CRF-230B

2363

SONY®

SERVICE MANUAL

2363

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SECTION 1
OUTLINE

1-1. SECIFICATIONS

Circuit System: Superheterodyne (FM-1, FM-2, MW, LW, SW-1)
Double superheterodyne (SW-2 ~ SW-19)

Semiconductor: 27 transistors, 4FET for reception, 17 transistors for auxiliary functions, 34 diodes, 2 thermistor

Frequency Coverage:

FM-1	76 - 90 MHz
FM-2	87.5 - 108 MHz
MW	530 - 1,605 kHz (566 - 187 m)
LW	150 - 400 kHz (2,000 - 750 m)
SW-1	1.6 - 4.5 MHz (187 - 66 m ; Marine Band)
SW-2	2.0 - 2.6 MHz (120 m)
SW-3	3.0 - 3.6 MHz (90 m)
SW-4	3.5 - 4.1 MHz (75 - 81 m)
SW-5	4.5 - 5.1 MHz (60 m)
SW-6	5.8 - 6.4 MHz (49 m)
SW-7	7.0 - 7.6 MHz (40 - 41 m)
SW-8	9.5 - 10.1 MHz (31 m)
SW-9	11.5 - 12.1 MHz (25 m)
SW-10	14.0 - 14.6 MHz (20 m)
SW-11	15.0 - 15.6 MHz (19 m)
SW-12	17.5 - 18.1 MHz (16 m)
SW-13	21.0 - 21.6 MHz (15 m)
SW-14	21.4 - 22.0 MHz (13 m)
SW-15	25.5 - 26.1 MHz (11 m)
SW-16	26.8 - 27.4 MHz (11 m)
SW-17	28.0 - 28.6 MHz (10 m)
SW-18	28.6 - 29.2 MHz (10 m)
SW-19	29.2 - 29.8 MHz (10 m)

Intermediate Frequency:

FM	10.7 MHz
MW, LW, SW-1	455 kHz
SW-2 ~ SW-19	1st : 1.6 - 2.2 MHz 2nd: 455 kHz

Antenna System:

FM	telescopic antennas 1,000 mm 2 pcs external antenna terminals (300 Ω, 75 Ω) are provided
MW, LW	built-in ferrite bar antenna, 10φ x 180 mm external antenna terminal is provided
SW-1 ~ SW-19	telescopic antenna 1,470 mm external antenna terminal is provided

Power Requirement:
AC 100, 120, 220, 240 V, 50/60 Hz (c/s)
DC 9 V, battery (size "D") 6 pcs
DC 12 V, with SONY car battery cord DCC-2AW (optional)

Power Output: (at 10% distortion)
4 W with AC power supply
1.5 W with DC power supply

Current Drain: (at zero signal)
AC 180 mA
DC 90 mA

Maximum Sensitivity: (at output 50 mW, S/N 6 dB)

FM	-2 dB (0.8 μV)
MW	28 dB/m (25 μV/m)
LW	36 dB/m (63 μV/m)
SW	0 dB (1 μV); average

Selectivity: LW, MW, SW-1 ~ SW-19; 40 dB at BROAD position
60 dB at SHARP position

Muting Level: 10 ~ 30 dB (adjustable)

Signal-to-Noise Ratio:
FM ; 63 dB at 54 dB input, 400 Hz, 30% modulation
MW; 37 dB at 60 dB input, 400 Hz, 30% modulation
LW ; 30 dB at 60 dB input, 400 Hz, 30% modulation
SW ; 44 dB at 44 dB input, 400 Hz, 30% modulation

Image Rejection:
FM-1 ; 72 dB at 77 MHz
FM-2 ; 72 dB at 98 MHz
MW ; 60 dB at 1,605 kHz
LW ; 80 dB at 360 kHz
SW-1 ; 30 dB at 4.5 MHz
SW-2 ; 80 dB at 2.5 MHz
SW-19; 30 dB at 29 MHz

Frequency Response: 100 - 20,000 Hz within ±10 dB by tone control

AUX Input Jack
input impedance: 5 kΩ
maximum sensitivity: -53 dB (1.7 mV) at 50 mW output

MPX Output Jack
output impedance: 5 kΩ
output level: -24 dB (49 mV) at 5 kΩ load impedance

Recording Jack
output impedance: 2.2 kΩ
output level: -50 dB (2.5 mV)

Recording Connector
output impedance: 80 kΩ
output level: -29.5 dB (26 mV)

External Speaker Jack: 3 ~ 8 Ω speakers can be connected

Headphone Jack: 8 Ω headphone can be connected

Earphone Jack: 8 Ω earphone can be connected

Other Controls:
Battery check switch
Calibrator reset knob
AGC/MGC knob
BFO control knob
Selectivity switch
Noise limiter switch
Muting switch
Sensitivity switch

Dimensions: 17 13/16" (W) x 12 13/16" (H) x 7 1/2" (D)
(452 mm x 325 mm x 190 mm)

Weight: 31 lb, 14 kg (without batteries)

Supplied Accessories:
AC power cord
polishing cloth

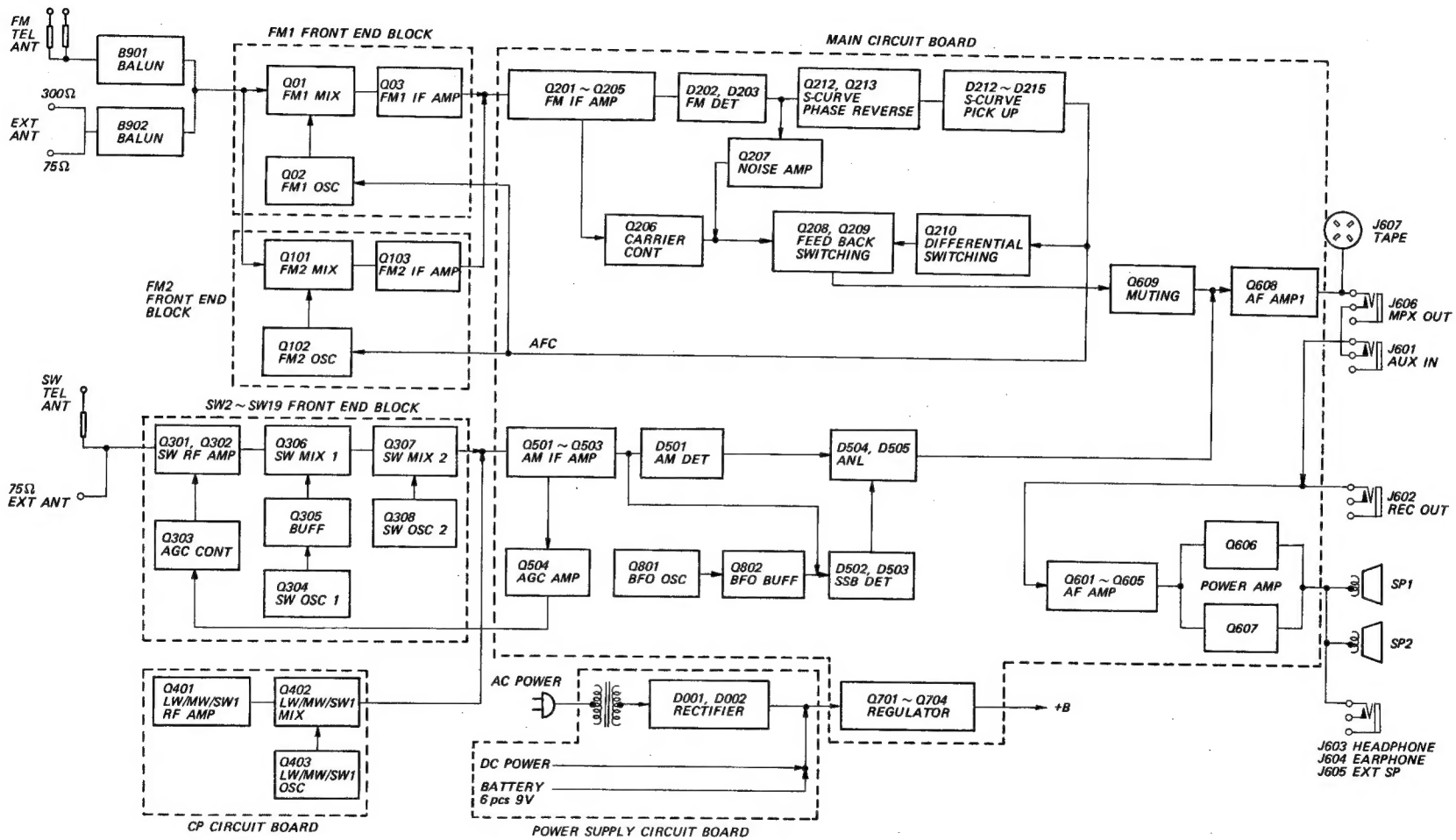

FM TEL ANT
300Ω
EXT ANT
75Ω
B901 BALUN
B902 BALUN
FM1 FRONT END BLOCK
Q01 FM1 MIX
Q03 FM1 IF AMP
Q02 FM1 OSC
FM2 FRONT END BLOCK
Q101 FM2 MIX
Q103 FM2 IF AMP
Q102 FM2 OSC
MAIN CIRCUIT BOARD
Q201 ~ Q205 FM IF AMP
D202, D203 FM DET
Q212, Q213 S-CURVE PHASE REVERSE
D212 ~ D215 S-CURVE PICK UP
Q207 NOISE AMP
Q206 CARRIER CONT
Q208, Q209 FEED BACK SWITCHING
Q210 DIFFERENTIAL SWITCHING
Q609 MUTING
Q608 AF AMP1
J607 TAPE
J606 MPX OUT
J601 AUX IN
AFC
SW TEL ANT
75Ω EXT ANT
SW2 ~ SW19 FRONT END BLOCK
Q301, Q302 SW RF AMP
Q306 SW MIX 1
Q307 SW MIX 2
Q303 AGC CONT
Q305 BUFF
Q308 SW OSC 2
Q304 SW OSC 1
Q501 ~ Q503 AM IF AMP
D501 AM DET
D504, D505 ANL
Q504 AGC AMP
Q801 BFO OSC
Q802 BFO BUFF
D502, D503 SSB DET
J602 REC OUT
Q601 ~ Q605 AF AMP
Q606
POWER AMP
Q607
SP1
SP2
Q401 LW/MW/SW1 RF AMP
Q402 LW/MW/SW1 MIX
Q403 LW/MW/SW1 OSC
CP CIRCUIT BOARD
AC POWER
D001, D002 RECTIFIER
Q701 ~ Q704 REGULATOR
+B
DC POWER
BATTERY 6 pcs 9V
POWER SUPPLY CIRCUIT BOARD
J603 HEADPHONE
J604 EARPHONE
J605 EXT SP

Fig. 1-1

1-3 TECHNICAL FEATURES

The SONY Model CRF-230B is a high-performance radio receiver having many features found in communication receivers. Among them are the following:

- A total of 23 bands covering the broadcast frequencies of any country in the world. Included are 2 fm bands, 19 sw bands, a mw band and a lw band.
- FET (Field Effect Transistor) front ends in fm and sw bands provide superior sensitivity, image rejection, and stability.
- Easy-to-tune sw bands due to a dual-conversion system providing a uniform 600 kHz tuning range on each band.
- Product detector for receiving ssb signals.
- An fm i-f circuit employing ceramic filters. An a-m i-f circuit employing two ceramic filters with two-step adjustable selectivity.
- Individual tuning knobs for sw2 ~ 19 bands, sw1/mw/lw bands and fm bands. Preset-tuning of three stations is available.
- The power supply will operate from household current in any country of the world (via built-in voltage selector), internal battery, or car battery.
- Stable, noise-free fm tuning by means of AFC and a muting system.
- ANL (Automatic Noise Limiter) to minimize noise.
- Up to 4 watts of undistorted audio power output with two built-in speakers or external speakers.

1-4. CIRCUIT EXPLANATIONS

AFC (Automatic Frequency Control) Available for Both FM Bands

In the Model CRF-230B, the local oscillator frequency is above the signal frequency for the FM2 band, but below the signal frequency for the FM1 band. Because of this, oscillator drift produces a detector dc output-voltage change of different polarity on the FM1 band than on the FM2 band. Therefore, dc control voltages taken directly from the detector output can not be used to stabilize the frequency of the local oscillator. To get around this problem, a comparator circuit with selectable output polarity is used (Fig. 1-2). The detector output is devided by equal-value resistors R232 and R233 to provide two voltages identical in magnitude but opposite in polarity. These voltages are compared against a reference voltage of approximately 1.5 volts produced by the forward voltage drop across D204 and D205. The resultant voltages are applied to the bases of transistor Q211 and Q212. The each collector voltage is fed through AFC switch S202 to variable-capacitance diode (D01 for FM1 band and D101 for FM2 band). The variable-capacitance diode is voltage sensitive, so its capacitance (and hence the oscillator frequency) depends on the magnitude of the control voltage. Load resistors R254, R255 and also R258, R259 are connected in a balanced bridge and the contact voltage at the junction of R260 and R261 is used as a fixed bias voltage (0.7 V) for the variable-capacitance diode when AFC switch S202 is set to OFF.

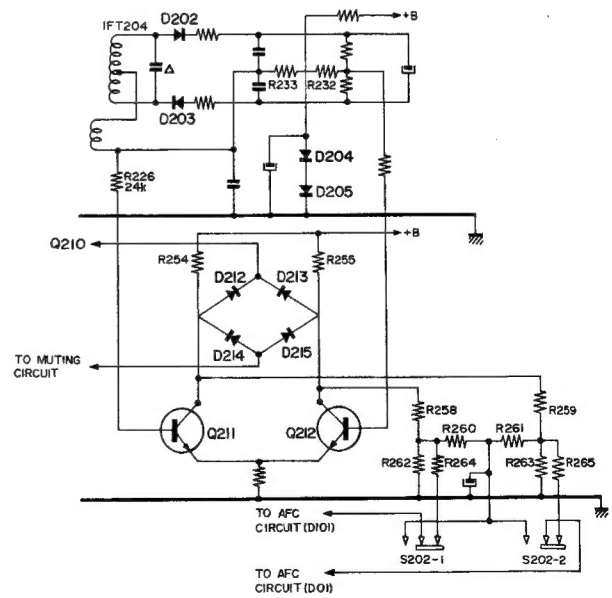


Fig. 1-2

Muting Circuit:

When the receiver is detuned from a signal, the signal decreases. Since less i-f signal is then rectified by diodes D207 and D208, the negative output voltage of these rectifiers can no longer back the positive voltage applied to the base of transistor Q206 through adjustable resistor VR901 (Fig. 1-3). This allows Q206 to conduct lowering its collector voltage. Since the collector of Q206 is connected to the base of PNP transistor Q209, Q209 conducts when its base voltage decreases (with respect to ground), thereby causing transistor Q208 to conduct. The collector voltage of Q208 then drops to near ground potential. The voltage at the collector of Q208 is fed to the base of transistor Q609 through MUTING switch S203. Since this voltage is so low Q609 cannot conduct and complete the emitter circuit of transistor Q608. This prevents Q608 from amplifying the detector output.

When tuned to a signal, the opposite actions occur. I-f signal through capacitor C227 is rectified into negative d-c voltage by diodes D207 and D208. This voltage cuts off transistor Q206 and eventually turns on transistor Q609, thereby enabling transistor Q608 to amplify the detector output. The muting level can be adjusted by potentiometer VR901. The muting level is usually set approximately 20 dB lower than the signal level. If the receiver tuning is shifted within range B of Fig. 1-4, the difference between the collector voltages of transistors Q211 and Q212 becomes large enough drops across resistors R251 and R252, thus lowering the base voltage of PNP transistor Q209 and results in its conduction. As before, the conduction of Q209 begins a chain of events which prevents Q608 from amplifying. If the tuning is shifted within range C of Fig. 1-4, the difference between the collector voltages of transistors Q211 and Q212 is so small that transistor Q210 is turned off within this range as well as in range A. Noise components caused by detuning, however, are coupled to transistor Q207 through capacitor C240 and resistor R247 from the detector output.

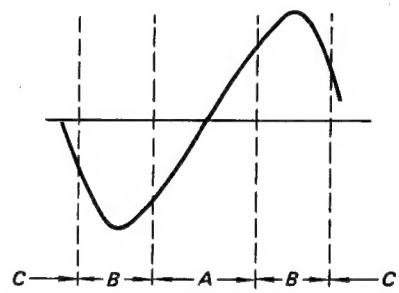


Fig. 1-4 Discriminator characteristic

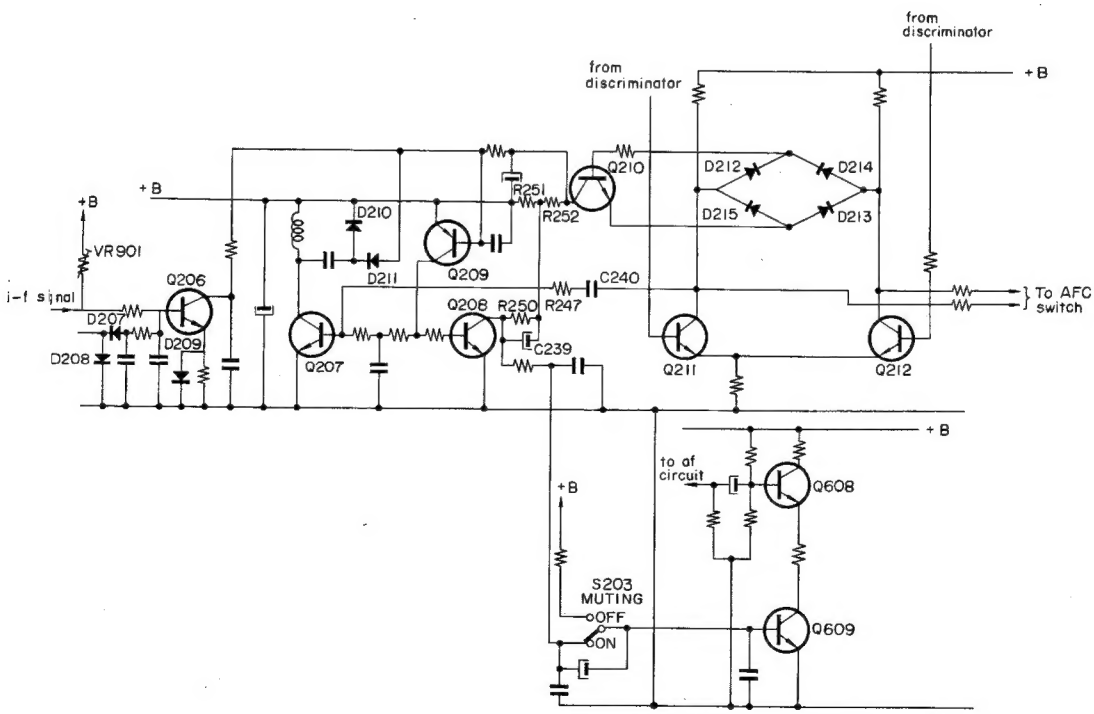


Fig. 1-3

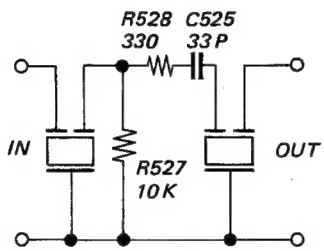
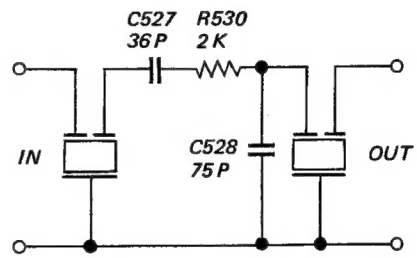
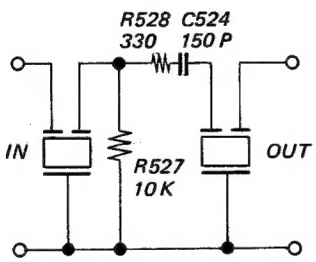
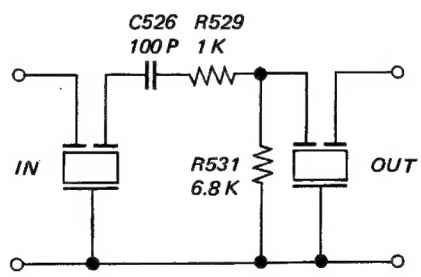
The noise is amplified, rectified into negative d-c voltage by diodes D210 and D211, and applied to the base of transistor Q209 to turn it on. Since the base voltage of Q207 is controlled by the collector voltage of Q209, the amplification of transistor Q207 increases due to increased base bias, and transistor Q209 is held conducting quite reliably. As before, transistor Q608 cuts off the detector output.

Positive feedback through resistor R250 and capacitor C239 from transistor Q209 aids in turning off Q208.

Adjustable Selectivity Employing Ceramic Filters:

The bandwidth in a-m reception can be altered by changing the coupling between the sections of ceramic filters in the a-m i-f circuit. Ceramic filters CF501 and CF502 can be manually set to narrow or wide bandwidth by switch S501.

The net result of the switch manipulations on the ceramic filter circuits are summarized in Table. The overall selectivity curves of the a-m i-f strip are shown in Fig. 1-5.

Band width	CF501 (S501-1)	CF502 (S501-2 ~ 3)	Overall response (Fig. 1-5)
Sharp			A
Broad			B

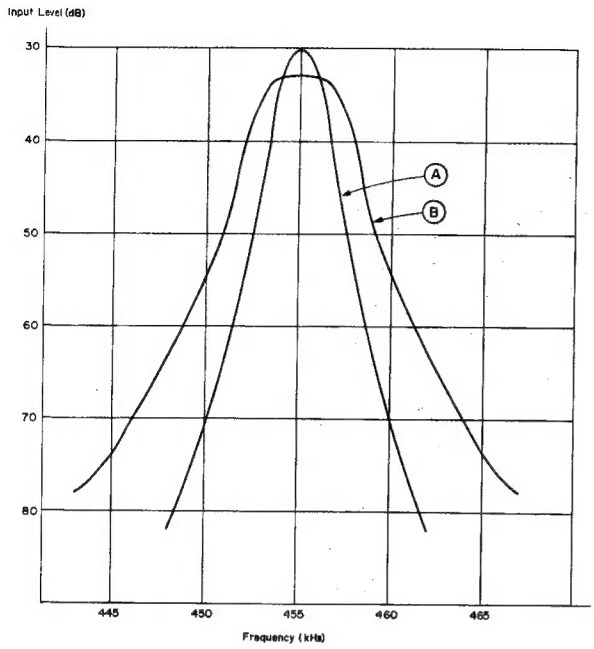


Fig. 1-5 Overall i-f response curve

ANL (Automatic Noise Limiter):

This limiter in the a-m section clips any noise pulses accompanying the signal to a level no longer than the signal amplitude. The clipping level is automatically adjusted to match the variations in signal level. The collector voltage of i-f amplifier Q502 forward biases diodes D504 and D505 through resistors R509 and R521, while the output voltage of detector D501 provides a reverse-bias voltage (Fig. 1-6). These two bias voltages adjust the clipping level of diodes D504 and D505 to match the average signal level.

Product Detector for Single-Sideband Reception:

A product detector is a type of heterodyne detector. Single-sideband signals can be recovered by passing them through nonlinear device after being mixed with a carrier identical in frequency to that used during modulation at the transmitter. That is, these two signals, sideband and carrier, are converted into two beat signals, upper and lower, against the carrier frequency by heterodyne action. The upper beat signal is eliminated by passing through the filter circuit and the lower beat signal is fed to the next stage as audio signals.

In the model CRF-230B, the detector utilizes the square-law characteristic (output current proportional to the square of the effective value of the input voltage) of a diode for the nonlinear device.

To minimize distortion, two diodes D502 and D503 are connected in reverse each other and applied the signals respectively positive in phase. That is because the range of square-law curve of one diode is narrow causing distorted detection for strong input signal.

The BFO injection voltage used for carrier reinsertion is comparatively high (about 0.8 volt is optimum) to set the operating point of the detector within a linear portion of the diodes' characteristic. This results to minimize distortion of the recovered audio signal.

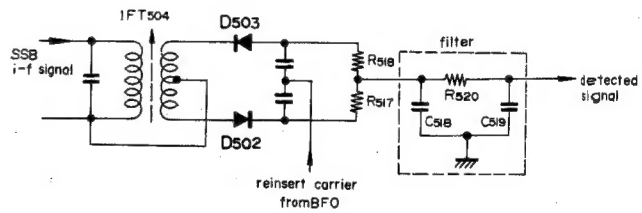


Fig. 1-7 Production detector

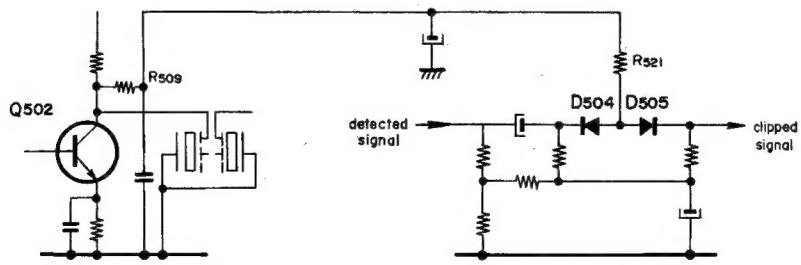


Fig. 1-6 Automatic noise limiter circuit

1-5. EXTERNAL VIEW

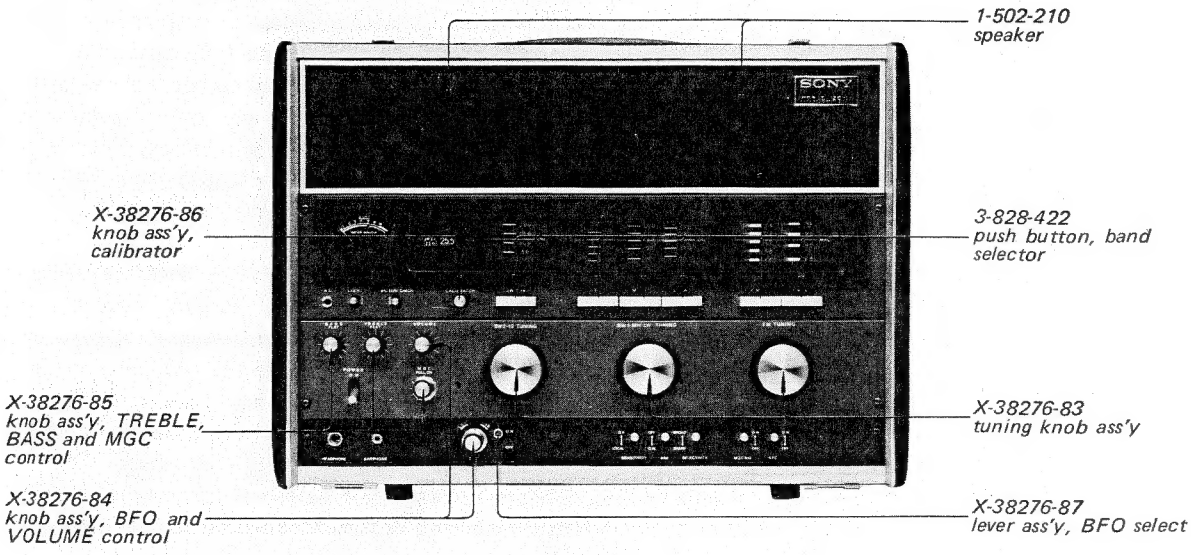


Fig. 1-8.

