| C33,34,35,36 | 22362470 | 47pF 50V ±10% CC (SL) |
| C41,42,43,44 | 22442470 | 47μF 6.3WV Electric Capacitor |
| C45,46,47,48 | 22362101 | 100pF 50V ±10% CC (SL) |
| | **CARBON RESISTORS** | |
| R03,04,05,06 | 22554222 | 2.2 kohm 1/8W ±10% Single ended |
| R07,08,09,10 | 22554104 | 100 kohm 1/8W ±10% Single ended |
| R11,12,13,14 | 22554472 | 4.7 kohm 1/8W ±10% Single ended |
| R15,16,17,18 | 22554274 | 270 kohm 1/8W ±10% Single ended |
| R19,20,21,22 | 22554272 | 2.7 kohm 1/8W ±10% Single ended |
| R23,24,25,26 | 22554122 | 1.2 kohm 1/8W ±10% Single ended |
| R27,28,29,30 | 22554183 | 18 kohm 1/8W ±10% Single ended |
| R31,32,33,34 R51,52,53,54 | 22554103 | 10 kohm 1/8W ±10% Single ended |
| R35,36,37,38 R43,44,45,46 R75,77,78 | 22554102 | 1 kohm 1/8W ±10% Single ended |
| R39,40,41,42 R55,56,57 | 22554123 | 12 kohm 1/8W ±10% Single ended |
| R47,48 | 22544332 | 3.3 kohm 1/8W ±10% Single ended |
| R49,50,59,60 R61,62,79,80 R81,82 | 22554332 | 3.3 kohm 1/8W ±10% Single ended |
| R58 | 22544123 | 12 kohm 1/8W ±10% Single ended |
| R63,64 | 22544224 | 220 kohm 1/8W ±10% Single ended |
| R65,66 | 22554224 | 220 kohm 1/8W ±10% Single ended |
| R67,68 | 22554333 | 33 kohm 1/8W ±10% Single ended |
| R69,70 | 22544333 | 33 kohm 1/8W ±10% Single ended |
| R71,72,73,74 | 22554562 | 5.6 kohm 1/8W ±10% Single ended |
| R76 | 22544102 | 1 kohm 1/8W ±10% Single ended |
| R83,84,85,86 | 22554474 | 470 kohm 1/8W ±10% Single ended |
| VR01 A,B,C,D | 22650406 | 100 kohm B Bass TREBLE Variable Resistor |
| VR02 A,B,C,D | 22650406 | 100 kohm B Bass TREBLE Variable Resistor |
| | **MATRIX UNIT ASSEMBLY (CCT-AF-C10)** | |
| TR01,02,03 TR04,05,06 TR07,08,09 | 31231000 | TR-2SC1000-GR Transistor |
| | **CAPACITORS** | |
| C01,02,07,08 C09,10,11,12 C13,14,22,27 C28 | 22448109 | 1μF 50WV Electric Capacitor |
| C03,04,19,20 C25 | 22445100 | 10μF 16WV Electric Capacitor |
| C05,06,21,23 C24,25 | 23373104 | 0.1μF 50V ±20% MY |
| C15,16 | 22373823 | 0.082μF 50V ±20% MY |
| C17,18 | 22373153 | 0.015μF 50V ±20% MY |

| SYMBOL No. | PART No. | DESCRIPTION |
|---|---|---|
| | **CARBON RESISTORS** | |
| R01,02 R51,52,53 | 22544683 | 68 kohm 1/8W ±10% Single ended |
| R03,04 | 22544224 | 220 kohm 1/8W ±10% Single ended |
| R05,58 | 22544333 | 33 kohm 1/8W ±10% Single ended |
| R06 | 22544183 | 18 kohm 1/8W ±10% Single ended |
| R07 | 22544334 | 330 kohm 1/8W ±10% Single ended |
| R08 | 22554334 | 330 kohm 1/8W ±10% Single ended |
| R09,10,11,12 R59,60 | 22544103 | 10 kohm 1/8W ±10% Single ended |
| R13,15 | 22554563 | 56 kohm 1/8W ±10% Single ended |
| R14,16 | 22544563 | 56 kohm 1/8W ±10% Single ended |
| R17,19,20,23 | 22544223 | 22 kohm 1/8W ±10% Single ended |
| R18,24,47,48 | 22554223 | 22 kohm 1/8W ±10% Single ended |
