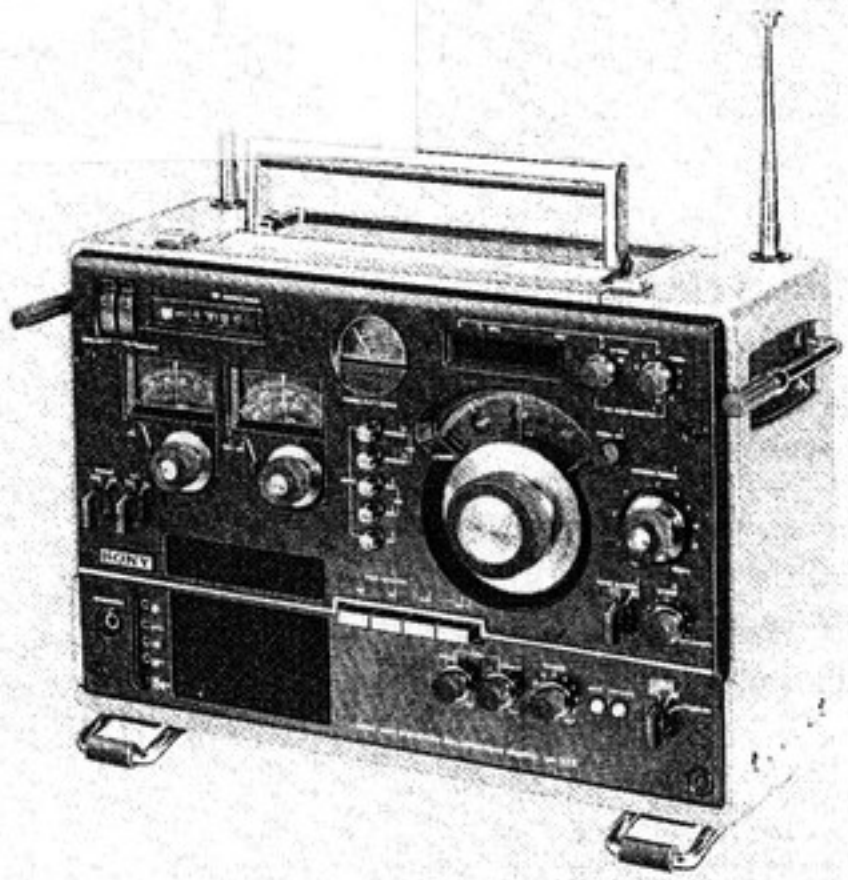
CRF-320

US Model
Canadian Model
E Model
AEP Model
UK Model



FM/SW/MW/LW 32-BAND RADIO RECEIVER

SPECIFICATIONS

Frequency Range:
FM: 87.5–108 MHz (3.43–2.78 m)
SW: 1.6–30 MHz (187–10 m)
MW: 530–1,605 kHz (566–187 m)
LW: 150–400 kHz (2,000–750 m)

Antennas:
FM: Telescopic antenna, external antenna terminals (75 Ω)
SW: Telescopic antenna, external antenna terminals (50–75 Ω)
MW/LW: Built-in ferrite-rod antenna, external antenna terminals (high impedance)

Intermediate Frequency:
FM: 10.7 MHz, MW/LW: 455 kHz
SW-1st: 45.145 MHz, SW-2nd: 455 kHz

Sensitivity:
FM: 1.8 μV (5 dB), S/N = 30 dB
SW: 0.7 μV (–3 dB), S/N = 6 dB, at 10 MHz
MW: 32 μV/m (30 dB/m), S/N = 6 dB, built-in ferrite-rod antenna
LW: 57 μV/m (35 dB/m), S/N = 6 dB, built-in ferrite-rod antenna

Image Rejection:
FM: 60 dB, at 104 MHz
SW: 1st: 90 dB, 2nd: 65 dB, at 10 MHz
MW: 55 dB, at 1,605 kHz
LW: 80 dB, at 360 kHz

Selectivity:
FM: Better than 70 dB (±400 kHz off resonance)
SW/MW/LW:
–60 dB at NORMAL (±8 kHz off resonance)
–60 dB at NARROW (±6 kHz off resonance)

Speaker: 12 cm (4 3/4 inches) dia.

Clock: QUARTZ clock

Input:
AUX IN (mini jack) 1
Maximum sensitivity 4.4 mV (–45 dB) at 50 mW output
Input impedance 5 kΩ

Outputs:
Earphone (mini jack) 1
For 8 Ω earphone
HEADPHONES (phone jack) . 1
For 8 Ω headphones
Recording (mini jack) 1
Output level 0.8 mV (–60 dB)
Output impedance 1 kΩ

Control Jack: TIMER OUT (mini jack) 1

– Continued on next page –

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

SONY®

SERVICE MANUAL

Power Requirements: Radio: 120 V ac (adjustable to 100, 220 or 240 V at Sony service station) (US, Canadian model)
100-110, 115-127, 200-220 or 230-250 V ac (E model)
110, 127, 220 or 240 V ac (AEP model)
240 V ac (adjustable to 110, 127 or 220 V at the authorized Sony personnel) (UK model)
12 V dc, eight size-D* batteries
12 V car battery with Sony Car Battery Cord DCC-9 (optional)
Clock: 1.5 V dc, one size-D* battery
*IEC designation: R20

Power Consumption: 10 W ac (US, Canadian model)
12 W ac (AEP, UK, E model)

Current Drain: FM/MW/LW: 75 mA, SW: 250 mA, at zero signal, dc
FM/LW/MW: 310 mA, SW: 500 mA, at 2000 mW output, dc

Dimensions: Approx. 451 (w) x 308 (h) x 207 (d) mm
17 3/4 (w) x 12 1/8 (h) x 8 1/8 inches
(including projecting parts and controls with the Carrying Handle pushed down)

Weight: Approx. 13 kg, 28 lb 11 oz
(including batteries)

MODEL IDENTIFICATION

- Specification Label

US model

SONY® WORLD ZONE MODEL NO. CRF-320
FM/SW/MW/LW 32 BAND RADIO RECEIVER
FREQ RANGE: FM87.5–108MHz LW150–400kHz
MW530–1605kHz SW1.6–30.0MHz (29 BANDS)
IF: FM10.7MHz SW-1st 45.145MHz 2nd 455kHz MW, LW455kHz
BATT. SUPPLY: 1.5V x 8 USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
EXT. DC POWER SUPPLY: 12 V 700 mA
AC POWER SUPPLY: 120 V 10W 60Hz
CLOCK: QUARTZ CLOCK CRYSTAL FREQ 32.768kHz
BATT. SUPPLY 1.5V x 1 USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
SERIAL NO.
CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
CERTIFICATION: DESIGN CERTIFIED AS COMPLYING WITH F.C.C. RULES PART 15, IN EFFECT AS OF DATE OF MANUFACTURE.
MADE IN

Canadian model

SONY® WORLD ZONE MODEL NO. CRF-320
FM/SW/MW/LW 32 BAND RADIO RECEIVER
FREQ. RANGE: FM87.5–108MHz LW150–400kHz
MW530–1605kHz SW1.6–30.0MHz (29 BANDS)
IF: FM10.7MHz SW-1st 45.145MHz 2nd 455kHz MW, LW455kHz
BATT. SUPPLY: 1.5V x 8 USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
EXT. DC POWER SUPPLY: 12 V 700 mA
AC POWER SUPPLY: 120 V 10W 60Hz
CLOCK: QUARTZ CLOCK CRYSTAL FREQ.: 32.768kHz
BATT. SUPPLY: 1.5V x 1 USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
SERIAL NO.
CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. (LAMPS SOLDERED IN PLACE) REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
MADE IN

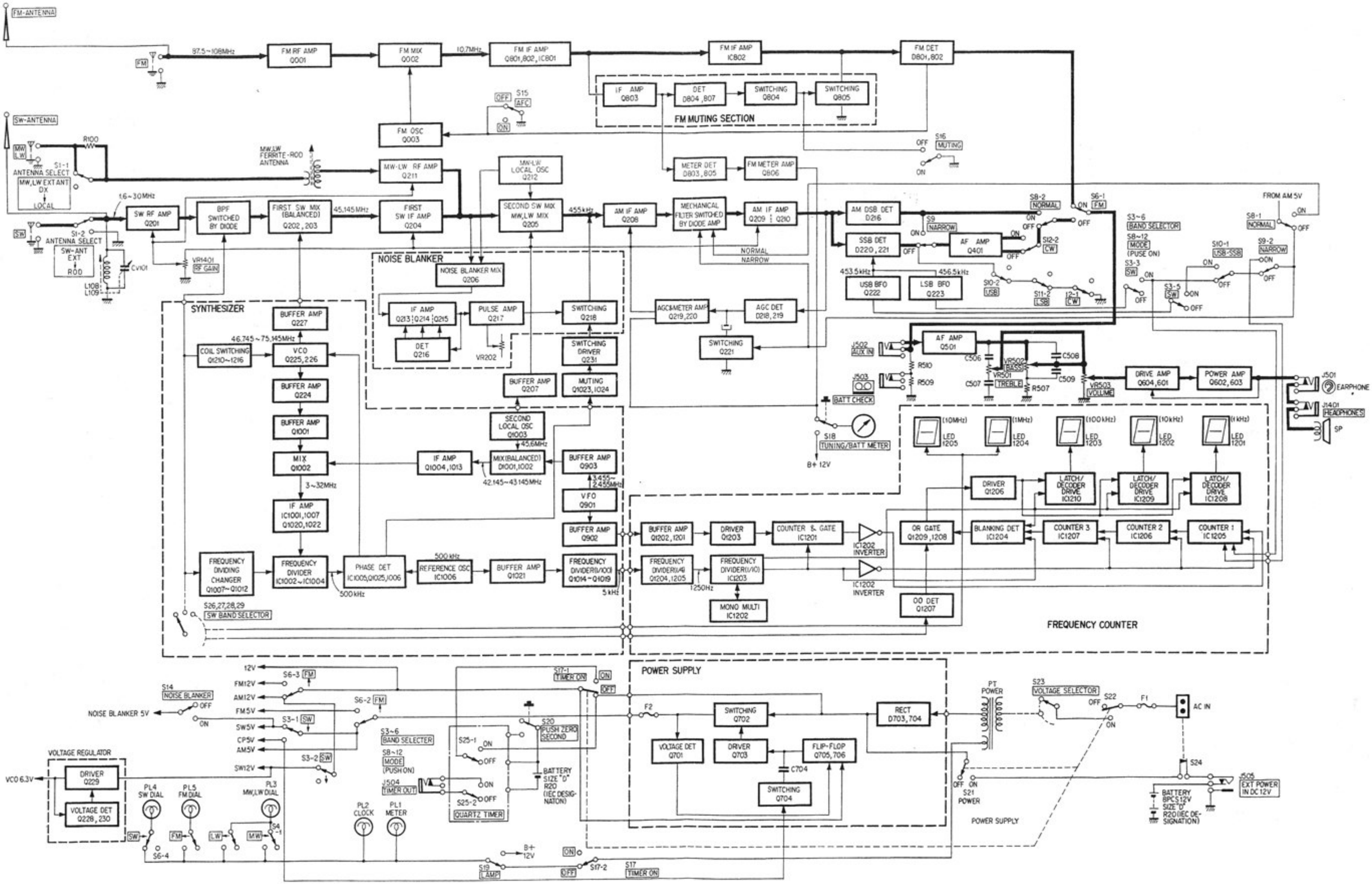
E model

SONY® WORLD ZONE MODEL NO. CRF-320
FM/SW/MW/LW 32 BAND RADIO RECEIVER
FREQ. RANGE: FM87.5–108MHz LW150–400kHz
MW530–1605kHz SW1.6–30.0MHz (29 BANDS)
IF: FM10.7MHz SW-1st 45.145MHz 2nd 455kHz MW, LW455kHz
BATT. SUPPLY: 1.5V x 8 USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
EXT. DC POWER SUPPLY: 12 V 700 mA
AC POWER SUPPLY: 100–110 V, 115–127 V 200–220 V, 230–250 V 12 W 50/60Hz
CLOCK: QUARTZ CLOCK CRYSTAL FREQ: 32.768kHz
BATT. SUPPLY: 1.5V x 1 USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
SERIAL NO. MADE IN

AEP, UK model

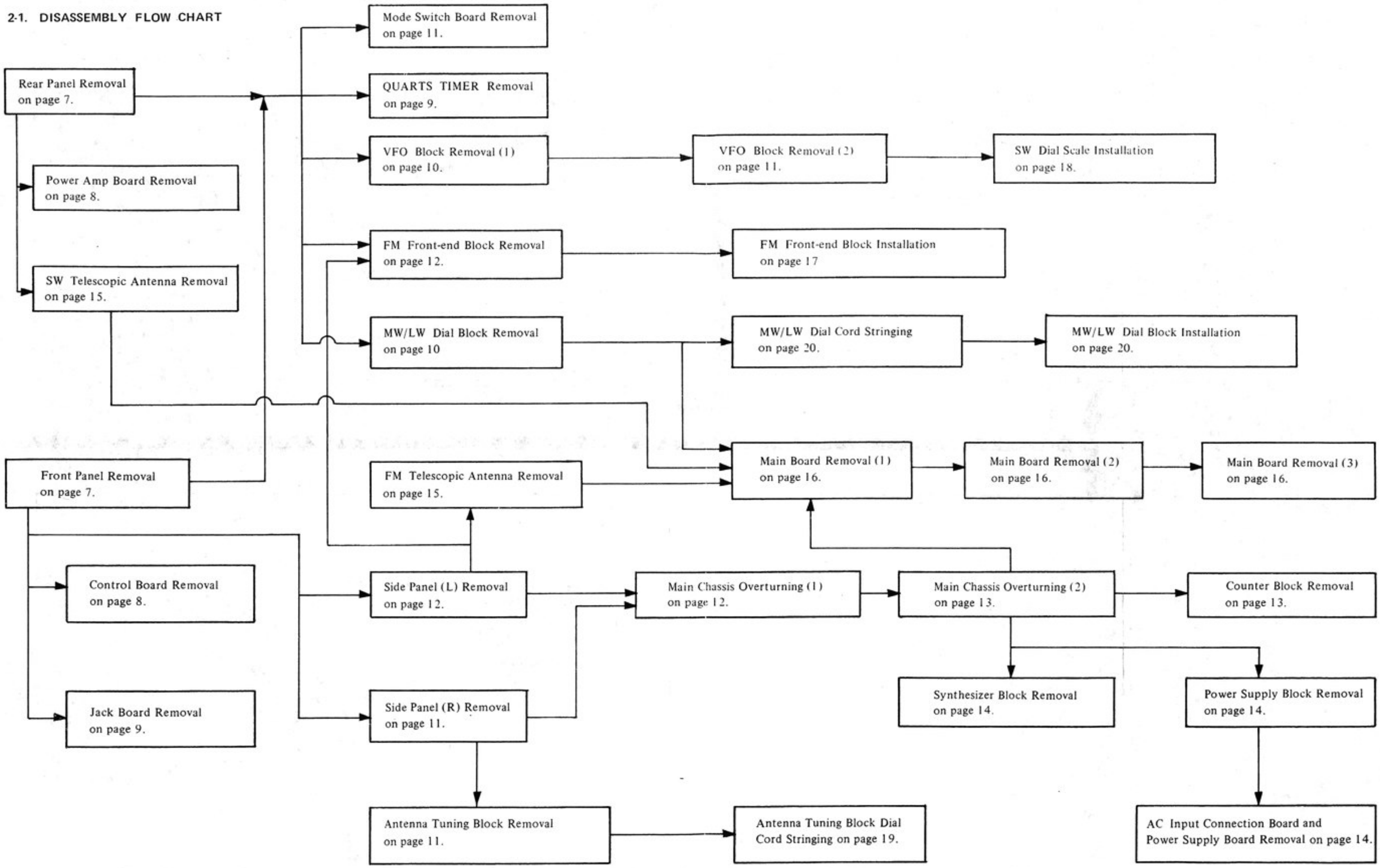
SONY® WORLD ZONE MODEL NO. CRF-320
FM/SW/MW/LW 32 BAND RADIO RECEIVER
FREQ. RANGE: FM87.5–108MHz LW150–400kHz
MW530–1605kHz SW1.6–30.0MHz (29 BANDS)
IF: FM10.7MHz SW-1st 45.145MHz 2nd 455kHz MW, LW455kHz
BATT. SUPPLY: 12V ⎓ USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
EXT. POWER SUPPLY: 12 V ⎓ 700 mA
POWER SUPPLY: 110, 127, 220, 240 V ~50/60Hz 12W
CLOCK: QUARTZ CLOCK CRYSTAL FREQ. 32.768kHz
BATT. SUPPLY: 15V ⎓ USE SIZE "D" STANDARD FLASHLIGHT BATT. OR EQUIV.
SERIAL NO.
CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. (LAMPS SOLDERED IN PLACE) REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
MADE IN

SECTION 1
BLOCK DIAGRAM



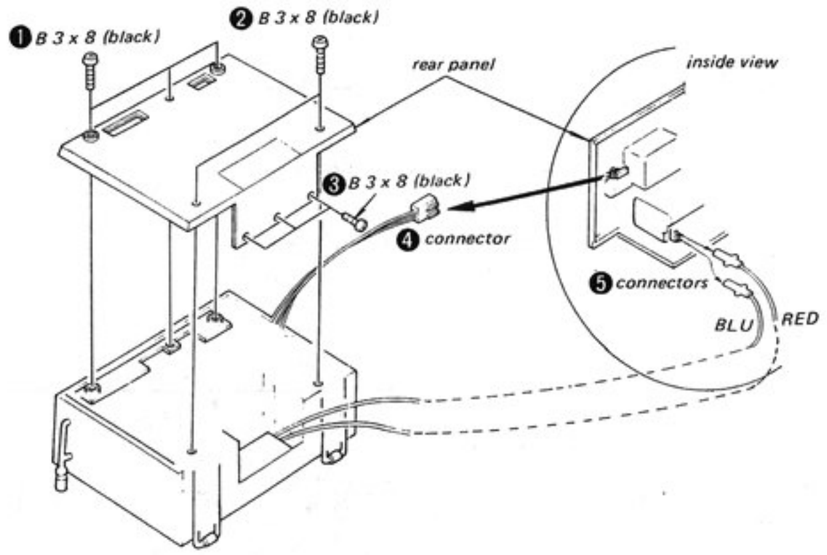
SECTION 2
DISASSEMBLY

2-1. DISASSEMBLY FLOW CHART

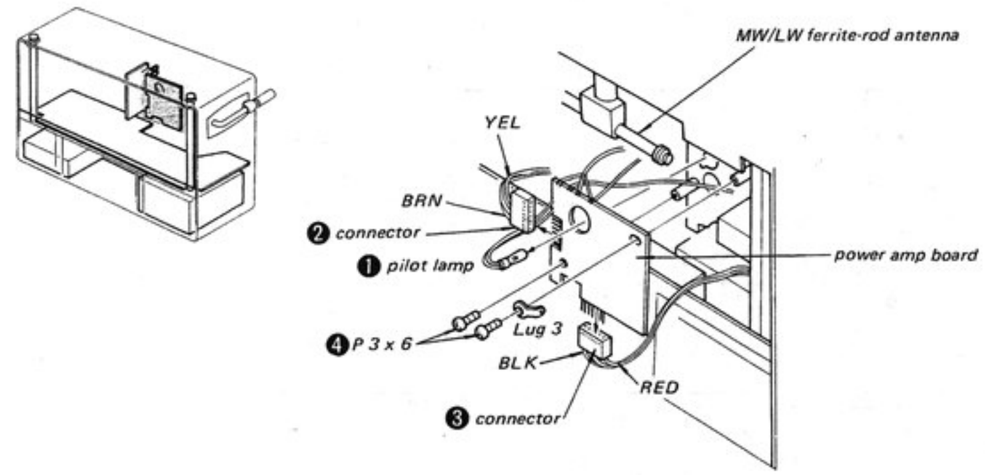


2-2. STEP-BY-STEP DISASSEMBLY

Rear Panel Removal

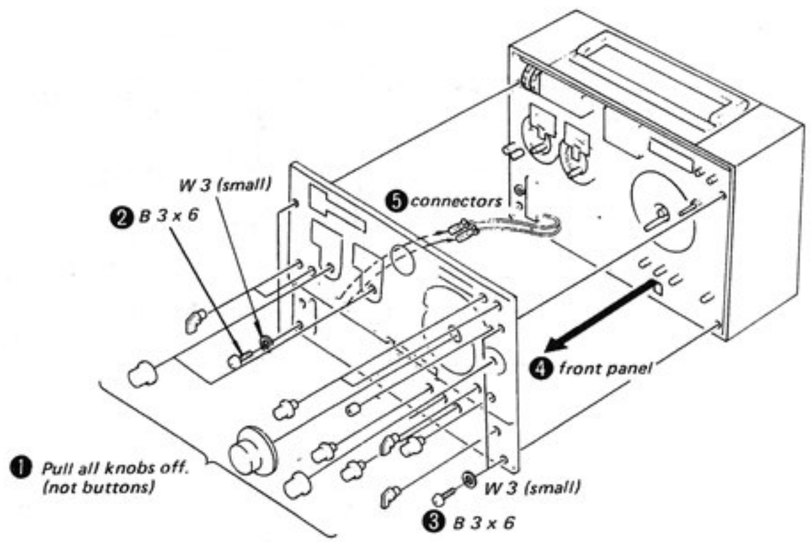


Power Amp Board Removal

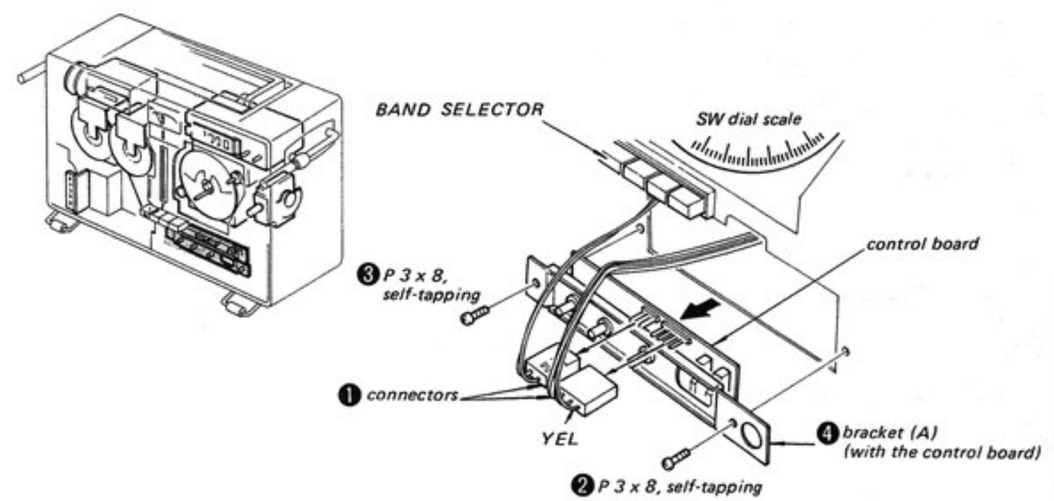


Ⓐ SW Telescopic Antenna Removal on page 15.

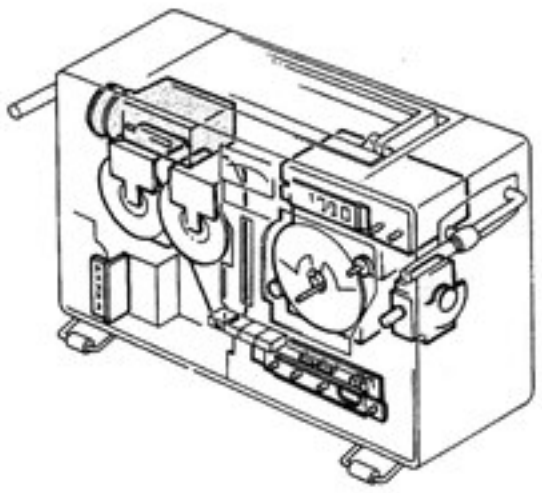
Front Panel Removal

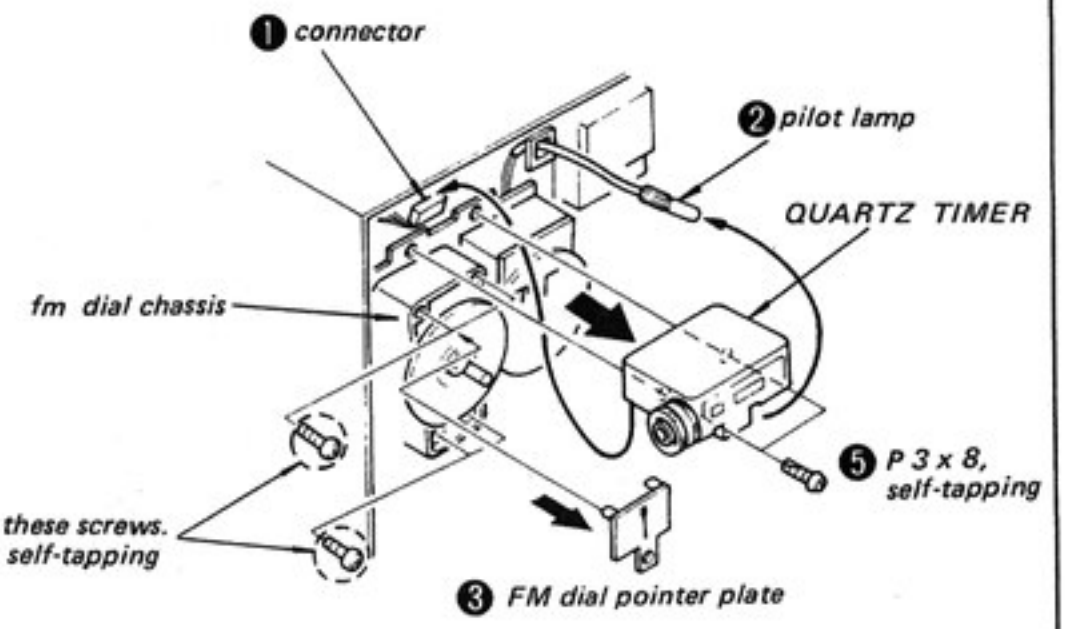


Control Board Removal

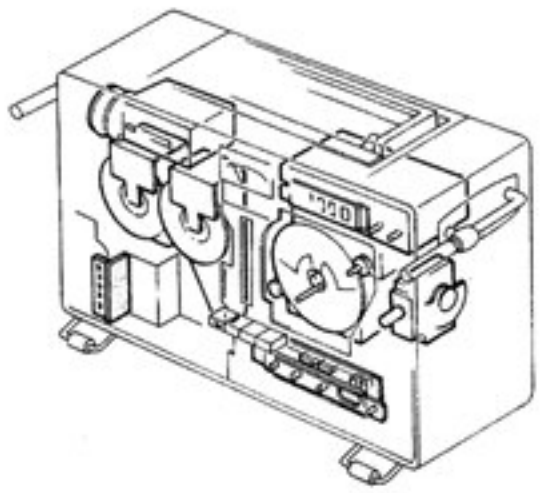


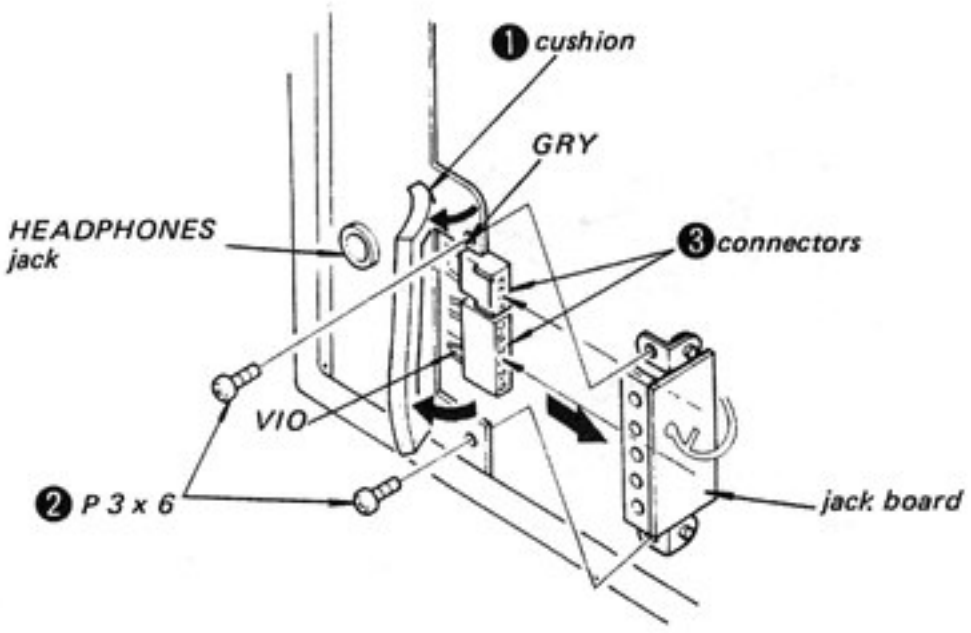
QUARTZ TIMER Removal



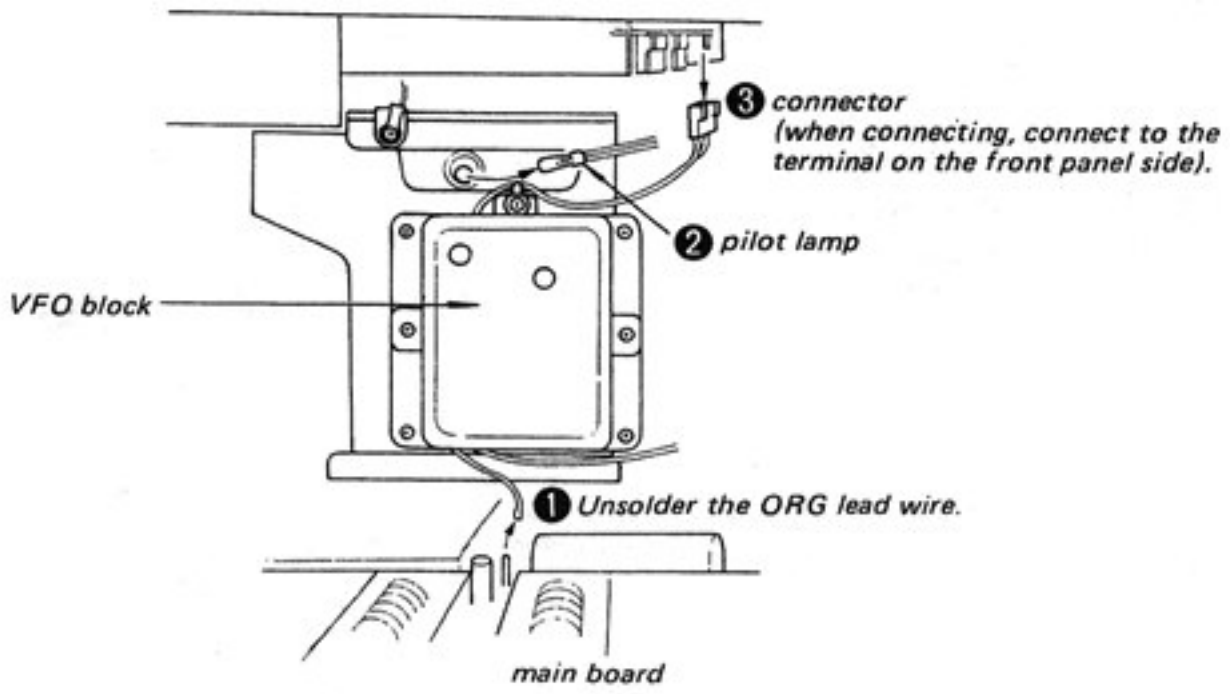


Jack Board Removal

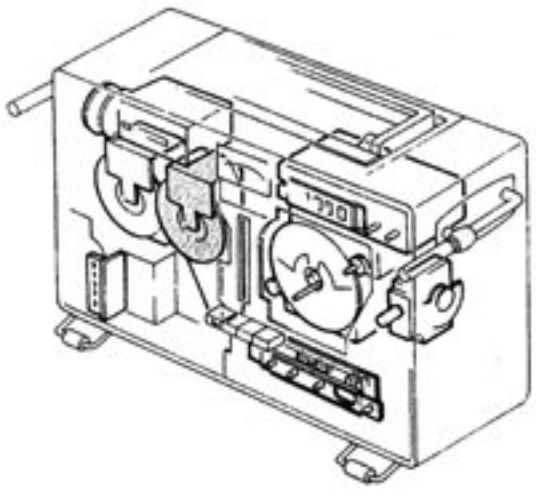


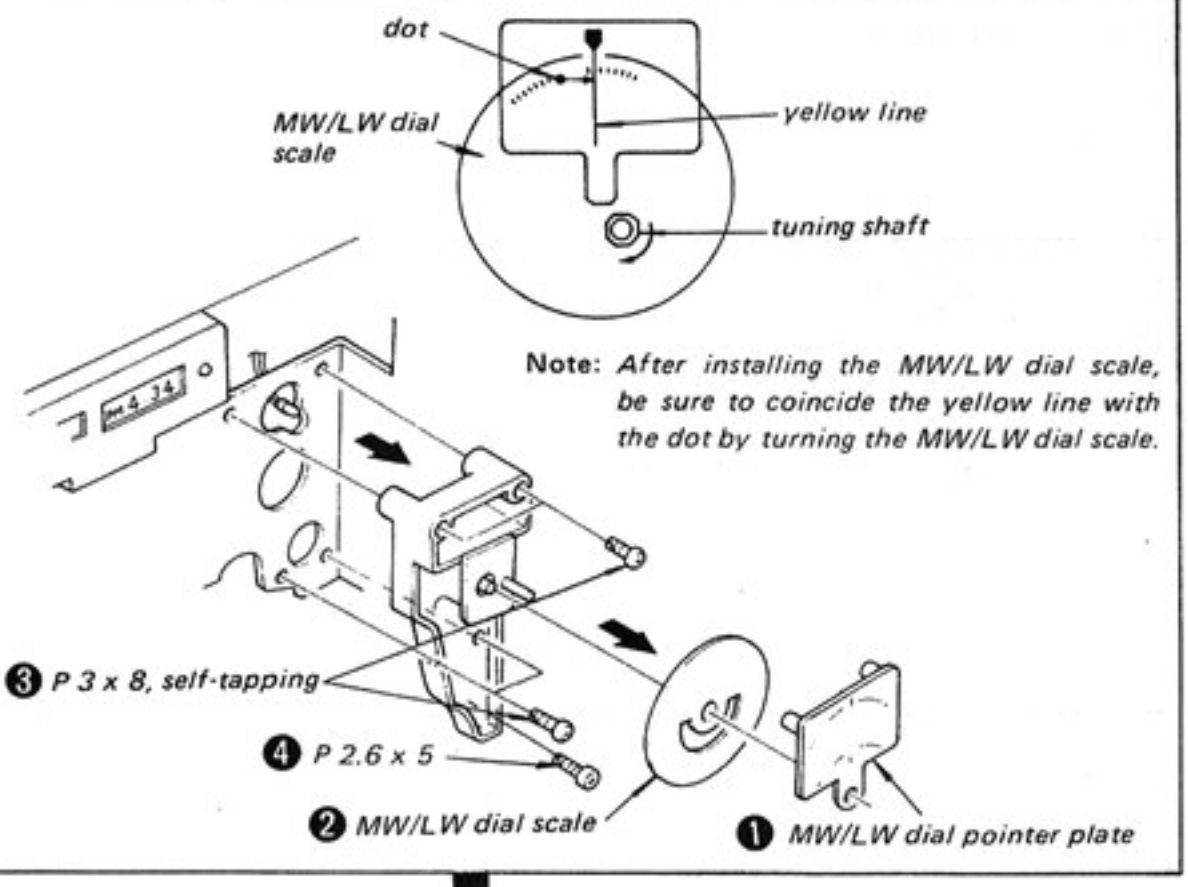


VFO Block Removal (1)



MW/LW Dial Block Removal



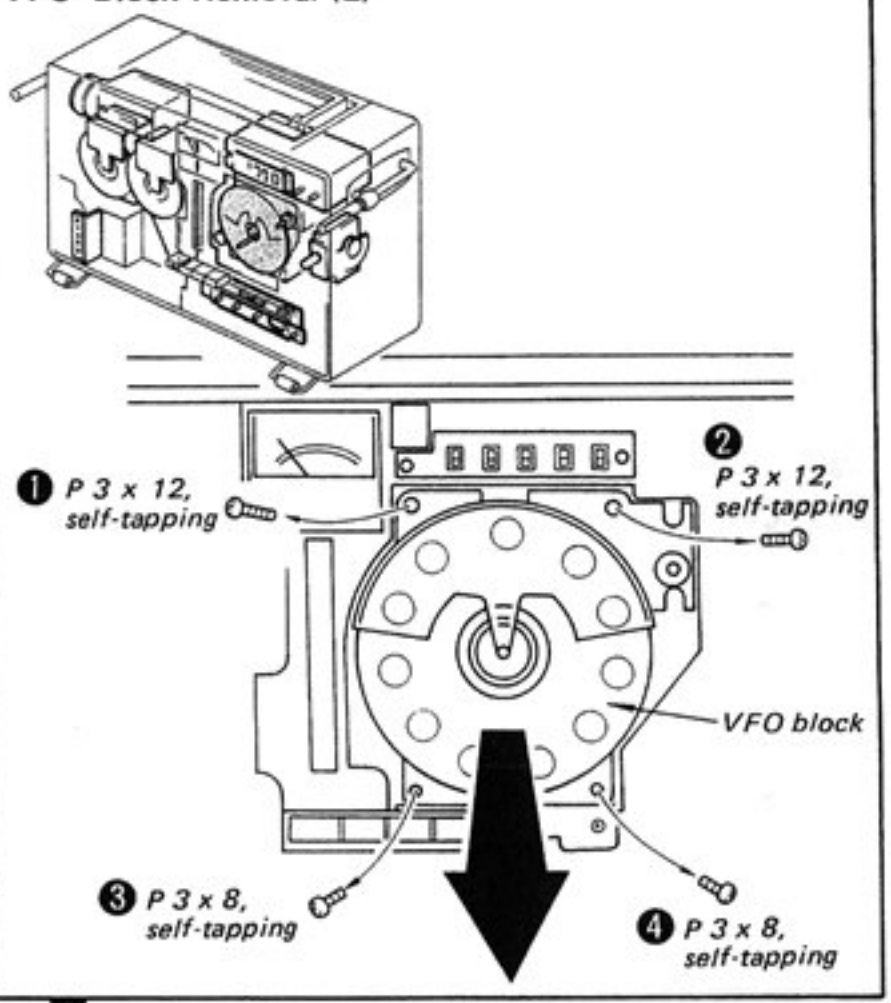


Note: *After installing the MW/LW dial scale, be sure to coincide the yellow line with the dot by turning the MW/LW dial scale.*

Ⓑ Main Board Removal on page 16.

