ICF-7800W

US Model
Canadian Model

PSB/FM/AM 3 BAND RECEIVER

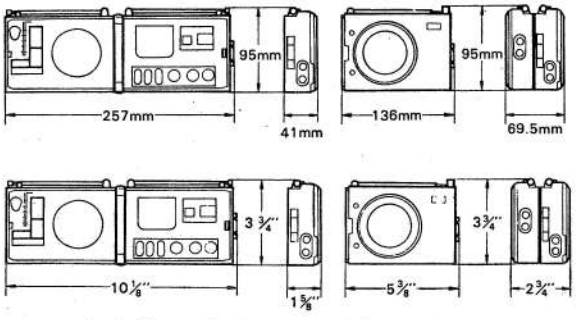
SPECIFICATIONS

Power Requirements: 6V dc, four batteries size AA (IEC Designation R6)
120V ac, 60 Hz with optional Sony AC Power Adaptor AC-9W (for US model) or AC-9 (for Canadian model) or 12V car battery with Sony Car Battery Cord DCC-127H (optional)

Power Consumption: 6W ac (60 Hz) with Sony AC Power Adaptor AC-9W or AC-9

Weight: 780 g, 1 lb 12 oz, including batteries

Dimensions:



including projecting parts and controls

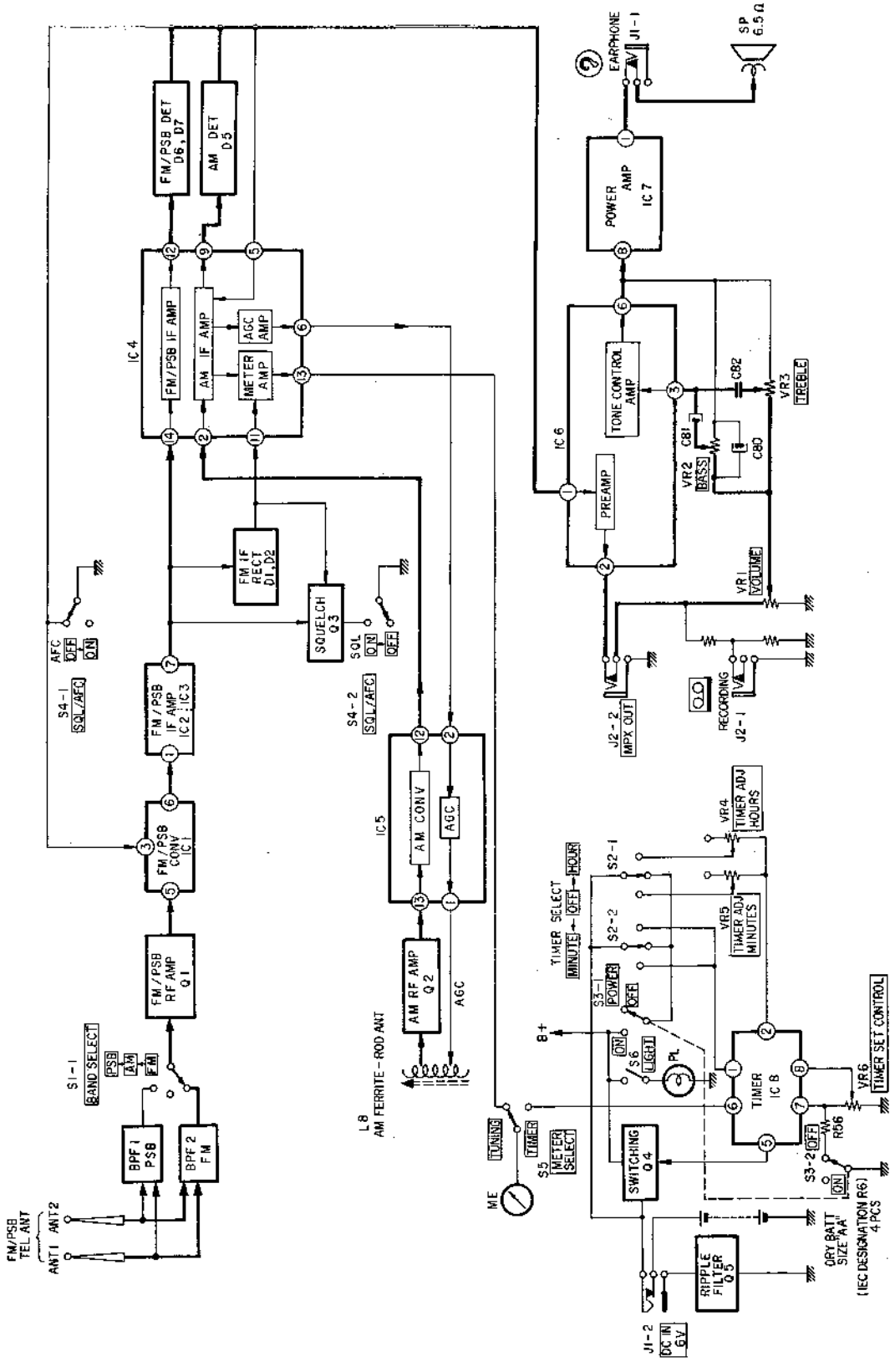
Frequency Range:
PSB 147–174 MHz
FM 87.5–108 MHz
AM 530–1,605 kHz

Antennas:
PSB/FM: Telescopic antennas
AM: Built-in ferrite-rod antenna

Speaker: 7.7 cm (3 inches) dia.

