

Service Manual

ST-C01

FM/AM Stereo Tuner

ST-C01

(M), (MC)



- * The model ST-C01(M) is available in America only.
- * The model ST-C01(MC) is available in Canada only.

TECHNICAL SPECIFICATIONS

Specifications are subject to change without notice for further improvement.

FM TUNER SECTION

| | |
|-------------------------------|--|
| Frequency range | 88 ~ 108 MHz |
| Antenna terminals | 300 ohms (balanced), 75 ohms (unbalanced) |
| Sensitivity | 10.8 dBf 1.9 μ V (IHF '58) |
| 50 dB quieting sensitivity | 17.0 dBf |
| MONO | 3.9 μ V (IHF '58) |
| STEREO | 38.3 dBf 45 μ V (IHF '58) |
| Total harmonic distortion | |
| MONO | 100 Hz 0.1% 1 kHz 0.1% 6 kHz 0.15% |
| STEREO | 100 Hz 0.25% 1 kHz 0.15% 6 kHz 0.25% |
| S/N | MONO 75 dB STEREO 70 dB |
| Frequency response | 20Hz ~ 15 kHz, +0.5 dB, -1.5 dB |
| Alternate channel selectivity | 75 dB |
| Capture ratio | 1.0 dB |
| Image rejection at 98 MHz | 50 dB |

| | |
|---------------------------------------|---------------------------|
| IF rejection at 98 MHz | 85 dB |
| Spurious response rejection at 98 MHz | 75 dB |
| AM suppression | 55 dB |
| Stereo separation | 1 kHz 45 dB, 10 kHz 35 dB |
| Leak carrier | 19 kHz, 38 kHz -40 dB |

AM TUNER SECTION

| | |
|-----------------------------|---------------------------|
| Frequency range | 525 ~ 1605 kHz |
| Sensitivity | 30 μ V, 250 μ V/m |
| Selectivity | 30 dB |
| Image rejection at 1000 kHz | 50 dB |
| IF rejection at 1000 kHz | 40 dB |

GENERAL

| | |
|------------------------|---|
| Output voltage | 0.5V |
| Power consumption | 8W |
| Power supply | AC 60Hz, 120V |
| Dimensions (W x H x D) | 297 x 49 x 255 mm (11 $\frac{1}{16}$ x 1 $\frac{15}{16}$ x 10 $\frac{1}{2}$) inch |
| Weight | 2.9 kg (6.4 lb.) |

Weights and dimensions shown are approximate.

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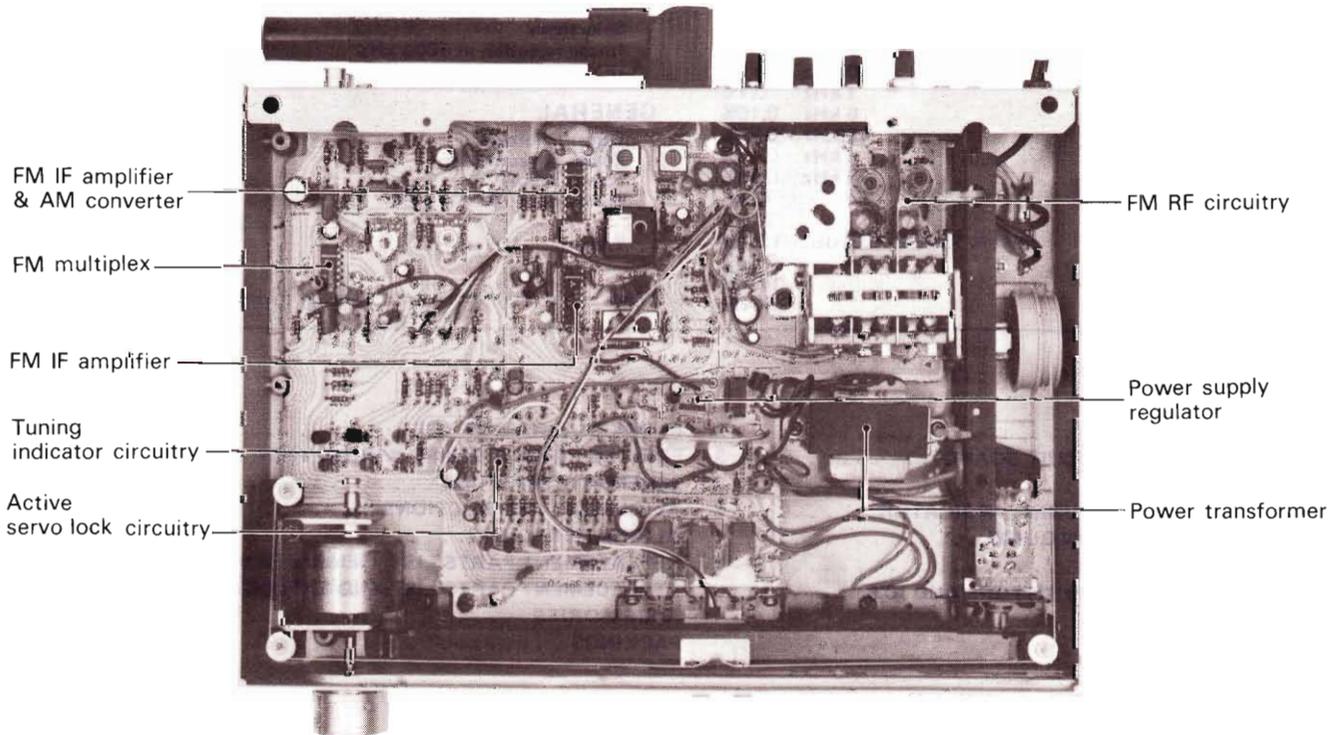
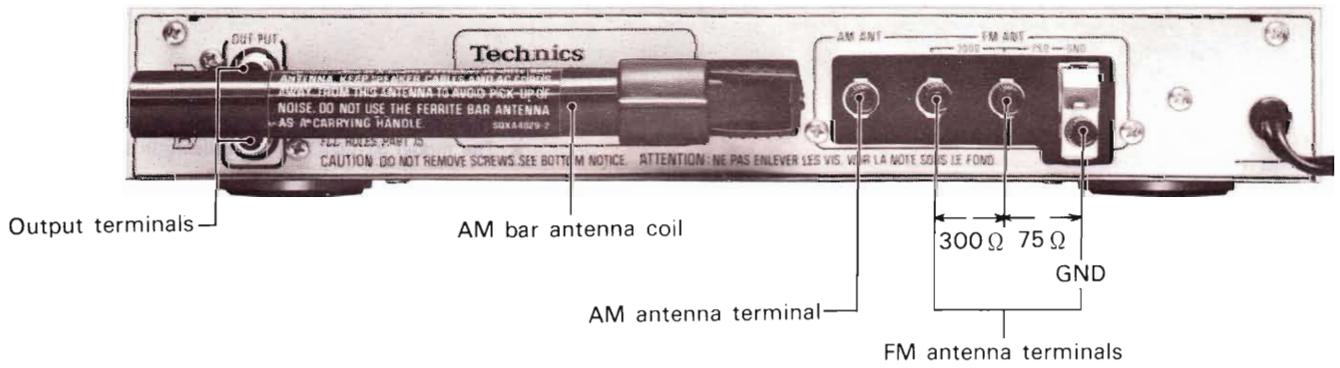
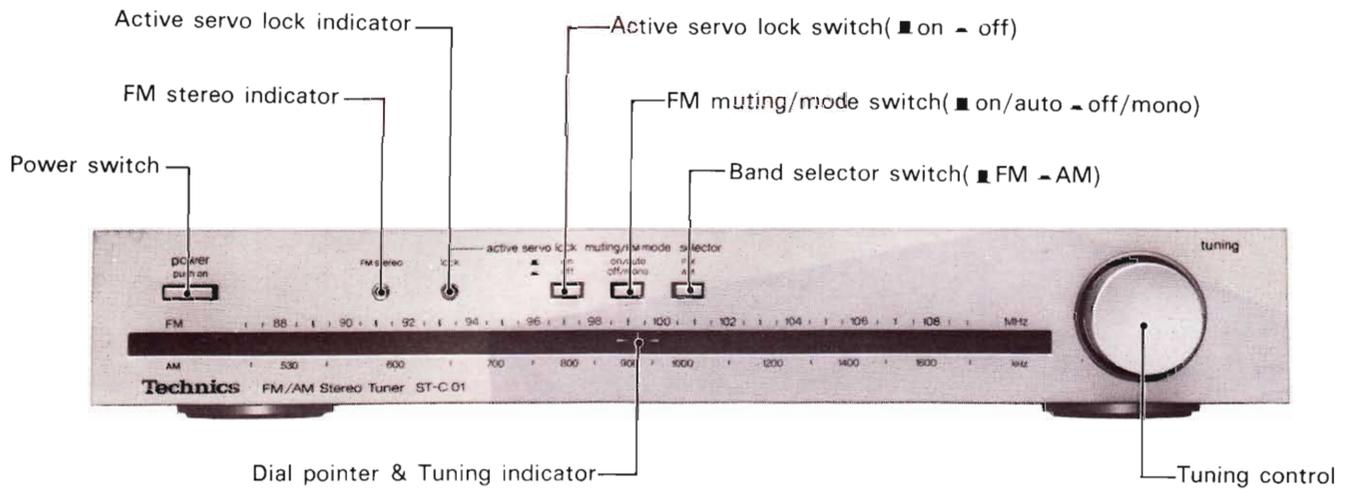
Technics

Panasonic Company
Division of Matsushita Electric
Corporation of America
One Panasonic Way, Secaucus,
New Jersey 07094

Panasonic Hawaii, Inc
320 Waiakamilo Road, Honolulu,
Hawaii 96817

Matsushita Electric of Canada Ltd.
5770 Ambler Drive,
Mississauga, Ontario L4W 2K9

LOCATION OF CONTROLS



■ TO REMOVE PRINTED CIRCUIT BOARD

1. Remove the bottom board from the set.
2. Loosen the tuning knob setscrew with a hexagonal wrench and then pull out the knob. (fig. 1)
3. Remove the 5 setscrews (① ~ ⑤) in fig. 2) used to secure the printed circuit board on the cabinet.
4. Remove the 2 setscrews (⑥, ⑦) in fig. 3) used to fasten the rear plate.

5. Pull the printed circuit board backwards along with the rear panel. Then the printed circuit board can be removed from the cabinet.
6. When installing the printed circuit board, reverse the procedure 1 ~ 5.