| R21,22 | 22544104 | 100 kohm 1/8W ±10% Single ended |
| R25,26 | 22544330 | 33 ohm 1/8W ±10% Single ended |
| R27,28 | 22554123 | 12 kohm 1/8W ±10% Single ended |
| R29,39,63 | 22554393 | 39 kohm 1/8W ±10% Single ended |
| R30,37,38,72 R73 | 22554103 | 10 kohm 1/8W ±10% Single ended |
| R31,32 | 22544274 | 270 kohm 1/8W ±10% Single ended |
| R33,34 | 22554682 | 6.8 kohm 1/8W ±10% Single ended |
| R35 | 22544182 | 1.8 kohm 1/8W ±10% Single ended |
| R36 | 22554182 | 1.8 kohm 1/8W ±10% Single ended |
| R40 | 22554273 | 27 kohm 1/8W ±10% Single ended |
| R41,42 | 22554224 | 220 kohm 1/8W ±10% Single ended |
| R43,44,45,46 | 22554332 | 3.3 kohm 1/8W ±10% Single ended |
| R49,50 | 22554153 | 15 kohm 1/8W ±10% Single ended |
| R54 | 22554683 | 68 kohm 1/8W ±10% Single ended |
| R55,61,62,64 | 22554105 | 1 Mohm 1/8W ±10% Single ended |
| R56 | 22544684 | 680 kohm 1/8W ±10% Single ended |
| R57 | 22554333 | 33 kohm 1/8W ±10% Single ended |
| R65 | 22554123 | 12 kohm 1/8W ±10% Single ended |
| R68,69 | 22544822 | 8.2 kohm 1/8W ±10% Single ended |
| R70 | 22544102 | 1 kohm 1/8W ±10% Single ended |
| R71 | 22554102 | 1 kohm 1/8W ±10% Single ended |
| | **LOUDNESS UNIT ASSEMBLY (CCT-SWI-C01)** | |
| | 22142731 | SWI-C01-PCB PC BOARD |
| | **CAPACITORS** | |
| C01,02,03,04 | 22362151 | 150pF 50V ±10% CC (SL) |
| C05,06,07,08 | 22373103 | 0.01μF 50V ±20% MY |
| | **CARBON RESISTORS** | |
| R01,02,03,04 | 22544273 | 27 kohm 1/8W ±10% |
| | **HIGH FILTER UNIT (CCT-SWI-C02)** | |
| | 22142732 | SWI-C02-PCB PC BOARD |
| | **CAPACITORS** | |
| C01,02,03,04 | 22373103 | 0.01μF 50V ±20% MY |

| SYMBOL No. | PART No. | DESCRIPTION |
|---|---|---|
| **LOW FILTER UNIT ASSEMBLY (CCT-SWI-C03)** | | |
| | 22142733 | SWI-C03-PCB PC BOARD |
| | **CAPACITORS** | |
| C01,02,03,04 | 22373103 | 0.01μF 50V ±20% MY |
| | **CARBON RESISTORS** | |
| R01,02,03,04 | 22544474 | 470kohm 1/8W ±10% |
| **MUTING UNIT ASSEMBLY (CCT-SWI-C05)** | | |
| | 22142735 | SWI-C05-PCB PC BOARD |
| | **CARBON RESISTORS** | |
| R01,02,03,04 | 22544103 | 10 kohm 1/8W ±10% |
| R05,06,07,08 | 22544104 | 100 kohm 1/8W ±10% |
| **TAPE MONITOR UNIT ASSEMBLY (CCT-SWI-C06)** | | |
| | 22142736 | SWI-C06-PCB PC BOARD |
| | **CARBON RESISTORS** | |
| R01,02,03,04 | 22544472 | 4.7 kohm 1/8W ±10% |
| **FILTER UNIT ASSEMBLY (CCT-FILT-C01)** | | |
| | **CAPACITORS** | |
| C01,02,03,04 C05,06,07,08 | 22448109 | 1μF 50WV Electric Capacitor |
| C09,10,11,12 | 22448229 | 2.2μF 50WV Electric Capacitor |
| | **CARBON RESISTORS** | |
| R01,02,03,04 R05,06,07,08 | 22544473 | 47 kohm 1/8W ±10% |
| R09,10,11,12 | 22544223 | 22 kohm 1/8W ±10% |
| **PHASE INVERTER UNIT ASSEMBLY (CCT-AF-C13)** | | |
| TR01,02 | 31231000 | TR-2SC1000-GR Transistor |
