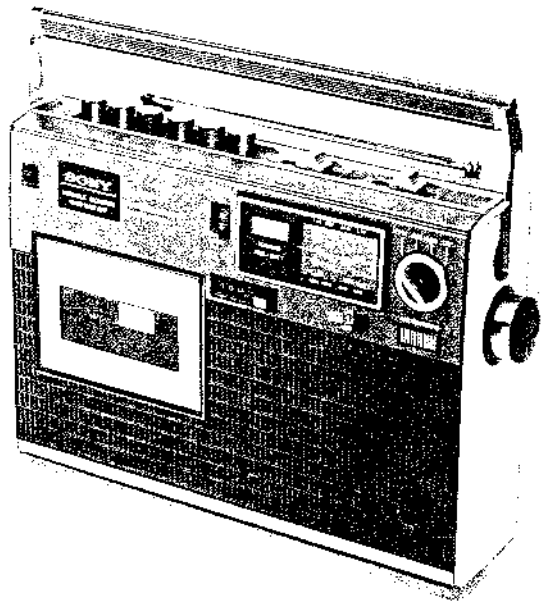


SPECIFICATIONS

RADIO SECTION

Circuit:	Superheterodyne
Frequency Ranges:	FM 87.5 ~ 108 MHz (3.43 ~ 2.78 m) MW 530 ~ 1,605 kHz (566 ~ 187 m) SW 6 ~ 18 MHz (51 ~ 17 m) LW 150 ~ 350 kHz (2,000 ~ 857 m)
Intermediate Frequencies:	FM 10.7 MHz AM 455 kHz
Antennas	FM, SW built-in telescopic (5 section, 87 cm long) MW, LW built-in ferrite bar (10 mm dia x 13 cm)
Sensitivity at 50 mW output:	FM 2.5 dB (1.3 µV) S/N 6 dB 1.3 dB (4.5 µV) S/N 30 dB MW 33 dB m (45 µV m, S/N 6 dB SW 7 ... dB (2.2 µV, S/N 6 dB LW 41 dB m (10 µV m, S/N 6 dB
Selectivity at 10 kHz offresonance:	MW 29 dB at 1,400 kHz
Signal-to Noise Ratio:	FM 67 dB at 98 MHz input level 55 dB (550 µV) MW 35 dB at 1,000 kHz input level 60 dB m (1 mV m) SW 44 dB at 10 MHz input level 44 dB (160 µV) LW 26 dB at 250 kHz input level 60 dB m (1 mV m)

TAPE RECORDER SECTION

Track:	Two-track mono
Record Bias Frequency:	Approximately 35 kHz
Frequency Response:	50 ~ 10,000 Hz
Wow and Flutter:	0.3 % (RMS) weighted
Signal-to-Noise Ratio:	42 dB
Overall Distortion:	3.5 %
Record/playback Head:	PP134 3E (250 Ω) 1 unit
Erase Head:	EBF5-02B (ferrite)
Motor:	D-009G (DC governor)
Electret Condenser Microphone:	C-1002S
Automatic Shut-off Mechanism:	Operates in playback, record, fast forward and rewind modes to automatically stop tape operation and turns RADIO switch OFF.
Inputs:	MIC minimum level: −72 dB (0.2 mV) impedance: low LINE IN minimum level: −11 dB (0.22 V) impedance: 100 kΩ
Outputs:	MONITOR normal level: −10 dB (245 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
REC/PB Connector:	Input normal level: −33 dB (17.35 mV) impedance: 10 kΩ Output normal level: −1.5 dB (0.65 V) load impedance: 10 kΩ

GENERAL

Power Requirements:	AC 110, 127, 220, 240 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, DCC-128
Power Consumption	AC 8 W
Speaker:	12 cm (5") dia, 28 Ω
Output Power:	2.7 W
Semiconductors:	1 FET, 1 unijunction, 1 electret condenser microphone, 18 transistors and 12 diodes
Dimensions:	340 (w) x 224 (h) x 103 (d) mm 13 3/8 (w) x 8 7/8 (h) x 4 1/8 (d) inches
Weight:	3.75 kg, 8 lb 4 oz (with battery)

SERVICE MANUAL

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.

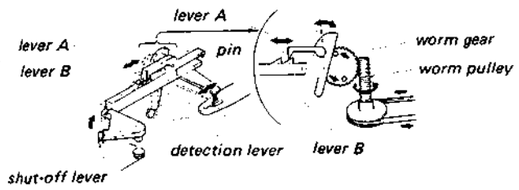
In West Germany the fm frequency coverage should be within the range between 87.5 MHz and 108 MHz.
Adjust the frequency coverage by osc coil and osc trimmer (See FM Frequency Coverage Adjustment on page 29).

SECTION 1
OUTLINE

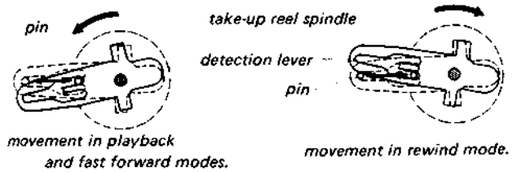
1-1. AUTOMATIC SHUT-OFF MECHANISM OPERATION

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

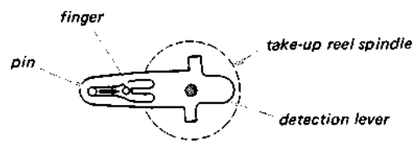
1 The operation in playback mode is explained as an example. When the forward button is depressed and locked, the brake lever is pushed and turns the power switch ON starting the motor.



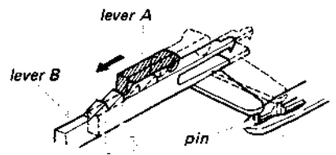
2 Turning force is transmitted as shown. Lever A, activated by the worm gear rotation, moves lever B back and forth as shown.



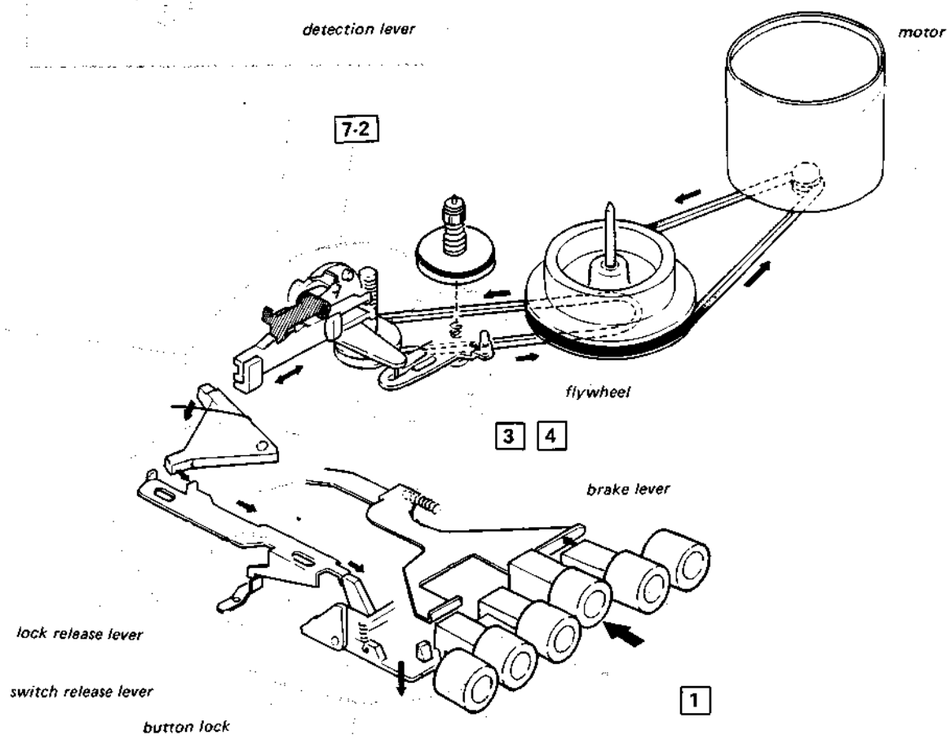
3 Take-up reel spindle rotates as long as there is some tape remaining on the supply reel. The rotational force on the detection lever, which is attached to the take-up reel spindle through a spring, permits movement of the pin as shown above in various modes.

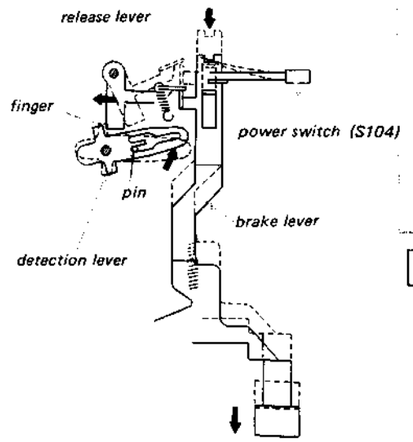


4 When tape supply ends, the rotational force on the detection lever stops and the pin movement is limited by the finger.



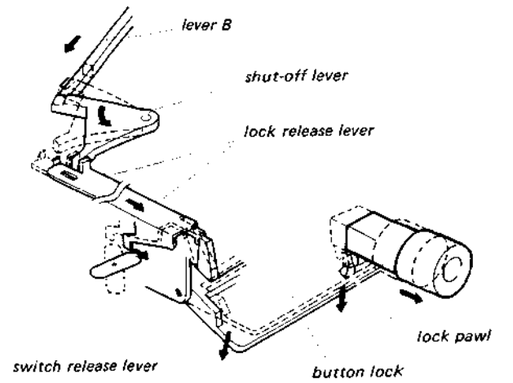
5 The finger holds the pin (lever B) forward far enough so that the pawl of lever A is able to push lever B at position 2.



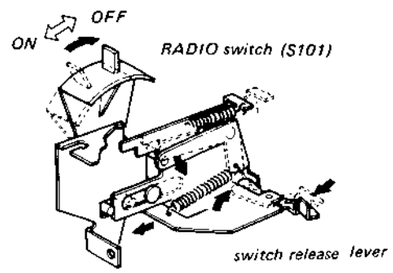


7-1 **RELEASE OPERATION (1)**

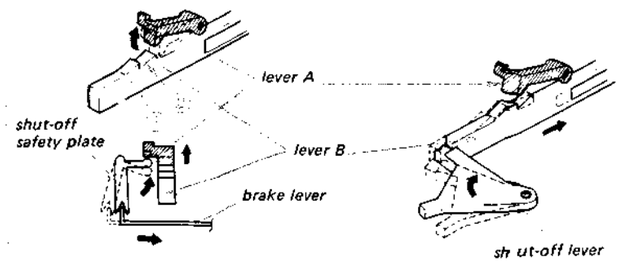
With the function button released, the brake lever moves in the direction shown by the arrow, the power switch (S104) turns OFF and the release lever hits the detection lever and releases the pin from the finger.



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.

1-2. CIRCUIT OPERATION

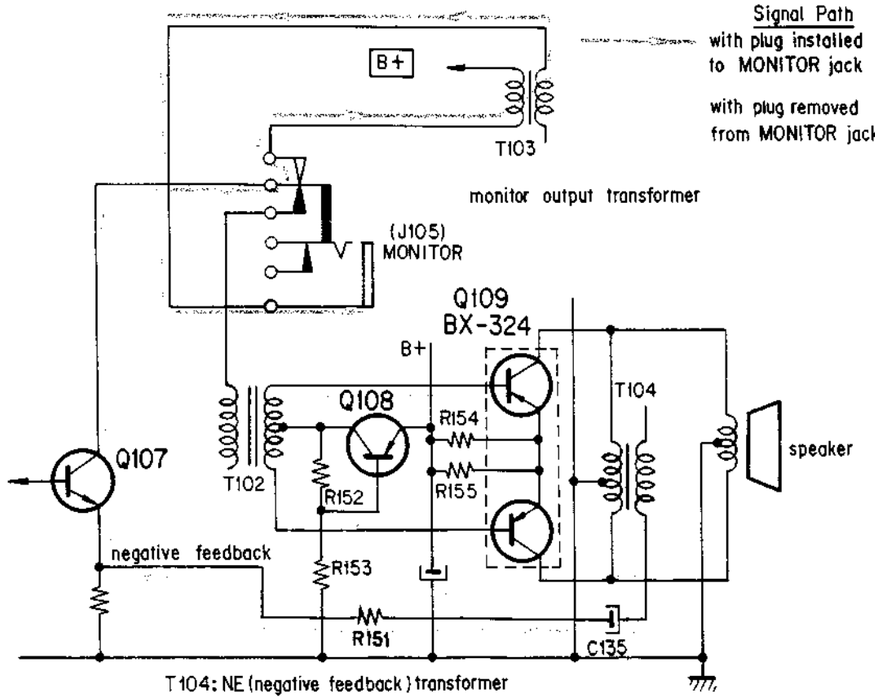
POWER AMPLIFIER

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.

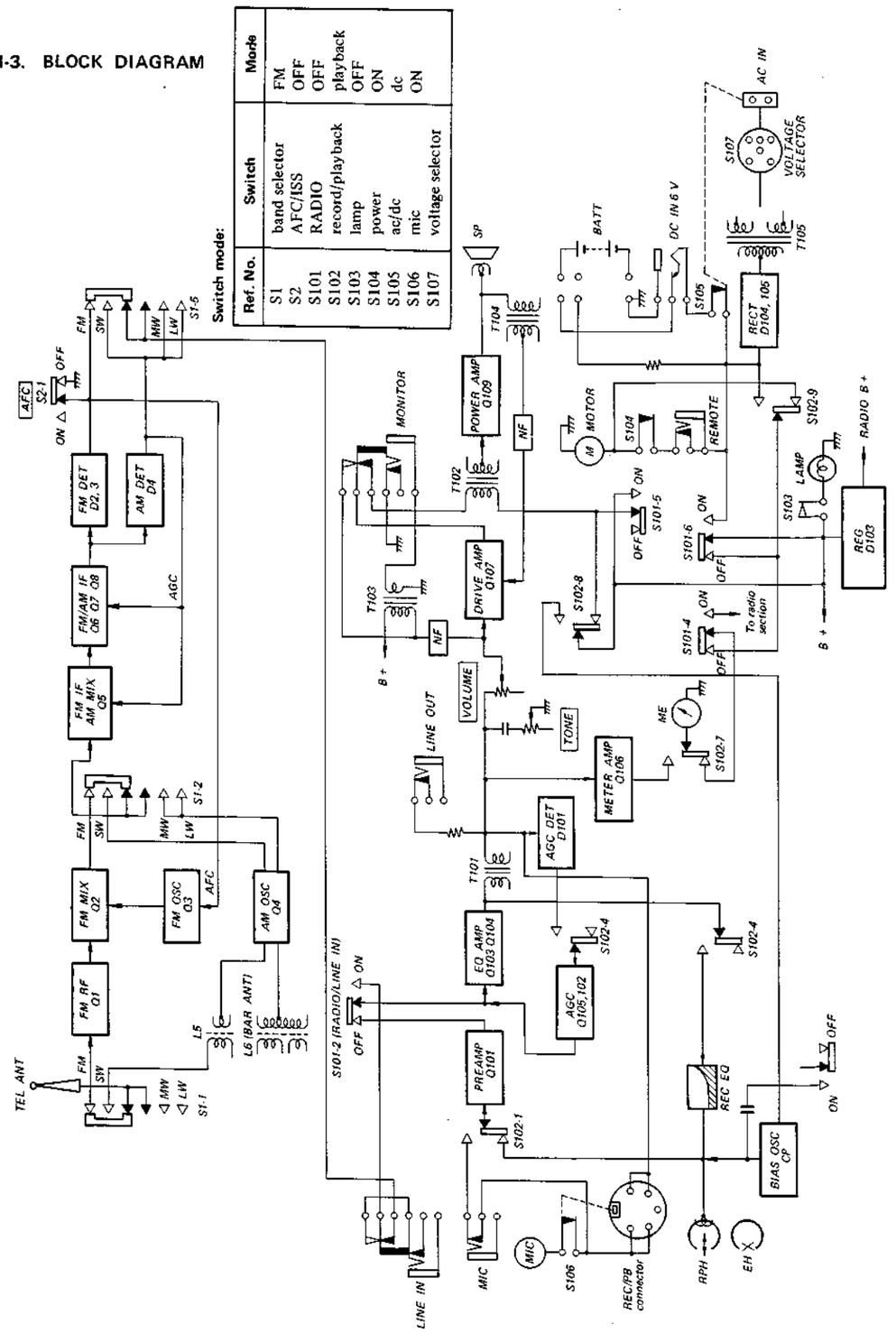
Q108:

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.

