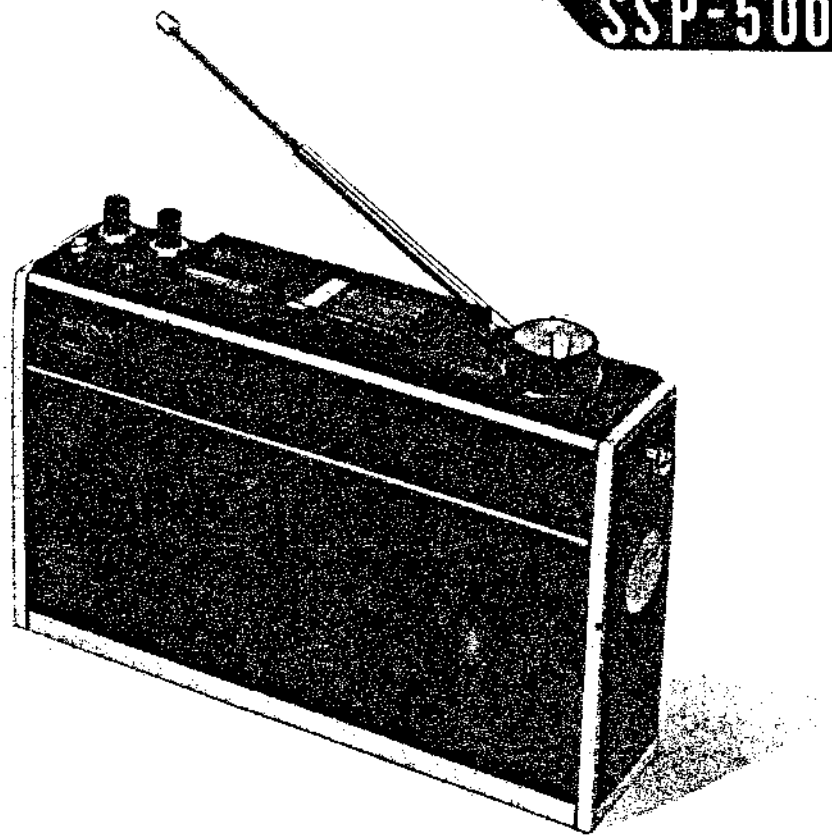
ICF-8500

SSP-500W; BP-500W



SPECIFICATIONS

Circuit System: 2-IC, 15-transistor for reception, 3-transistor for auxiliary circuits, superheterodyne

Frequency Coverage:
FM 87 – 108 MHz (3.44 – 2.78 m)
MW 530 – 1,605 kHz (566 – 187 m)
MRN 1.5 – 4.5 MHz (200 – 66.7 m)
BCN 150 – 400 kHz (2,000 – 750 m)
AIR 110 – 135 MHz (2.73 – 2.22 m)

Sensitivity (at 50-mW output):
FM 1.8 μV, 5 dB (usable, at 30 dB S/N)
MW 63 μV/m, 36 dB/m (maximum)
MRN 6.3 μV, 16 dB (maximum)
BCN 160 μV/m, 55.5 dB/m (maximum)
AIR 1 μV, 0 dB (maximum)

Intermediate Frequency:
FM 10.7 MHz
MW/MRN/BCN 455 kHz
AIR 10.7 MHz

Antenna System:
FM/AIR/MRN built-in telescopic antenna
MW/BCN built-in ferrite bar antenna

Power Requirement: Four "C" size flashlight batteries or DC 6V, AC 117 V household current by using BP-500W, SSP-500W or AC-60W, DC 12 V car battery by using DCC-2AW and BP-500W.

Power Output: 10% distortion 850 mW
Maximum 1.2W

Current Drain:
FM/AIR 38 mA at zero signal
290 mA at 850 mW output
MW/BCN/MRN 35 mA at zero signal
290 mA at 850 mW output

Selectivity: 36 dB at 1,400 kHz ±10 kHz off-resonance

AUX IN: Impedance 2.2 kΩ
Level 2.5 mV

MPX OUT: Impedance 5 kΩ
Level 30 mV

Record Output: Impedance 5 kΩ
Level 7.8 mV

Speaker: 5" x 3" (125 mm x 75 mm)

Dimensions: 10"(W) x 6¼"(H) x 2⅝"(D)
(235 mm x 160 mm x 67 mm)

Weight: 4 lb 7 oz (2 kg)

SONY®

SERVICE MANUAL

SECTION 1
TECHNICAL DESCRIPTION

1-1. TECHNICAL FEATURES

* High-performance portable radio receiver with five bands; AIR, FM, MARINE, MW, and BEACON.
* Separate AIR band circuit with a ceramic filter and four high-Q i-f transformers for superior sensitivity and selectivity.
* Squelch circuit for AIR band reception.
* FET (field effect transistor) with triple-tuned passive input circuit for superior interference rejection.
* Two integrated-circuit i-f amplifier.
* Useful as an a-m band direction finder.

1-2. CIRCUIT DESCRIPTION

Stage/Control	*Function*
Fm Tuner	
FET mixer Q101	Usually an fm front end consists of an rf amplifier, mixer and local oscillator as shown in Fig. 1-1. The rf amplifier sometimes worsens the crossmodulation-ability of the receiver when ordinary bipolar transistors are used. It is, however, difficult to eliminate the rf amplifier because its removal causes strong suprious radiation, poor sensitivity and a poor noise figure. To solve this problem, the Model ICF-8500 uses a low-noise junction FET for the mixer and a triple-tuned circuit for a passive input circuit as shown in Fig. 1-2. The Model ICF-8500 is capable of clear fm reception even in strong signal-strength areas due to the extremely superior interference-rejection characteristics of the passive input circuit.
Local oscillator Q102	The oscillator generates a frequency 10.7 MHz higher than the incoming signal frequency and injects the generated voltage at the source of FET mixer Q101.
Afc diode D101	This diode is connected across the resonant circuit of the oscillator and works as a variable-capacitance diode. A dc feedback voltage from the discriminator controls the bias applied to the diode to keep the local oscillator frequency correct.
Fm i-f amplifier Q103	Transistor Q103 amplifies the 10.7 MHz i-f signal produced by mixer Q101 and coupled to it through i-f transformer IFT F101.
I-f Strip	
Fm i-f amplifier and limiter Q001	Q001 amplifies the 10.7 MHz fm i-f signal coupled through ceramic filter CF001. Also, the saturation due to high base-emitter bias clips the negative peak of the ac signal voltage developed at the collector of Q001.
Limiter D005	This diode clips the positive peak of ac signal voltage developed at the collector of Q001.

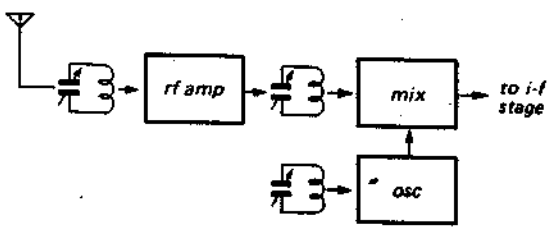


Fig. 1-1 Usual front end

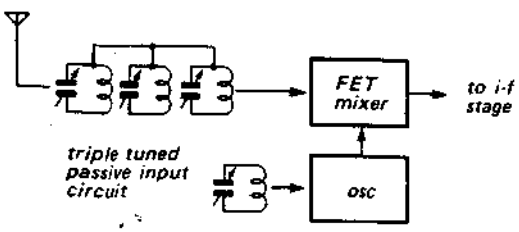


Fig. 1-2 ICF-8500 front end

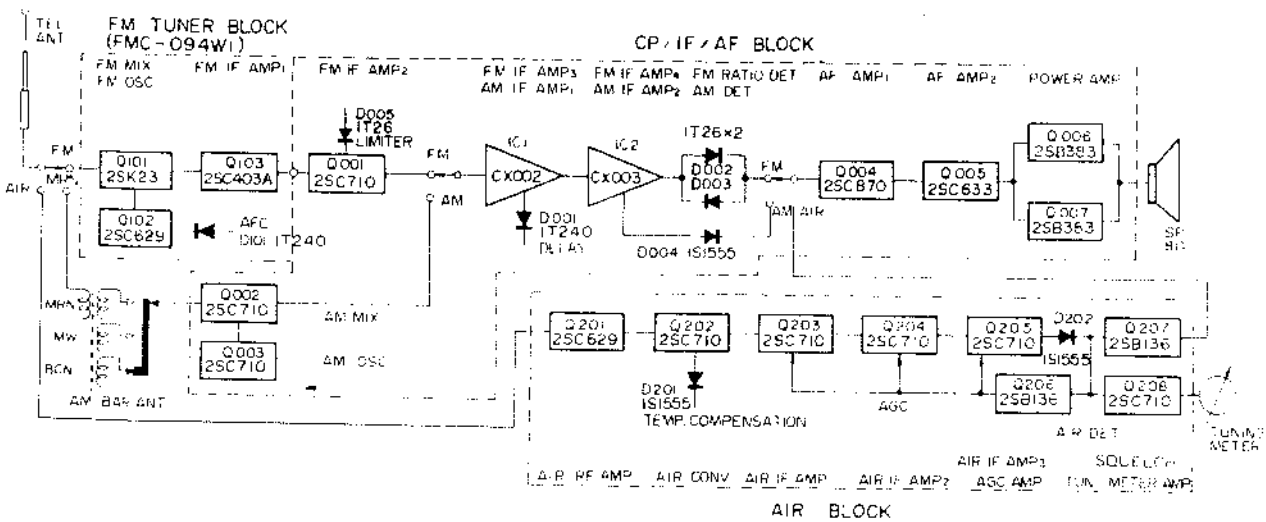
Stage/Control	Function
IC1	This monolithic integrated circuit consists of nine transistors, two diodes and 17 resistors functioning as the a-m/fm i-f amplifier, fm tuning meter circuit, and a-m agc circuit.
IC2	This monolithic integrated circuit consists of seven transistors, seven diodes and 15 resistors functioning as the a-m/fm i-f amplifier, a-m agc amplifier, and voltage regulator.
Agc delay D001	Agc voltages below a certain level are blocked by D001. This allows a-m converter Q002 to operates at full gain on weak signals.
A-m detector D004	This diode detects the a-m signal output of IC2.
Discriminator IFT002, IFT003 D002, D003	The discriminator is a ratio detector and transforms the fm i-f signal into an audio signal. The resistors and the capacitors in this circuit are capsulated in one component.
AIR Band Circuit	
Rf amplifier Q201	Q201 amplifies the VHF a-m signals coupled through bandpass filter T201. This amplifier uses a common-base circuit for best high-frequency response.
Converter Q202	Q202 generates a frequency 10.7 MHz higher than the incoming signal frequency and mixes it with the incoming signal for conversion to the 10.7 MHz i-f.
Temperature compensator D201	Diode D201 compensates the frequency drift of the local oscillator caused by temperature variations.
I-f amplifier Q203 to Q205	This 10.7 MHz i-f amplifier consists of three stages coupled by i-f transformers and a ceramic filter.
Detector D202	Diode D202 rectifies the i-f signal and converts it into an audio signal.

Stage/Control	Function
Agc amplifier Q206	This stage amplifies a dc voltage from detector D202 and applies it to the bases of Q203 and Q204 as an agc voltage. Transistor Q206 also applies the dc voltage to the base of Q207 as a squelch control voltage.
Squelch circuit Q207	When the receiver is tuned to a signal, the dc output voltage from detector D202 decreases the collector current flow of pnp transistor Q206. This decreases the collector voltage of Q206. The base-emitter bias of Q207 (pnp) therefore increases, enabling Q207 to pass the detected signals. When detuned from a signal, the collector current of Q206 increases and the base-emitter bias of Q207 decreases, cutting off the collector current of Q207 and preventing it from passing the detected noise. The base voltage of transistor Q207 is also supplied by the regulator circuit (output at pin 10) of IC2, and can be manually controlled by potentiometer VR001.
Tuning meter amplifier Q208	This stage amplifies the agc voltage applied to the tuning meter.
Audio Amplifier	
Audio driver Q004, Q005	This direct-coupled stage amplifies the audio signal supplied by VOLUME control VR002. VR003 is a high-cut type tone control.
Power amplifier Q006, Q007	This stage uses a transformer-coupled push-pull class-B amplifier. Thermistor Th001 temperature-compensates the base bias of Q006 and Q007. Negative feedback from the output of T002 to the emitter of Q005 improves the frequency response and reduces distortion.

Power Supply

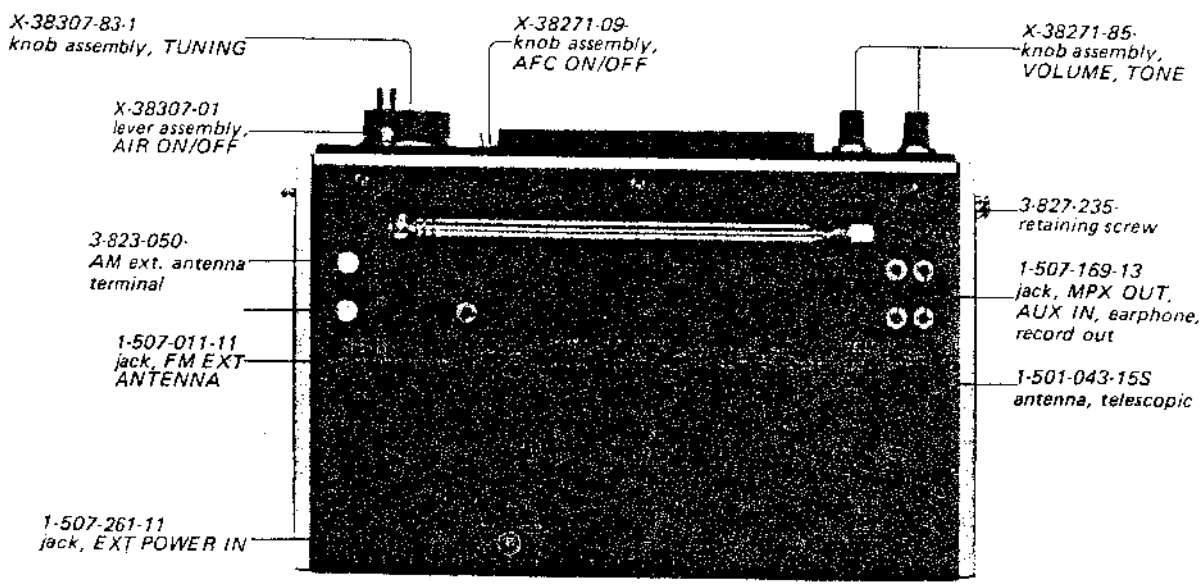
The ICF-8500 uses four C-size manganese batteries in its power supply, and has a power-in jack for an external 6-volt dc power source. However, by using the rechargeable battery unit BP-500W, the ICF-8500 can be operated from a 115-volt ac outlet.

1-3. BLOCK DIAGRAM

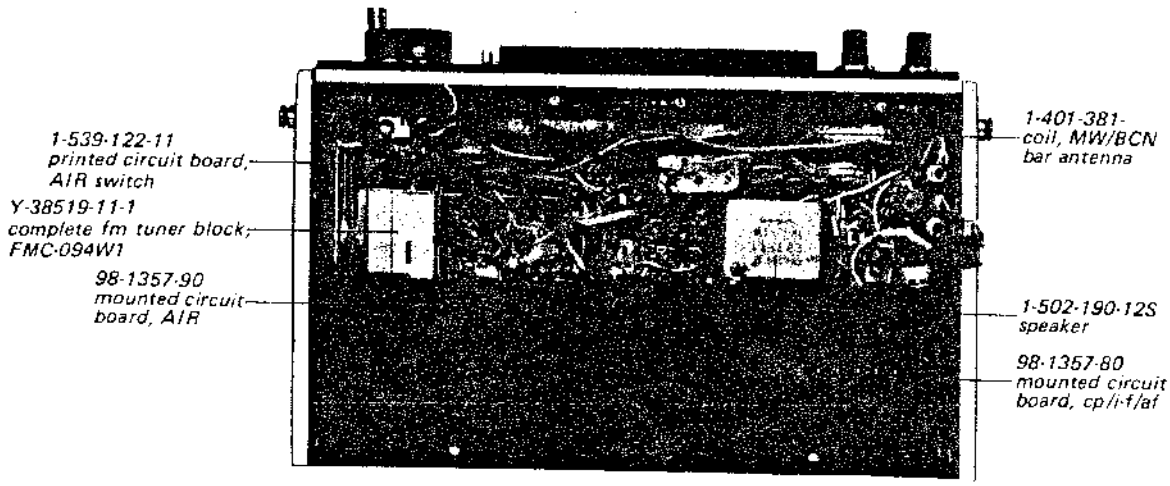


1-4. MAJOR PARTS LOCATIONS

External View



Internal View



SECTION 2
DISASSEMBLY AND REPLACEMENT PROCEDURES

2-1. CABINET REMOVAL

1. Remove the two retaining screws marked Ⓐ in Fig. 2-1.
2. Remove the ornamental screw marked Ⓑ in Fig. 2-1 and pull out the band-selector knob.
3. Remove the battery unit.
4. Remove the three tapping screws (⊕ P 3×6) marked Ⓒ in Fig. 2-1.
5. Remove the cabinet in the direction shown by the arrow in Fig. 2-1.

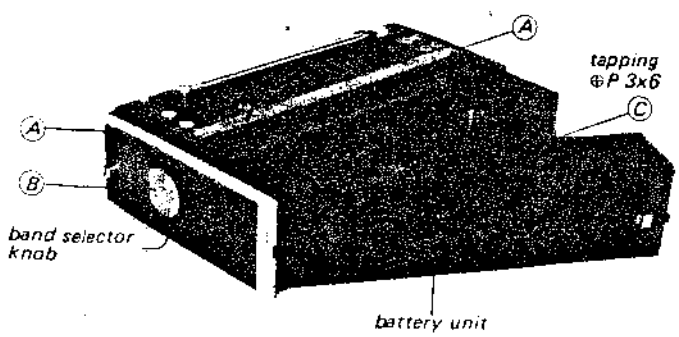


Fig 2-1

2-2. REAR CABINET REMOVAL

1. Remove the cabinet.
2. Remove the three screws (⊕ B 3×12) marked Ⓓ, and the two tapping screws (⊕ R 3×8) marked Ⓔ in Fig. 2-2.
3. Remove the five jack nuts marked Ⓕ in Fig. 2-2.
4. Remove the rear cabinet in the direction shown by the arrow in Fig. 2-2.

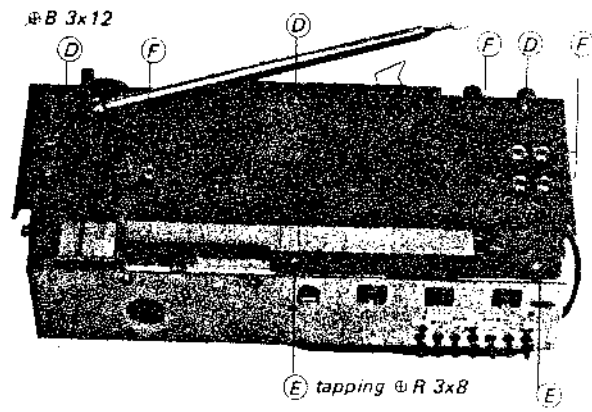


Fig. 2-2

5. Remove the telescopic-antenna holding nut marked Ⓖ in Fig. 2-3.

6. Unsolder the two pvc lead wires at the a-m external antenna terminals as shown in Fig. 2-3.

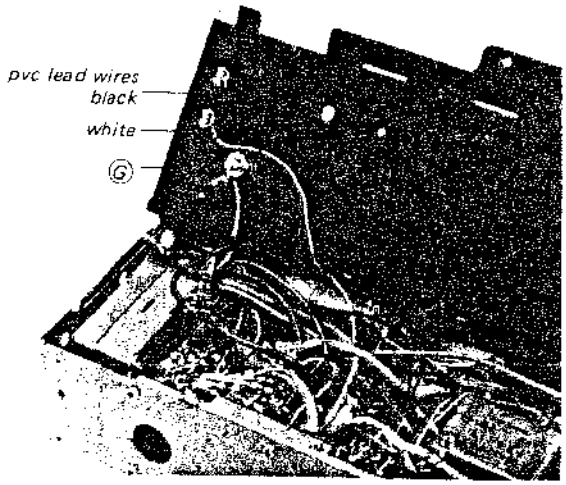


Fig. 2-3

2-3. CP/IF/AF CIRCUIT BOARD REMOVAL

1. Remove the cabinet.
2. Remove the rear cabinet.
3. Pull out the VOLUME control knob, the TONE control knob, and the TUNING knob shown in Fig. 2-4.

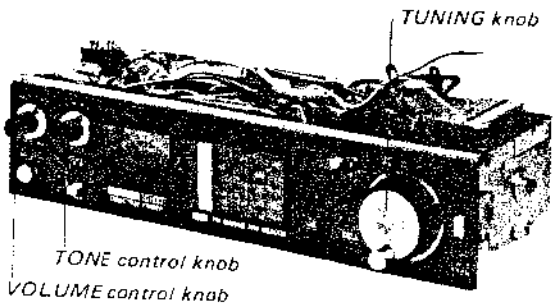


Fig. 2-4

4. Remove the retaining ring on the tuning shaft.
5. Take out the AIR band selector lever shown in Fig. 2-5.
6. Remove the two screws (⊕P 3x6) marked Ⓗ in Fig. 2-5.
7. Remove the screw (⊕P 2.6x6) marked Ⓘ and the tapping screw (⊕R 2.6x5) marked Ⓙ in Fig. 2-6.

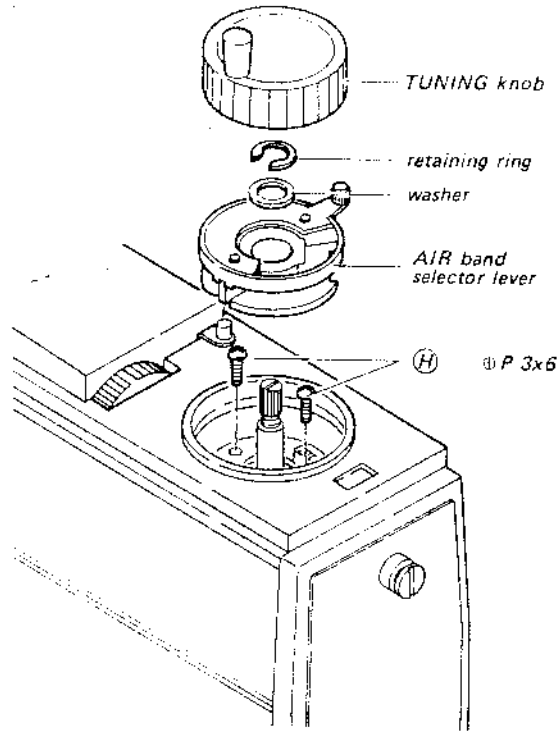


Fig. 2-5

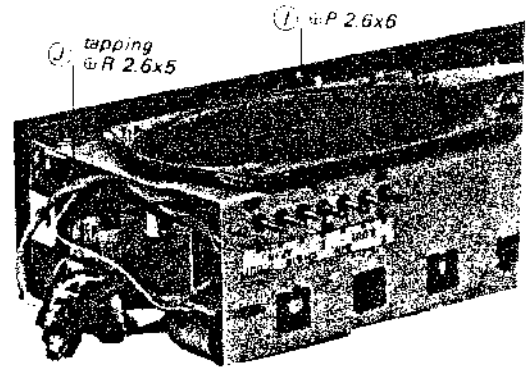


Fig. 2-6

8. Remove the three screws (⊕P 2.6x6) marked Ⓚ and the screw (⊕P 3x4) marked Ⓛ in Fig. 2-7.

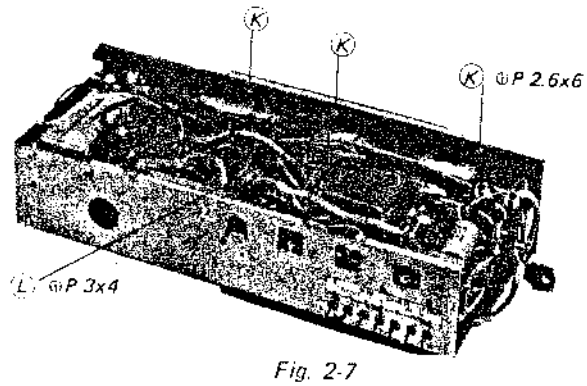


Fig. 2-7

9. Unsolder the two pvc lead wires (white and blue) at the TUNING meter shown in Fig. 2-8.

10. Unsolder the two pvc lead wires (gray and red) and the ceramic capacitor lead at the SQUELCH control shown in Fig. 2-8.

