HMK-70

UK Model
AEP Model

STEREO MUSIC SYSTEM

SPECIFICATIONS

FM TUNER SECTION

Frequency range:	87.5 to 108 MHz
Antenna terminals:	75 ohms unbalanced 300 ohms balanced
Intermediate frequency:	10.7 MHz
Usable sensitivity:	7 dB (2.2 μV), S/N = 30 dB
Signal-to-noise ratio:	65 dB
Capture ratio:	2 dB
Selectivity:	50 dB
Image rejection:	40 dB
I-f rejection:	90 dB
A-m suppression:	50 dB
Frequency response:	20 to 15,000 Hz
Harmonic distortion:	Mono: 0.5 % at 400 Hz Stereo: 1.0 % at 400 Hz
Fm stereo separation:	Better than 35 dB
19 kHz, 38 kHz suppression:	45 dB

A-M TUNER SECTION

Frequency range:	MW 530 to 1,605 kHz LW 150 to 350 kHz
Antenna:	MW/LW Built-in ferrite rod antenna and external antenna jack
Intermediate frequency:	MW/LW 468 kHz
Sensitivity:	MW 48 dB/m (250 μV/m), built-in antenna 26 dB (20 μV), external antenna LW 52 dB/m (400 μV/m), built-in antenna 45 dB (180 μV), external antenna
Signal-to-noise ratio:	MW/LW 50 dB
Harmonic distortion:	MW/LW 0.8 % at 400 Hz
Image rejection:	MW 40 dB at 1,000 kHz LW 50 dB at 160 kHz
I-f rejection:	MW 40 dB at 1,000 kHz LW 40 dB at 240 kHz

— Continues to page 2 —

SONY®

SERVICE MANUAL

AUDIO AMPLIFIER SECTION

Continuous RMS power output: 2 x 20W, 40 Hz–12.5 kHz (THD 0.9%, 8 ohms) DIN
2 x 25W, 1 kHz (THD 0.9%, 4 ohms)

Music output power: 70W (THD 0.9%, 8 ohms)

Power band width: 10 Hz–25 kHz, IHF (-3 dB)

Harmonic distortion: Less than 0.9 % at 1 kHz at continuous RMS power output

IM distortion: (250 Hz: 8 kHz = 4: 1) Less than 0.2 % at 1 kHz at continuous RMS power outout, DIN 45500

Frequency response:
PHONO: RIAA equalization curve ±2 dB
TAPE: 40 Hz to 20 kHz at continuous RMS power output

Input: (at continuous RMS power)

	Sensitivity	Impedance
TAPE	440 mV	50 k ohms
REC/PB (inputs)	440 mV	50 k ohms
MIC	1 mV	600 ohms

Outputs:

	Output voltage	Impedance
REC OUT	250 mV	10 k ohms
REC/PB (output)	30 mV	80 k ohms
SPEAKER	8-ohm speakers are most suitable.	
HEADPHONE	Accepts 8-ohm or higher headphones.	

Signal-to-noise ratio: PHONO 50 dB at 3 mV input
TAPE, REC/PB (input) } 75 dB at 440 mV input

Tone controls: BASS: ±10 dB at 100 Hz
TREBLE: ±10 dB at 10 kHz

Loudness control: +8 dB at 100 Hz
+4 dB at 10 kHz
(volume control attenuation: 30 dB)

Damping factor: Better than 60 (8 Ω), DIN 45500

High filter: 6 dB/octave above 4.3 kHz

GENERAL

Circuit system: Fm stereo, FM/MW/LW superheterodyne tuner, SEPP OTL power amplifier

Power consumption: 150 watts

Power requirements: 220V, 50 Hz/60 Hz (AEP Model)
(110, 127, 220 and 240V adjustable)
240V, 50 Hz (UK Model)

Dimensions: 626 (w) x 191 (h) x 430 (d) mm
24 5/8 (w) x 7 1/2 (h) x 16 9/16 (d) inches

Net weight: 19.4 kg (42 lb 12 oz)

RECORD PLAYER SECTION

Platter: 30 cm (11 13/16"), die-cast aluminum alloy 1 kg (2 lb 3 oz)

Speeds: 33 1/3, 45 rpm

Drive system: Belt-drive

Motor: 4-pole hysteresis synchronous

Wow and flutter: ±0.09 % weighted (DIN 45507)

S/N ratio: Greater than 63 dB weighted (DIN 45544)

Tonearm: Universal type, statically balanced

Optimum stylus force: 3g

Cartridge: Magnetic type VL-30G

Stylus: SONY ND-133G (Conical 0.5 mil diamond)

Note: For further information, refer to the service manual "TTS-360" supplied with this service manual.

STEREO CASSETTE DECK SECTION

Track: 4 track, 2 channel

Tape speed: 4.8 cm/sec (1 7/8 ips.)

Recording bias frequency: 85 kHz (ISS: 1), 80 kHz (ISS: 2)

Record/playback head: PF145–3602

Erase head: EF135–36

SPEAKER SECTION

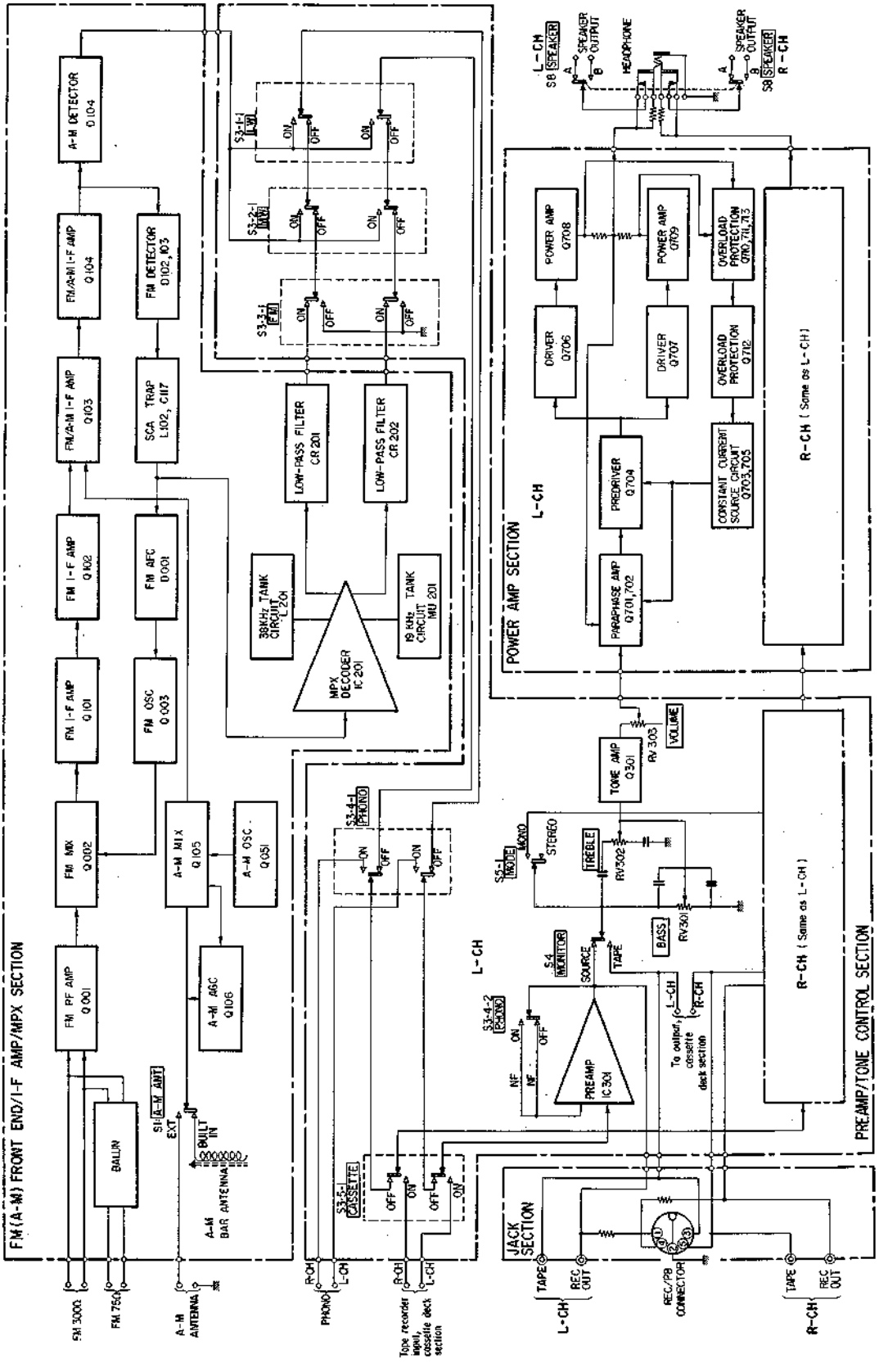
System: 3-way
Woofer: 22 cm (8 3/4") cone type
Mid-range: 9 cm (3 1/2") cone type
Tweeter: 5 cm (2") cone type

Impedance: 8 Ω

Dimensions: 285 (w) x 495 (h) x 240 (d) mm
11 1/4 (w) x 19 1/2 (h) x 9 3/8 (d) inches

Net weight: 5.5 kg (12 lb 2 oz) (each)

SECTION 1
BLOCK DIAGRAM



SECTION 2
DISASSEMBLY AND REPLACEMENT

2-1. RECORD PLAYER AND WOODEN CABINET REMOVAL

1. Remove ❶ ~ ❻ for record player removal.
2. Remove ❼ ~ ❿ for cassette deck panel removal.
3. Remove ⓫ ~ ⓭ for record player cabinet removal.

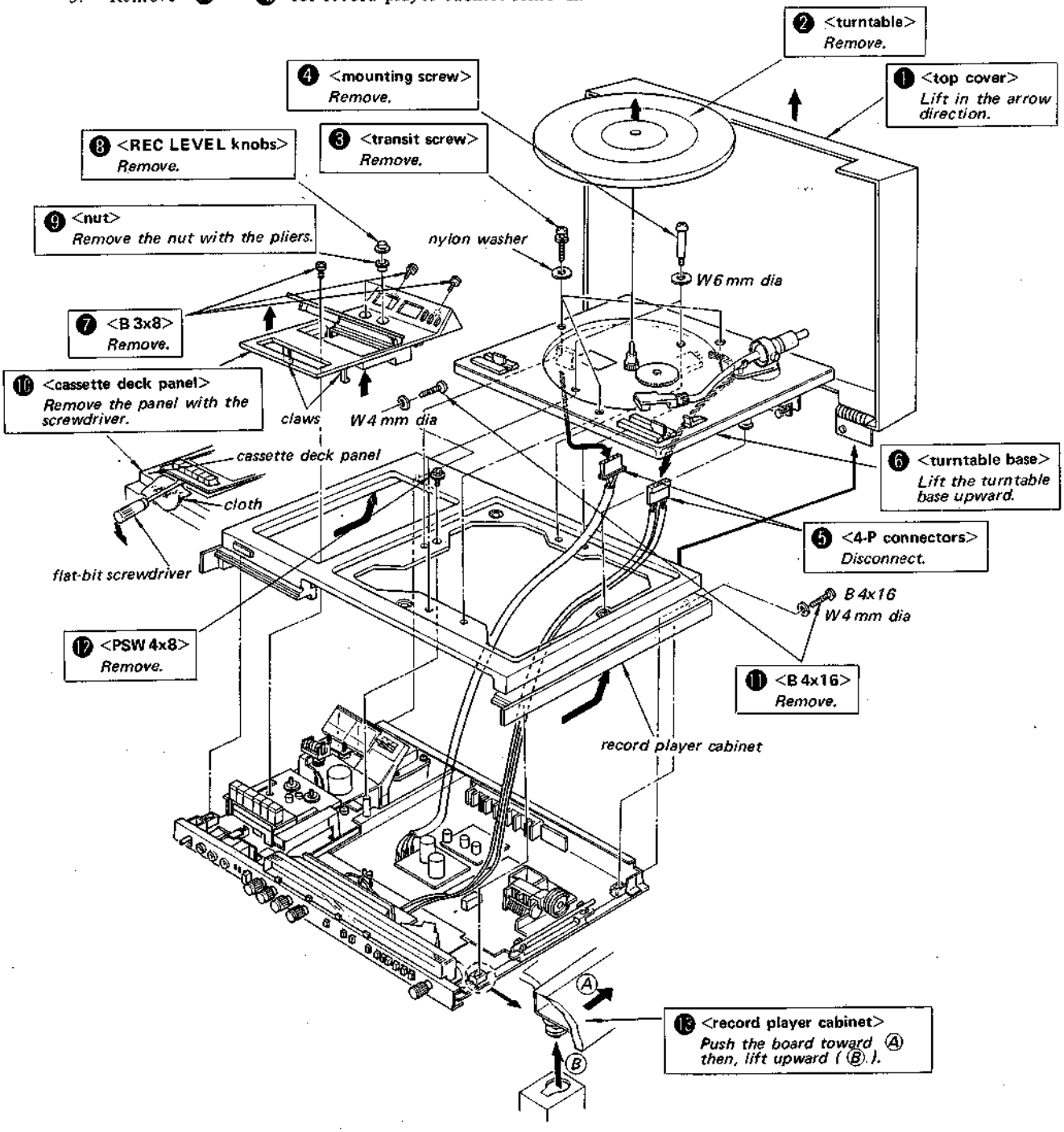


Fig. 2-1. Record player and wooden cabinet removal

2-2. FRONT PANEL, FM (A-M) FRONT-END BOARD AND PREAMP/TONE CONTROL BOARD REMOVAL

1. Remove ❶ , ❷ and ❸ for front panel removal.
2. Remove ❹ ~ ⓭ for fm (a-m) front-end board removal.
3. Remove ⓮ ~ ⓰ for preamp/tone control board removal.

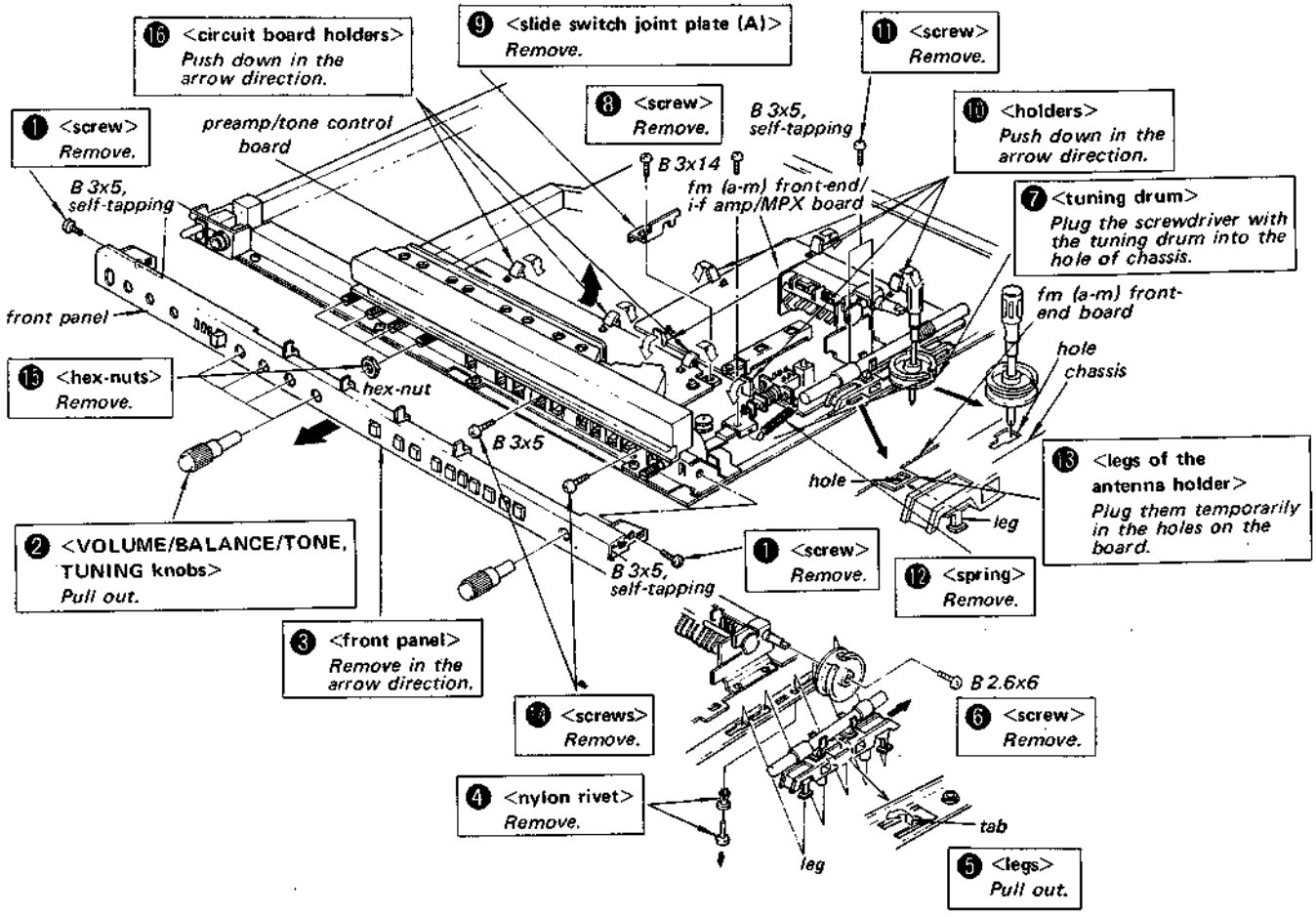


Fig. 2-2. Front panel, fm (a-m) front-end board and preamp/tone control board removal.

2-3. DIAL CORD STRINGING

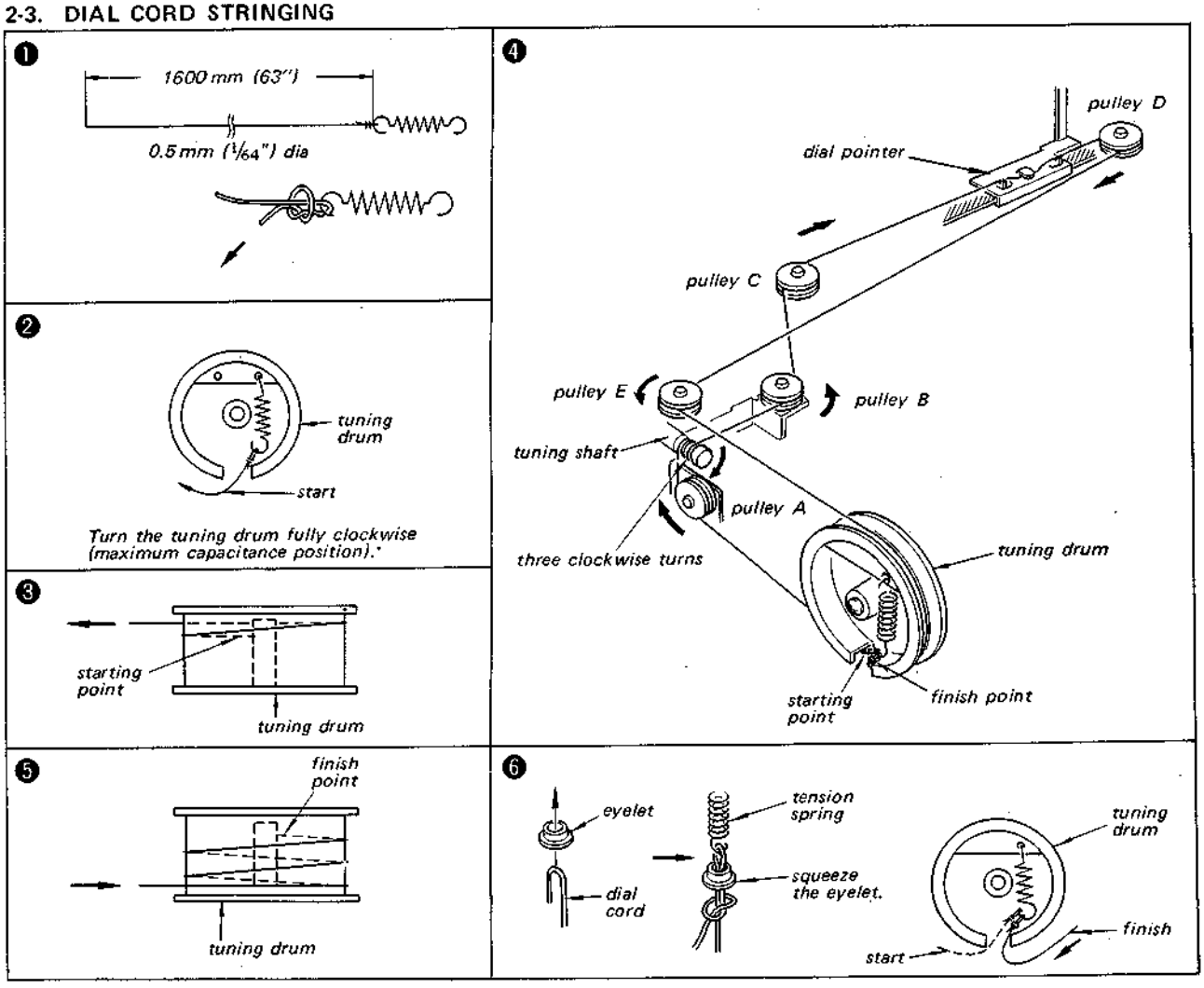


Fig. 2-3. Dial cord stringing

2-4. MECHANICAL DIAL CALIBRATION

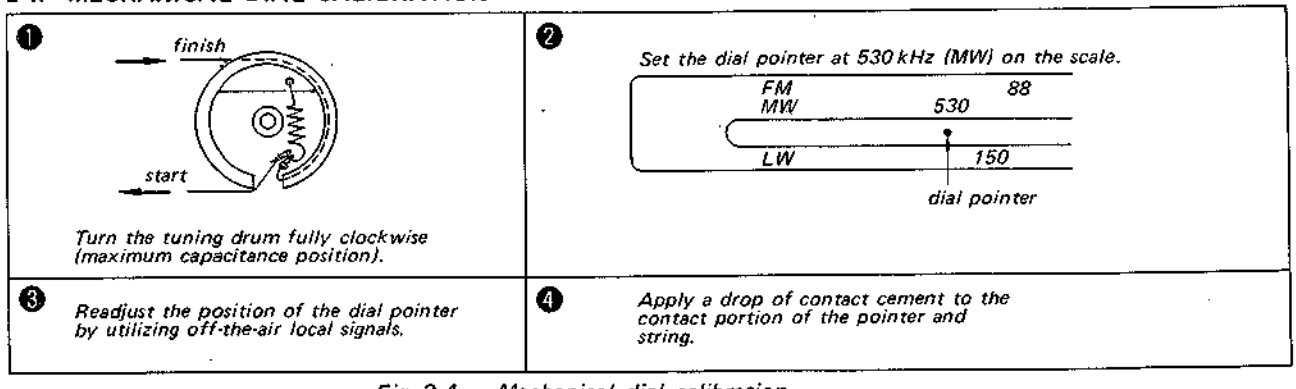


Fig. 2-4. Mechanical dial calibration

2-5. CHASSIS LAYOUT

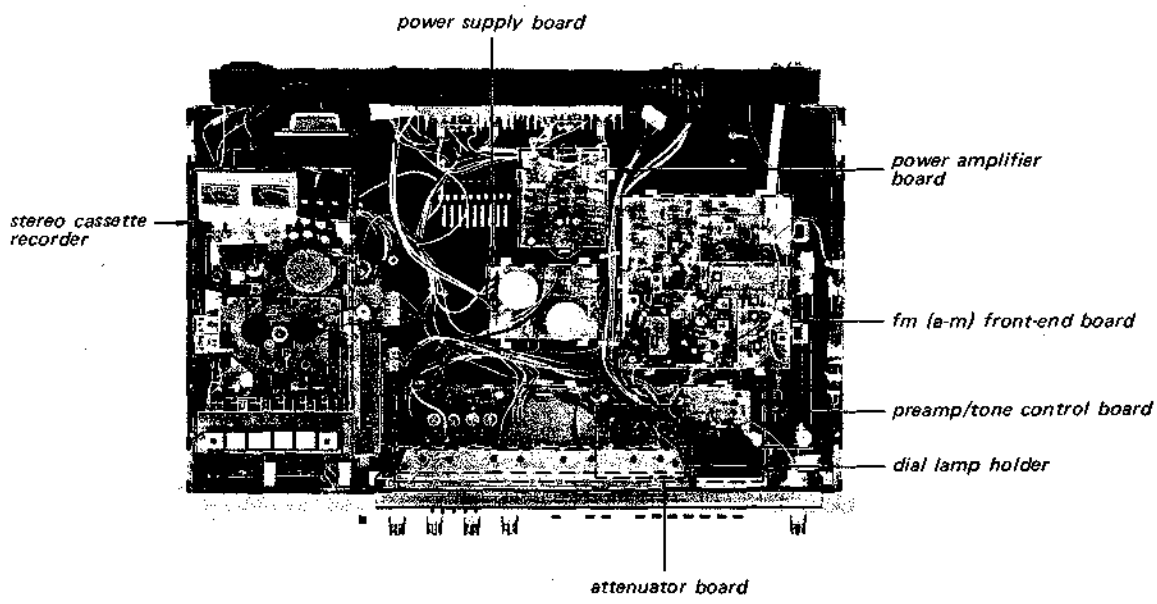


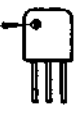
Fig. 2-5. Chassis layout

SECTION 3
ALIGNMENT AND ADJUSTMENT

3-1. FM I-F AND DISCRIMINATOR ALIGNMENT (See page 9 for procedure.)