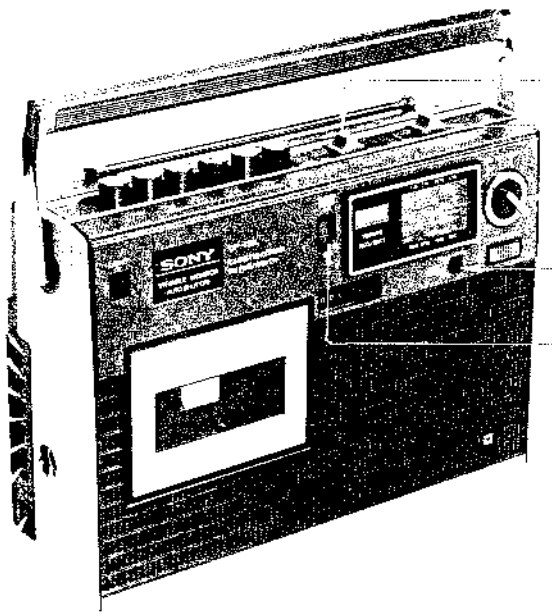


1-3. BLOCK DIAGRAM

Switch mode:			
Ref. No.	Switch	Mode
S1	band selector	FM
S2	AFC/ISS	OFF
S101	RADIO	OFF
S102	record/playback	playback
S103	lamp	OFF
S104	power	ON
S105	ac/dc	dc
S106	mic	ON
S107	voltage selector	



1-4. EXTERNAL VIEW



TONE
VOLUME
X-35329-89-0
knob ass'y

X-35322-06-0
knob ass'y, band selector

1-516-257-00
switch, slide: AFC/ISS (S2)

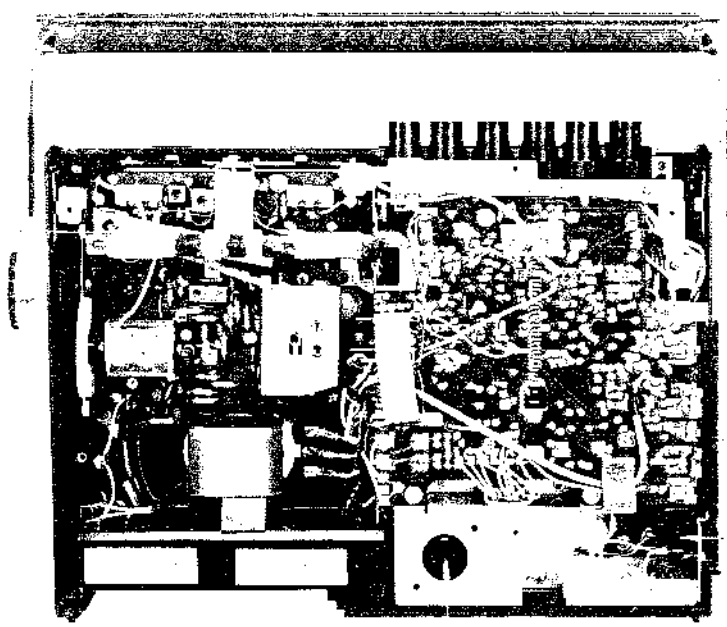
3-532-201-00
lever, slide switch

1-507-392-00
jack, 6-units
- MIC (J101)
- REMOTE (J102)
- LINE IN (J103)
- LINE OUT (J104)
- MONITOR (J105)
- DC IN 6 V (CNJ101)

1-509-510-00
connector, power (CNJ102)

1-508-615-00
connector, REC/PB w/ switch S106 (J106)

1-5. INTERNAL VIEW



1-516-256-00
switch, rotary; band selector (S1)

1-509-510-00
connector, power (CNJ102)

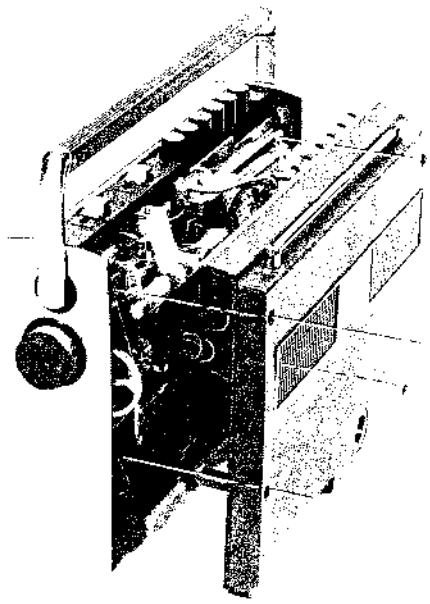
1-516-174-00
switch, rotary; voltage selector (S107)

SECTION 2

DISASSEMBLY

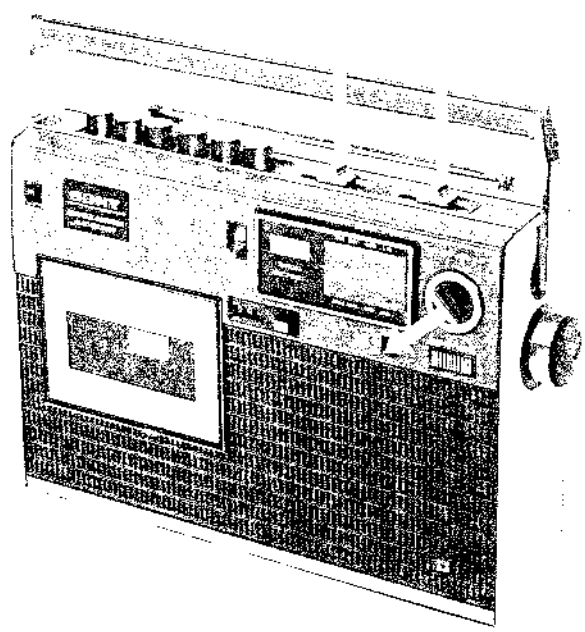
2-1. REAR CABINET REMOVAL

Remove four screws shown.



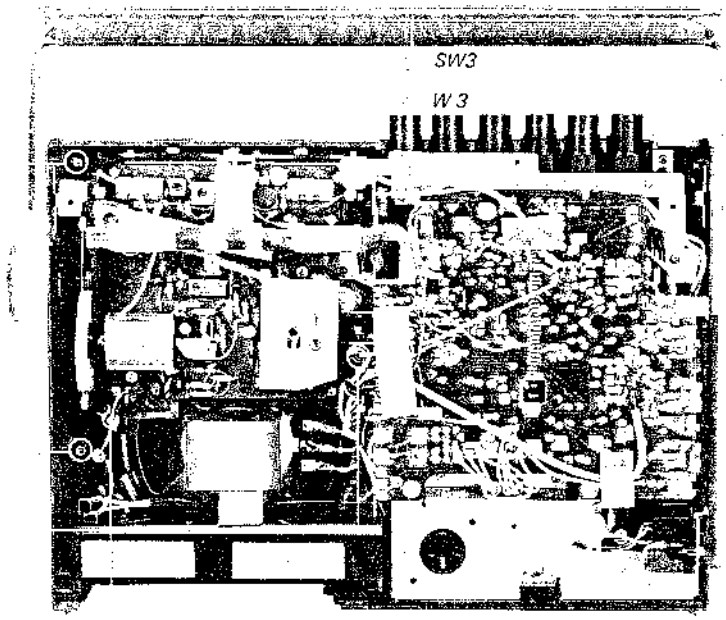
2-2. RADIO CHASSIS REMOVAL

Remove these knobs.



Remove five screws shown.

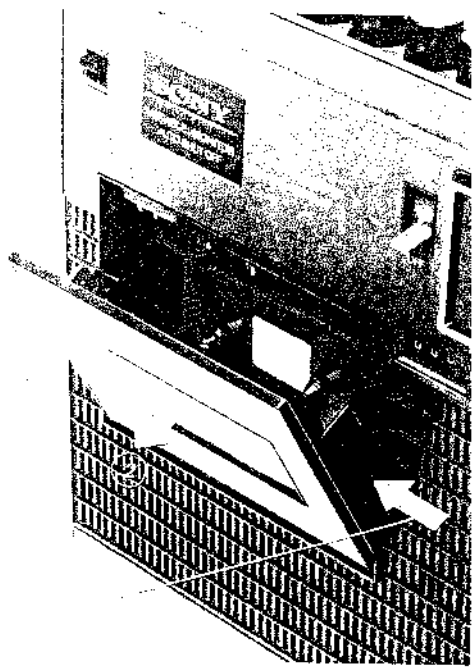
P 3 x 6



Unsolder this lead wire.

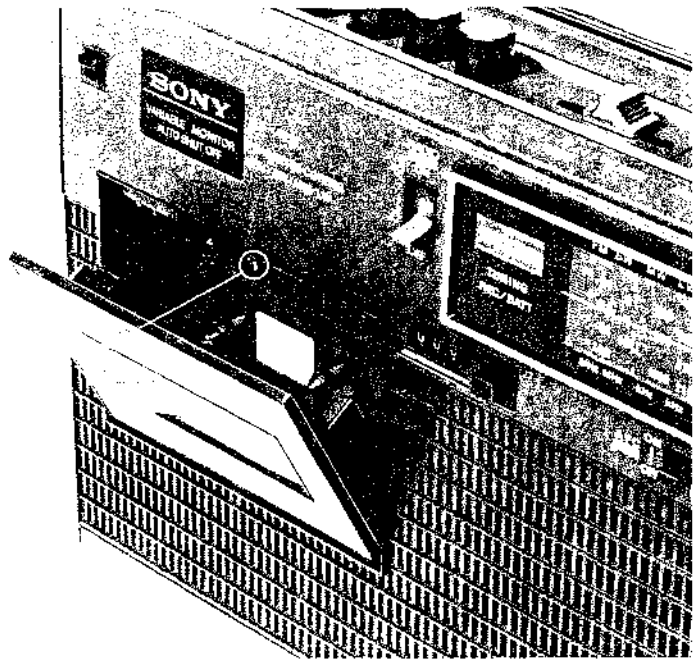
P 3 x 8, self-tapping

2-3. CASSETTE HOLDER REMOVAL



2-4. TAPE RECORDER CHASSIS REMOVAL

Remove this screw.

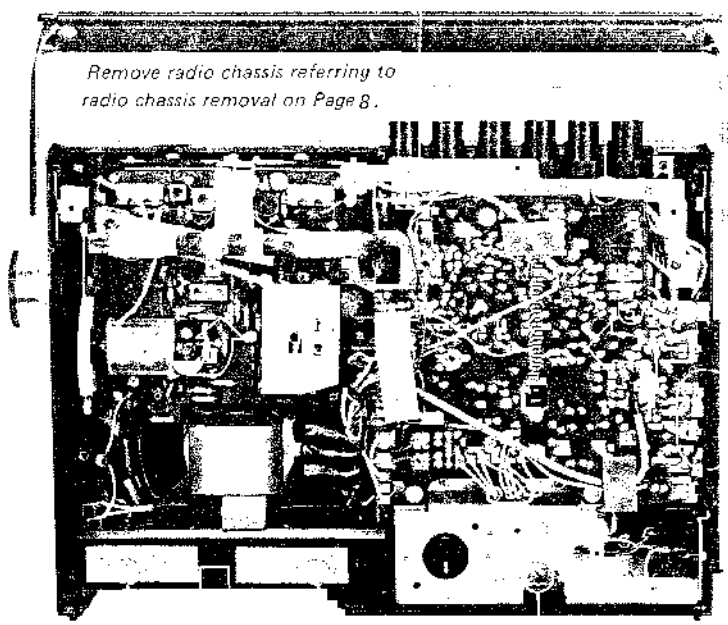


P 3 x 30

Remove five screws shown.

SW 3

Remove radio chassis referring to radio chassis removal on Page 8.



Remove battery case in the direction shown by arrow.

W 3

SW 3

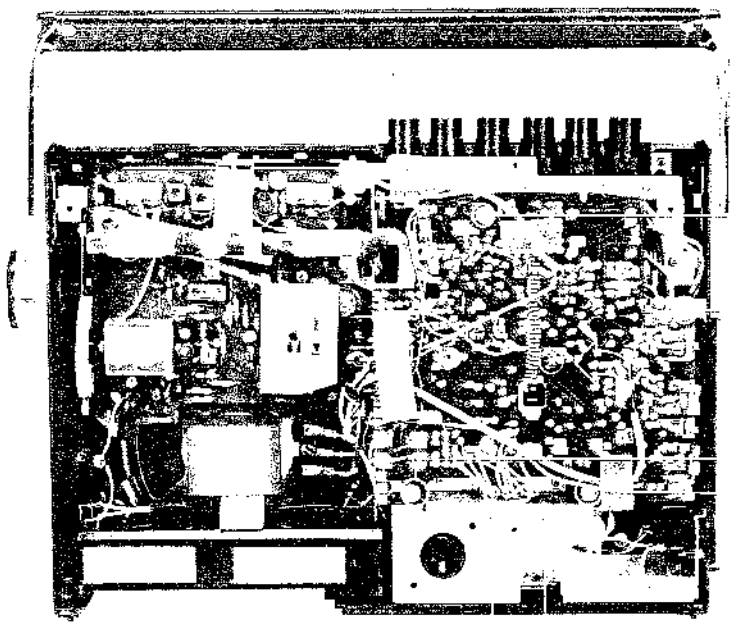
P 3 x 6

P 3 x 6, self-tapping (Remove from front side.)

Note: Carefully remove tape recorder circuit board in the direction shown by the arrow, since REC/PB connector securing screw is caught on cabinet.

2-5. TAPE RECORDER CIRCUIT BOARD REMOVAL

Remove six screws shown.



PSW 3 x 6

PS 2.6 x 6

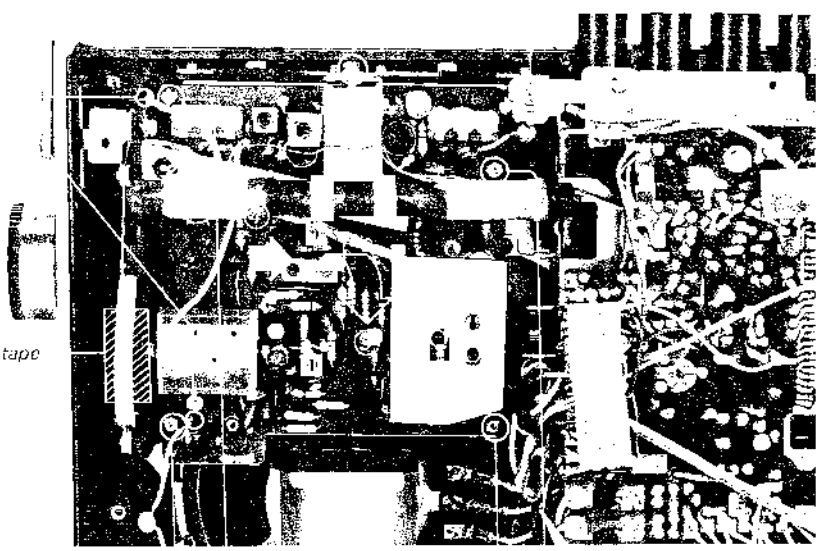
2-6. RADIO CIRCUIT BOARD REMOVAL

Remove six screws shown.

PS 3 x 5 *PSW 3 x 6*

Unsolder two lead wires.

Put a piece of cellophane tape to fix dial cord.