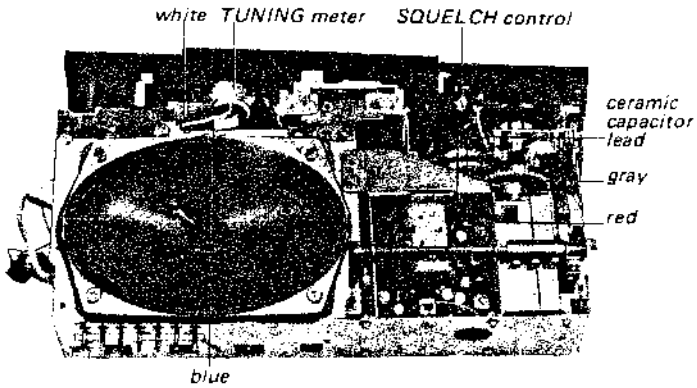


Fig. 2-8

11. Remove the two screws (⊕B 2.6x8) marked (M) and the two tapping screws (⊕K 3x8) marked (N) in Fig. 2-9.

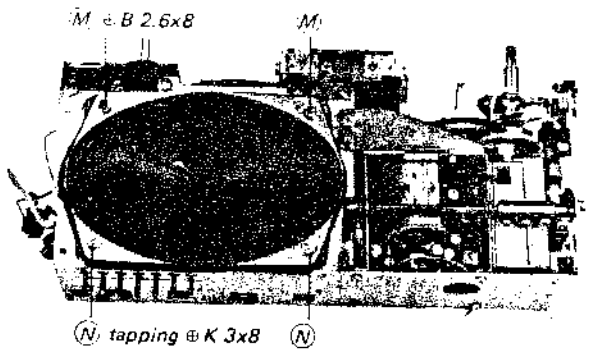


Fig. 2-9

12. Take out the speaker and unsolder the two speaker leads.

13. Unsolder the seven pvc lead wires and one coaxial cable shown in Fig. 2-10.

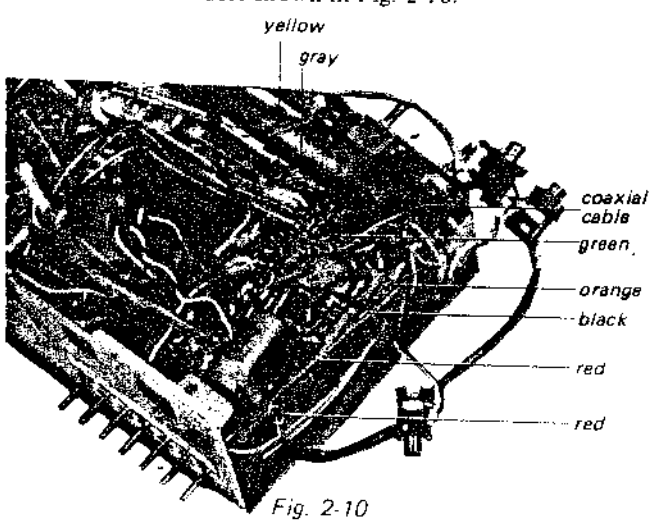


Fig. 2-10

14. Unsolder the two pvc lead wires and two braided wires shown in Fig. 2-11.

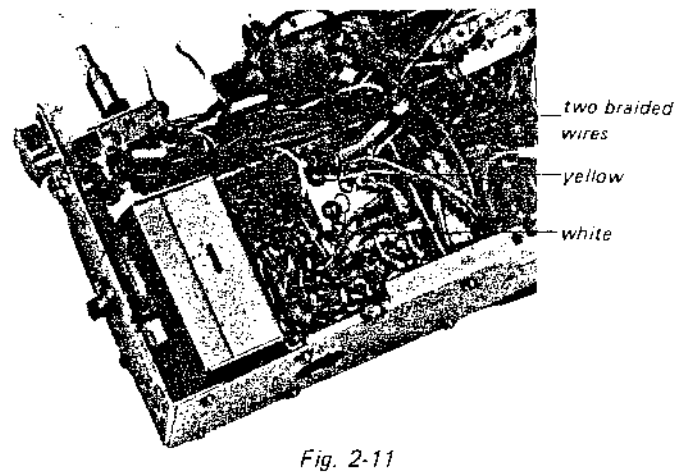


Fig. 2-11

15. Unsolder the braided wire and tinned copper wire indicated in Fig. 2-12.

16. Remove the screw (⊕P 2.6x6) marked (O) in Fig. 2-12.

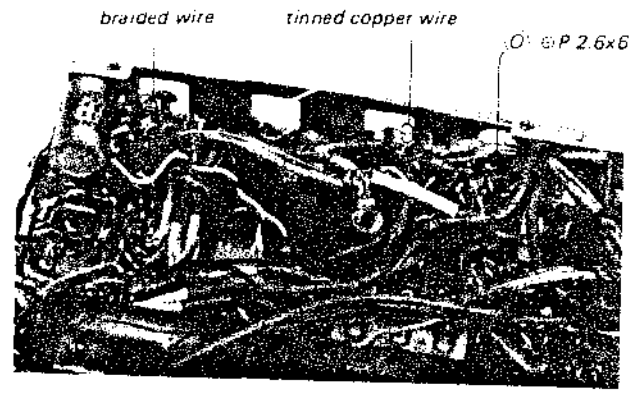


Fig. 2-12

17. Carefully remove the printed circuit board in the direction shown by the arrow in Fig. 2-13.

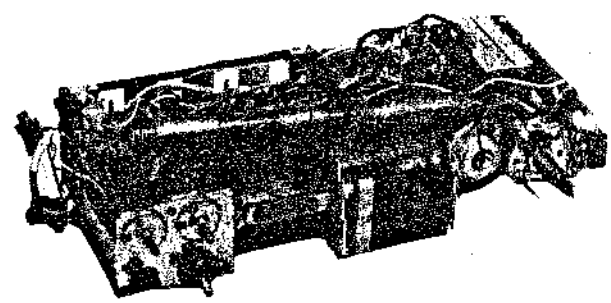


Fig. 2-13

2-4. FM TUNER DISASSEMBLY

Fm Tuner Block Removal

1. Remove the cabinet and the rear cabinet.
2. Remove the two screws (⊕B 2.6x5) marked (P) in Fig. 2-14.
3. Loosen the two dial-tuning gear set screws (2.6x4) marked (Q) in Fig. 2-14.

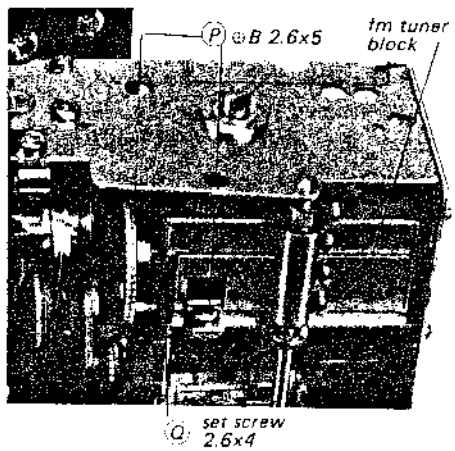


Fig. 2-14

4. Remove the screws (⊕B 2.6x5) marked (R) in Fig. 2-15.

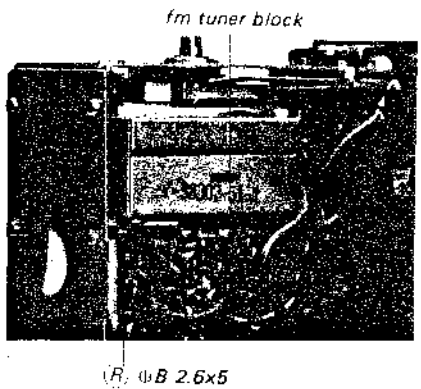


Fig. 2-15

5. While turning the dial drum in the direction shown by the arrow, push out the fm tuner block in the direction shown by the arrow in Fig. 2-16.

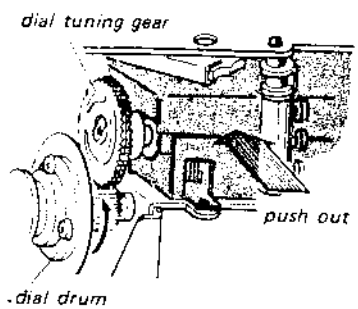


Fig. 2-16

Fm Tuner Circuit Board Removal

1. Remove the fm tuner block.
2. Remove the dial-tuning gear by loosening the two set screws (2.6 x 4) marked (S) in Fig. 2-17.
3. Unsolder the two portions of the cover marked (T) in Fig. 2-17 and remove the shield case cover in the direction shown.

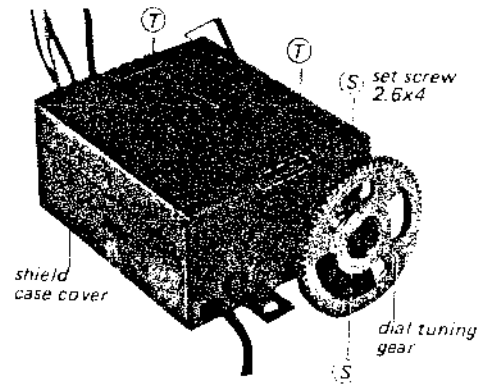


Fig. 2-17

4. Remove the two screws (⊕P 2x4) marked (U) in Fig. 2-18.

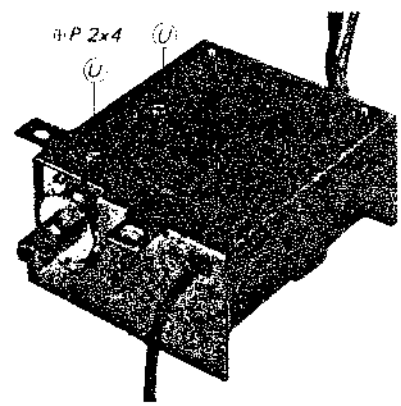


Fig. 2-18

5. Unsolder the braided wire at the i-f transformer case marked (V) in Fig. 2-19.

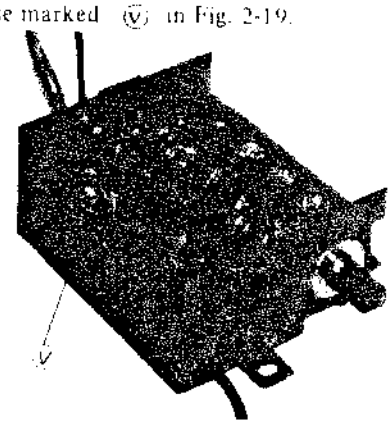


Fig. 2-19

6. Remove the circuit board in the direction shown by the arrow in Fig. 2-20.

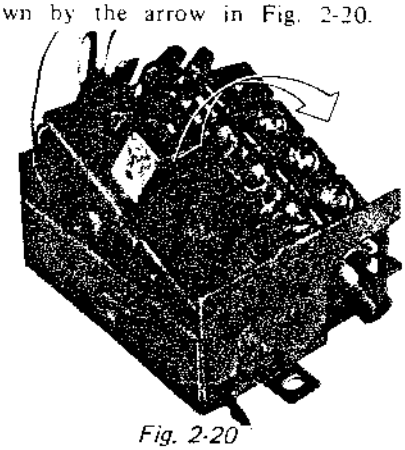


Fig. 2-20

2-5. DIAL CORD RESTRINGING

Tuning Dial Cord

1. Make a loop of the cord as shown in Fig. 2-21.
2. Remove the tension pulley from the chassis.
3. Turn the tuning shaft fully counterclockwise.
4. Turn the dial pulley so that the area midway between "kHz" and "–150" on the dial scale is aligned with the cut portion of the dial frame as shown in Fig. 2-22.
5. String the dial cord as shown in Fig. 2-22. Perform the stringing steps in the numerical order indicated.
6. Hook the dial cord to the tension pulley and fix the tension pulley to the chassis with the screw.

Band-Selector Dial Cord

1. Tie one end of the cord prepared as specified in Fig. 2-23 to the spring.

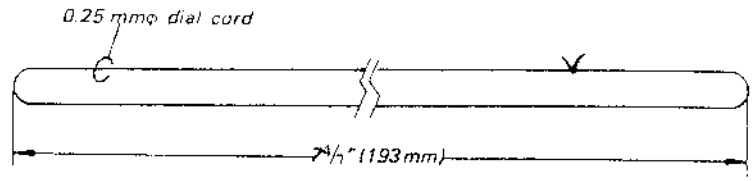


Fig. 2-21 Tuning dial cord

Fig. 2-22 Tuning dial cord restringing

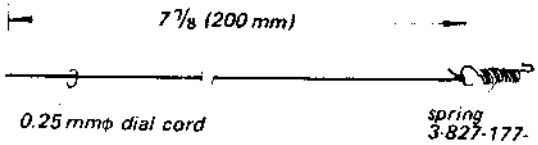


Fig. 2-23 Band-selector dial cord

2. Tie the other end of the cord to the retaining plate.

3. String the cord as shown in Fig. 2-24 and hook the spring to the slot of the chassis. Perform the steps in the numerical order.

4. Turn the band selector shaft fully clockwise and turn the band indicator drum so that "BCN" on the drum is positioned at the top.

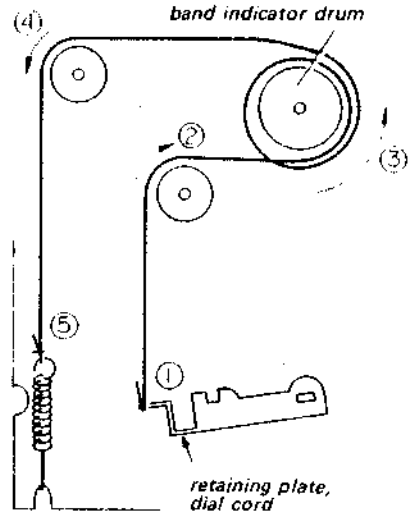


Fig. 2-24 Band-selector dial cord restringing

SECTION 3

ALIGNMENT PROCEDURES

3-1. FM I-F STRIP ALIGNMENT

Test Equipments/Tools Required: 10.7 MHz sweep generator
Oscilloscope
Screw driver for alignment

Sweep Generator Coupling	Sweep Generator Frequency	Oscilloscope Connection	Adjust	Remarks
See Fig. 3-1 and Fig. 3-2.	10.7 MHz	MPX OUT jack	IFT 001 IFT 002 IFT 003 (See Fig. 3-9.)	Band selector: FM AFC switch: OFF Adjust for maximum amplitude and symmetrical S curve on the scope.

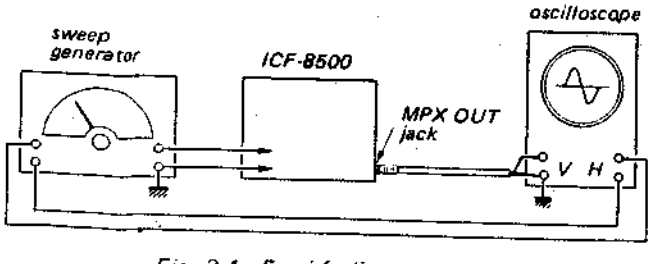


Fig. 3-1 Fm i-f alignment setup

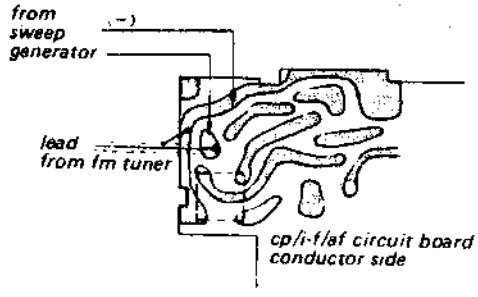


Fig. 3-2 Sweep generator connection

3-2. AIR I-F STRIP ALIGNMENT

Test Equipments/Tools Required: Rf signal generator (for a-m)
VTVM
8 Ω resistor
Screw driver for alignment

Rf Signal Generator Coupling	Rf Signal Generator Coupling	VTVM Connection	Adjust	Remarks
See Fig. 3-3 and Fig. 3-4.	10.7 MHz (1 kHz 30% a-m)	Earphone jack with 8 Ω load resistor in parallel	T 202 T 203 T 204 T 205 (See Fig. 3-5.)	Band selector: AIR VOLUME control: MAX TONE control: H Tuning capacitor: minimum capacitance position Adjust for maximum meter reading.

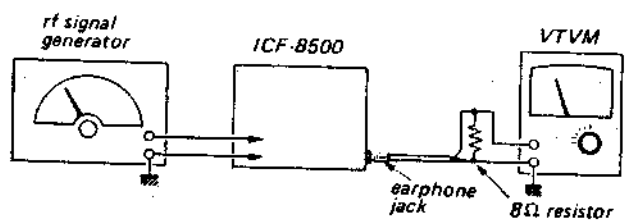


Fig. 3-3 AIR i-f strip alignment setup

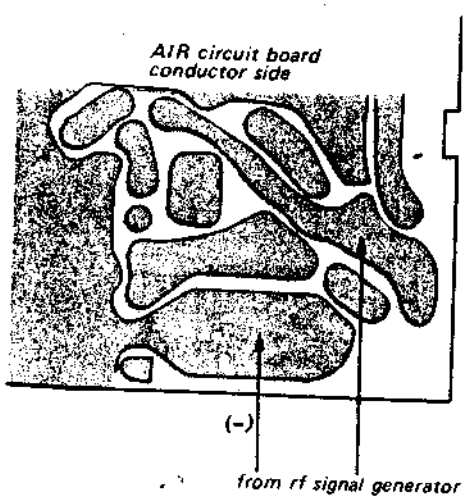


Fig. 3-4 Rf signal generator connection

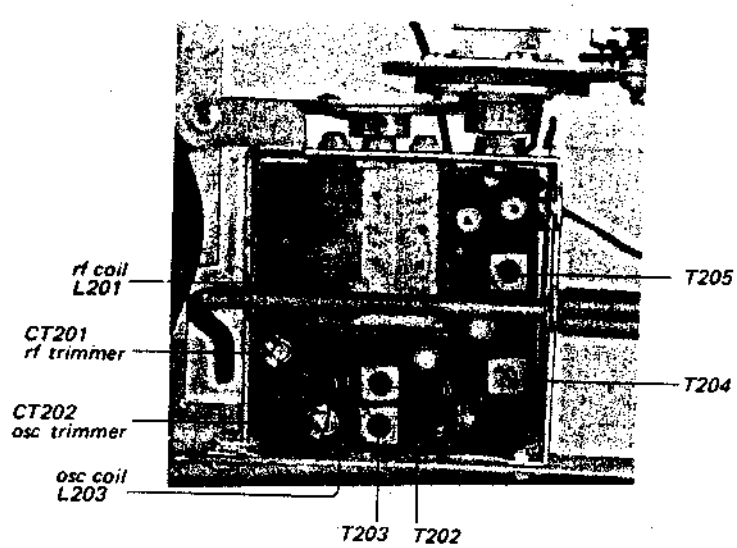


Fig. 3-5 Alignment parts locations on AIR circuit board

3-3. FREQUENCY COVERAGE AND TRACKING ADJUSTMENT

Test Equipments/Tools Required:

Rf signal generator (for fm and a-m)
Loop antenna
VTVM
8 Ω resistor
Screw driver for alignment

Preparation:

VTVM Connection: To earphone jack with 8 Ω load resistor in parallel.

Modulation : FM - 400 Hz ±22.5 kHz frequency modulated signal
AM - 1 kHz 30% amplitude modulated signal

VOLUME Control Setting: MAX
TONE Control Setting : H
AFC Switch : OFF

Adjustment	Rf Signal Generator Coupling	Rf Signal Generator Frequency	TUNING Knob Setting	Adjust	Remarks
FM frequency coverage	To FM EXT ANTENNA jack See Fig. 3-6.	85.5 MHz	Fully counter-clockwise	FM osc coil L104	Band selector: FM Adjust for maximum meter reading.
		109 MHz	Fully clockwise	FM osc trimmer CT1-4	
FM tracking	This special test equipment required for this adjustment makes this strictly a factory adjustment.				
AIR frequency coverage	To telescopic antenna See Fig. 3-6.	109 MHz	Fully counter-clockwise	AIR osc coil L203	SQUELCH control: OFF Band selector: AIR Adjust for maximum meter reading.
		136.5 MHz	Fully clockwise	AIR osc trimmer CT202	
AIR tracking		109 MHz	Tune to 109 MHz signal	AIR rf coil L201	
		136.5 MHz	Tune to 136.5 MHz signal	AIR rf trimmer CT201	
MRN frequency coverage	To AM external antenna terminal See Fig. 3-6.	1.45 MHz	Fully counter-clockwise	MRN osc coil L004	Band selector: MRN Adjust for maximum meter reading.
		4.65 MHz	Fully clockwise	MRN osc trimmer CT004	

Adjustment	Rf Signal Generator Coupling	Rf Signal Generator Frequency	TUNING Knob Setting	Adjust	Remarks
MRN tracking	To AM external antenna terminal See Fig. 3-6.	1.45 MHz	Tune to 1.45 MHz signal	MRN ant coil L001	Band selector: MRN Adjust for maximum meter reading.
		4.65 MHz	Tune to 4.65 MHz signal	MRN ant trimmer CT001	
MW frequency coverage	Loop antenna See Fig. 3-7.	520 kHz	Fully counter-clockwise	MW osc coil L005	Band selector: MW Adjust for maximum meter reading.
		1,680 kHz	Fully clockwise	MW osc trimmer CT005	
MW tracking		620 kHz	Tune to 620 kHz signal	MW ant coil L002-2	
		1,400 kHz	Tune to 1,400 kHz signal	MW ant trimmer CT002	
BCN frequency coverage	Loop antenna See Fig. 3-7.	145 kHz	Fully counter-clockwise	BCN osc coil L006	Band selector: BCN Adjust for maximum meter reading.
		420 kHz	Fully clockwise	BCN osc trimmer CT006	
BCN tracking		200 kHz	Tune to 200 kHz signal	BCN ant coil L002-1	
		350 kHz	Tune to 350 kHz signal	BCN ant trimmer CT003	

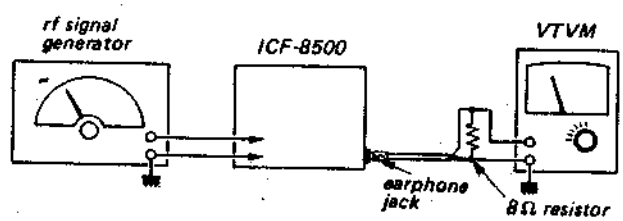


Fig. 3-6 FM/AIR/MRN frequency coverage and tracking adjustment setup

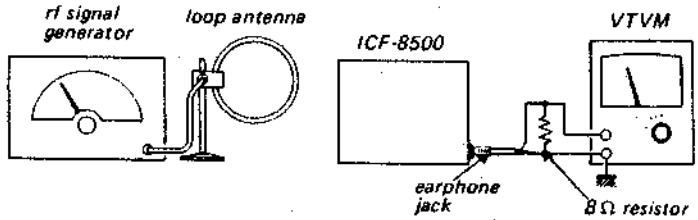


Fig. 3-7 MW/BCN frequency coverage and tracking adjustment setup

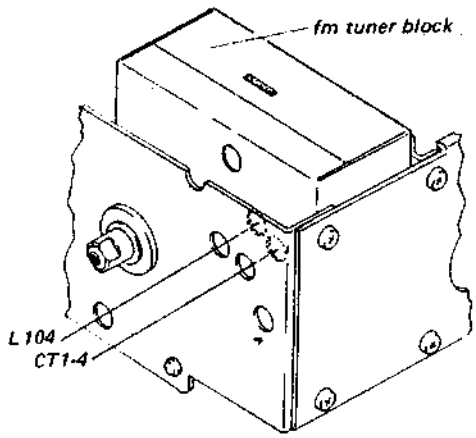


Fig. 3-8 Alignment parts locations on fm tuner

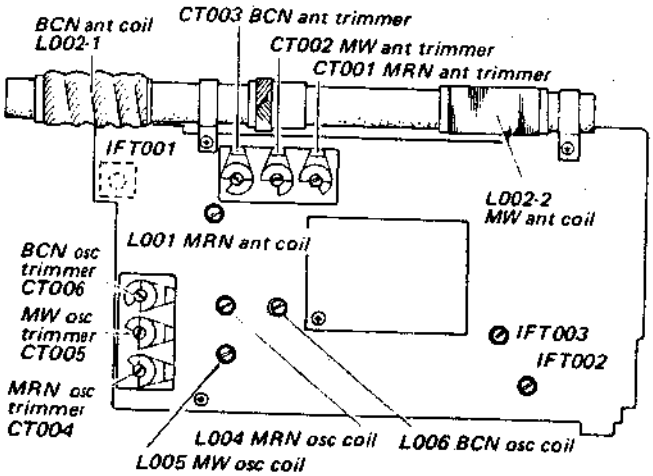


Fig. 3-9 Alignment parts locations on cp/i-f/af circuit board (viewed from the conductor side)

3-4. AGC VOLTAGE ADJUSTMENTS

Test Equipment Required: Voltmeter (20kΩ/V)

a) A-m Agc Voltage Adjustment 1

This adjustment shall be made when IC2 is replaced.

1. Set the band selector to MW.
2. Select resistor R010 in so appropriate value as to obtain 1.5 V between terminal-7 of IC2 and ground circuit.
   R010: 10 kΩ to 51 kΩ

b) A-m Agc Voltage Adjustment 2

This adjustment shall be made when Q002 is replaced.

1. Set the band selector to MW.
2. Select resistor R003 in so appropriate value as to obtain 0.1 V across resistor R001 (220 Ω).
   R003: 62 kΩ to 110 kΩ

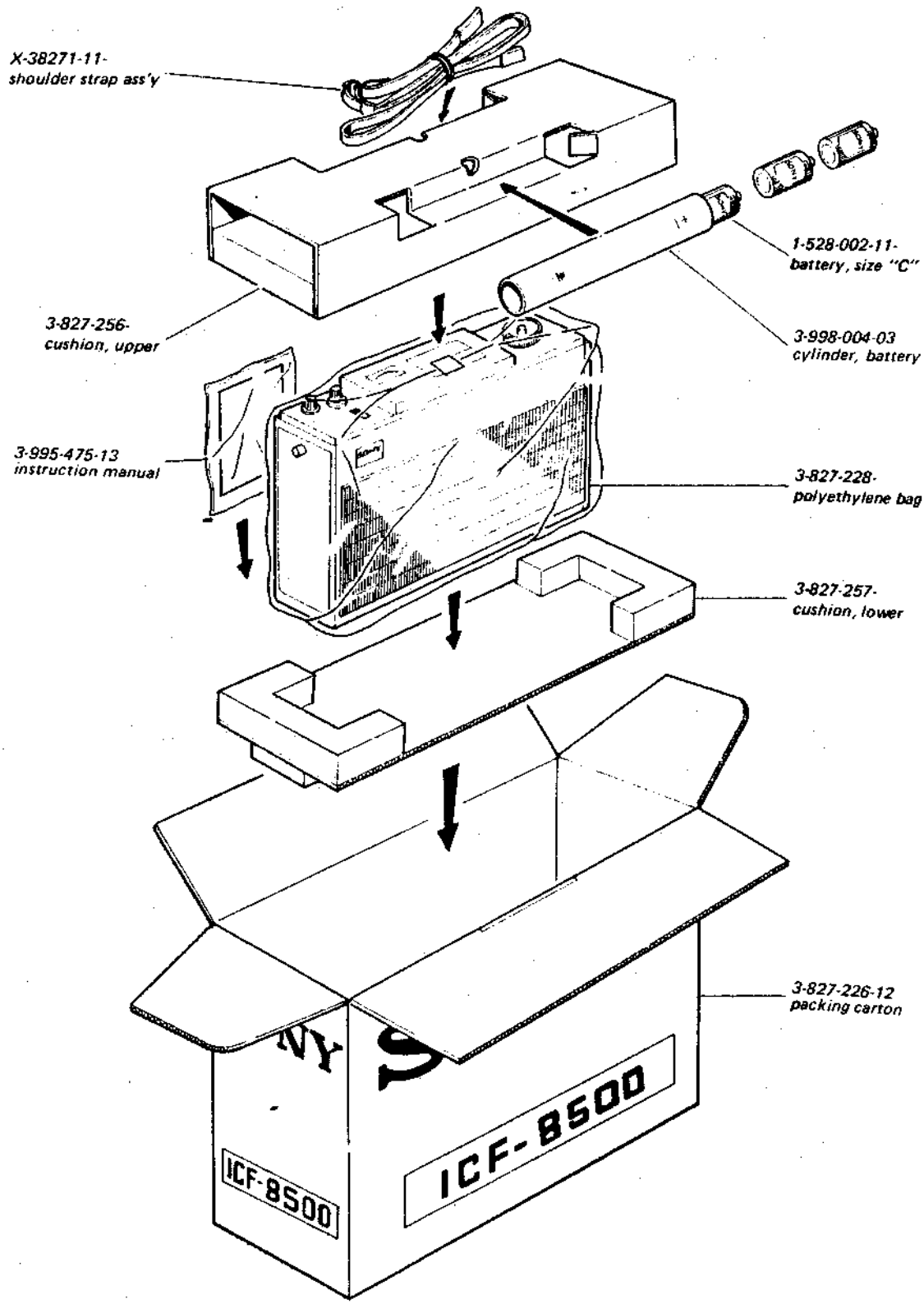
c) AIR Agc Voltage Adjustment

This adjustment shall be made when Q206 is replaced.