The ceramic filters used in the fm i-f circuit are color coded according to their specified center frequencies.

Part No.	*Specified Center Freq.*	*Color*
1-527-220-11	10.70 MHz	red
1-527-220-21	10.67 MHz	blue
1-527-220-31	10.73 MHz	orange
1-527-220-41	10.64 MHz	black
1-527-220-51	10.76 MHz	white



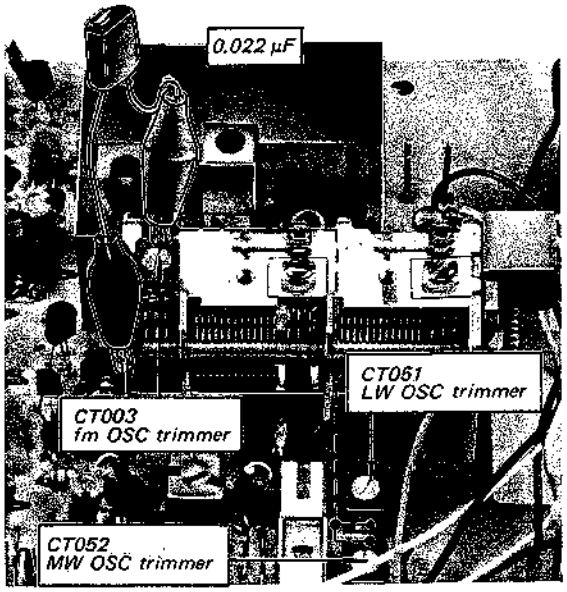
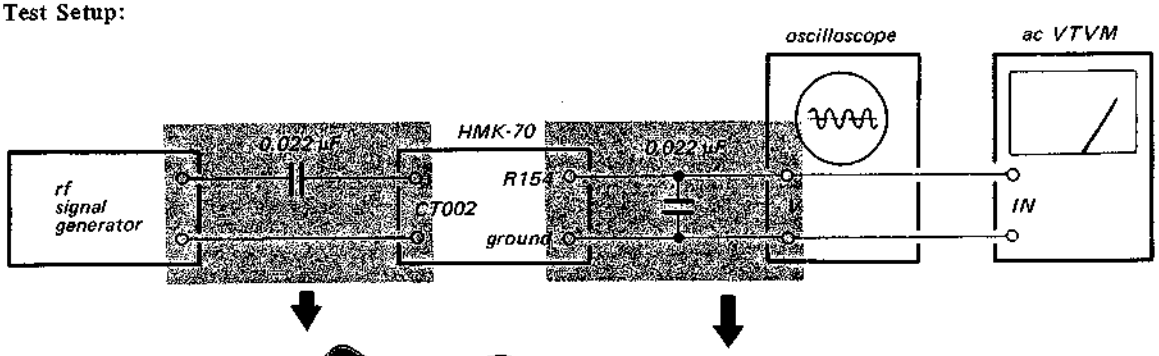


Fig. 3-1. Interruption of fm or a-m local oscillator operation

Note: Local oscillator should be killed when performing this alignment. To stop the local oscillator's operation, shunt the oscillator capacitor with a 0.022 µF capacitor as shown in Fig. 3-1.

Test Setup:



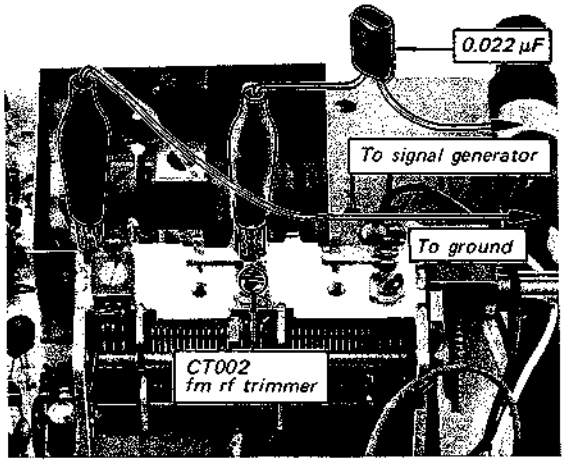


Fig. 3-2. 10.7 MHz signal injection

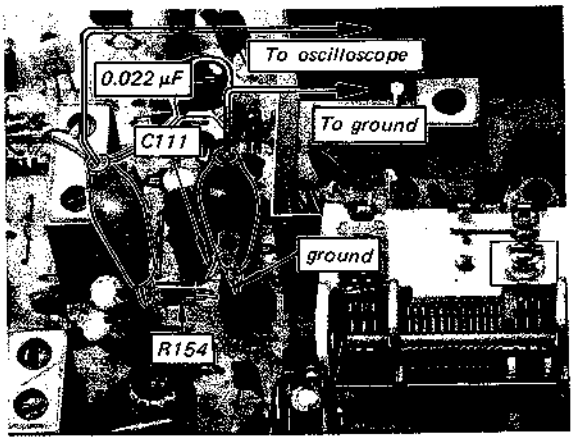
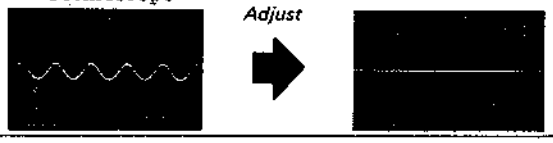


Fig. 3-3. Fm discriminator output connection

FM Signal Generator Setting:

Carrier frequency: Specified center frequency of ceramic filter. (See page 8)
Output level : 60 dB (1,000 μV)

Step	Modulation	Procedure
1	FM 400 Hz 75 kHz deviation (100 %)	Tune HMK-70 to SG signal.
2	AM 400 Hz 30 %	Oscilloscope 
3	FM 400 Hz 75 kHz deviation (100 %)	Adjust for maximum reading on VTVM.

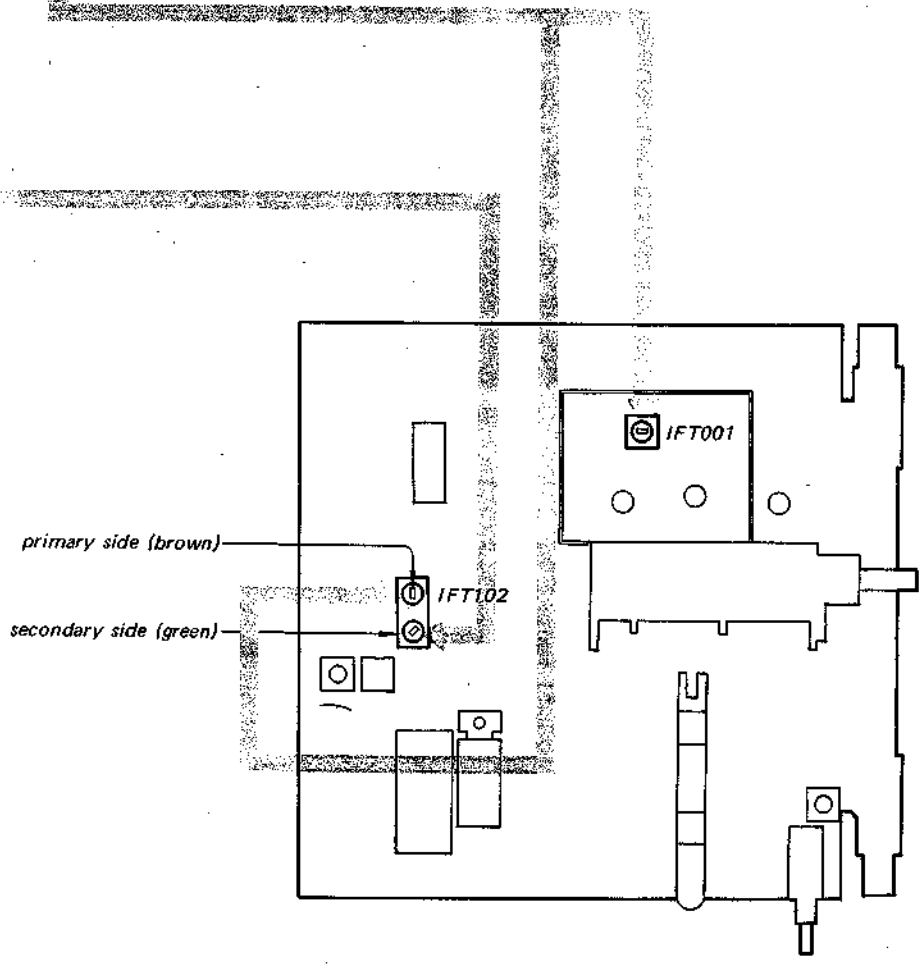


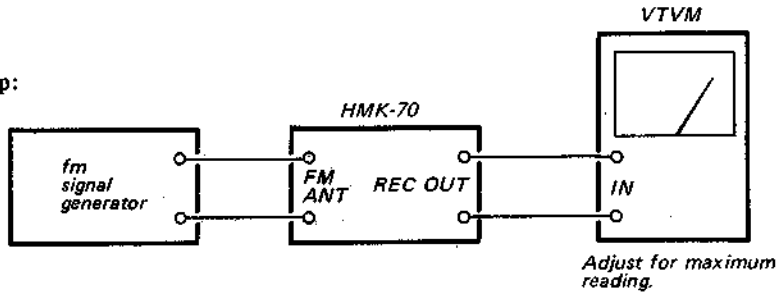
Fig. 3-4. Adjustment parts location

3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Note: 1. Before starting this alignment, be sure that the fm i-f and discriminator alignment has been performed, and that the dial is mechanically calibrated as described in Procedure 2-4 on page 6.

2. Repeat the fm frequency coverage alignment and tracking alignment two or three times, alternately.

Test Setup:



Preparation:

Short the connection point of R154 and C111 (AFC circuit) to ground as shown in Fig. 3-5.

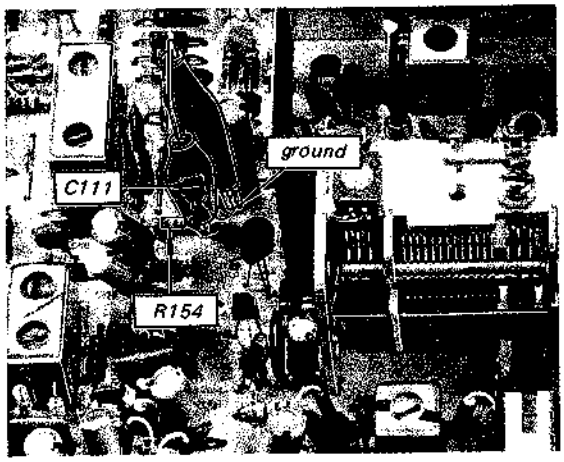


Fig. 3-5. Interruption of AFC circuit

Procedure:

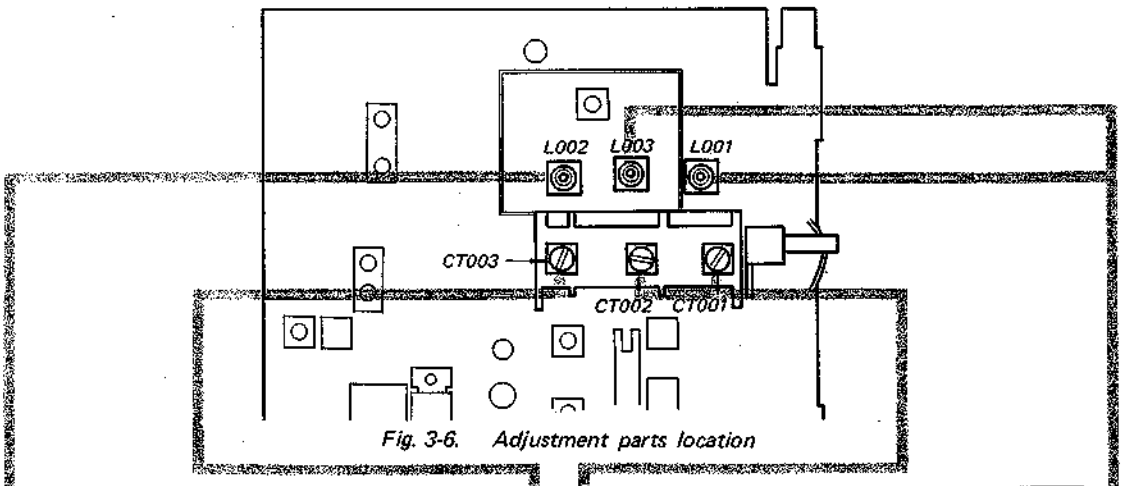


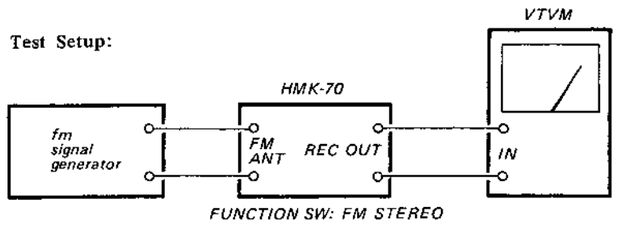
Fig. 3-6. Adjustment parts location

FM FREQUENCY COVERAGE ALIGNMENT	FM TRACKING ALIGNMENT
→ 87.2 MHZ (※ 87.5 MHz) (modulated)	87.2 MHz (※ 87.5 MHz) (modulated) ←
108.4 MHz (※ 108.0 MHz) (modulated) ←	→ 108.4 MHz (※ 108.0 MHz) (modulated)

Note: ※ West Germany Model only.

3-3. FM STEREO SEPARATION ADJUSTMENT

Test Setup:



FM Stereo Signal Generator Setting:

Carrier frequency ..... 98 MHz
Output level ..... 1,000 μV (60 dB)
Mode ..... Stereo
Audio (400 Hz) Mod ..... 67.5 kHz (90 %)
Pilot (19 kHz) Mod ..... 7.5 kHz (10 %)

Procedure:

1. Set the signal generator input selector to the left.
2. Tune the receiver to 98 MHz.
3. Adjust L201 for maximum output on the VTVM at the left channel, and record the output level.
4. Record the residual signal level when the stereo signal generator input selector is to the right.

   Note: The output level to residual-level ratio represents the separation.
5. Measure the separation at the right channel.
6. Readjust L201 for minimum difference between left and right channel separation.

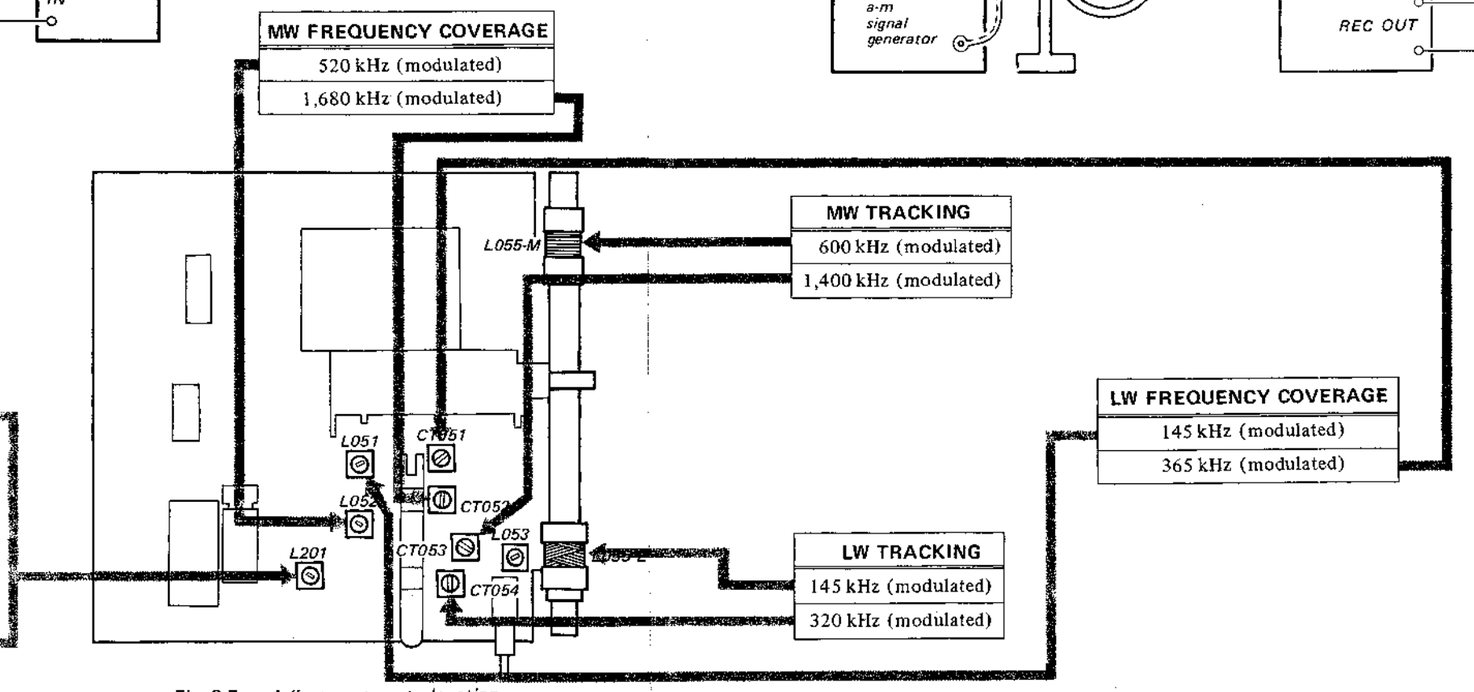


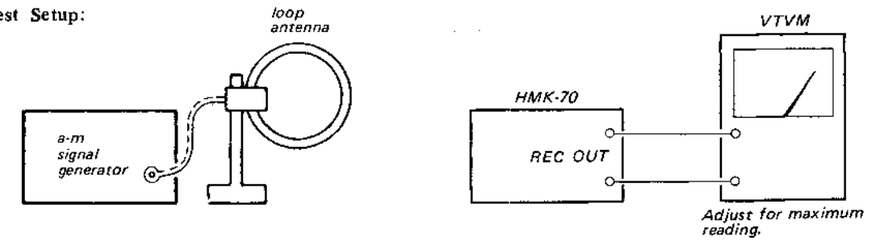
Fig. 3-7. Adjustment parts location

3-4. A-M I-F ALIGNMENT

Note: The a-m i-f transformers (CFU101 and IFT101) are shipped from the factory with all adjustments set for correct operation. Therefore no adjustment is required in the field service.