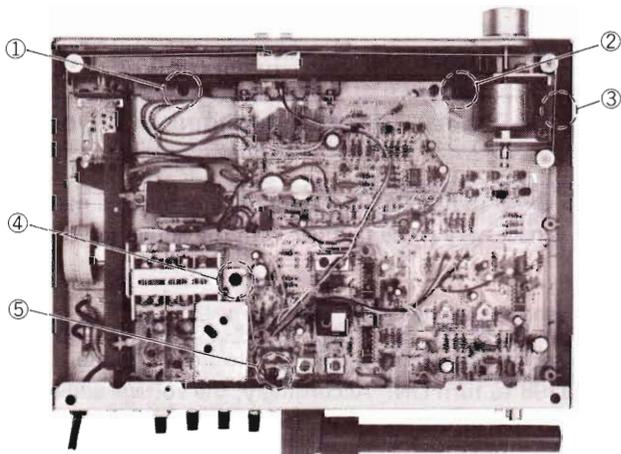


Fig. 2

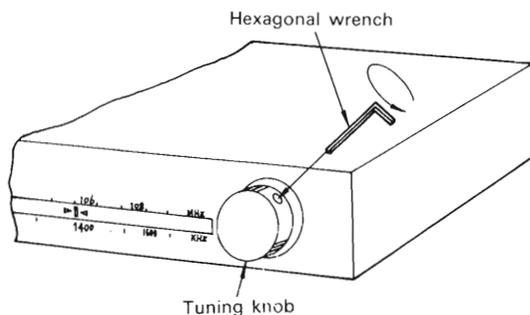


Fig. 1

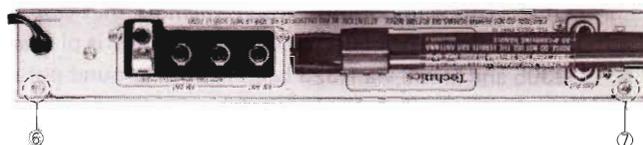
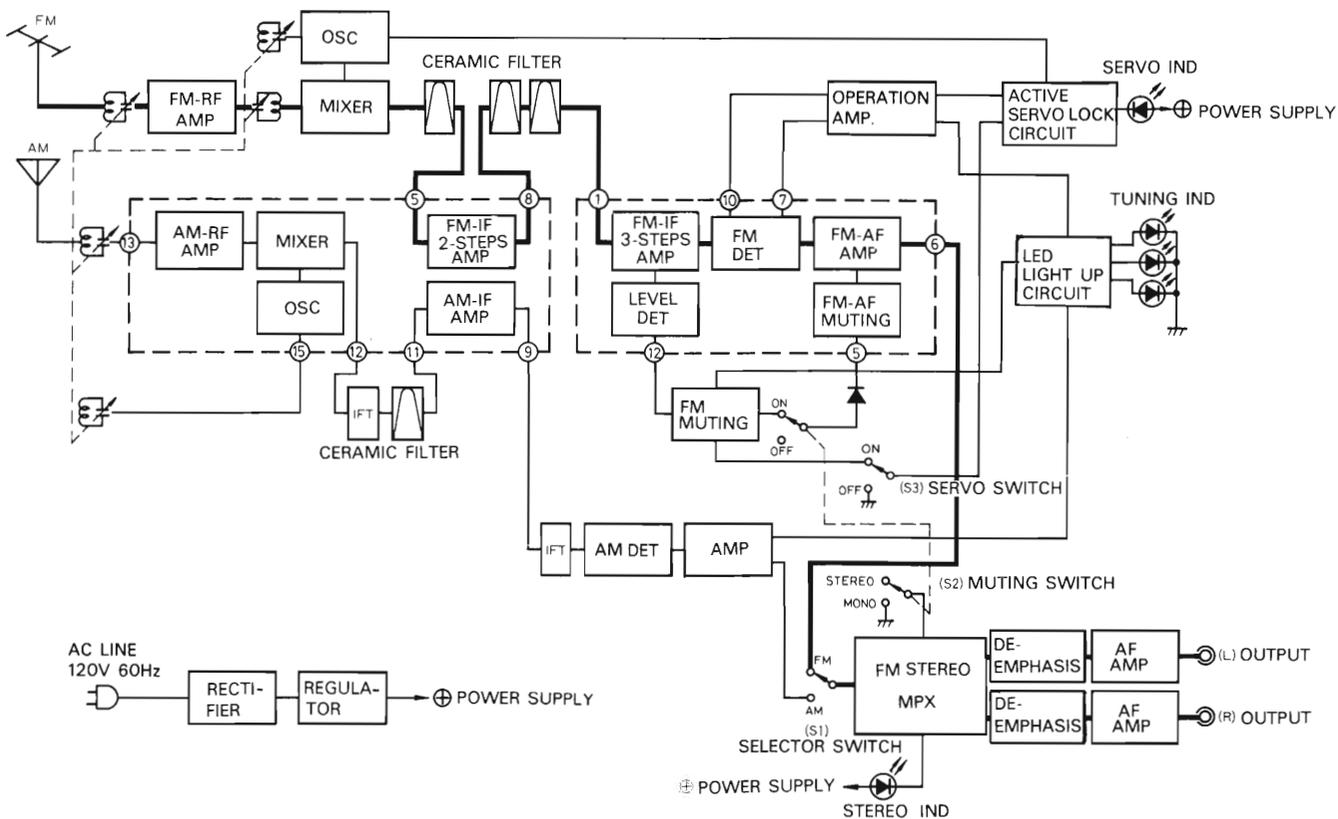


Fig. 3

■ BLOCK DIAGRAM

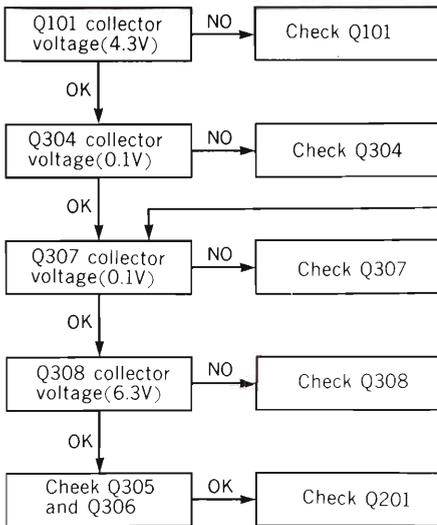


■ TROUBLESHOOTING OF TUNING INDICATOR

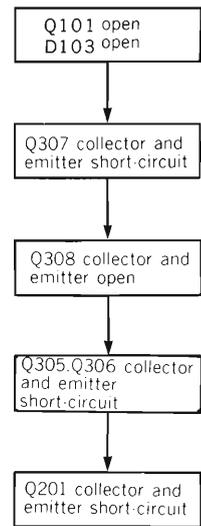
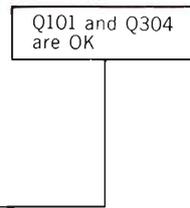
1. The tuning LED(Light Emitting Diode) doesn't go out with stereo signal received.

2. The tuning LED doesn't light up in no signal mode.

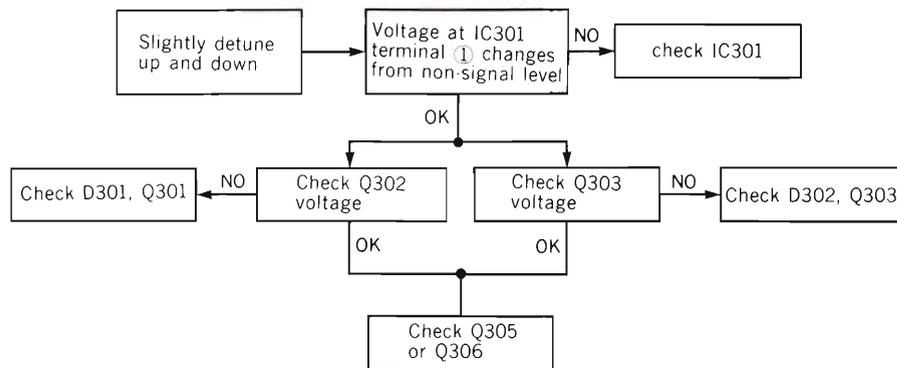
● LED doesn't go out with servo lock "ON"



● LED doesn't go out with servo lock "OFF"

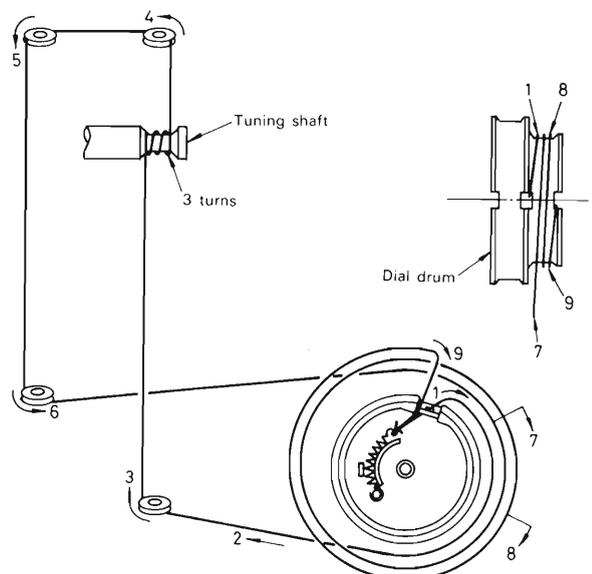


3. Only one tuning LED goes out with stereo signal received.



■ DIAL CORD INSTALLATION GUIDE

- For threading a fresh cord, proceed as follows.
 1. Prepare a fresh cord more than 130 cm (51-1/4") in length.
 2. Bring the variable capacitor into a state where the drum is completely turned to the right (maximum capacity and lowest frequency for the variable capacitor).
 3. Direct the cord in the order from 1 to 9.
 4. Stretch the cord in such a tension as the spring length is elongated by 1.5 times that of the original state.
 5. Fix the knot of the cord with the bond.



■ TECHNICAL GUIDE

(A) ACTIVE SERVO LOCK CIRCUIT

This circuit is designed to maintain the exact tuning point even in case of frequency drift in the set or at the broadcasting station.

It watches the S curve of the FM IF detector and shifts the voltage to its original level if it is deflected from the reference voltage thus keeping the set in optimum "Tuned" condition at all times.

1. No signal reception mode

IC301 is dual operational amplifier plus voltage amplifier.

A reference voltage of about 5.6V is applied from terminal ⑩ of IC102 to terminal ⑤ of IC301. The IF detector output voltage is fed from terminal ⑦ of IC102 to terminals ⑥ and ③ of IC301. (Since this unit is a quadrature detection type, the output voltage at terminal ⑦ is about 5.6V in "No signal" and "Exact tuned" condition.)

IC301 detects the difference between the detector output voltage and the reference voltage to obtain an amplified difference voltage at terminal ⑦ of IC301.

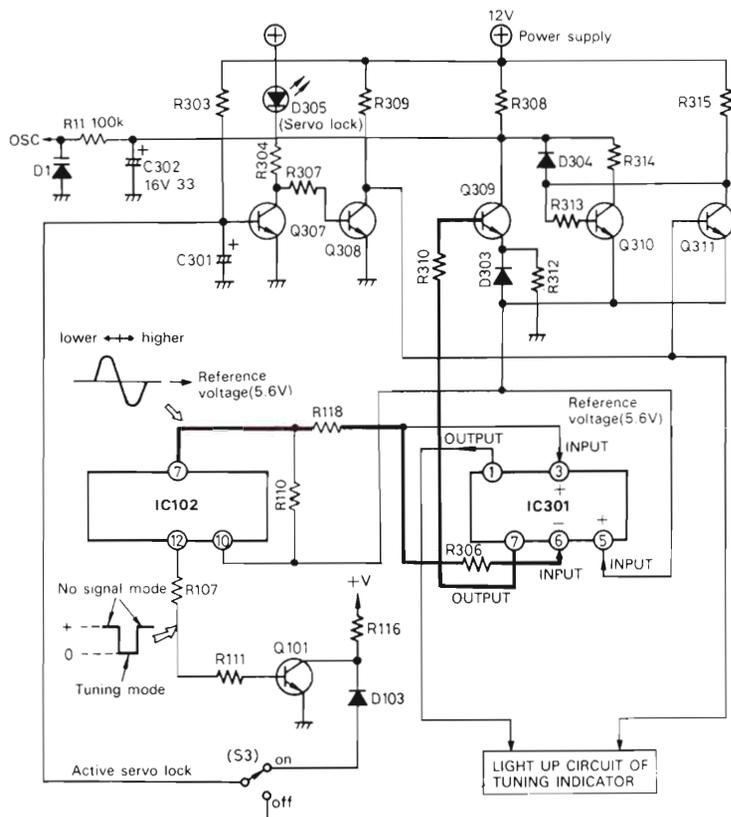
This voltage controls Q309 which is turned off in the "Exact tuned" and in the "No signal" mode. (Reference voltage and detector output voltage are the same.)

