TC-95A

AEP Model

ISO
Set using ISO screws

SPECIFICATIONS

Power Requirements:	AC 110, 127, 220, 240V 50/60 Hz, 12W DC 6V, Four "C" size standard flashlight batteries, SONY rechargeable battery pack BP-16 or Car battery with SONY car battery cord DCC-126, 3W
Track System:	Two-track mono
Tape Cassette:	SONY tape cassette or equivalent
Tape Speed:	1 7/8 ips (4.8 cm/s)
Playing Time: (with C-120 tape cassette)	2.0 hrs total
Frequency Response:	50～10,000 Hz
Singal-to-Noise Ratio:	45 dB or more
Bias Frequency:	Approx. 85 kHz
Power Output:	1.5W maximum

Inputs:	MIC Impedance: low impedance Maximum Sensitivity: 0.2 mV (-72 dB) AUX Impedance: 100 kΩ Maximum Sensitivity: 60 mV (-22 dB)
Outputs:	MONITOR Impedance: 8Ω or more Output level: 0.775V (0 dB) with 10 kΩ load
Speaker:	4" (100 mm) dynamic speaker Voice coil impedance: 8Ω
Semiconductors:	1 IC, 5 transistors and 5 diodes
Dimensions:	9 15/16 (W) x 2 3/4 (H) x 8 1/4" (D) (252 x 69 x 209 mm)
Weight:	5 lb 8 oz (2.5 kg) with batteries

SONY®

SERVICE MANUAL

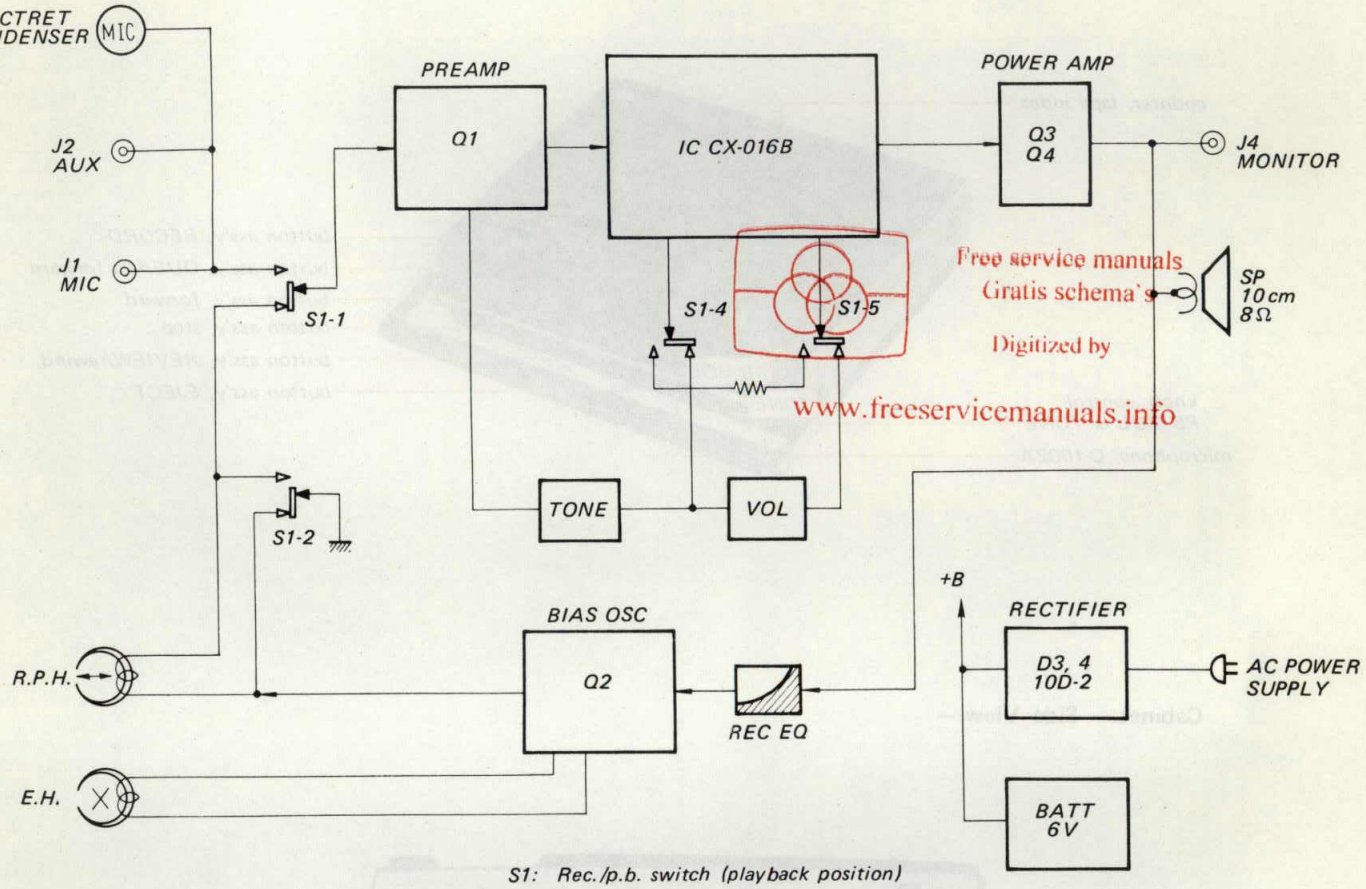
Published in Heiloo Holland

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.

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



S1: Rec./p.b. switch (playback position)

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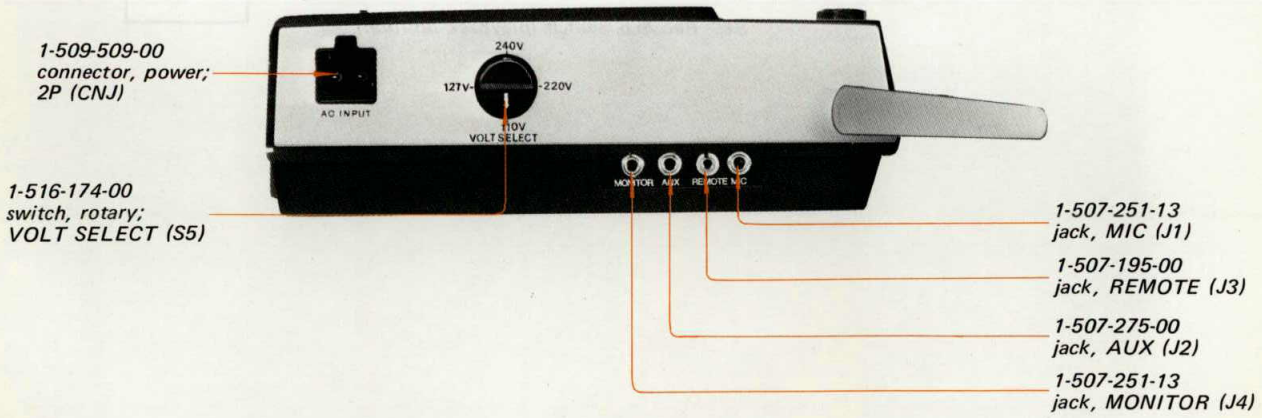
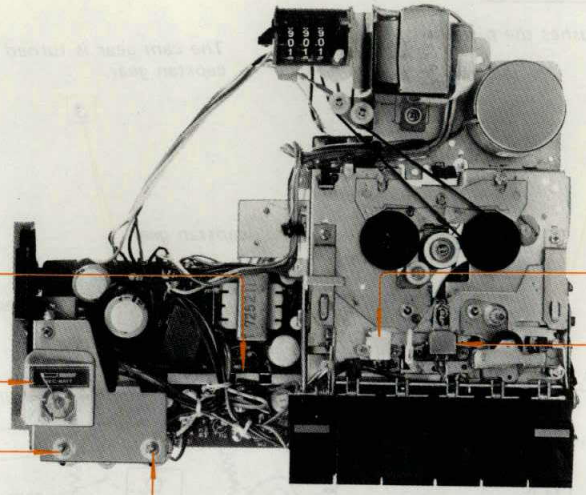
1-2. MAJOR PARTS LOCATION

Cabinet – Front View –

Cabinet – Side View –



Chassis – Top View –



1-514-813-22
switch, slide; rec/pb (S1)

1-520-105-11
meter, level

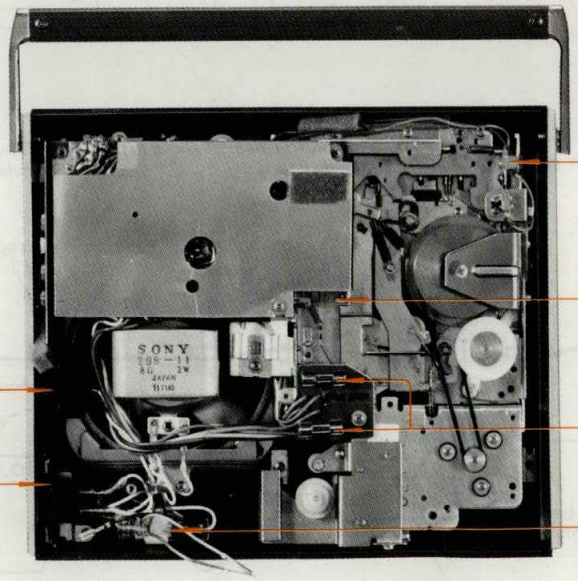
1-221-536-00
resistor, variable;
TONE; 20 kΩ(B) (R40)

1-221-540-00
resistor, variable;
PB VOL; 10 kΩ(A) (R41)

8-825-506-00
head, erase; EF135-36

8-829-336-00
head, rec/pb; PP134-36

Chassis – Bottom View –



1-541-841-00
switch, leaf; timing (S4)

1-514-792-00
switch, leaf; power (S2)

1-516-174-00
switch, rotary,
VOLT SELECT (S5)

1-509-509-00
connector, power;
2P

1-532-279-00
fuse, 500 mAT (F2, 3)