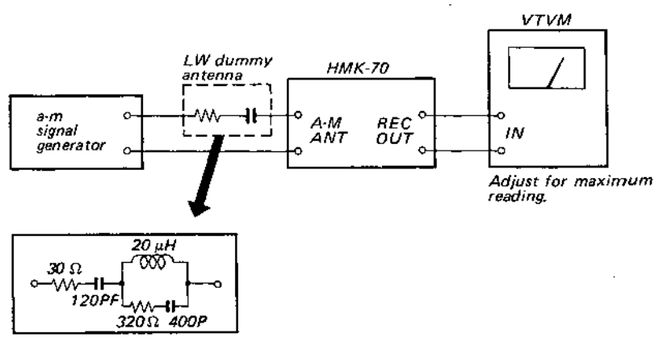
3-5. MW/LW FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Test Setup:



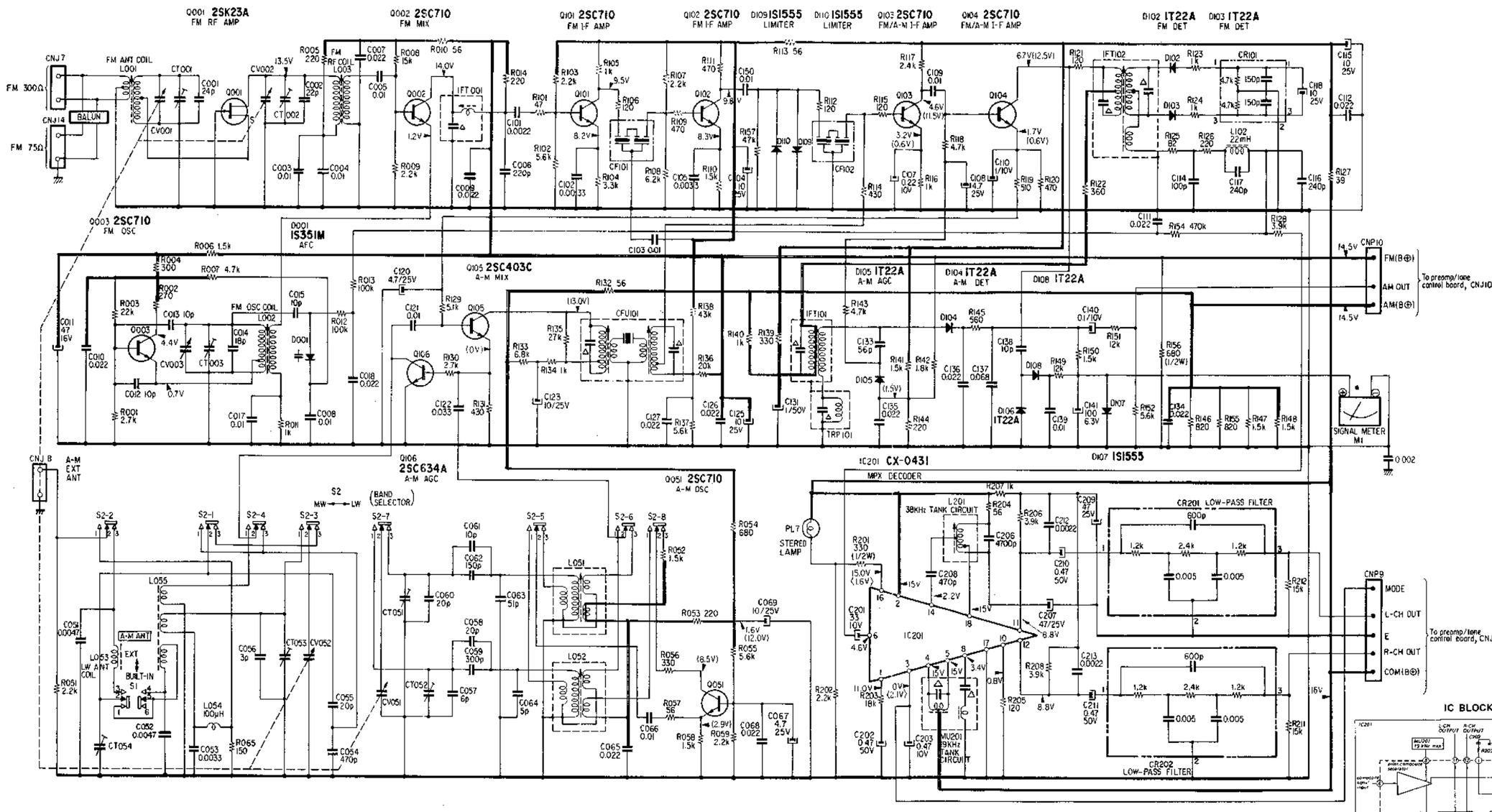
3-6. EXTERNAL ANTENNA COIL ALIGNMENT

Test Setup:



SECTION 4
DIAGRAMS

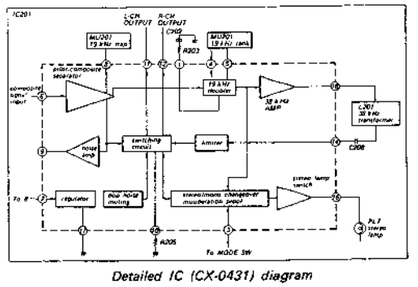
4-1. SCHEMATIC DIAGRAM – Fm (A-m) Front-End Section –



Ref. No.	Description	Position
S1	A-M ANT	BUILT-IN
S2	BAND SELECTOR	LW

Note: All resistance values are in ohms. k = 1,000, M = 1,000 k.
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.
Voltage variations may be noted because of normal production tolerances.
Capacitors marked △ are built in transformers.
( ) ; A-m operation
< > ; STEREO operation
——— ····· B+ line

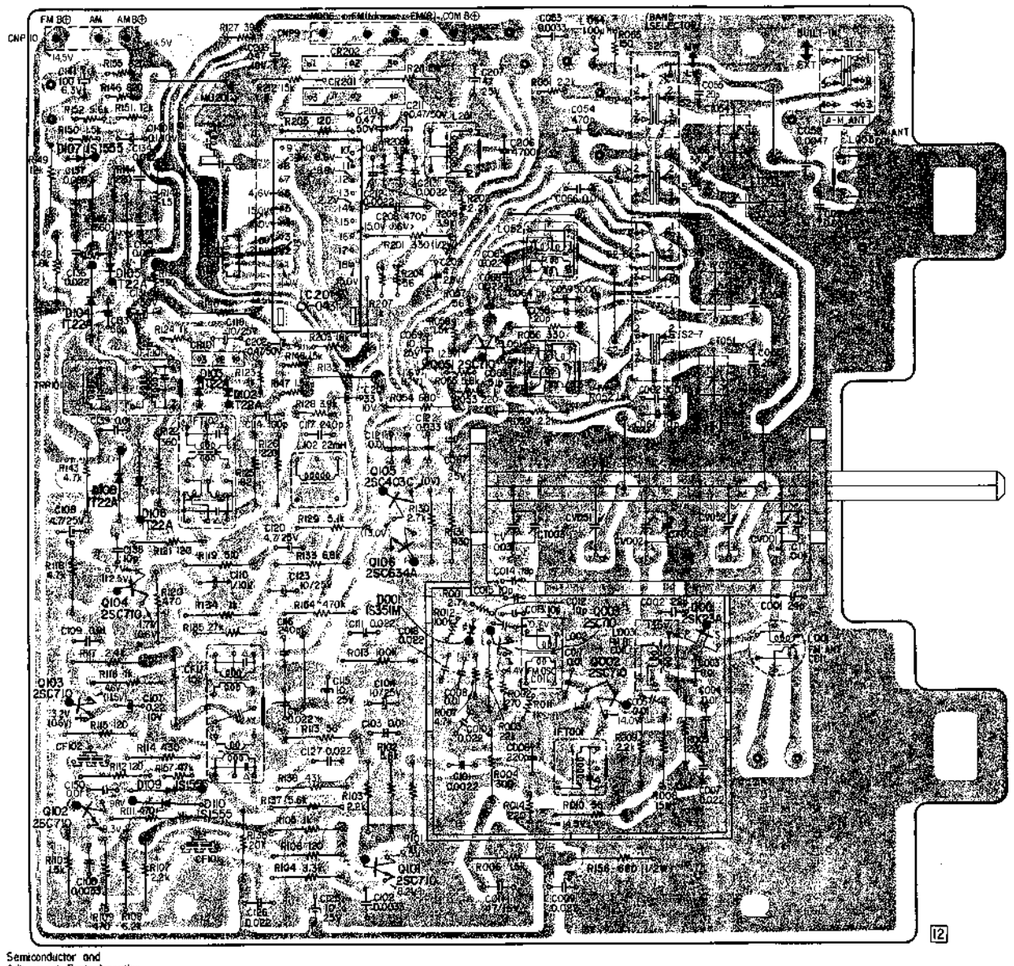
IC BLOCK DIAGRAM



Detailed IC (CX-0431) diagram

4-2. MOUNTING DIAGRAM — Fm (A-m) Front-End Board —

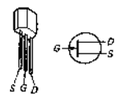
— Conductor Side —



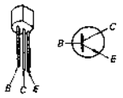
Semiconductor and Adjustment Parts Location

Q and IC	Q103 Q104 Q102 IC201 Q101 Q105 Q106 Q051 Q003 Q002 Q001
D	DI07 DI05 DI09 DI03 DI02 DI04 DI08 DI06 DI10 D001
ADJ	IFT102 L052 L051 CT003 L002 IFT001 CT002 CT052 CT053 L053 L003 CT051 L001 CT001 CT054 L055

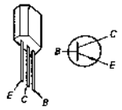
2SK23



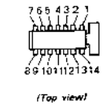
2SC710



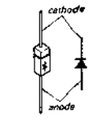
2SC403C
2SC634A



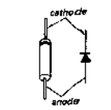
CX-0431



1S1555



1S351M
1T22A



Note: [ ]⊢ Shows the location of stencilled part number. Refer to this mark when replacing the part.

Capacitors marked △ are built in transformers.

( ) ; A-m operation

< > ; STEREO operation

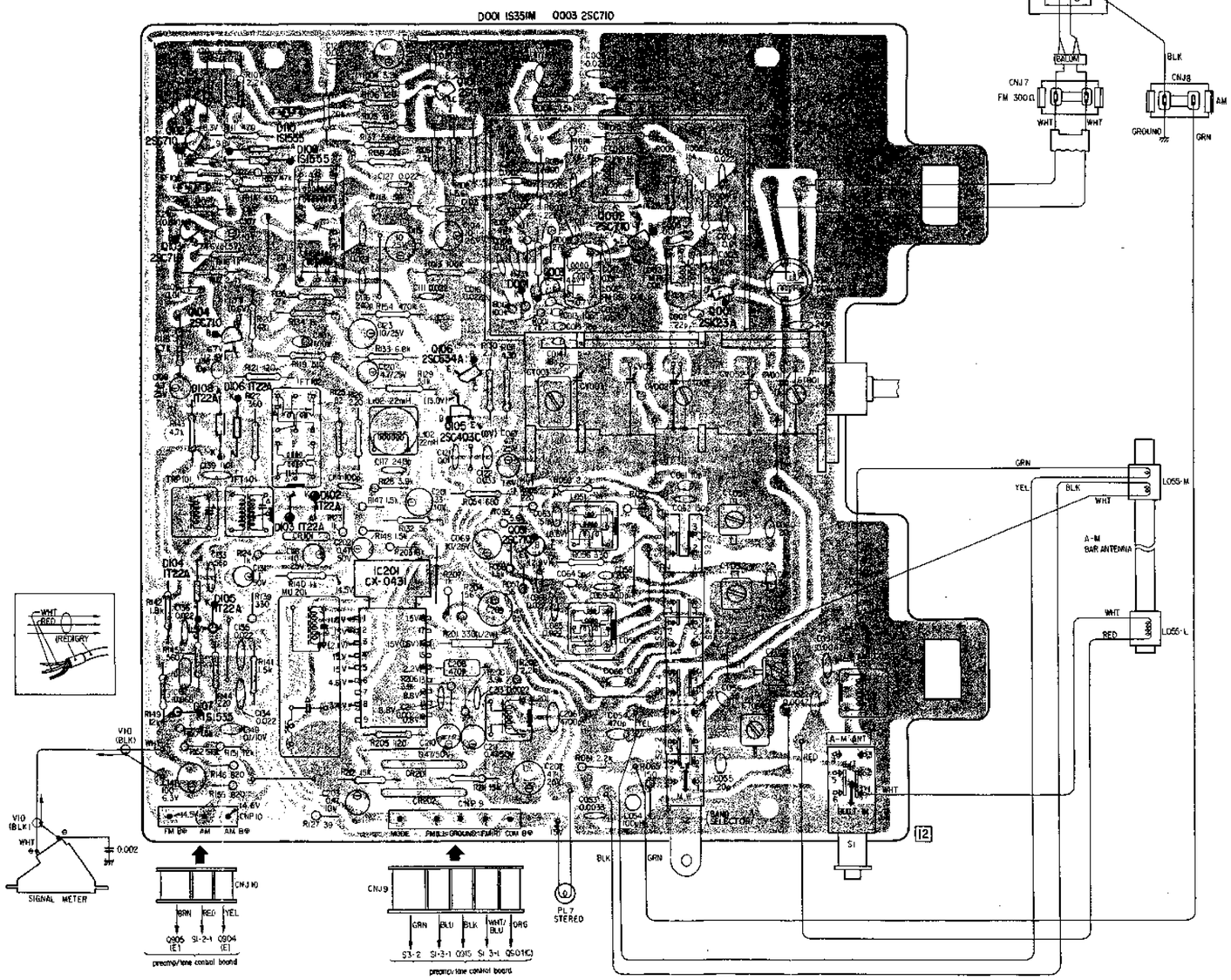
▒▒ : B+ pattern

4-3. MOUNTING DIAGRAM – Fm (A-m) Front-End Board –

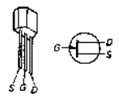
– Component Side –

Semiconductor and Adjustment Parts Location

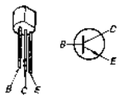
ADJ	IFT102 L002 IFT001 CT003 L051 L052 L003 CT051 L001 CT001 CT002 CT052 CT053 CT054 L053
D	D104 D108 D106 D110 D107 D105 D109 D103 D102 D001
Q and IC	Q102 Q103 Q104 IC201 Q101 Q106 Q105 Q051 Q003 Q002 Q001



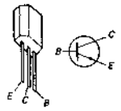
2SK23



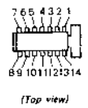
2SC710



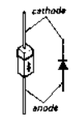
2SC403C
2SC634A



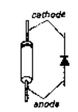
CX-0431



1S1555



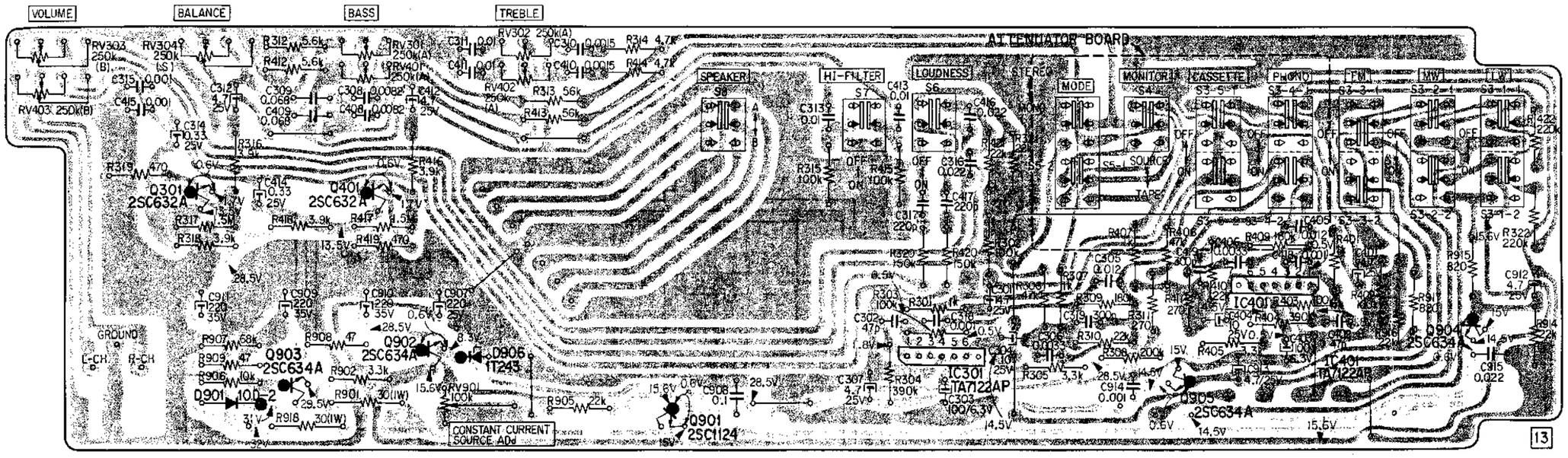
1S351M
1T22A



Note: [ ]– Shows the location of stencilled part number. Refer to this mark when replacing the part.
( ) ; A-m operation
< > ; STEREO operation
: B+ pattern

4-4. MOUNTING DIAGRAM – Preamp/Tone Control Board –

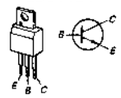
– Conductor Side –



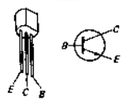
Semiconductor Location

Q301		Q401							
D901	Q903		Q902	D906	Q901	IC301	Q905	IC401	Q904

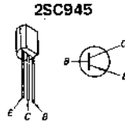
2SC1124



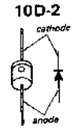
2SC900



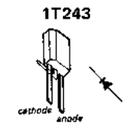
2SC945



10D-2



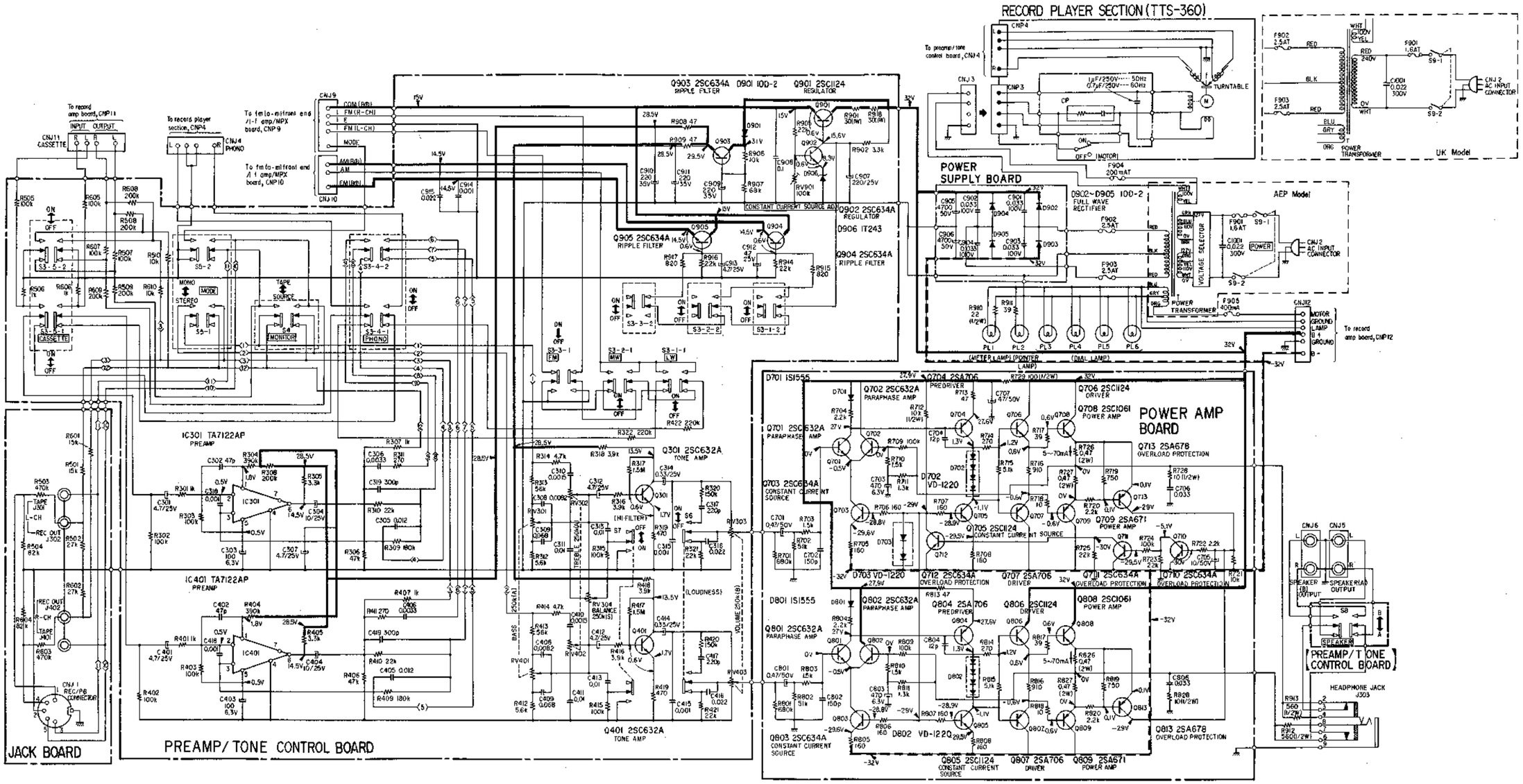
1T243



TA7122AP

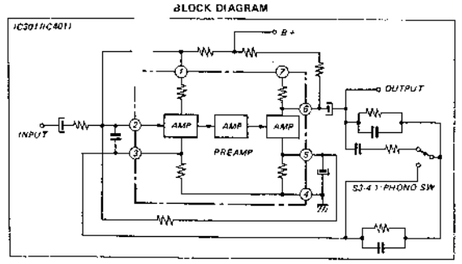
: B+ pattern

4-5. SCHEMATIC DIAGRAM — Audio Amplifier Section —



Ref. No.	Description	Position
S3	FUNCTION	FM
S3-1	LW	OFF
S3-2	MW	OFF
S3-3	FM	ON
S3-4	PHONO	OFF
S3-5	CASSETTE	OFF
S4	MONITOR	SOURCE
S5	MODE	STEREO
S6	LOUDNESS	OFF
S7	HI-FILTER	OFF
S8	SPEAKER	A
S9	POWER	OFF

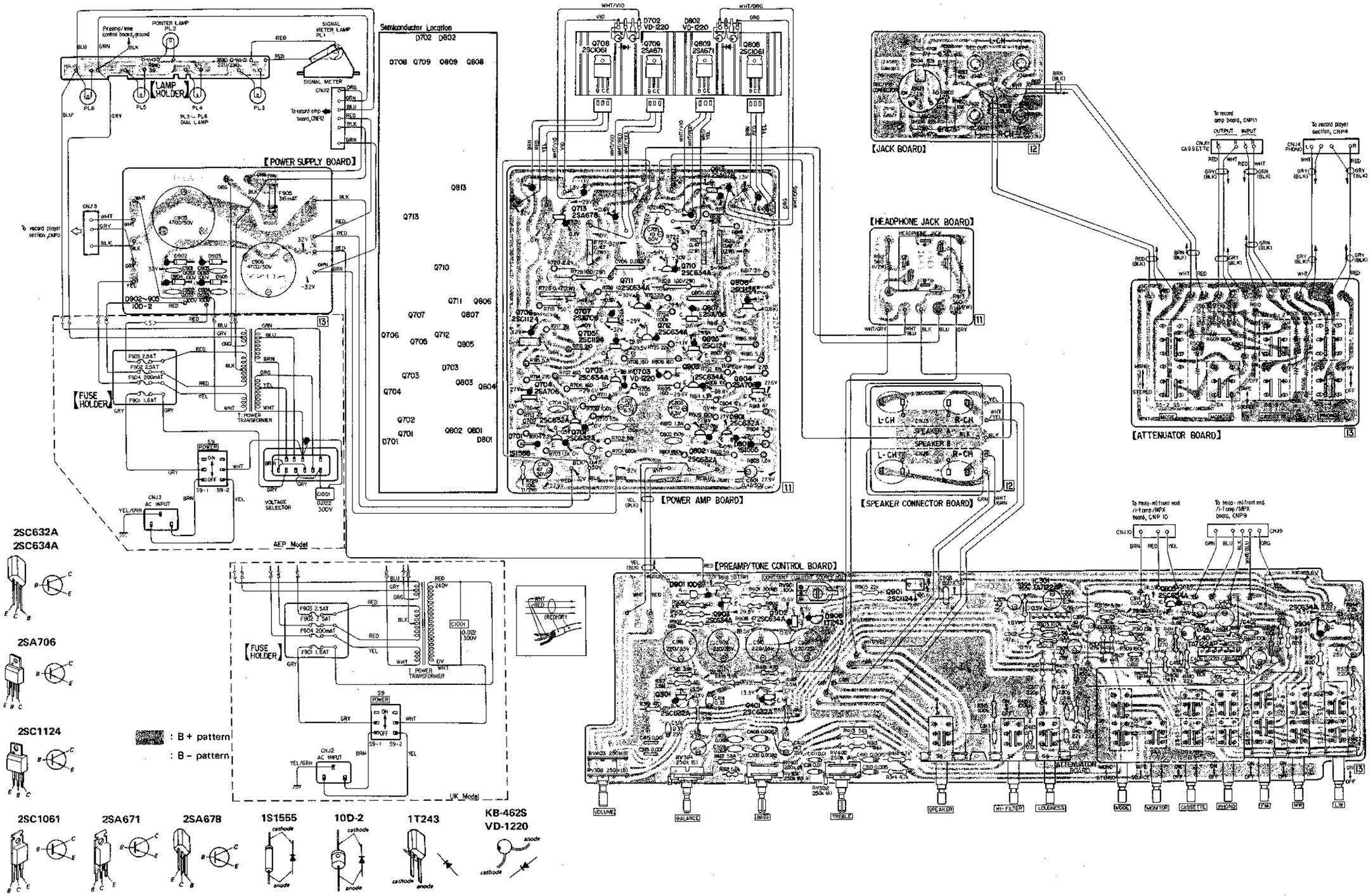
BLOCK DIAGRAM



Note:
All resistance values are in ohms. k = 1,000, M = 1,000k
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.
Voltage variations may be noted because of normal production tolerances.

