

TCS-470

SERVICE MANUAL

- Refer to MDR-W20L Service Manual issued previously for information of headphones supplied with TCS-470.

*US Model
Canadian Model
AEP Model
UK Model
E Model*



'Dolby' and the double-D symbol are the trade marks of Dolby Laboratories Licensing Corporation. Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.

SPECIFICATIONS

Recording system 4-track 2-channel stereo
Fast winding time Approx. 2 min. 30 sec. with Sony Cassette HF-60
Frequency response (DOLBY NR OFF)
90-9,000 Hz
60-15,000 Hz (with PB EQ selector set to NORM)
60-15,000 Hz (with PB EQ selector set to METAL•CrO₂)
Tape speed 4.8 cm/sec
Speaker Approx. 3.6 cm dia.
Power output (DC) Speaker: 140 mW (at 10% harmonic distortion)
Headphones: 20 mW + 20 mW (18 ohms, at 10% harmonic distortion)
Input Microphone input jack (stereo minijack) sensitivity 0.2 mV (-72 dB) for low impedance microphone
Output Headphones jack (stereo minijack) load impedance 18-300 ohms
Power requirements
3 V dc, two IEC designation R6 (size AA) batteries
DC IN 3 V jack accepts:
100 V ac with optional Sony AC-D2 ac power adaptor
120 or 220 V ac with optional Sony AC-D2 ac power adaptor (tourist model)
optional Sony EBP-500 battery case for use on two IEC designation R20 (size D) batteries (for extended operation)
optional Sony DCC-70 car battery cord for use on 12 V car battery

Tape Transport Mechanism Type MT-470-30

0dB = 0.775V

Battery life

Batteies	Recording	Playback (speaker)	Playback (headphones)
Sony New Super SUM-3(NS) batteries	2.5	3	4
Sony Eveready AM3 Alkaline batteries	6	7	9.5

(hours)

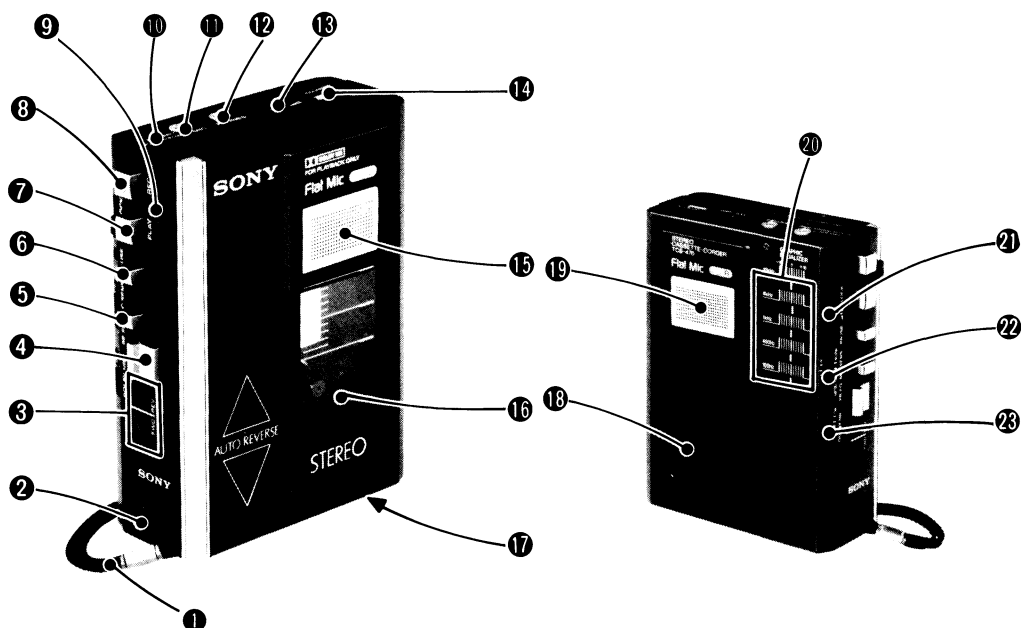
Dimensions Approx. 83.4×110.2×36.0 mm (w/h/d) not incl. projecting parts and controls
Approx. 87.7×112.7×38.2 mm (w/h/d) incl. projecting parts and controls
Weight Approx. 350 g incl. batteries, not incl. other accessories



STEREO CASSETTE-CODER
SONY®

TC

PARTS IDENTIFICATION



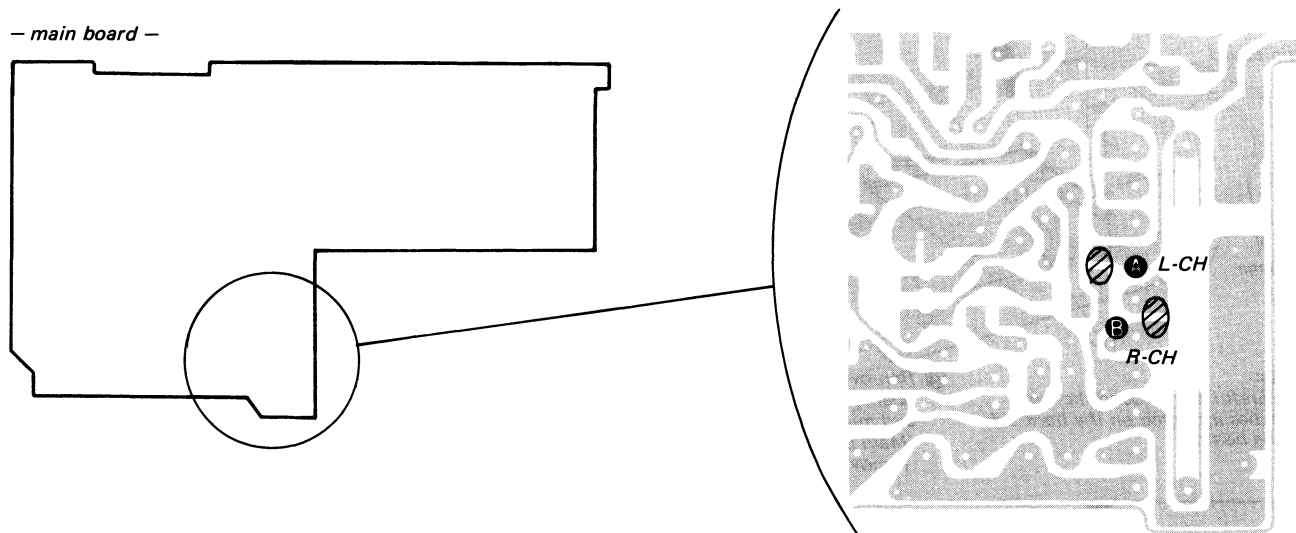
- | | |
|--|---|
| ① Hand strap | ⑮ Flat Mic L (built-in microphone) (left) |
| ② DC IN 3V (external power input) jack | ⑯ Cassette holder |
| ③ Tape transport direction indicator | ⑰ Battery compartment |
| ④ DIRECTION
(tape transport direction change) button | ⑱ Speaker |
| ⑤ ▼ (fast forward) button | ⑲ Flat Mic R (built-in microphone) (right) |
| ⑥ ▲ (fast reverse) button | ⑳ GRAPHIC EQUALIZER controls |
| ⑦ ▼ PLAY (playback) button | ㉑ PAUSE ◀▶ LOCK switch |
| ⑧ ● REC (record) button | ㉒ PB EQ/MIC SENS (playback equalizer/microphone sensitivity) switch |
| ⑨ ■ STOP button | ㉓ DOLBY NR (noise reduction) selector
(playback only) |
| ⑩ REC/BATT (record/battery) indicator | |
| ⑪ PLUG IN POWER/MIC (microphone) jack
(stereo minijack) | |
| ⑫ PHONES (headphones) jack
(stereo minijack) | |
| ⑬ VOL (volume) control | |
| ⑭ Tape counter and reset button | |

SERVICING NOTES

Repairing Precaution

If control panel is removed, no signal will be outputted because of removing graphic equalizer circuit. So when repairing, it's necessary to short the patterns **A**, **B** (input/output short-circuit pattern).

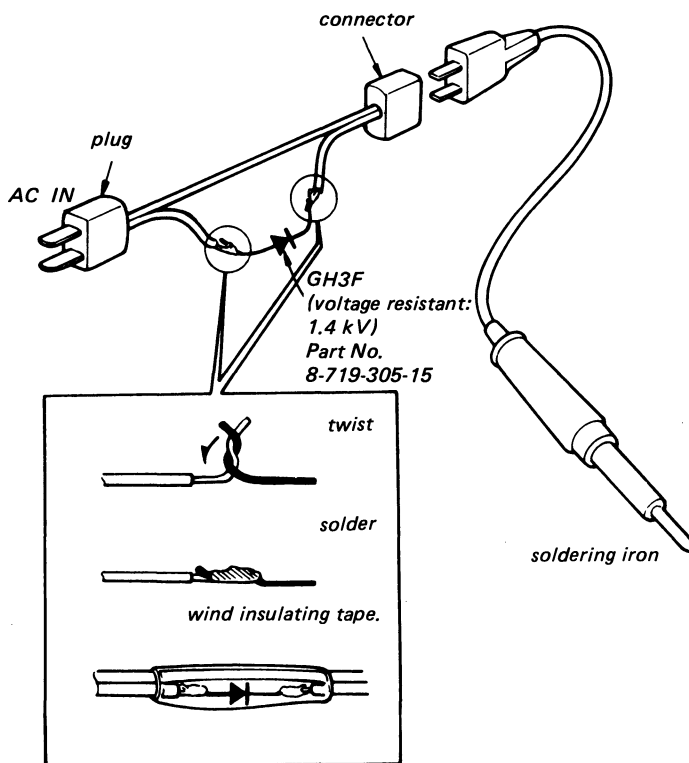
After repairing, remove the solder **A**, **B** on the land surface completely. (If the solder remains, it cause poor connector contacting.)



Flexible Circuit Board Repairing

1. Keep the temperature of the soldering iron at $270^{\circ} \pm 10^{\circ}\text{C}$ during repairing.
You can maintain the temperature of the soldering iron around 270°C by using the thermal controller as illustrated on the right.
2. Do not touch the soldering iron more than 4 seconds or 3 times on the same conductor of the circuit board.
3. Do not apply force on the conductor when soldering or unsoldering.

To make thermal controller of soldering iron



Tip of soldering iron



Replacing chip components

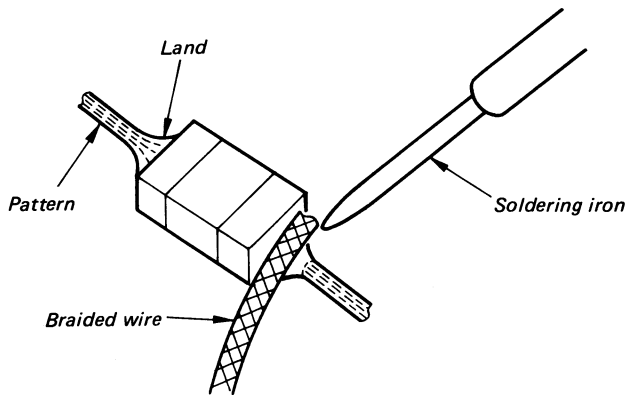
All chip components should be connected and disconnected, using a tapered soldering iron [temperature of the iron tip: less than 280°C (536°F)], a pair of tweezers and braided wire.

Precautions for replacement

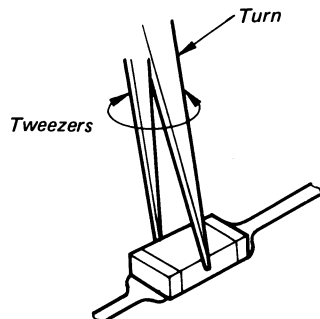
1. Do not disconnect the chip component forcefully. Otherwise, the pattern may peel off.
2. Never re-use a disconnected chip component. Dispose of all old chip components.
3. To protect the chip component, heating time for attaching the component should be within 3 seconds.

○ Removing chip components**(1) Removing solder at electrode**

Remove the solder at the electrode, using a thin braided wire. Do not remove the solder of the part (chip component) attached adjacent to the electrode.

**(2) Disconnecting chip components**

Turn the tweezers with the soldering iron alternately applied to both electrodes, and the chip component will be disconnected. Take careful precautions while disconnecting, because if the chip component is forcefully removed the land may peel off. Never re-use a disconnected chip component.

**(3) Smoothing the soldered surface**

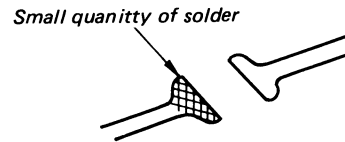
After disconnecting the chip component, remove the solder by using a braided wire to smooth the land surface.