SONY®
SERVICE MANUAL

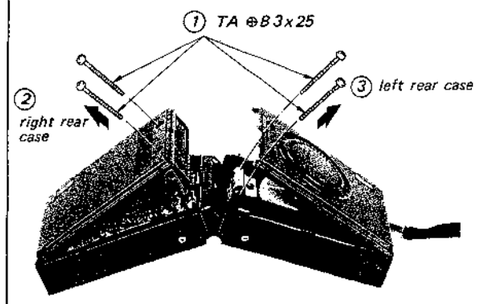
SECTION 1
BLOCK DIAGRAM



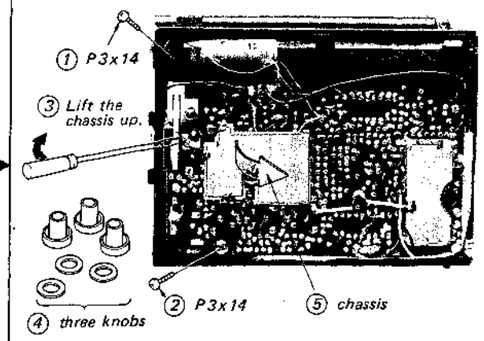
SECTION 2
DISASSEMBLY

2-1. REMOVALS AND REPLACEMENT

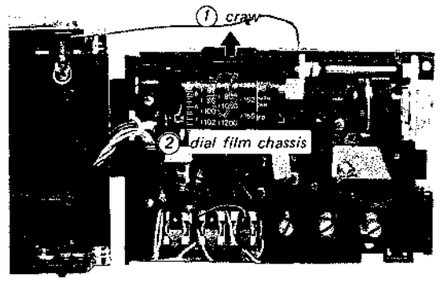
Left and Right Rear Case Removal



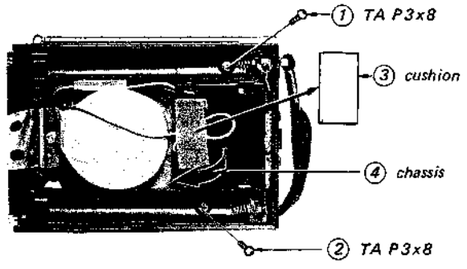
Right Chassis Removal



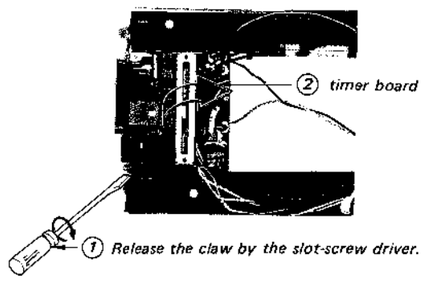
Dial Film Chassis Removal



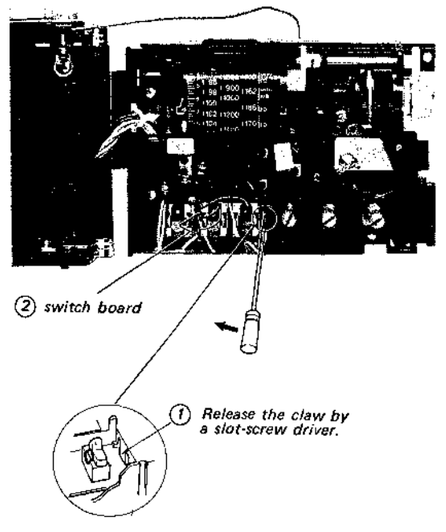
Left Chassis Removal



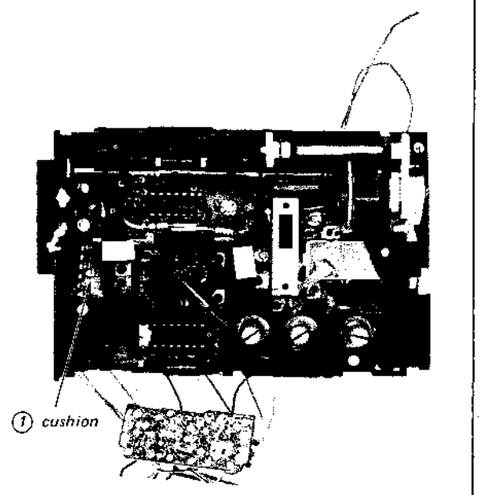
Timer Board Removal

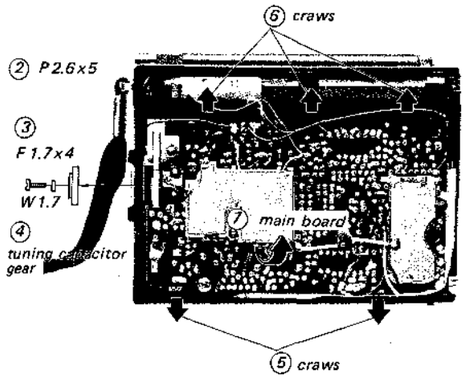


Switch Board Removal



Main Board Removal

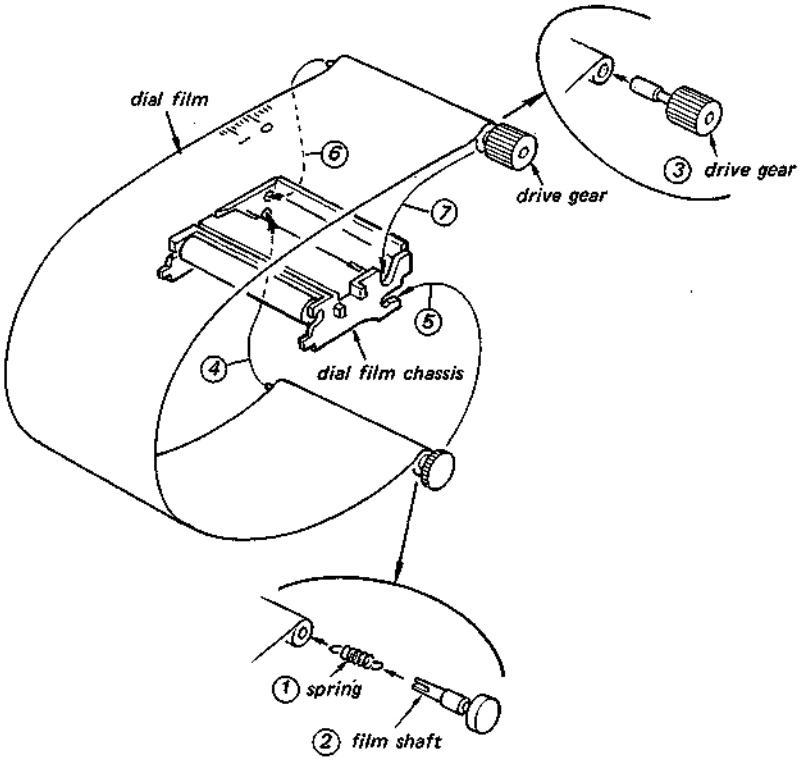




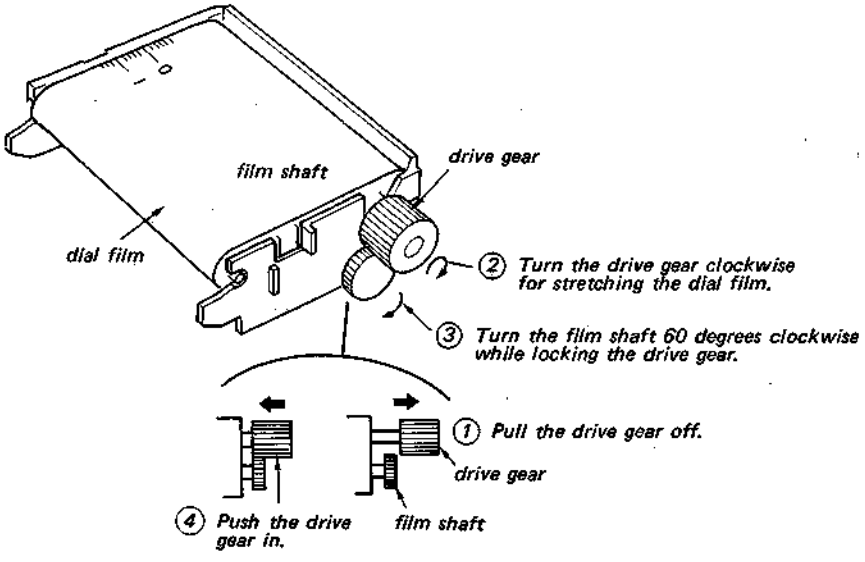
Note: *After replacing the main board, dial film calibration should be performed. (on page 6)*

Dial Film Replacement

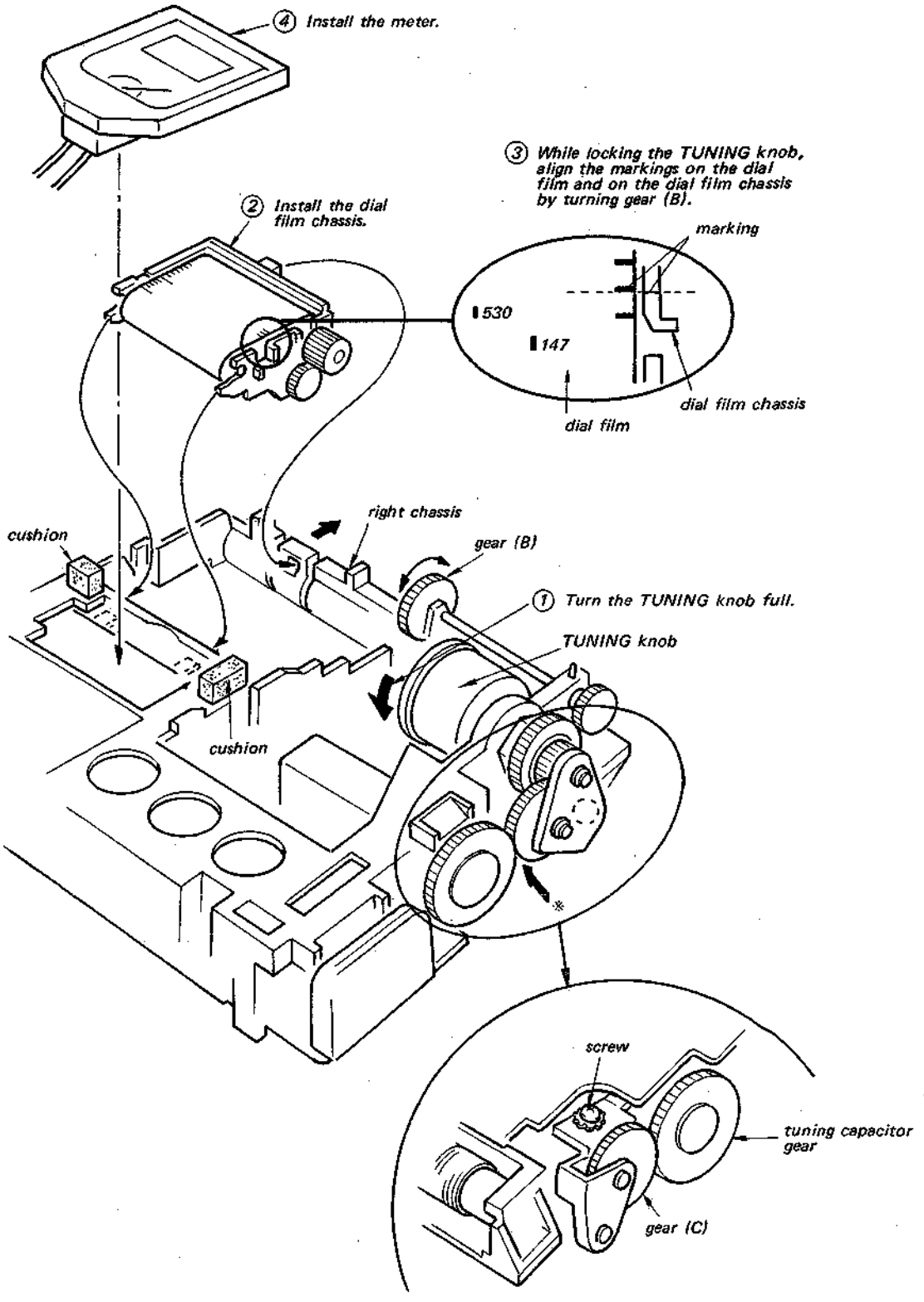
(1)



(2)