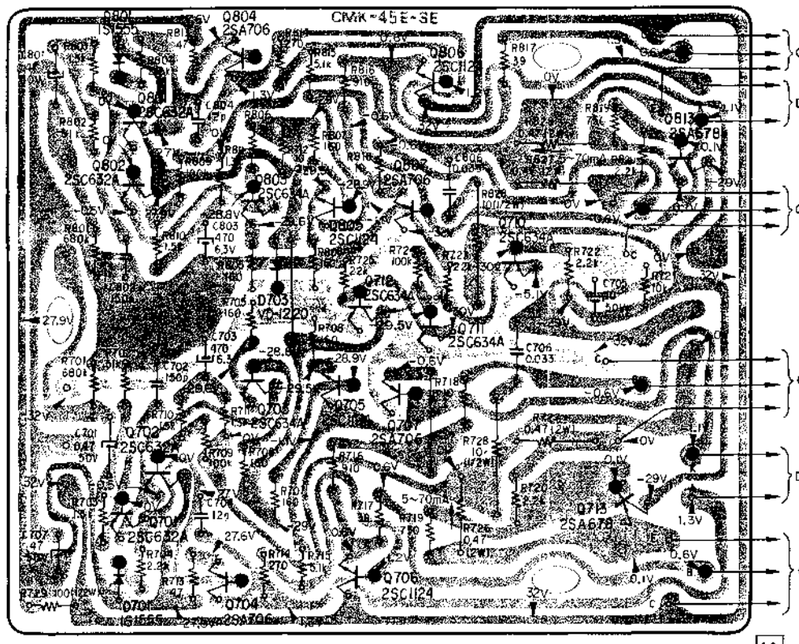
▬▬ ····· B+ voltage
▬ ▬ ····· B- voltage

4-6. MOUNTING DIAGRAM – Audio Amplifier Boards/Power Supply Board –



4-7. MOUNTING DIAGRAM – Power Amplifier Board –

– Conductor Side –



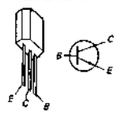
Semiconductor Location

D801	Q804		Q806				
Q801	Q803	Q805	Q807	Q710		Q813	
Q802		Q712	Q711				
	Q703	Q705	Q707				
D702	Q703						
Q701					Q713		
D701	Q704	Q706					

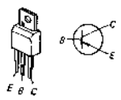
: B+ pattern

: B– pattern

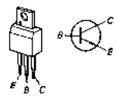
2SC632A
2SC634A



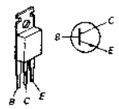
2SA706



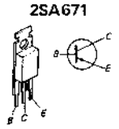
2SC1124



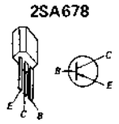
2SC1061



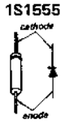
2SA671



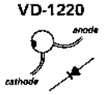
2SA678



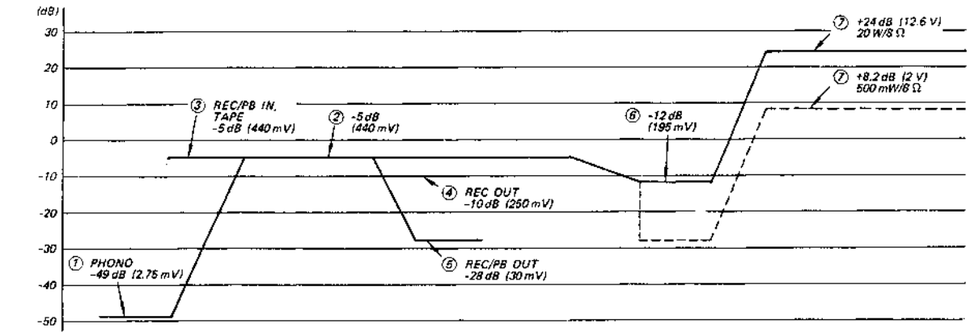
1S1555

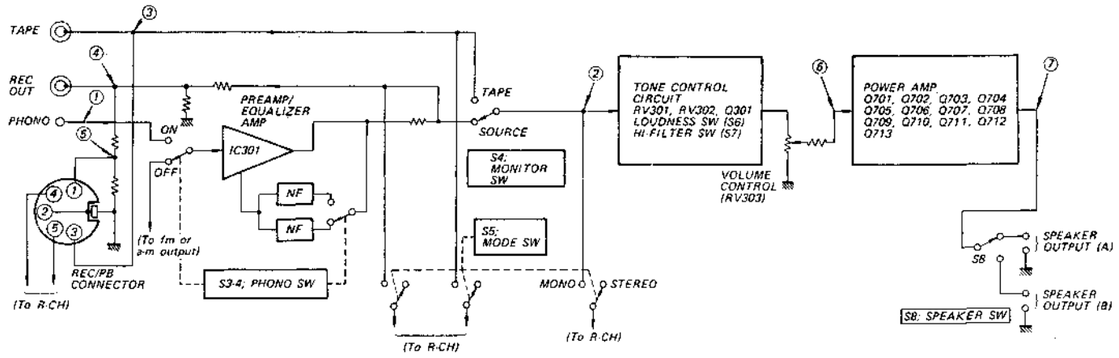


KB-462S
VD-1220



4-8. LEVEL DIAGRAM

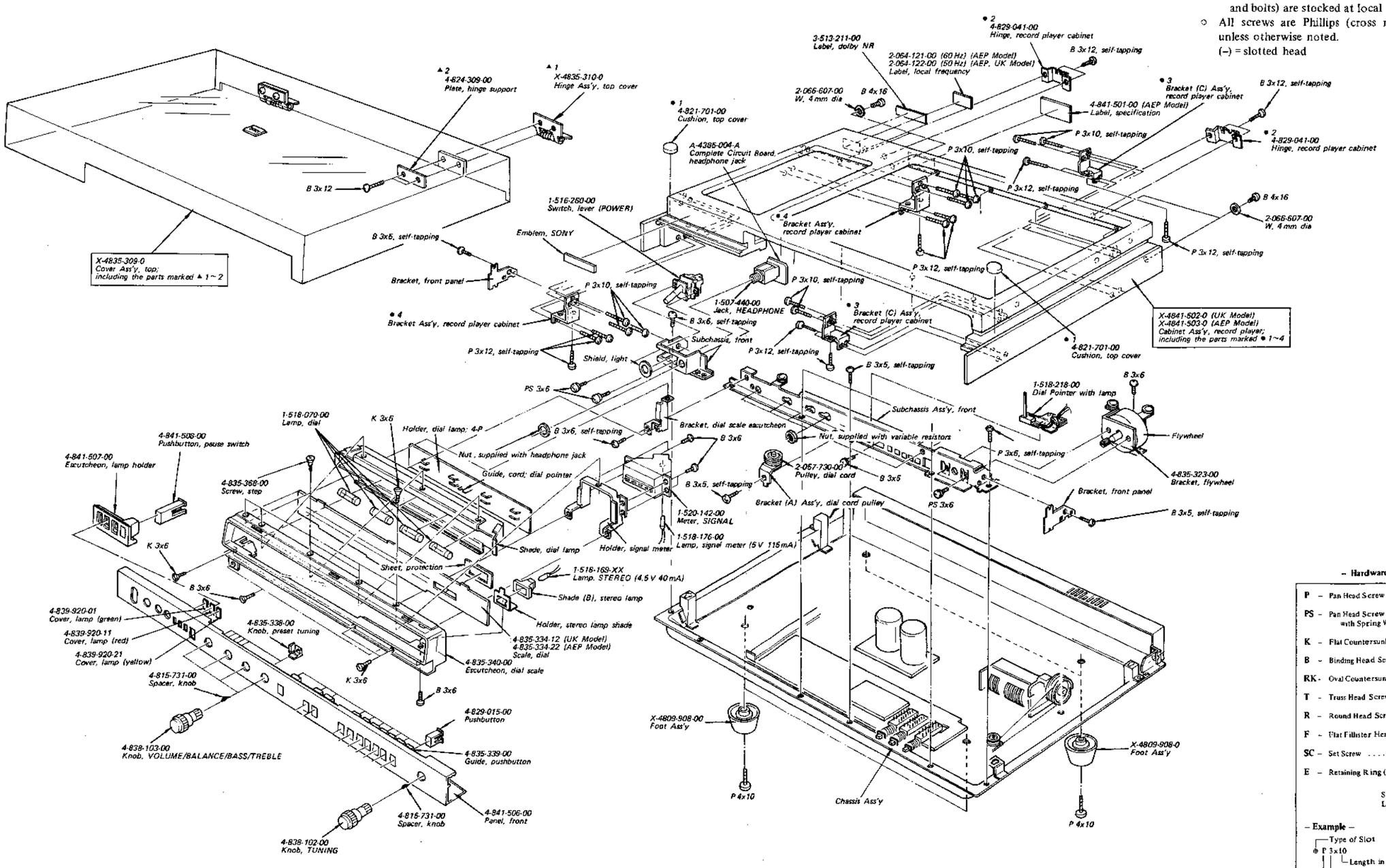




Note: Signal voltages are measured with ac VTVM and expressed in dB referred to 0.775 V, 1 kHz.

SECTION 5
EXPLODED VIEWS

(1)



Note:

- Items with no part number (excluding the hard wares*) are seldom required for routine service and are not stocked at local part depots.
  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

– Hardware Nomenclature –

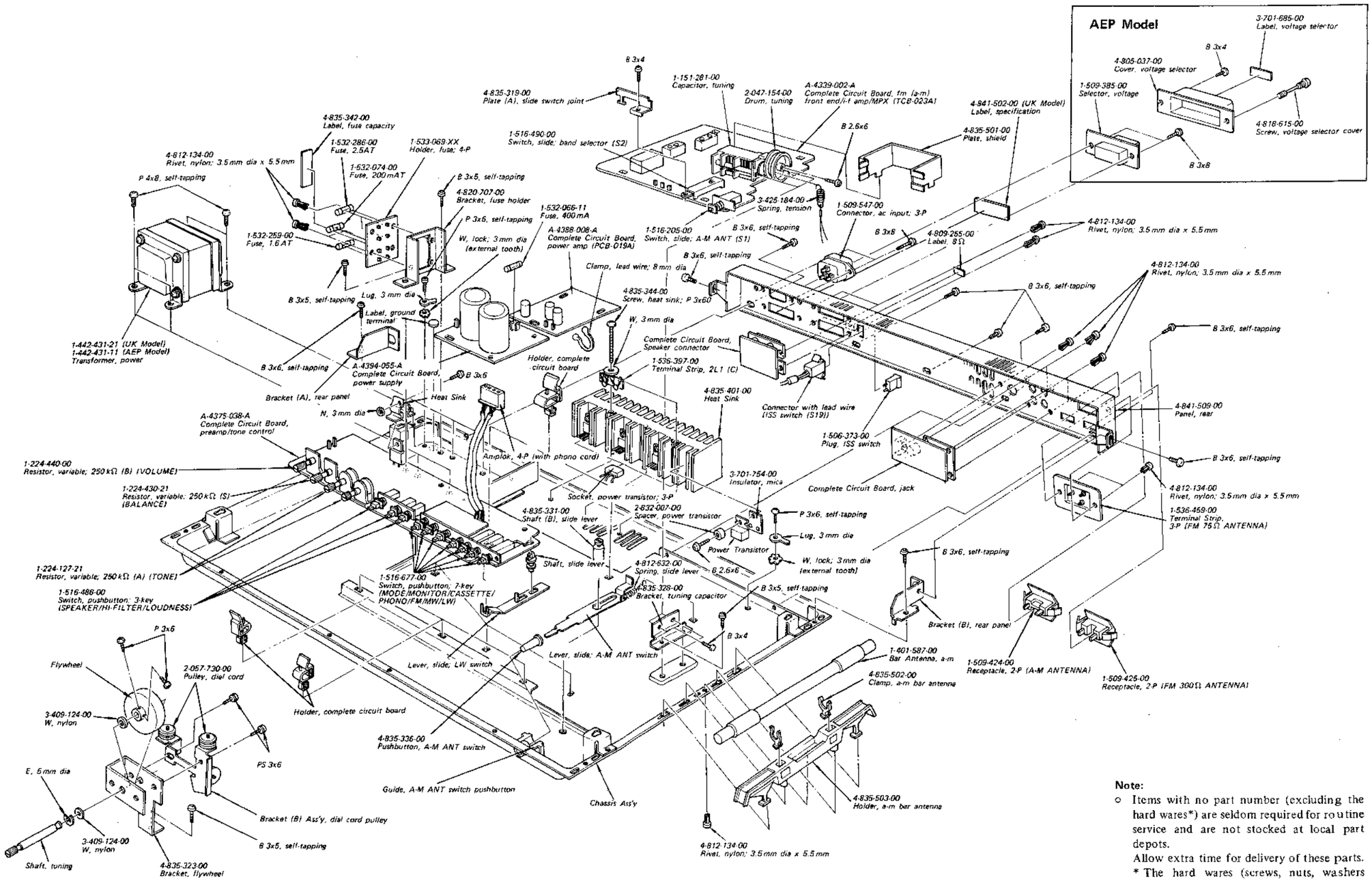
P	–	Pan Head Screw
PS	–	Pan Head Screw with Spring Washer
K	–	Flat Countersunk Head Screw
B	–	Binding Head Screw
RK	–	Oval Countersunk Head Screw
T	–	Truss Head Screw
R	–	Round Head Screw
F	–	Flat Fillister Head Screw
SC	–	Set Screw
E	–	Retaining Ring (E Washer)

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

– Example –

P 3x10
- Type of Slot
- Length in mm (L)
- Diameter in mm (D)
- Type of Head

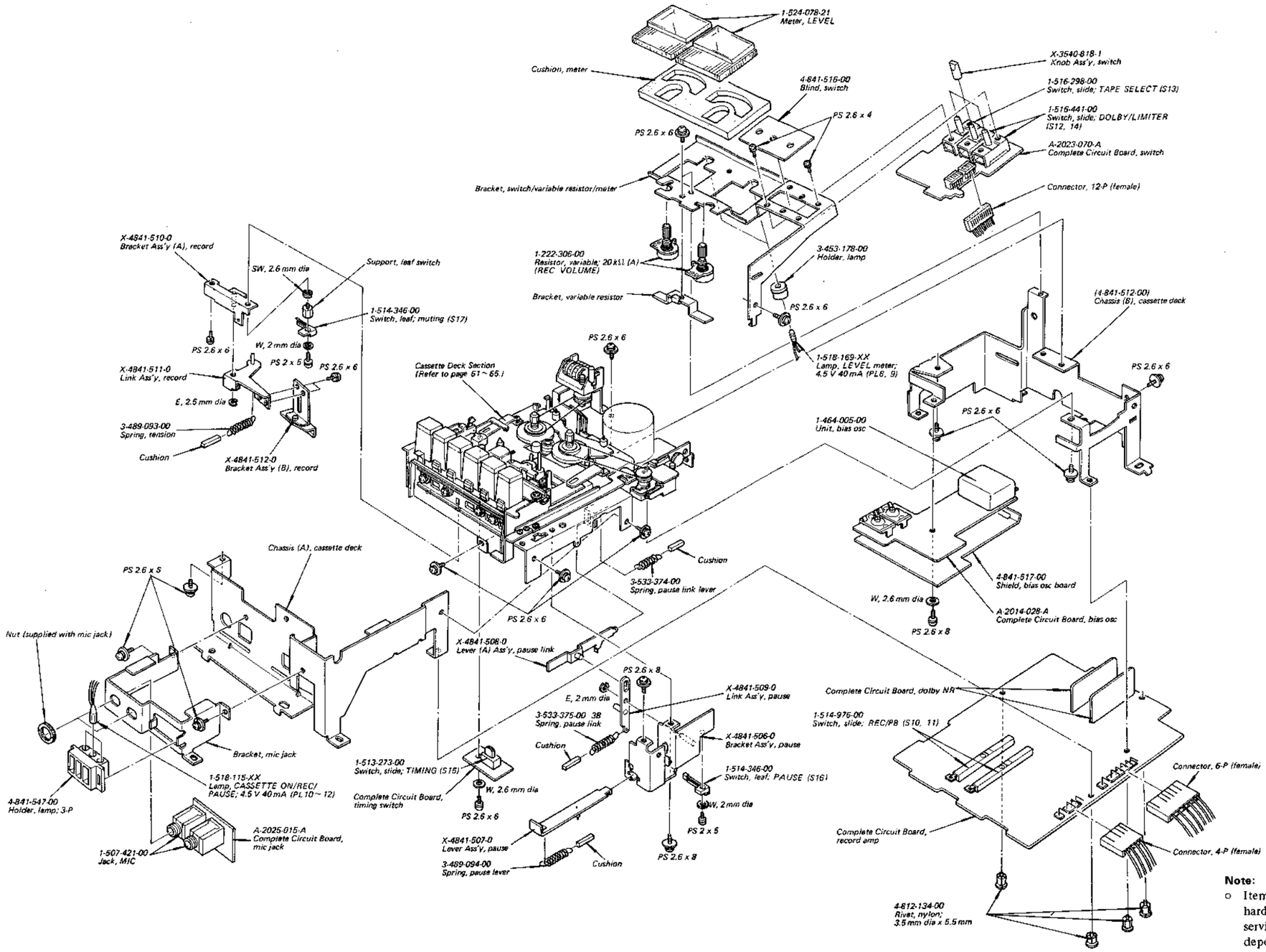
(2)



Note:

- Items with no part number (excluding the hard wares*) are seldom required for routine service and are not stocked at local part depots.
  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

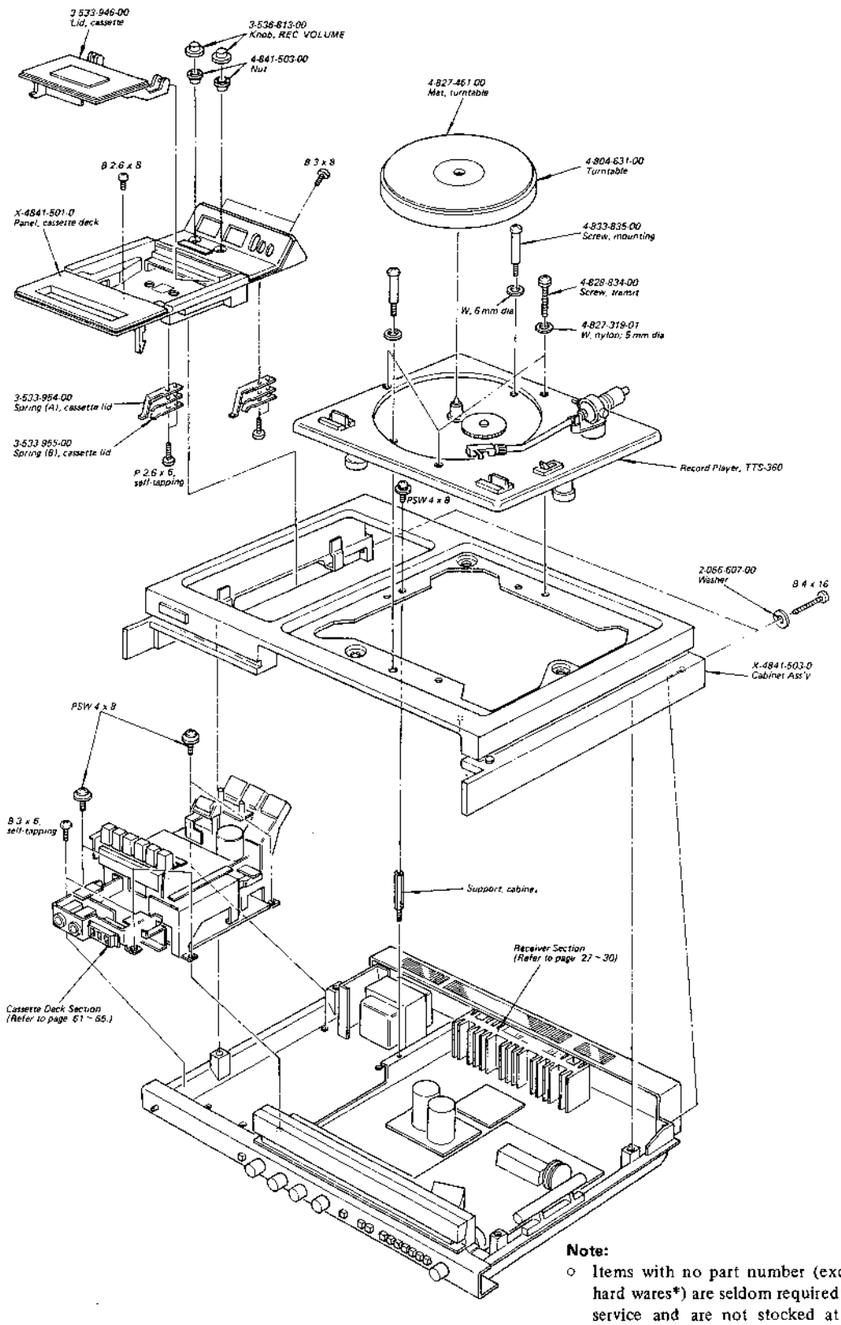
(3)