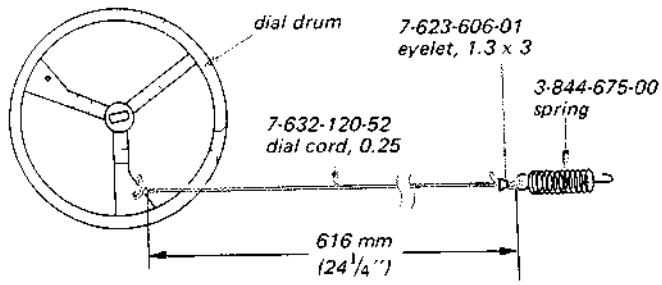


P 3 x 8, self-tapping

2-7. DIAL CORD STRINGING

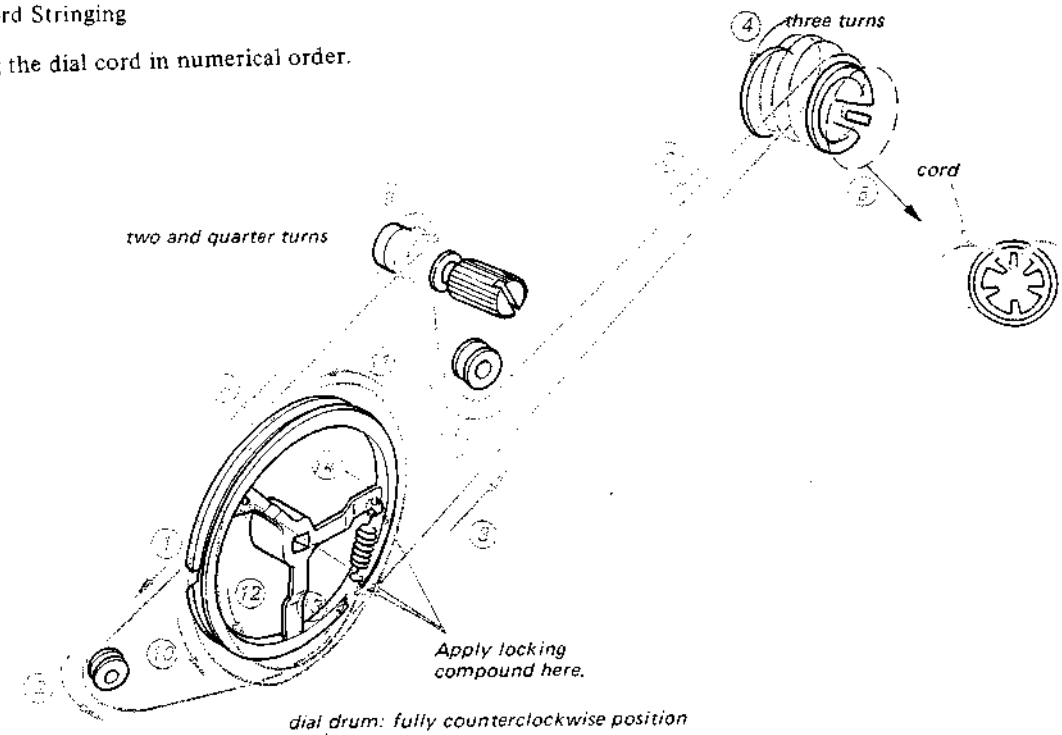
Remove rear cabinet. (See Page 8)
Remove radio chassis. (See Page 8 and 9)

1. Dial Cord Assembly

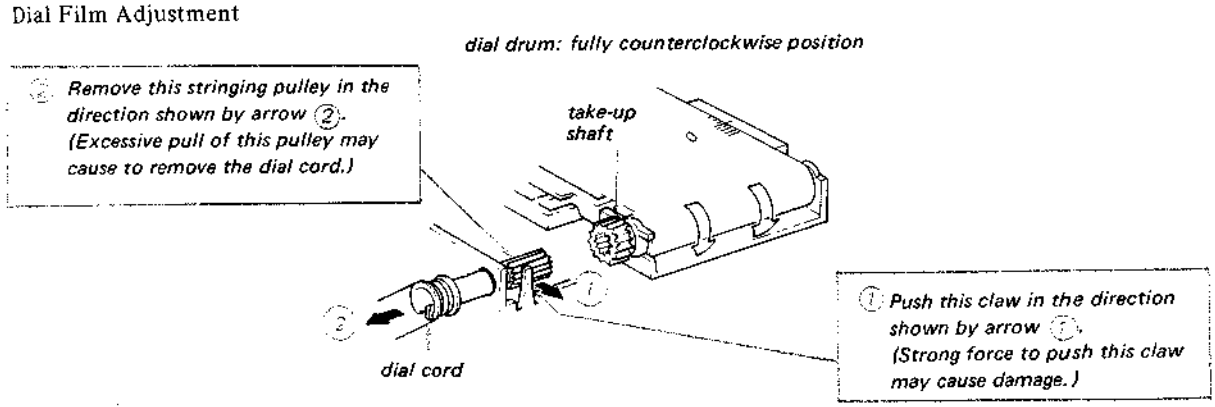


2. Dial Cord Stringing

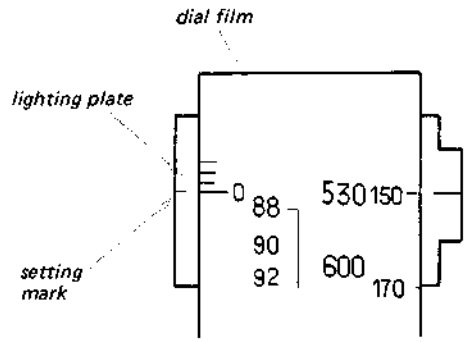
String the dial cord in numerical order.



3. Dial Film Adjustment

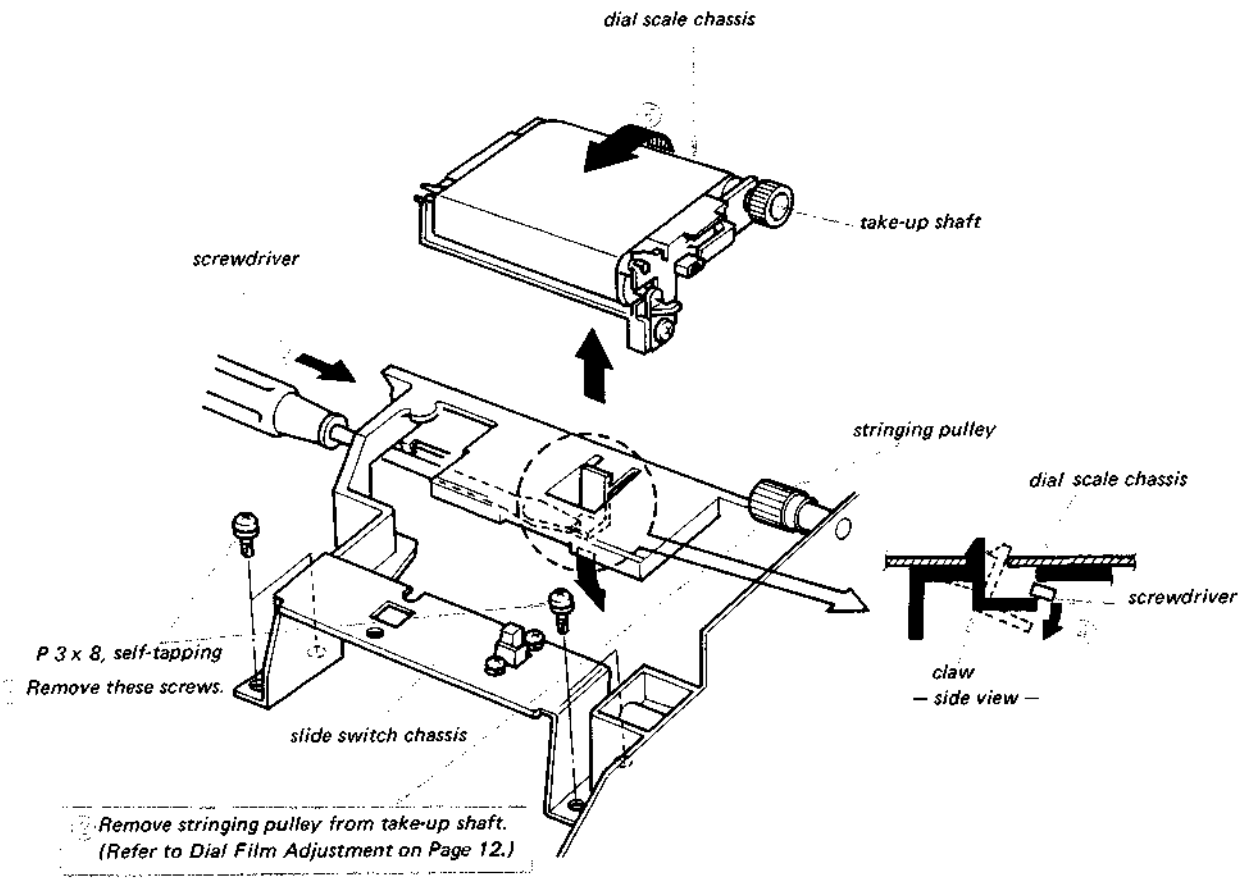


Turn take-up shaft so that "0" scale on the dial film comes at setting mark on lighting plate.



Insert the stringing pulley to take-up shaft.

2-8. DIAL SCALE CHASSIS REMOVAL



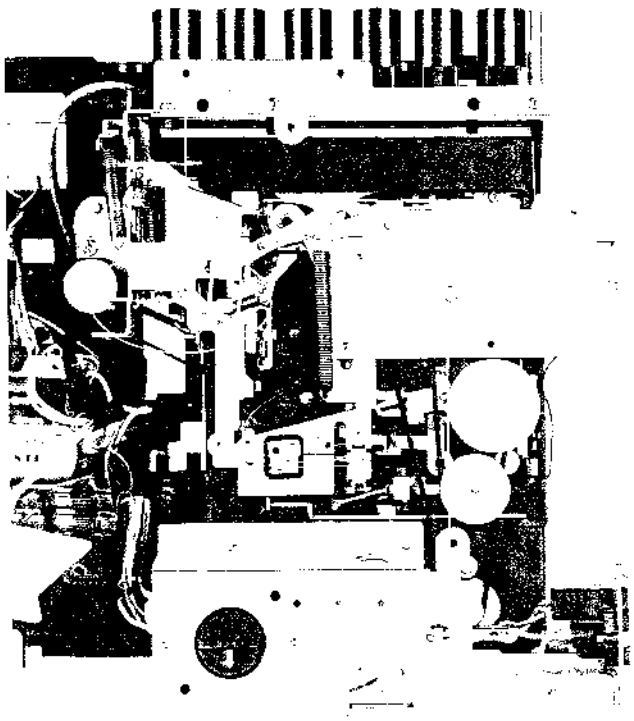
Remove stringing pulley from take-up shaft.
(Refer to Dial Film Adjustment on Page 12.)

SECTION 3

ADJUSTMENTS

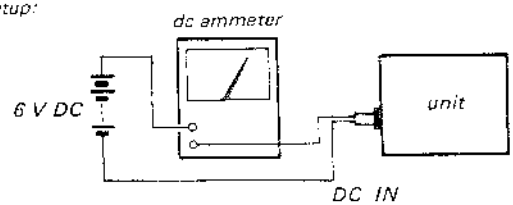
3-1. MECHANICAL ADJUSTMENTS

Remove tape recorder chassis. (See Page 10)



Flywheel Thrust Play Adjustment
– playback mode –

1. *Setup:*

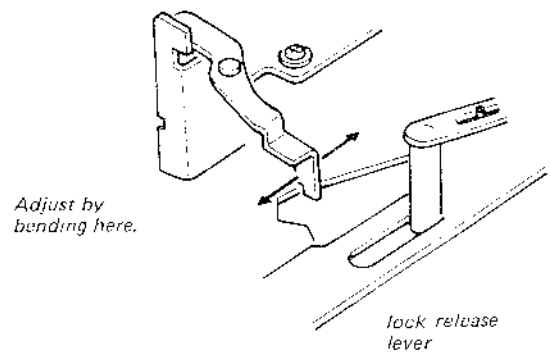


2. *Position unit horizontally with flywheel side up.*
3. *Loosen thrust screw for sufficient flywheel play.*
4. *Tighten the screw until current suddenly increases, then loosen the screw 1/4 turn.*

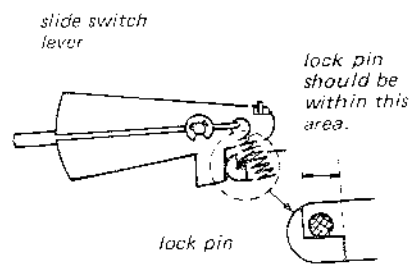
RADIO Switch Timing Adjustment
– rewind mode –

[1] Turn RADIO switch ON.

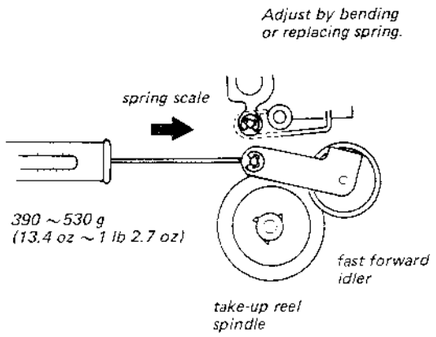
[2] When shut-off mechanism operates at the tape end, ensure that rewind button releases after RADIO switch turns OFF. If necessary, adjust as follows:



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

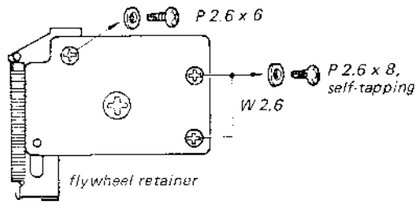


Fast Forward Idler Pressure Adjustment
– fast forward mode –

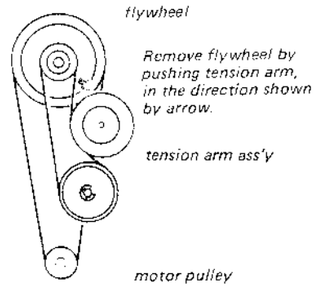


When adjusting, proceed as follows:

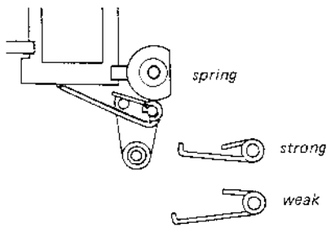
[1] Remove Flywheel Retainer



[2] Remove Flywheel

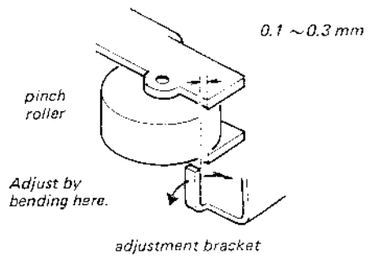


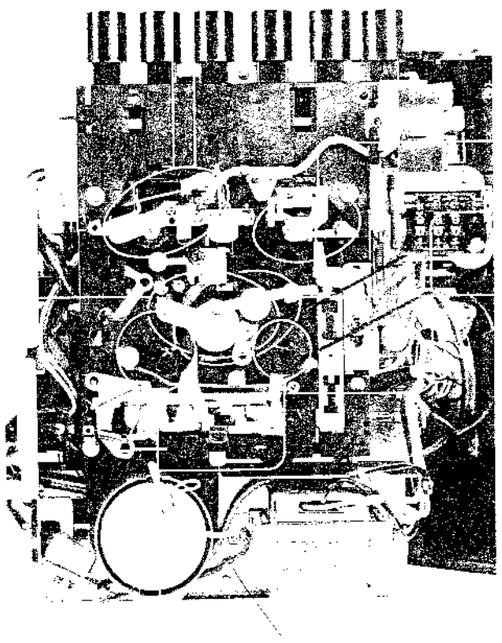
[3] Adjust by bending or replacing spring.



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

Pinch Roller Timing Adjustment
– playback mode –





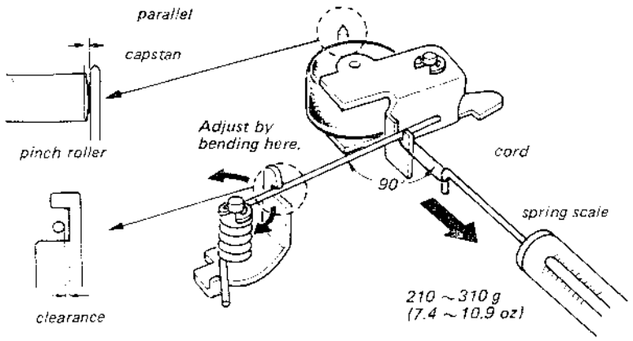
Torque Measurement

Mode	Torque meter	Meter reading
Playback	CQ-101	25 ~ 45 g-cm
	General torque meter	35 ~ 60 g-cm (0.4 ~ 0.85 oz-inch)
fast forward	CQ-201	50 ~ 130 g-cm
	General torque meter	50 ~ 90 g-cm (0.7 ~ 1.25 oz-inch)
rewind	CQ-201	50 ~ 100 g-cm
	General torque meter	50 ~ 100 g-cm (0.7 ~ 1.5 oz-inch)

* SONY cassette type torque meter

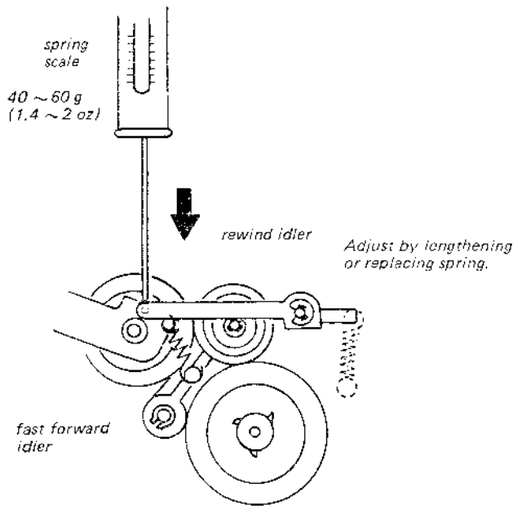
Part No.	Model Name
Y-20926-01-1	CQ-101
Y-20926-11-1	CQ-201

Pinch Roller Pressure Adjustment
– playback mode –



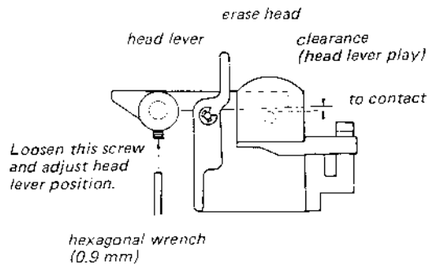
Note: The pressure should be measured just when the pinch roller contacts the capstan after being separated.