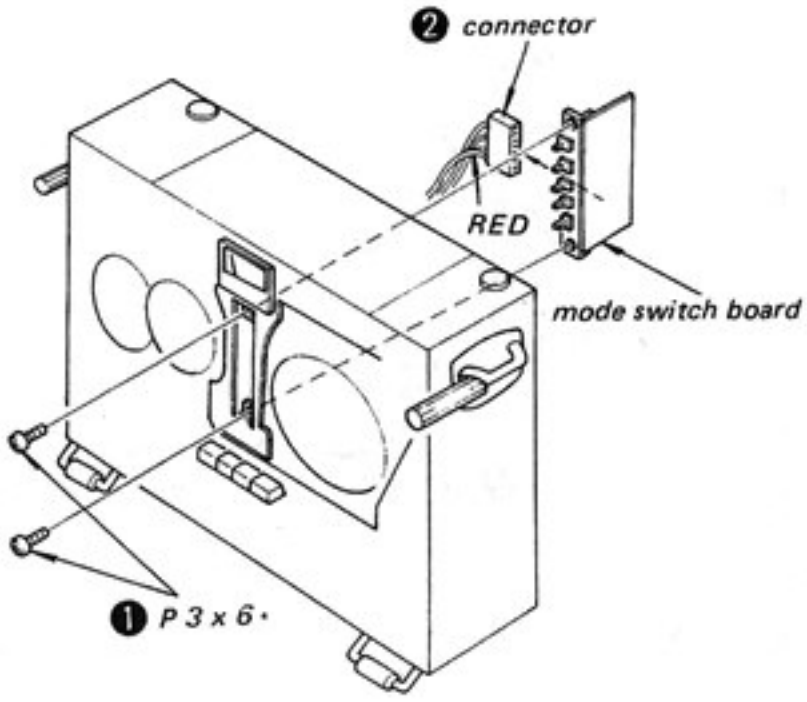
Ⓒ MW/LW Dial Cord Stringing on page 20.

VFO Block Removal (2)

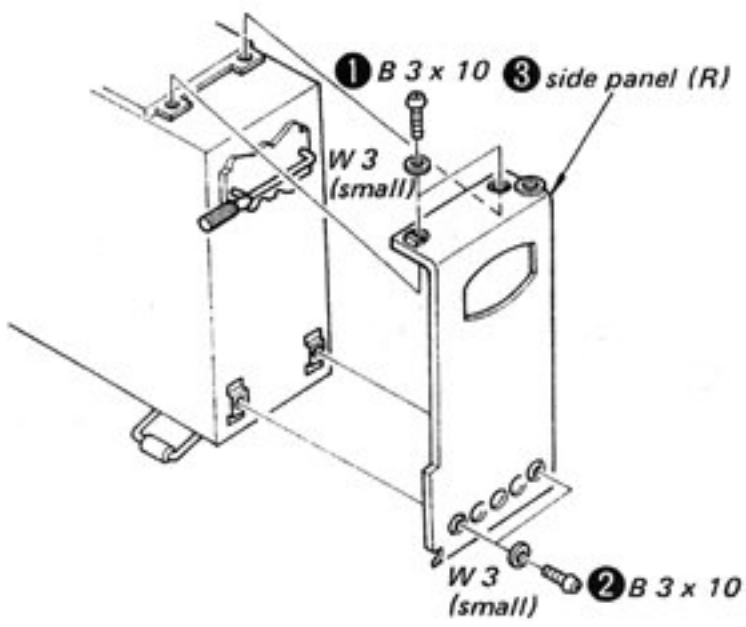


Ⓓ SW Dial Scale Installation on page 18.

Mode Switch Board Removal

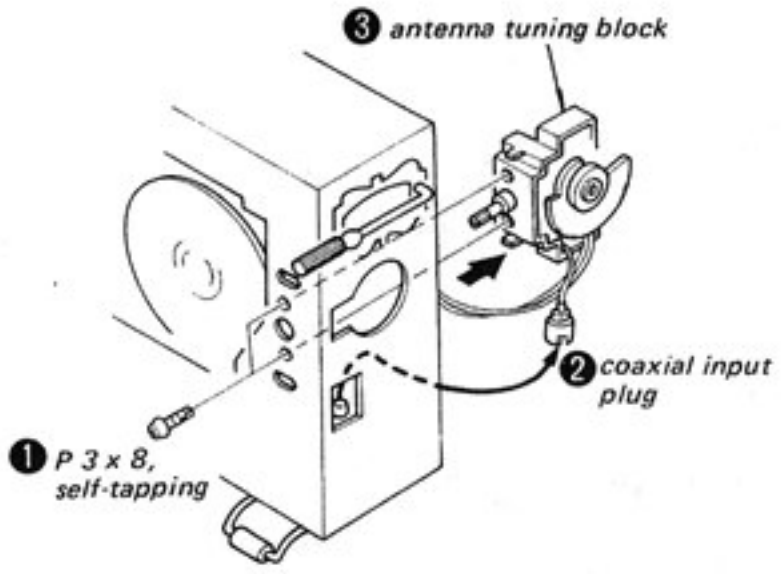


Side Panel (R) Removal



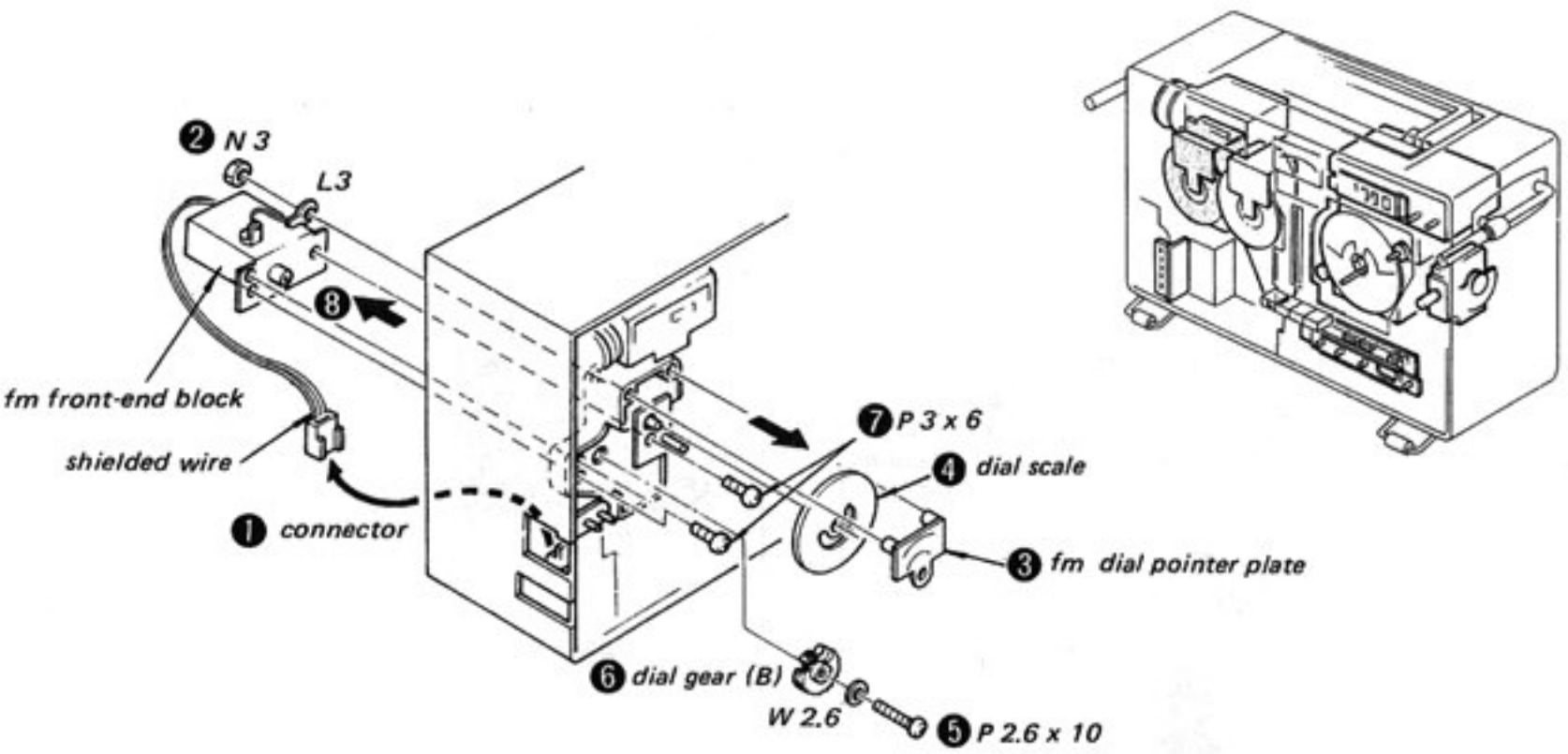
Ⓔ Main Chassis Overturning (1) on page 12.

Antenna Tuning Block Removal



Ⓕ Antenna Tuning Block Dial Cord Stringing on page 19.

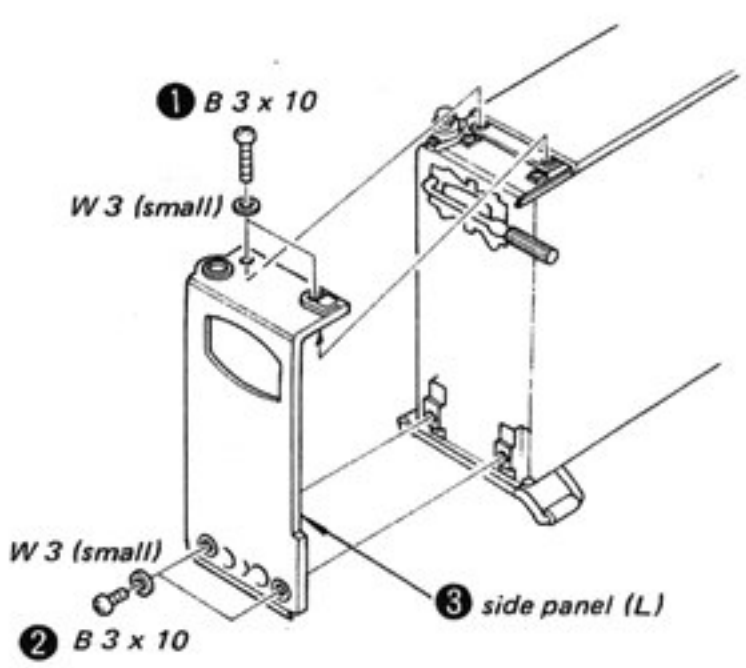
FM Front-end Block Removal



Ⓖ FM Telescopic Antenna Removal on page 15.

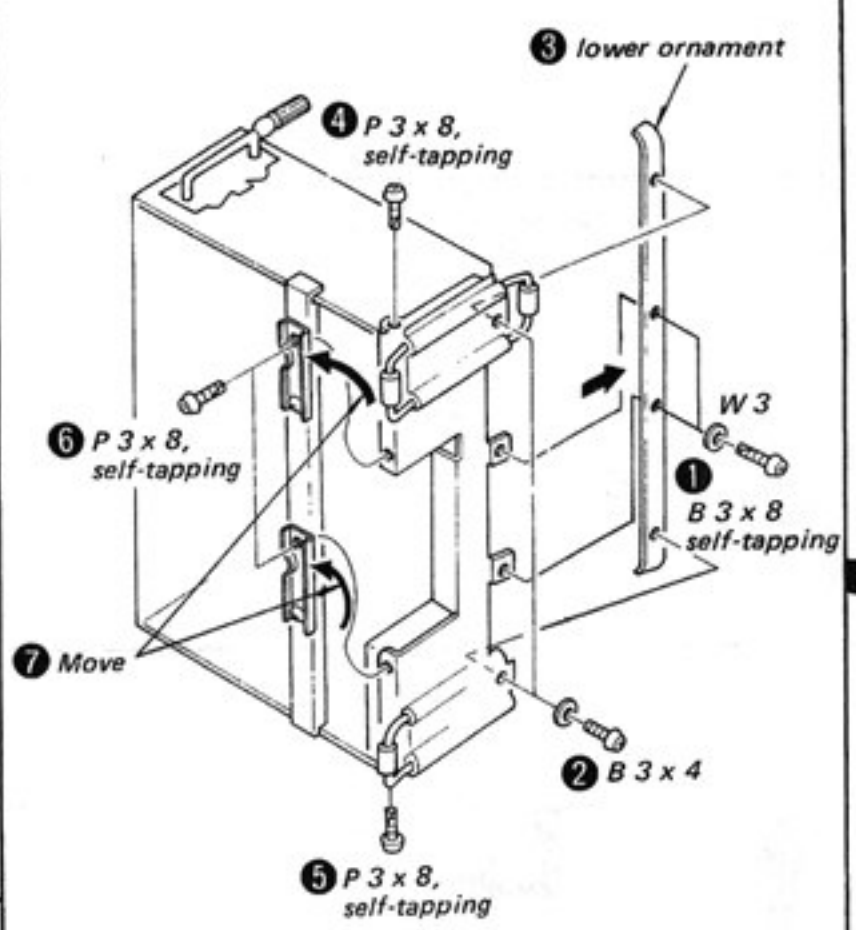
Ⓗ FM Front-end Block Installation on page 17.

Side Panel (L) Removal

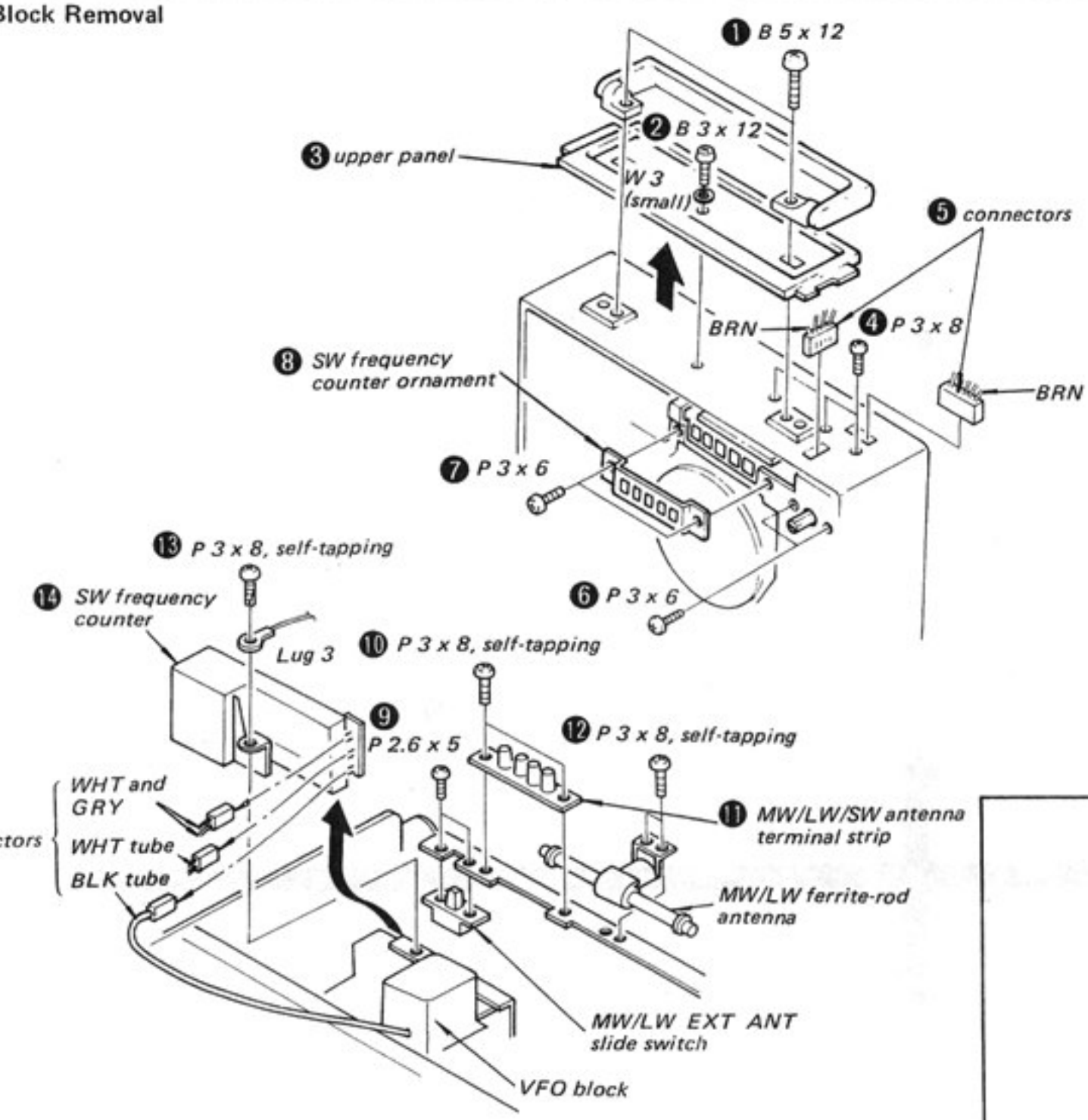


Ⓔ Side Panel (R) Removal on page 11.

Main Chassis Overturning (1)

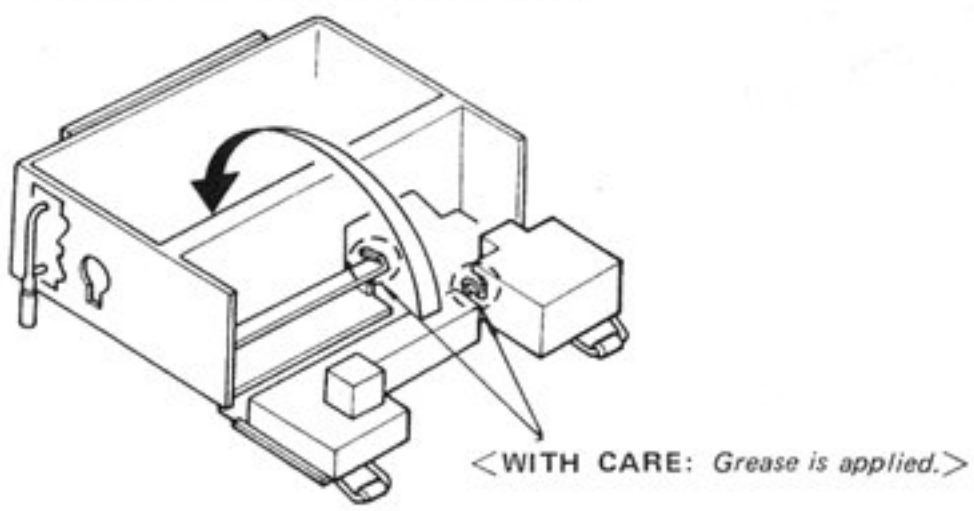


Counter Block Removal

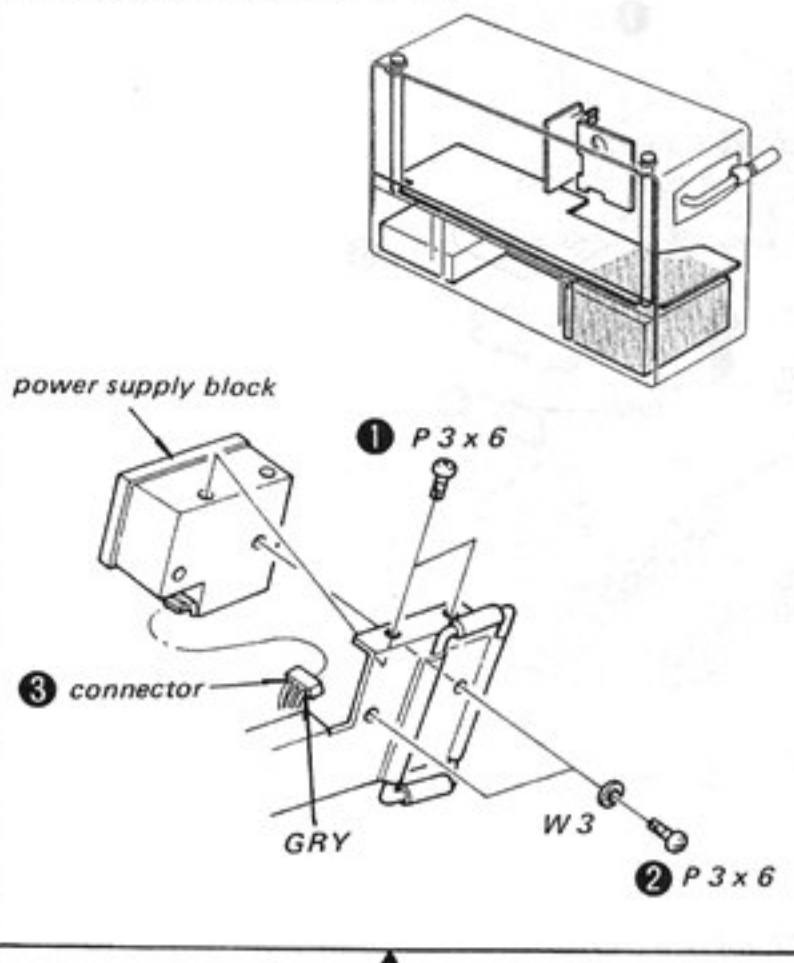


Main Chassis Overturning (2)

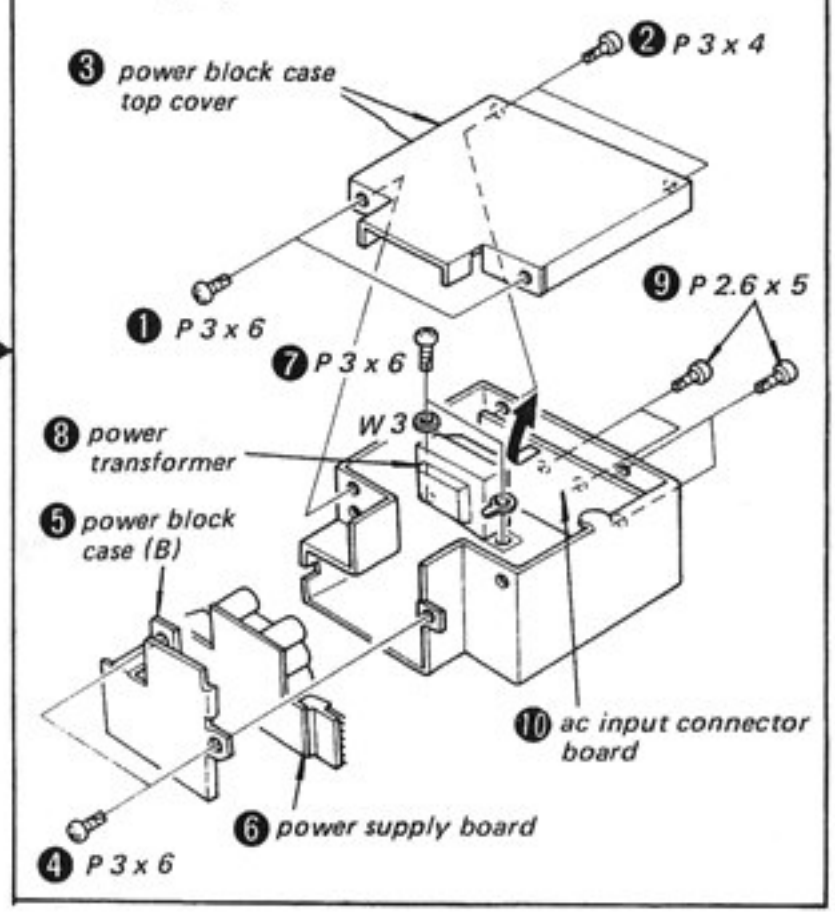
The set can be overturned as shown below.



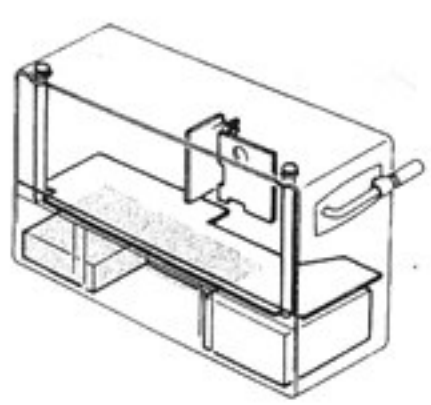
Power Supply Block Removal

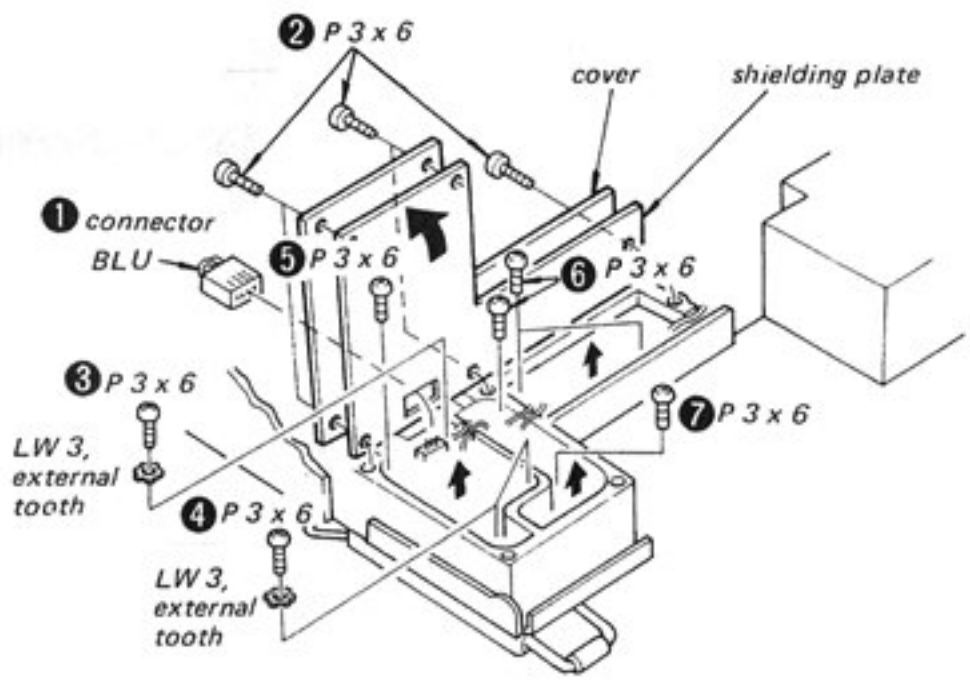


AC Input Connector Board and Power Supply Board Removal

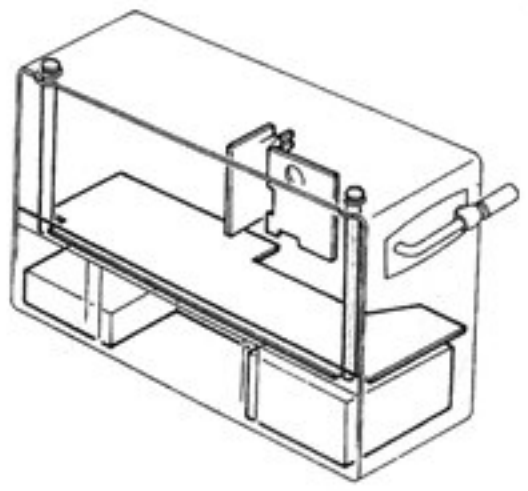


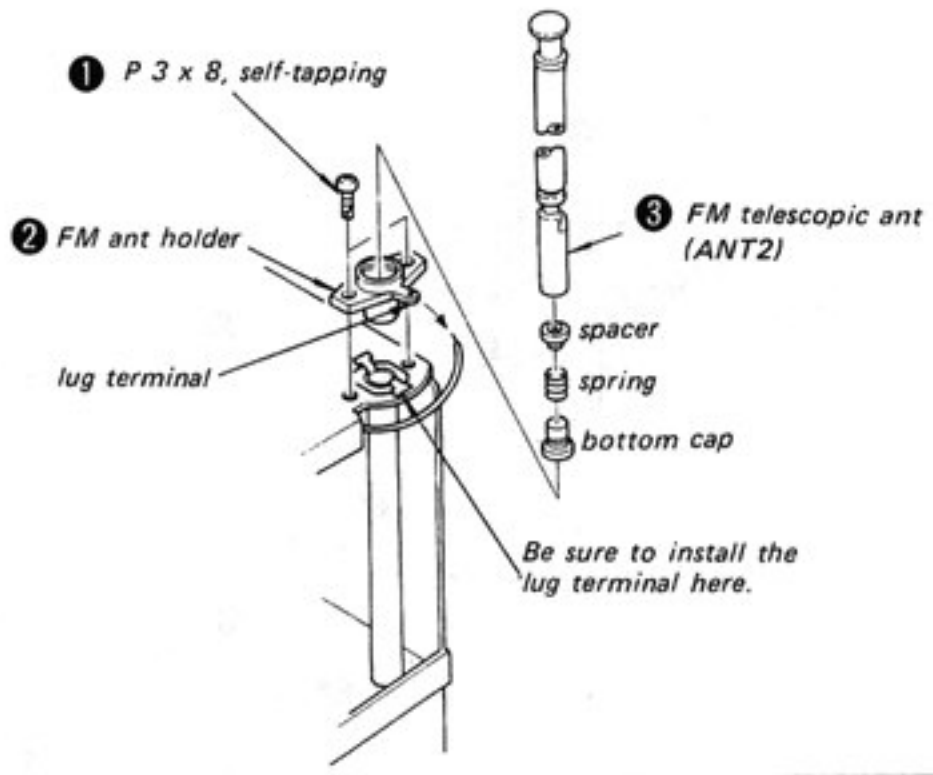
Synthesizer Block Removal





FM Telescopic Antenna Removal



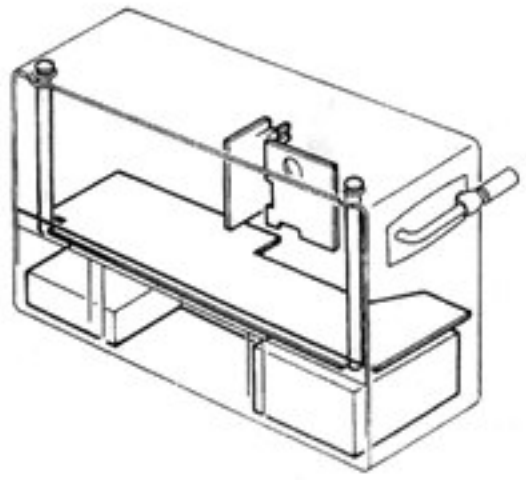


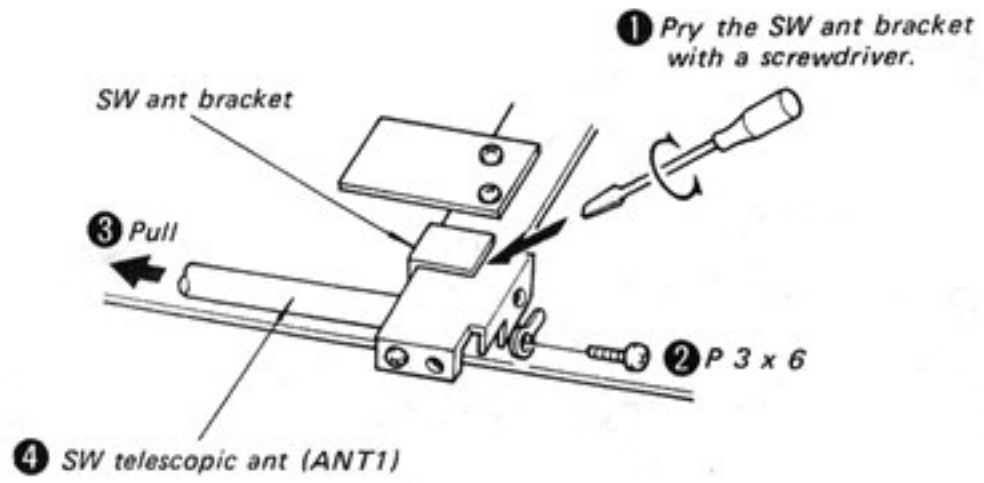
Ⓖ Side Panel (L) Removal on page 12.

Ⓑ MW/LW Dial Block Removal on page 10.

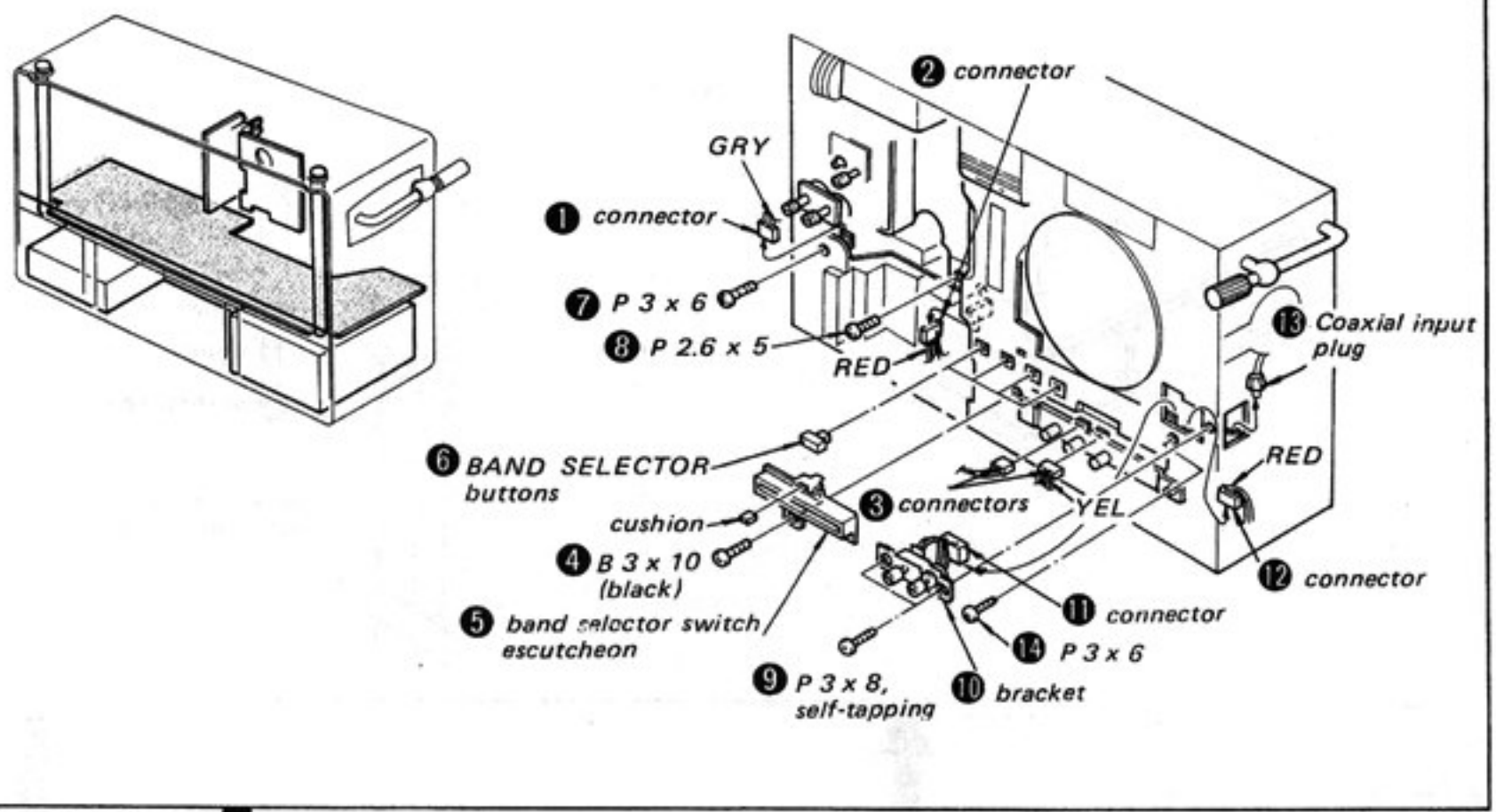
Ⓐ Rear Panel Removal on page 7.