Q101 located near IC102 is a switching transistor to operate in accordance with the FM-IF signal level.

It is ON in the "No signal" mode as its base potential is high at that time, and it turns OFF only, when the input level of the FM-IF signal reaches a certain level.

With the active servo lock switch "ON", and Q101 "ON", both the collector voltage of Q101 and the base voltage of Q307 are 0V (ground potential), while Q307 is OFF.

Consequently, Q308 is ON, Q311 is OFF and Q310 is ON, and voltage is being applied to the variable capacity diode D1 as in Fig. 5.



(Active servo lock circuit)
Fig. 4

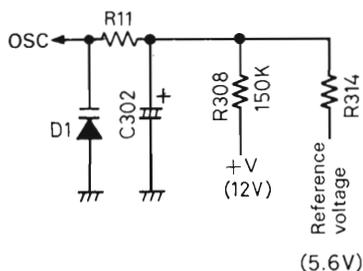
2. Signal reception mode

As explained above, Q101 turns OFF when a signal is received, causing the collector voltage to rise. D103 is reverse-biased and current stops to flow. In other words, the base of Q307 is electrically disconnected from the collector of Q101.

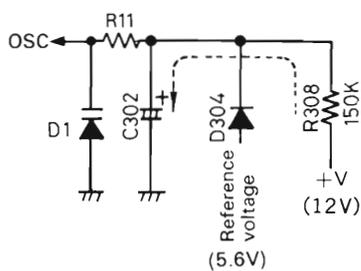
This causes C301 to be charged through R303. About 2 or 3 seconds later, Q307 turns ON and the servo lock circuit starts to operate.

Then, servo lock indicator D305 light up.

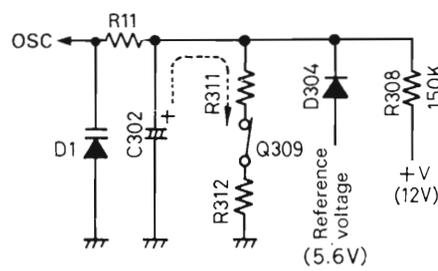
When Q307 is ON, then Q308 is OFF, Q311 is ON and Q310 is OFF and a constant voltage is applied to D1 as shown in Fig. 6.



(No signal mode)
Fig. 5



(Exact tuning &
deviation to lower frequency)
Fig. 6



(Deviation to higher frequency)
Fig. 7

3. Deviation to higher frequency

If the frequency is deflected upward, the FM-IF detector output voltage (voltage at IC102 terminal ⑦) drops, while the output voltage at terminal ⑦ of IC301 rises above the reference voltage (5.6V). Then Q309 turns ON, resulting in the circuit as shown in Fig. 7. The voltage across D1 drops, causing the capacity to increase and the frequency of the local oscillator circuit to become lower, thus shifting the frequency back to the correct tuning point.

4. Deviation to lower frequency

If the frequency is deflected to the lower side, the if detector voltage goes up, dropping the output voltage at terminal ⑦ of IC301 below the reference level and Q309 turns OFF. C302 starts to charge up (see fig. 6). The voltage across D1 increases, capacity of D1 decreases, which causes the oscillator frequency to go up to the correct tuning point.

| MODE | Q101 | Q307 | Q308 | Q311 | Q310 | Q309 | C302 | D1 (CAPACITY) |
|---------------------|------|----------------|-----------------|----------------|-----------------|------|---------------|---------------|
| NO SIGNAL | ON | OFF | ON | OFF | ON | OFF | FULLY CHARGED | CONSTANT |
| EXACT TUNING | OFF | AFTER 3 SEC ON | AFTER 3 SEC OFF | AFTER 3 SEC ON | AFTER 3 SEC OFF | OFF | FULLY CHARGED | CONSTANT |
| FREQUENCY IS HIGHER | OFF | ON | OFF | ON | OFF | ON | DISCHARGING | ↑ UP |
| FREQUENCY IS LOWER | OFF | ON | OFF | ON | OFF | OFF | CHARGING | ↓ DOWN |

(B) TUNING INDICATOR CIRCUIT

This circuit is designed to activate the arrow shaped indicator LED'S (▶◀) in place of conventionally employed meters. Since the circuit is interlocked with the active servo lock circuit, it is necessary to be familiar with the active servo lock circuit.

1. No signal mode

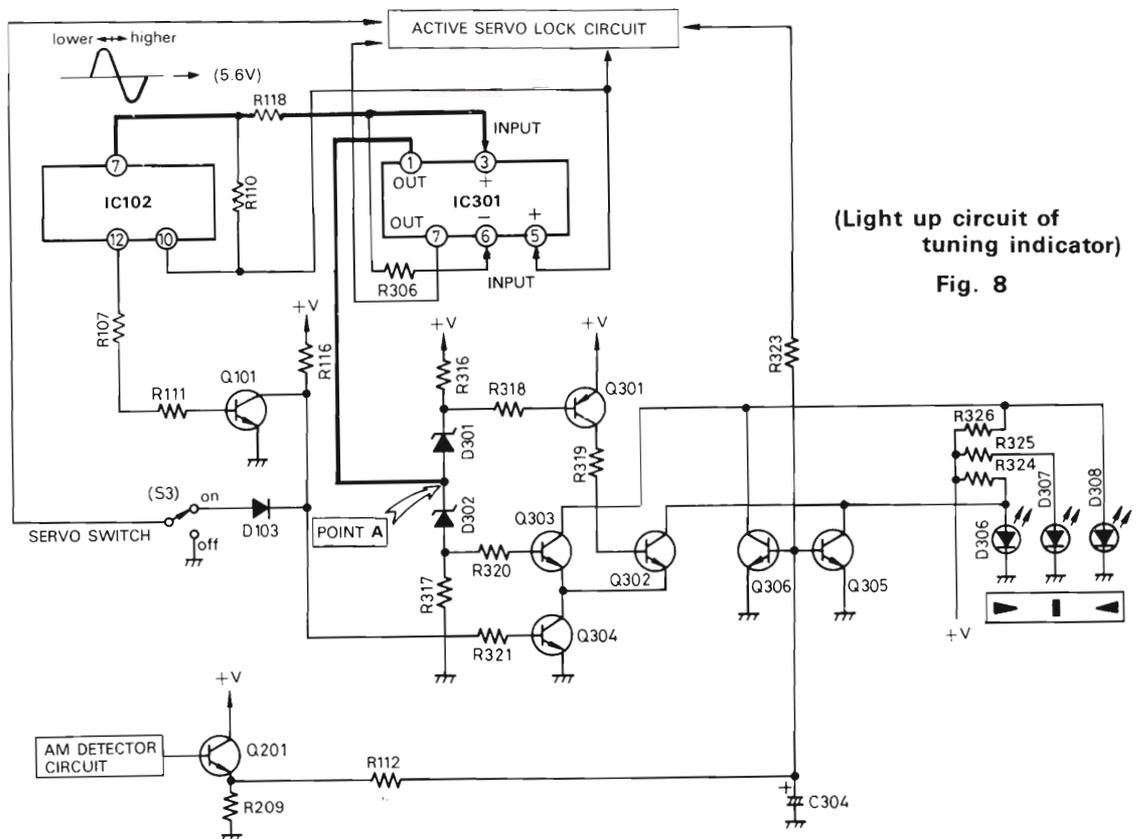
As explained in section (A)-1 "Active servo lock circuit", Q101 is ON in "no signal" mode. Therefore Q304 is OFF. This is important. Also remember that Q307 in the active servo lock circuit is OFF in "no signal" mode.

At that time, the collector voltage of Q307 is plus and it causes Q308 to turn ON. Accordingly, the voltage added to Q305 and Q306 via R323 becomes 0V (ground potential), and both transistors are OFF. That is, all tuning indicators are showing. (▶◀)

2. Exact tuning

The output voltage from terminal ① of IC301 (see fig. 8) is applied to point A, causing Q301 and Q303 to turn ON. Q302 turns ON when Q301 is turned ON. Also, in exact tuning mode Q101 is OFF as previously explained.

When Q101 is OFF, Q304 is ON, and accordingly, the collectors of Q303 and Q302 drop to 0V (ground potential), and the arrow tuning indicators go out and only the pointer indicator remains illuminated. (■)



(Light up circuit of tuning indicator)
Fig. 8

3. Deviation to lower frequency

The voltage at terminal ① of IC301, that is, the voltage at point A increases. D301 loses its Zener effect and Q301 turns OFF as it is not biased. When Q301 is OFF, Q302 is OFF, too.

Therefore, the ► shaped indicator D306 lights up.

When the voltage at point A rises, the Zener effect of D302 becomes greater, and then Q303 is kept biased and turned ON. Accordingly, the ◀-mark LED (D308) goes out as its anode is of ground potential. That means you have to turn the dial in the direction of the ►-mark (higher frequency side).

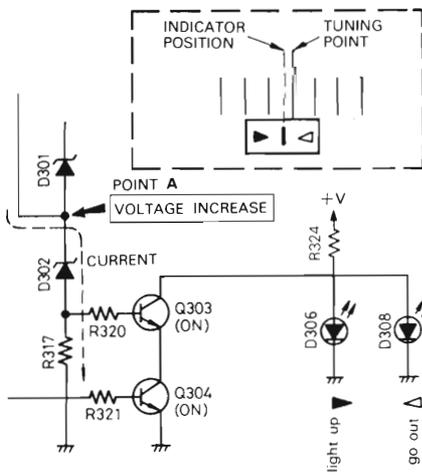
4. Deviation to higher frequency

This time, the voltage at point A drops, D302 loses its Zener effect and Q303 turns OFF. Conversely the Zener effect of D301 increases causing Q301 to be biased and Q301 turns ON. Subsequently, Q302 turns ON. Then, the ►-mark LED goes out, while the ◀-mark LED lights up. That means you have to turn the dial in the direction of the ◀-mark (lower frequency side).