Rewind Idler Pressure Adjustment
– rewind mode –

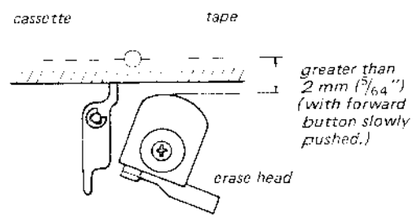


Note: The pressure should be measured just when the rewind idler contacts the supply reel spindle after being separated.

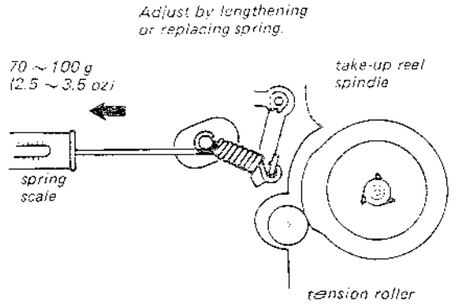
Head Lever Adjustment
– record mode –



– 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.

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
400 Hz bandpass filter
resistors 10 Ω, 300 Ω, 580 Ω, 600 Ω, 10 kΩ, 80 kΩ, 100 kΩ
speed checker (SONY LFM-30)
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

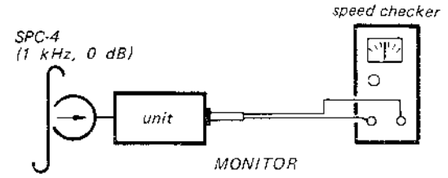
1. Tape Speed Adjustment

Control/Switch Setting:

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

Procedure:

1. Mode: playback

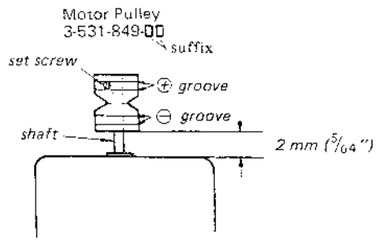


Specification:

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

Frequency 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

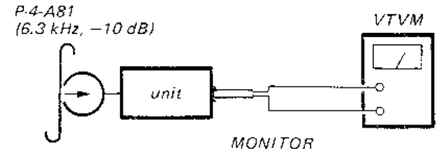
2. Record/playback Head Azimuth Adjustment

Control/Switch Setting:

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

Procedure:

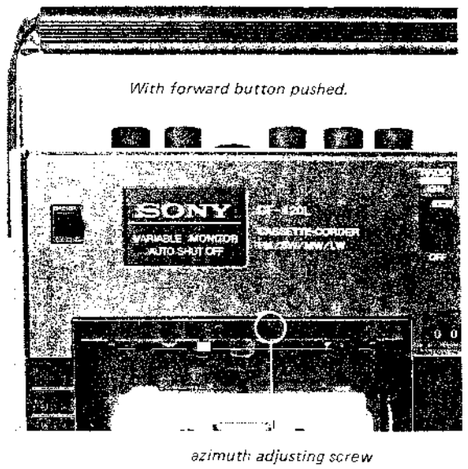
1. Mode: playback



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 9.)

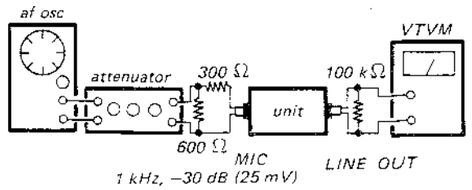
3. AGC Recovery Time Adjustment

Control/Switch Setting :

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

Procedure:

1. Mode: record

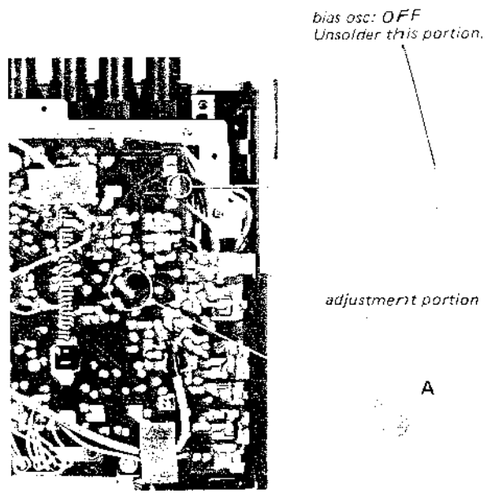


2. Quickly decrease input signal to −60 dB (0.77 mV).
3. Measure recovery time when output level increases 10 dB.

Specification:

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

Adjustment Location



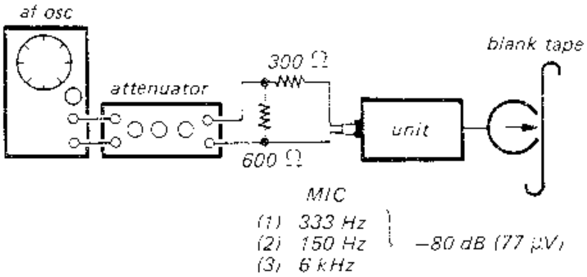
4. Bias Adjustment

Control/Switch Setting:

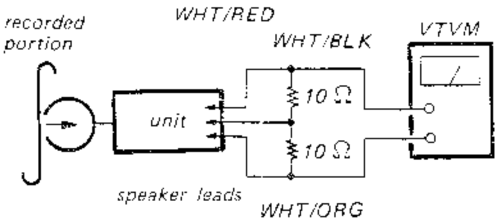
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

1. Mode: record



2. Mode: playback



Recorded signal	VTVM reading
333 Hz	[illegible]
150 Hz	[illegible]
6 kHz	[illegible]

If necessary, adjust by soldering.

R125, 126, 127, 128 connections

Connect	Resistance value (Ω)	6 kHz level
3 and 4	1?0	decrease
1 and 4	[illegible]	
2 and 4	2?0	
2 and 3	[illegible]	
1 and 2	340	
open	430	increase

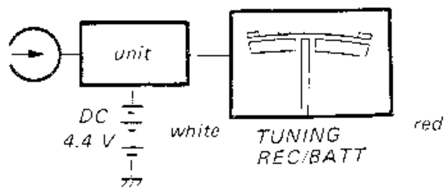
5. REC/BATT Meter Adjustment

Control/Switch Setting:

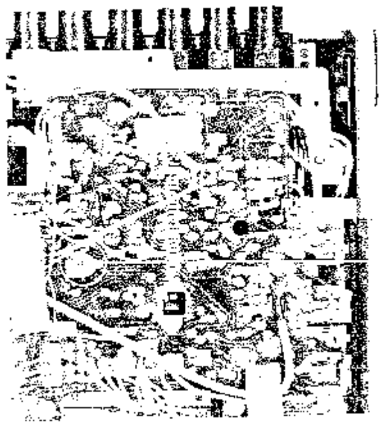
RADIO switch:	OFF
Power Source:	4.4 V DC

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
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	
open	[illegible]	white zone

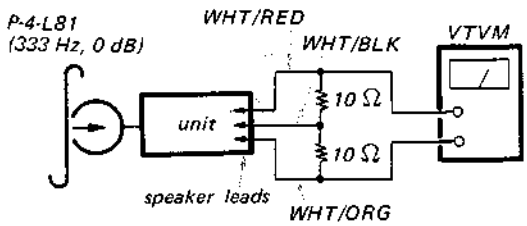
6. Playback Frequency Response Measurement

Control/Switch Setting:

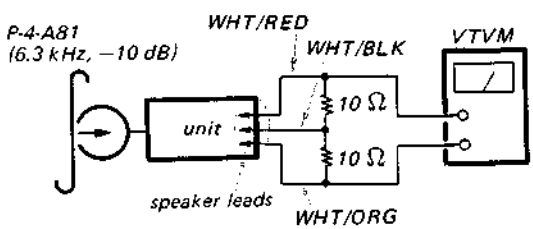
RADIO switch: OFF
TONE control: HIGH

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)

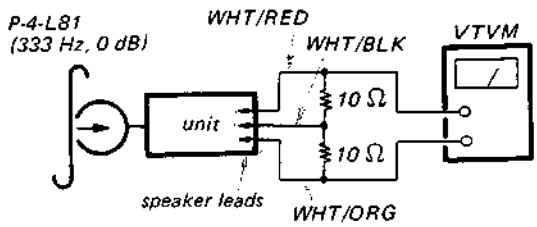
7. Playback Signal-to-Noise Ratio Measurement

Control/Switch Setting :

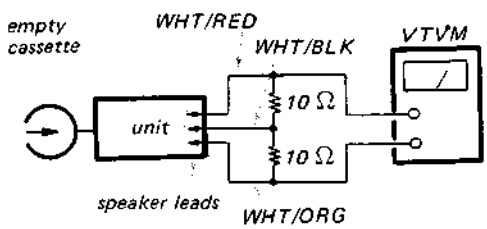
RADIO switch: OFF
TONE control: HIGH

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.

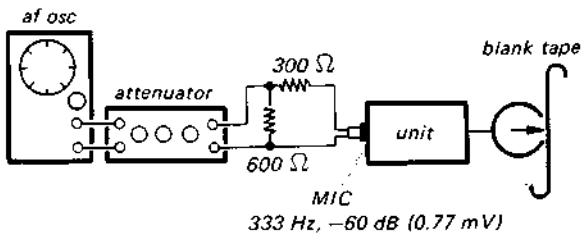
8. Overall Signal-to-Noise Ratio Measurement

Control/Switch Setting:

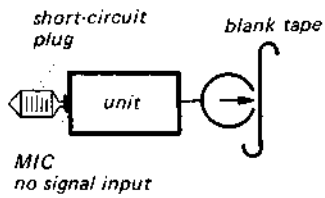
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

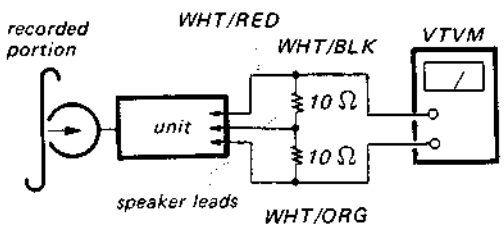
1. Mode: record



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.

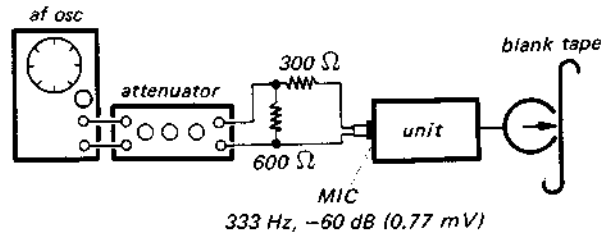
9. Overall Maximum Output Measurement

Control/Switch Setting:

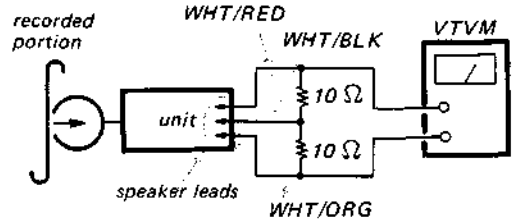
RADIO switch:	OFF
TONE control:	HIGH
VOLUME control:	MAX

Procedure:

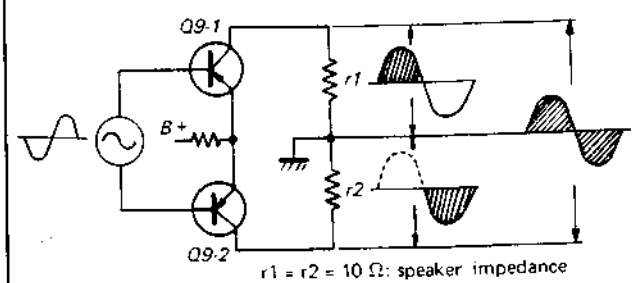
1. Mode: record



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.

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

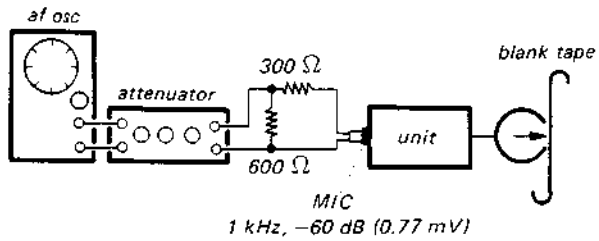
10. Overall Distortion Measurement

Control/Switch Setting:

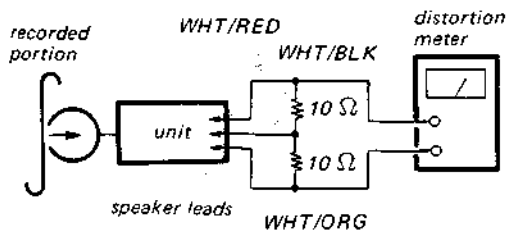
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

1. Mode: record



2. Mode: playback



Specification:

less than 8 %

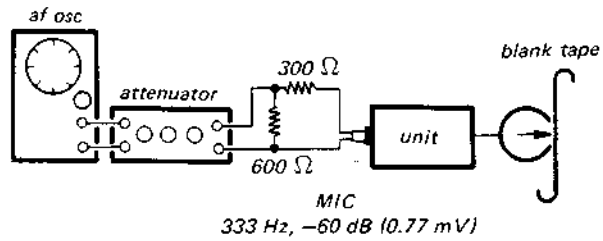
11. Overall LINE OUT Level Measurement

Control/Switch Setting:

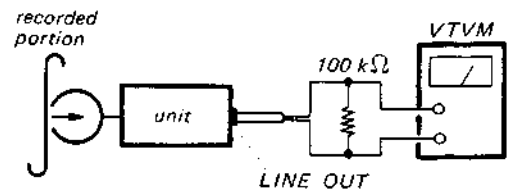
RADIO switch:	OFF
VOLUME control.	MIN

Procedure:

1. Mode: record



2. Mode: playback



Specification:

–3.8 ~ +3.8 dB (0.47 ~ 1.2 V)

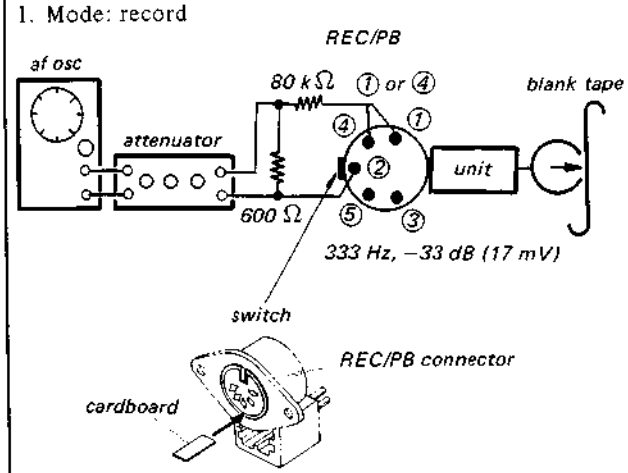
12. Overall REC/PB Connector Level Measurement

Control/Switch Setting:

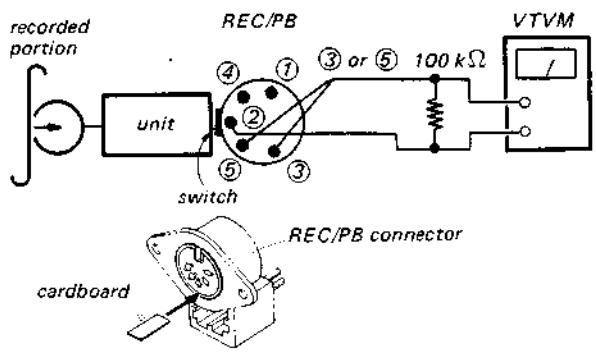
RADIO switch:	OFF
TONE control:	HIGH
VOLUME control:	MIN

Procedure:

1. Mode: record



2. Mode: playback



Specification:

−3.8 dB ~ +2 dB (0.47 ~ 0.95 V)

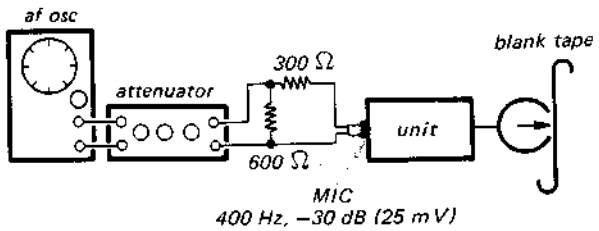
13. Erase Ratio Measurement:

Control/Switch Setting

RADIO switch:	OFF
TONE control:	HIGH

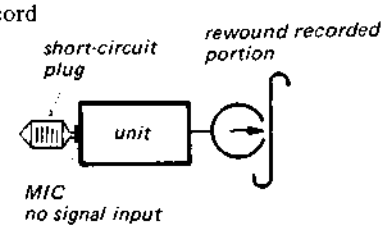
Procedure:

1. Mode: record

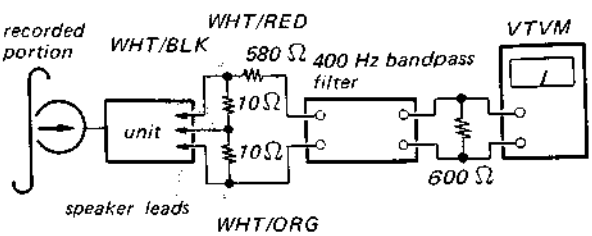


2. Rewind half of the recorded portion.

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).