SW Telescopic Antenna Removal

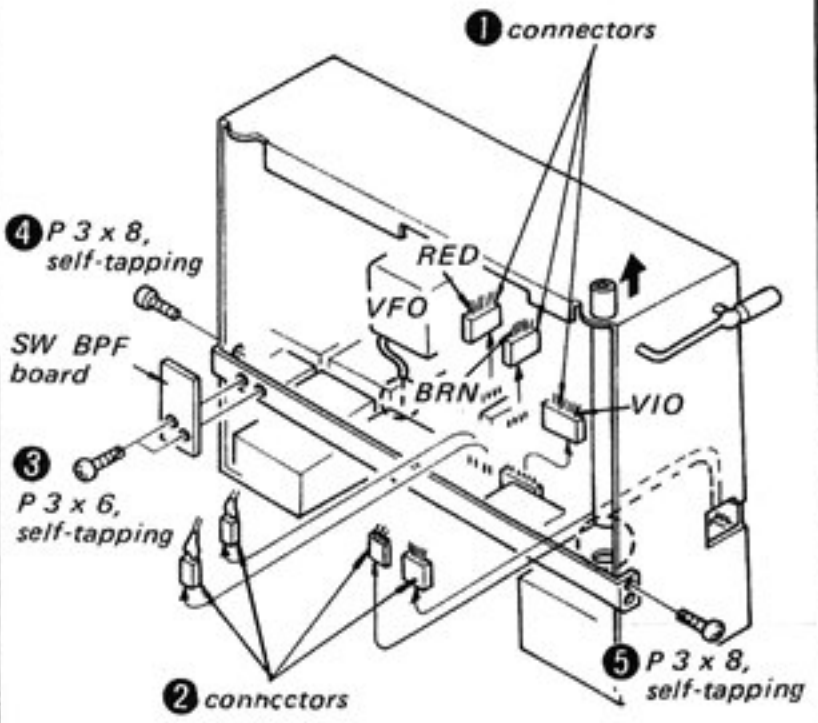




Main Board Removal (1)



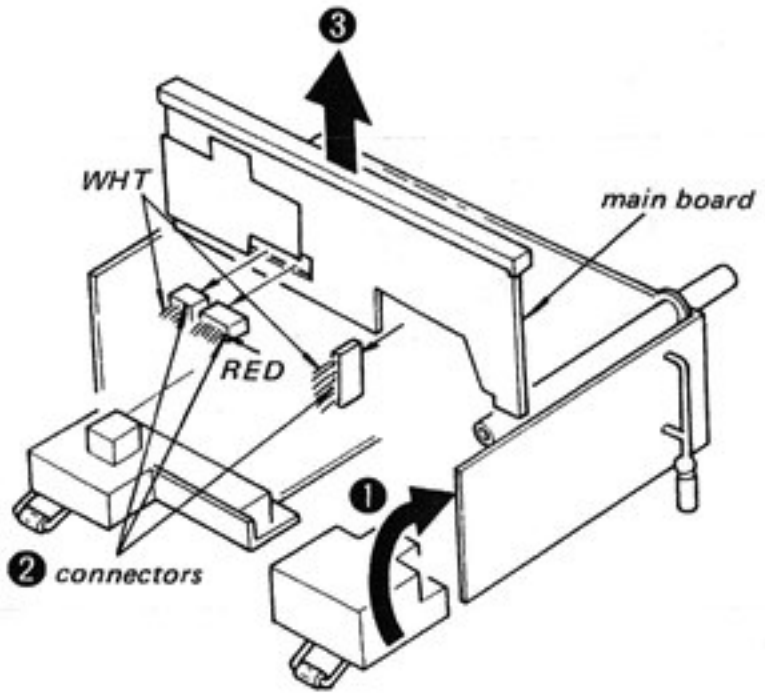
Main Board Removal (2)



❻ *Remove the antenna guide pipe off.*

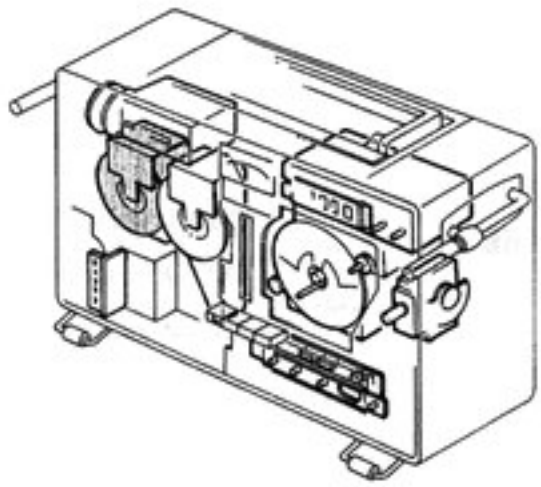
Note: *The antenna guide pipe is fixed with locking compound.*

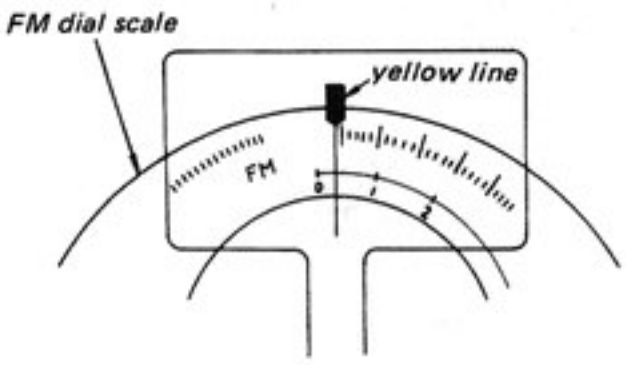
Main Board Removal (3)

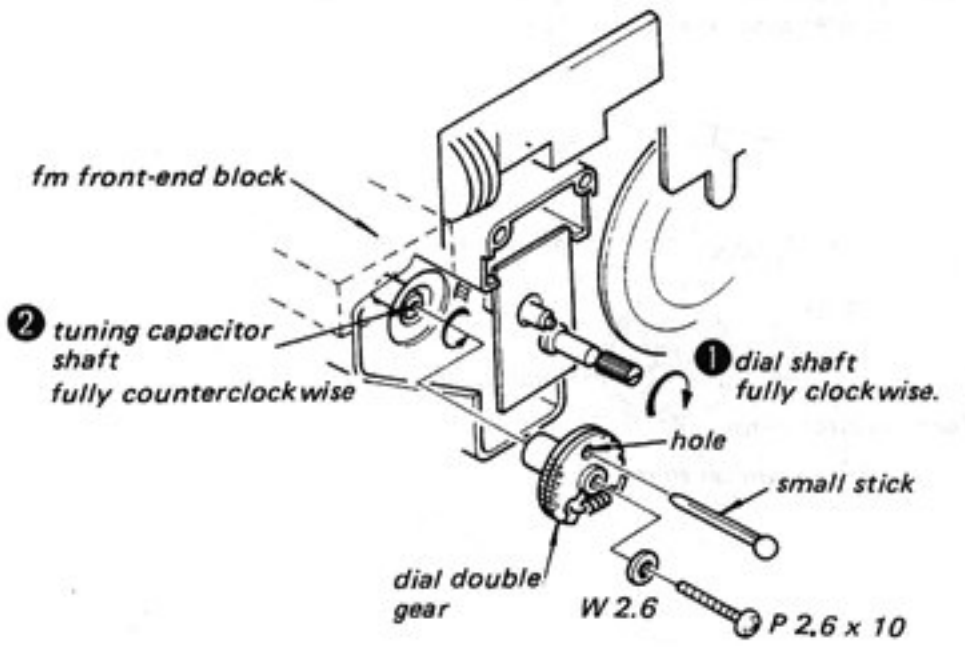


(H) FM Front-end Block Removal on page 12.

FM Front-end Block Installation





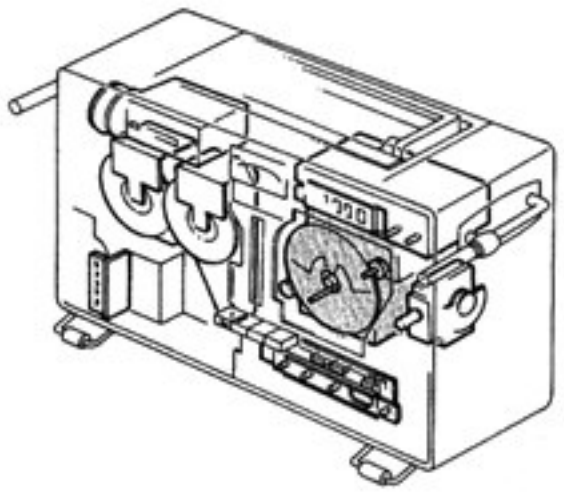


❸ *Fix the double gear with a small stick. Take a small stick off after installing the double gear to the tuning capaictor shaft.*

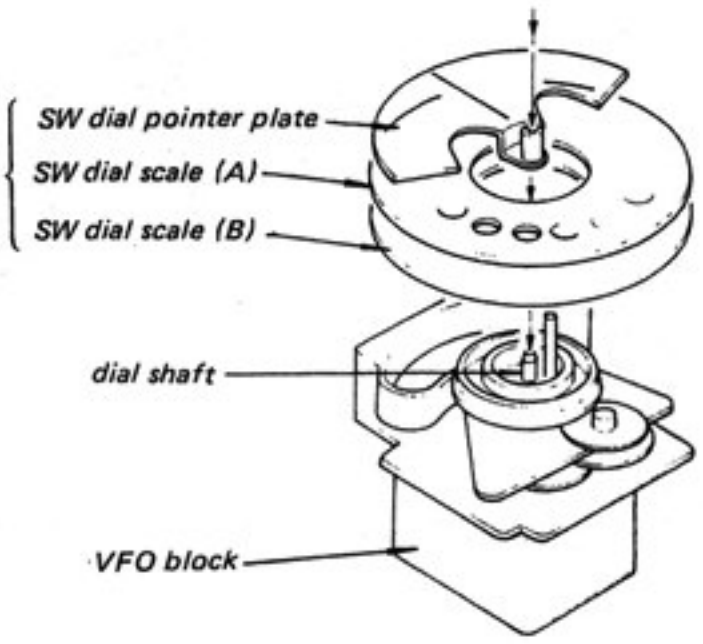
❹ *Turn and set the fm dial scale so that the first long line of the scale places one division ahead of the yellow line.*

Ⓓ VFO Block Removal (2)
on page 11.

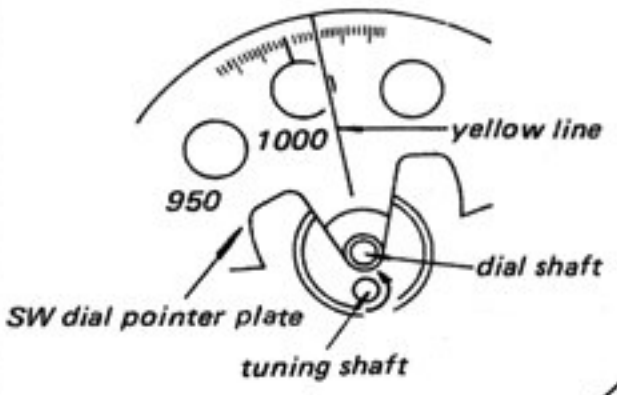
SW Dial Scale Installation



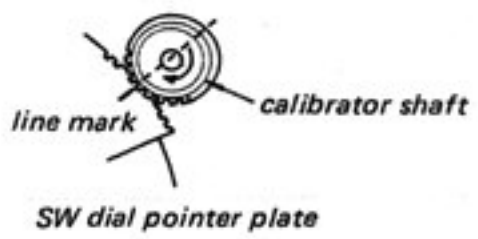
❶ *Install them slightly to the dial shaft.*

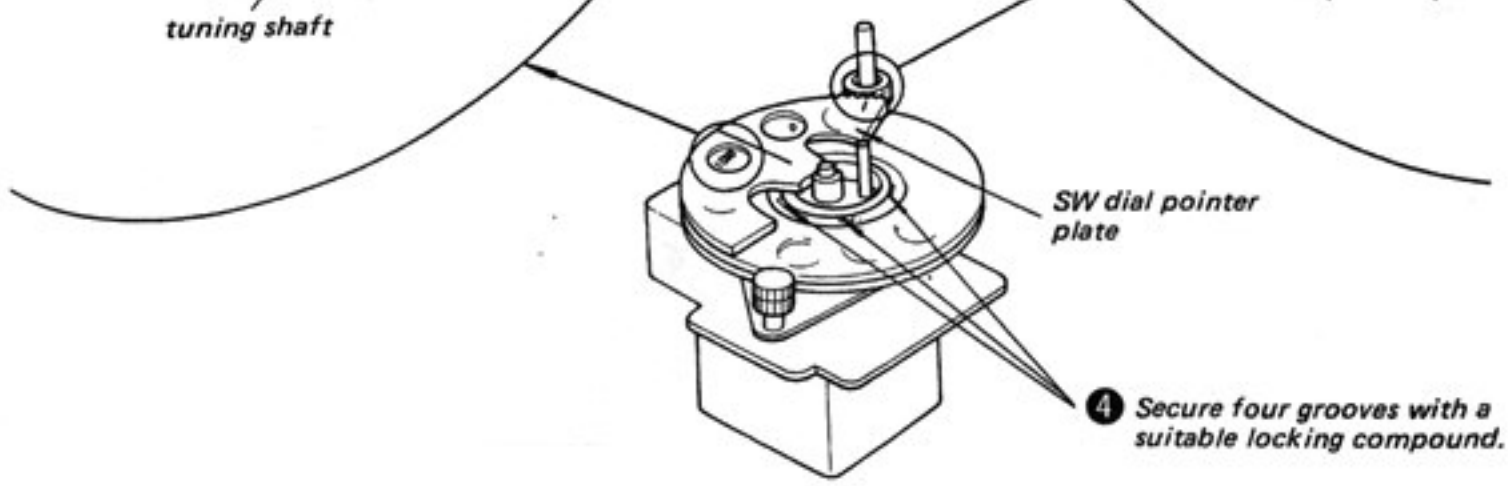


❸ *Turn the tuning shaft fully counterclockwise. Install the two kinds of dial scale and dial pointer plate so that the yellow line on the dial pointer plate points to "1010".*



❷ *After turning the calibrator shaft fully clockwise, gear the SW dial pointer plate into the calibrator shaft on line mark.*

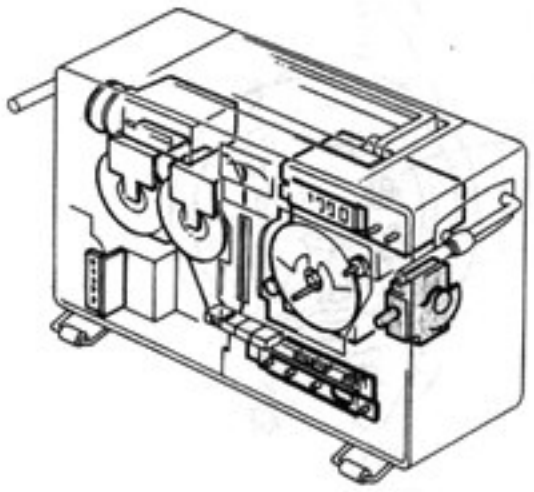




❹ *Secure four grooves with a suitable locking compound.*

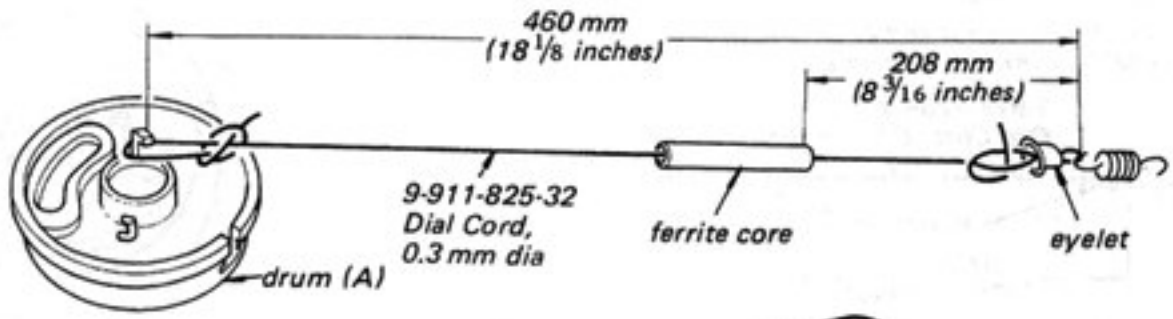
Ⓕ Antenna Tuning Block Removal on page 11.

Antenna Tuning Block Dial Cord Stringing

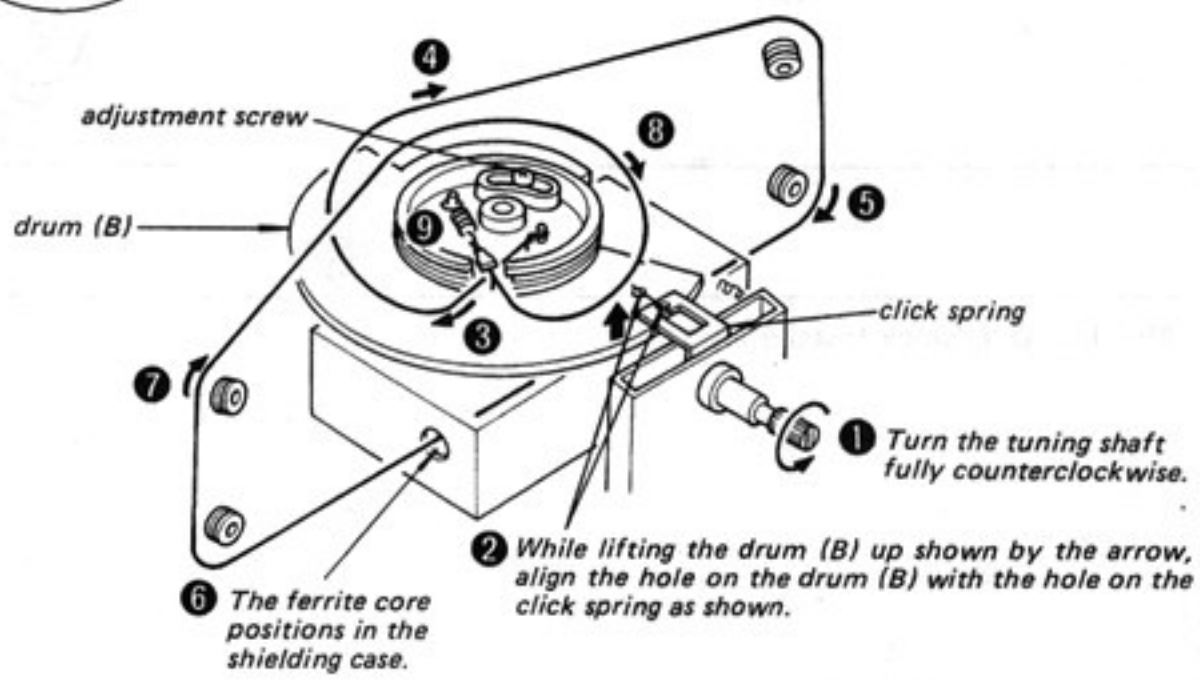


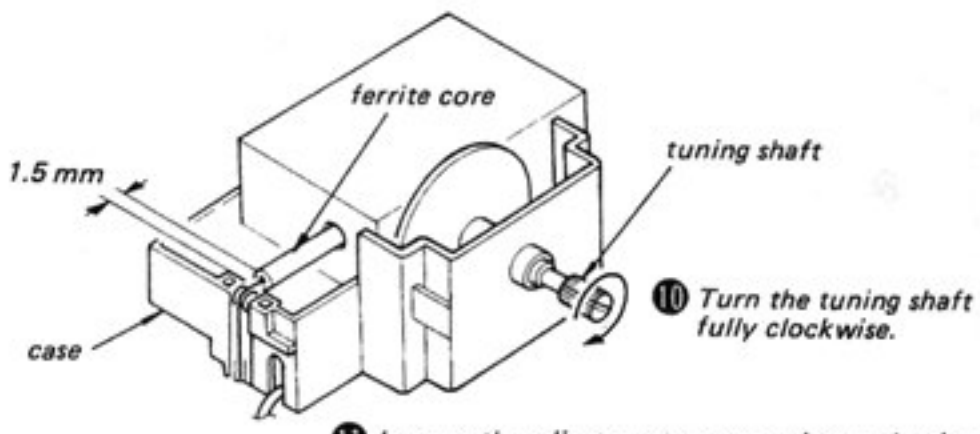
1. Dial Cord Preparation

- *Crimp the eyelet.*
- *Secure the ties, eyelet and ferrite core with a suitable locking compound.*



2. Dial Cord Stringing

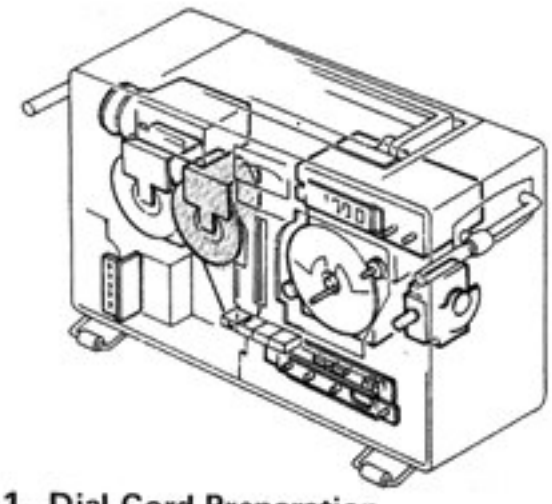




⓫ *Loosen the adjustment screw and turn the drum (A) so that the clearance between the case and the ferrite core should be 1.5 mm.*

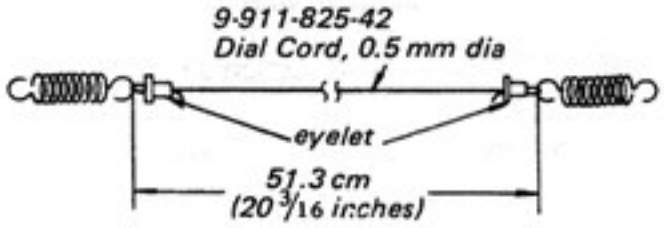
© MW/LW Dial Block Removal on page 10.

MW/LW Dial Cord Stringing

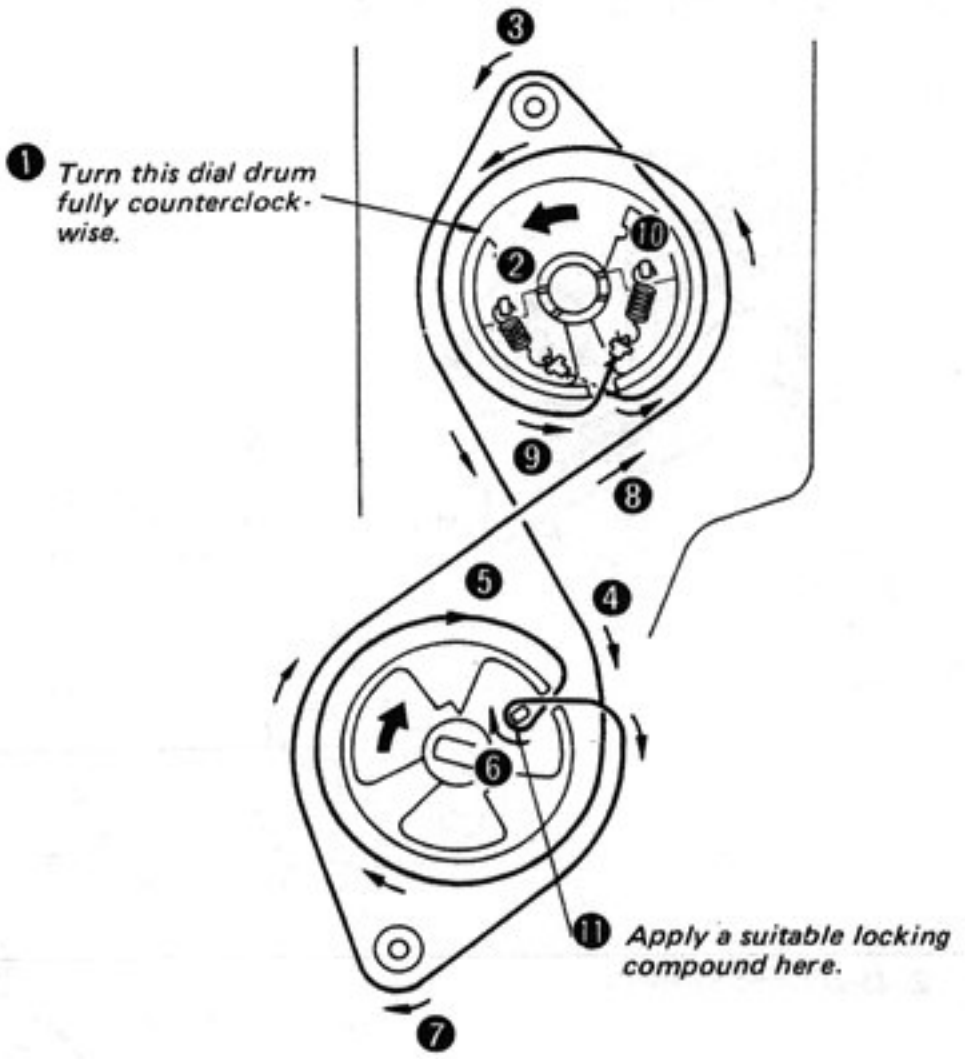


1. Dial Cord Preparation

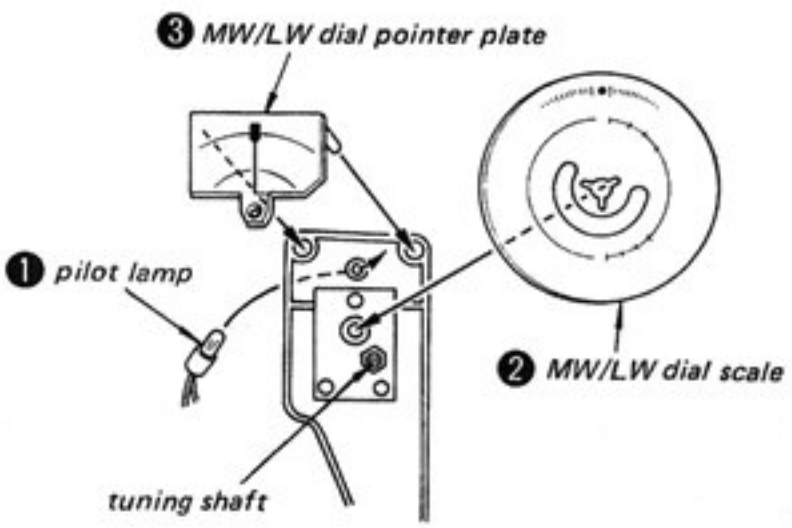
- *Crimp the eyelets.*
- *Secure the dial cord and eyelets with a suitable locking compound.*



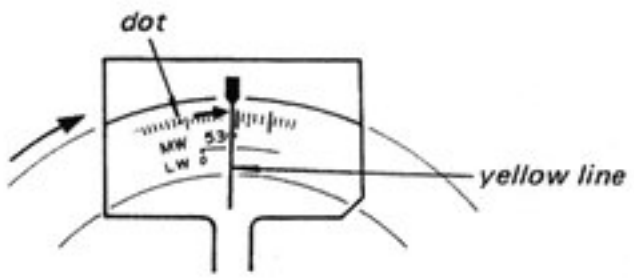
2. Dial Cord Stringing



MW/LW Dial Block Installation



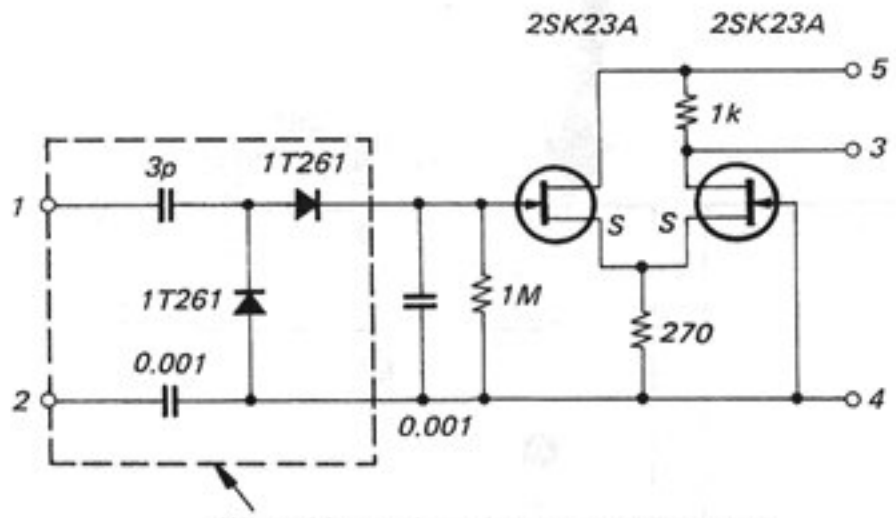
❹ *Turn the tuning shaft fully clockwise and then coincide the yellow line with the dot by turning the MW/LW dial scale.*



SECTION 3
ADJUSTMENTS

Test Equipment Required:

- FM rf signal generator
- AM rf signal generator
- FM sweep generator
- AM sweep generator
- marker generator
- frequency counter
  (100 MHz, resolution ± 1 Hz)
- ac/dc VTVM
- rf VTVM
- oscilloscope
- detector (shown below)



Wire this section shortest possible and connect capacitor leads directly to the test points shown in setup diagrams.

- **Note:** 1. Adjustments to the VFO can not be made by using generally available test equipment. When trouble is encountered to the VFO, replace the VFO Block.
  Part No.: **A-3624-020-B**

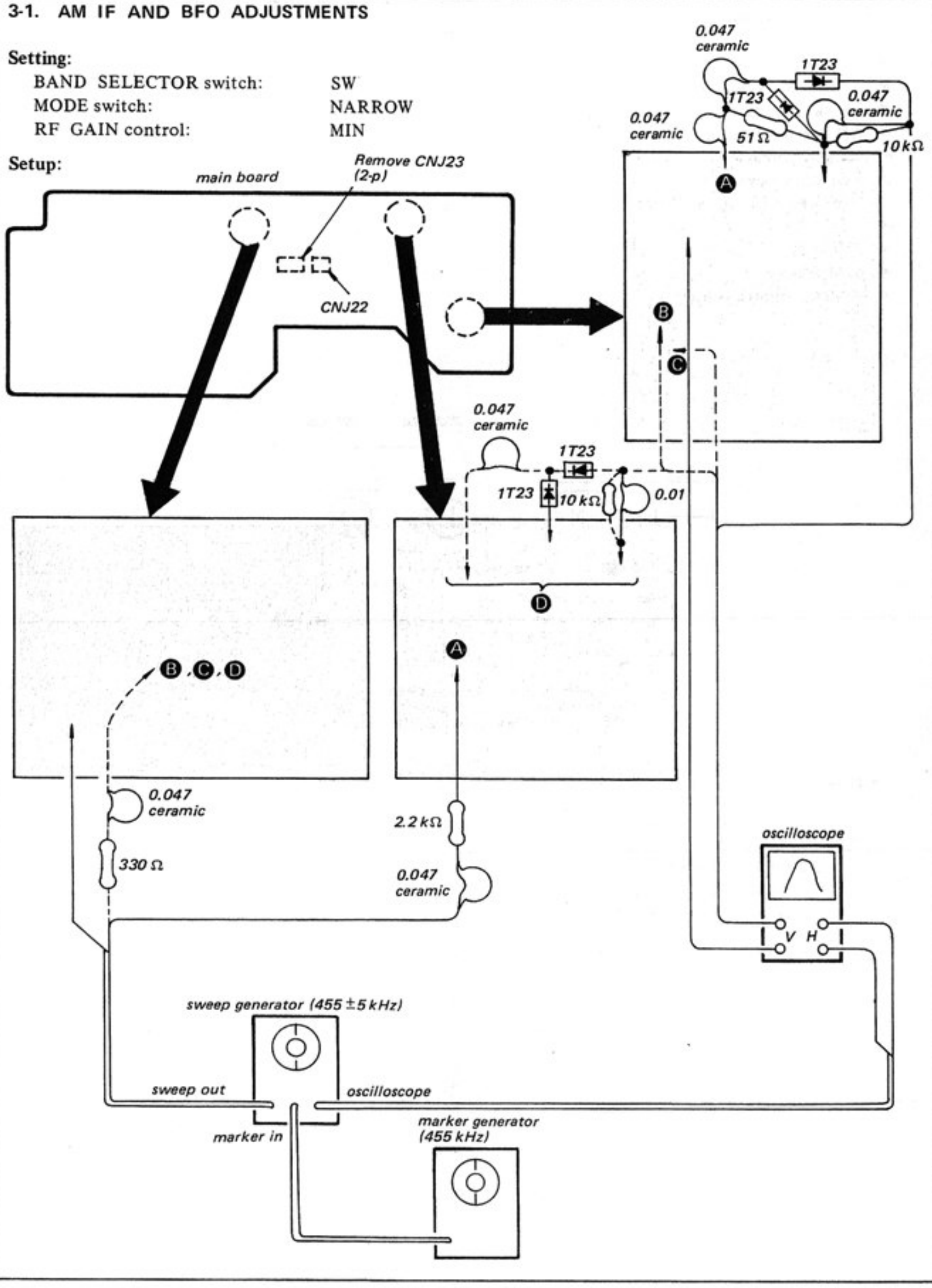
  2. Overturn the main chassis before the adjustments. Refer to pages 12 and 13.

3-1. AM IF AND BFO ADJUSTMENTS

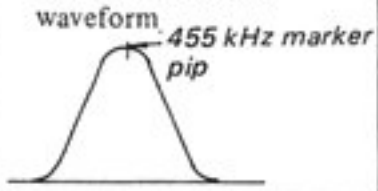
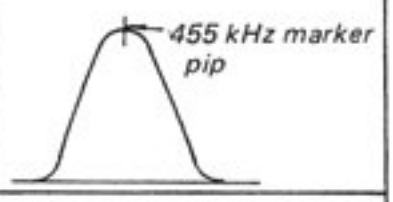
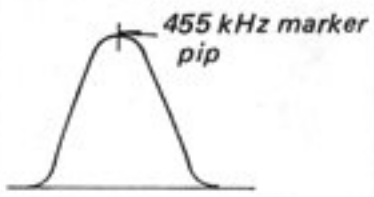
Setting:

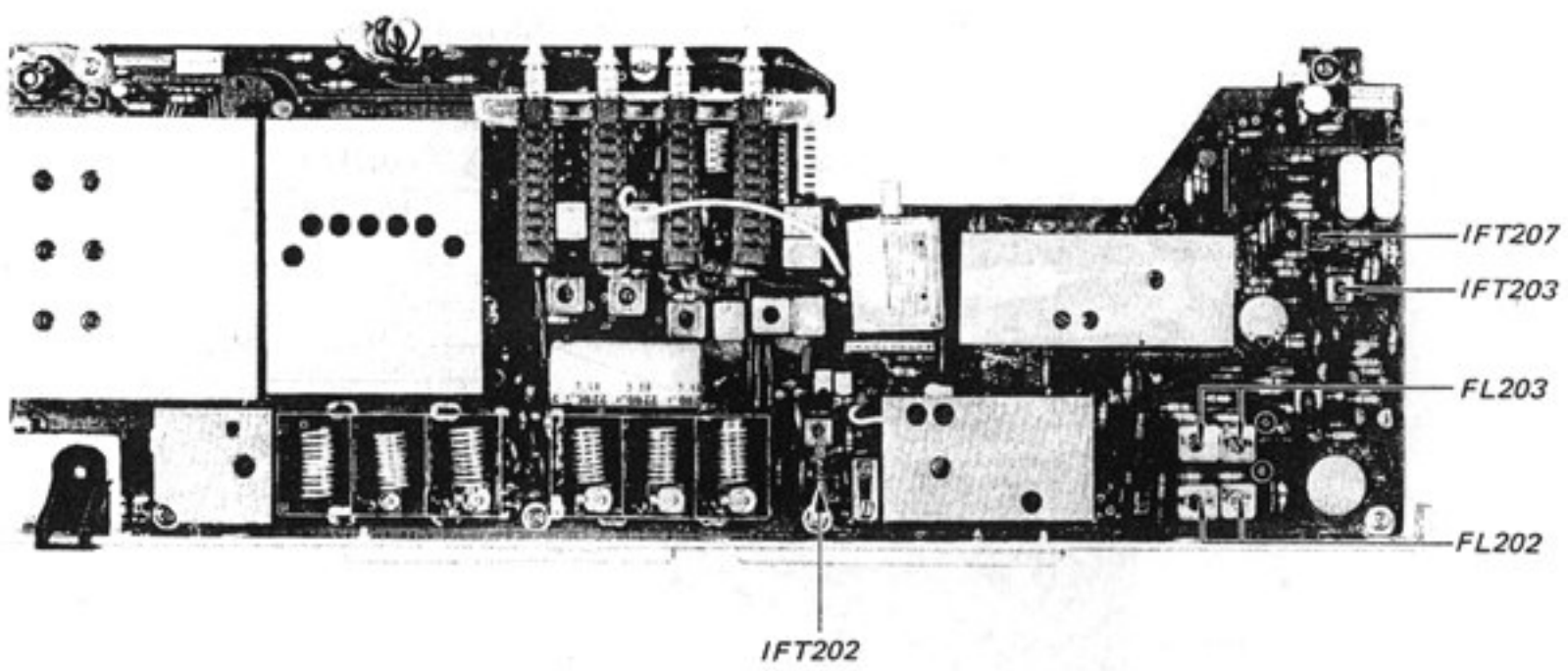
BAND SELECTOR switch:	SW
MODE switch:	NARROW
RF GAIN control:	MIN

Setup:



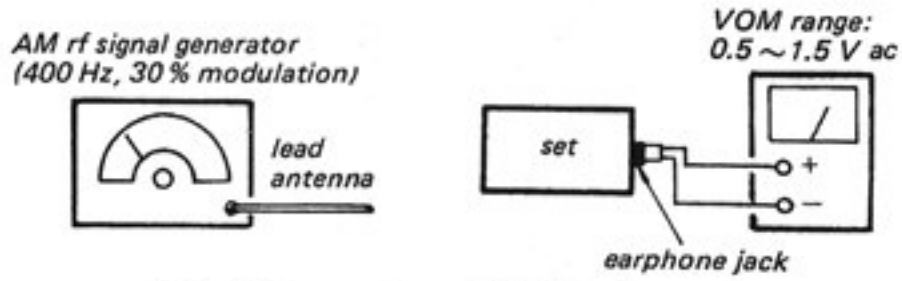
Procedure:

Adjust	Obtain
FL203 (Connect oscilloscope and sweep out to Ⓐ.) (MODE switch: NORMAL) FL202 (MODE switch: NARROW)	Highest and widest waveform 
IFT202, IFT203 (Connect oscilloscope and sweep out to Ⓑ.) (MODE switch: NORMAL)	Highest waveform 
IFT207 (MODE switch: LSB Connect oscilloscope to Ⓒ.) Check: MODE switch: USB	A beat spike on the above waveform. Set the core at the center of rotation in which a spike appears on the waveform. Beat spike should move to the opposite slope and stays stably.
IFT202 (Connect oscilloscope and sweep out to Ⓓ.) (MODE switch: NARROW)	Highest waveform 



3-2. LW/MW FREQUENCY COVERAGE AND TRACKING ADJUSTMENTS

Setup:

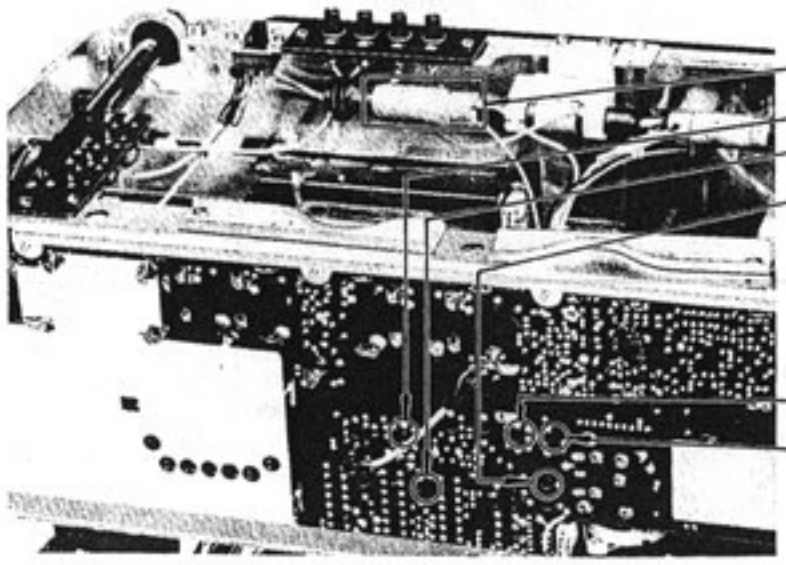


Adjust for maximum VOM reading.

