# SANYO

**MODEL**

**10X-05**

## All-transistor Radio

# *Service Manual*

## SPECIFICATIONS

**FREQUENCY RANGE**

| | |
|---|---|
| BC | 535 – 1,605 Kc/s |
| SW1 | 1.6 – 4.5 Mc/s |
| SW2 | 4.5 – 12.0 Mc/s |
| SW3 | 12.0 – 26.0 Mc/s |

**INTERMEDIATE FREQUENCY**

455 Kc/s

**TRANSISTOR COMPLEMENT**

| | | |
|---|---|---|
| (1) | 2SA223 | Local Oscillator |
| (2) | 2SA221 | Mixer |
| (3) | 2SA202 | 1st IF Amplifier |
| (4) | 2SA203 | 2nd IF Amplifier |
| (5) | 2SB188 | Detector & AGC |
| (6) | 2SB188 | 1st AF Amplifier |
| (7) | 2SB188 | 2nd AF Amplifier |
| (8) | 2SB187 | 3rd AF Amplifier |
| (9) | 2SB22×2 | Power Amplifier (B class pushpull) |

**THERMISTOR**

| | |
|---|---|
| SDT-20 | Temperature compensator |

**OUTPUT POWER**

| | |
|---|---|
| Undistorted | 350 mW |
| Maximum | 500 mW |

**SENSITIVITY**

(Lower limit for 10mW output)

| | |
|---|---|
| BC | 200 μV/m |
| SW1 | 140 μV/m |
| SW2 | 140 μV/m |
| SW3 | 50 μV |

**BATTERY USED**

6V (4 size D standard flashlight batteries)

| | | |
|---|---|---|
| Current drain | No signal | 15 mA |
| | Maximum | 140 mA |

**LOUDSPEAKER**

103mm (4″) permanent dynamic
Voice coil impedance 7 ohms

**DIMENSIONS**

| | |
|---|---|
| Width | 292mm (11½″) |
| Height | 216mm (8½″) |
| Depth | 76mm (3″) |

**WEIGHT**

Approximately 1800 grams (4 lbs)

***SANYO ELECTRIC CO., LTD.***

| PART NO. | STOCK NO. | DESCRIPTION |
|---|---|---|

**FIXED CAPACITORS**

| | | | | | |
|---|---|---|---|---|---|
| C 1 | | 5 | pF | ±0.5pF | 25 V Titacon |
| C 2 | | 10 | ,, | ±10% | ,, ,, |
| C 3 | | 50 | ,, | ,, | 500V ,, |
| C 4 | | 0.01 | μF | +30−20% | 50 V Mylarcon |
| C 5 | | 0.04 | ,, | ,, ,, | ,, ,, |
| C 7 | | 15 | pF | ±10% | 25 V Titacon |
| C 8 | | 0.01 | μF | +30−20% | 50 V Mylarcon |
| C 10 | | 10 | pF | ±10% | 25 V Titacon |
| C 11 | | 0.04 | μF | +30−20% | 50 V Mylarcon |
| C 12 | | 0.04 | ,, | ,, ,, | ,, ,, |
| C 13 | | 0.01 | ,, | ,, ,, | ,, ,, |
| C 15 | | 0.01 | ,, | ,, ,, | ,, ,, |
| C 17 | | 0.04 | ,, | ,, ,, | ,, ,, |
| C 18 | | 0.04 | ,, | ,, ,, | ,, ,, |
| C 25 | | 0.0075 | ,, | ,, ,, | ,, ,, |
| C 26 | | 0.0075 | ,, | ,, ,, | ,, ,, |
| C 29 | | 0.01 | ,, | ,, ,, | ,, ,, |
| C 30 | | 0.005 | ,, | ,, ,, | ,, ,, |
| C 31 | | 0.005 | ,, | ,, ,, | ,, ,, |
| C 32 | | 0.001 | ,, | ,, ,, | ,, ,, |
| C 33 | | 0.002 | ,, | ,, ,, | ,, ,, |
| C 34 | | 0.01 | ,, | ,, ,, | ,, ,, |
| C 35 | | 0.001 | ,, | ,, ,, | ,, ,, |
| C 36 | | 0.01 | ,, | ,, ,, | ,, ,, |
| C 37 | | 250 | pF | ±10% | 500V Titacon |
| C 38 | | 330 | ,, | ,, | 125V Stycon |
| C 39 | | 900 | ,, | ,, | 35 V ,, |
| C 40 | | 2500 | ,, | ,, | ,, ,, |
| C 41 | | 7700 | ,, | ,, | 125V ,, |
| C 42 | | 0.04 | μF | +30−20% | 50 V Mylarcon |
| C 43 | | 5 | pF | ±0.5pF | 25 V Titacon |
| C 44 | | 30 | ,, | ±10% | 500V ,, |