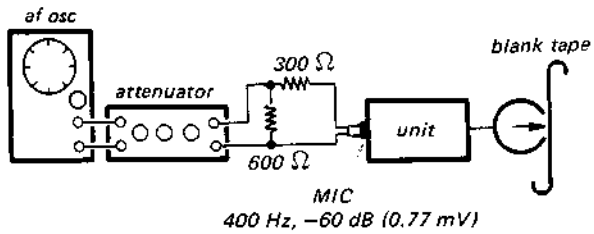
14. Cross-talk Measurement (between tracks)

Control/Switch Setting:

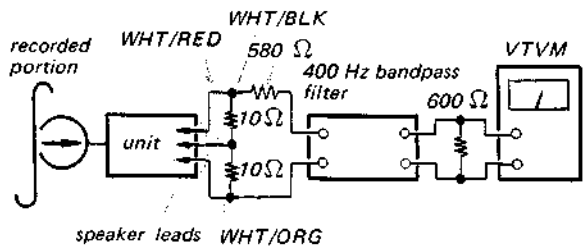
RADIO switch:	OFF
TONE control:	HIGH

Procedure:

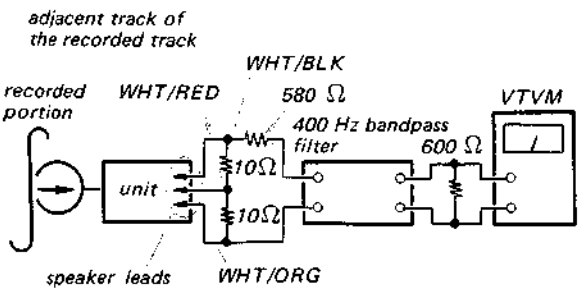
1. Mode: record



2. Mode: playback



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



Specification:

less than −55 dB (1.4 mV)

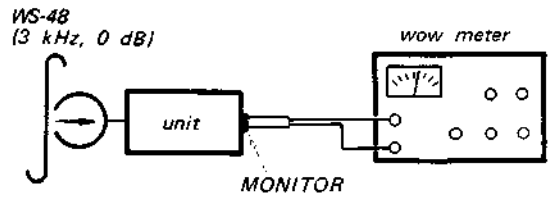
15 Wow and Flutter Measurement

Control/Switch Setting:

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
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 modulation by 400 Hz signal.

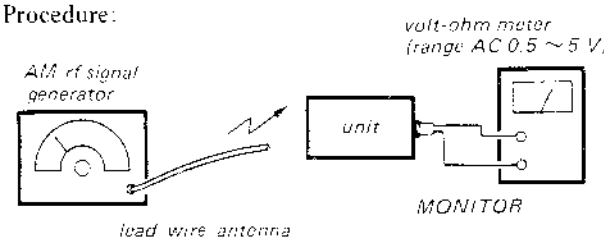
2. AM, FM rf signal generator output level should be as low as possible for following adjustments.

1. AM I-f Alignment

Control/Switch Setting:

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

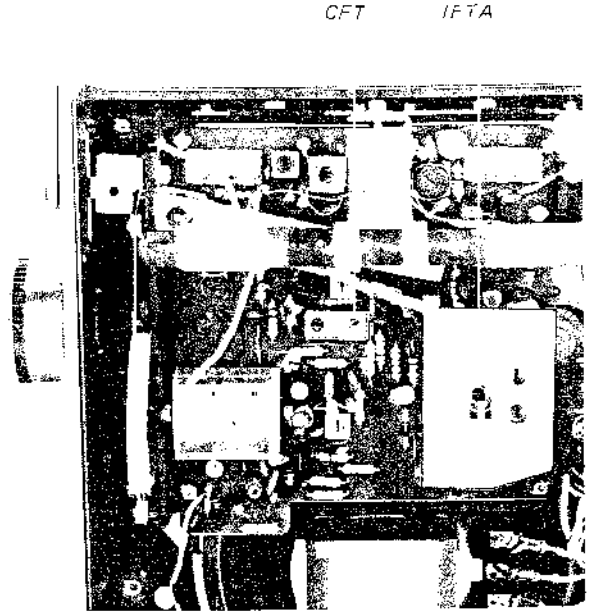
Procedure:



Step	AM rf signal generator frequency	Tuning knob	Adjust	Volt-ohm meter reading
1	468 kHz	Detune broad-casting signals.	CFT IFTA	maximum

Note: Adjust CFT and IFTA alternately.

Adjustment Location:

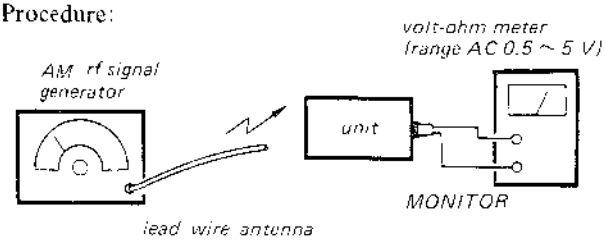


2. MW Frequency Coverage and Tracking Adjustments

Control/Switch Setting:

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

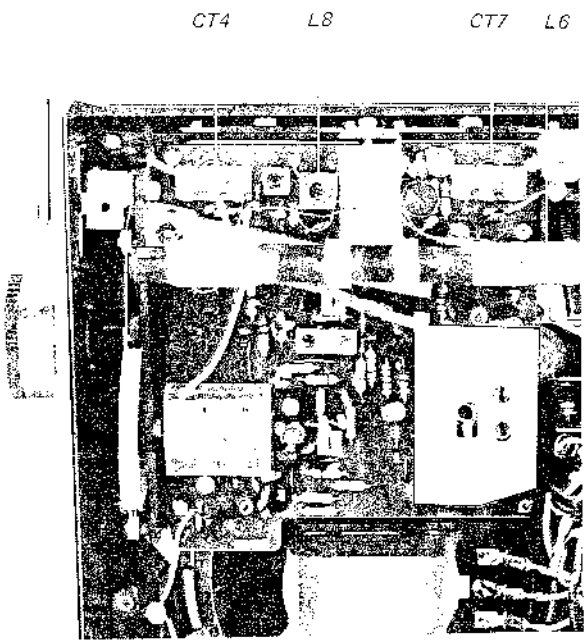
Procedure:



Adjustment	Step	AM rf signal generator frequency	Tuning knob	Adjust	Volt-ohm meter reading
Frequency coverage	1	520 kHz	fully counter-clockwise	L8	maximum
	2	1,060 kHz	fully clockwise	CT7	maximum
Tracking	1	620 kHz	tune to 620 kHz	L6	maximum
	2	1,400 kHz	tune to 1,400 kHz	CT4	maximum

Note: Repeat Tracking Adjustment steps two or three times.

Adjustment Location:

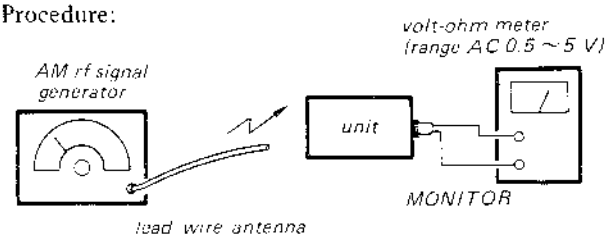


3. LW Frequency Coverage and Tracking Adjustments

Control/Switch Setting:

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

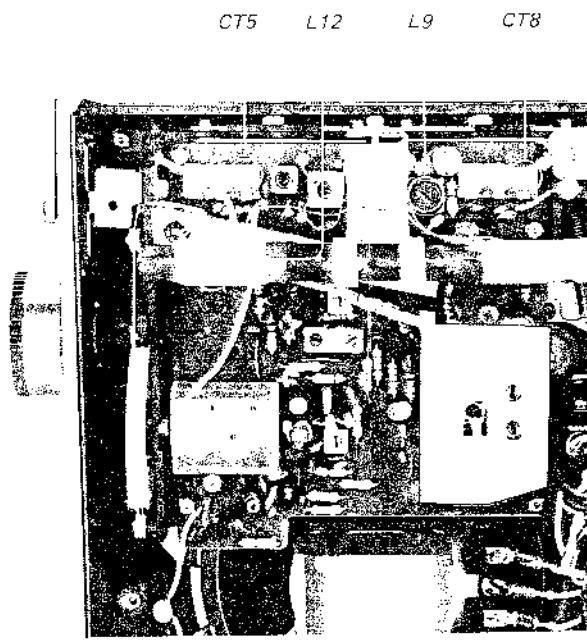
Procedure:



Adjustment	Step	AM rf signal generator frequency	Tuning knob	Adjust	Volt-ohm meter reading
Frequency coverage	1	145 kHz	fully counter-clockwise	L9	maximum
	2	365 kHz	fully clockwise	CT8	maximum
Tracking	1	160 kHz	tune to 160 kHz	L12	maximum
	2	330 kHz	tune to 330 kHz	CT5	maximum

Note: Repeat above steps two or three times.

Adjustment Location:



4. MW and LW Maximum Sensitivity Measurement

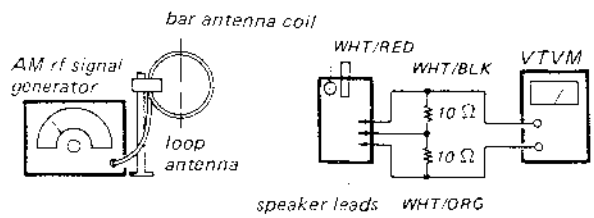
Control/Switch Setting:

RADIO switch: ON
band selector switch: MW or LW
TONE control: HIGH
VOLUME control: MAX
AM rf signal generator:

MW	LW
620 kHz (1400 kHz)	160 kHz (330 kHz)

tuning knob: MW tune to 620 kHz (1,400 kHz)
LW tune to 160 kHz (330 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 ≧ 6 dB

Maximum Sensitivity = AM rf signal generator output level − * attenation (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 − * attenation (dB)

Specification:

MW 33 dB/m (45 μV/m) at S/N 6 dB
LW 41 dB/m (110 μV/m) at S/N 6 dB

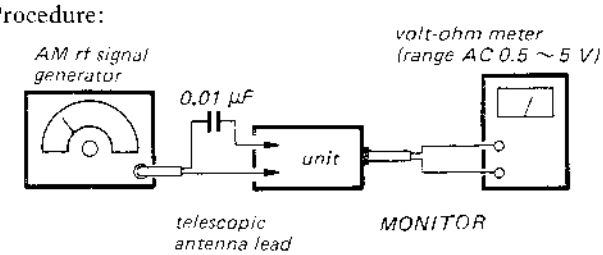
Note: * Attenation is given according to characteristics of loop antenna and distance between bar antenna of radio set and loop antenna.

5. SW Frequency Coverage and Tracking Adjustments

Control/Switch Setting:

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

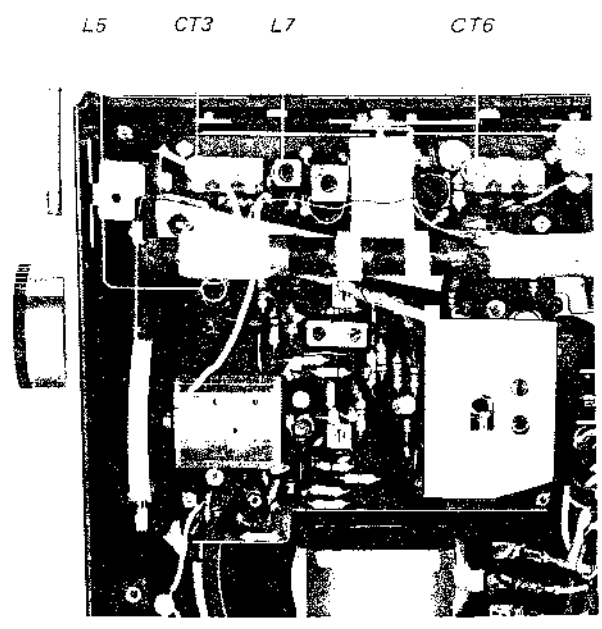
Procedure:



Adjustment	Step	AM rf signal generator frequency	Tuning knob	Adjust	Volt-ohm meter reading
Frequency coverage	1	5.8 MHz	fully counter-clockwise	L7	maximum
	2	18.4 MHz	fully clockwise	CT6	maximum
Tracking	1	5.8 MHz	fully counter-clockwise	L5	maximum
	2	18.4 MHz	fully clockwise	CT3	maximum

Note: Repeat above steps two or three times.

Adjustment Location:

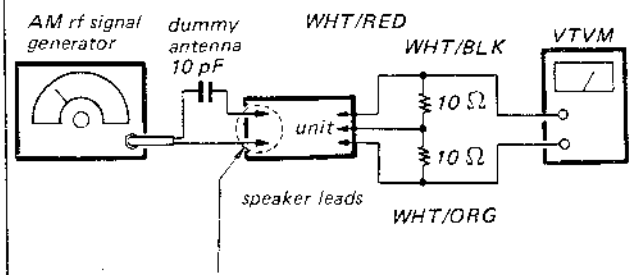


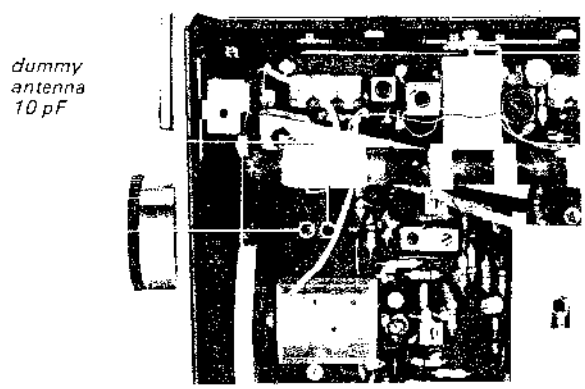
6. SW Maximum Sensitivity Measurement

Control/Switch Setting:

RADIO switch:	ON
band selector switch:	SW
TONE control:	HIGH
VOLUME control:	MAX
AM rf signal generator frequency:	5.8 MHz (18.4 MHz)
tuning knob:	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 $\geq$ 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:

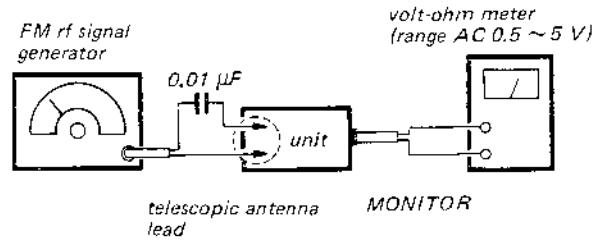
7 dB (2.2 μV) at S/N 6 dB

7. FM I-f Alignment

Control/Switch Setting:

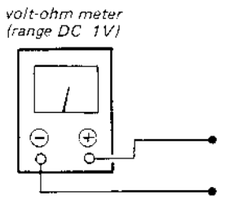
RADIO switch:	ON
band selector switch:	FM
AFC/ISS switch:	OFF
VOLUME control:	MAX

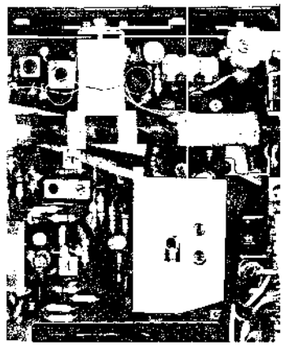
Procedure:



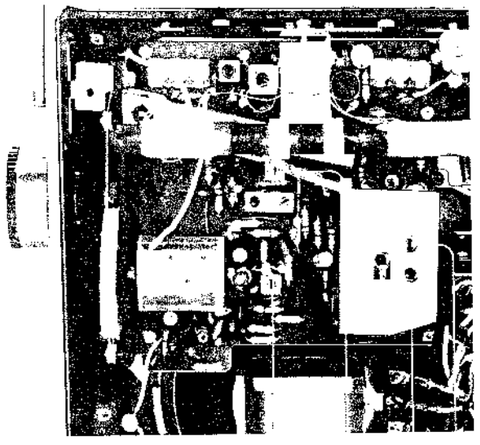
Step	FM rf signal generator frequency	Tuning knob	Adjust	volt-ohm meter reading
1	10.7 MHz	Detune broad-casting signals.	IFT F1 ~ F4	maximum
2	10.7 MHz	Detune broad-casting signals.	FM rf signal gener-ator tuning knob	maximum
3	Repeat above steps two or three times.			
4	no signal	Detune broad-casting signals.	IFT F4	DC 0 V (See Figure on Page 29.)