A) LW

Setting:

BAND SELECTOR switch:	LW
MODE switch:	NORMAL
VOLUME control:	MAX
TONE controls:	MAX
RF GAIN control:	MAX/NORMAL



LW TRACKING	
L261-1	200 kHz
L263	
CT203	380 kHz
CT202	

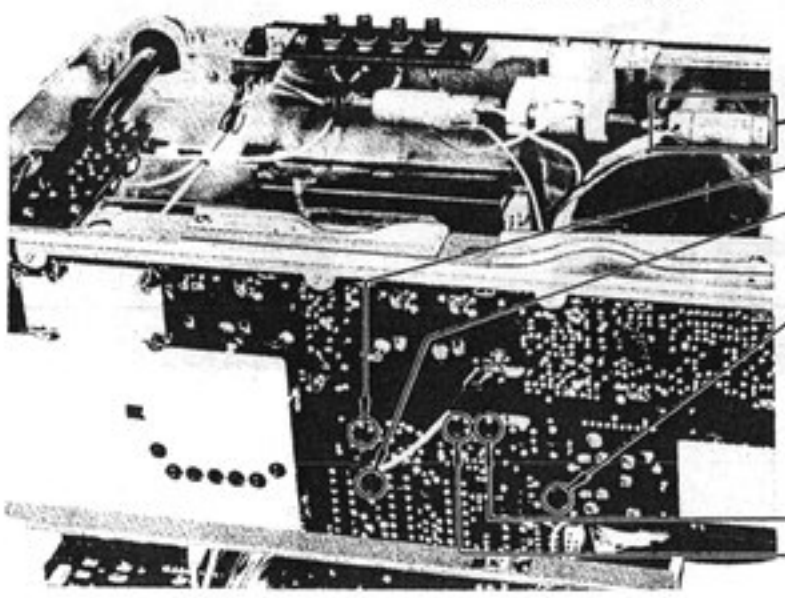
Fix L261-1 with wax after the adjustment.

LW FREQUENCY COVERAGE
L265 (146 kHz)
CT205 (407 kHz)

B) MW

Setting:

BAND SELECT switch:	MW
MODE switch:	NORMAL
VOLUME control:	MAX
TONE controls:	MAX
RF GAIN control:	MAX/NORMAL



MW TRACKING	
L261-2	620 kHz
L262	
CT204	1,400 kHz
CT201	

Fix L261-2 with wax after the adjustment.

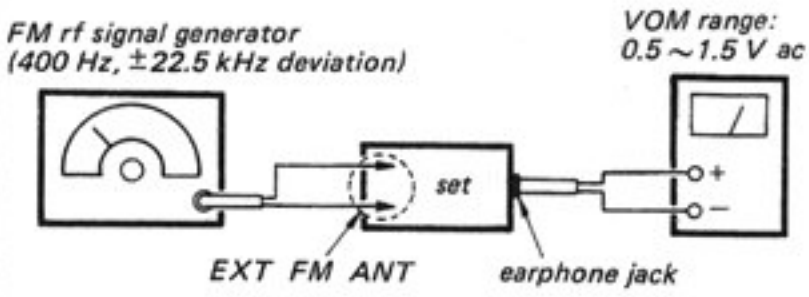
MW FREQUENCY COVERAGE
L264 (520 kHz)
CT206 (1,680 kHz)

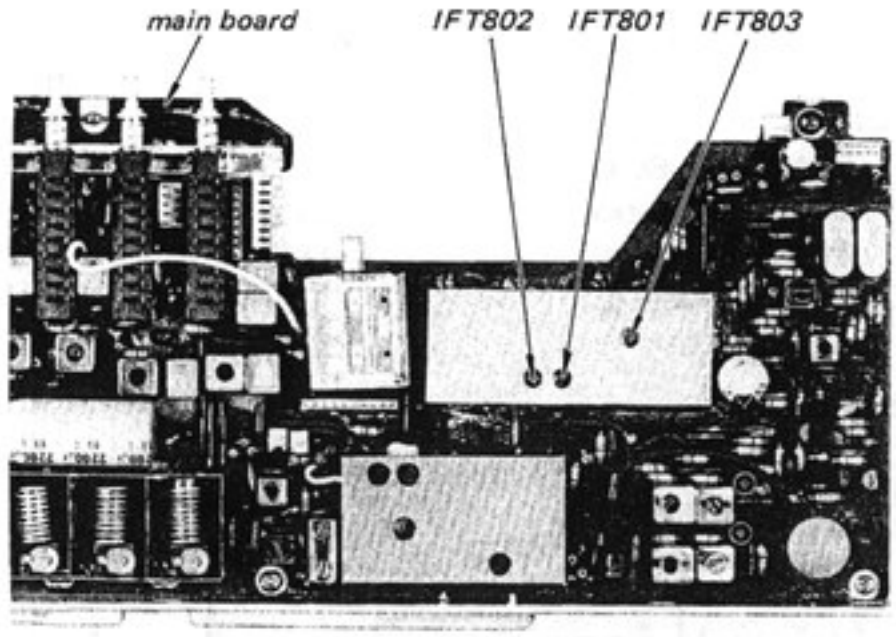
3-3. FM IF ALIGNMENT

Setting:

BAND SELECTOR switch:	FM
VOLUME control:	MAX
TONE controls:	MAX
MUTING switch:	OFF
AFC switch:	OFF

Setup:

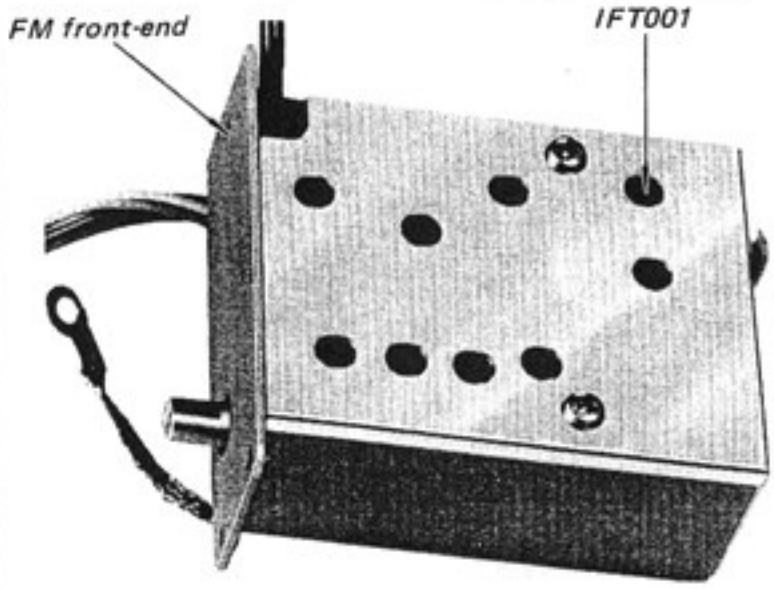


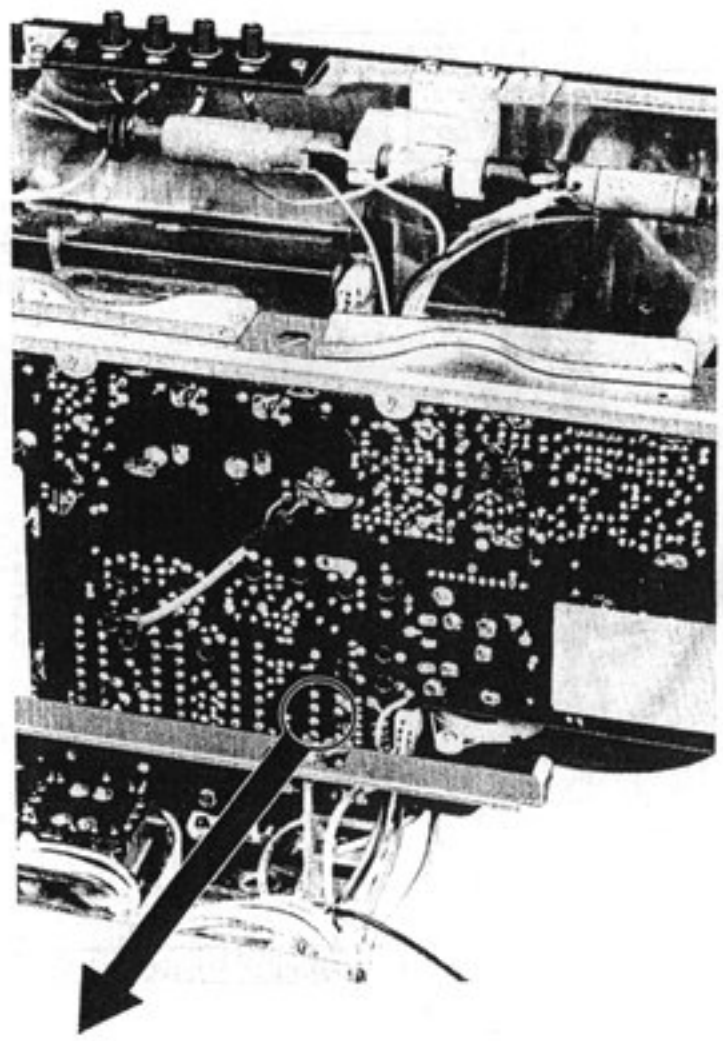


Procedure

Remove the FM front-end (Refer to page 12).

Signal Generator Frequency	Adjust	Obtain
10.7 MHz	IFT001 IFT801 IFT802	Maximum VOM ① reading.
10.7 MHz	IFT802	0 V VOM ② reading.
86.5–109.5 MHz (Tune the receiver in.)	IFT803	Maximum TUNING meter reading



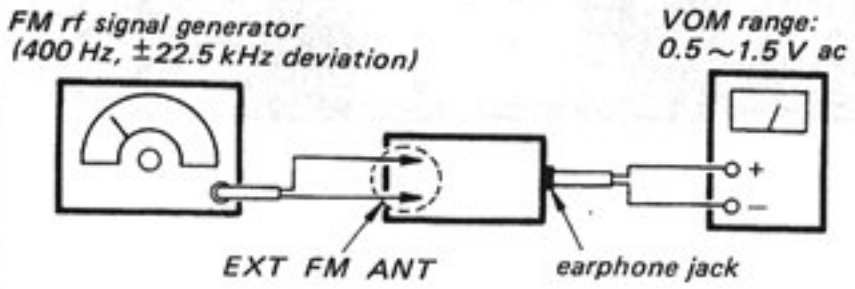


3-4. FM FREQUENCY COVERAGE AND TRACKING ADJUSTMENTS

Setting:

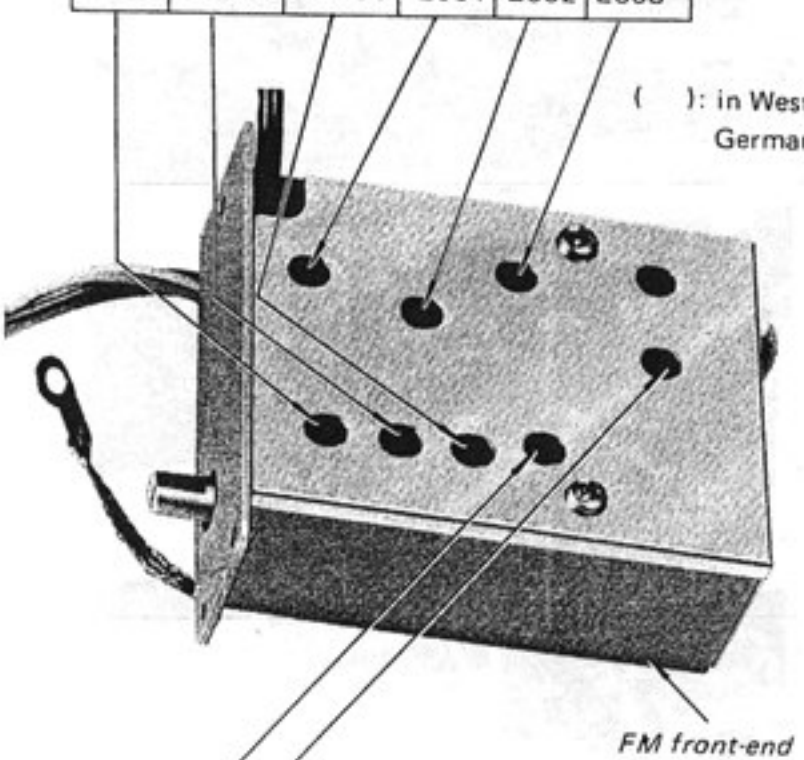
BAND SELECTOR switch:	FM
VOLUME control:	MAX
TONE controls	MAX
MUTING switch:	OFF
AFC switch:	OFF

Setup:



FM TRACKING					
109.5 MHz (108 MHz)			86.5 MHz (87.5 MHz)		
CT001	CT002	CT003	L001	L002	L003

( ): in West Germany



FM FREQUENCY COVERAGE	
L004	86.5 MHz (87.5 MHz)
CT004	109.5 MHz (108 MHz)

( ): in West Germany

3-5. +5 V VOLTAGE ADJUSTMENT

Setting:

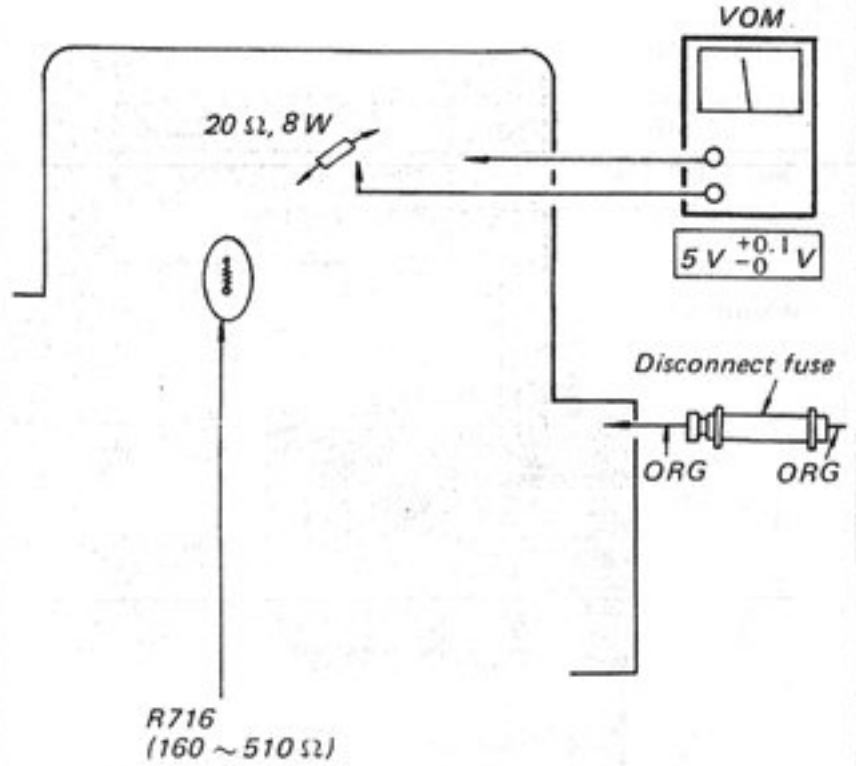
BAND SELECTOR switch: SW

Procedure:

1. Disconnect the fuse F2.
2. Install a 20 Ω, 8 W resistor on the conductor side as shown.
3. Adjust the value of R716 to obtain the specified voltage. Perform this adjustment on the conductor side.

Note: When the patterns are heated by a soldering iron, thermistor warms up. Cool off the components and circuit board at a time in selecting resistor.

4. Install the selected resistor on the component side.
5. Remove 20 Ω, 8 W resistor and reconnect the fuse.

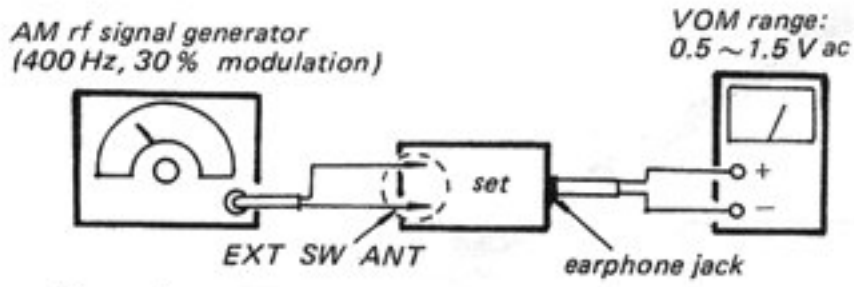


3-6. SW 1st IF ADJUSTMENT

Setting:

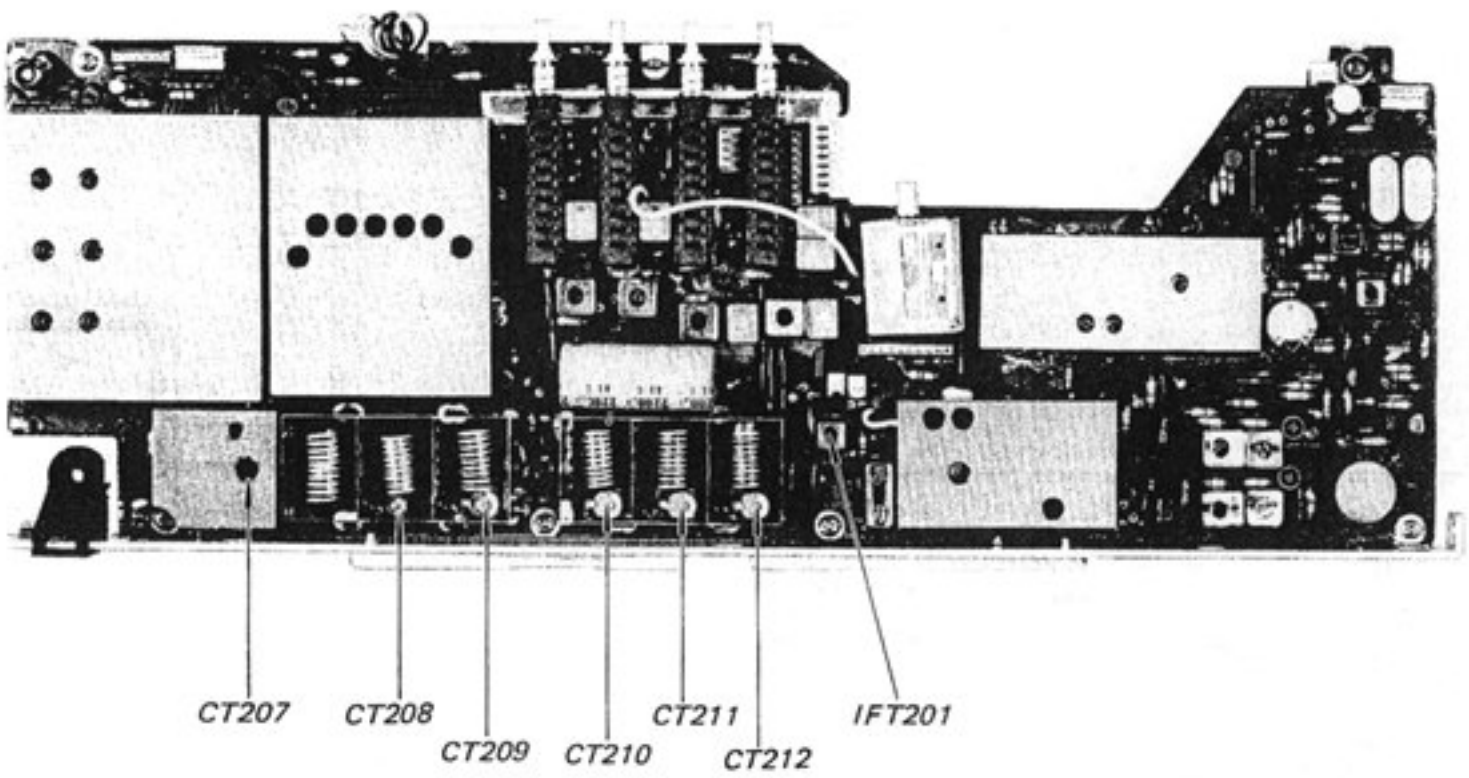
BAND SELECTOR switch:	SW
MODE switch:	NORMAL
VOLUME control:	center of rotation
TONE control:	center of rotation
NOISE BLANKER switch:	OFF

Setup:



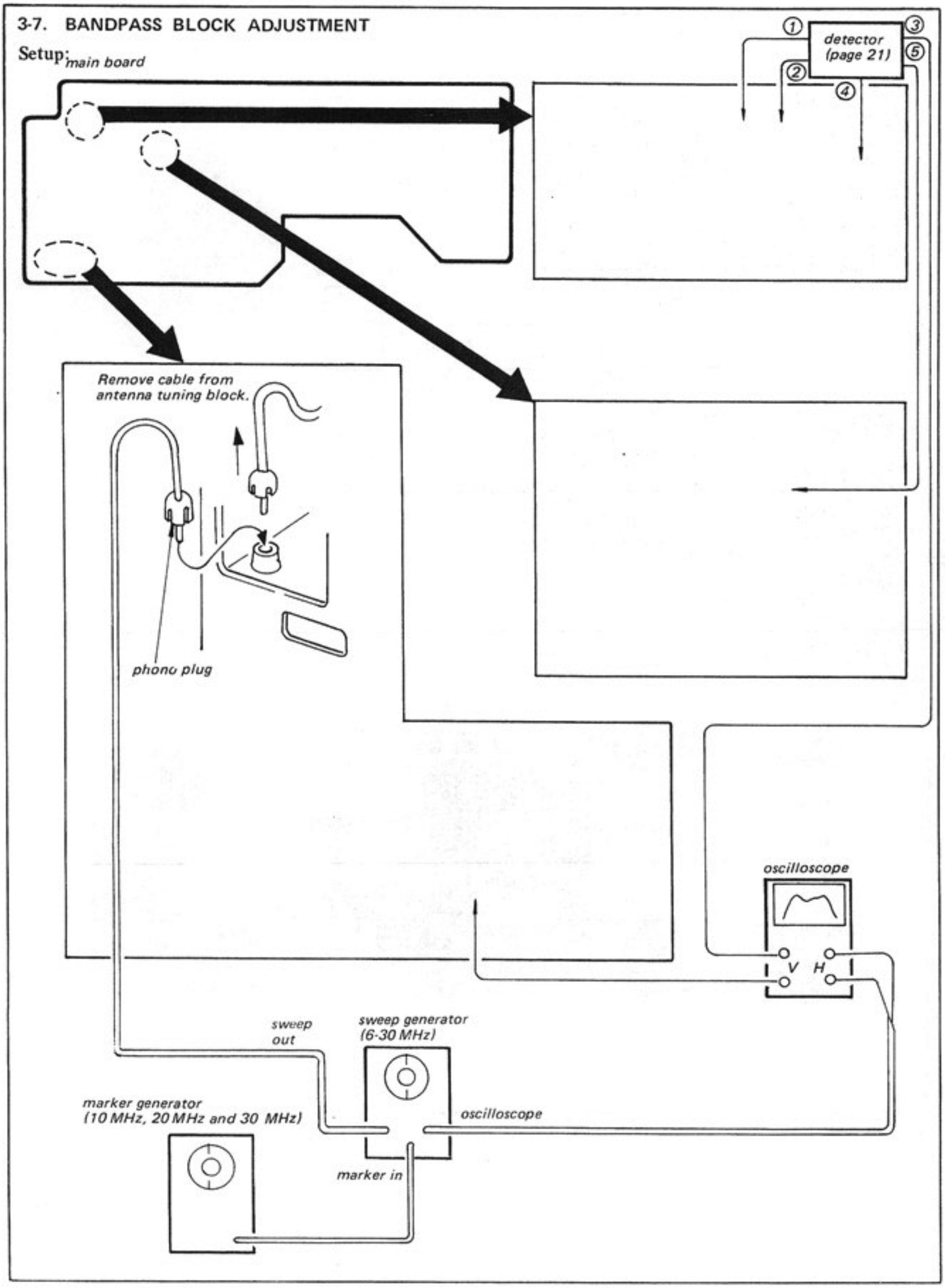
Procedure:

1. Set the AM rf signal generator to an appropriate frequency between 1.6 MHz and 30 MHz.
2. Tune the set in to the frequency set in step 1.
3. Adjust CTs207, 208, 209, 210, 211 and 212, and IFT201 for maximum VOM reading.



3-7. BANDPASS BLOCK ADJUSTMENT

Setup: *main board*

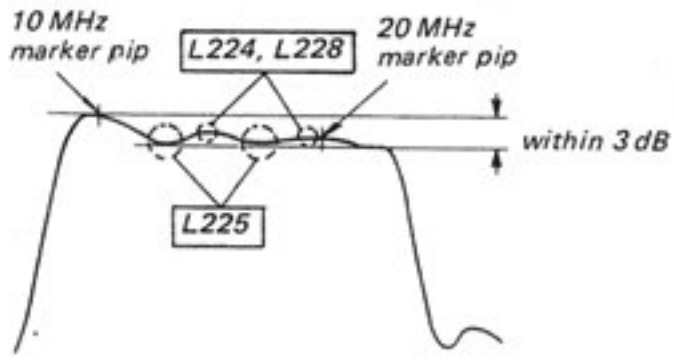


Setting:

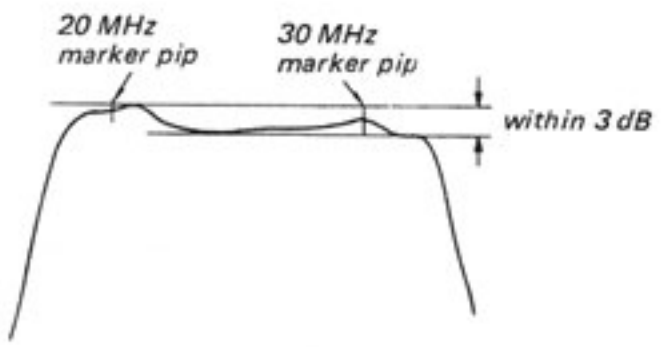
BAND SELECTOR switch:	SW
VOLUME control:	center of rotation
TONE controls:	center of rotation
Marker Generator Frequencies:	10, 20 and 30 MHz

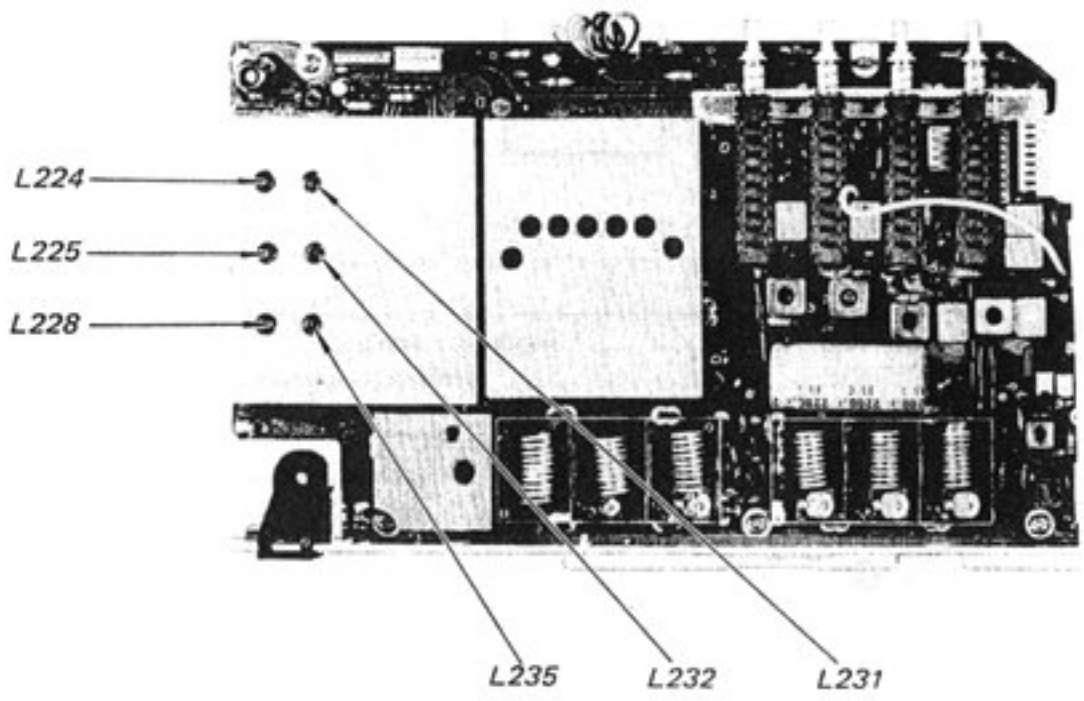
Procedure:

1. SW BAND SELECTOR switch: 10 MHz
   Sweep Generator Frequency: 6-30 MHz
2. Adjust L224, 225 and 228 to obtain a waveform shown below.



3. SW BAND SELECTOR switch: 20 MHz
   Sweep Generator Frequency: 15-35 MHz
4. Adjust L231, 232 and 235 to obtain a waveform shown below.





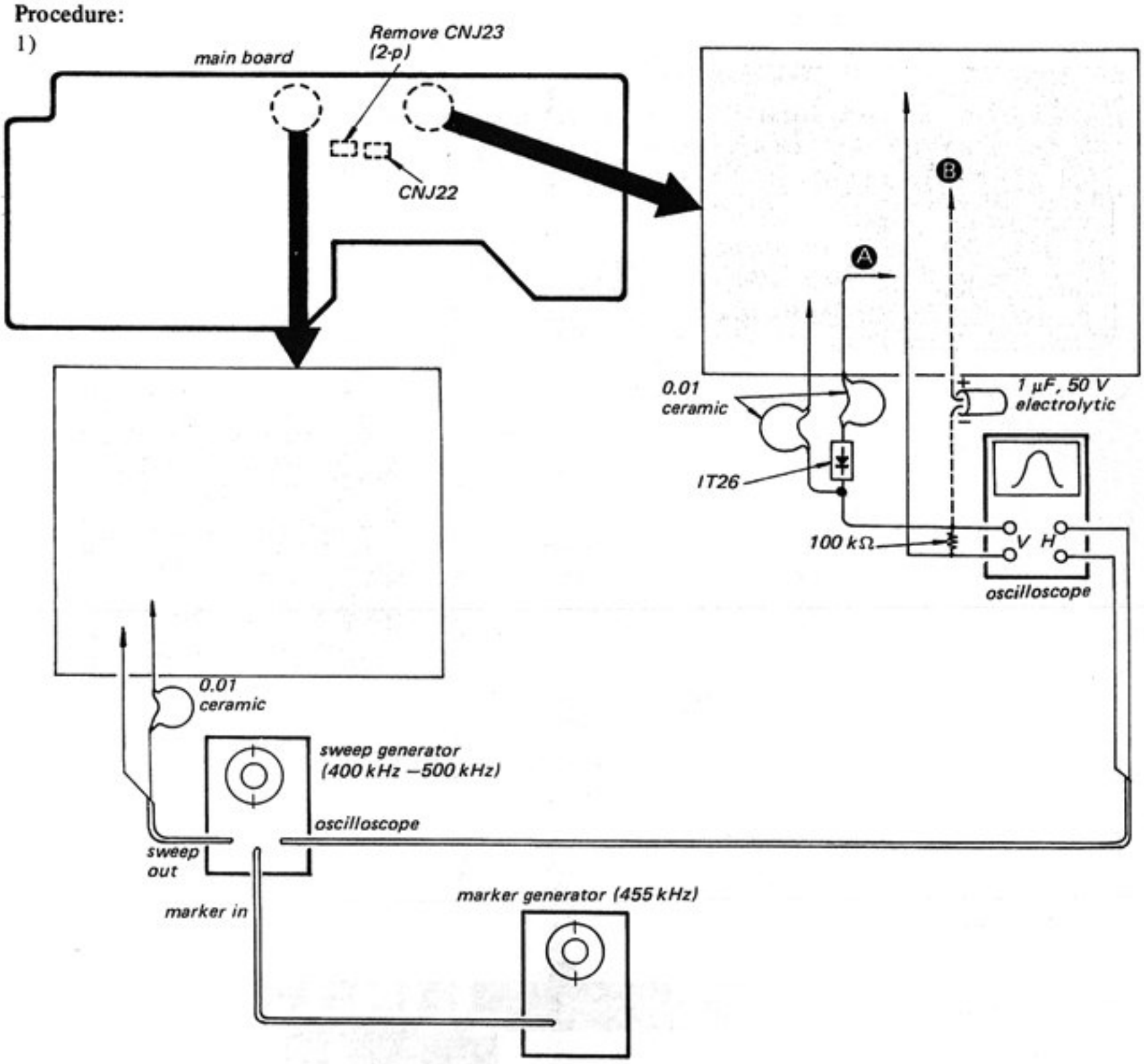
3-8. NOISE BLANKER ADJUSTMENT

Setting:

BAND SELECTOR switch: SW
NOISE BLANKER switch: ON

Procedure:

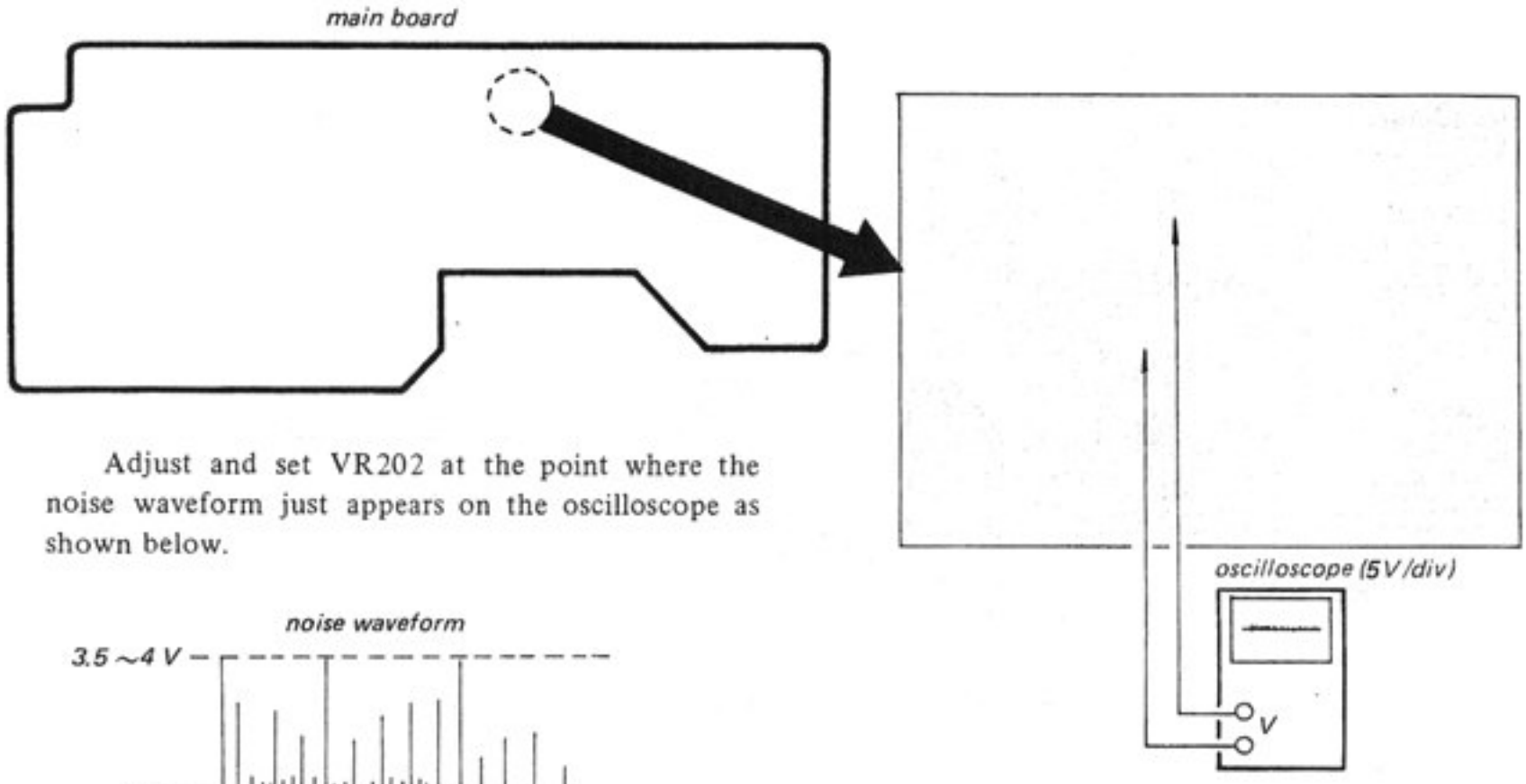
1)



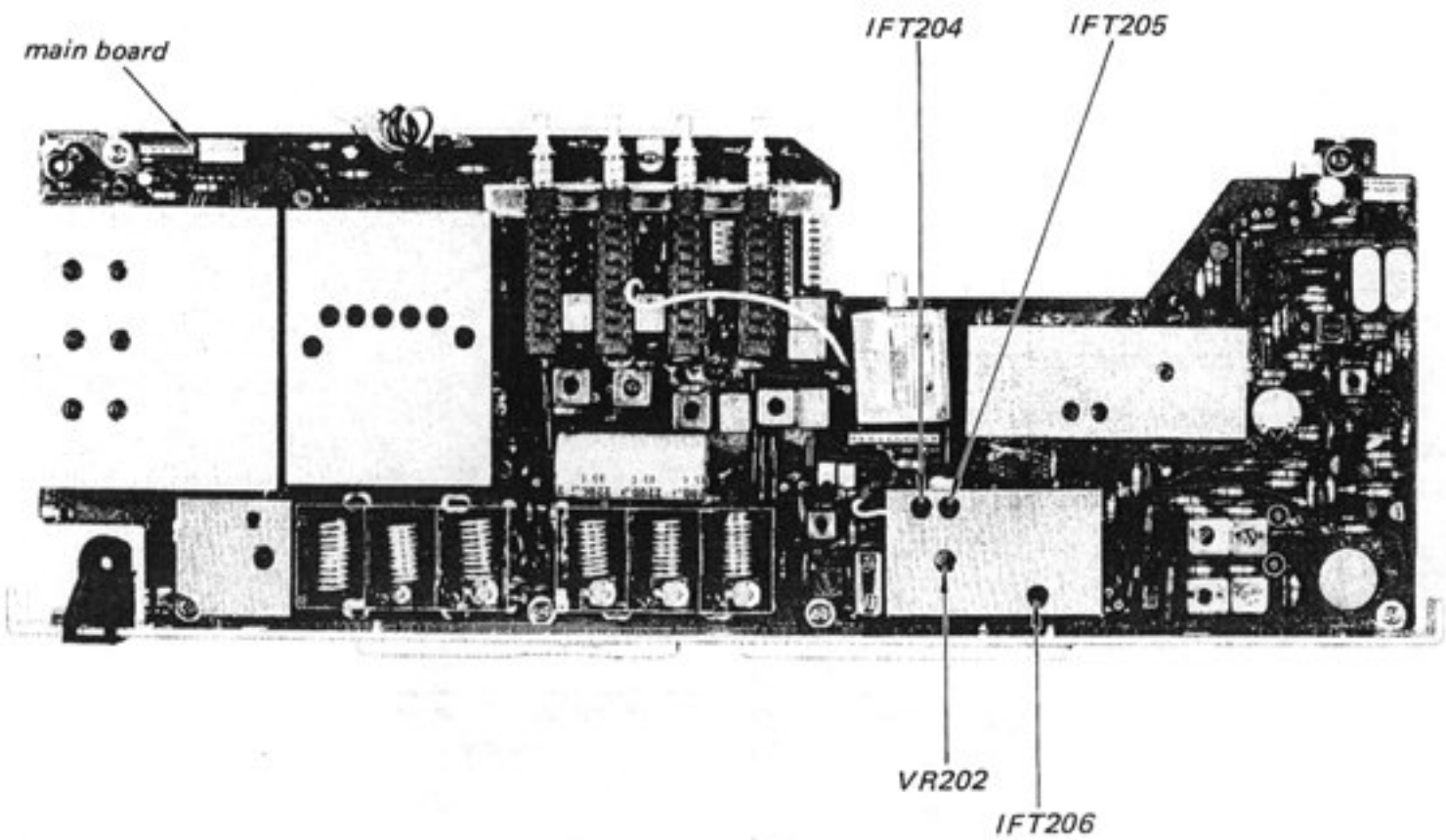
RF GAIN control: MIN

Adjust	Obtain
IFT204 IFT205 (Connect oscilloscope to Ⓐ.)	Highest waveform 455 kHz marker pip about 20 kHz
IFT206 (Connect oscilloscope to Ⓑ.)	