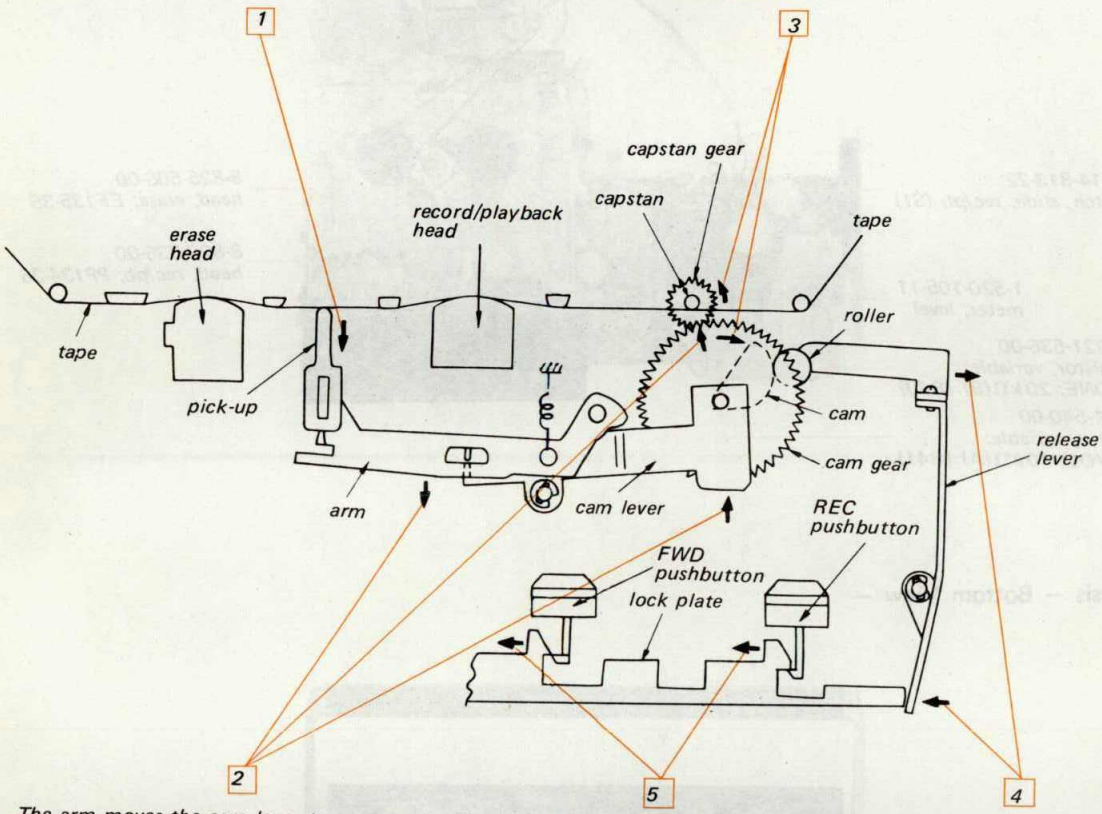
1-533-102-00
holder, fuse

1-532-292-00
fuse, 125 mAQ (F1)

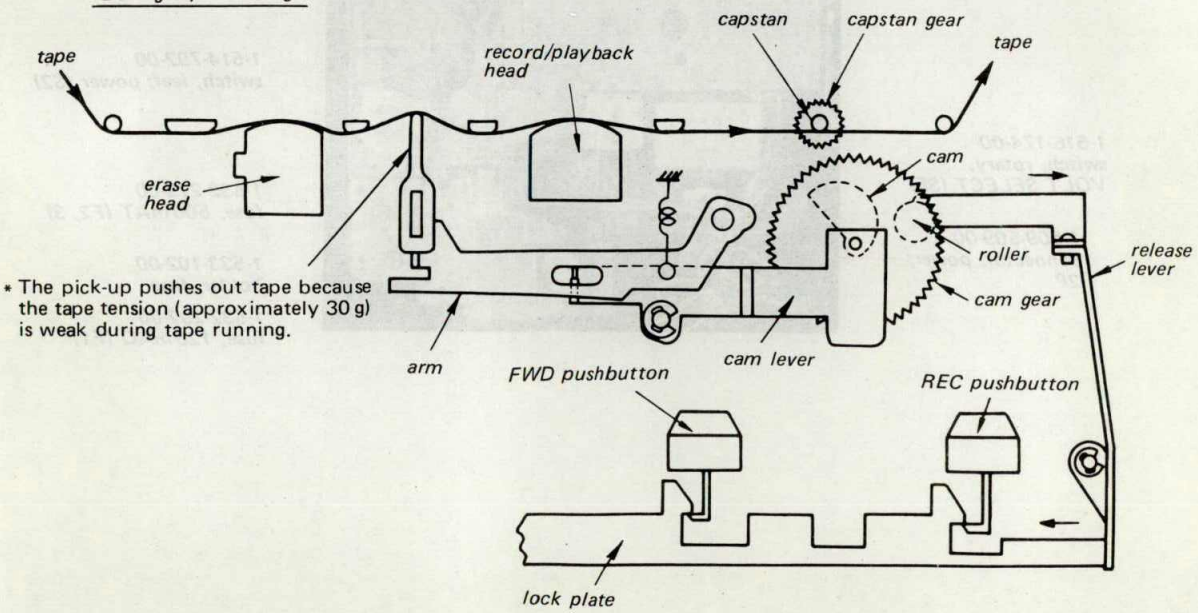
1-3. AUTO-SHUT-OFF SYSTEM FUNCTION

TC-95A has auto-shut-off system to stop the tape running automatically at tape end. This system detects the stronger tape-tension at tape end than the tension during tape running and shuts off tape transport mechanism.

When tape stops running at tape end:



During tape running:



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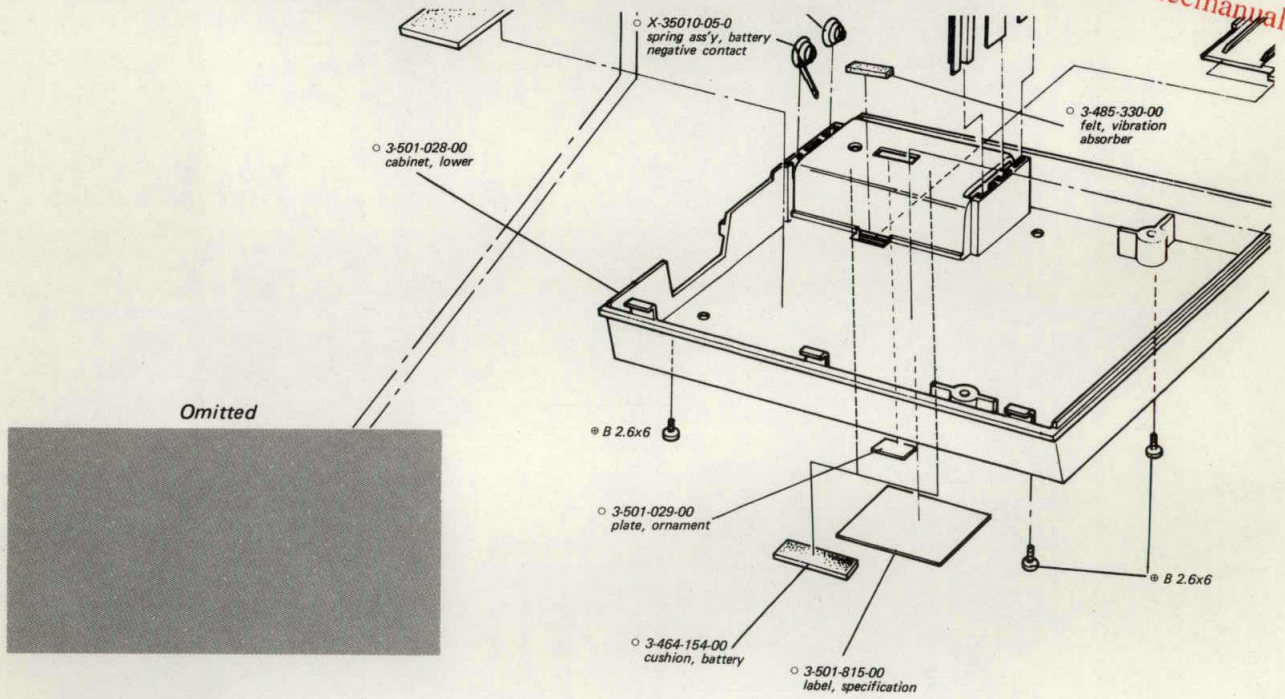
AEP Model

CORRECTION

File this correction with the service manual.

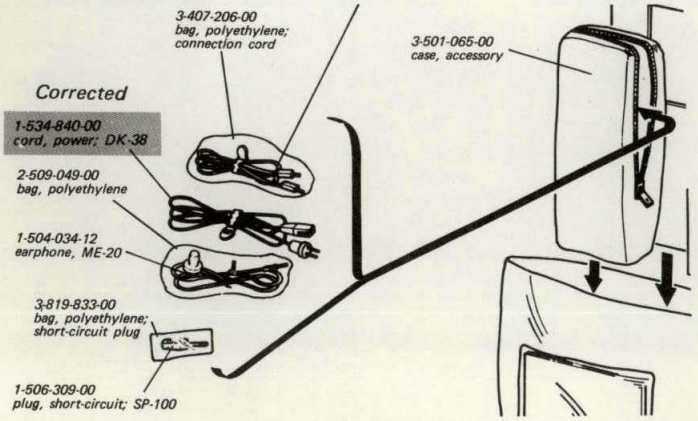
SUBJECT: INCORRECT PARTS and PART NUMBERS

1. Voltage Selector (On page 24)



2. Power Cord (On page 28)

5-5. PACKING



(On page 30)

ELECTRICAL PARTS

1-534-518-13
cord, power; DK-17

↓

1-534-840-00
cord, power; DK-38

SONY CORPORATION

2K0655-1

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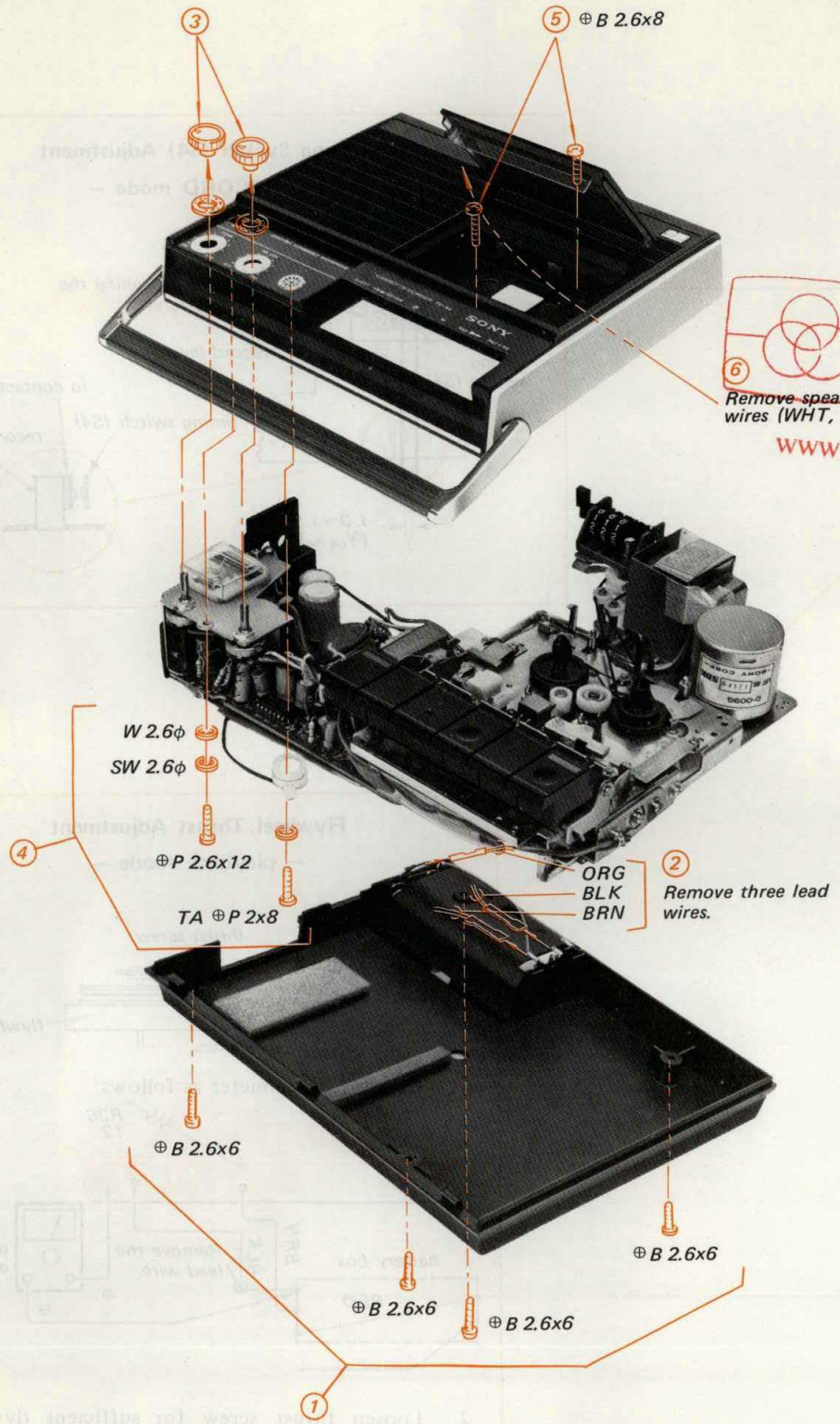
SECTION 2
DISASSEMBLY