– continued on next page –





Adjustment Location:

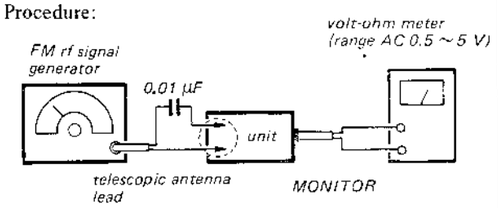


8. FM Frequency Coverage and Tracking Adjustments

Control/Switch Setting:

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

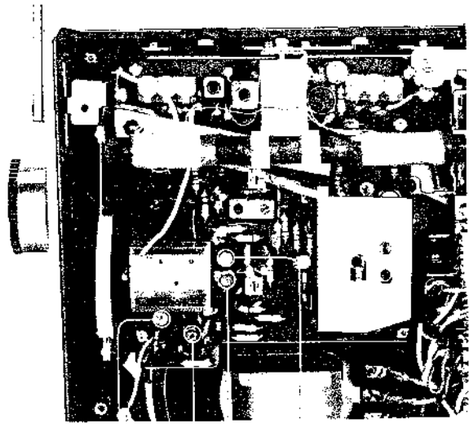
Procedure:



Adjustment	Step	FM rf signal generator frequency	Tuning knob	Adjust	volt-ohm meter reading
Frequency coverage	1	87.1 MHz	fully counter-clockwise	L4	maximum
	2	108.5 MHz	fully clockwise	CT2	maximum
Tracking	1	87.1 MHz	fully counter-clockwise	L2	maximum
	2	108.5 MHz	fully clockwise	CT1	maximum

Note: Repeat above steps two or three times.

Adjustment Location:

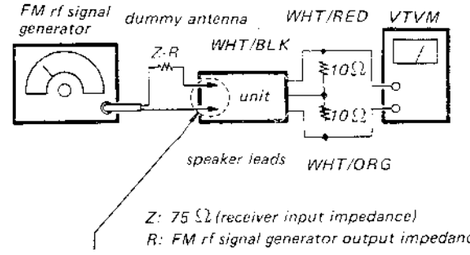


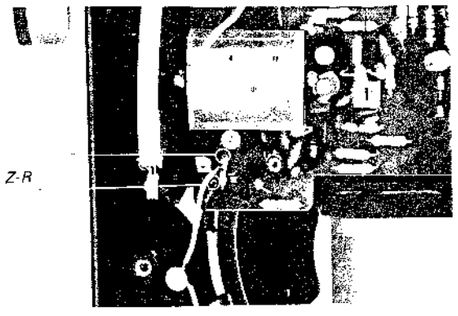
9. FM Usable Sensitivity Measurement

Control/Switch Setting:

RADIO switch:	ON
band selector switch:	FM
AFC/ISS switch:	OFF
TONE control:	mechanical mid
VOLUME control:	mechanical mid
FM rf signal generator output level:	15 dB (5.6 μV)
FM rf signal generator frequency:	87.1 MHz (108.5 MHz)
tuning knob:	tune to 87.1 MHz (108.5 MHz)

Procedure:





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

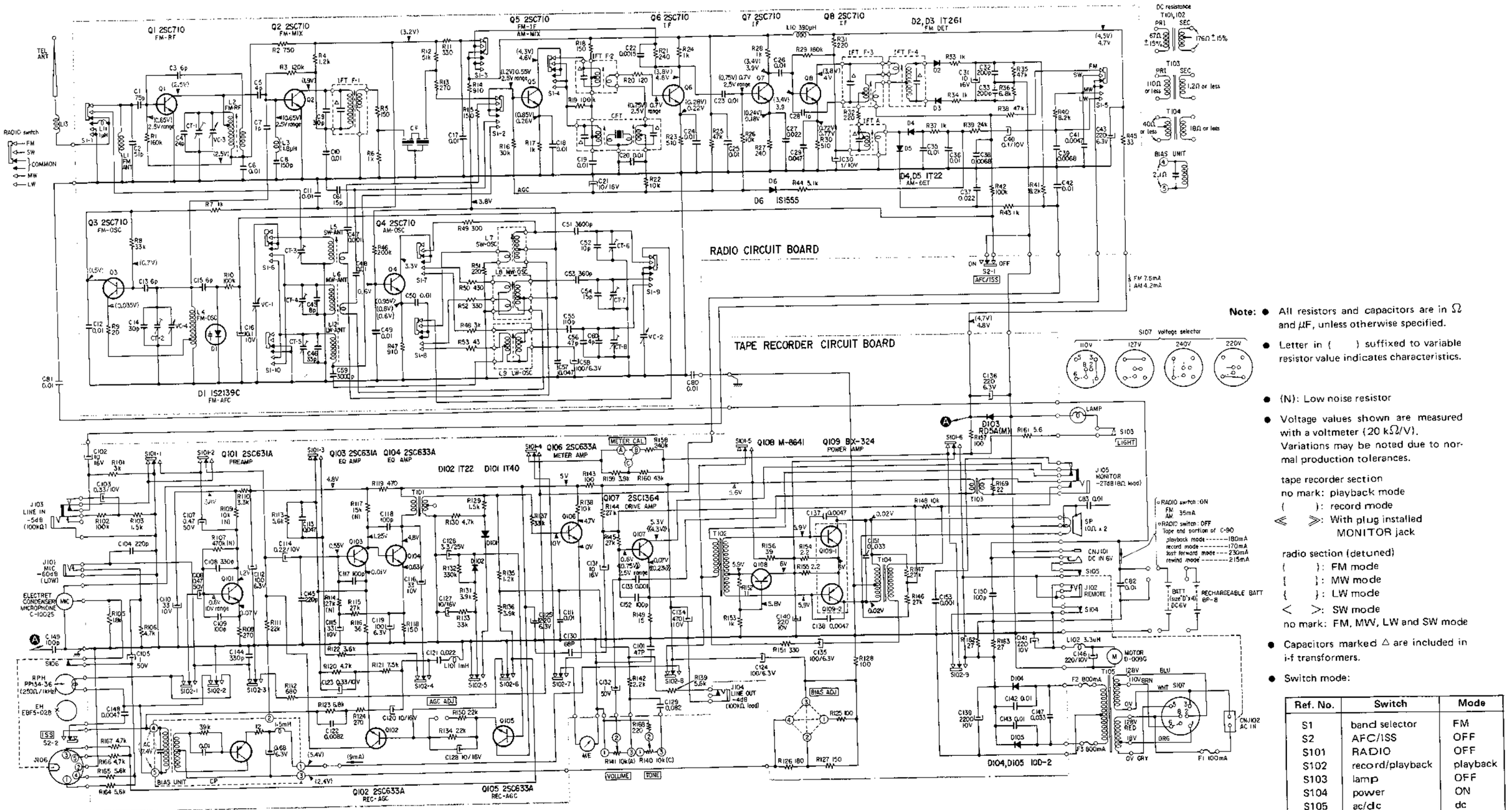
Specification:

13 dB (4.5 μV) at S/N 30 dB

SECTION 4

DIAGRAMS

4-1. SCHEMATIC DIAGRAM



Note:

- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- (N): Low noise resistor
- Voltage values shown are measured with a voltmeter (20 kΩ/V). Variations may be noted due to normal production tolerances.

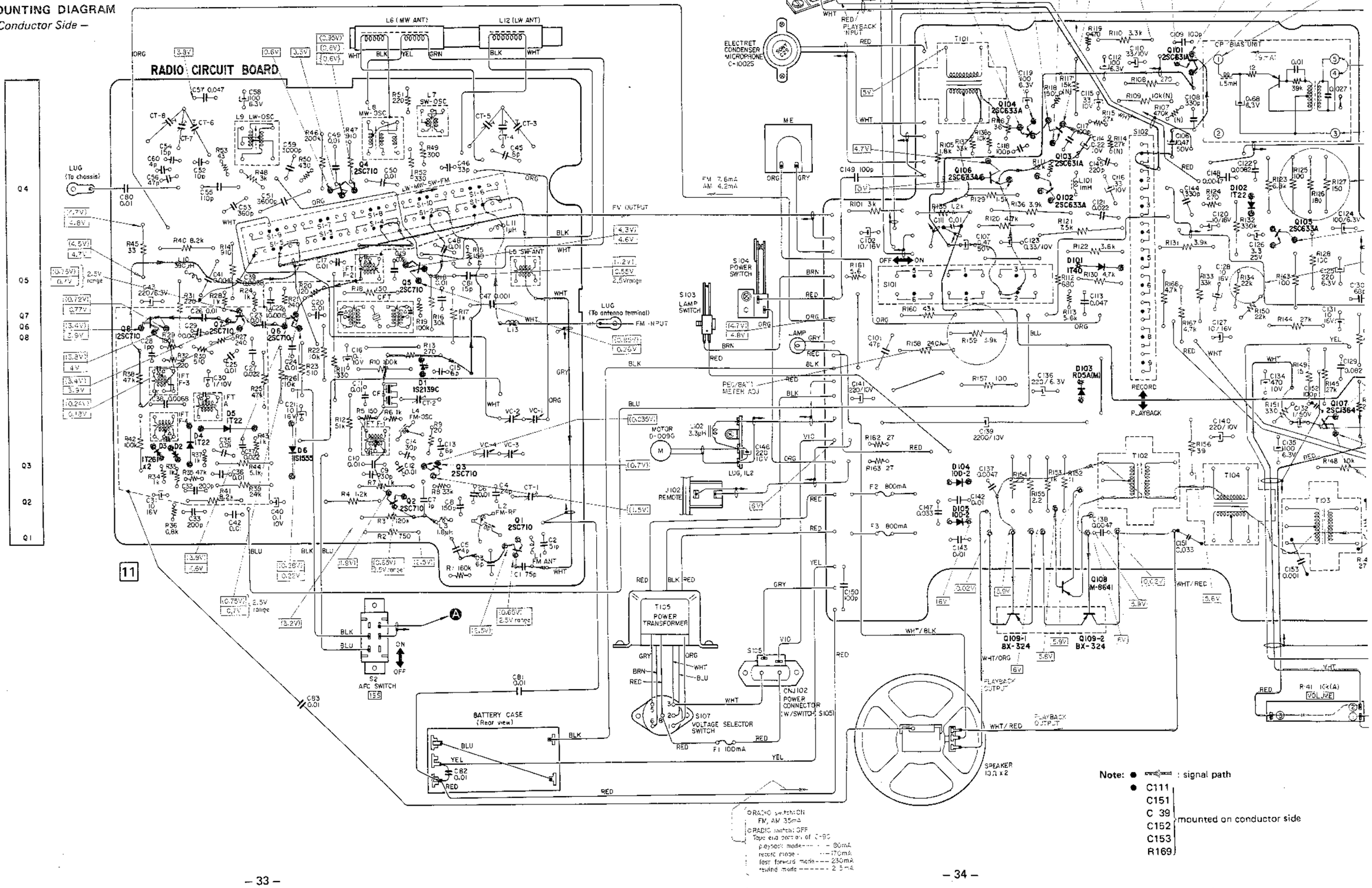
  tape recorder section
  no mark: playback mode
  ( ): record mode
  ≪ ≫: With plug installed MONITOR jack

  radio section (detuned)
  ( ): FM mode
  [ ]: MW mode
  { }: LW mode
  < >: SW mode
  no mark: FM, MW, LW and SW mode
- Capacitors marked △ are included in i-f transformers.
- Switch mode:

Ref. No.	Switch	Mode
S1	band selector	FM
S2	AFC/ISS	OFF
S101	RADIO	OFF
S102	record/playback	playback
S103	lamp	OFF
S104	power	ON
S105	ac/dc	dc
S106	mic	ON
S107	voltage selector	

4-2. MOUNTING DIAGRAM

– Conductor Side –



Note: ● ⟿ : signal path

● C111, C151, C 39, C152, C153, R169 mounted on conductor side

TAPE RECORDER CIRCUIT BOARD

Note: ● ⟿ : signal path
● C111, C151, C 39, C152, C153, R169 } mounted on conductor side