2) RF GAIN control: MAX/NORMAL



Adjust and set VR202 at the point where the noise waveform just appears on the oscilloscope as shown below.



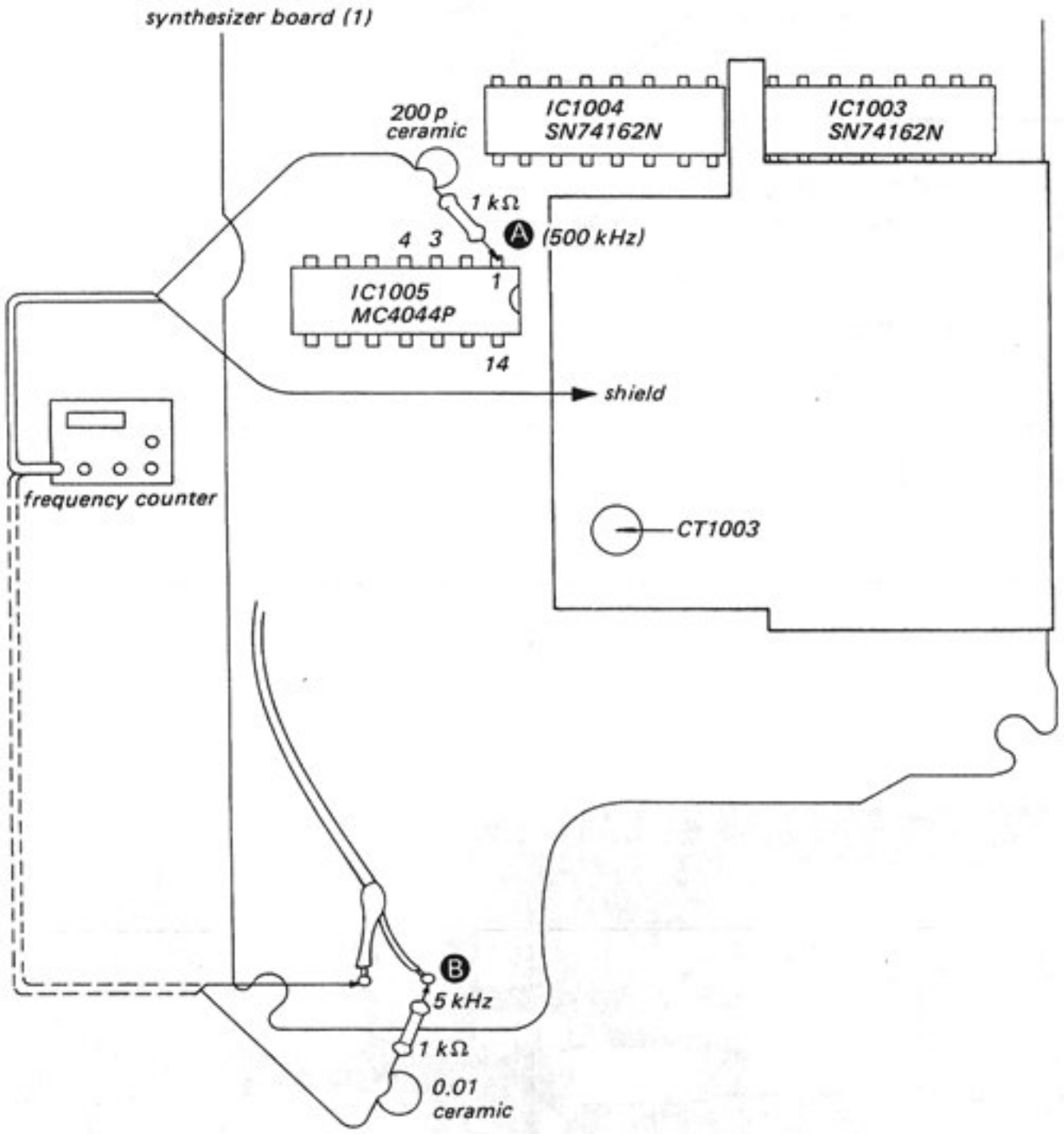
3-9. 500 kHz REFERENCE OSCILLATOR ADJUSTMENT

Setting:

BAND SELECTOR switch: SW

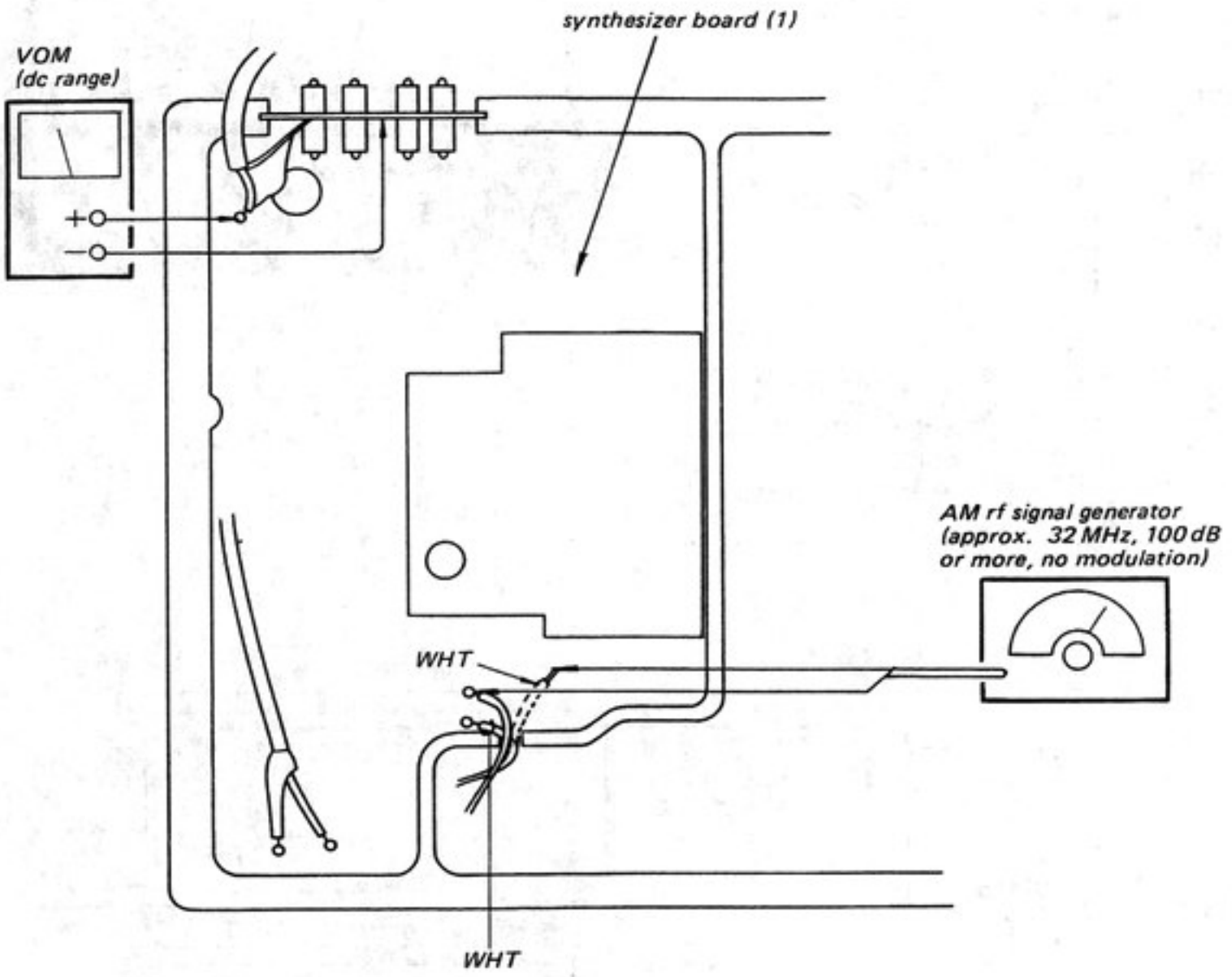
Procedure:

1)



Adjust	Connect Frequency Counter to	Frequency Counter Reading
CT1003	Ⓐ	500,000 Hz ± 1 Hz
(Check)	Ⓑ	5,000 Hz

2) SW BAND SELECTOR switch: 29 MHz
Unsolder a white wire.



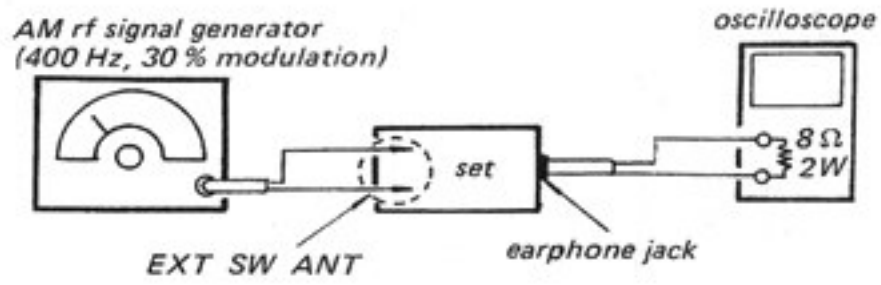
Adjust AM Rf Signal Generator Frequency	VOM Reading
around 32 MHz	0.7 V
below the frequency obtained above	6.3 V

3-10. SW 1st MIXER BALANCE ADJUSTMENT

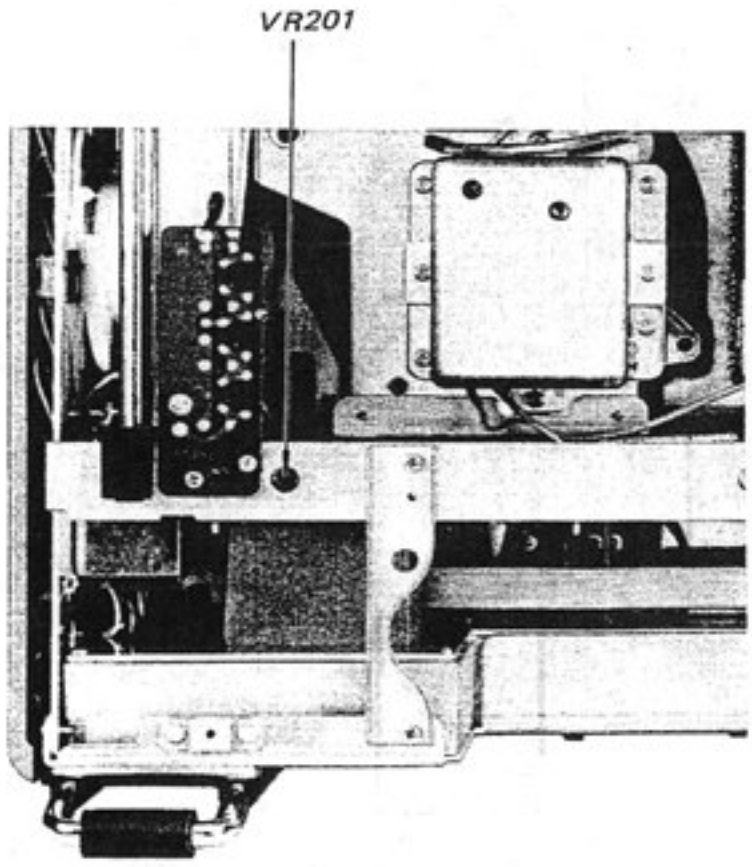
Setting:

BAND SELECTOR switch:	SW
SW BAND SELECTOR switch:	22 MHz
VOLUME control:	center of rotation
TONE controls:	center of rotation
MODE switch:	AM NORMAL

Setup:



AM Rf Signal Generator Frequency	Tune the Set to	Adjust
22.57 MHz 70dB	around 22.8 MHz to obtain a maximum waveform	VR201 to obtain a minimum waveform

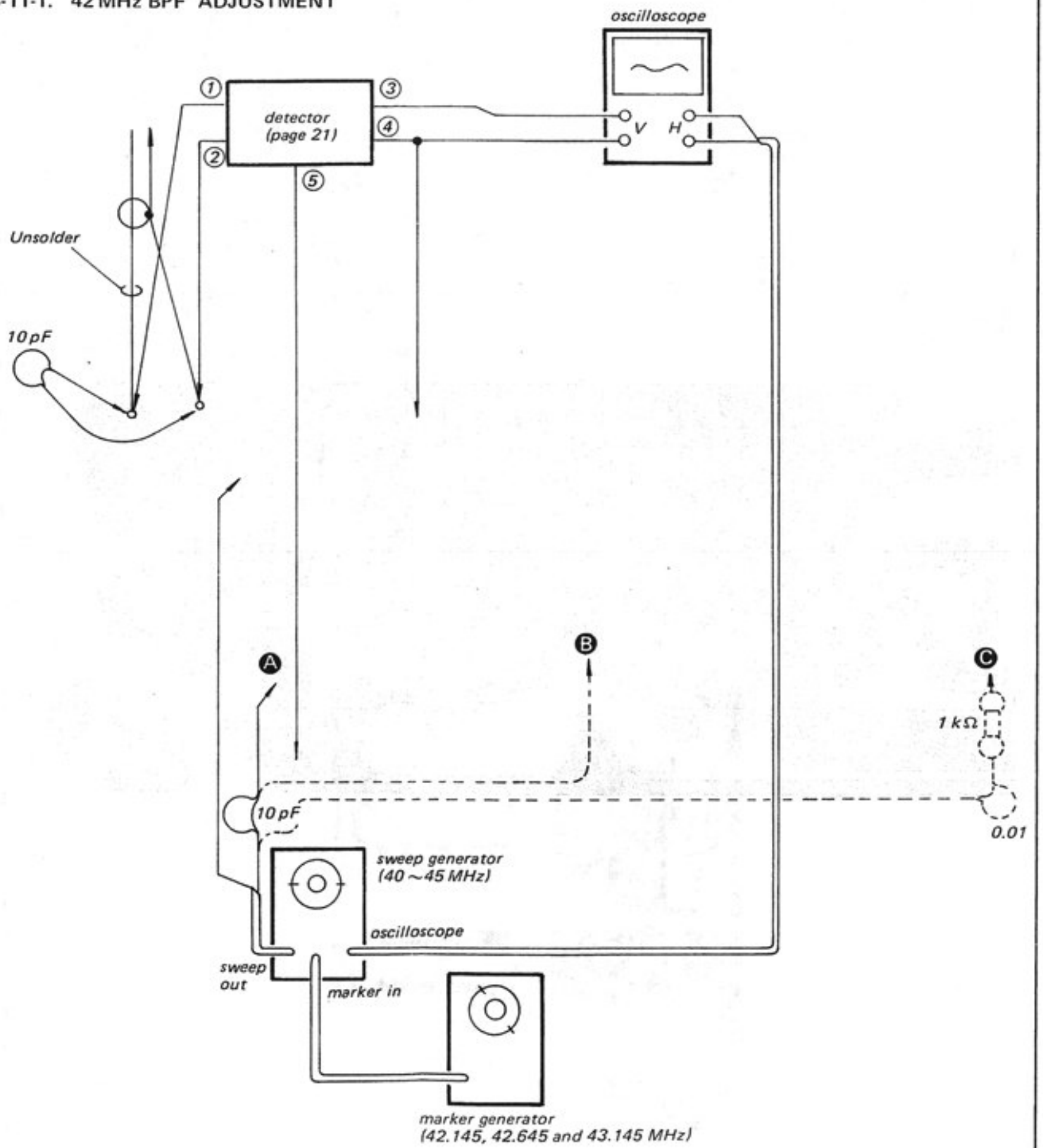


3-11. SYNTHESIZER SECTION ADJUSTMENTS

Setting:

BAND SELECTOR switch: SW

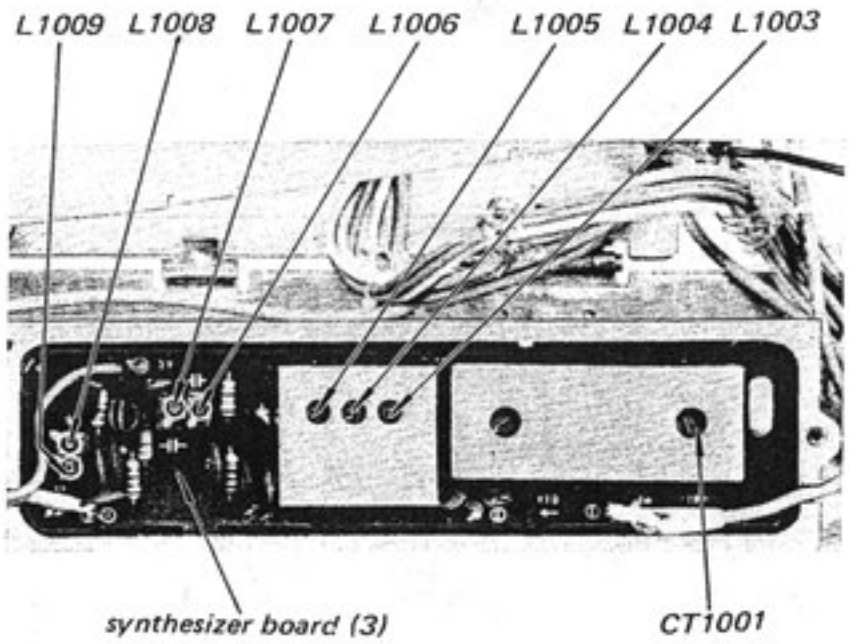
3-11-1. 42 MHz BPF ADJUSTMENT

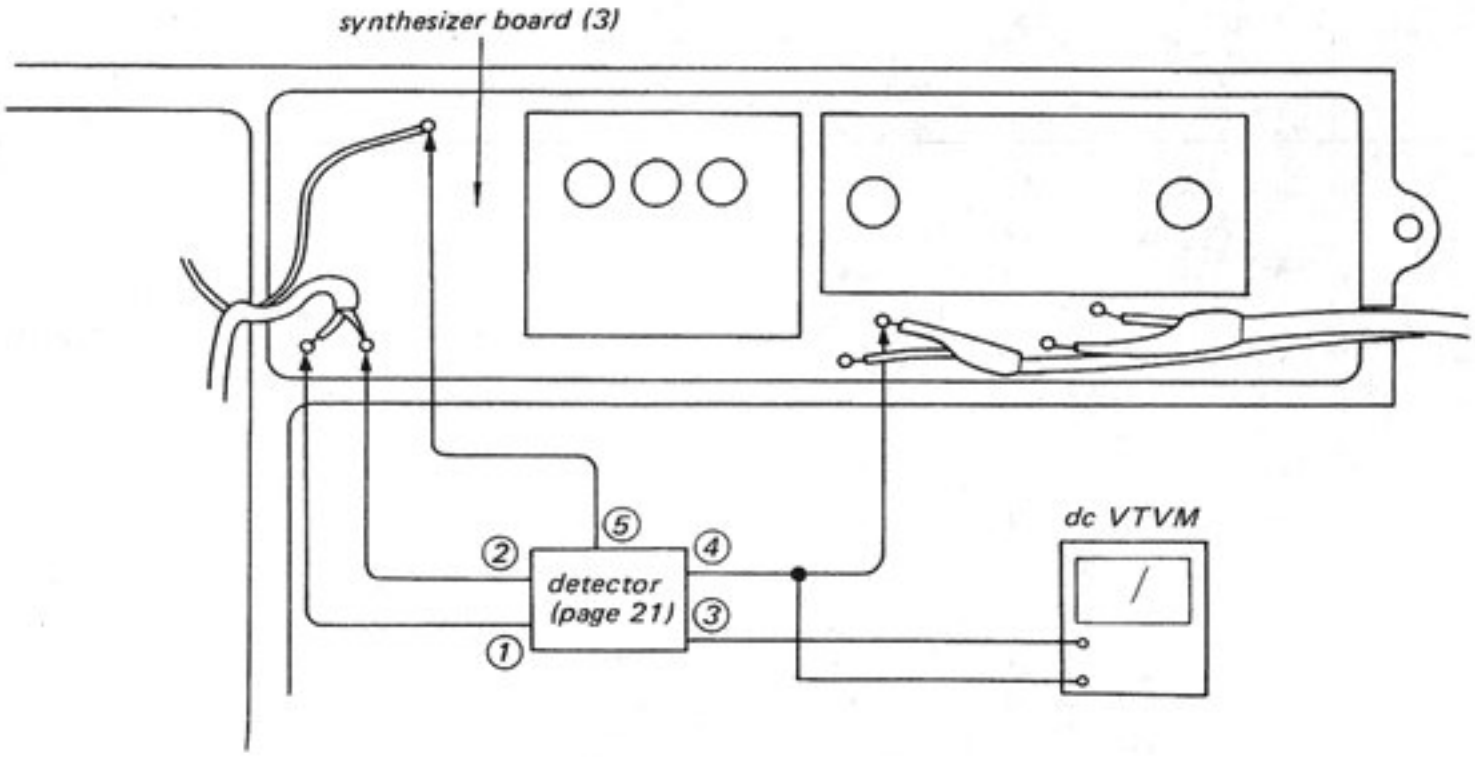


Procedure:

1. Turn CT1001 and stop the oscillation of 45.6 MHz. The 45.6 MHz pip disappears from the waveform on the oscilloscope.
2. Turn the cores, of L1003 through L1006 counterclockwise until they place on top of the coils.
3.

Connect Sweep Out to	Adjust	Obtain
Ⓐ	L1008 L1009	Maximum double-humped waveform 42.645 MHz marker pip
Ⓑ	L1006 L1007	
Ⓒ	L1003 L1004 L1005	
Ⓒ (Reduce sweep out level)	L1003 through L1009 (fine adjust)	Symmetrical waveform within 3 dB 42.145 MHz marker pip 43.145 MHz marker pip





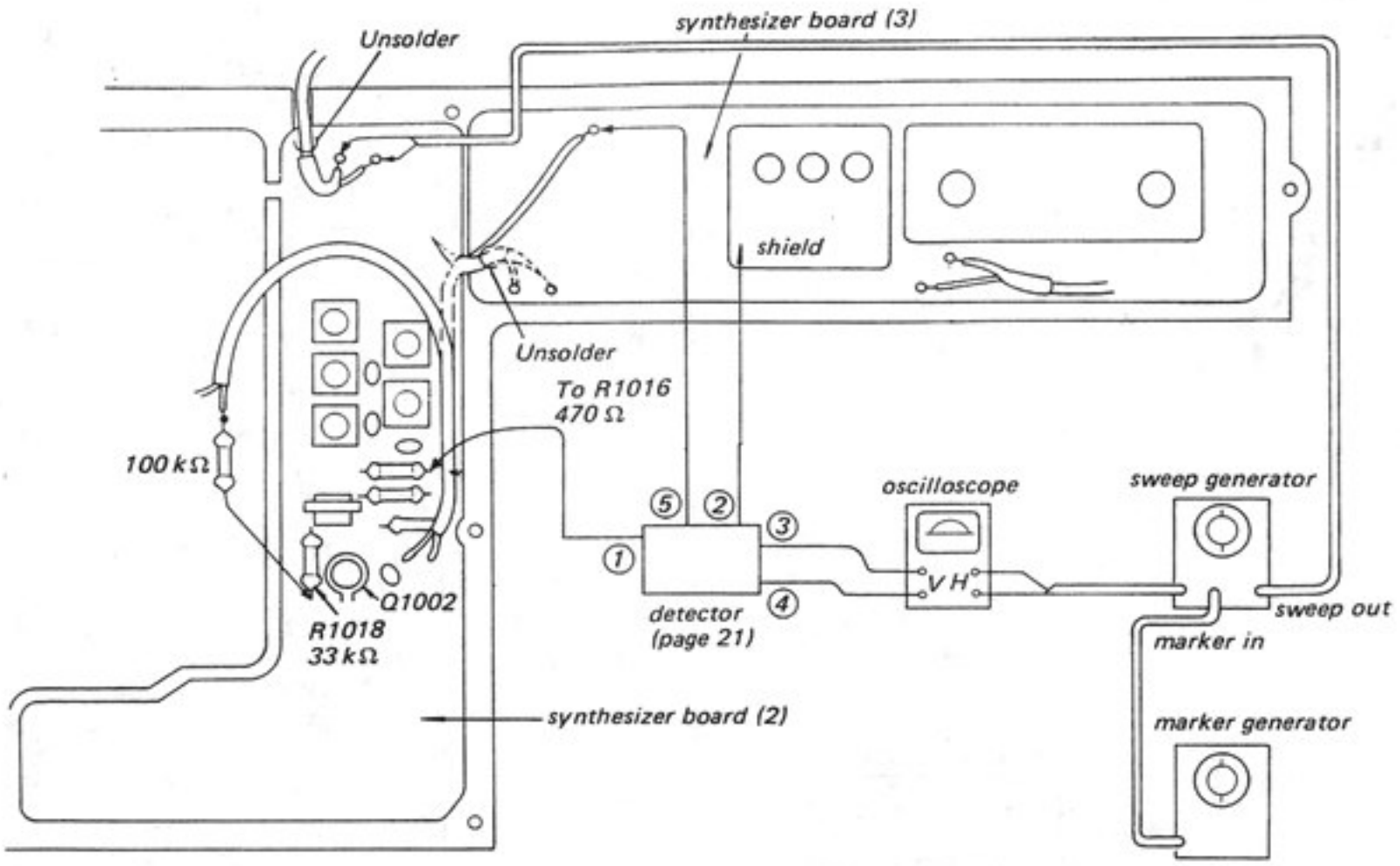
4. Turn the tuning dial throughout the range and confirm that the VTVM reading variation is within 3 dB. If not, perform steps 1 through 3.
5. Turn CT1001 and oscillate 45.6 MHz. 45.6 MHz pip appears on the waveform again.

3-11-2. 46-76 MHz BPF ADJUSTMENT

Setting:

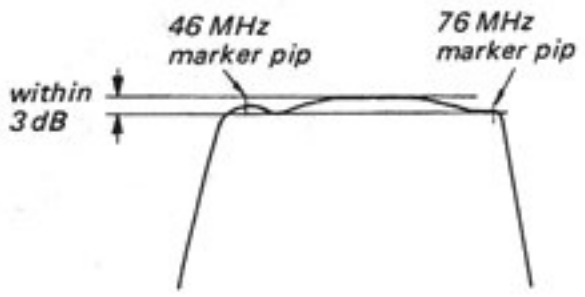
BAND SELECTOR switch: SW

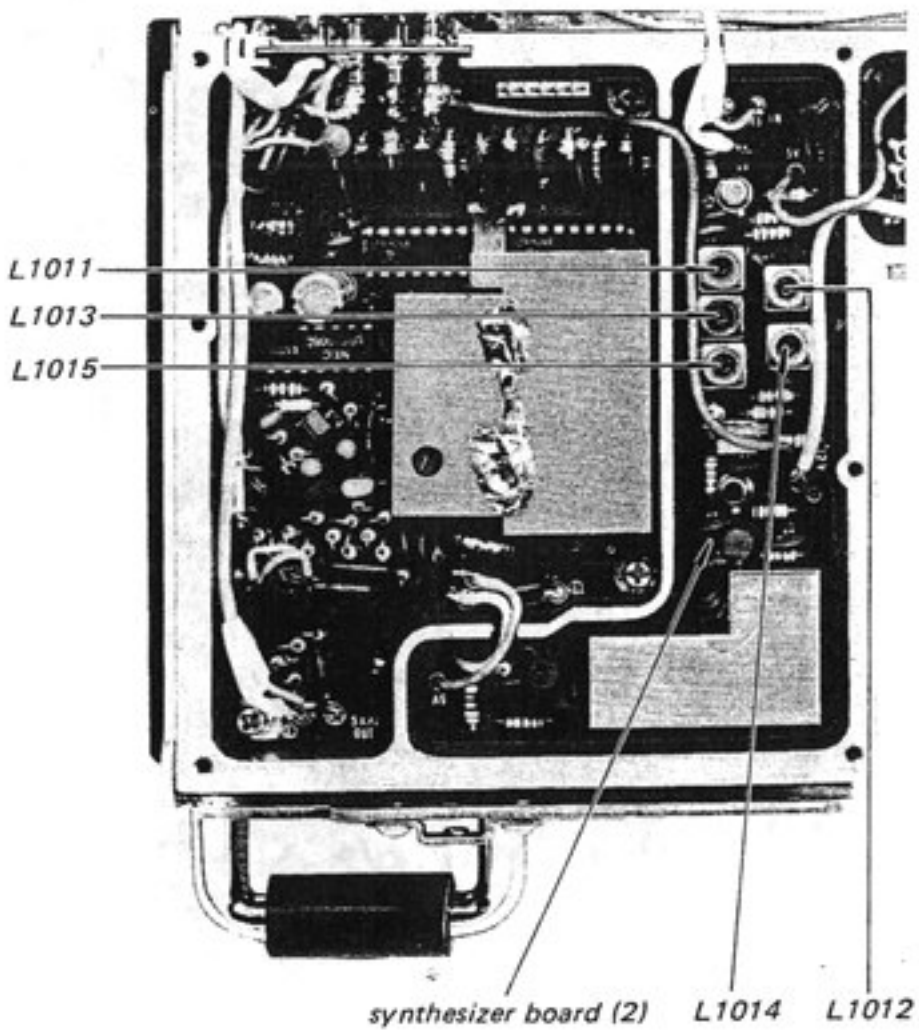
Setup:



Procedure:

Adjust	Obtain
L1012 L1014 (ORG)	Maximum amplitude at 76 MHz.
L1013 (RED)	Maximum amplitude at 46 MHz.
L1011 L1015 (BLU)	Same amplitude at 46 MHz and 76 MHz.
Repeat all the above adjustment.	



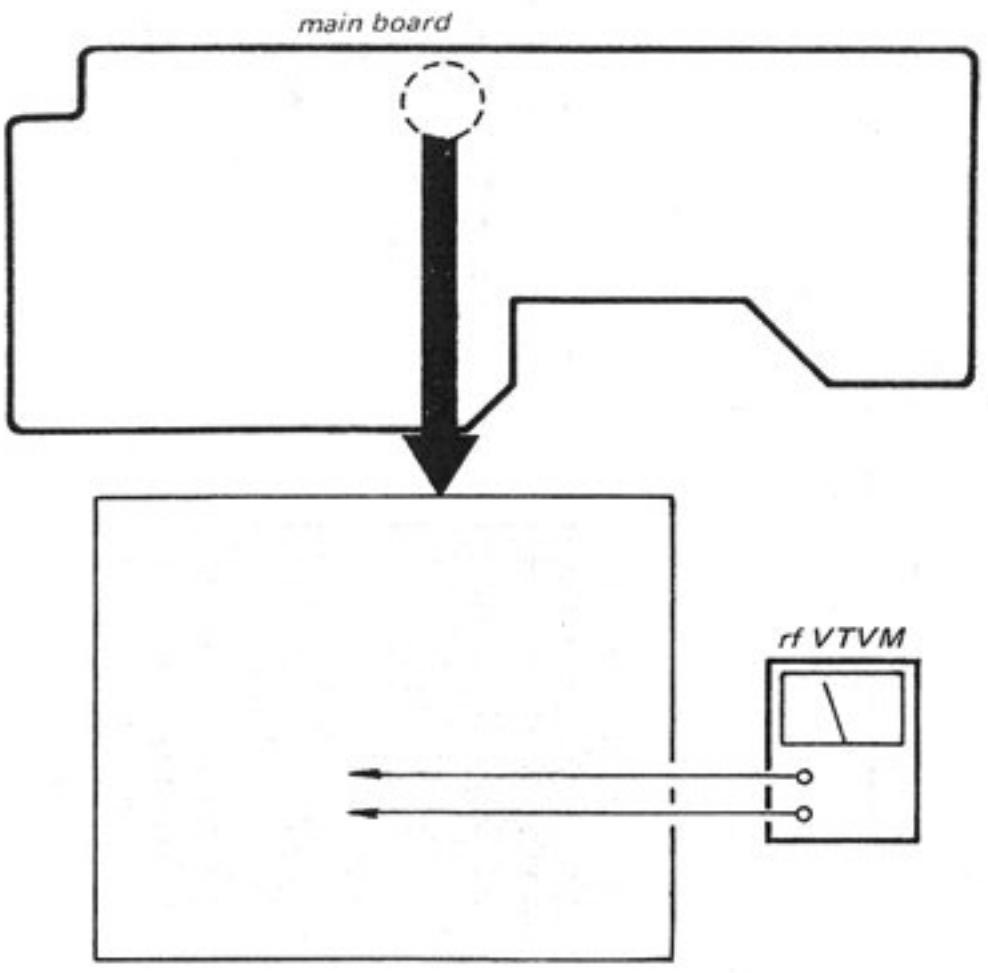


3-11-3. SW 2nd LOCAL OSCILLATOR ADJUSTMENT

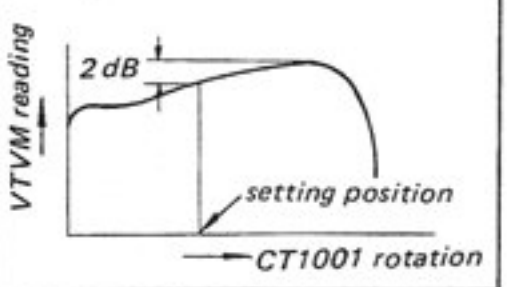
Setting:

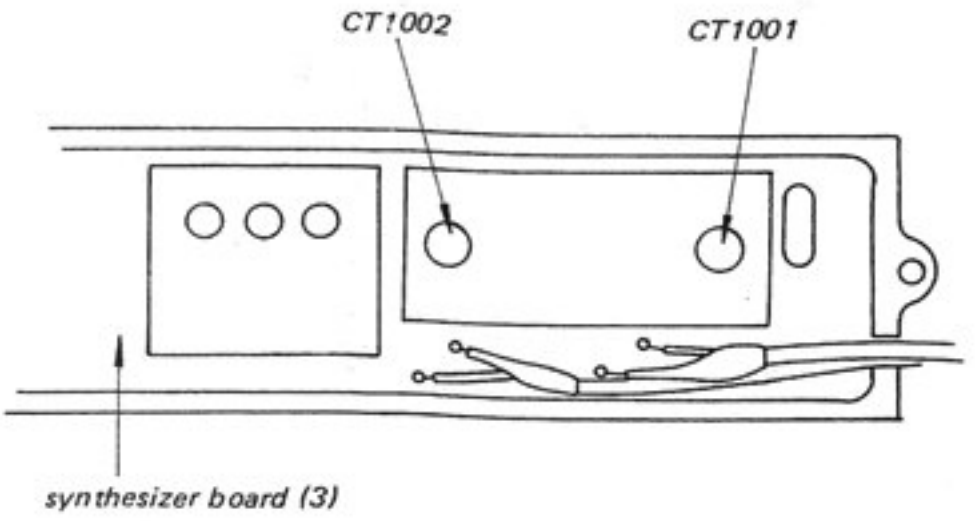
BAND SELECTOR switch: SW

Setup:



Procedure:

Adjust	Obtain
CT1001	Setting position. 
CT1002	Minimum VTVM reading.