**FIXED RESISTORS**

| | | | | | | |
|---|---|---|---|---|---|---|
| R 1 | | 39 | ohms | ±10% | ¼W | Carbon |
| R 2 | | 56 K | ,, | ,, | ,, | ,, |
| R 3 | | 1.5 K | ,, | ,, | ,, | ,, |
| R 4 | | 33 K | ,, | ,, | ,, | ,, |
| R 5 | | 8.2 K | ,, | ±20% | ½W | Mold |
| R 6 | | 390 | ,, | ±10% | ¼W | Carbon |
| R 7 | | 56 K | ,, | ,, | ,, | ,, |
| R 8 | | 10 K | ,, | ,, | ,, | ,, |
| R 9 | | 1 K | ,, | ,, | ,, | ,, |
| R 10 | | 68 K | ,, | ,, | ,, | ,, |
| R 11 | | 220 | ,, | ,, | ,, | ,, |
| R 12 | | 220 | ,, | ,, | ,, | ,, |
| R 13 | | 22 K | ,, | ,, | ,, | ,, |
| R 14 | | 390 | ,, | ,, | ,, | ,, |
| R 15 | | 5.6 K | ,, | ,, | ,, | ,, |
| R 16 | | 3.3 K | ,, | ,, | ,, | ,, |
| R 17 | | 27 K | ,, | ,, | ,, | ,, |
| R 18 | | 5.6 K | ,, | ,, | ,, | ,, |
| R 19 | | 1.5 K | ,, | ,, | ,, | ,, |
| R 20 | | 100 | ,, | ±20% | ½W | Mold |
| R 21 | | 2.2 K | ,, | ±10% | ¼W | Carbon |
| R 22 | | 560 | ,, | ,, | ,, | ,, |
| R 23 | | 56 | ,, | ,, | ,, | ,, |
| R 24 | | 10 K | ,, | ,, | ,, | ,, |
| R 25 | | 3.3 K | ,, | ,, | ,, | ,, |
| R 26 | | 470 | ,, | ,, | ,, | ,, |

| PART NO. | STOCK NO. | DESCRIPTION |
|---|---|---|

**FIXED RESISTORS** (Continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| R 27 | | 22 | ohms | ±10% | ¼W | Carbon |
| R 28 | | 100 | ,, | ±20% | ½W | Mold |
| R 29 | | 3.9 K | ,, | ±10% | ¼W | Carbon |
| R 30 | | 220 | ,, | ,, | ,, | ,, |
| R 31 | | 330 | ,, | ,, | ,, | ,, |
| R 32 | | 2.2 | ,, | ,, | ,, | ,, |
| R 33 | | 330 | ,, | ,, | ,, | ,, |
| R 34 | | 4.7 K | ,, | ,, | ,, | ,, |
| R 35 | | 15 K | ,, | ,, | ,, | ,, |
| R 36 | | 1.2 K | ,, | ,, | ,, | ,, |
| R 37 | | 82 | ,, | ,, | ,, | ,, |
| R 38 | | 56 K | ,, | ,, | ,, | ,, |