1-6. INTERNAL VIEW

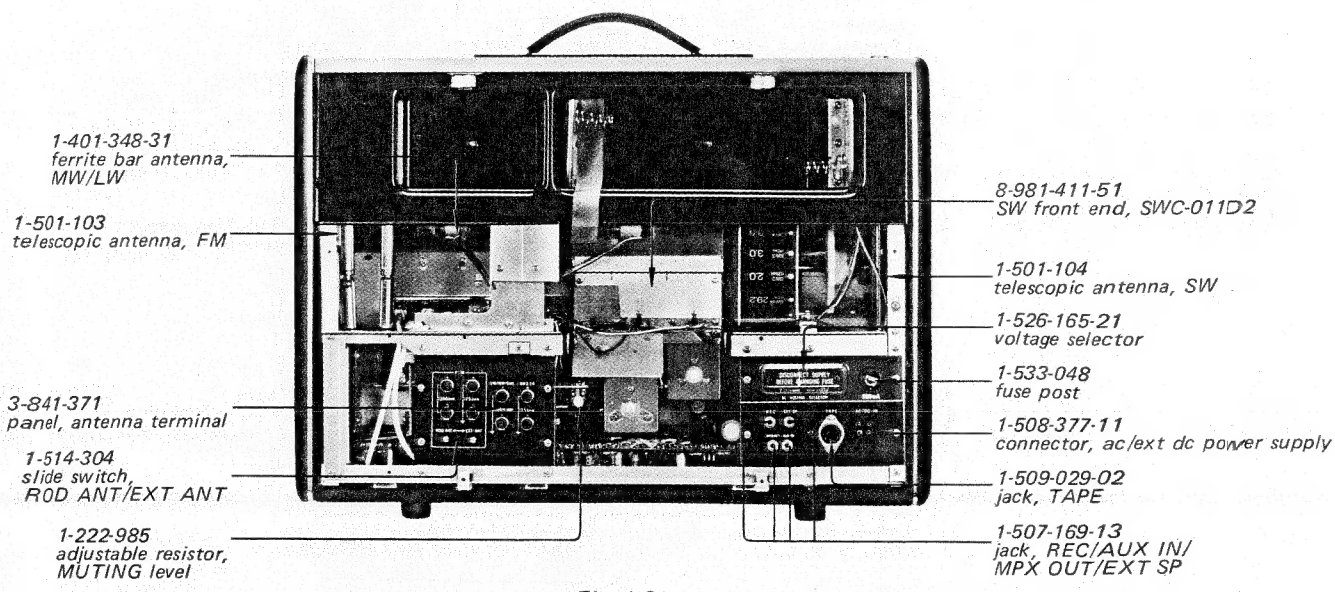
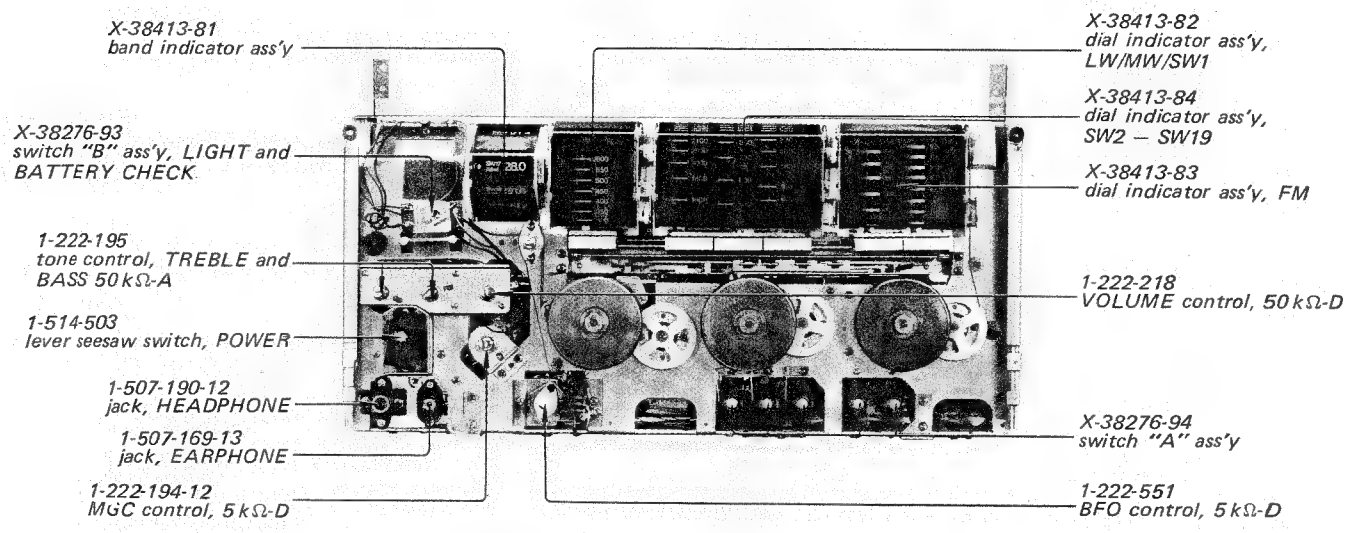


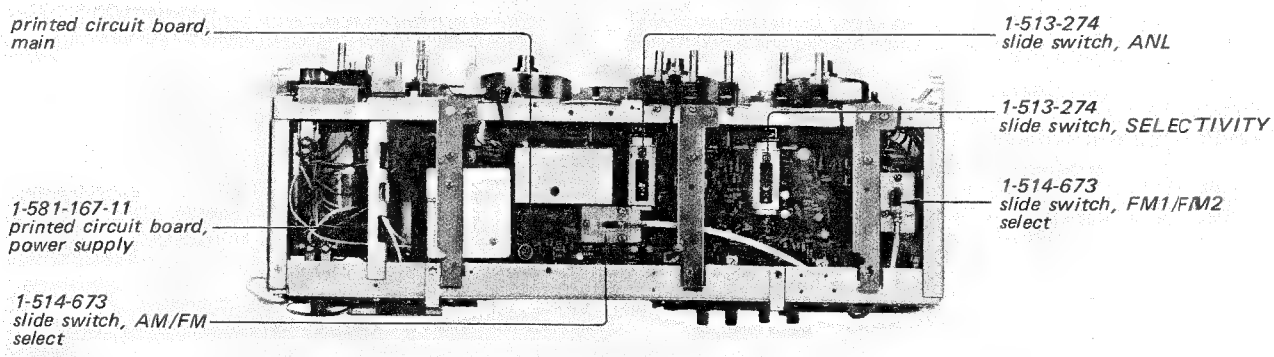
Fig. 1-9.

1-7. CHASSIS VIEW

— Front —



— Bottom —



SECTION 2
DISASSEMBLY

2-1. REAR COVER REMOVAL

1. Remove the six screws marked Ⓐ in Fig. 2-1.
2. Remove the rear cover in the direction shown by the arrow Ⓑ
3. Remove the two wood screws marked Ⓒ in Fig. 2-1.

2-2. CABINET REMOVAL

1. Remove the four screws marked Ⓔ in Fig. 2-1.
2. Push up the three telescopic antennas' bottom.
3. Remove the six screws marked Ⓕ and Ⓖ in detail (1) and (3) of Fig. 2-1.
4. Unsolder the coaxial cable and the three lead wires shown in detail (1) and (3) of Fig. 2-1.
5. Loosen the three set screws fixing band selector knob shown in detail (2) of Fig. 2-1 and pull out the band selector knob.

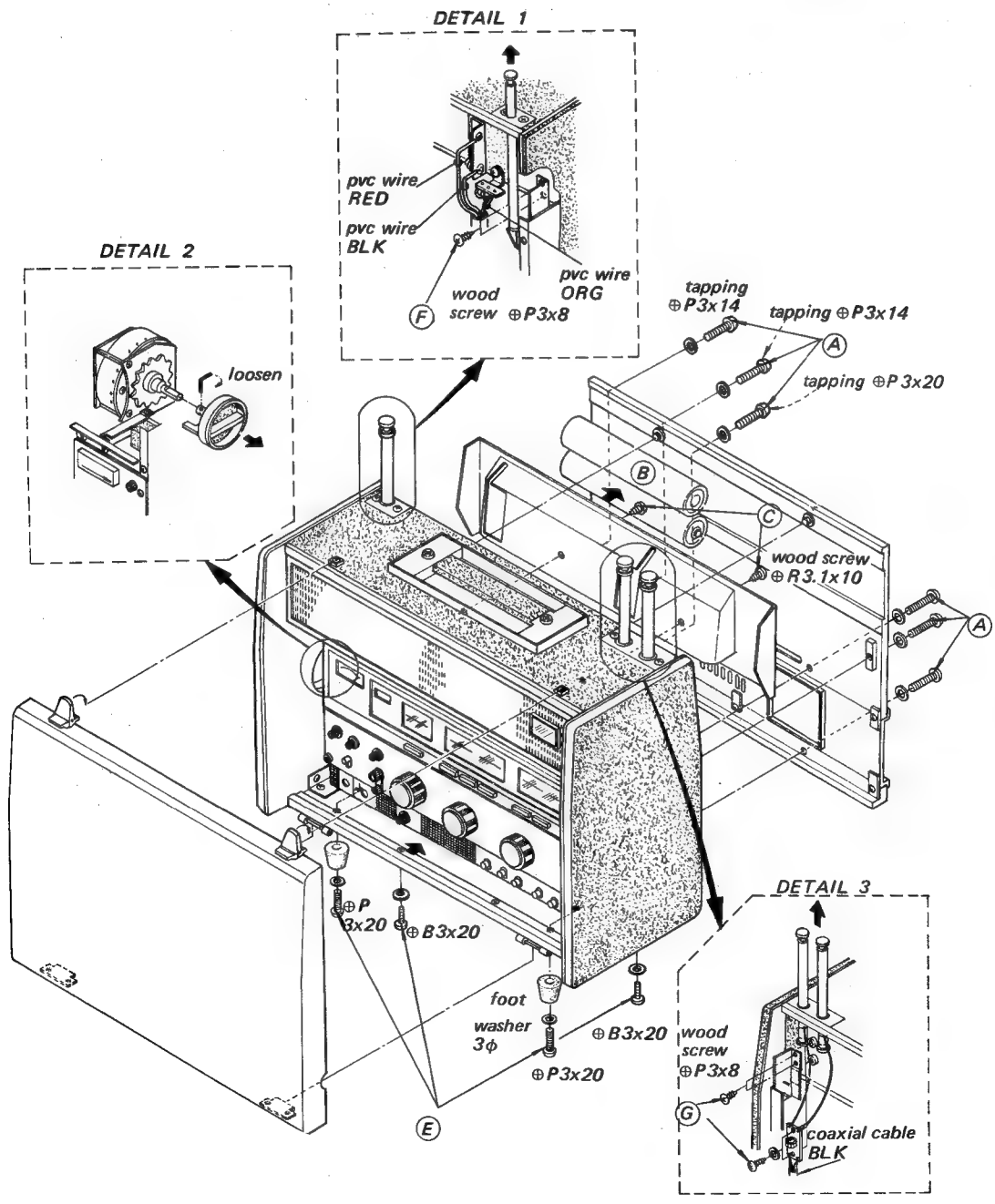


Fig. 2-1

2-3. FRONT PANEL REMOVAL

1. Remove the three TUNING knobs and the CALIBRATOR knob by loosening their set-screws.
2. Pull out the five control knobs marked ※ in Fig. 2-2.
3. Remove the six screws marked Ⓗ and remove the main panel and the sub-panel.

2-4. SPEAKER REMOVAL

1. Remove the rear cover and battery case.
2. Remove the three truss head screws marked Ⓘ in Fig. 2-3.
3. Now, baffle board and two speakers are removable as shown in Fig. 2-3.

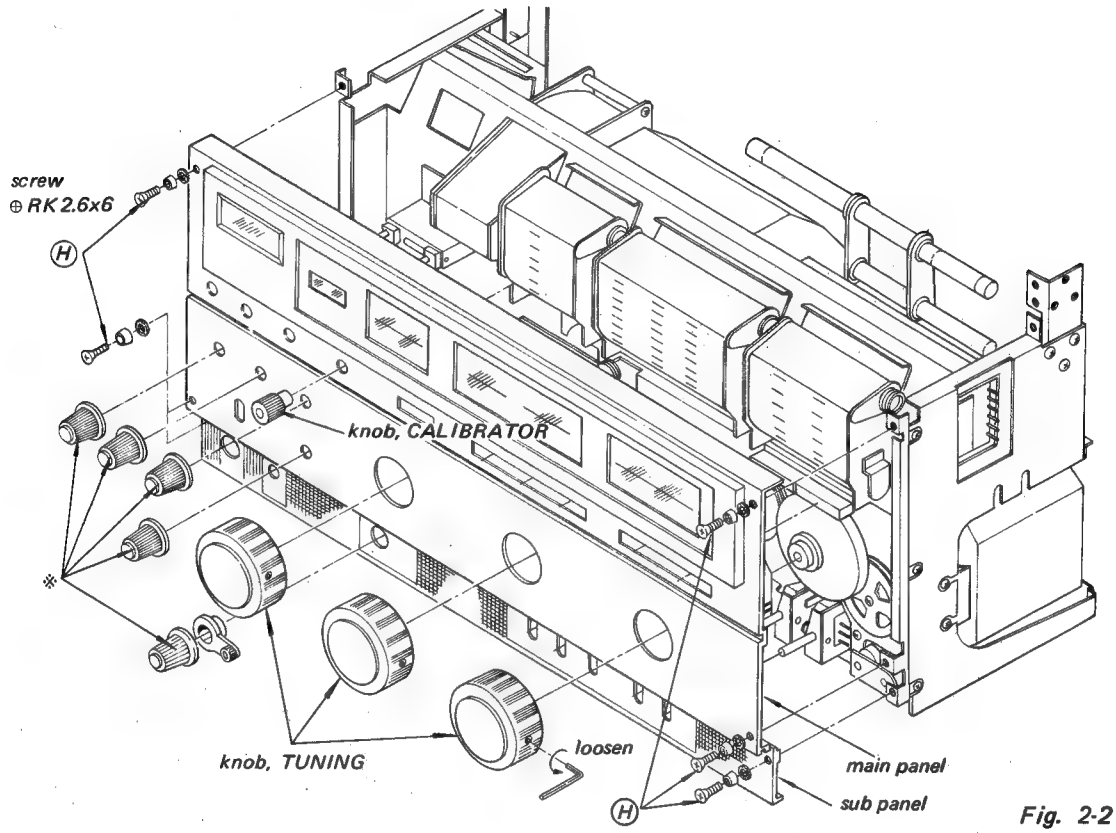


Fig. 2-2

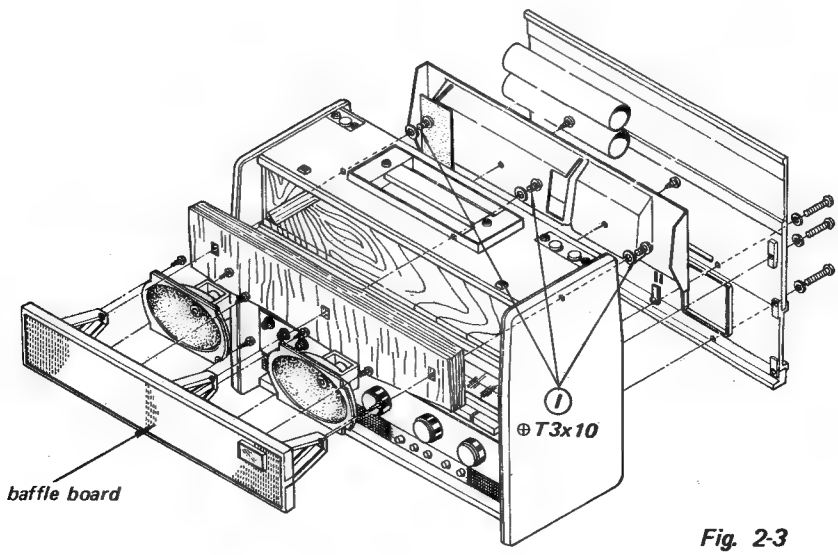


Fig. 2-3

2-5. FM FRONT END BLOCK REMOVAL

1. Remove the thirteen screws shown in Fig. 2-4.
2. Remove the antenna terminal panel.
3. Loosen the two screws marked ※ in Fig. 2-5, which hold the tuning shaft.
4. Remove the screw shown in Fig. 2-6.
5. Remove the two fm front-end blocks in the direction shown by the arrows in Fig. 2-7.

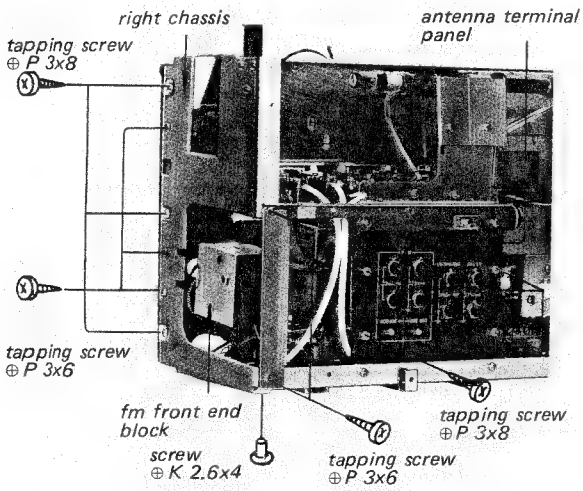


Fig. 2-4

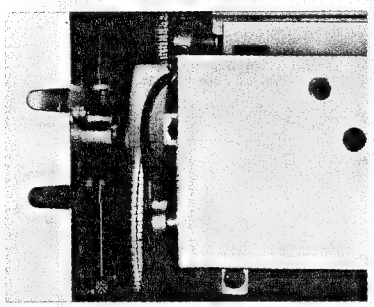


Fig. 2-5

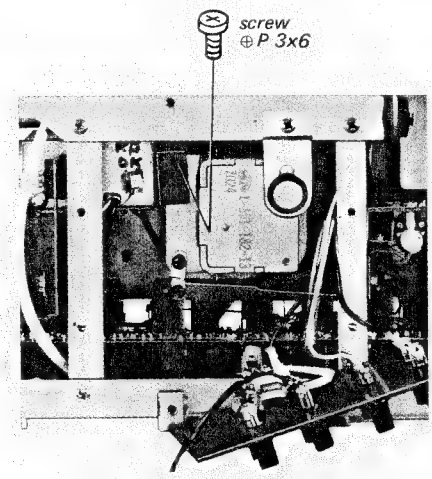


Fig. 2-6

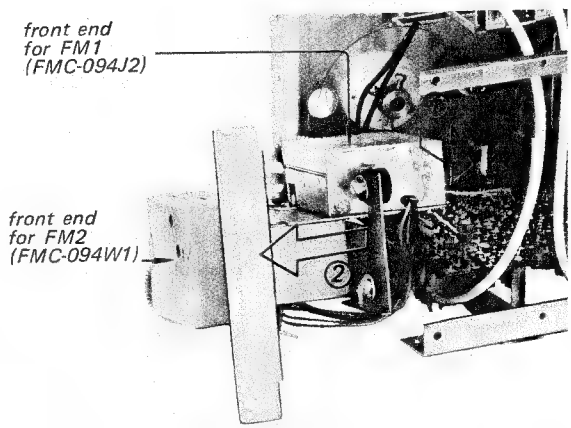


Fig. 2-7

2-6. MAIN CIRCUIT BOARD REMOVAL

1. Remove the two slide switches with lever springs by removing the two screws marked ▲ in Fig. 2-8.
2. Remove the three screws marked ◎.
3. Remove the main circuit board as shown in Fig. 2-9.

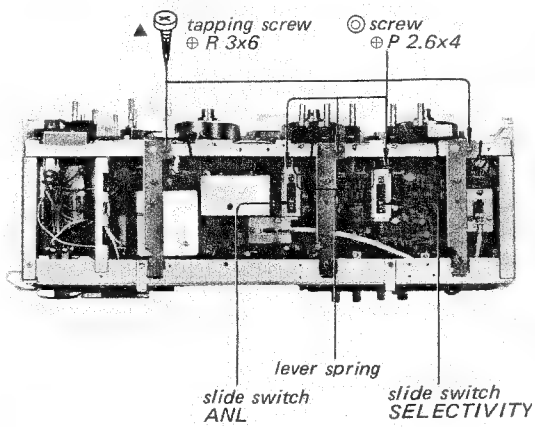


Fig. 2-8

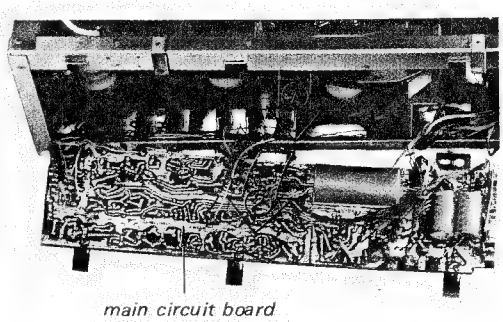


Fig. 2-9

2-7. SW FRONT END BLOCK REMOVAL

1. Unsolder the five wires shown in Fig. 2-10.
2. Remove the four screws shown in Fig. 2-11.
3. Loosen the two screws marked ★ in Fig. 2-12 which fix the friction disk.

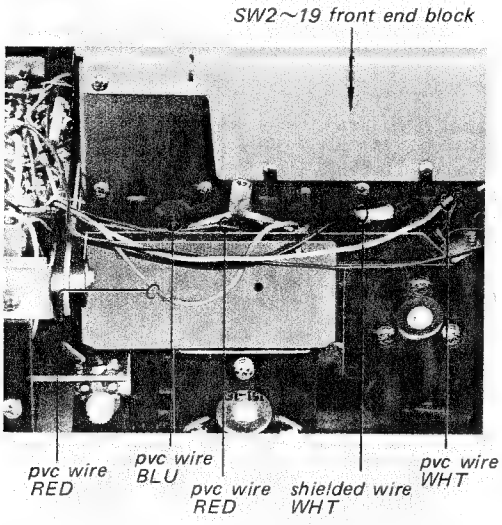


Fig. 2-10

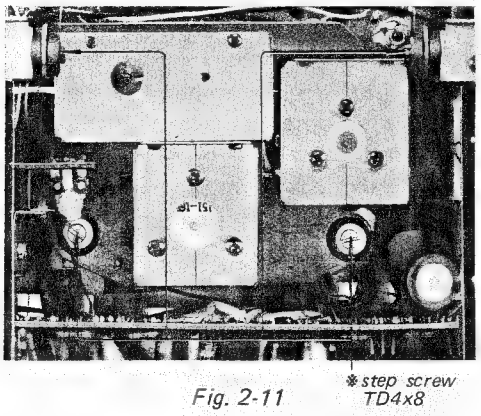


Fig. 2-11

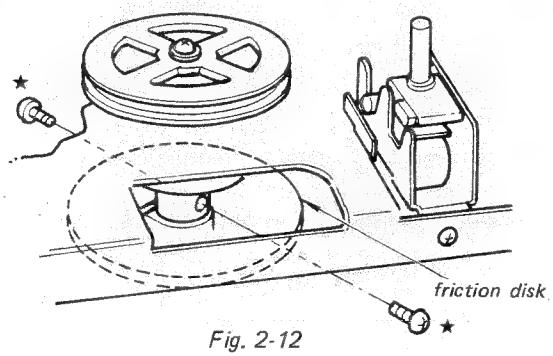


Fig. 2-12

4. Sw front-end block can be removed in the direction shown by the arrow in Fig. 2-13.

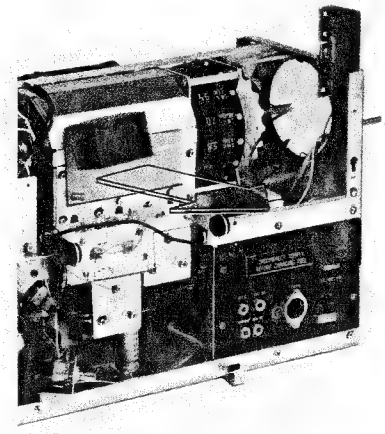


Fig. 2-13

2-8. CP CIRCUIT BOARD REMOVAL

1. Remove the eight screws shown in Fig. 2-14 and remove the bar antenna holder and antenna terminal panel.

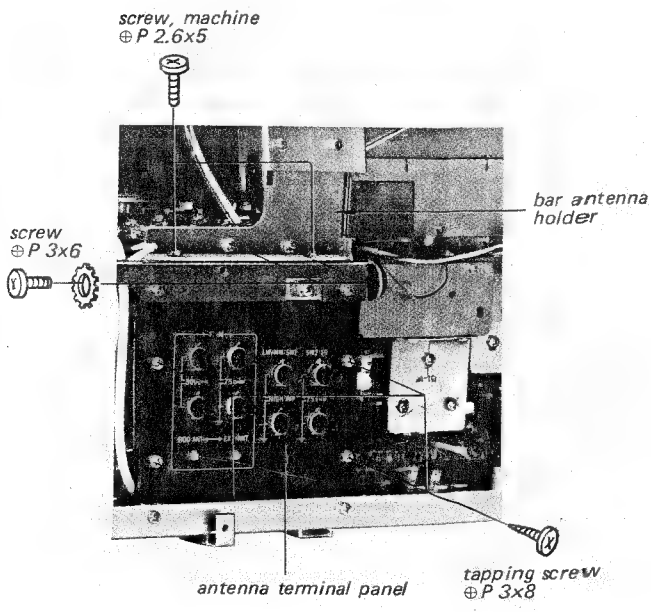


Fig. 2-14

2. Remove the two screws shown in Fig. 2-15.
3. Unsolder the two wires at the antenna terminal panel.
4. Unsolder the six tuning capacitor lead wires.
5. Unsolder the three wires which come from the sw front end as shown in Fig. 2-16.
6. Unsolder all the wires shown in Fig. 2-17.
7. Remove the circuit board in the direction shown by the arrow in Fig. 2-15.

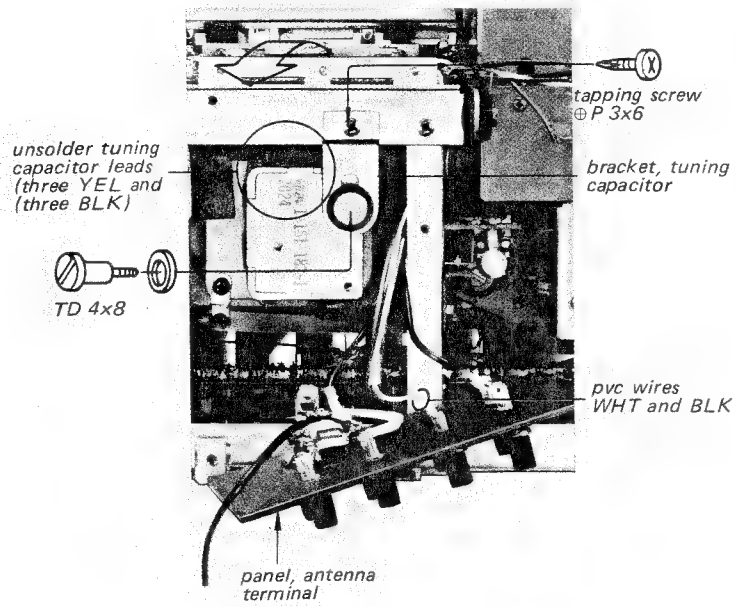


Fig. 2-15

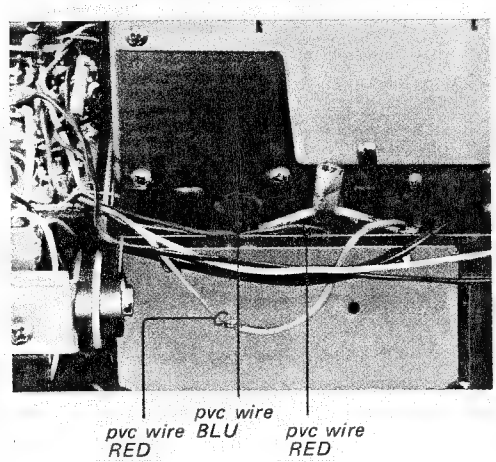


Fig. 2-16

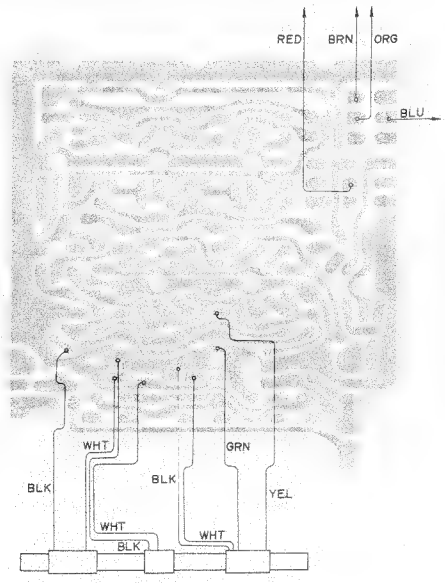


Fig. 2-17

2-9. POWER SUPPLY CIRCUIT BOARD REMOVAL

1. Remove the 19 screws shown in Fig. 2-18.
2. Remove the four jack nuts.
3. Unsolder all the wires on the terminal strip shown in Fig. 2-19.
4. Remove the two screws shown in Fig. 2-20.
5. Unsolder the three wires on the light switch shown in Fig. 2-21.
6. Remove the power supply circuit board as shown in Fig. 2-22.