1. Set the band selector to AIR.
2. Select resistor R221 in so appropriate value as to obtain 1.7 V across resistor R223 (820 Ω).
   R221: 120 Ω to 220 Ω

SECTION 4

REPACKING

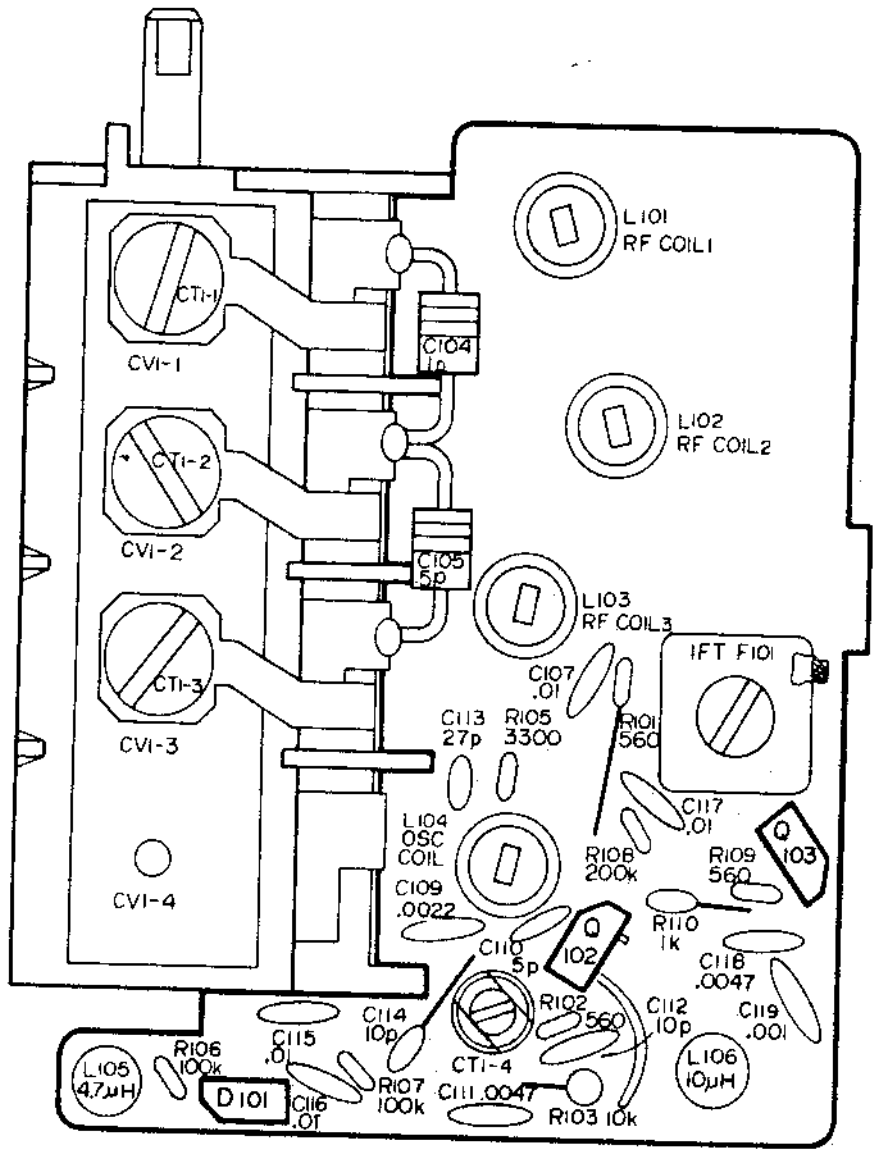


SECTION 5

DIAGRAMS

5-1. MOUNTING DIAGRAMS

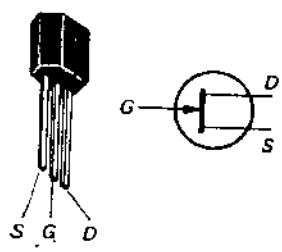
Fm Tuner Circuit Board (P2) — *Component Side* —



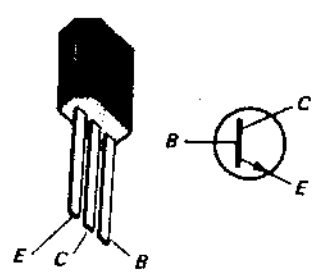
Note:
The following components are mounted on the conductor side:

C101, C102, C103, C108, C120, C121, C122, R104, Q101

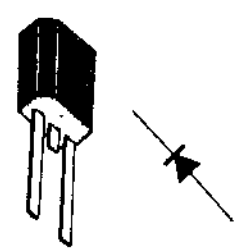
Q101; 2SK23



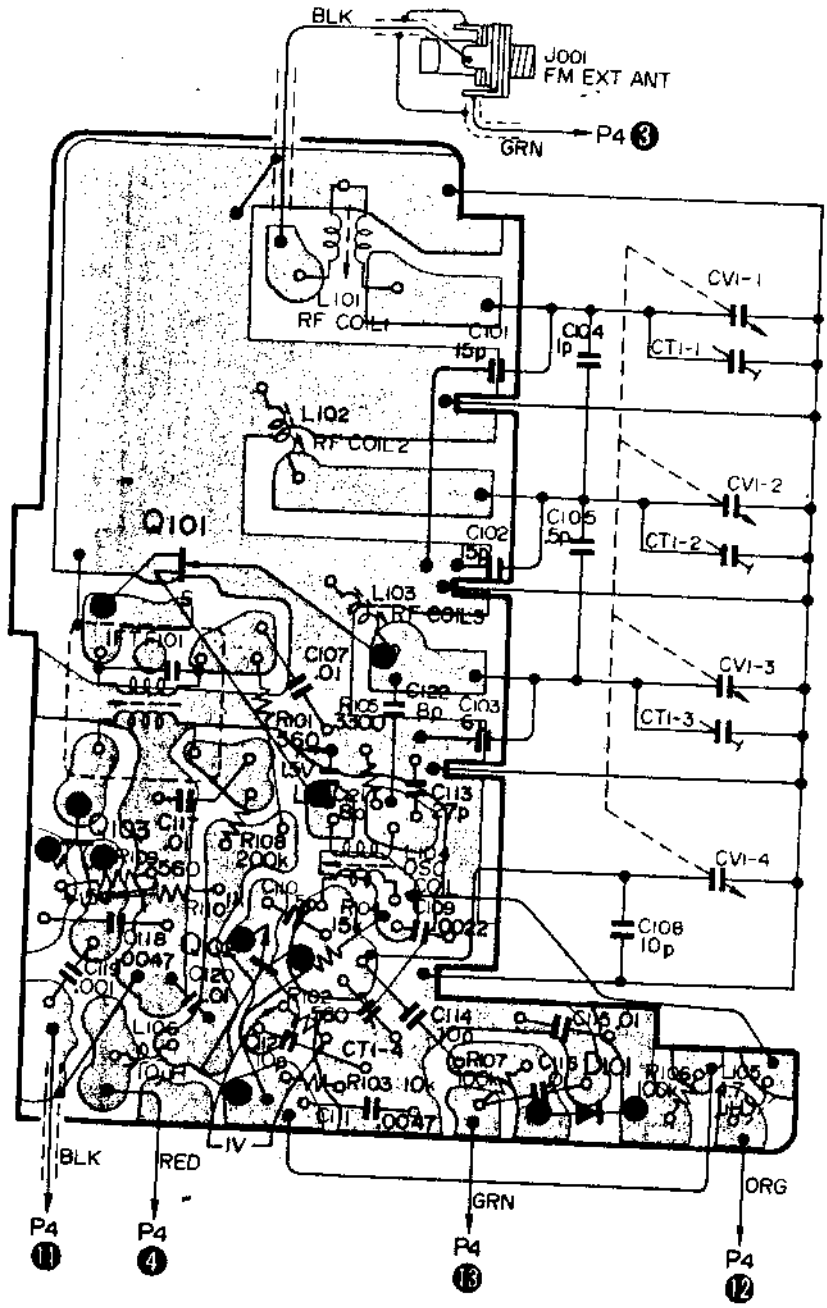
Q102; 2SC629
Q103; 2SC403A



D101; 1T240



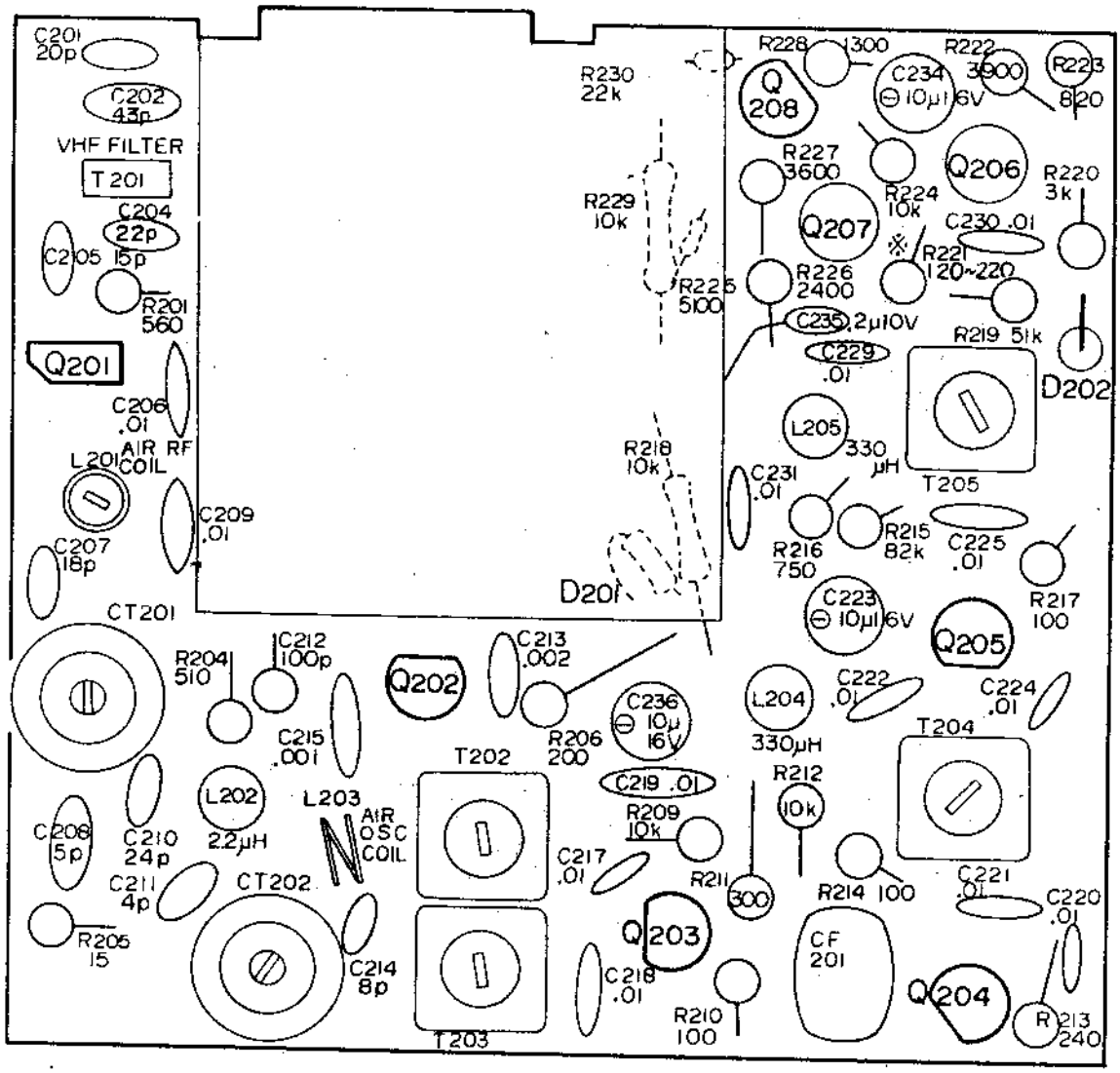
Fm Tuner Circuit Board (P2) — *Conductor Side* —



Printed circuit board
Part No. 1-538-793-12

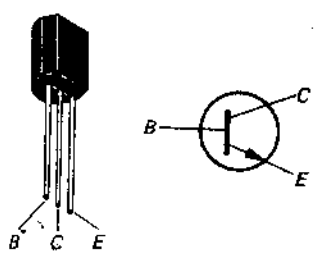
Note: The following components are mounted on the conductor side:
C101, C102, C103, C108, C120, C121, C122, R104, Q101

AIR Circuit Board (P3) — *Component Side* —

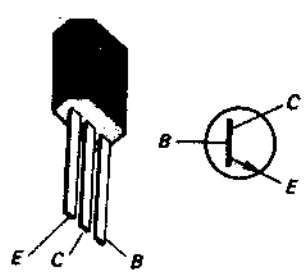


Note: The following components are mounted on the conductor side.
C203, C216, C232, C233, C237, C238, C239, CT202, R202, R203, R207, R208, R231.
The symbol ※ indicates a component whose value is selected to yield specified operating condition.

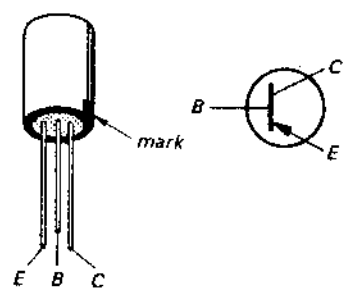
Q202, Q203, Q204, Q205, Q208; 2SC710



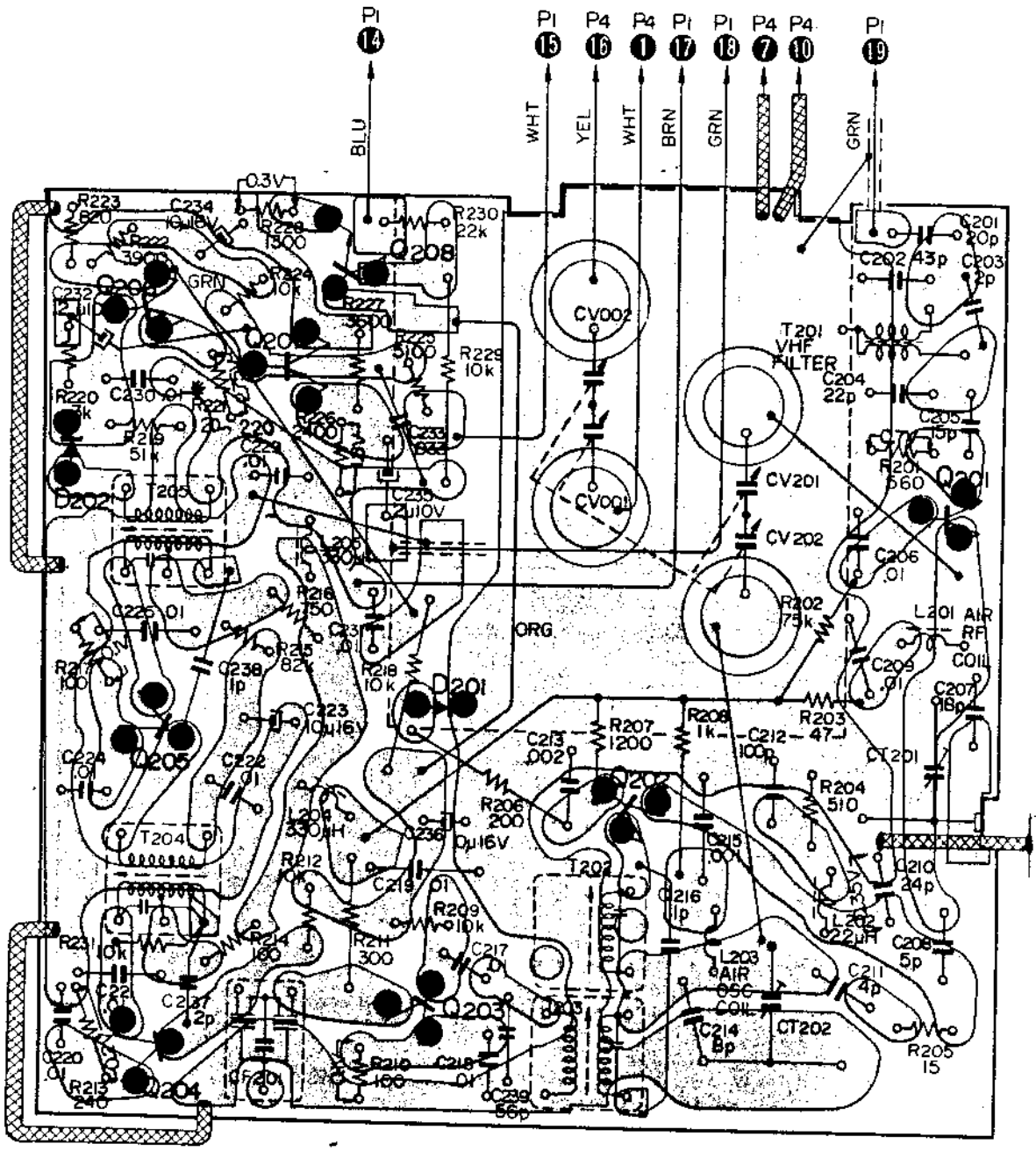
Q210; 2SC629



Q206, Q207; 2SB136



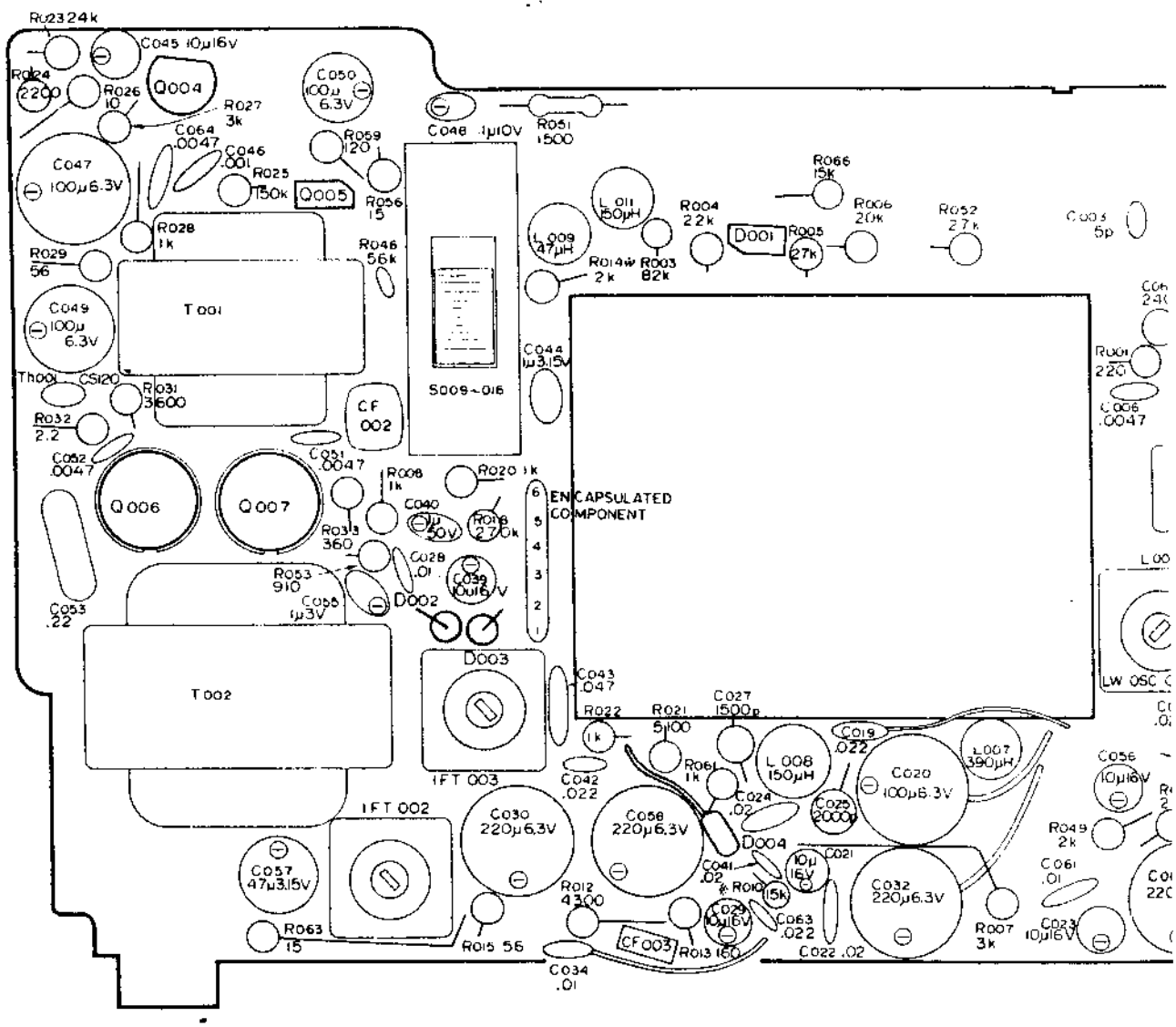
AIR Circuit Board (P3) — *Conductor Side* —



Printed circuit board
Part No. 1-539-124-11

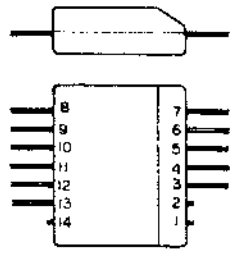
Note: The following components are mounted on the conductor side:
C203, C216, C232, C233, C237, C238, C239, CT202, R202, R203, R207, R208, R231.
The symbol * indicates a component whose value is selected to yield specified operating condition.

Cp/i-f/af Circuit Board (P4) — *Component Side* —

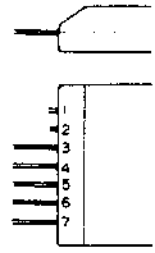


Note: The following components are mounted on the conductor side:
C012, C014, C054, C059, C067, C068, C069, C071, C072, CT001, CT002, CT004, CT005, CT006, R009, R060, R064, R065, R080, IC1, IC2.
The symbol ✳ indicates a component whose value is selected to yield specified operating condition.