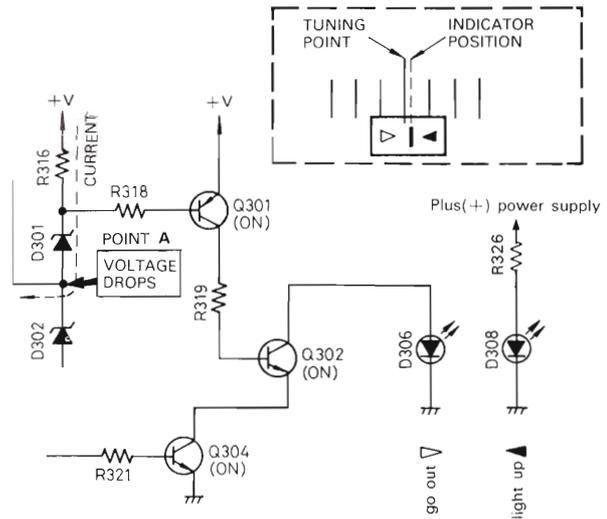
5. AM reception

With no signal received, the emitter voltage of Q201 is low, then Q305 and Q306 is not biased, so the arrow mark LED lights up.

When the detection voltage rises with AM tuned, the emitter voltage of Q201 increases, therefore the bias applied to Q305 and Q306 also becomes greater. In complete tuning condition, Q305 and Q306 turn ON and both of the arrow mark LED's go out.



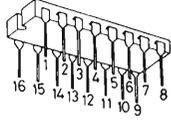
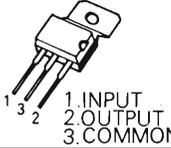
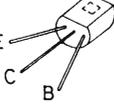
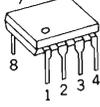
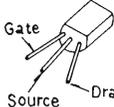
(Deviation to lower frequency)
Fig. 9



(Deviation to higher frequency)
Fig. 10

| MODE | Q101 | Q301 | Q302 | Q303 | Q304 | Q305 | Q306 | TUNING INDICATOR | SERVO INDICATOR |
|---------------------|------|----------------|------|------|------|------|------|------------------|-----------------|
| NO SIGNAL | ON | ON | ON | ON | OFF | OFF | OFF | ►◀ | |
| EXACT TUNING | OFF | AFTER 3 SEC ON | ON | ON | ON | OFF | OFF | | LIGHT UP |
| FREQUENCY IS LOWER | OFF | ON | OFF | ON | ON | OFF | OFF | ► | |
| FREQUENCY IS HIGHER | OFF | ON | ON | OFF | ON | OFF | OFF | ◀ | |
| A. M. | ON | ON | ON | ON | OFF | ON | ON | | |

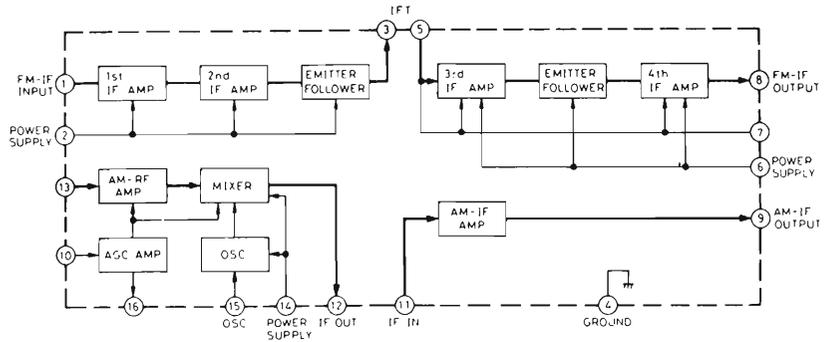
■ TERMINAL GUIDE OF TRANSISTORS AND IC'S

| | | |
|--|--|--|
| AN217, AN377, AN363N IC101, 102, 401  | SVIFS7812C IC501  | 2SC1674, 2SC1675 2SC945, 2SA733 Q2, 3, 101, 201, 301~311, 401, 402  |
| SVI μ PC4558C IC301  | 2SK49 Q1  | |

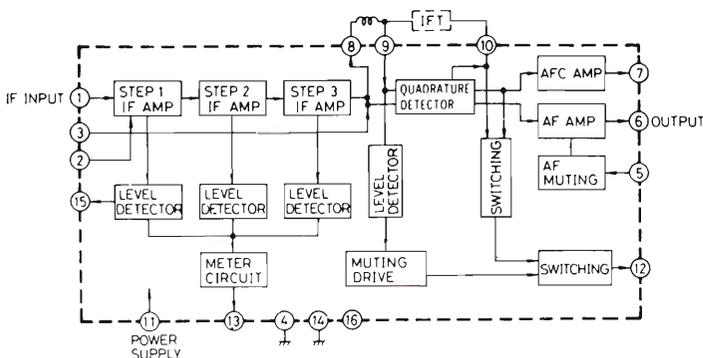
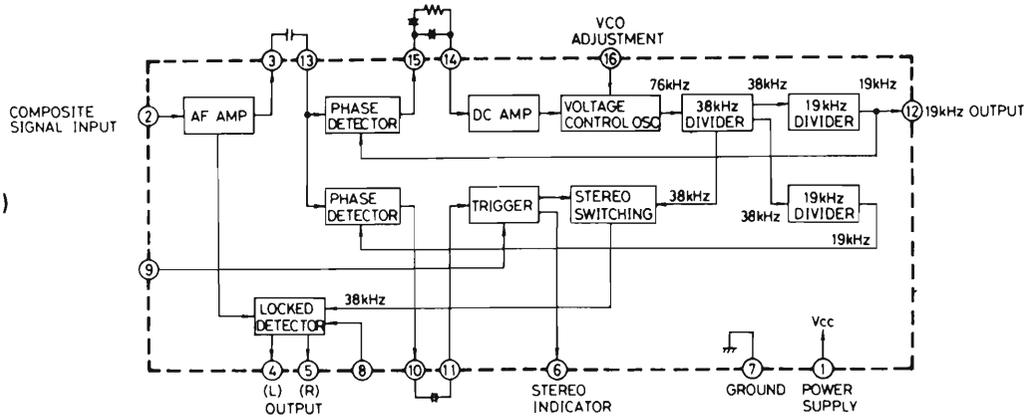
■ BLOCK DIAGRAM OF IC'S

- This is the basic block diagram of the inside circuit of IC. In an actual circuit, there may be sometimes idle terminals or some different functions other than the basic circuit.

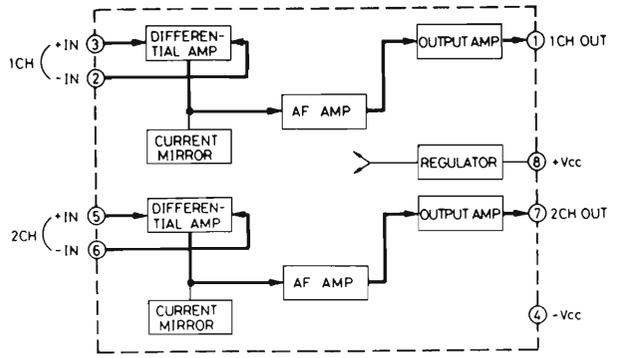
IC101 (AN217)
FM IF Amplifier & AM Converter



IC401 (AN363)
FM Multiplex



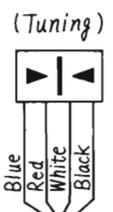
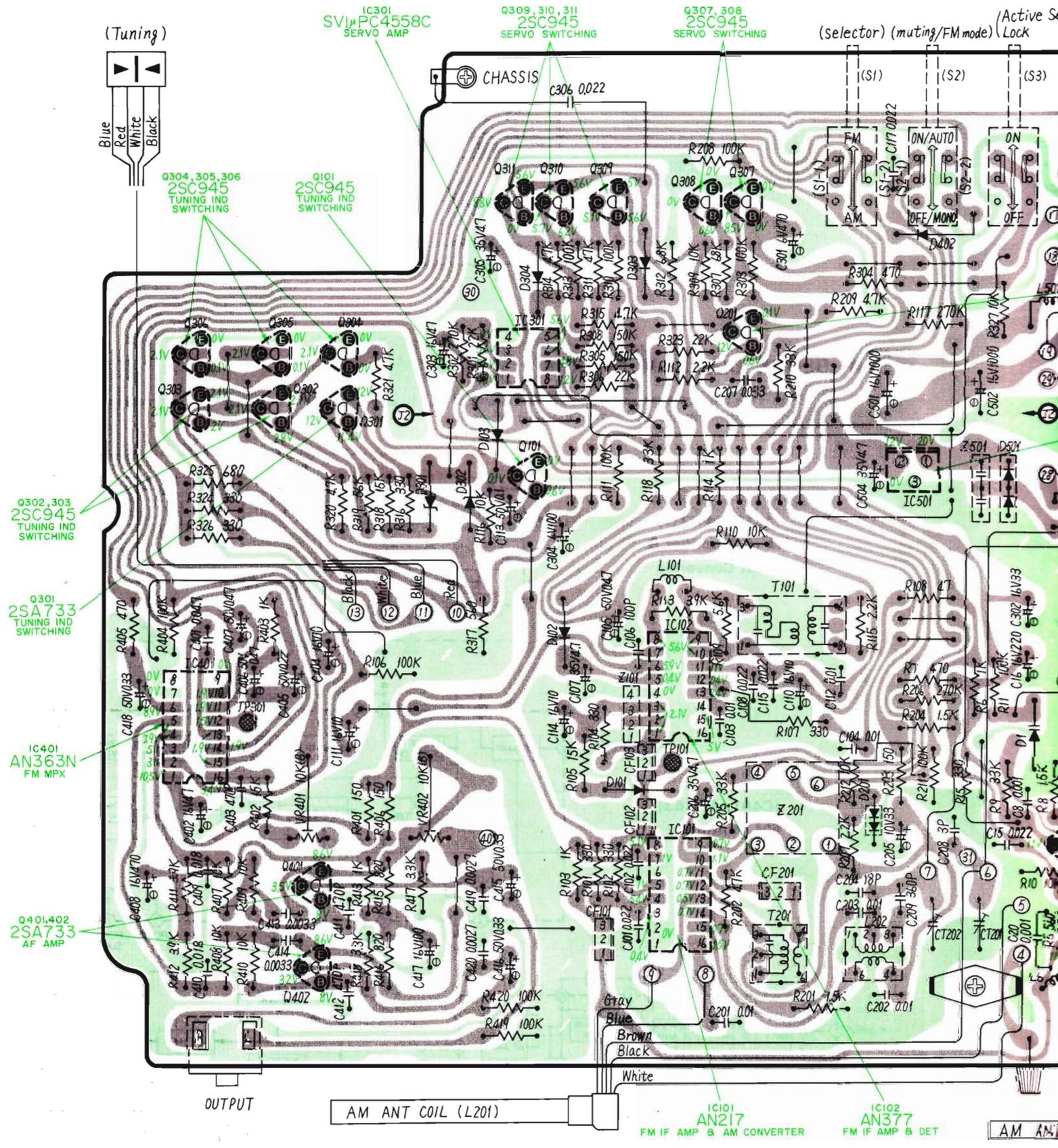
IC102 (AN377)
FM IF Amplifier & Detector



IC301 (SVIUPC4558C)
DC Amplifier

PRINTED CIRCUIT BOARD WIRING VIEW

Earth(Ground) Lines



(selector) (muting/FM mode) (Lock)

(S1) (S2) (S3)

