CF-420S

E Model

FM/MW/SW RADIO CASSETTE-CORDER

SPECIFICATIONS

RADIO SECTION

Circuit: Superheterodyne

Frequency Ranges:
FM 87.5 ~ 108 MHz (3.43 ~ 2.78 m)
MW 530 ~ 1605 kHz (566 ~ 187 m)
SW1 2.3 ~ 6 MHz (130 ~ 50 m)
SW2 6 ~ 18 MHz (50 ~ 16.7 m)

Intermediate Frequencies:
PSB, FM 10.7 MHz
AM 455 kHz

Antennas:
FM, SW built-in telescopic
(5 section, 85 cm: 2 feet 11 inches long)
MW built-in ferrite bar
(10 mm dia x 13 cm)

Sensitivity at 50 mW output:
FM (0.9 μV (−1 dB), S/N 6 dB
3.2 μV (10 dB), S/N 30 dB
MW 44 μV/m (33 dB/m), S/N 6 dB
SW1 2.2 μV (7 dB), S/N 6 dB
SW2 3.2 μV (10 dB), S/N 6 dB

Selectivity at 10 kHz off-resonance: MW 30 dB at 1400 kHz

Signal-to-Noise Ratio:
FM 63 dB at 98 MHz
input level 55 dB (550 μV)
MW 35 dB at 1000 kHz
input level 60 dB/m (1 mV/m)
SW1 45 dB at 4 MHz
input level 44 dB (160 μV)
SW2 40 dB at 10 MHz
input level 44 dB (160 μV)

TAPE RECORDER SECTION

Track: Two-track monaural

Record Bias Frequency: Approximately 35 kHz

Frequency Response: 50 ~ 10000 Hz

Wow and Flutter: 0.28 % (RMS) weighted

Signal-to-Noise Ratio: 42 dB

Overall Distortion: 3.5 %

Record/playback Head: PP134-36 (250 Ω/1 kHz)

Erase Head: EBF5-02B (ferrite)

Motor: D-009G (DC governor)

Electret Condenser Microphone: C-1002S

Tape Speed: 4.8 cm/s (1 7/8 ips)

Automatic Shut-off Mechanism: Operates in playback, record, fast forward and rewind modes by detecting reel spindle rotation and turns RADIO switch OFF.

Battery Life: Approximately 16 hours of continuous recording with built-in microphone (using SONY super batteries)

Inputs:
MIC
maximum sensitivity: −72 dB (0.2 mV)
impedance: low
LINE IN
maximum sensitivity: −13 dB (0.17 V)
impedance: 100 kΩ

Outputs:
MONITOR
normal level: −19 dB (85 mV) with 8 Ω load
load impedance: 8 Ω
LINE OUT
normal level: −1.5 dB (0.65 V) with 100 kΩ load
load impedance: greater than 10 kΩ

GENERAL

Power Requirements:
AC 100 ~ 110 V, 115 ~ 127 V, 200 ~ 220 V
230 ~ 250 V, 50/60 Hz
DC 6 V
Battery size "D" x 4
Rechargeable battery BP-8
Car Battery DC 12 V by using SONY car battery cord DCC-127

Power Consumption: AC 8 W

Speaker: 12 cm (5") dia, 20 Ω

Output Power: 2.7 W (maximum)

Semiconductors: 1 FET, (included in electret condenser microphone), 18 transistors and 11 diodes

Dimensions:
340 (w) x 224 (h) x 103 (d) mm
13 7/16 (w) x 8 7/8 (h) x 4 1/16 (d) inches

Weight: 4.1 kg, 9 lb 1 oz (with battery)

Supplied Accessories: demonstration tape, earphone, power cord, shorting plug, batteries size "D", head cleaning tip

SONY®

SERVICE MANUAL

Published in Heiloo, Holland.

TABLE OF CONTENTS

When ordering replacement parts, use PART NUMBERS listed in Parts Lists or shown in EXPLODED VIEWS.
Parts List reference numbers should not be used.

In West Germany the FM frequency coverage should be within the range between 87.5 MHz and 108 MHz.
Adjust the frequency coverage by osc coil and osc trimmer (See FM Frequency Coverage Adjustment on page 30).

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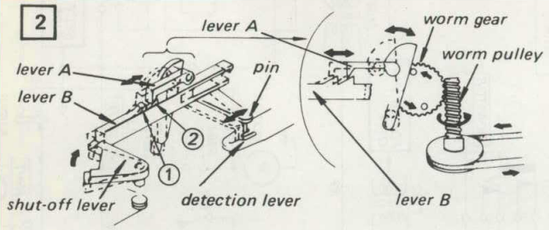
SECTION 1
OUTLINE

1-1. AUTOMATIC SHUT-OFF MECHANISM OPERATION

The automatic shut-off mechanism operates in record, playback, fast forward and rewind modes. Operation is shown step by step in numerical order.

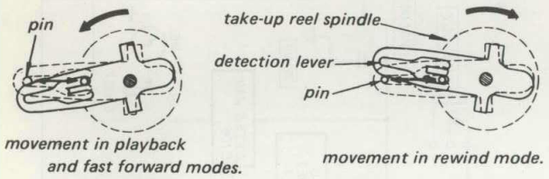
1 The operation in playback mode is explained as an example. When the forward button is depressed and locked, the brake lever is pushed and turns the power switch ON to start the motor.

2



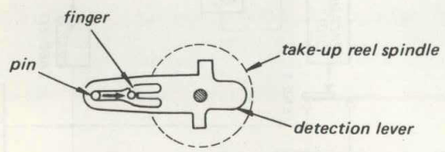
Turning force is transmitted as shown. Lever A, activated by the worm gear rotation, moves lever B back and forth as shown.

3



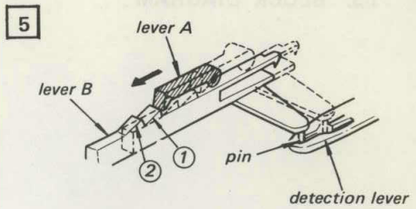
Take-up reel spindle rotates as long as there is some tape remaining on the supply reel. The rotational force on the detection lever, which is attached to the take-up reel spindle through a spring, permits movement of the pin as shown above in various modes.

4

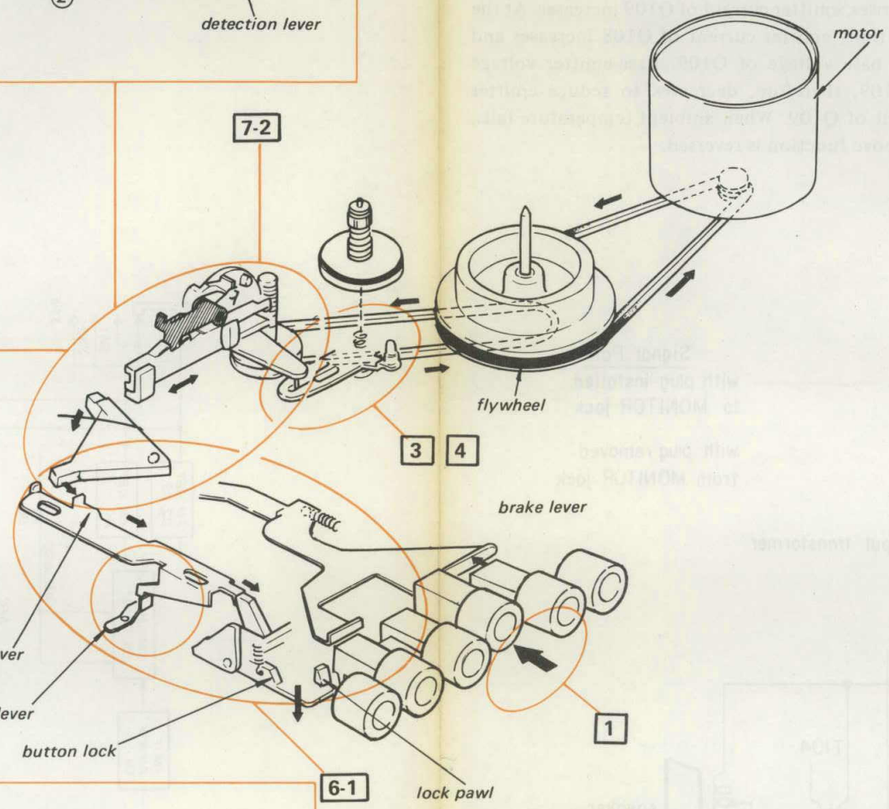


When tape supply ends, the rotational force on the detection lever stops and the pin movement is limited by the finger.

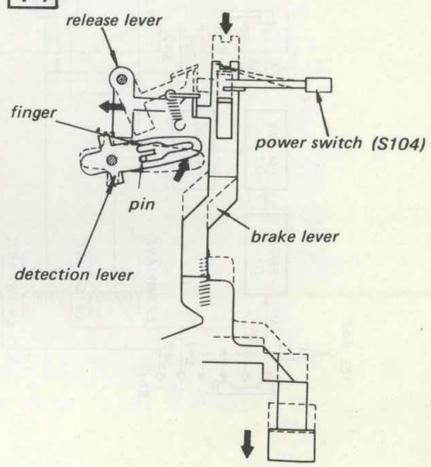
5



The finger holds the pin (lever B) forward far enough so that the pawl of lever A is able to push lever B at position 2.



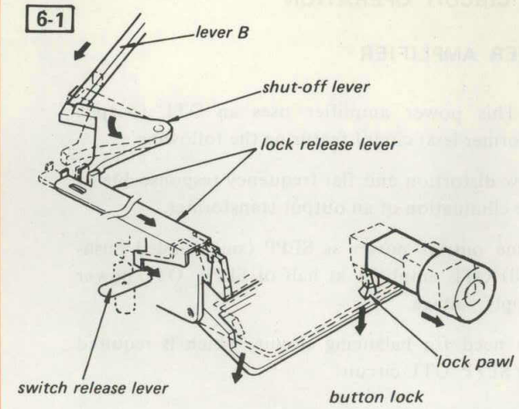
7-1



RELEASE OPERATION (1)

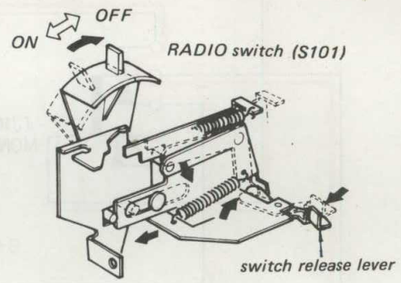
With the function button released, the brake lever moves in the direction shown by the arrow, the motor switch (S104) turns OFF and the release lever hits the detection lever and releases the pin from the finger.

6-1



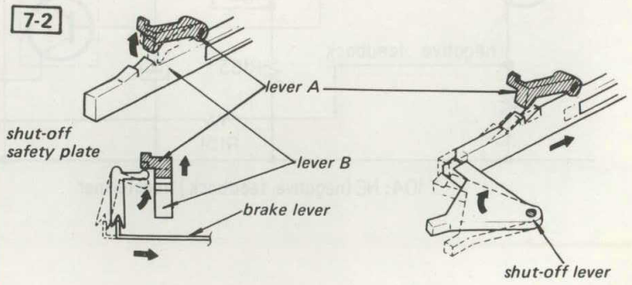
Then lever B can push the shut-off lever far enough to release the button lock and the function button as shown.

6-2



RADIO switch (S101) is released as shown.

7-2



RELEASE OPERATION (2)

By the brake lever movement, the shut-off safety plate releases lever A as shown.

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1-2. CIRCUIT OPERATION

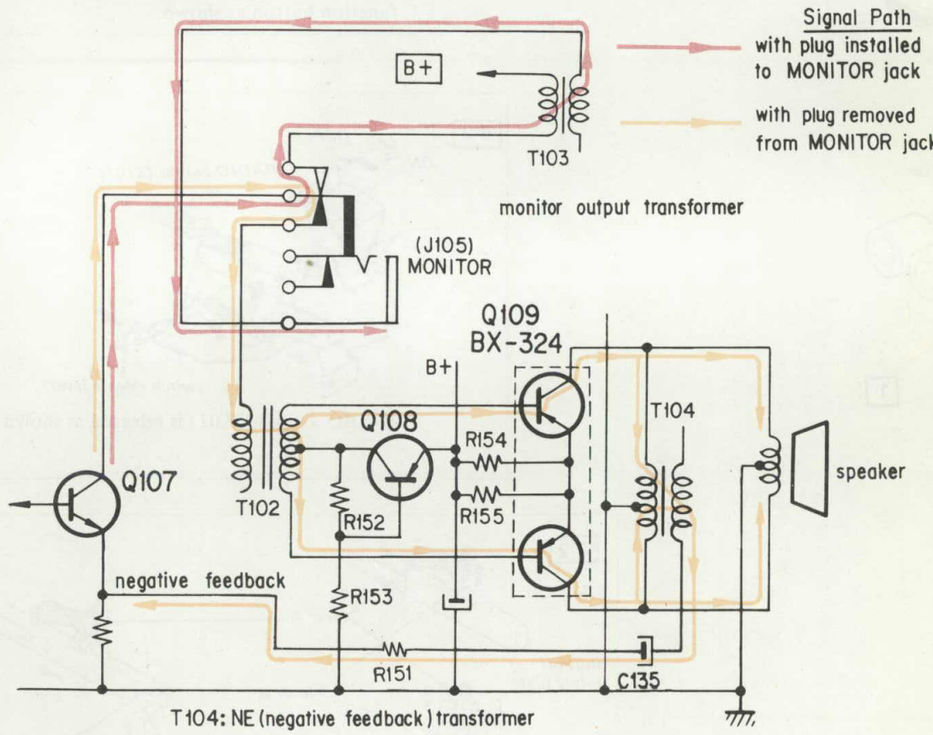
POWER AMPLIFIER

This power amplifier uses an OTL (output transformer-less) circuit featuring the following:

1. Low distortion and flat frequency response due to the elimination of an output transformer.
2. Same output power as SEPP (single-ended push-pull) OTL amplifier at half of SEPP OTL power supply voltage.
3. No need for balancing circuit, which is required for SEPP OTL circuit.

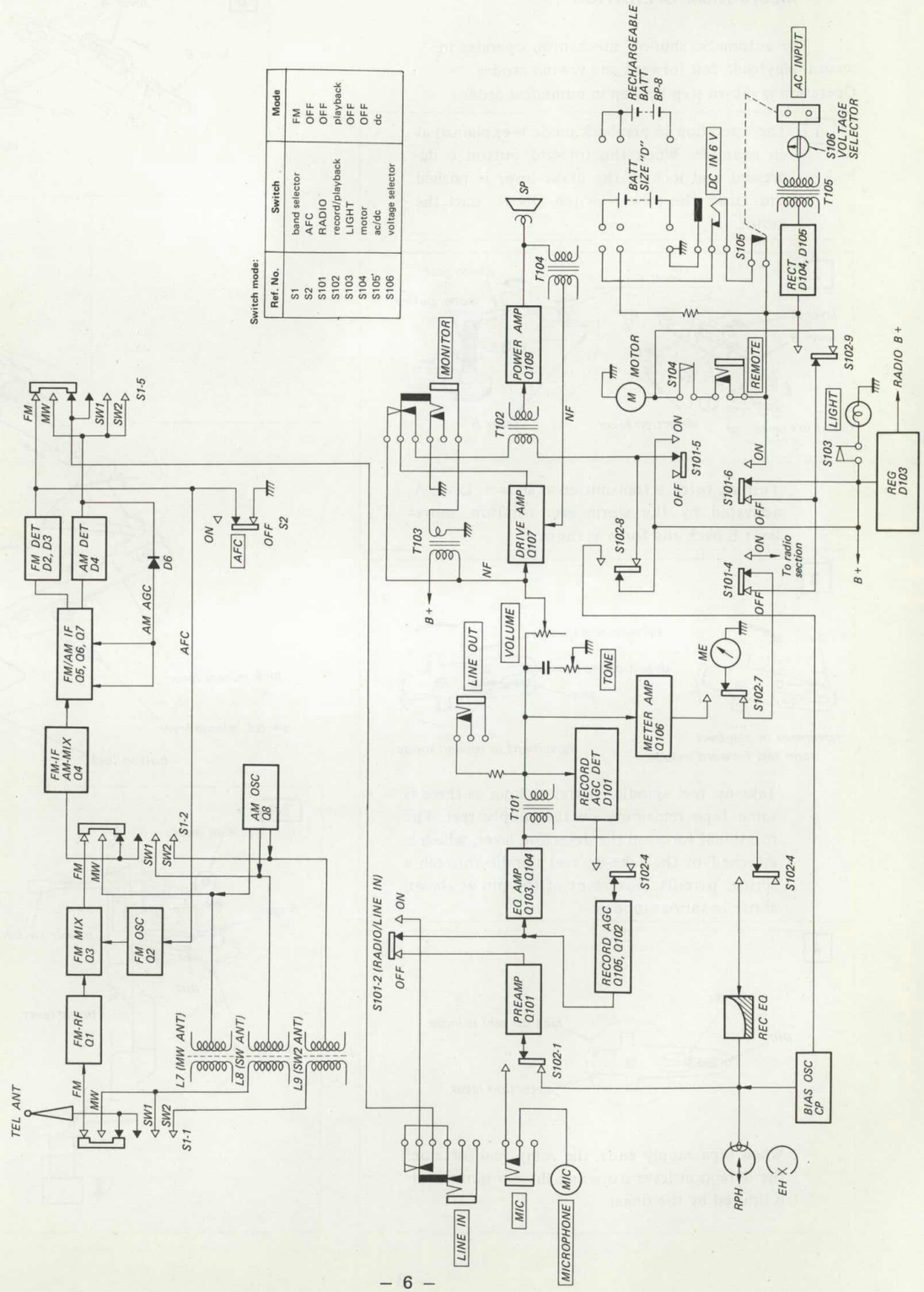
Q108:

To obtain high degree of circuit stability, Q108 neutralizes emitter current variations of Q109 caused by effects of ambient temperature, since Q108 and Q109 are germanium transistors having the same thermal response. When ambient temperature rises, emitter current of Q109 increases. At the same time, emitter current of Q108 increases and raises base voltage of Q109. Base-emitter voltage of Q109, therefore, decreases to reduce emitter current of Q109. When ambient temperature falls, the above function is reversed.