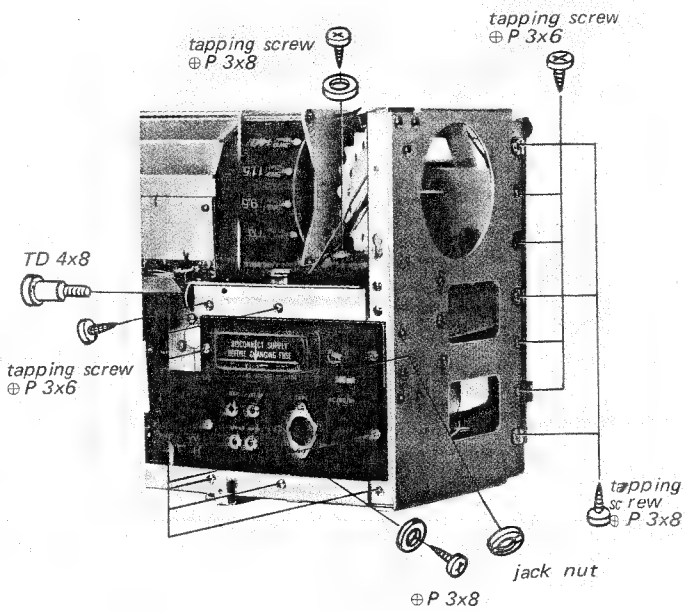


Fig. 2-18

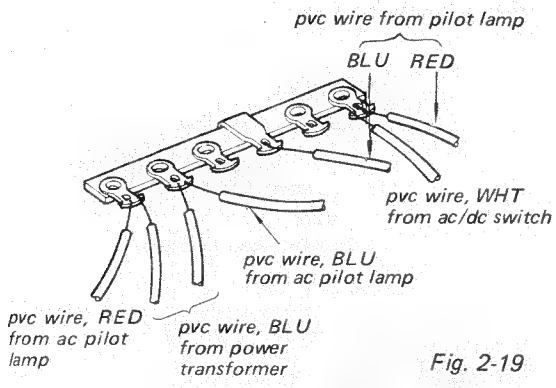


Fig. 2-19

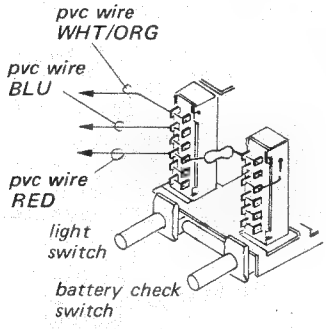


Fig. 2-21

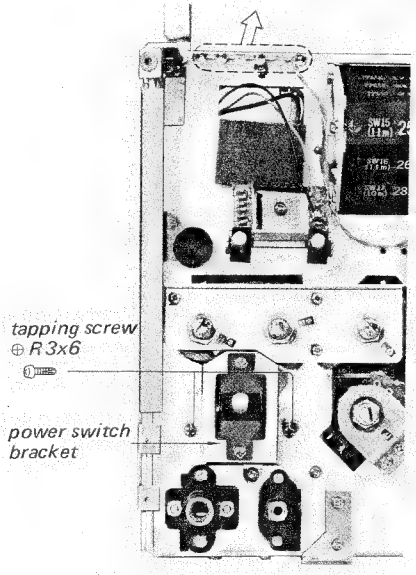


Fig. 2-20

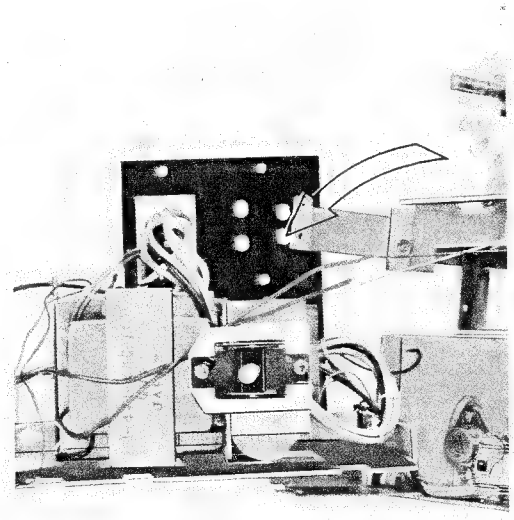


Fig. 2-22

2-10. DIAL CORD STRINGING

Dial cord and dial film is shown in Fig. 2-23.

dial cord Part No. 7-633-120-52
dial cord [1] : FM1/FM2
dial cord [2] : MW/LW/SW1
dial cord [3] : SW2-SW19
dial cord [4], [5]: SW2-SW19 calibrator

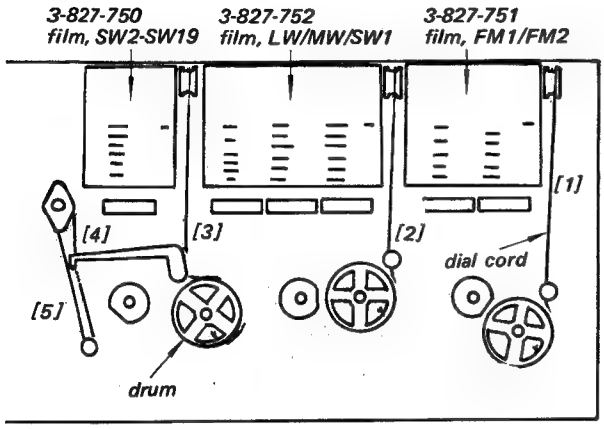


Fig. 2-23

1. FM1/FM2 Dial Cord

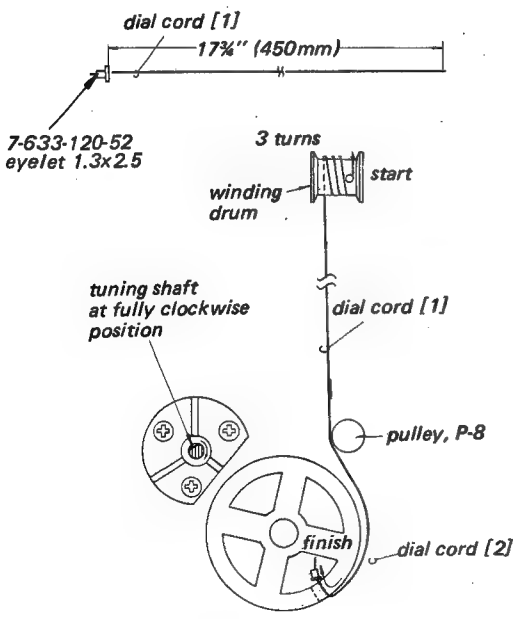


Fig. 2-24

2. MW/LW/SW1 Dial Cord

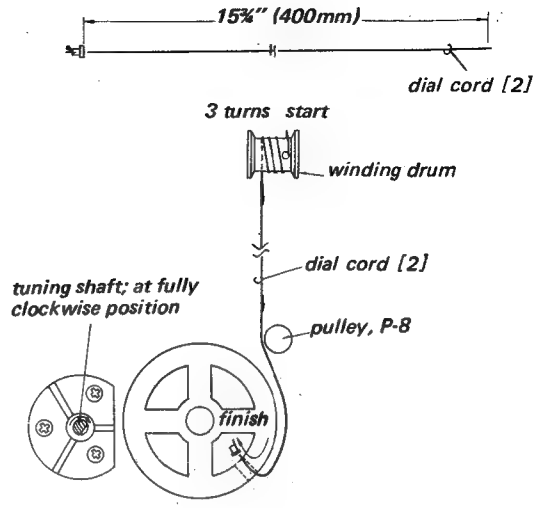


Fig. 2-25

3. SW2~SW19 Dial Cord

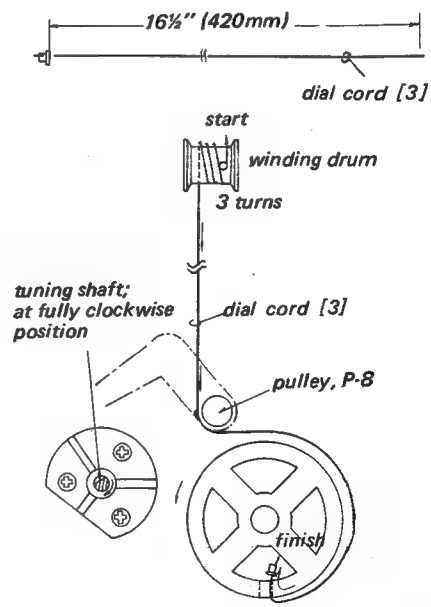
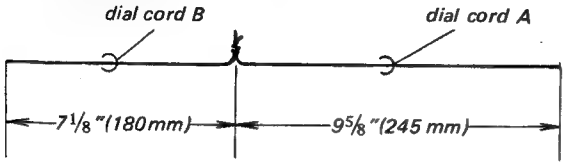


Fig. 2-26

4. SW2～SW19 Tuning Capacitor Driving Cord

String the cord by removing the SW2-SW19 front end block from the chassis.
Dial Film Setting



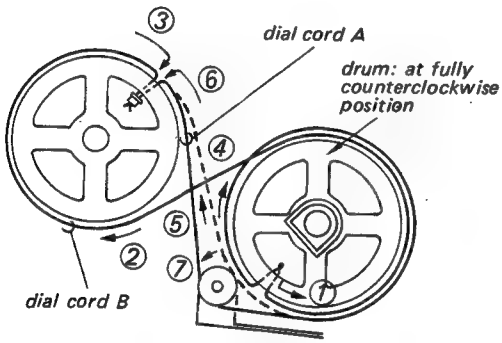


Fig. 2-27

5. SW2～SW19 Calibrator Dial Cord

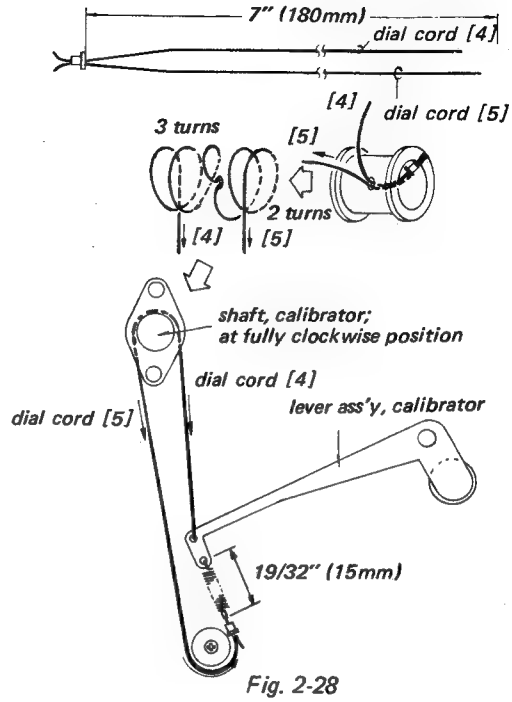


Fig. 2-28

6. Dial Film Setting

1. Set the top of dial film to the film-drum as shown in Fig. 2-29 (step ①).
2. Attach the other end of dial film with an adhesive tape (step ②).
3. Turn the ratchet-wheel four turns in the direction shown by the arrow (step ③).
4. Set the side mark of the film on the film setting position. After setting the film you must keep the film with fingers or adhesive tape so that the film does not move.
5. String the dial cord as shown in Fig. 2-29 (step ⑤).

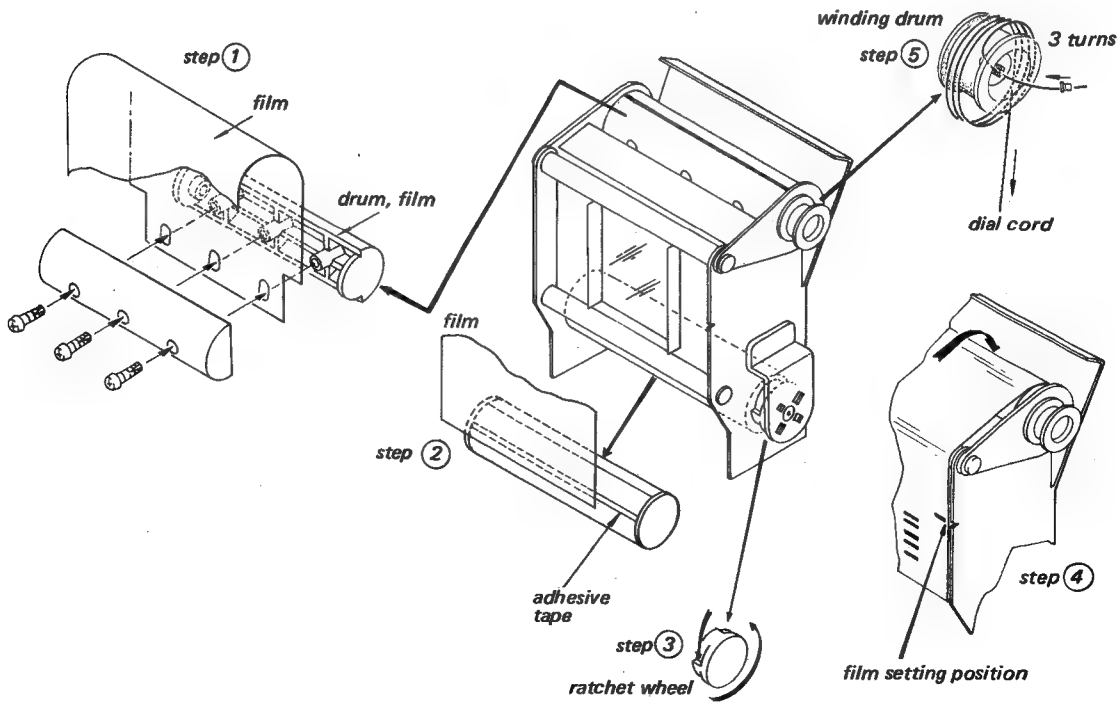


Fig. 2-29

SECTION 3
CIRCUIT ADJUSTMENTS

3-1. PREPARATION

1. Power Supply

At circuit adjustment remove the cabinet and front panel, and supply dc 9V across the red and the black lead wires shown in Fig. 3-1.

2. Receiver Control Setting

Set control knobs as follows except noted in each adjustment.

* VOLUME Control : Maximum
* BASS Control : FLAT
* TREBLE Control : FLAT
* SENSITIVITY : DX
* SELECTIVITY : SHARP
* ANL : OFF
* BFO : OFF
* AFC : OFF
* MUTING : OFF

3. Test Equipment/Tools Required

* Rf Signal Generator
* 10.7 MHz Sweep/Marker Generator
* Loop Antenna
* Oscilloscope
* VTVM
* 0.01 μF ceramic capacitor
* 4Ω Resistor
* Screwdriver For Alignment

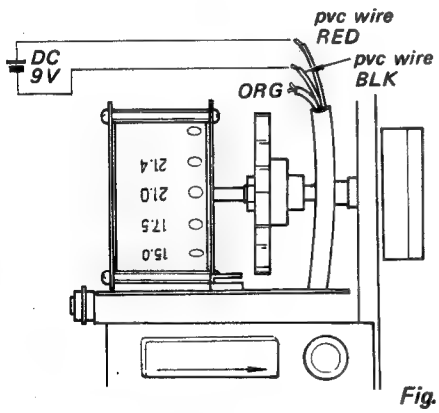


Fig. 3-1

3-2. AM IF ALIGNMENT

Preparation:

Band Selector: MW
Rf Signal Generator Coupling:
Loop antenna (See Fig. 3-2)
Modulation:
1-kHz 30% amplitude-modulated signal

VTVM Connection:
To EXT SP jack in parallel with 4Ω resistor

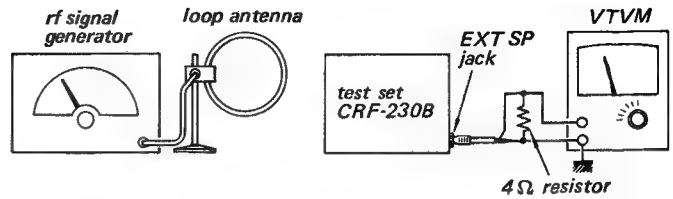


Fig. 3-2 A-m i-f alignment setup

Rf Signal Generator Frequency	Adjust	Remarks
455 kHz	IFT 401 IFT 501 IFT 502 IFT 504	Adjust for maximum meter reading on VTVM.

Note: IFT401 is on the cp circuit board. See Fig. 3-13 on page 25.

3-3. SSB DETECTOR ADJUSTMENT

Preparation:

Band Selector: MW
SELECTIVITY switch: SHARP
BFO Switch: ON
BFO Knob: Mechanical mid position
Rf Signal Generator Coupling: Loop antenna
Setup: See Fig. 3-3.

Note: Be sure that a-m i-f section is aligned for the normal operating condition before adjusting ssb detector.

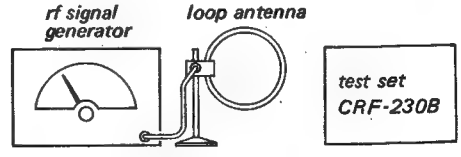


Fig. 3-3 Ssb detector adjustment setup

Rf Signal Generator Frequency	Adjust	Remarks
455 kHz unmodulated signal	BFO osc coil LT 801	Adjust for zero beat hearing

3-4. FM IF ALIGNMENT

Test Equipment/Tools Required

* 10.7 MHz Sweep/Marker Generator
* Oscilloscope
* 1 kΩ carbon type resistor
* Screwdriver for Alignment

Preparation:

Sweep/Marker Generator Connection:
On the main circuit board with 1 kΩ resistor in series (See Fig. 3-4).
Oscilloscope Connection: MPX OUT jack
Sweep Generator Center Frequency:
10.7 MHz
Marker Generator Center Frequency:
10.7 MHz
Band Selector: FM2

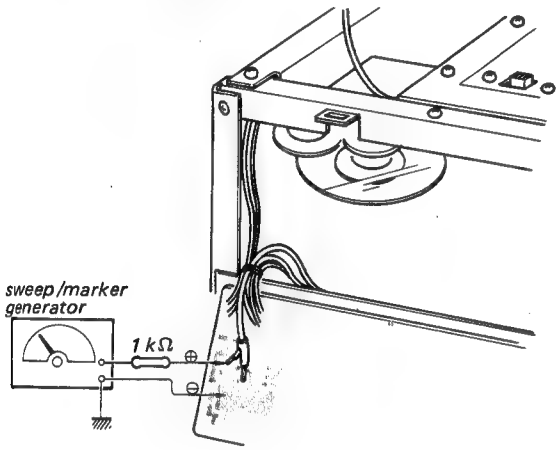


Fig. 3-4

Procedure:

1. Turn the core of discriminator transformer (IFT 204) fully counterclockwise.
2. Turn the core of fm i-f transformer (IFT 201, IFT 202) and discriminator transformer (IFT 203) to obtain the maximum amplitude response curve shown in Fig. 3-5.
3. Turn the core of discriminator transformer (IFT 204) to obtain the S curve response shown in Fig. 3-6.

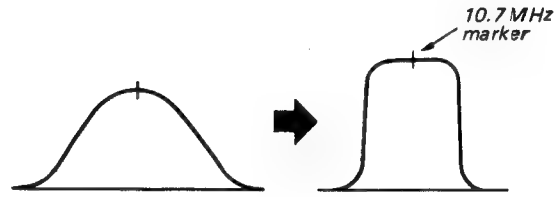


Fig. 3-5 Response curve

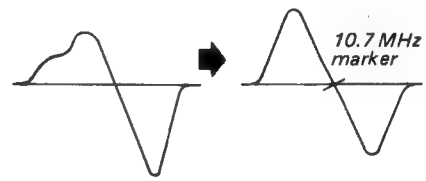


Fig. 3-6 "S" curve

Sweep/Marker Generator Coupling	Sweep/Marker Generator Frequency	Oscilloscope Connection	Adjust	Remarks
On the main circuit board with 1 kΩ resistor in series. (See Fig. 3-4)	10.7 MHz	MPX OUT jack	IFT201 IFT202 IFT203 IFT204	Band Selector: FM 2 AFC Switch: off Adjust for maximum amplitude and symmetrical S curve on the scope.

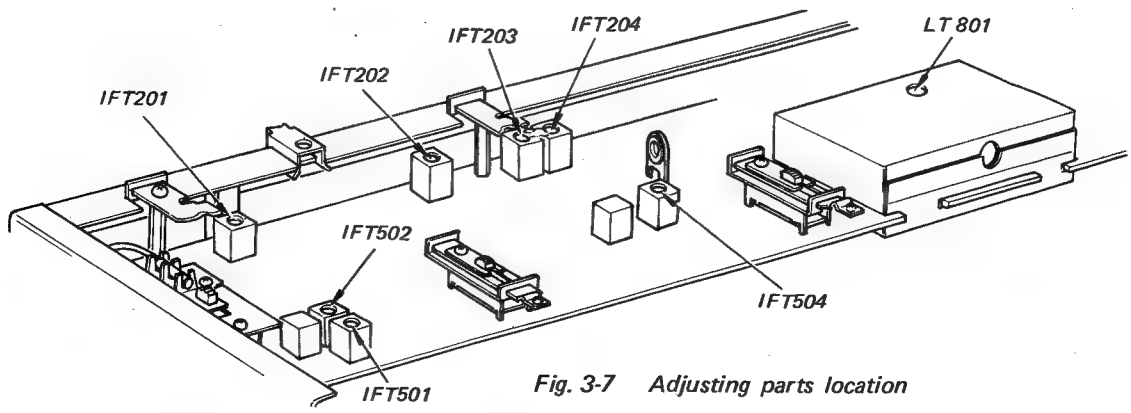


Fig. 3-7 Adjusting parts location

3-5. MUTING LEVEL SETTING

Preparation:

Band Selector: FM1
MUTING Switch: ON
ROD ANT-EXT ANT Switch: EXT ANT
Rf signal Generator Connection:
To FM EXT ANT terminal (75 Ω)
VTVM Connection:
To EXT SP jack in parallel with 4 Ω resistor
Modulation:
Fm 400-Hz ± 22.5-kHz frequency-modulated signal (rf signal: 77.5 MHz)

Note: Be sure that fm i-f section is operating in normal condition before setting the muting level.

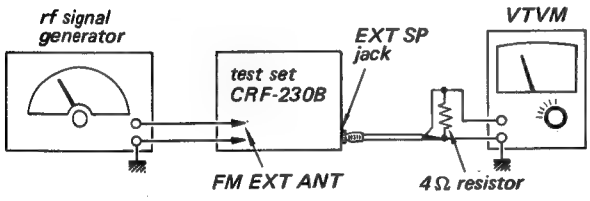


Fig. 3-8 Muting level setting setup

Procedure:

1. Detune from rf signal.
2. Turn the muting level adjustable resistor VR901 fully counterclockwise.
3. Gradually turn VR901 clockwise and set it at the position that the VTVM shows minimum indication.

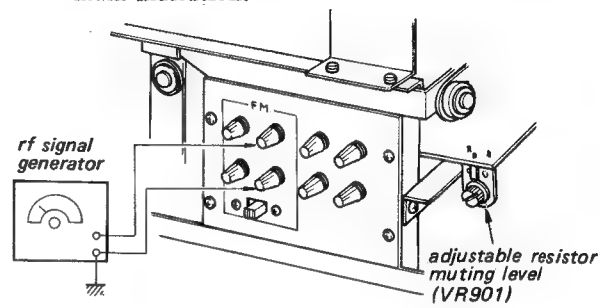


Fig. 3-9 Rf signal generator connection and parts location

Rf Signal Generator Frequency	Receiver Dial Setting	Adjust
77.5 MHz	90 MHz (Detune from rf signal of 77.5 MHz)	Muting level adjustable resistor VR901

3-6. FM1/FM2 FREQUENCY COVERAGE ADJUSTMENT

Preparation:

ROD ANT-EXT ANT Switch: EXT ANT
Rf Signal Generator Coupling:
Direct connection across FM EXT ANT terminal (75 Ω)
Rf Signal Modulation:
400-Hz ± 22.5-kHz frequency-modulated signal
VTVM Connection:
To EXT SP jack in parallel with 4 Ω resistor

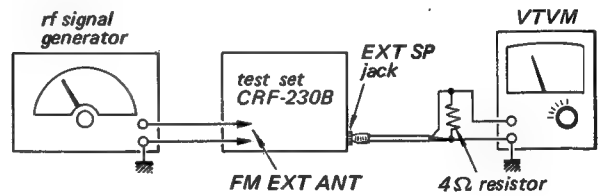


Fig. 3-10 FM1/FM2 frequency coverage and tracking adjustment setup

Adjusting Item	Rf Signal Generator Frequency	Receiver Tuning Knob Setting	Adjust	Remarks
FM 1 Frequency Coverage	75 MHz	Fully counter-clockwise	FM 1 osc coil L04	Band Selector: FM 1 Adjust for maximum meter reading on VTVM.
	91.5 MHz	Fully clockwise	FM 1 osc trimmer CT01-4	
FM 2 Frequency Coverage	86.5 MHz	Fully counter-clockwise	FM 2 osc coil L104	Band Selector: FM 2 Adjust for maximum meter reading on VTVM.
	109.5 MHz	Fully clockwise	FM 2 osc trimmer CT101-4	

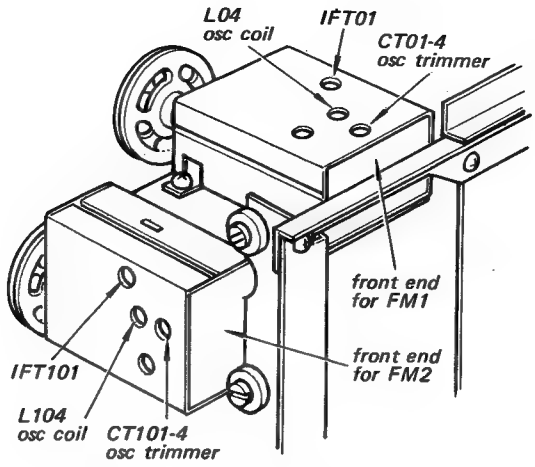


Fig. 3-11 Adjusting parts location

Note:

1. The special test equipment requried for tracking adjustment makes this strictly a factory adjustment.
2. IFT 01 and IFT 101 (shown in Fig. 3-11) are to be adjusted for i-f alignment. Adjust IFT 01 (with FM1 band) and IFT 101 (with FM2 band) for maximum meter reading on VTVM with the same setup of FM1/FM2 frequency coverage adjustment.

3-7. LW/MW/SW1 FREQUENCY COVERAGE AND TRACKING ADJUSTMENT

Preparation:

Rf Signal Generator Coupling:
Loop antenna
Rf Signal Modulation:
1-kHz 30% amplitude-modulated signal
VTVM Connection:
To EXT SP jack in parallel with 4Ω load resistor

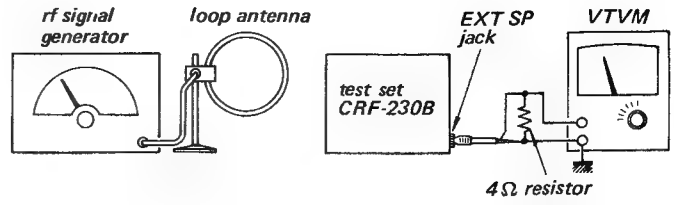


Fig. 3-12 LW/MW/SW1 frequency coverage and tracking adjustment setup

Adjusting Item	Rf Signal Generator Frequency	Receiver Tuning Knob Setting	Adjust	Remarks
LW Frequency Coverage	145 kHz	Fully counterclockwise	LW osc coil L409	Band Selector: LW
	410 kHz	Fully clockwise	LW osc trimmer CT409	
LW Tracking	160 kHz	Tune to 160 kHz signal	LW ant coil L403, LW rf coil L406	Adjust for maximum meter reading on VTVM.
	360 kHz	Tune to 360 kHz signal	LW ant trimmer CT403, LW rf trimmer CT406	
MW Frequency Coverage	520 kHz	Fully counterclockwise	MW osc coil L408	Band Selector: MW
	1,680 kHz	Fully clockwise	MW osc trimmer CT408	
MW Tracking	620 kHz	Tune to 620 kHz signal	MW ant coil L402, MW rf coil L405	Adjust for maximum meter reading on VTVM.
	1,400 kHz	Tune to 1,400 kHz signal	MW ant trimmer CT402, MW rf trimmer CT405	
SW1 Frequency Coverage	1,550 kHz	Fully counterclockwise	SW1 osc coil L407	Band Selector: SW1
	4,600 kHz	Fully clockwise	SW1 osc trimmer CT407	
SW1 Tracking	1,800 kHz	Tune to 1,800 kHz signal	SW1 ant coil L401, SW1 rf coil L404	Adjust for maximum meter reading on VTVM.
	4,200 kHz	Tune to 4,200 kHz signal	SW1 rf trimmer CT404	

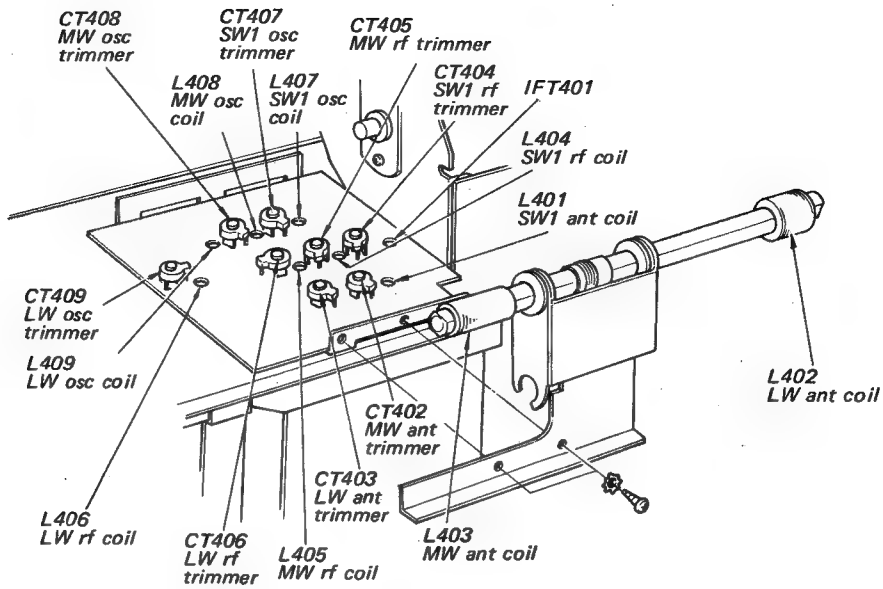


Fig. 3-13 Adjusting parts location

3-8. SW2-SW19 1st IF ALIGNMENT, FREQUENCY COVERAGE AND TRACKING ADJUSTMENT

Preparation:

Rf Signal Modulation:
1-kHz 30% amplitude-modulation

Rf Signal Generator Coupling:
To hermetic terminal HT304 with 0.01μF ceramic capacitor

VTVM Connection:
Across the coaxial cable (to cp circuit board) through the 455-kHz amplifier

DC 4.5V Supply:
To feed-through capacitor CP305

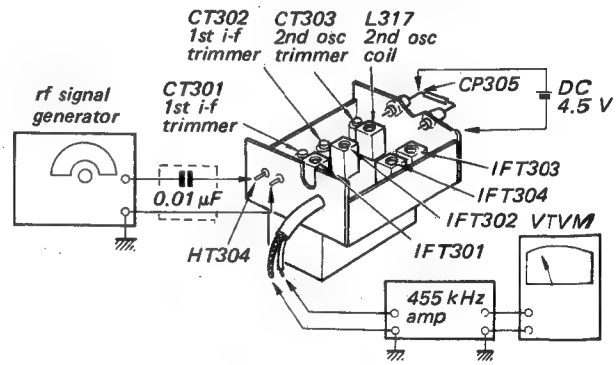


Fig. 3-14

Adjustment Item	Rf Signal Generator Frequency	Adjust	Remarks
Frequency Coverage	1.6 MHz	2nd osc coil L317	Adjust for maximum meter reading.
	2.2 MHz	2nd osc trimmer CT303	
Tracking	1.6 MHz	IFT 301 IFT 302	- ditto -
	2.2 MHz	CT301 CT302	
I-f Alignment	1.6 MHz ~ 2.2 MHz	IFT 303 IFT 304	- ditto -

3-9. SW2 ~ SW19 FREQUENCY COVERAGE AND TRACKING ADJUSTMENT

Preparation:

Rf Signal Modulation:
1-kHz 30% amplitude-modulated signal

Rf Signal Generator Coupling:
Direct connection across the antenna terminal SW2 ~ 19

VTVM Connection:
To EXT SP jack in parallel with 4Ω load resistor

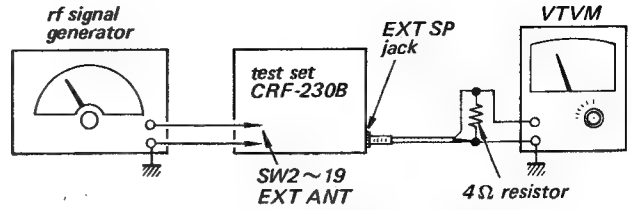


Fig. 3-15 SW2 ~ SW19 frequency coverage and tracking adjustment setup

Adjusting Item	Rf Signal Generator Frequency	Receiver Tuning Knob Setting	Adjust	Remarks
SW 2 Frequency Coverage	2.0 MHz	Fully counterclockwise	SW 2 osc coil L324	Band Selector: SW 2
SW 2 Tracking	2.1 MHz	Tune to 2.1 MHz signal	SW 2-4 ant coil L301, SW 2-4 rf coil L307	
	2.5 MHz	Tune to 2.5 MHz signal	SW 2 ant trimmer CT304, SW 2 rf trimmer CT322	Adjust for maximum meter reading on VTVM.
SW 3 Frequency Coverage	3.0 MHz	Fully counterclockwise	SW 3 osc coil L325	Band Selector: SW 3
SW 3 Tracking	3.5 MHz	Tune to 3.5 MHz signal	SW 3 ant trimmer CT305 SW 3 rf trimmer CT323	Adjust for maximum meter reading on VTVM.
SW 4 Frequency Coverage	3.5 MHz	Fully counterclockwise	SW 4 osc coil L326	Band Selector: SW 4
SW 4 Tracking	4.0 MHz	Tune to 4.0 MHz signal	SW 4 ant trimmer CT306, SW 4 rf trimmer CT324	Adjust for maximum meter reading on VTVM.
SW 5 Frequency Coverage	4.5 MHz	Fully counterclockwise	SW 5 osc coil L327	Band Selector: SW 5
SW 5 Tracking	4.6 MHz	Tune to 4.6 MHz signal	SW 5-7 ant coil L302, SW 5-7 rf coil L308	
	5.0 MHz	Tune to 5.0 MHz signal	SW 5 ant trimmer CT307 SW 5 rf trimmer CT325 trimmer	Adjust for maximum meter reading on VTVM.
SW 6 Frequency Coverage	5.8 MHz	Fully counterclockwise	SW 6 osc coil L328	Band Selector: SW 6
SW 6 Tracking	6.3 MHz	Tune to 6.3 MHz signal	SW 6 ant trimmer CT308, SW 6 rf trimmer CT326	Adjust for maximum meter reading on VTVM.