○ Connecting chip components

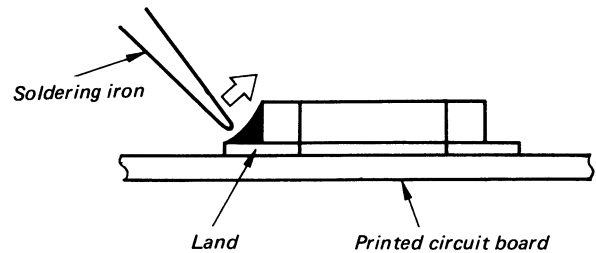
The value of chip components is not displayed on the main body. Take due precautions to avoid mixing new chip components with other ones.

(1) Applying solder to land on one side

Apply a thin layer of solder to the land on one side where the chip component is to be connected. Too much solder may cause bridging.

**(2) Speedy soldering**

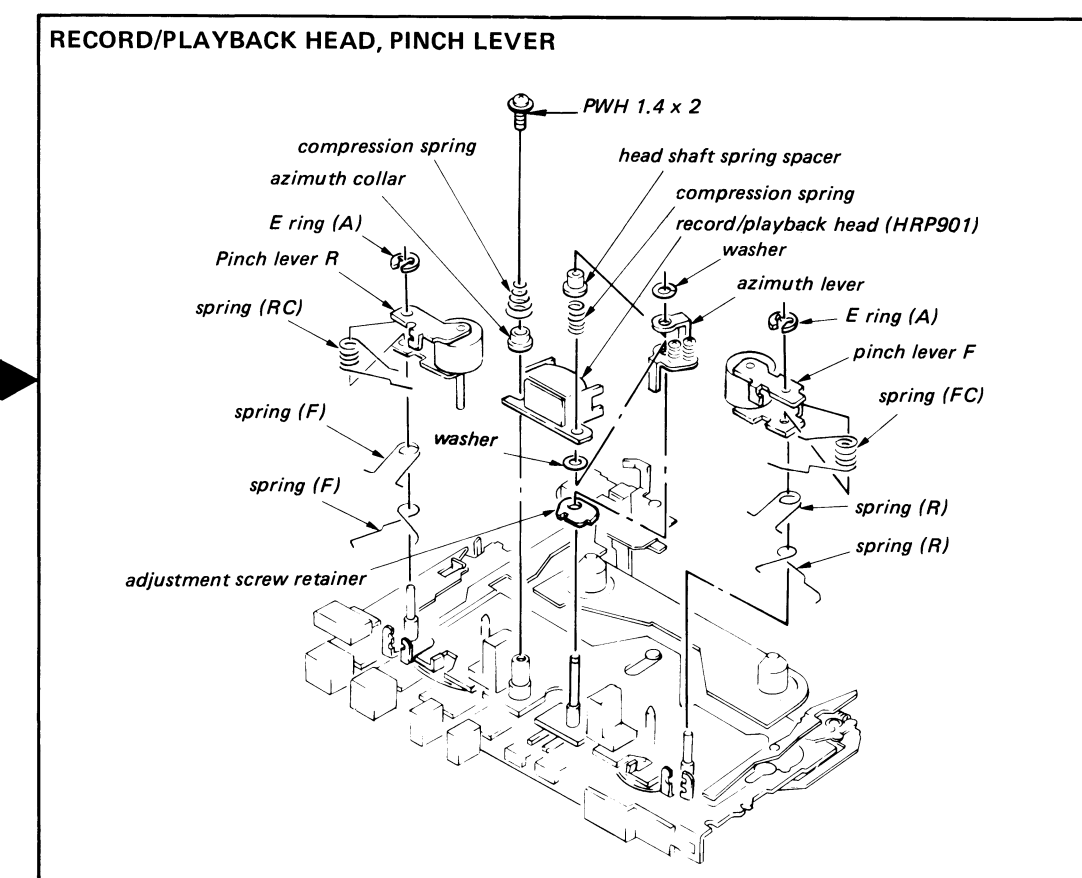
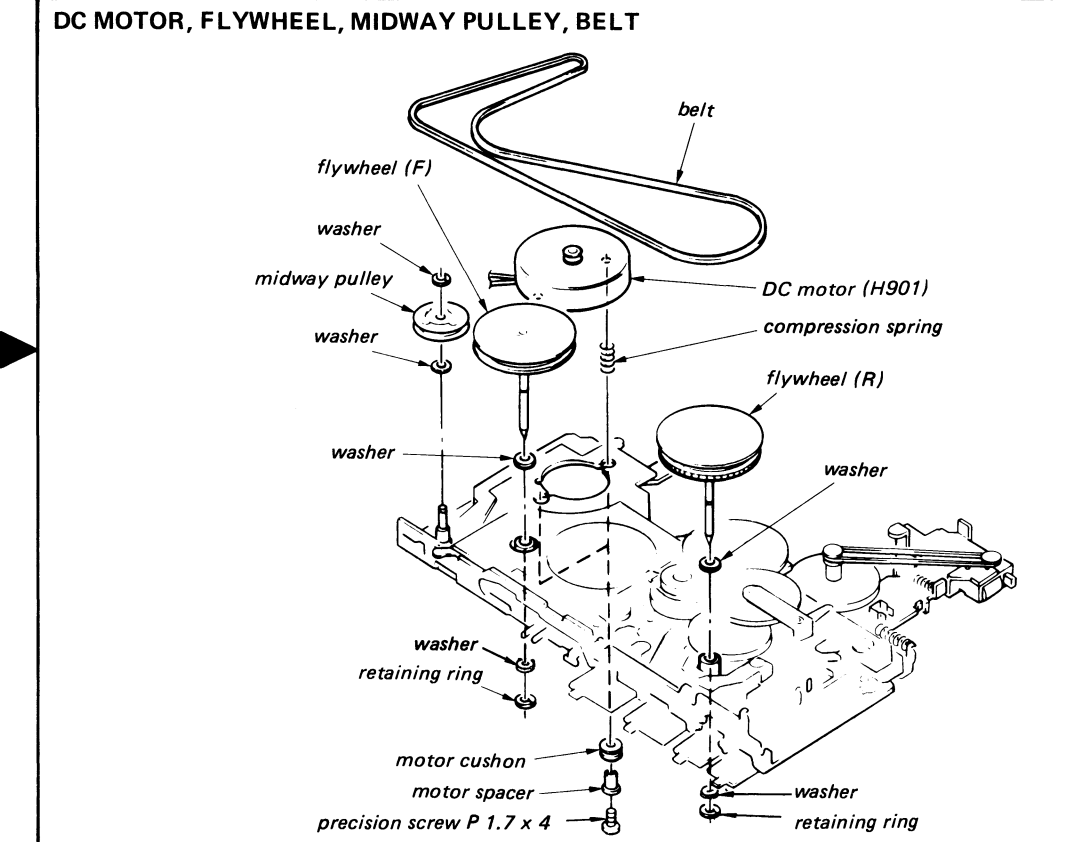
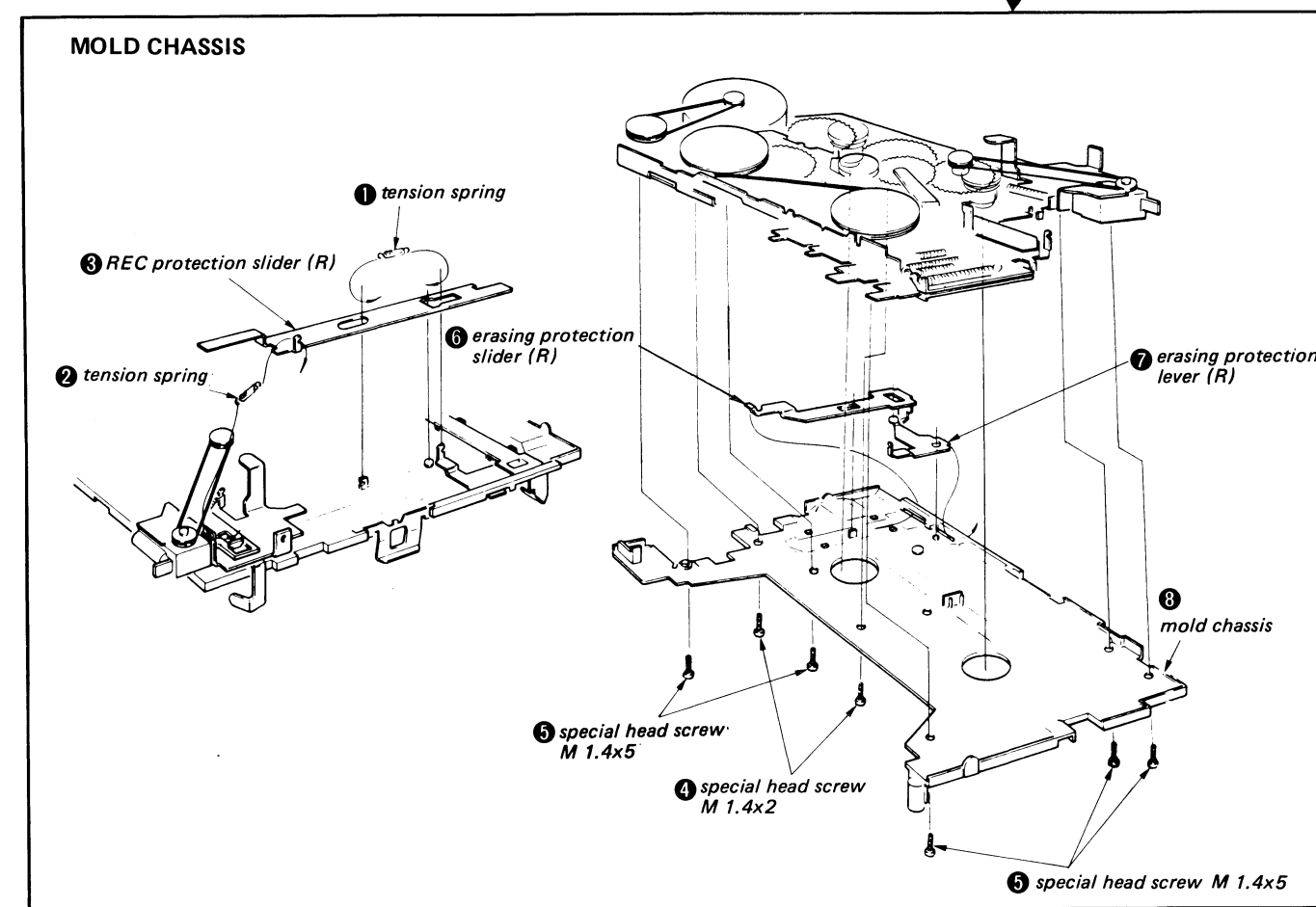
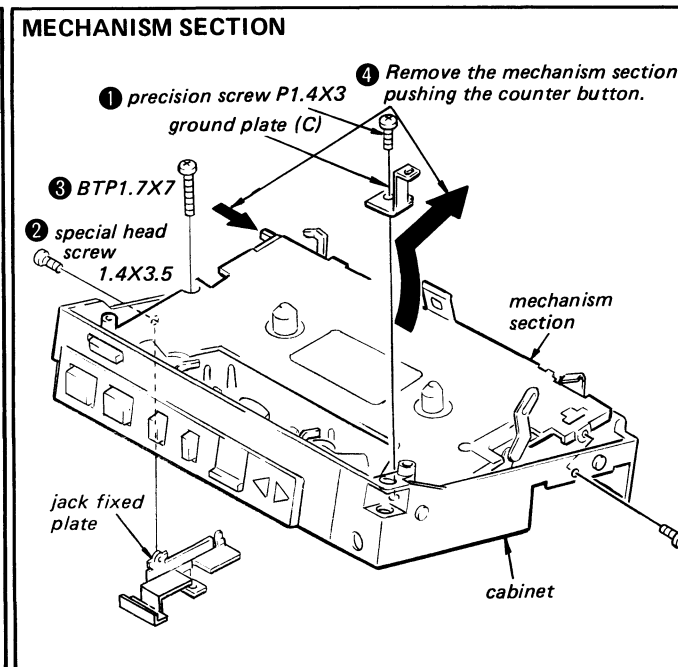
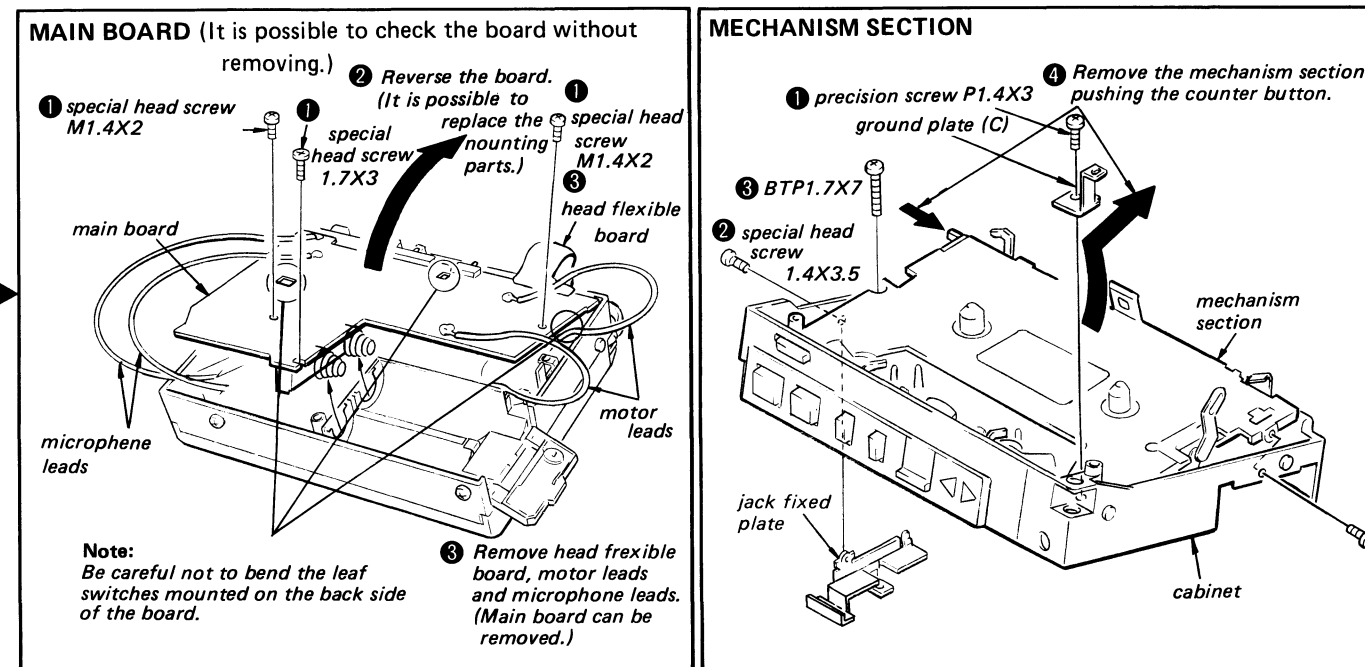
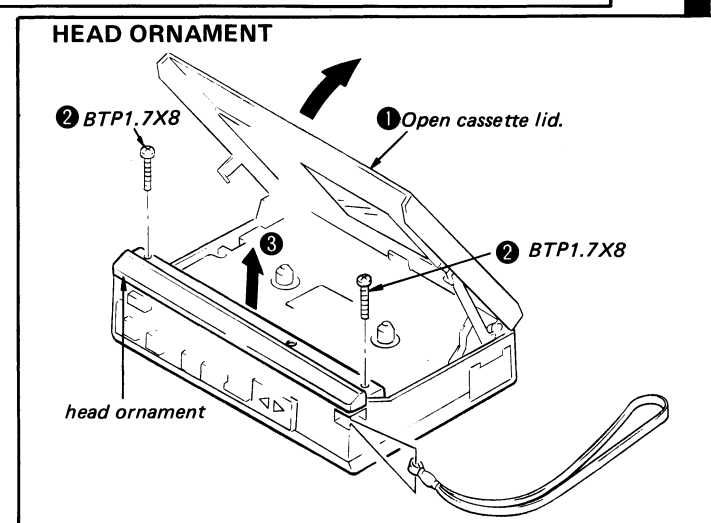
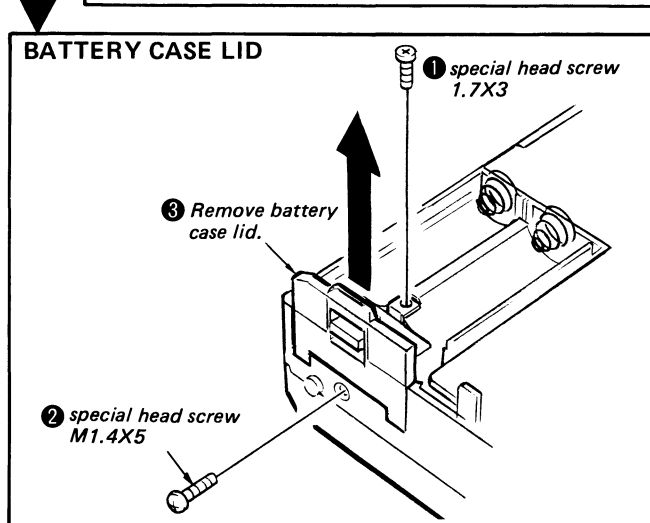
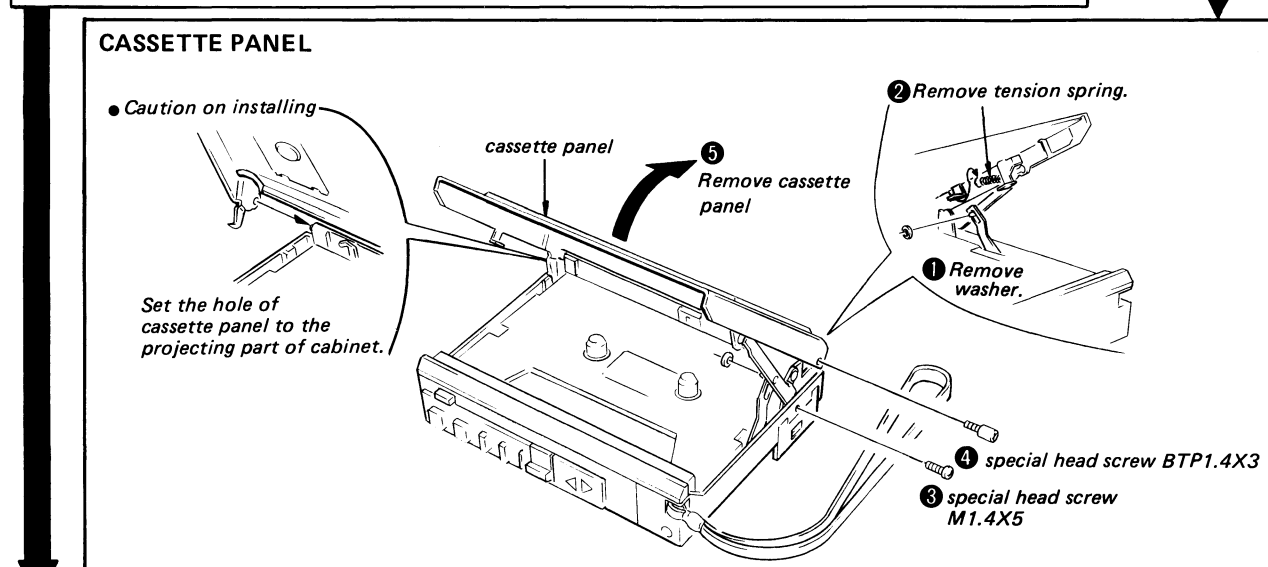
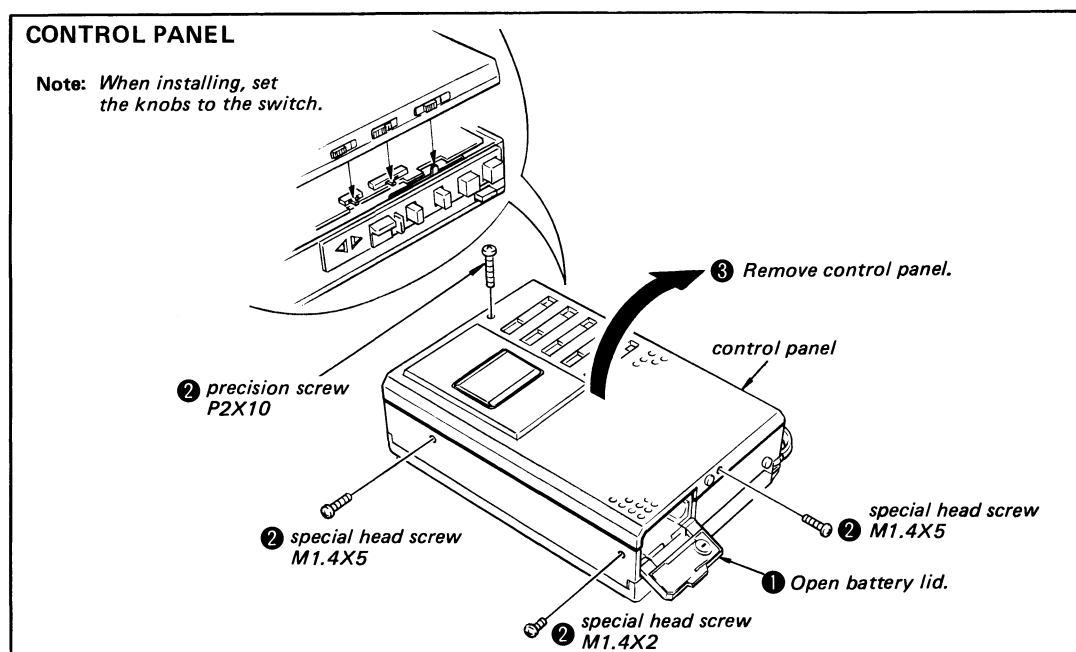
Hold the chip component at the desired position, using tweezers, and apply the soldering iron in the arrow-marked direction. To protect the chip component, heating time should be within 3 seconds.