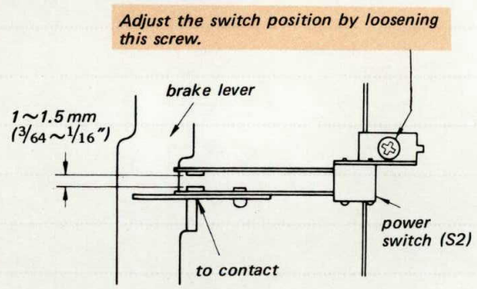


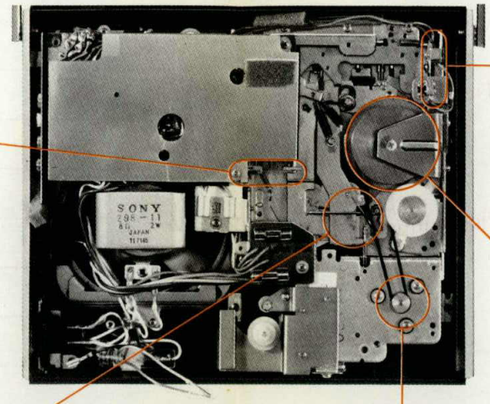
MEMO

SECTION 3
ADJUSTMENTS

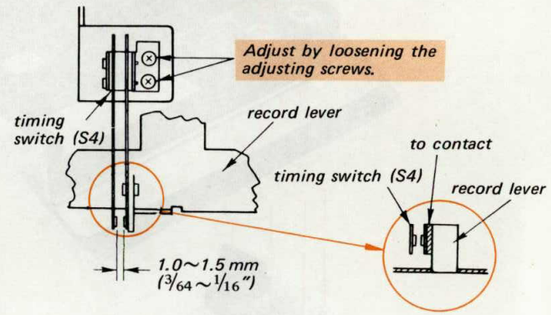
3-1. MECHANICAL ADJUSTMENTS

Power Switch (S2) Clearance Adjustment
– stop mode –

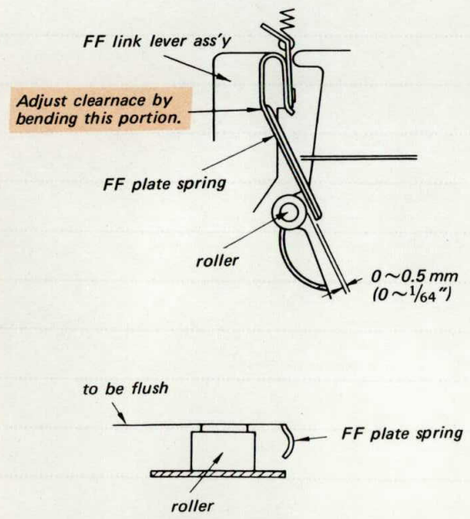




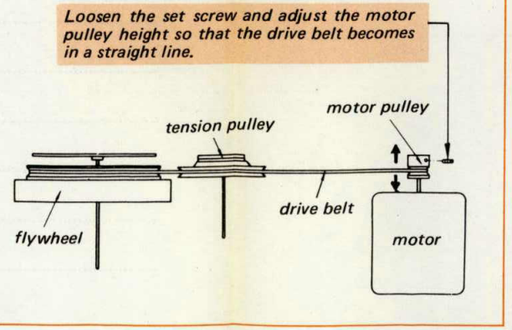
Timing Switch (S4) Adjustment
– RECORD mode –



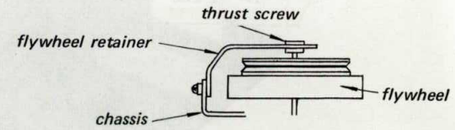
FF Plate Spring Clearance Adjustment
– stop mode –



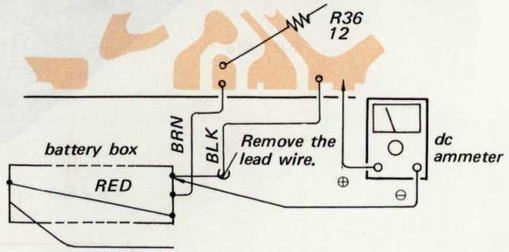
Motor Pulley Height Adjustment



Flywheel Thrust Adjustment
– playback mode –



1. Connect dc ammeter as follows:

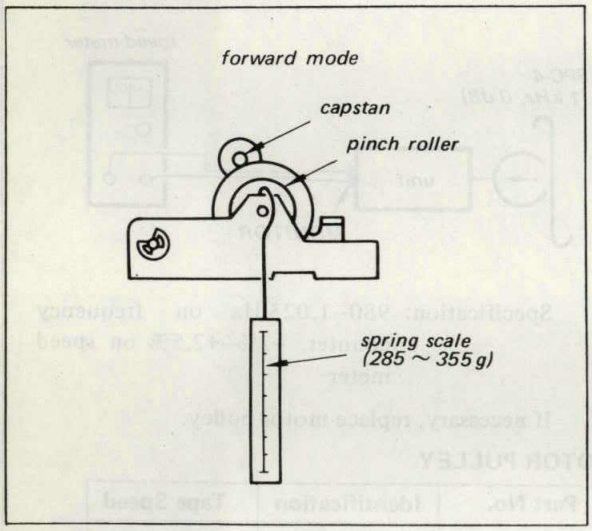


2. Loosen thrust screw for sufficient flywheel play.
3. Tighten adjusting screw until current suddenly increases, then loosen the screw 1/4 turn.

Check after Adjustments

1. Pinch Roller Pressure Check

1. Make certain that the pinch roller and the capstan shaft contact each other in parallel.
2. In playback mode, attach a spring scale to the pinch roller and pull the spring scale to separate the pinch roller from the capstan shaft. And take a reading just when the pinch roller begins to rotate again, releasing the spring scale to bring the pinch roller close to the capstan shaft.
3. The reading should be 285 to 355 g (9.9 to 12.7 oz).



2. Pushbutton Operation Check

1. In stop mode, all the buttons except the EJECT button are to be pushed and locked individually.
2. The locked buttons (REW, FF or REC button) are to be released by pushing one of the other buttons except the EJECT button.

Note: When the FWD button is pushed and locked, pushing the FF and REW buttons will result in cue and review operation without being released. The REW and FF buttons are not to be pushed when the REC button is locked.

3. The FWD and FF buttons are not to be locked simultaneously.
4. The FWD and REW buttons are not to be locked simultaneously.
5. The REC and FF buttons are not to be locked simultaneously.
6. The REC and REW buttons are not to be locked simultaneously.

3. Review Function Check

When pushing the REW button slowly in playback mode, review operation will be performed according to the following sequence and when releasing the button, the review operation will be released according to the reverse sequence.

1. Pinch roller separates from capstan shaft.
2. Rotation of take-up reel spindle stops.
3. Supply reel spindle starts to rotate.

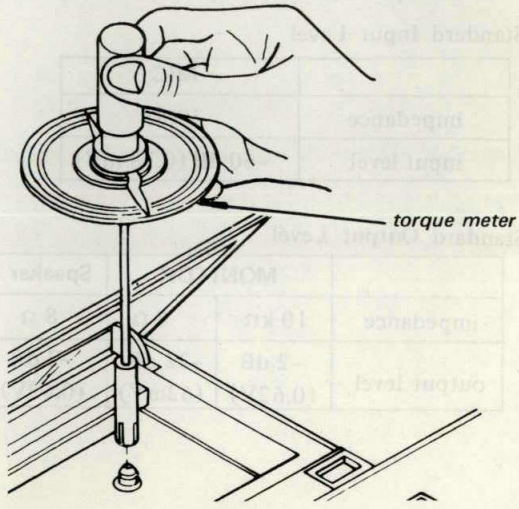
4. Cue Function Check

When pushing the FF button slowly in forward mode, cue operation will be performed according to the following sequence, and when releasing the button, the cue operation will be released according to the reverse sequence.

1. Pinch roller separates from capstan shaft.
2. Take-up reel spindle rotates at the same speed as in the fast forward mode.

Torque Measurement

forward torque	45 ~ 65 g·cm (0.63 ~ 0.91 oz·inch)
fast forward torque	80 ~ 110 g·cm (1.12 ~ 1.54 oz·inch)
rewind torque	85 ~ 115 g·cm (1.19 ~ 1.61 oz·inch)



3-2. ELECTRICAL ADJUSTMENTS/ MEASUREMENTS

PRECAUTION

1. Clean the following parts with alcohol moistened swab:
   - Record/Playback head
   - Erase head
   - Capstan
   - Pinch roller
   - Rubber belt
   - Idlers
2. Demagnetize reocrd/playback head with a head demagnetizer.
   (Don't use magnetized screwdriver for adjustments).
3. After the adjustments, apply lock paint to the parts adjusted.
4. Adjustments should be performed in the order arranged in service manual.
5. Adjustments and measurements should be performed with rated voltage unless otherwise specified.

Test Equipment/Tools Required

audio oscillator (af osc)
VTVM
digital frequency counter
wow meter
speed meter
1 kHz bandpass filter
10 kΩ, 300Ω, 600Ω, 8Ω resistor
attenuator
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)

Standard Input Level

	MIC
impedance	300Ω
input level	-60 dB (0.78 mV)

Standard Output Level

	MONITOR		Speaker
impedance	10 kΩ	8 Ω	8 Ω
output level	-2 dB (0.62V)	-22 dB (62mV)	-2 dB (0.62V)

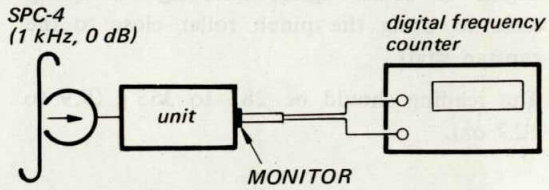
Tape Speed Adjustment

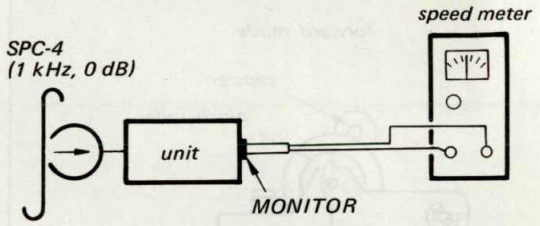
Control/Switch Setting:

Tone control: mechanical mid
PB VOL control: at any position so that frequency counter or speed meter can work.