**CABINET**

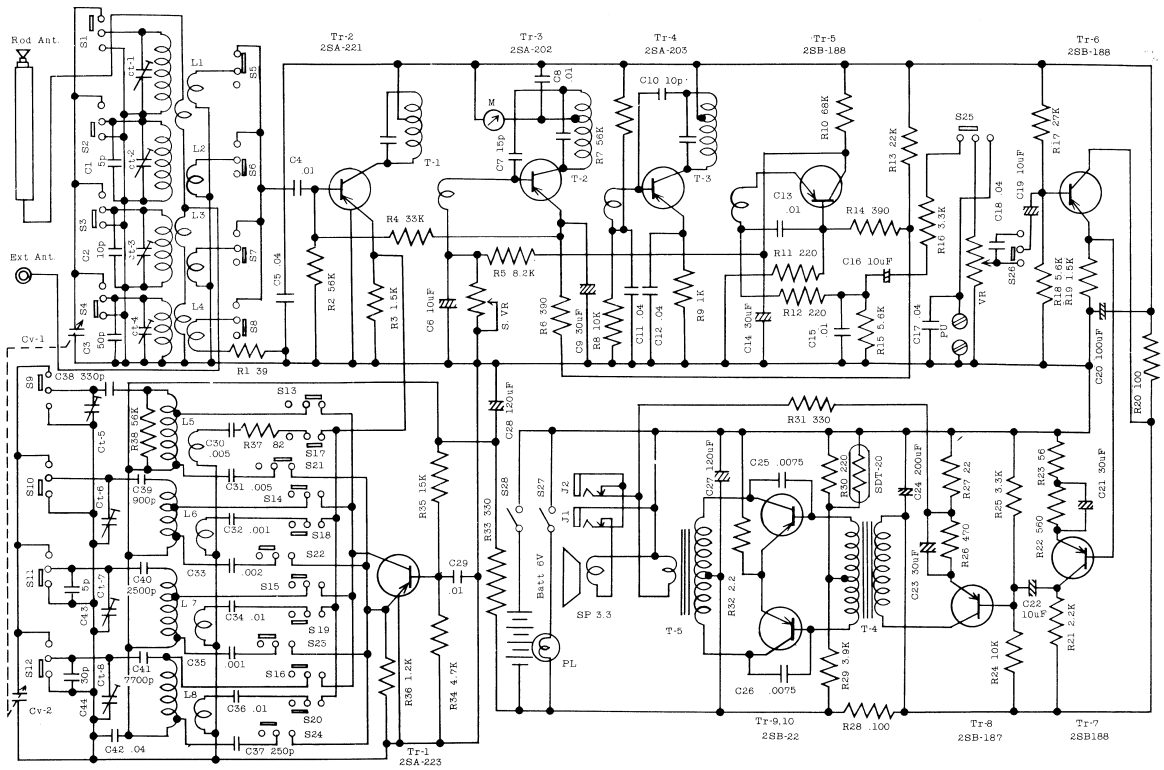
| | | |
|---|---|---|
| | R-31390b | Cabinet |
| | R-32235 | Dial plate |
| | R-23546 | Switch panel |
| | R-26336 | Decoration panel |
| | R-23461 | Metal ribbon |
| | R-S8325 | Handle |
| | R-26339 | Emblem "SANYO" |
| | R-26488 | Metal ribbon with engraved letters |
| | R-33304 | Push button |
| | R-31391b | Back cover |
| | R-26489 | Push button sign board |
| | R-26434 | Knob base |
| | R-39014 | Knob |
| | R-26338 | Cap metal for knob |

**MISCELLANEOUS**

| | | |
|---|---|---|
| | R-24031b | Screw to fix back cover |
| | R-13004L | Lock washer for screw above |
| | R-S8259 | Pointer assembly |
| | R-S8263 | + terminal assembly |
| | R-S8472 | − terminal assembly |
| | R-33226 | Drum |
| | R-15131 | Tension spring |
| | R-S8379 | Collapsable rod antenna |
| | R-S3096 | Phono input terminal |
| | R-S6075a | Earphone |
| | R-S2025a | Antenna jack |
| | R-S2081 | Twin earphone jack |
| | R-S5507a | Check meter |
| | R-S1107 | Pilot lamp |
| | R-S8265 | Antenna lead with rubber cup |
| | R-35171 | Battery inserting tube |