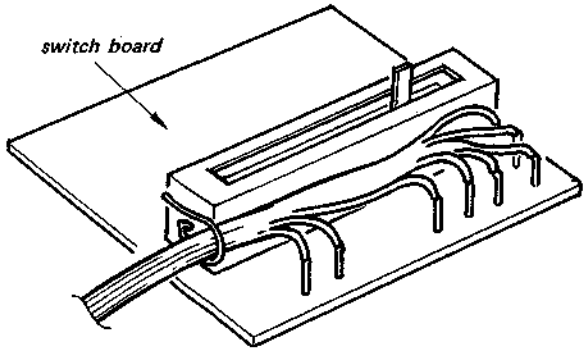


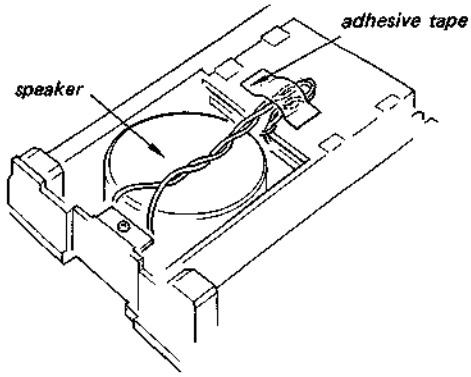
2-2. DIAL FILM CALIBRATION

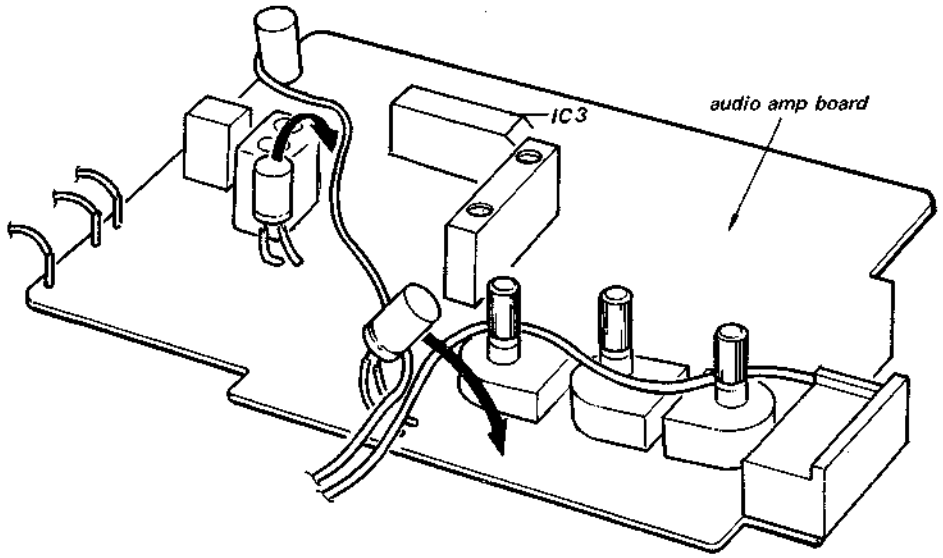


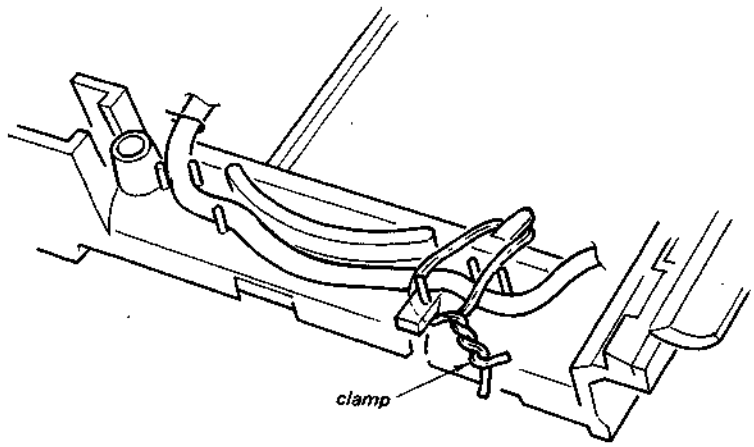
2-3. LEAD WIRE ARRANGEMENT

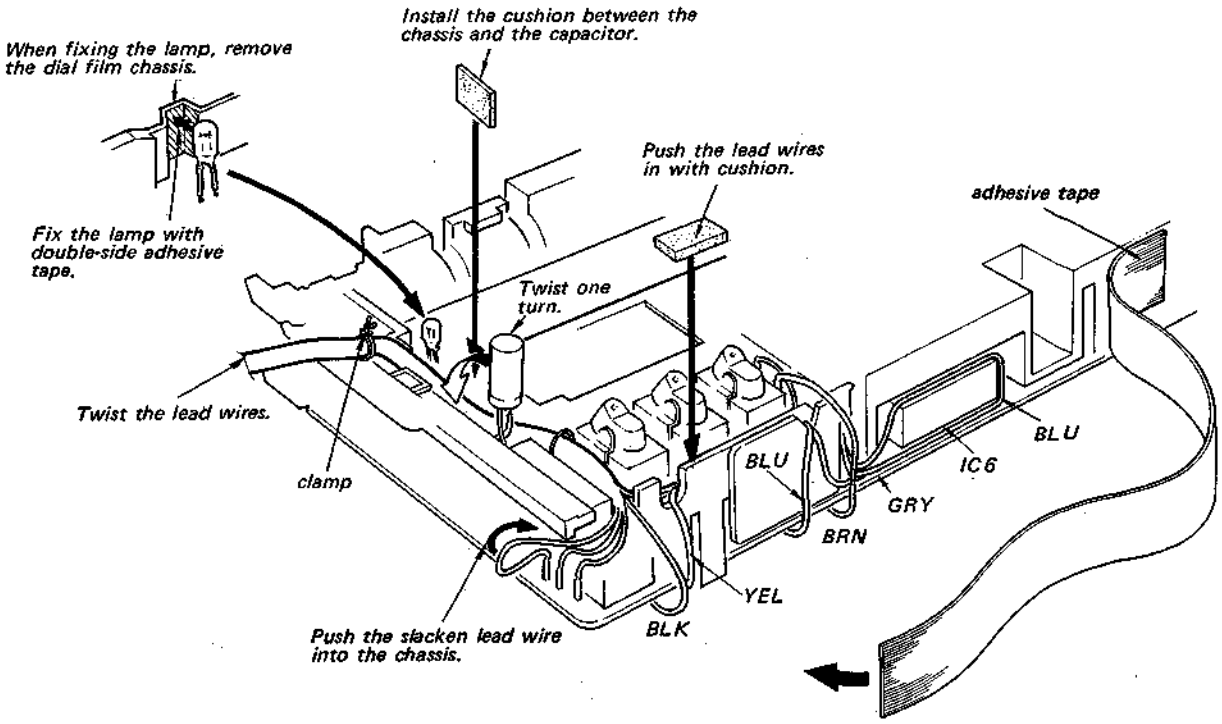
Arrange the lead wires as shown below.





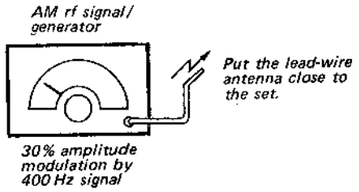




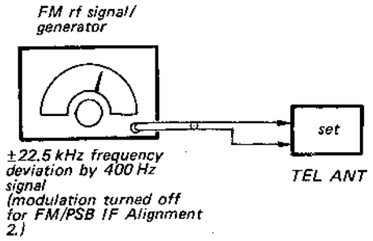

Install the cushion between the chassis and the capacitor.
When fixing the lamp, remove the dial film chassis.
Push the lead wires in with cushion.
adhesive tape
Fix the lamp with double-side adhesive tape.
Twist one turn.
Twist the lead wires.
clamp
BLU
IC6
BLU
GRY
BRN
YEL
BLK
Push the slacken lead wire into the chassis.

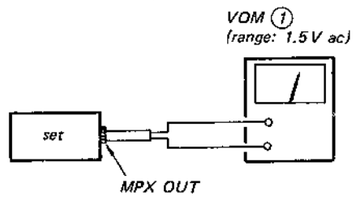
SECTION 3
ADJUSTMENTS

[AM]

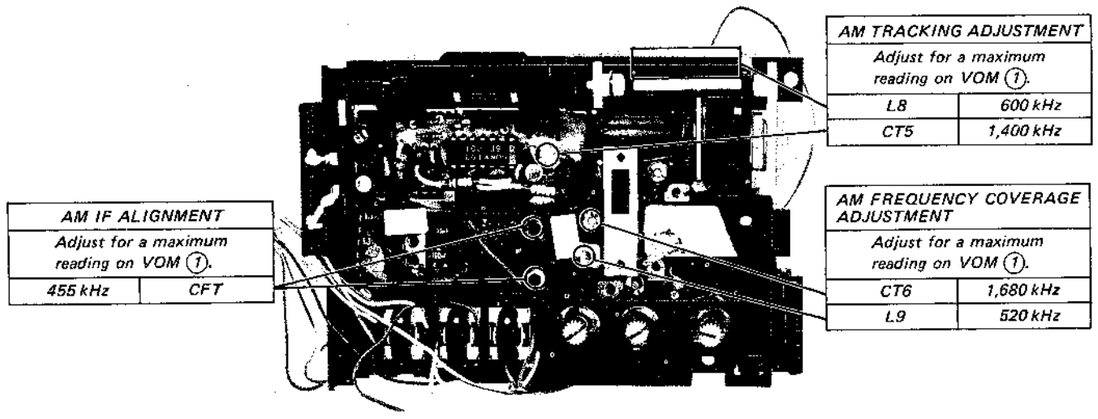


[FM/PSB]





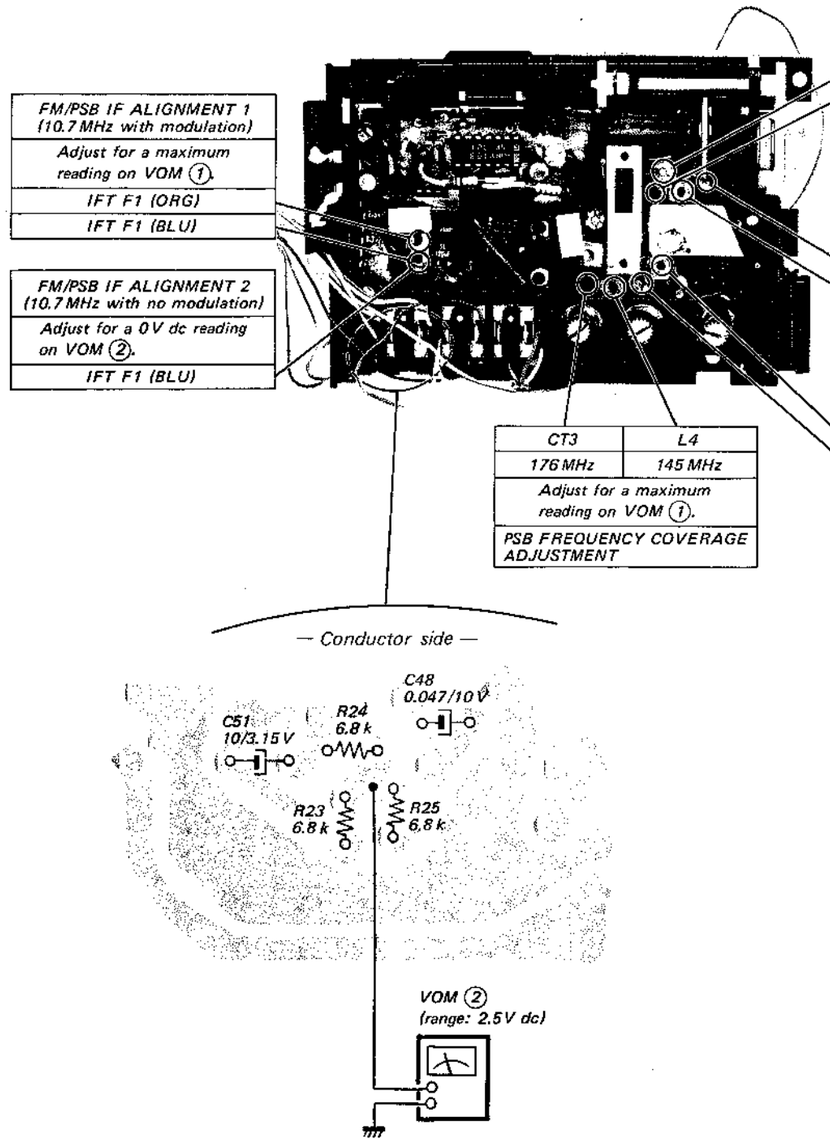
- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.



AM IF ALIGNMENT	
Adjust for a maximum reading on VOM ①.	
455 kHz	CFT

AM TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM ①.	
L8	600 kHz
CT5	1,400 kHz

AM FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM ①.	
CT6	1,680 kHz
L9	520 kHz



FM/PSB IF ALIGNMENT 1 (10.7 MHz with modulation)
Adjust for a maximum reading on VOM ①.
IFT F1 (ORG)
IFT F1 (BLU)

FM/PSB IF ALIGNMENT 2 (10.7 MHz with no modulation)
Adjust for a 0 V dc reading on VOM ②.
IFT F1 (BLU)