T104: NE (negative feedback) transformer

1-3. BLOCK DIAGRAM



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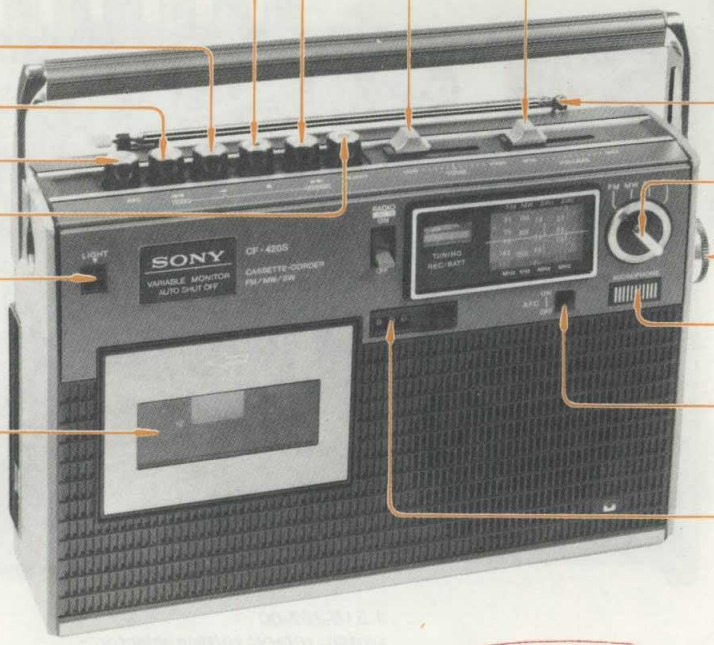
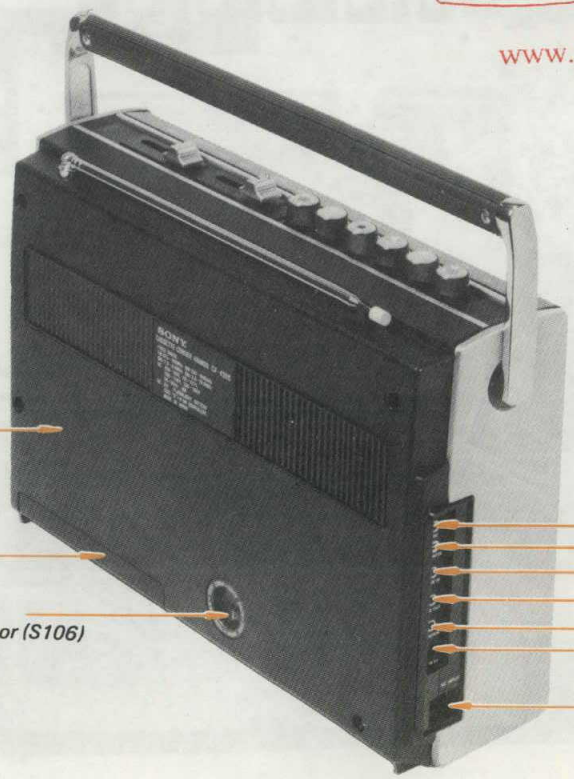
1-4. EXTERNAL VIEWS





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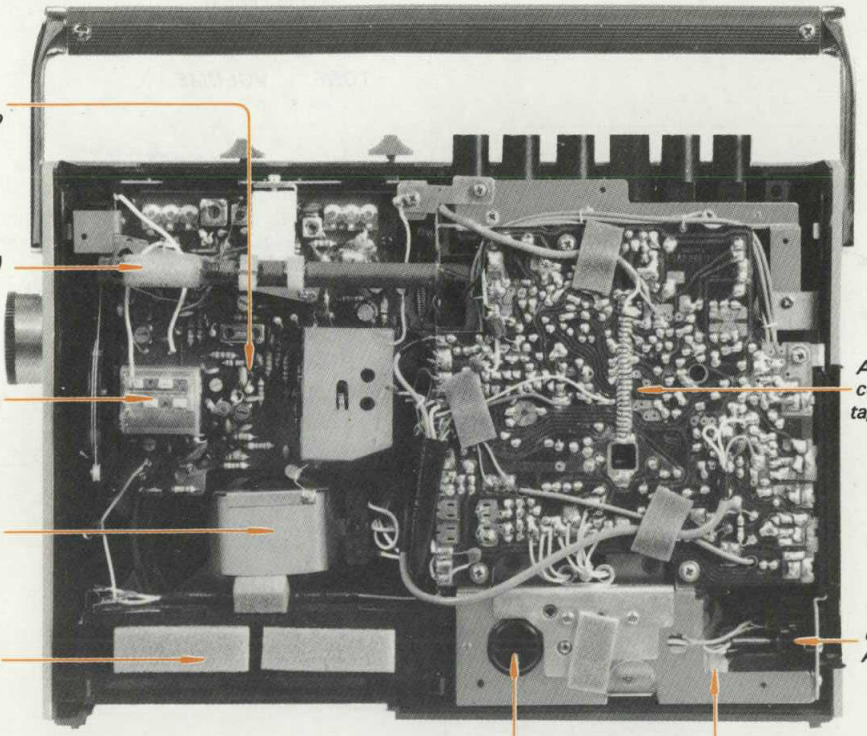
1-5. INTERNAL VIEWS



A-3266-004-A
complete circuit board, radio

1-401-531-00
coil, AM ferrite bar antenna (L7)

1-151-196-00
capacitor, tuning (VC1 ~4)

1-502-419-00
speaker

X-35329-86-0
lid ass'y, battery

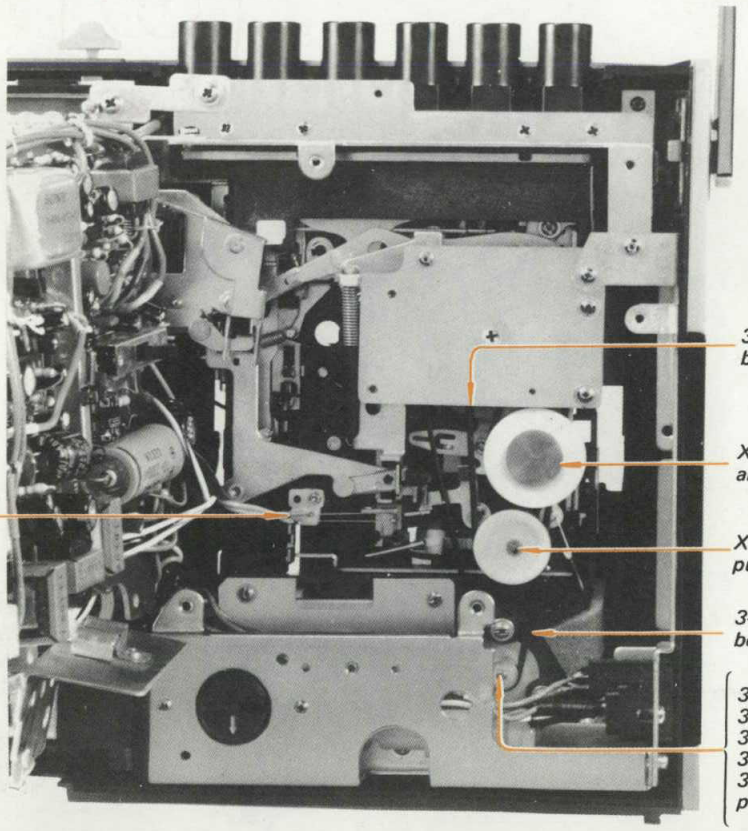
A-3268-004-A
complete circuit board,
tape recorder

1-509-511-00
connector,
AC INPUT (CNJ102)

1-532-084-00
fuse, 100 mA

1-533-102-00
holder, fuse

1-516-267-00
switch, rotary; voltage selector
(S106)



3-531-845-00
belt, take-up

X-35317-15-0
arm ass'y, tension

1-516-164-00
switch, leaf; motor (S104)

X-35317-27-0
pulley ass'y, worm

3-531-844-00
belt, capstan

3-531-849-01 (no groove)
3-531-849-11 ((+) one groove)
3-531-849-21 ((+) two grooves)
3-531-849-31 ((–) one groove)
3-531-849-41 ((–) two grooves)
pulley, motor

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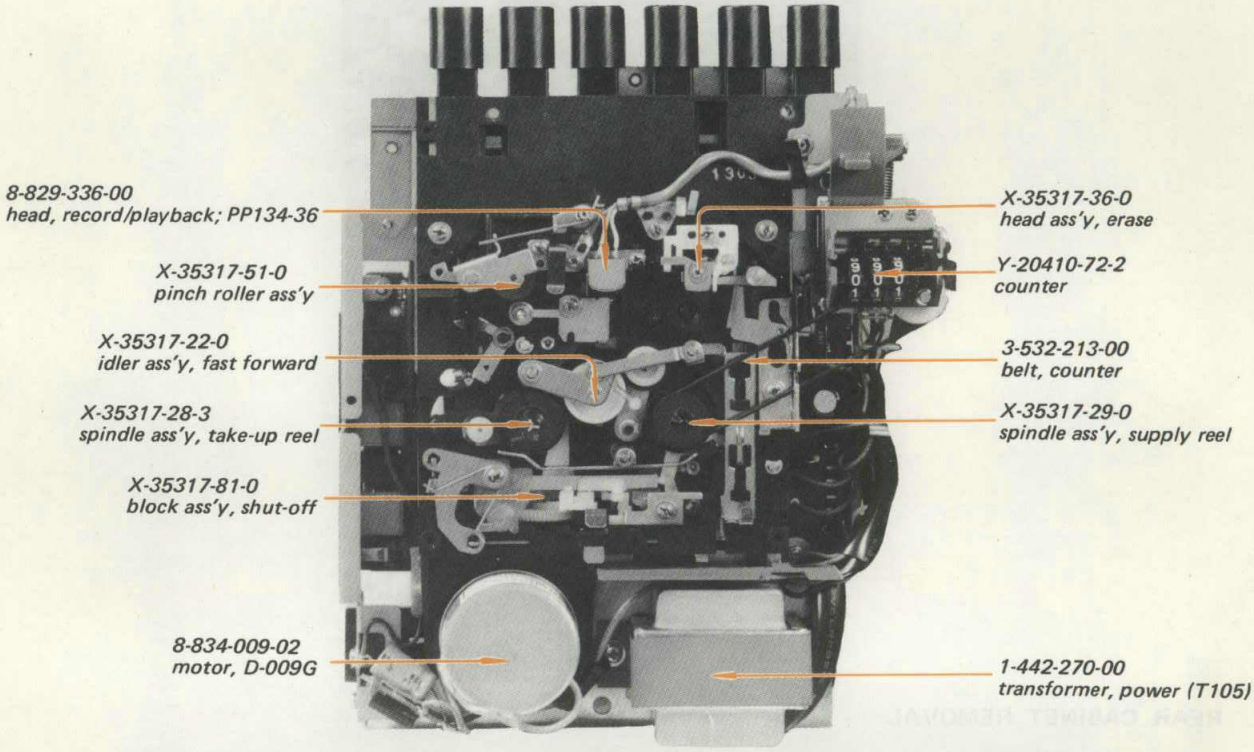

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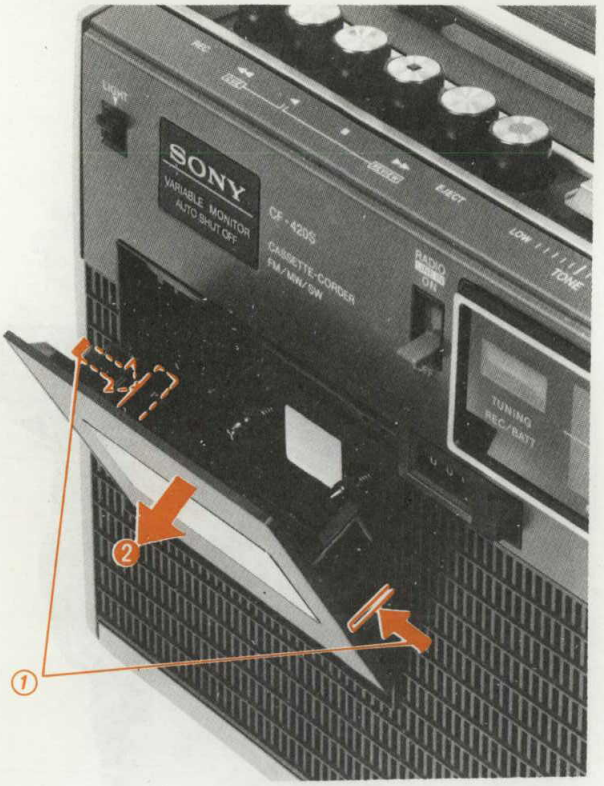
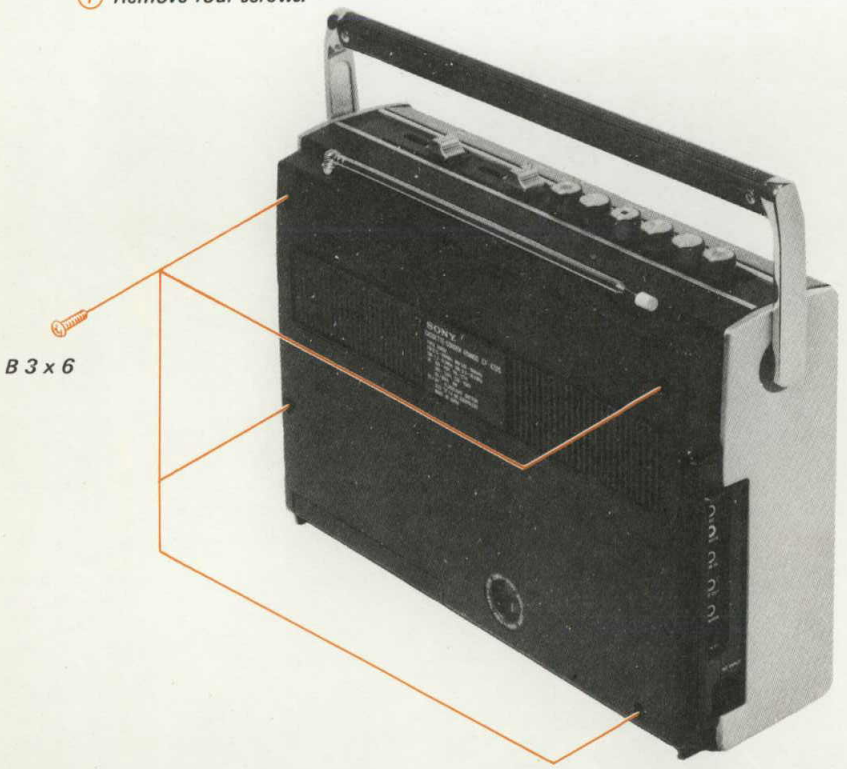
SECTION 2
DISASSEMBLY

2-1. CASSETTE HOLDER REMOVAL



2-2. REAR CABINET REMOVAL

① *Remove four screws.*



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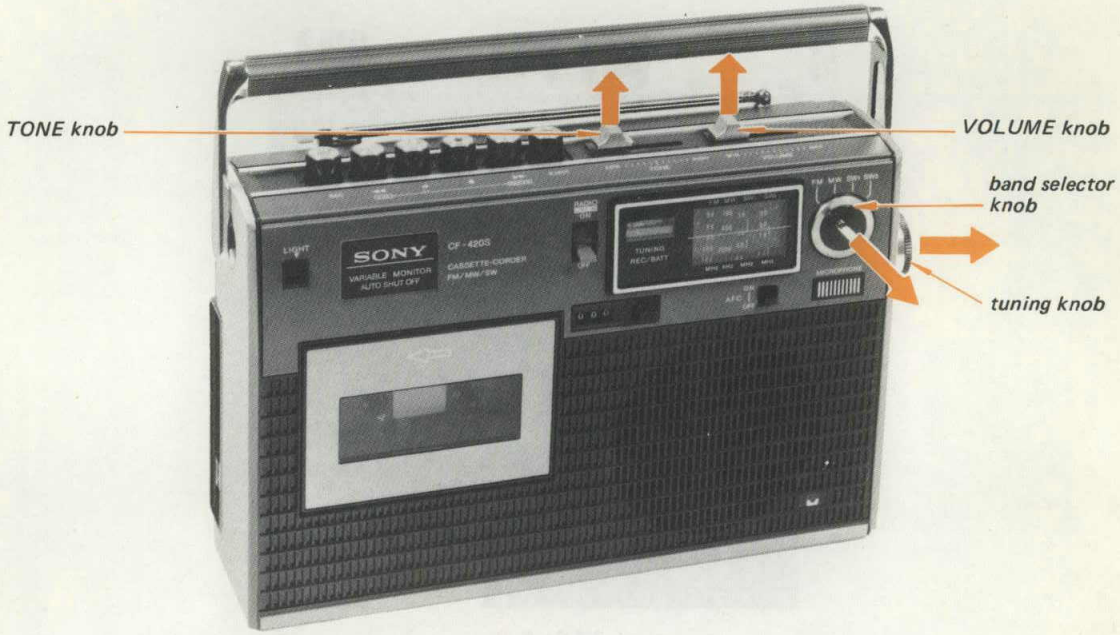
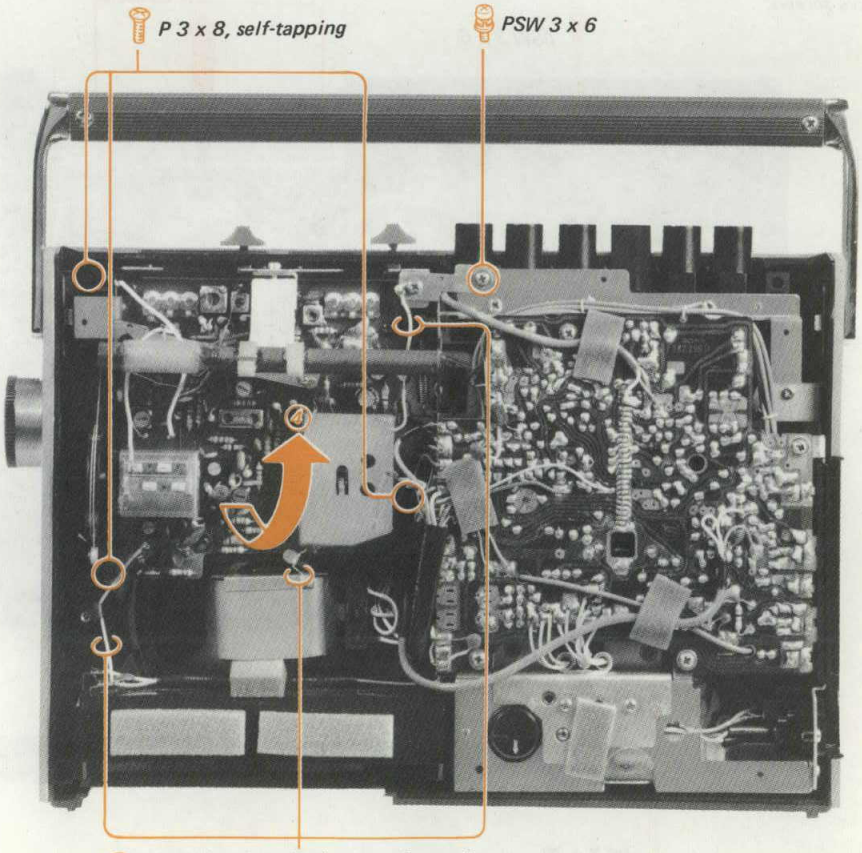
2-3. RADIO CHASSIS REMOVAL

Do this removal after rear cabinet removal.

(1) *Remove four knobs.*



(2) *Remove four screws.*



(3) *Unsolder three lead wires of capacitor.*

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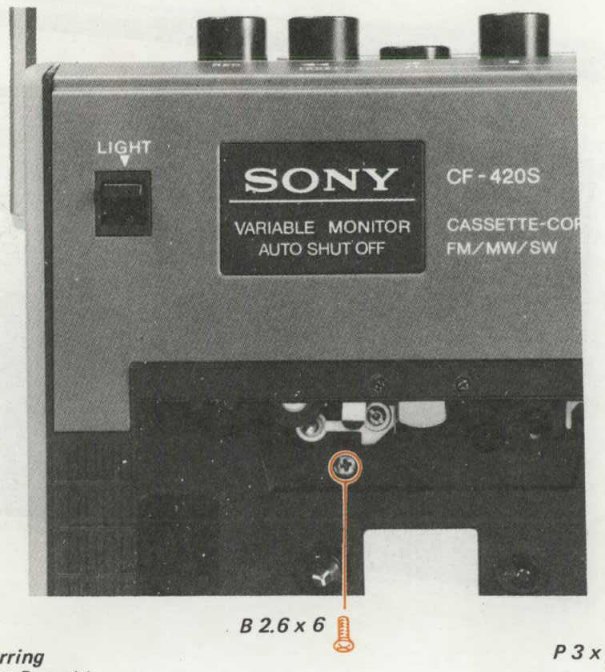
2-4. TAPE RECORDER CHASSIS REMOVAL

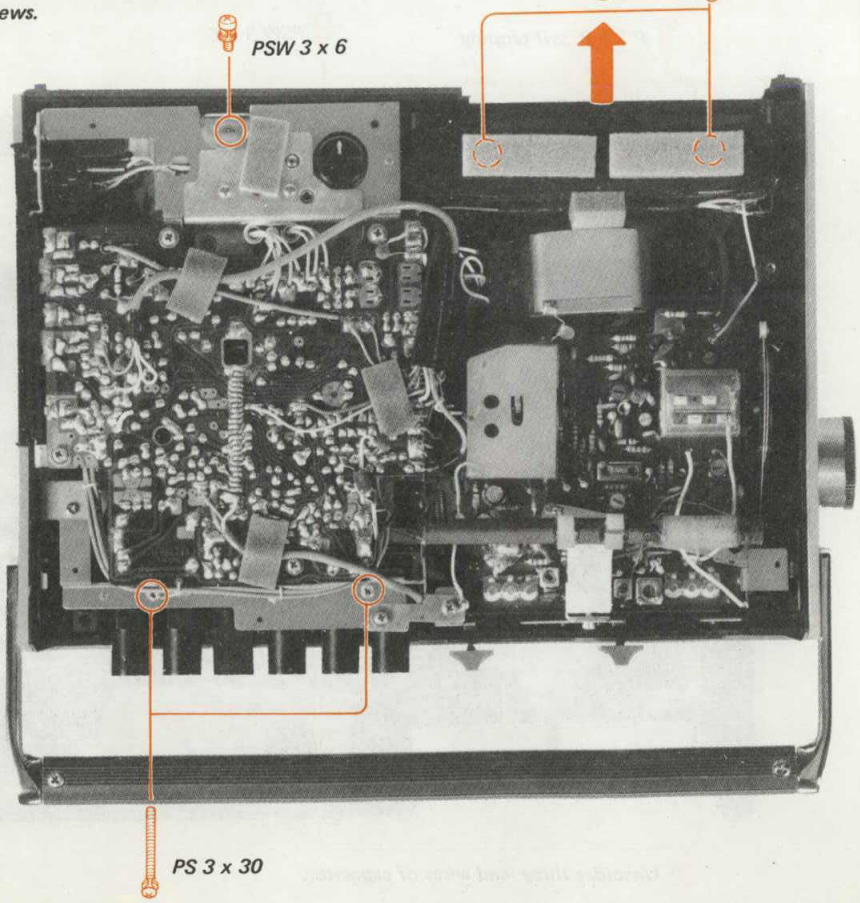
Do this removal after rear cabinet removal and cassette holder removal.