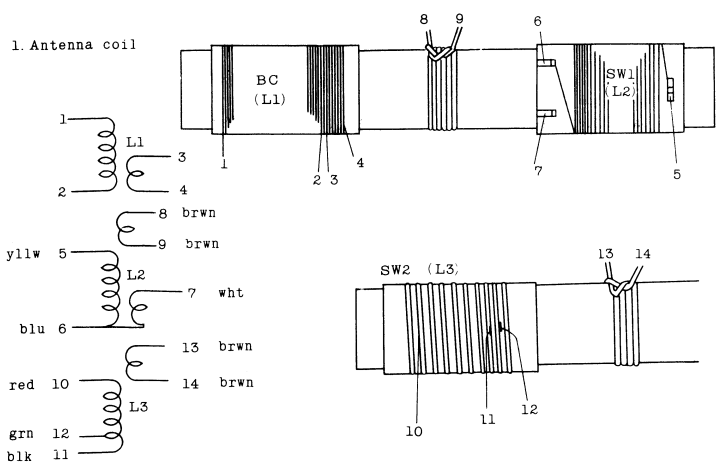
Printed in Japan

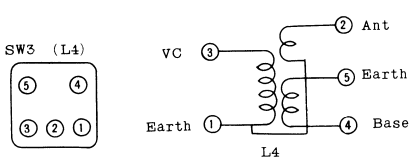
# Model 10X-05 Circuit Diagram



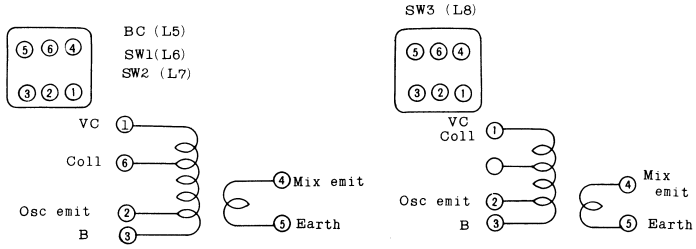

## Main Parts Connection

1. Antenna coil

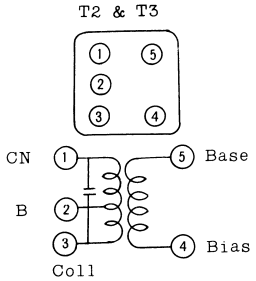


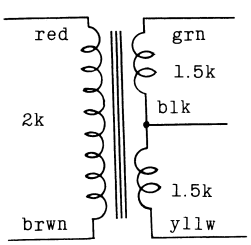

2. Oscillator coil



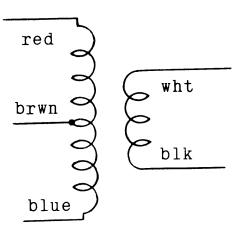

3. IF transformer T2 & T3



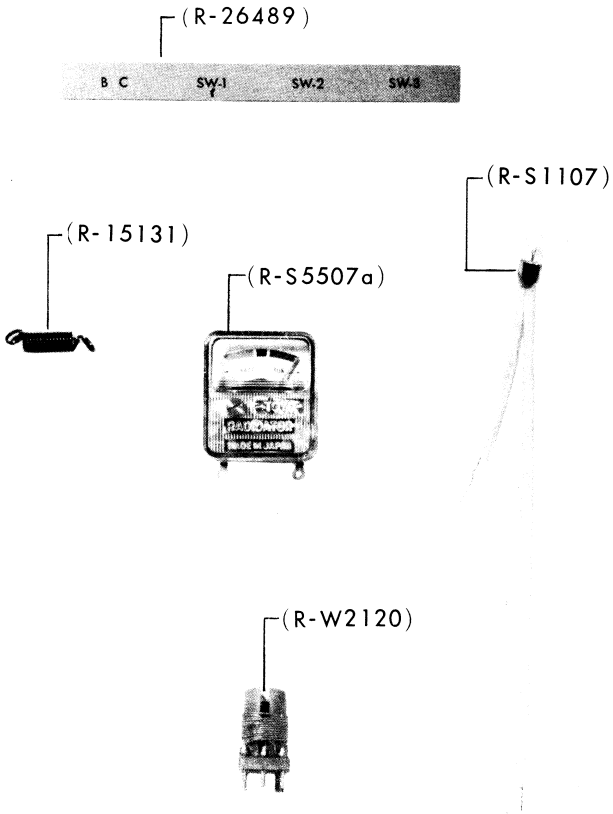

4. Input transformer T4

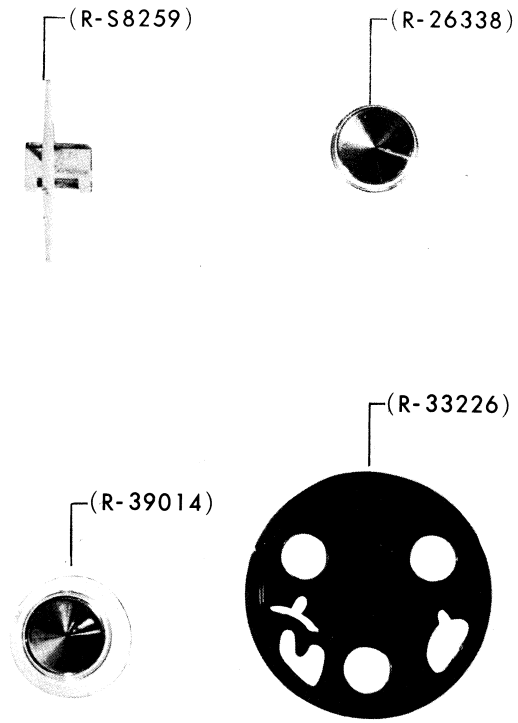



5. Output transformer T5




150 : 3.3 ohms




| PART NO. | STOCK NO. | DESCRIPTION |
|---|---|---|

**TRANSISTORS**

| | | |
|---|---|---|
| Tr 1 | 2SA223 | Local Oscillator |
| Tr 2 | 2SA221 | Mixer |
| Tr 3 | 2SA202 | 1st IF Amplifier |
| Tr 4 | 2SA203 | 2nd IF Amplifier |
| Tr 5 | 2SB188 | Detector & AGC |
| Tr 6 | 2SB188 | 1st AF Amplifier |
| Tr 7 | 2SB188 | 2nd AF Amplifier |