Adjusting Item	Rf Signal Generator Frequency	Receiver Tuning Knob Setting	Adjust	Remarks
SW 7 Frequency Coverage	7.0 MHz	Fully counterclockwise	SW 7 osc coil L329	Band Selector: SW 7
SW 7 Tracking	7.5 MHz	Tune to 7.5 MHz signal	SW 7 ant trimmer CT309, SW 7 rf trimmer CT327	Adjust for maximum meter reading on VTVM.
SW 8 Frequency Coverage	9.5 MHz	Fully counterclockwise	SW 8 osc coil L330	Band Selector: SW 8
SW 8 Tracking	9.6 MHz	Tune to 9.6 MHz signal	SW 8-10 ant coil L303, SW 8-10 rf coil L309	
	10.0 MHz	Tune to 10.0 MHz signal	SW 8 ant trimmer CT310, SW 8 rf trimmer CT328	Adjust for maximum meter reading on VTVM.
SW 9 Frequency Coverage	11.5 MHz	Fully counterclockwise	SW 9 osc coil L331	Band Selector: SW 9
SW 9 Tracking	12.0 MHz	Tune to 12.0 MHz signal	SW 9 ant trimmer CT311, SW 9 rf trimmer CT329	Adjust for maximum meter reading on VTVM.
SW 10 Frequency Coverage	14.0 MHz	Fully counterclockwise	SW 10 osc coil L332	Band Selector: SW 10
SW 10 Tracking	14.5 MHz	Tune to 14.5 MHz signal	SW 10 ant trimmer CT312, SW 10 rf trimmer CT330	Adjust for maximum meter reading on VTVM.
SW 11 Frequency Coverage	15.0 MHz	Fully counterclockwise	SW 11 osc coil L333	Band Selector: SW 11
SW 11 Tracking	15.1 MHz	Tune to 15.1 MHz signal	SW 11-13 ant coil L304 SW 11-13 rf coil L310	
	15.5 MHz	Tune to 15.5 MHz signal	SW 11 ant trimmer CT313, SW 11 rf trimmer CT331	Adjust for maximum meter reading on VTVM.
SW 12 Frequency Coverage	17.5 MHz	Fully counterclockwise	SW 12 osc coil L334	Band Selector: SW 12
SW 12 Tracking	18.0 MHz	Tune to 18.0 MHz signal	SW 12 ant trimmer CT314, SW 12 rf trimmer CT322	Adjust for maximum meter reading on VTVM.

Adjusting Item	Rf Signal Generator Frequency	Receiver Tuning Knob Setting	Adjust	Remarks
SW 13 Frequency Coverage	21.0 MHz	Fully counterclockwise	SW 13 osc coil L335	Band Selector: SW 13
SW 13 Tracking	21.5 MHz	Tune to 21.5 MHz signal	SW 13 ant trimmer CT315, SW 13 rf trimmer CT333	Adjust for maximum meter reading on VTVM.
SW 14 Frequency Coverage	21.4 MHz	Fully counterclockwise	SW 14 osc coil L336	Band Selector: SW 14
SW 14 Tracking	21.5 MHz	Tune to 21.5 MHz	SW 14-16 ant coil L305, SW 14-16 rf coil L311	Adjust for maximum meter reading on VTVM.
	21.9 MHz	Tune to 21.9 MHz signal	SW 14 ant trimmer CT316, SW 14 rf trimmer CT334	
SW 15 Frequency Coverage	25.5 MHz	Fully counterclockwise	SW 15 osc coil L337	Band Selector: SW 15
SW 15 Tracking	26.0 MHz	Tune to 26.0 MHz signal	SW 15 ant trimmer CT317, SW 15 rf trimmer CT335	Adjust for maximum meter reading on VTVM.
SW 16 Frequency Coverage	26.8 MHz	Fully counterclockwise	SW 16 osc coil L338	Band Selector: SW 16
SW 16 Tracking	27.3 MHz	Tune to 27.3 MHz signal	SW 16 ant trimmer CT318 SW 16 rf trimmer CT336	Adjust for maximum meter reading on VTVM.
SW 17 Frequency Coverage	28.0 MHz	Fully counterclockwise	SW 17 osc coil L339	Band Selector: SW 17
SW 17 Tracking	28.1 MHz	Tune to 28.1 MHz signal	SW 17-19 ant coil L306, SW 17-19 rf coil L312	Adjust for maximum meter reading on VTVM.
	28.5 MHz	Tune to 28.5 MHz signal	SW 17 ant trimmer CT319, SW 17 rf trimmer CT337	
SW 18 Frequency Coverage	28.6 MHz	Fully counterclockwise	SW 18 osc coil L340	Band Selector: SW 18
SW 18 Tracking	29.1 MHz	Tune to 29.1 MHz	SW 18 ant trimmer CT320, SW 18 rf trimmer CT338	Adjust for maximum meter reading on VTVM.

Adjusting	Rf Signal Generator Frequency	Receiver Tuning Knob Setting	Adjust	Remarks
SW 19 Frequency Coverage	29.2 MHz	Fully counterclockwise	SW 19 osc coil L341	Band Selector: SW 19
SW 19 Tracking	29.7 MHz	Tune to 29.7 MHz signal	SW 19 ant trimmer CT321, SW 19 rf trimmer CT339	Adjust for maximum meter reading on VTVM.

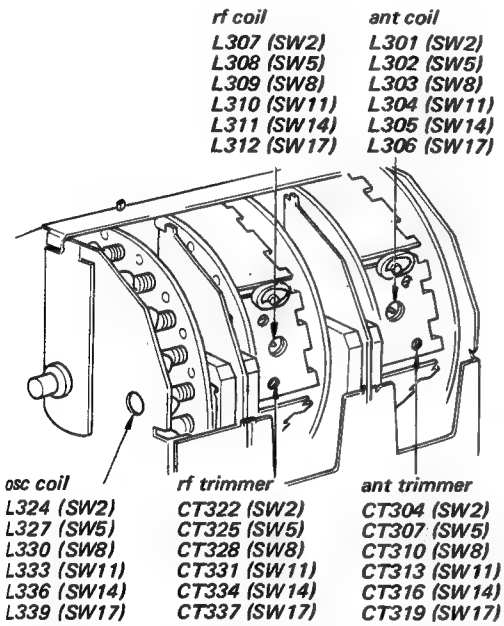


Fig. 3-16 Adjusting parts location for SW2, SW5, SW8, SW11, SW14 and SW17

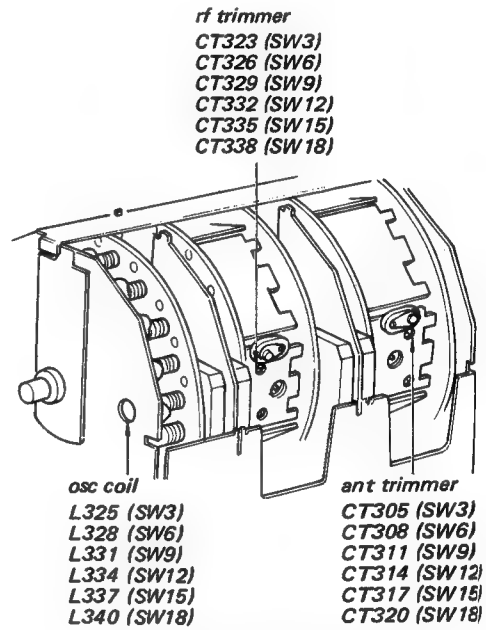


Fig. 3-17 Adjusting parts location for SW3, SW6,SW9, SW12, SW15 and SW18

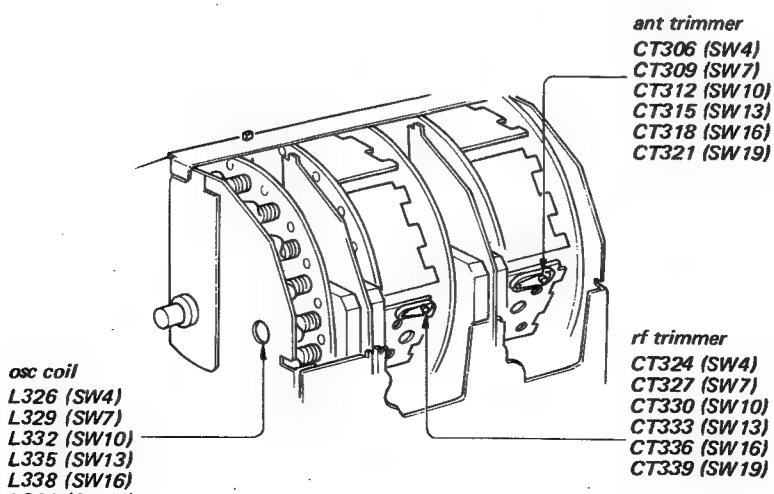


Fig. 3-18 Adjusting parts location for SW4, SW7, SW10, SW13, SW16 and SW19

3-10. VOLTAGE AND CURRENT ADJUSTMENT

A. Emitter Voltage of Q201

1. Band Selector: FM
2. R202 is to be selected to obtain 1.0 ± 0.1 V at the emitter of Q201.

R202	1-244-706	24 kΩ
	1-244-707	27 kΩ
	1-244-708	30 kΩ
	1-244-709	33 kΩ

B. Collector Current of Q401

1. Band Selector: MW
2. Select the resistance value of R402 to obtain 0.27 ± 0.02 V at the emitter of Q401. Then collector current may be adjusted at 270 μA.

R401	1-242-717	68 kΩ
	1-242-718	75 kΩ
	1-242-719	82 kΩ

C. Collector Current of Q501

1. Band Selector: MW
2. Select the resistance value of R503 to obtain 0.32 ± 0.03 V at the emitter of Q501. Then collector current may be adjusted at 600 μA.

R503	1-240-514	51 kΩ
	1-240-515	56 kΩ
	1-240-516	62 kΩ
	1-240-517	68 kΩ

D. Collector Current of Q502

1. Band Selector: MW
2. Select the resistance value of R507 to obtain 0.40 ± 0.04 V at the emitter of Q502. Then collector current may be adjusted at 800 μA.

R507	1-240-514	51 kΩ
	1-240-515	56 kΩ
	1-240-516	62 kΩ
	1-240-517	68 kΩ

E. Regulator Voltage Adjustment

Select the resistance value of R703 to obtain 4.5 ± 0.1 V at the emitter of Q701.

R703	1-244-652	130 Ω
	1-244-653	150 Ω
	1-244-654	160 Ω
	1-244-655	180 Ω
	1-244-656	200 Ω
	1-244-657	220 Ω

F. Tuning Meter Calibration

1. Band Selector: FM2
2. Supply a 98 MHz signal of 310 μV (50 dB) to the FM EXT ANT (75 ohms) terminal.
3. Adjust the adjustable resistor VR201 (5 kΩ) so that the meter indicates between 8 and 9. (See Fig. 3-20).

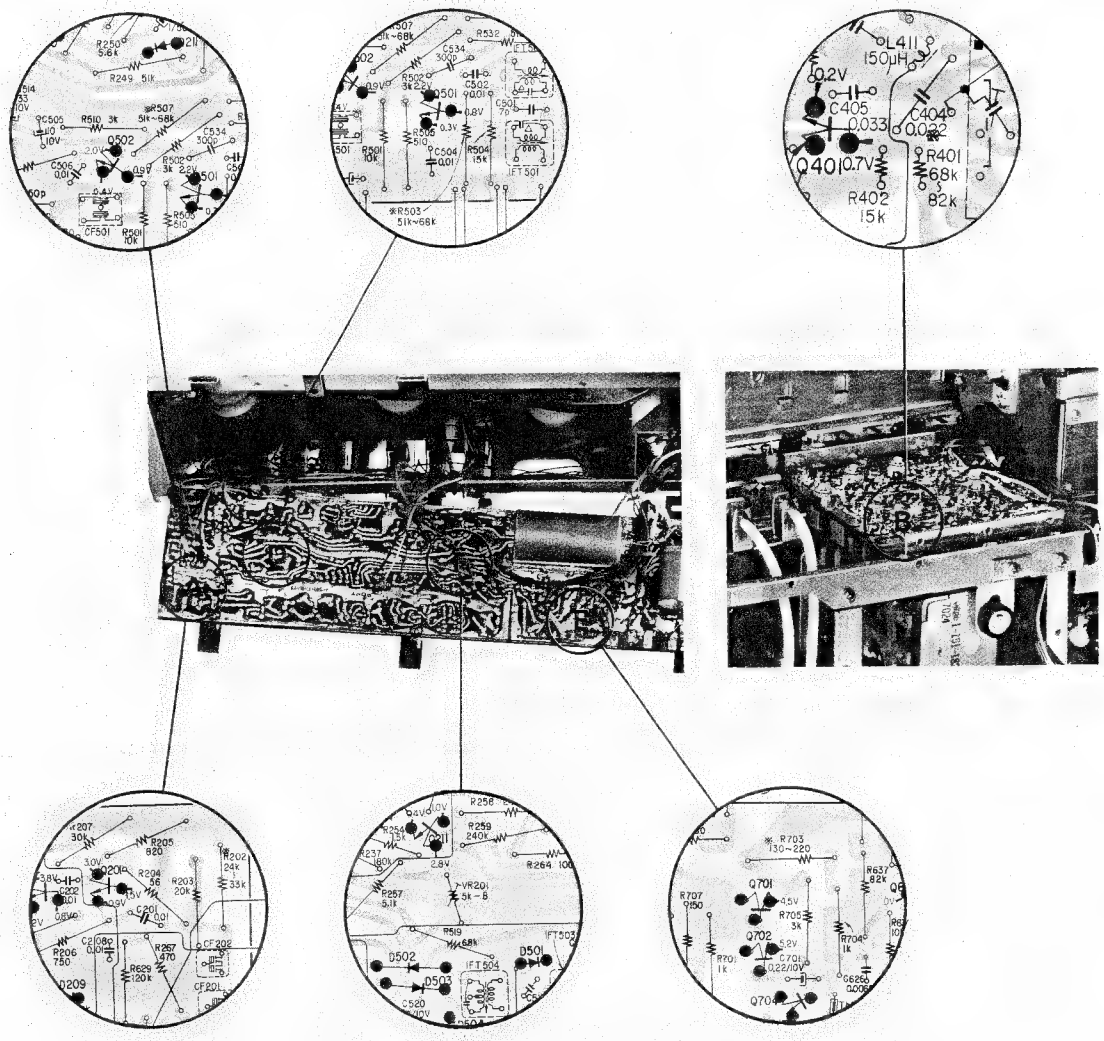


Fig. 3-19 Adjusting parts location for voltage and current adjustment

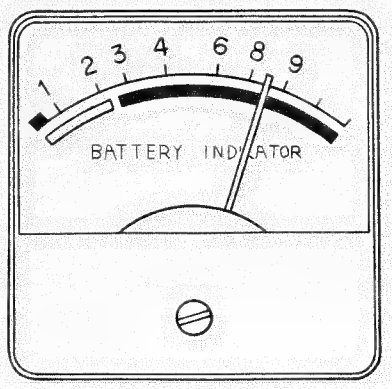
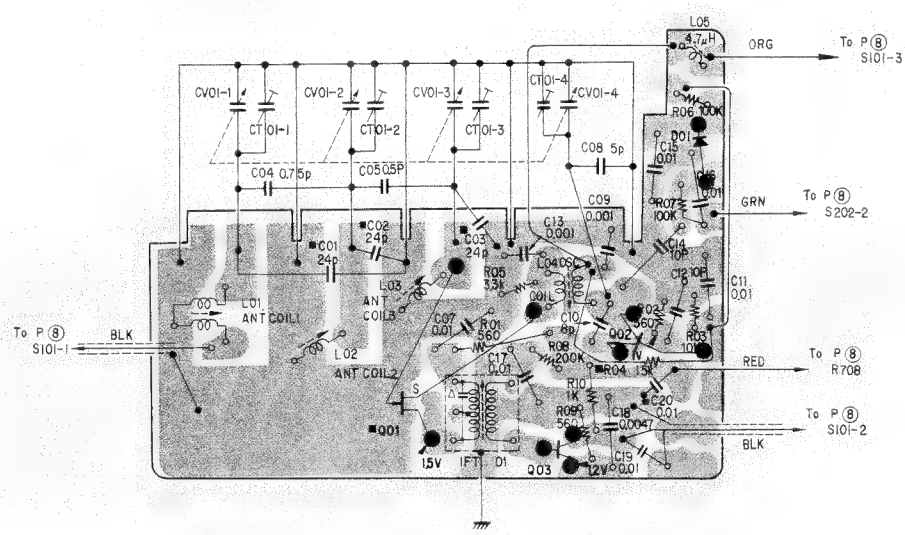


Fig. 3-20 Tuning meter calibration

SECTION 4
MOUNTING AND SCHEMATIC DIAGRAMS

4-1. FM1 FRONT END (P1)

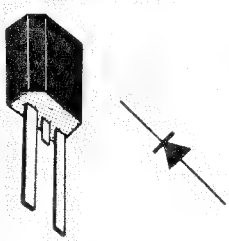
– Conductor Side –

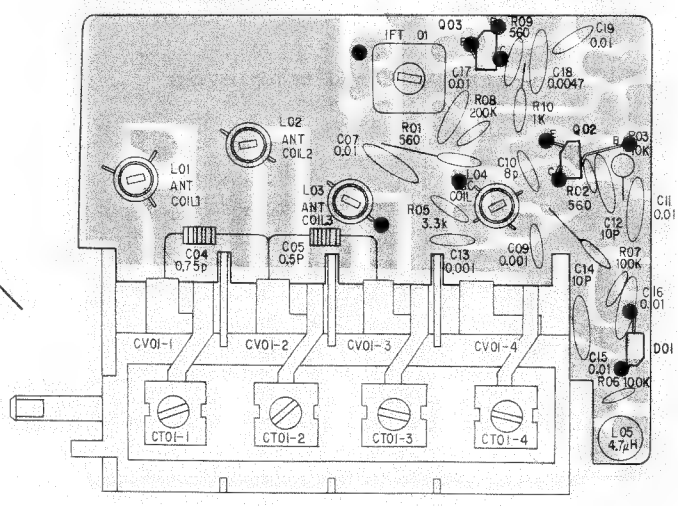


Printed circuit board, Part No. 1-538-793-12
The parts marked ■ are mounted on the conductor side.

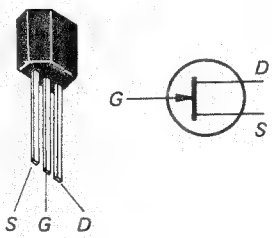
– Component Side –

D01: 1T240-3

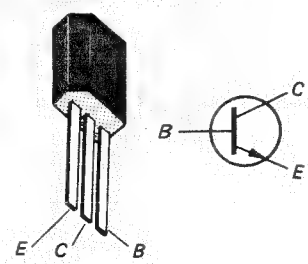




Q01: 2SK23

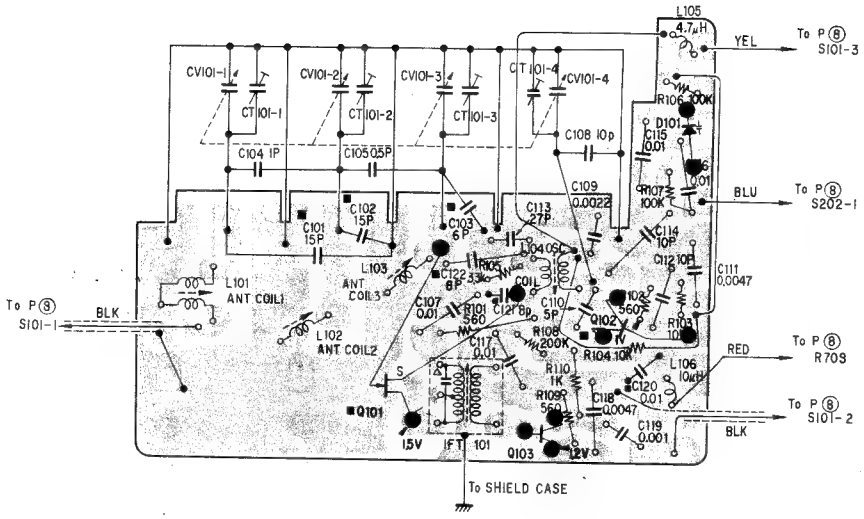


Q02: 2SC629
Q03: 2SC403A



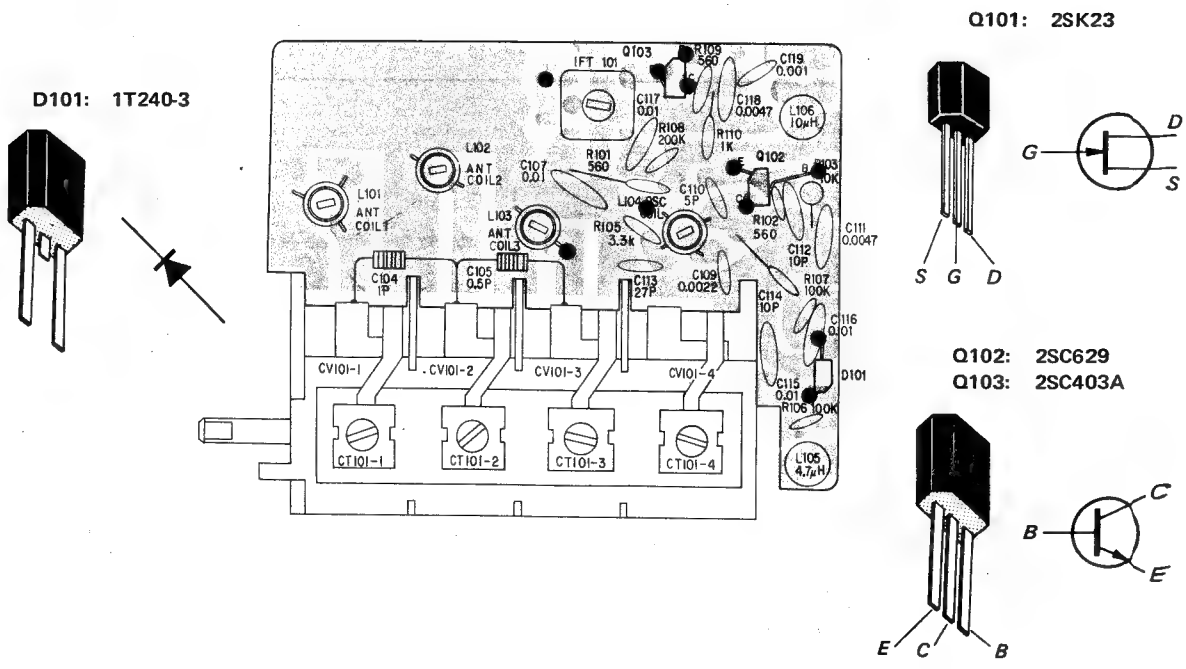
4-2. FM2 FRONT END (P2)

– Conductor Side –



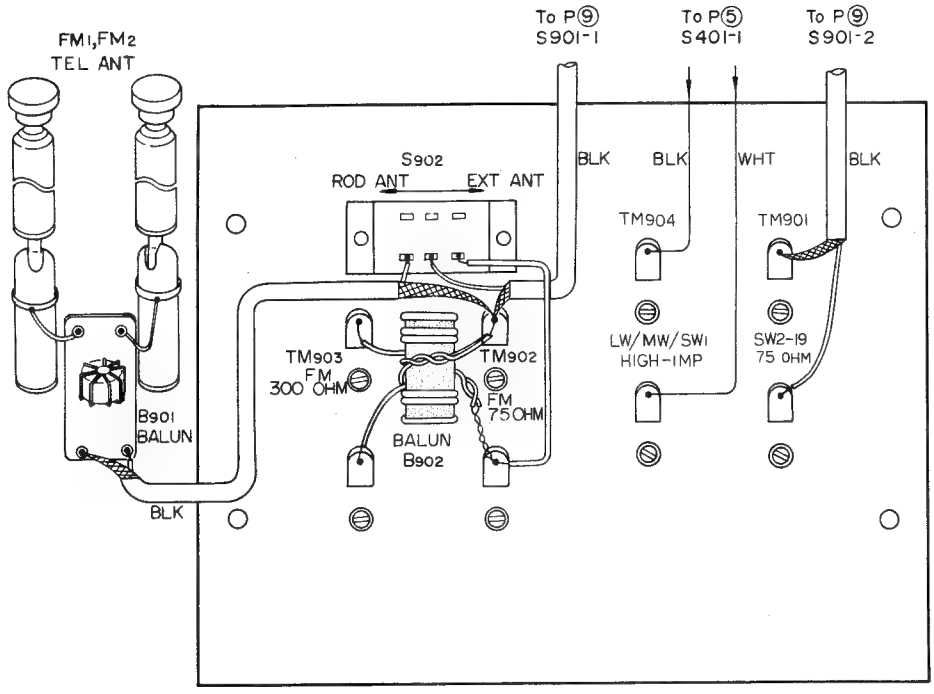
Printed circuit board, Part No. 1-538-793-12
The parts marked ■ are mounted on the conductor side.