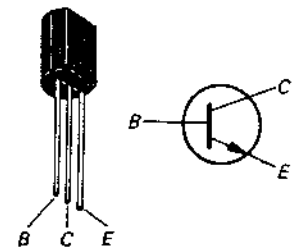
IC 1;
CX002



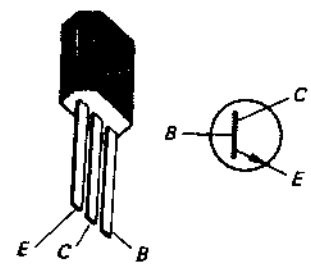
IC 2;
CX003



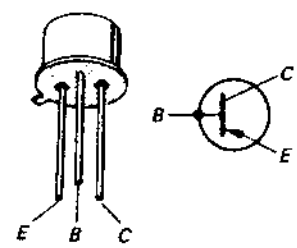
Q001, Q002,
Q003;
2SC710
Q004; 2SC870



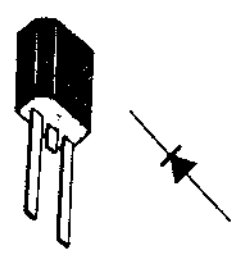
Q005; 2SC633

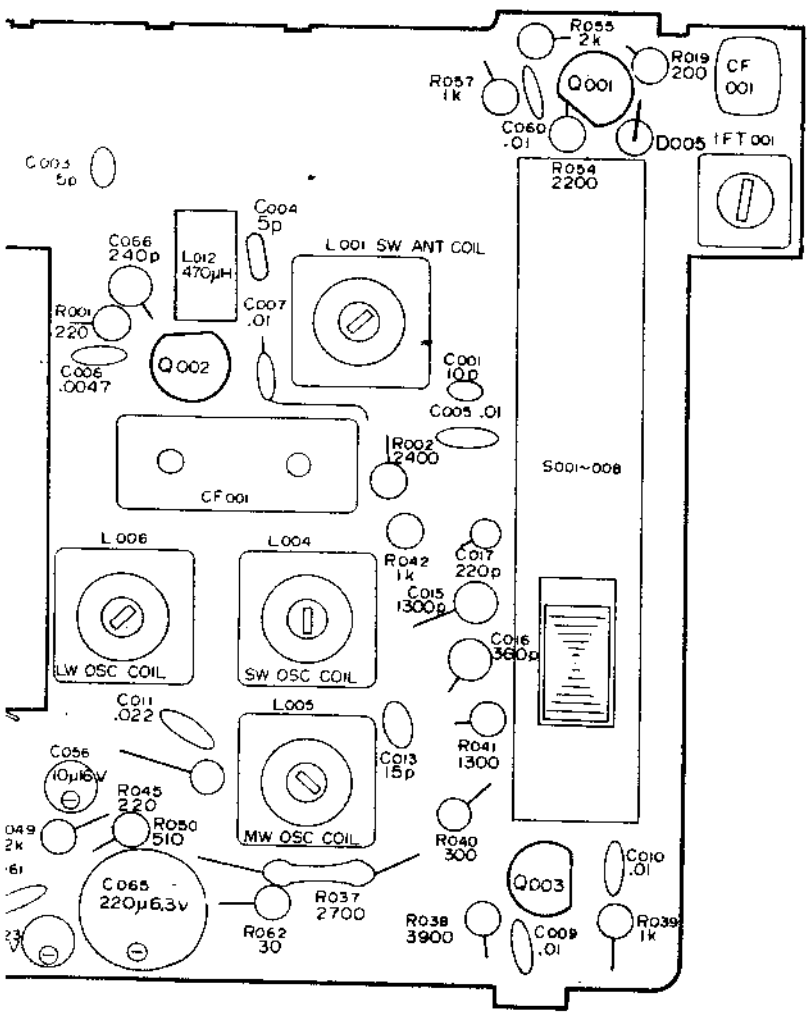


Q006, Q007,
2SB383

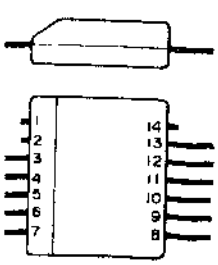


D101; 1T240

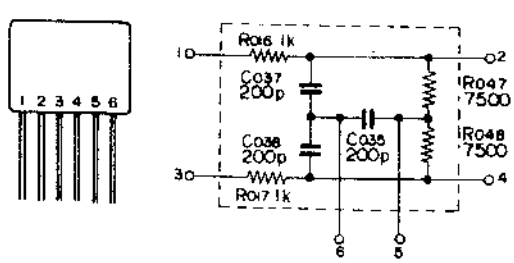




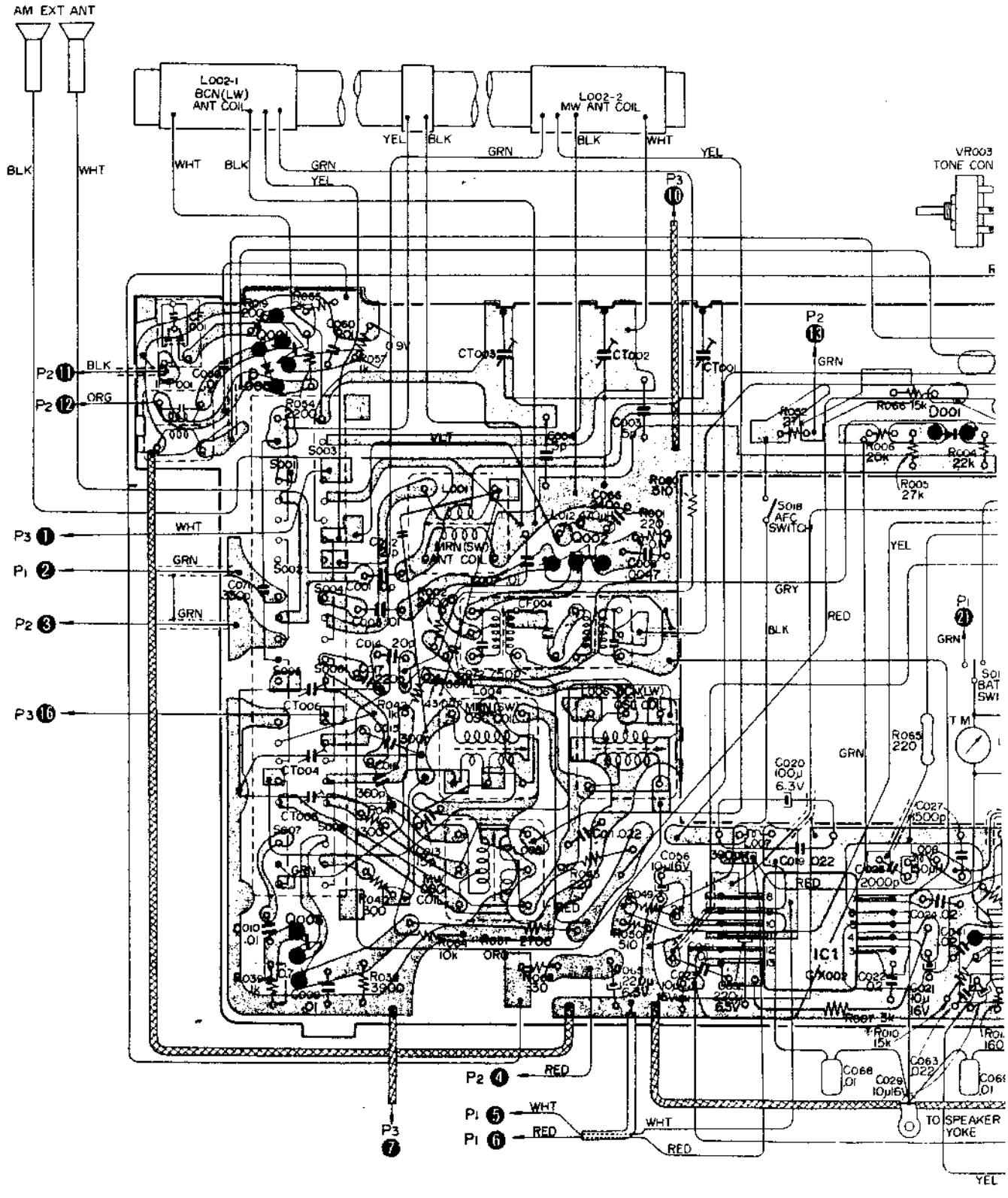
IC 2;
CX003



ENCAPSULATED COMPONENT

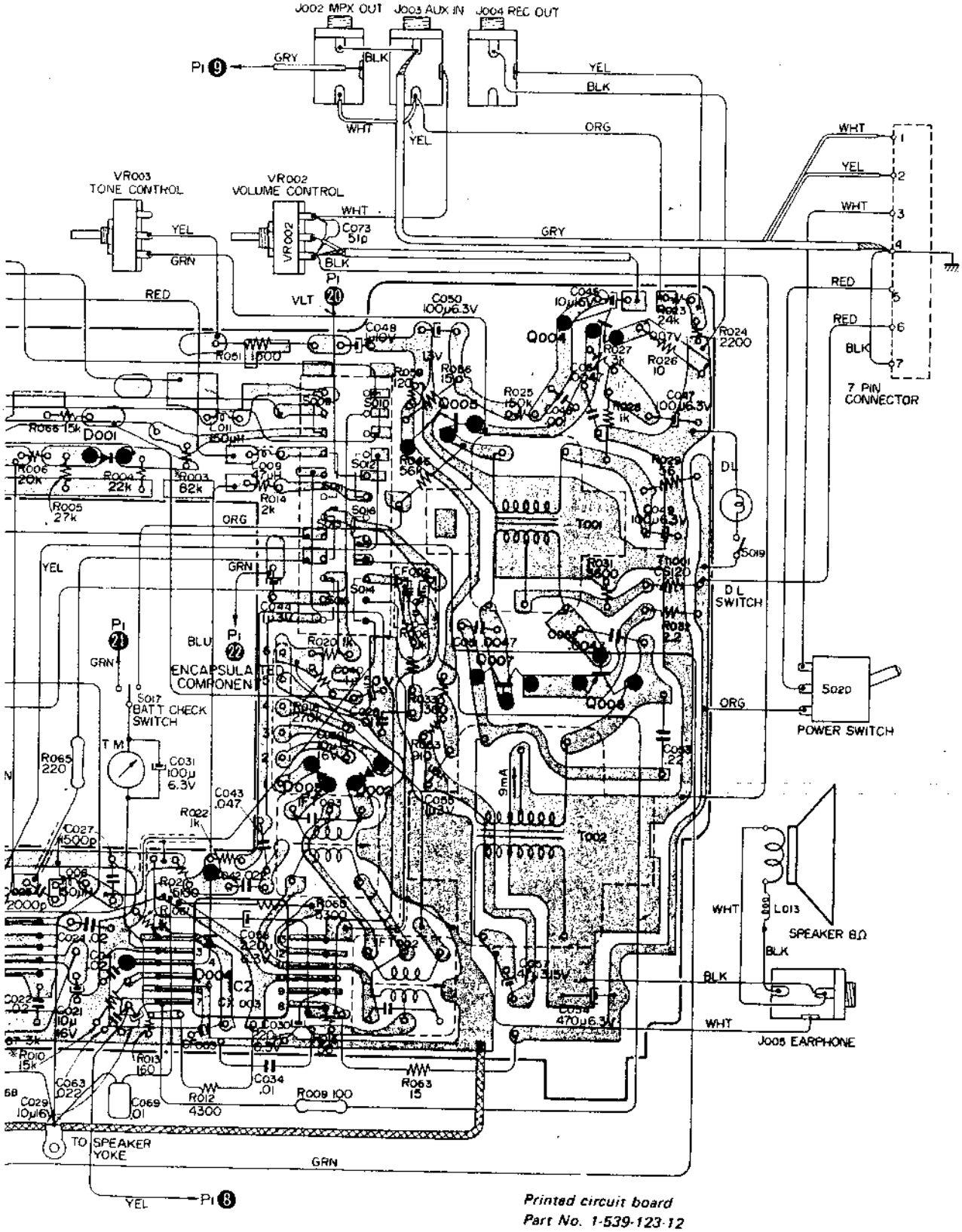


Cp/i-f/af Circuit Board (P4) — *Conductor Side* —



Note: The following components are mounted on the conductor side: C012, C014, C054, C059, C067, C068, C069, C071, C072, CT001, CT002, CT003, CT004, CT005, CT006, R009, R060, R064, R065, R080, IC1, IC2.

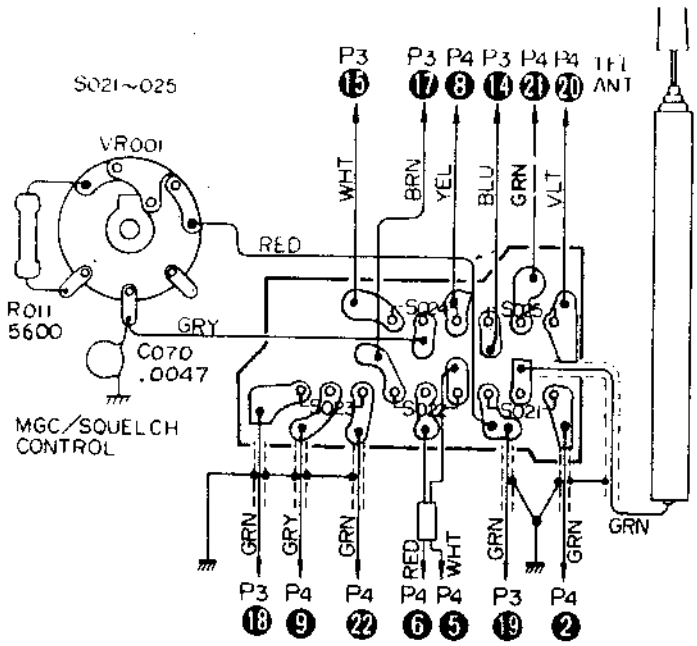
The symbol * indicates a component whose yield specified operating condition.



Printed circuit board
Part No. 1-539-123-12

a component whose value is selected to
g condition.

AIR Switch Circuit Board (P1) — *Conductor Side* —



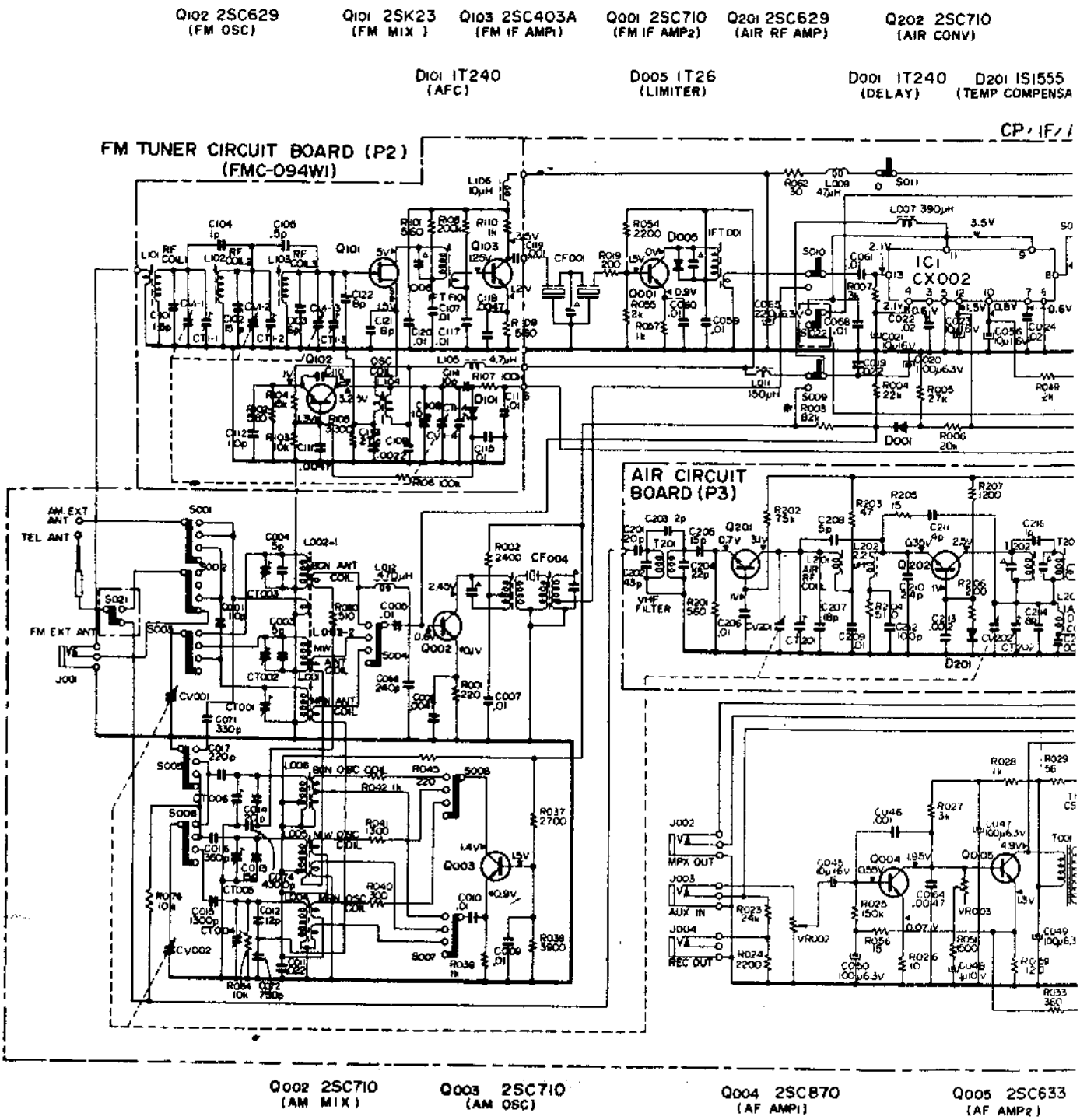
Printed circuit board
Part No. 1-539-122-11

Note:

1. ⏚ indicates grounding to chassis.
2. All resistors and capacitors are in Ω and μF, unless otherwise indicated.
3. Capacitors marked △ are built in i-f transformers.
4. Capacitors and resistors marked ☆ are built in the encapsulated component.
5. Resistors marked ✳ are selected in value to yield specified operating condition. Refer to the Agc Voltage Adjustment in Page 15.
6. Voltage values shown are measured to ground circuit with a dc voltmeter (20 kΩ/V) and with no signal input. Variations may be noted due to normal production tolerances.
7. Current values shown are measured with a dc ammeter with no signal input.
8. Switches shown are in the following mode:

Ref. No.	Description	Mode
S001 – 008	band selector MRN/MW/BCN/FM	FM
S009 – 016	band selector FM/A-M	FM
S017	BATTERY check	OFF
S018	AFC ON/OFF	OFF
S019	LIGHT	OFF
S020	POWER ON/OFF	ON
S021 – 025	AIR ON/OFF	ON

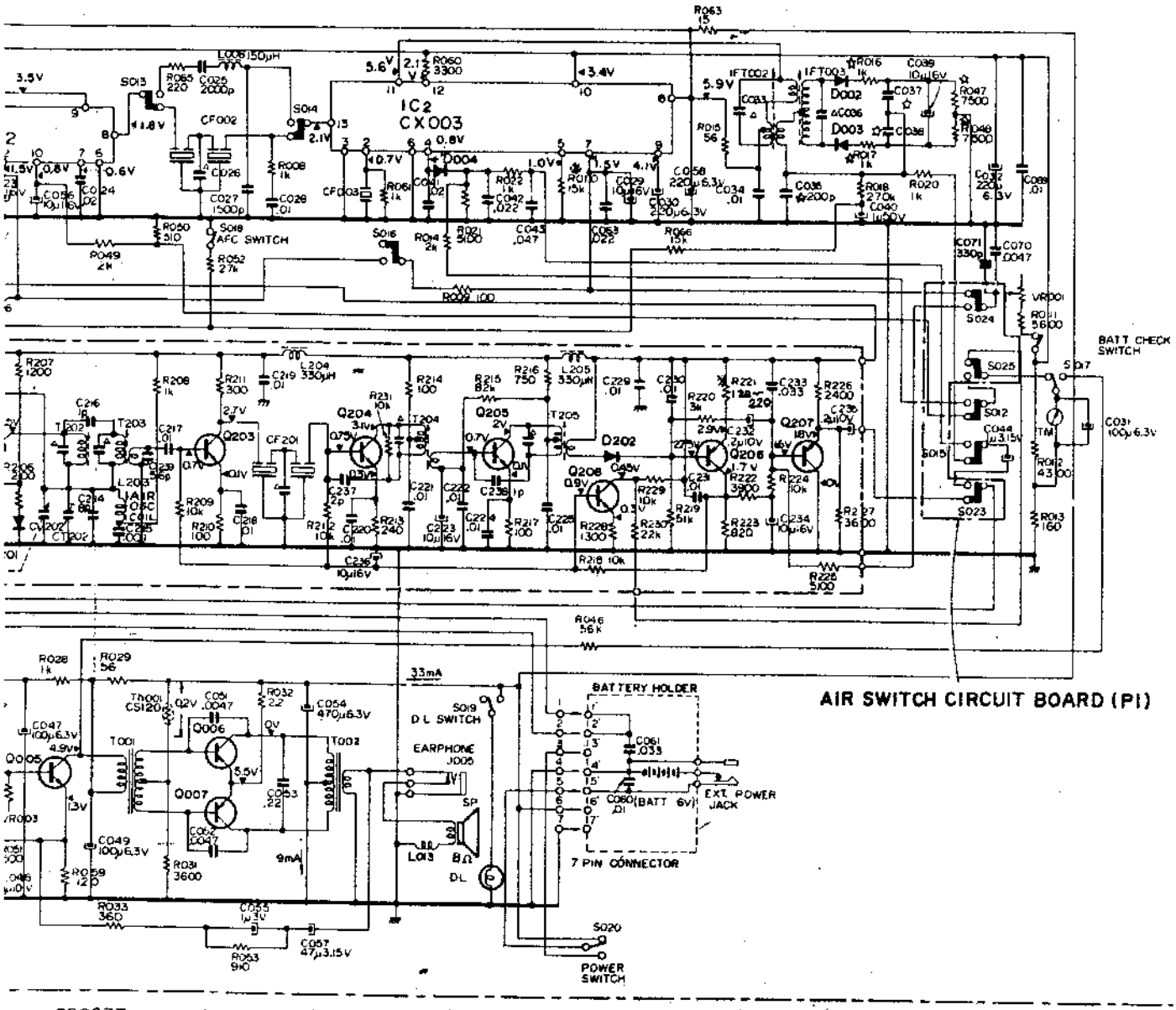
5-2. SCHEMATIC DIAGRAM



C710 (V)
Q203 2SC710 (AIR IF AMP1)
Q204 2SC710 (AIR IF AMP2)
Q205 2SC710 (AIR IF AMP3)
Q208 2SC710 (TM AMP)
Q206 2SB136 (AIR AGC AMP)
Q207 2SB136 (SQUELCH)

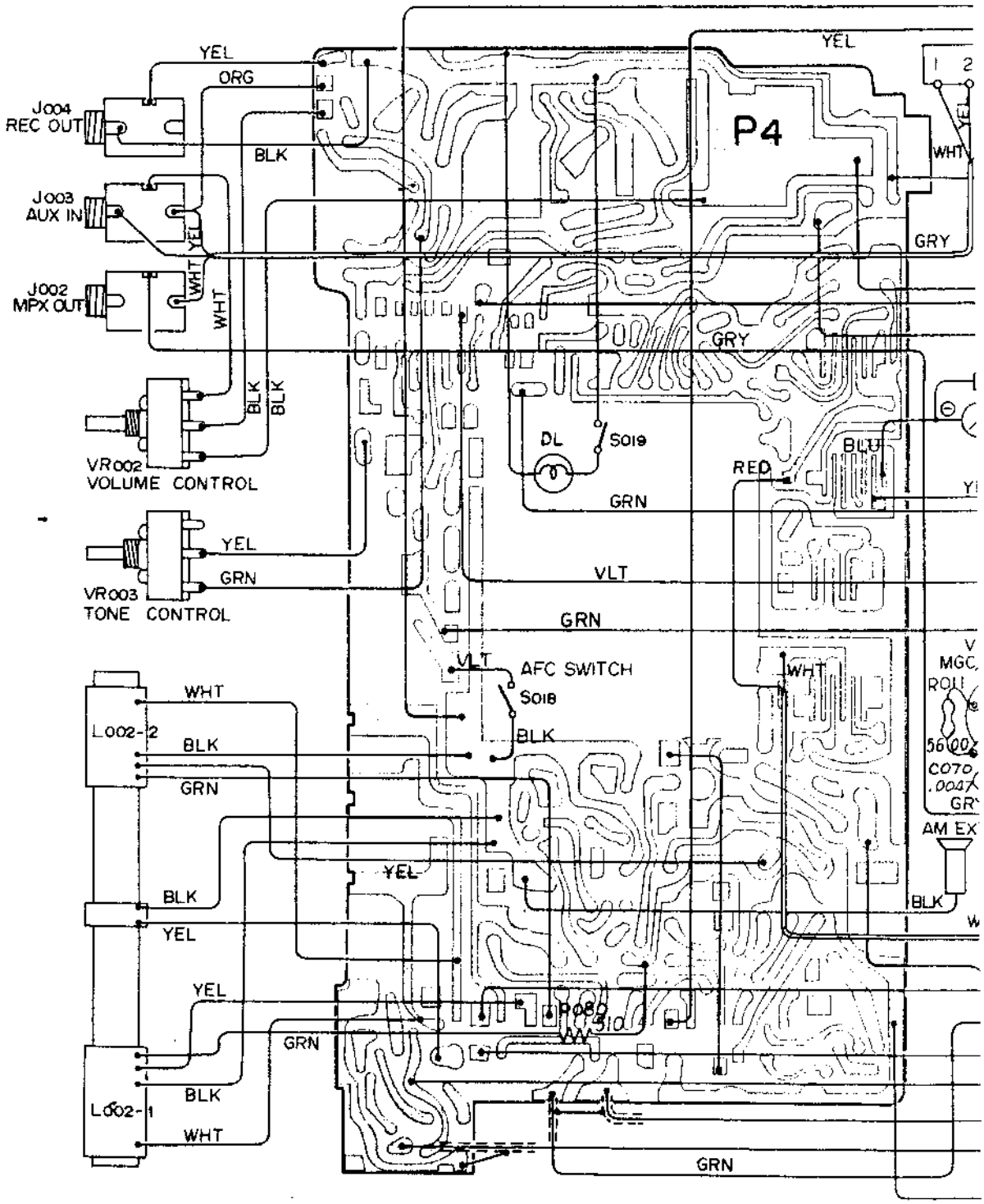
D201 1SI555 (TEMP COMPENSATION)
D004 1SI555 (AM DET)
D202 1SI555 (AIR DET)
D002,003 1T26 (FM RATIO DET)

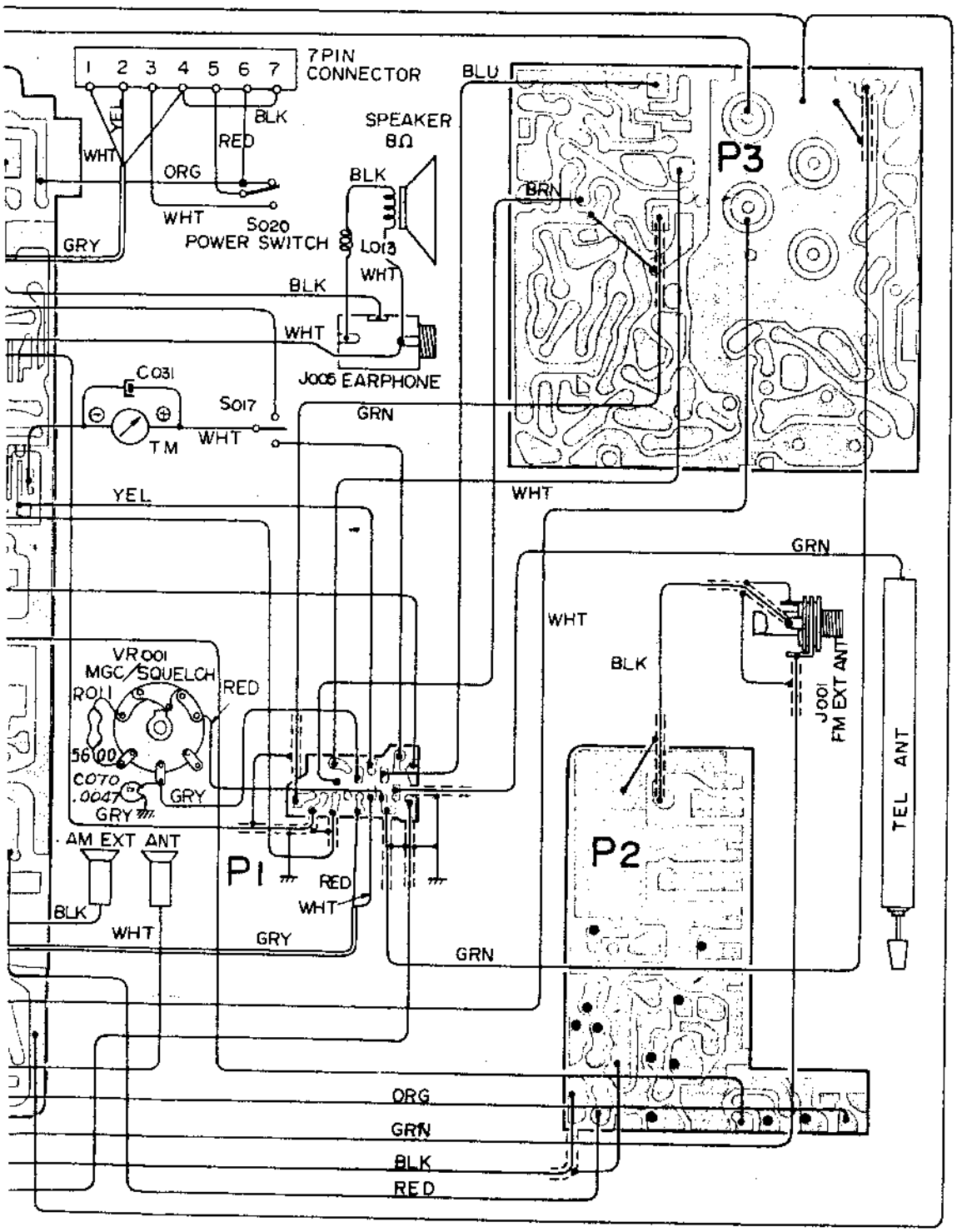
CP/IF/AF CIRCUIT BOARD (P4)



J005 2SC633 (AF AMP2)
Q006,007 2SB383 (POWER AMP)

5-3. WIRING DIAGRAM




7PIN CONNECTOR
1 2 3 4 5 6 7
YEL
WHT
BLK
RED
ORG
WHT
GRY
S020
POWER SWITCH
SPEAKER 8Ω
BLK
L013
WHT
BLK
WHT
J005 EARPHONE
C031
S017
TM
WHT
GRN
YEL
BLU
P3
BRN
WHT
GRN
WHT
BLK
J001 FM EXT ANT
TEL ANT
VR001
MGC/SQUELCH
R011
RED
5600
COTO
.0047
GRY
GRY
AM EXT ANT
P1
RED
WHT
BLK
WHT
GRY
P2
GRN
ORG
GRN
BLK
RED

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	Y-38519-11-1	complete fm tuner block, FMC-094W1
	98-1357-80	mounted circuit board, cp/i-f/af
	98-1357-90	mounted circuit board, AIR
	98-1357-10	mounted circuit board, fm tuner
	1-539-122-11	printed circuit board, AIR switch

SEMICONDUCTORS

IC1		IC	CX002
IC2		IC	CX003
Q001	1-801-003-	transistor	2SC710
Q002	1-801-003-	transistor	2SC710
Q003	1-801-003-	transistor	2SC710
Q004	1-801-004-	transistor	2SC870
Q005		transistor	2SC633
Q006		transistor	2SB383
Q007		transistor	2SB383
Q101		transistor	(FET) 2SK23
Q102		transistor	2SC629
Q103		transistor	2SC403A
Q201		transistor	2SC629
Q202	1-801-003-	transistor	2SC710
Q203	1-801-003-	transistor	2SC710
Q204	1-801-003-	transistor	2SC710
Q205	1-801-003-	transistor	2SC710
Q206	1-801-006-	transistor	2SB136
Q207	1-801-006-	transistor	2SB136
Q208	1-801-003-	transistor	2SC710
D001		diode	1T240
D002		diode	1T26
D003		diode	1T26
D004		diode	1S1555
D005		diode	1T26
D101		diode	1T240
D201		diode	1S1555
D202		diode	1S1555
Th001	8-691-001-01	thermistor	CS-120

COILS & TRANSFORMERS

Note: Ceramic filter marked * is selected to yield specified operating condition.
When replacing it, use a ceramic filter as same colored as the used one.