① *Remove one screw.*



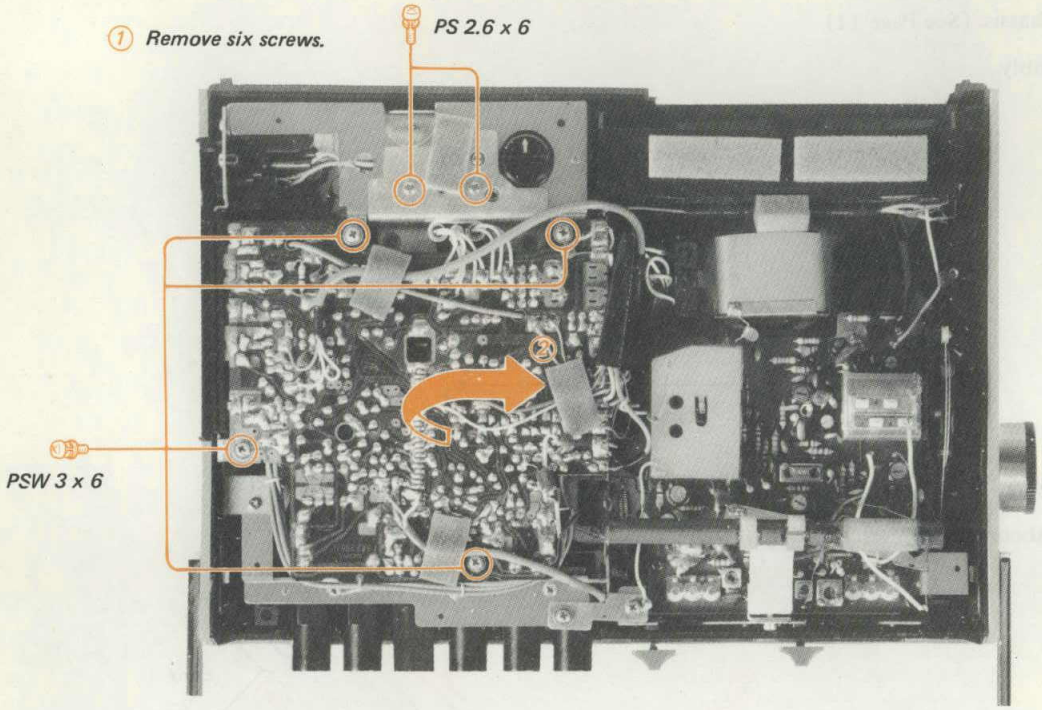
② *Remove radio chassis referring to radio chassis removal on Page 11.*

③ *Remove five screws.*



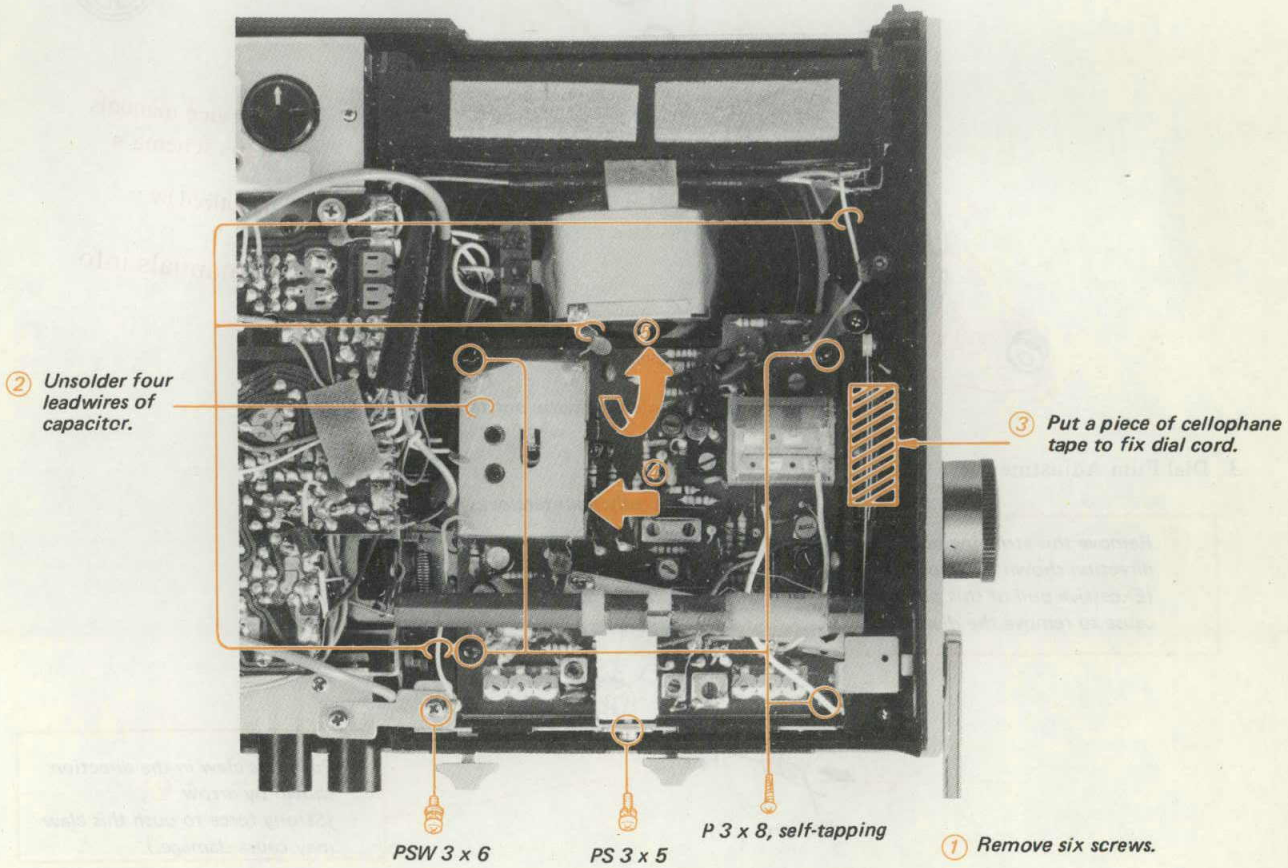
2-5. TAPE RECORDER CIRCUIT BOARD REMOVAL

Do this removal after rear cabinet removal.



2-6. RADIO CIRCUIT BOARD REMOVAL

Do this removal after radio chassis removal.



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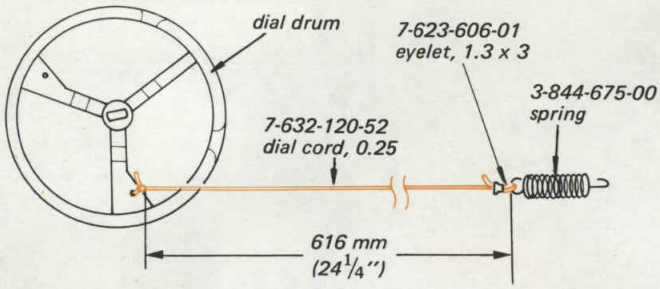
2-7. DIAL CORD STRINGING

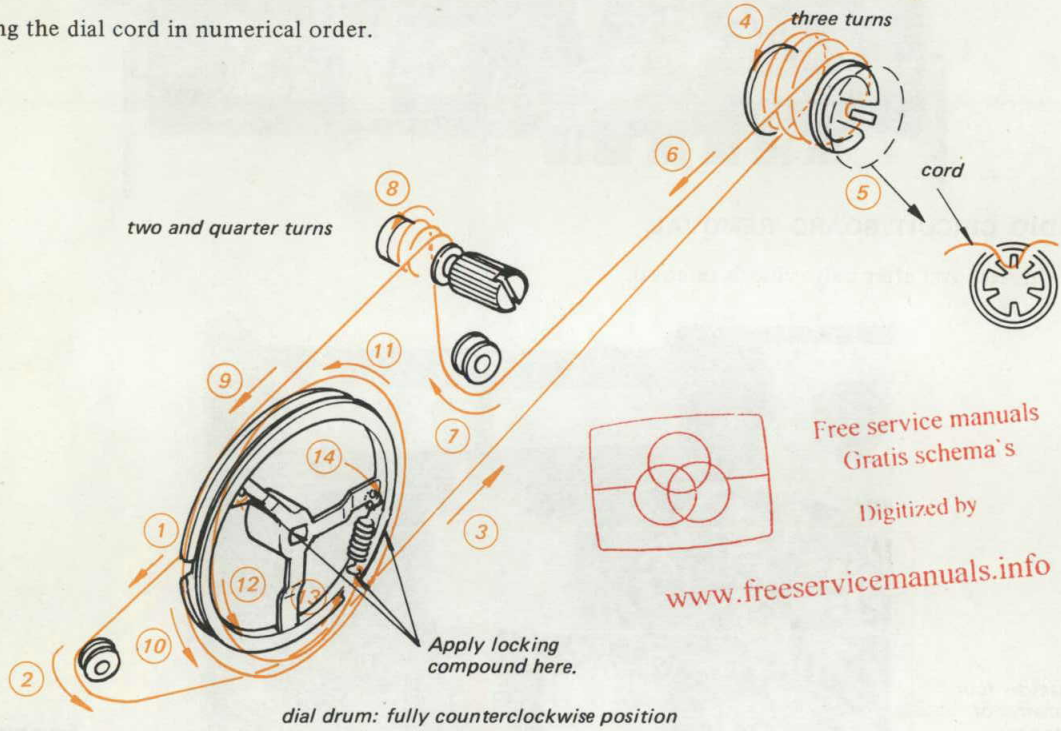
Remove rear cabinet. (See Page 10)
Remove radio chassis. (See Page 11)

1. Dial Cord Assembly



2. Dial Cord Stringing

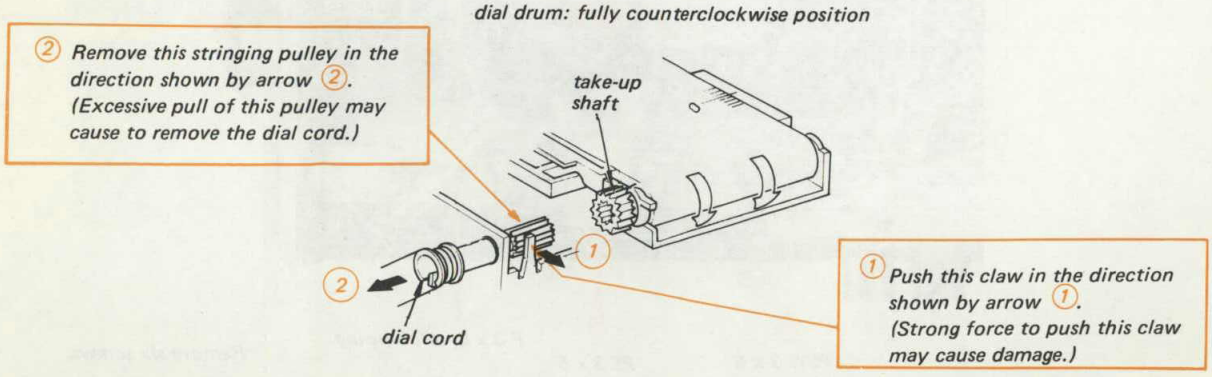
String the dial cord in numerical order.



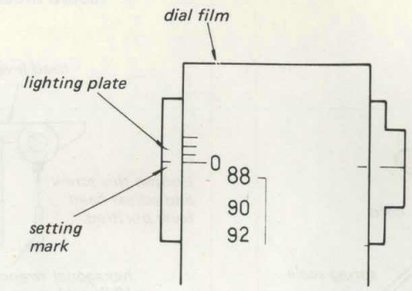
dial drum: fully counterclockwise position

3. Dial Film Adjustment

dial drum: fully counterclockwise position

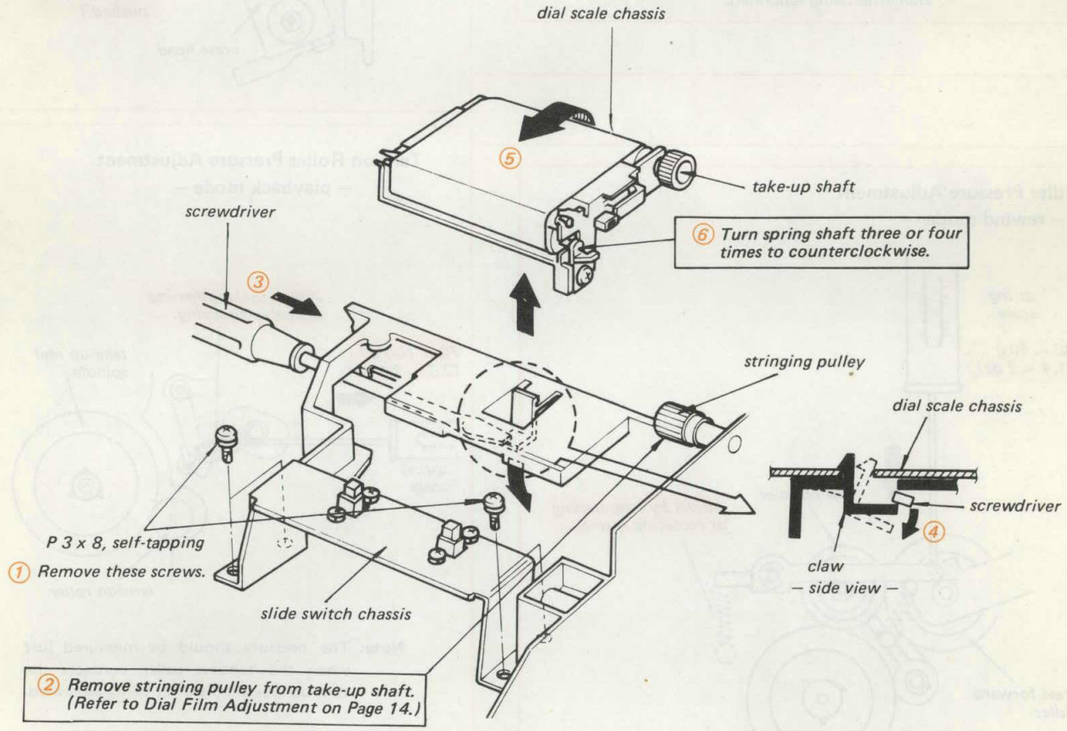


③ *Turn take-up shaft so that "O" scale on the dial film comes at setting mark on lighting plate.*



④ *Insert the stringing pulley to take-up shaft.*

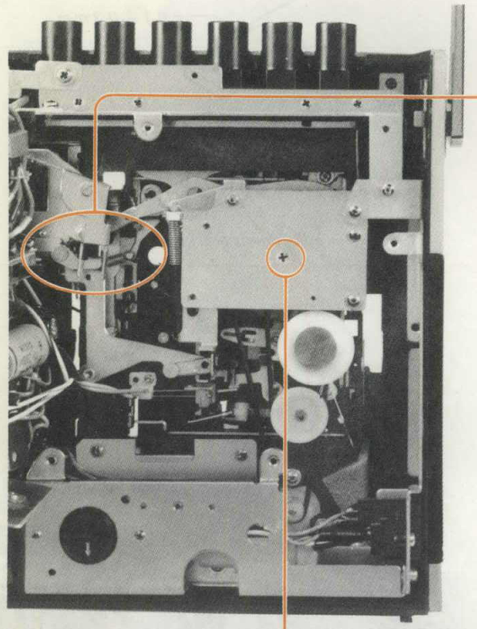
2-8. DIAL SCALE CHASSIS REMOVAL



SECTION 3
ADJUSTMENTS

3-1. MECHANICAL ADJUSTMENTS

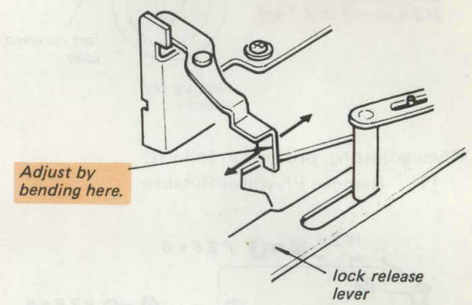
Remove tape recorder chassis. (See Page 12)



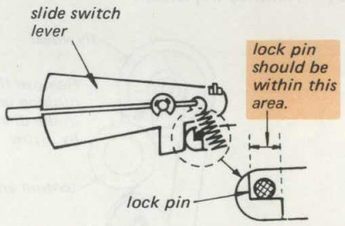
RADIO Switch Timing Adjustment
– rewind mode –

[1] Turn RADIO switch ON.

[2] When shut-off mechanism operates at the tape end, ensure that rewind button releases after RADIO switch turns OFF. If necessary, adjust as follows:

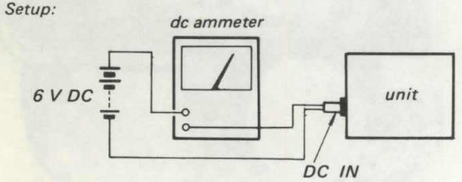


Note: After the adjustment, ensure that lock pin positions as shown below.



Flywheel Thrust Play Adjustment
– playback mode –

1. *Setup:*



2. *Position unit horizontally with flywheel side up.*
3. *Loosen thrust screw for sufficient flywheel play.*
4. *Tighten the screw until current suddenly increases, then loosen the screw 1/4 turn.*

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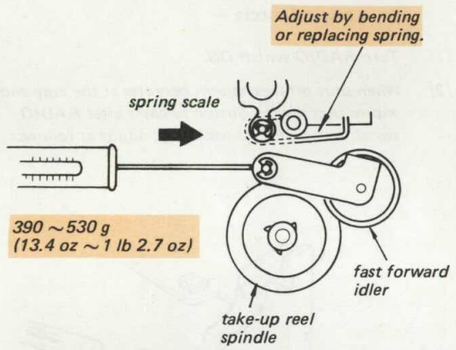
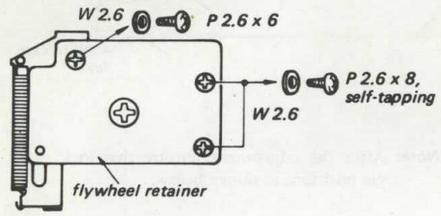
Fast Forward Idler Pressure Adjustment
— fast forward mode —

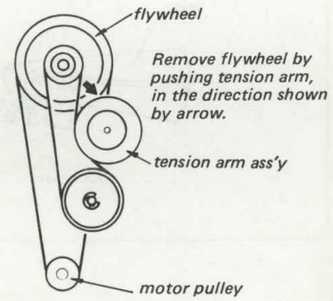


When adjusting, proceed as follows:

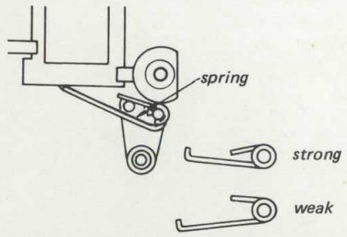
[1] Remove Flywheel Retainer



[2] Remove Flywheel

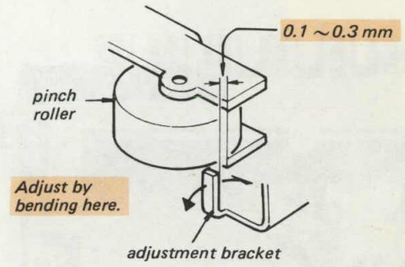


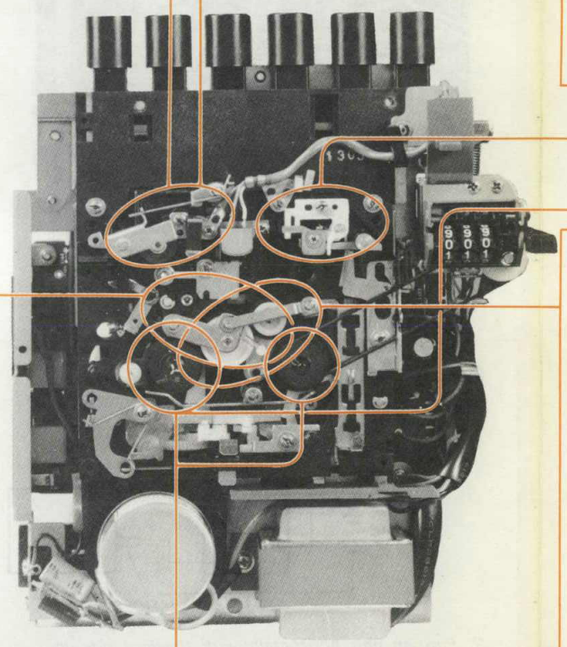
[3] Adjust by bending or replacing spring.