Procedure:

1. Mode: playback



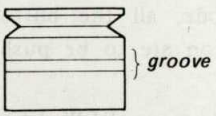


Specification: 980–1,025 Hz on frequency counter, -2%–+2.5% on speed meter

2. If necessary, replace motor pulley.

MOTOR PULLEY

Part No.	Identification	Tape Speed
3-489-117-01	no groove	decrease 2%
3-489-118-11	one groove	standard
3-489-117-21	two grooves	increase 2%
3-489-117-31	three grooves	decrease 1%



Note: After replacing motor pulley, perform Motor Pulley Height Adjustment on page 9, 10.

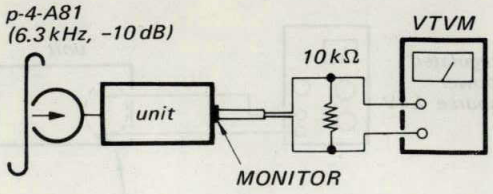
Head Azimuth Adjustment

Control/Switch Setting:

PB VOL control: mechanical mid

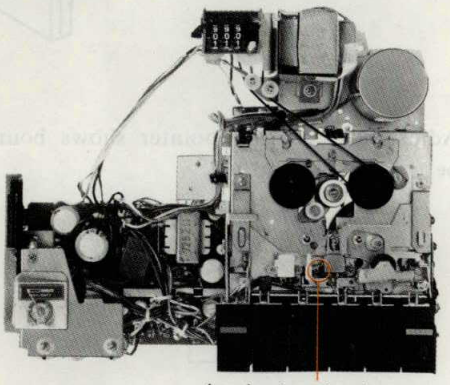
Procedure:

1. Mode: playback



2. Adjust adjusting screw for the biggest peak VTVM reading.

Note: Several peaks may appear, take the biggest.



head azimuth adjustment

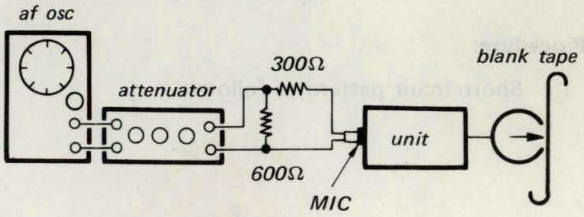
Overall Frequency Response Measurement

Control/Switch Setting:

TONE control: HIGH

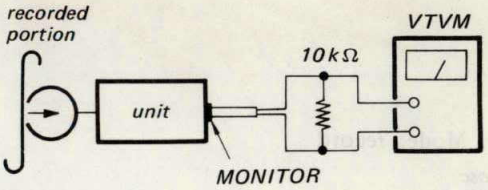
Procedure:

1. Mode: record

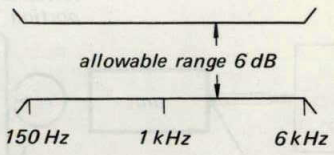


1. 1 kHz, -80 dB (77.5μV)
2. 150 Hz, -80 dB (77.5μV)
3. 6 kHz, -80 dB (77.5μV)

2. Mode: playback



recorded signal	VTVM reading
1 kHz	Adjust VOLUME control for -10 dB (0.25V)
150 Hz	Within the range as shown below
6 kHz	



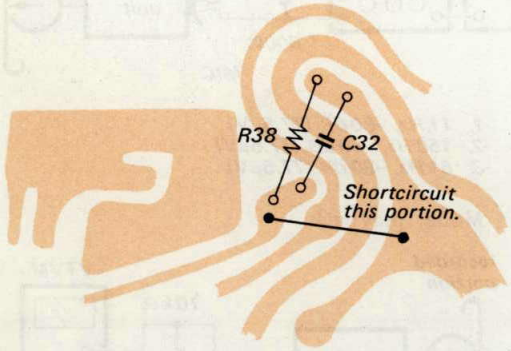
Erase Ratio Measurement

Control/Switch Setting:

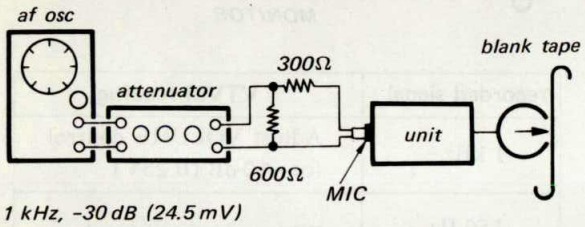
TONE control: HIGH
PB VOL control: at any position so that output of speaker terminal is +2 dB when playing back alignment tape (P-4-L81)

Procedure:

1. Shortcircuit pattern as follows:

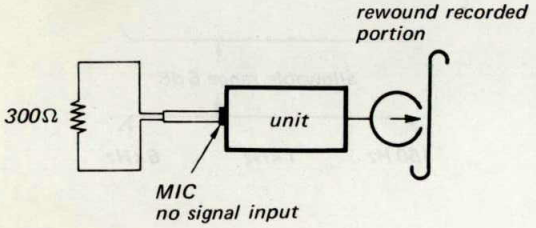


2. Mode: record

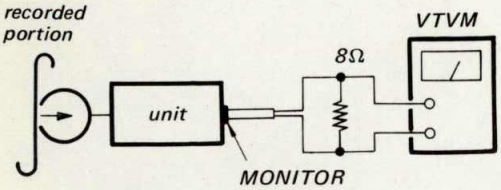


1 kHz, -30 dB (24.5 mV)

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



5. Mode: playback



Specification:
output level difference..... more than 60 dB between 1 kHz and erased portions.

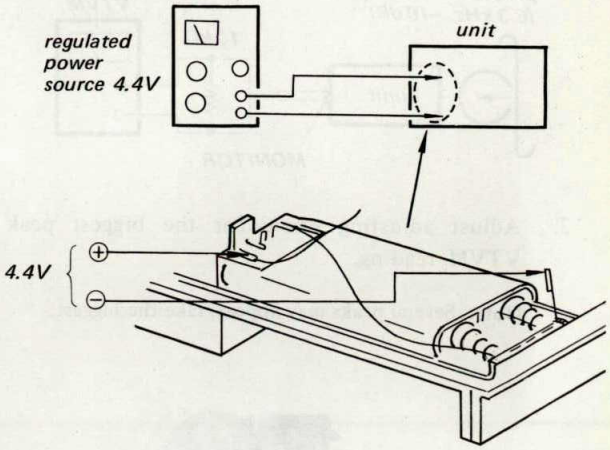
Battery Indicator Calibration

Control/Switch Setting:

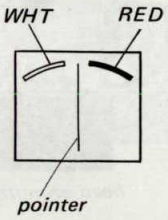
TONE control: mechanical mid
PB VOL control: MIN position

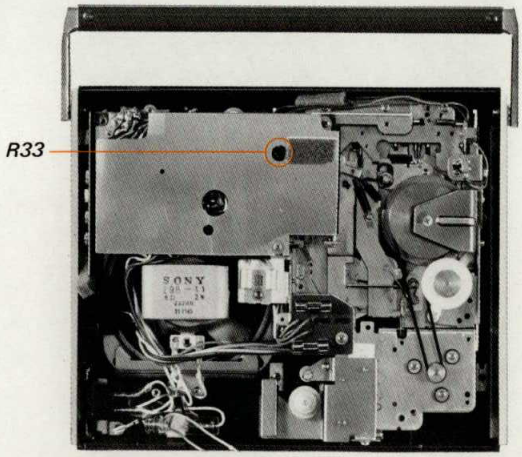
Procedure:

1. Mode: playback



2. Adjust R33 so that pointer shows boundary between white and red.





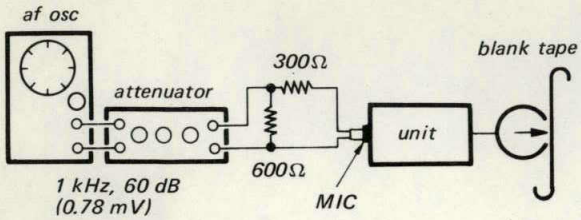
Overall Maximum Output Measurement

Control/Switch Setting:

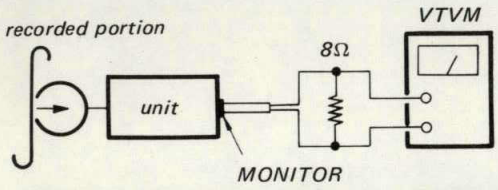
TONE control: HIGH
PB VOL control: MAX

Procedure:

1. Shortcircuit pattern as well as Erase Ratio Measurement on page 14.
2. Mode: record

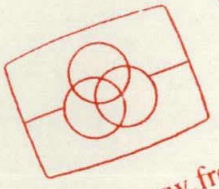


2. Mode: playback



Specification:
VTVM reading: AC ..... more than +9 dB (2.2V) 0.605W
DC ..... more than +11 dB (2.75V) 0.925W

Note: Measure output level for both AC power supply and battery.



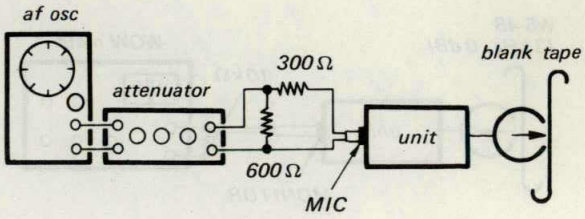
Record Bias Adjustment

Control/Switch Setting:

TONE control: mechanical mid

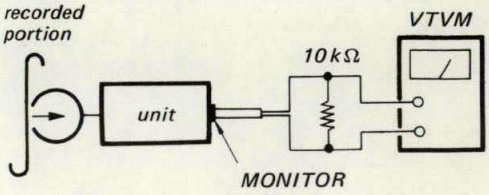
Procedure:

1. Mode: record



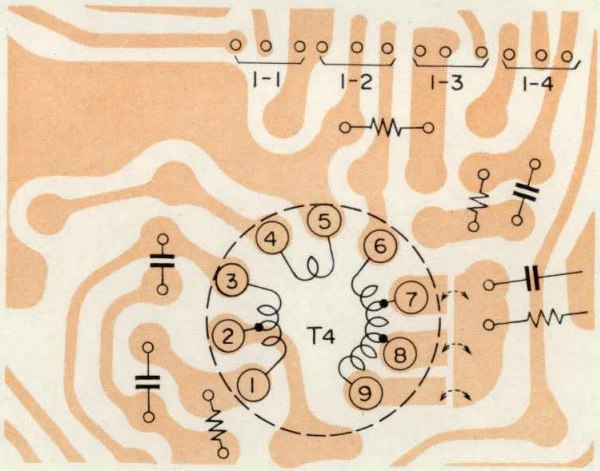
1. 1 kHz, -80 dB (77μV)
2. 6 kHz, -80 dB (77μV)