Note:

- Items with no part number (excluding the hard wares*) are seldom required for routine service and are not stocked at local part depots.
  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

(4)



Note:

- Items with no part number (excluding the hard wares*) are seldom required for routine service and are not stocked at local part depots.
  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
		COMPLETE CIRCUIT BOARDS
	A-4339-002-A	Fm (A-m) Front-end (TCB-023A)
	A-4375-038-A	Preamp/Tone Control
	A-4385-004-A	Headphone Jack
	A-4388-008-A	Power Amp (PCB-019A)
	A-4394-055-A	Power Supply
		SEMICONDUCTORS
		Transistors
Q001		2SK23A (FET)
Q002		2SC710
Q003		2SC710
Q051		2SC710
Q101~Q104		2SC710
Q105		2SC403C
Q106		2SC634A
Q301(Q401)		2SC632A
Q701(Q801)		2SC632A
Q702(Q802)		2SC632A
Q703(Q803)		2SC634A
Q704(Q804)		2SA706
Q705(Q805)		2SC1124
Q706(Q806)		2SC1124
Q707(Q807)		2SA706
Q708(Q808)		2SC1061
Q709(Q809)		2SA671
Q710~Q712		2SC634A
Q713(Q813)		2SA678
Q901		2SC1124
Q902~Q905		2SC634A
		ICs
IC201		CX-0431
IC301(IC401)		TA-7122AP

Ref. No.	Part No.	Description
		Diodes
D001		1S351M
D102~D106		1T22A
D107		1S1555
D108		1T22A
D109,D110		1S1555
D701(D801)		1S1555
D702(D802)		VD-1220
D703		VD-1220
D901~D905		10D-2
D906		1T243
		TRANSFORMERS, COILS AND INDUCTORS
CFU101	1-403-830-51	I-f Transformer/Ceramic Filter, a-m
IFT001	1-403-821-00	IFT, fm
IFT101	1-403-820-00	IFT, a-m
IFT102	1-403-822-00	Transformer, discriminator
L001	1-425-814-00	Coil, fm antenna
L002	1-405-628-00	Coil, fm osc
L003	1-425-815-00	Coil, fm rf
L051	1-405-555-00	Coil, LW osc
L052	1-405-556-00	Coil, MW osc
L053	1-401-586-00	Coil, external antenna
L054	1-407-169-00	Inductor, micro; 100 μH
L055	1-401-587-00	Bar Antenna, a-m
L102	1-407-418-00	Inductor, shielded; 22 mH
L201	1-425-729-00	Transformer, switching; 38 kHz
MU201	1-464-009-00	Unit, MPX
T	1-442-431-11	Transformer, power (AEP Model)
	1-442-431-21	Transformer, power (UK Model)
TRP101	1-409-274-00	Coil, trap
	1-417-014-00	Balun
		CAPACITORS
		Capacitors here are in μF and ceramic type unless otherwise noted. (p = μμ, elect = electrolytic) The working voltages of 50 volts or less are omitted except for electrolytic type
C001	1-102-960-11	24p
C002	1-102-959-11	22p

Ref. No.	Part No.		Description	
C003	1-101-118-11	0.01		
C004	1-101-118-11	0.01		
C005	1-101-923-11	0.01		
C006	1-102-978-11	220p		
C007	1-101-924-11	0.022		
C008	1-101-118-11	0.01		
C009	1-101-924-11	0.022		
C010	1-101-924-11	0.022		
C011	1-121-409-11	47	16V	elect
C012	1-101-978-11	10p		
C013	1-101-978-11	10p		
C014	1-101-972-11	18p		
C015	1-102-858-11	10p		
C017	1-101-923-11	0.01		
C018	1-101-924-11	0.022		
C051	1-105-669-12	0.0047		mylar
C052	1-105-669-12	0.0047		mylar
C053	1-105-667-12	0.0033		mylar
C054	1-102-824-11	470p		
C055	1-102-958-11	20p		
C056	1-102-936-11	3p		
C057	1-102-808-11	6p		
C058	1-102-958-11	20p		
C059	1-102-981-11	300p		
C060	1-102-958-11	20p		
C061	1-102-947-11	10p		
C062	1-101-361-11	150p		
C063	1-101-882-11	51p		
C064	1-102-942-11	5p		
C065	1-101-924-11	0.022		
C066	1-105-673-12	0.01		mylar
C067	1-121-395-11	4.7	25V	elect
C068	1-101-924-11	0.022		
C069	1-121-398-11	10	25V	elect
C101	1-101-919-11	0.0022		
C102	1-105-667-12	0.0033		mylar
C103	1-101-923-11	0.01		
C104	1-121-398-11	10	25V	elect
C105	1-105-667-12	0.0033		mylar
C107	1-127-020-11	0.22	10V	solid aluminum
C108	1-121-395-11	4.7	25V	elect

Ref. No.	Part No.		Description	
C109	1-101-923-11	0.01		
C110	1-127-023-11	1	10V	solid aluminum
C111	1-101-924-11	0.022		
C112	1-101-924-11	0.022		
C114	1-102-973-11	100p		
C115	1-121-398-11	10	25V	elect
C116	1-102-979-11	240p		
C117	1-107-140-11	240p		silvered mica
C118	1-121-398-11	10	25V	elect
C120	1-121-395-11	4.7	25V	elect
C121	1-101-923-11	0.01		
C122	1-105-679-12	0.033		mylar
C123	1-121-398-11	10	25V	elect
C125	1-121-398-11	10	25V	elect
C126	1-101-924-11	0.022		
C127	1-101-924-11	0.022		
C131	1-121-391-11	1	50V	elect
C133	1-101-884-11	56p		
C134	1-101-924-11	0.022		
C135	1-101-924-11	0.022		
C136	1-105-677-12	0.022		mylar
C137	1-105-683-12	0.068		mylar
C138	1-102-947-11	10p		
C139	1-101-923-11	0.01		
C140	1-127-019-11	0.1	10V	solid aluminum
C141	1-121-413-11	100	6.3V	elect
C150	1-101-923-11	0.01		
C201	1-121-402-11	33	10V	elect
C202	1-121-726-11	0.47	50V	elect
C203	1-127-022-11	0.47	10V	solid aluminum
C206	1-103-575-11	4700p		styrol
C207	1-121-410-11	47	25V	elect
C208	1-103-717-11	470p		styrol
C209	1-121-410-11	47	25V	elect
C210	1-121-726-11	0.47	50V	elect
C211	1-121-726-11	0.47	50V	elect
C212	1-105-665-12	0.0022		mylar
C213	1-105-665-12	0.0022		mylar
C301(C401)	1-121-395-11	4.7	25V	elect
C302(C402)	1-101-881-11	47p		

Ref. No.	Part No.			Description
C303(C403)	1-121-413-11	100	6.3V	elect
C304(C404)	1-121-398-11	10	25V	elect
C305(C405)	1-108-581-12	0.012		mylar
C306(C406)	1-108-567-12	0.0033		mylar
C307	1-121-395-11	4.7	25V	elect
C308(C408)	1-108-356-12	0.0082		mylar
C309(C409)	1-108-249-12	0.068		mylar
C310(C410)	1-108-228-12	0.0015		mylar
C311(C411)	1-108-239-12	0.01		mylar
C312(C412)	1-121-395-11	4.7	25V	elect
C313(C413)	1-108-239-12	0.01		mylar
C314(C414)	1-127-082-11	0.33	25V	solid aluminum
C315(C415)	1-108-227-12	0.001		mylar
C316(C416)	1-108-242-12	0.0022		mylar
C317(C417)	1-102-983-11	220p		
C318(C418)	1-108-227-12	0.001		mylar
C319(C419)	1-102-981-11	300p		
C701(C801)	1-121-726-11	0.47	50V	elect
C702(C802)	1-101-124-11	150p		
C703(C803)	1-121-424-11	470	6.3V	elect
C704(C804)	1-102-955-11	12p		
C705	1-121-738-11	10	50V	elect
C706(C806)	1-108-244-12	0.033		mylar
C707	1-121-411-11	47	50V	elect
C901~C904	1-108-383-12	0.033	100V	mylar
C905	1-123-119-11	4700	50V	
C906	1-123-119-11	4700	50V	
C907	1-121-936-11	220	25V	elect
C908	1-108-251-12	0.1		mylar
C909~C911	1-123-063-11	220	35V	elect
C912	1-121-395-11	4.7	25V	elect
C913	1-121-395-11	4.7	25V	elect
C914	1-108-227-12	0.001		mylar
C915	1-108-242-12	0.022		mylar
C1001	1-108-777-11	0.022	300V	polyethylene
CV001~CV003, CV051, CV052	1-151-281-00	Tuning		
CT051~CT054	1-141-097-00	Trimmer		

Ref. No.	Part No.			Description
RESISTORS				
	All resistors are in Ω. ¼W, ±5% carbon or composition resistors (except special type) are omitted. Check schematic diagram for the resistance values. (k = 1000, M = 1000 k)			
R156	1-202-569-11	680	½W	composition
R201	1-202-561-11	330	½W	composition
R712	1-202-597-11	10	½W	composition
R726(R826)	1-217-153-11	0.47	2W	metal
R727(R827)	1-217-153-11	0.47	2W	metal
R728(R828)	1-212-958-11	10	½W	metal-oxide (fuse type)
R729	1-212-982-11	100	½W	metal-oxide (fuse type)
R901	1-213-071-11	30	1W	metal-oxide (fuse type)
R910	1-244-833-11	22	½W	carbon
R912	1-202-567-11	560	½W	composition
R913	1-202-567-11	560	½W	composition
R918	1-213-071-11	30	1W	metal-oxide (fuse type)
RV301 (RV401)	1-224-127-21	250 k (A), variable (BASS)		
RV302 (RV402)	1-224-127-21	250 k (A), variable (TREBLE)		
R303 (RV403)	1-224-440-00	250 k (B), variable (VOLUME)		
RV304	1-224-430-21	250 k (S), variable (BALANCE)		
RV901	1-222-766-00	100 k, adjustable		
SWITCHES				
S1	1-516-205-00	Slide (A-M ANTENNA)		
S2	1-516-490-00	Slide (BAND SELECTOR)		
S3~S5	1-516-677-00	Pushbutton, 7-key (LW, MW, FM, PHONO, CASSETTE, MONITOR, MODE)		
S6~S8	1-516-488-00	Pushbutton, 3-key (LOUDNESS, HI-FILTER, SPEAKER)		
S9	1-516-260-00	Lever (POWER)		

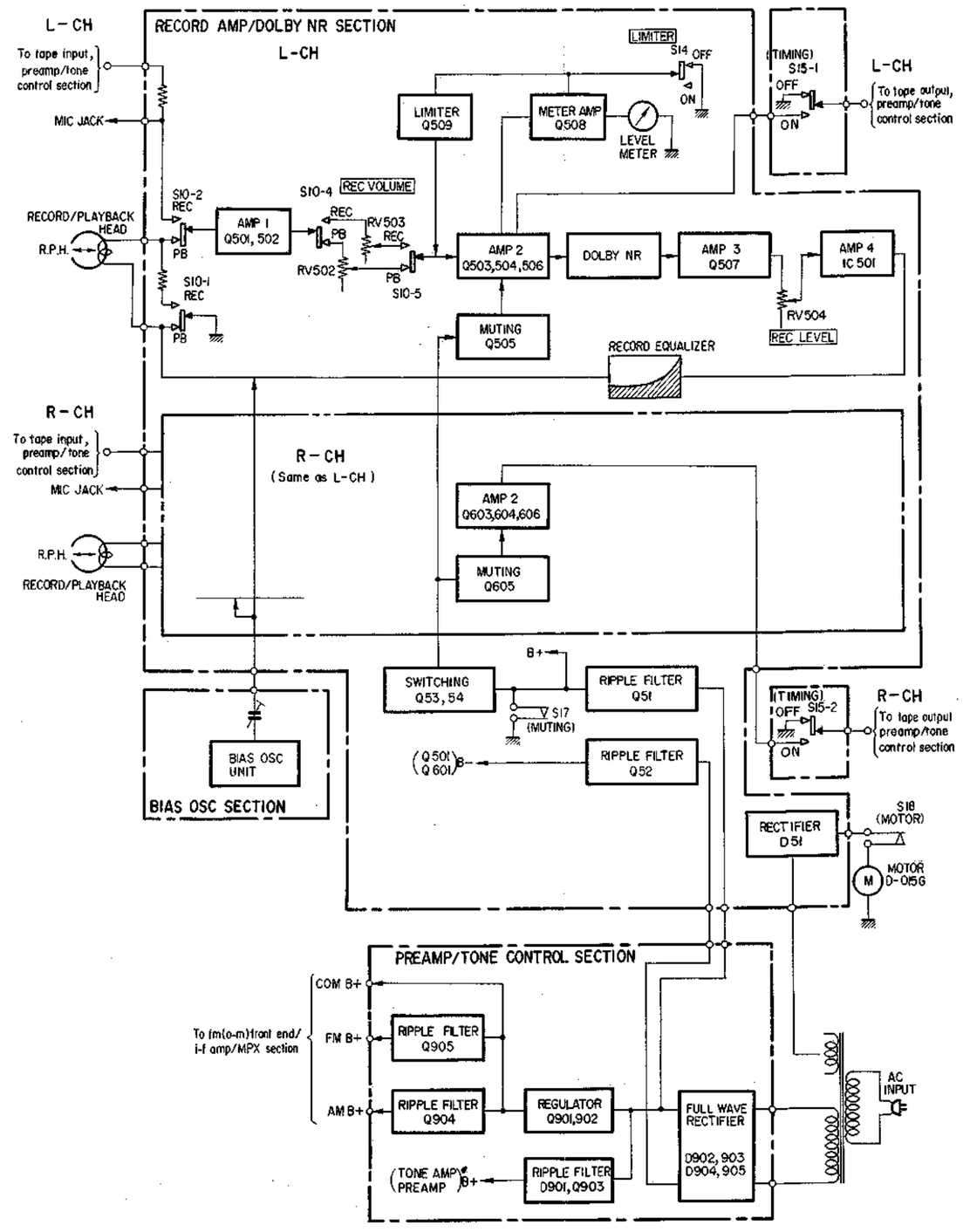
Ref. No.	*Part No.*	*Description*
		FILTERS
CF101,102	1-527-220-11	Fm I-f, ceramic; 10.70 MHz (red)
	1-527-220-21	Fm I-f, ceramic; 10.67 MHz (blue)
	1-527-220-31	Fm I-f, ceramic; 10.73 MHz (orange)
	1-527-220-41	Fm I-f, ceramic; 10.64 MHz (black)
	1-527-220-51	Fm I-f, ceramic; 10.76 MHz (white)
		MISCELLANEOUS
CNJ1	1-509-508-00	Connector, REC/PB
CNJ2	1-509-547-00	Connector, ac input; 3-P
CNJ7	1-509-425-00	Receptacle, 2-P (FM 300 Ω)
CNJ8	1-509-424-00	Receptacle, 2-P (AM ANTENNA)
CNJ14	1-536-459-00	Terminal Strip, 3-P (FM 75 Ω)
CR101	1-231-175-00	Encapsulated Component
CR201, CR202	1-231-224-00	Encapsulated Component
F901	1-532-259-00	Fuse, 1.6AT
F902,F903	1-532-286-00	Fuse, 2.5AT
F904	1-532-074-00	Fuse, 200 mAT
F905	1-532-066-11	Fuse, 400 mA
J301(J401), J302(J402)	1-536-352-00	Jack, phono; 4-P
J303	1-507-440-00	Jack, HEADPHONE
M1	1-520-142-00	Meter, SIGNAL
PL1	1-518-176-00	Lamp, signal meter 5V 115 mA
PL2	1-518-218-00	Pointer, dial (with lamp)
PL3~PL6	1-518-070-00	Lamp, dial 8 V 300 mA
PL7	1-518-169-xx	Lamp, STEREO 4.5 V 40 mA
	1-506-373-00	Plug, ISS switch
	1-507-421-00	Jack, MIC
	1-509-385-00	Selector, voltage (AEP Model)
	1-533-069-xx	Holder, fuse; 4-P
	1-536-397-00	Terminal Strip, 2L1 (C)
	1-534-819-00	Cord, power

Part No.	*Description*
	ACCESSORIES
X-3701-018-2	Head Cleaner Ass'y
X-4827-415-0	Pulley Ass'y, motor (50 Hz) (AEP, UK Model)
X-4827-416-0	Pulley Ass'y, motor (60 Hz) (AEP Model)
1-501-149-00	Ribbon Antenna, fm
3-701-806-00	Adaptor, manual; 45 rpm
3-780-687-12	Manual, instruction (AEP Model)
3-780-687-42	Manual, instruction (UK Model)

MEMO

STEREO CASSETTE DECK SECTION

SECTION 1
BLOCK DIAGRAM



SECTION 2
DISASSEMBLY AND REPLACEMENT

2-1. CASSETTE LID REMOVAL

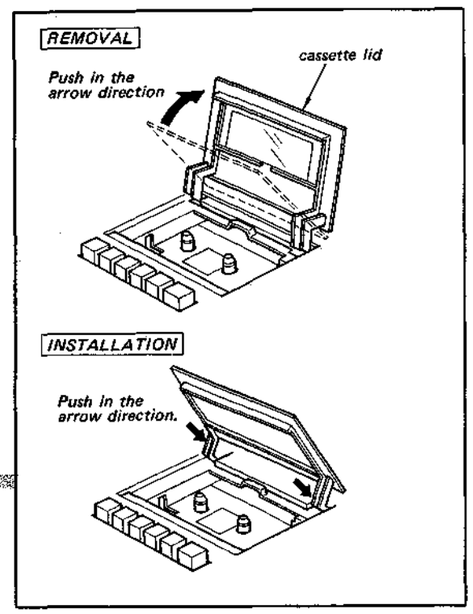


Fig. 2-1. Cassette lid removal

2-2. SWITCH BOARD AND REEL SPINDLE REMOVAL

1. Remove ❶ and ❷ for switch board removal.
2. Remove ❸ , ❹ and ❺ for reel spindle removal.

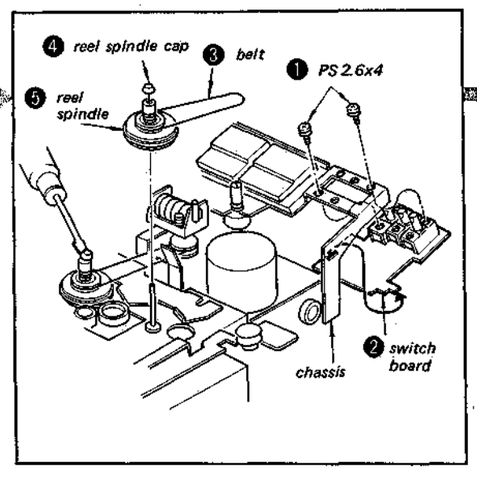


Fig. 2-2. Switch board and reel spindle removal

2-3. CASSETTE DECK REMOVAL

Remove in numerical order (❶ ~ ❹).

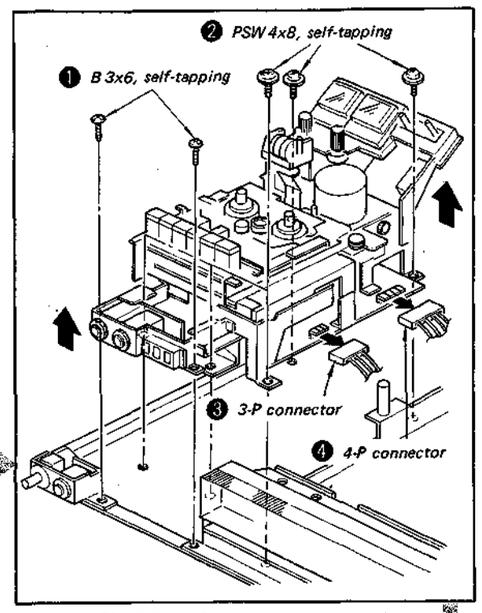


Fig. 2-3. Cassette deck removal

2-4. RECORD AMP BOARD REMOVAL

Remove in numerical order (❶ ~ ❸).

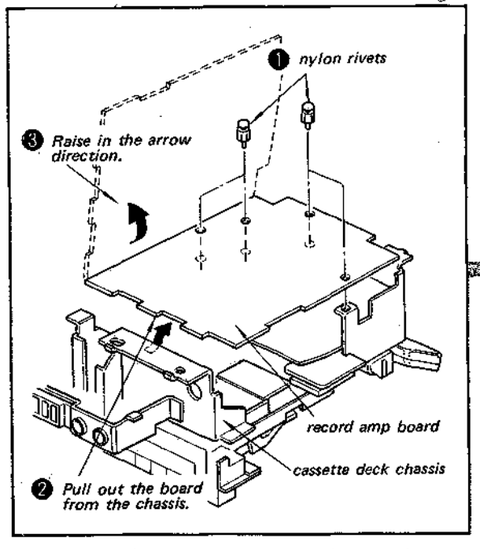


Fig. 2-4. Record amp board removal

2-5. BIAS OSC BOARD AND TIMING SWITCH BOARD REMOVAL

1. Remove ❶ , ❷ and ❸ for bias osc board removal.
2. Remove ❹ and ❺ for timing switch board removal.

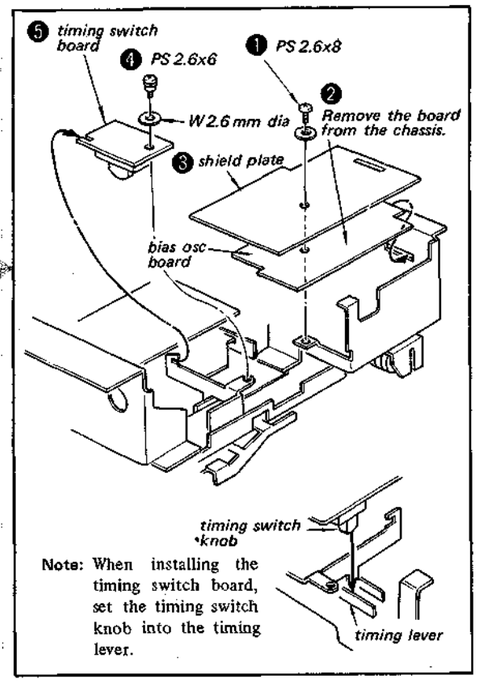


Fig. 2-5. Bias osc board and timing switch board removal.