**(3) Speedy soldering of electrode on the other side**

Solder the electrode on the other side in the same way as in (2) above.

SECTION 1 DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.



SECTION 2 ADJUSTMENTS

2-1. MECHANICAL ADJUSTMENTS AND MEASUREMENT

PRECAUTION

1. Clean the following parts with a denatured-alcohol-moistened swab:

record/playback head	pinch roller
erase head	rubber belts
capstan	idlers
2. Demagnetize the record/playback head with a head demagnetizer. (Do not bring the head demagnetizer close to the erase head.)
3. Do not use a magnetized screwdriver for the adjustments.
4. After the adjustments, apply suitable locking compound to the parts adjusted.
5. The adjustments should be performed with the rated power supply voltage unless otherwise noted.

2-2. ELECTRICAL ADJUSTMENTS

See MOUNTING DIAGRAM for ELECTRICAL ADJUSTMENTS.

Torque Measurement

Torque	Torque Meter	Meter Reading
Forward	CQ-102C	22 – 50 g•cm (0.32 – 0.69 oz•inch)
Forward Back Tension	CQ-102C	0.5 – 5 g•cm (0.007 – 0.07 oz•inch)
Reverse	CQ-102RC	22 – 50 g•cm (0.32 – 0.69 oz•inch)
Reverse Back Tension	CQ-102RC	0.5 – 5 g•cm (0.007 – 0.07 oz•inch)
FF/REW	CQ-201B	more than 60 g•cm (more than 0.84 oz•inch)

Tape Tension Measurement

Tension	Meter	Meter Reading
Forward	CQ-403A	more than 60 g (more than 2.12 oz)
Reverse	CQ-403R	