2. Mode: playback



Specification: level difference between 1 kHz and 6 kHz ..... less than 2 dB

3. If the difference is more than 2 dB, change the tap of T4 as shown in the following.



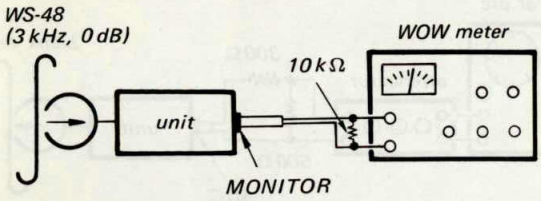
Wow and Flutter Measurement

Control/Switch Setting:

PB VOL control: mechanical mid

Procedure:

1. Mode: playback



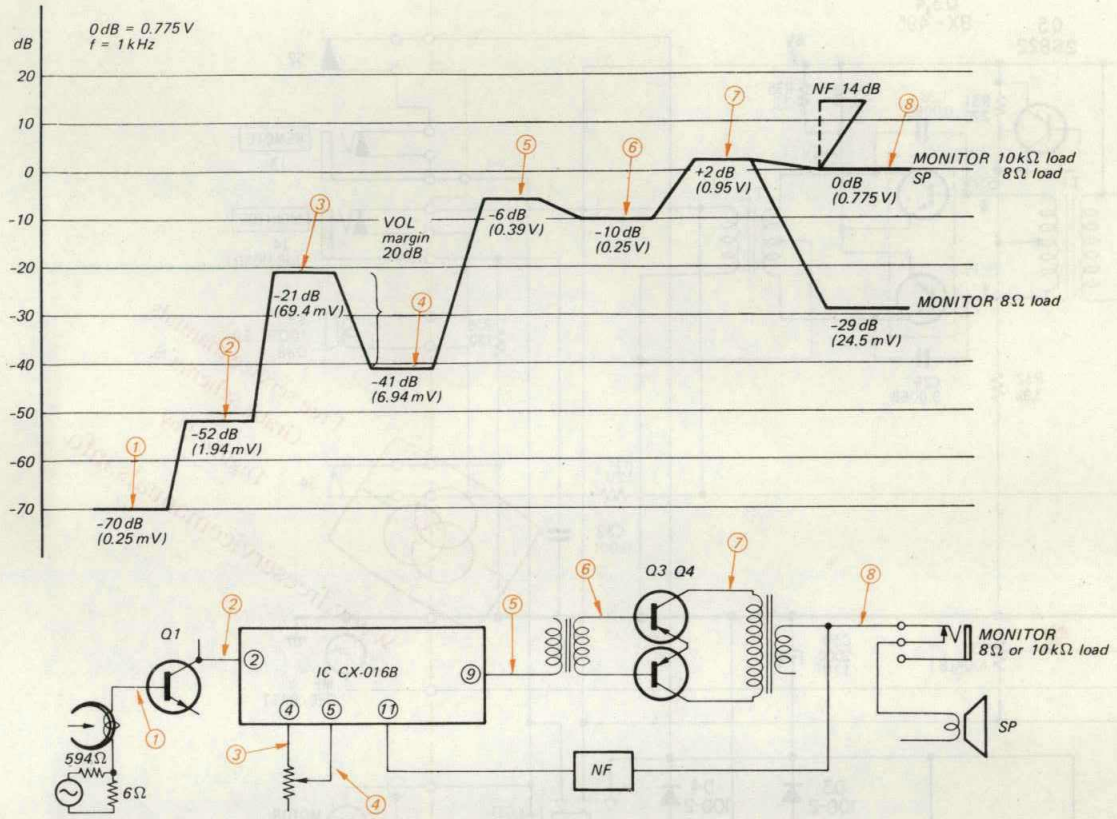
Specification: 0.35% (RMS) or less

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

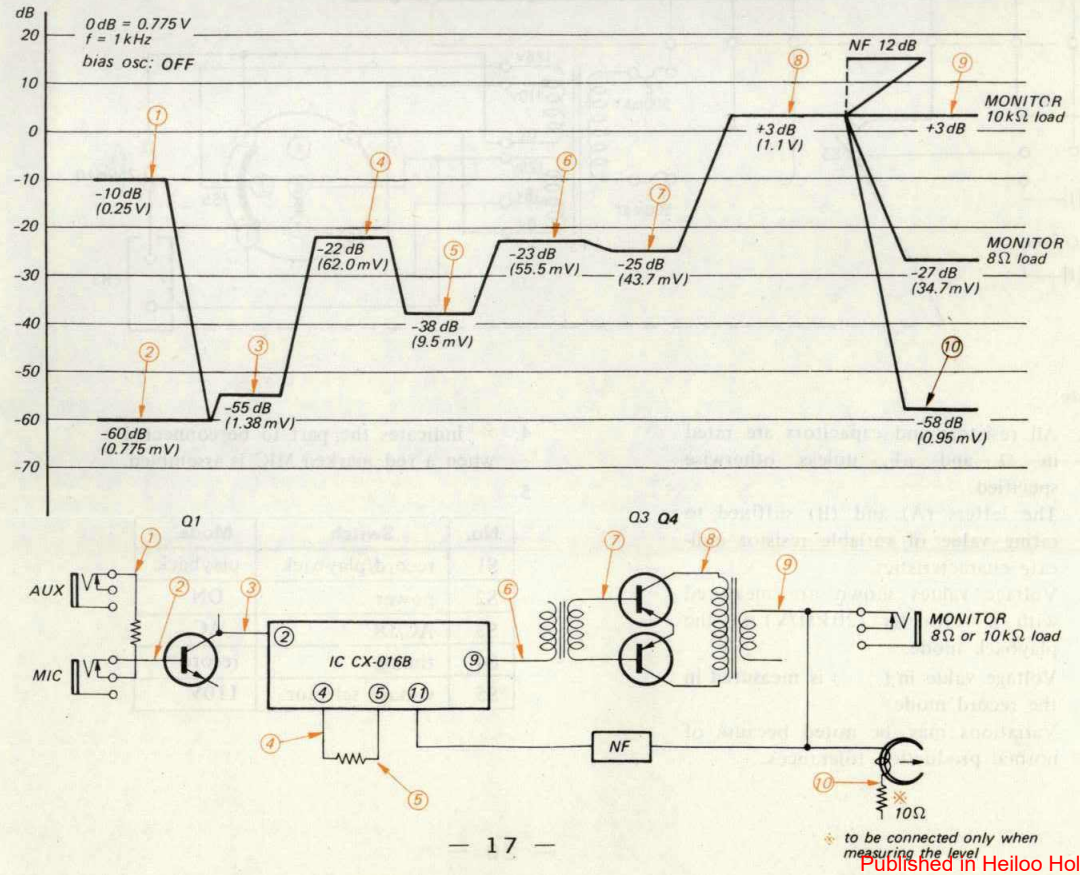
SECTION 4
DIAGRAMS

4-1. LEVEL DIAGRAMS

4-1-1. Playback

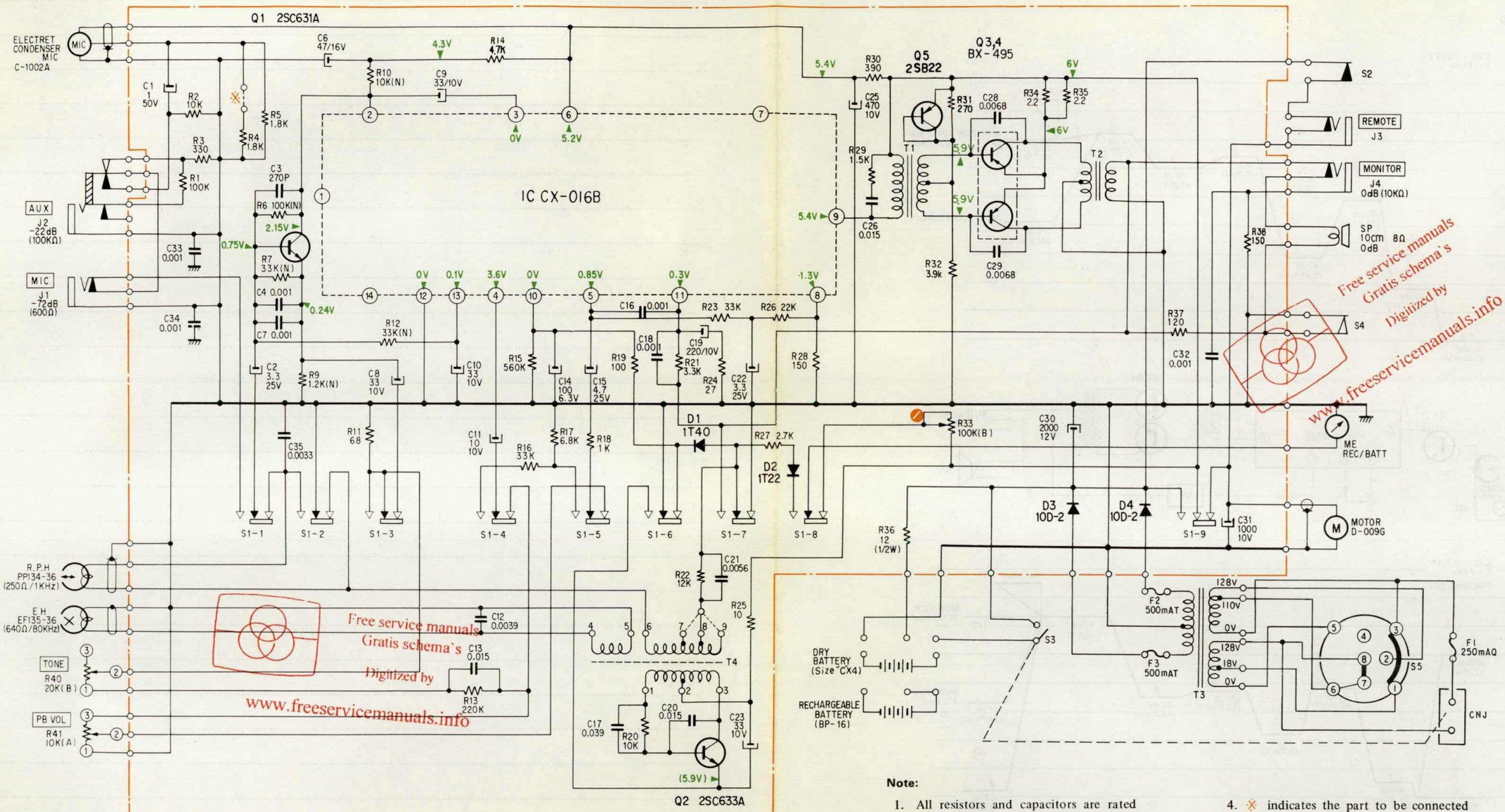


4-1-2. Record

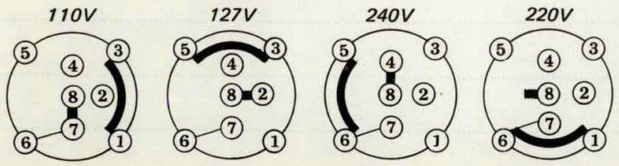


MEMO

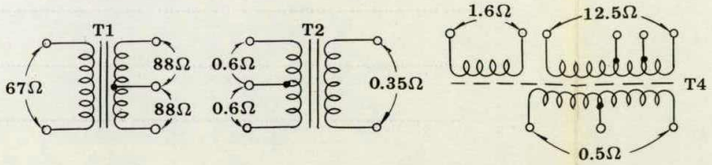
4-2. SCHEMATIC DIAGRAM



Voltage Selector Switch (S5)
Rotor Positions



Transformer DC Resistance (T1, T2, T4)



Note:

1. All resistors and capacitors are rated in Ω and μF, unless otherwise specified.
2. The letters (A) and (B) suffixed to rating value of variable resistor indicate characteristics.
3. Voltage values shown are measured with a voltmeter (20kΩ/V) in the playback mode.
   Voltage value in ( ) is measured in the record mode.
   Variations may be noted because of normal production tolerances.
4. ※ indicates the part to be connected when a red marked MIC is assembled.
5.