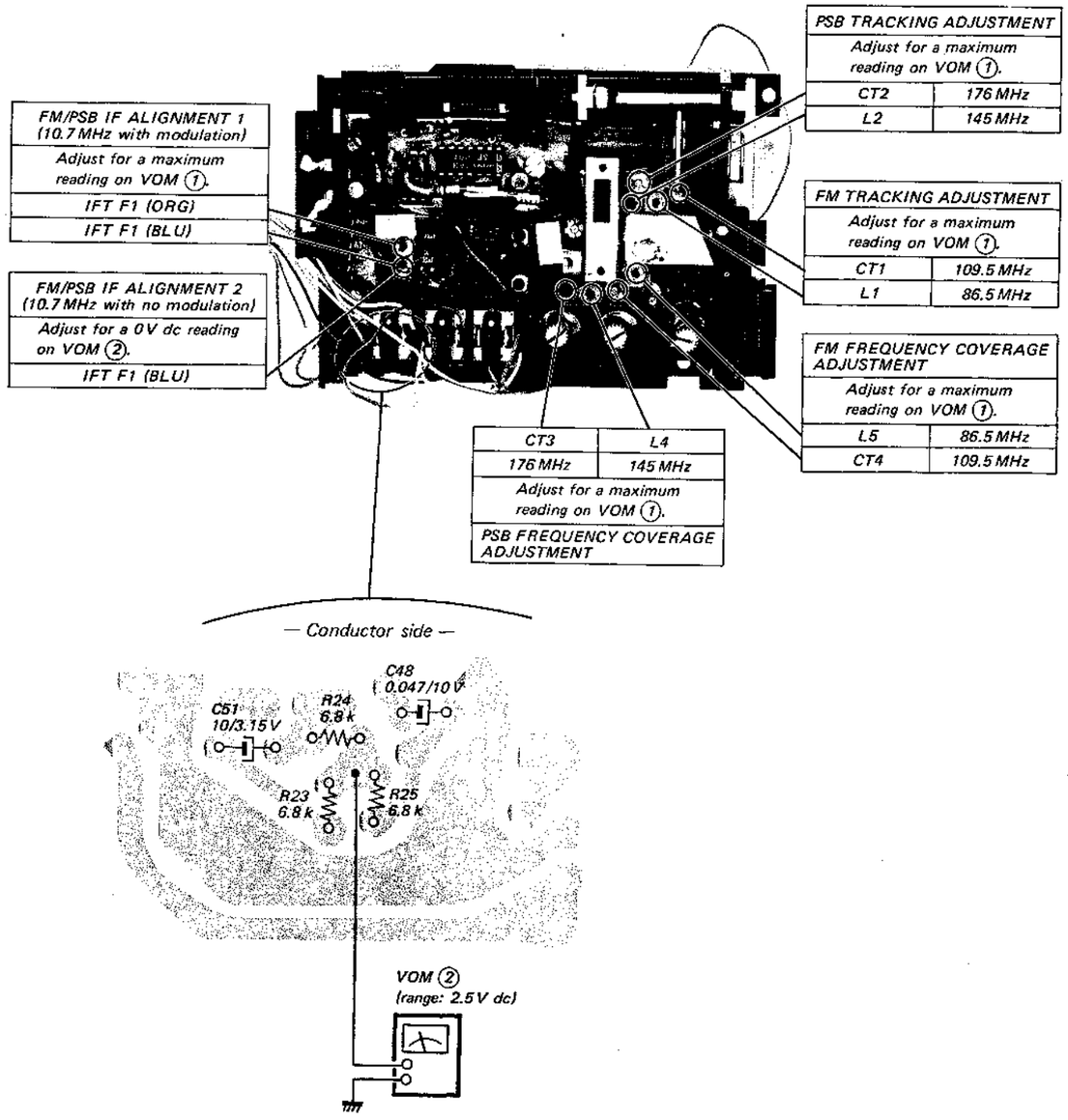
PSB TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM ①.	
CT2	176 MHz
L2	145 MHz

FM TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM ①.	
CT1	109.5 MHz
L1	86.5 MHz

FM FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM ①.	
L5	86.5 MHz
CT4	109.5 MHz

CT3	L4
176 MHz	145 MHz
Adjust for a maximum reading on VOM ①.	
PSB FREQUENCY COVERAGE ADJUSTMENT	

— Conductor side —



Timer Adjustment

Setting:

POWER switch: ON
Timer set control: minimum

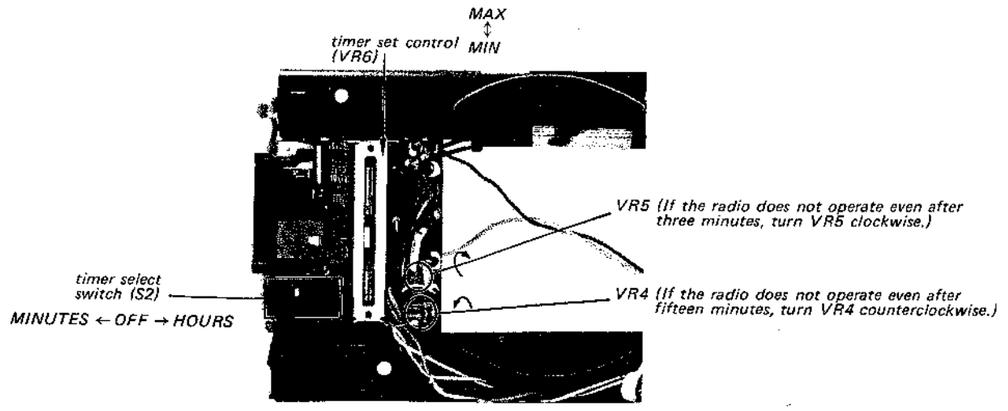
Procedure:

1. Turn the timer select switch from OFF to MINUTES and make sure that the radio operates after three minutes.

   Note: If necessary, adjust VR5 and repeat the step 1.

2. Turn the timer select switch to HOURS and make sure that the radio operates after fifteen minutes.

   Note: If necessary, adjust VR4 and repeat the step 2.



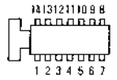
SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM

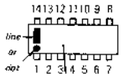
— Conductor Side —

IC1: CX160
IC2, 3: CX161
IC6: CX164

IC4: CX162
IC7: CX165

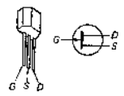


IC5: CX163

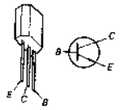


IC8: CX077

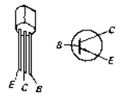
Q1, 2: 2SK42



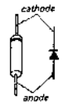
Q3: 2SC633A



Q4, 5: 2SA772



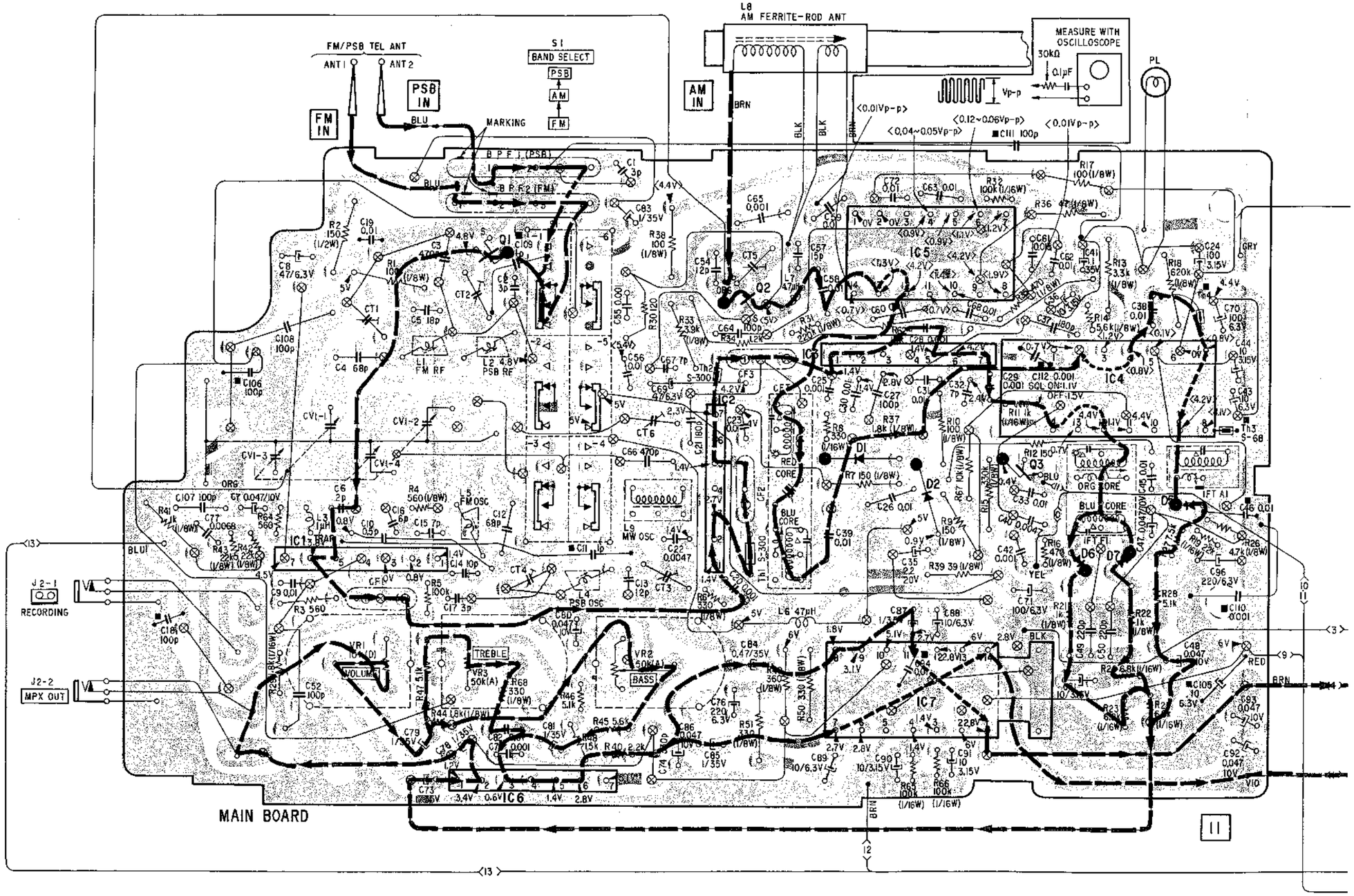
D1, 2: 1S1555
D4~7: 1T26



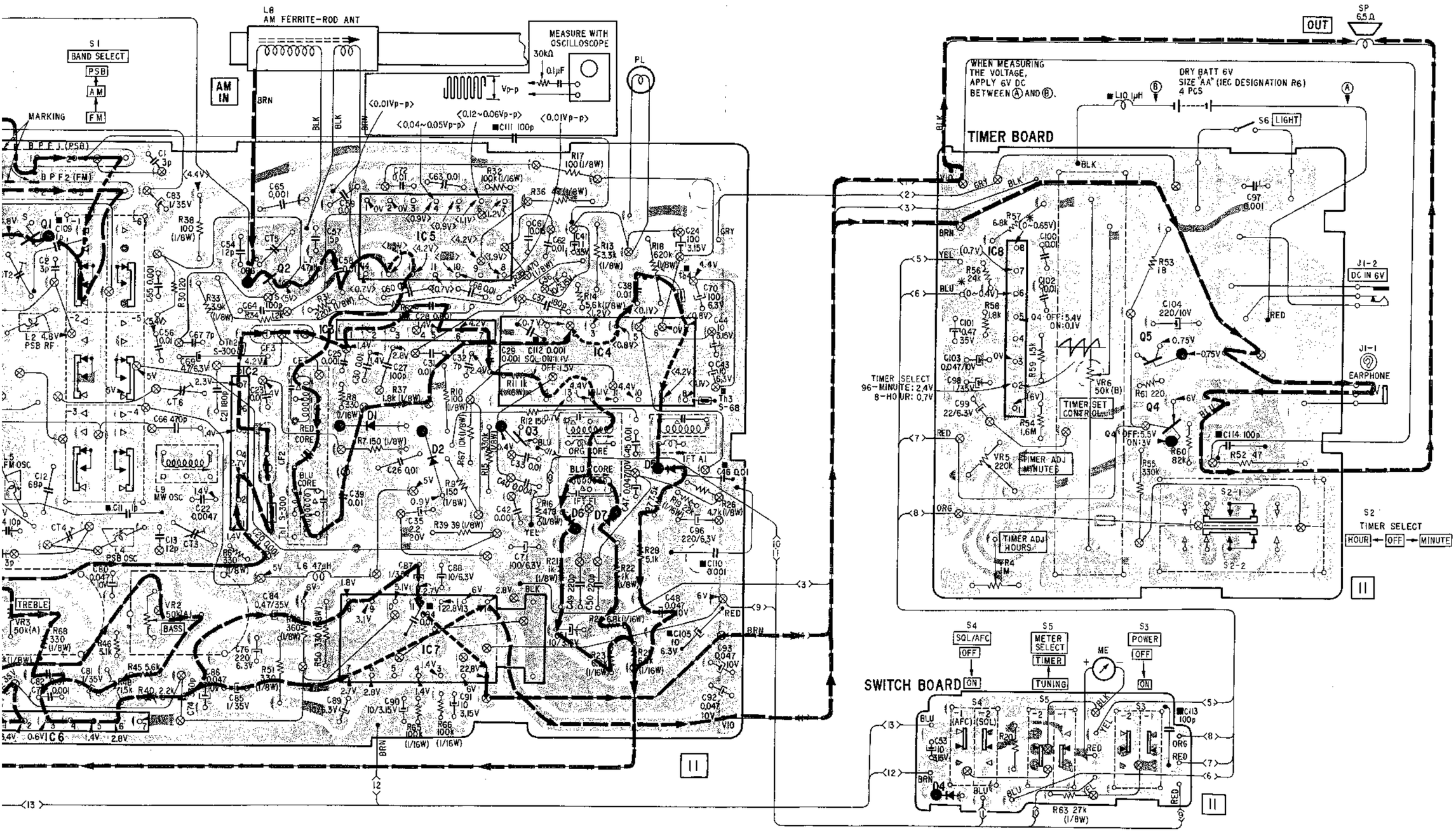
Note:

- ○—— : parts extracted from the component side.
- ●—— : parts extracted from the conductor side.
- ■ : part mounted on the conductor side.
- ┌──┐ : indicates side identified with part number or with marking.
- ⊗ : Through hole.
- ⊗——⊗ : component side pattern.
- ——— : B+ pattern.
- ——►—— : signal path.

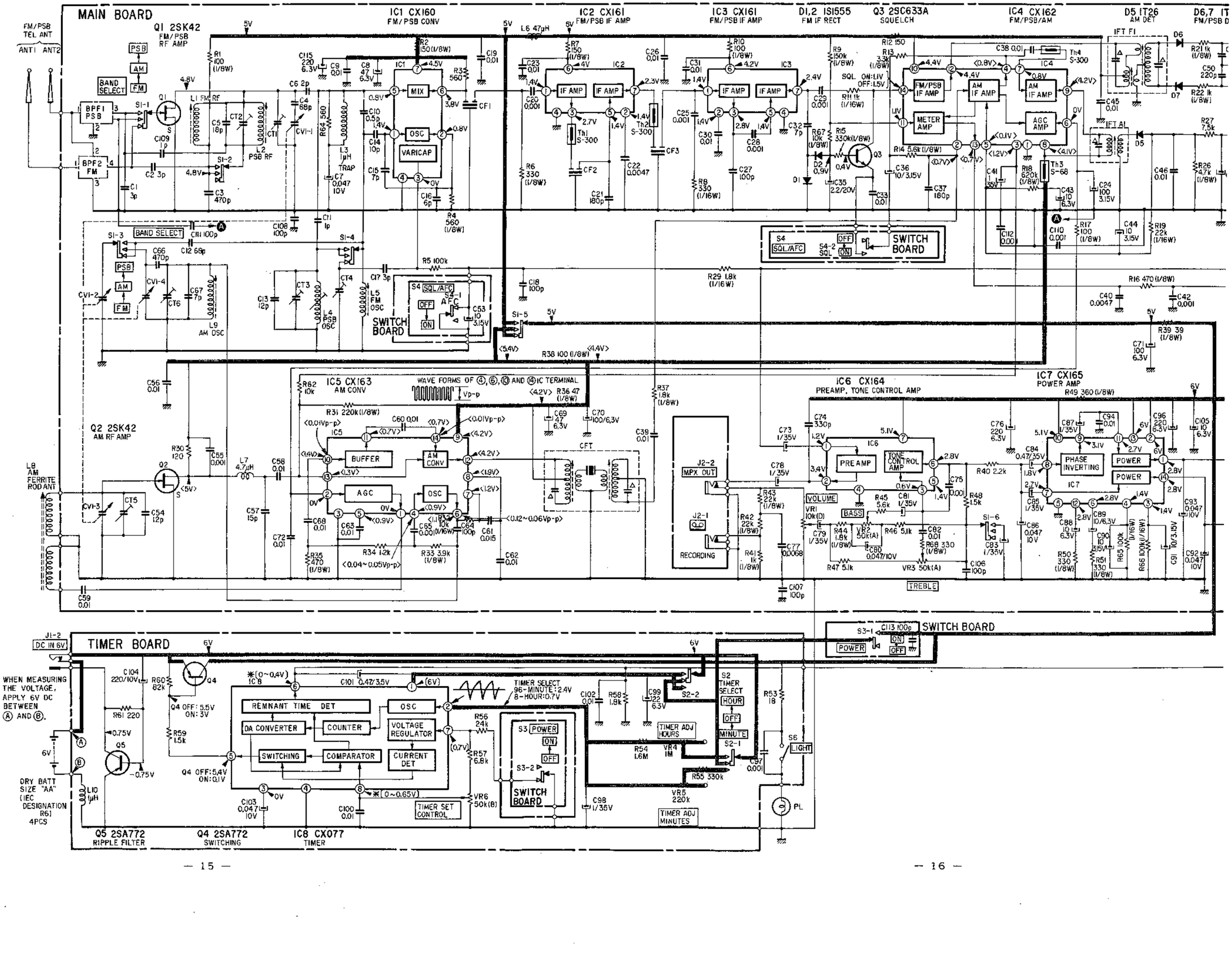
IC1 Q1 IC6 IC2 Q2 D1 D2 IC5,3,7 Q3 D6 IC4 D7 D5



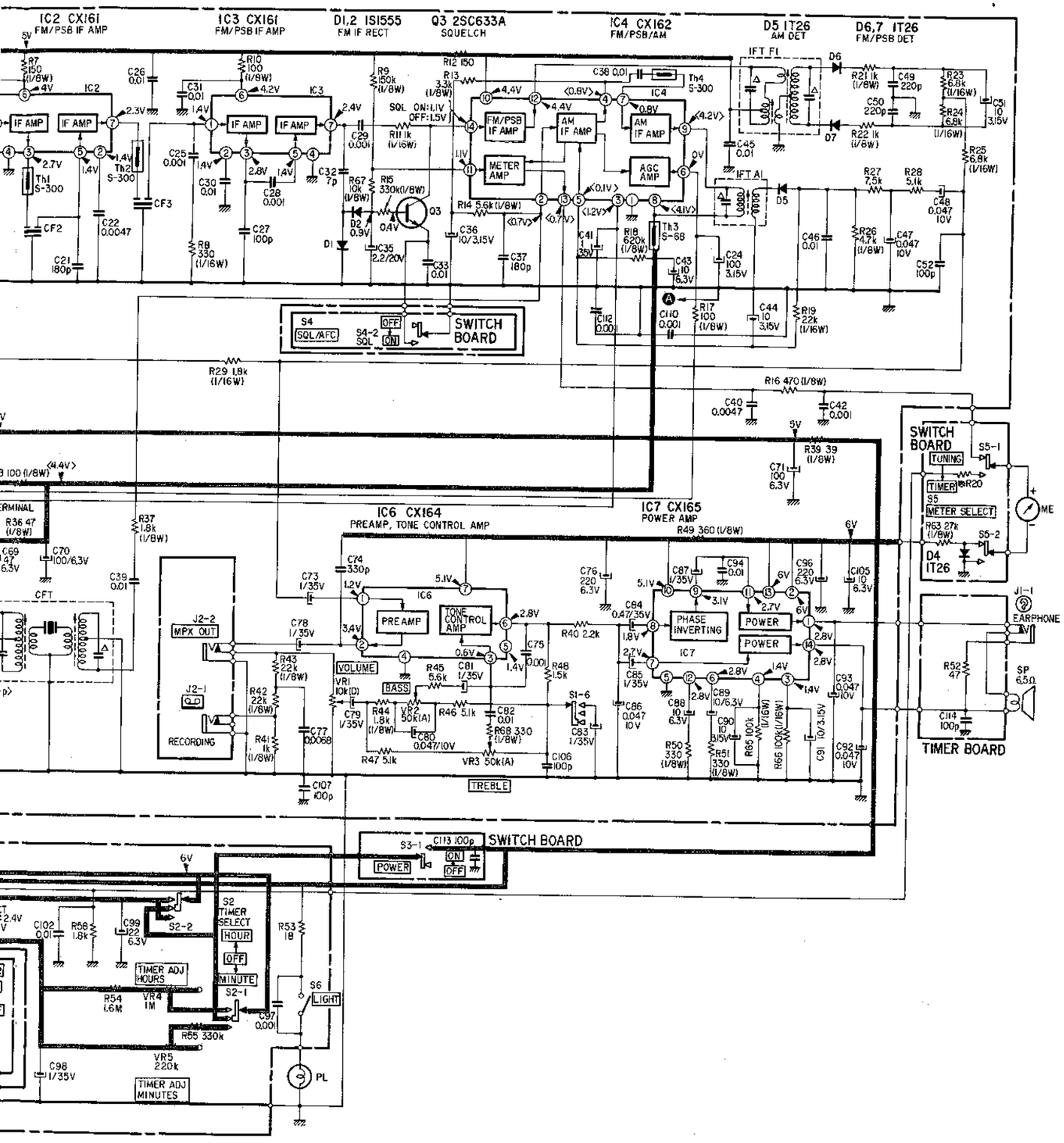
Q1 IC6 IC2 Q2 D1 D2 IC5,3,7 Q3 D6 IC4 D7 D5 D4 IC8 Q5 Q4



4-2. SCHEMATIC DIAGRAM



ICF-7800W



Note:

- All capacitors are in μF unless otherwise noted.

Note:

- All capacitors are in μF unless otherwise noted. pF = μμF 50V or less does not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000 kΩ
- All adjustable resistors have characteristic curve B.
- R20 MARKED ※ varies according to the IC8.