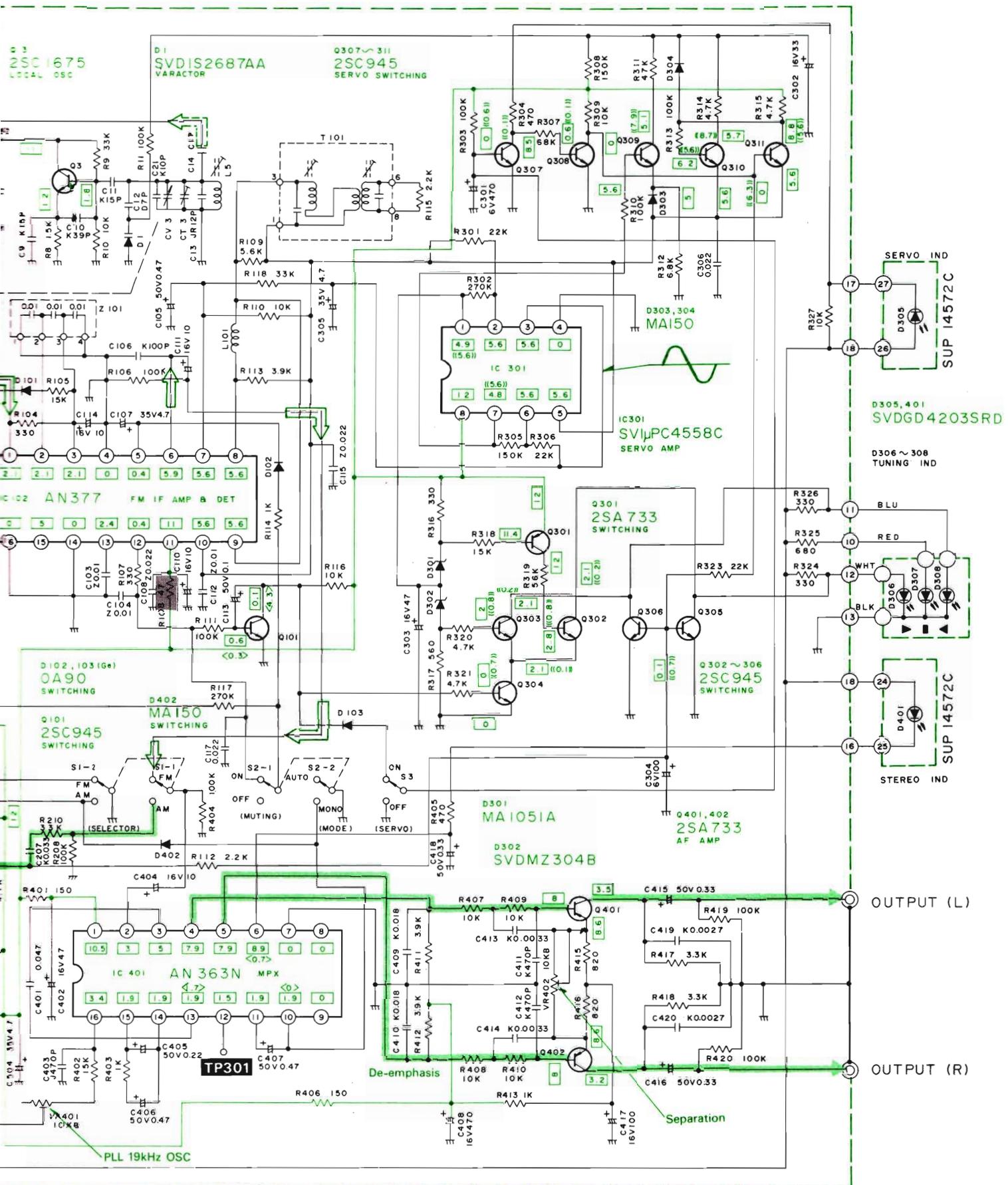
AM ANT COIL (L201)

OUTPUT

IC101 AN217 FM IF AMP & AM CONVERTER

IC102 AN377 FM IF AMP & DET

AM ANT



■ ALIGNMENT INSTRUCTIONS

Notes:

1. Band selector switch. { AM (AM Alignment)
FM (FM Alignment)
2. FM muting & mode switch off/mono
3. Active servo lock switch. off
4. Maintain line voltage at 120 volts.
5. 300Ω FM dummy antenna. Refer to fig. 11
6. Output of signal generator should be no higher than necessary to obtain an output reading.
7. Adjust the antenna coil (L201) position by using a screwdriver so that it is at approximately 25 degrees to the rear panel.

| AM/FM SIGNAL GENERATOR | | DIAL SETTING | INDICATOR (VTVM, SCOPE or DISTORTION METER) | ADJUSTMENT POINTS | REMARKS |
|-------------------------------------|---|---|--|--|---|
| CONNECTION | FREQUENCY | | | | |
| AM ALIGNMENT | | | | | |
| 1 | High side through 0.001μF to AM antenna trimmer terminal. (point Ⓐ). Common to chassis. | 450kHz (30% Mod.) with 400 Hz | Point of non-interference | Connect AC VTVM or scope to "OUTPUT" terminals. | T201 (1st IFT) Z201 (2nd IFT) Adjust for maximum output. |
| 2 | Fashion loop of several turns of wire and radiate signal into loop of tuner. | 600kHz (30% Mod.) with 400Hz | 600kHz | Connect AC VTVM or scope to "OUTPUT" terminals. | L202 (OSC Coil) L201 (ANT Coil) Adjust for maximum output, adjust ferrite core of L201 by screwdriver. |
| 3 | Fashion loop of several turns of wire and radiate signal into loop of tuner. | 1500kHz (30% Mod.) with 400Hz | 1500kHz | Connect AC VTVM or scope to "OUTPUT" terminal. | CT202 (OSC Trimmer) CT201 (ANT Trimmer) Adjust for maximum output. Repeat steps (2) and (3). |
| FM IF ALIGNMENT | | | | | |
| 4 | | No-Signal | Point of non-interference | Connect DC VTVM to R110 resistor. (Refer to fig. 12) | T101 (DISCRI IFT) A •FM muting/mode switch to "on/auto" position. •Adjust T101 (A) core so that voltage measured in signal mode is 0V in 300mV range. |
| FM RF ALIGNMENT | | | | | |
| 5 | Connect to FM 300Ω antenna terminal through 300Ω FM dummy antenna. | 90MHz (100% Mod.) with 400Hz weak input | 90MHz | Connect scope to "OUTPUT" terminal. | L5 (OSC Coil) L2 (RF DET Coil) L1 (ANT Coil) •Add weak input so that noise is included in the output wave form. •Make the adjustment so that the output wave form is vertically symmetrical. (Fig. 13) •Repeat the steps 5 and 6 until the frequency correctly matches the dial scale. |
| 6 | | 106MHz (100% Mod. with 400Hz) weak input | 106MHz | Connect scope to "OUTPUT" terminal. | |
| FM MONO DISTORTION ALIGNMENT | | | | | |
| 7 | Connect to FM 300Ω antenna terminal through 300Ω FM dummy antenna. | 100MHz (100% Mod. with 400Hz) Apply 60dB (1mV) to tuner | 100MHz | Connect distortion meter to "OUTPUT" terminals. | T101 (DISCRI IFT) A T101 (DISCRI IFT) B •Set the FM muting/mode switch to "on/auto" and then check step 4 in no signal mode. •If it is deflected, re-adjust A (primary side) of T101. •Adjust T101 (B) core so that distortion of right and left channels are minimized. |
| FM MPX PILOT ALIGNMENT | | | | | |
| Using a frequency counter | | | Using alternate system | | |
| 8 | <ol style="list-style-type: none"> 1 100MHz Non-modulated mono signal applied (60dB) tuner. 2 FM muting/mode switch to "on" 3 Connect frequency counter to TP301 through resistor (100kΩ). 4 Adjust VR401 to 19kHz ±30Hz. | | <ol style="list-style-type: none"> 1 Apply stereo signal from generator or stereo station to tuner. 2 Adjust VR401 until stereo indicator lights up. Cement arm of VR401 as shown in fig. 14. | | |
| SEPARATION ALIGNMENT | | | | | |
| PREPARATIONS | | | ADJUSTING PROCEDURE | | |
| 9 | <ol style="list-style-type: none"> 1 Add 100MHz, 1kHz, 30% pilot 10% modulation, 60dB stereo signal to the tuner. 2. Connect AC VTVM or scope to "OUTPUT" terminal through low pass filter. Refer to fig. 15 | | <ol style="list-style-type: none"> 1. Set the FM muting/mode switch to "on/auto" and then adjust the tuning so that only tuning indicator b (fig. 16) lights up. 2 Adjust VR402 so that R output is minimized when stereo modulator is in L (Lch. modulation) mode and that L output is minimized in R mode. | | |

■ ALIGNMENT POINTS

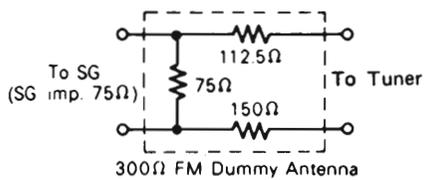
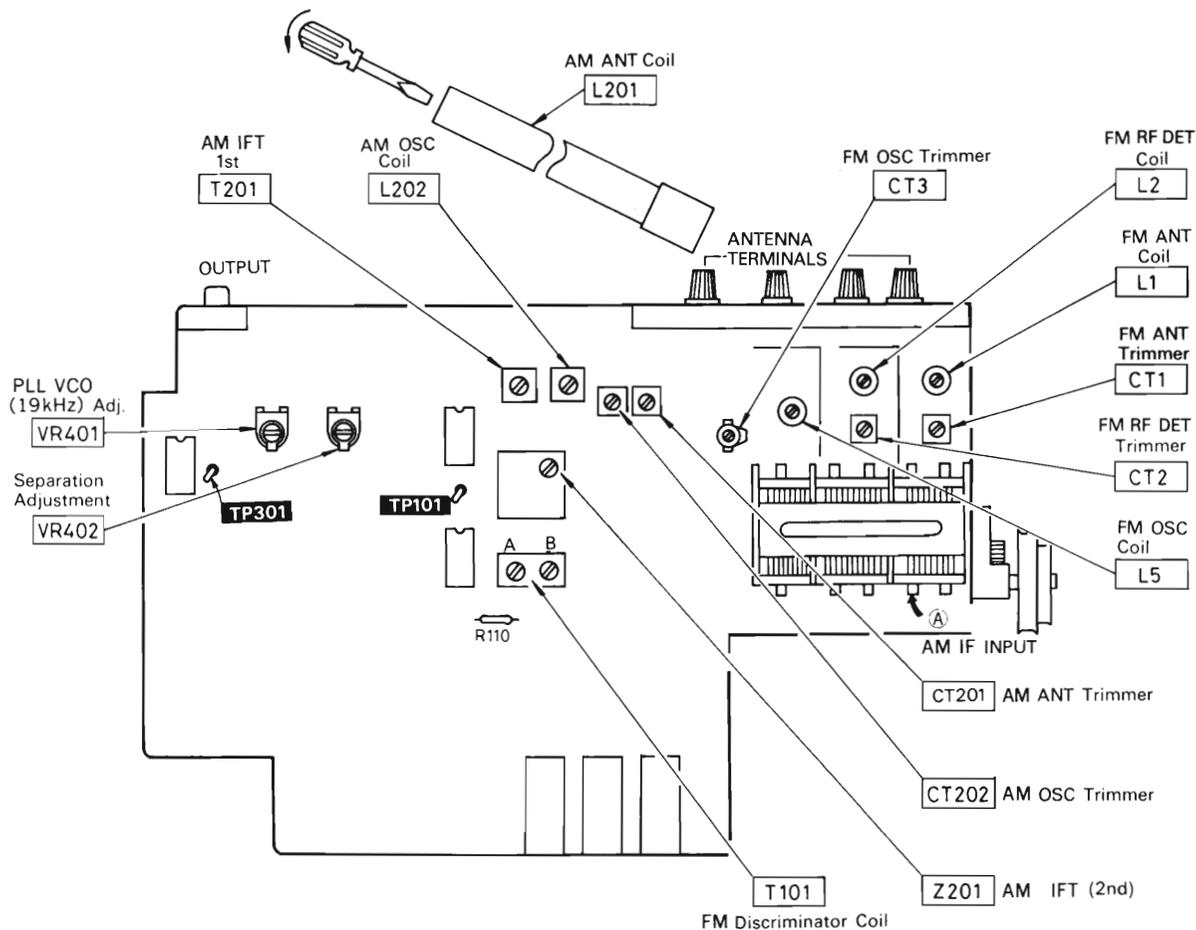