* CF001	1-527-501-11	ceramic filter, 10.7 MHz (RED)
* CF002	1-527-501-12	ceramic filter, 10.7 MHz (BLU)
	1-527-501-13	ceramic filter, 10.7 MHz (ORG)
	1-527-501-14	ceramic filter, 10.7 MHz (BLK)
	1-527-501-15	ceramic filter, 10.7 MHz (WHT)
	1-527-501-16	ceramic filter, 10.7 MHz (GRN)
	1-527-501-17	ceramic filter, 10.7 MHz (YEL)
CF003	1-403-154-	ceramic filter, 455 kHz
CF004	1-403-165-	ceramic filter, 455 kHz
CF201	1-527-501-12	ceramic filter, 10.7 MHz
IFT001	1-403-244-15	transformer, i-f 10.7 MHz
IFT002	1-403-287-11	descriminator, primary
IFT003	1-403-287-21	descriminator, secondary
IFT/F101	1-403-294-	transformer, i-f 10.7 MHz
L001	1-401-382-	coil, MRN ant
L002	1-401-381-	coil, MW/BCN bar ant
L003		– discarded –
L004	1-405-289-	coil, MRN osc
L005	1-405-330-	coil, MW osc
L006	1-405-158-	coil, BCN osc
L007	1-407-176-	micro inductor 390 µH
L008	1-407-347-	micro inductor 150 µH
L009	1-407-165-	micro inductor 47 µH
L010		– discarded –
L011	1-407-171-	micro inductor 150 µH
L012	1-407-177-	micro inductor 470 µH
L013	1-407-165-	micro inductor 47 µH
L101	1-425-526-	coil, FM rf
L102	1-425-525-	coil, FM rf
L103	1-425-525-	coil, FM rf
L104	1-405-386-	coil, FM osc
L105	1-407-186-	micro inductor 4.7 µH
L106	1-407-190-	micro inductor 10 µH
L201	1-425-533-	coil, AIR rf
L202	1-407-182-	micro inductor 2.2 µH
L203	1-405-389-	coil, AIR osc
L204	1-407-175-	micro inductor 330 µH
L205	1-407-175-	micro inductor 330 µH
T001	1-423-077-	transformer, driver
T002	1-427-225-	transformer, output
T201	1-401-383-	coil, AIR ant
T202	1-403-243-15	transformer, AIR i-f
T203	1-403-243-15	transformer, AIR i-f
T204	1-403-244-15	transformer, AIR i-f
T205	1-403-555-	transformer, AIR i-f

CAPACITORS

C001	1-101-976-	10 pF	ceramic
C002		– discarded –	
C003	1-101-955-	5 pF	ceramic
C004	1-101-955-	5 pF	ceramic
C005	1-105-411-12	0.01 µF	mylar
C006	1-105-829-12	0.0047 µF	mylar
C007	1-105-411-12	0.01 µF	mylar
C008		– discarded –	
C009	1-105-411-12	0.01 µF	mylar
C010	1-105-411-12	0.01 µF	mylar

Ref. No.	Part No.	Description
C011	1-105-413-12	0.022 µF mylar
C012	1-102-962-	12 pF ceramic
C013	1-101-861-	15 pF ceramic
C014	1-101-892-	82 pF ceramic
C015	1-103-628-	1300 pF styrol
C016	1-103-614-	360 pF styrol
C017	1-103-609-	220 µF styrol
C018		– discarded –
C019	1-105-413-12	0.022 µF mylar
C020	1-121-491-	100 µF 6.3V electrolytic
C021	1-121-471-	10 µF 16V electrolytic
C022	1-102-073-	0.02 µF ceramic
C023	1-121-471-	10 µF 16V electrolytic
C024	1-102-073-	0.02 µF ceramic
C025	1-103-632-	2000 pF styrol
C026		– discarded –
C027	1-103-629-	1500 pF styrol
C028	1-105-411-12	0.01 µF mylar
C029	1-121-471-	10 µF 16V electrolytic
C030	1-121-419-	220 µF 6.3V electrolytic
C031	1-121-491-	100 µF 6.3V electrolytic
C032	1-121-419-	220 µF 6.3V electrolytic
C033		– discarded –
C034	1-102-072-	0.01 µF ceramic
C035	built in encapsulated component	
C036		– discarded –
C037	built in encapsulated component	
C038	built in encapsulated component	
C039	1-121-471-	10 µF 16V electrolytic
C040	1-121-343-	1 µF 50V electrolytic
C041	1-102-073-	0.02 µF ceramic
C042	1-105-413-12	0.022 µF mylar
C043	1-105-415-12	0.047 µF mylar
C044	1-127-053-	1 µF 3V alox
C045	1-121-471-	10 µF 16V electrolytic
C046	1-105-821-12	0.001 µF mylar
C047	1-121-491-	100 µF 6.3V electrolytic
C048	1-127-019-	0.1 µF 10V alox
C049	1-121-491-	100 µF 6.3V electrolytic
C050	1-121-491-	100 µF 6.3V electrolytic
C051	1-105-829-12	0.0047 µF mylar
C052	1-105-829-12	0.0047 µF mylar
C053	1-105-419-12	0.22 µF mylar
C054	1-121-359-	500 µF 6.3V electrolytic
C055	1-127-053-	1 µF 3V alox
C056	1-121-471-	10 µF 16V electrolytic
C057	1-121-486-	47 µF 3.15V electrolytic
C058	1-121-419-	220 µF 6.3V electrolytic
C059	1-102-072-	0.01 µF ceramic
C060	1-102-072-	0.01 µF ceramic
C061	1-105-414-12	0.033 µF mylar
C062		– discarded –
C063	1-105-413-12	0.022 µF mylar
C064	1-105-829-12	0.0047 µF mylar
C065	1-121-419-	220 µF 6.3V electrolytic
C066	1-103-610-	240 pF styrol

Ref. No.	Part No.	Description
C067		– discarded –
C068	1-105-411-12	0.01 µF mylar
C069	1-105-411-12	0.01 µF mylar
C070	1-105-829-12	0.0047 µF mylar
C071	1-103-663-	330 pF styrol
C072	1-103-622-	750 pF styrol
C073	1-101-882-	51 pF ceramic
C074	1-103-640-	4300 pF styrol
C101	1-101-861-	15 pF ceramic
C102	1-101-861-	15 pF ceramic
C103	1-101-956-	6 pF ceramic
C104	1-102-937-	1 pF ceramic
C105	1-101-936-	0.5 pF ceramic
C106		– discarded –
C107	1-101-072-	0.01 µF ceramic
C108	1-102-662-	7 pF ceramic
C109	1-102-089-	0.0022 µF ceramic
C110	1-102-864-	5 pF ceramic
C111	1-102-090-	0.0047 µF ceramic
C112	1-102-508-	10 pF ceramic
C113	1-101-869-	27 pF ceramic
C114	1-101-976-	10 pF ceramic
C115	1-101-072-	0.01 µF ceramic
C116	1-101-072-	0.01 µF ceramic
C117	1-101-072-	0.01 µF ceramic
C118	1-105-829-12	0.0047 µF mylar
C119	1-101-918-	0.001 µF ceramic
C120	1-101-072-	0.01 µF ceramic
C121	1-101-958-	8 pF ceramic
C122	1-101-958-	8 pF ceramic
C201	1-101-864-	20 pF ceramic
C202	1-101-880-	47 pF ceramic
C203	1-101-952-	2 pF ceramic
C204	1-101-865-	22 pF ceramic
C205	1-101-861-	15 pF ceramic
C206	1-102-923-	0.01 µF ceramic
C207	1-101-862-	18 pF ceramic
C208	1-101-955-	5 pF ceramic
C209	1-102-923-	0.01 µF ceramic
C210	1-102-802-	24 pF ceramic
C211	1-102-744-	4 pF ceramic
C212	1-103-601-	100 pF styrol
C213	1-102-919-	0.002 µF ceramic
C214	1-102-746-	8 pF ceramic
C215	1-105-821-12	0.001 µF mylar
C216	1-101-951-	1 pF ceramic
C217	1-105-411-12	0.01 µF mylar
C218	1-105-411-12	0.01 µF mylar
C219	1-102-923-	0.01 µF ceramic
C220	1-105-411-12	0.01 µF mylar
C221	1-105-411-12	0.01 µF mylar
C222	1-105-411-12	0.01 µF mylar
C223	1-121-347-	10 µF 16V electrolytic
C224	1-105-411-12	0.01 µF mylar

Ref. No.	Part No.	Description
C225	1-105-411-12	0.01 μF mylar
C226		– discarded –
C227		– discarded –
C228		– discarded –
C229	1-105-411-12	0.01 μF mylar
C230	1-105-411-12	0.01 μF mylar
C231	1-105-411-12	0.01 μF mylar
C232	1-127-020-	0.2 μF 10V alox
C233	1-105-414-12	0.033 μF mylar
C234	1-121-347-	10 μF 16V electrolytic
C235	1-127-020-	0.2 μF 10V alox
C236	1-121-347-	10 μF 16V electrolytic
C237	1-101-952-	2 pF ceramic
C238	1-101-951-	1 pF ceramic
C239	1-101-884-	56 pF ceramic
CT001	1-141-015-01	trimmer, 3 unit
CT002	1-141-015-01	trimmer, 3 unit
CT003	1-141-015-01	trimmer, 3 unit
CT004	1-141-015-12	trimmer, 3 unit
CT005	1-141-015-12	trimmer, 3 unit
CT006	1-141-015-12	trimmer, 3 unit
CT1-1	1-141-086-11	trimmer, cylinder
CT1-2	1-141-086-11	trimmer, cylinder
CT1-3	1-141-086-11	trimmer, cylinder
CT1-4	1-141-086-11	trimmer, cylinder
CT1-5	1-141-086-11	trimmer, cylinder
CT1-6	1-141-086-11	trimmer, cylinder
CT1-7	1-141-086-11	trimmer, cylinder
CT1-8	1-141-086-11	trimmer, cylinder
CT201	1-141-022-	trimmer, ceramic
CT202	1-141-022-	trimmer, ceramic
CV001,002 CV201,202	1-151-196-	tuning, 4 gang, a-m
CV1-1~1-4	1-151-158-	tuning, 4 gang, fm

RESISTORS

Note: 1. Resistors listed below are ¼ watt type carbon resistors, unless otherwise noted.
2. Resistors marked * are selected in value to yield specified operating condition. Refer to the Agc Voltage Adjustment in page 15.

Ref. No.	Part No.	Description
R001	1-244-657-	220 Ω
R002	1-244-682-	2400 Ω
* R003	1-244-716-	62 kΩ
	1-244-717-	68 kΩ
	1-244-718-	75 kΩ
	1-244-719-	82 kΩ
	1-244-720-	91 kΩ
	1-244-721-	100 kΩ
	1-244-722-	110 kΩ
R004	1-244-705-	22 kΩ
R005	1-244-707-	27 kΩ
R006	1-244-704-	20 kΩ
R007	1-244-684-	3 kΩ
R008	1-244-673-	1 kΩ
R009	1-244-649-	100 Ω
* R010	1-244-697-	10 kΩ
	1-244-699-	12 kΩ
	1-244-701-	15 kΩ
	1-244-703-	18 kΩ
	1-244-705-	22 kΩ
	1-244-707-	27 kΩ
	1-244-709-	33 kΩ
	1-244-711-	39 kΩ
	1-244-713-	47 kΩ
	1-244-714-	51 kΩ
R011	1-244-691-	5600 Ω
R012	1-244-688-	4300 Ω
R013	1-244-654-	160 Ω
R014	1-244-680-	2 kΩ
R015	1-244-643-	56 Ω
R016	built in encapsulated component	
R017	built in encapsulated component	
R018	1-244-731-	270 kΩ
R019	1-244-656-	200 Ω
R020	1-244-673-	1 kΩ
R021	1-244-690-	5100 Ω
R022	1-244-673-	1 kΩ
R023	1-244-706-	24 kΩ
R024	1-244-681-	2200 Ω
R025	1-244-525-	150 kΩ ⅛ W
R026	1-244-425-	10 Ω ⅛ W
R027	1-244-684-	3 kΩ
R028	1-244-673-	1 kΩ
R029	1-244-443-	56 Ω ⅛ W
R030		– discarded –
R031	1-244-686-	3600 Ω
R032	1-244-609-	2.2 Ω
R033	1-244-662-	360 Ω
R034		– discarded –
R035		– discarded –
R036		– discarded –
R037	1-244-683-	2700 Ω
R038	1-244-687-	3900 Ω
R039	1-244-673-	1 kΩ
R040	1-244-660-	300 Ω
R041	1-244-676-	1300 Ω
R042	1-244-673-	1 kΩ
R043		– discarded –
R044		– discarded –
R045	1-244-657-	220 Ω
R046	1-244-715-	56 kΩ
R047	built in encapsulated component	
R048	built in encapsulated component	
R049	1-244-680-	2 kΩ
R050	1-244-666-	510 Ω
R051	1-244-677-	1500 Ω
R052	1-244-707-	27 kΩ

Ref. No.	Part No.	Description
R053	1-244-672-	910 Ω
R054	1-244-681-	2200 Ω
R055	1-244-680-	2 kΩ
R056	1-244-629-	15 Ω
R057	1-244-673-	1 kΩ
R058		– discarded –
R059	1-244-651-	120 Ω
R060	1-244-686-	3600 Ω
R061	1-244-673-	1 kΩ
R062	1-244-636-	30 Ω
R063	1-244-629-	15 Ω
R064	1-208-133-	10 kΩ 1/16 W ceramic
R065	1-208-113-	220 Ω 1/16 W ceramic
R066	1-244-701-	15 kΩ
R101	1-208-027-	560 Ω 1/16 W ceramic
R102	1-208-027-	560 Ω 1/16 W ceramic
R103	1-244-697-	10 kΩ
R104	1-244-697-	10 kΩ
R105	1-208-045-	3300 Ω 1/16 W ceramic
R106	1-208-145-	100 kΩ 1/16 W ceramic
R107	1-208-145-	100 kΩ 1/16 W ceramic
R108	1-208-088-	200 kΩ 1/16 W ceramic
R109	1-208-027-	560 Ω 1/16 W ceramic
R110	1-208-033-	1 kΩ 1/16 W ceramic
R201	1-244-667-	560 Ω
R202	1-244-718-	75 kΩ
R203	1-244-641-	47 Ω
R204	1-244-666-	510 Ω
R205	1-244-629-	15 Ω
R206	1-244-656-	200 Ω
R207	1-244-675-	1200 Ω
R208	1-244-673-	1 kΩ
R209	1-244-697-	10 kΩ
R210	1-244-649-	100 Ω
R211	1-244-660-	300 Ω
R212	1-244-697-	10 kΩ
R213	1-244-658-	240 Ω
R214	1-244-649-	100 Ω
R215	1-244-719-	82 kΩ
R216	1-244-670-	750 Ω
R217	1-244-649-	100 Ω
R218	1-244-697-	10 kΩ
R219	1-244-714-	51 kΩ
R220	1-244-684-	3 kΩ

Ref. No.	Part No.	Description
* R221	1-244-651-	120 Ω
	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
R222	1-244-687-	3900 Ω
R223	1-244-671-	820 Ω
R224	1-244-697-	10 kΩ
R225	1-209-774-	5100 Ω 1/16 W
R226	1-244-682-	2400 Ω
R227	1-244-686-	3600 Ω
R228	1-244-676-	1300 Ω
R229	1-244-697-	10 kΩ
R230	1-210-114-	22 kΩ 1/16 W
R231	1-244-697-	10 kΩ
VR001	1-222-125-	50 kΩ variable, SQUELCH
VR002	1-221-851-	5 kΩ variable, VOLUME
VR003	1-222-127-	50 kΩ variable, TONE

MISCELLANEOUS

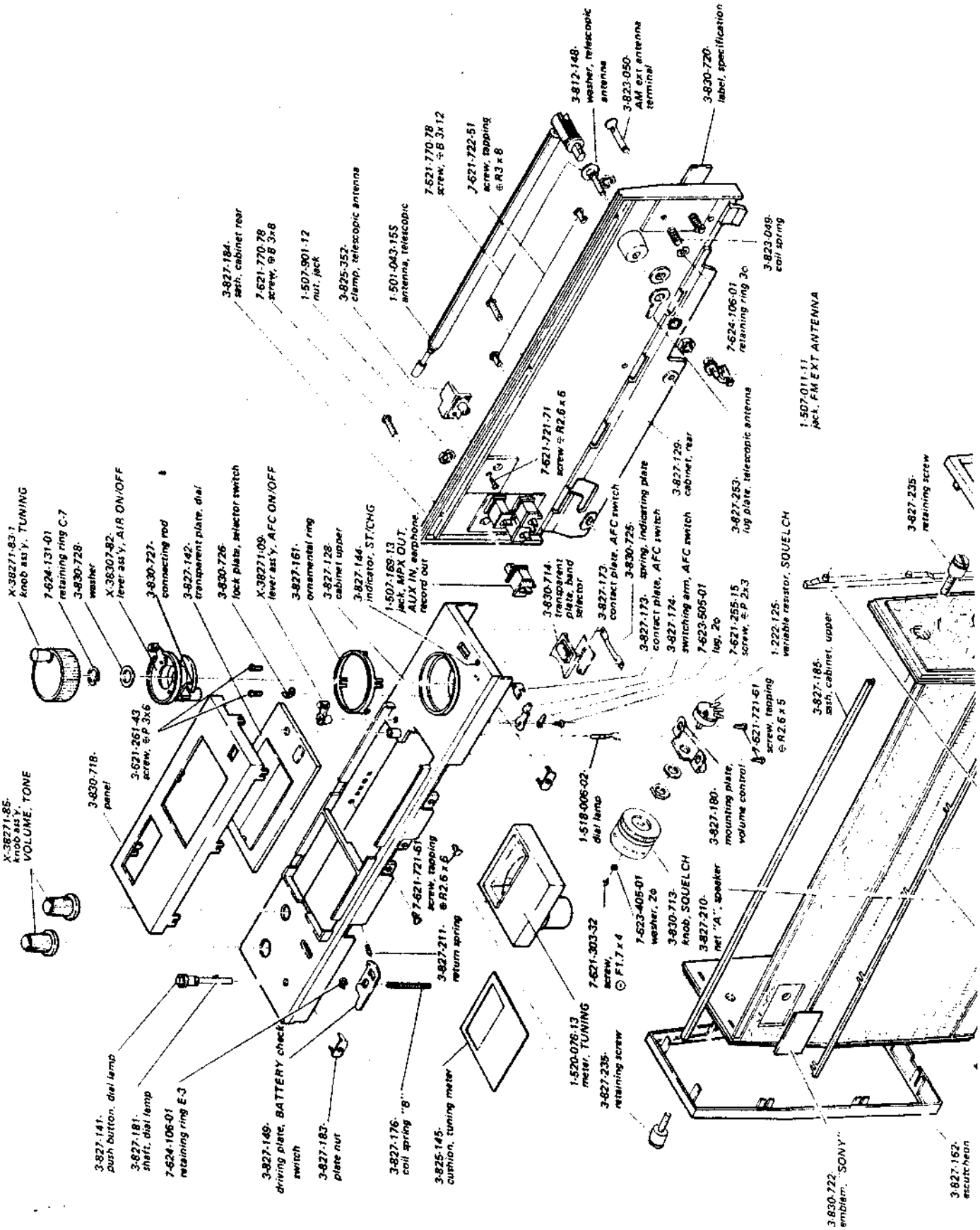
	1-231-071-11	encapsulated component
DL	1-518-006-02	lamp, dial
J001	1-507-011-11	jack, FM EXT ANTENNA
J002	1-507-169-13	jack, MPX OUT
J003	1-507-169-13	jack, AUX IN
J004	1-507-169-13	jack, record out
J005	1-507-169-13	jack, earphone
	1-507-901-12	nut, jack
	1-507-261-11	jack, EXT POWER IN
	1-536-205-13	terminal plug, 7 P
S001~008	1-513-297-	slide switch, band selector, MRN/MW/BCN/FM
S009~016	1-513-275-	slide switch, band selector, FM/AM
S017	1-514-422-	switch, BATTERY check
S018	3-827-173-	contact plate, AFC ON/OFF switch
	3-827-174-	switching arm, AFC ON/OFF switch
S019	1-514-269-	switch, LIGHT
S020	1-514-421-	switch, POWER ON/OFF
S021~025	1-513-274-	slide switch, AIR ON/OFF
SP	1-502-190-12S	speaker
TEL ANT	1-501-043-15S	antenna, telescopic
TM	1-520-076-13	meter, TUNING
	1-536-205-13	7 P connector, plug

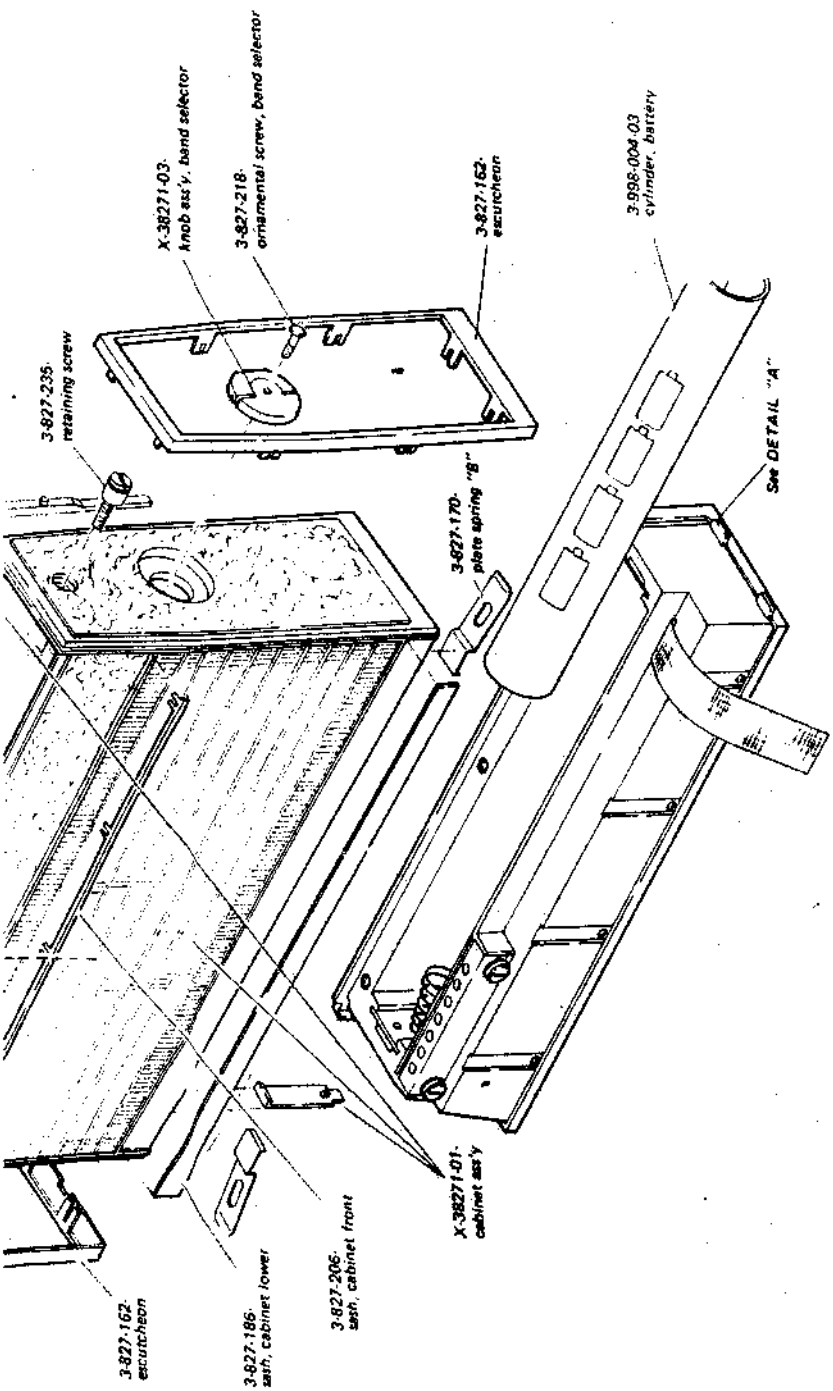
Note: When ordering replacement parts, you should use PART NUMBER listed in the parts list or the exploded views. The reference number should not be used for ordering purposes.