No.	Switch	Mode
S1	record/playback	playback
S2	power	ON
S3	AC/DC	AC
S4	timing	record
S5	voltage selector	110V

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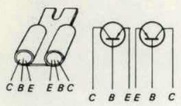
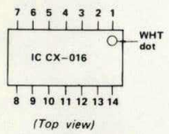
4-3. MOUNTING DIAGRAM

– Conductor Side –

Q3, Q4: BX-495

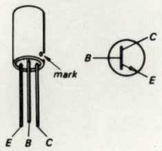


IC: CX-016B

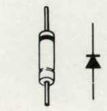


(Top view)

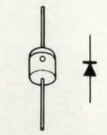
Q5: 2SB22



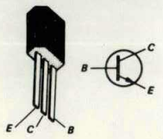
D1: 1T40
D2: 1T22

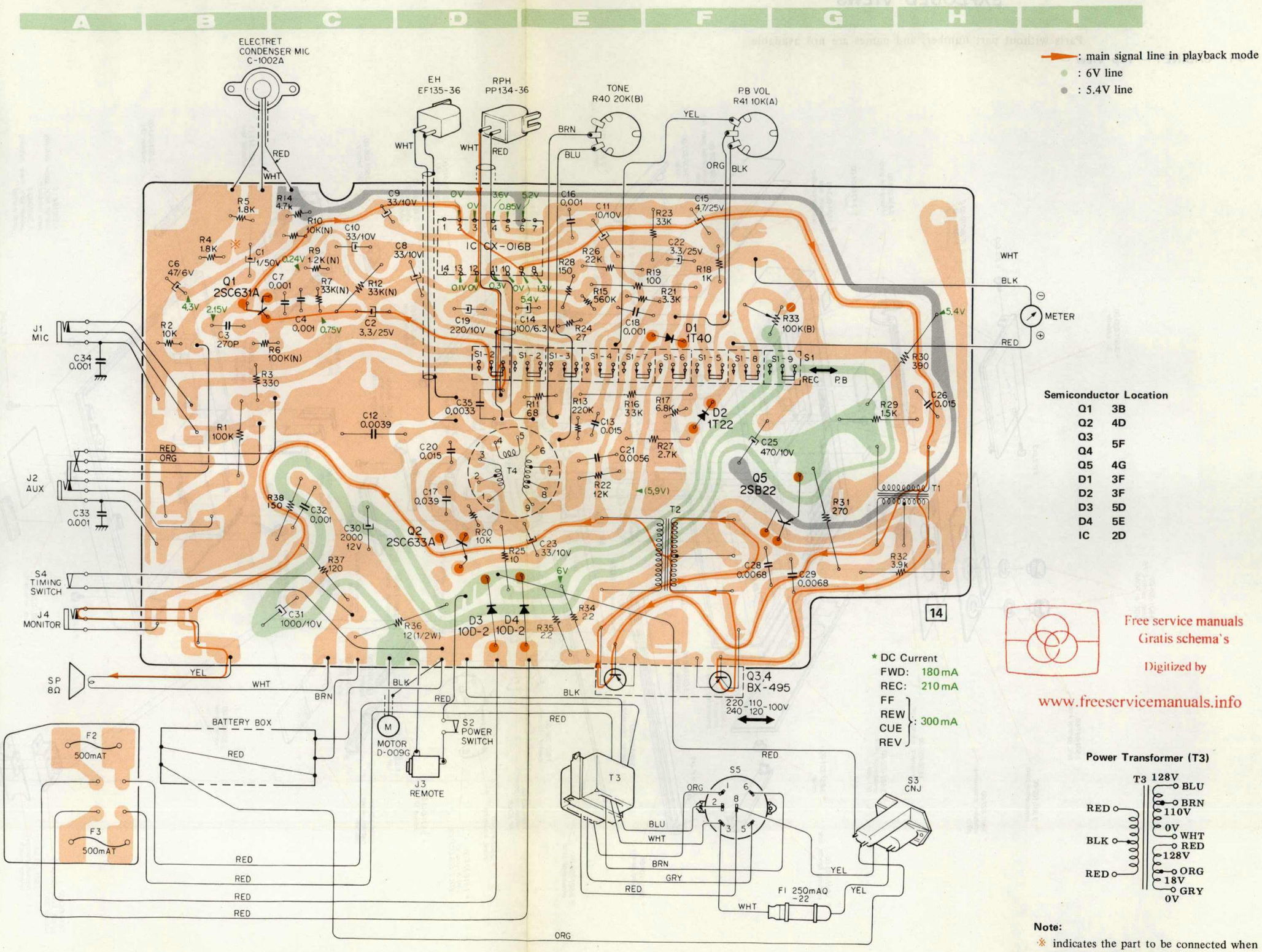


D3, D4: 10D-2



Q1, Q2: 2SC631A
2SC633A





Note:

※ indicates the part to be connected when a red marked MIC is assembled.

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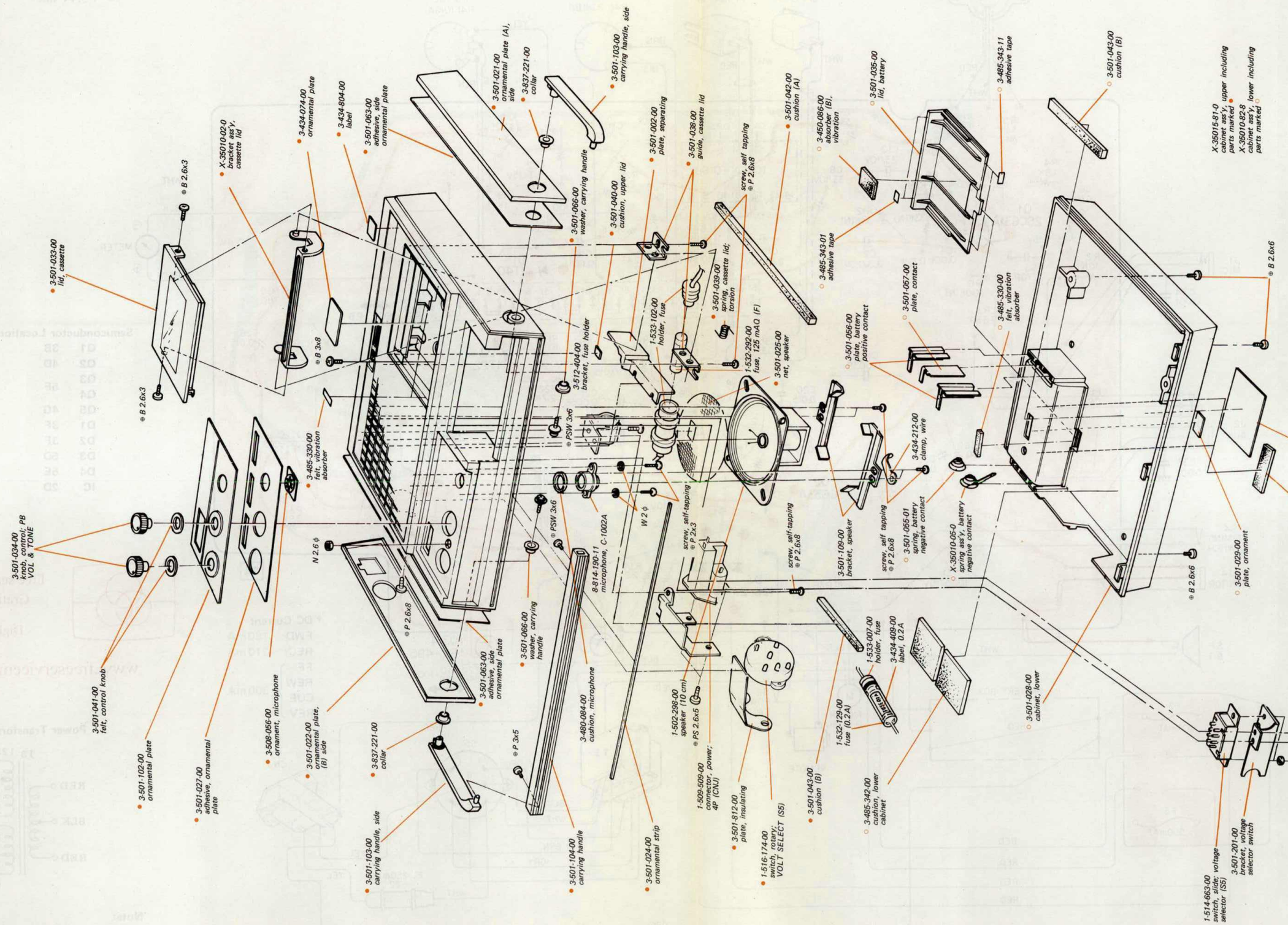
SECTION 5
EXPLODED VIEWS