Fig. 11

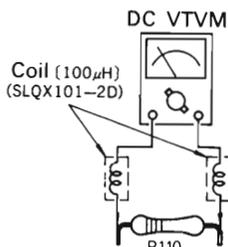


Fig. 12

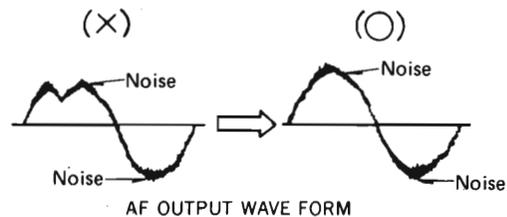
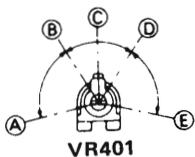


Fig. 13



A - B, D - E: Stereo OFF Position.
 B - D: Stereo ON Position (Indicator Lighting).
 C: Adjust Point of Pilot Circuit.

Fig. 14

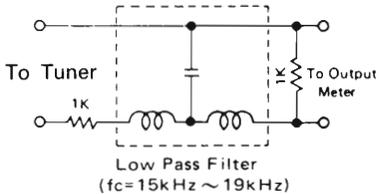


Fig. 15

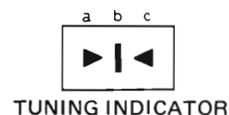


Fig. 16

■ REPLACEMENT PARTS LIST Electric Parts

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

NOTE: Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.

| Ref. No. | Part No. | Part Name & Description |
|---|---|--|
| INTEGRATED CIRCUITS | | |
| IC101 IC102 IC301 IC401 IC501 | AN217P-BB AN377N SVIUPC4558C AN363N SVIFS7812C | IC, FM IF Amplifier & AM Converter IC, FM IF Amplifier IC, DC Amplifier (Active servo lock) IC, FM Multiplex IC, Voltage Stabilizer |
| TRANSISTORS | | |
| Q1 Q2 Q3 Q101, 201, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311 Q301, 401, 402 | 2SK49-H1 2SC1674-M 2SC1675-L1 2SC945-P2 2SA733-P1 | Transistor, FM RF Amplifier (FET) Transistor, FM Mixer Transistor, FM Local Oscillator Transistor, Muting, AM Buffer, Switching, & Servo Lock Circuitry (Use in ranks P1, P2 or R) Transistor, Switching & AF Amplifier |
| DIODES | | |
| D1 D101,303,304,402 D102,103 D201 D301 D302 D305,401 D501 | SVD1S2687AA MA150 OA90 SVDKB262E MA1051A SVDMMZ304B SVDGD4203SRD SVDMM151U | Diode, Variable Capacitance Diode, Switching & Active Servo Lock Diode, Muting Switching Diode, AM AGC Diode, Zener 5.1V Diode, Zener 4V Light Emitting Diode, Servo Lock & Stereo Rectifier |
| COILS and TRANSFORMERS | | |
| L1 L2 L4, 6, 501 L5 L7 L101 L201 L202 L502 T101 T201 T501 (M)only T501 (MC)only | SLD4P25-P SLD4P21-P RLQY15G5-Y SLO4P55-P SLAA4W1-3 SLQW180-1K SLF2C17 SLO2C9-P SLQX101-2D SLI4D513-Z SLI2C125-P SLT5J69 SLT5J93 | Coil, FM RF Detector, 1st Coil, FM RF Detector, 2nd Coil, Choke Coil, FM Oscillator Coil, FM Balun Antenna Coil, Choke Coil, AM Antenna Coil, AM Oscillator Coil, Choke Transformer, FM Discriminator Transformer, AM IF Transformer, Power Source Transformer, Power Source |

| Ref. No. | Part No. | Part Name & Description |
|--|--|--|
| CERAMIC FILTERS | | |
| CF101, 102 | SVFE107MM-A SVFE107MM-B SVFE107MM-C | Ceramic Filter, FM 10.7MHz, Red Ceramic Filter, FM 10.67MHz, Blue Ceramic Filter, FM 10.73MHz, Orange |
| CF103 | SVFE107ML-A SVFE107ML-B SVFE107ML-C (Use in pair ranks) | Ceramic Filter, FM 10.7MHz, Red Ceramic Filter, FM 10.67MHz, Blue Ceramic Filter, FM 10.73MHz, Orange as same as CF101, 102 and CF103.) |
| CF201 | SVFSFU450B | Ceramic Filter, AM 450kHz |
| COMPONENT COMBINATIONS | | |
| Z1 Z101 Z201 | EXRP103P102C EXF3SLO4C SLI9F101-Z | Component Combination, 1k Ω /0.01 μ F Component Combination, 0.01 μ F(X3) Component Combination, AM IFT & Detector |
| Z501 | EXPFS203ZS | Component Combination, 0.01 μ F (X2) |
| VARIABLE RESISTORS | | |
| VR401 VR402 | EVTS3MA00B14 EVL3AA00B14 | PLL VCO 19kHz Adjustment Separation Adjustment |
| VARIABLE CAPACITORS | | |
| CV1, 2, 3, 201, 202 CT1, 2, 201, 202 CT3 | ECV5MD34X72G SVCTY121B269 ECV1ZW06X32E | Tuning Gang, FM/AM Ceramic Trimmer Ceramic Trimmer |
| SWITCHES | | |
| S1, 2, 3 S4 | SSH359 SSH97 | Switch, Servo Lock, Muting & Selector Switch, Power Source |
| <p>(M) is available in America only. (MC) is available in Canada only.</p> | | |

| Ref. No. | Part No. | Part Name & Description |
|--|--|---|
| RESISTORS | | |
| R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 | ERD25TJ104 ERD25TJ221 ERD25TJ103 ERD25TJ473 ERD25TJ561 ERD25TJ102 ERD25TJ471 ERD25TJ152 ERD25TJ333 ERD25TJ103 | Carbon, 100k Ω , 1/4W, \pm 5% Carbon, 220 Ω , 1/4W, \pm 5% Carbon, 10k Ω , 1/4W, \pm 5% Carbon, 47k Ω , 1/4W, \pm 5% Carbon, 560 Ω , 1/4W, \pm 5% Carbon, 1k Ω , 1/4W, \pm 5% Carbon, 470 Ω , 1/4W, \pm 5% Carbon, 1.5k Ω , 1/4W, \pm 5% Carbon, 33k Ω , 1/4W, \pm 5% Carbon, 10k Ω , 1/4W, \pm 5% |
| R11 R12 R15 R101, 102 R103 R104 R105 R106 R107 R108 | ERD25TJ104 ERD25TJ220 ERD25TJ331 ERD25TJ331 ERD25TJ102 ERD25TJ331 ERD25TJ153 ERD25TJ104 ERD25TJ331 ERD25TJ104 | Carbon, 100k Ω , 1/4W, \pm 5% Carbon, 22 Ω , 1/4W, \pm 5% Carbon, 330 Ω , 1/4W, \pm 5% Carbon, 330 Ω , 1/4W, \pm 5% Carbon, 1k Ω , 1/4W, \pm 5% Carbon, 330 Ω , 1/4W, \pm 5% Carbon, 15k Ω , 1/4W, \pm 5% Carbon, 100k Ω , 1/4W, \pm 5% Carbon, 330 Ω , 1/4W, \pm 5% Carbon, 47 Ω , 1/4W, \pm 5% |

| Ref. No. | Part No. | Part Name & Description |
|--|--|---|
| R109 R110 R111 R112 R113 R114 R115 R116 R117 R118 | ERD25TJ562 ERD25TJ103 ERD25TJ104 ERD25TJ222 ERD25TJ392 ERD25TJ102 ERD25TJ222 ERD25TJ103 ERD25TJ274 ERD25TJ333 | Carbon, 5.6k Ω , 1/4W, \pm 5% Carbon, 10k Ω , 1/4W, \pm 5% Carbon, 100k Ω , 1/4W, \pm 5% Carbon, 2.2k Ω , 1/4W, \pm 5% Carbon, 3.9k Ω , 1/4W, \pm 5% Carbon, 1k Ω , 1/4W, \pm 5% Carbon, 2.2k Ω , 1/4W, \pm 5% Carbon, 10k Ω , 1/4W, \pm 5% Carbon, 270k Ω , 1/4W, \pm 5% Carbon, 33k Ω , 1/4W, \pm 5% |
| R201 R202 R203 R204 R205 R206 R207 R208 R209 R210 | ERD25TJ152 ERD25TJ472 ERD25TJ151 ERD25TJ152 ERD25TJ333 ERD25TJ274 ERD25TJ222 ERD25TJ104 ERD25TJ472 ERD25TJ333 | Carbon, 1.5k Ω , 1/4W, \pm 5% Carbon, 4.7k Ω , 1/4W, \pm 5% Carbon, 150 Ω , 1/4W, \pm 5% Carbon, 1.5k Ω , 1/4W, \pm 5% Carbon, 33k Ω , 1/4W, \pm 5% Carbon, 270k Ω , 1/4W, \pm 5% Carbon, 2.2k Ω , 1/4W, \pm 5% Carbon, 100k Ω , 1/4W, \pm 5% Carbon, 4.7k Ω , 1/4W, \pm 5% Carbon, 33k Ω , 1/4W, \pm 5% |