Q1 ~ 8 2SC710

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

Q107 2SC1364

Q108 M-8641

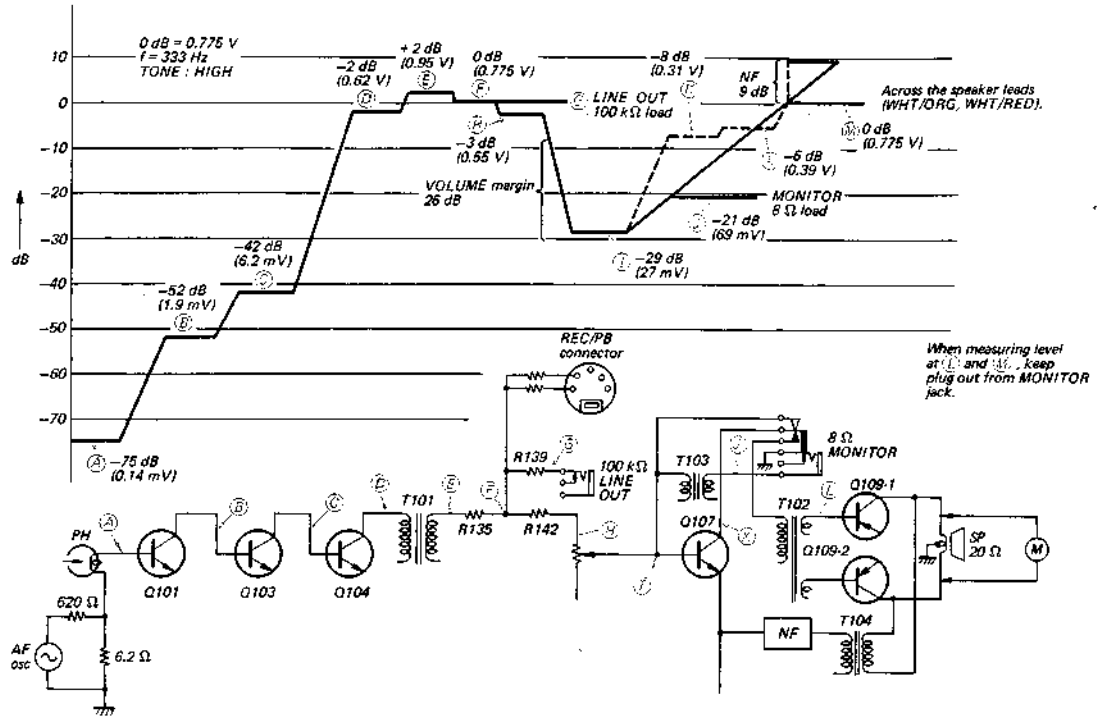
Q109 BX324

D1 1S2139C
D2, 3 1T261
D4, 5 } 1T22
D102 }
D6 1S1555
D101 1T40
D103 RD5A

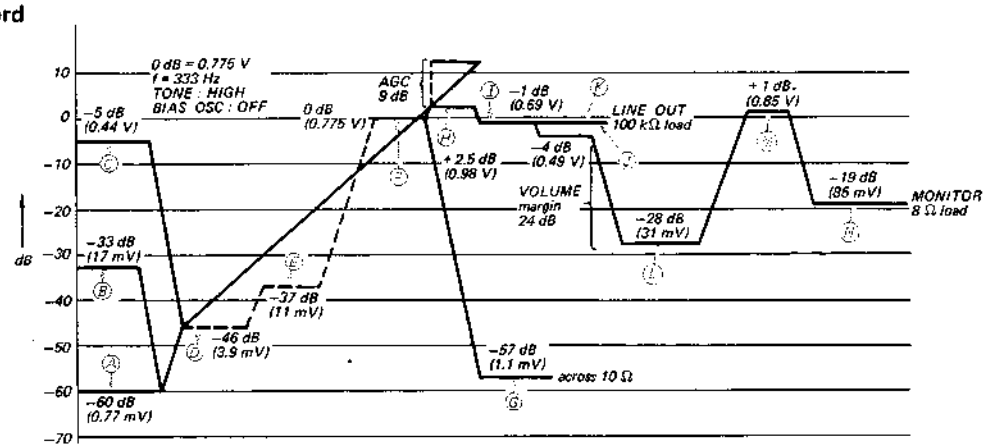
D104, 105 10D2

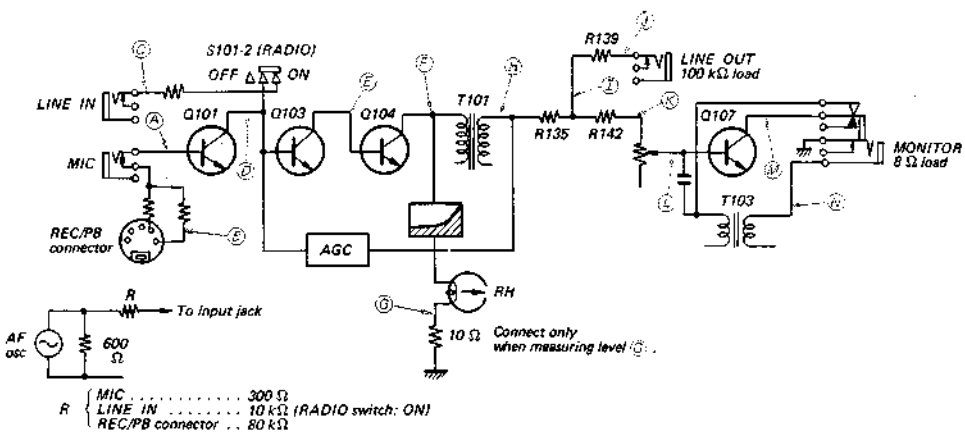
4-3. LEVEL DIAGRAMS

Playback



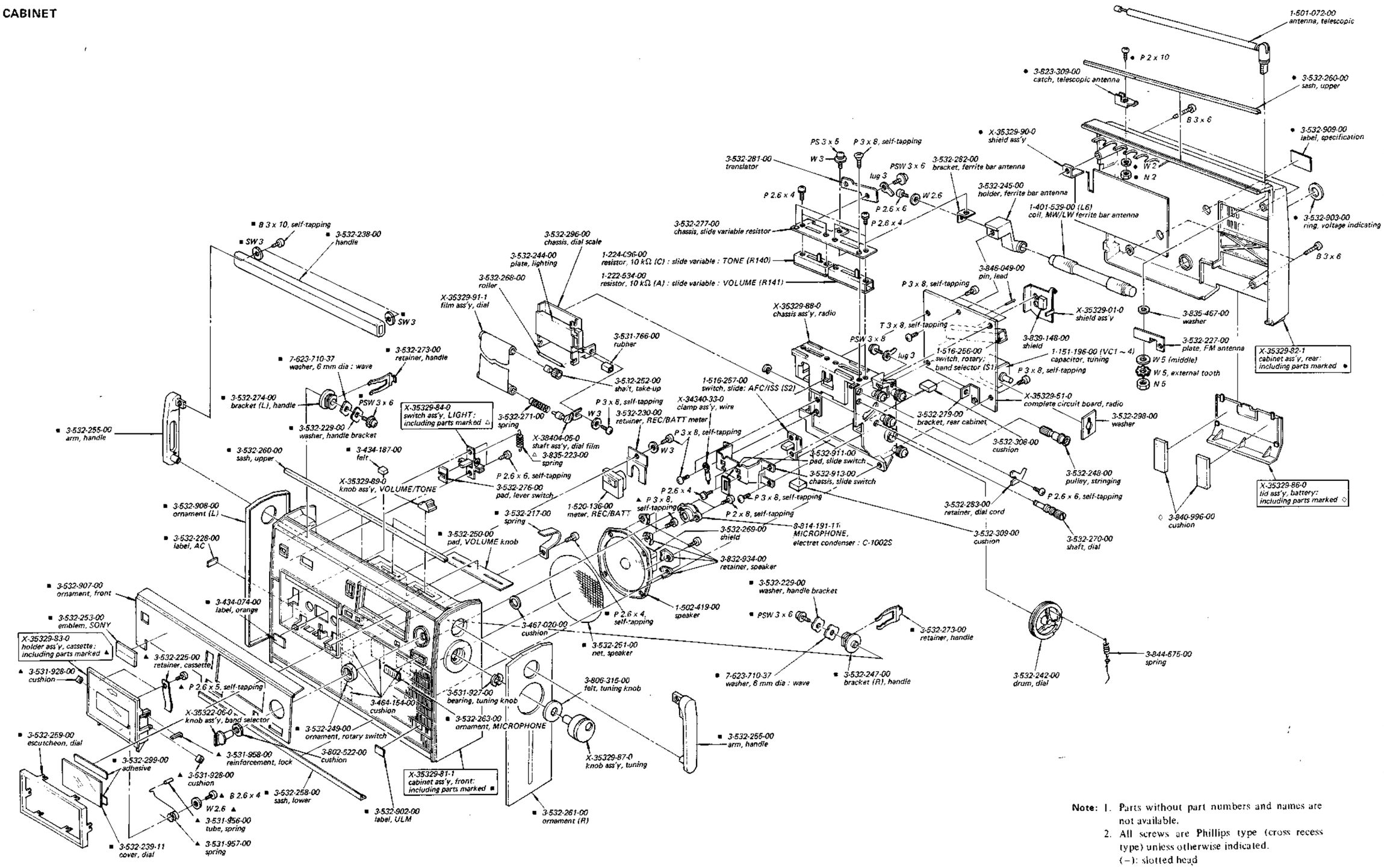
Record





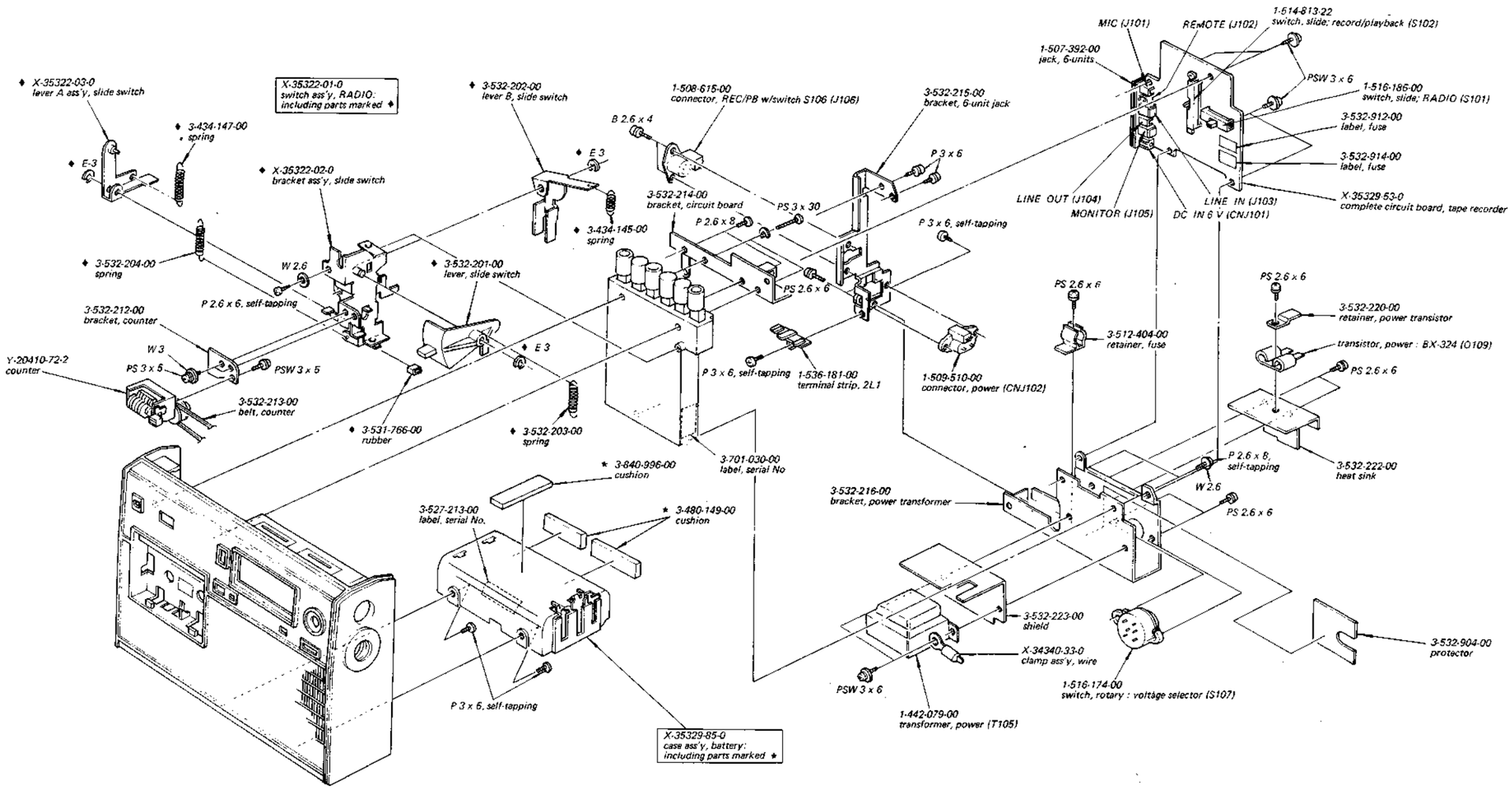
SECTION 5
EXPLODED VIEWS

5-1. CABINET



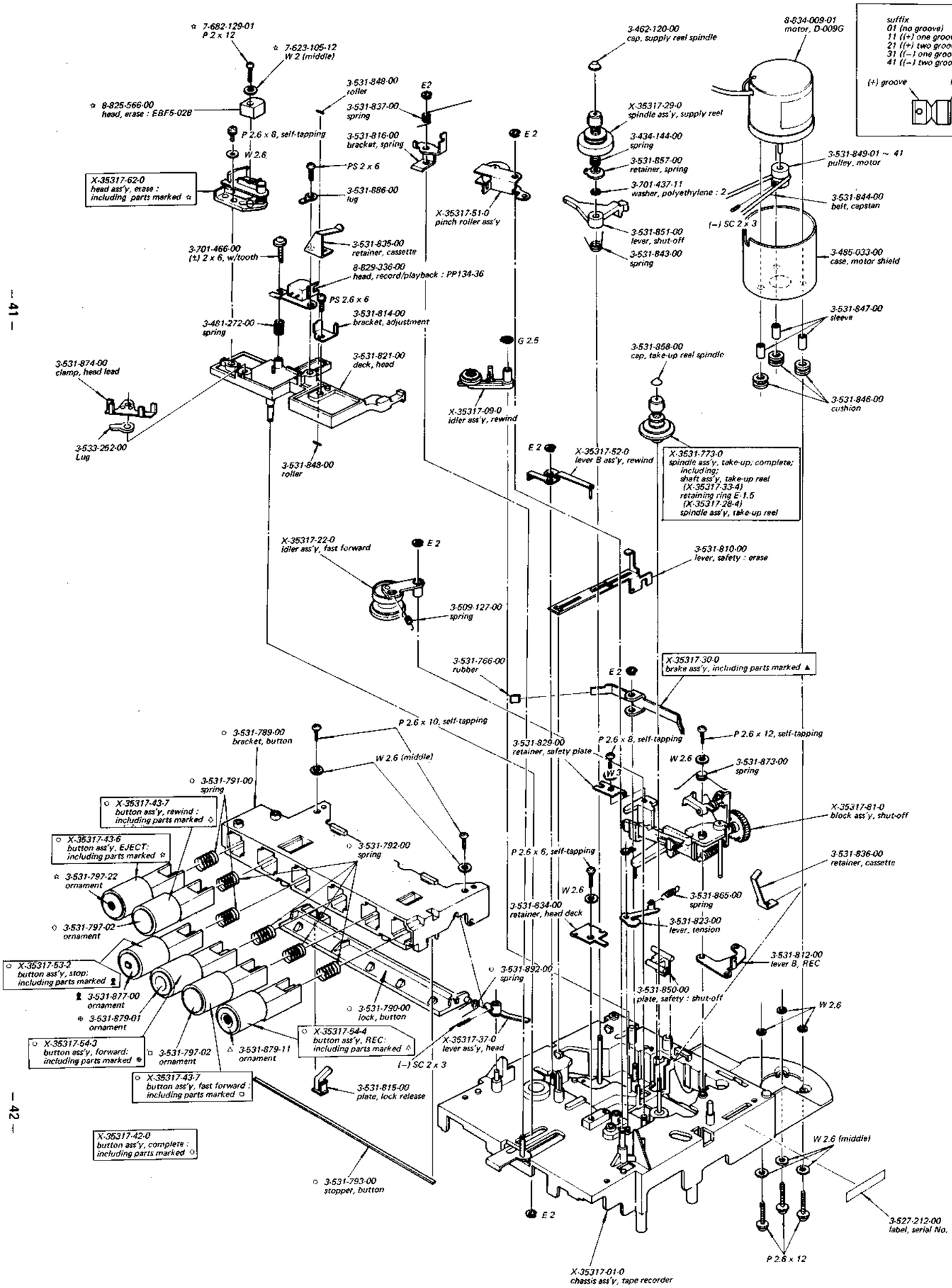
Note: 1. Parts without part numbers and names are not available.
2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

5-2. RADIO SECTION

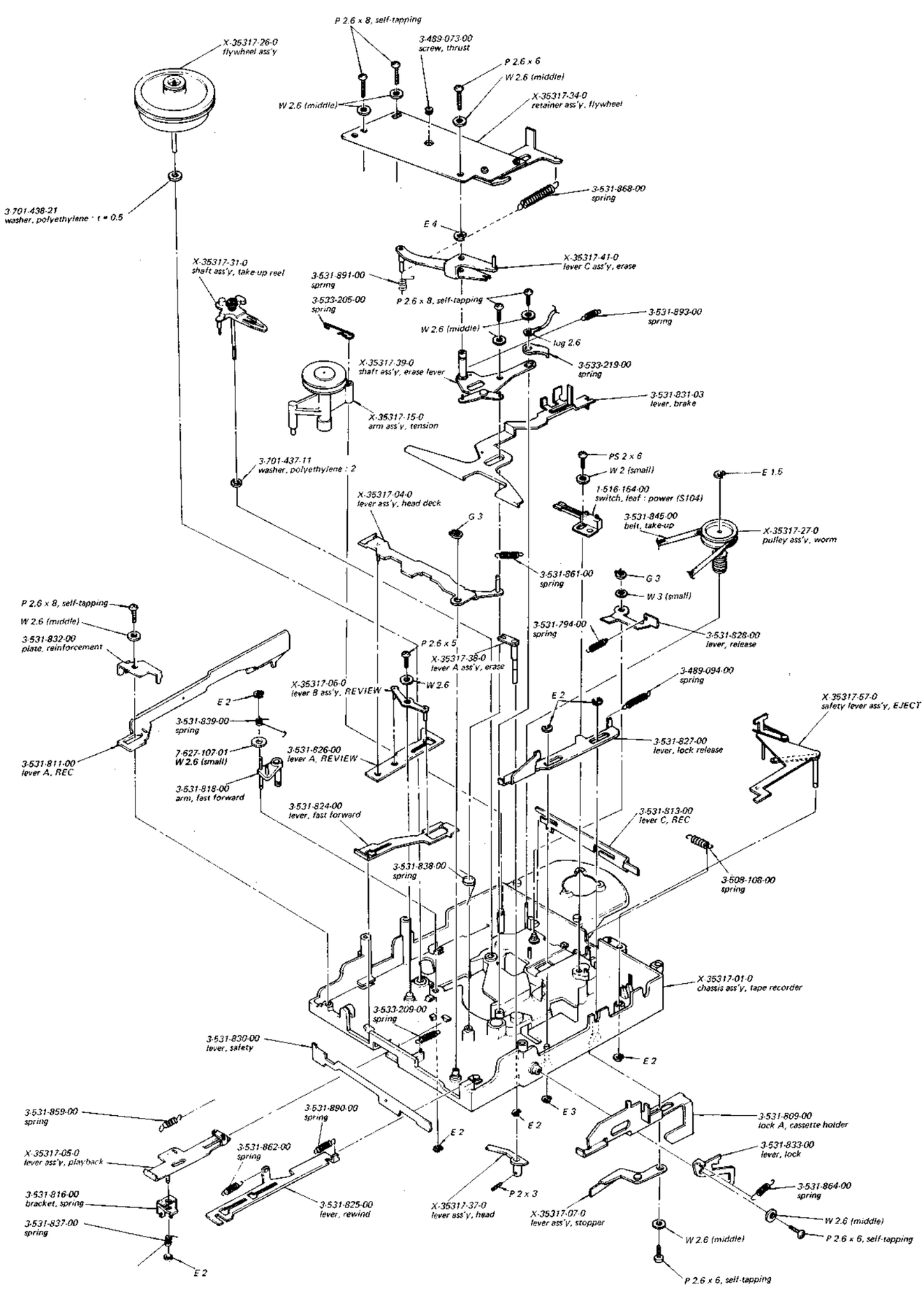


Note: 1. Parts without part numbers and names are not available.