After the adjustment, clean the belts with alcohol moistened swab and install them without twist.

Pinch Roller Timing Adjustment
— playback mode —





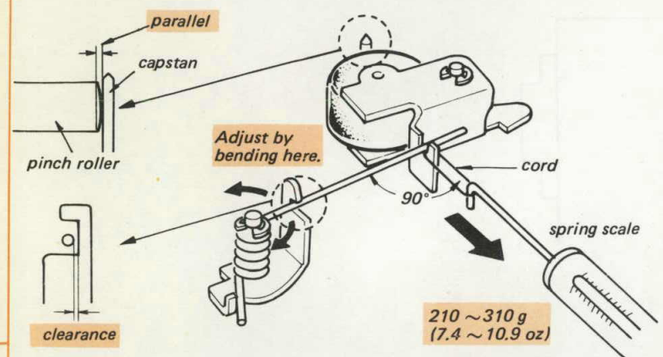
Torque Measurement

Mode	Torque meter	Meter reading
Playback	* CQ-101	25 ~ 50 g·cm
	General torque meter	35 ~ 60 g·cm (0.49 ~ 0.83 oz·inch)
fast forward	* CQ-201	50 ~ 100 g·cm
	General torque meter	50 ~ 100 g·cm (0.7 ~ 1.39 oz·inch)
rewind	* CQ-201	50 ~ 100 g·cm
	General torque meter	50 ~ 100 g·cm (0.7 ~ 1.39 oz·inch)

* SONY cassette type torque meter

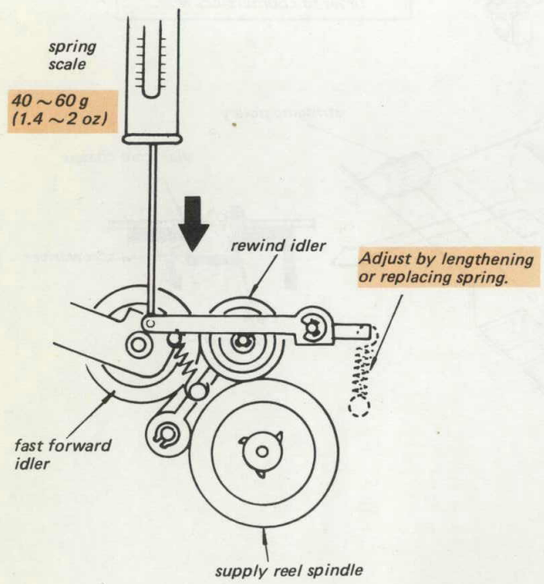
Part No.	Model Name
Y-20926-01-1	CQ-101
Y-20926-11-1	CQ-201

Pinch Roller Pressure Adjustment
— playback mode —



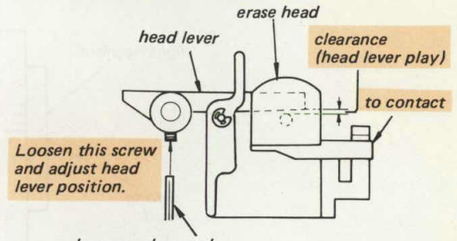
Note: The pressure should be measured just when the pinch roller contacts the capstan after being separated.

Rewind Idler Pressure Adjustment
— rewind mode —

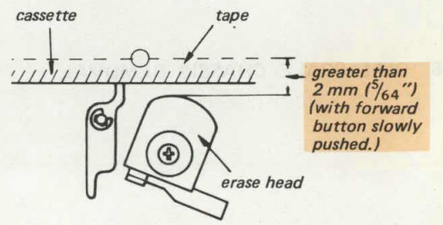


Note: The pressure should be measured just when the rewind idler contacts the supply reel spindle after being separated.

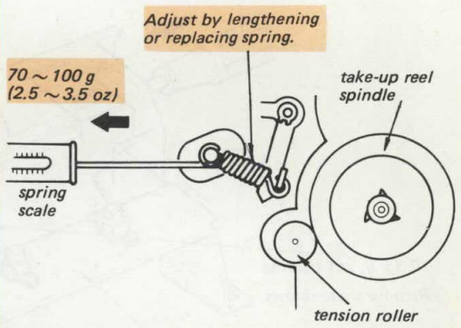
Head Lever Adjustment
— record mode —



— playback mode —



Tension Roller Pressure Adjustment
— playback mode —



Note: The pressure should be measured just when the tension roller contacts the take-up reel spindle after being separated.

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3-2. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

PRECAUTION

1. Clean the following parts with alcohol moistened swab:
   - Record/Playback head
   - Erase head
   - Capstan
   - Pinch roller
   - Rubber belts
   - Idlers
2. Demagnetize record/playback head with a head demagnetizer.
   (Do not bring head demagnetizer close to erase head, and do not use magnetized screwdriver for adjustments).
3. After the adjustments, apply locking compound to adjusted parts.
4. Adjustments should be performed in the order listed in this service manual.
5. Adjustments and measurements should be performed with rated power supply voltage unless otherwise specified.

TAPE RECORDER SECTION

Test Equipment/Tools Required

audio oscillator (af osc)
VTVM
(digital frequency counter
or speed checker (SONY LFM-30)
400 Hz bandpass filter
resistors 10 Ω, 300 Ω, 580 Ω, 600 Ω, 100 kΩ
attenuator
distortion meter
SONY test tapes
- P-4-A81 (6.3 kHz, −10 dB)
- P-4-L81 (333 Hz, 0 dB)
- SPC-4 (1 kHz, 0 dB)
- WS-48 (3 kHz, 0 dB)

blank tape cassette (completely erased)
wow meter

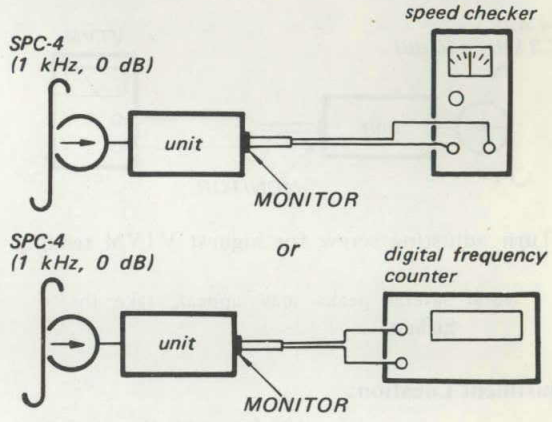
1. Tape Speed Adjustment

Settings:

RADIO switch:	OFF
VOLUME control:	mechanical mid
Power source:	6 V DC

Procedure:

1. Mode: playback

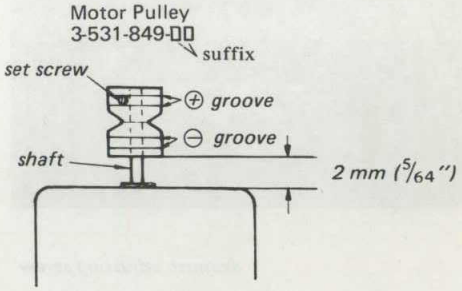


Specification:

speed checker	digital frequency counter
−2 ~ +2 %	980 ~ 1020 Hz

Difference between beginning and end of tape should be within 1 % (10 Hz).

2. If necessary, replace motor pulley.



suffix	groove	speed
21	⊕ two	faster
11	⊕ one	
01	none	
31	⊖ one	
41	⊖ two	slower

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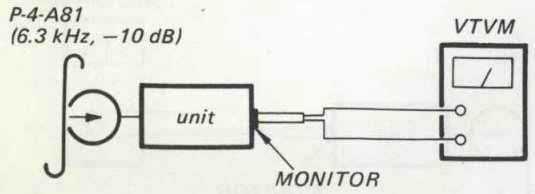
2. Record/playback Head Azimuth Adjustment

Settings:

RADIO switch:	OFF
TONE control:	HIGH
VOLUME control:	mechanical mid

Procedure:

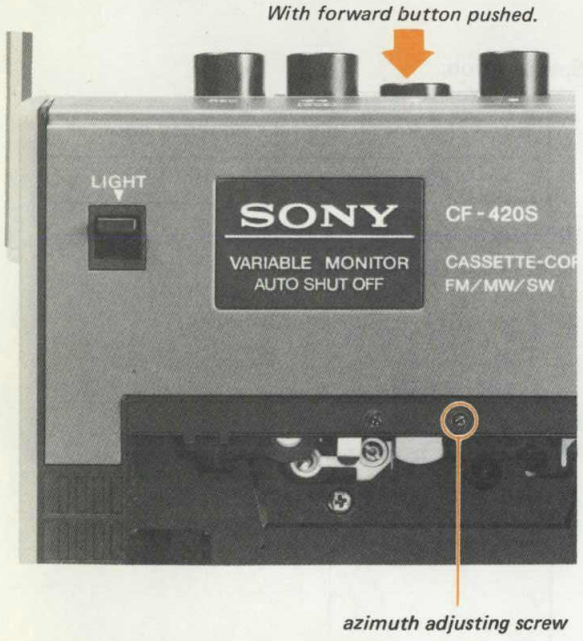
1. Mode: playback



2. Turn adjusting screw for highest VTVM reading.

Note: Several peaks may appear, take the highest.

Adjustment Location:



Note: Remove the cassette holder for azimuth adjustment. (See Page 10)

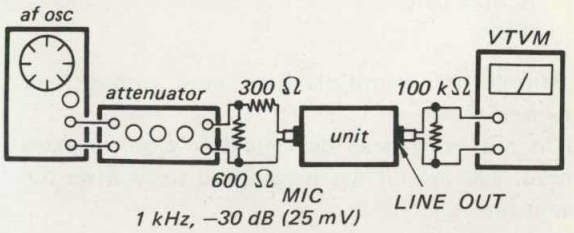
3. AGC Recovery Time Adjustment

Settings:

RADIO switch :	OFF
Bias osc:	OFF
	(See Adjustment Location)

Procedure:

1. Mode: record

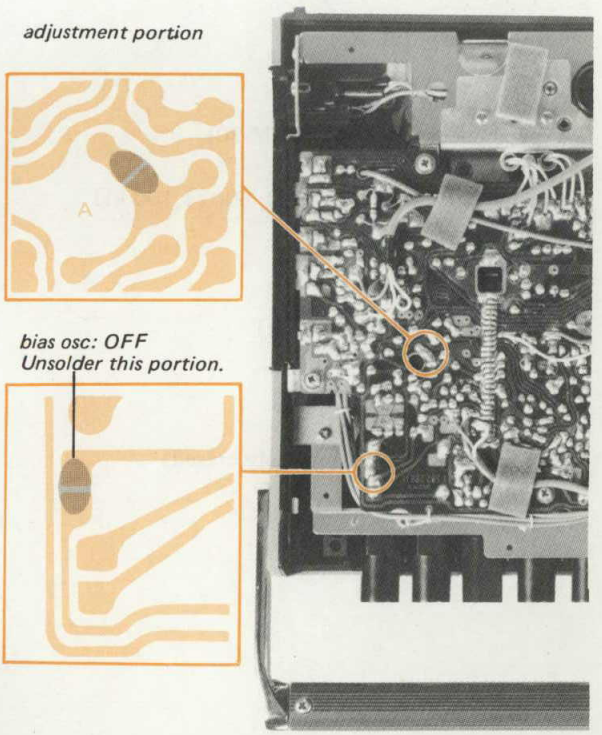


2. Quickly decrease input signal to −60 dB (0.77 mV).
3. Measure recovery time when output level increases 10 dB.

Specification:

60 ± 40 seconds.
If necessary, unsolder portion A.
(Recovery time increases.)

Adjustment Location



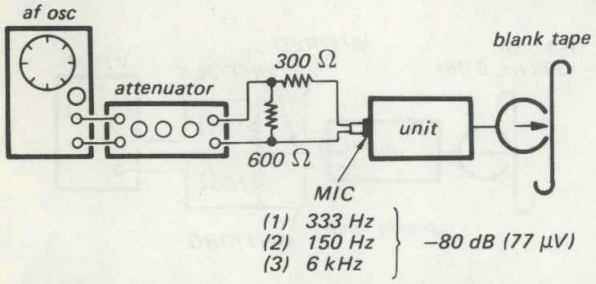
4. Bias Adjustment

Settings:

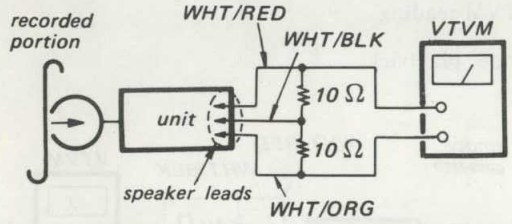
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

1. Mode: record

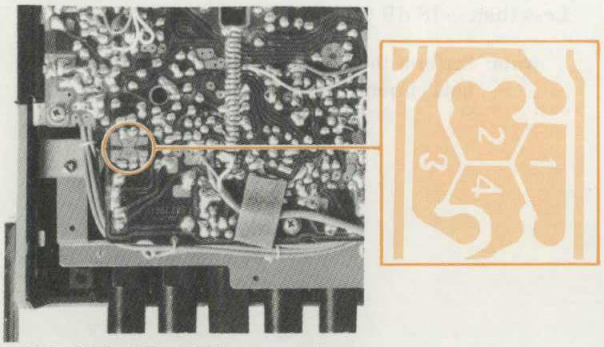


2. Mode: playback



Recorded signal	VTVM reading
333 Hz	Adjust VOLUME control for –10 dB (0.25 V)
150 Hz	6 dB allowable range
6 kHz	150 Hz 333 Hz 6 kHz

If necessary, adjust by soldering.



R125, 126, 127, 128 connections

Connect	Resistance value (Ω)	6 kHz level
3 and 4	150	decrease
2 and 3	250	↕
1 and 4	352	↕
1 and 2	430	↕
2 and 4	510	↕
open	610	increase

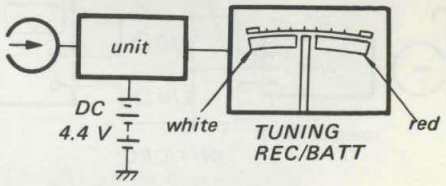
5. REC/BATT Meter Adjustment

Settings:

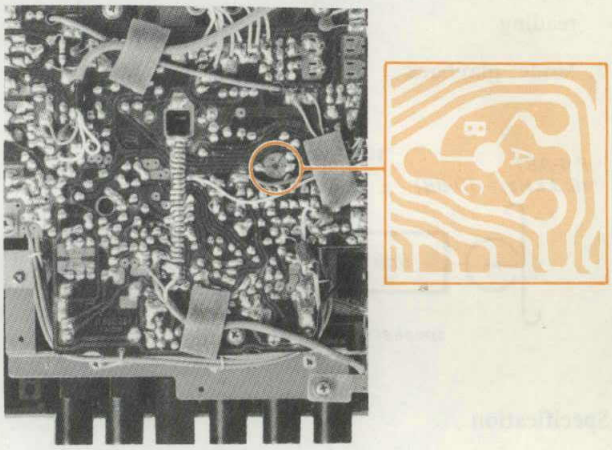
RADIO switch:	OFF
Power Source:	4.4 V DC

Procedure:

1. Mode: playback
   Ensure that the pointer is at boundary between white and red zone.

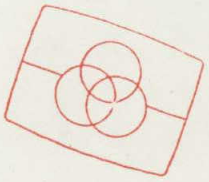


If necessary, adjust by soldering.



R158, 159, 160 connections

Connect	Resistance value (Ω)	Meter reading
B and C	40.3 k	red zone
A and C	43 k	↕
open	46.9 k	white zone



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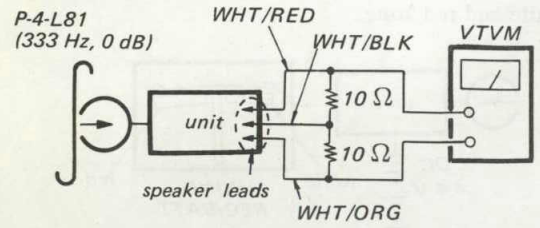
6. Playback Frequency Response Measurement

Settings:

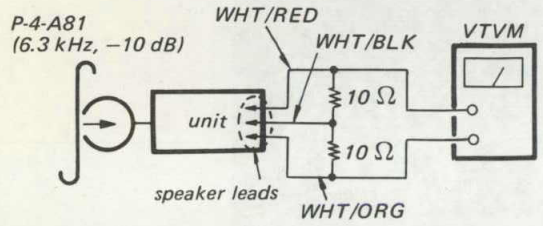
RADIO switch: OFF
TONE control: HIGH

Procedure:

1. Mode: playback



2. Adjust VOLUME control for 0 dB (0.775 V) VTVM reading.
3. Mode: playback



Specification .

−12 ~ −4 dB (0.19 ~ 0.49 V)

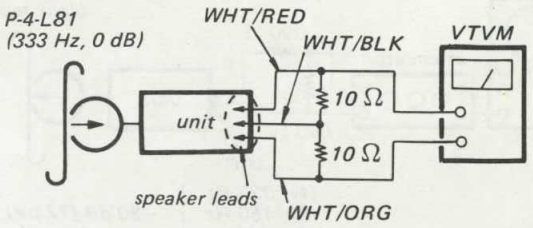
7. Playback Signal-to-Noise Ratio Measurement

Settings:

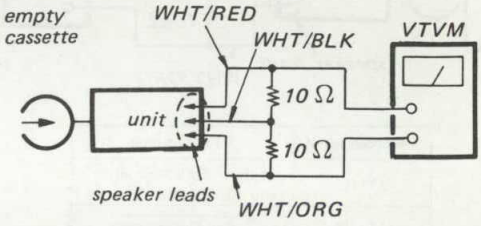
RADIO switch: OFF
TONE control: HIGH

Procedure:

1. Mode: playback



2. Adjust VOLUME control for 0 dB (0.775 V) VTVM reading.
3. Mode: playback



Specification:

Less than −46 dB (3.9 mV) for household current
Less than −48 dB (3.1 mV) for battery

Note: Perform this adjustment for both household current and battery.

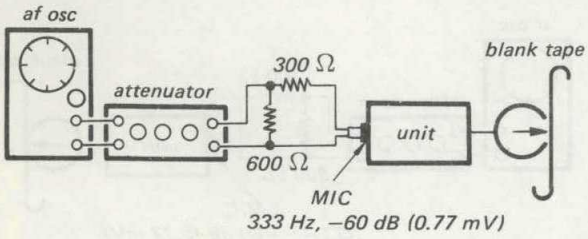
8. Overall Signal-to-Noise Ratio Measurement

Settings:

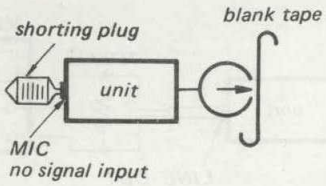
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

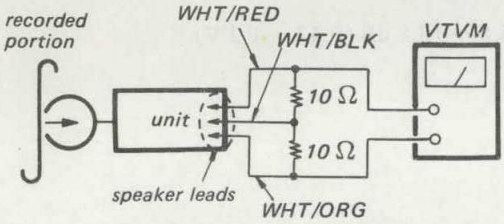
1. Mode: record



2. Mode: record



3. Mode: playback



Recorded signal	VTVM reading
333 Hz	Adjust VOLUME control for 0 dB (0.775 V)
no signal	Less than −36 dB (12 mV) for household current Less than −38 dB (9.5 mV) for battery

Note: Perform this adjustment for both household current and battery.