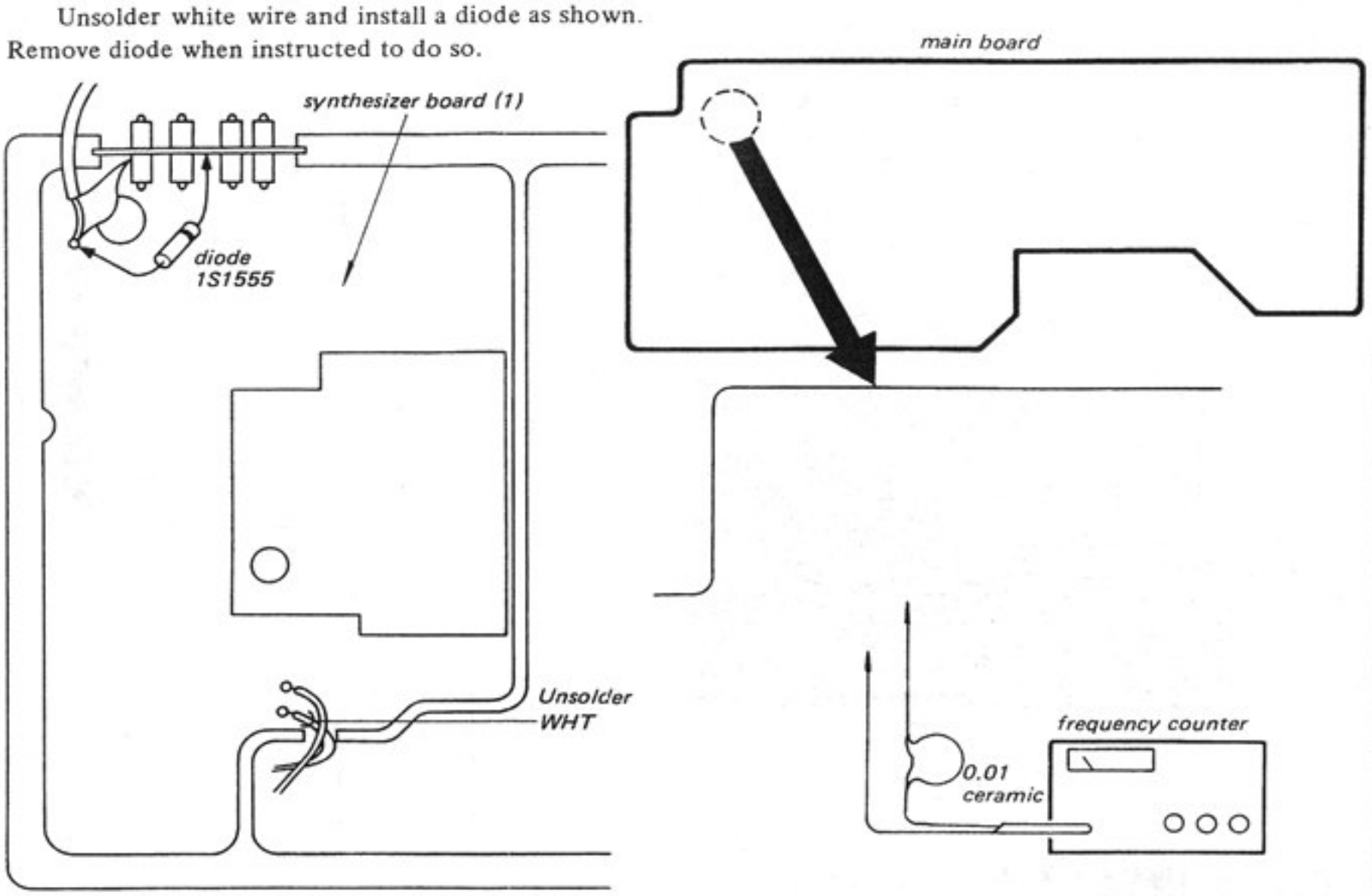


3-11-4. VCO ADJUSTMENT

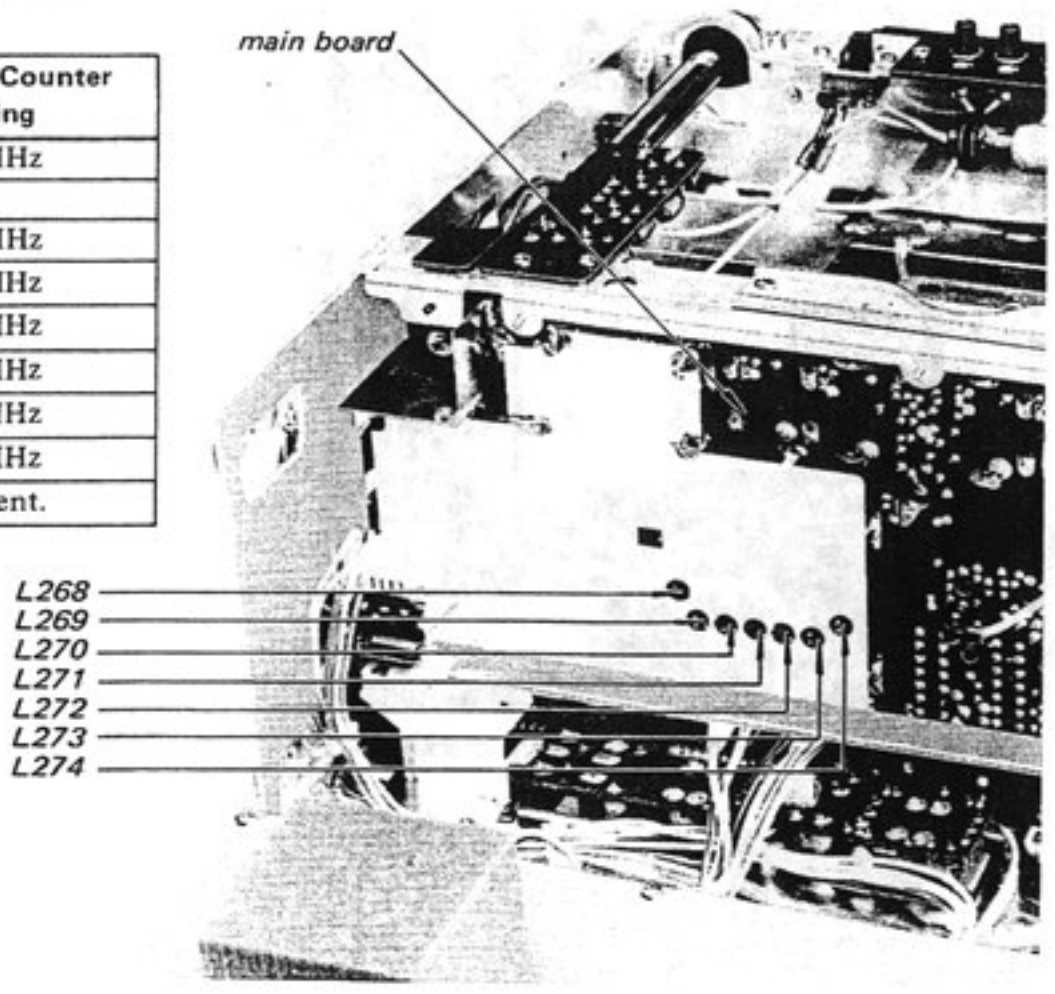
Setting:

BAND SELECTOR switch: SW

Unsolder white wire and install a diode as shown. Remove diode when instructed to do so.



Step	SW BAND SELECTOR	Adjust	Frequency Counter Reading
1	2 MHz	L268	44.0 MHz
2	Remove diode 1S1555.		
3	3 MHz	L274	52.3 MHz
4	6 MHz	L269	56.1 MHz
5	10 MHz	L270	61.6 MHz
6	15 MHz	L273	66.4 MHz
7	20 MHz	L271	71.7 MHz
8	25 MHz	L272	76.8 MHz
9	Fix all coils with wax after the adjustment.		

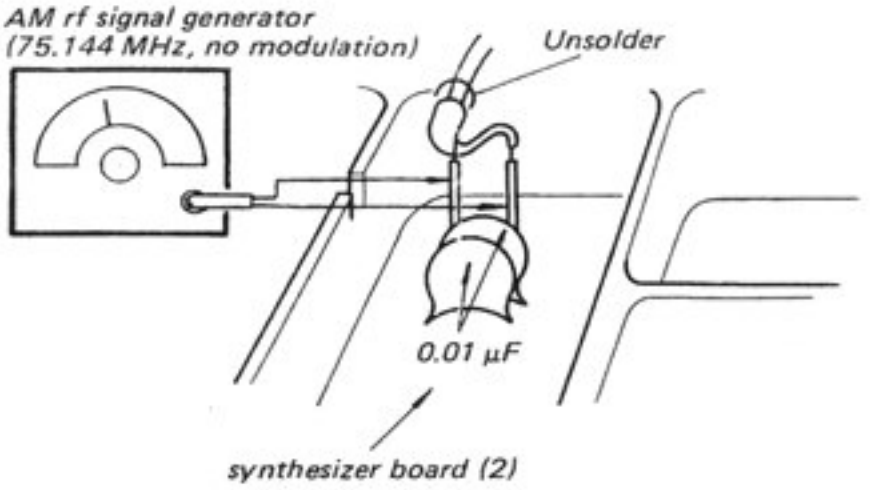


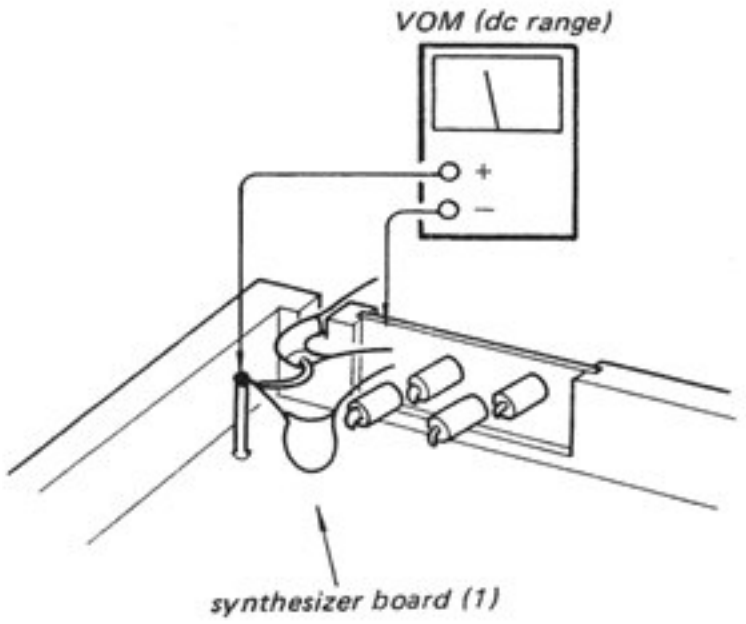
3-11-5. SYNTHESIZER SECTION CHECKOUT

Setting:

BAND SELECTOR switch: SW
SW BAND SELECTOR switch: 29 MHz

Setup:





Procedure:

1. Turn the SW tuning knob and obtain a 29 MHz 999 kHz indication on the digital frequency indicator on the front panel.
2. Fine adjust the frequency of AM rf signal generator around 75.14 MHz.

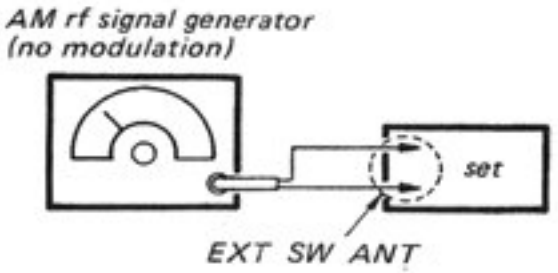
AM Rf Signal Generator Frequency	VOM Indication
above 75.144 MHz	0.7 V
below 75.144 MHz	6.3 V

3-11-6. SW SPURIOUS BEAT ADJUSTMENT

Setting:

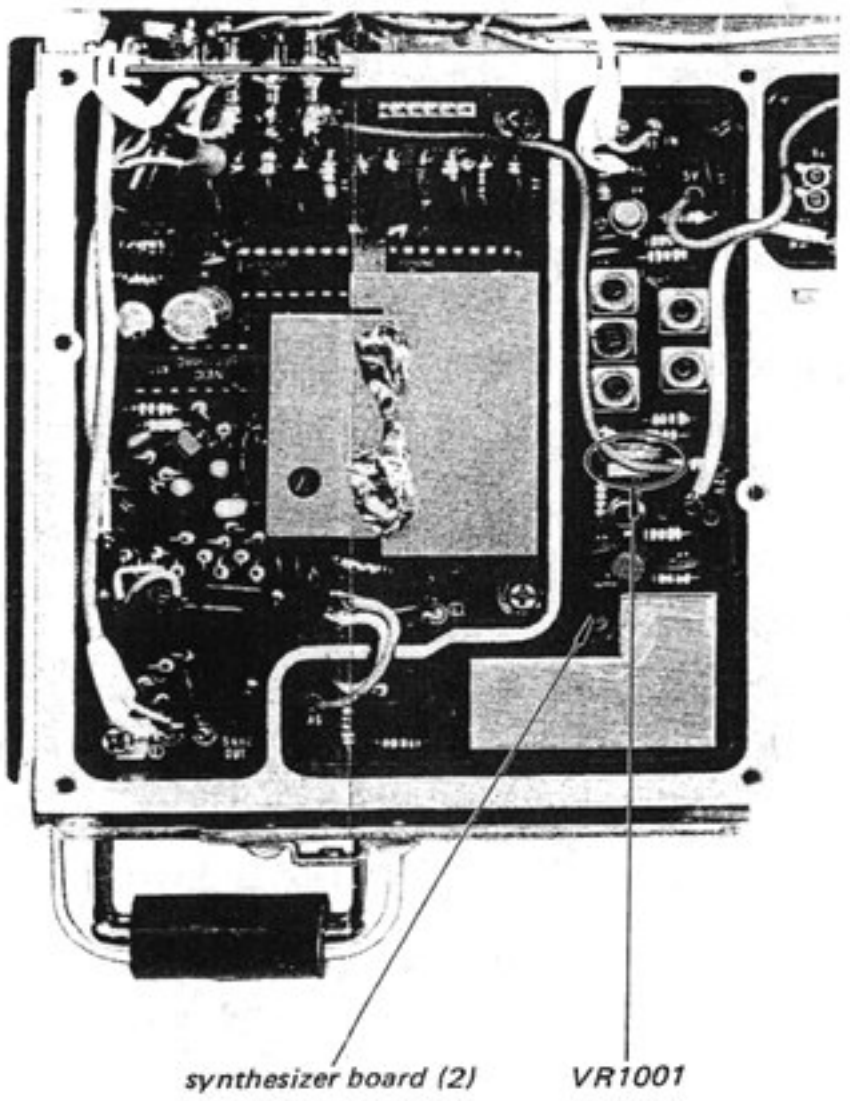
BAND SELECTOR switch: SW
SW BAND SELECTOR switch: 29 MHz
VOLUME control: MAX
TONE controls: MAX
RF GAIN control: MAX/NORMAL

Setup:



Procedure:

AM Rf Signal Generator Frequency	Adjust
approximately 29.352 MHz or 29.852 MHz	VR1001 for a minimum beat note



4-1. MOUNTING DIAGRAM
– Conductor Side –

Q001, 224, 901: 2SK42

IC1001, 1007: TAP7060

Q002, 202, 203, 205, 206, 902, 903, 1006, 1025, 1201: 2SK23A

IC1002, 1004: SN74162N
IC1203: MSM551H
IC1205 ~ 1207: MSM5503
IC1208 ~ 1210: MSM561

Q003, 207 ~ 223, 801 ~ 803, 1003, 1004, 1013 ~ 1019, 1021, 1022, 1202, 1203: 2SC710

IC1201: 34013PC

Q201, 204, 227, 1001, 1002: 3SK37

Q216, 218 ~ 221, 228, 230, 401, 501, 601, 604, 703 ~ 706, 804 ~ 806, 1007 ~ 1012, 1204 ~ 1212: 2SC1363

D001: 1S2687
D201 ~ 209, 211 ~ 215, 217 ~ 219, 223, 225, 237 ~ 241, 401, 803 ~ 807, 1003, 1004, 1201 ~ 1204: 1S1555
D216, 220, 221: 1T23
D235, 801, 802, 1001, 1002: 1T261
D236: RD6A
D702: RD5A

Q217, 229, 231, 702: 2SA772

Q225, 226: 2SC668

D226, 227: 1T18

Q602, 603: 2SC1429

D228, 234: 1S2222

Q701, 1213 ~ 1216: 2SA678

D601, 602: VD1120

Q1020: 2SC641K

Q1023, 1024: 2SC633

D701: 2SB324

IC801, 802: CX-075

LED1201 ~ 1205 SL1122 (rear view)

IC1002: SN74S113
IC1005: MC4044P
IC1006: 74LS00
IC1202: MSM505
IC1204: MSM530

Note:
- Color in ( ) indicates color of sleeving over the end portion of shielded wire.
- Component-side pattern and through hole:

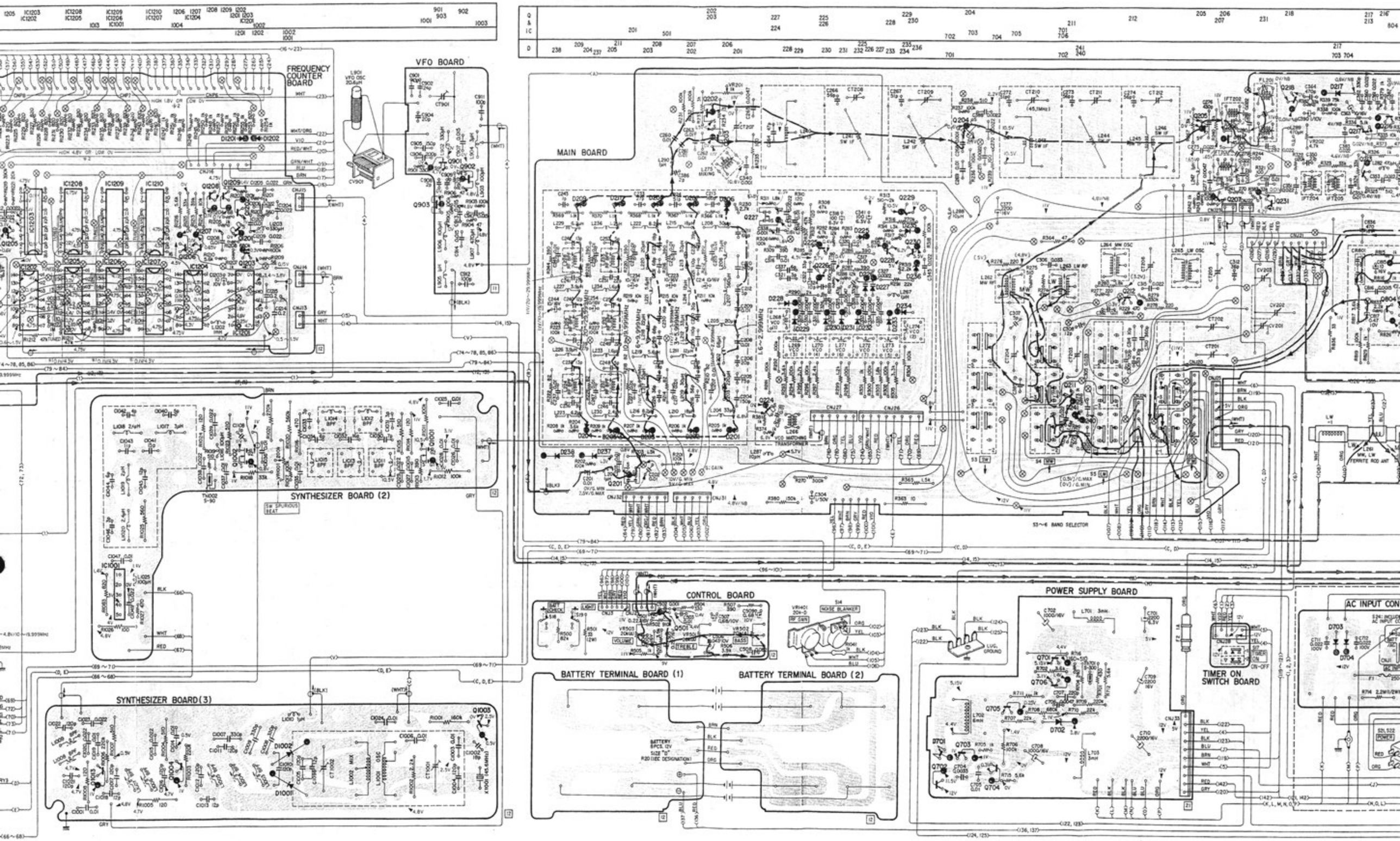
component side pattern / through hole

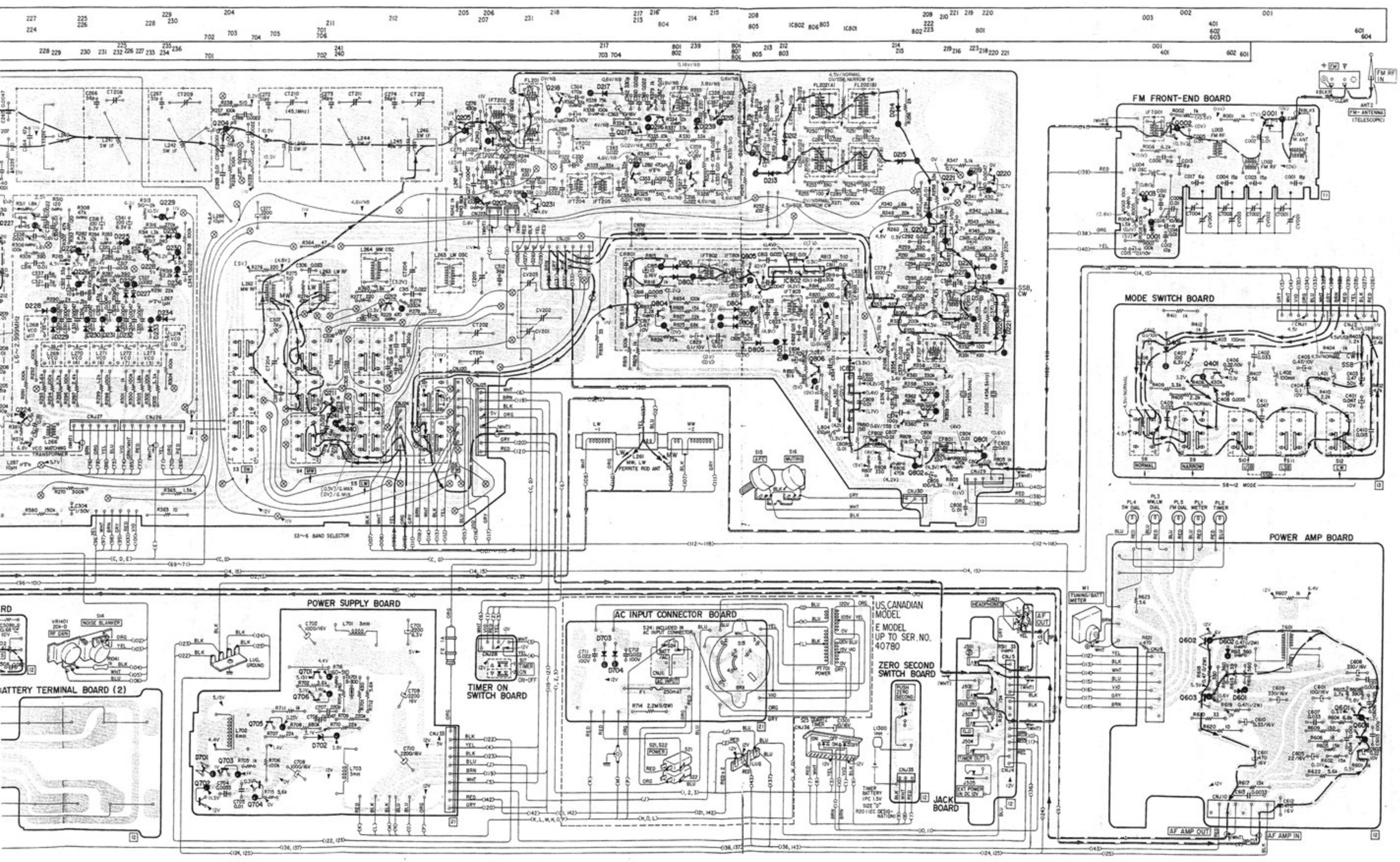
- : B+ pattern.
- ——: signal path.

Note:
R210, 214, 218, 222, 226
R235, 239, 244, 321, 363,

Note:

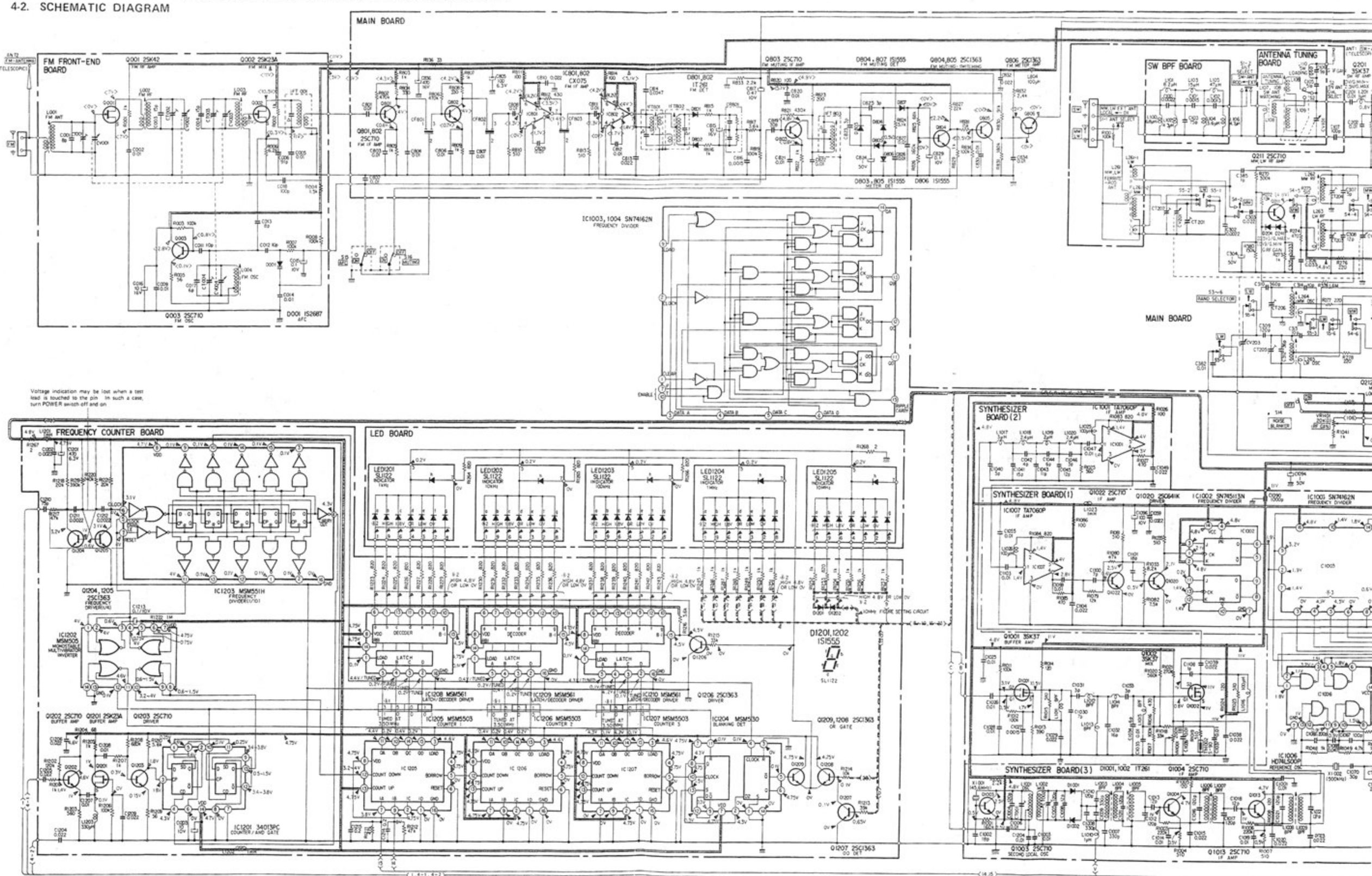
R210, 214, 218, 222, 226
R235, 239, 244, 321, 363, 836 : fusible resistor





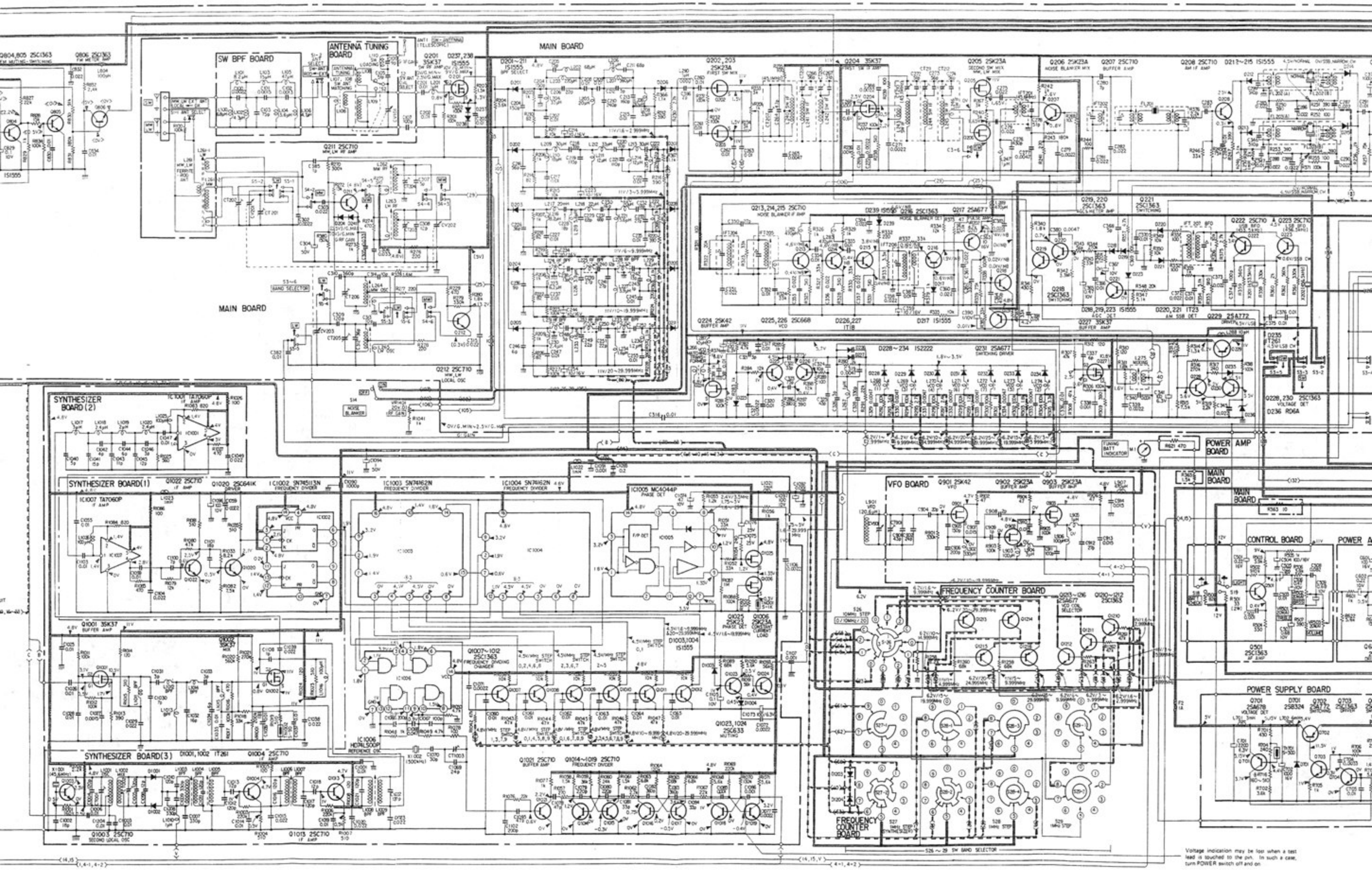
Note: The components identified by shading are critical for safety. Replace only with part number specified.

4-2. SCHEMATIC DIAGRAM

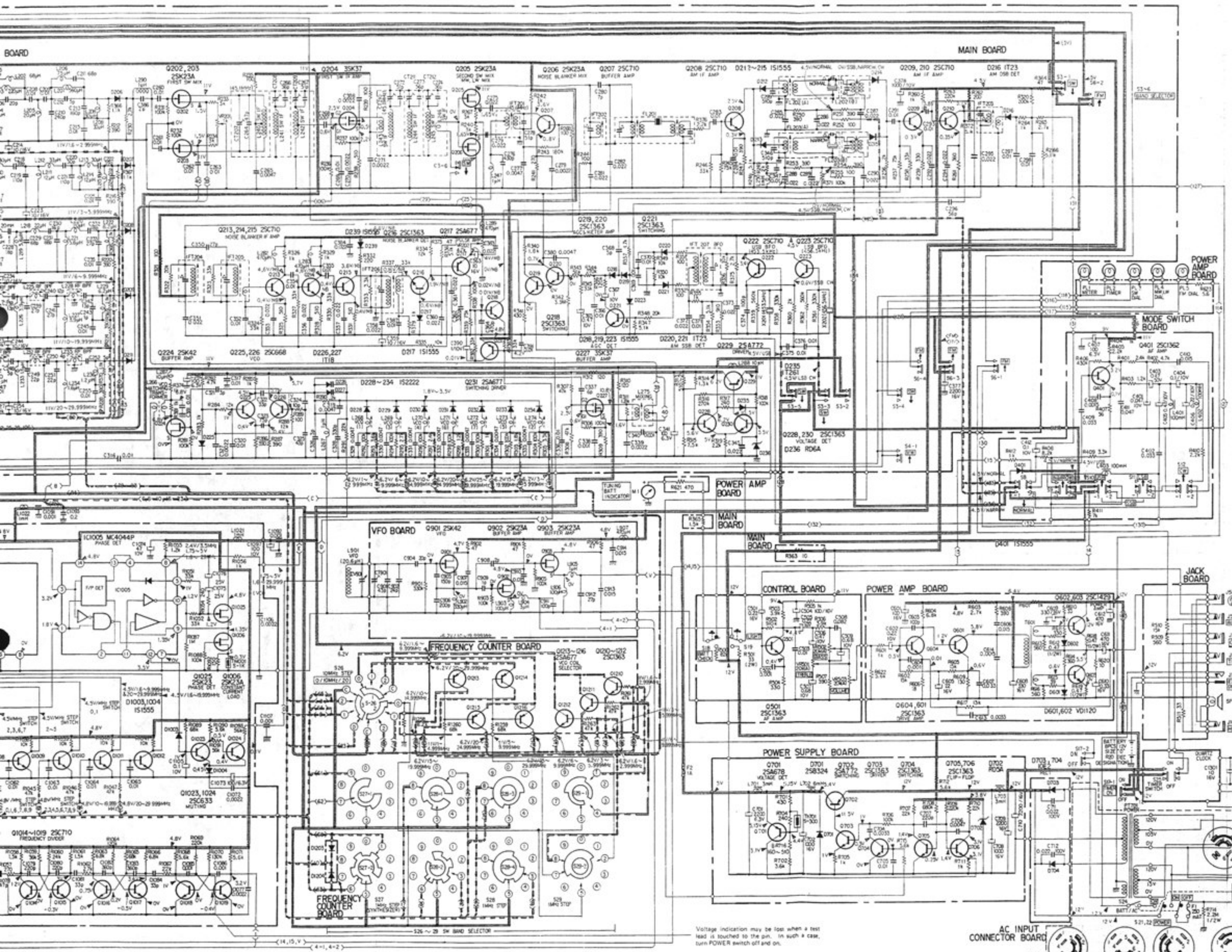


Note:

R210, 214, 218, 222, 226
R235, 239, 244, 321, 363, 836 : fusible resistor



4, 218, 222, 226
9, 244, 321, 363, 836 : fusible resistor



Note:

- All capacitors are in μF unless otherwise noted. 50 or less working voltages are not indicated except for electrolytic type. (p = μμF)
- All resistors are in Ω, ¼W, unless otherwise noted. k = 1,000, M = 1,000 k
- △ indicates internal components
- ⏚ indicates chassis ground
- ▭ indicates normal B+ circuit

▭▭▭ B+ circuit which is changed by SW BAND SELECTOR switch

▭▭▭ B+ circuit at 3.501 MHz

- Voltages are DC with respect to ground unless otherwise noted. Readings are taken under no-signal conditions with a VOM (20 kΩ/V).