IC8 CX077-□□

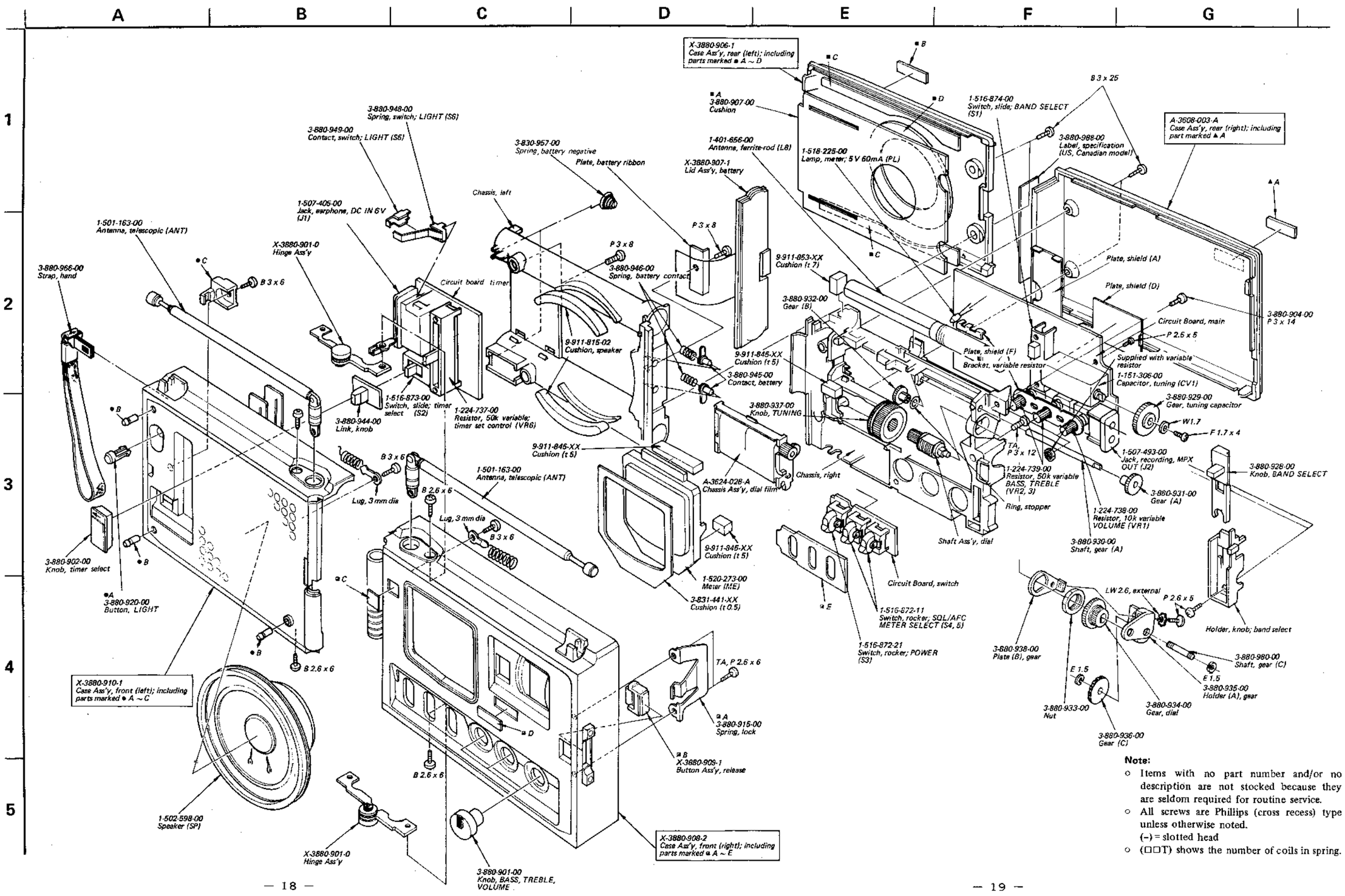
-□□	R20 (Ω, 1/8 W)
-10	680
-20	620
-30	560

- △: internal component.
- ▬▬ : B+ bus.
- ▭ : panel designation.
- ▭ : adjustment for repair.

- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal (detuned) conditions with a VOM (20 kΩ/V).
  [ ]: TIMER SELECT HOUR OR MINUTE
  ⟨ ⟩: AM
  ※[ ]: VARIEGATED WITH TIMER SET CONTROL (R6).
  no mark: FM
- Voltage variations may be noted due to normal production tolerances.
- Switch:

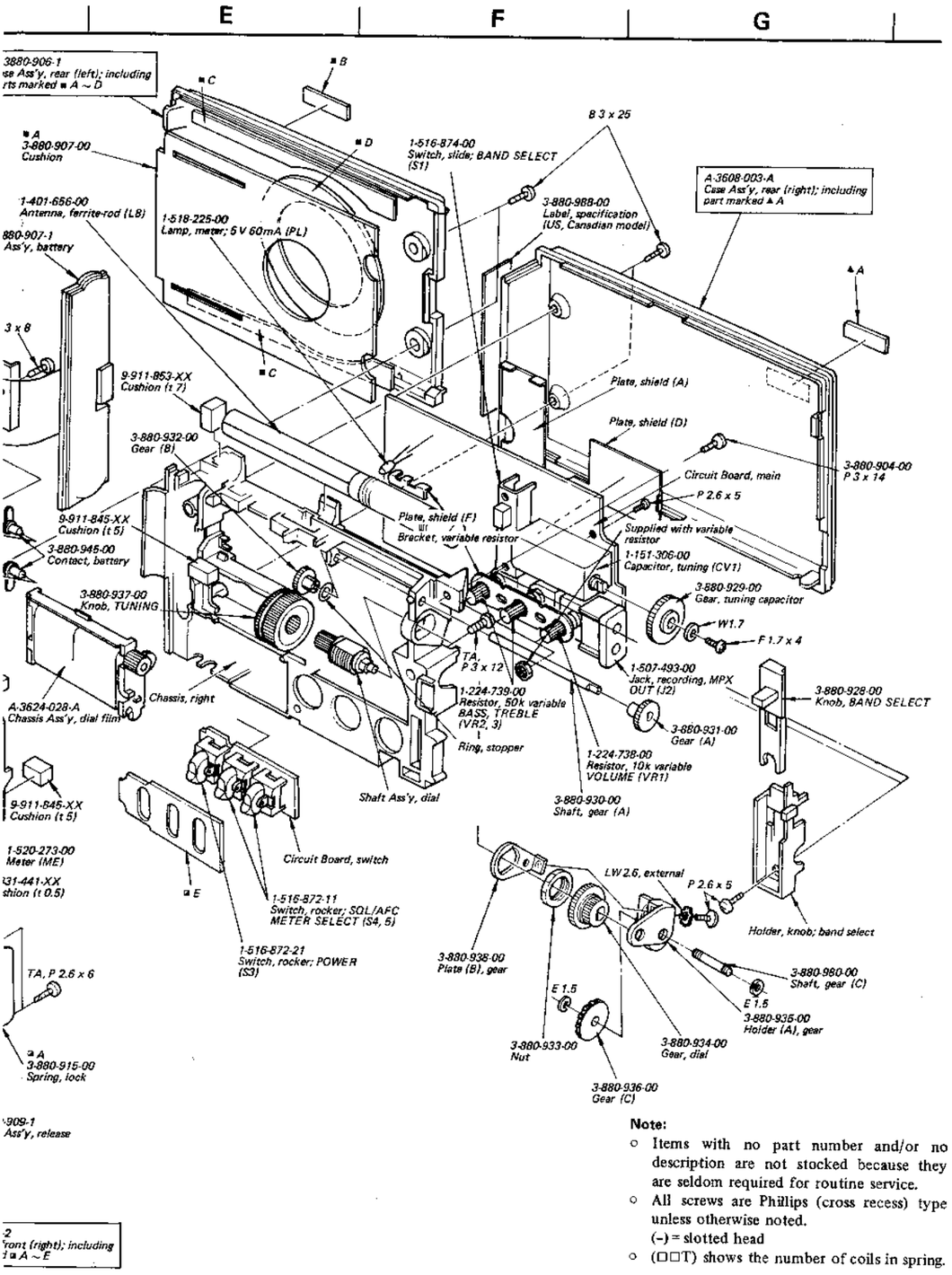
Ref. No.	Switch	Position
S1-1~1-6	BAND SELECT	FM
S2-1, 2-2	TIMER SELECT	OFF
S3-1, 3-2	POWER	OFF
S4	SQL/AFC	OFF
S5	METER SELECT	TUNING
S6	LIGHT	OFF

SECTION 5
EXPLODED VIEW



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.



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.

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	SEMICONDUCTORS	
	Transistors	
Q1	8-727-301-03	2SK42
Q2	8-727-302-00	2SK42
Q3	8-726-377-00	2SC633A
Q4	8-760-513-10	2SA722
Q5	8-760-514-10	2SA772
IC1	8-751-600-00	CX160
IC2,3	8-751-610-00	CX161
IC4	8-751-620-00	CX162
IC5	8-751-630-00	CX163
IC6	8-751-640-00	CX164
IC7	8-751-650-00	CX165
IC8	8-750-770-10	CX077
	Diodes	
D1,2	8-719-815-55	1S1555
D4~7	8-719-026-11	1T26
	Thermistors	
Th1,2	1-800-071-XX	S-300
Th3	1-800-193-00	S-68
Th4	1-800-071-XX	S-300
	COILS	
L1	1-459-182-00	FM Rf
L2	1-459-180-00	PSB Rf
L3	1-407-882-00	Trap, 1μH
L4	1-459-181-00	PSB Osc
L5	1-425-905-00	FM Osc
L6	1-407-471-00	Microinductor, 47μH
L7	1-407-186-XX	Microinductor, 4.7μH
L8	1-401-656-00	Antenna, a-m ferrite-rod
L9	1-405-709-00	AM Osc
L10	1-407-178-XX	Microinductor, 1μH

Ref. No.	Part No.	Description
	TRANSFORMERS	
IFTA1	1-404-022-00	AM IFT
IFTF1	1-404-032-00	FM IFT
	FILTERS	
BPF1	1-231-314-00	Band Pass, PSB
BPF2	1-231-315-00	Band Pass, FM
CF1~3	1-527-198-00	Ceramic, FM/PSB; 10.7 MHz
CFT	1-527-273-00	Ceramic, AM; 455 kHz
	CAPACITORS	

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

C1	1-102-936-11	3p		
C2	1-102-936-11	3p		
C3	1-102-114-11	470p		
C4	1-101-888-11	68p		
C5	1-102-953-11	18p		
C6	1-102-935-11	2p		
C7	1-127-018-11	0.047	10V	solid aluminum
C8	1-131-191-11	47	6.3V	tantalum
C9	1-161-032-11	0.01		(boundary layer)
C10	1-101-937-11	0.5p		
C11	1-102-934-11	1p		
C12	1-101-888-11	68p		
C13	1-102-637-11	12p		
C14	1-102-285-11	10p		
C15	1-102-745-11	7p		
C16	1-101-998-11	6p		
C17	1-102-743-11	3p		
C18	1-102-106-11	100p		
C19	1-161-032-11	0.01		(boundary layer)
C20	1-102-268-11	0.001		
C21	1-102-109-11	180p		
C22	1-161-030-11	0.0047		(boundary layer)