– Component Side –

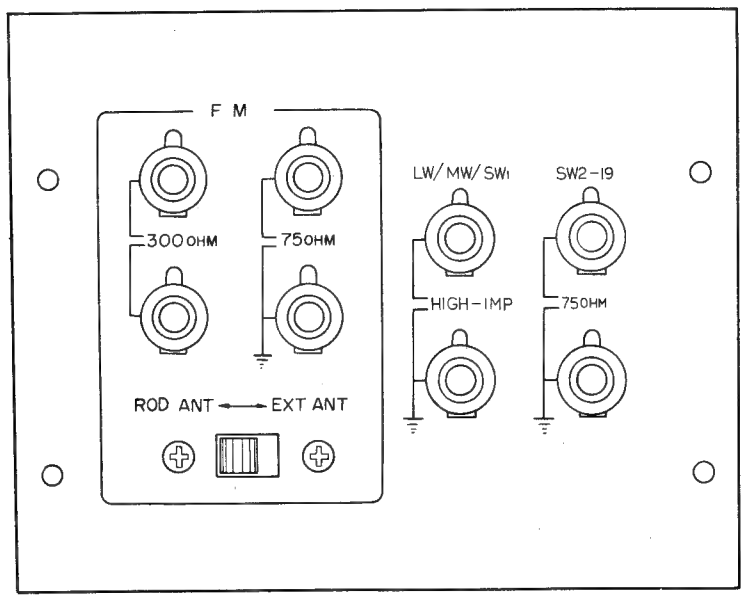


4-3. ANTENNA TERMINAL (P3)

– Conductor Side –

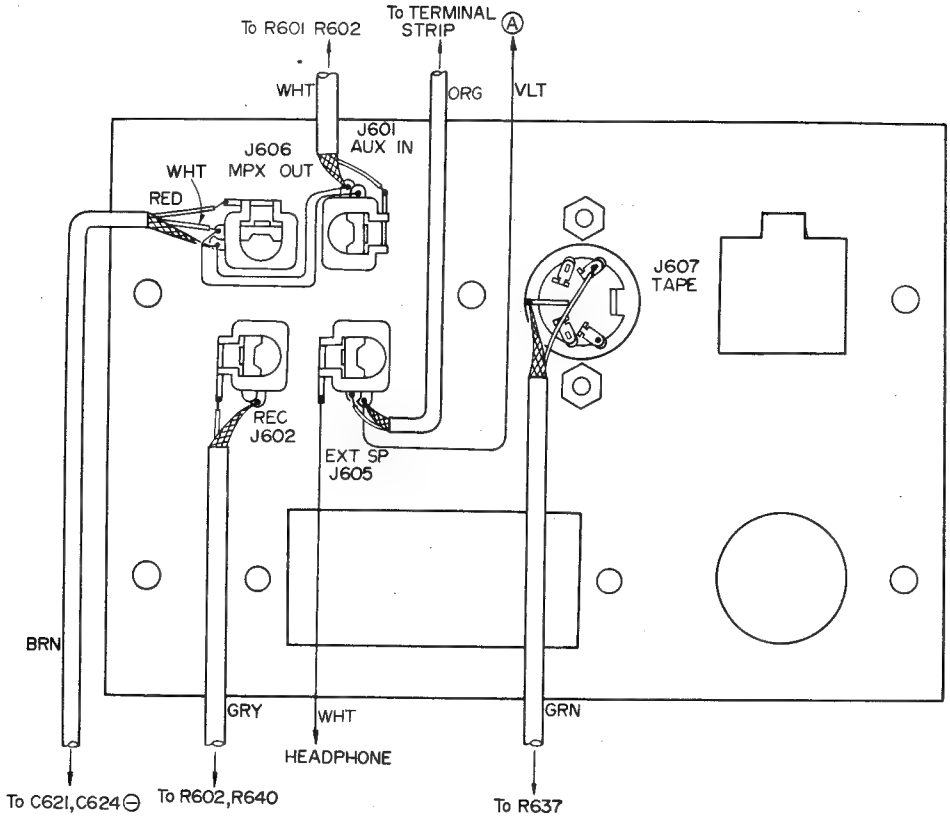


– Component Side –

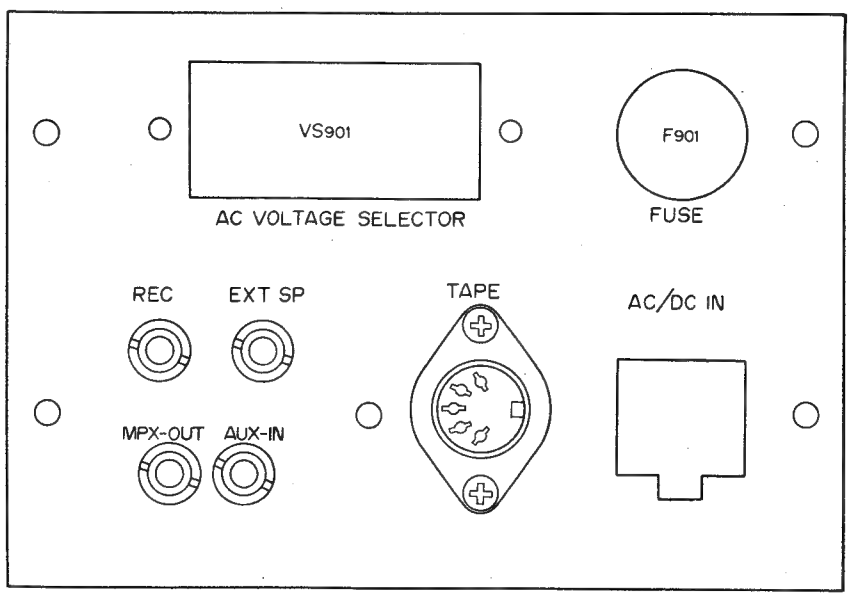


4-4. JACK PANEL (P4)

– Conductor Side –

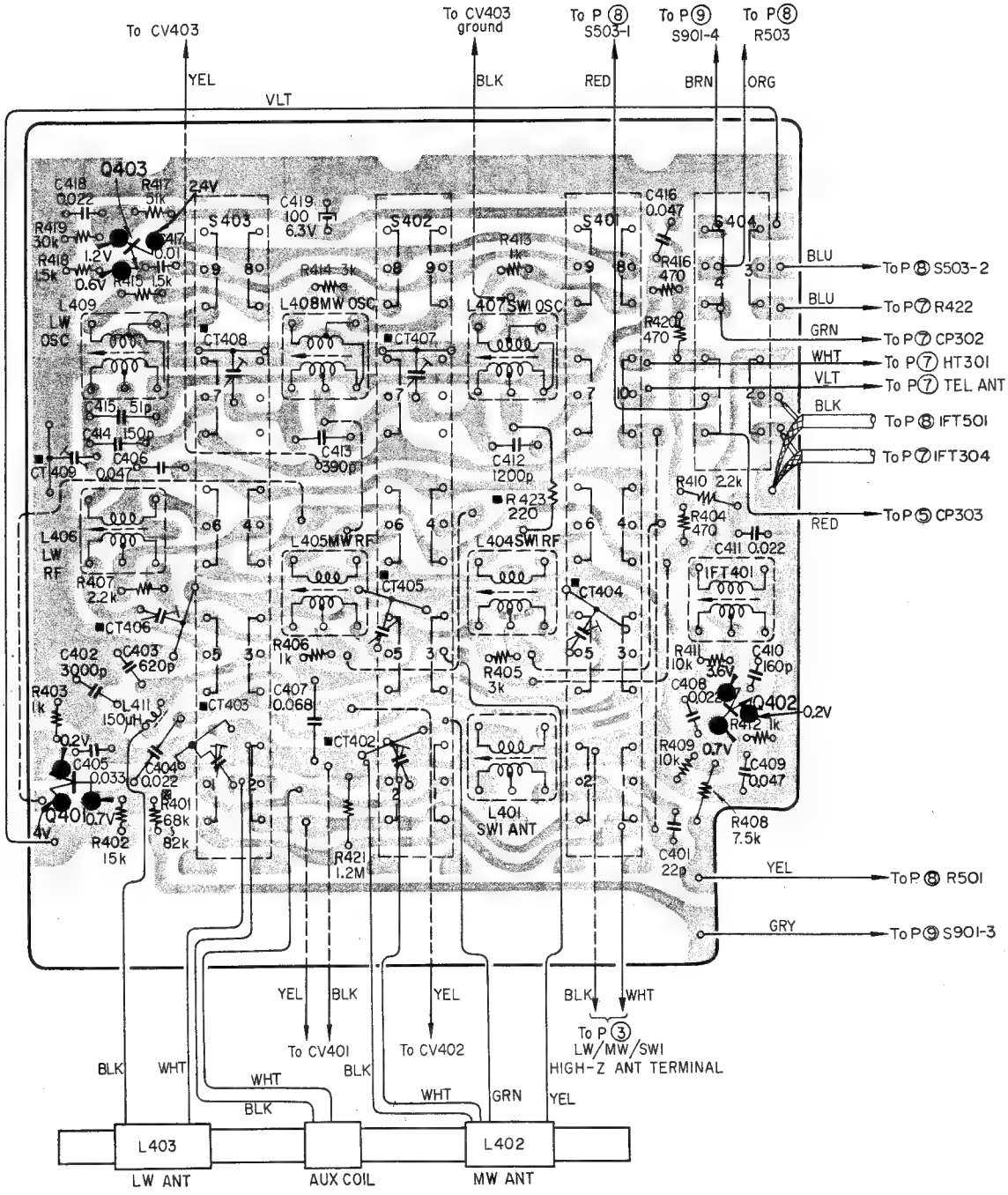


– Component Side –



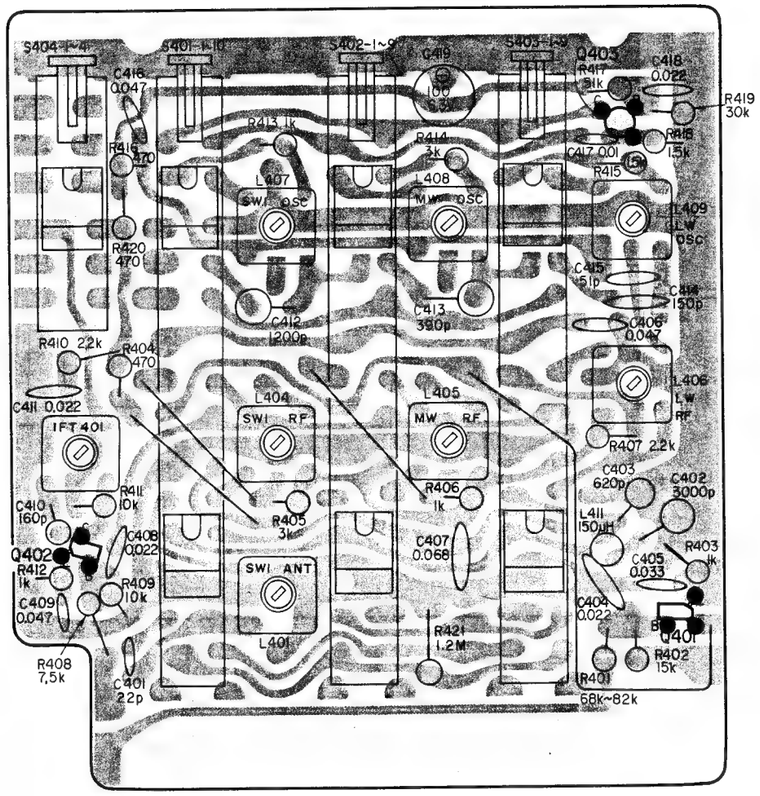
4-5. CP CIRCUIT BOARD (P5)

– Conductor Side –

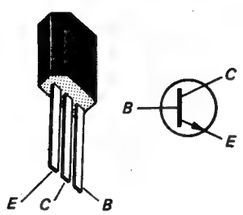


Printed circuit board, Part No. 1-581-165-11
The parts marked ■ are mounted on the conductor side.

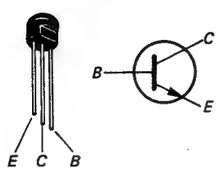
— Component Side —



Q401, Q403: 2SC403B

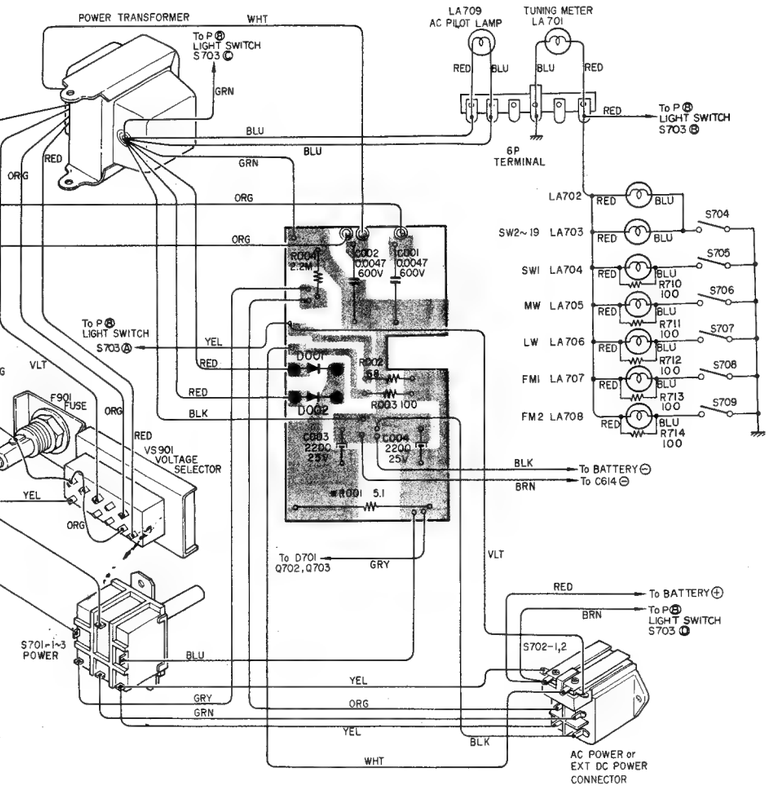


Q402: 2SC668

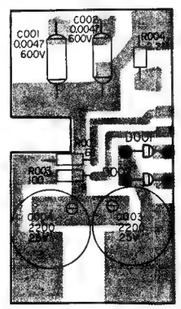


4-6. POWER SUPPLY CIRCUIT BOARD (P6)

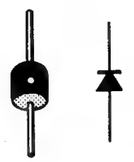
— Conductor Side —



— Component Side —



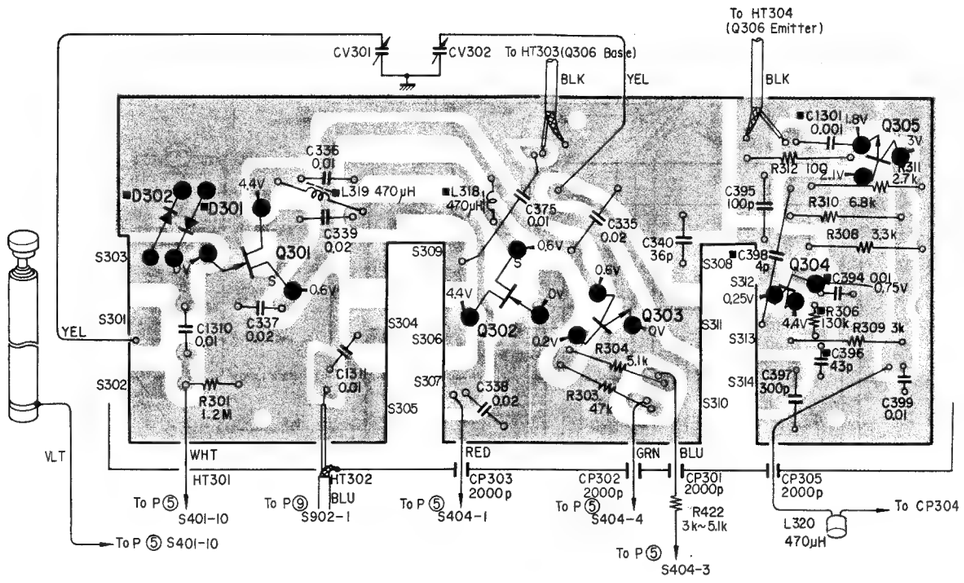
D001, D002: 10D-2



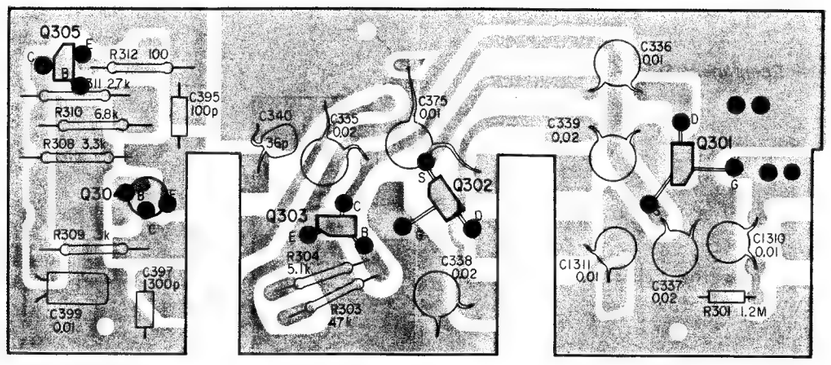
Printed circuit board, Part No. 1-581-167-11
The parts marked ■ is mounted on the conductor side.

4-7. SW2-SW19 FRONT END BLOCK (P7)

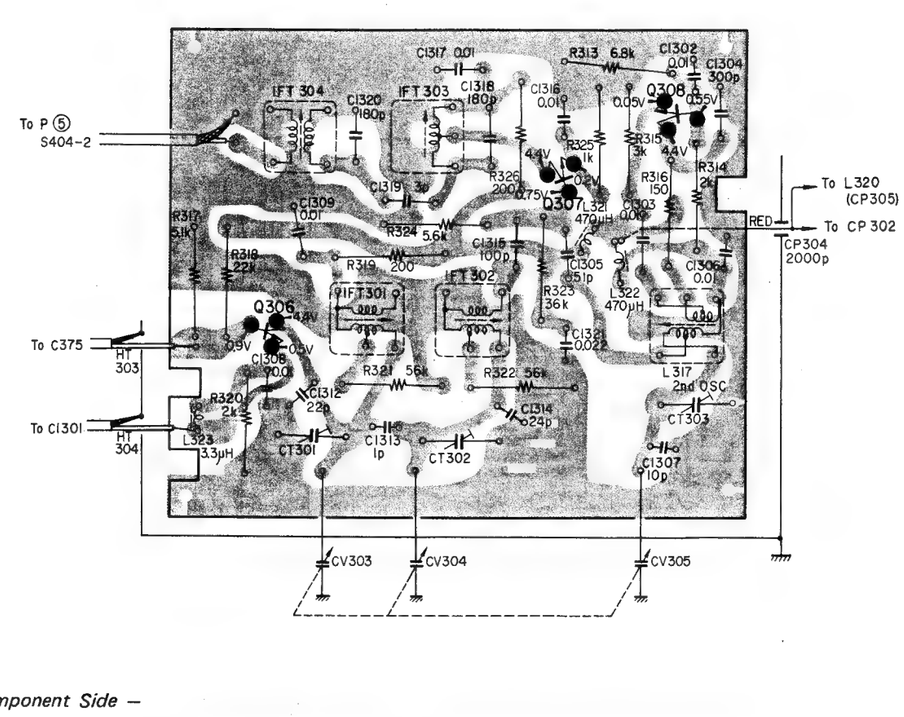
– Conductor Side –



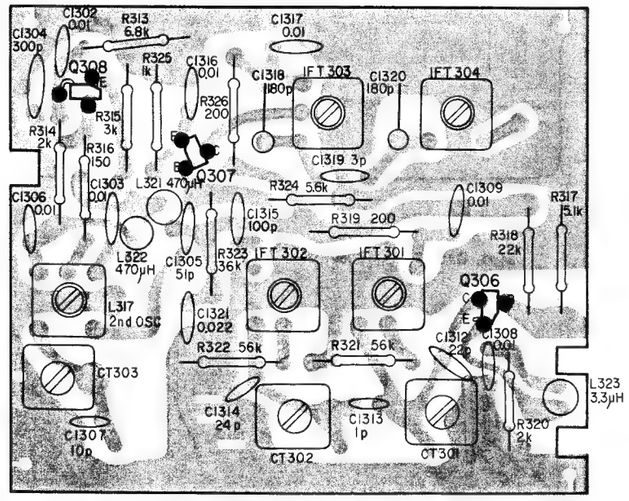
– Component Side –

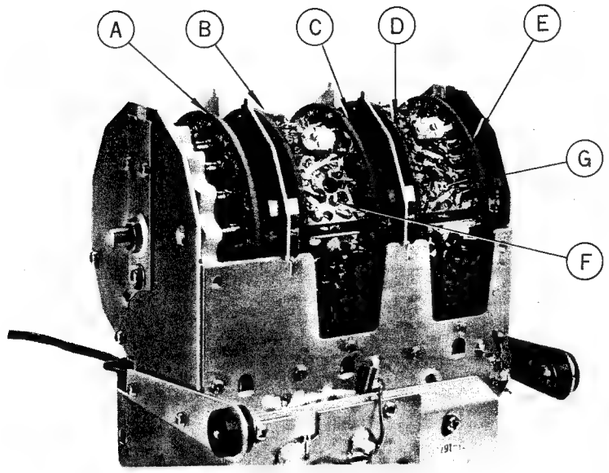


– Conductor Side –



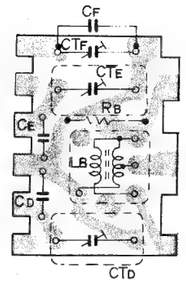
– Component Side –



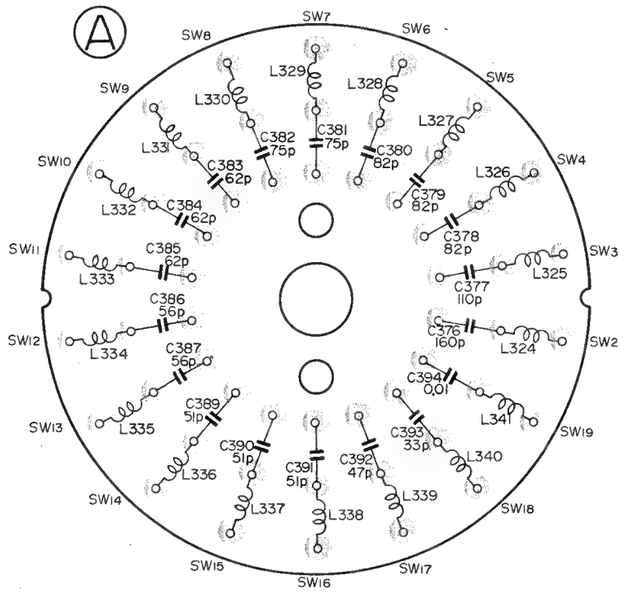


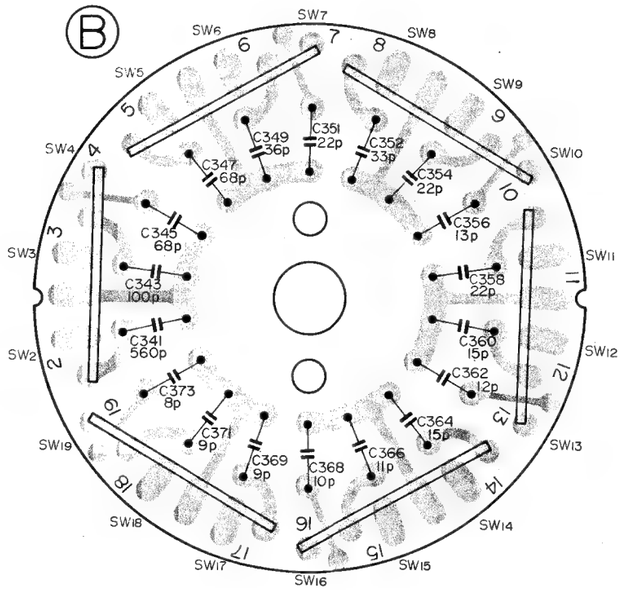
BAND	SW2～19 RF COIL LB	CD	CE	CF	TRIMMER CAPACITOR CTD	CTE	CTF	RB
SW2～SW4	L307	C342	C344	C346	CT322	CT323	CT324	R305
		220P	75P	43P				18 k
SW5～SW7	L308	C348	C350		CT325	CT326	CT327	R328
		75P	22P					33 k
SW8～SW10	L309	C353	C355		CT328	CT329	CT330	
		68P	24P					
SW11～SW13	L310	C359	C361		CT331	CT332	CT333	
		56P	27P					
SW14～SW16	L311	C365	C367		CT334	CT335	CT336	
		36P	10P					
SW17～SW19	L312	C370	C372	C374	CT337	CT338	CT339	
		10P	7P	7P				

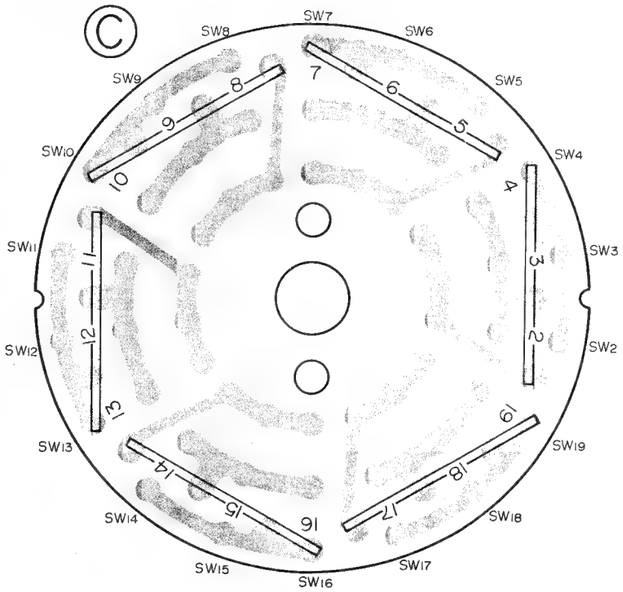
F

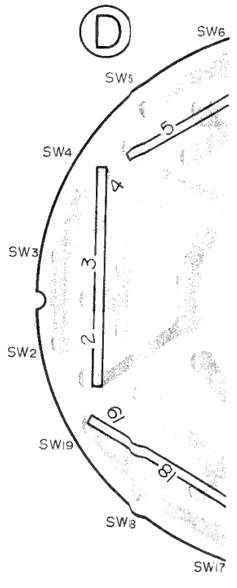


BAND	SW2～19 ANT COIL LA	CA	CB	CC	TRIMMER CAPACITOR CTA	CTB	CTC	RA
SW2～SW4	L301	C302	C304	C306	CT304	CT305	CT306	R3
		20P	75P	43P				18
SW5～SW7	L302	C308	C310		CT307	CT308	CT309	R3
		75P	22P					33
SW8～SW10	L303	C313	C315		CT310	CT311	CT312	
		68P	24P					
SW11～SW13	L304	C319	C321		CT313	CT314	CT315	
		56P	27P					
SW14～SW16	L305	C325	C327		CT316	CT317	CT318	
		36P	10P					
SW17～SW19	L306	C330	C332	C334	CT319	CT320	CT321	
		10P	7P	7P				



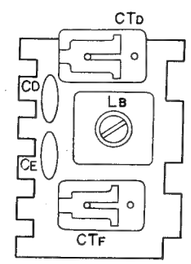






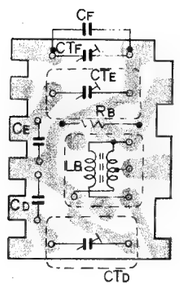
SW2～19: 1st OSC Coil.
All coils and capacitors: Mounted on the Conductor Side.

All capacitors: Mounted on the Conductor Side.



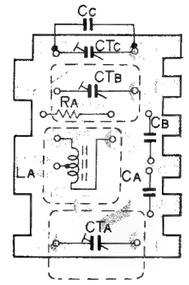
		TRIMMER CAPACITOR			RB
E	CF	CTD	CTE	CTF	
44	C346	CT322	CT323	CT324	R305
P	43P				18 k
50		CT325	CT326	CT327	R328
P					33 k
55		CT328	CT329	CT330	
P					
61		CT331	CT332	CT333	
P					
67		CT334	CT335	CT336	
P					
72	C374	CT337	CT338	CT339	
	7P				

Ⓕ



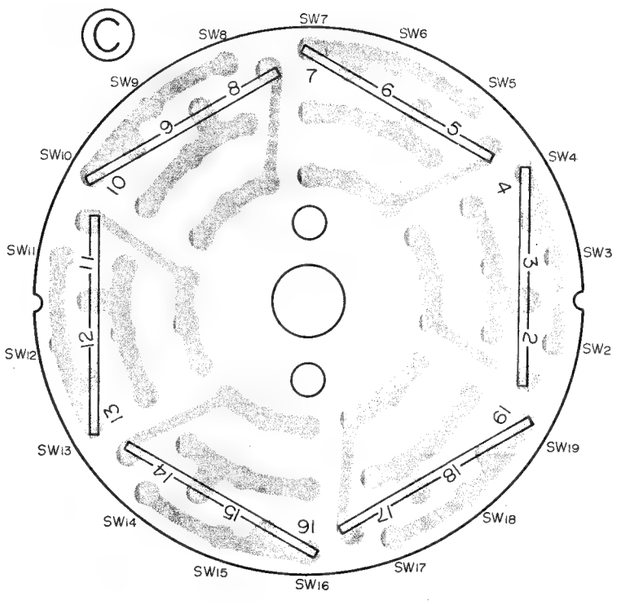
BAND	SW2~19 ANT COIL LA	CA	CB	CC	TRIMMER CAPACITOR CTA	CTB	CTC	RA
SW2~ SW4	L301	C302	C304	C306	CT304	CT305	CT306	R302
		20P	75P	43P				18 k
SW5~ SW7	L302	C308	C310		CT307	CT308	CT309	R327
		75P	22P					33 k
SW8~ SW10	L303	C313	C315		CT310	CT311	CT312	
		68P	24P					
SW11~ SW13	L304	C319	C321		CT313	CT314	CT315	
		56P	27P					
SW14~ SW16	L305	C325	C327		CT316	CT317	CT318	
		36P	10P					
SW17~ SW19	L306	C330	C332	C334	CT319	CT320	CT321	
		10P	7P	7P				

Ⓖ

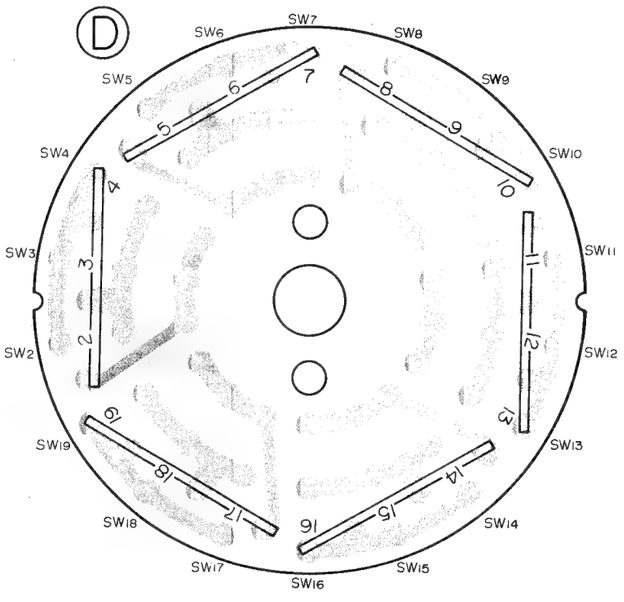


CC, CTC, RA: Mounted on the Conductor Side.

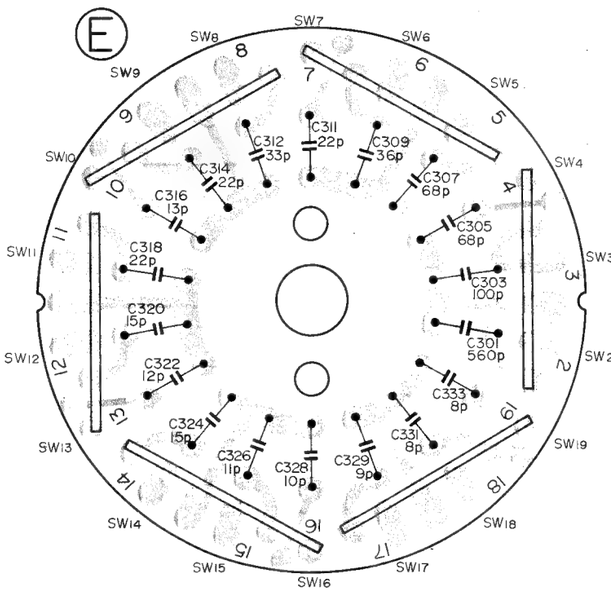
Ⓒ



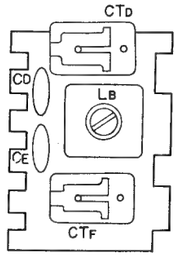
Ⓓ

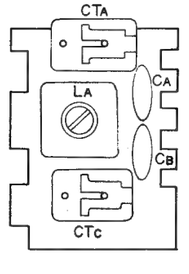


Ⓔ



itors: Mounted on the Conductor Side.