| | **CAPACITORS** | |
| C01,02,03,04 C05,06 | 22448109 | 1μF 50WV Electric Capacitor |
| C07,08 | 22362470 | 47pF 50WV ±10% CC (SL) |
| | **CARBON RESISTORS** | |
| R01,02 | 22544154 | 150 kohm 1/8W ±10% |
| R03,04,07,08 | 22544562 | 5.6 kohm 1/8W ±10% |
| R05,06 | 22544683 | 68 kohm 1/8W ±10% |
| R09,10 | 22544474 | 470 kohm 1/8W ±10% |
| **DRIVER UNIT ASSEMBLY (CCT-AF-C04)** | | |
| TR01,02 | | 2SA561-Y |
| TR03,04 | | 2SA561-Y |
| TR05,06 | | 2SC497-Y |
| TR07,08 | | 2SC497-Y |
| TR09,10 | | 2SC497-Y |
| TR11,12 | | 2SA497-Y |

| SYMBOL No. | PART No. | DESCRIPTION |
|---|---|---|
| TR13,14 | | 2SC496 |
| D01,02 | | S3016-R To M8513A-R (Modification) |
| D03,04 | | S3016-R To M8513A-R (Modification) |
| | **RESISTORS** | |
| R01,02 | 22544474 | 47 kohm ±10% 1/8W RD |
| R03,04 | 22544332 | 3.3 kohm ±10% 1/8W RD |
| R05,06 | 22544104 | 100 kohm ±10% 1/8W RD |
| R07,08 | 22544473 | 47 kohm ±10% 1/8W RD |
| R09,10 | 22544562 | 5.6 kohm ±10% 1/8W RD |
| R11,12 | 22544562 | 5.6 kohm ±10% 1/8W RD |
| R13,14 | 22570021 | 100 ohm ±10% 2W RN |
| R15,16 | 22544821 | 820 ohm ±10% 1/8W RD |
| R17,18 | 22544273 | 27 kohm ±10% 1/8W RD |
| R19,20 | 22544102 | 1 kohm ±10% 1/8W RD |
| R21,22 | 22544222 | 2.2 kohm ±10% 1/8W RD |
| R23,24 | 22544392 | 3.9 kohm ±10% 1/8W RD |
| R25,26 | 22544221 | 220 ohm ±10% 1/8W RD |
| R27,28 | 22544221 | 220 ohm ±10% 1/8W RD |
| R29,30 | 22500047 | 10 ohm ±10% 5W RW |
| VR01,02 | 22658188 | 300 kohm Semifixed |
| VR03,04 | 22658189 | 500 ohm Semifixed |
| | **CAPACITORS** | |
| C01,02 | 22448109 | 1μF/50WV CE |
| C03,04 | 22447470 | 47μF/35WV CE |
| C05,06 | 22373224 | 0.22μF 50V ±20% MY |
| C07,08 | 22443330 | 33μF/10WV |
| C09,10 | 22362220 | 22pF 50V ±10% CC (SL) |
| C11,12 | 22447221 | 220μF/35WV CE |
| C13,14 | 22362221 | 220pF 50V ±10% CC (SL) |
| C15,16 | 22373103 | 0.01μF 50V ±20% MY |
| C17,18 | 22373104 | 0.1μF 50V ±20% MY |
| C19,20 | 22362470 | 47pF 50V ±10% CC (SL) |
| **POWER SUPPLY UNIT ASSEMBLY (CCT-SPLY-C06)** | | |
| | **TRANSISTOR & DIODE** | |
| TR01 | 31240235 | TR-2SD235-0 |
| D02 | 37682020 | D-1D-2C1 |
| D03 | 31112121 | D-1S2121A |
| | **CAPACITORS** | |
| C03,04 | 22448471 | 470μF 50WV Electric Capacitor |
| C05 | 22448221 | 220μF 50WV Electric Capacitor |
| C06,07 | 22446221 | 220μF 25WV Electric Capacitor |
| C08 | 22430019 | 1000μF 35WV Electric Capacitor |
| C11,12 | 22340030 | 0.01μF 500V $\pm^{100}_{0}$% CK |
| C15 | 22447471 | 470μF 35WV Electric Capacitor |
| | **CARBON RESISTORS** | |
| R01 | 22570022 | 220 ohm ±10% 2W Cement type |
| R02 | 22570038 | 3.9 kohm ±10% 2W Metalized film |
| R03 | 22574391 | 390 ohm ±10% 2W Metalized film |
| R04 | 22570021 | 100 ohm ±10% 2W Cement type |
| F01,02 | 22144187 | FUSE 1.2A UL Metalized film |