| Ref. No. | Part No. | Part Name & Description |
|-----------|-------------------|---------------------------|
| R211 | ERD25TJ104 | Carbon, 100k Ω, 1/4W, ±5% |
| R212 | ERD25TJ103 | Carbon, 10k Ω, 1/4W, ±5% |
| R301 | ERD25TJ223 | Carbon, 22k Ω, 1/4W, ±5% |
| R302 | ERD25TJ274 | Carbon, 270k Ω, 1/4W, ±5% |
| R303 | ERD25TJ104 | Carbon, 100k Ω, 1/4W, ±5% |
| R304 | ERD25TJ471 | Carbon, 470 Ω, 1/4W, ±5% |
| R305 | ERD25TJ154 | Carbon, 150k Ω, 1/4W, ±5% |
| R306 | ERD25TJ223 | Carbon, 22k Ω, 1/4W, ±5% |
| R307 | ERD25TJ683 | Carbon, 68k Ω, 1/4W, ±5% |
| R308 | ERD25TJ154 | Carbon, 150k Ω, 1/4W, ±5% |
| R309 | ERD25TJ103 | Carbon, 10k Ω, 1/4W, ±5% |
| R310 | ERD25TJ104 | Carbon, 100k Ω, 1/4W, ±5% |
| R311 | ERD25TJ473 | Carbon, 47k Ω, 1/4W, ±5% |
| R312 | ERD25TJ682 | Carbon, 6.8k Ω, 1/4W, ±5% |
| R313 | ERD25TJ104 | Carbon, 100k Ω, 1/4W, ±5% |
| R314, 315 | ERD25TJ472 | Carbon, 4.7k Ω, 1/4W, ±5% |
| R316 | ERD25TJ331 | Carbon, 330 Ω, 1/4W, ±5% |
| R317 | ERD25TJ561 | Carbon, 560 Ω, 1/4W, ±5% |
| R318 | ERD25TJ153 | Carbon, 15k Ω, 1/4W, ±5% |
| R319 | ERD25TJ563 | Carbon, 56k Ω, 1/4W, ±5% |

| Ref. No. | Part No. | Part Name & Description |
|-----------|-------------------|---------------------------|
| R320, 321 | ERD25TJ472 | Carbon, 4.7k Ω, 1/4W, ±5% |
| R323 | ERD25TJ223 | Carbon, 22k Ω, 1/4W, ±5% |
| R324 | ERD25TJ331 | Carbon, 330 Ω, 1/4W, ±5% |
| R325 | ERD25TJ681 | Carbon, 680 Ω, 1/4W, ±5% |
| R326 | ERD25TJ331 | Carbon, 330 Ω, 1/4W, ±5% |
| R327 | ERD25TJ103 | Carbon, 10k Ω, 1/4W, ±5% |
| R401 | ERD25TJ151 | Carbon, 150 Ω, 1/4W, ±5% |
| R402 | ERD25TJ153 | Carbon, 15k Ω, 1/4W, ±5% |
| R403 | ERD25TJ102 | Carbon, 1k Ω, 1/4W, ±5% |
| R404 | ERD25TJ104 | Carbon, 100k Ω, 1/4W, ±5% |
| R405 | ERD25TJ471 | Carbon, 470 Ω, 1/4W, ±5% |
| R406 | ERD25TJ151 | Carbon, 150 Ω, 1/4W, ±5% |
| R407, 408 | ERD25TJ103 | Carbon, 10k Ω, 1/4W, ±5% |
| R409, 410 | ERD25TJ103 | Carbon, 10k Ω, 1/4W, ±5% |
| R411, 412 | ERD25TJ392 | Carbon, 3.9k Ω, 1/4W, ±5% |
| R413 | ERD25TJ102 | Carbon, 1k Ω, 1/4W, ±5% |
| R415, 416 | ERD25TJ821 | Carbon, 820 Ω, 1/4W, ±5% |
| R417, 418 | ERD25TJ332 | Carbon, 3.3k Ω, 1/4W, ±5% |
| R419, 420 | ERD25TJ104 | Carbon, 100k Ω, 1/4W, ±5% |
| R501 | ERC12GK335 | Solid, 3.3M Ω, 1/2W, ±10% |

| Ref. No. | Part No. | Part Name & Description |
|-------------------|-------------------|--------------------------------|
| CAPACITORS | | |
| C1 | ECCD1H180KC | Ceramic, 18pF, 50V, ±10% |
| C2 | ECCD1H470KC | Ceramic, 47pF, 50V, ±10% |
| C3 | ECCD1H180KC | Ceramic, 18pF, 50V, ±10% |
| C4 | ECKD1H102MDA | Ceramic, 0.001 μF, 50V, ±20% |
| C5 | ECCD1H040CC | Ceramic, 4pF, 50V, ±0.25pF |
| C6 | ECCD1H070DC | Ceramic, 7pF, 50V, ±0.5pF |
| C7 | ECCD1H181K | Ceramic, 180pF, 50V, ±10% |
| C8 | ECKD1H102ZF | Ceramic, 0.001 μF, 50V, ±80% |
| C9 | ECCD1H150KC | Ceramic, 15pF, 50V, ±10% |
| C10 | ECCD1H390KC | Ceramic, 39pF, 50V, ±10% |
| C12 | ECCD1H070DC | Ceramic, 7pF, 50V, ±0.5pF |
| C15 | ECQM1H223KZ | Polyester, 0.022 μF, 50V, ±10% |
| C16 | ECEA1CS221 | Electrolytic, 220 μF, 16V |
| C17, 18 | ECCD1H100KC | Ceramic, 10pF, 50V, ±10% |
| C19, 20 | ECKD1H102MDA | Ceramic, 0.001 μF, 50V, ±20% |
| C21 | ECCD1H100KC | Ceramic, 10pF, 50V, ±10% |
| C101 | ECQM1H223KZ | Polyester, 0.022 μF, 50V, ±10% |
| C102 | ECKD1H223ZF | Ceramic, 0.022 μF, 50V, ±80% |
| C103, 104 | ECKD1H103ZF | Ceramic, 0.01 μF, 50V, ±80% |
| C105 | ECEA50ZR47 | Electrolytic, 0.47 μF, 50V |
| C106 | ECCD1H101K | Ceramic, 100pF, 50V, ±10% |
| C107 | ECEA1JS4R7 | Electrolytic, 4.7 μF, 63V |
| C108 | ECKD1H223ZF | Ceramic, 0.022 μF, 50V, ±80% |
| C110, 111 | ECEA1HS100 | Electrolytic, 10 μF, 50V |
| C112 | ECKD1H103ZF | Ceramic, 0.01 μF, 50V, ±80% |
| C113 | ECEA50ZR1 | Electrolytic, 0.1 μF, 50V |
| C114 | ECEA1HS100 | Electrolytic, 10 μF, 50V |
| C115 | ECKD1H223ZF | Ceramic, 0.022 μF, 50V, ±80% |
| C117 | ECKD1H223ZF | Ceramic, 0.022 μF, 50V, ±80% |
| C201, 202 | ECKD1H103MD | Ceramic, 0.01 μF, 50V, ±20% |

| Ref. No. | Part No. | Part Name & Description |
|-----------|-------------------|---------------------------------|
| C203 | ECKD1H103MD | Ceramic, 0.01 μF, 50V, ±20% |
| C204 | ECCD1H180KC | Ceramic, 18pF, 50V, ±10% |
| C205 | ECEA1CS330 | Electrolytic, 33 μF, 16V |
| C206 | ECEA1JS4R7 | Electrolytic, 4.7 μF, 63V |
| C207 | ECQM1H333KZ | Polyester, 0.033 μF, 50V, ±10% |
| C208 | ECCD1H030CC | Ceramic, 3pF, 50V, ±0.25pF |
| C209 | ECQS1361JZ | Polystyrene, 360pF, 125V, ±5% |
| C301 | ECEA0JS471 | Electrolytic, 470 μF, 6.3V |
| C302 | ECEA1CS330 | Electrolytic, 33 μF, 16V |
| C303 | ECEA1ES470 | Electrolytic, 47 μF, 25V |
| C304 | ECEA1AS101 | Electrolytic, 100 μF, 10V |
| C305 | ECEA1JS4R7 | Electrolytic, 4.7 μF, 63V |
| C306 | ECKD1H223ZF | Ceramic, 0.022 μF, 50V, ±80% |
| C401 | ECQM1H473KZ | Polyester, 0.047 μF, 50V, ±10% |
| C402 | ECEA1ES470 | Electrolytic, 47 μF, 25V |
| C403 | ECQS1471JZ | Polystyrene, 470pF, 125V, ±5% |
| C404 | ECEA1HS100 | Electrolytic, 10 μF, 50V |
| C405 | ECEA50ZR22R | Electrolytic, 0.22 μF, 50V |
| C406 | ECEA50ZR47 | Electrolytic, 0.47 μF, 50V |
| C407 | ECEA50MR47S | Electrolytic, 0.47 μF, 50V |
| C408 | ECEA1CS471 | Electrolytic, 470 μF, 16V |
| C409, 410 | ECQM1H183KZ | Polyester, 0.018 μF, 50V, ±10% |
| C411, 412 | ECKD1H471KB | Ceramic, 470pF, 50V, ±10% |
| C413, 414 | ECQM1H332KZ | Polyester, 0.0033 μF, 50V, ±10% |
| C415, 416 | ECEA50ZR33R | Electrolytic, 0.33 μF, 50V |
| C417 | ECEA1ES101 | Electrolytic, 100 μF, 25V |
| C418 | ECEA50ZR33R | Electrolytic, 0.33 μF, 50V |
| C419, 420 | ECQM1H272KZ | Polyester, 0.0027 μF, 50V, ±10% |
| C501, 502 | ECEA1CS102 | Electrolytic, 1000 μF, 16V |
| C503 | ECKD1H223ZF | Ceramic, 0.022 μF, 50V, ±80% |
| C504 | ECEA1JS4R7 | Electrolytic, 4.7 μF, 63V |