| Tr 8 | 2SB187 | 3rd AF Amplifier |
| Tr 9 | 2SB22 | Power Amplifier |
| Tr10 | 2SB22 | Power Amplifier |

**THERMISTOR**

| | | |
|---|---|---|
| | SDT-20 | Temperature Compensator |

**COILS**

| | | |
|---|---|---|
| L1,2 | R-W2118 | Antenna coil BC, SW1 |
| L 3 | R-W2119 | Antenna coil SW2 |
| L 4 | R-W2120 | Antenna coil SW3 |
| L 5 | R-W8014 | Oscillator coil BC |
| L 6 | R-W8060 | Oscillator coil SW1 |
| L 7 | R-W8061 | Oscillator coil SW2 |
| L 8 | R-W8062 | Oscillator coil SW3 |

**LOUDSPEAKER**

| | | |
|---|---|---|
| | R-S6144 | 4″ permanent dynamic |

| PART NO. | STOCK NO. | DESCRIPTION |
|---|---|---|

**TRANSFORMERS**

| | | |
|---|---|---|
| T 1 | R-W5T008 | 1st IF Trans. 6038A |
| T 2 | R-W5T039 | 2nd IF Trans. 6029R |
| T 3 | R-W5T060 | 3rd IF Trans. 6156R |
| T 4 | R-W6121 | Input transformer |
| T 5 | R-W6122 | Output transformer |