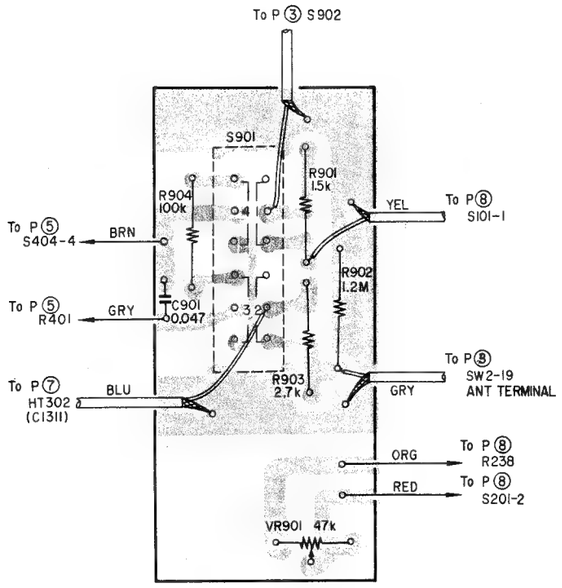




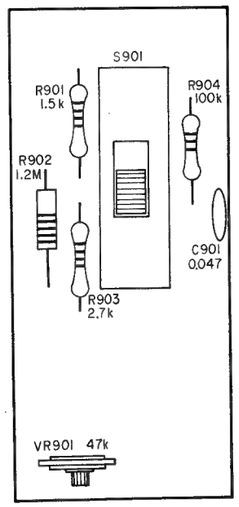
All capacitors: Mounted on the Conductor Side.

4-8. SWITCH CIRCUIT BOARD (P9)

– Conductor Side –



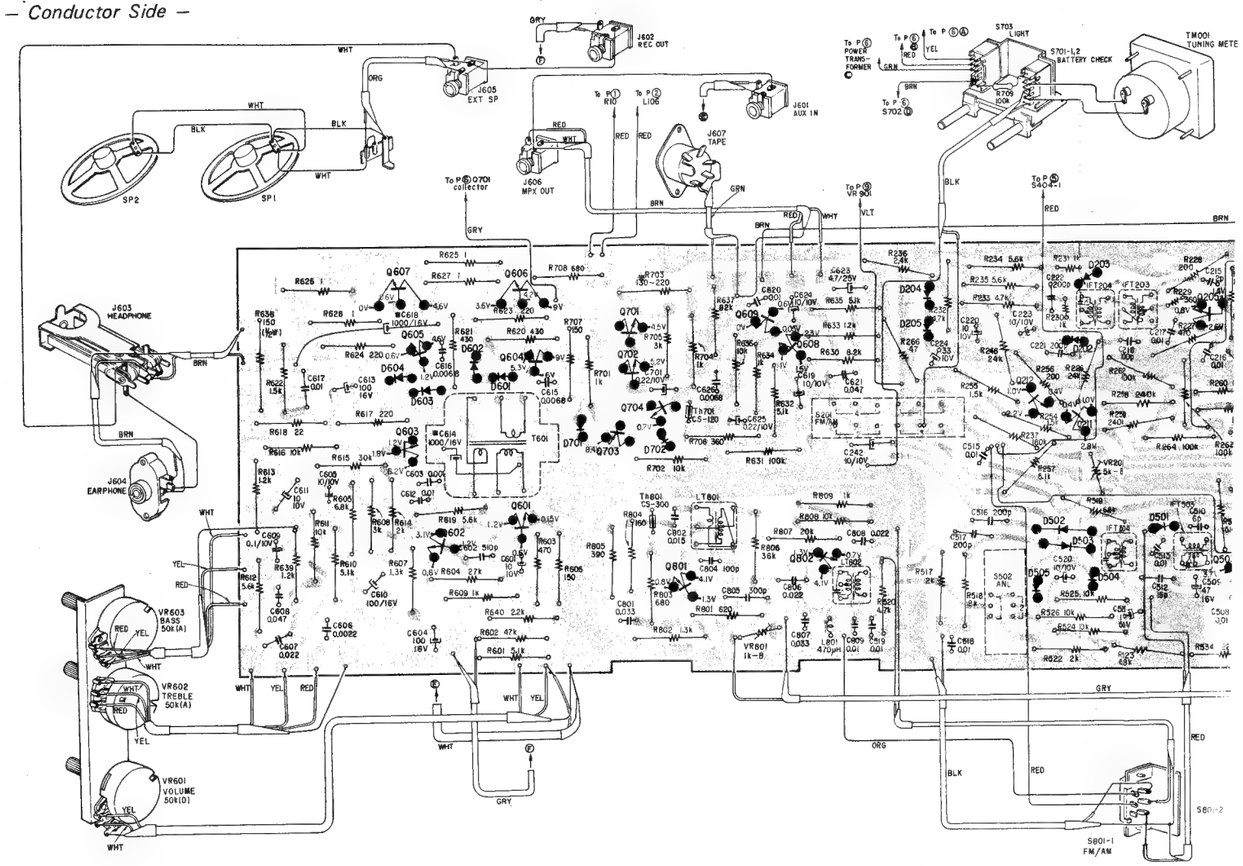
– Component Side –



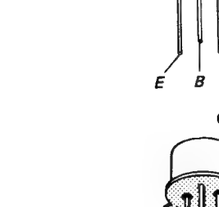
Printed Circuit Board,
Part No. 1-581-166-11

4-9. MAIN CIRCUIT BOARD (P8)

– Conductor Side –



D201, D204, D205
D212 ~ D215 } 1T243
D504, D505
D701, D702: 1T240



D202, D203: 1T261
D206 ~ D211: 1T262
D501 ~ D503 }: 1T23
D506, D507

D601 ~ D604: 10D-2

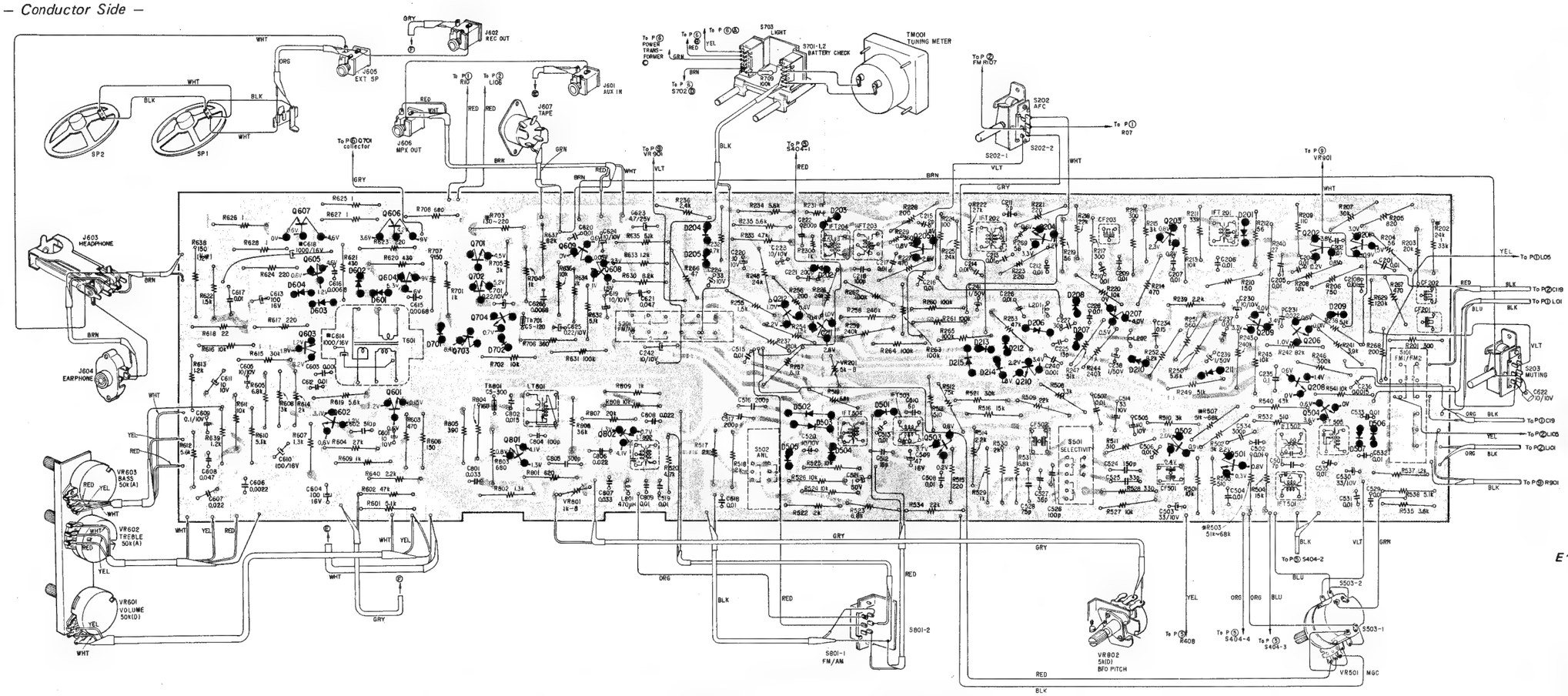
– Component Side –

Q701: 2SC352A

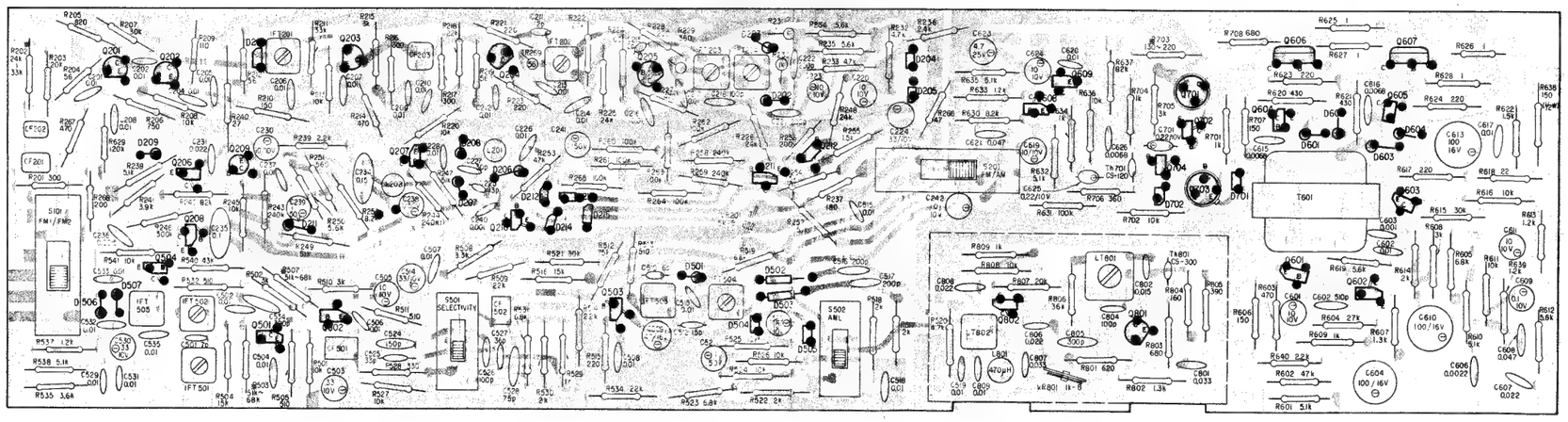
Q703: 2SB381

4-9. MAIN CIRCUIT BOARD (P8)

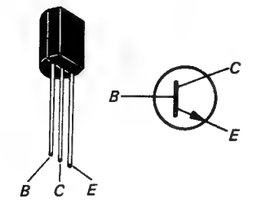
– Conductor Side –



– Component Side –

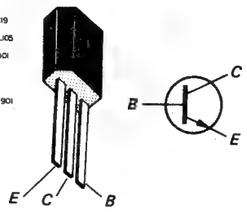


Q201 ~ Q205: 2SC710
Q801: 2SC870

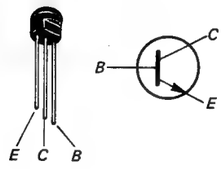


Q206 ~ Q208
Q210
Q601 ~ Q605
Q608, Q609
Q702, Q704
} **2SC633A**

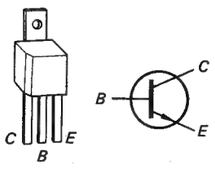
Q211, Q212
Q501 ~ Q504
Q802
} **2SC403**



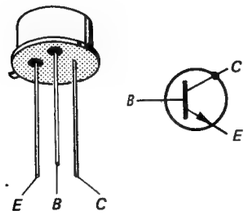
Q209: 2SC678



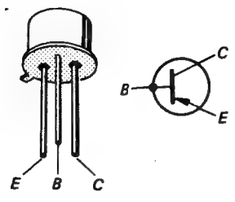
Q606, Q607: 2SC1013



Q701: 2SC352A

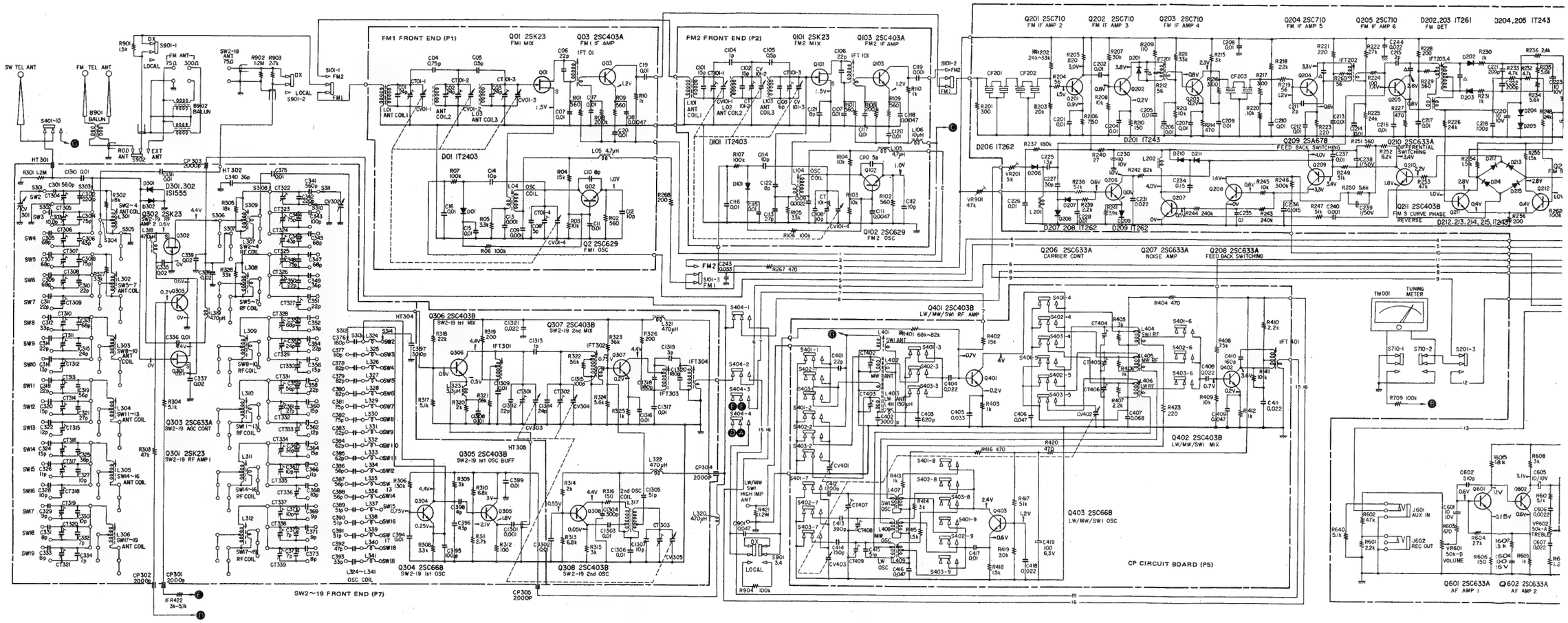


Q703: 2SB381



Printed circuit board, Part No. 1-581-168-11
The parts marked ■ are mounted on the conductor side.

4-10. SCHEMATIC DIAGRAM



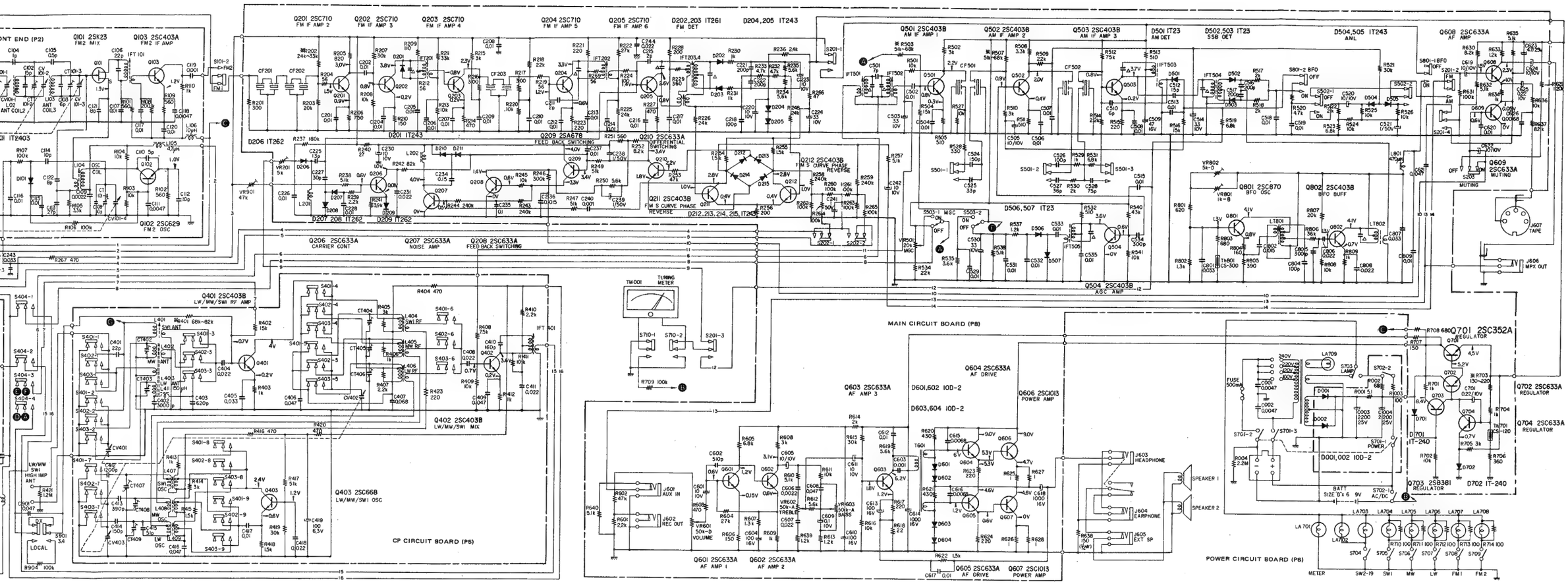
Note:

1. ⏚ shows grounding to chassis.
2. All resistors and capacitors are in Ω and μF, unless otherwise indicated.
3. Capacitor marked △ is built in i-f transformer.
4. The symbol ✱ indicates a component whose value is selected to yield specified operating condition.
5. Voltage value is measured to ground circuit with a dc voltmeter (20 kΩ/V) and current value is measured with a dc ammeter. Voltage and current are taken with no radio signal received. Variations may be noted due to normal production tolerances.

6. Switch Position

Switch	Function	Position	Switch	Function	Position
S101	FM 1/FM 2 select	FM2	S701	POWER	OFF
S201	FM/AM select	FM	S702	ext power/battery	ext power (built in connector)
S202	AFC	ON			
S203	MUTING	ON	S703	LIGHT	OFF (ON with ac power source)
S401	Band Selector (SW1)	OFF	S704–S709	LIGHT	built in band selector
S402	Band Selector (MW)	OFF			
S403	Band Selector (LW)	OFF	S710	BATTERY CHECK	ON
S404	Band Selector (SW2–19)	ON	S801	BFO	ON
S501	SELECTIVITY (BROAD/SHARP)	BROAD	S901	SENSITIVITY (LOCAL/DX)	DX
S502	ANL	OFF	S902	ROD ANT/EXT ANT	ROD ANT
S503	MGC	OFF			

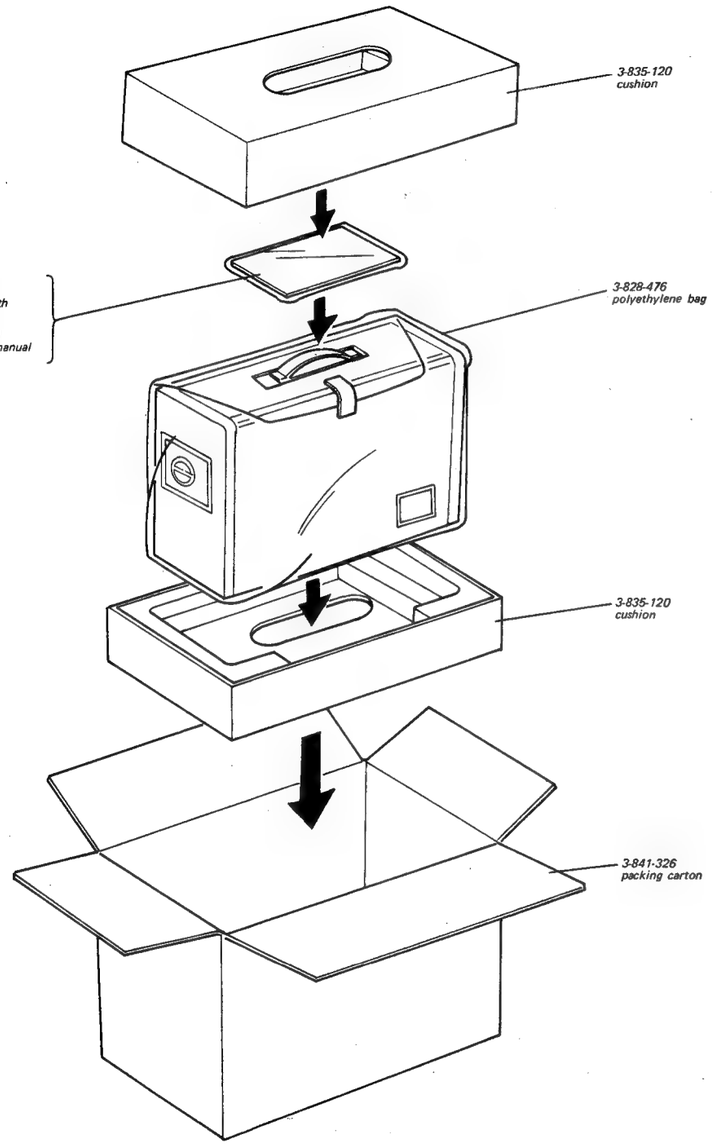
CRF-230B



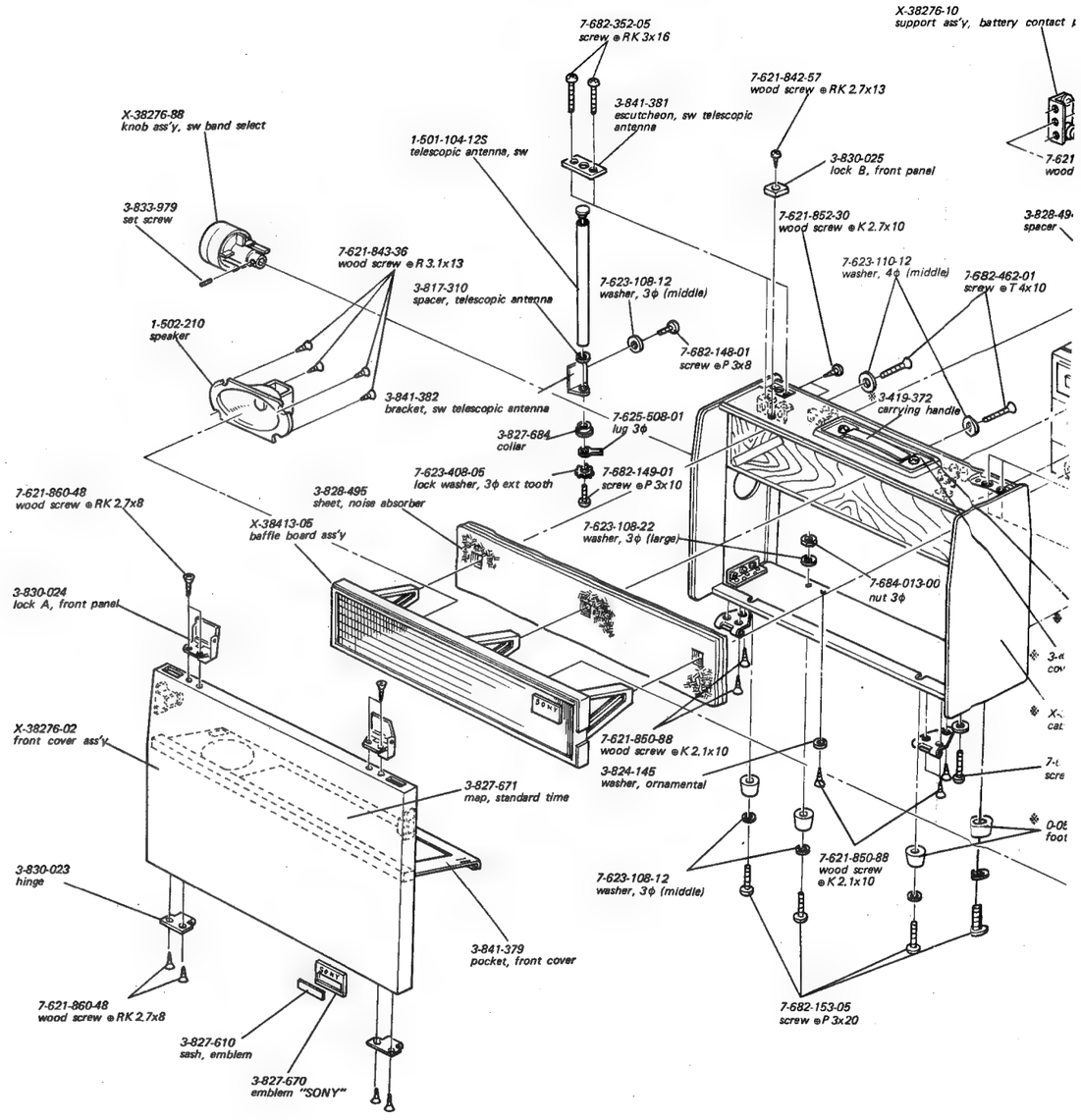
Position	Switch	Function	Position
FM2	S701	POWER	OFF
FM	S702	ext power/battery	ext power (built in connector)
ON	S703	LIGHT	OFF (ON with ac power source)
ON	S704–S709	LIGHT	built in band selector
OFF	S710	BATTERY CHECK	ON
ON	S801	BFO	ON
BROAD	S901	SENSITIVITY (LOCAL/DX)	DX
OFF	S902	ROD ANT/EXT ANT	ROD ANT

SECTION 5
PACKING AND EXPLODED VIEW

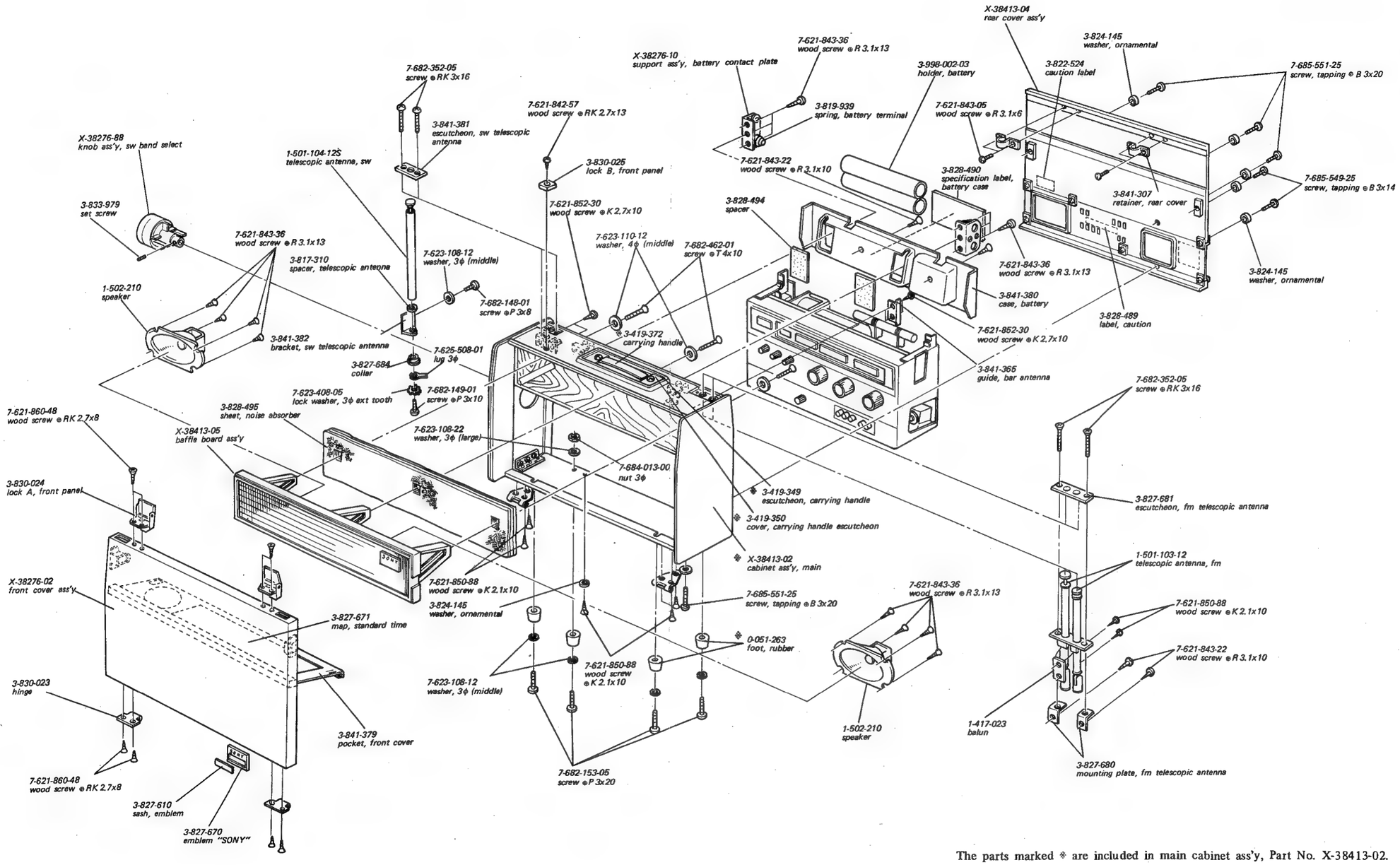
5-1. PACKING



5-2. EXPLODED VIEW (1)