2-6. FLYWHEEL AND MOTOR REMOVAL

1. Remove ❶ , ❷ , ❸ , ❹ , ❺ and ❻ for flywheel removal.
2. Remove ❼ , ❽ , ❾ and ❿ for motor removal.

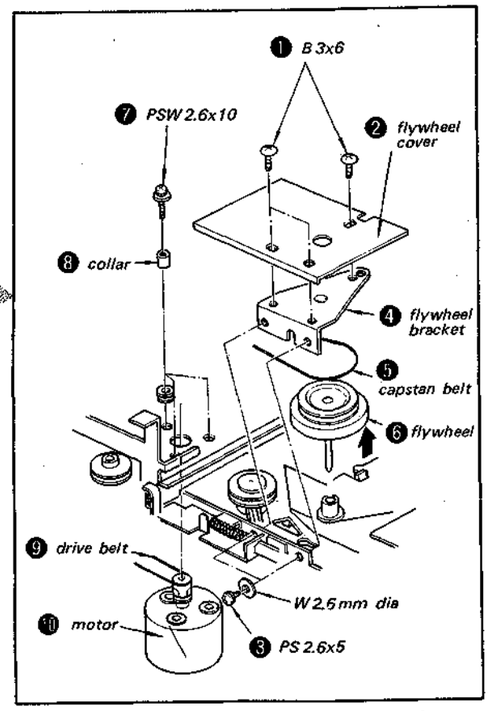
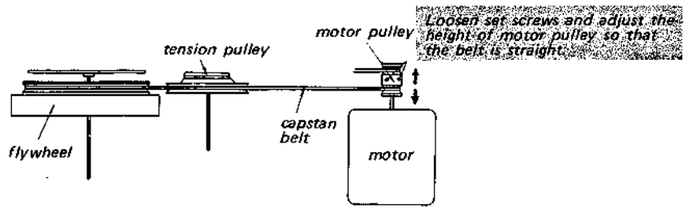


Fig. 2-6. Flywheel and motor removal.

SECTION 3
ADJUSTMENTS AND MEASUREMENTS

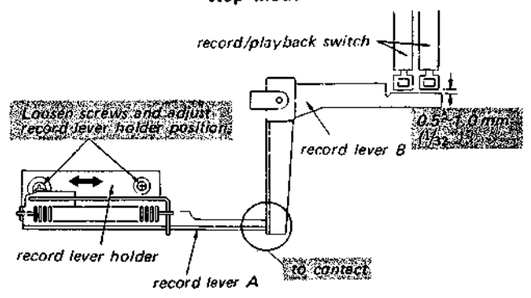
3-1. MECHANICAL ADJUSTMENTS AND CHECKS

Motor Pulley Height Adjustment
— stop mode —

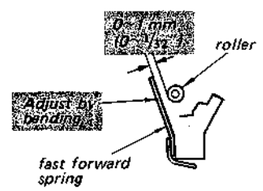


Note: Capstan belt should be installed without twist and dirt.

Record Lever Holder Adjustment
— stop mode —



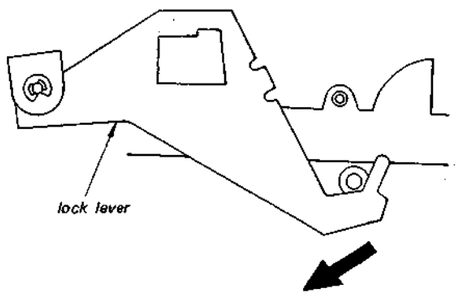
Fast Forward Spring Check
— stop mode —



Note: When fast forward and rewind torques are poor, clean idlers and adjust fast forward spring.

Lock Lever Operation Check
— record mode —

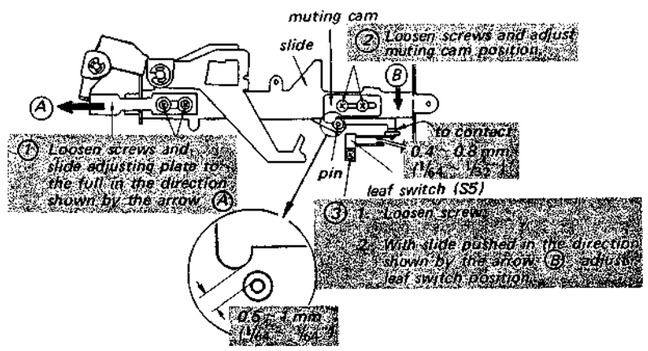
1. With forward and record buttons kept depressed. depress stop button.
   (REC button is only released but record function is not completely released.)
2. With forward button gradually released, lock lever should move in the direction shown by the arrow.



Note: If lock lever does not release, REC button may not be depressed with a tape cassette loaded.

Muting Leaf Switch (S8) Adjustment
— stop mode —

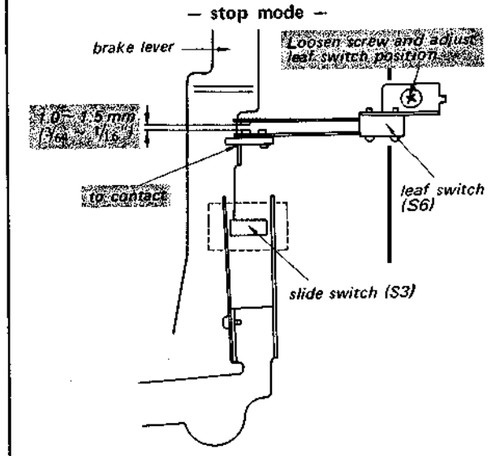
Perform in numerical order



Note: After this adjustment.

1. When depressing RECORD button without a tape cassette, ensure that record/playback switch is not changed.
2. When depressing RECORD button with a tape cassette that has safety tab, ensure that record/playback switch is changed.

Motor Leaf Switch (S9) Adjustment
— stop mode —



Note: When slowly depressing forward button, slide switch should be changed after leaf switch is closed.

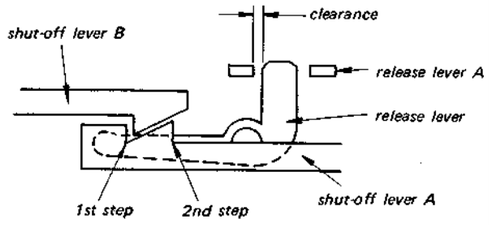
Shut-off Lever-A and Shut-off Lever-B Operation Check (1)

– playback, fast forward and rewind mode –
(during tape running)

Check the following:

1. Shut-off lever B should completely interlock shut-off lever A at lst step.
2. The release lever should not push shut-off lever B.
3. There should be a clearance between the release lever and release lever A.

Note: If the above checks are not satisfied, automatic shut-off mechanism will operate during tape running or will not operate even at end of tape. Perform Release-Lever-C Operation Check on Page 45.

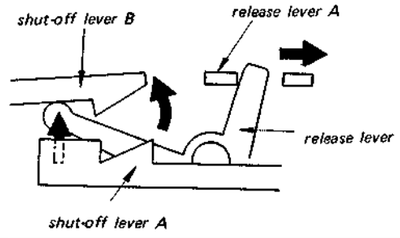


Shut-off Lever-A and Shut-off Lever-B Operation Check (2)

With stop button or PAUSE button depressed in playback, fast forward or rewind mode, and with automatic shut-off mechanism operated at end of tape.

Check the following:

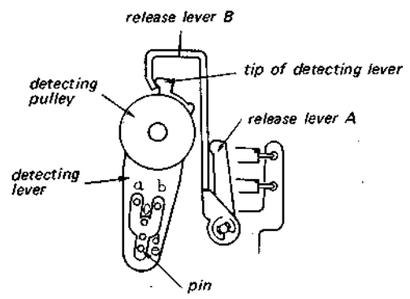
1. Release lever A should push the release lever which pushes shut-off lever B upwards.
2. Shut-off lever B should not interlock shut-off lever A and repeat constant motion.



Release-Lever-B Operation Check.

Check the following:

1. When the pin comes at position "d" or "e" before automatic shut-off operates at end of tape in playback mode, the pin should be stopped at position "b" by depressing PAUSE button.
2. When the pin comes at position "d" in playback, fast forward or rewind mode, the pin should be stopped at position "a" or "b" by depressing stop button.
3. After automatic shut-off mechanism has operated at end of tape in playback, fast forward or rewind mode, the pin should be stopped at position "b".

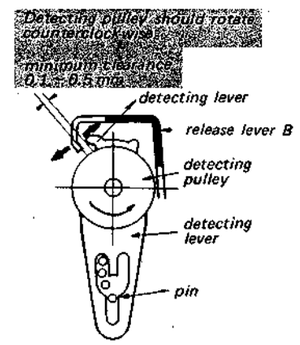


Detecting-Lever and Release-Lever-B Operation Check

1. Rewind Mode

Check as shown below:

Settings:
** With cassette loaded*
** POWER switch: ON*



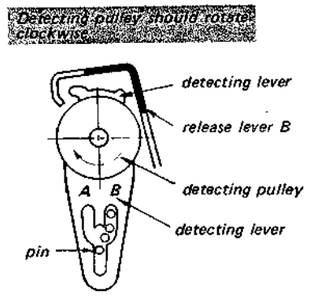
If necessary, adjust by bending the tip of release lever B. (Do not bend the portion of release lever B shown in black.)

Note: If the above adjustment is not correctly made, automatic shut-off mechanism will operate during rewind mode.

2. Playback and Fast Forward Modes

Check as shown below:

Settings:
** With cassette loaded*
** POWER switch: ON*



- Ensure that the pin moves along the slot B.

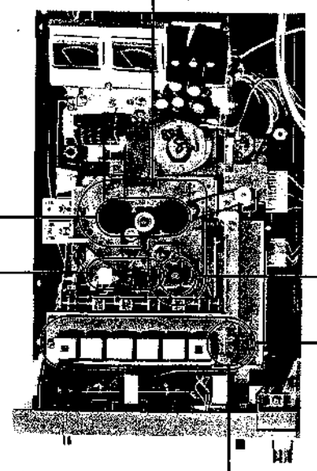
If the pin does not move along the slot B, automatic shut-off mechanism will operate during playback and fast forward modes.

Check the following:

- Friction between detecting pulley and detecting lever should not be weak.
- Detecting pulley belt should not slip.

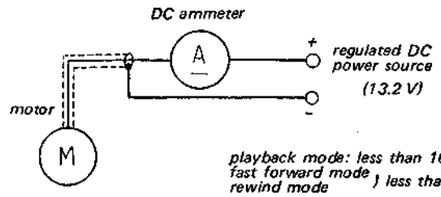
Torque Measurement

Mode	Torque
Playback	28 ~ 50 g · cm (0.39 ~ 0.69 oz · inch)
Fast forward Rewind	70 ~ 150 g · cm (0.84 ~ 2.1 oz · inch)



Motor Current Measurement

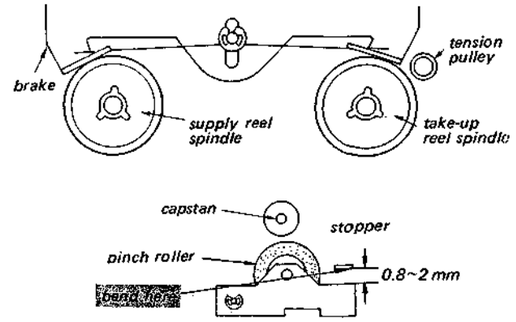
Measure current as shown.



Forward Button Timing Check

When slowly depressing forward button, ensure that the following functions occur in the numerical order. (or simultaneously.)

1. Brake separates from each reel spindle.
2. Tension pulley contacts take-up reel spindle.
3. Motor switch turns on and capstan starts to rotate.
4. Pinch roller contacts capstan.
5. Clearance between pinch roller and stopper should be 0.8 ~ 2 mm.

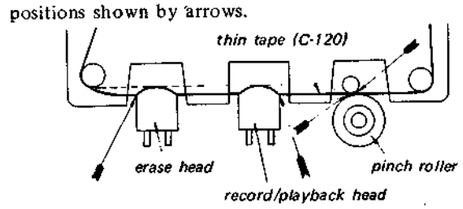


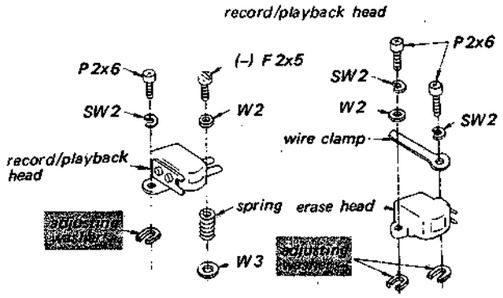
3-1. MECHANICAL ADJUSTMENTS

Head Height Adjustment

– playback mode –

Adjust by removing or adding the adjusting washer so that tape straight runs without curl at positions shown by arrows.

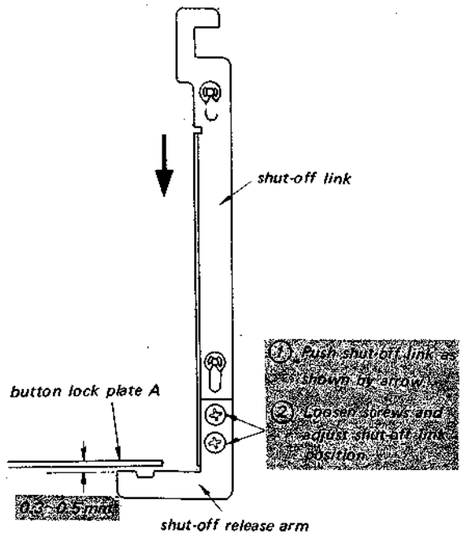




Part No.	Description
3-513-237-01	adjusting washer (t = 0.1)
3-513-237-11	adjusting washer (t = 0.2)

Shut-off Release Arm Adjustment

– stop mode –



Note: If above adjustment is not correctly made, automatic shut-off mechanism will operate during pause mode.

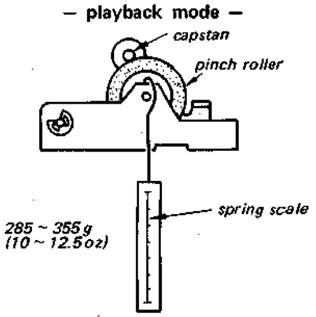
Button Operation Check

Depress	Results
forward button fast forward button rewind button REC button	locked
stop button EJECT button	not locked
PAUSE button	first depressing.....locked second depressing .....released

Mode	Depress	Results
playback	fast forward button	fast forward mode
	rewind button	rewind mode
	stop button	stop mode
	REC button	not depressed
	EJECT button	playback mode with cassette lid opened
fast forward	forward button	playback mode
	rewind button	rewind mode
	stop button	stop mode
	EJECT button	eject, stop mode
	REC button	not depressed
rewind	forward button	playback mode
	fast forward button	fast forward mode
	stop button	stop mode
	EJECT button	eject, stop mode
	REC button	not depressed
record	fast forward button	fast forward mode
	rewind button	rewind mode
	stop button	stop mode
	EJECT button	record mode with cassette lid opened

Pinch Roller Pressure Measurement

– playback mode –



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

Checks After Mechanical Adjustments

Automatic Shut-off Mechanism Operation Check

Release-Lever-C Operation Check

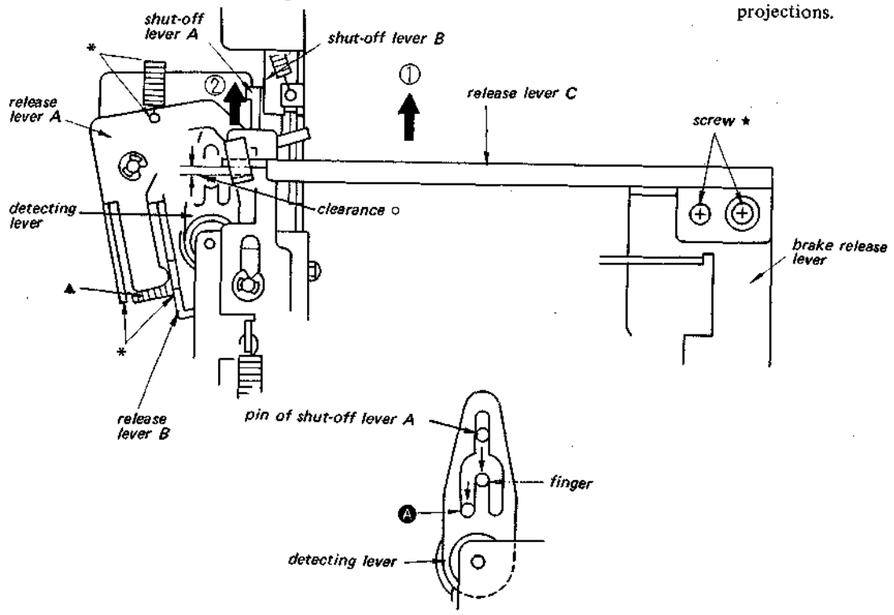
1. Turn POWER switch OFF and place the unit in stop mode.
2. Pull release lever C in the direction shown by the arrow ① to obtain the clearance marked ○.
3. Pull shut-off lever A in the direction shown by the arrow ② to interlock shut-off lever B with shut-off lever A.
4. Lift shut-off lever B to stop the pin of shut-off lever A at finger of detecting lever.
5. When returning release lever C, ensure that the pin of shut-off lever A returns to position Ⓐ.

Note: Release Function Order:
release lever C → release lever A → release lever B → detecting lever

If the pin of shut-off lever A does not return to position Ⓐ in Step 5, automatic shut-off mechanism will operate, as soon as mode changes from stop to playback, fast forward or rewind.

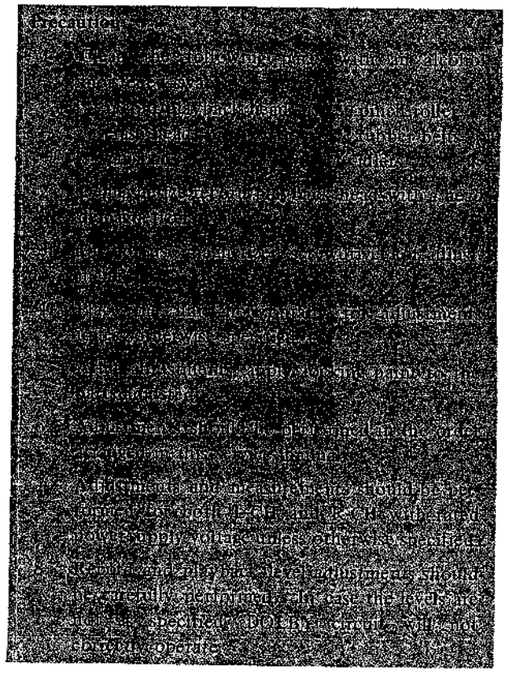
This trouble is caused by the following:

Cause	Remedy
Stretched-out spring marked ▲	Replace.
Clearance marked ○	Loosen screws marked ★ and adjust release-lever-C position for no clearance.
Unsmooth return of brake release lever	Make the lever free from being caught by other levers or projections.



Do not crush marked ＊, apply lock paint there.

3-2. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS



Test Equipment/Tools Required:

audio oscillator (af osc)
VTVM
digital frequency counter
oscilloscope
wow meter
1 kHz, 5 kHz } bandpass filter
attenuator (600 Ω)
non-magnetic screwdriver
blank tape cassette (completely erased with bulk eraser) C-60 HF
C-60 CR
resistors .....100 kΩ (¼ W), 600 Ω (¼ W)
300 Ω (¾ W),
SONY test tapes
SPC-4 (1 kHz, 0 dB)
WS-48 (3 kHz, 0 dB)
P-4-L81 (333 Hz, 0 dB)
P-4-L82 (333 Hz, −10 dB)
P-4-A81 (6.3 kHz, −10 dB)
P-4-A82 (10 kHz, −10 dB)

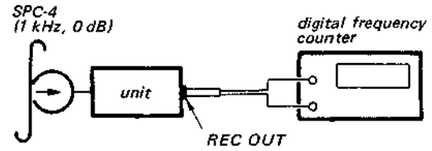
1. Tape Speed Adjustment

Settings:

LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF
MONITOR switch:	SOURCE
CASSETTE switch:	ON

Procedure:

1. Mode: Playback



Specification: 1000 Hz ± 2 % (980 ~ 1020 Hz)
3000 Hz ± 2 % (2940 ~ 3060 Hz)
Frequency difference between beginning and end is within 10 Hz.

2. If necessary, change motor pulley.

Part No.	Motor Pulley (groove)	Tape Speed
3-533-357-01		slower ↕ faster
3-533-357-11	width of a groove: 0.3mm	
3-533-357-21	width of a groove: 0.3mm	
3-533-357-31	width of a groove: 0.3mm	
3-533-357-41	width of a groove: 0.3mm	
3-533-357-51	width of a groove: 0.6mm	

Note: After the motor pulley is changed, perform Motor Pulley Height Adjustment on Page 43.

2. Head Azimuth Adjustment

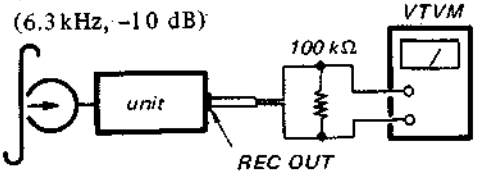
Settings:

LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF
MONITOR switch:	SOURCE
CASSETTE switch:	ON

Procedure:

1. Mode: Playback

P-4-A81
(6.3 kHz, -10 dB)

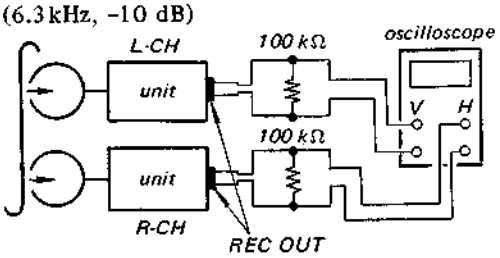


2.