SECTION 7

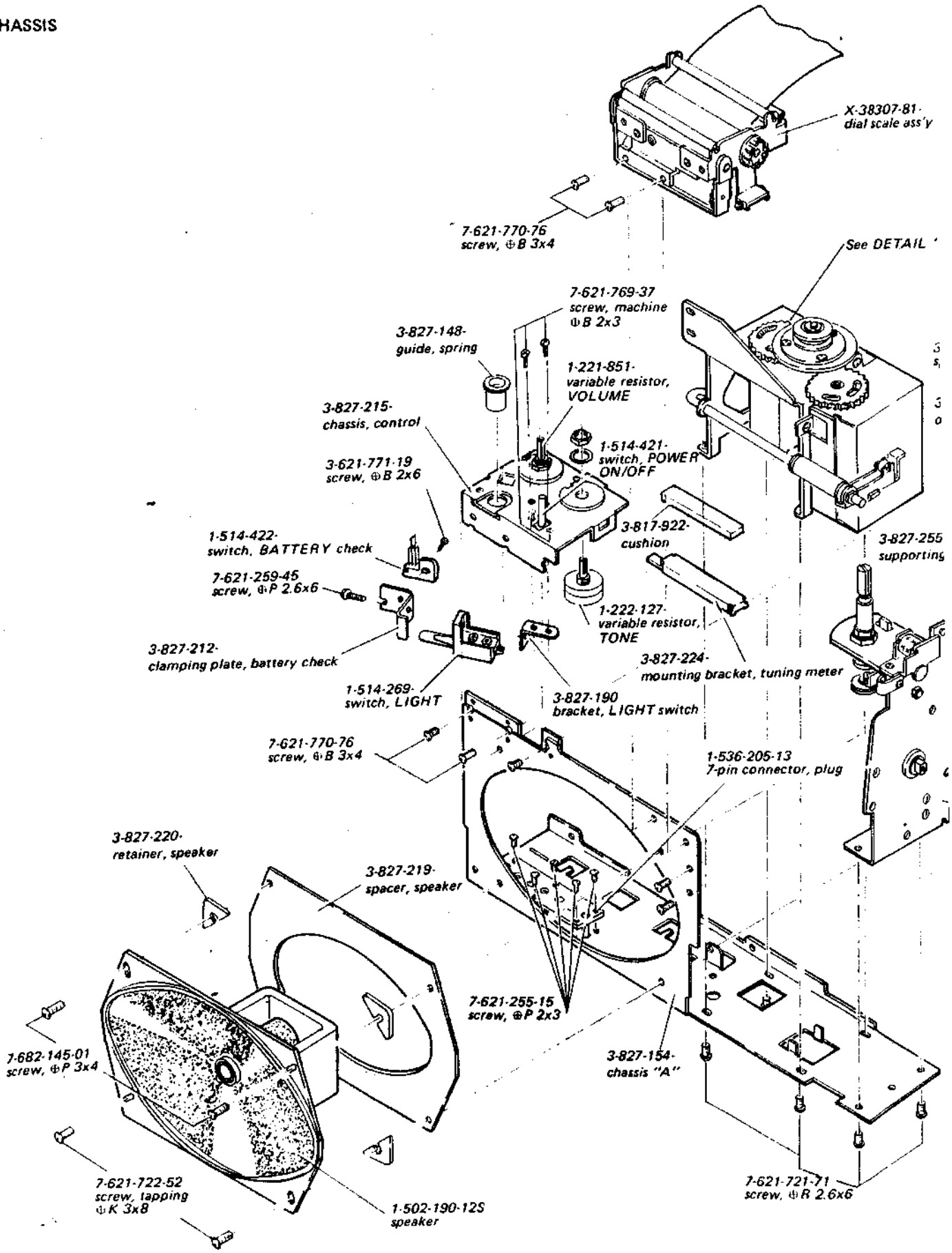
EXPLODED VIEWS

7-1. CABINET

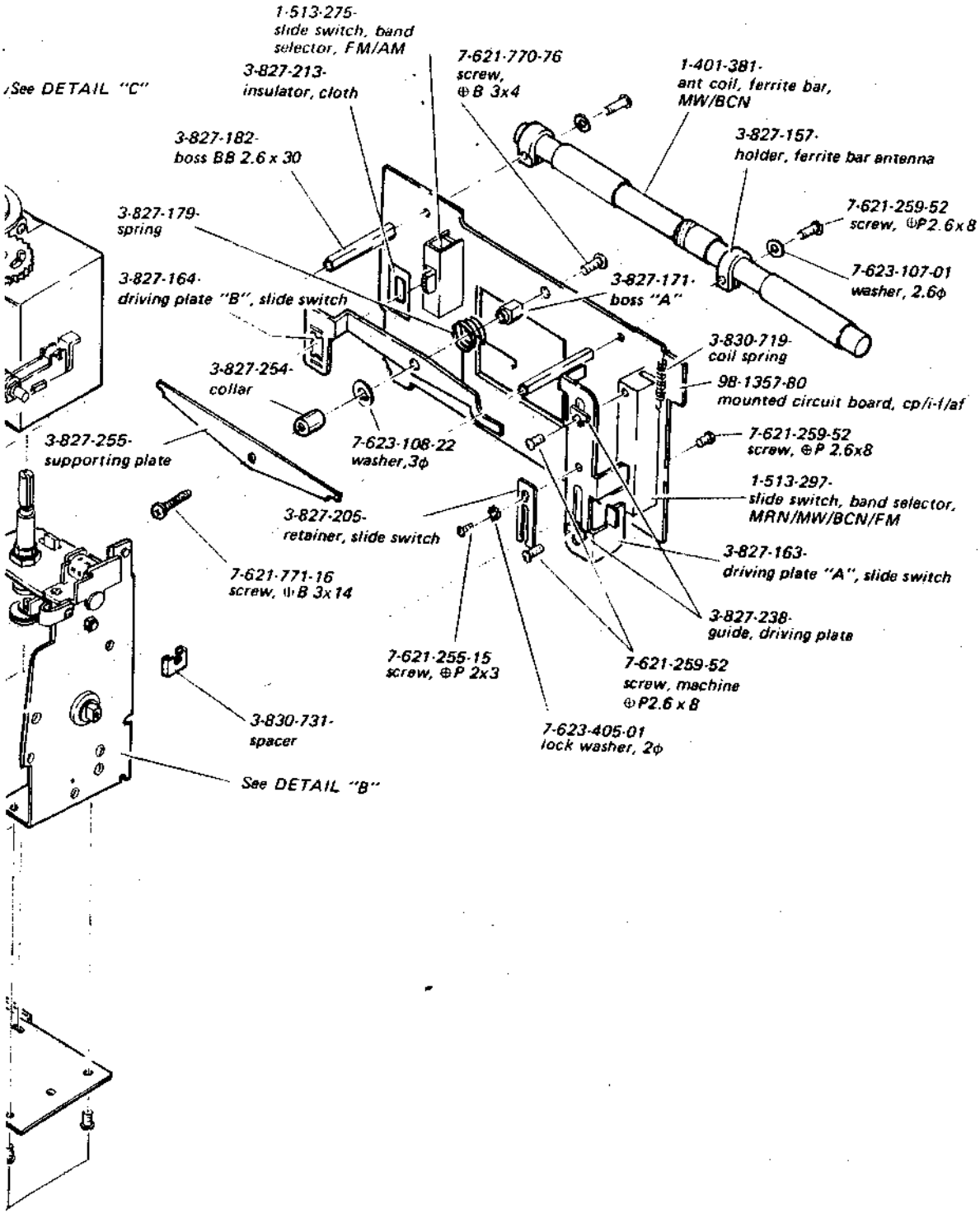



X-38271-03
knob ass'y, band selector
3-827-218
ornamental screw, band selector
3-827-162
escutcheon
3-998-004-03
cylinder, battery
3-827-235
retaining screw
See DETAIL "A"
3-827-170
plate spring "B"
X-38271-01
cabinet ass'y
3-827-206
sash, cabinet front
3-827-186
sash, cabinet lower
3-827-162
escutcheon

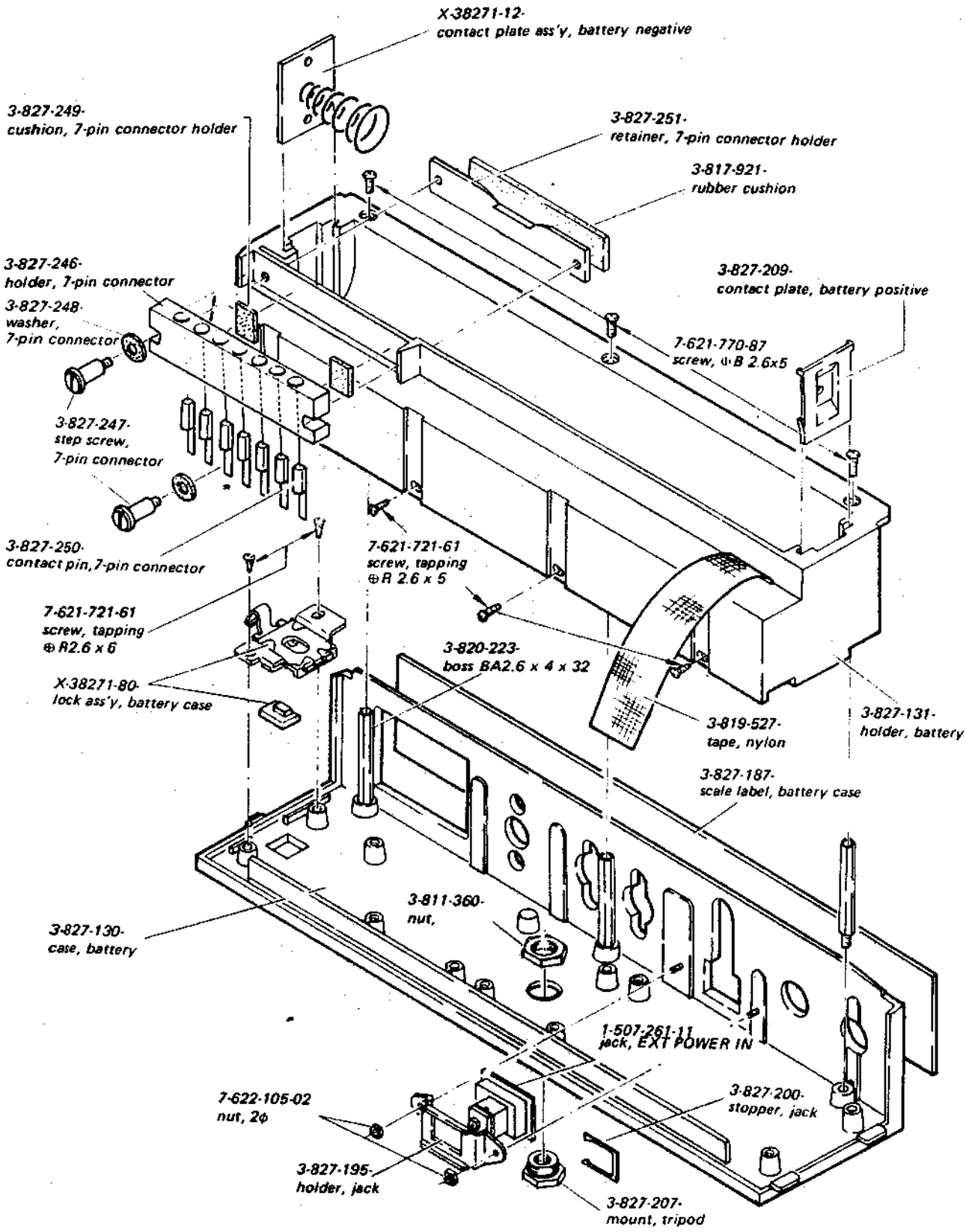
7-2. CHASSIS


X-38307-81
dial scale ass'y
7-621-770-76
screw, ⊕B 3x4
See DETAIL
7-621-769-37
screw, machine
⊕B 2x3
3-827-148-
guide, spring
1-221-851-
variable resistor,
VOLUME
3-827-215-
chassis, control
1-514-421-
switch, POWER
ON/OFF
3-621-771-19
screw, ⊕B 2x6
3-817-922-
cushion
3-827-255
supporting
1-514-422-
switch, BATTERY check
7-621-259-45
screw, ⊕P 2.6x6
1-222-127-
variable resistor,
TONE
3-827-212-
clamping plate, battery check
3-827-224-
mounting bracket, tuning meter
1-514-269-
switch, LIGHT
3-827-190
bracket, LIGHT switch
7-621-770-76
screw, ⊕B 3x4
1-536-205-13
7-pin connector, plug
3-827-220-
retainer, speaker
3-827-219-
spacer, speaker
7-621-255-15
screw, ⊕P 2x3
7-682-145-01
screw, ⊕P 3x4
3-827-154-
chassis "A"
7-621-722-52
screw, tapping
⊕K 3x8
1-502-190-12S
speaker
7-621-721-71
screw, ⊕R 2.6x6

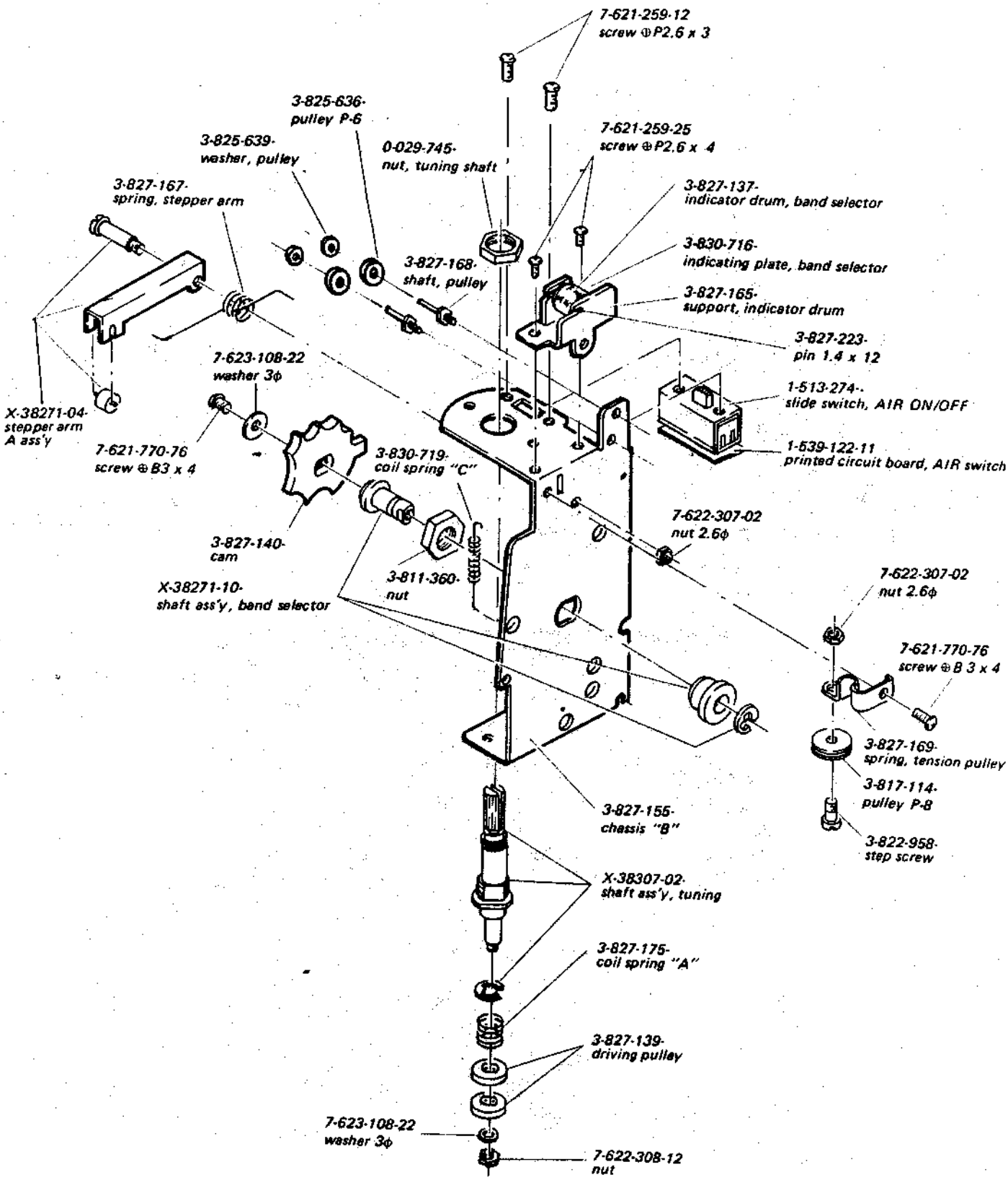
X-38307-81-
dial scale ass'y



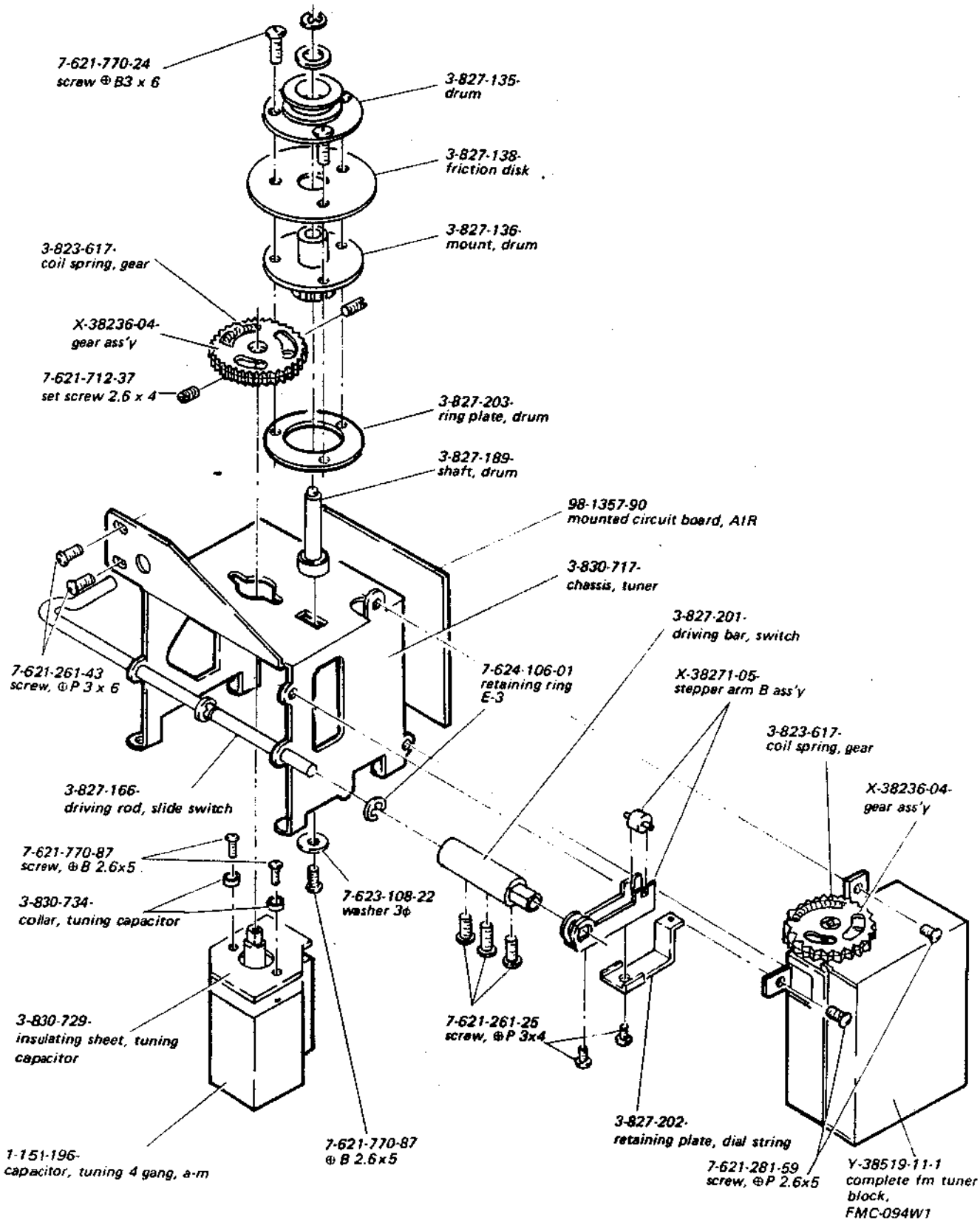
7-3. DETAIL "A" (BATTERY UNIT)



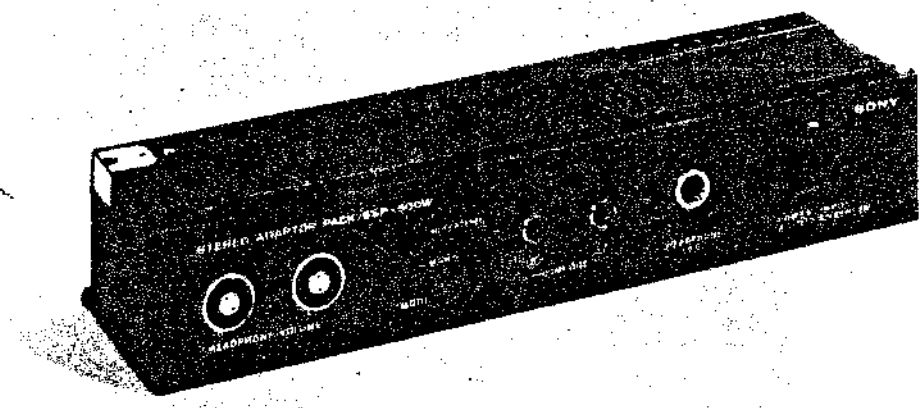
7-4. DETAIL "B" (CHASSIS B)



7-5. DETAIL "C" (TUNER CHASSIS)



STEREO ADAPTOR PACK
SSP-500W



SPECIFICATIONS

Circuit System:	10-transistor 11-diode multiplex stereo decoder
Input Level:	17 mV
Channel Separation:	Greater than 40 dB at 1 kHz
LINE OUT Jack:	Impedance: 10 kΩ Level : 0.25 V (-10 dB)
HEADPHONE Jack:	Impedance: 8 Ω Level : 24.5 mV (-30 dB)
Power Requirement:	Ac 117V, 50/60 Hz
Dimensions:	9 5/8" (W) x 1 15/16" (H) x 2 7/16" (D) (245 mm x 49 mm x 62 mm)
Weight:	1 lb 1 oz (500 g)

CIRCUIT DESCRIPTION

Stage/Control	Function
Composite signal amplifier Q501	This stage serves two functions. It extracts the 19 kHz pilot carrier by means of a tuned circuit at its collector, and provides a low-impedance source of composite stereo signal (without the pilot carrier) at its emitter.
19 kHz trap L501, C504	A series-resonant circuit consisting of L501 and C504 grounds the 19 kHz pilot carrier at the composite signal take-off point.
SCA (67 kHz) trap L502, C509	A parallel-resonant circuit consisting of L502 and C509 blocks 67 kHz SCA signal.
Frequency doubler D501, D502	Signals developed at the collector of Q501 are transformer-coupled to a full-wave rectifier consisting of diodes D501 and D502. The output of these rectifiers is not filtered, resulting in two positive pulses for each input cycle, as shown in Fig. 1. Therefore, the 19 kHz frequency of the pilot carrier is effectively doubled by D501 and D502. However, wave-form is not sinusoidal at the base of Q502.

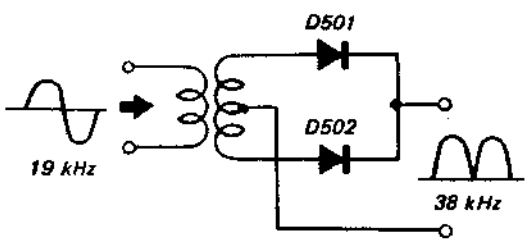


Fig. 1 Frequency doubler

38 kHz amplifier Q502	The 38 kHz pulses produced by D501 and D502 are amplified by Q502. At its collector a tank circuit is tuned to 38 kHz to restore these pulses to a sine-wave signal. This signal is transformer-coupled to the bridge-type demodulator to supply sampling drive.

Stage/Control	Function
STEREO lamp circuit	The STEREO indicator lights when an fm stereo signal is received. As shown in Fig. 2, the emitter of Q502 is connected to the base of Q503, which is normally cut-off. The circuit operates as follows: When a composite stereo signal is applied to the multiplex decoder, the 38 kHz pulses produced at the output of the frequency doubler yield a higher average current flow through Q502. This forces Q503 into conduction, lighting the STEREO indicator lamp. Q503 is in cut-off during monaural signal reception.

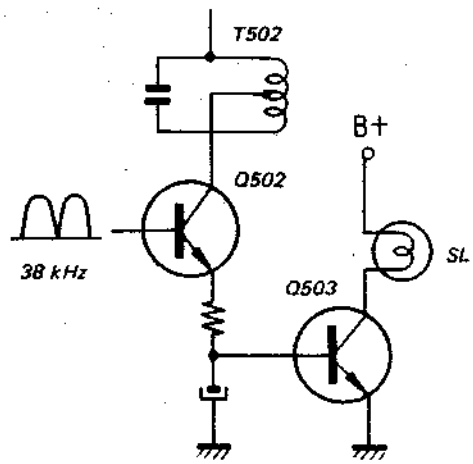


Fig. 2 Stereo lamp circuit

Muting circuit Q510 D507, D508	This circuit prevents the STEREO indicator lamp from lighting on interstation noise. The 38 kHz signal out of the doubler is fed to the base of Q510 through R552 and C537. However, C535 by-passes the 38 kHz signal frequency to ground. When tuned to a stereo signal, Q510 is turned off due to low noise level and D507 is reverse-biased by the high voltage of Q510's collector. However, interstation noise can turn on Q510. This noise is amplified by Q510, rectified by D508, and resulting positive dc

Stage/Control	Function
	voltage is fed back to the base of Q510, driving it into saturation. This causes the collector voltage of Q510 to decrease, which in turn forward-biases D507 into conduction. Q502 therefore turns off, and Q503 opens the lamp circuit.
Multiplex demodulator D503 to D506	The demodulator circuit employs a switching system consisting of four diodes in a balanced-bridge arrangement (Fig. 3). The 38 kHz signal switches the composite signal. A positive half cycle of 38 kHz signal turns on D503 and D506 so that "L" component is developed at the "L" side. A negative half cycle turns on D504 and D505 so that "R" component is developed at the "R" side.
Twin-T filter C512 to C519, R516 to R521	This filter eliminates 38 kHz signal leakage to the next stage.
Audio amplifier Q504 to Q507	These stages are direct coupled amplifiers provided with dc feedback through R530 and R531.
Separation control R528	"L" and "R" components separated by the switching circuit contain some cross-talk components. R528 mixes the cross-talk components in a manner resulting in their cancelling each other.
Headphone amplifier Q508, Q509	This stage employs emitter-follower output amplifiers so low-impedance headphones can be driven.
Power supply	The ac power supply circuit in this unit has a full-wave rectifier circuit which supplies dc power to both the ICF-8500 main unit and this multiplex adaptor unit.