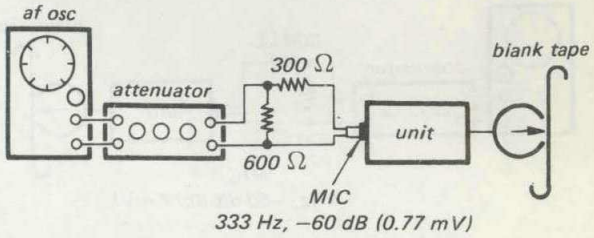
9. Overall Maximum Output Measurement

Settings:

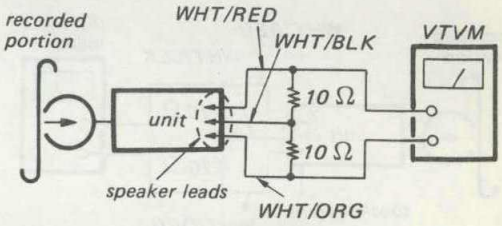
RADIO switch:	OFF
TONE control:	HIGH
VOLUME control:	MAX

Procedure:

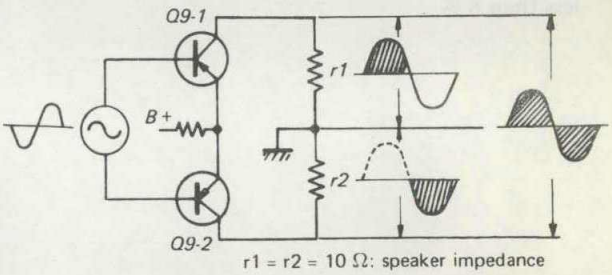
1. Mode: record



2. Mode: playback



Note:



r1 = r2 = 10 Ω: speaker impedance

This unit uses 20 Ω impedance speaker having a center tap. Due to class B amplifier, Q9-1 amplifies negative half cycles of input signals and Q9-2 amplifies positive half cycles. Positive half cycles of output voltage are obtained across r1 and negative half cycles across r2. Full-wave output voltage across (r1 + r2) is voltage obtained alternately across r1 and across r2. Load resistance, therefore, is 10 Ω.

$$\text{Output power (W)} = \frac{(\text{voltage across r1 + r2})^2}{10\ (\Omega)}$$

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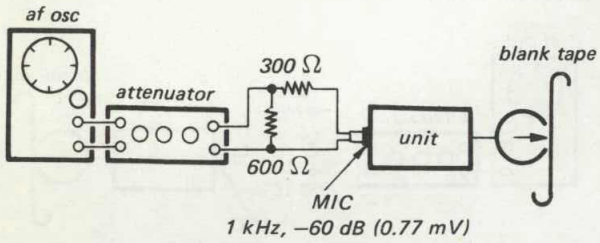
10. Overall Distortion Measurement

Settings:

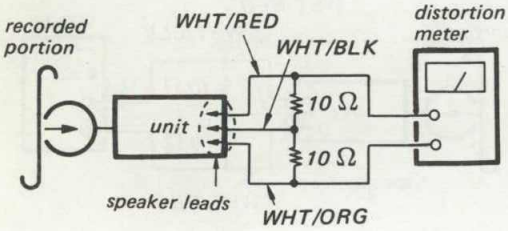
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

1. Mode: record



2. Mode: playback



Specification:

less than 8 %

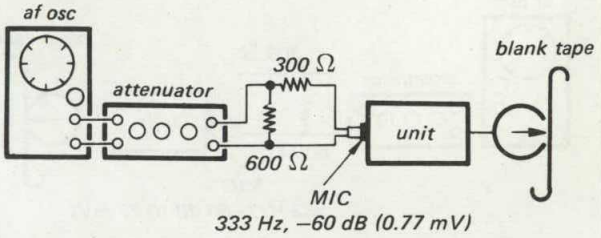
11. Overall LINE OUT Level Measurement

Settings:

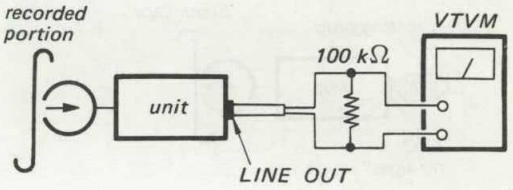
RADIO switch:	OFF
VOLUME control.	MIN

Procedure:

1. Mode: record



2. Mode: playback



Specification:

–3.8 ~ +3.8 dB (0.47 ~ 1.2 V)

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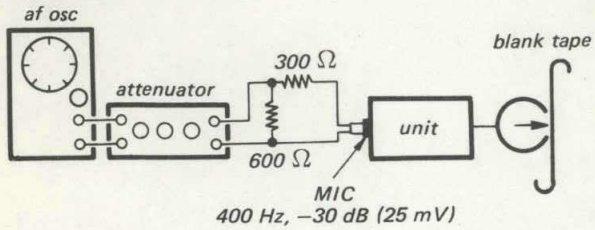
12. Erase Ratio Measurement:

Settings:

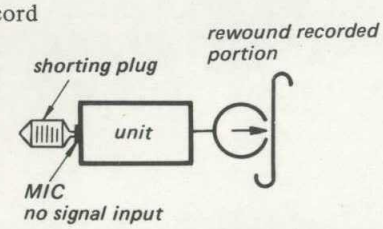
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

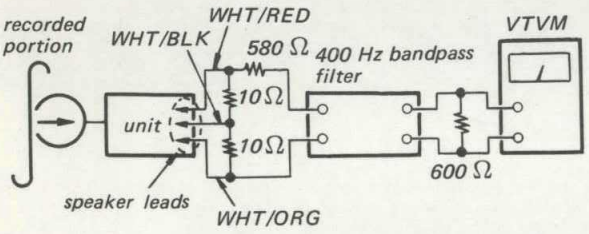
1. Mode: record



2. Rewind half of the recorded portion.
3. Mode: record



4. Mode: playback



Recorded signal	VTVM reading
400 Hz	Adjust VOLUME control for 0 dB (0.775 V) VTVM reading.
no signal	Less than –60 dB (0.77 mV).

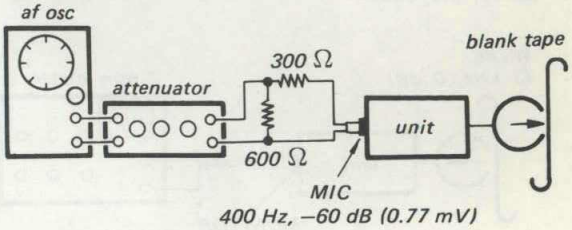
13. Cross-talk Measurement (between tracks)

Settings:

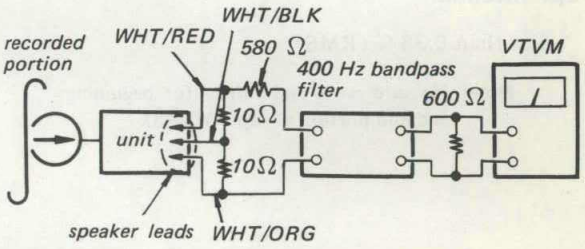
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

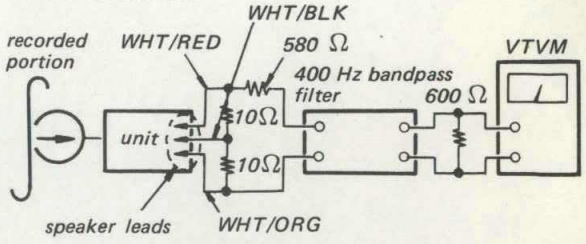
1. Mode: record



2. Mode: playback



3. Adjust VOLUME control for 0 dB (0.775 V) VTVM reading.
4. Turn the cassette over.
5. Mode: playback
   adjacent track of the recorded track



Specification:

less than –55 dB (1.4 mV)

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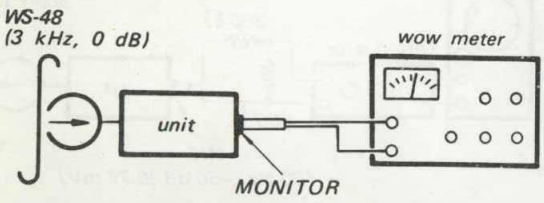
14. Wow and Flutter Measurement

Settings:

RADIO switch:	OFF
VOLUME control:	mechanical mid
POWER source:	6 V

Procedure:

1. Mode: playback



Specification:

less than 0.38 % (RMS)

Note: Measure wow and flutter for beginning and end portion of tape (WS-48).

RADIO SECTION

Test Equipment/Tools Required:

AM rf signal generator
FM rf signal generator
VTVM
volt-ohm meter (VOM)
loop antenna
resistors 10 Ω
capacitors 0.01 μF, 10 pF

Note: 1. Modulation
AM: 30 % amplitude modulation by 400 Hz signal.
FM: ± 22.5 kHz frequency deviation by 400 Hz signal.

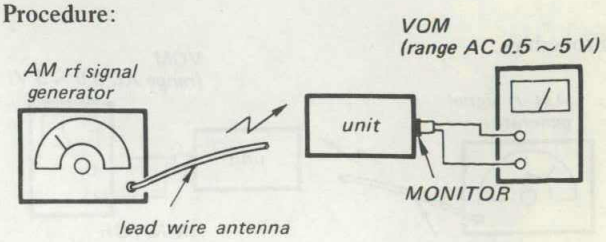
2. AM, FM rf signal generator output level should be as low as possible.

1. MW I-f Alignment

Settings:

RADIO switch:	ON
band selector switch:	MW
VOLUME control:	MAX

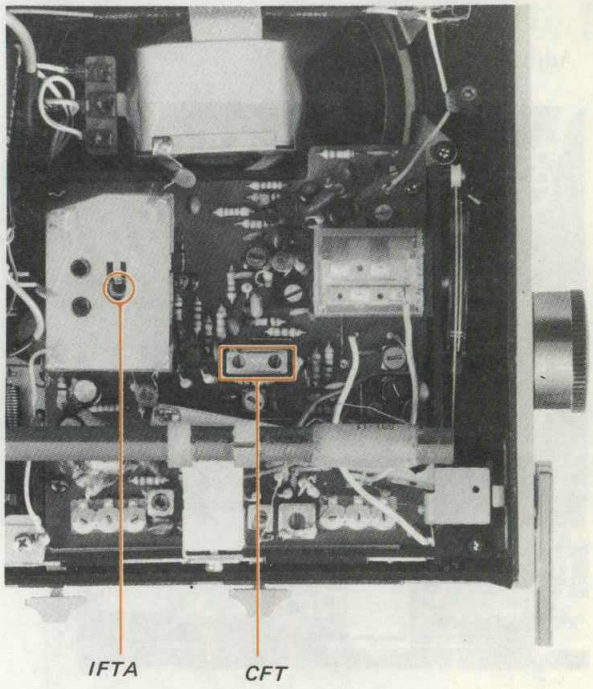
Procedure:



Step	AM rf signal generator frequency	Tuning knob	Adjust	VOM reading
1	455 kHz	Detune broad-casting signals.	CFT IFTA	maximum
2	455 kHz	Detune broad-casting signals.	AM rf signal generator frequency	maximum

Note: 1. Adjust CFT and IFTA alternately.
2. Repeat above steps two or three times ending with Step 1.

Adjustment Location:



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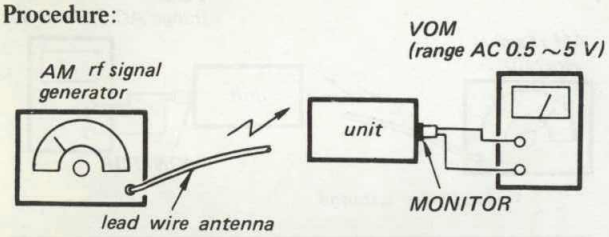
2. MW Frequency Coverage and Tracking Adjustments

Settings:

RADIO switch:	ON
band selector switch:	MW
VOLUME control:	MAX

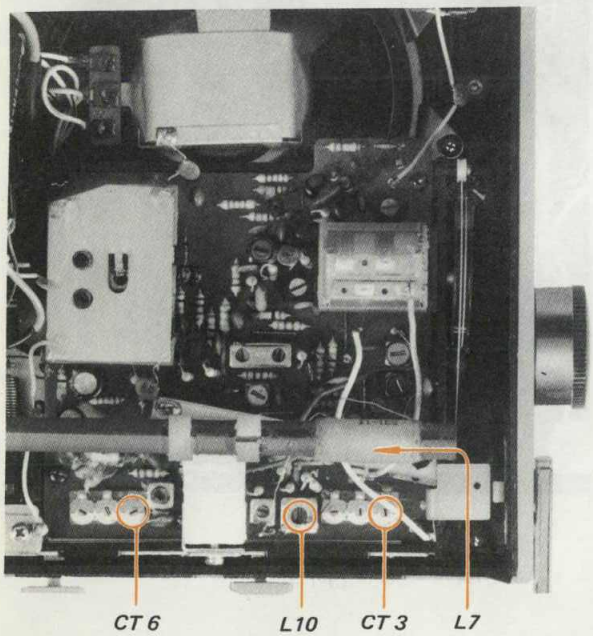
Procedure:



Adjustment	Step	AM rf signal generator frequency	Tuning knob	Adjust	VOM reading
Frequency coverage	1	520 kHz	fully counter-clockwise	L10	maximum
	2	1680 kHz	fully clockwise	CT 6	maximum
Tracking	1	620 kHz	tune to 620 kHz	L 7	maximum
	2	1400 kHz	tune to 1400 kHz	CT 3	maximum

Note: 1. Repeat above steps two or three times.
2. Fix the MW bar antenna coil L7 with wax.

Adjustment Location:

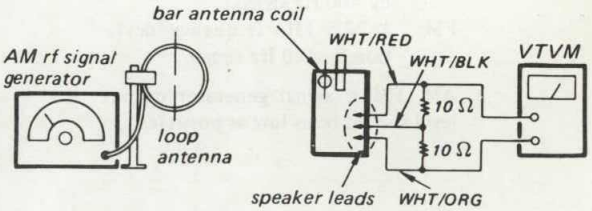


3. MW Maximum Sensitivity Measurement

Settings:

RADIO switch:	ON
band selector switch:	MW
TONE control:	HIGH
VOLUME control:	MAX
AM rf signal generator:	600 kHz (1400 kHz)
tuning knob:	tune to 600 kHz (1400 kHz)

Procedure:



1. Adjust AM rf signal generator output for −1 dB (0.69 V) VTVM reading.
2. Modulation Signal (400 Hz) : OFF
   Memorize the VTVM reading.
3. Measure S/N ratio between Step 1 and 2.

S/N Ratio $\geq$ 6 dB

Maximum Sensitivity = [AM rf signal generator output level] − [* attenuation (dB)]

S/N Ratio $<$ 6 dB

Increase AM rf signal generator output level so that S/N ratio is 6 dB, keeping VTVM reading −1 dB (0.69 V) by sliding VOLUME control.

Maximum Sensitivity = [AM rf signal generator output level] − [*attenuation (dB)]

Specification:

less than 100 μV/m (40 dB/m) at S/N 6 dB

Note: * Attenuation is given according to characteristics of loop antenna and distance between bar antenna of radio set and loop antenna.

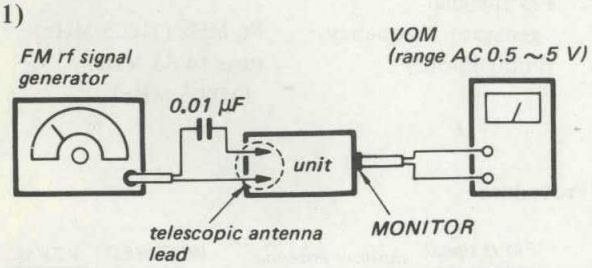
4. FM I-f Alignment

Settings:

RADIO switch:	ON
band selector switch:	FM
AFC switch:	OFF
VOLUME control:	MAX

Procedure:

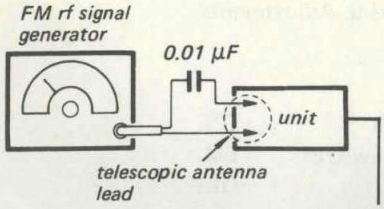
1)

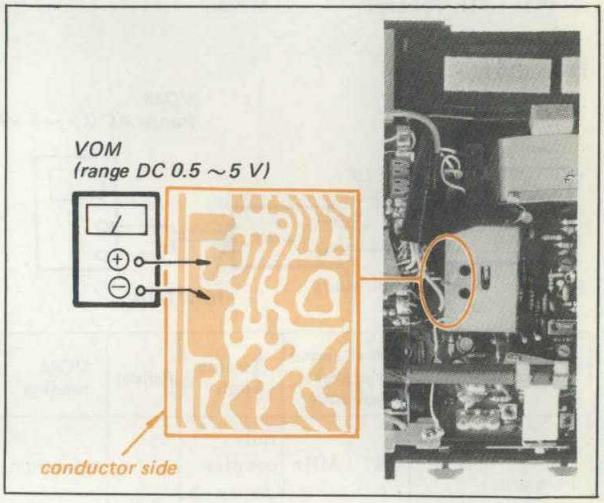


Step	FM rf signal generator frequency	Tuning knob	Adjust	VOM reading
1	10.7 MHz	Detune broad-casting signals.	FM rf signal generator tuning knob	maximum
2	10.7 MHz	Detune broad-casting signals.	IFT F1 ~ F4	maximum
3	Repeat above steps two or three times.			

– continued –

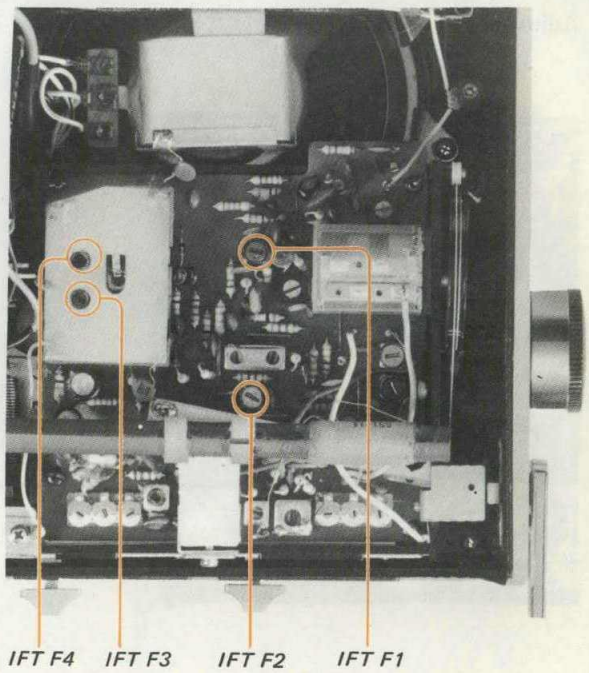
2)





1	10.7 MHz (no modula-tion)	Detune broad-casting signals.	IFT F4	DC 0 V

Adjustment Location:



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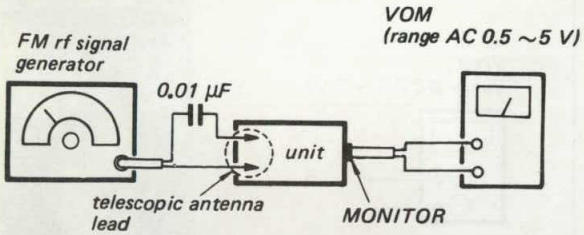
5. FM Frequency Coverage and Tracking Adjustments

Settings:

RADIO switch:	ON
band selector switch:	FM
AFC switch:	OFF
VOLUME control:	MAX

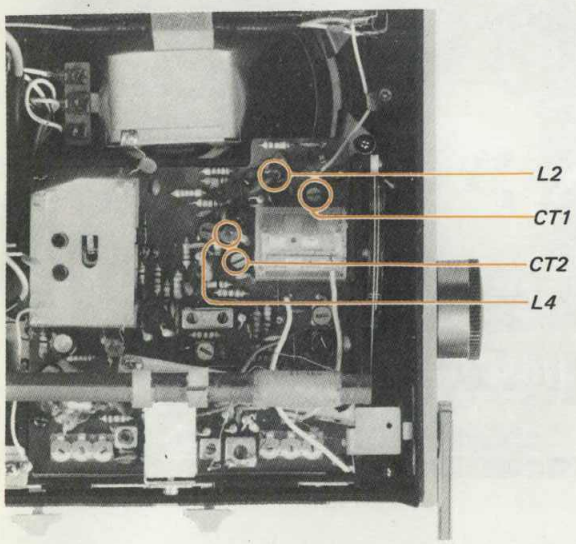
Procedure:



Adjustment	Step	FM rf signal generator frequency	Tuning knob	Adjust	VOM reading
Frequency coverage	1	87.1 MHz	fully counter-clockwise	L 4	maximum
	2	108.5 MHz	fully clockwise	CT 2	maximum
Tracking	1	87.1 MHz	fully counter-clockwise	L 2	maximum
	2	108.5 MHz	fully clockwise	CT 1	maximum

Note: Repeat above steps two or three times.