**CONTROLS**

| | | |
|---|---|---|
| | R-R11619 | Volume control |
| | R-C1029a | Tuning capacitor |
| | R-C0024 | 4-block trimmer |
| | R-R11006 | Semi-fixed resistor |
| | R-S4106 | Tone select switch |
| | R-S4106 | Phono switch |
| | R-S4206 | Pilot light switch |

**ELECTROLYTIC CAPACITORS**

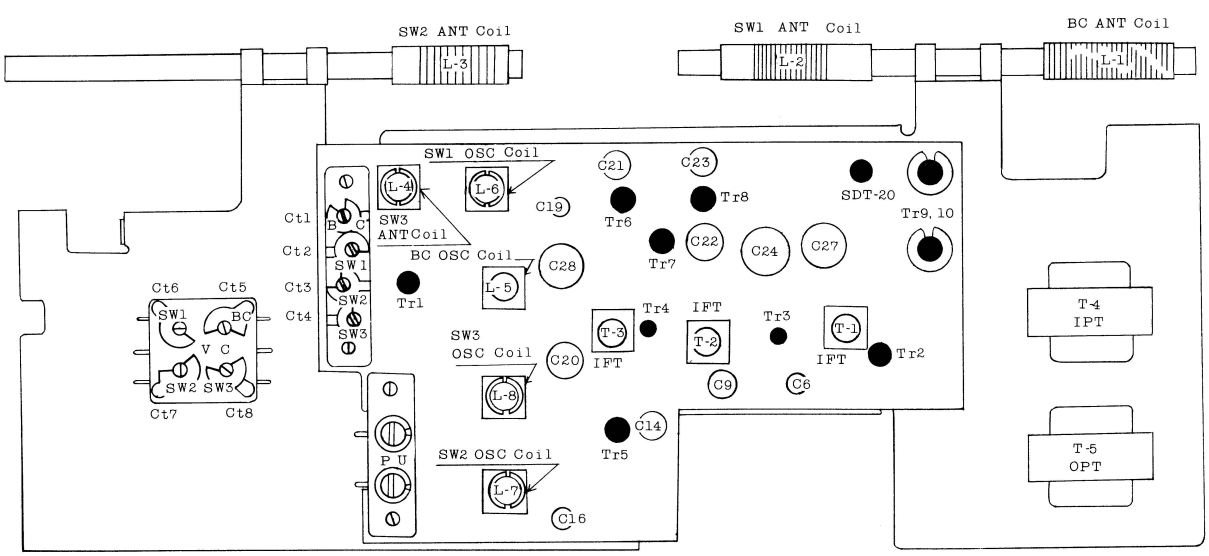
| | | | |
|---|---|---|---|
| C 6 | | 10 μF | 3V |
| C 9 | | 30 ,, | ,, |
| C 14 | | 30 ,, | ,, |
| C 16 | | 10 ,, | ,, |
| C 19 | | 10 ,, | ,, |
| C 20 | | 100 ,, | 6V |
| C 21 | | 30 ,, | 3V |
| C 22 | | 10 ,, | ,, |
| C 23 | | 30 ,, | ,, |
| C 24 | | 200 ,, | 6V |
| C 27 | | 120 ,, | ,, |
| C 28 | | 120 ,, | ,, |