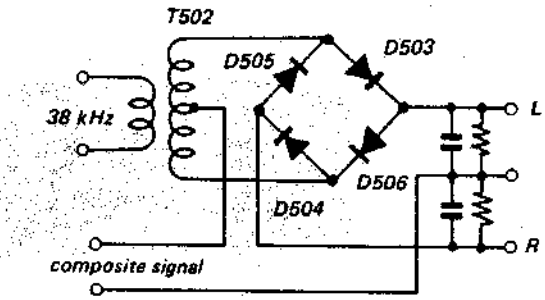
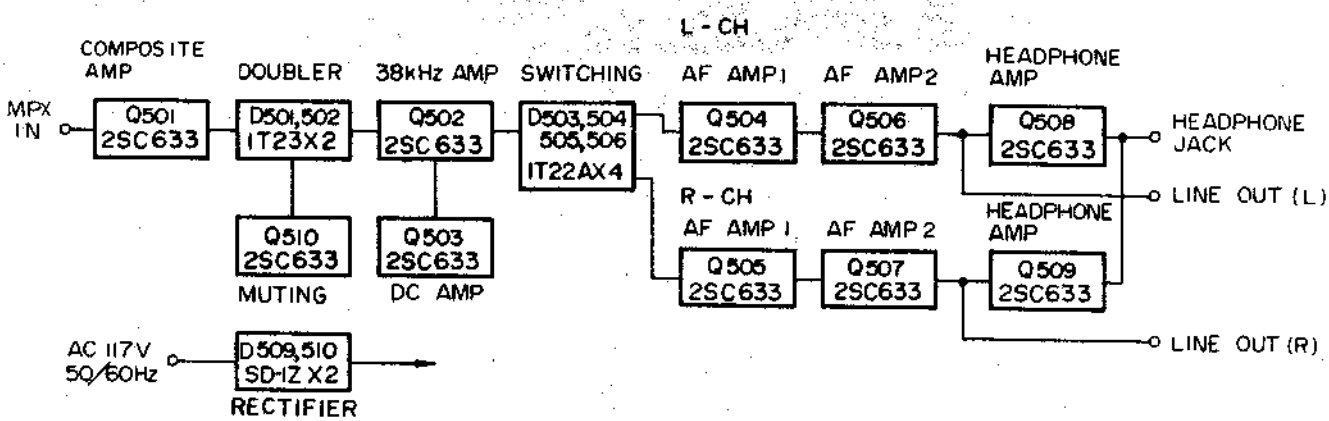
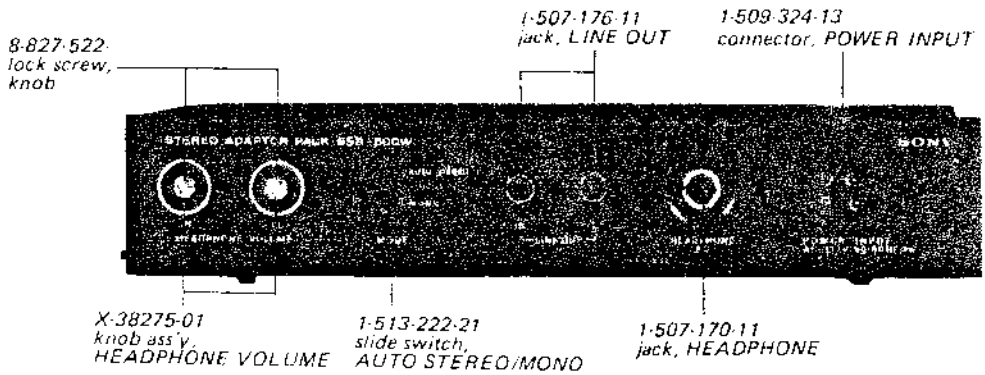


Fig. 3 Demodulator

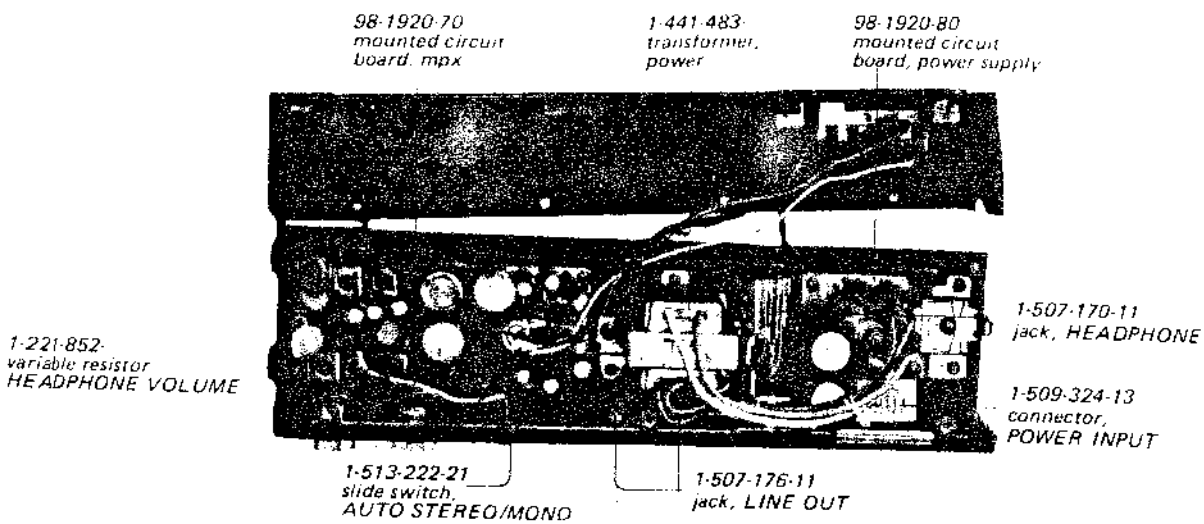
BLOCK DIAGRAM



EXTERNAL VIEW



INTERNAL VIEW



DISASSEMBLY

1. Cover Removal

1-1. Remove the six screws marked ⓐ and ⓑ in Fig. 4.

1-2. Remove the cover in the direction shown by the arrow.

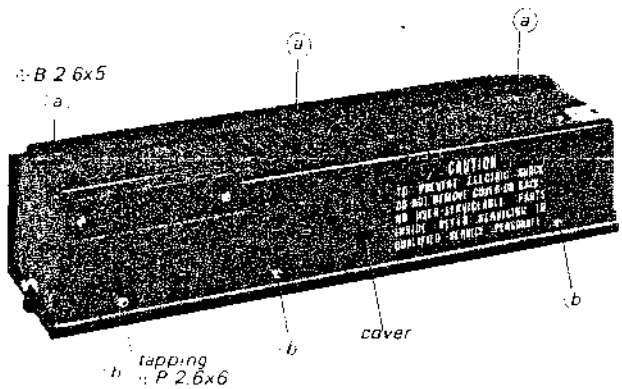


Fig. 4 Cover removal

2. Mpx Circuit Board Removal

2-1. Remove the four screws marked ⓒ in Fig. 5.

2-2. Remove the mpx circuit board.

3. Power Supply Circuit Board Removal

3-1. Remove the two screws marked ⓓ in Fig. 5.

3-2. Unsolder the two-capacitors leads (C541 and C542) at the power connector shown in Fig. 5.

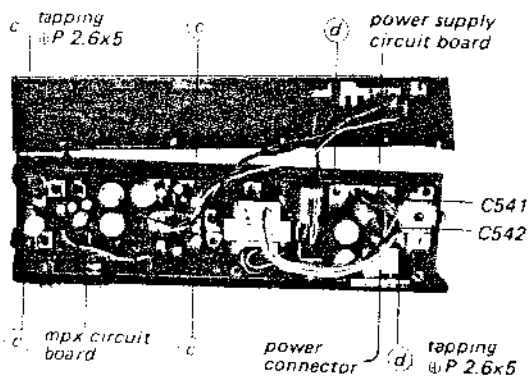


Fig. 5 Circuit board removal

ADJUSTMENTS

Test Equipment Required:

Mpx stereo signal generator
Audio signal generator
VTVM

1. Trap Coil Adjustment

1-1. Make the test setup as shown in Fig. 6 and 7.

1-2. Deliver a 19 kHz signal from the audio signal generator.

1-3. Adjust trap coil L501 so that VTVM indicates the minimum reading.

1-4. Deliver a 67 kHz signal from the audio signal generator.

1-5. Adjust trap coil L502 so that VTVM indicates the minimum reading.

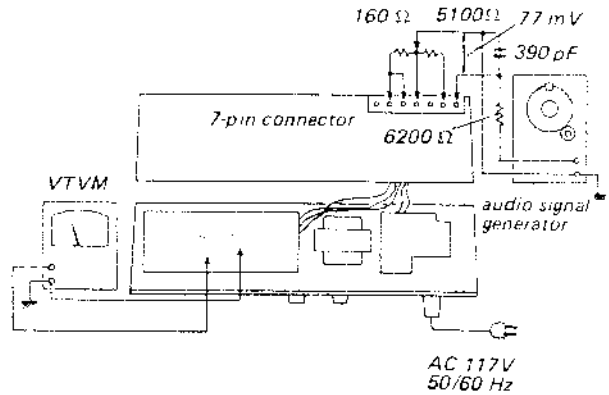


Fig. 6 Trap coil adjustment setup

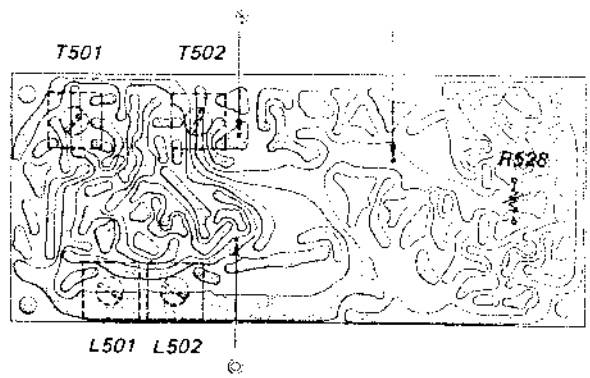


Fig. 7 Connection and adjusting parts locations

2. Input Level Setting

2-1. Make the test setup as shown in Fig. 8.

2-2. Set the mpx stereo signal generator as follows:
main channel ..... off
sub channel ..... off
19 kHz (pilot signal) ..... on

2-3. Adjust the output level of the mpx stereo signal generator so that the VTVM indicates 17 mV.

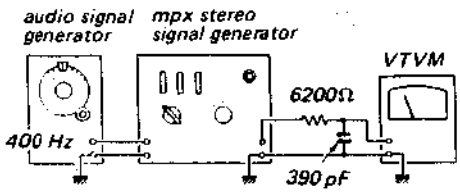


Fig. 8 Input level setting setup

2-4. Set the mpx stereo generator as follows:
main channel ..... on
sub channel ..... off
19 kHz (pilot signal) ..... off

2-5. Adjust the output level of the audio signal generator so that the VTVM indicates 77 mV. (audio signal frequency: 400 Hz)

3. Sub Carrier Adjustment

3-1. Make the test setup as shown in Fig. 7 and 9.

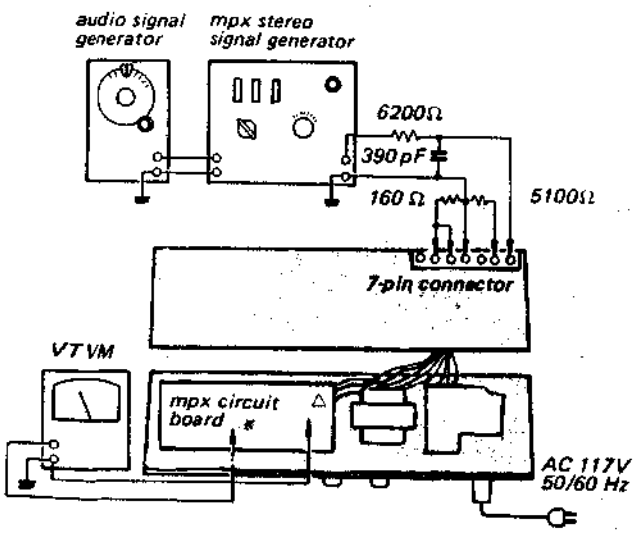


Fig. 9 Sub carrier adjustment setup

3-2. Set the mpx stereo signal generator as follows:
main channel ..... off
sub channel ..... off
19 kHz (pilot signal) ..... on

3-3. Adjust doubler transformer T501 and switching transformer T502 so as to obtain the maximum reading on the VTVM.

4. Channel Separation Adjustment

4-1. Make the test setup as shown in Fig. 10.

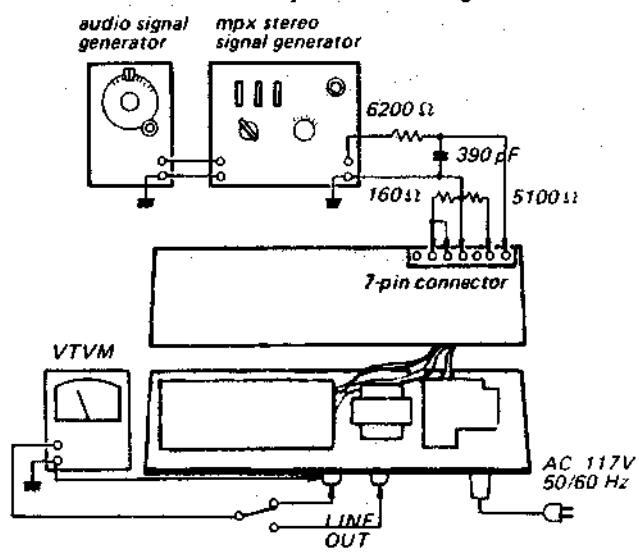


Fig. 10 Channel separation adjustment setup

4-2. Set the mpx stereo signal generator as follows:
main channel ..... on
sub channel ..... on
19 kHz (pilot signal) ..... on

4-3. Set the mpx stereo signal generator to "L" channel and connect the VTVM to "L" channel of LINE OUT jack.

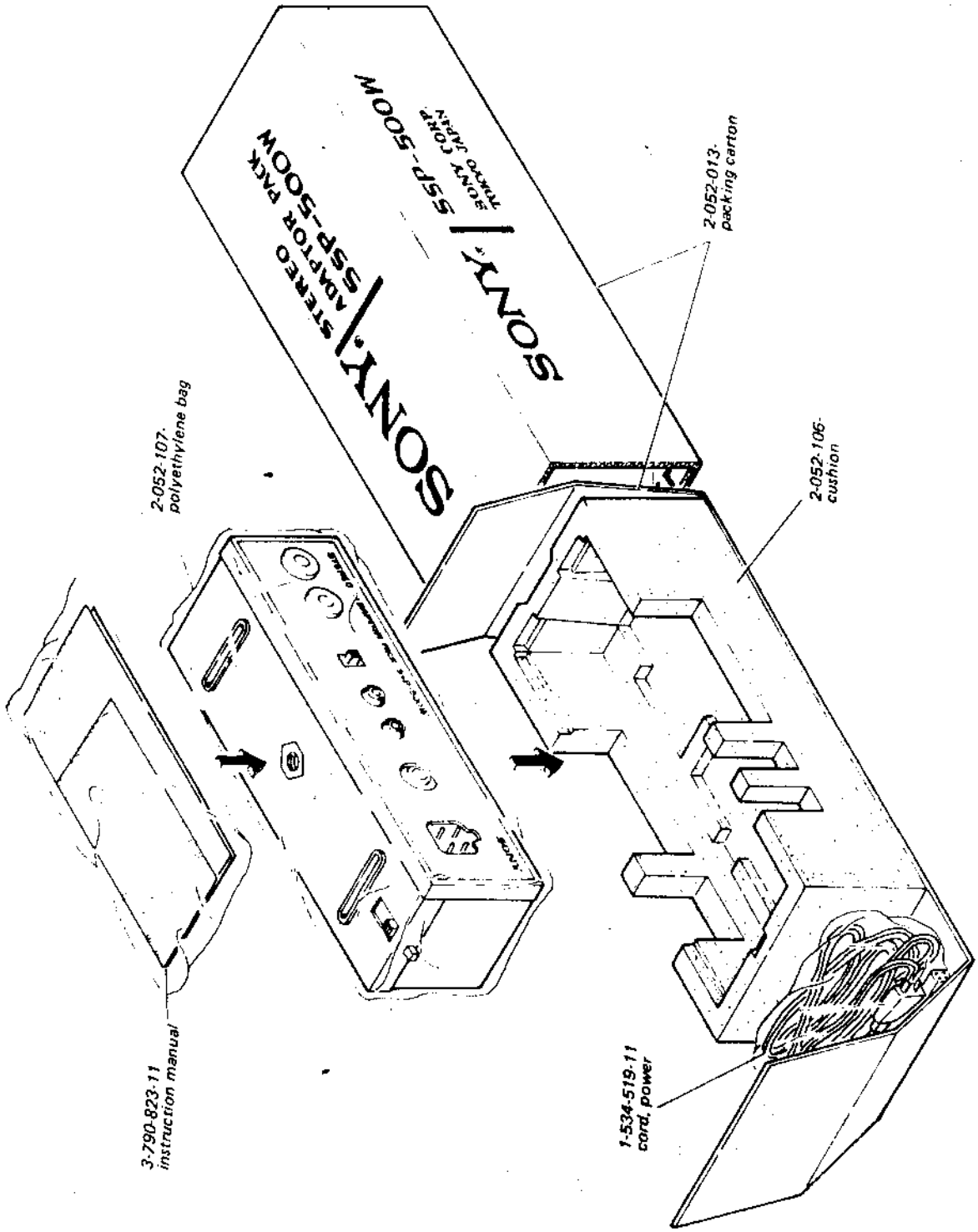
4-4. Set the AUTO STEREO/MONO switch to AUTO STEREO.

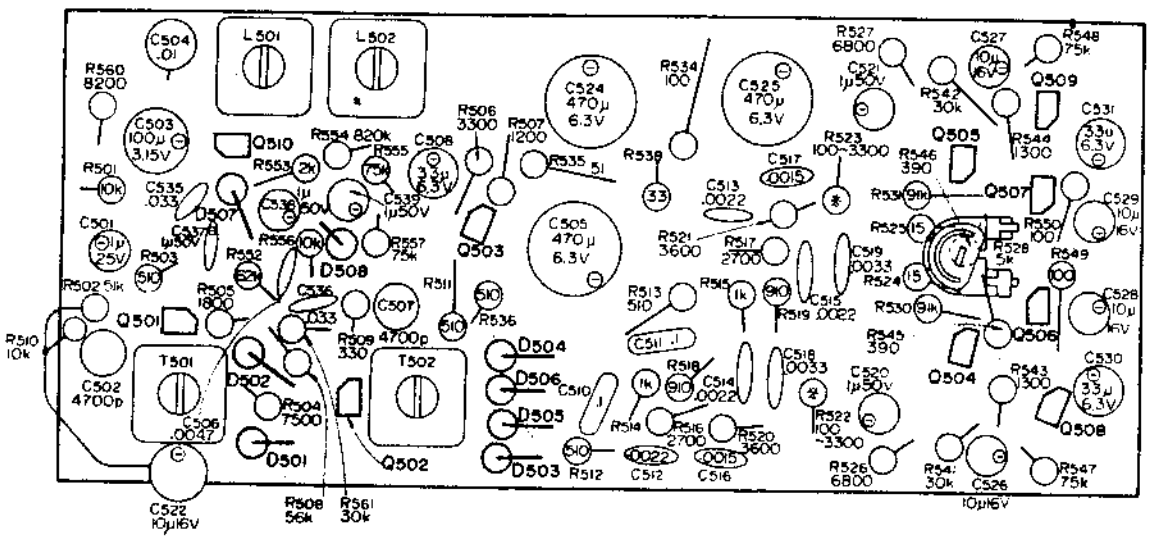
4-5. Adjust switching transformer T502 so as to obtain the maximum reading on the VTVM.

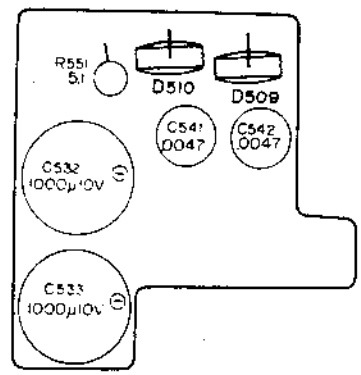
4-6. Change the connection of VTVM to "R" channel of LINE OUT jack.

4-7. Adjust adjustable resistor R528 so as to obtain the minimum reading on the VTVM.

REPACKING

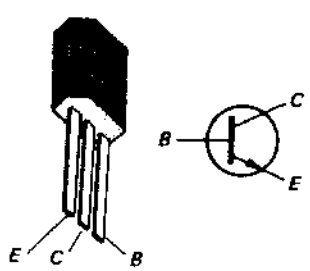

2-052-013-
packing carton
2-052-107-
polyethylene bag
2-052-106-
cushion
3-790-823-11
instruction manual
1-534-519-11
cord, power



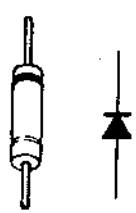


C509, R562, R563:
mounted on the conductor side.

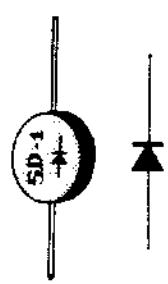
Q501–Q510; 2SC633



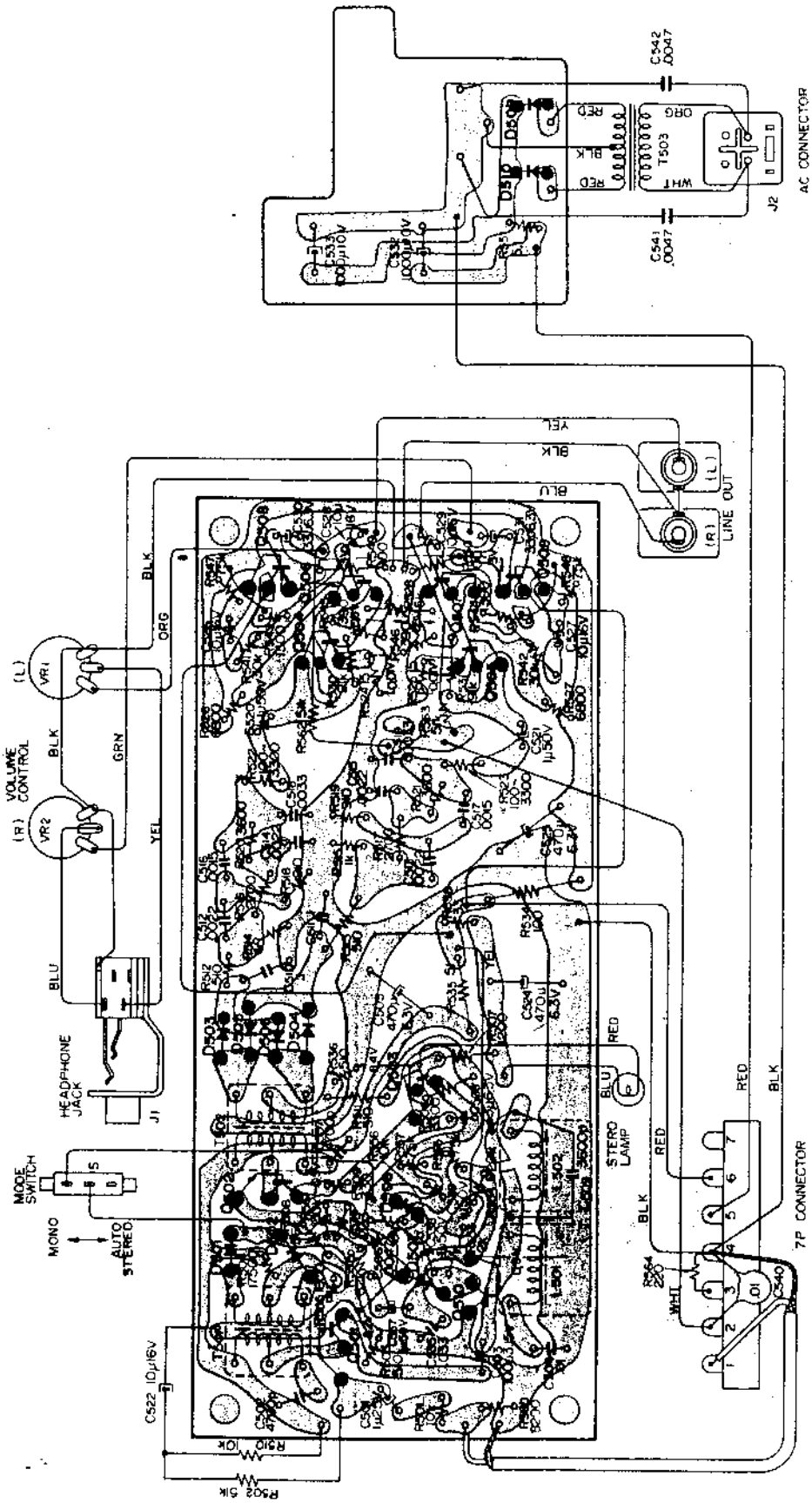
D501, 502; 1T23
D503–D506; 1T22A
D507, 508; 1T262



D509, 510; SD-1Z



– Conductor Side –



Power Supply Printed Circuit Board Part No. 1-538-881-12

MPX Printed Circuit Board Part No. 1-538-880-11

C509, R562, R563: mounted on the conductor side.