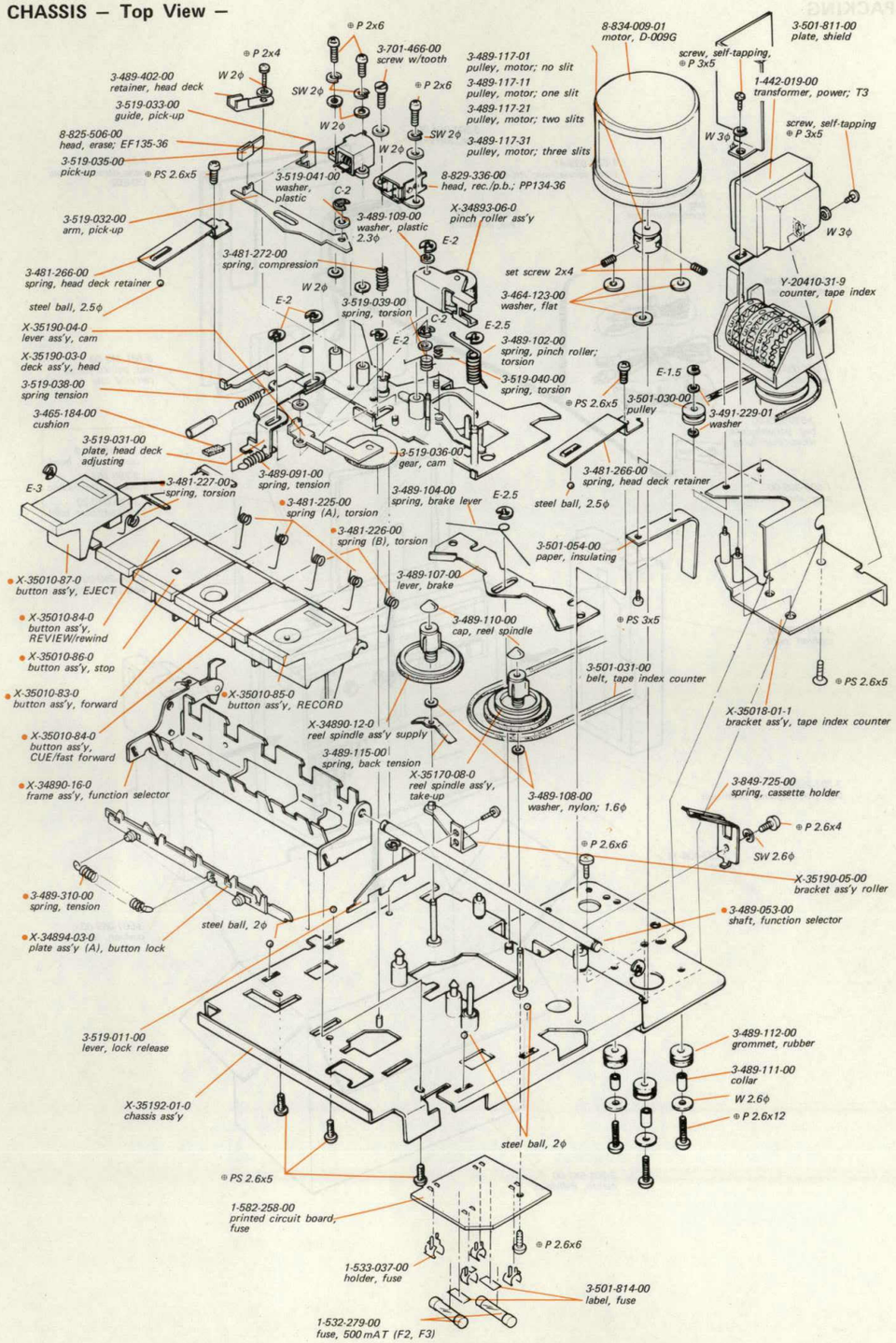
Parts without part numbers and names are not available.

5-1. CABINET – Top View –



Parts without part numbers and names are not available.

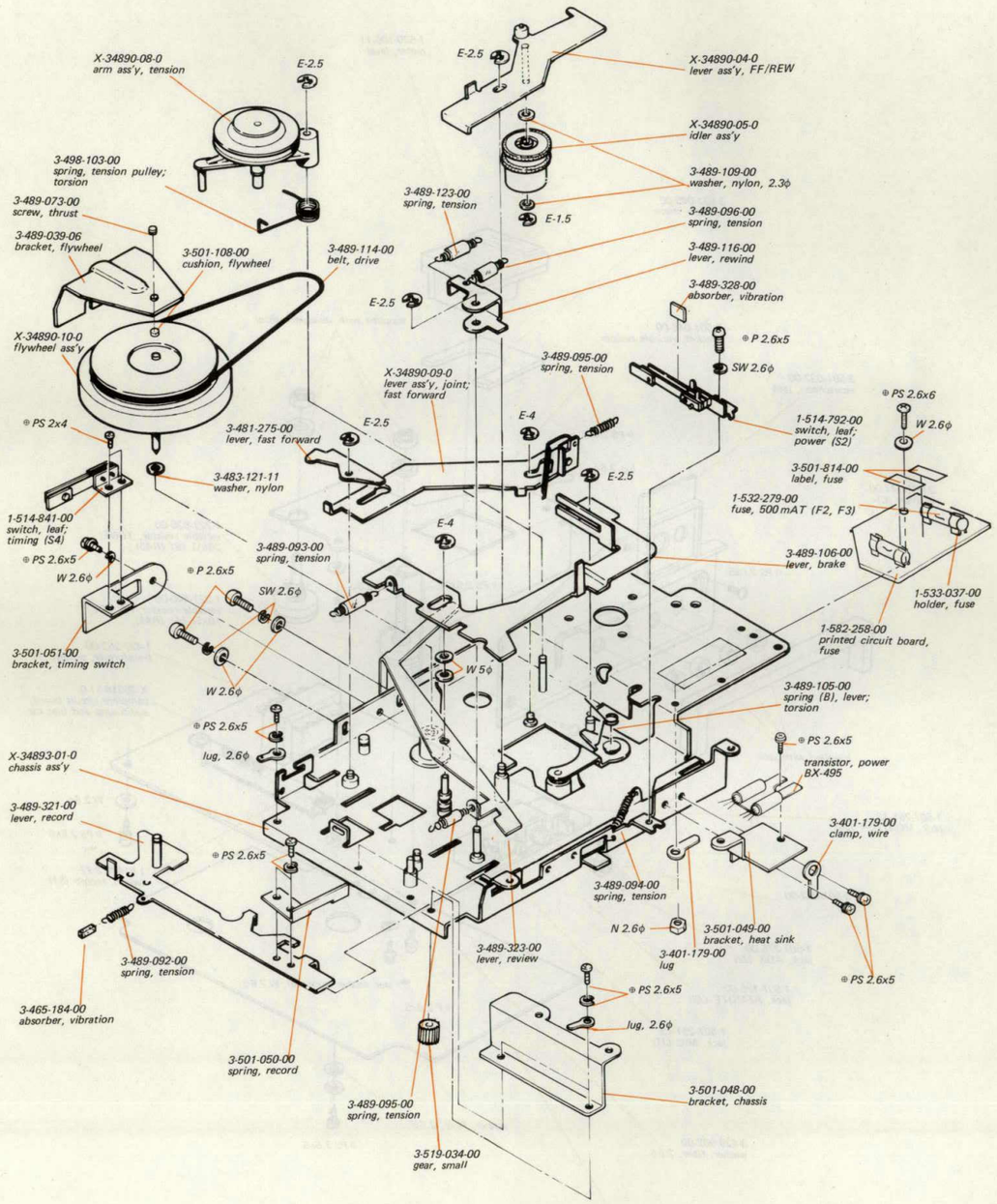
5-2. CHASSIS – Top View –



X-35192-02-0 pushbutton ass'y, complete; including parts marked ●.

Parts without part numbers and names are not available.