Adjustment Location:

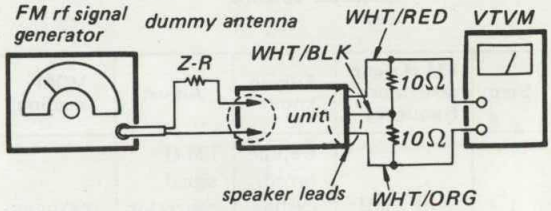


6. FM Usable Sensitivity Measurement

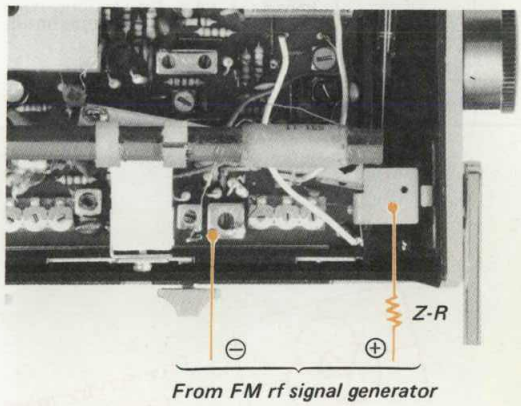
Settings:

RADIO switch:	ON
band selector switch:	FM
AFC switch:	OFF
TONE control:	HIGH
FM rf signal generator output level:	15 dB (5.6 μV)
FM rf signal generator frequency:	86 MHz (109.5 MHz)
tuning knob:	tune to 86 MHz (109.5 MHz)

Procedure:



Z: 75 Ω (receiver input impedance)
R: FM rf signal generator output impedance



1. Adjust VOLUME control for −1 dB (0.69 V) VTVM reading.
2. Modulation signal (400 Hz) : OFF
   Memorize the VTVM reading.
3. Measure S/N ratio between step 1 and 2.
4. Repeating above steps, adjust FM rf signal generator output level so that S/N ratio becomes 30 dB.
5. Read output level of the signal generator.

Specification:

6.3 μV (16 dB) at S/N 30 dB

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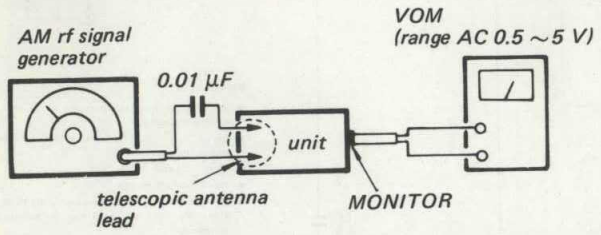
7. SW1 Frequency Coverage and Tracking Adjustments

Settings:

RADIO switch:	ON
band selector switch:	SW1
VOLUME control:	MAX

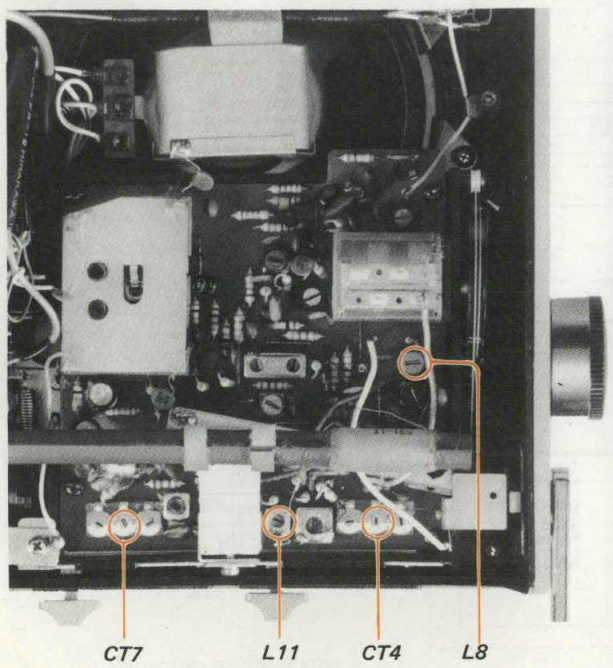
Procedure:



Adjustment	Step	AM rf signal generator frequency	Tuning knob	Adjust	VOM reading
Frequency coverage	1	2.2 MHz	fully counter-clockwise	L 11	maximum
	2	6.3 MHz	fully clockwise	CT 7	maximum
Tracking	1	2.2 MHz	tune to 2.2 MHz	L 8	maximum
	2	6.3 MHz	tune to 6.3 MHz	CT 4	maximum

Note: Repeat above steps two or three times.

Adjustment Location:

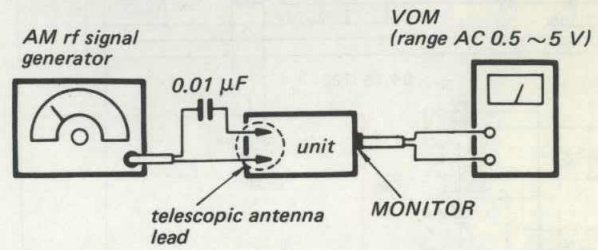


8. SW2 Frequency Coverage and Tracking Adjustments

Settings:

RADIO switch:	ON
band selector switch:	SW2
VOLUME control:	MAX

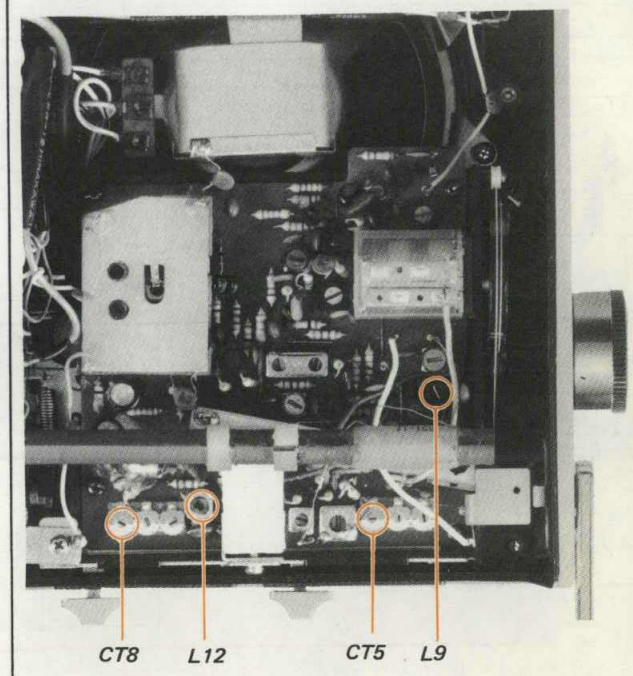
Procedure:



Adjustment	Step	AM rf signal generator frequency	Tuning knob	Adjust	VOM reading
Frequency coverage	1	5.8 MHz	fully counter-clockwise	L 12	maximum
	2	18.4 MHz	fully clockwise	CT 8	maximum
Tracking	1	5.8 MHz	tune to 5.8 MHz	L 9	maximum
	2	18.4 MHz	tune to 18.4 MHz	CT 5	maximum

Note: Repeat above steps two or three times.

Adjustment Location:

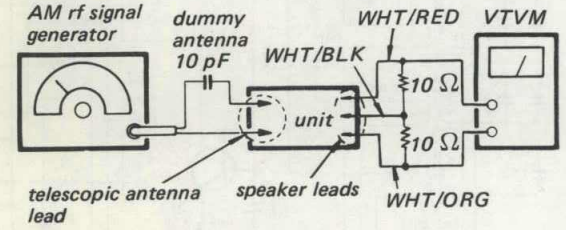


9. SW Maximum Sensitivity Measurement

Settings:

RADIO switch:	ON
band selector switch:	SW1 or SW2
TONE control:	HIGH
VOLUME control:	MAX
AM rf signal generator frequency:	SW1: 2.2 MHz (6.3 MHz); SW2: 5.8 MHz (18.4 MHz)
tuning knob:	SW1 tune to 2.2 MHz (6.3 MHz) SW2 tune to 5.8 MHz (18.4 MHz)

Procedure:



1. Adjust AM rf signal generator output level for −1 dB (0.69 V) VTVM reading.
2. Modulation signal (400 Hz): OFF
   Memorize the VTVM reading.
3. Measure S/N ratio between Step 1 and 2.

S/N Ratio $\geqq$ 6 dB

Maximum Sensitivity = AM rf signal generator output level

S/N Ratio $<$ 6 dB

Increase AM rf signal generator output level so that S/N ratio is 6 dB, keeping VTVM reading −1 dB (0.69 V) by sliding VOLUME control.

Maximum Sensitivity = AM rf signal generator output level.

Specification:

AM rf signal generator frequency	Maximum sensitivity
2.2 MHz, 5.8 MHz	3.15 µV (10 dB) at S/N 6 dB
6.3 MHz, 18.4 MHz	10 µV (20 dB) at S/N 6 dB

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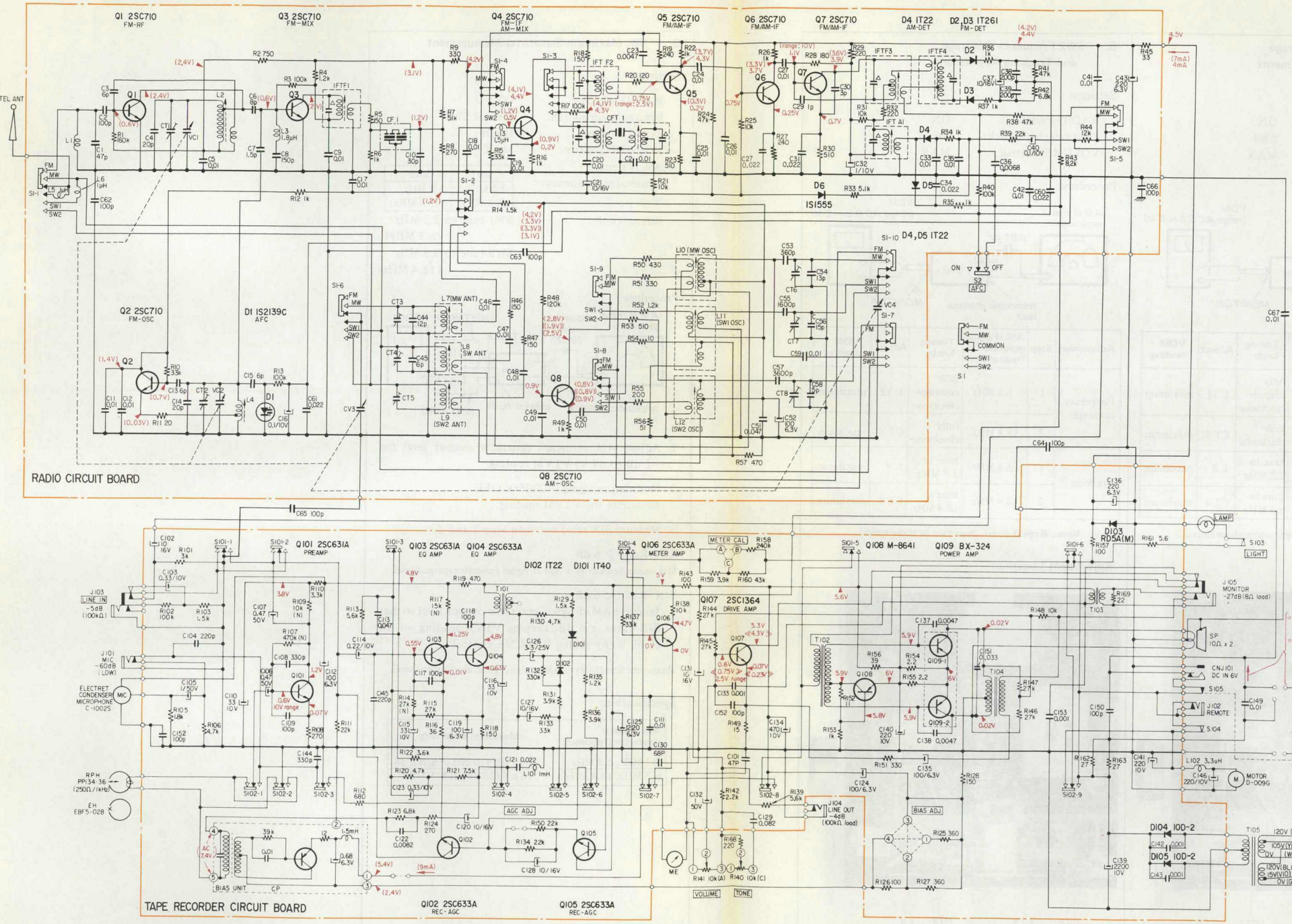
SECTION 4
DISASSEMBLY

4-1. SCHEMATIC DIAGRAM



DC resistance

	PRI	SEC
T101, T102	67Ω ± 15%	176Ω ± 15%
T103	110Ω or less	1.2Ω or less
T104	40Ω or less	18Ω or less
BIAS UNIT	2.1Ω	

Note:

- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- : Chassis ground
- (N): Low noise resistor
- Voltage values shown are measured with a VOM (20kΩ/V). Variations may be noted due to normal production tolerances.
  tape recorder section
  no mark: playback mode
  ( ) : record mode
  < > : With plug installed MONITOR jack (Q107)
  radio section (detuned)
  ( ) : FM mode
  < > : MW mode
  (( )) : SW1 mode
  [ ] : SW2 mode
  no mark: FM, MW, SW1 and SW2 mode
- Capacitors marked △ are included in i-f transformers.
- When replacing ceramic filter, use one whose identification color is the same as the used one.
- Switch mode:

Ref. No.	Switch	Mode
S1	band selector	FM
S2	AFC	OFF
S101	RADIO	OFF
S102	record/playback	playback
S103	LIGHT	OFF
S104	motor	OFF (with tape run: ON)
S105	ac/dc	dc (with power cord plug installed to AC INPUT jack (CNJ102): ac)
S106	voltage selector	

RADIO switch: ON
FM 35mA
AM 35mA
RADIO switch: OFF
Tape end portion of C-90
playback mode ------ 180mA
record mode ------ 170mA
fast forward mode ---- 230mA
rewind mode ------ 215mA

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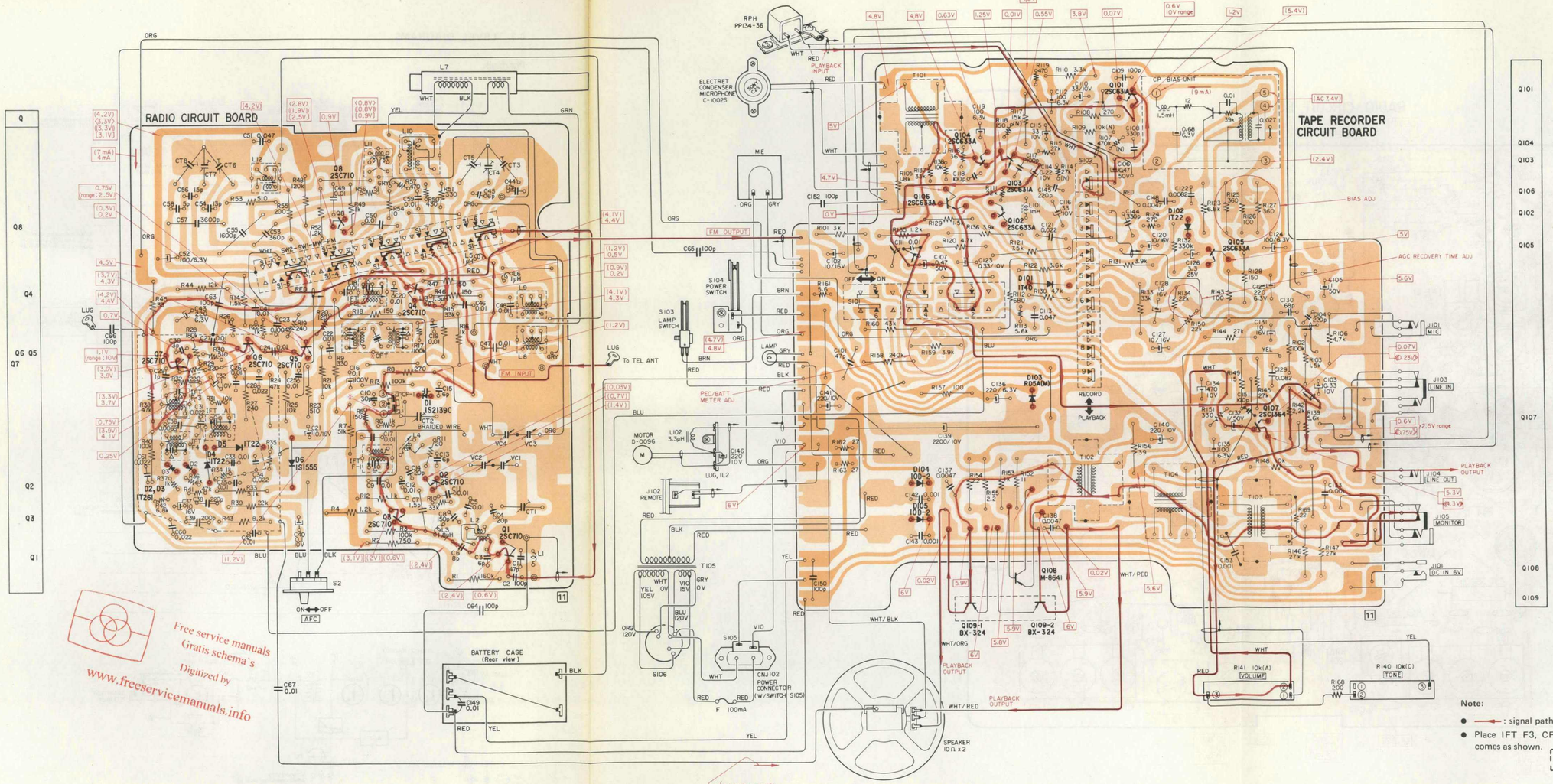
4-2. MOUNTING DIAGRAM

– Conductor Side –

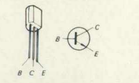


Note:

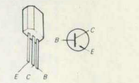
- ——: signal path
- Place IFT F3, CFT and CF-1 so that the marking side comes as shown.