Q501 2SC633 (COMPOSITE AMP)

Q502 2SC633 (38 kHz AMP)

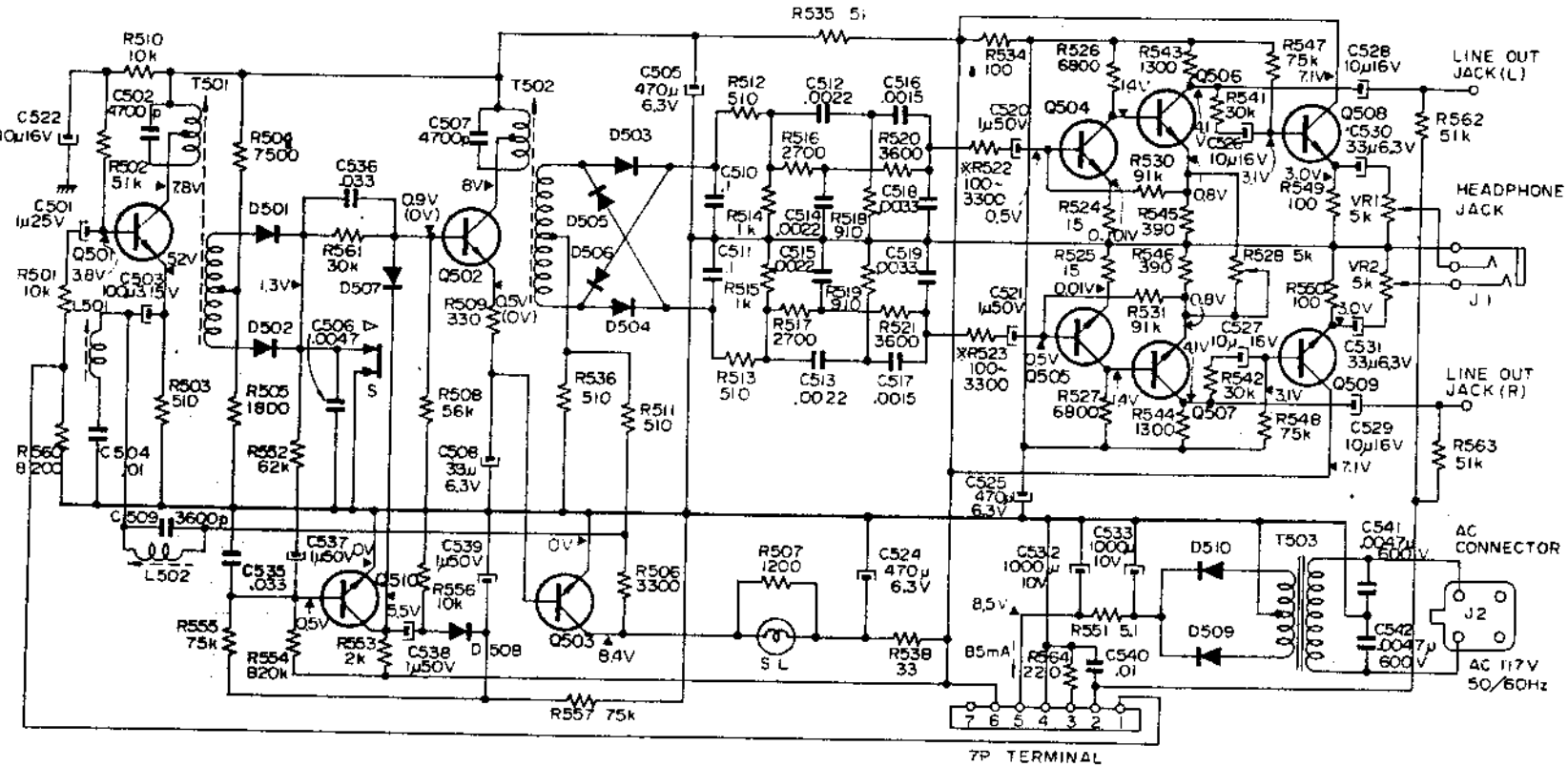
Q504,506 2SC633 (L CHANNEL AMP)

Q508 Q509 2SC633 (HEADPHONE AMP)

D501,502 1T23 (19kHz DOUBLER)

D507 1T262

D503, 504 505, 506 1T22A (SWITCHING)



D508 1T262

D509,510 SD-1Z (RECTIFIER)

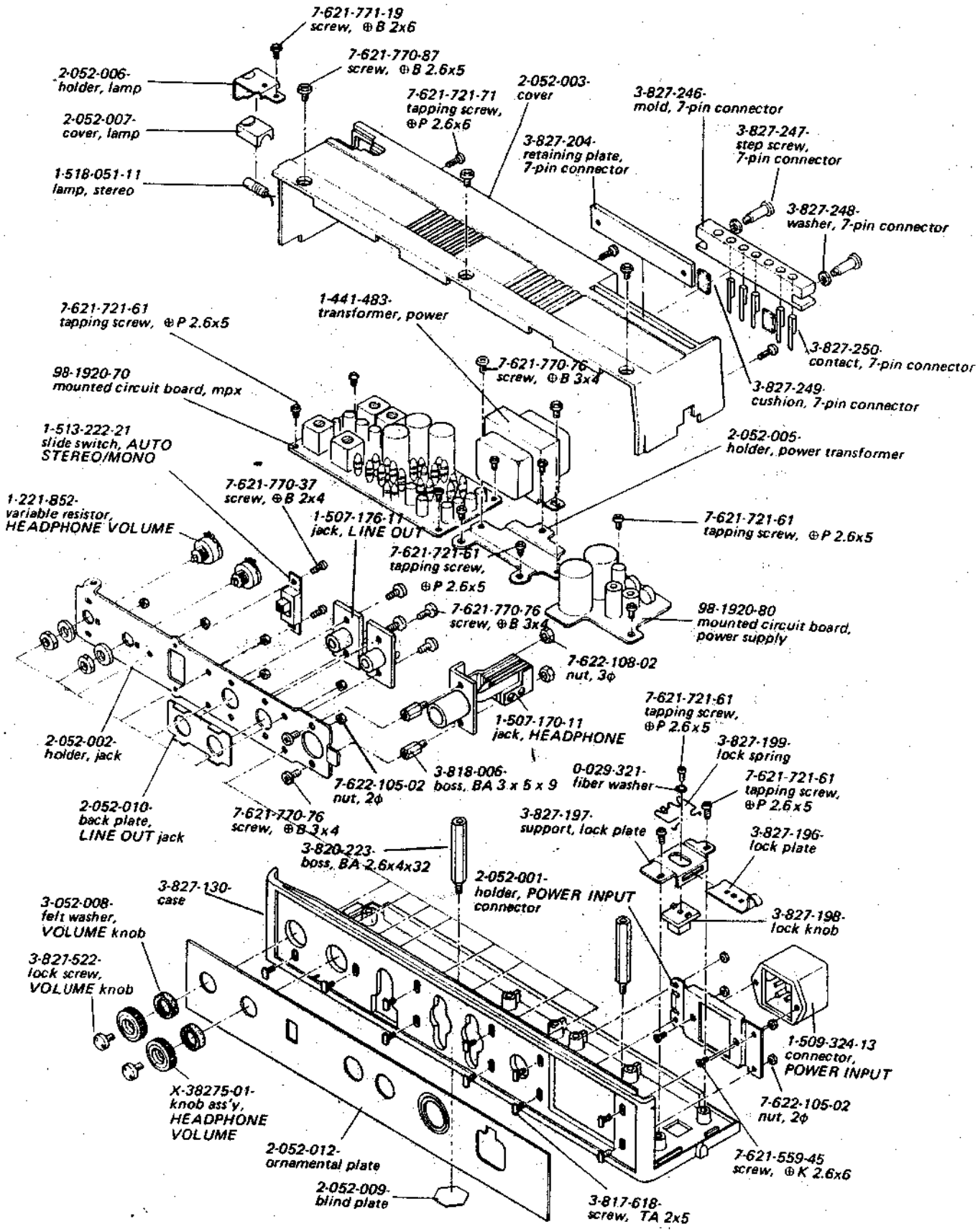
Q510 2SC633 (MUTING)

Q503 2SC633 (DC AMP)

Q505,507 2SC633 (R CHANNEL AMP)

Note: 1. All resistors and capacitors are in Ω and µF unless otherwise indicated.
2. R522 and R523 are selected in value to obtain the same level between L and R LINE OUT jacks.
3. Voltage values shown are measured to ground circuit with a dc voltmeter (20 kΩ/V). Current value is measured with a dc ammeter. This unit is measured separately. Variations may be noted due to normal production tolerances.
4. Voltage values in ( ) are measured with AUTO STEREO/MONO switch (S) set to MONO.

EXPLODED VIEW



ELECTRICAL PARTS LIST

Ref.No.	Part No.	Description
	98-1920-70	mounted circuit board, mpx
	98-1920-80	mounted circuit board, power supply

SEMICONDUCTORS

Q501		transistor 2SC633
Q502		transistor 2SC633
Q503		transistor 2SC633
Q504		transistor 2SC633
Q505		transistor 2SC633
Q506		transistor 2SC633
Q507		transistor 2SC633
Q508		transistor 2SC633
Q509		transistor 2SC633
Q510		transistor 2SC633
D501		diode 1T23
D502		diode 1T23
D503		diode 1T22A
D504		diode 1T22A
D505		diode 1T22A
D506		diode 1T22A
D507		diode 1T262
D508		diode 1T262
D509		diode SD-1Z
D510		diode SD-1Z

COILS & TRANSFORMERS

L501	1-409-107-	coil, 19 kHz trap
L502	1-409-108-	coil, 68 kHz trap
T501	1-425-259-	transformer, doubler
T502	1-425-260-	transformer, switching
T503	1-441-483-	transformer, power

CAPACITORS

C501	1-121-279-	1μF	50V, electrolytic
C502	1-103-641-	4,700pF	styrol
C503	1-121-290-	100μF	3V, electrolytic
C504	1-103-649-	0.01μF	styrol
C505	1-121-359-	470μF	6.3V, electrolytic
C506	1-105-829-12	0.0047μF	mylar
C507	1-103-641-	4,700pF	styrol
C508	1-121-284-	33μF	6.3V, electrolytic
C509	1-103-638-	3,600pF	styrol
C510	1-105-417-12	0.1μF	mylar
C511	1-105-417-12	0.1μF	mylar
C512	1-105-665-12	0.0022μF	mylar
C513	1-105-665-12	0.0022μF	mylar
C514	1-105-665-12	0.0022μF	mylar
C515	1-105-665-12	0.0022μF	mylar
C516	1-105-663-12	0.0015μF	mylar
C517	1-105-663-12	0.0015μF	mylar
C518	1-105-827-12	0.0033μF	mylar
C519	1-105-827-12	0.0033μF	mylar
C520	1-121-343-	1μF	50V, electrolytic
C521	1-121-343-	1μF	50V, electrolytic
C522	1-121-347-	10μF	16V, electrolytic
C523		– discarded –	
C524	1-121-359-	470μF	6.3V, electrolytic
C525	1-121-359-	470μF	6.3V, electrolytic
C526	1-121-347-	10μF	16V, electrolytic
C527	1-121-347-	10μF	16V, electrolytic
C528	1-121-347-	10μF	16V, electrolytic
C529	1-121-347-	10μF	16V, electrolytic
C530	1-121-284-	33μF	6.3V, electrolytic
C531	1-121-284-	33μF	6.3V, electrolytic
C532	1-121-736-	1,000μF	10V, electrolytic
C533	1-121-736-	1,000μF	10V, electrolytic
C534		– discarded –	
C535	1-105-414-12	0.033μF	mylar
C536	1-105-414-12	0.033μF	mylar
C537	1-121-343-	1μF	50V, electrolytic
C538	1-121-343-	1μF	50V, electrolytic
C539	1-121-343-	1μF	50V, electrolytic
C540	1-101-923-	0.01μF	ceramic
C541	1-115-071-	0.0047μF	metalized paper
C542	1-115-071-	0.0047μF	metalized paper

RESISTORS

Note: 1. Resistors listed below are ¼W carbon resistor, unless otherwise indicated.
2. Resistors marked * are selected to yield specified operating condition.

VR1	1-221-852-	5 kΩ	variable
VR2	1-221-852-	5 kΩ	variable
R501	1-244-697-	10 kΩ	
R502	1-244-714-	51 kΩ	
R503	1-244-666-	510 Ω	
R504	1-244-694-	7,500 Ω	
R505	1-244-679-	1,800 Ω	
R506	1-244-685-	3,300 Ω	
R507	1-244-675-	1,200 Ω	

Ref.No.	Part No.	Description
R508	1-244-715-	56 kΩ
R509	1-244-661-	330 Ω
R510	1-244-697-	10 kΩ
R511	1-244-666-	510 Ω
R512	1-244-666-	510 Ω
R513	1-244-666-	510 Ω
R514	1-244-673-	1 kΩ
R515	1-244-673-	1 kΩ
R516	1-244-683-	2,700 Ω
R517	1-244-683-	2,700 Ω
R518	1-244-672-	910 Ω
R519	1-244-672-	910 Ω
R520	1-244-686-	3,600 Ω
R521	1-244-686-	3,600 Ω
* R522	1-244-649-	100 Ω
R523	1-244-653-	150 Ω
	1-244-657-	220 Ω
	1-244-661-	330 Ω
	1-244-665-	470 Ω
	1-244-669-	680 Ω
	1-244-673-	1 kΩ
	1-244-677-	1,500 Ω
	1-244-681-	2,200 Ω
	1-244-685-	3,300 Ω
R524	1-244-629-	15 Ω
R525	1-244-629-	15 Ω
R526	1-244-693-	6,800 Ω
R527	1-244-693-	6,800 Ω
R528	1-221-635-	5 kΩ adjustable
R529		– discarded –
R530	1-244-720-	91 kΩ
R531	1-244-720-	91 kΩ
R532		– discarded –
R533		– discarded –
R534	1-244-649-	100 Ω
R535	1-244-642-	51 Ω

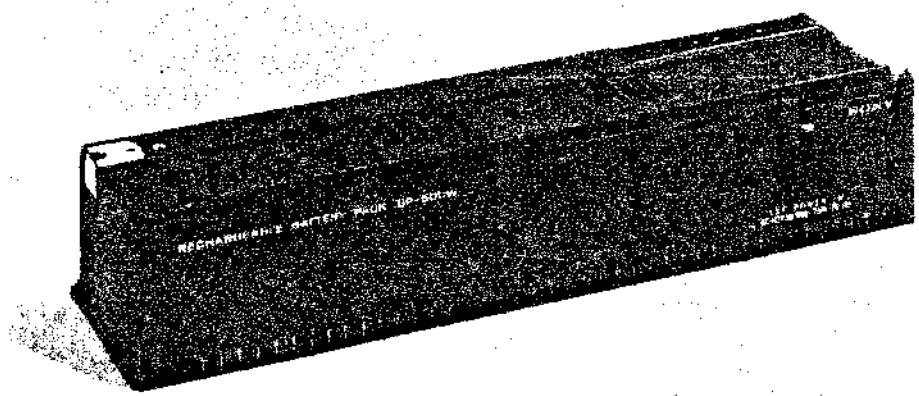
Ref.No.	Part No.	Description
R536	1-244-666-	510 Ω
R537		– discarded –
R538	1-244-637-	33 Ω
R539		– discarded –
R540		– discarded –
R541	1-244-708-	30 kΩ
R542	1-244-708-	30 kΩ
R543	1-244-676-	1,300 Ω
R544	1-244-676-	1,300 Ω
R545	1-244-663-	390 Ω
R546	1-244-663-	390 Ω
R547	1-244-718-	75 kΩ
R548	1-244-718-	75 kΩ
R549	1-244-649-	100 Ω
R550	1-244-649-	100 Ω
R551	1-210-162-	5.1 Ω 1W
R552	1-244-716-	62 kΩ
R553	1-244-680-	2 kΩ
R554	1-244-743-	820 kΩ
R555	1-244-718-	75 kΩ
R556	1-244-697-	10 kΩ
R557	1-244-718-	75 kΩ
R558		– discarded –
R559		– discarded –
R560	1-244-695-	8,200 Ω
R561	1-244-708-	30 kΩ
R562	1-244-714-	51 kΩ
R563	1-244-714-	51 kΩ
R564	1-209-162-	220 Ω 1W

MISCELLANEOUS

J1	1-507-170-11	jack, HEADPHONE
	1-509-324-13	connector, POWER INPUT
	1-507-176-11	jack, LINE OUT
S	1-513-222-21	slide switch, AUTO STEREO/ MONO
SL	1-518-051-11	lamp, stereo

When ordering replacement parts, you should use PART NUMBER listed in the parts list or shown in the exploded view. The reference number should not be used for ordering purposes.

RECHARGEABLE BATTERY PACK BP-500W



SPECIFICATIONS

Semiconductors:	one transistor, four diodes
Built-in Batteries:	four nickel-cadmium rechargeable batteries, 5V in total
Power Requirement:	AC 117V, 50/60 Hz, 2.5W
Dimensions:	$9\frac{5}{8}$"(W) x $1\frac{15}{16}$"(H) x $2\frac{7}{16}$"(D) (245 mm x 49 mm x 61 mm)
Weight:	14 oz (400 g)

CIRCUIT DESCRIPTION

The SONY Model BP-500W is a power-supply unit for the ICF-8500. The BP-500W allows you to operate the ICF-8500 from a 12-volt car battery (through SONY Car Battery Cord DCC-2AW) or on 117-volt ac household current. This power-supply unit also contains four rechargeable nickel-cadmium batteries and can be recharged either separately or while attached to the ICF-8500. Transistor Q1 maintains a constant charging current to the battery.

When attached to ICF-8500 with the POWER switch to ON, Q1 turns on and the rectified current flows to the ICF-8500 through terminal 5 and also to the batteries, whose negative side is grounded through terminal 7 by the ICF-8500. The batteries, therefore, are charged while operating the ICF-8500.

When attached to the ICF-8500 with the POWER switch to OFF, Q1 turns off because terminals 3 and 5 are short-circuited by the POWER switch of the ICF-8500. The rectified current flows to the batteries through R3, thereby charging the batteries.

When the BP-500W is used separately, Q1 turns on and the rectified current flows through the batteries and R5, because the terminal 7 is open. R5 limits the current flow. When charging current flows, diode D1 conducts and turns on lamp 1, completing the lamp circuit. When the batteries have been charged and the charging current ceases to flow, diode D1 ceases conduction and effectively opens the lamp circuit. When the BP-500W supplies the power to ICF-8500, the lamp also lights.

DISASSEMBLY

1. Cover Removal

1-1. Remove the six screws marked ⓔ and ⓕ in Fig. 11.

1-2. Remove the cover in the direction shown by the arrow.

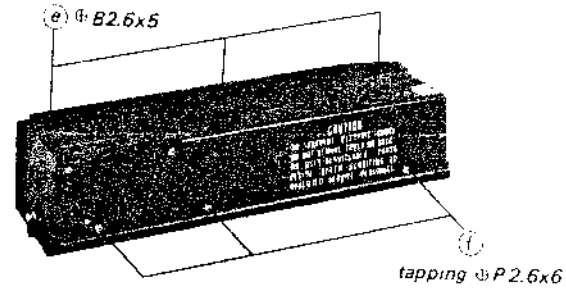


Fig. 11

2. Circuit Board Removal

Remove the six screws marked ⓖ in Fig. 12.

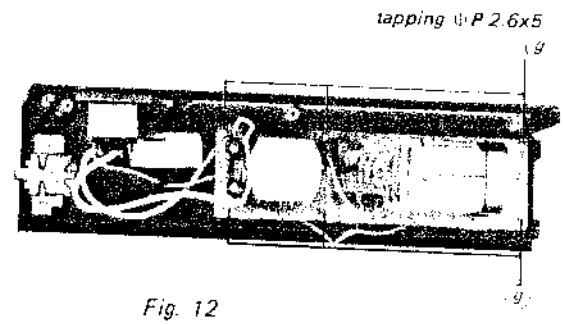
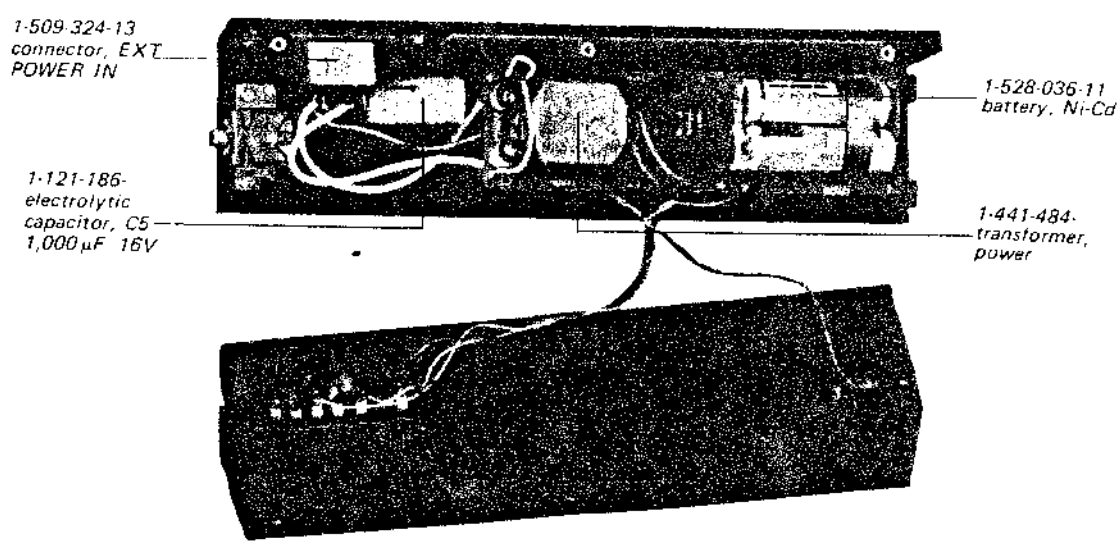
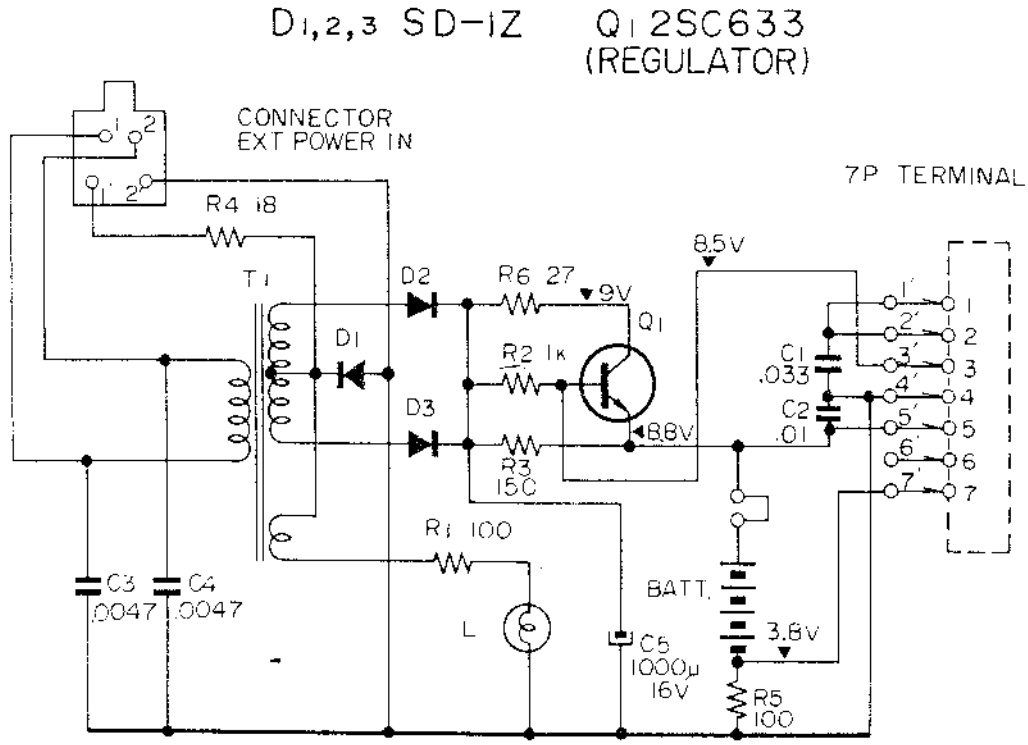


Fig. 12

INTERNAL VIEW



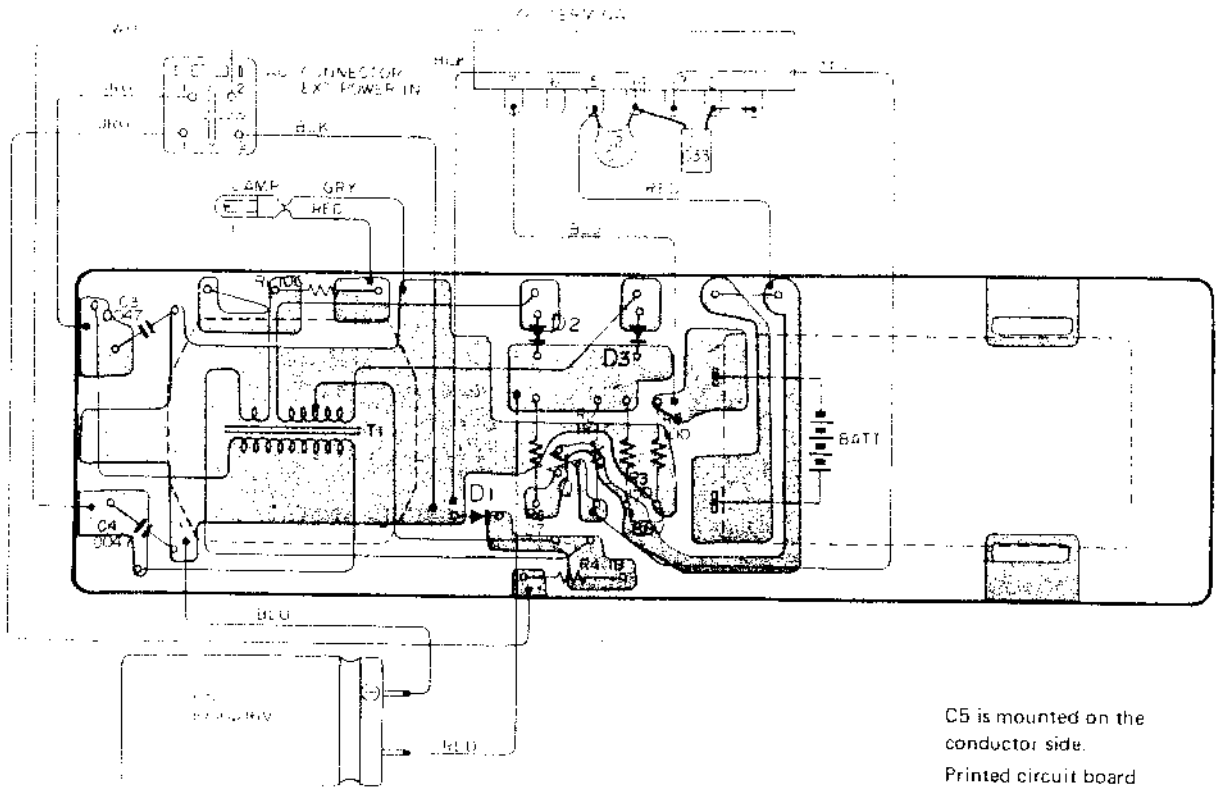
SCHEMATIC DIAGRAM



Note:

1. All resistors and capacitors are in Ω and μF, unless otherwise indicated.
2. Voltage values shown are measured with a dc voltmeter (20 kΩ/V) and with no load

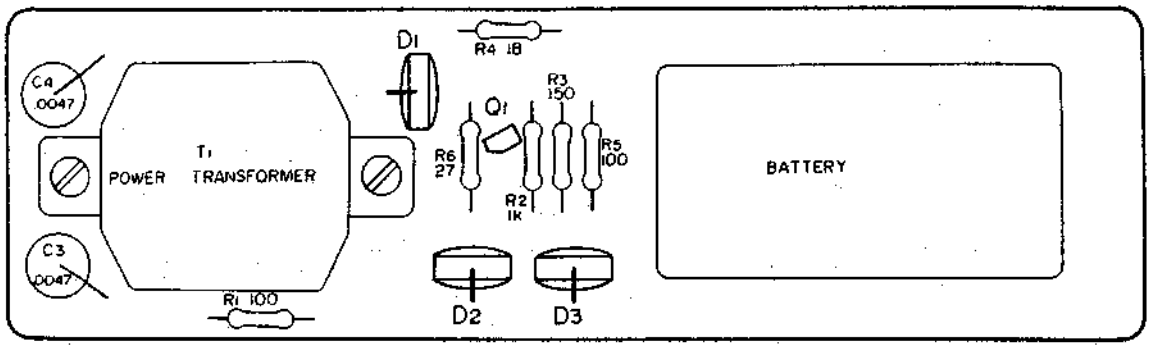
MOUNTING DIAGRAM — *Conductor Side* —



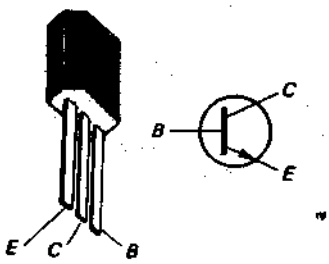
C5 is mounted on the conductor side.

Printed circuit board
Part No. 1-539-146-11

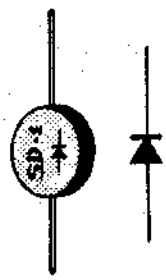
MOUNTING DIAGRAM – *Component Side* –



Q1; 2SC633



D1–D3; SD-1Z



C5 is mounted on the conductor side.

ELECTRICAL PARTS LIST

Ref.No.	Part No.	Description
	1-539-146-11	printed circuit board
	SEMICONDUCTORS	
Q1		transistor 2SC633
D1		diode SD-1Z
D2		diode SD-1Z
D3		diode SD-1Z
	TRANSFORMER	
T1	1-441-484-13	transformer, power
	CAPACITORS	
C1	1-105-414-12	0.033μF mylar
C2	1-101-923-	0.01μF ceramic
C3	1-115-071-	0.0047μF 600V, metalized paper
C4	1-115-071-	0.0047μF 600V, metalized paper
C5	1-121-186-	1,000μF 16V, electrolytic
	RESISTORS	(All resistors are ¼W carbon.)
R1	1-244-649-	100 Ω
R2	1-244-673-	1 kΩ
R3	1-244-653-	150 Ω
R4	1-244-631-	18 Ω
R5	1-244-649-	100 Ω
R6	1-244-635-	27 Ω
	MISCELLANEOUS	
BATT	1-528-036-11	battery, Ni-Cd
L	1-518-006-04	lamp
	1-509-324-13	connector, EXT POWER IN

When ordering replacement parts, you should use PART NUMBER listed in the parts list or shown in the exploded view. The reference number should not be used for ordering purposes.

EXPLODED VIEW