# ALIGNMENT PROCEDURES

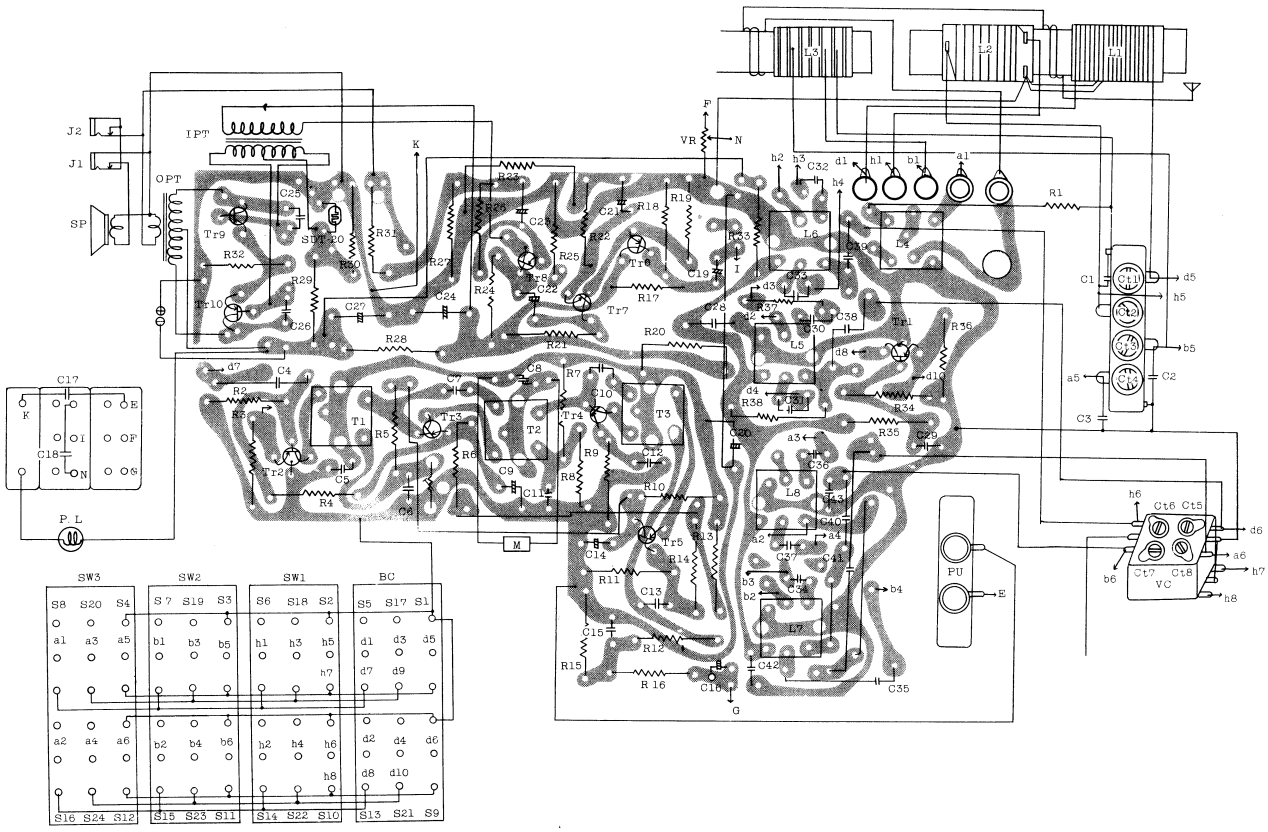
Apply volt-meter across the voice coil. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain output reading in order to avoid AGC function.