- ▬: B + pattern

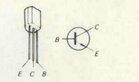
Q1 ~ 8: 2SC710



Q101, 103: 2SC631A
Q102, 104, Q105, 106: 2SC633A



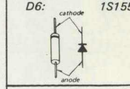
Q107: 2SC1364



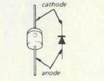
Q108: M-8641

Q109: BX-324

D1:	1S2139C
D2, 3:	1T261
D4, 5, 102:	1T22
D101:	1T40
D103:	RD5A (M)
D6:	1S1555



D104, 105: 10D-2



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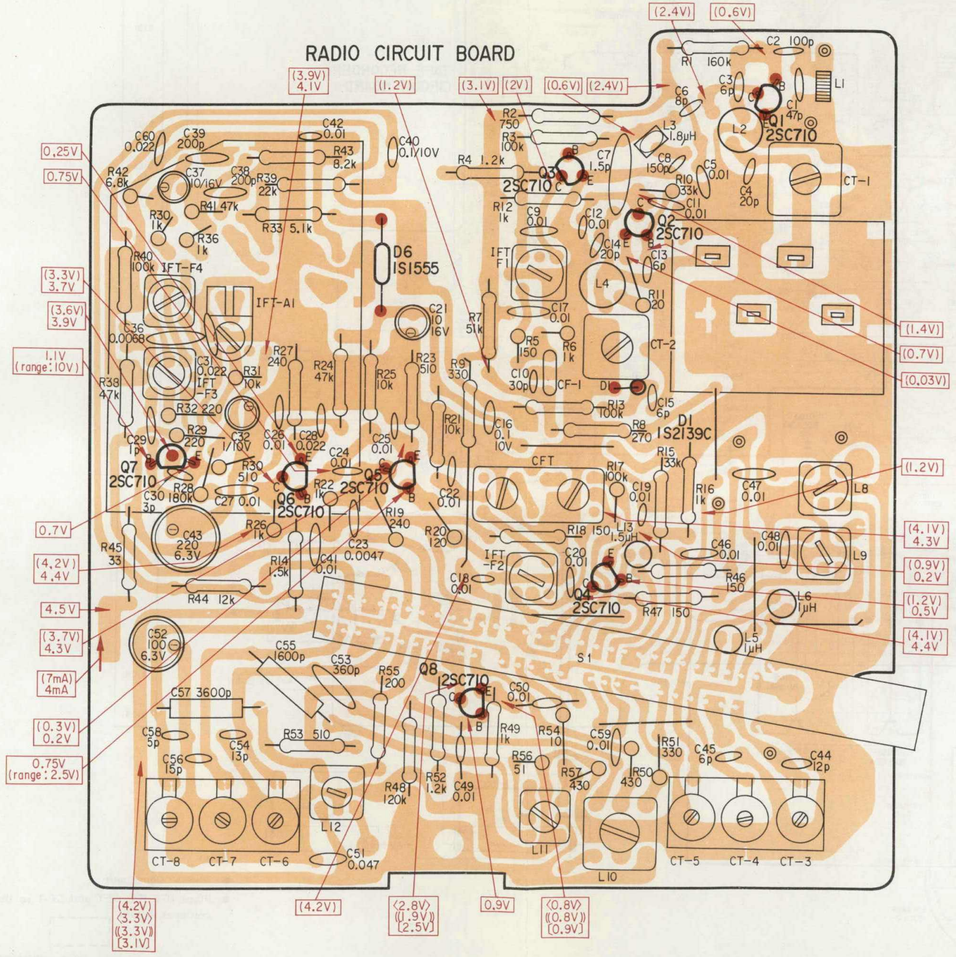
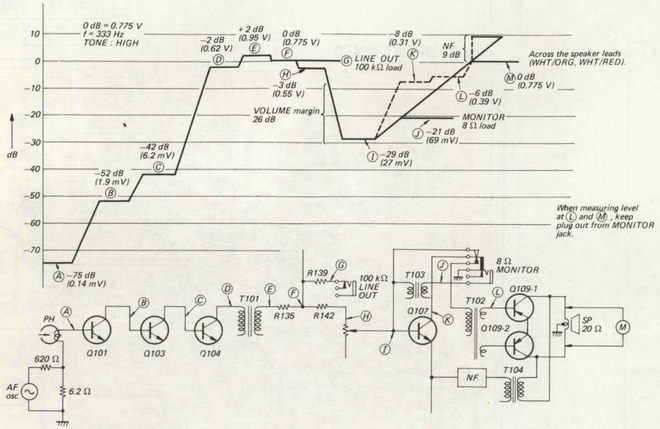
– Component Side –



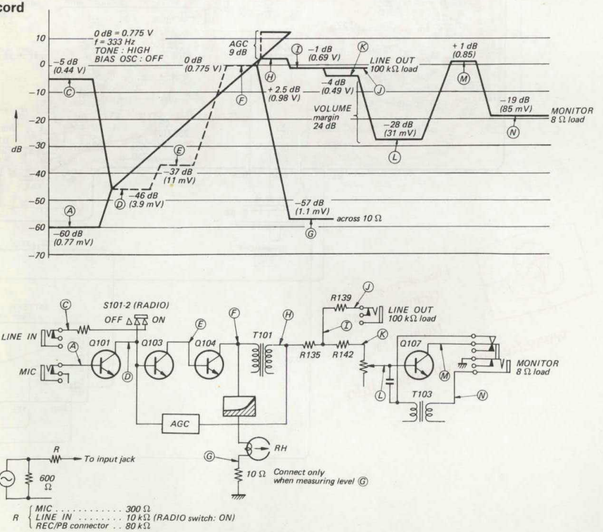
CF-420S

4-3. LEVEL DIAGRAMS

Playback

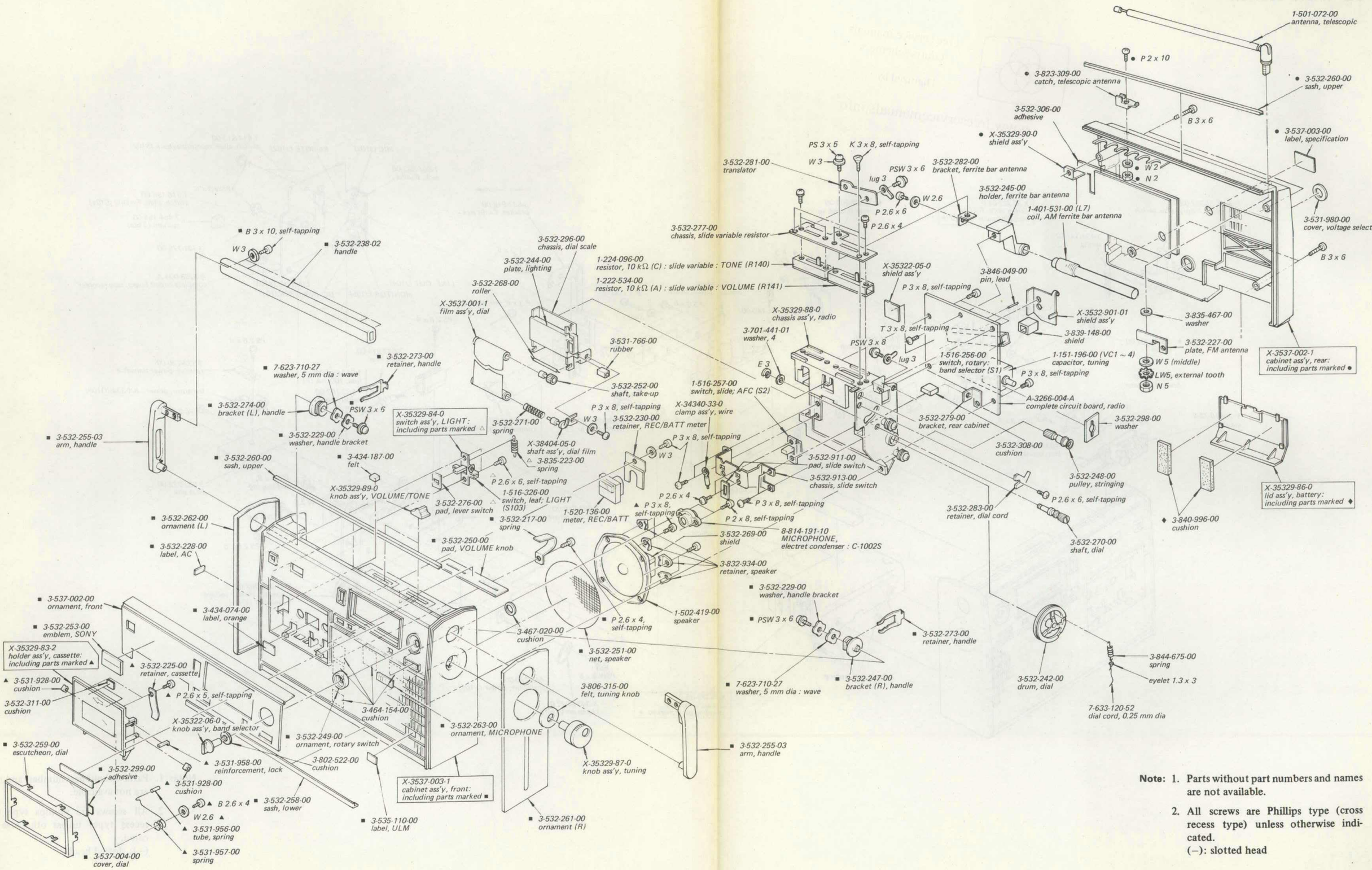


Record



SECTION 5
EXPLODED VIEWS

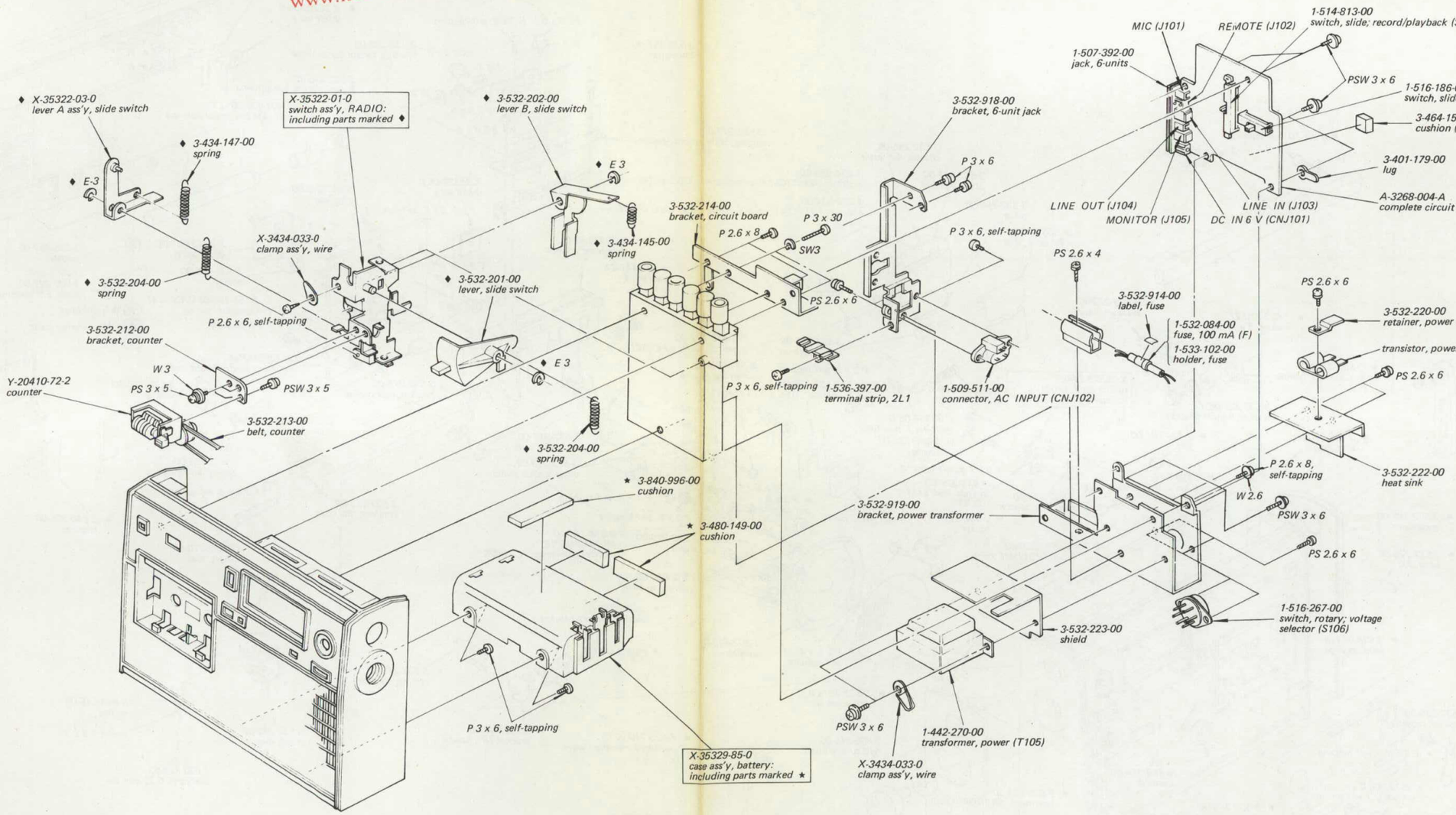
5-1. CABINET



Note: 1. Parts without part numbers and names are not available.

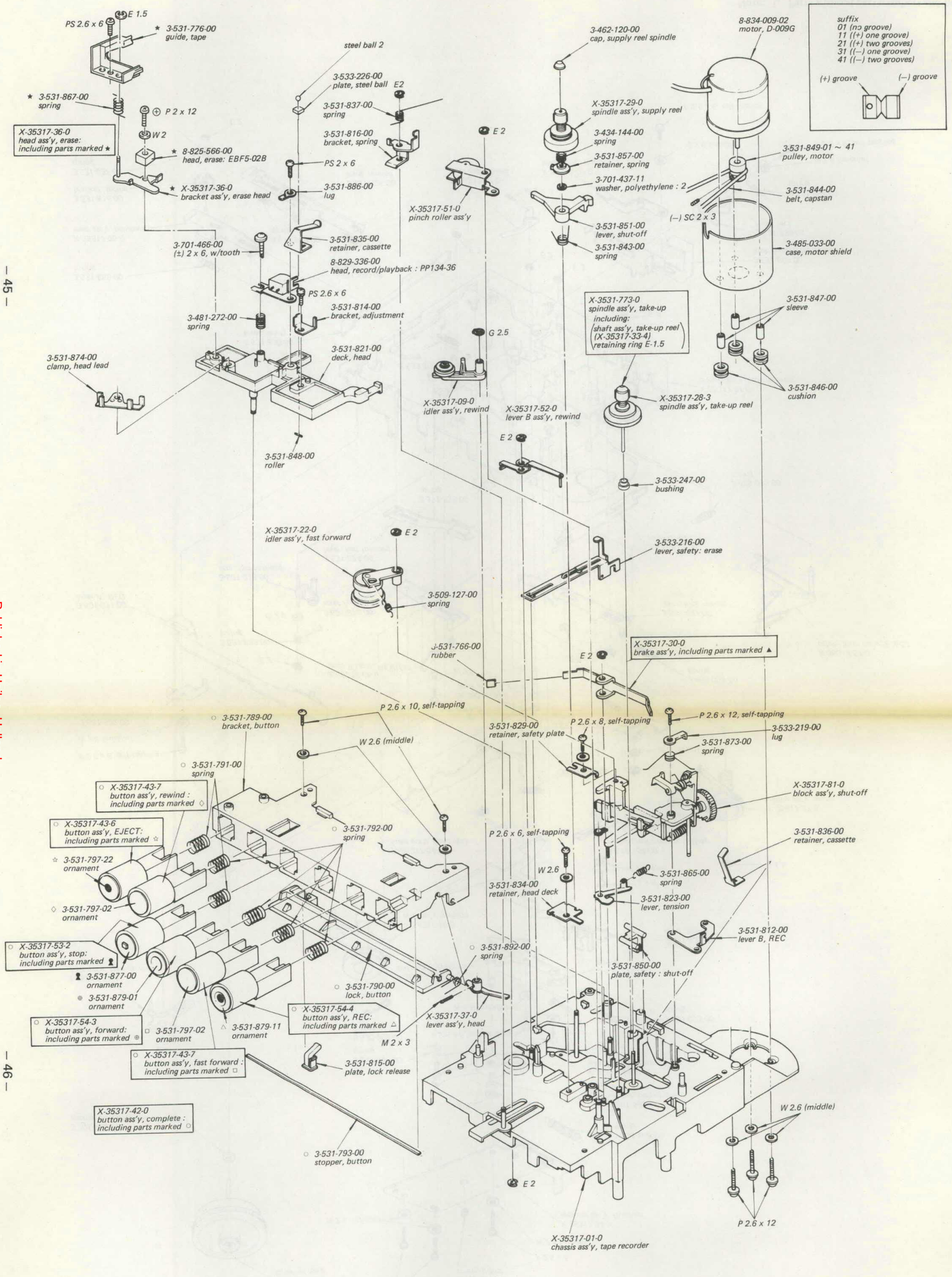
2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(−): slotted head

5-2. RADIO SECTION



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

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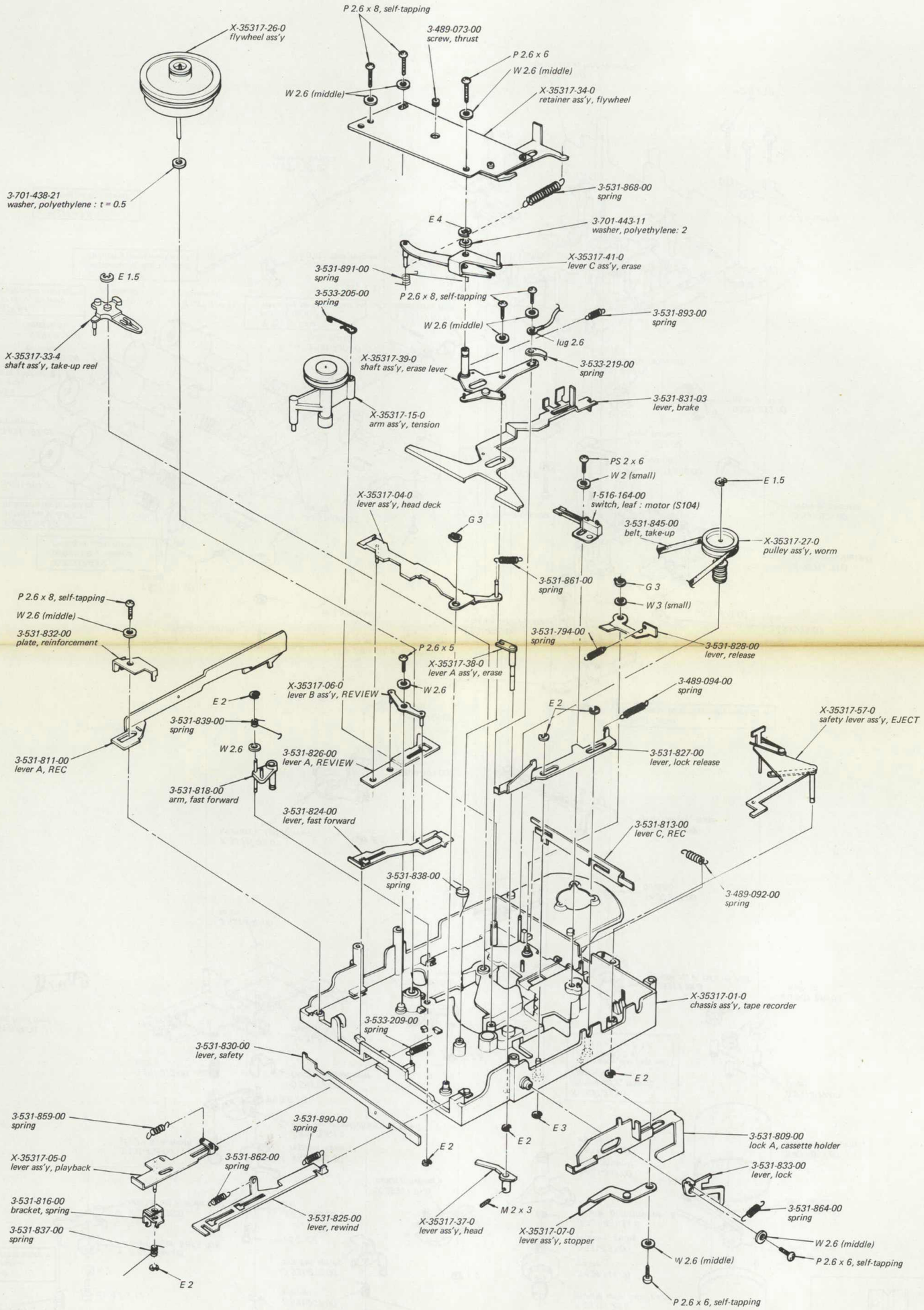
5/29/16

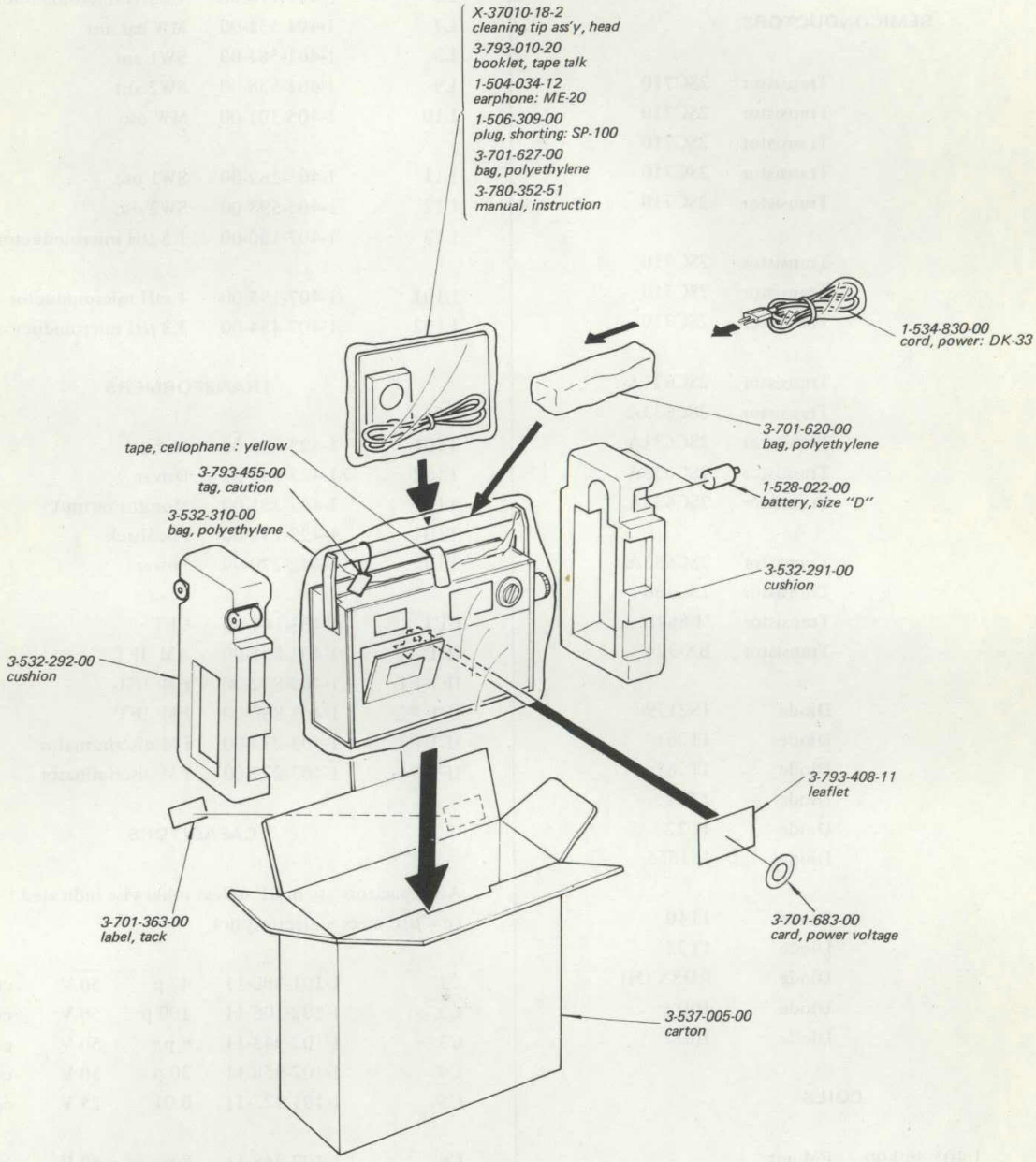
5-4. CHASSIS – Bottom View –



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

5-5. PACKING



Note: 1. Parts without part numbers and names are not available.