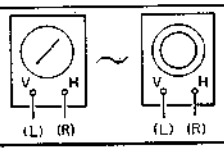
Adjust	VTVM reading	Remarks
azimuth adjusting screw	highest peak	If the azimuth angles of L-CH and R-CH are not the same, set the screw midway between two screw positions.

3. Mode: Playback

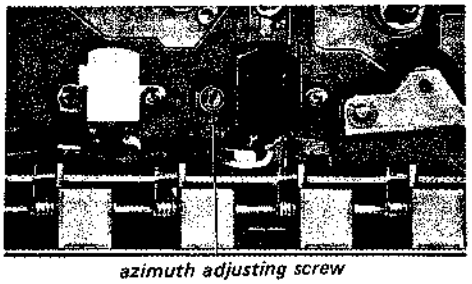
P-4-A81
(6.3 kHz, -10 dB)



4.

Adjust	On the oscilloscope
azimuth adjusting screw	in phase  90°

Adjustment Location:



azimuth adjusting screw

3. Playback Level Adjustment

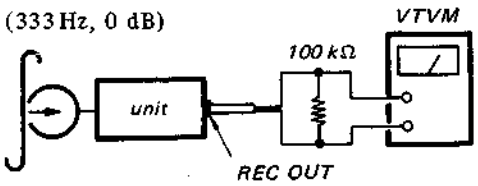
Settings:

LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF
MONITOR switch:	SOURCE
CASSETTE switch:	ON

Procedure:

1. Mode: Playback

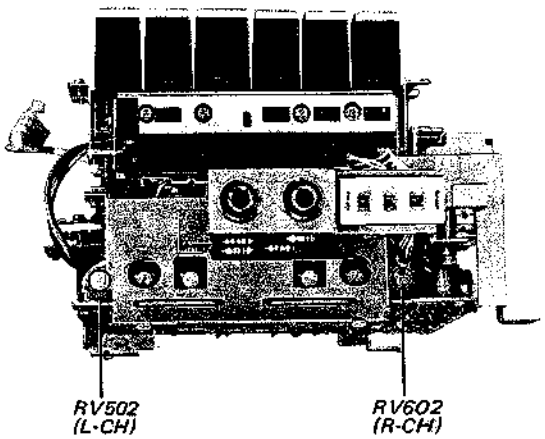
P-4-L81
(333 Hz, 0 dB)



2.

Adjust	VTVM reading	Remarks
RV502 RV602	0 dB (0.775 V)	1. Allowance: within ±0.5 dB 2. Level difference between the L-CH and R-CH should be within 1 dB.

Adjustment Location:



4. Playback Equalizer Adjustment

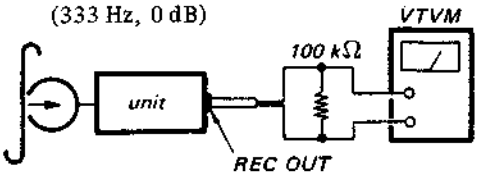
Settings:

LIMITER switch:	OFF
DOLBY NR switch:	OFF
MONITOR switch:	TAPE
CASSETTE switch:	ON

Procedure:

1. Mode: Playback
   TAPE SELECT switch: CrO_2 or Fe-Cr

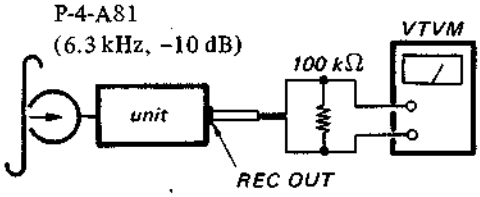
   P-4-A81
   (333 Hz, 0 dB)



Adjust	VTVM reading
RV501 (L-CH) RV601 (R-CH)	-17 dB (0.11 V)

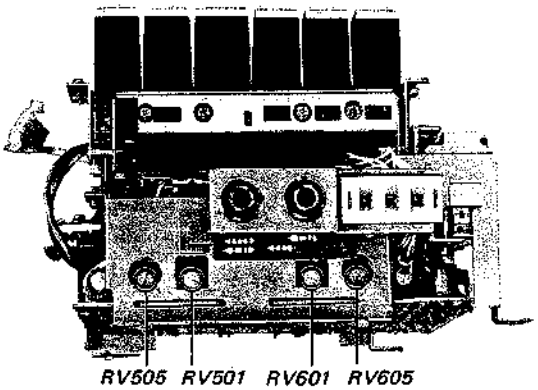
2. Mode: Playback
   TAPE SELECT switch: NORMAL

   P-4-A81
   (6.3 kHz, -10 dB)



Adjust	VTVM reading
RV505 (L-CH) RV605 (R-CH)	-11.5 dB (0.2 V)

Adjustment Location:



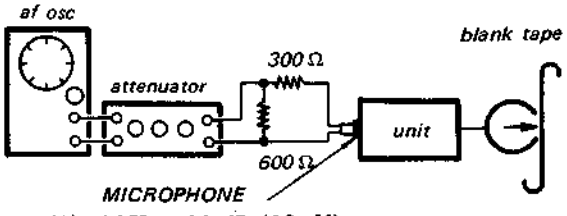
5. Record Bias Adjustment

Settings:

LIMITER switch:	OFF
DOLBY NR switch:	OFF
MONITOR switch:	TAPE
CASSETTE switch:	ON
TAPE SELECT switch:	CrO_2
REC VOLUME control:	For 0 dB (0.775 V) REC OUT level with 400 Hz, 60 dB (0.77 mV) MICROPHONE signal in record mode.

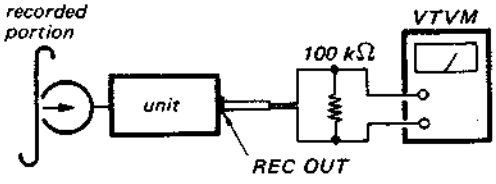
Procedure:

1. Mode: Record



   (1) 1 kHz, -90 dB (25 μV)
   (2) 10 kHz, -90 dB (25 μV)

2. Mode: Playback



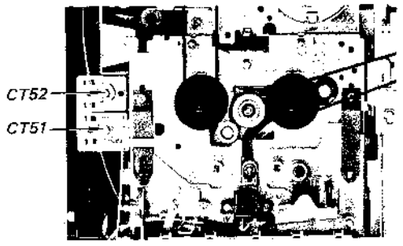
Confirmation

VTVM reading
1 kHz level = 10 kHz level Allowance: within ±0.5 dB

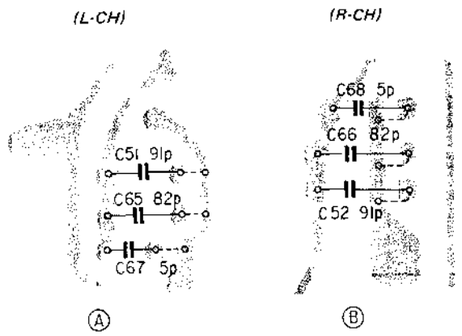
3. If necessary, adjust by CT51, CT52.

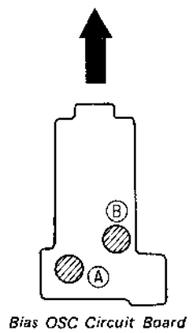
Adjust	Remarks
trimmer capacitor CT51, CT52	Slowly turn the trimmer capacitor clockwise until VTVM reads 0.5 dB below and beyond the maximum reading as shown.

Adjustment Location:



If the specified results are not obtained, change the record bias by changing the capacitor connection points.





Bias OSC Circuit Board

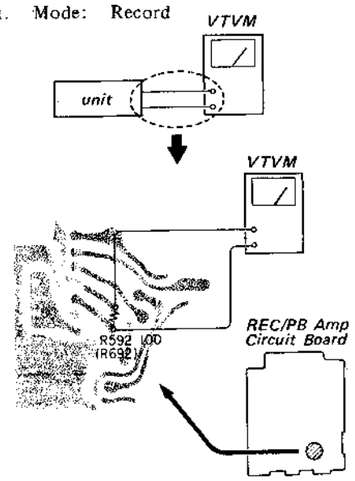
6. Trap Coil Adjustment

Settings:

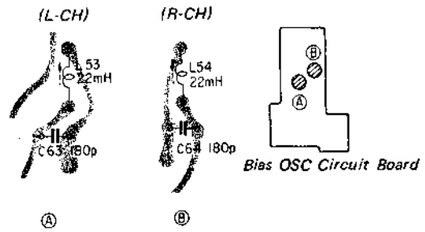
LIMITER switch:	OFF
MONTOR switch:	TAPE
CASSETTE switch:	ON
REC VOLUME control:	MIN

Procedure:

1. Mode: Record



Adjust	VTVM reading
L53, 54	With ISS switch (S19) turned ON = With ISS switch (S19) turned OFF



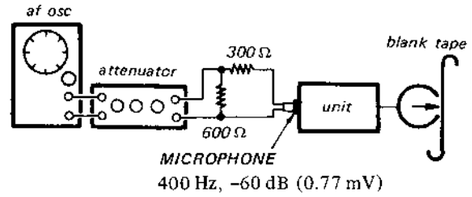
7. Record Level Adjustment

Settings:

MONITOR switch:	TAPE
TAPE SELECT switch:	NORMAL
CASSETTE switch:	ON
LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF
REC VOLUME control:	For 0 dB (0.775 V) REC OUT level with 400 Hz, −60 dB ((0.77 mV) MICRO-PHONE signal in record mode.

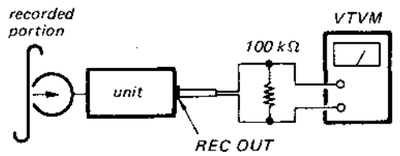
Procedure:

1. Mode: Record



400 Hz, −60 dB (0.77 mV)

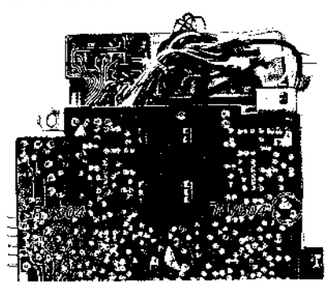
2. Mode: Playback



Adjust	VTVM reading	Remarks
RV504 (L-CH) RV604 (R-CH)	0 dB (0.775 V)	Allowance: within ±0.5 dB

Adjust RV504 and RV604 and repeat steps 1 and 2.

Adjustment Location:

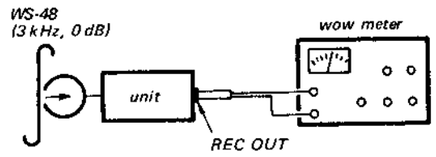


8. Wow and Flutter Measurement

Settings:

LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF

Procedure:



Specification: 0.25 % (RMS) weighted

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

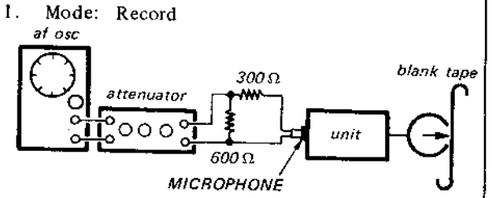
7. Record Level Adjustment

Settings:

MONITOR switch:	TAPE
TAPE SELECT switch:	NORMAL
CASSETTE switch:	ON
LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF
REC VOLUME control:	For 0 dB (0.775 V) REC OUT level with 400 Hz, -60 dB ((0.77 mV) MICRO-PHONE signal in record mode.

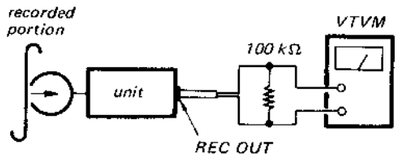
Procedure:

1. Mode: Record



400 Hz, -60 dB (0.77 mV)

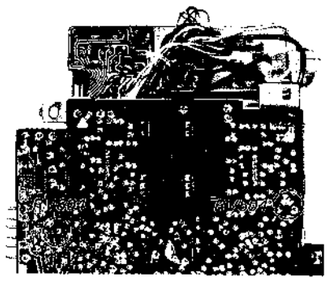
2. Mode: Playback



Adjust	VTVM reading	Remarks
RV504 (L-CH) RV604 (R-CH)	0 dB (0.775 V)	Allowance: within ±0.5 dB

Adjust RV504 and RV604 and repeat steps 1 and 2.

Adjustment Location:

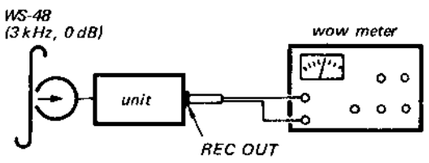


8. Wow and Flutter Measurement

Settings:

LIMITER switch:	OFF
TAPE SELECT switch:	NORMAL
DOLBY NR switch:	OFF

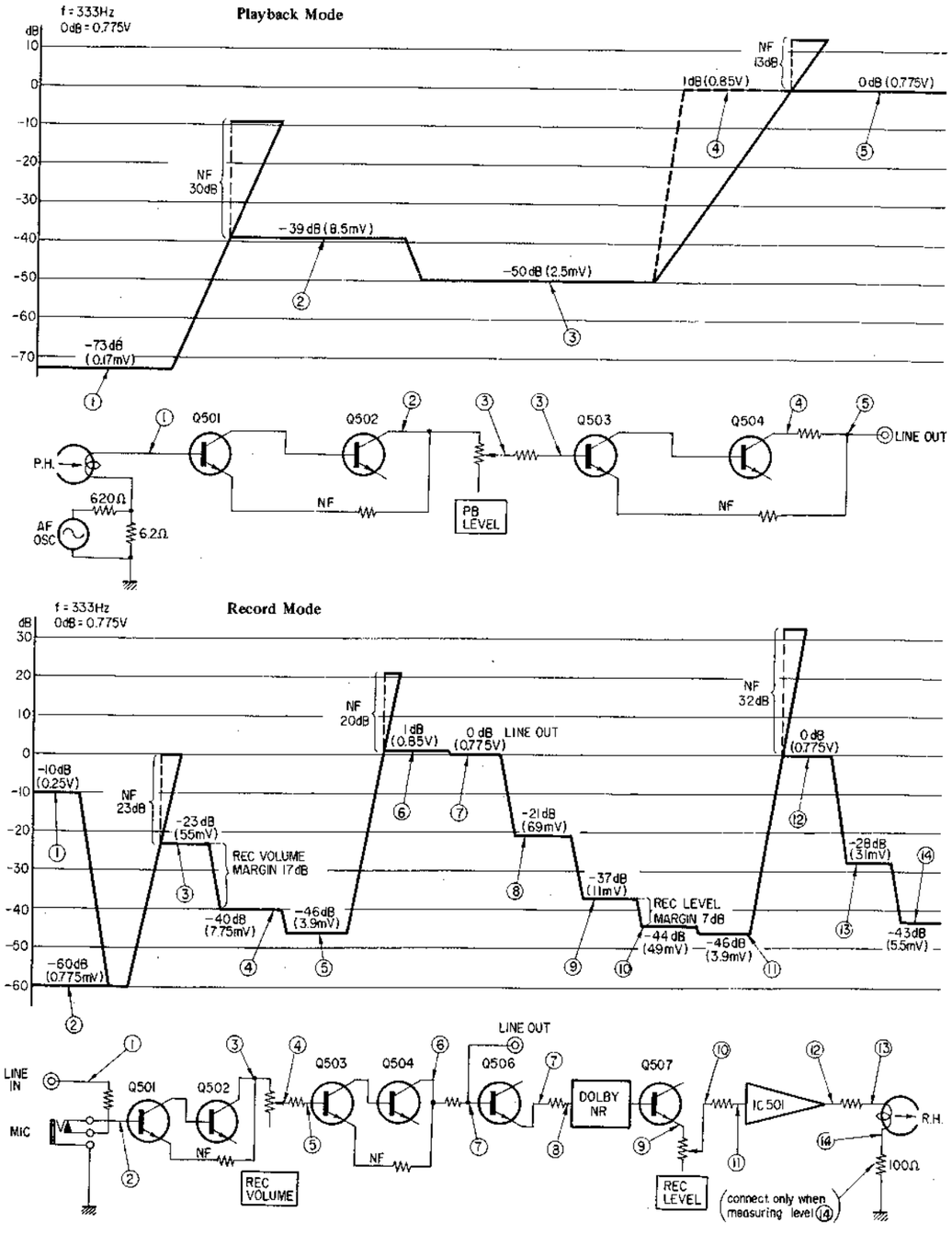
Procedure:



Specification: 0.25 % (RMS) weighted

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

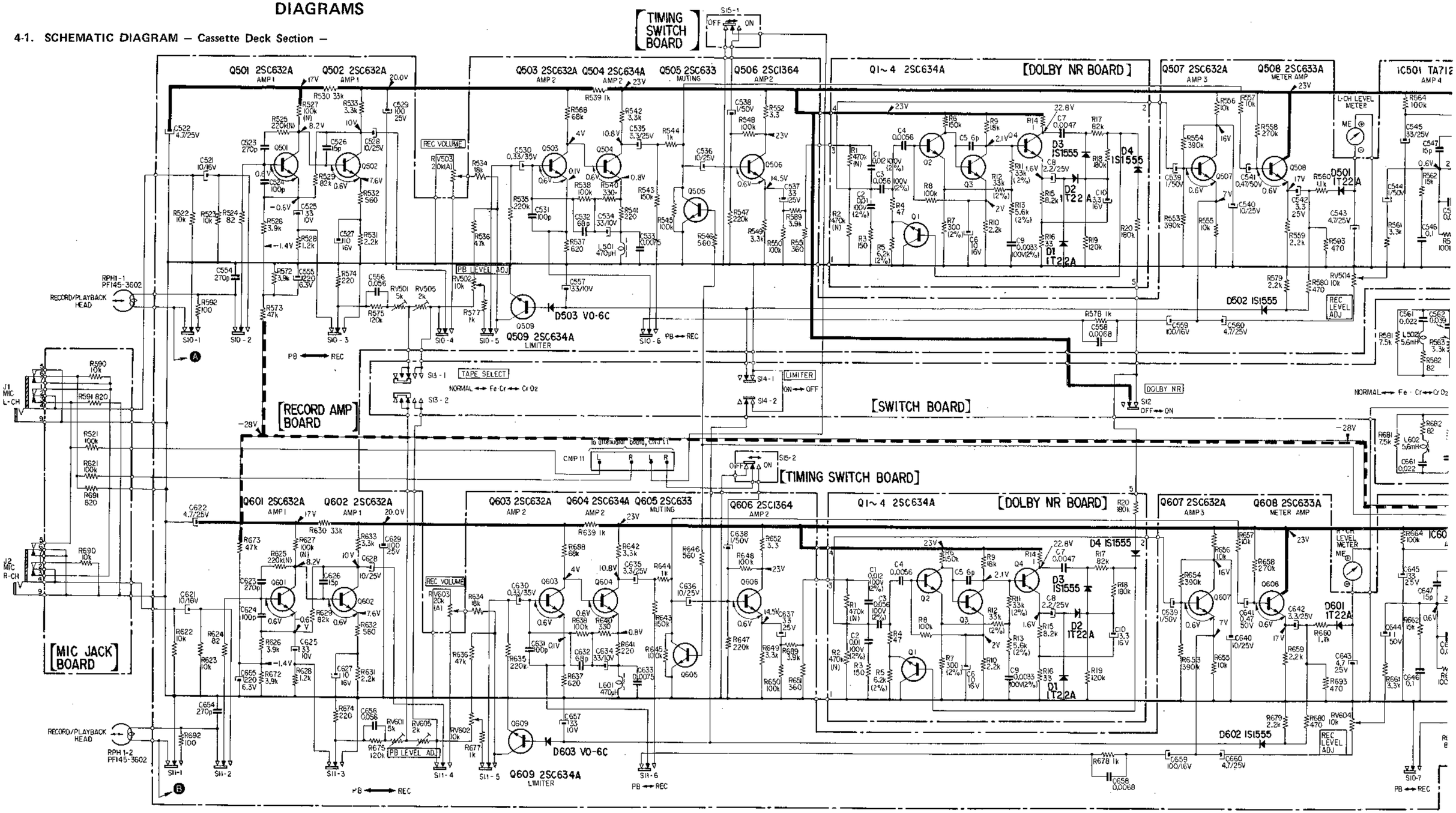
3-3. LEVEL DIAGRAM



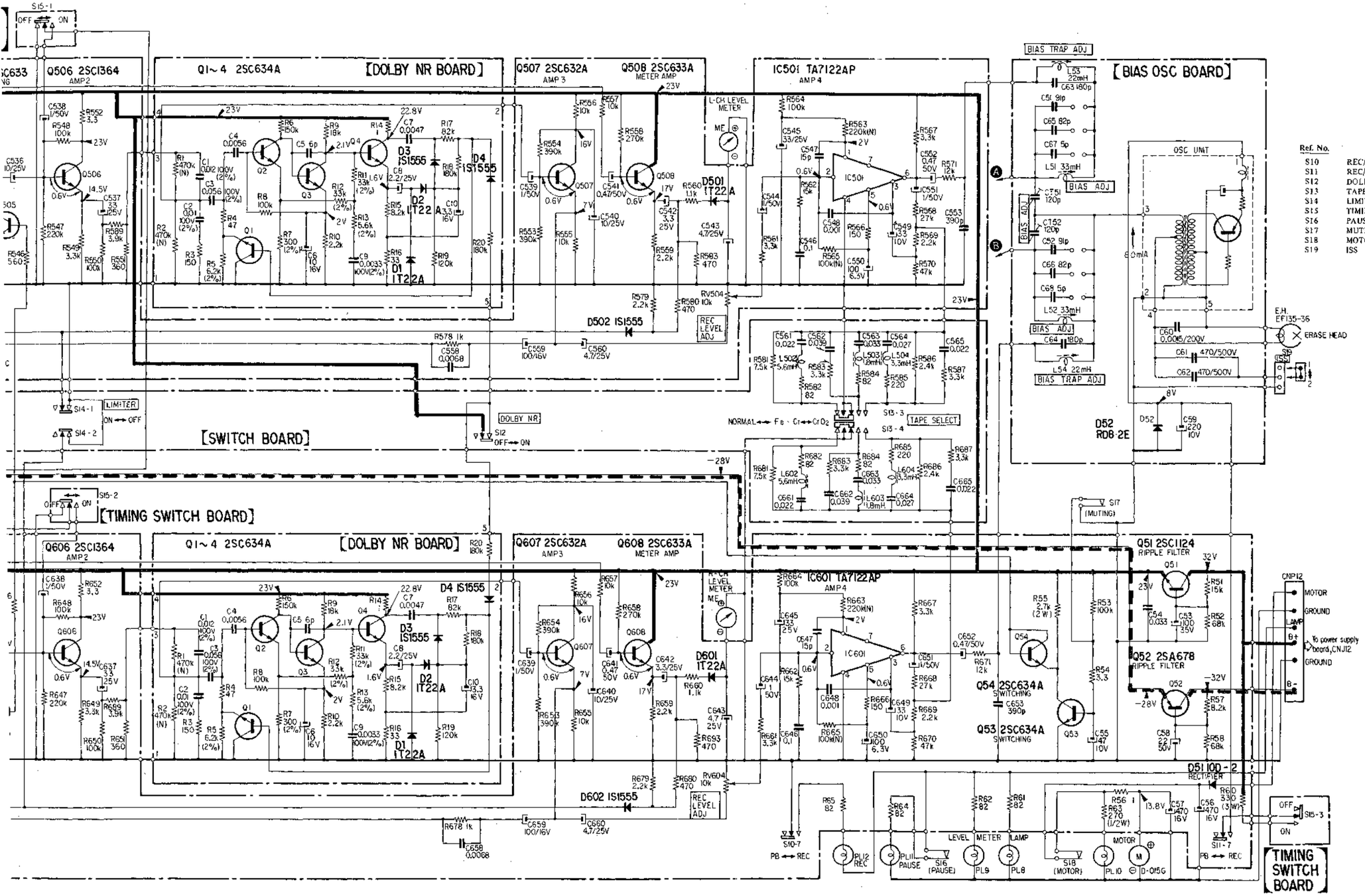
Note: Signal voltages are measured with ac VTVM and expressed in dB referred to 0.775 V, 1 kHz.