| STEP | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | ADJUST FOR MAXIMUM OUTPUT |
|---|---|---|---|---|
| **IF ALIGNMENT** | | | | |
| 1 | High side through 0.1 mf capacitor to antenna stator lug on tuning gang. Low side to chassis. | 455 Kc | 530 Kc | IF Trans. T 3<br>IF Trans. T 2<br>IF Trans. T 1 |
| **BROADCAST RF ALIGNMENT** | | | | |
| 2 | Fashion loop of several turns of wire and radiate signal into loop antenna. | 530 Kc | left end | BC OSC Coil L 5 |
| 3 | | 1650 Kc | right end | BC OSC Trim. Ct 5 |
| 4 | | Repeat steps 2 and 3. | | |
| 5 | | 600 Kc | 600 Kc | BC Ant. Coil L 1 |
| 6 | | 1400 Kc | 1400 Kc | BC Ant. Trim. Ct 1 |
| 7 | | Repeat steps 5 and 6. | | |
| **SHORTWAVE 1 RF ALIGNMENT** | | | | |
| 8 | Fashion loop of several turns of wire and radiate signal into loop antenna. | 1.55 Mc | left end | SW1 OSC Coil L 6 |
| 9 | | 4.6 Mc | right end | SW1 OSC Trim. Ct 6 |
| 10 | | Repeat steps 8 and 9. | | |
| 11 | | 1.7 Mc | 1.7 Mc | SW1 Ant. Coil L 2 |
| 12 | | 4.3 Mc | 4.3 Mc | SW1 Ant. Trim. Ct 2 |
| 13 | | Repeat steps 11 and 12. | | |
| **SHORTWAVE 2 RF ALIGNMENT** | | | | |
| 14 | Fashion loop of several turns of wire and radiate signal into loop antenna. | 4.36 Mc | left end | SW2 OSC Coil L 7 |
| 15 | | 12.4 Mc | right end | SW2 OSC Trim. Ct 7 |
| 16 | | Repeat steps 14 and 15. | | |
| 17 | | 5.0 Mc | 5.0 Mc | SW2 Ant. Coil L 3 |
| 18 | | 11.0 Mc | 11.0 Mc | SW2 Ant. Trim. Ct 3 |
| 19 | | Repeat steps 17 and 18. | | |
| **SHORTWAVE 3 RF ALIGNMENT** | | | | |
| 20 | High side through dummy antenna to antenna terminal. Low side to chassis. | 11.6 Mc | left end | SW3 OSC Coil L 8 |
| 21 | | 26.8 Mc | right end | SW3 OSC Trim. Ct 8 |
| 22 | | Repeat steps 20 and 21. | | |
| 23 | | 12.0 Mc | 12.0 Mc | SW3 Ant. Coil L 4 |
| 24 | | 25.0 Mc | 25.0 Mc | SW3 Ant. Trim. Ct 4 |
| 25 | | Repeat steps 23 and 24. | | |

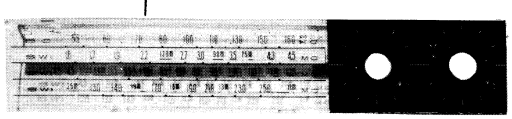
## Main Parts Location



## Main Parts Connection

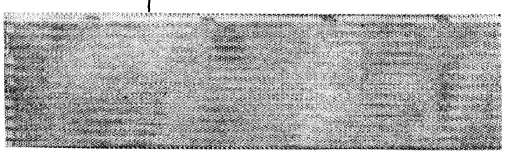



(R-32235)



(R-23546)

(R-26336)



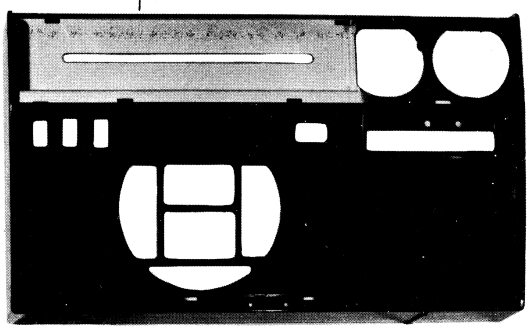
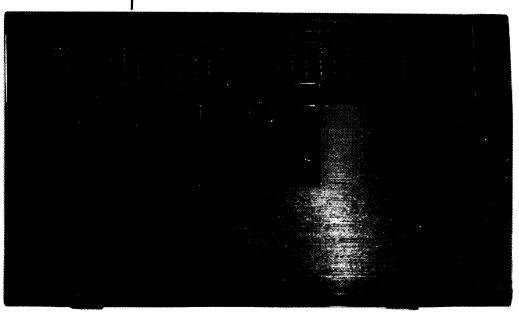
(R-S8379)



(R-S8263)

(R-S8265)

(R-31390b)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