SECTION 3

EXPLODED VIEWS AND PARTS LIST

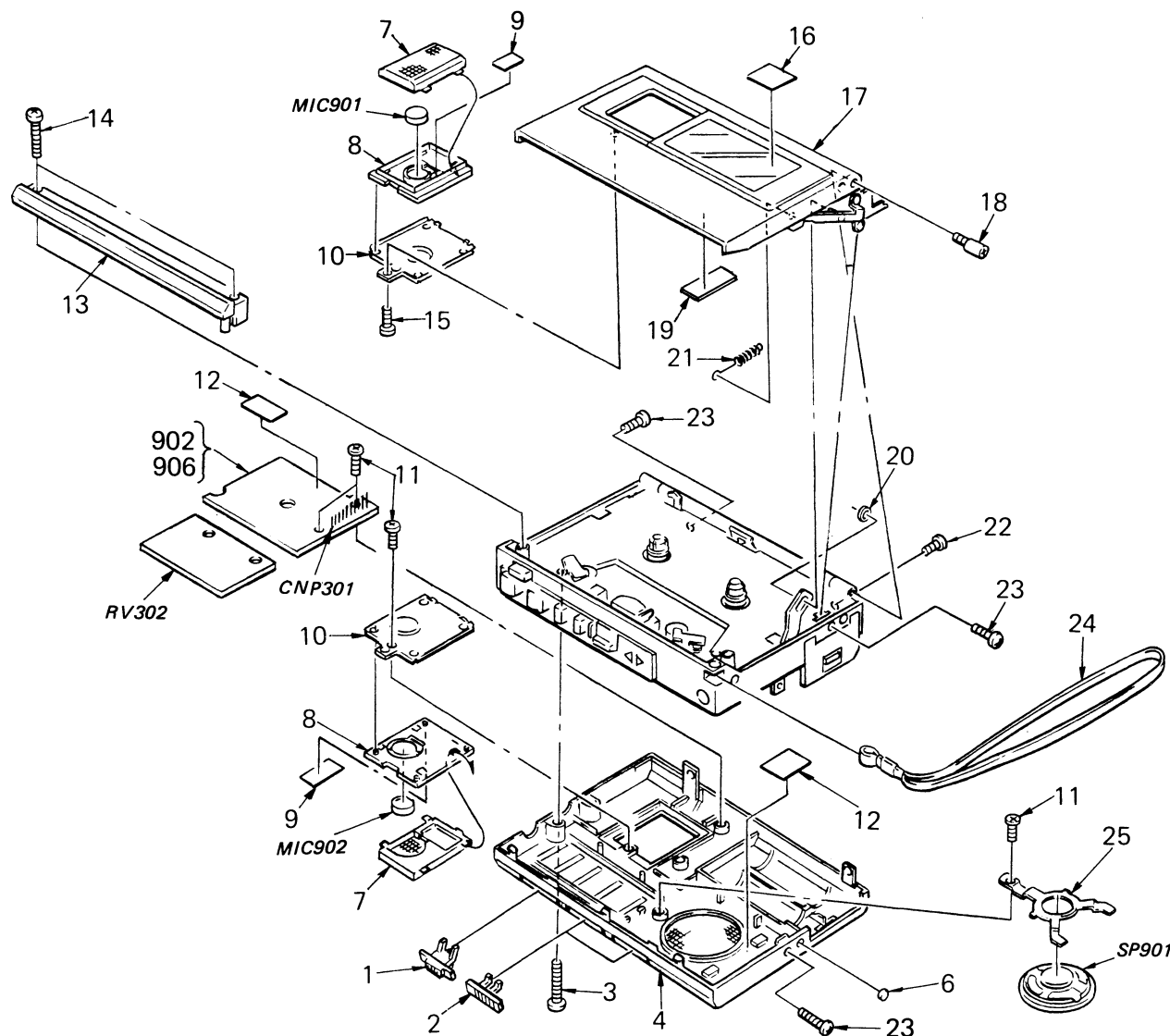
NOTE:

The mechanical parts with no reference number in the exploded views are not supplied.

Items marked " ★ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

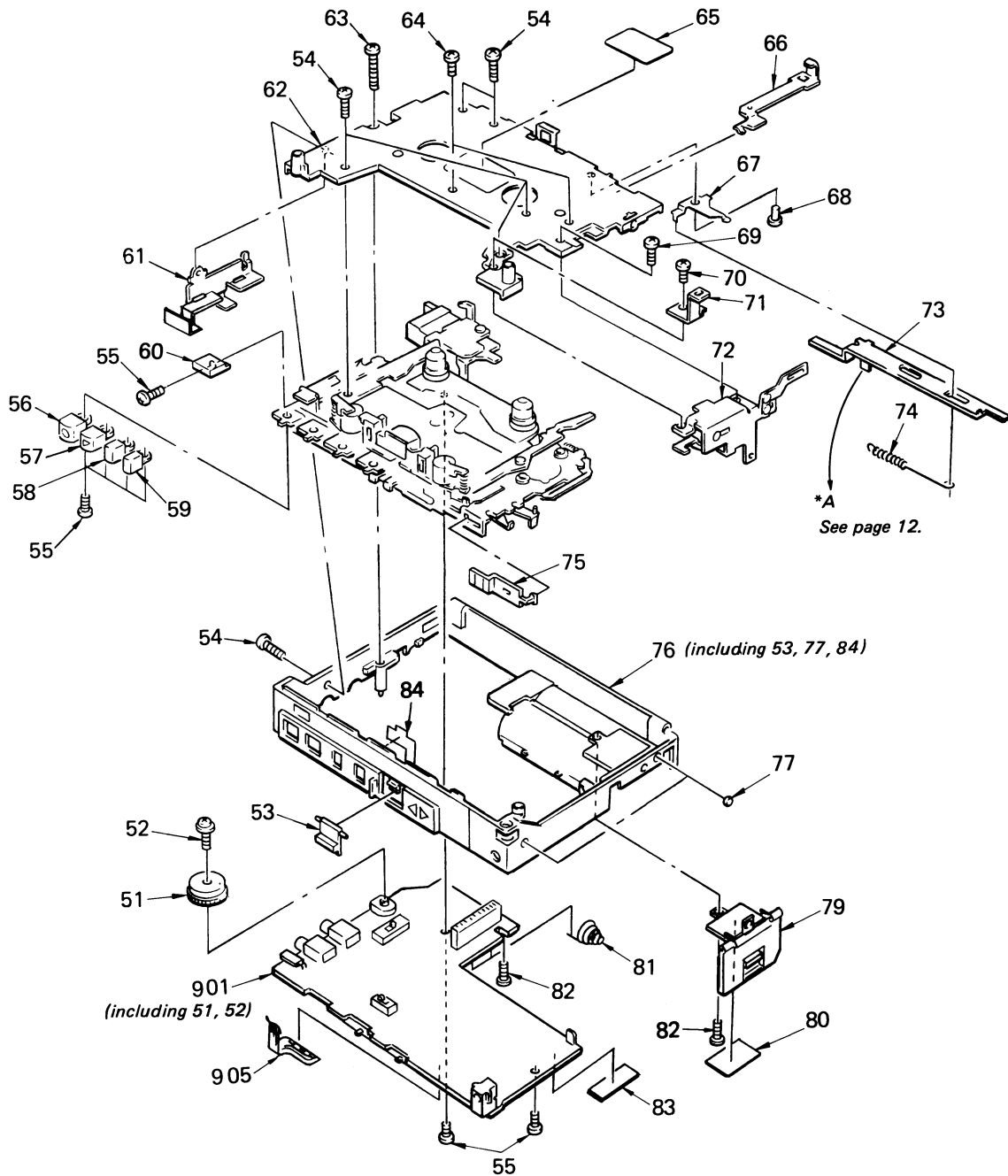
The construction parts of an assembled part are indicated with a collation number on the remark column.

CASSETTE PANEL, CONTROL PANEL, G.EQ BOARD

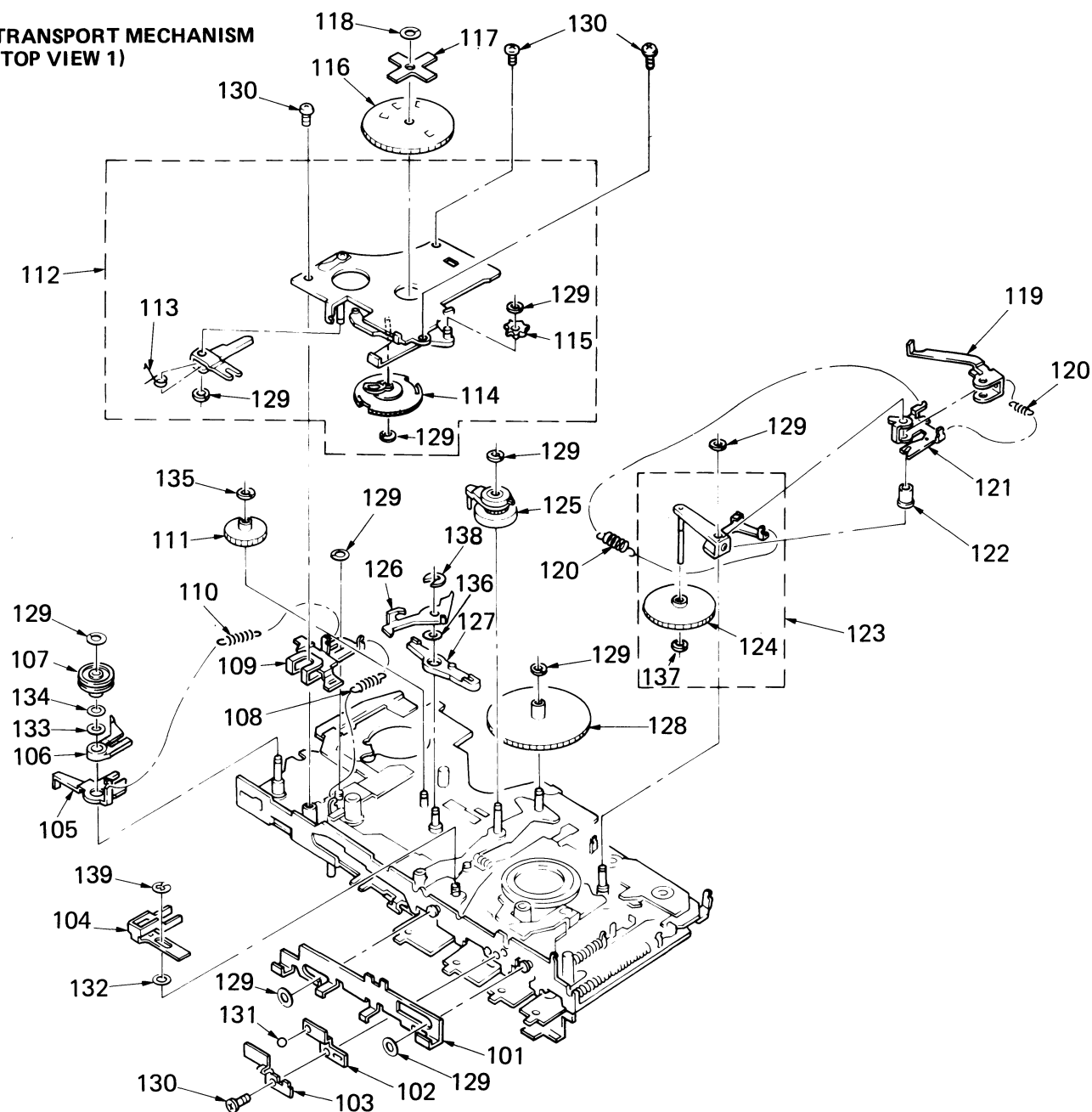


No.	Part No.	Description	Remarks	No.	Part No.	Description	Remarks
1	3-313-583-11	KNOB, PAUSE LOCK		18	3-313-575-11	SCREW (B1.4), TAPPING	
2	3-313-581-11	KNOB, SELECTION		19	*3-701-999-00	LABEL, SERIAL NUMBER	
3	7-627-553-78	SCREW, PRECISION +P 2X10		20	3-318-236-01	WASHER, POLY, SLIT	
4	X-3313-523-1	PANEL ASSY, CONTROL		21	3-328-312-01	SPRING, TENSION	
6	3-305-454-00	FOOT, RUBBER		22	3-703-816-02	SCREW (M1.4X2.0), SPECIAL HEAD	
7	X-3313-514-1	PANEL ASSY, MICROPHONE		23	3-703-816-22	SCREW (M1.4X5.0), SPECIAL HEAD	
8	3-313-592-01	CUSHION, MICROPHONE		24	3-328-319-01	STRAP, HAND	
9	3-831-441-XX	CUSHION, CABINET UPPER 10X7X0.3		25	*3-313-586-01	BRACKET, SP	
10	*3-313-594-01	COVER, MICROPHONE		902	*A-3015-405-A	PCB ASSY, GRAPHIC EQUALIZER	
11	3-318-382-01	SCREW (1.7X3), TAPPING		906	*1-617-724-11	PC BOARD, G.EQ	
12	3-831-441-11	CUSHION (B)		CNP301	1-506-648-11	PIN, CONNECTOR (PC BOARD) 10P	
13	3-313-596-01	ORNAMENT, HEAD		MIC901	8-814-184-00	MICROPHONE UNIT (C-1011)	
14	3-318-203-21	SCREW (B1.7X8), TAPPING		MIC902	8-814-184-00	MICROPHONE UNIT (C-1011)	
15	7-627-551-08	SCREW, PRECISION +P 1.4X1.6		RV302	1-237-056-11	RES, VAR, SLIDE (BLOCK) 100K (GRAPHIC EQUALIZER)	
16	3-703-710-01	STICKER, SONY SYMBOL (12)		SP901	1-503-585-11	SPEAKER	
17	X-3313-521-1	PANEL ASSY, CASSETTE	7-10,15				