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

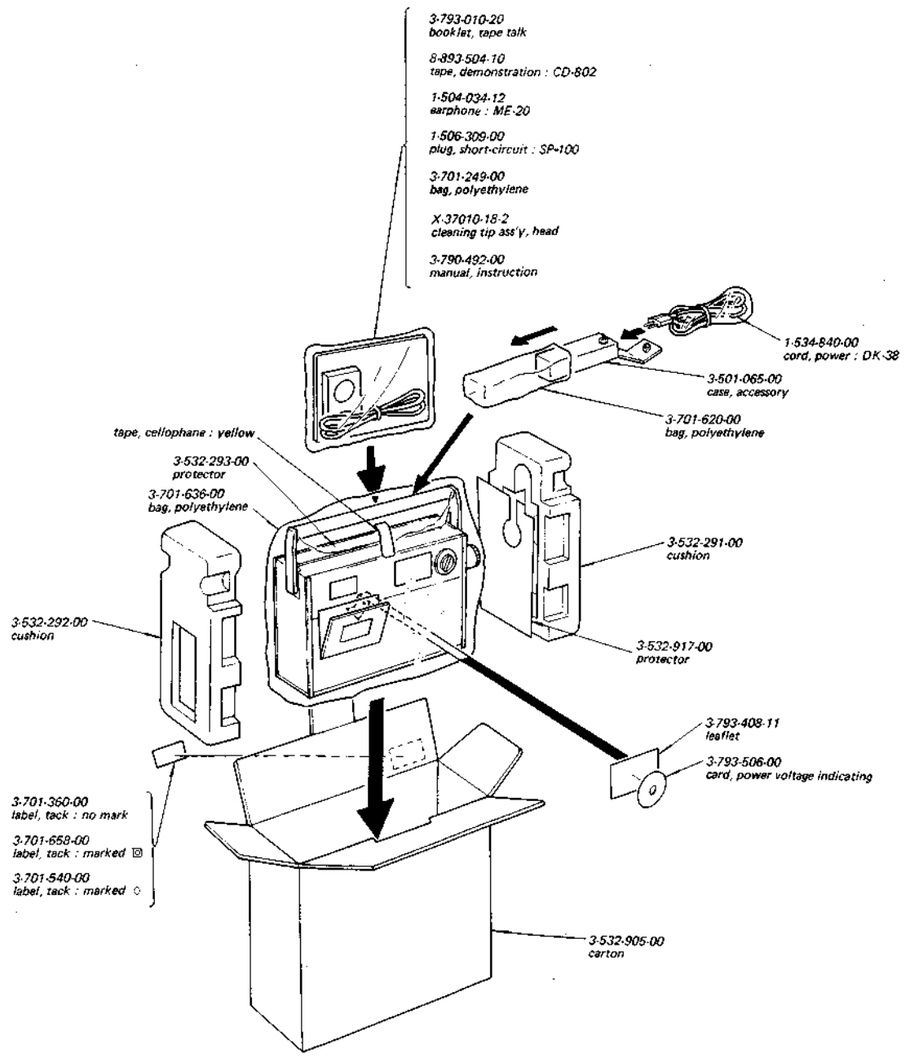


Note: 1. Parts without part numbers and names are not available.
2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head



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. Parts without part numbers and names are not available.

SECTION 6

ELECTRICAL PARTS LIST

Ref. No.	*Part No.*	*Description*
		COMPLETE CIRCUIT BOARDS
	X-35329-53-0	tape recorder
	X-35329-51-0	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 BX324
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
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	1-405-595-00	FM osc
L5	1-401-538-00	SW ant
L6	1-401-539-00	MW ferrite bar antenna
L7	1-405-593-00	SW osc
L8	1-405-301-00	MW osc
L9	1-405-594-00	LW osc
L10	1-407-176-00	390 μH, microinductor
L11	1-407-178-00	1 μH, microinductor
L12		included in MW ferrite bar antenna (L6)
L13	1-401-219-11	loading
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	1-442-079-00	power
CFT	1-403-144-00	CFT
IFT A	1-403-152-00	AM
IFT F1	1-403-242-00	FM
IFT F2	1-403-244-00	FM
IFT F3	1-403-272-31	FM discriminator
IFT F4	1-403-273-31	FM discriminator

CAPACITORS

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

CT1,2	1-141-097-00	trimmer one unit		
CT3 ~ 8	1-141-151-00	trimmer three units		
VC1 ~ 4	1-151-196-00	tuning		
C1	1-101-890-11	75 p	50 V	ceramic
C2	1-101-882-11	51 p	50 V	ceramic
C3	1-102-943-11	6 p	50 V	ceramic
C4	1-102-960-11	24 p	50 V	ceramic
C5	1-102-941-11	4 p	50 V	ceramic
C6	1-101-923-11	0.01	50 V	ceramic
C7	1-102-938-11	1 p	50 V	ceramic
C8	1-107-135-11	150 p	50 V	silvered mica
C9	1-102-962-11	30 p	50 V	ceramic
C10	1-101-923-11	0.01	50 V	ceramic
C11	1-101-923-11	0.01	50 V	ceramic
C12	1-105-833-12	0.01	50 V	mylar
C13	1-102-943-11	6 p	50 V	ceramic
C14	1-102-673-11	30 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 elect
C17	1-105-833-12	0.01	50 V	mylar
C18	1-105-833-12	0.01	50 V	mylar
C19	1-105-833-12	0.01	50 V	mylar
C20	1-101-923-11	0.01	50 V	ceramic
C21	1-121-651-11	10	16V	elect
C22	1-105-823-12	0.0015	50 V	mylar
C23	1-101-923-11	0.01	50 V	ceramic
C24	1-105-833-12	0.01	50 V	mylar
C25	1-105-833-12	0.01	50 V	mylar
C26	1-101-923-11	0.01	50 V	ceramic
C27	1-105-837-12	0.022	50 V	mylar

Ref. No.	Part No.	Description		
C28	1-102-938-11	1 p	50 V	ceramic
C29	1-105-841-12	0.047	50 V	mylar
C30	1-127-049-11	1	10 V	solid aluminum elect
C31	1-121-651-11	10	16 V	elect
C32	1-107-138-11	200 p	50 V	silvered mica
C33	1-107-138-11	200 p	50 V	silvered mica
C34		----------		
C35	1-105-833-12	0.01	50 V	mylar
C36	1-105-833-12	0.01	50 V	mylar
C37	1-105-837-12	0.022	50 V	mylar
C38	1-105-671-12	0.0068	50 V	mylar
C39	1-105-671-12	0.0068	50 V	mylar
C40	1-127-045-11	0.1	10 V	solid aluminum elect
C41	1-102-102-11	0.0047	50 V	ceramic
C42	1-101-923-11	0.01	50 V	ceramic
C43	1-121-419-11	220	6.3 V	elect
C44		----------		
C45	1-102-945-11	8 p	50 V	ceramic
C46	1-102-969-11	33 p	50 V	ceramic
C47	1-101-918-11	0.001	50 V	ceramic
C48	1-101-923-11	0.01	50 V	ceramic
C49	1-105-833-12	0.01	50 V	mylar
C50	1-101-923-11	0.01	50 V	ceramic
C51	1-103-888-11	3600 p		styrol
C52	1-102-285-11	10 p	50 V	ceramic
C53	1-107-241-11	360 p	50 V	silvered mica
C54	1-102-951-11	15 p	50 V	ceramic
C55	1-107-132-11	110 p	50 V	silvered mica
C56	1-101-881-11	47 p	50 V	ceramic
C57	1-105-841-12	0.047	50 V	mylar
C58	1-121-413-11	100	6.3 V	elect
C59	1-103-886-11	3000 p		styrol
C60	1-102-941-11	4 p	50 V	ceramic
C61	1-102-956-11	15 p	50 V	ceramic
C80	1-101-923-11	0.01	50 V	ceramic
C81	1-101-923-11	0.01	50 V	ceramic
C82	1-101-923-11	0.01	50 V	ceramic
C83	1-101-923-11	0.01	50 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 elect
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	1-105-833-12	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 elect
C115	1-121-402-11	33	10 V	elect
C116	1-121-402-11	33	10 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 elect
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	1-101-923-11	0.01	50 V	ceramic
C143	1-101-923-11	0.01	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	1-105-679-12	0.033	50 V	mylar
C148	1-105-709-12	0.0047	50 V	mylar
C149	1-102-106-11	100 p	50 V	ceramic
C150	1-102-106-11	100 p	50 V	ceramic
C151	1-105-679-12	0.033	50 V	mylar
C152	1-102-106-11	100 p	50 V	ceramic
C153	1-101-918-11	0.001	50 V	ceramic

RESISTORS

All resistors are ¼W, carbon type and in Ω unless otherwise indicated. (k = 1,000)

R1	1-242-726-11	160 k
R2	1-244-670-11	750
R3	1-244-723-11	120 k
R4	1-244-675-11	1.2 k
R5	1-242-653-11	150
R6	1-242-673-11	1 k
R7	1-244-673-11	1 k
R8	1-242-709-11	33 k
R9	1-242-632-11	20
R10	1-244-721-11	100 k

Ref. No.	Part No.	Description	
R11	1-244-661-11	330	
R12	1-244-714-11	51 k	
R13	1-244-659-11	270	
R14	1-244-672-11	910	
R15	1-242-653-11	150	
R16	1-244-708-11	30 k	
R17	1-244-673-11	1 k	
R18	1-244-653-11	150	
R19	1-242-721-11	100 k	
R20	1-242-651-11	120	
R21	1-242-658-11	240	
R22	1-244-697-11	10 k	
R23	1-244-666-11	510	
R24	1-242-673-11	1 k	
R25	1-244-713-11	47 k	
R26	1-244-697-11	10 k	
R27	1-242-658-11	240	
R28	1-242-673-11	1 k	
R29	1-242-727-11	180 k	
R30	1-242-666-11	510	
R31	1-244-657-11	220	
R32	1-242-657-11	220	
R33	1-242-673-11	1 k	
R34	1-242-673-11	1 k	
R35	1-242-713-11	47 k	
R36	1-242-693-11	6.8 k	
R37	1-242-673-11	1 k	
R38	1-244-713-11	47 k	
R39	1-244-706-11	24 k	
R40	1-244-695-11	8.2 k	
R41	1-244-695-11	8.2 k	
R42	1-244-721-11	100 k	
R43	1-242-673-11	1 k	
R44	1-244-690-11	5.1 k	
R45	1-244-637-11	33	
R46	1-244-728-11	200 k	
R47	1-244-672-11	910	
R48	1-242-684-11	3 k	
R49	1-242-660-11	300	
R50	1-242-664-11	430	
R51	1-242-657-11	220	
R52	1-242-661-11	330	
R53	1-242-640-11	43	
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	1-242-737-11	470 k	low noise
R108	1-244-659-11	270	
R109	1-244-697-09	10 k	low noise

Ref. No.	Part No.	Description	
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	low noise
R115	1-242-707-11	27 k	
R116	1-242-638-11	36	
R117	1-244-701-09	1.5 k	low noise
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	1-244-649-11	100	
R126	1-244-655-11	180	
R127	1-244-653-11	150	
R128	1-244-649-11	100	
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	1-244-675-11	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	1-224-096-00	10 k (C), slide variable; TONE	
R141	1-222-534-00	10 k (A), slide variable; VOLUME	
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	1-244-624-11	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	

Ref. No.	Part No.	Description
R163	1-242-635-11	27
R164	1-242-691-11	5.6 k
R165	1-242-691-11	5.6 k
R166	1-244-689-11	4.7 k
R167	1-244-689-11	4.7 k
R168	1-242-657-11	220
R169	1-244-633-11	22

SWITCHES

S1	1-516-256-00	rotary, band selector
S2	1-516-257-00	slide, AFC/ISS
S101	1-516-186-00	slide, RADIO
S102	1-514-813-22	slide, record/playback
S103		included in lamp switch ass'y (X-35329-84-0)
S104	1-516-164-00	leaf, power
S105		included in power connector (CNJ102)
S106		included in REC/PB connector (J106)
S107	1-516-174-00	rotary, voltage selector

JACKS

J101	1-507-392-00	6-units:	MIC
J102			REMOTE
J103			LINE IN
J104			LINE OUT
J105			MONITOR
CNJ101			DC IN 6 V
J106	1-508-615-00		connector, REC/PB w/switch S106
CNJ102	1-509-510-00		connector, power

MISCELLANEOUS

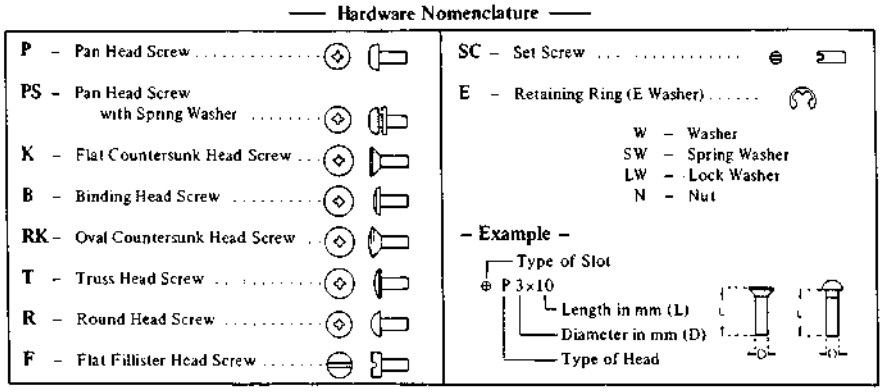
	8-829-336-00	head, record/playback: PP134-36
	8-825-566-00	head, erase: EBF5-02B
	8-834-009-01	motor, D-009G
	1-464-007-00	unit, bias osc
	1-527-184-11 ~ 15	filter, ceramic
	1-502-419-00	speaker
	1-501-072-00	antenna, telescopic
	8-814-191-11	MICROPHONE, electret condenser: C-1002S
	1-518-095-13	lamp, 6 V: 35 mA: dial
	1-520-136-00	meter, REC/BATT
F1	1-532-084-00	fuse, 100 mA: primary
F2,3	1-532-080-00	fuse, 800 mA: secondary
	1-533-037-00	holder, fuse: secondary
	1-533-102-00	holder, fuse: primary
	1-536-181-00	terminal strip, 2L1
	1-535-047-00	terminal, solderless
	1-535-050-00	connector, circuit board

SECTION 7

HARDWARE

Part No.	Description	
	SCREWS	
7-621-255-15	P 2 x 3	
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	
7-621-720-46	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
7-621-773-86	B 2.6 x 4	
7-628-154-15	PS 2.6 x 6	
7-628-253-25	PS 2 x 6	
7-682-129-01	P 2 x 12	
7-682-135-01	P 2.6 x 6	
7-682-547-04	B 3 x 6	
7-682-624-01	PS 2 x 4	
7-682-626-01	PS 2 x 4	
7-682-646-01	PS 3 x 5	
7-682-647-01	PS 3 x 6	
7-682-655-01	PS 3 x 30	
7-682-946-01	PSW 3 x 5	
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
7-685-446-21	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	
7-623-710-37	6 wave	
7-623-107-01	2.6 (small)	
	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	
7-632-120-52	0.25	
	EYELET	
7-623-606-01	1.3 x 3	

— Hardware Nomenclature —



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