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SECTION 6

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	COMPLETE CIRCUIT BOARDS	
	A-3268-004-A	Tape recorder
	A-3266-004-A	Radio
	SEMICONDUCTORS	
Q1		Transistor 2SC710
Q2		Transistor 2SC710
Q3		Transistor 2SC710
Q4		Transistor 2SC710
Q5		Transistor 2SC710
Q6		Transistor 2SC710
Q7		Transistor 2SC710
Q8		Transistor 2SC710
Q101		Transistor 2SC631A
Q102		Transistor 2SC633A
Q103		Transistor 2SC631A
Q104		Transistor 2SC633A
Q105		Transistor 2SC633A
Q106		Transistor 2SC633A
Q107		Transistor 2SC1364
Q108		Transistor M-8641
Q109		Transistor BX-324
D1		Diode 1S2139C
D2		Diode 1T261
D3		Diode 1T261
D4		Diode 1T22
D5		Diode 1T22
D6		Diode 1S1555
D101		Diode 1T40
D102		Diode 1T22
D103		Diode RD5A (M)
D104		Diode 10D2
D105		Diode 10D2
	COILS	
L1	1-401-460-00	FM ant
L2	1-425-632-00	FM rf
L3	1-407-670-00	1.8 μH microinductor
L4	1-405-491-00	FM osc
L5	1-407-178-00	1.0 μH microinductor
L6	1-407-178-00	1.0 μH microinductor
L7	1-401-531-00	MW bar ant
L8	1-401-584-00	SW1 ant
L9	1-401-538-00	SW2 ant
L10	1-405-301-00	MW osc
L11	1-405-262-00	SW1 osc
L12	1-405-593-00	SW2 osc
L13	1-407-180-00	1.5 μH microinductor
L101	1-407-195-00	1 mH microinductor
L102	1-407-484-00	3.3 μH microinductor
	TRANSFORMERS	
T101	1-423-049-00	Meter
T102	1-423-049-00	Driver
T103	1-427-351-00	Monitor output
T104	1-423-191-00	Feedback
T105	1-442-270-00	Power
CFT	1-403-144-00	CFT
IFT A	1-403-801-00	AM IFT
IFT F1	1-403-872-00	FM IFT
IFT F2	1-403-868-00	FM IFT
IFT F3	1-403-272-00	FM discriminator
IFT F4	1-403-273-00	FM discriminator

CAPACITORS

All capacitors are in μF unless otherwise indicated.
(p = μμ, elect = electrolytic)

C1	1-101-880-11	47 p	50 V	ceramic
C2	1-102-106-11	100 p	50 V	ceramic
C3	1-102-943-11	6 p	50 V	ceramic
C4	1-102-958-11	20 p	50 V	ceramic
C5	1-101-923-11	0.01	25 V	ceramic
C6	1-102-945-11	8 p	50 V	ceramic
C7	1-101-576-11	1.5 p	50 V	ceramic

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Ref. No.	Part No.	Description		
C8	1-107-135-11	150 p	50 V	silvered mica
C9	1-101-923-11	0.01	25 V	ceramic
C10	1-102-962-11	30 p	50 V	ceramic
C11	1-101-923-11	0.01	25 V	ceramic
C12	1-101-923-11	0.01	25 V	ceramic
C13	1-102-943-11	6 p	50 V	ceramic
C14	1-102-671-11	20 p	50 V	ceramic
C15	1-102-943-11	6 p	50 V	ceramic
C16	1-127-045-11	0.1	10 V	solid aluminum
C17	1-101-923-11	0.01	25 V	ceramic
C18	1-105-833-12	0.01	50 V	mylar
C19	1-105-833-12	0.01	50 V	mylar
C20	1-105-833-12	0.01	50 V	mylar
C21	1-121-651-11	10	16 V	elect
C22	1-101-923-11	0.01	25 V	ceramic
C23	1-105-829-12	0.0047	50 V	mylar
C24	1-101-923-11	0.01	25 V	ceramic
C25	1-105-833-12	0.01	50 V	mylar
C26	1-101-923-11	0.01	25 V	ceramic
C27	1-101-923-11	0.01	25 V	ceramic
C28	1-105-837-12	0.01	50 V	mylar
C29	1-102-938-11	1 p	50 V	ceramic
C30	1-102-940-11	3 p	50 V	ceramic
C31	1-105-837-11	0.022	50 V	mylar
C32	1-127-049-11	1	10 V	solid aluminum
C33	1-105-833-12	0.01	50 V	mylar
C34	1-105-837-12	0.022	50 V	mylar
C35	1-105-833-12	0.01	50 V	mylar
C36	1-105-671-12	0.068	50 V	mylar
C37	1-121-651-11	10	16 V	elect
C38	1-107-138-11	200 p		silvered mica
C39	1-107-138-11	200 p		silvered mica
C40	1-127-045-11	0.1	10 V	solid aluminum
C41	1-101-923-11	0.01	25 V	ceramic
C42	1-105-833-12	0.01	50 V	mylar
C43	1-121-419-11	220	16 V	elect
C44	1-102-949-11	12 p	50 V	ceramic
C45	1-102-943-11	6 p	50 V	ceramic

Ref. No.	Part No.	Description		
C46	1-101-923-11	0.01	25 V	ceramic
C47	1-101-923-11	0.01	25 V	ceramic
C48	1-101-923-11	0.01	25 V	ceramic
C49	1-105-833-12	0.01	50 V	mylar
C50	1-101-923-11	0.01	25 V	ceramic
C51	1-105-841-12	0.047	50 V	mylar
C52	1-121-413-11	100	6.3 V	elect
C53	1-107-241-11	360 p	50 V	silvered mica
C54	1-102-950-11	13 p	50 V	ceramic
C55	1-103-880-11	1600 p	50 V	polystyrol
C56	1-102-291-11	15 p	50 V	ceramic
C57	1-103-888-11	3600 p	50 V	polystyrol
C58	1-102-280-11	5 p	50 V	ceramic
C59	1-101-923-11	0.01	25 V	ceramic
C60	1-101-924-11	0.022	50 V	ceramic
C61	1-101-924-11	0.022	50 V	ceramic
C62	1-102-106-11	100 p	50 V	ceramic
C63	1-102-106-11	100 p	50 V	ceramic
C64	1-102-106-11	100 p	50 V	ceramic
C65	1-102-106-11	100 p	50 V	ceramic
C66	1-102-106-11	100 p	50 V	ceramic
C67	1-101-923-11	0.01	25 V	ceramic
C68	1-101-923-11	0.01	25 V	ceramic
C101	1-101-881-11	47 p	50 V	ceramic
C102	1-121-651-11	10	16 V	elect
C103	1-127-021-11	0.33	10 V	solid aluminum
C104	1-102-110-11	220 p	50 V	ceramic
C105	1-121-391-11	1	50 V	elect
C106	1-121-726-11	0.47	50 V	elect
C107	1-121-726-11	0.47	50 V	elect
C108	1-102-112-11	330 p	50 V	ceramic
C109	1-102-106-11	100 p	50 V	ceramic
C110	1-121-402-11	33	10 V	elect
C111	1-105-673-12	0.01	50 V	mylar
C112	1-121-413-11	100	6.3 V	elect
C113	1-105-681-12	0.047	50 V	mylar
C114	1-127-020-11	0.22	10 V	solid aluminum
C115	1-121-402-11	33	6.3 V	elect

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Ref. No.	Part No.	Description		
C116	1-121-402-11	33	6.3 V	elect
C117	1-102-106-11	100 p	50 V	ceramic
C118	1-102-106-11	100 p	50 V	ceramic
C119	1-121-413-11	100	6.3 V	elect
C120	1-121-651-11	10	16 V	elect
C121	1-105-677-12	0.022	50 V	mylar
C122	1-105-672-12	0.0082	50 V	mylar
C123	1-127-021-11	0.33	10 V	solid aluminum
C124	1-121-413-11	100	6.3 V	elect
C125	1-121-419-11	220	6.3 V	elect
C126	1-121-392-11	3.3	25 V	elect
C127	1-121-651-11	10	16 V	elect
C128	1-121-651-11	10	16 V	elect
C129	1-105-684-12	0.082	50 V	mylar
C130	1-101-889-11	68 p	50 V	ceramic
C131	1-121-651-11	10	16 V	elect
C132	1-121-391-11	1	50 V	elect
C133	1-105-821-12	0.001	50 V	mylar
C134	1-121-425-11	470	10 V	elect
C135	1-121-413-11	100	6.3 V	elect
C136	1-121-419-11	220	6.3 V	elect
C137	1-105-829-12	0.0047	50 V	mylar
C138	1-105-829-12	0.0047	50 V	mylar
C139	1-119-356-11	2200	10 V	elect
C140	1-121-420-11	220	10 V	elect
C141	1-121-420-11	220	10 V	elect
C142	1-101-918-11	0.001	50 V	ceramic
C143	1-101-918-11	0.001	50 V	ceramic
C144	1-102-112-11	330 p	50 V	ceramic
C145	1-102-110-11	220 p	50 V	ceramic
C146	1-121-420-11	220	10 V	elect
C147		----------		
C148		----------		
C149	1-101-923-11	0.01	50 V	ceramic
C150	1-102-106-11	100 p	50 V	ceramic
C151		----------		
C152	1-102-106-11	100 p	50 V	ceramic
C153	1-101-918-11	0.001	50 V	ceramic

Ref. No.	Part No.	Description
VC1 ~ 4	1-151-196-00	Tuning
CT1, 2	1-141-097-00	Trimmer, one unit
CT3 ~ 8	1-141-151-00	Trimmer, three gang

RESISTORS

All resistors are ¼ W, carbon type and in Ω unless otherwise indicated. (k = 1000, (N) = low noise)

R1	1-244-726-11	160 k
R2	1-244-670-11	750
R3	1-244-721-11	100 k
R4	1-244-675-11	1.2 k
R5	1-242-653-11	150
R6	1-242-673-11	1 k
R7	1-244-714-11	51 k
R8	1-244-659-11	270
R9	1-244-661-11	330
R10	1-242-709-11	33 k
R11	1-242-632-11	20
R12	1-244-673-11	1 k
R13	1-244-721-11	100 k
R14	1-244-677-11	1.5 k
R15	1-244-709-11	33 k
R16	1-244-673-11	1 k
R17	1-242-721-11	100 k
R18	1-244-653-11	150
R19	1-242-658-11	240
R20	1-242-651-11	120
R21	1-244-697-11	10 k
R22	1-242-673-11	1 k
R23	1-244-666-11	510
R24	1-244-713-11	47 k
R25	1-244-697-11	10 k
R26	1-242-673-11	1 k
R27	1-244-658-11	240
R28	1-242-727-11	180 k
R29	1-242-657-11	220
R30	1-242-666-11	510

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Ref. No.	Part No.	Description
R31	1-242-679-11	10 k
R32	1-242-657-11	220
R33	1-244-690-11	5.1 k
R34	1-242-673-11	1 k
R35	1-242-673-11	1 k
R36	1-242-673-11	1 k
R37	1-242-673-11	1 k
R38	1-244-713-11	47 k
R39	1-244-705-11	22 k
R40	1-244-721-11	100 k
R41	1-242-713-11	47 k
R42	1-242-693-11	6.8 k
R43	1-244-695-11	8.2
R44	1-244-699-11	12 k
R45	1-244-637-11	33
R46	1-244-653-11	150
R47	1-244-653-11	150
R48	1-244-723-11	120 k
R49	1-244-673-11	1 k
R50	1-242-664-11	430
R51	1-242-661-11	330
R52	1-244-675-11	1.2 k
R53	1-244-666-11	510
R54	1-242-625-11	10
R55	1-244-656-11	200
R56	1-242-642-11	51
R57	1-242-665-11	470
R101	1-244-684-11	3 k
R102	1-244-721-11	100 k
R103	1-244-677-11	1.5 k
R104		----------
R105	1-244-679-11	1.8 k
R106	1-244-689-11	4.7 k
R107	1-242-737-09	470 k (N)
R108	1-244-659-11	270
R109	1-244-697-09	10 k (N)
R110	1-244-685-11	3.3 k
R111	1-242-705-11	22 k
R112	1-242-669-11	680
R113	1-242-715-11	56 k
R114	1-242-707-09	27 k (N)
R115	1-242-707-11	27 k
R116	1-242-638-11	36
R117	1-244-701-09	15 k (N)
R118	1-242-653-11	150
R119	1-242-665-11	470
R120	1-244-689-11	4.7 k
R121	1-244-694-11	7.5 k
R122	1-244-686-11	3.6 k
R123	1-244-693-11	6.8 k
R124	1-242-659-11	270
R125	1-244-662-11	360
R126	1-244-649-11	100
R127	1-244-662-11	360
R128	1-244-653-11	150
R129	1-244-677-11	1.5 k
R130	1-242-689-11	4.7 k
R131	1-244-687-11	3.9 k
R132	1-244-733-11	330 k
R133	1-244-709-11	33 k
R134	1-242-705-11	22 k
R135	1-242-675-11	1.2 k
R136	1-244-687-11	3.9 k
R137	1-242-709-11	33 k
R138	1-242-697-11	10 k
R139	1-244-691-11	5.6 k
R140	1-222-534-00	10 k (A), slide variable
R141	1-224-096-00	10 k (C), slide variable
R142	1-244-681-11	2.2 k
R143	1-244-649-11	100
R144	1-244-707-11	27 k
R145	1-244-707-11	27 k
R146	1-244-707-11	27 k
R147	1-244-707-11	27 k
R148	1-244-697-11	10 k
R149	1-244-629-11	15
R150	1-242-705-11	22 k
R151	1-242-661-11	330
R152	1-244-626-11	11
R153	1-244-673-11	1 k
R154	1-244-609-11	2.2
R155	1-244-609-11	2.2
R156	1-244-639-11	39
R157	1-244-649-11	100
R158	1-244-730-11	240 k
R159	1-244-687-11	3.9 k
R160	1-244-712-11	43 k
R161	1-242-619-11	5.6
R162	1-242-635-11	27
R163	1-242-635-11	27
R164		----------
R165		----------
R166		----------
R167		----------
R168	1-242-657-11	220
R169	1-242-633-11	22

SWITCHES

S1	1-516-256-00	Rotary, band selector
S2	1-516-257-00	Slide, AFC
S101	1-516-186-00	Slide, RADIO
S102	1-514-813-00	Slide, record/playback
S103	1-516-326-00	Included in LIGHT Switch Ass'y (X-35329-84-0)
S104	1-516-164-00	Leaf, motor
S105		Included in power connector (1-509-511-00) (CNJ102)
S106	1-516-267-00	Rotary, voltage selector

JACKS

J101, J102, J103, J104, J105, CNJ101	1-507-392-00	6-unit, MIC / REMOTE / LINE IN / LINE OUT / MONITOR / DC IN 6 V
CNJ102	1-509-511-00	Connector, AC INPUT

MISCELLANEOUS

	8-825-566-00	Head, erase; EBF5-02B
	8-829-336-00	Head, record/playback; PP134-36
	8-834-009-01	Motor, D-009G
	8-814-191-10	Microphone, electret condenser; C-1002S
	1-464-007-00	Unit, bias osc
※	1-527-184-11	Filter, ceramic; red
※	1-527-184-12	Filter, ceramic; blue
※	1-527-184-13	Filter, ceramic; orange
※	1-527-184-14	Filter, ceramic; black
※	1-527-184-15	Filter, ceramic; white
※	1-527-184-16	Filter, ceramic; green
※	1-527-184-17	Filter, ceramic; yellow
	1-501-072-00	Antenna, telescopic
	1-502-419-00	Speaker
	1-518-152-00	Lamp, 35 mA
	1-520-136-00	Meter, level
	1-532-084-00	Fuse, 100 mA
	1-533-102-00	Holder, fuse
	1-535-050-00	Connector, circuit board
	1-536-397-00	Strip, terminal
	1-535-047-00	Connector, solderless

※: When replaceing ceramic filter, use one whose identification color is the same as the used one.

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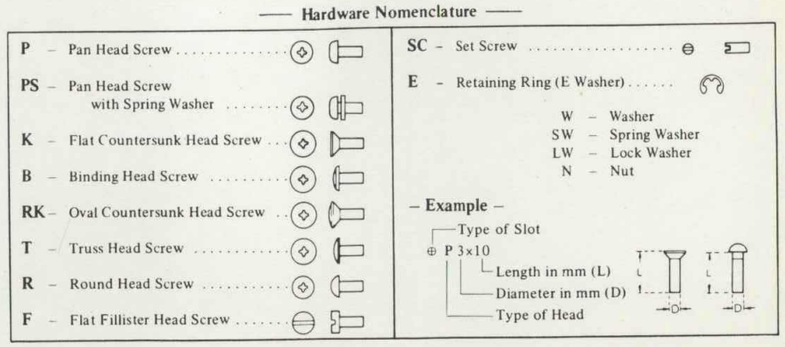
SECTION 7

HARDWARE

Part No.	*Description*
	SCREWS
	All screws are Phillips type (cross recess type) unless otherwise indicated. (–): slotted head.
7-621-255-67	P 2 x 10
7-621-259-25	P 2.6 x 4
7-621-259-45	P 2.6 x 5
7-621-259-72	P 2.6 x 12
7-621-716-38	M 2 x 3
7-621-720-46	P 2 x 8, self-tapping
7-621-721-52	P 2.6 x 4, self-tapping
7-621-721-61	P 2.6 x 5, self-tapping
7-621-721-71	P 2.6 x 6, self-tapping
7-621-721-81	P 2.6 x 8, self-tapping
7-621-721-91	P 2.6 x 10, self-tapping
7-621-722-02	P 2.6 x 12, self-tapping
7-621-770-67	B 2.6 x 6
7-621-773-86	B 2.6 x 4
7-628-154-15	PS 2.6 x 6
7-628-253-25	PS 2 x 6
7-682-135-01	P 2.6 x 6
7-682-547-04	B 3 x 6
7-682-548-04	B 3 x 8
7-682-624-01	PS 2 x 4
7-682-626-01	PS 2 x 4
7-682-646-01	PS 3 x 5
7-682-655-01	PS 3 x 30
7-682-947-01	PSW 3 x 6
7-682-948-01	PSW 3 x 8
7-683-126-00	(–) SC 2 x 3
7-685-145-01	P 3 x 6, self-tapping
7-685-145-51	P 3 x 6, self-tapping
7-685-146-21	P 3 x 8, self-tapping
7-685-246-21	K 3 x 8, self-tapping
7-685-446-21	T 3 x 8, self-tapping
7-685-547-24	B 3 x 10, self-tapping
	WASHERS
7-623-105-01	2 (small)
7-623-105-11	2 (middle)
7-623-105-12	2 (middle)
7-623-107-12	2.6 (middle)
7-623-107-19	2.6 (middle)
7-623-108-12	3
7-623-112-19	5 (middle)
7-623-208-21	3 spring
7-623-412-01	5 external tooth
7-623-710-27	5 wave
	NUTS
7-622-205-02	2
7-684-025-01	5
	LUGS
7-623-505-01	2
7-623-505-11	2
7-623-507-11	2.6
7-623-508-11	3
	RETAINING RINGS
7-624-102-01	E 1.5
7-624-104-01	E 2
7-624-106-01	E 3
7-624-108-01	E 4
7-624-171-41	G 2.5
7-624-171-51	G 3
	DIAL CORD
7-633-120-52	0.25
	EYELET
7-623-606-01	1.3 x 3

— Hardware Nomenclature —



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