TREBLE: MIN, BASS: MIN, VOLUME: center of rotation
< > FM IAFC: OFF, MUTING: OFF, tuning dial: fixed
< > FM IAFC: OFF, MUTING: ON, tuning dial: fixed
[ ] LW IRF GAIN: MAX, MODE: NORMAL, tuning dial: fixed
[ ] SW IRF GAIN: MAX, MODE: NORMAL, tuning dial: fixed

/G MAX	RF GAIN MAX
/G MIN	RF GAIN MIN
/U	MODE USB
/L	MODE LSB
/SSB	MODE USB/LSB
/CW	MODE CW
/NB	NOISE BLANKER ON
/TUNE	at 501 kHz
/ MHz	BAND SELECTOR 3 MHz (/10 MHz: 10 MHz step, /MHz: 1 MHz step)

no mark : common and SW

- Voltage variations may be noted due to normal production tolerances.
- Voltage between base and emitter are measured with 25v range.
- These all voltages at the following points are different at the frequencies other than 3.501 MHz
  1) From the frequency setting rotary switches to the program inputs of programmable counter IC.
  2) From the outputs of counter 3 to the inputs of latch/decoder drive.
  3) From the outputs of decoder drive to the inputs of LED.

Relations of the LED indication (decimal value) and BCD (binary coded decimal) value are as follows:

LED Indication	BCD code A	B	C	D
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1

0: low level
1: high level

Relation of the LED indication (decimal value) and inputs to the LED are as follows:

LED Indication	LED Input Terminal a	b	c	d	e	f	g
0	1	1	1	1	1	1	0
1	0	1	1	0	0	0	0
2	1	1	0	1	1	0	1
3	1	1	1	1	0	0	1
4	0	1	1	0	0	1	1
5	1	0	1	1	0	1	1
6	0	0	1	1	1	1	1
7	1	1	1	0	0	0	0
8	1	1	1	1	1	1	1
9	1	1	1	1	0	1	1

0: low level
1: high level

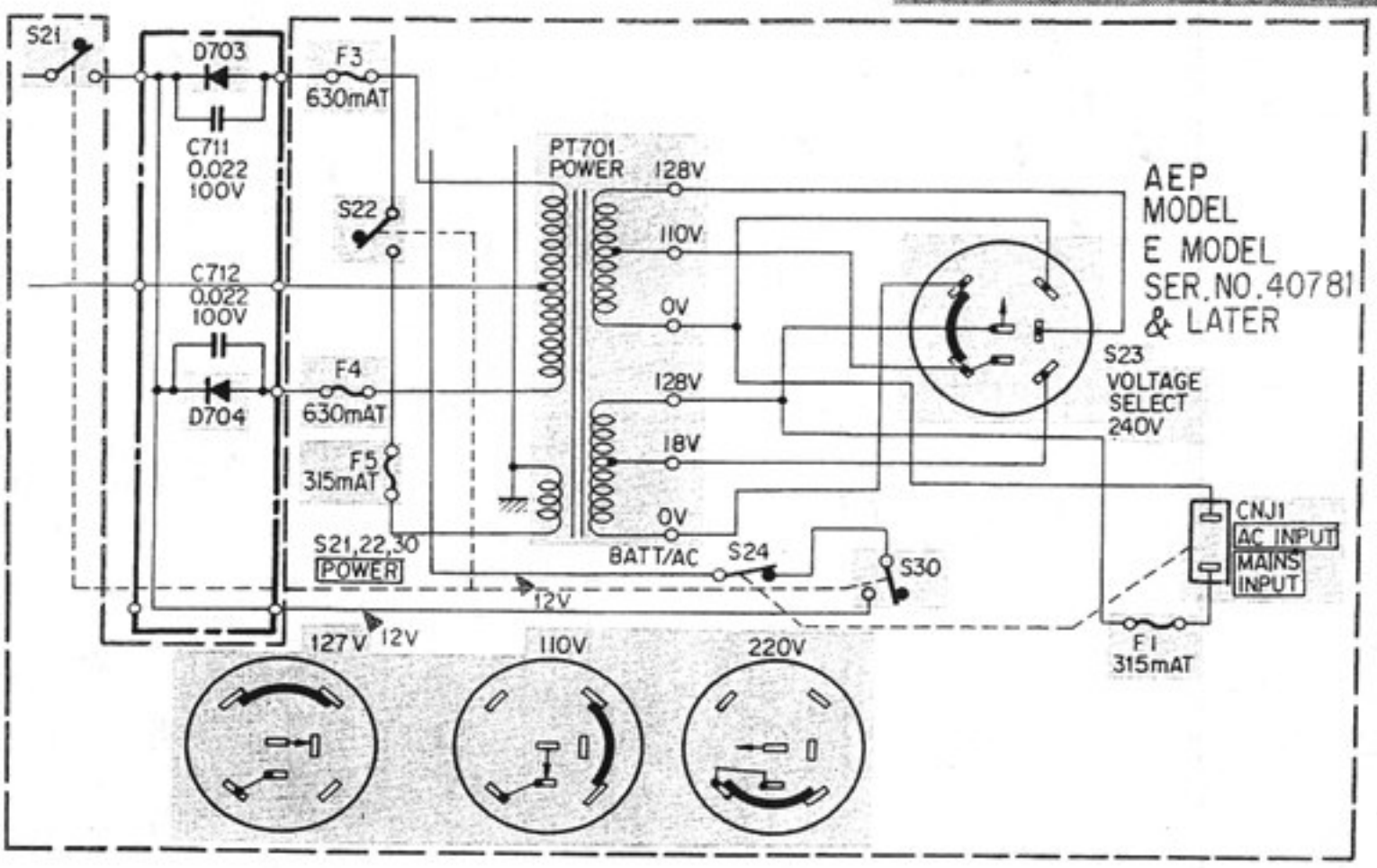
- Switch Mode

Ref. No.	Switch	Position
S1-1	ANT SELECT MW, LW EXT ANT	LOCAL
S1-2	LOCAL–DX ANT SELECT SW-ANT ROD–EXT	ROD
S2	SW AND COIL SELECT L108 – L109	L108
S3-1 ~ 3-6	BAND SELECTOR, SW	ON
S4-1 ~ 4-6	BAND SELECTOR, MW	OFF
S5-1 ~ 5-6	BAND SELECTOR, LW	OFF
S6-1 ~ 6-4	BAND SELECTOR, FM	OFF
S8	MODE, NORMAL	ON
S9	MODE, NARROW	OFF
S10	MODE, USB – SSB	OFF
S11	MODE, LSB – SSB	OFF
S12	MODE, CW	
S14	NOISE BLANKER	OFF
S15	AFC	OFF
S16	MUTING	OFF
S17	TIMER ON	OFF
S18	BATT CHECK	OFF
S19	LIGHT	OFF
S20	PUSH ZERO SECOND	OFF
S21	POWER OFF–ON–TIMER ON	OFF
S22		
S23	VOLTAGE SELECT 100 V–120 V–240 V–220 V (US, CANADIAN, E MODEL) 110 V–127 V–220 V–240 V (AEP, UK MODEL)	120 V / 240 V
S24	BATT/AC	BATT
S25	QUARTZ TIMER	OFF
S26	SW BAND SELECTOR 10 MHz STEP 0 – 10 MHz – 20	0
S27 S28	SW BAND SELECTOR 1 MHz STEP 0–1 MHz–2–3–4–5–6–7–8–9	9
S29	SW BAND SELECTOR	
S30	POWER (AEP, UK MODEL) OFF–ON–TIMER ON	OFF

AEP model

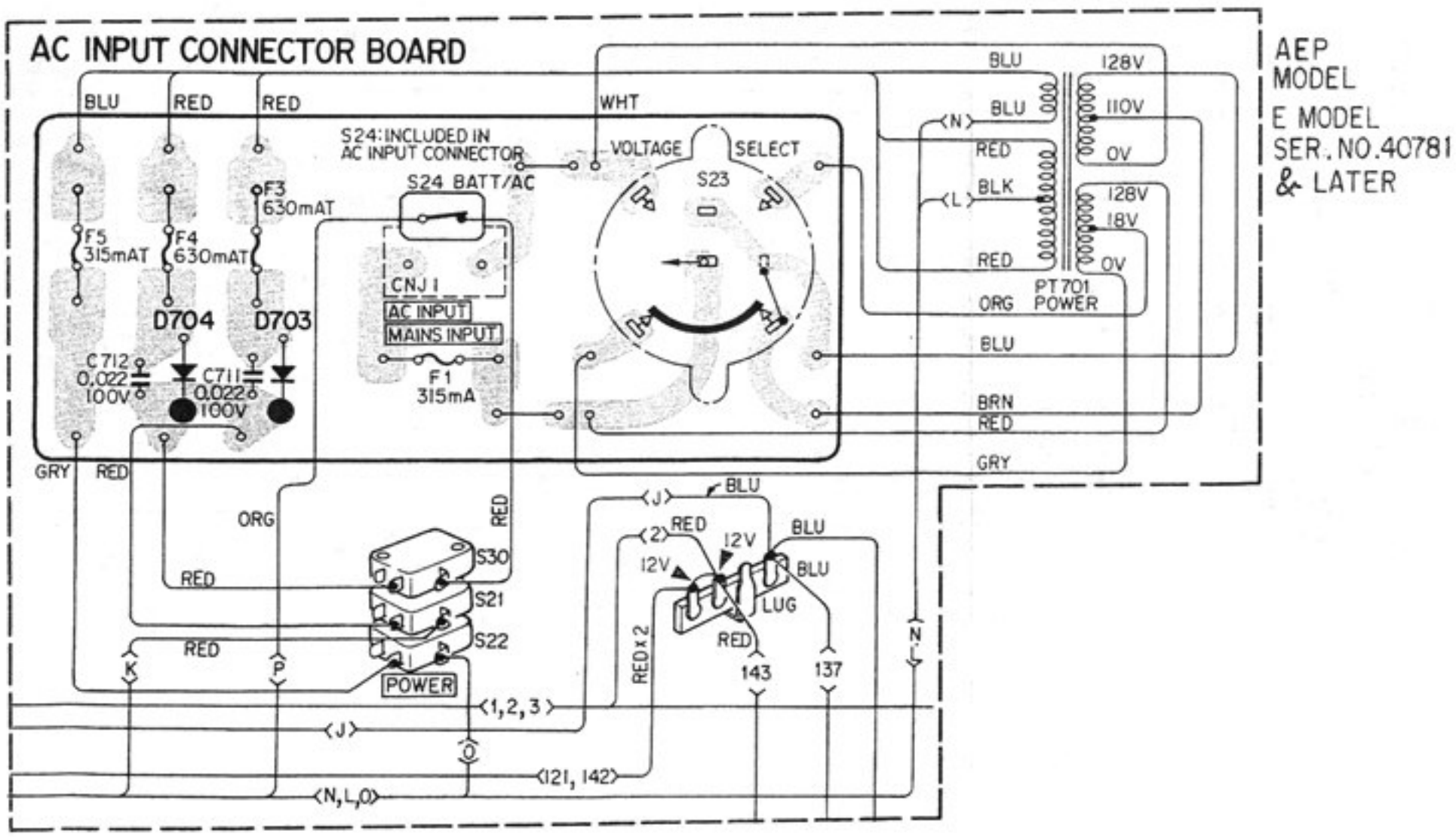
4-3. SCHEMATIC DIAGRAM – Power Supply Section –

Note: The components identified by shading are critical for safety. Replace only with part number specified.

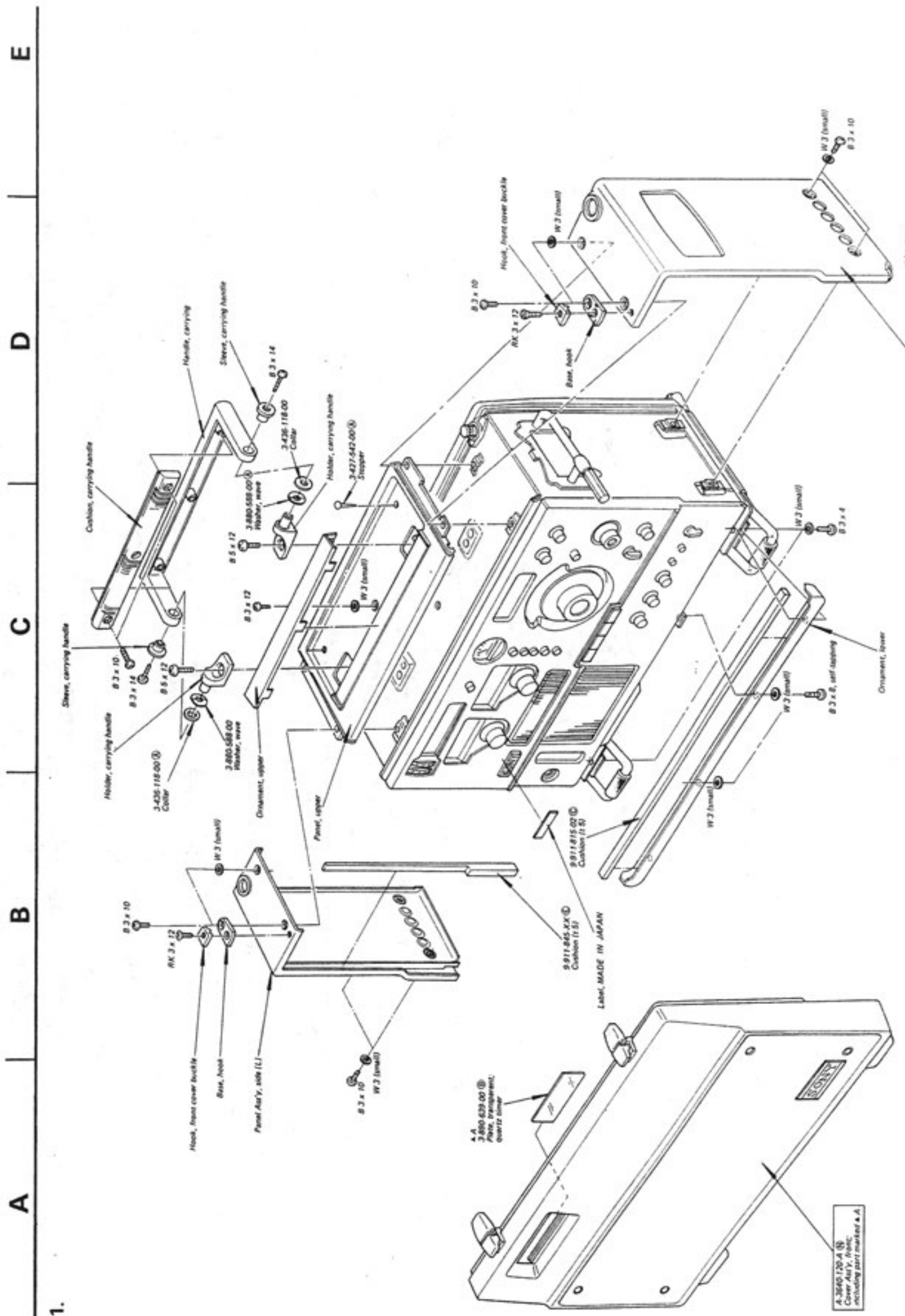


4-4. MOUNTING DIAGRAM

– Conductor Side –



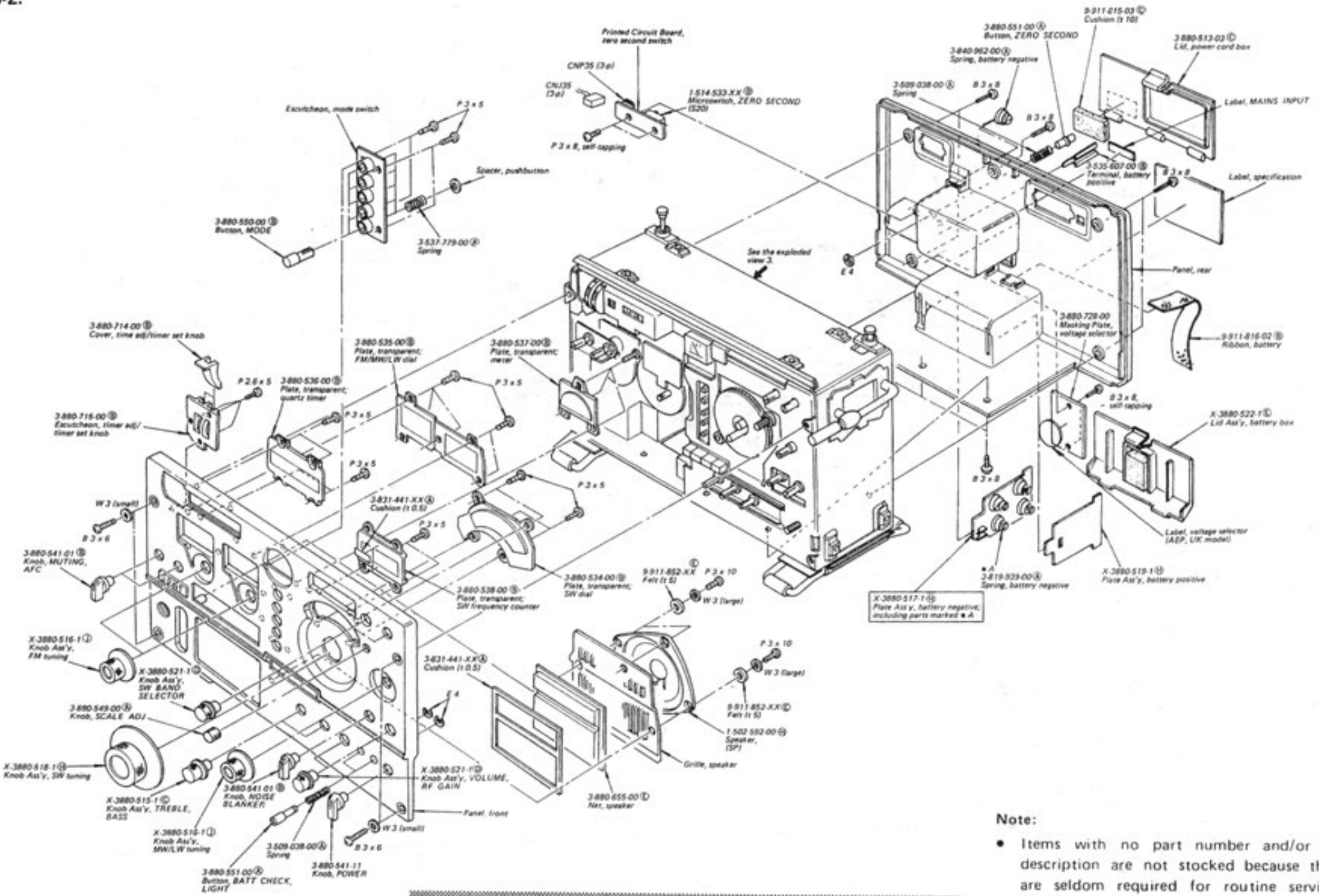
SECTION 5
EXPLODED VIEWS



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

5-2.



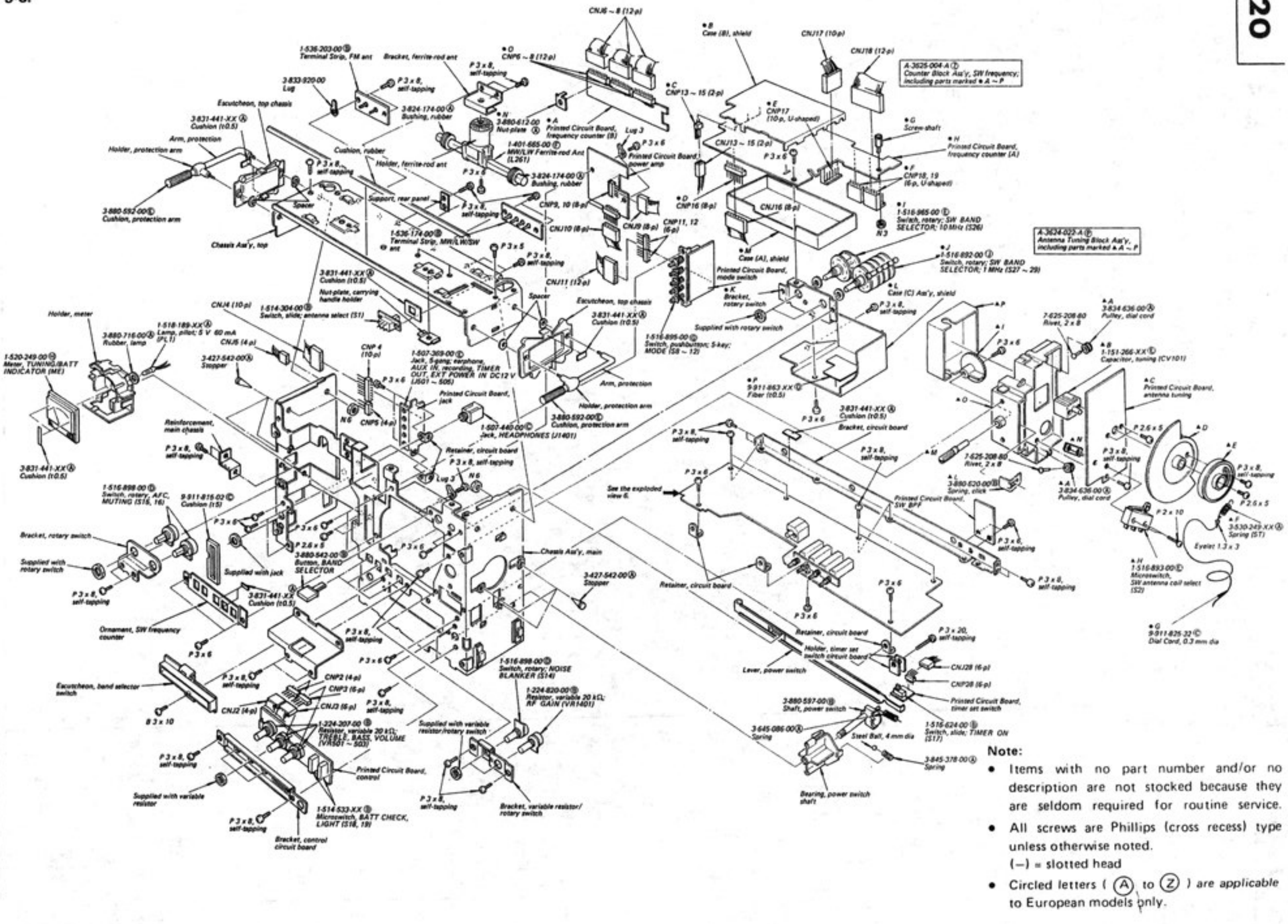
Note: The components identified by shading are critical for safety. Replace only with part number specified.

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

CRF-320

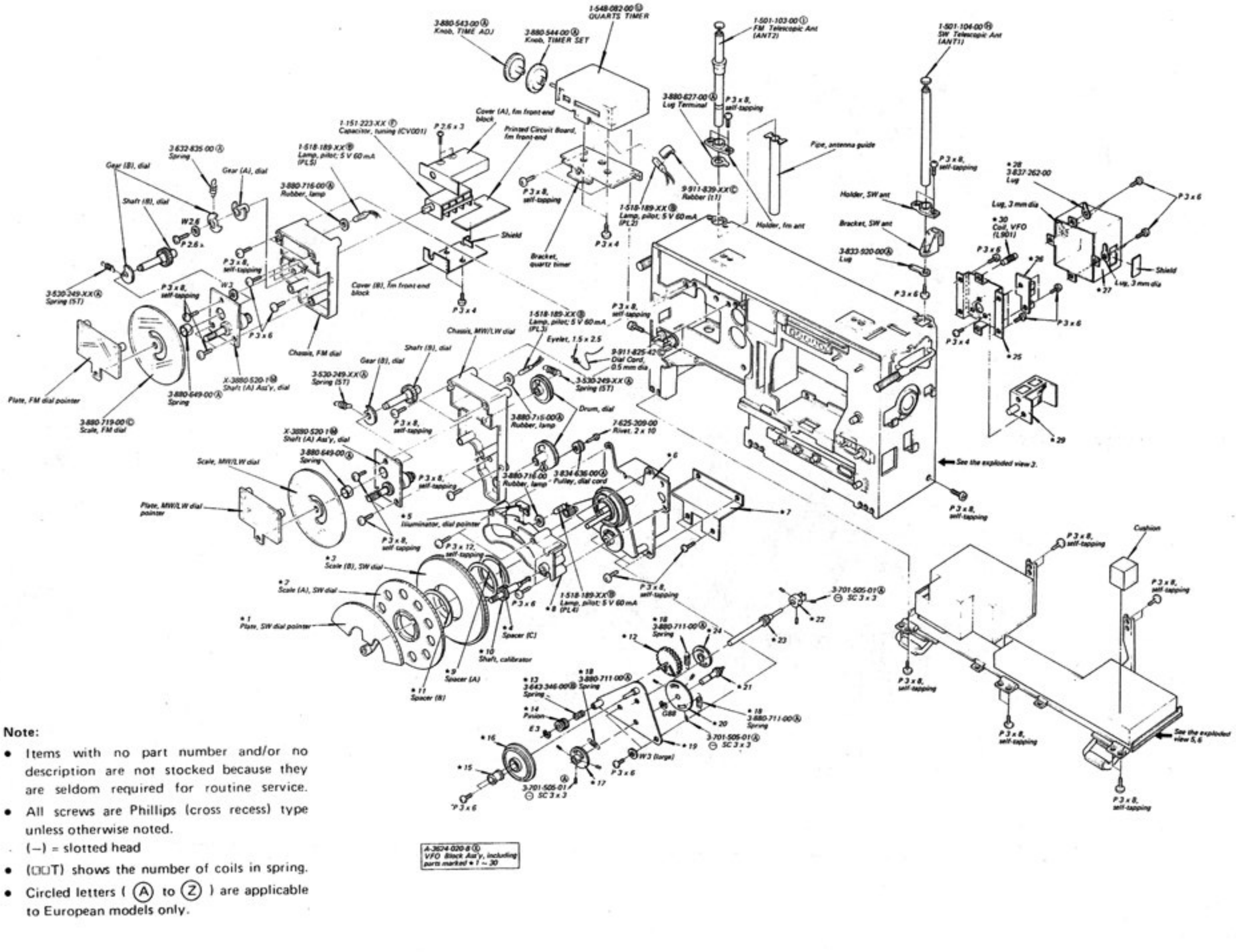
5-3.



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) *are applicable* to European models only.

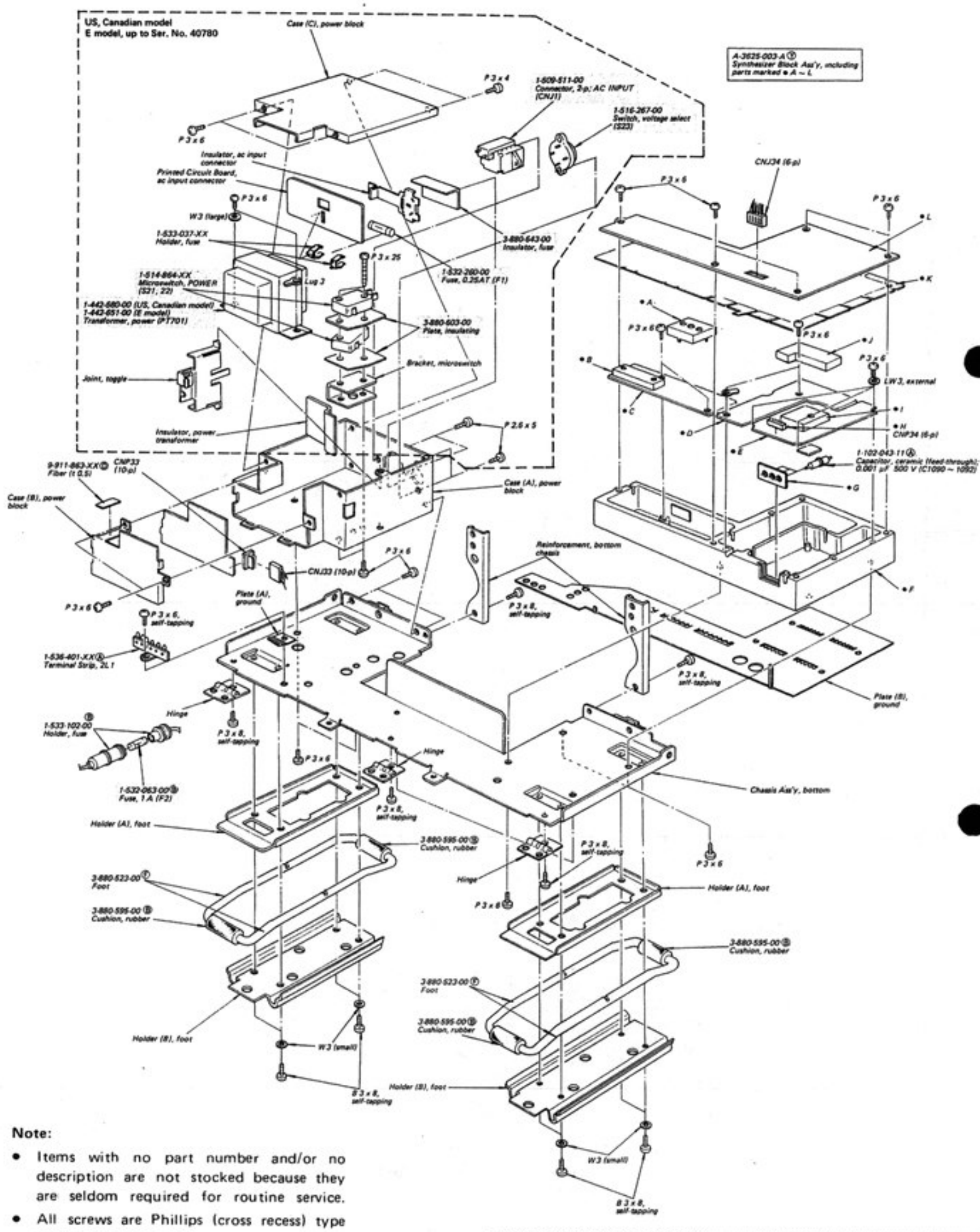
5-4.



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- (□□T) shows the number of coils in spring.
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

5-5.



Note:

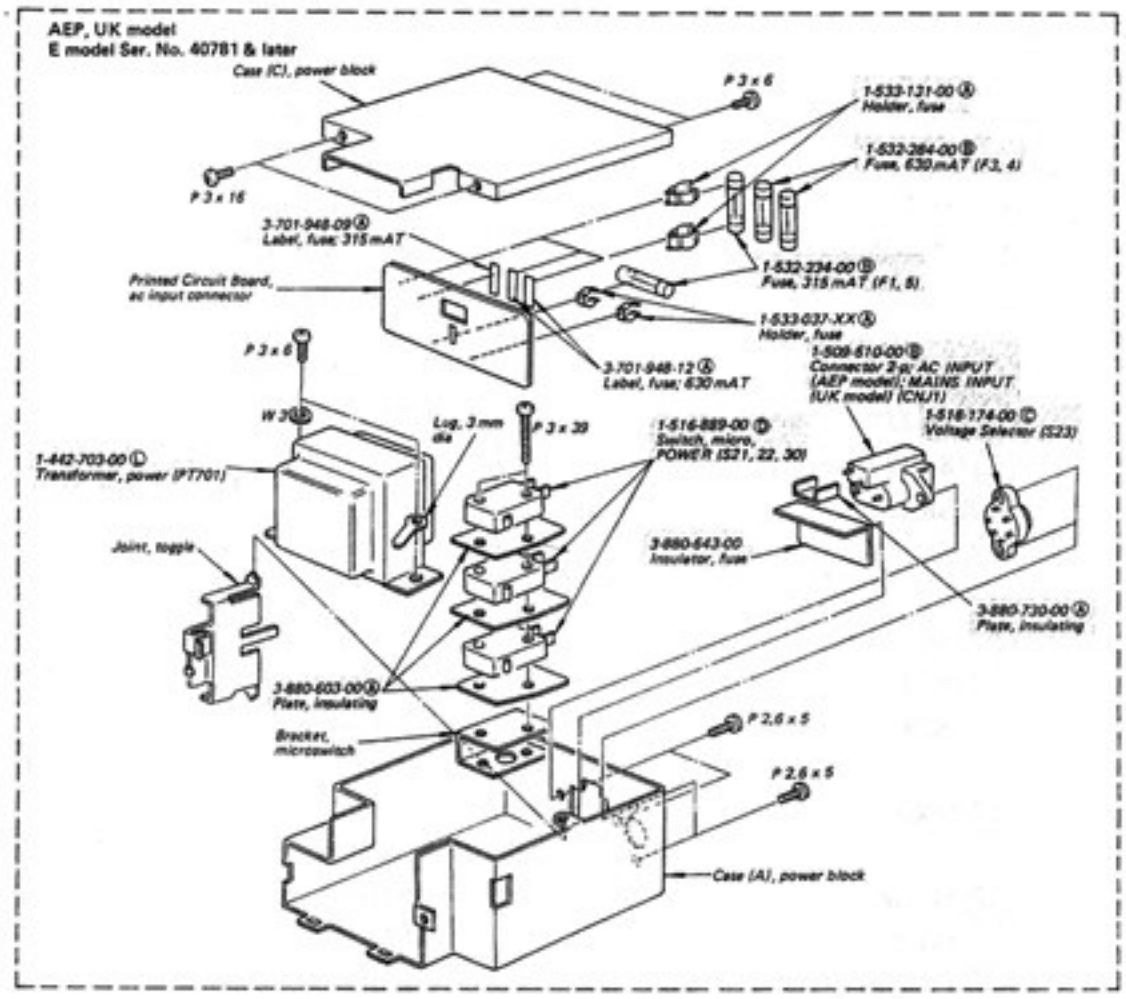
- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

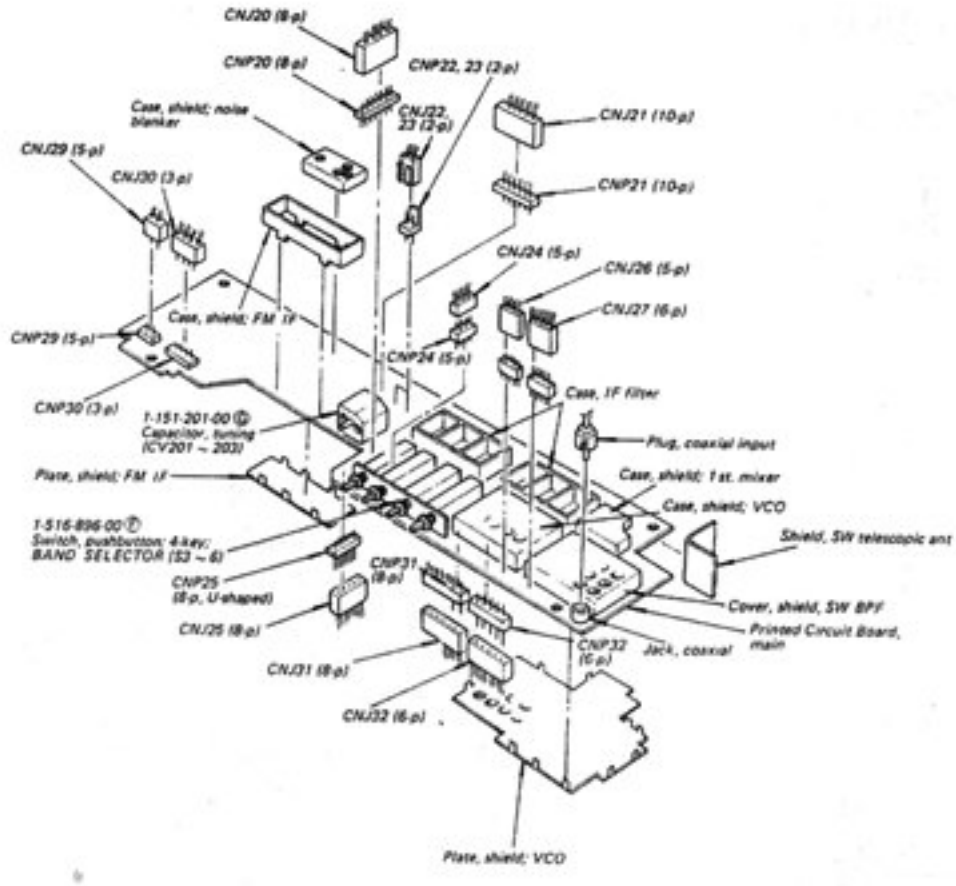
Note: The components identified by shading are critical f safety. Replace only with part number specifie

A B C D

1 2 3 4 5

5-6.