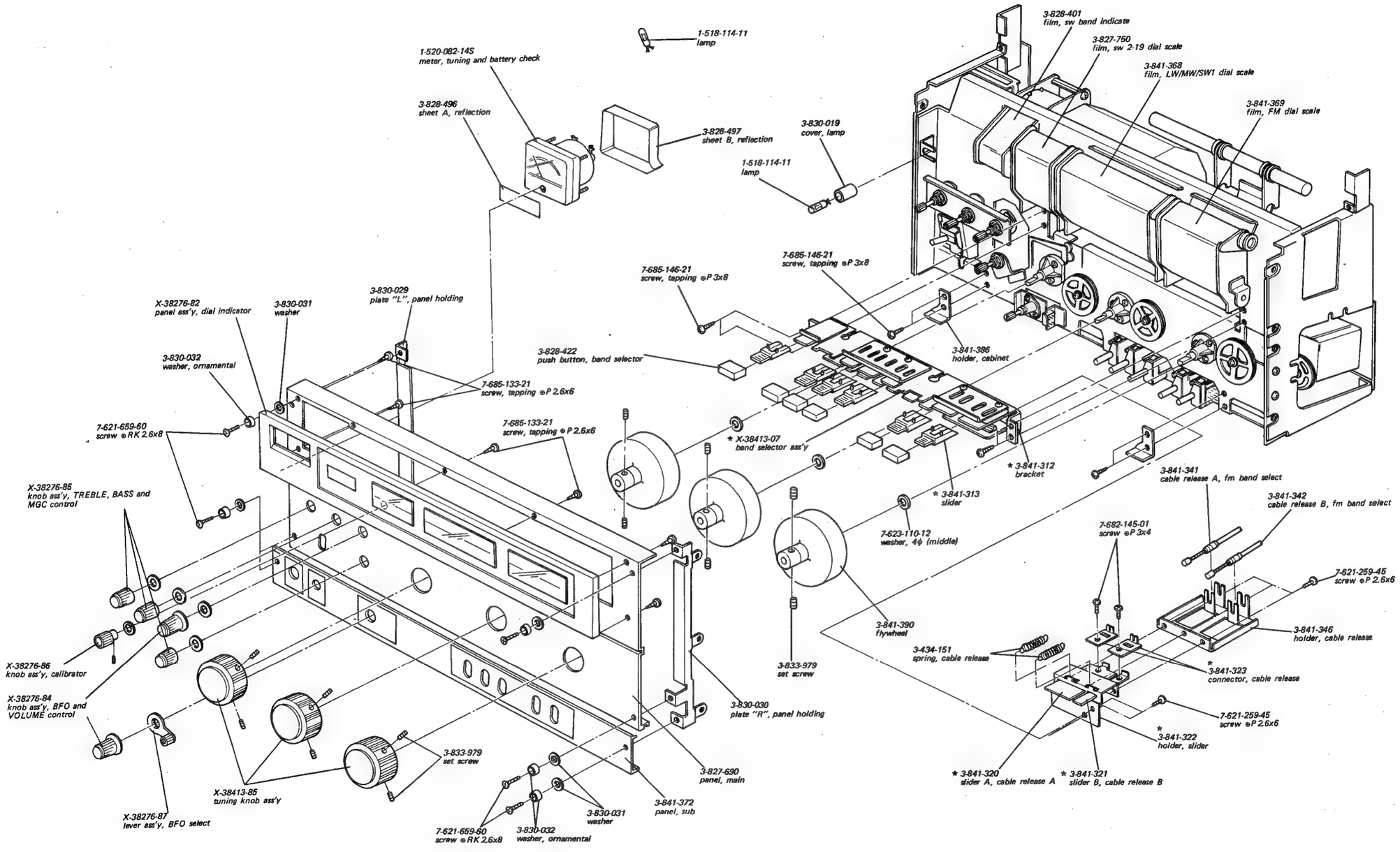


5-2. EXPLODED VIEW (1)



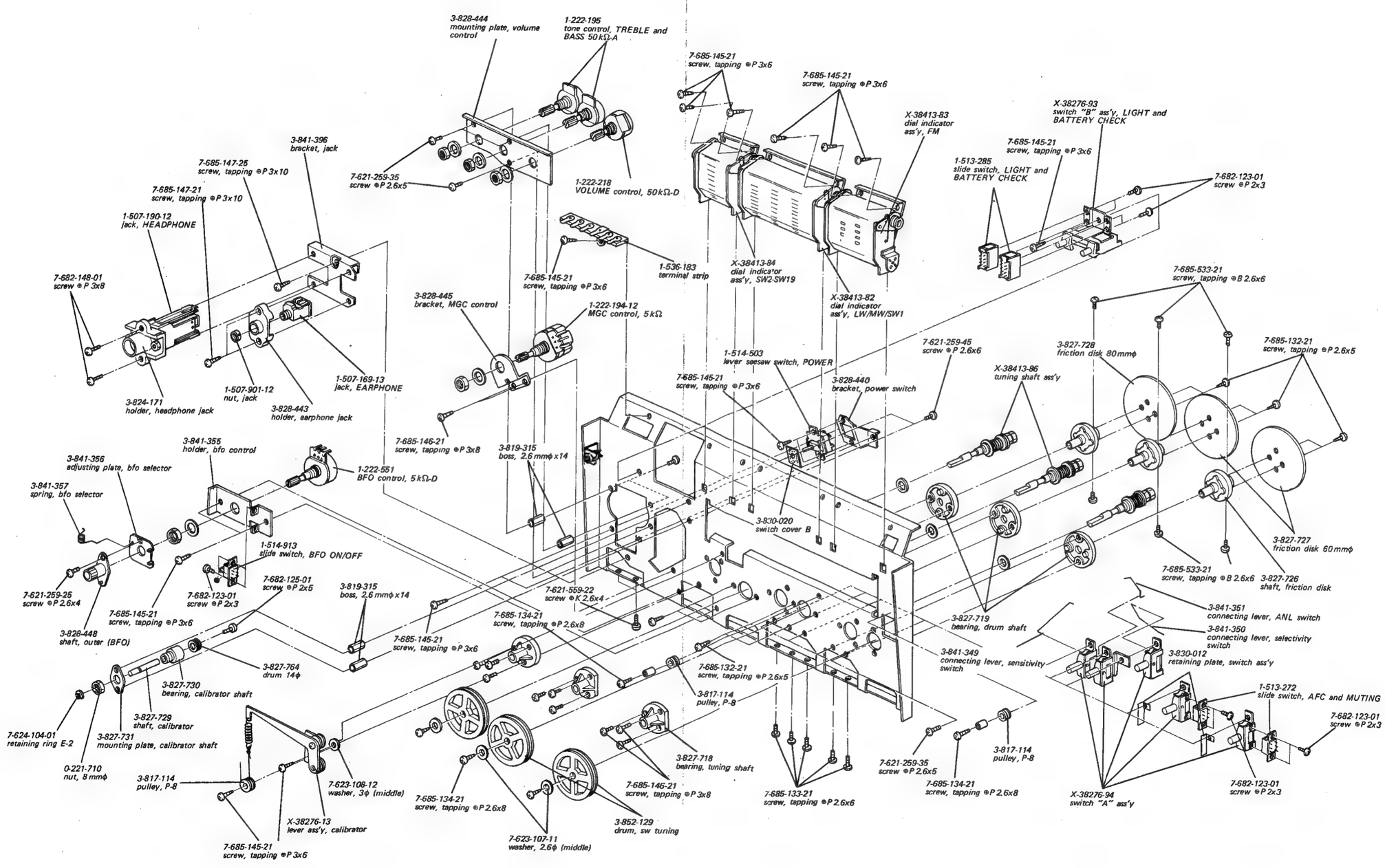
The parts marked * are included in main cabinet ass'y, Part No. X-38413-02.

5-3. EXPLODED VIEW (2)

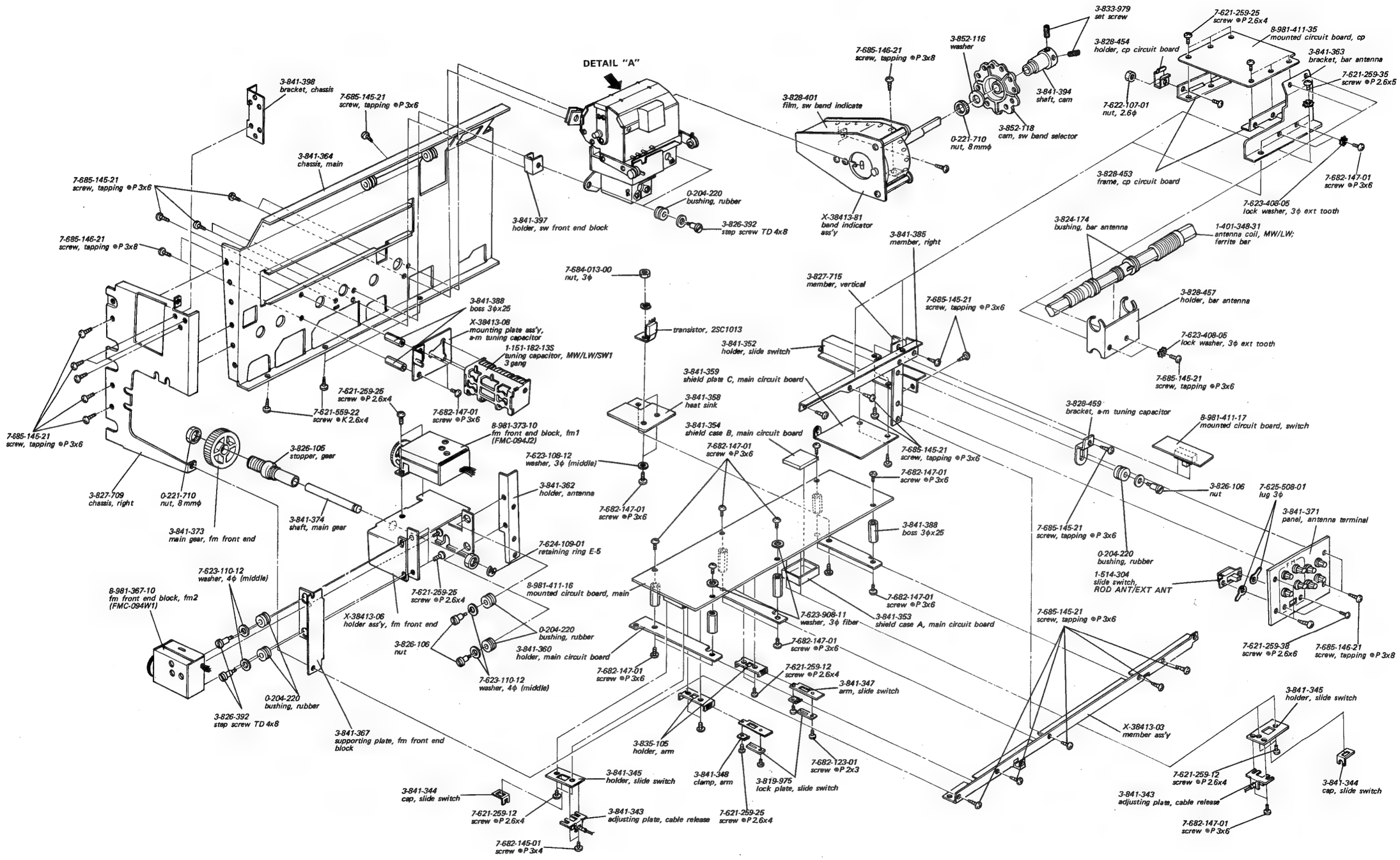


The parts marked ★ are included in band selector ass'y, Part No. X-38413-07.

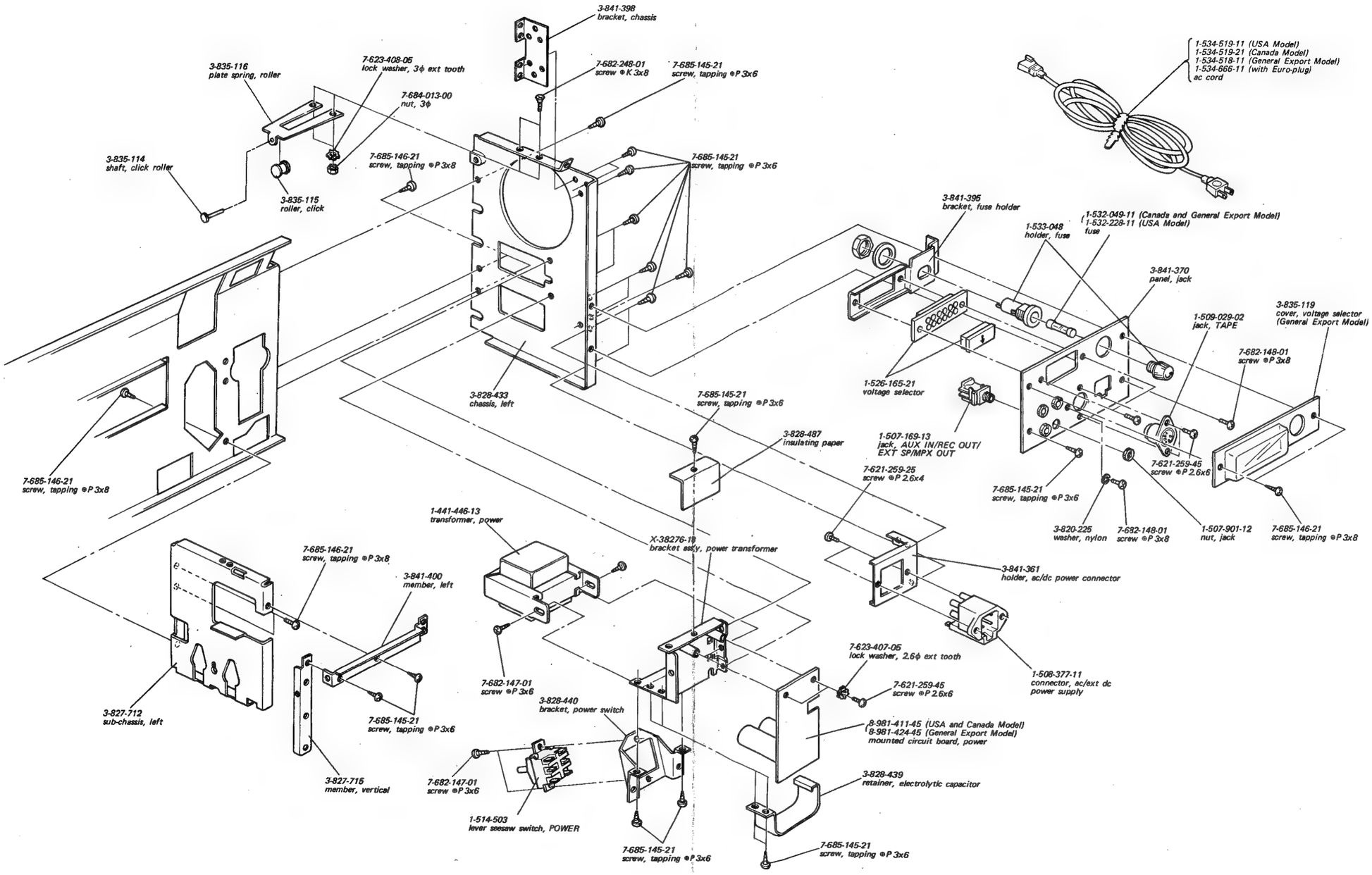
5-4. EXPLODED VIEW (3)



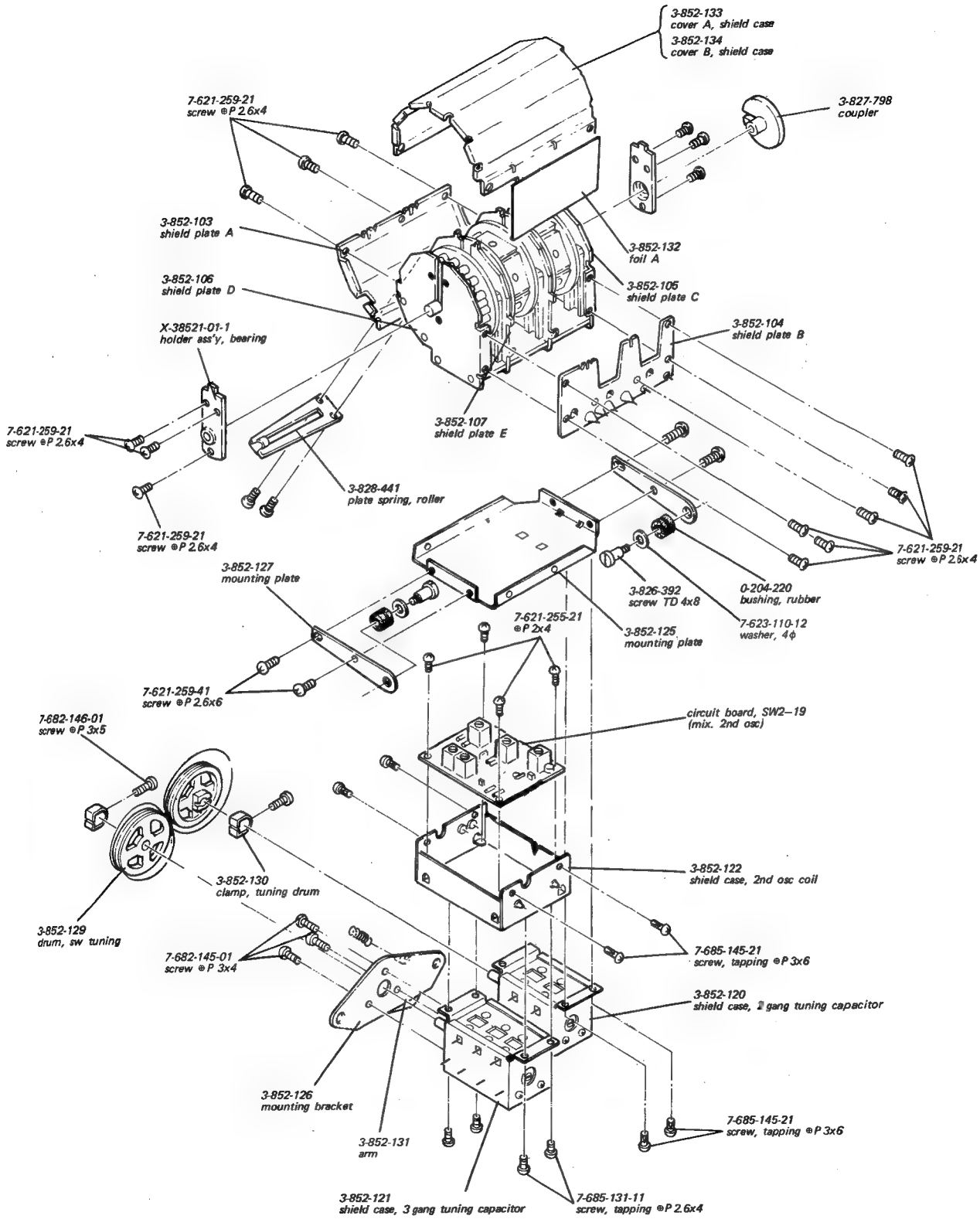
5-5. EXPLODED VIEW (4)



5-6. EXPLODED VIEW (5)



5-7. EXPLODED VIEW (6)



SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	
		SEMICONDUCTORS	
Q01		transistor	2SK23
Q02		transistor	2SC629
Q03		transistor	2SC403A
Q101		transistor	2SK23
Q102		transistor	2SC629
Q103		transistor	2SC403A
Q201		transistor	2SC710
Q202		transistor	2SC710
Q203		transistor	2SC710
Q204		transistor	2SC710
Q205		transistor	2SC710
Q206		transistor	2SC633A
Q207		transistor	2SC633A
Q208		transistor	2SC633A
Q209		transistor	2SC678
Q210		transistor	2SC633A
Q211		transistor	2SC403B
Q212		transistor	2SC403B
Q301		transistor	2SK23
Q302		transistor	2SK23
Q303		transistor	2SC633A
Q304		transistor	2SC668
Q305		transistor	2SC403B
Q306		transistor	2SC403B
Q307		transistor	2SC403B
Q308		transistor	2SC403B
Q401		transistor	2SC403B
Q402		transistor	2SC668
Q403		transistor	2SC403B
Q501		transistor	2SC403B
Q502		transistor	2SC403B
Q503		transistor	2SC403B
Q504		transistor	2SC403B
Q601		transistor	2SC633A
Q602		transistor	2SC633A
Q603		transistor	2SC633A
Q604		transistor	2SC633A
Q605		transistor	2SC633A
Q606		transistor	2SC1013
Q607		transistor	2SC1013
Q608		transistor	2SC633A
Q609		transistor	2SC633A
Q701		transistor	2SC352A
Q702		transistor	2SC633A
Q703		transistor	2SB381
Q704		transistor	2SC633A
Q801		transistor	2SC870
Q802		transistor	2SC403B
D01		diode	1T240-3
D101		diode	1T240-3
D201		diode	1T243
D202		diode	1T261
D203		diode	1T261
D204		diode	1T243
D205		diode	1T243
D206		diode	1T262
D207		diode	1T262
D208		diode	1T262
D209		diode	1T262
D210		diode	1T262
D211		diode	1T262
D212		diode	1T243
D213		diode	1T243
D214		diode	1T243
D215		diode	1T243
D301		diode	1S1555
D302		diode	1S1555
D501		didoe	1T23
D502		diode	1T23
D503		diode	1T23
D504		didoe	1T243
D505		diode	1T243
D506		diode	1T23
D507		diode	1T23
D601		diode	10D-2
D602		diode	10D-2
D603		diode	10D-2
D604		diode	10D-2
D701		diode	1T240
D702		diode	1T240
Th701		thermistor	CS-120
Th801		thermistor	CS-300
		COILS AND TRANSFORMERS	
L01	1-425-407	ant coil 1, fm 1	
L02	1-425-409	ant coil 2, fm 1	
L03	1-425-409	ant coil 3, fm 1	
L04	1-425-408	osc coil, fm 1	
L05	1-407-186	4.7μH, micro inductor	

Ref. No.	Part No.	Description
L101	1-425-526	ant coil 1, fm2
L102	1-425-525	ant coil 2, fm2
L103	1-425-525	ant coil 3, fm2
L104	1-405-386	osc coil, fm2
L105	1-407-186	4.7μH, fm2
L106	1-407-190	10μH, fm2
L201	1-407-177	470μH, micro inductor
L202	1-407-177	470μH, micro inductor
L301	1-401-463	ant coil, sw2～sw4
L302	1-401-341	ant coil, sw5～sw7
L303	1-401-342	ant coil, sw8～sw10
L304	1-401-343	ant coil, sw11～sw13
L305	1-401-345	ant coil, sw14～sw16
L306	1-401-345	ant coil, sw17～sw19
L307	1-425-680	rf coil, sw2～sw4
L308	1-425-429	rf coil, sw5～sw7
L309	1-425-430	rf coil, sw8～sw10
L310	1-425-431	rf coil, sw11～sw13
L311	1-425-433	rf coil, sw14～sw16
L312	1-425-433	rf coil, sw17～sw19
L317	1-405-352	osc coil, sw 2nd
L318	1-407-177	470μH, micro inductor
L319	1-407-177	470μH, micro inductor
L320	1-407-177	470μH, micro inductor
L321	1-407-177	470μH, micro inductor
L322	1-407-177	470μH, micro inductor
L323	1-407-184	3.3μH, micro inductor
L324	1-405-334	osc coil, sw2
L325	1-405-335	osc coil, sw3
L326	1-405-336	osc coil, sw4
L327	1-405-337	osc coil, sw5
L328	1-405-338	osc coil, sw6
L329	1-405-339	osc coil, sw7
L330	1-405-340	osc coil, sw8
L331	1-405-341	osc coil, sw9
L332	1-405-342	osc coil, sw10
L333	1-405-343	osc coil, sw11
L334	1-405-344	osc coil, sw12
L335	1-405-345	osc coil, sw13
L336	1-405-346	osc coil, sw14
L337	1-405-347	osc coil, sw15
L338	1-405-348	osc coil, sw16
L339	1-405-349	osc coil, sw17
L340	1-405-350	osc coil, sw18
L341	1-405-351	osc coil, sw19
L401	1-401-467	ant coil, sw1
L402, L403	1-401-348-31	ant coil, mw/lw: ferrite bar
L404	1-425-684	rf coil, sw1
L405	1-425-685	rf coil, mw
L406	1-425-444	rf coil, lw
L407	1-405-484	osc coil, sw1
L408	1-405-357	osc coil, mw
L409	1-405-358	osc coil, lw
L410	1-425-445	transformer, a-m i-f
L801	1-407-177	470μH, micro inductor
LT801	1-405-450	osc coil, bfo
LT802	1-403-128	output coil, bfo
IFT03	1-403-294	transformer, fm1 i-f
IFT103	1-403-294	transformer, fm2 i-f
IFT201	1-403-244-31	transformer, fm i-f
IFT202	1-403-244-31	transformer, fm i-f
IFT203	1-403-272-31	transformer, fm discriminator
IFT204	1-403-273-31	transformer, fm discriminator
IFT301	1-425-434	transformer, sw 1st i-f
IFT302	1-425-434	transformer, sw 1st i-f
IFT303	1-403-812	transformer, sw 1st i-f
IFT304	1-403-812	transformer, sw 1st i-f
IFT501	1-403-139	transformer, a-m i-f
IFT502	1-403-139	transformer, a-m i-f
IFT503	1-403-128	transformer, a-m i-f
IFT504	1-403-135	transformer, a-m i-f
IFT505	1-403-128	transformer, a-m i-f
CF201	1-527-501	ceramic filter, fm i-f
CF202	1-527-501	ceramic filter, fm i-f
CF203	1-527-501	ceramic filter, fm i-f
CF501	1-403-161-13	ceramic filter, a-m i-f
CF502	1-403-161-13	ceramic filter, a-m i-f
B901	1-417-023	balun
B902	1-417-014	balun
T601	1-423-114	transformer, driver
T701	1-441-446-13	transformer, power

CAPACITORS

CV01, CT01	1-151-223-12	tuning capacitor, fm
CV101, CT101	1-151-223-12	tuning capacitor, fm
CV301, 302	1-151-214	tuning capacitor, sw 2 gang
CV303～305	1-151-168	tuning capacitor, sw 3 gang
CV401～403	1-151-182-13S	tuning capacitor, mw/lw/sw1 3 gang

Ref. No.	Part No.	Description
CT301	1-141-097	capacitor, trimmer (10pF)
CT302	1-141-097	capacitor, trimmer (10pF)
CT303	1-141-097	capacitor, trimmer (10pF)
CT304	1-141-078	capacitor, trimmer (16pF)
CT305	1-141-078	capacitor, trimmer (16pF)
CT306	1-141-095	capacitor, trimmer (16pF)
CT307	1-141-078	capacitro, trimmer (16pF)
CT308	1-141-078	capacitor, trimmer (16pF)
CT309	1-141-080	capacitor, trimmer (10pF)
CT310	1-141-078	capacitor, trimmer (16pF)
CT311	1-141-078	capacitor, trimmer (16pF)
CT312	1-141-080	capacitor, trimmer (10pF)
CT313	1-141-078	capacitor, trimmer (16pF)
CT314	1-141-078	capacitor, trimmer (16pF)
CT315	1-141-080	capacitor, trimmer (10pF)
CT316	1-141-078	capacitor, trimmer (16pF)
CT317	1-141-079	capacitor, trimmer (10pF)
CT318	1-141-080	capacitor, trimmer (10pF)
CT319	1-141-079	capacitor, trimmer (10pF)
CT320	1-141-079	capacitor, trimmer (10pF)
CT321	1-141-080	capacitor, trimmer (10pF)
CT322	1-141-078	capacitor, trimmer (16pF)
CT323	1-141-078	capacitor, trimmer (16pF)
CT324	1-141-095	capacitor, trimmer (16pF)
CT325	1-141-078	capacitor, trimmer (16pF)
CT326	1-141-078	capacitor, trimmer (16pF)
CT327	1-141-080	capacitor, trimmer (10pF)
CT328	1-141-078	capacitor, trimmer (16pF)
CT329	1-141-078	capacitor, trimmer (16pF)
CT330	1-141-080	capacitor, trimmer (10pF)
CT331	1-141-078	capacitor, trimmer (16pF)
CT332	1-141-078	capacitor, trimmer (16pF)
CT333	1-141-080	capacitor, trimmer (10pF)
CT334	1-141-078	capacitor, trimmer (16pF)
CT335	1-141-079	capacitor, trimmer (10pF)
CT336	1-141-080	capacitor, trimmer (10pF)
CT337	1-141-079	capacitor, trimmer (10pF)
CT338	1-141-079	capacitor, trimmer (10pF)
CT339	1-141-080	capacitor, trimmer (10pF)
CT401		– discarded –
CT402	1-141-135	capacitor, trimmer (30pF)
CT403	1-141-135	capacitor, trimmer (30pF)
CT404	1-141-135	capacitor, trimmer (30pF)
CT405	1-141-135	capacitor, trimmer (30pF)
CT406	1-141-135	capacitor, trimmer (30pF)
CT407	1-141-135	capacitor, trimmer (30pF)
CT408	1-141-135	capacitor, trimmer (30pF)
CT409	1-141-135	capacitor, trimmer (30pF)
CO1	1-101-867	24pF ceramic
CO2	1-101-867	24pF ceramic
CO3	1-101-867	24pF ceramic