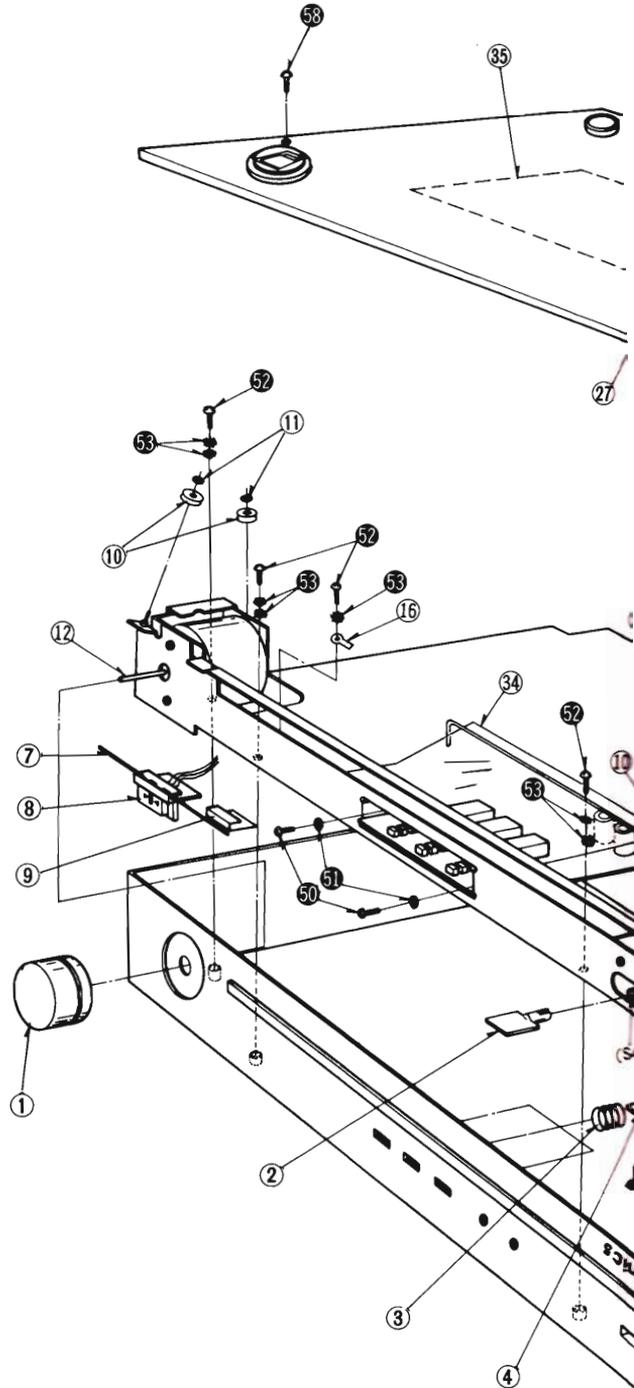
REPLACEMENT PARTS LIST AND EXPLODED VIEW

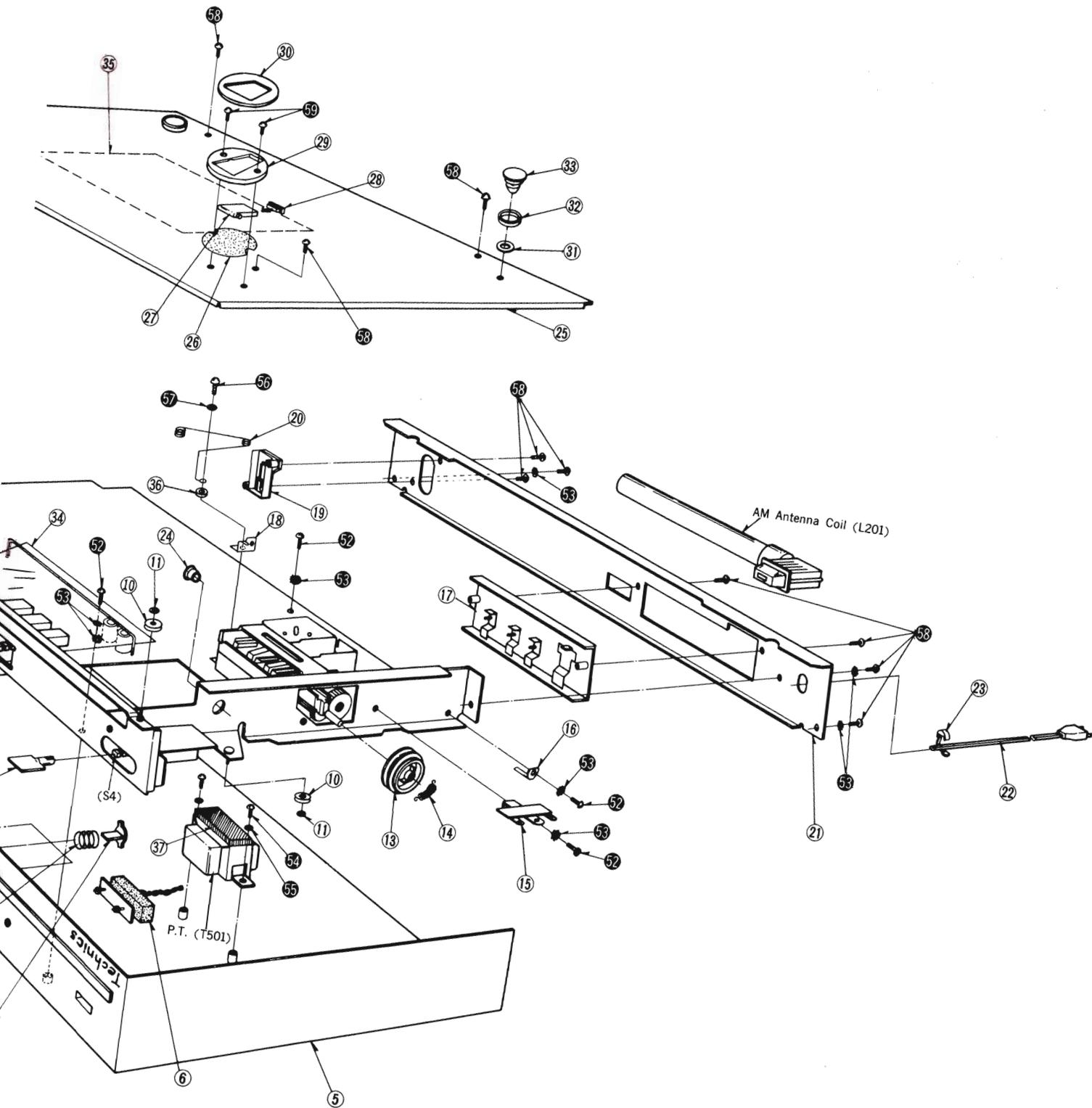
Important Safety Notice

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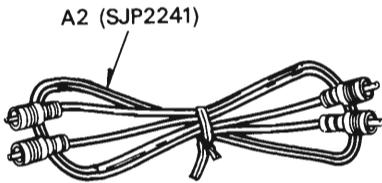
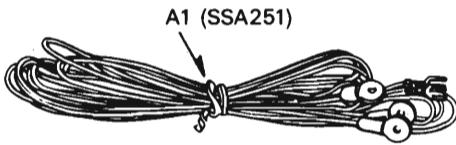
NOTE: Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.

| Ref. No. | Part No. | Part Name & Description |
|----------------------------------|------------------|---|
| CABINET and CHASSIS PARTS | | |
| 1 | SBN779 | Knob, Tuning Control (with M'tg Screw) |
| 2 | SBC207-1 | Button, Power Switch |
| 3 | SUS123-1 | Spring, Push Switches Button |
| 4 | SBC205-1 | Button, Push Switches |
| 5 | SGWTC01M | Panel, Front Ass'y (with Cabinet) |
| 6 | SHR9431 | Cushion, Stereo & Servo Lock Indicators |
| 7 | SDZ051-2 | Cord, Dial 130cm (51-1/4") |
| 8 | SWV5-1 | Pointer, Dial (with Tuning Indicator) |
| 9 | SHP31-1 | Paper, Pointer Slide |
| 10 | RDR20-3 | Pulley, Dial Cord |
| 11 | RNW150-2 | Washer, Pulley Lock |
| 12 | SDT8051 | Shaft, Tuning Ass'y (with Flywheel) |
| 13 | SDD9021 | Drum, Tuning Gang |
| 14 | SDSA4121 | Spring, Dial Cord |
| 15 | RJR4B | Terminal Strip, 2P |
| 16 | RJT202B | Lug, Earth |
| 17 | SJF4419-1 | Terminal, Antenna |
| 18 | SMV125-1 | Lug, Tuning Gang Earth |
| 19 | SJF3225A | Terminal, Output |
| 20 | SUS149 | Spring, Pointer Lead Wire |
| 21 | SGP1430B | Rear Panel |
| 22 | RJA9YA | AC Cord, Power Source |
| 23 | RHR111 | Bushing, AC Cord |
| 24 | RHR110 | Bushing, P.T. Secondary Lead Wire |
| 25 | SKU7290 | Bottom Board |
| 26 | SHS2411 | Fiber, Front Side Feet |
| 27 | SKX259 | Stand Foot, Front Side |
| 28 | SHG1493 | Rubber Cushion, Stand Feet |
| 29 | SKL217 | Foot, Front Side |
| 30 | SHG1485 | Rubber Cushion, Front Feet |
| 31 | SHR5013 | Washer, Rear Side Feet |
| 32 | SGX803 | Ring, Rear Side Feet |
| 33 | SHG1487 | Foot, Rear Side |
| 34 | SHR9441-1 | Cover, Transparency |
| 35 | SHR5015-1 | Sheet, Dial Pointer Protection |
| 36 | SNWA351 | Washer, Tuning Gang M'tg Lug |
| 37 | SHG6025 | Rubber, Power Transformer Spacer |
| SCREWS and WASHERS | | |
| 50 | XSN3+8S | Screw, Push Switches M'tg |
| 51 | XWA3B | Washer, Spring |
| 52 | XTB3+8BFZ | Screw, P.C.B. & Earth Lug M'tg |
| 53 | XWC3B | Washer |
| 54 | XTN3+8B | Screw, Power Transformer M'tg |
| 55 | XWG3 | Washer |
| 56 | XTN3+8BFZ | Screw, Spring M'tg |
| 57 | XWG3FZ | Washer |
| 58 | XTB3+8BFN | Screw, Bottom Board & Rear Panel M'tg |
| 59 | XSS3+6S | Screw, Feet M'tg |



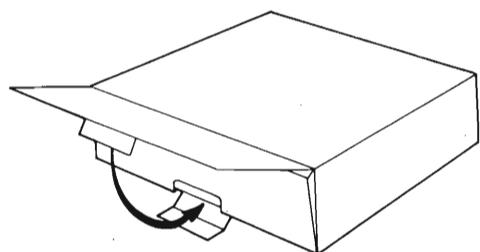
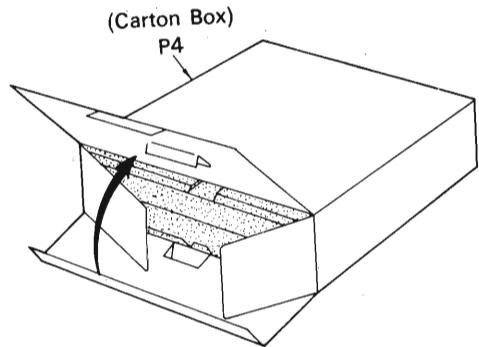
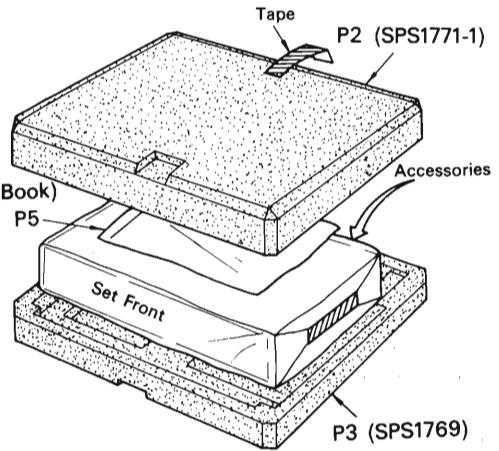
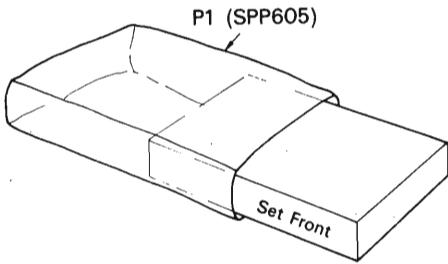


■ ACCESSORIES



| Ref. No. | Part No. | Part Name & Description |
|----------------------|-----------|-----------------------------------|
| ACCESSORIES | | |
| A1 | SSA251 | Cord, FM Indoor Antenna |
| A2 | SJP2241 | Cord, Connection |
| PACKING PARTS | | |
| P1 | SPP605 | Polythylene Bag |
| P2 | SPS1771-1 | Pad, Upper Side |
| P3 | SPS1769 | Pad, Lower Side |
| P4 [M]only | SPG1885 | Carton Box |
| P4 [MC]only | SPG1887 | Carton Box |
| P5 [M]only | SQF10101 | Instructions Book, Printed Matter |
| P5 [MC]only | SQF10103 | Instructions Book, Printed Matter |

■ PACKINGS



How to assemble the carrying handle.