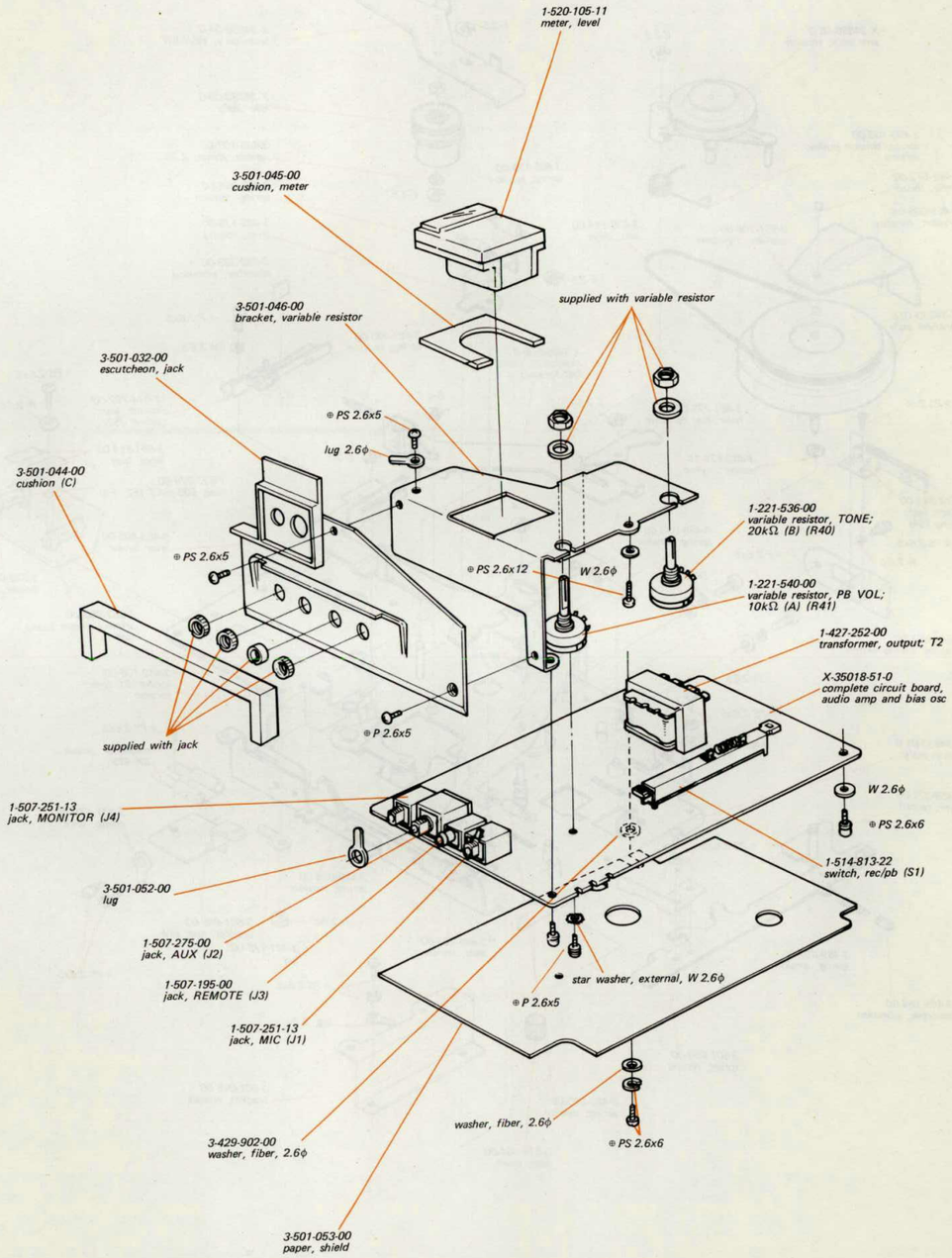
5-3. CHASSIS – Bottom View –



TC-95A

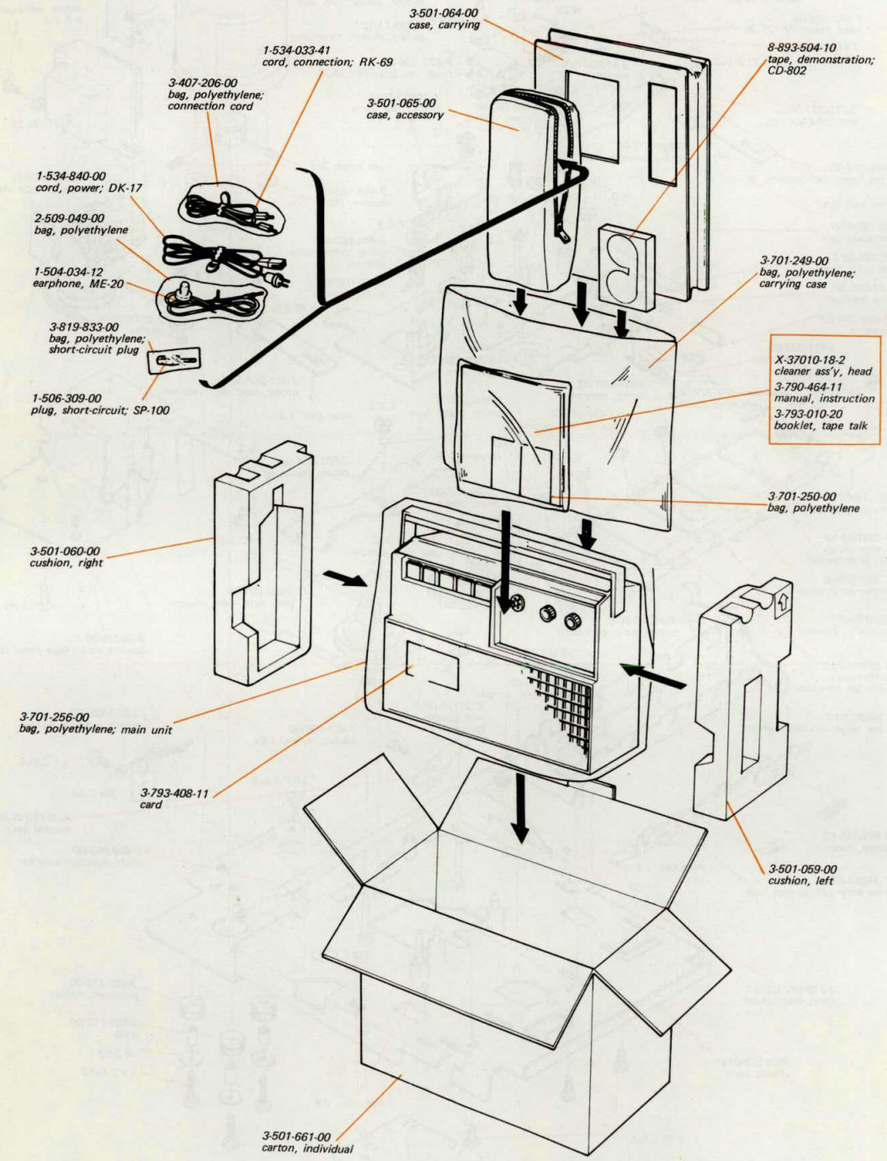
Parts without part numbers and names are not available.

5-4. ELECTRICAL PARTS — Top View —



Parts without part numbers and names are not available.

5-5. PACKING



SECTION 6
ELECTRICAL PARTS LIST

COMPLETE CIRCUIT BOARD

Ref. No.	Part No.	Description
	X-35018-51-0	audio amp and bias osc

SEMICONDUCTORS

Ref. No.	Description
Q1	transistor 2SC631A
Q2	transistor 2SC633A
Q3, 4	transistor BX-495
Q5	transistor 2SB22
IC	IC CX-016B
D1	diode 1T40
D2	diode 1T22
D3	diode 10D-2
D4	diode 10D-2

TRANSFORMERS

Ref. No.	Part No.	Description
T1	1-423-049-00	driver
T2	1-427-252-00	output
T3	1-442-019-00	power
T4	1-433-132-00	bias osc

CAPACITORS

Ref. No.	Part No.			
C1	1-121-391-00	1 µF	50 V	electrolytic
C2	1-121-392-00	3.3 µF	25 V	electrolytic
C3	1-107-141-00	270 pF	50 V	silvered mica
C4	1-105-821-12	0.001 µF	50 V	mylar
C5		----------		
C6	1-121-409-00	47 µF	16 V	electrolytic
C7	1-101-918-00	0.001 µF	25 V	ceramic
C8	1-121-402-00	33 µF	10 V	electrolytic
C9	1-121-402-00	33 µF	10 V	electrolytic
C10	1-121-402-00	33 µF	10 V	electrolytic
C11	1-121-469-00	10 µF	10 V	electrolytic
C12	1-129-709-00	0.0039 µF	630 V	polypropylene film
C13	1-105-675-12	0.015 µF	50 V	mylar
C14	1-121-413-00	100 µF	6.3 V	electrolytic
C15	1-121-395-00	4.7 µF	25 V	electrolytic
C16	1-101-918-00	0.001 µF	25 V	ceramic
C17	1-105-680-12	0.039 µF	50 V	mylar
C18	1-105-661-12	0.001 µF	50 V	mylar
C19	1-121-420-00	220 µF	10 V	electrolytic
C20	1-105-675-12	0.015 µF	50 V	mylar
C21	1-105-670-12	0.0056 µF	50 V	mylar
C22	1-121-392-00	3.3 µF	25 V	electrolytic
C23	1-121-402-00	33 µF	10 V	electrolytic
C24		----------		
C25	1-121-425-00	470 µF	10 V	electrolytic
C26	1-105-675-12	0.015 µF	50 V	mylar
C27	1-121-395-00	4.7 µF	25 V	mylar
C28	1-105-831-12	0.0068 µF	50 V	mylar
C29	1-105-831-12	0.0068 µF	50 V	mylar
C30	1-121-529-00	2,000 µF	12 V	electrolytic
C31	1-121-736-00	1,000 µF	10 V	electrolytic
C32	1-101-918-00	0.001 µF	25 V	ceramic
C33	1-101-918-00	0.001 µF	25 V	ceramic
C34	1-101-918-00	0.001 µF	25 V	ceramic
C35	1-106-070-12	0.0033 µF	50 V	mylar

RESISTORS

All resistors are ¼W carbon unless otherwise specified.

Ref. No.	Part No.	
R1	1-244-721-11	100 kΩ
R2	1-242-697-11	10 kΩ
R3	1-242-661-11	330 Ω
R4	1-242-679-11	1.8 kΩ
R5	1-242-679-11	1.8 kΩ
R6	1-242-721-11	100 kΩ (N)
R7	1-242-709-09	33 kΩ (N)
R8		----------
R9	1-242-675-09	1.2 kΩ (N)
R10	1-242-697-11	10 kΩ (N)
R11	1-242-645-11	68Ω
R12	1-242-709-09	33 kΩ (N)
R13	1-242-729-11	220 kΩ
R14	1-242-689-11	4.7 kΩ
R15	1-242-739-11	560 kΩ
R16	1-242-709-11	33 kΩ
R17	1-242-693-11	6.8 kΩ
R18	1-242-673-11	1 kΩ
R19	1-244-649-11	100 Ω
R20	1-242-697-11	10 kΩ
R21	1-242-685-11	3.3 kΩ
R22	1-242-699-11	12 kΩ
R23	1-242-709-11	33 kΩ
R24	1-242-635-11	27 Ω
R25	1-242-625-11	10 Ω
R26	1-242-705-11	22 kΩ
R27	1-242-683-11	2.7 kΩ
R28	1-242-653-11	150 Ω

Note: (N) indicates low noise resistor.

Ref. No.	Part No.	Description
R29	1-244-677-11	1.5 kΩ
R30	1-244-663-11	390 Ω
R31	1-244-659-11	270 Ω
R32	1-244-680-11	3.9 kΩ
R33	1-222-845-11	100 kΩ (B), adjustable
R34	1-242-609-11	2.2 Ω
R35	1-242-609-11	2.2 Ω
R36	1-244-827-11	12Ω ½W
R37	1-242-651-11	120Ω
R38	1-242-653-11	150Ω
R39		----------
R40	1-221-536-11	20 kΩ (B), variable TONE
R41	1-221-540-11	10 kΩ (A), variable PB VOL

SWITCHES

S1	1-514-813-22	slide, rec/pb
S2	1-514-792-00	leaf, power
S3		included in 2P power connector
S4	1-514-841-00	leaf, timing
S5	1-516-174-00	rotary, VOLT SELECT

JACKS

CNJ	1-509-509-00	connector, power; 2P
J1	1-507-251-13	jack, MIC
J2	1-507-275-00	jack, AUX
J3	1-507-195-00	jack, REMOTE
J4	1-507-251-13	jack, MONITOR

HEADS

EH	8-825-506-00	erase (EF 135-36)
RPH	8-829-336-00	rec/pb (PP 134-36)

MISCELLANEOUS

	1-582-258-00	printed circuit board, fuse
M	8-834-009-01	motor, D-009G
ME	1-520-105-11	meter, level
MIC	8-814-190-11	microphone, C-1002A
SP	1-502-298-00	speaker (10 cm)
	1-534-518-13	cord, power; DK-17
F1	1-532-292-00	fuse 125 mAQ
F2, 3	1-532-279-00	fuse 500 mAT
	1-533-102-00	holder, fuse
	1-533-037-00	holder, fuse
	1-533-007-00	holder, fuse
	1-514-663-00	switch, slide

SECTION 7
HARDWARE

Part No.	Description
	SCREWS
7-621-255-15	⊕ P 2 x 3
7-621-255-45	⊕ P 2 x 6
7-621-259-25	⊕ P 2.6 x 4
7-621-259-35	⊕ P 2.6 x 5
7-621-259-65	⊕ P 2.6 x 10
7-621-710-39	⊖ SC 2 x 4
7-621-770-64	⊕ B 2.6 x 8
7-621-771-13	⊕ B 2.6 x 6
7-621-773-92	⊕ B 2.6 x 3
7-628-254-45	⊕ PS 2.6 x 12
7-628-254-15	⊕ PS 2.6 x 6
7-628-253-05	⊕ PS 2 x 4
7-628-254-04	⊕ PS 2.6 x 5
7-682-947-01	⊕ PSW 3 x 6
7-682-546-01	⊕ B 3 x 5
7-682-547-05	⊕ B 3 x 6
7-685-105-21	⊕ P 2 x 8, self tapping
7-685-133-21	⊕ P 2.6 x 6, self tapping
7-685-134-21	⊕ P 2.6 x 8, self tapping
7-685-144-51	⊕ P 3 x 5, self tapping
7-685-133-21	⊕ P 2.6 x 6, self tapping
	WASHERS
7-623-105-02	2φ (small)
7-623-107-12	2.6φ (middle)
7-623-108-12	3φ
7-623-205-22	2φ, spring
7-623-207-22	2.6φ, spring
7-623-407-01	2.6φ, lock washer, external
7-623-907-01	2.6φ, fiber
	LUGS
7-623-507-01	2.6φ
7-623-508-11	3φ
	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
7-624-118-01	E-2.5
7-624-124-01	C-2
	STEEL BALLS
7-671-112-01	2φ
7-671-112-11	2.5φ
	NUT
7-622-127-01	2.6φ

Hardware Nomenclature

P – Pan Head Screw .....

PS – Pan Head Screw with Spring Washer .....

K – Flat Countersunk Head Screw ...

B – Binding Head Screw .....

RK – Oval Countersunk Head Screw ..

T – Truss Head Screw .....

R – Round Head Screw .....

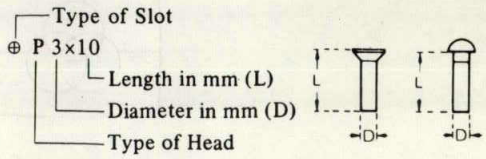
F – Flat Fillister Head Screw .....

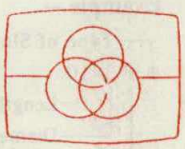
SC – Set Screw .....

E – Retaining Ring (E Washer) .....

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

Example –





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