Note: The components identified by shading are critical for safety. Replace only with part number specified.

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (—) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

SECTION 6

ELECTRICAL PARTS LIST

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*
		SEMICONDUCTORS
		Transistors
Q001		Ⓒ2SK42
Q002		Ⓒ2SK23A
Q003		Ⓑ2SC710
Q201		Ⓔ3SK37
Q202, 203		Ⓒ2SK23A
Q204		Ⓔ3SK37
Q205, 206		Ⓒ2SK23A
Q207 ~ 215		Ⓑ2SC710
⇒Q216		Ⓑ2SC634A
⇒Q217		Ⓒ2SA678
⇒Q218 ~221		Ⓑ2SC634A
Q222, 223		Ⓑ2SC710
Q224		Ⓒ2SK42
Q225, 226		Ⓑ2SC668
Q227		Ⓔ3SK37
⇒Q228		Ⓑ2SC634A
Q229		Ⓒ2SA772
⇒Q230		Ⓑ2SC634A
⇒Q231		Ⓒ2SA678
Q401		Ⓑ2SC632A
⇒Q501, 601		Ⓑ2SC634A
Q602, 603		Ⓒ2SC1429
⇒Q604		Ⓑ2SC634A
Q701		Ⓒ2SA678
Q702		Ⓒ2SA772
Q703 ~706		Ⓑ2SC634A
Q801 ~803		Ⓑ2SC710
⇒Q804 ~806		Ⓑ2SC634A
Q901		Ⓒ2SK42
Q902, 903		Ⓒ2SK23A
Q1001, 1002		Ⓔ3SK37
Q1003, 1004		Ⓑ2SC710
Q1006		Ⓒ2SK23A
⇒Q1007 ~1012		Ⓑ2SC634A
Q1013 ~1018		Ⓑ2SC710
Q1019, 1020		Ⓒ2SC641K
Q1021, 2022		Ⓑ2SC710
⇒Q1023, 1024		Ⓑ2SC634A
Q1025, 1201		Ⓒ2SK23A
Q1202, 1203		Ⓑ2SC710
⇒Q1204 ~1212		Ⓑ2SC634A
⇒Q1213 ~1216		Ⓒ2SA678
		ICs
IC801, 802		Ⓓ CX075A
IC1001		Ⓓ TA7060P
⇒IC1002		Ⓙ 74S113DC
IC1003, 1004		Ⓙ SN74162N
IC1005		Ⓚ MC4044P
⇒IC1006		Ⓔ HD74LS00P
IC1007		Ⓓ TA7060P
IC1201		Ⓗ 34013PC
IC1202		Ⓔ MSM505
IC1203		Ⓚ MSM551H
IC1204		Ⓗ MSM530
IC1205 ~ 1207		Ⓛ MSM5503
IC1208 ~ 1210		Ⓚ MSM561
		Diodes
⇒D001		Ⓑ 1S351M
D201 ~209		Ⓑ 1S1555
D211 ~215		Ⓑ 1S1555
⇒D216		Ⓑ 1T23S
D217 ~219		Ⓑ 1S1555
⇒D220, 221		Ⓑ 1T23S
D223, 225		Ⓑ 1S1555
D226, 227		Ⓒ 1T18
D228 ~ 234		Ⓑ 1S2222
D235		Ⓑ 1T261
D236		Ⓑ RD6A
D237 ~ 241, D401		Ⓑ 1S1555
D601, 602		Ⓐ VD1120
D701		Ⓑ 2SB324

⇒: Due to replacement parts, the descriptions are different from the diagrams.

E* 1 model Up to Ser. No. 40780
E* 2 model Ser. No. 40781 and later

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*
D702		Ⓑ RD5A
D703, 704		Ⓑ 10E2
D801, 802		Ⓑ 1T261
D803 ~ 807		Ⓑ 1S1555
D1001, 1002		Ⓑ 1T261
D1003, 1004 D1201 ~ 1204)		Ⓑ 1S1555
LED1201 ~ 1205		Ⓗ SL1122

Thermistors

Th701	1-800-196-00	Ⓐ S-300
Th1001	1-800-198-00	Ⓐ S-1K
Th1002	1-800-194-00	Ⓐ S-90

COILS

L001	1-425-929-00	Ⓑ FM Antenna
L002	1-425-930-00	Ⓑ FM RF
L003	1-425-929-00	Ⓑ FM RF
L004	1-405-527-00	Ⓑ FM Osc
L006	1-407-157-XX	Ⓐ Microinductor, 10 μH
L201	1-407-178-XX	Ⓐ Microinductor, 1 μH
L224	1-407-864-00	Ⓑ RF BPF
L225	1-407-865-00	Ⓑ RF BPF
L228	1-407-864-00	Ⓑ RF BPF
L231	1-407-862-00	Ⓑ RF BPF
L232	1-407-863-00	Ⓑ RF BPF
L235	1-407-862-00	Ⓑ RF BPF
L261	1-401-665-00	Ⓕ MW/LW Ferrite-rod Antenna
L262	1-425-911-00	Ⓑ MW RF
L263	1-425-444-00	Ⓑ LW RF
L264	1-405-717-00	Ⓑ MW Osc
L265	1-405-716-00	Ⓑ LW Osc
L266	1-417-053-00	Ⓓ VCO Matching Transformer
L267	1-407-178-XX	Ⓐ Microinductor, 1 μH
L268	1-433-184-00	Ⓑ VCO (1)
L269	1-433-185-00	Ⓑ VCO (3)
L270	1-433-188-00	Ⓑ VCO (4)
L271	1-433-189-00	Ⓑ VCO (6)
L272	1-433-190-00	Ⓑ VCO (7)
L273	1-433-186-00	Ⓑ VCO (5)
L274	1-433-187-00	Ⓑ VCO (2)
L275	1-425-912-00	Ⓑ Mixing
L282, 283	1-407-661-XX	Ⓐ Microinductor, 470 μH
L287, 288	1-407-157-XX	Ⓐ Microinductor, 10 μH
L289	1-407-661-XX	Ⓐ Microinductor, 470 μH
L290	1-407-178-XX	Ⓐ Microinductor, 1 μH
L401 ~ 403	1-407-883-00	Ⓒ Microinductor, 100 mH
L701, 703	1-407-857-00	Ⓓ Choke, 3 mH
L702	1-407-884-00	Ⓗ Choke, 6 mH
L804	1-407-169-XX	Ⓐ Microinductor, 100 μH
L1010	1-407-178-XX	Ⓐ Microinductor, 1 μH
L1016	1-407-169-XX	Ⓐ Microinductor, 100 μH
L1021~1023	1-407-856-00	Ⓒ Choke, 1 mH
L1025, 1026	1-407-169-XX	Ⓐ Microinductor, 100 μH
L1201, 1202	1-407-856-00	Ⓒ Choke, 1 mH
L1203	1-407-175-XX	Ⓐ Microinductor, 330 μH
L1300	1-407-856-00	Ⓒ Choke, 1 mH

TRANSFORMERS

FL201	1-403-165-00	Ⓒ Ceramic Filter
FL202A, B	1-403-888-00	Mechanical Filter
FL203A, B	1-404-024-00	Mechanical Filter
IFT001	1-404-031-00	Ⓑ FM IFT
IFT202	1-404-023-00	Ⓑ AM IFT
IFT203	1-404-152-00	Ⓑ AM IFT
IFT204~206	1-404-023-00	Ⓑ AM IFT
IFT207	1-459-153-00	Ⓑ BFO
IFT801	1-403-959-00	Ⓑ FM Discriminator
IFT802	1-403-953-00	Ⓑ FM Discriminator
IFT803	1-403-243-00	Ⓑ FM IFT
PT701	1-442-580-00	Power (US, Canadian model)
	1-442-651-00	Power (E * 1 model)
	1-442-703-00	Ⓛ Power (AEP, UK, E * 2 model)
T601	1-423-140-XX	Ⓒ Input

Note: The components identified by shading are critical for safety. Replace only with part number specified.

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

CAPACITORS

All capacitors are in μF and of ceramic unless otherwise noted.
(p = μμF, elect = electrolytic)
50 or less working volts are omitted except for electrolytic type.

Ref. No.	Part No.	Description		
C001	1-102-947-11 Ⓐ	10 p		
C002	1-161-013-11 Ⓐ	0.01		(boundary layer)
C003, 004	1-102-951-11 Ⓐ	15 p		
C005	1-161-013-11 Ⓐ	0.01		(boundary layer)
C006	1-102-972-11 Ⓐ	91 p		
C009	1-161-013-11 Ⓐ	0.01		(boundary layer)
C011, 012	1-102-947-11 Ⓐ	10 p		
C013	1-102-663-11 Ⓐ	8 p		
C014	1-161-013-11 Ⓐ	0.01		(boundary layer)
C015	1-127-019-11 Ⓑ	0.1	10 V	solid aluminum
C016	1-121-651-11 Ⓐ	10	16 V	elect
C017	1-102-712-11 Ⓐ	6 p		
C018	1-102-975-11 Ⓐ	100 p		
C100	1-103-733-11 Ⓐ	2200 p	50 V	polystyrol
C101	1-103-729-11 Ⓐ	0.0015	50 V	polystyrol
C102	1-103-728-11 Ⓐ	0.0013	50 V	polystyrol
C103	1-107-082-11 Ⓐ	75 p		silvered mica
C105	1-101-882-11 Ⓐ	51 p		
C106	1-102-946-11 Ⓐ	9 p		
C107	1-102-975-11 Ⓐ	100 p		
C201 ~ 203	1-101-118-11 Ⓐ	0.01		
C204	1-101-361-11 Ⓐ	150 p		
C205	1-107-082-11 Ⓐ	75 p		silvered mica
C206	1-107-068-11 Ⓐ	20 p		silvered mica
C207 ~ 209	1-161-013-11 Ⓐ	0.01		(boundary layer)
C210	1-102-979-11 Ⓐ	240 p		
C211	1-107-081-11 Ⓐ	68 p		silvered mica
C212	1-107-102-11 Ⓐ	5 p		silvered mica
C213	1-101-367-11 Ⓐ	160 p		
C214	1-121-651-11 Ⓐ	10	16 V	elect
C215	1-161-013-11 Ⓐ	0.01		(boundary layer)
C216	1-107-079-11 Ⓐ	56 p		silvered mica
C217	1-161-013-11 Ⓐ	0.01		(boundary layer)
C218	1-107-075-11 Ⓐ	39 p		silvered mica
C219	1-107-086-11 Ⓐ	110 p		silvered mica
C220	1-107-072-11 Ⓐ	30 p		silvered mica
C221	1-107-086-11 Ⓐ	110 p		silvered mica
C222	1-107-075-11 Ⓐ	39 p		silvered mica
C223	1-121-651-11 Ⓐ	10	16 V	elect
C224	1-107-078-11 Ⓐ	51 p		silvered mica
C225	1-161-013-11 Ⓐ	0.01		(boundary layer)
C226	1-107-074-11 Ⓐ	36 p		silvered mica
C227	1-161-013-11 Ⓐ	0.01		(boundary layer)
C228	1-107-067-11 Ⓐ	18 p		silvered mica
C229	1-107-081-11 Ⓐ	68 p		silvered mica
C230	1-107-066-11 Ⓐ	16 p		silvered mica
C231	1-107-081-11 Ⓐ	68 p		silvered mica
C232	1-107-067-11 Ⓐ	18 p		silvered mica
C233	1-107-071-11 Ⓐ	27 p		silvered mica
C234	1-121-651-11 Ⓐ	10	16 V	elect
C235	1-161-013-11 Ⓐ	0.01		(boundary layer)
C236	1-102-507-11 Ⓐ	9 p		
C237	1-161-013-11 Ⓐ	0.01		(boundary layer)
C238	1-102-511-11 Ⓐ	13 p		
C239	1-102-516-11 Ⓐ	27 p		
C240	1-102-510-11 Ⓐ	12 p		
C241	1-102-516-11 Ⓐ	27 p		
C242	1-102-511-11 Ⓐ	13 p		
C243	1-102-501-11 Ⓐ	1 p		
C244	1-121-651-11 Ⓐ	10	16 V	elect
C245	1-161-013-11 Ⓐ	0.01		(boundary layer)
C246	1-102-505-11 Ⓐ	6 p		
C247	1-161-013-11 Ⓐ	0.01		(boundary layer)
C248	1-102-864-11 Ⓐ	5 p		
C249	1-102-514-11 Ⓐ	22 p		
C250	1-102-504-11 Ⓐ	4 p		
C251	1-102-514-11 Ⓐ	22 p		
C252	1-102-864-11 Ⓐ	5 p		
C254	1-121-651-11 Ⓐ	10	16 V	elect
C255	1-161-013-11 Ⓐ	0.01		(boundary layer)
C260 ~ 263	1-101-923-11	0.01		

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*		
C264	1-107-077-11 Ⓐ	47 p		silvered mica
C265	1-102-125-11 Ⓐ	0.0047		
C266	1-107-079-11 Ⓐ	56 p		silvered mica
C267	1-107-078-11 Ⓐ	51 p		silvered mica
C268	1-102-074-11 Ⓐ	0.001		
C269	1-101-923-11 Ⓐ	0.01		
C270, 271	1-102-121-11 Ⓐ	0.0022		
C272	1-107-078-11 Ⓐ	51 p		silvered mica
C273, 274	1-107-079-11 Ⓐ	56 p		silvered mica
C275	1-161-017-11 Ⓐ	0.022		(boundary layer)
C276	1-107-233-11 Ⓐ	430 p		silvered mica
C277	1-102-125-11 Ⓐ	0.0047		
C278	1-107-078-11 Ⓐ	51 p		silvered mica
C279	1-161-017-11 Ⓐ	0.022		(boundary layer)
C280	1-102-944-11 Ⓐ	7 p		
C281, 282	1-101-924-11 Ⓐ	0.022		
C283	1-101-923-11 Ⓐ	0.01		
C284	1-108-239-12 Ⓐ	0.01		mylar
C285 ~ 290	1-101-924-11 Ⓐ	0.022		
C291	1-101-923-11 Ⓐ	0.01		
C292	1-161-017-11 Ⓐ	0.022		(boundary layer)
C293	1-101-923-11 Ⓐ	0.01		
C294	1-108-242-12 Ⓐ	0.022		mylar
C295	1-101-924-11 Ⓐ	0.022		
C296	1-107-079-11 Ⓐ	56 p		silvered mica
C297, 298	1-108-239-12 Ⓐ	0.01		mylar
C299	1-107-235-11 Ⓐ	510 p		silvered mica
C302	1-108-563-12 Ⓑ	0.0022		mylar
C303	1-101-924-11 Ⓐ	0.022		
C304	1-121-391-11 Ⓐ	1	50 V	elect
C305, 306	1-108-244-12 Ⓐ	0.033		mylar
C307	1-102-942-11 Ⓐ	5 p		
C308	1-102-949-11 Ⓐ	12 p		
C309	1-102-679-11 Ⓐ	12 p		
C310	1-103-714-11 Ⓐ	360 p	50 V	polystyrol
C312	1-102-964-11 Ⓐ	36 p		
C313, 314	1-102-947-11 Ⓐ	10 p		

Ref. No.	*Part No.*	*Description*		
C315	1-108-242-12 Ⓐ	0.022		mylar
C316, 317	1-101-923-11 Ⓐ	0.01		
C318	1-121-413-11 Ⓐ	100	6.3 V	elect
C319	1-102-125-11 Ⓐ	0.0047		
C320	1-101-923-11 Ⓐ	0.01		
C321	1-102-503-11 Ⓐ	3 p		
C322	1-102-877-11 Ⓐ	33 p		
C323	1-102-526-11 Ⓐ	75 p		
C324	1-101-999-11 Ⓐ	10 p		
C325	1-102-755-11 Ⓐ	43 p		
C326	1-102-743-11 Ⓐ	3 p		
C327	1-102-121-11 Ⓐ	0.0022		
C328	1-102-112-11 Ⓐ	330 p		
C329 ~ 335	1-102-125-11 Ⓐ	0.0047		
C336	1-101-923-11 Ⓐ	0.01		
C337	1-102-505-11 Ⓐ	6 p		
C338	1-102-074-11 Ⓐ	0.001		
C339	1-102-121-11 Ⓐ	0.0022		
C340	1-102-074-11 Ⓐ	0.001		
C341	1-121-413-11 Ⓐ	100	6.3 V	elect
C345	1-101-924-11 Ⓐ	0.022		
C346	1-107-235-11 Ⓐ	510 p		silvered mica
C347	1-101-923-11 Ⓐ	0.01		
C350	1-107-071-11 Ⓐ	27 p		silvered mica
C351	1-101-924-11 Ⓐ	0.022		
C352	1-101-923-11 Ⓐ	0.01		
C353	1-108-242-12 Ⓐ	0.022		mylar
C354, 355	1-101-923-11 Ⓐ	0.01		
C356, 357	1-108-242-12 Ⓐ	0.022		mylar
C358	1-101-924-11 Ⓐ	0.022		
C359	1-121-651-11 Ⓐ	10	16 V	elect
C360, 361	1-101-924-11 Ⓐ	0.022		
C362	1-102-832-11 Ⓐ	330 p		
C363	1-121-651-11	10	16 V	elect
C364	1-102-114-11 Ⓐ	470 p		
C365	1-127-022-11 Ⓑ	0.47	10 V	solid aluminum
C366	1-101-923-11 Ⓐ	0.01		
C367	1-127-023-11 Ⓑ	1	10 V	solid aluminum

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Ref. No.	*Part No.*	*Description*		
C368	1-107-102-11 Ⓐ	5 p		silvered mica
C369, 370	1-101-923-11 Ⓐ	0.01		
C371	1-108-239-12 Ⓐ	0.01		mylar
C372	1-108-242-12 Ⓐ	0.022		mylar
C373	1-101-924-11 Ⓐ	0.022		
C374	1-107-085-11 Ⓐ	100 p		silvered mica
C375, 376	1-101-923-11 Ⓐ	0.01		
C377	1-123-070-11 Ⓒ	2200	16 V	elect
C378	1-121-943-11 Ⓑ	1000	10 V	elect
C379	1-102-121-11 Ⓐ	0.0022		
C380	1-108-234-12 Ⓐ	0.0047		mylar
C381	1-101-923-11 Ⓐ	0.01		
C383, 384	1-101-924-11 Ⓐ	0.022		
C385	1-102-934-11 Ⓐ	1 p		
C386	1-102-935-11 Ⓐ	2 p		
C387	1-161-013-11 Ⓐ	0.01		(boundary layer)
C388	1-102-121-11 Ⓐ	0.0022		
C390	1-131-205-21 Ⓑ	2.2	10 V	tantalum
C391	1-101-923-11 Ⓐ	0.01		
C401	1-127-018-11 Ⓑ	0.047	10 V	solid aluminum
C402	1-108-244-12 Ⓐ	0.033		mylar
C403	1-121-951-11 Ⓐ	0.47	50 V	elect
C404	1-127-019-11 Ⓑ	0.1	10 V	solid aluminum
C405	1-127-022-11 Ⓑ	0.47	10 V	solid aluminum
C406	1-127-020-11 Ⓑ	0.22	10 V	solid aluminum
C407	1-121-415-11 Ⓑ	100	16 V	elect
C408	1-102-099-11 Ⓐ	1500 p		
C409	1-108-244-12 Ⓐ	0.033		mylar
C410	1-161-015-11 Ⓐ	0.015		(boundary layer)
C411	1-161-021-11 Ⓐ	0.047		(boundary layer)
C412	1-127-019-11 Ⓑ	0.1	10 V	solid aluminum
C501	1-127-377-11 Ⓑ	0.22	16 V	solid aluminum
C502	1-101-918-11 Ⓐ	0.001		
C503	1-161-013-11 Ⓐ	0.01		(boundary layer)
C504	1-121-415-11 Ⓑ	100	16 V	elect
C505	1-127-377-11 Ⓑ	0.22	16 V	solid aluminum
C506	1-127-018-11 Ⓑ	0.047	10 V	solid aluminum
C507	1-127-378-11 Ⓑ	0.68	10 V	solid aluminum
C508	1-161-024-11 Ⓐ	0.082		(boundary layer)
C509	1-127-378-11 Ⓑ	0.68	10 V	solid aluminum
C601	1-121-415-11 Ⓑ	100	16 V	elect
C602	1-127-377-11 Ⓑ	0.22	16 V	solid aluminum
C603	1-102-975-11 Ⓐ	100 p		
C604	1-102-074-11 Ⓐ	0.001		
C605	1-121-479-11 Ⓐ	22	16 V	elect
C606	1-161-015-11 Ⓐ	0.015		(boundary layer)
C607	1-161-019-11 Ⓐ	0.033		(boundary layer)
C608, 609	1-121-521-11 Ⓑ	330	16 V	elect
C610	1-127-203-11 Ⓑ	0.33	16 V	solid aluminum
C611, 612	1-121-939-11 Ⓑ	470	16 V	elect
C613	1-102-123-11 Ⓐ	0.0033		
C614	1-102-119-11 Ⓐ	0.0015		
C701	1-123-078-11 Ⓑ	2200	6.3 V	elect
C702	1-121-944-11 Ⓔ	1000	16 V	elect
C704	1-108-232-12 Ⓐ	0.0033		mylar
C705	1-101-923-11 Ⓐ	0.01		
C706	1-108-234-12 Ⓐ	0.0047		mylar
C707	1-107-093-11 Ⓐ	220 p		silvered mica
C708	1-121-944-11 Ⓔ	1000	16 V	elect
C709, 710	1-121-660-11 Ⓑ	2200	16 V	elect
C711, 712	1-108-381-12 Ⓐ	0.022	100 V	mylar
C801 ~ 804	1-101-923-11 Ⓐ	0.01		
C805	1-121-413-11 Ⓐ	100	6.3 V	elect
C806 ~ 809	1-101-923-11 Ⓐ	0.01		
C810	1-101-924-11 Ⓐ	0.022		
C811, 812	1-101-923-11 Ⓐ	0.01		
C813	1-101-924-11 Ⓐ	0.022		
C814	1-108-234-12 Ⓐ	0.0047		mylar
C815	1-121-651-11 Ⓐ	10	16 V	elect
C816	1-108-228-12 Ⓐ	0.0015		mylar
C817	1-127-022-11 Ⓑ	0.47	10 V	solid aluminum
C819	1-102-962-11 Ⓐ	30 p		
C820 ~ 822	1-101-923-11 Ⓐ	0.01		
C823	1-102-940-11 Ⓐ	3 p		
C824	1-127-024-11 Ⓑ	2.2	10 V	solid aluminum
C825	1-102-940-11 Ⓐ	3 p		

Note: The components identified by shading are critical for safety. Replace only with part number specified.

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Ref. No.	*Part No.*	*Description*		
C826, 827	1-101-923-11 Ⓐ	0.01		
C829	1-127-019-11 Ⓑ	0.1	10 V	solid aluminum
C830	1-101-923-11 Ⓐ	0.01		
C832	1-101-924-11 Ⓐ	0.022		
C834	1-101-923-11 Ⓐ	0.01		
C835	1-121-982-11 Ⓐ	470	6.3 V	elect
C836	1-121-426-11 Ⓑ	470	16 V	elect
C901	1-102-648-11 Ⓐ	43 p		
C902	1-102-672-11 Ⓐ	24 p		
C904	1-107-068-11 Ⓐ	20 p		silvered mica
C905	1-107-089-11 Ⓐ	150 p		silvered mica
C906	1-107-092-11 Ⓐ	200 p		silvered mica
C907	1-108-279-12 Ⓐ	0.015		mylar
C908	1-107-099-11 Ⓐ	2 p		silvered mica
C909	1-107-098-11 Ⓐ	1 p		silvered mica
C910	1-108-279-12 Ⓐ	0.015		mylar
C911	1-107-085-11 Ⓐ	100 p		silvered mica
C912	1-107-085-11 Ⓐ	100 p		silvered mica
C913, 914	1-108-279-12 Ⓐ	0.015		mylar
C1001	1-101-923-11 Ⓐ	0.01		
C1002	1-102-953-11 Ⓐ	18 p		
C1003	1-101-923-11 Ⓐ	0.01		
C1004, 1005	1-107-087-11 Ⓐ	120 p		silvered mica
C1006	1-101-923-11 Ⓐ	0.01		
C1007~1009	1-107-097-11 Ⓐ	330 p		silvered mica
C1010~1012	1-107-087-11 Ⓐ	120 p		silvered mica
C1013	1-102-949-11 Ⓐ	12 p		
C1014	1-101-923-11 Ⓐ	0.01		
C1015	1-101-924-11 Ⓐ	0.022		
C1016, 1017	1-107-087-11 Ⓐ	120 p		silvered mica
C1018	1-102-949-11 Ⓐ	12 p		
C1019	1-101-923-11 Ⓐ	0.01		
C1020	1-101-924-11 Ⓐ	0.022		
C1021, 1022	1-107-087-11 Ⓐ	120 p		silvered mica
C1023	1-101-924-11 Ⓐ	0.022		
C1024~1026	1-101-923-11 Ⓐ	0.01		
C1027	1-102-119-11 Ⓐ	0.0015		

Ref. No.	*Part No.*	*Description*		
C1028	1-101-923-11 Ⓐ	0.01		
C1029	1-101-924-11 Ⓐ	0.022		
C1030	1-102-506-11 Ⓐ	7 p		
C1031	1-102-503-11 Ⓐ	3 p		
C1032	1-102-512-11 Ⓐ	16 p		
C1033	1-102-503-11 Ⓐ	3 p		
C1034	1-102-505-11 Ⓐ	6 p		
C1035~1037	1-101-923-11 Ⓐ	0.01		
C1038, 1039	1-101-924-11 Ⓐ	0.022		
C1040	1-102-864-11 Ⓐ	5 p		
C1041	1-102-951-11 Ⓐ	15 p		
C1042	1-102-504-11 Ⓐ	4 p		
C1043	1-102-948-11 Ⓐ	11 p		
C1044	1-102-943-11 Ⓐ	6 p		
C1045	1-102-949-11 Ⓐ	12 p		
C1046	1-102-503-11 Ⓐ	3 p		
C1047	1-161-013-11 Ⓐ	0.01		(boundary layer)
C1049	1-101-924-11 Ⓐ	0.022		
C1055	1-101-923-11 Ⓐ	0.01		
C1059	1-102-121-11 Ⓐ	0.0022		
C1060~1065	1-101-923-11 Ⓐ	0.01		
C1066	1-102-977-11 Ⓐ	200 p		
C1067	1-102-973-11 Ⓐ	100 p		
C1068	1-161-021-11 Ⓐ	0.047		(boundary layer)
C1069	1-107-070-11 Ⓐ	24 p		silvered mica
C1070	1-102-409-11 Ⓒ	30 p		
C1071, 1072	1-102-121-11 Ⓐ	0.0022		
C1073	1-121-413-11 Ⓐ	100	6.3 V	elect
C1074	1-121-352-11 Ⓐ	47	10 V	elect
C1075, 1076	1-131-236-21 Ⓑ	1	25 V	tantalum
C1077	1-102-121-11 Ⓐ	0.0022		
C1078	1-101-880-11 Ⓐ	47 p		
C1079, 1080	1-107-093-11 Ⓐ	220 p		silvered mica
C1081	1-102-963-11 Ⓐ	33 p		
C1082, 1083	1-103-714-11 Ⓐ	360 p		polystyrol
C1084	1-102-963-11 Ⓐ	33 p		
C1085, 1086	1-108-555-12 Ⓑ	0.001		mylar
C1090~1092	1-102-043-11 Ⓐ	0.001	500 V	(feed-through)

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*		
C1093	1-101-798-11 Ⓐ	0.2		(boundary layer)
C1094	1-121-391-11 Ⓐ	1	50 V	elect
C1095	1-101-880-11 Ⓐ	47 p		
C1096, 1097	1-121-414-11 Ⓐ	100	10 V	elect
C1098	1-107-063-11 Ⓐ	12 p		silvered mica
C1099	1-161-013-11 Ⓐ	0.01		(boundary layer)
C1100	1-102-944-11 Ⓐ	7 p		
C1101	1-102-953-11 Ⓐ	18 p		
C1102	1-102-977-11 Ⓐ	200 p		
C1103	1-101-923-11 Ⓐ	0.01		
C1104	1-101-924-11 Ⓐ	0.022		
C1105	1-127-019-11 Ⓑ	0.1	10 V	solid aluminum
C1106	1-101-919-11 Ⓐ	0.0022		
C1107	1-102-043-11 Ⓐ	0.001	500 V	(feed-through)
C1108	1-102-934-11 Ⓐ	1 p		
C1201	1-121-424-11 Ⓑ	470	6.3 V	elect
C1202	1-102-121-11 Ⓐ	0.0022		
C1203	1-131-193-21 Ⓑ	10	10 V	tantalum
C1204~1206	1-101-924-11 Ⓐ	0.022		
C1207, 1208	1-101-923-11 Ⓐ	0.01		
C1209	1-101-924-11 Ⓐ	0.022		
C1210	1-101-890-11 Ⓐ	75 p		
C1211, 1212	1-108-563-12 Ⓑ	0.0022		mylar
C1213	1-127-019-11 Ⓑ	0.1	10 V	solid aluminum
C1214, 1215	1-101-798-11 Ⓐ	0.2		(boundary layer)
C1301	1-121-651-11 Ⓐ	10	16 V	elect
CT1001 ~ 1003	1-141-171-00 Ⓑ	Trimmer		
CT201~206	1-141-142-XX Ⓑ	Trimmer		
CT207	1-141-138-XX Ⓑ	Trimmer		
CT208	1-141-174-00 Ⓑ	Trimmer		
CT209~212	1-141-138-XX Ⓑ	Trimmer		
CV001	1-151-223-XX Ⓕ	Tuning		
CV101	1-151-266-21 Ⓔ	Tuning		
CV201~203	1-151-201-00 Ⓖ	Tuning		

Note: The components identified by shading are critical for safety. Replace only with part number specified.

Ref. No.	*Part No.*	*Description*		
RESISTORS				
All resistors are in ohms. Regular-type ¼W carbon and composition resistors are omitted. Check schematic diagram for resistance values. k = 1000, M = 1000 k				
R210, 214 R218, 222 R226	1-212-879-11 Ⓐ	82	¼W	fusible
R235, 239 R244, 321	1-212-881-11 Ⓐ	100	¼W	fusible
R363	1-212-857-11 Ⓐ	10	¼W	fusible
R501	1-206-475-11 Ⓐ	33	2W	metal-oxide
R551	1-244-837-11 Ⓐ	33	½W	carbon
R618, 619	1-207-459-11 Ⓐ	0.47	½W	wirewound
R714	1-202-723-11 Ⓐ	2.2M	½W	composition
R836	1-212-869-11 Ⓐ	33	¼W	fusible
VR201	1-224-642-XX Ⓑ	1 k, adjustable; first mixer balance		
VR202	1-224-644-XX Ⓑ	4.7 k, adjustable; blank level		
VR501~503	1-224-207-00 Ⓑ	20 k, variable; TREBLE, BASS, VOLUME		
VR1001	1-221-378-00 Ⓑ	200 k, adjustable; SW spurious beat		
VR1401	1-224-820-00 Ⓑ	20 k, variable; RF GAIN		
SWITCHES				
S1	1-514-304-00 Ⓑ	Slide, antenna select		
S2	1-516-893-00 Ⓔ	Micro, SW antenna coil select		
S3 ~ 6	1-516-896-00 Ⓕ	Pushbutton, 4-key; BAND SELECTOR		
S8 ~ 12	1-516-895-00 Ⓖ	Pushbutton, 5-key; MODE		
S14 ~ 16	1-516-898-00 Ⓓ	Rotary, NOISE BLANKER, AFC, MUTING		
S17	1-516-624-00 Ⓑ	Slide, TIMER ON		
S18 ~ 20	1-514-533-XX Ⓑ	Micro, BATT CHECK, LIGHT, ZERO SECOND		
S21, 22	1-514-864-XX	Micro, POWER (US, Canadian, E * 1 model)		
	1-516-889-00 Ⓓ	Micro, POWER (AEP, UK, E * 2 model)		
S23	1-516-267-00	Voltage Select (US, Canadian, E * 1 model)		
	1-516-174-00 Ⓓ	Voltage Select (AEP, UK, E * 2 model)		
S24	———	Included in ac input connector		
S25	———	Included in QUARTS TIMER		
S26	1-516-965-00 Ⓔ	Rotary, SW BAND SELECTOR (10 MHz)		
S27 ~ 29	1-516-892-00 Ⓙ	Rotary, SW BAND SELECTOR (1 MHz)		
S30	1-516-889-00 Ⓓ	Micro, POWER (AEP, UK, E * 2 model)		

E* 1 model Up to Ser. No. 40780
E* 2 model Ser. No. 40781 and later

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*
		MISCELLANEOUS
ANT1	1-501-104-00	Ⓗ SW Telescopic Antenna
ANT2	1-501-103-00	Ⓘ FM Telescopic Antenna
CF801～803	1-527-184-00	Ⓑ Filter, ceramic (10.7 MHz)
CNJ1	1-509-511-00	Connector; 2-p; AC INPUT including S24 (US, Canadian, E * 1 model)
	1-509-510-00	Ⓑ Connector, 2-p; AC INPUT (AEP model)/MAINS INPUT (UK model); including S24 (E * 2 model)
CR801	1-231-202-00	Ⓑ Encapsulated Component
F1	1-532-260-XX	Fuse, 0.25 A (US, Canadian, E * 1 model)
	1-532-234-00	Ⓑ Fuse, 315 mAT (AEP, UK, E * 2 model)
F2	1-532-063-00	Ⓑ Fuse, 1 A
F3, 4	1-532-284-00	Ⓑ Fuse, 630 mAT (AEP, UK, E * 2 model)
F5	1-532-234-00	Ⓑ Fuse, 315 mAT (AEP, UK, E * 2 model)
J501～505	1-507-369-00	Ⓔ Jack, 5-unit; earphone, AUX IN, recording, TIMER OUT, EXT POWER IN DC 12 V
J1401	1-507-440-00	Ⓒ Jack, HEADPHONES
ME	1-520-249-00	Ⓗ Meter, TUNING/BATT INDICATOR
PL1～5	1-518-189-XX	Ⓑ Lamp, pilot; 5 V 60 mA; meter, timer, dial
SP	1-502-592-00	Ⓗ Speaker
X201	1-527-270-00	Ⓘ Crystal
X202	1-527-271-00	Ⓘ Crystal
X1001	1-527-272-00	Ⓗ Crystal
X1002	1-527-269-00	Ⓚ Crystal
	1-533-037-XX	Ⓐ Holder, fuse
	1-533-102-00	Ⓑ Holder, fuse
	1-533-131-00	Ⓐ Holder, fuse (AEP, UK model)
	1-536-174-00	Ⓑ Terminal Strip, MW/LW/SW antenna
	1-536-203-00	Ⓑ Terminal Strip, FM antenna
	1-536-401-XX	Ⓐ Terminal Strip, 2L1
	1-548-082-21	Ⓤ QUARTZ TIMER

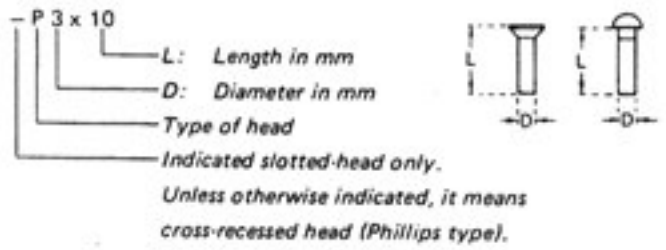
ACCESSORIES & PACKING MATERIALS

Part No.	*Description*
X-3701-032-0	Card Ass'y, warranty (US model)
1-504-059-11	Ⓒ Earphone, ME-20H
1-526-565-00	Adaptor, ac plug (E model)
1-534-830-00	Cord, power; DK-33H (E * 1 model)
1-534-840-XX	Ⓔ Cord, power (AEP, E * 2 model)
1-534-867-00	Cord, power; DK-35 (US model)
1-551-002-XX	Cord, power (Canadian model)
1-551-218-00	Ⓔ Cord, power; DK-50 (UK model)
3-701-625-00	Ⓐ Bag, polyethylene
3-701-632-00	Ⓐ Bag, polyethylene
3-793-956-31	Ⓑ Card, warranty (Canadian model)
3-880-697-00	Ⓒ Bag, polyethylene
3-880-699-00	Ⓒ Cushion
3-880-700-00	Ⓒ Cushion
3-880-701-00	Ⓒ Cushion
3-880-702-00	Ⓒ Cushion
3-880-721-00	Ⓕ Carton
3-993-063-13	Ⓑ Book, SHORT WAVE GUIDE
3-993-131-00	Ⓘ Chart, world time zone
3-995-735-11	Ⓚ Manual, instruction (E, AEP, UK model)
3-995-735-23	Manual, instruction (US, Canadian model)

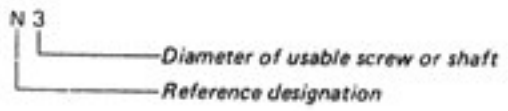
Note: The components identified by shading are critical for safety. Replace only with part number specified.

HARDWARE NOMENCLATURE

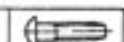
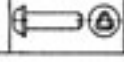
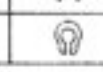
Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	

Sony Corporation