CABINET, MAIN BOARD

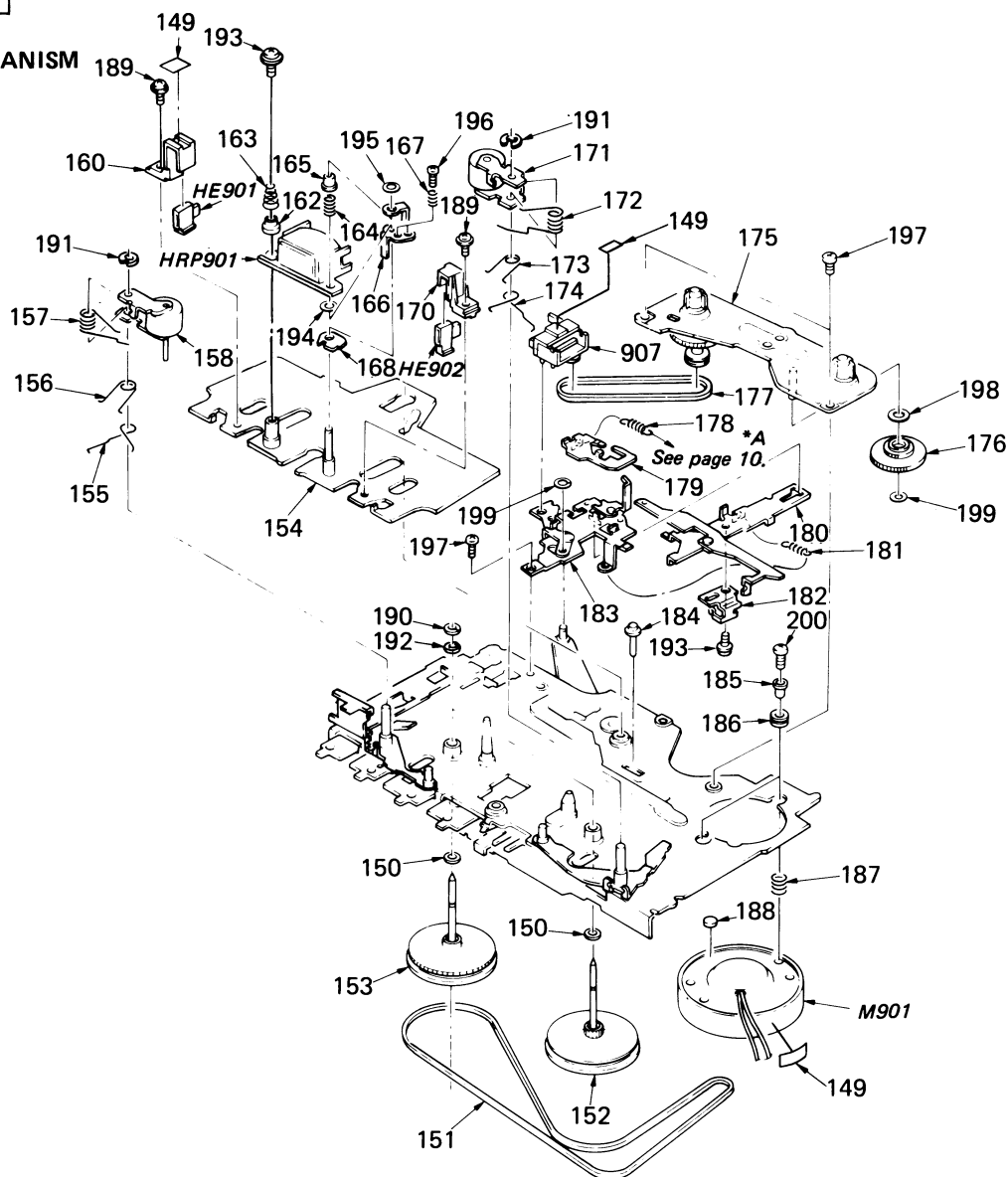


No.	Part No.	Description	Remarks	No.	Part No.	Description	Remarks
51	3-313-584-01	KNOB, VOLUME		69	3-703-816-72	SCREW (M1.4X3.0), SPECIAL HEAD	
52	3-703-502-31	SCREW		70	7-627-850-27	SCREW, PRECISION +P 1.4X3	
53	3-328-326-01	BUTTON, D		71	*3-326-966-01	PLATE (C), GROUND	
54	3-703-816-52	SCREW (M1.4X3.5), SPECIAL HEAD		72	X-3313-515-1	BRACKET ASSY, SLIDER	
55	3-703-816-01	SCREW (M1.4X2.0), SPECIAL HEAD		73	*3-328-407-01	SLIDER (R), REC PROTECTION	
56	3-328-320-01	BUTTON, REC		74	3-328-360-01	SPRING, TENSION	
57	3-328-321-01	BUTTON, PLAY		75	3-328-334-01	PLATE, INDICATION, D	
58	3-328-322-01	BUTTON, REW		76	X-3313-520-1	CABINET ASSY	53,77,84
59	3-328-323-01	BUTTON, FF		77	3-305-454-00	FOOT, RUBBER	
60	3-328-324-01	BUTTON, STOP		79	X-3313-517-1	LID ASSY, BATTERY CASE	
61	*3-313-588-01	PLATE, FIXED, JACK		80	3-332-004-01	LABEL	
62	X-3328-334-1	CHASSIS ASSY, MOLD		81	3-313-573-01	SPRING	
63	3-318-203-82	SCREW (B1.7X7), TAPPING		82	3-318-382-01	SCREW (1.7X3), TAPPING	
64	3-703-816-02	SCREW (M1.4X2.0), SPECIAL HEAD		83	3-831-441-11	CUSHION (B)	
65	3-556-221-00	PLATE, ORNAMENTAL		84	*3-332-020-01	PLATE (B), SHIELD	
66	3-328-440-01	SLIDER (R), ERASING PROTECTION		901	A-3015-404-A	PC BOARD ASSY, MAIN	51,52
67	*3-328-359-01	LEVER (R), ERASING PROTECTION		905	1-616-014-11	PC BOARD, HEAD FLEXIBLE	
68	3-328-474-01	SHAFT, SLIDER (R)					

**TRANSPORT MECHANISM
(TOP VIEW 1)**


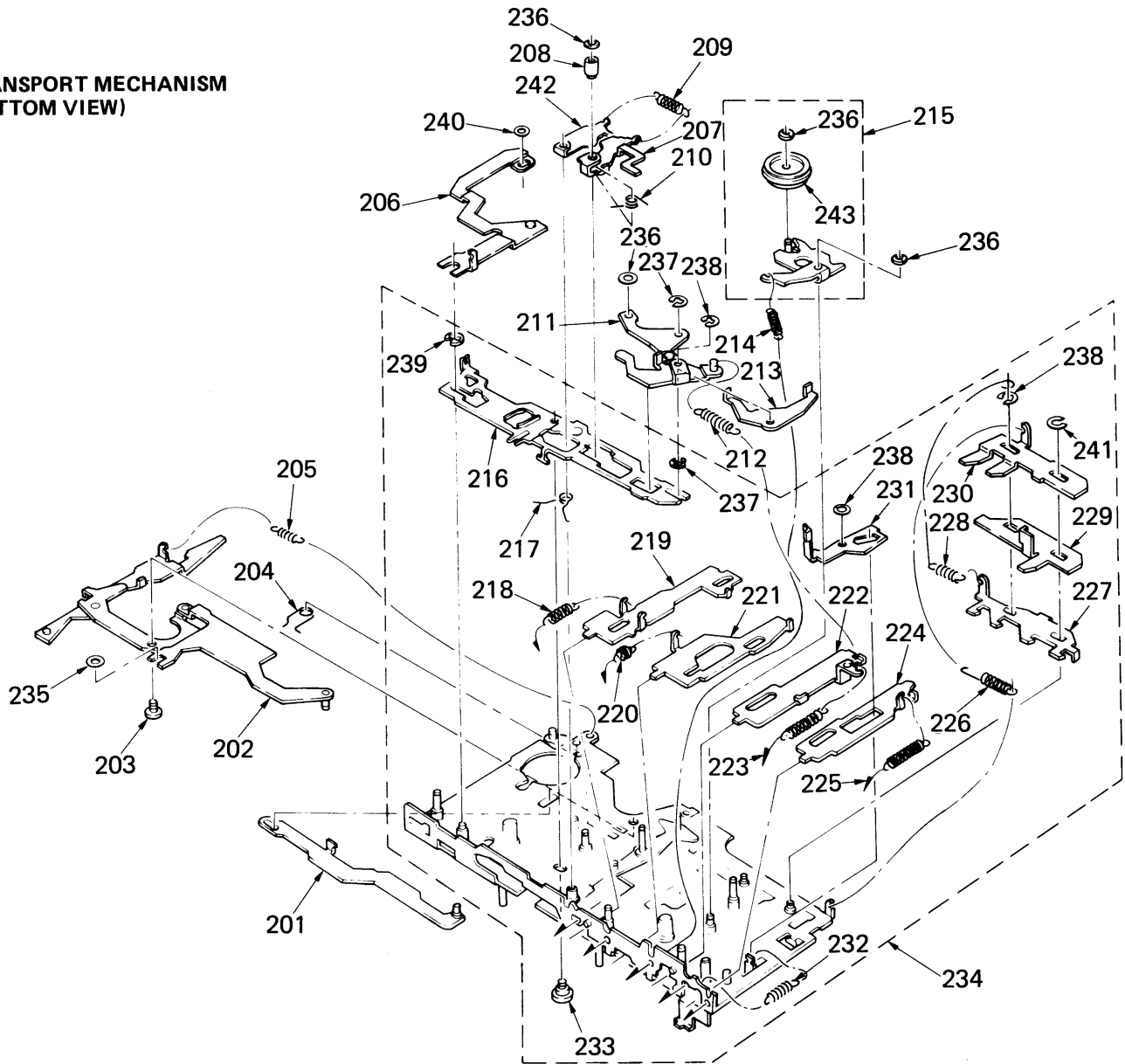
No.	Part No.	Description	Remarks	No.	Part No.	Description	Remarks
101	3-328-431-01	PLATE, LOCK, SAFETY		121	3-328-435-01	LEVER, PREVENTION, SHUT-OFF	
102	3-328-426-01	HOLDER, CLICK		122	3-328-344-01	COLLAR, PREVENTION, S	
103	3-328-427-01	SPRING		123	*X-3328-325-1	LEVER ASSY, FR GEAR	124,137
104	3-328-454-01	SPRING		124	3-324-947-01	GEAR, FR	
105	3-328-395-01	LEVER (A), FWD RETURN		125	X-3324-921-5	LIMITER ASSY, FWD	
106	3-332-001-01	LEVER (B), RETURN SW		126	3-325-357-11	LEVER, SHUT-OFF	
107	3-324-945-01	PULLEY, MIDWAY		127	3-325-326-01	LEVER (B), SHUT-OFF	
108	3-328-439-01	SPRING, TENSION		128	3-325-324-01	GEAR, IDLER	
109	*X-3328-333-1	SLIDER ASSY, RETURN		129	3-570-615-00	POLY-WASHER (DIA.1.2)	
110	3-328-471-01	SPRING, TENSION		130	3-703-816-02	SCREW (M1.4X2.0), SPECIAL HEAD	
111	3-325-323-01	GEAR, CAM		131	7-671-111-11	STEEL, BOUL 1.5MM	
112	*A-3039-152-A	PC BOARD COMPLETE ASSY, D 113-115,129,136		132	3-325-290-41	WASHER, 1.6 (t=0.1)	
113	3-328-352-01	SPRING BOARD		133	3-328-432-01	WASHER, STOPPER	
114	3-325-363-01	GEAR, D		134	3-701-436-01	WASHER, 1.6 (t=0.13)	
115	3-324-967-01	GEAR, MODE CHANGE			3-701-436-11	WASHER, 1.6 (t=0.25)	
116	3-328-460-01	GEAR, SHUT OFF		135	3-325-394-01	WASHER, STOPPER	
117	3-328-447-01	SPRING		136	3-325-290-01	WASHER	
118	3-578-242-11	WASHER		137	3-318-136-01	WASHER, POLYETHYLENE, DIA.1.2	
119	3-328-448-01	LEVER (B), CENTER RETURN		138	3-325-386-01	RING (A), C	
120	3-328-438-01	SPRING, TENSION		139	3-578-254-00	RING, RETAINING, E1.2	

TRANSPORT MECHANISM (TOP VIEW 2)