Ref. No.	Part No.			Description
C23	1-161-032-00	0.01		(boundary layer)
C24	1-131-187-11	100	3.15V	tantalum
C25	1-161-026-11	0.001		(boundary layer)
C26	1-161-032-11	0.01		
C27	1-102-106-11	100p		
C28,29	1-102-268-11	0.001		
C30,31	1-161-032-11	0.01		(boundary layer)
C32	1-102-944-11	7p		
C33	1-161-032-11	0.01		(boundary layer)
C35	1-131-196-11	2.2	20V	tantalum
C36	1-131-182-11	10	3.15V	tantalum
C37	1-102-109-11	180p		
C38,39	1-161-032-11	0.01		(boundary layer)
C40	1-161-030-11	0.0047		(boundary layer)
C41	1-131-215-11	1	35V	tantalum
C42	1-161-026-11	0.001		(boundary layer)
C43	1-131-228-11	10	6.3V	tantalum
C44	1-131-182-11	10	3.15V	tantalum
C45,46	1-161-032-11	0.01		(boundary layer)
C47,48	1-127-018-11	0.047	10V	solid aluminum
C49,50	1-102-110-11	220p		
C51	1-131-182-11	10	3.15V	tantalum
C52	1-102-106-11	100p		
C53	1-131-182-11	10	3.15V	tantalum
C54	1-102-9494-11	12p		
C55	1-161-026-11	0.001		(boundary layer)
C56	1-161-032-11	0.01		
C57	1-102-951-11	15p		
C58~60	1-161-032-11	0.01		(boundary layer)
C61	1-161-033-11	0.015		
C62,63	1-161-032-11	0.01		
C64	1-102-973-11	100p		
C65	1-161-026-11	0.001		(boundary layer)
C67	1-102-944-11	7p		
C68	1-161-032-11	0.01		(boundary layer)
C69	1-131-191-11	47	6.3V	tantalum
C70,71	1-123-201-11	100	6.3V	elect
C72	1-161-032-11	0.01		(boundary layer)
C73	1-131-215-11	1	35V	tantalum
C74	1-102-112-11	330p		
C75	1-161-026-11	0.001		(boundary layer)
C76	1-121-931-11	220	6.3V	elect
C77	1-161-031-11	0.0068		(boundary layer)
C78,79	1-131-215-11	1	35V	tantalum
C80	1-127-018-11	0.47	10V	solid aluminum
C81	1-131-215-11	1	35V	tantalum
C82	1-161-032-11	0.01		(boundary layer)
C83	1-131-215-11	1	35V	tantalum
C84	1-131-213-11	0.47	35V	tantalum
C85	1-131-215-11	1	35V	tantalum
C86	1-127-018-11	0.047	10V	solid aluminum
C87	1-131-215-11	1	35V	tantalum
C88,89	1-131-228-11	10	6.3V	tantalum
C90,91	1-131-182-11	10	3.15V	tantalum
C92,93	1-127-018-11	0.047	10V	solid aluminum
C94	1-161-032-11	0.01		(boundary layer)
C96	1-121-931-11	220	6.3V	elect
C97	1-161-026-11	0.001		(boundary layer)
C98	1-131-215-11	1	35V	tantalum
C99	1-131-190-11	22	6.3V	tantalum
C100	1-161-032-11	0.01		(boundary layer)
C101	1-131-213-11	0.47	35V	tantalum
C102	1-161-032-00	0.01		(boundary layer)
C103	1-127-018-11	0.047	10V	solid aluminum
C104	1-121-977-11	220	10V	elect
C105	1-131-228-11	10	6.3V	tantalum
C106~108	1-102-106-11	100p		
C109	1-102-934-11	1p		
C110	1-161-026-11	0.001		(boundary layer)
C111	1-102-106-11	200p		
C112	1-161-026-11	0.001		(boundary layer)
C113,114	1-102-973-11	100p		
C115	1-121-931-11	220	6.3V	elect
CT1~6	1-141-174-00	Trimmer		
CV1	1-151-306-00	Tuning		

RESISTORS

All resistors are in Ω, 1/8 W and composition type unless otherwise noted. k = 1,000, M = 1,000 k
Regular-type ¼W carbon resistors are omitted.
Check schematic diagram for resistance values.

R1	1-201-679-11	100
R2	1-201-873-11	150
R4	1-201-872-11	560

Ref. No.	Part No.	Description
R6	1-201-870-11	330
R7	1-201-873-11	150
R8	1-209-763-11	330 1/16 W carbon
R9	1-201-112-11	150 k
R10	1-201-679-11	100
R11	1-204-122-11	1 k 1/16 W carbon
R13	1-202-013-11	3.3 k
R14	1-202-027-11	5.6 k
R15	1-202-134-11	330 k
R16	1-201-618-11	470
R17	1-201-679-11	100
R18	1-202-746-11	620 k
R19	1-210-114-11	22 k 1/16 W carbon
R20	1-201-622-11	560
R20	1-201-624-11	620
R20	1-201-626-11	680
R21,22	1-201-634-11	1 k
R23~25	1-209-777-11	6.8 k 1/16 W carbon
R26	1-202-023-11	4.7 k
R29	1-209-878-11	1.8 k 1/16 W carbon
R31	1-202-123-11	220 k
R32	1-209-781-11	10 k 1/16 W carbon
R33	1-202-018-11	3.9 k
R35	1-201-618-11	470
R36	1-201-264-11	47
R37	1-201-650-11	1.8 k
R38	1-201-679-11	100
R39	1-201-839-11	39
R41	1-206-634-11	1 k
R42,43	1-202-064-11	22 k
R44	1-201-650-11	1.8 k
R49	1-201-859-11	360
R50,51	1-201-870-11	330
R63	1-202-066-11	27 k
R64	1-201-872-11	560
R65,66	1-210-115-11	100 k 1/16 W carbon
R67	1-202-043-11	10 k
R68	1-201-870-11	330
VR1	1-224-738-00	10 k, variable; VOLUME
VR2,3	1-224-739-00	50 k, variable; BASS, TREBLE
VR4	1-224-891-00	1 M, adjustable
VR5	1-224-256-00	220 k, adjustable
VR6	1-224-737-00	50 k, variable; timer set control

SWITCHES

S1	1-516-874-00	Slide, BAND SELECT
S2	1-516-873-00	Slide, timer select
S3	1-516-872-21	Rocker, POWER
S4,5	1-516-872-11	Rocker, SQL/AFC, METER SELECT

JACKS

J1	1-507-405-00	Earphone, DC IN 6 V
J2	1-507-493-00	Recording, MPX OUT

MISCELLANEOUS

ANT1,2	1-501-163-00	Antenna, telescopic
ME	1-520-273-00	Meter
PL	1-518-225-00	Lamp, meter; 5 V 60 mA
SP	1-502-598-00	Speaker, 6.5 Ω

ACCESSORIES & PACKING MATERIALS

Part No.	Description
1-504-059-11	Earphone (ME-20H)
3-816-719-00	Case, earphone
3-880-962-00	Spacer
3-880-963-00	Bag
3-880-964-11	Carton
3-880-965-00	Cushion
3-993-141-31	Mannual, instruction, French (Canadian model)
3-995-757-21	Manual, instruction

9-950-351-01

Sony Corporation

78F0609-2
Printed in Japan

PSB/FM/AM 3 BAND RECEIVER

ICF-7800W

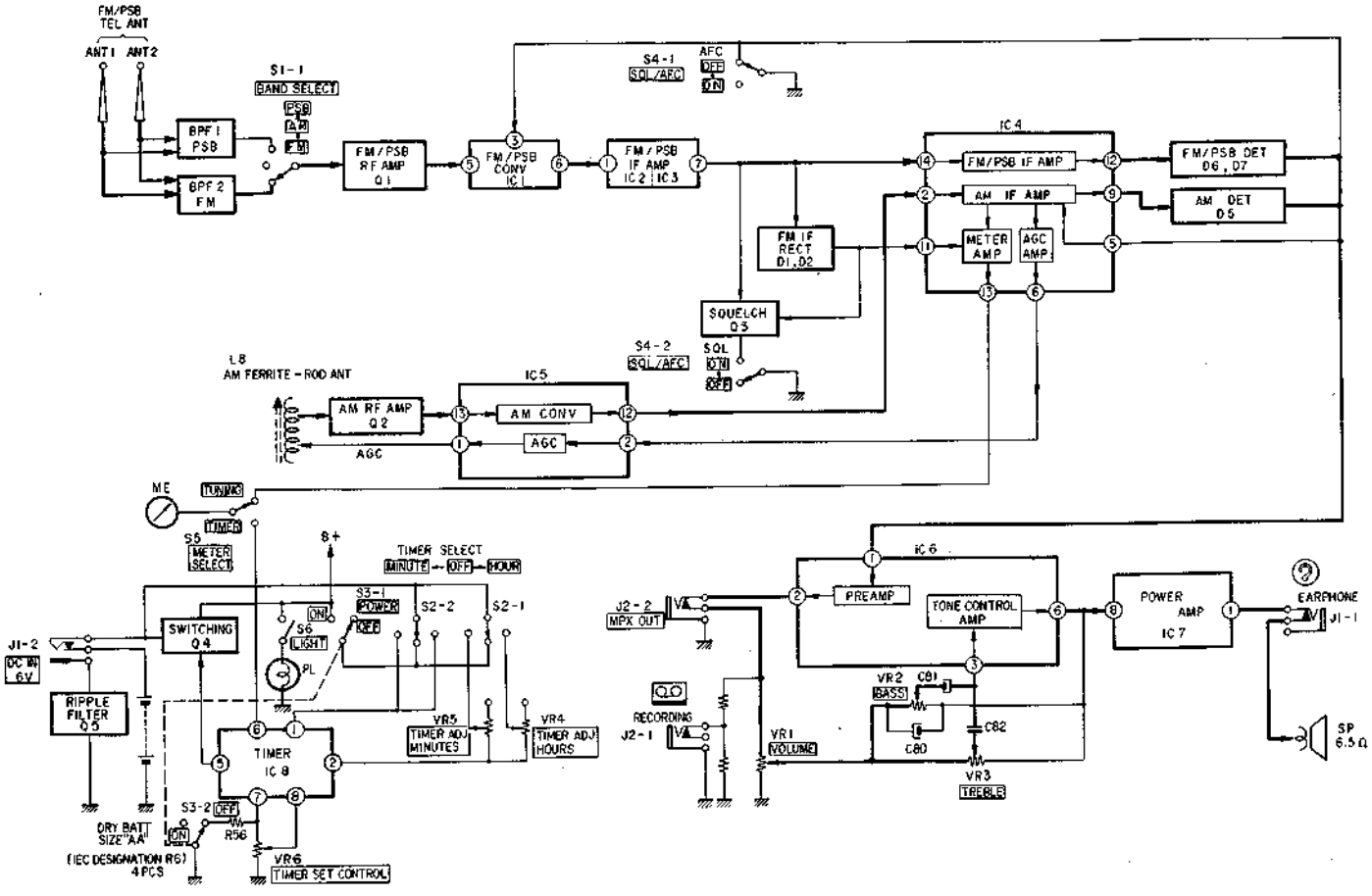
US Model
Canadian Model

No. 1
December, 1976

SUPPLEMENT

File this suppliment with the service manual.