Ref. No.	Part No.	Description
C04	1-102-064	0.75pF ceramic
C05	1-101-936	0.5pF ceramic
C06		
C07	1-101-072	0.01μF ceramic
C08	1-101-955	5pF ceramic
C09	1-105-821-12	0.001μF mylar
C10	1-102-945	8pF ceramic
C11	1-101-072	0.01μF ceramic
C12	1-101-854	10pF ceramic
C13	1-101-918	0.001μF ceramic
C14	1-101-959	10pF ceramic
C15	1-101-072	0.01μF ceramic
C16	1-101-072	0.01μF ceramic
C17	1-101-072	0.01μF ceramic
C18	1-101-140	0.005μF ceramic
C19	1-101-072	0.01μF ceramic
C20	1-101-072	0.01μF ceramic
C101	1-101-861	15pF ceramic
C102	1-101-861	15pF ceramic
C103	1-101-956	6pF ceramic
C104	1-101-937	1pF ceramic
C105	1-101-936	0.5pF ceramic
C106		– discarded –
C107	1-101-072	0.01μF ceramic
C108	1-102-508	10pF ceramic
C109	1-102-121	0.0022μF ceramic
C110	1-102-864	5pF ceramic
C111	1-102-090	0.0047μF ceramic
C112	1-102-508	10pF ceramic
C113	1-101-869	27pF ceramic
C114	1-101-976	10pF ceramic
C115	1-101-072	0.01μF ceramic
C116	1-101-072	0.01μF ceramic
C117	1-101-072	0.01μF ceramic
C118	1-105-829-12	0.0047μF mylar
C119	1-101-918	0.001μF ceramic
C120	1-101-072	0.01μF ceramic
C121	1-101-958	8pF ceramic
C122	1-101-958	8pF ceramic
C201	1-105-673-12	0.01μF mylar
C202	1-105-673-12	0.01μF mylar
C203		– discarded –
C204	1-105-673-12	0.01μF mylar
C205	1-105-673-12	0.01μF mylar
C206	1-105-673-12	0.01μF mylar
C207	1-105-673-12	0.01μF mylar
C208	1-105-673-12	0.01μF mylar
C209	1-105-673-12	0.01μF mylar
C210	1-105-673-12	0.01μF mylar
C211	1-102-939	2pF ceramic
C212	1-105-673-12	0.01μF mylar

Ref. No.	Part No.	Description
C213	1-105-673-12	0.01μF mylar
C214	1-105-673-12	0.01μF mylar
C215	1-102-939	2pF ceramic
C216	1-105-673-12	0.01μF mylar
C217	1-105-673-12	0.01μF mylar
C218	1-107-085	100pF silvered mica
C219		– discarded –
C220	1-121-469	10μF 10V electrolytic
C221	1-107-092	200pF silvered mica
C222	1-107-092	200pF silvered mica
C223	1-121-469	10μF 10V electrolytic
C224	1-121-402	33μF 10V electrolytic
C225	1-102-950	13pF ceramic
C226	1-105-673-12	0.01μF mylar
C227	1-102-962	30pF ceramic
C228	1-105-673-12	0.01μF mylar
C229		– discarded –
C230	1-121-469	10μF 10V electrolytic
C231	1-105-677-12	0.022μF mylar
C232		– discarded –
C233		– discarded –
C234	1-105-687-12	0.15μF mylar
C235	1-105-685-12	0.1μF mylar
C236	1-105-675-12	0.015μF mylar
C237	1-105-673-12	0.01μF mylar
C238	1-121-391	1μF 50V electrolytic
C239	1-121-391	1μF 50V electrolytic
C240	1-105-661-12	0.001μF mylar
C241	1-121-391	1μF 50V electrolytic
C242	1-121-469	10μF 10V electrolytic
C244	1-105-677-12	0.022μF mylar
C301	1-103-619	560pF styrol
C302	1-107-093	220pF silvered mica
C303	1-107-085	100pF silvered mica
C304	1-107-082	75pF silvered mica
C305	1-107-081	68pF silvered mica
C306	1-107-076	43pF silvered mica
C307	1-107-081	68pF silvered mica
C308	1-107-082	75pF silvered mica
C309	1-107-074	36pF silvered mica
C310	1-107-069	22pF silvered mica
C311	1-107-069	22pF silvered mica
C312	1-107-073	33pF silvered mica
C313	1-107-081	68pF silvered mica
C314	1-107-069	22pF silvered mica
C315	1-107-070	24pF silvered mica
C316	1-107-064	13pF silvered mica
C317		– discarded –
C318	1-107-069	22pF silvered mica
C319	1-107-079	56pF silvered mica
C320	1-107-065	15pF silvered mica
C321	1-107-071	27pF silvered mica
C322	1-107-063	12pF silvered mica
C323		– discarded –
C324	1-107-065	15pF silvered mica
C325	1-107-074	36pF silvered mica
C326	1-107-062	11pF silvered mica
C327	1-107-061	10pF silvered mica
C328	1-107-061	10pF silvered mica
C329	1-107-106	9pF silvered mica
C330	1-107-061	10pF silvered mica
C331	1-107-105	8pF silvered mica
C332	1-107-104	7pF silvered mica
C333	1-107-105	8pF silvered mica
C334	1-107-104	7pF silvered mica
C335	1-101-924	0.02μF ceramic
C336	1-101-923	0.01μF ceramic
C337	1-101-924	0.02μF ceramic
C338	1-101-924	0.02μF ceramic
C339	1-101-924	0.02μF ceramic
C340	1-107-074	36pF silvered mica
C341	1-103-619	560pF styrol
C342	1-107-093	220pF silvered mica
C343	1-107-085	100pF silvered mica
C344	1-107-082	75pF silvered mica
C345	1-107-081	68pF silvered mica
C346	1-107-076	43pF silvered mica
C347	1-107-081	68pF silvered mica
C348	1-107-082	75pF silvered mica
C349	1-107-074	36pF silvered mica
C350	1-107-069	22pF silvered mica
C351	1-107-069	22pF silvered mica
C352	1-107-073	33pF silvered mica
C353	1-107-081	68pF silvered mica
C354	1-107-069	22pF silvered mica
C355	1-107-070	24pF silvered mica
C356	1-107-064	13pF silvered mica
C357		– discarded –
C358	1-107-069	22pF silvered mica
C359	1-107-079	56pF silvered mica
C360	1-107-065	15pF silvered mica
C361	1-107-071	27pF silvered mica
C362	1-107-063	12pF silvered mica
C363		– discarded –
C364	1-107-065	15pF silvered mica
C365	1-107-074	36pF silvered mica
C366	1-107-062	11pF silvered mica
C367	1-107-061	10pF silvered mica
C368	1-107-061	10pF silvered mica
C369	1-107-106	9pF silvered mica
C370	1-107-061	10pF silvered mica
C371	1-107-106	9pF silvered mica
C372	1-107-104	7pF silvered mica
C373	1-107-105	8pF silvered mica
C374	1-107-104	7pF silvered mica

Ref. No.	Part No.		Description
C375	1-101-923	0.01μF	ceramic
C376	1-107-090	160pF	silvered mica
C377	1-107-086	110pF	silvered mica
C378	1-107-083	82pF	silvered mica
C379	1-107-083	82pF	silvered mica
C380	1-107-083	82pF	silvered mica
C381	1-107-082	75pF	silvered mica
C382	1-107-082	75pF	silvered mica
C383	1-107-080	62pF	silvered mica
C384	1-107-080	62pF	silvered mica
C385	1-107-080	62pF	silvered mica
C386	1-107-079	56pF	silvered mica
C387	1-107-079	56pF	silvered mica
C388	1-107-079	56pF	silvered mica
C389	1-107-078	51pF	silvered mica
C390	1-107-078	51pF	silvered mica
C391	1-107-078	51pF	silvered mica
C392	1-107-077	47pF	silvered mica
C393	1-107-073	33pF	silvered mica
C394	1-105-673-12	0.01μF	mylar
C395	1-103-601	100pF	styrol
C396	1-102-871	43pF	ceramic
C397	1-103-612	300pF	styrol
C398	1-107-101	4pF	silvered mica
C399	1-105-673-12	0.01μF	mylar
C1301	1-101-918	0.001μF	ceramic
C1302	1-105-673-12	0.01μF	mylar
C1303	1-105-673-12	0.01μF	mylar
C1304	1-107-096	300pF	silvered mica
C1305	1-107-078	51pF	silvered mica
C1306	1-105-673-12	0.01μF	mylar
C1307	1-107-061	10pF	silvered mica
C1308	1-105-673-12	0.01μF	mylar
C1309	1-105-673-12	0.01μF	mylar
C1310	1-101-923	0.01μF	ceramic
C1311	1-101-923	0.01μF	ceramic
C1312	1-107-069	22pF	silvered mica
C1313	1-107-098	1pF	silvered mica
C1314	1-107-070	24pF	silvered mica
C1315	1-107-085	100pF	silvered mica
C1316	1-105-673-12	0.01μF	mylar
C1317	1-105-673-12	0.01μF	mylar
C1318	1-103-607	180pF	styrol
C1319	1-107-100	3pF	silvered mica
C1320	1-103-607	180pF	styrol
C401	1-107-069	22pF	silvered mica
C402	1-103-636	3,000pF	styrol
C403	1-103-620	620pF	styrol
C404	1-105-837-12	0.022μF	mylar
C405	1-105-839-12	0.033μF	mylar
C406	1-105-841-12	0.047μF	mylar

Ref. No.	Part No.		Description
C407	1-105-843-12	0.068μF	mylar
C408	1-105-837-12	0.022μF	mylar
C409	1-105-841-12	0.047μF	mylar
C410	1-103-606	160pF	styrol
C411	1-105-837-12	0.022μF	mylar
C412	1-103-627	1,200pF	styrol
C413	1-103-615	390pF	styrol
C414	1-107-089	150pF	silvered mica
C415	1-101-882	51pF	ceramic
C416	1-105-841-12	0.047μF	mylar
C417	1-105-833-12	0.01μF	mylar
C418	1-105-837-12	0.022μF	mylar
C419	1-121-413	100μF	6.3V electrolytic
C501	1-102-944	7pF	ceramic
C502	1-105-673-12	0.01μF	mylar
C503	1-121-402	33μF	10V electrolytic
C504	1-105-673-12	0.01μF	mylar
C505	1-121-469	10μF	10V electrolytic
C506	1-105-673-12	0.01μF	mylar
C507	1-105-673-12	0.01μF	mylar
C508	1-105-673-12	0.01μF	mylar
C509	1-121-409	47μF	16V electrolytic
C510	1-102-943	6pF	ceramic
C511		– discarded –	
C512	1-102-951	15pF	ceramic
C513	1-105-673-12	0.01μF	mylar
C514	1-121-402	33μF	10V electrolytic
C515	1-105-673-12	0.01μF	mylar
C516	1-107-092	200pF	silvered mica
C517	1-107-092	200pF	silvered mica
C518	1-105-673-12	0.01μF	mylar
C519	1-105-673-12	0.01μF	mylar
C520	1-121-469	10μF	10V electrolytic
C521	1-121-391	1μF	50V electrolytic
C522		– discarded –	
C523		– discarded –	
C524	1-107-089	150pF	silvered mica
C525	1-107-073	33pF	silvered mica
C526	1-107-085	100pF	silvered mica
C527	1-107-074	36pF	silvered mica
C528	1-107-082	75pF	silvered mica
C529	1-105-673-12	0.01μF	mylar
C530	1-121-402	33μF	10V electrolytic
C531	1-105-673-12	0.01μF	mylar
C532	1-105-673-12	0.01μF	mylar
C533	1-105-673-12	0.01μF	mylar
C534	1-107-096	300pF	silvered mica
C535	1-105-673-12	0.01μF	mylar
C601	1-121-469	10μF	10V electrolytic
C602	1-107-235	510pF	silvered mica
C603	1-105-661-12	0.001μF	mylar

Ref. No.	Part No.	Description
C604	1-121-415	100μF 16V electrolytic
C605	1-121-469	10μF 10V electrolytic
C606	1-105-665-12	0.0022μF mylar
C607	1-105-677-12	0.022μF mylar
C608	1-105-681-12	0.047μF mylar
C609	1-127-019	0.1μF 10V electrolytic (alox)
C610	1-121-415	100μF 16V electrolytic
C611	1-121-469	10μF 10V electrolytic
C612	1-105-673-12	0.01μF mylar
C613	1-121-415	100μF 16V electrolytic
C614	1-121-245	1,000μF 16V electrolytic
C615	1-105-671-12	0.0068μF mylar
C616	1-105-671-12	0.0068μF mylar
C617	1-105-673-12	0.01μF mylar
C618	1-121-245	1,000μF 16V electrolytic
C619	1-121-469	10μF 10V electrolytic
C620	1-105-673-12	0.01μF mylar
C621	1-105-681-12	0.047μF mylar
C622	1-121-469	10μF 10V electrolytic
C623	1-121-395	4.7μF 25V electrolytic
C624	1-121-469	10μF 10V electrolytic
C625	1-127-020	0.22μF 10V electrolytic (alox)
C626	1-105-671-12	0.0068μF mylar
C701	1-127-020	0.22μF 10V electrolytic (alox)
C801	1-105-679-12	0.033μF mylar
C802	1-105-675-12	0.015μF mylar
C803		– discarded –
C804	1-101-914	100pF ceramic
C805	1-107-096	300pF silvered mica
C806	1-105-677-12	0.022μF mylar
C807	1-105-679-12	0.033μF mylar
C808	1-105-677-12	0.022μF mylar
C809	1-105-673-12	0.01μF mylar
C901	1-105-841-12	0.047μF mylar
C001	1-115-110	0.0047μF 600V paper
C002	1-115-110	0.0047μF 600V paper
C003	1-121-389	2,200μF 25V electrolytic
C004	1-121-389	2,200μF 25V electrolytic
CP301~305	1-101-799	2,000pF ceramic
HT301~304	1-535-036	hermetic terminal

RESISTORS

All resistors are ¼W ±5% carbon type resistors unless otherwise noted.

VR201	1-221-635	adjustable resistor 5kΩ
VR501	1-222-194-12	MGC control, 20kΩ-B
VR601	1-222-218	VOLUME control, 50kΩ-D
VR602	1-222-195	tone control, TREBLE 50kΩ-A
VR603	1-222-195	tone control, BASS 50kΩ-A
VR801	1-221-634-12	adjustable resistor, 1kΩ-B
VR802	1-222-551	BFO control, 5kΩ-D
VR901	1-222-985	adjustable resistor, MUTING level

Ref. No.	Part No.			
R01	1-208-027	560Ω	1/16W	ceramic
R02	1-208-027	560Ω	1/16W	ceramic
R03	1-244-497	10kΩ	1/8W	carbon
R04	1-244-501	15kΩ	1/8W	carbon
R05	1-208-045	3,3kΩ	1/16W	ceramic
R06	1-208-145	100kΩ	1/16W	ceramic
R07	1-208-145	100kΩ	1/16W	ceramic
R08	1-208-088	200kΩ	1/16W	ceramic
R09	1-208-027	560Ω	1/16W	ceramic
R10	1-208-033	1kΩ	1/16W	ceramic
R101	1-208-027	560Ω	1/16W	ceramic
R102	1-208-027	560Ω	1/16W	ceramic
R103	1-244-697	10kΩ		
R104	1-244-697	10kΩ		
R105	1-208-045	3.3kΩ	1/16W	ceramic
R106	1-208-145	100kΩ	1/16W	ceramic
R107	1-208-145	100kΩ	1/16W	ceramic
R108	1-208-088	200kΩ	1/16W	ceramic
R109	1-208-027	560Ω	1/16W	ceramic
R110	1-208-033	1kΩ	1/16W	ceramic
R201	1-244-660	300Ω		
* R202	1-244-706	24kΩ		
	1-244-707	27kΩ		
	1-244-708	30kΩ		
	1-244-709	33kΩ		
R203	1-244-704	20kΩ		
R204	1-244-643	56Ω		
R205	1-244-671	820Ω		
R206	1-244-670	750Ω		
R207	1-244-708	30kΩ		
R208	1-244-697	10kΩ		
R209	1-244-650	110Ω		
R210	1-244-653	150Ω		
R211	1-244-709	33kΩ		
R212	1-244-643	56Ω		
R213	1-244-697	10kΩ		
R214	1-244-665	470Ω		
R215	1-244-684	3kΩ		
R216	1-244-660	300Ω		
R217	1-244-660	300Ω		
R218	1-244-705	22kΩ		
R219	1-244-643	56Ω		
R220	1-244-697	10kΩ		
R221	1-244-657	220Ω		
R222	1-244-707	27kΩ		
R223	1-244-657	220Ω		
R224	1-244-649	100Ω		

Ref. No.	Part No.	Description		
R225	1-244-706	24 kΩ		
R226	1-244-706	24 kΩ		
R227	1-244-665	470 Ω		
R228	1-244-656	200 Ω		
R229	1-244-662	360 Ω		
R230	1-244-673	1 kΩ		
R231	1-244-673	1 kΩ		
R232	1-244-689	4.7 kΩ		
R233	1-244-689	4.7 kΩ		
R234	1-244-691	5.6 kΩ		
R235	1-244-691	5.6 kΩ		
R236	1-244-684	2.4 kΩ		
R237	1-244-727	180 kΩ		
R238	1-244-690	5.1 kΩ		
R239	1-244-681	2.2 kΩ		
R240	1-244-635	27 Ω		
R241	1-244-687	3.9 kΩ		
R242	1-244-719	82 kΩ		
R243	1-244-730	240 kΩ		
R244	1-244-730	240 kΩ		
R245	1-244-697	10 kΩ		
R246	1-244-732	300 kΩ		
R247	1-244-714	51 kΩ		
R248	1-244-706	24 kΩ		
R249	1-244-714	51 kΩ		
R250	1-244-691	5.6 kΩ		
R251	1-244-667	560 Ω		
R252	1-244-695	8.2 kΩ		
R253	1-244-713	47 kΩ		
R254	1-244-677	1.5 kΩ		
R255	1-244-677	1.5 kΩ		
R256	1-244-656	200 Ω		
R257	1-244-690	5.1 kΩ		
R258	1-244-730	240 kΩ		
R259	1-244-730	240 kΩ		
R260	1-244-721	100 kΩ		
R261	1-244-721	100 kΩ		
R262	1-244-721	100 kΩ		
R263	1-244-721	100 kΩ		
R264	1-244-721	100 kΩ		
R265	1-244-721	100 kΩ		
R266	1-244-641	47 Ω		
R267	1-244-665	470 Ω		
R268	1-244-656	200 Ω		
R269	1-244-643	56 Ω		
R301	1-202-647	1.2 MΩ	½ W	composition
R302	1-244-703	18 kΩ		
R303	1-244-713	47 kΩ		
R304	1-244-690	5.1 kΩ		
R305	1-244-703	18 kΩ		
R306	1-244-724	130 kΩ		
R307		– discarded –		

Ref. No.	Part No.	Description		
R308	1-244-685	3.3 kΩ		
R309	1-244-684	3 kΩ		
R310	1-244-693	6.8 kΩ		
R311	1-244-683	2.7 kΩ		
R312	1-244-649	100 Ω		
R313	1-244-693	6.8 kΩ		
R314	1-244-680	2 kΩ		
R315	1-244-684	3 kΩ		
R316	1-244-653	150 Ω		
R317	1-244-690	5.1 kΩ		
R318	1-244-705	22 kΩ		
R319	1-244-656	200 Ω		
R320	1-244-680	2 kΩ		
R321	1-244-715	56 kΩ		
R322	1-244-715	56 kΩ		
R323	1-244-710	36 kΩ		
R324	1-244-691	5.6 kΩ		
R325	1-244-673	1 kΩ		
R326	1-244-656	200 Ω		
R327	1-244-709	33 kΩ		
R328	1-244-709	33 kΩ		
※ R401	1-242-717	68 kΩ		
	1-242-718	75 kΩ		
	1-242-719	82 kΩ		
R402	1-242-701	15 kΩ		
R403	1-242-673	1 kΩ		
R404	1-242-665	470 Ω		
R405	1-242-684	3 kΩ		
R406	1-242-673	1 kΩ		
R407	1-242-681	2.2 kΩ		
R408	1-242-694	7.5 kΩ		
R409	1-242-697	10 kΩ		
R410	1-242-681	2.2 kΩ		
R411	1-242-697	10 kΩ		
R412	1-242-673	1 kΩ		
R413	1-242-673	1 kΩ		
R414	1-242-684	3 kΩ		
R415	1-242-677	1.5 kΩ		
R416	1-242-665	470 Ω		
R417	1-242-714	51 kΩ		
R418	1-242-677	1.5 kΩ		
R419	1-242-708	30 kΩ		
R420	1-242-665	470 Ω		
R421	1-202-647	1.2 MΩ	½W	composition
※ R422	1-244-684	3 kΩ		
	1-244-685	3.3 kΩ		
	1-244-686	3.6 kΩ		
	1-244-687	3.9 kΩ		
	1-244-688	4.3 kΩ		
	1-244-689	4.7 kΩ		
	1-244-690	5.1 kΩ		
R423	1-244-657	220 Ω		

Ref. No.	Part No.	Description
R501	1-244-697	10 kΩ
R502	1-244-684	3 kΩ
* R503	1-244-714	51 kΩ
	1-244-715	56 kΩ
	1-244-716	62 kΩ
	1-244-717	68 kΩ
R504	1-244-701	15 kΩ
R505	1-244-666	510 Ω
R506		– discarded –
* R507	1-244-714	51 kΩ
	1-244-715	56 kΩ
	1-244-716	62 kΩ
	1-244-717	68 kΩ
R508	1-244-685	3.3 kΩ
R509	1-244-705	22 kΩ
R510	1-244-684	3 kΩ
R511	1-244-666	510 Ω
R512	1-244-718	75 kΩ
R513	1-244-666	510 Ω
R514	1-244-705	22 kΩ
R515	1-244-657	220 Ω
R516	1-244-701	15 kΩ
R517	1-244-680	2 kΩ
R518	1-244-680	2 kΩ
R519	1-244-692	6.2 kΩ
R520	1-244-689	4.7 kΩ
R521	1-244-708	30 kΩ
R522	1-244-680	2 kΩ
R523	1-244-693	6.8 kΩ
R524	1-244-697	10 kΩ
R525	1-244-697	10 kΩ
R526	1-244-697	10 kΩ
R527	1-244-697	10 kΩ
R528	1-244-661	330 Ω
R529	1-244-673	1 kΩ
R530	1-244-680	2 kΩ
R531	1-244-693	6.8 kΩ
R532	1-244-666	510 Ω
R533		– discarded –
R534	1-244-705	22 kΩ
R535	1-244-686	3.6 kΩ
R536		– discarded –
R537	1-244-675	1.2 kΩ
R538	1-244-690	5.1 kΩ
R539		– discarded –
R540	1-244-712	43 kΩ
R541	1-244-697	10 kΩ
R601	1-244-690	5.1 kΩ
R602	1-244-713	47 kΩ
R603	1-244-665	470 Ω
R604	1-244-707	27 kΩ
R605	1-244-693	6.8 kΩ
R606	1-244-653	150 Ω
R607	1-244-676	1.3 kΩ
R608	1-244-684	3 kΩ
R609	1-244-673	1 kΩ
R610	1-244-690	5.1 kΩ
R611	1-244-697	10 kΩ
R612	1-244-691	5.6 kΩ
R613	1-244-675	1.2 kΩ
R614	1-244-680	2 kΩ
R615	1-244-708	30 kΩ
R616	1-244-697	10 kΩ
R617	1-244-657	220 Ω
R618	1-244-633	22 Ω
R619	1-244-691	5.6 kΩ
R620	1-244-664	430 Ω
R621	1-244-664	430 Ω
R622	1-244-677	1.5 kΩ
R623	1-244-657	220 Ω
R624	1-244-657	220 Ω
R625	1-244-601	1 Ω
R626	1-244-601	1 Ω
R627	1-244-601	1 Ω
R628	1-244-601	1 Ω
R629	1-244-723	120 kΩ
R630	1-244-695	8.2 kΩ
R631	1-244-721	100 kΩ
R632	1-244-690	5.1 kΩ
R633	1-244-675	1.2 kΩ
R634	1-244-673	1 kΩ
R635	1-244-690	5.1 kΩ
R636	1-244-697	10 kΩ
R637	1-244-719	82 kΩ
R638	1-244-853	150 Ω ½W carbon
R639	1-244-675	1.2 kΩ
R640	1-244-681	2.2 kΩ
R701	1-244-673	1 kΩ
R702	1-244-702	10 kΩ
* R703	1-244-652	130 Ω
	1-244-653	150 Ω
	1-244-654	160 Ω
	1-244-655	180 Ω
	1-244-656	200 Ω
	1-244-657	220 Ω
R704	1-244-673	1 kΩ
R705	1-244-684	3 kΩ
R706	1-244-662	360 Ω
R707	1-244-653	150 Ω
R708	1-244-669	680 Ω
R709	1-244-721	100 kΩ
R710	1-244-650	110 Ω
R711	1-244-650	110 Ω
R712	1-244-650	110 Ω

Ref. No.	Part No.	Description		
R713	1-244-650	110Ω		
R714	1-244-650	110Ω		
R801	1-244-668	620Ω		
R802	1-244-676	1.3kΩ		
R803	1-244-669	680Ω		
R804	1-244-654	160Ω		
R805	1-244-663	390Ω		
R806	1-244-710	36kΩ		
R807	1-244-704	20kΩ		
R808	1-244-697	10kΩ		
R809	1-244-673	1kΩ		
R901	1-244-677	1.5kΩ		
R902	1-202-647	1.2MΩ	½W	composition
R903	1-244-683	2.7kΩ		
R904	1-244-721	100kΩ		
R001	1-211-001	5.1Ω	1W	carbon
R002	1-202-545	68Ω	½W	composition
R003	1-202-549	100Ω	½W	composition
R004	1-202-653	2.2MΩ	½W	composition

MISCELLANEOUS

	1-538-793-12	printed circuit board, fm1
	1-538-793-12	printed circuit board, fm2
	1-538-825-11	printed circuit board, G (sw front end)
	1-538-826-11	printed circuit board, F (sw front end)
	1-538-827-11	printed circuit board, disk E (sw front end)
	1-538-828-11	printed circuit board, disk D (sw front end)
	1-538-829-11	printed circuit board, disk C (sw front end)
	1-538-830-11	printed circuit board, disk B (sw front end)
	1-538-831-11	printed circuit board, disk A (sw front end)
	1-581-176-11	printed circuit board, rf (sw front end)
	1-581-177-12	printed circuit board, osc (sw front end)
	1-581-165-11	printed circuit board, cp
	1-581-168-11	printed circuit board, main
	1-581-166-11	printed circuit board, switch
	1-581-167-11	printed circuit board, power supply
S101	1-514-673	slide switch, FM1/FM2 select
S201	1-514-673	slide switch, FM/AM select
S202	1-513-272	slide switch, AFC
S203	1-513-272	slide switch, MUTING
S401	1-513-304	slide switch, band selector SW1
S402	1-513-304	slide switch, band selector MW
S403	1-513-304	slide switch, band selector LW
S404	1-513-302	slide switch, band selector SW2~SW19
S501	1-513-274	slide switch, SELECTIVITY
S502	1-513-274	slide switch, ANL
S503		switch, MGC; built in MGC control (VR501)
S701	1-514-503	lever seesaw switch, POWER
S702		switch, ext power/battery select; built in ext power connector
S703	1-513-285	slide switch, LIGHT
S710	1-513-285	slide switch, BATTERY CHECK
S704~709		switch, lamp; built in band selector
S801	1-514-913	slide switch, BFO ON/OFF
S901	1-514-673	slide switch, SENSITIVITY
S902	1-514-304	slide switch, ROD ANT/EXT ANT
	1-526-165-21	voltage selector
	1-532-049-11	fuse (Canada and General Export model)
	1-532-228-11	fuse (USA model)
	1-533-048	holder, fuse
LA701~709	1-518-114-11	lamp
TM001	1-520-082-14S	meter, tuning and battery check
	1-536-111	terminal strip
	1-536-183	terminal strip
FM TEL ANT	1-501-103-12	telescopic antenna, fm
SW TEL ANT	1-501-104-12S	telescopic antenna, sw
SP1	1-502-210	speaker
SP2	1-502-210	speaker
J601	1-507-169-13	jack, AUX IN
J602	1-507-169-13	jack, REC OUT
J603	1-507-190-12	jack, HEADPHONE
J604	1-507-169-13	jack, EARPHONE
J605	1-507-169-13	jack, EXT SP
J606	1-507-169-13	jack, MPX OUT
J607	1-509-029-02	jack, TAPE
	1-507-901-12	nut, jack
	1-508-377-11	connector, ac/ext dc power supply
	8-981-373-10	fm front end block, FM1 (FMC-094J2)
	8-981-367-10	fm front end block, FM2 (FMC-094W1)
	8-981-411-51	sw front end block,
	8-981-411-16	SW2~SW19 (SWC-011D2)
	8-981-411-35	mounted circuit board, main
	8-981-411-17	mounted circuit board, cp
	8-981-411-45	mounted circuit board, switch
	8-981-424-45	mounted circuit board, power (USA and Canada model)
		mounted circuit board, power (General Export model)

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