No.	Part No.	Description	Remarks	No.	Part No.	Description	Remarks
149	3-831-441-XX	SUSHION		179	3-328-364-01	SLIDER (F), REC PREVENTION	
150	3-321-489-01	WASHER		180	*X-3328-330-1	LEVER (B) ASSY, REC	
151	3-325-387-01	BELT		181	3-561-626-00	SPRING, TENSION	
152	X-3325-206-1	FLYWHEEL (F) ASSY		182	*3-328-443-01	SPRING	
153	X-3325-213-1	FLYWHEEL (R) ASSY		183	*X-3328-329-1	BRACKET ASSY, COUNTER	
154	X-3328-316-1	CHASSIS ASSY, HEAD		184	3-328-402-01	SHAFT (B), SLIDE	
155	3-328-403-01	SPRING (F)		185	3-325-385-01	SPACER, MOTOR	
156	3-328-372-02	SPRING (F)		186	3-570-770-00	CUSHION (A), MOTOR	
157	3-328-368-01	SPRING (RC)		187	3-558-662-01	SPRING, COMPRESSION	
158	X-3328-313-1	PINCH LEVER (R) ASSY		188	3-570-937-00	CUSHION (C), MOTOR	
160	3-328-410-01	GUIDE (F), E		189	3-703-502-22	SCREW	
162	3-325-358-01	COLLAR, AZIMUTH		190	3-321-483-11	RING, RETAINING	
163	3-318-106-01	SPRING (H), COMPRESSION		191	3-590-768-00	RING (A), E	
164	3-328-351-01	SPRING, COMPRESSION		192	3-308-555-21	WASHER, VIBRATION PROOF	
165	3-328-350-01	SPACER, HEAD SHAFT SPRING		193	3-703-502-12	SCREW	
166	3-328-378-01	LEVER, AZIMUTH		194	3-315-495-51	WASHER	
167	3-302-492-00	SPRING, COMPRESSION		195	3-578-242-11	WASHER	
168	3-328-386-01	RETAINER, SCREW, ADJUSTMENT		196	7-627-551-38	SCREW, PRECISION +P 1.4X5	
170	3-328-411-01	GUIDE (R), E		197	3-703-816-02	SCREW (M1.4X2.0), SPECIAL HEAD	
171	X-3328-338-1	PINCH LEVER (F) ASSY		198	3-701-441-01	WASHER	
172	3-328-367-01	SPRING (FC)		199	3-570-615-00	POLY-WASHER (DIA.1.2)	
173	3-328-371-01	SPRING (R)		200	7-627-552-48	SCREW, PRECISION +P 1.7X4	
174	3-328-394-01	SPRING (R)		907	1-548-582-11	COUNTER, TAPE (SMALL TYPE)	
175	X-3313-519-1	TABLE ASSY, REEL		HE901	A-3163-109-A	HOLDER (F) SUB ASSY, E	
176	X-3328-315-1	GEAR (B) ASSY, T		HE902	A-3163-108-A	HOLDER (R) SUB ASSY, E	
177	3-328-379-01	BELT, COUNTER		HRP901	8-825-537-51	HEAD, REC/PB (PP238-3604D)	
178	3-328-472-01	SPRING, TENSION		M901	8-835-150-01	MOTOR, DC (MNR-8000B)	

TRANSPORT MECHANISM (BOTTOM VIEW)



No.	Part No.	Description	Remarks	No.	Part No.	Description	Remarks
201	X-3324-923-1	SLIDER ASSY, SHUT-OFF		222	*3-328-449-01	LEVER (C), FWD	
202	*X-3328-318-1	LEVER (C) ASSY, REC		223	3-328-354-01	SPRING, TENSION	
203	3-328-436-01	SHAFT, LEVER (C), REC		224	*3-328-408-01	LEVER, REC	
204	3-328-358-01	SPRING		225	3-308-704-00	SPRING, TENSION	
205	3-547-668-00	SPRING, TENSION		226	3-328-353-01	SPRING, TENSION	
206	*X-3328-328-1	LEVER ASSY, MODE SELECTION		227	*3-328-451-01	PLATE (C), LOCK	
207	*3-328-433-01	LEVER (D), IDLER		228	3-570-552-00	SPRING, TENSION	
208	3-325-263-01	COLLAR (B), IDLER		229	*3-328-452-01	LEVER (C), SWITCH	
209	3-328-476-01	SPRING, TENSION		230	*3-328-450-01	LEVER (FR), SWITCH	
210	3-328-473-01	SPRING		231	*3-328-482-01	LEVER, RELEASE, PAUSE	
211	*X-3328-308-1	LEVER (D) ASSY, H		232	3-325-347-01	SPRING, TENSION	
212	3-328-345-01	SPRING, TENSION		233	3-328-393-01	SCREW, D SLIDER	
213	3-328-341-01	LEVER (A), RETURN, CENTER		234	*A-3039-153-A	LEVER ASSY, CONTROL	216-233,237-240
214	3-325-348-01	SPRING, TENSION		235	3-578-224-21	WASHER	
215	X-3328-337-3	IDLER COMPLETE ASSY, FWD	236,243	236	3-570-615-00	POLY-WASHER (DIA.1.2)	
216	*X-3328-312-1	SLIDER ASSY, D		237	3-590-768-00	RING (A), E	
217	3-325-341-01	SPRING		238	3-578-254-00	RING, RETAINING, E1.2	
218	3-325-350-01	SPRING, TENSION (POWER TENSION)		239	7-624-104-04	STOP RING 2.0, TYPE -E	
219	*3-325-365-21	LEVER, FF		240	3-578-242-21	WASHER	
220	3-325-345-01	SPRING, TENSION (POWER TENSION)		241	3-325-386-01	RING (A), C	
221	*3-325-325-21	LEVER, REW		242	3-325-265-01	LEVER (C), IDLER	

SECTION 4 ELECTRICAL PARTS LIST

NOTE:

Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

If there are two or more same circuits in a set such as a stereophonic machine, only typical circuit parts may be indicated and capacitors and resistors in other same circuits may be omitted.

CAPACITORS:

MF:μF, PF:μμF.

RESISTORS

All resistors are in ohms.

F : nonflammable

COILS

MMH : mH, UH : μH

SEMICONDUCTORS

In each case, U : μ, for example:

UA...: μA..., UPA...: μPA..., UPC...: μPC,

UPD...: μPD...

ELECTRICAL PARTS

Ref.No.	Part No.	Description		
901	A-3015-404-A	PC BOARD ASSY, MAIN		
902	*A-3015-405-A	PCB ASSY, GRAPHIC EQUALIZER		
905	1-616-014-11	PC BOARD, HEAD FLEXIBLE		
906	*1-617-724-11	PC BOARD, G.EQ		
907	1-548-582-11	COUNTER, TAPE (SMALL TYPE)		
C101	1-163-077-00	CERAMIC CHIP 0.1MF		50V
C102	1-163-063-00	CERAMIC CHIP 0.022MF	10%	50V
C103	1-162-611-00	CERAMIC CHIP 1MF		25V
C104	1-163-021-00	CERAMIC CHIP 0.01MF	10%	50V
C105	1-135-083-00	TANTAL. CHIP 0.47MF	20%	25V
C106	1-163-017-00	CERAMIC CHIP 0.0047MF	10%	50V
C107	1-163-141-00	CERAMIC CHIP 0.001MF	10%	50V
C108	1-124-431-00	ELECT 33MF	20%	4V
C109	1-163-079-00	CERAMIC CHIP 0.039MF	10%	25V
C110	1-163-079-00	CERAMIC CHIP 0.039MF	10%	25V
C111	1-163-014-00	CERAMIC CHIP 0.0027MF	10%	50V
C112	1-162-611-00	CERAMIC CHIP 1MF		25V
C113	1-163-021-00	CERAMIC CHIP 0.01MF	10%	50V
C114	1-162-611-00	CERAMIC CHIP 1MF		25V
C115	1-162-611-00	CERAMIC CHIP 1MF		25V
C116	1-163-019-00	CERAMIC CHIP 0.0068MF	10%	50V
C117	1-162-611-00	CERAMIC CHIP 1MF		25V
C118	1-163-075-00	CERAMIC CHIP 0.047MF	10%	25V
C119	1-163-074-00	CERAMIC CHIP 0.033MF	5%	25V
C120	1-135-087-21	TANTAL. CHIP 0.68MF	10%	20V
C121	1-163-017-00	CERAMIC CHIP 0.0047MF	5%	50V
C122	1-163-079-00	CERAMIC CHIP 0.039MF	10%	25V
C123	1-135-087-21	TANTAL. CHIP 0.68MF	20%	20V
C124	1-163-060-00	CERAMIC CHIP 0.012MF	10%	50V
C125	1-163-081-00	CERAMIC CHIP 0.22MF		25V
C126	1-163-054-00	CERAMIC CHIP 0.0039MF	10%	50V
C127	1-163-076-00	CERAMIC CHIP 0.068MF		50V
C128	1-163-048-91	CERAMIC CHIP 0.0012MF	10%	50V
C129	1-163-063-00	CERAMIC CHIP 0.022MF	10%	50V
C130	1-163-042-11	CERAMIC CHIP 390PF	10%	50V
C131	1-163-057-00	CERAMIC CHIP 0.0068MF	10%	50V
C132	1-162-611-00	CERAMIC CHIP 1MF		25V
C133	1-135-091-00	TANTAL. CHIP 1MF	20%	16V
C134	1-163-141-00	CERAMIC CHIP 0.001MF	10%	50V
C135	1-163-251-00	CERAMIC CHIP 100PF	5%	50V
C136	1-124-430-00	ELECT 22MF	20%	4V
C137	1-131-368-00	TANTALUM 3.3MF	20%	10V
C138	1-163-141-00	CERAMIC CHIP 0.001MF	10%	50V
C201	1-163-077-00	CERAMIC CHIP 0.1MF		50V

ELECTRICAL PARTS

Ref.No.	Part No.	Description		
C202	1-163-063-00	CERAMIC CHIP 0.022MF	10%	50V
C203	1-162-611-00	CERAMIC CHIP 1MF		25V
C204	1-163-021-00	CERAMIC CHIP 0.01MF	10%	50V
C205	1-135-083-00	TANTAL. CHIP 0.47MF	20%	25V
C206	1-163-017-00	CERAMIC CHIP 0.0047MF	10%	50V
C207	1-163-141-00	CERAMIC CHIP 0.001MF	10%	50V
C208	1-124-431-00	ELECT 33MF	20%	4V
C209	1-163-079-00	CERAMIC CHIP 0.039MF	10%	25V
C210	1-163-079-00	CERAMIC CHIP 0.039MF	10%	25V
C211	1-163-014-00	CERAMIC CHIP 0.0027MF	10%	50V
C212	1-162-611-00	CERAMIC CHIP 1MF		25V
C213	1-163-021-00	CERAMIC CHIP 0.01MF	10%	50V
C214	1-162-611-00	CERAMIC CHIP 1MF		25V
C215	1-162-611-00	CERAMIC CHIP 1MF		25V
C216	1-163-019-00	CERAMIC CHIP 0.0068MF	10%	50V
C217	1-162-611-00	CERAMIC CHIP 1MF		25V
C218	1-163-075-00	CERAMIC CHIP 0.047MF	10%	25V
C219	1-163-074-00	CERAMIC CHIP 0.033MF	5%	25V
C220	1-135-087-21	TANTAL. CHIP 0.68MF	10%	20V
C221	1-163-017-00	CERAMIC CHIP 0.0047MF	5%	50V
C222	1-163-079-00	CERAMIC CHIP 0.039MF	10%	25V
C223	1-135-087-21	TANTAL. CHIP 0.68MF	20%	20V
C224	1-163-060-00	CERAMIC CHIP 0.012MF	10%	50V
C225	1-163-081-00	CERAMIC CHIP 0.22MF		25V
C226	1-163-054-00	CERAMIC CHIP 0.0039MF	10%	50V
C227	1-163-076-00	CERAMIC CHIP 0.068MF		50V
C228	1-163-048-91	CERAMIC CHIP 0.0012MF	10%	50V
C229	1-163-063-00	CERAMIC CHIP 0.022MF	10%	50V
C230	1-163-042-11	CERAMIC CHIP 390PF	10%	50V
C231	1-163-057-00	CERAMIC CHIP 0.0068MF	10%	50V
C232	1-162-611-00	CERAMIC CHIP 1MF		25V
C233	1-135-091-00	TANTAL. CHIP 1MF	20%	16V
C234	1-163-141-00	CERAMIC CHIP 0.001MF	10%	50V
C235	1-163-251-00	CERAMIC CHIP 100PF	5%	50V
C236	1-124-430-00	ELECT 22MF	20%	4V
C237	1-131-368-00	TANTALUM 3.3MF	20%	10V
C238	1-163-141-00	CERAMIC CHIP 0.001MF	10%	50V
C301	1-124-432-00	ELECT 47MF	20%	4V
C302	1-124-432-00	ELECT 47MF	20%	4V
C303	1-131-392-00	TANTALUM 33MF	20%	3.15V
C304	1-124-431-00	ELECT 33MF	20%	4V
C305	1-124-432-00	ELECT 47MF	20%	4V
C306	1-124-430-00	ELECT 22MF	20%	4V
C307	1-163-081-00	CERAMIC CHIP 0.22MF		25V
C308	1-124-432-00	ELECT 47MF	20%	4V
C309	1-163-205-00	CERAMIC CHIP 0.001MF	10%	50V