SUBJECT: CIRCUIT DESCRIPTION



SONY
SERVICE MANUAL

1. ELECTRONIC TIMER (Figs. 1-1 and 1-2)

This radio receiver uses a timer IC which contains the blocking oscillator, the counter, the digital-analog (D/A) converter, the comparator, the switching circuit, the remnant time detector, the voltage regulator and the current detector.

The blocking oscillator produces a reference signal for the timer. The timer selector S2-1 (96 minutes/8 hours) selects time constant of the oscillator to change the oscillation frequency. The oscillation can be checked by observing the sawtooth wave on the oscilloscope connected to terminal 2 of IC8. The cycle period of sawtooth wave should be 0.35156 seconds for 96-minute timer and 1.7578 seconds for 8-hour timer. The acurate frequency, however, can not be read on the oscilloscope, since the oscilloscope connection changes time constant of the oscillator.

The sawtooth wave produced by the oscillator is demultiplied into a pulse wave at the counter and then converted into the analog signal by the D/A converter. The circuit of this converter is as shown in Fig. 1-2. The pulses supplied to point Ⓐ charges capacitor C step by step and gradually increases the voltage at Ⓑ.

In the next stage, the comparator, the voltage at Ⓑ is compared with the voltage determined by VR6 (TIMER SET control).

When those two voltages become equal, the comparator actuates the switching circuit. Then the switching circuit turns Q4 ON or OFF to switch B+ circuit ON or OFF.

On the other hand, the difference of those two voltages is detected by the remnant time detector and is indicated as remnant time on the meter. The voltage regulator supplies stable reference voltage to the comparator through VR6. The current detector detects output current change of the voltage regulator caused by turning POWER switch S3-2 ON or OFF and actuates the switching circuit.

That is, if the POWER switch S3-1 is turned ON and the timer is preset, the radio section will be automatically switched ON at the preset time, and if the POWER switch S3-1 is turned OFF and the timer is preset, the radio section will be switched OFF at the preset time.

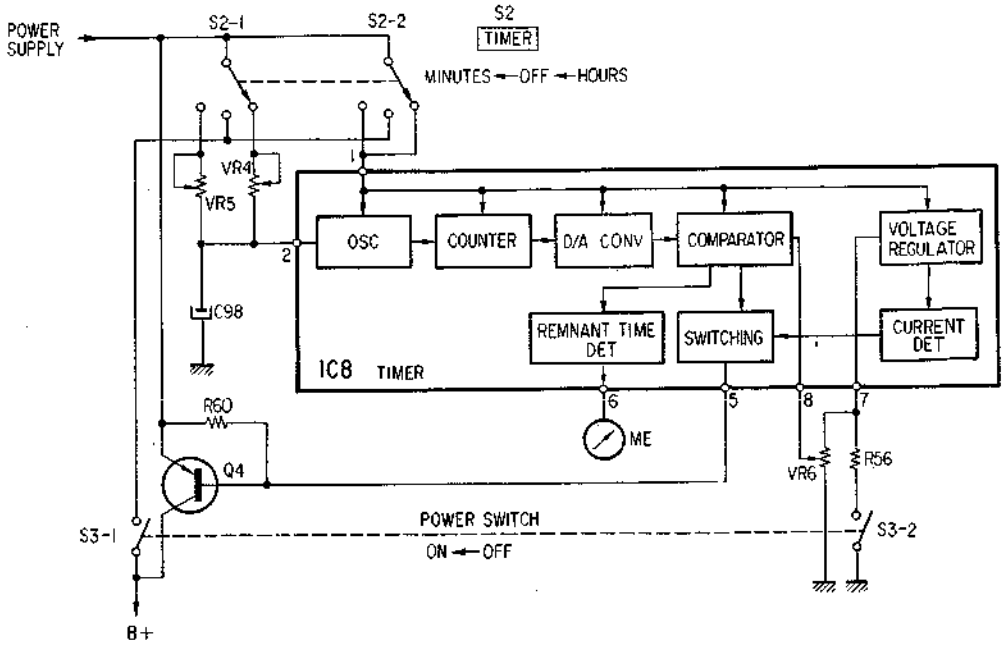


Fig. 1-1

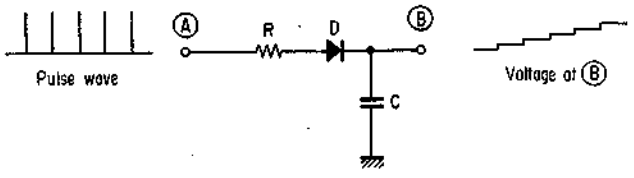


Fig. 1-2

2. TONE CONTROL (Fig. 1-3)

An NF (Negative Feedback) type where the VOLUME controls the amount of feedback. Bass and treble emphasis are more pronounced when the VOLUME is at a lower setting.

VR2 (BASS)

Due to the effect of C80, the impedance across points Ⓒ and Ⓓ in Fig. 1-3 is low at high frequencies and high at low frequencies. Therefore, the low frequencies feedback signals are emphasized at point Ⓒ but de-emphasized at point Ⓓ. Consequently, if the VR2 slider is shifted toward point Ⓒ, the amount of low frequency feedback will increase, thus reducing the amount of bass in the sound. If, however, the slider is shifted toward point Ⓓ, the amount of feedback is reduced and the VR1 output level is increased. So the low frequencies in the IC6 output are emphasized.

VR3 (TREBLE)

High frequencies are better able to pass through C82 than low frequencies. So the VR3 (TREBLE) action controls the high frequencies in the IC6 input signals. When the VR3 slider in Fig. 1-3 is shifted toward point Ⓔ, the amount of high frequency negative feedback is increased while the signal level of the VR1 (VOLUME) output is reduced. So the IC6 output will be low in high frequency signals. But when the slider is shifted toward point Ⓕ, the amount of negative feedback of high frequency signals is reduced, and the VR1 output signal is increased, resulting in an emphasis of the high frequencies in the IC6 output.

VR1 (VOLUME)

The IC6 input signal level is increased when the VR1 slider is shifted toward point Ⓖ. The impedance across the TONE controls (VR2 and VR3) to ground portion is consequently increased, reducing the relative proportion of impedance due to C80 and C82 and thus the relative effect of the TONE control. But when the VR1 slider is shifted toward point Ⓗ, the effect of the TONE control is increased, producing a kind of loudness effect.

3. OSCILLATOR

Since a large part of the circuitry has been replaced with ICs, it is no longer possible to check the operation of the local oscillator directly with a VOM. The oscillation can be checked, however, by the following procedures.

FM/PSB Local Oscillator Check

Receive the local oscillator signal with another FM receiver. The signal should be received at a position 10.7 MHz higher than the dial position.

AM Local Oscillator Check

Connect an oscilloscope directly to the IC terminals and compare the waveforms with those shown in the diagrams.

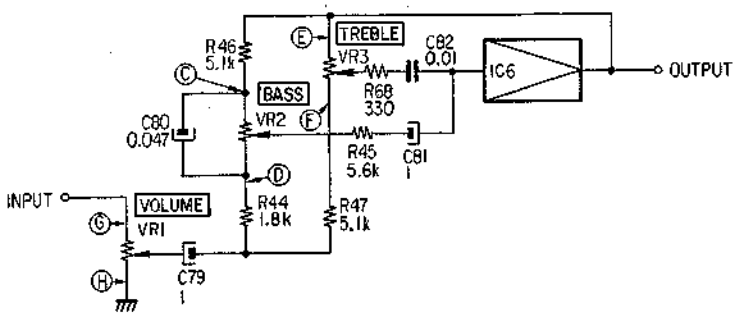


Fig. 1-3

4. AGC CIRCUIT (Automatic Gain Control) (See the block diagram on page 1)

The AGC circuit in this unit is divided into two stages, that is, a reverse AGC in IC4, and a shunt AGC for Q2. The AGC circuit can be checked by measuring the voltage at terminals 5 and 6 of IC4, and terminal 1 of IC5.

The voltage of terminal 5 of IC4 starts to give negative values when the TUNE meter reads about 2. A reading of 8 indicates a voltage of about -0.2 V. The voltage at terminal 6 will range from 1.2 V to 1.4 V (TUNE meter reading from about 8 and above) for inputs of 74 dB/m and above for AM. Voltages below this inputs are 0 V shown. The voltages at terminal 1 of IC5 are about half the value of those produced at terminal 6 of IC4 above.

5. POWER AMPLIFIER (Fig. 1-4)

This small-sized power amplifier produces a large output due to its BTL circuit (Balanced Transformerless). The BTL circuit consists of two SEPP (Single Ended Push-Pull) amplifiers combined together as shown in Fig. 1-4. Out-of-phase signals are applied to the inputs, while a load (speaker) is connected across the output terminals. By employing a speaker of the same impedance as the BTL output impedance and the proper B+ voltage, the output obtained by the BTL is about 4 times as great as obtained by an SEPP circuit. An OCL circuit (Output Capacitorless) can also be formed with a single power supply.

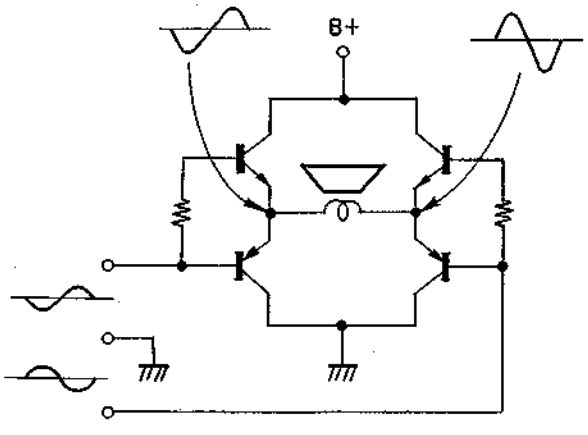


Fig. 1-4

6. SQUELCH CIRCUIT (Fig. 1-5)

The bias voltage is supplied to the base of Q3 constantly. If the SQL/AFC switch turns on, the between-channel input signal to IC4 is grounded and the output signal from IC4 is not obtained. When receiving the rf signal, the divided signal from IC3 is rectified by D2 and the negative voltage is obtained on the base of Q3. So Q3 turns off and the output signal from IC3 goes into IC4. The radio sound is heard from the speaker.

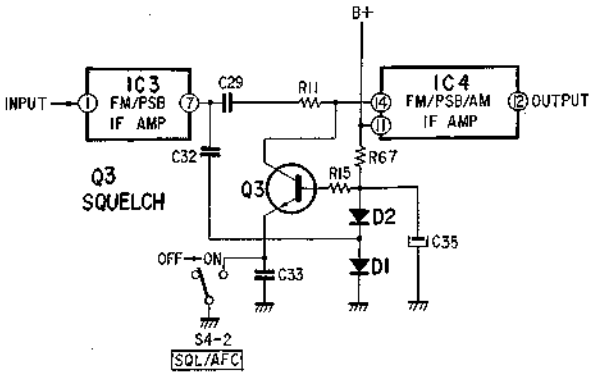


Fig. 1-5

9-950-351-81
78F0609-2
Printed in Japan