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C310	1-135-104-00	TANTAL. CHIP	10MF	20%	4V
C311	1-124-433-00	ELECT	100MF	20%	4V
C312	1-124-431-00	ELECT	33MF	20%	4V
C313	1-124-434-00	ELECT	220MF	20%	4V
C314	1-163-017-00	CERAMIC CHIP	0.0047MF	10%	50V
C315	1-163-017-00	CERAMIC CHIP	0.0047MF	10%	50V
C316	1-124-432-00	ELECT	47MF	20%	4V
C317	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C318	1-124-434-00	ELECT	220MF	20%	4V
C319	1-124-431-00	ELECT	33MF	20%	4V
C320	1-124-434-00	ELECT	220MF	20%	4V
C321	1-124-434-00	ELECT	220MF	20%	4V
C601	1-131-389-00	TANTALUM	10MF	20%	3.15V
C602	1-124-438-00	ELECT	1MF	20%	50V
C603	1-163-081-00	CERAMIC CHIP	0.22MF		25V
C604	1-131-419-00	TANTALUM	2.2MF	20%	10V
C605	1-124-432-00	ELECT	47MF	20%	4V
C606	1-162-611-00	CERAMIC CHIP	1MF		25V
C607	1-162-611-00	CERAMIC CHIP	1MF		25V
CN301	1-507-723-00	JACK, EXTENTION POWER (DC IN 3V)			
CNJ301*1	562-334-00	SOCKET, CONNECTOR 10P			
CNP301	1-506-648-11	PIN, CONNECTOR (PC BOARD) 10P			
D301	8-719-936-67	DIODE SLP174B (REC/BATT)			
D302	8-719-936-79	DIODE DCC010			
D601	8-719-914-44	DIODE DAP202K			
HE901	A-3163-109-A	HOLDER (F) SUB ASSY, E			
HE902	A-3163-108-A	HOLDER (R) SUB ASSY, E			
HRP901	8-825-537-51	HEAD, REC/PB (PP238-3604D)			
IC101	8-759-802-42	IC LA3610M			
IC201	8-759-802-42	IC LA3610M			
IC301	8-759-907-36	IC CX20023			
IC302	8-759-701-07	IC NJM2063AM			
IC303	8-759-910-71	IC BA5208AF			
IC601	8-759-400-12	IC AN6612S			
J301	1-507-999-11	JACK (PLUG IN POWER/MIC)			
J302	1-507-999-21	JACK (PHONES)			
M901	8-835-150-01	MOTOR, DC (MNR-8000B)			
MIC901	8-814-184-00	MICROPHONE UNIT (C-1011)			
MIC902	8-814-184-00	MICROPHONE UNTT (C-1011)			
Q301	8-729-271-23	TRANSISTOR 2SC2712			
Q302	8-729-271-23	TRANSISTOR 2SC2712			
Q303	8-729-900-52	TRANSISTOR DTC114YK			
Q305	8-729-900-52	TRANSISTOR DTC114YK			

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
Q306	8-729-271-23	TRANSISTOR 2SC2712			
Q307	8-729-216-22	TRANSISTOR 2SA1162			
Q308	8-729-271-23	TRANSISTOR 2SC2712			
Q601	8-729-804-42	TRANSISTOR 2SB1122-T			
Q602	8-729-900-98	TRANSISTOR DTC143TK			
Q603	8-729-900-52	TRANSISTOR DTC114YK			
Q604	8-729-901-46	TRANSISTOR DTA114YK			
Q605	8-729-900-52	TRANSISTOR DTC114YK			
Q606	8-729-901-46	TRANSISTOR DTA114YK			
Q607	8-729-900-52	TRANSISTOR DTC114YK			
R101	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R102	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R103	1-216-049-00	METAL CHIP	1K	5%	1/10W
R104	1-216-049-00	METAL CHIP	1K	5%	1/10W
R105	1-216-097-00	METAL CHIP	100K	5%	1/10W
R106	1-216-089-00	METAL CHIP	47K	5%	1/10W
R107	1-216-063-00	METAL CHIP	3.9K	5%	1/10W
R108	1-216-039-00	METAL CHIP	390	5%	1/10W
R109	1-216-097-00	METAL CHIP	100K	5%	1/10W
R110	1-216-097-00	METAL CHIP	100K	5%	1/10W
R111	1-216-073-00	METAL CHIP	10K	5%	1/10W
R112	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R113	1-216-025-00	METAL CHIP	100	5%	1/10W
R114	1-216-089-00	METAL CHIP	47K	5%	1/10W
R115	1-216-089-00	METAL CHIP	47K	5%	1/10W
R116	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R117	1-216-112-00	METAL CHIP	430K	5%	1/10W
R118	1-216-214-00	METAL CHIP	4.7K	5%	1/8W
R120	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R121	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R122	1-216-047-00	METAL CHIP	820	5%	1/10W
R201	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R202	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R203	1-216-049-00	METAL CHIP	1K	5%	1/10W
R204	1-216-049-00	METAL CHIP	1K	5%	1/10W
R205	1-216-097-00	METAL CHIP	100K	5%	1/10W
R206	1-216-089-00	METAL CHIP	47K	5%	1/10W
R207	1-216-063-00	METAL CHIP	3.9K	5%	1/10W
R208	1-216-039-00	METAL CHIP	390	5%	1/10W
R209	1-216-097-00	METAL CHIP	100K	5%	1/10W
R210	1-216-097-00	METAL CHIP	100K	5%	1/10W
R211	1-216-073-00	METAL CHIP	10K	5%	1/10W
R212	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R213	1-216-025-00	METAL CHIP	100	5%	1/10W
R214	1-216-089-00	METAL CHIP	47K	5%	1/10W
R215	1-216-089-00	METAL CHIP	47K	5%	1/10W

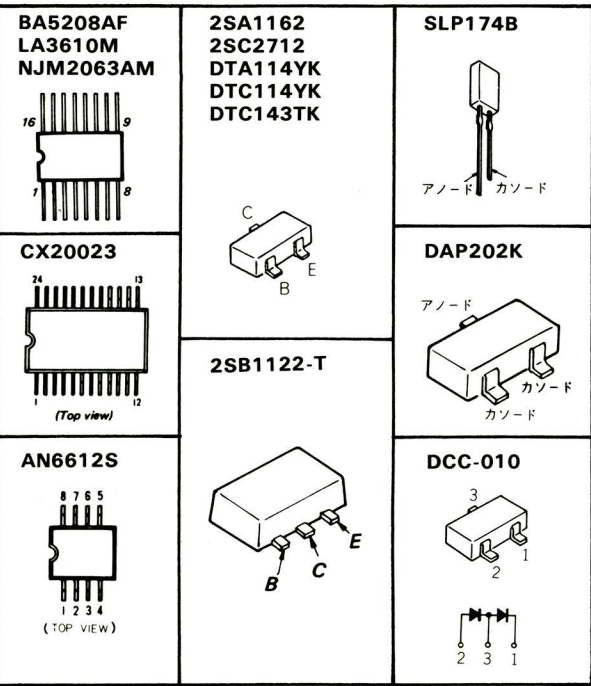
ELECTRICAL PARTS

Ref.No.	Part No.	Description
R216	1-216-061-00	METAL CHIP 3.3K 5% 1/10W
R217	1-216-112-00	METAL CHIP 430K 5% 1/10W
R218	1-216-214-00	METAL CHIP 4.7K 5% 1/8W
R220	1-216-220-00	METAL CHIP 8.2K 5% 1/8W
R221	1-216-067-00	METAL CHIP 5.6K 5% 1/10W
R222	1-216-045-00	METAL CHIP 680 5% 1/10W
R223	1-216-134-00	METAL CHIP 2.2 5% 1/8W
R301	1-216-049-00	METAL CHIP 1K 5% 1/10W
R302	1-216-025-00	METAL CHIP 100 5% 1/10W
R303	1-216-071-00	METAL CHIP 8.2K 5% 1/10W
R304	1-216-081-00	METAL CHIP 22K 5% 1/10W
R305	1-216-077-00	METAL CHIP 15K 5% 1/10W
R306	1-216-041-00	METAL CHIP 470 5% 1/10W
R307	1-216-252-00	METAL CHIP 180K 5% 1/8W
R308	1-216-075-00	METAL CHIP 12K 5% 1/10W
R309	1-216-013-00	METAL CHIP 33 5% 1/10W
R310	1-216-017-00	METAL CHIP 47 5% 1/10W
R311	1-216-190-00	METAL CHIP 470 5% 1/8W
R312	1-216-073-00	METAL CHIP 10K 5% 1/10W
R313	1-216-075-00	METAL CHIP 12K 5% 1/10W
R314	1-216-049-00	METAL CHIP 1K 5% 1/10W
R601	1-216-172-00	METAL CHIP 82 5% 1/8W
R603	1-216-133-00	METAL CHIP 3.3M 5% 1/10W
R604	1-216-301-11	METAL CHIP 2.4 5% 1/10W
R605	1-216-301-11	METAL CHIP 2.4 5% 1/10W
R606	1-216-049-00	METAL CHIP 1K 5% 1/10W
R607	1-216-218-00	METAL CHIP 6.8K 5% 1/8W
R608	1-216-077-00	METAL CHIP 15K 5% 1/10W
RV101	1-237-119-11	RES, ADJ, METAL GLAZE 22K
RV201	1-237-119-11	RES, ADJ, METAL GLAZE 22K
RV301	1-230-485-21	RES, VAR, CARBON 10K/10K (VOL)
RV302	1-237-056-11	RES, VAR, SLIDE (BLOCK) 100K (GRAPHIC EQUARIZER)
RV601	1-230-818-11	RES, ADJ, METAL GLAZE 5K
S301	1-554-575-21	SWITCH, SLIDE (PEC/PB)
S302	1-570-259-11	SWITCH, SLIDE (DIRECTION)
S303	1-570-087-11	SWITCH, SLIDE (PB EQ/MIC SENS)
S304	1-554-669-00	SWITCH, SLIDE (DOLBY NR)
S305	1-570-175-11	SWITCH, LEAF (POWER)
S601	1-570-175-11	SWITCH, LEAF (PAUSE)
S602	1-570-518-11	SWITCH, LEAF (DIRECTION)
SP901	1-503-585-11	SPEAKER
T301	1-433-251-00	TRANSFORMER, BIAS OSCILLATOR
THP601	1-806-800-11	THERMISTOR (POSITIVE)
THP602	1-807-282-11	THERMISTOR (POSITIVE)

ACCESSORY & PACKING MATERIAL

Part No.	Description
3-332-010-01	CUSHION
3-332-012-01	(US).....INDIVIDUAL CARTON
3-332-013-01	(Canadian,AEP,UK,E)...INDIVIDUAL CARTON
3-332-017-01	CASE, CARRYING
3-332-018-01	SHEET, PROTECTION
3-760-961-11	(AEP,UK,E).....MANUAL, INSTRUCTION
3-760-961-21	(US,Canadian)...MANUAL, INSTRUCTION
3-760-961-31	(Canadian).....MANUAL, INSTRUCTION
3-760-961-41	(AEP).....MANUAL, INSTRUCTION
3-795-748-21	(US)...SAFETY INSTRUCTIONS, HEADPHONE
8-952-232-90	HEADPHONE MDR-W20L/B SET

●半導体外形図
Semiconductor lead layouts



Tape Speed Adjustment

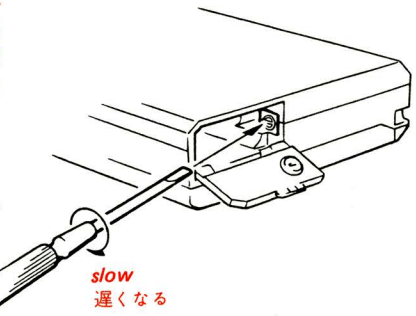
- ① Play back center portion of test tape (WA-48A) in FWD mode. Adjust RV601 so that the frequency counter reading is $3000 \pm 10\text{kHz}$.
- ② Play back center portion of test tape (WA-48A) in REV mode. Make sure that the frequency difference between step ① and step ② is within 1.5% (45Hz).

Note: Make sure that the frequency difference at the beginning and the end of tape is within 2% (60Hz).

【テープスピード調整】

- ① FWD状態で、テストテープWS-48A(テープセンター部)を再生し、周波数カウンターの読みが $3,000 \pm 10\text{Hz}$ になるようにRV601を調整する。
- ② REV状態で、WS-48A(テープセンター部)を再生し、①項との周波数の差が1.5%(45Hz)以内であることを確認する。

注) 巻始めと巻終りの周波数の差が2%(60Hz)以内であること。

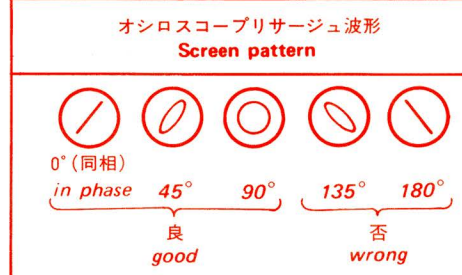


Record/Playback Head Azimuth Adjustment

Play back test tape (P-4-100) in FWD mode. Adjust the adjustment screw (FWD) so that the phase is within 90° and the reading is maximum on VTVM. Also in REV mode, perform this adjustment. (In this case, adjust the adjustment screw (REV).)

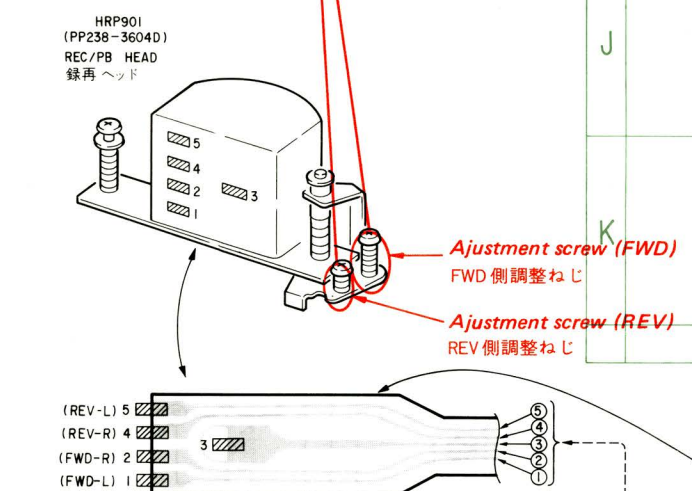
【録再ヘッド垂直調整】

FWD状態でテストテープP-4-A100を再生し、位相が 0° から 90° 以内で、L-CH、R-CHの出力が最大になるようにFWD側調整ねじを調整する。REV状態でも同様に調整する。(但し調整はREV側調整ねじで行なう。)

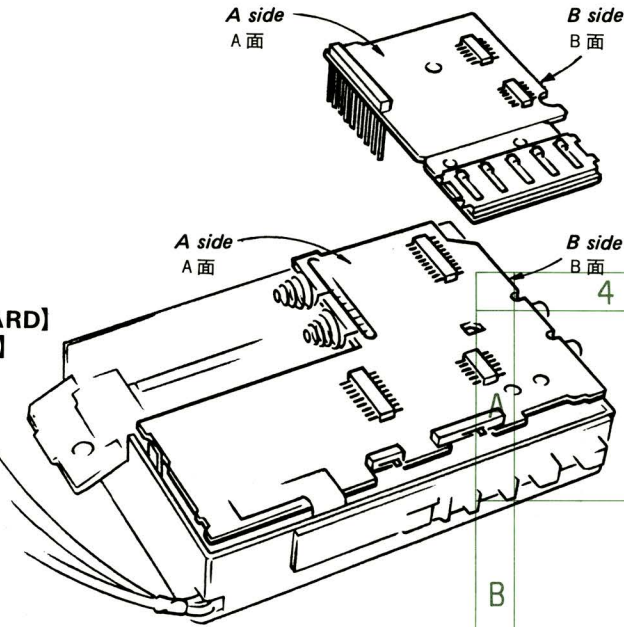


- : chip component mounted on B side.
- : Through hole.
- : B side pattern

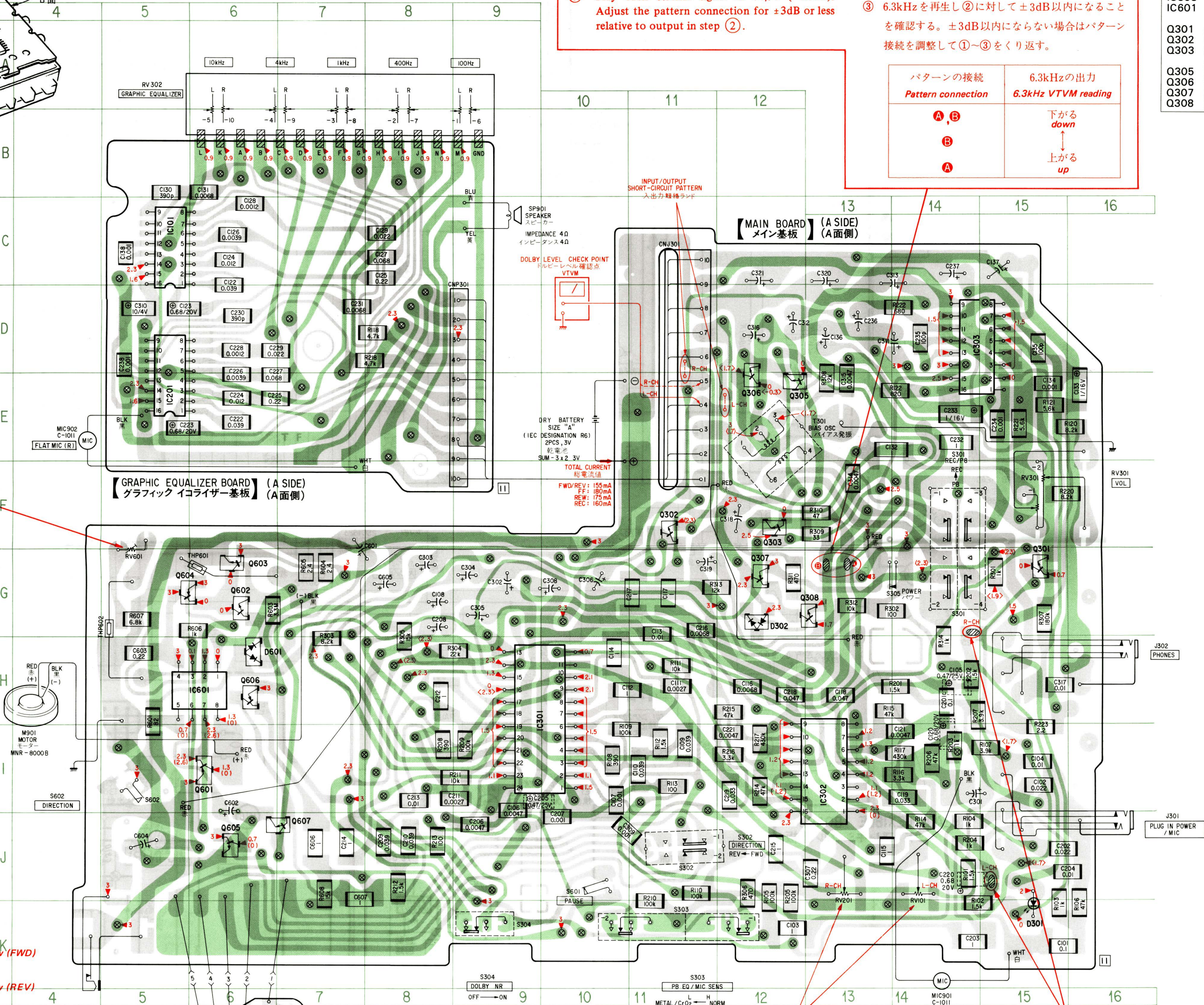
- ・ 印はB面側取付のチップ部品。
- ・ 印はスルーホール。
- ・ B面側パターン。



【GRAPHIC EQUALIZER BOARD】
【グラフィックイコライザー基板】



【MAIN BOARD】
【メイン基板】



Record Bias Adjustment

- ① Record the signals, 315Hz and 6.3kHz of $77\mu\text{V}$ (-80dB) through MIC jack (J301).
- ② Play back 315kHz signal of $77\mu\text{V}$ (-80dB) and adjust VOLUME control to obtain 0.25V (-10dB) output.
- ③ Play back 6.3kHz signal of $77\mu\text{V}$ (-80dB). Adjust the pattern connection for $\pm 3\text{dB}$ or less relative to output in step ②.

【録音バイアス調整】

- ① 315Hz, $77\mu\text{V}$ (-80dB) と 6.3kHz, $77\mu\text{V}$ (-80dB) をマイクジャック (J301) を通じて録音する。
- ② 315Hzを再生し出力が0.25V (-10dB) になるようにVOLUMEつまみを調整する。
- ③ 6.3kHzを再生し②に対して $\pm 3\text{dB}$ 以内になることを確認する。 $\pm 3\text{dB}$ 以内にならない場合はパターン接続を調整して①～③をくり返す。

パターンの接続 Pattern connection	6.3kHzの出力 6.3kHz VTVM reading
A B	下がる down
B	
A	上がる up

●半導体インデックス
Semiconductor Index

Ref. No.	Location	Ref. No.	Location
IC101	C-5	Q601	I-6
IC201	E-5	Q602	G-6
IC301	H-9	Q603	G-6
IC302	I-13	Q604	G-5
IC303	D-14	Q605	J-6
IC601	H-6	Q606	H-6
		Q607	J-6
Q301	G-15		
Q302	F-11	D301	K-15
Q303	F-12	D302	G-12
		D601	H-6
Q305	E-12		
Q306	E-12		
Q307	G-12		
Q308	G-12		

Dolby NR Level Adjustment

Setting:

- PB EQ switch : NORM
- DOLBY NR switch: OFF
- VTVM connecting point: CNJ301 4 pin (L-CH) 5 pin (L-CH)

Play back test tape (P-4-L300) in FWD mode. Adjust RV101 (L-CH), RV201 (R-CH) to obtain $71\text{mV} \sim 75\text{mV}$ ($-20.7 \sim -20.3\text{dB}$) output. In REV mode, make sure to obtain $65\text{mV} \sim 82\text{mV}$ ($-21.5 \sim -19.5\text{dB}$) output.

【ドルビーレベル調整】

条件:

- PB EQスイッチ: NORM
- DOLBY NRスイッチ: OFF

FWD状態でテストテープP-4-L300を再生し、CNJ301の4番端子(L-CH)または5番端子(R-CH)に接続したVTVMの読みが $71\text{mV} \sim 75\text{mV}$ ($-20.7 \sim -20.3\text{dB}$) になるようにRV101 (L-CH)、RV201 (R-CH)を調整する。REV状態については $65\text{mV} \sim 82\text{mV}$ ($-21.5 \sim -19.5\text{dB}$)であることを確認する。

Microphone Sensitivity Adjustment

When replacing the microphone, perform this Adjustment.

Mark of Microphone	Pattern Connection
BLACK	OPEN
RED	SHORT

【マイク感度調整】

マイク側面のマークの色が赤のときパターンを接続する。

SONY STEREO CASSETTE CORDER TCS-470

US Model
Canadian Model
AEP Model
UK Model
E Model

Note:

- All capacitors are in μF unless otherwise noted. pF: μF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and $\frac{1}{4}\text{W}$ or less unless otherwise specified.
- Components for right channel have same values as for left channel. Reference numbers are coded from 200.
- Switch

Ref. No.	Switch	Position
S301	REC / PB	PB
S302	DIRECTION	FWD
S303	PB EQ / MIC SENS	NORM/H
S304	DOLBY NR	OFF
S305	POWER	ON
S601	PAUSE	OFF
S602	DIRECTION	OFF

- : B+ bus.
- : adjustment for repair.
- Total current is measured with no cassette installed.
- Power voltage is 3V and fed with regulated dc power supply from dry battery terminal.
- Readings are taken under no-signal conditions with a VOM (50 k Ω /V).
- Readings are taken under no-signal conditions with a VOM (50 k Ω /V).
- no mark: PLAY
- () : PAUSE ON
- [] : DOLBY NR ON
- < > : REC
- Voltage variations may be noted due to normal production tolerances.

- : playback signal path
- : record signal path

- ・ケミコン、タンタルを除くコンデンサで、耐圧50V以下のものは、その耐圧を省略。
- 単位はすべて μF (pはpF)。
- ・抵抗値は乾電池端子より定電圧電流で3Vを供給し、対アース間をテスター(DC50k Ω /V)を使用し、無信号状態で測定した参考値。
- ・リファレンス番号は200番台。
- ・スイッチ

リファレンスNo	名 称	現在位置
S301	REC/PB	PB
S302	DIRECTION	FWD
S303	PB EQ/MIC SENS	NORM/H
S304	DOLBY NR	OFF
S305	POWER	ON
S601	PAUSE	OFF
S602	DIRECTION	OFF

- : B+ライン。
- : 調整名。
- ・総合電流は、カセットを入れない状態で測定。
- ・電圧値は乾電池端子より定電圧電流で3Vを供給し、対アース間をテスター(DC50k Ω /V)を使用し、無信号状態で測定した参考値。
- 無印: PLAY時
- () : PAUSE ON時
- [] : DOLBY NR ON時
- < > : REC時

- : 再生信号経路を示す。
- : 録音信号経路を示す。

【HEAD FLEXIBLE BOARD ヘッドフレキシブル基板】

【MAIN BOARD メイン基板】

【GRAPHIC EQUALIZER BOARD グラフィックイコライザー基板】

TOTAL CURRENT
総電流値
FWD/REV: 155mA
FF: 180mA
REW: 175mA
REC: 160mA

DC IN 3V
乾電池
SUM 3 X 2
3V

DRY BATTERY
SIZE "AA"
(IEC DESIGNATION R6)
2PCS 3V