SECTION 6
DIAGRAMS

4-1. SCHEMATIC DIAGRAM — Cassette Deck Section —



Note:
All resista
M = 1,000
All capaci
indicated



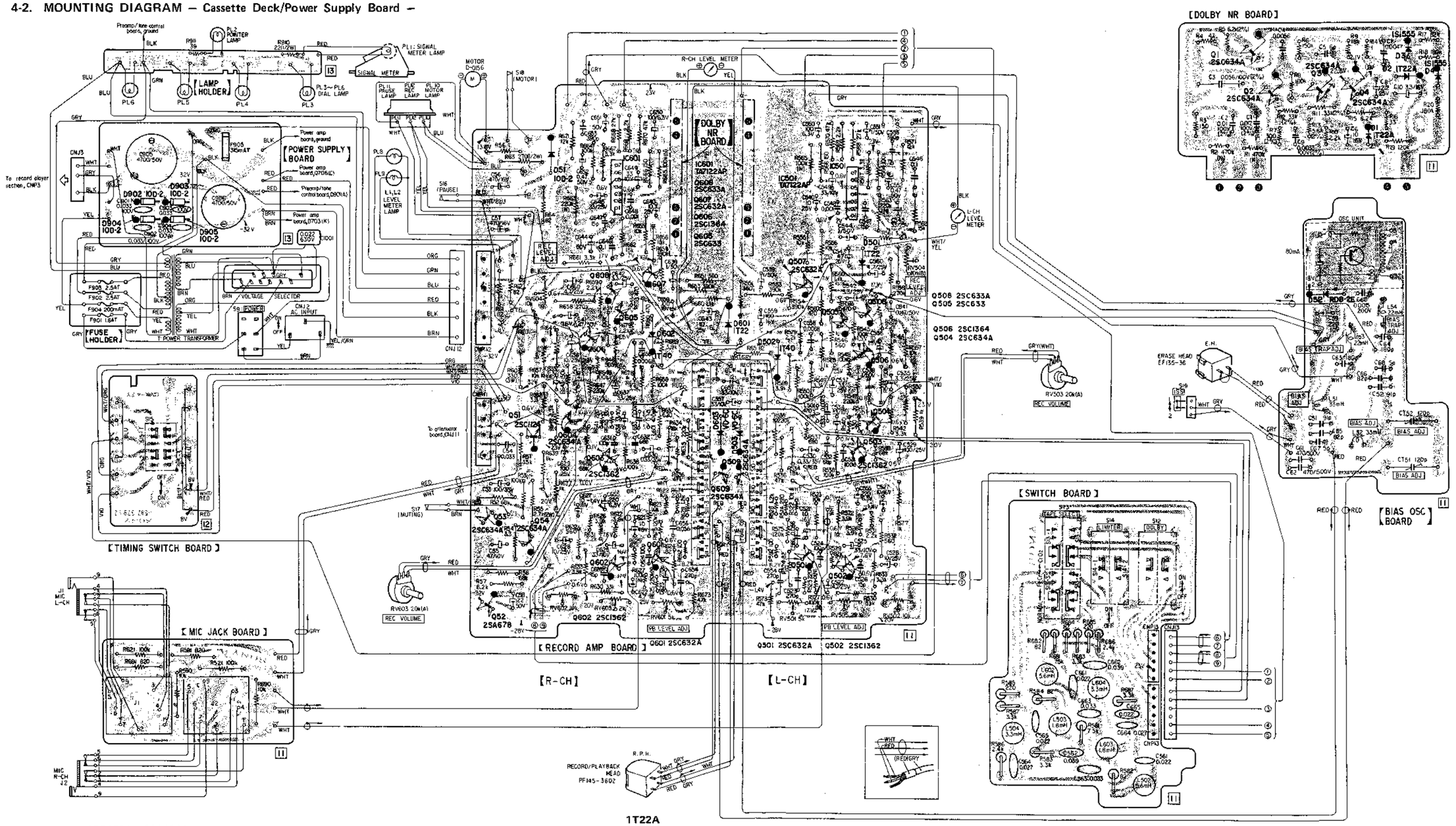
Ref. No.	Description	Position
S10	REC/PB SELECTOR (L-CH)	PB
S11	REC/PB SELECTOR (R-CH)	PB
S12	DOLBY NR	ON
S13	TAPE SELECT	NORMAL
S14	LIMITER	OFF
S15	TIMING	OFF
S16	PAUSE	ON
S17	MUTING	ON
S18	MOTOR	ON
S19	ISS	1

Note:
All resistance values are in ohms. k = 1,000, M = 1,000 k.
All capacitance values are in μF except as indicated with p, which means μμF.

All voltages are dc measured in playback mode with a VOM which has an input impedance of 20 k ohms/volt. No signal in. Voltage variations may be noted because of normal production tolerances.

—— ····· B+ voltage
— — — ····· B- voltage

4-2. MOUNTING DIAGRAM – Cassette Deck/Power Supply Board –

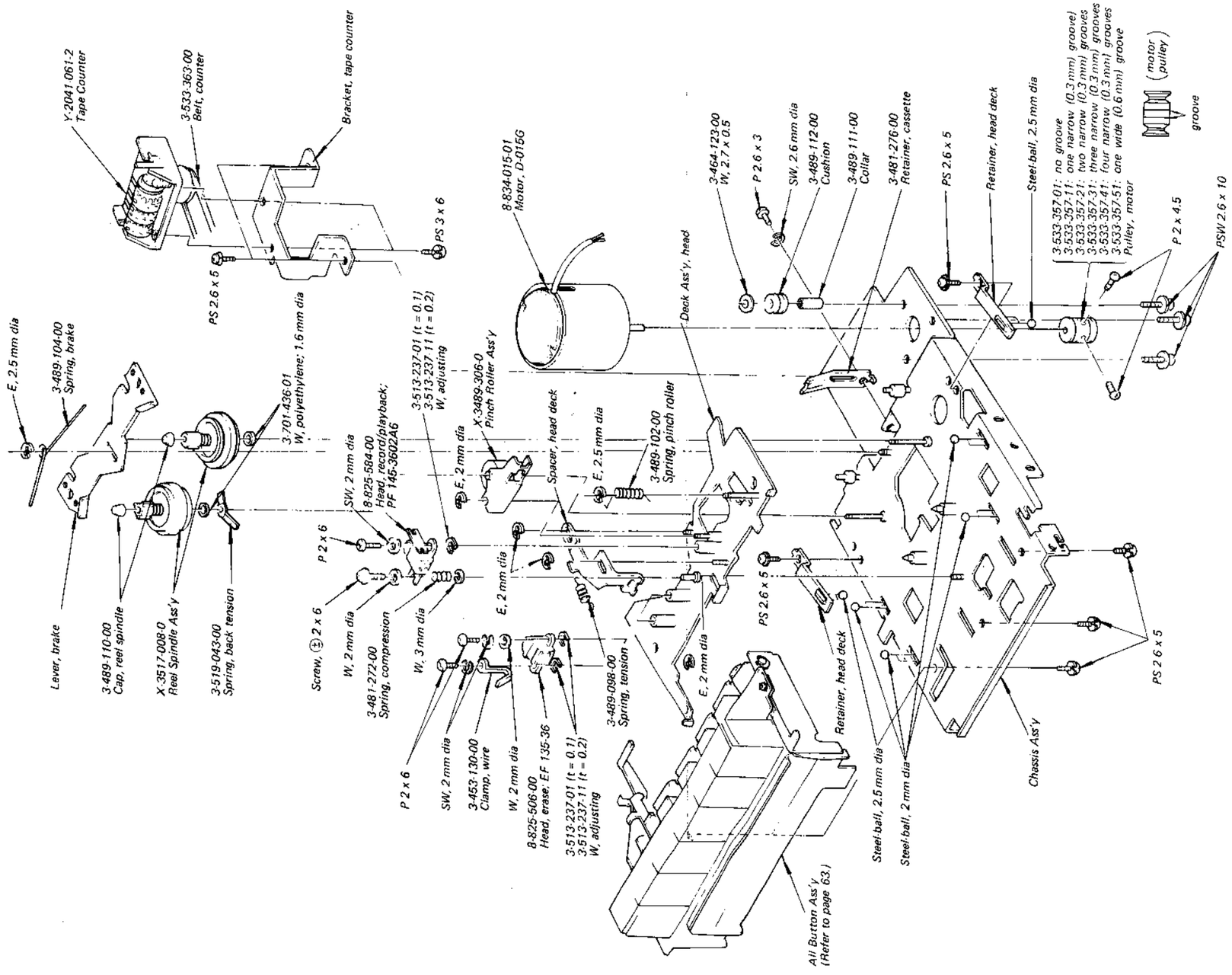


2SA678 2SC632A 2SC633A 2SC633 2SC634A 2SC1362 2SC1364 2SC1124 VO-6C 10D-2 1T22A 1S1555 1T40 1T22 RD8·2E TA7122AP

: B+ pattern
: B- pattern

SECTION 5
EXPLODED VIEWS

(1)



– 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 –

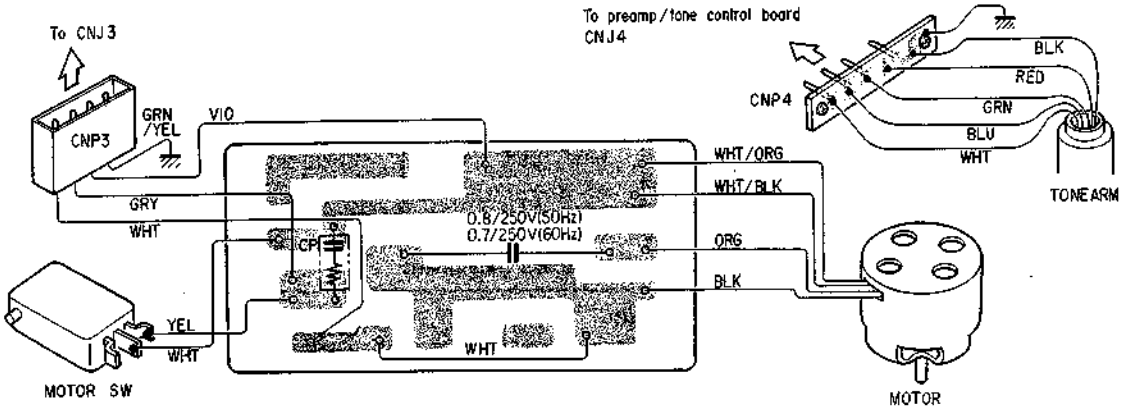
Type of Slot
P 3×10
Length in mm (L)
Diameter in mm (D)
Type of Head

Note:

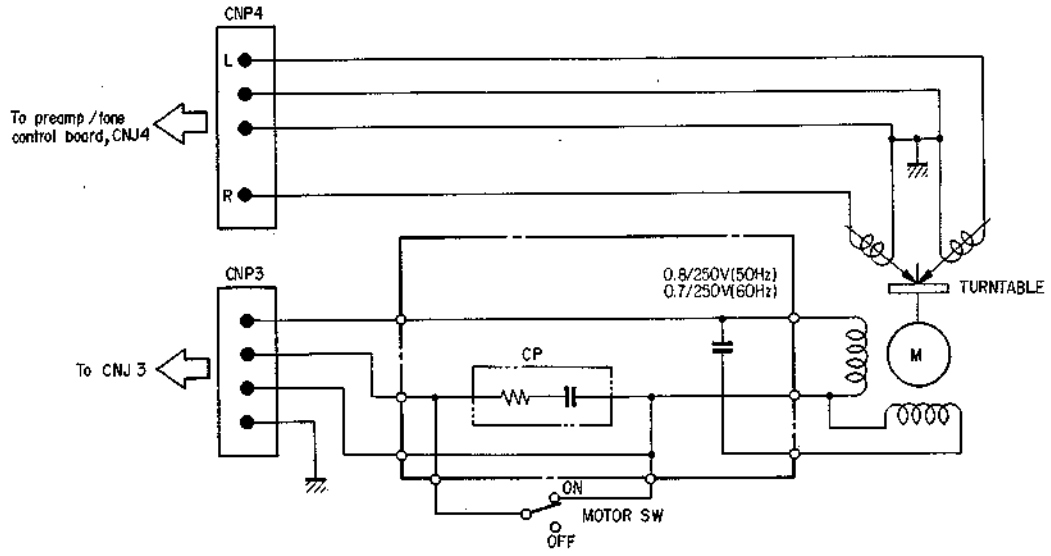
- Items with no part number (excluding the hard wares*) are seldom required for routine service and are not stocked at local part depots.
  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

SECTION 6
DIAGRAMS

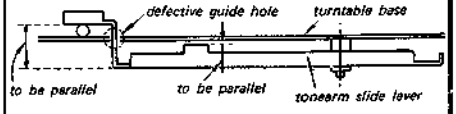
6-1. WIRING/MOUNTING DIAGRAM



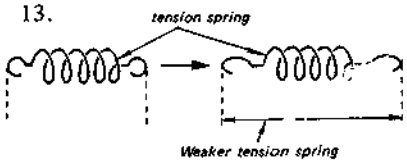
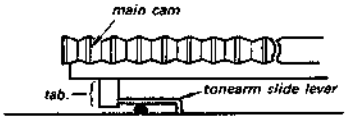
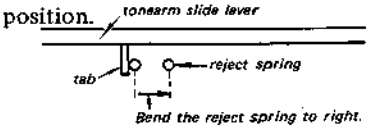
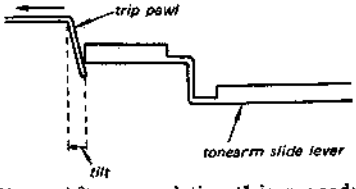
6-2. SCHEMATIC DIAGRAM



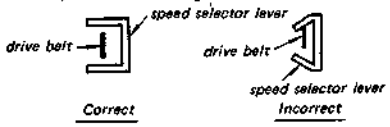
Distorted sound at close to lead-out groove of record.

Symptom	Cause	Remedy
Distorted sound at close to lead-out groove of record.	b) Defective guide hole.	Repair guide hole. 
	2) Trip pawl movement slow. a) No space between trip pawl and return pawl.	Replace return pawl and trip pawl.
	b) Dirty trip pawl and return pawl surfaces.	Clean with denatured alcohol.

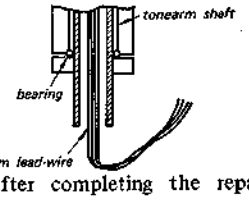
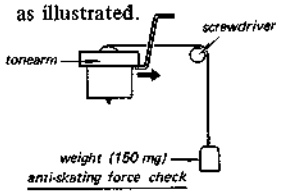
When tonearm returns to its rest, tonearm repeats up and down movement.

Symptom	Cause	Remedy
Return pawl moves by mechanical shock.	1) Excessive tension of spring.	Adjust main cam return position as described in procedure 3-6 on page 13.  Loosen tension of spring (See Fig. 3-15.) by expanding spring. **Note:** After completing repair procedure, perform main cam return position adjustment as described in procedure 3-6 on page 13.
Tonearm slide lever does not return to its original position.	1) Tab of main cam broken. 	Replace main cam.
	2) Reject (torsion) spring and tonearm lever are in contact.	Bend reject spring so that reject spring is not in contact with tab of tonearm slide lever when tonearm slide lever is returned to its original position. 
	3) Tilted trip pawl.	Reshape trip pawl.  **Note:** After completing this procedure, adjust automatic return position as described in procedure 3-2 on page 10.

Turntable does not run.

Symptom	Cause	Remedy
Turntable does not run.	b) Defective speed selector lever. 	Repair speed selector lever.
	2) Defective motor pulley.	Replace motor pulley.
	3) Defective motor.	Replace motor.
	4) Drive belt off.	Reinstall belt.
	5) Broken or stretched belt.	Replace belt.
	6) Loose motor pulley set screw.	Fix screw.
	7) Defective motor on/off switch.	Replace switch.

Tonearm does not trace.

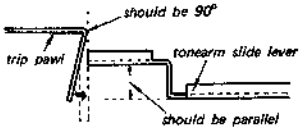
Symptom	Cause	Remedy
Tonearm does not trace.	1) Improper anti-skating force.	
	a) Excessive tension of tonearm lead-wire.	Loosen tonearm lead-wire.
	b) Dirty tonearm shaft bearing.	Clean with denatured alcohol.  **Note:** After completing the repair or cleaning, perform anti-skating force check as described below; 1. Remove the anti-skating weight. 2. Make sure that tonearm is moved in the arrow direction as illustrated. 
	2) Stylus force too low.	Readjust stylus force as described in procedure 3-3 on page 11.

Distorted sound at close to lead-out groove of record.

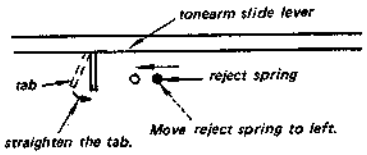
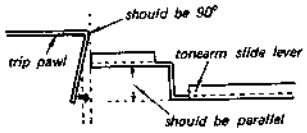
Symptom	Cause	Remedy
Distorted sound at close to lead-out groove of record.	1) Tonearm slide lever movement too late.	
	a) Tilted tonearm slide lever.	Reshape or replace tonearm slide lever.

– Continued to next page –

Automatic return mechanism does not operate correctly.

Symptom	Cause	Remedy
Automatic return mechanism does not operate.	5) Movement of tonearm slide lever is not transmitted correctly to return pawl.	
	a) Tonearm pivot loose.	Tighten pivot screws properly.
	b) Defective tonearm lever ass'y.	Replace tonearm lever ass'y.
	c) Defective trip pawl and/or return pawl.	Replace trip pawl and/or return pawl.
	d) Bent or loose trip pawl shaft.	Straighten shaft or replace main cam.
	e) Deformed return pawl or tonearm slide lever. 	Reshape trip pawl or tonearm slide lever ass'y.

Does not reject

Symptom	Cause	Remedy
Does not reject.	1) Tonearm slide lever does not move because of the improper tilt of tonearm slide lever tab or improper reject spring position.	Straighten tab of tonearm slide lever or bend reject (torsion) spring for satisfactory result. 
	2) Movement of tonearm slide lever is not transmitted to trip pawl.	Reshape trip pawl or tonearm slide lever.  After reshaping, adjust the automatic return position as described in procedure 3-2 on page 10.

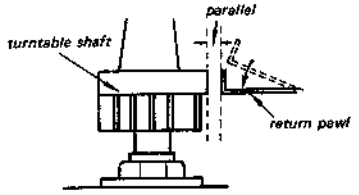
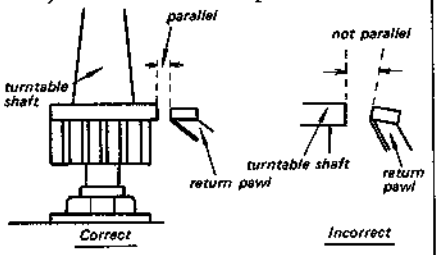
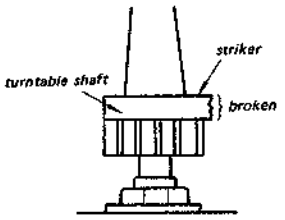
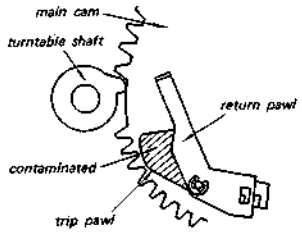
Turntable does not run

Symptom	Cause	Remedy
Turntable does not run.	1) Drive belt does not shift.	
	a) Improper motor pulley height.	Adjust motor pulley height as described in procedure 4-1 on page 15.

– Continued to next page –

SECTION 5
TROUBLESHOOTING GUIDE

Automatic return mechanism does not operate correctly.

Symptom	Cause	Remedy
Automatic return mechanism triggered too late.	Improper automatic return position.	Adjust the automatic return position as described in procedure 3-2 on page 10.
Automatic return mechanism triggered too early.	1) Deformed return pawl. 	Reshape or replace return pawl.
	2) Striker of turntable shaft broken.	Replace turntable shaft as described in procedure 2-2 on page 4.
	3) Improper automatic return position.	Adjust the automatic return position as described in procedure 3-2 on page 10.
Automatic return mechanism does not operate.	1) Deformed return pawl. 	Reshape or replace return pawl.
	2) Striker of turntable shaft broken. 	Replace the turntable shaft as described in procedure 2-2 on page 4.
	3) Improper main cam return position.	Readjust main cam return position as described in procedure 3-6 on page 13.
	4) Surfaces of trip pawl and return pawl are contaminated with grease and dust. 	Remove the trip pawl and return pawl, clean with denatured alcohol.

– Continued to next page –

SECTION 4
MAINTENANCE

4-1. ADAPTATION TO LOCAL LINE FREQUENCY

Note: The TTS-360 can be adapted to operate at the another ac local line frequency by replacing the motor pulley, the motor starting capacitor and the resistor.

Motor Pulley Replacement

Refer to table 4-1 to determine the part number of the motor pulley.

TABLE 4-1. MOTOR PULLEYS

Motor Pulleys	
For 50 Hz	For 60 Hz
	
[Part No. X-4827-415-X]	[Part No. X-4827-416-X]

Procedure

1. Remove the turntable base as described in procedure 2-1.
2. Remove the motor pulley by loosening the allen-head screw.
3. Install the replacement pulley, and the set the speed selector knob to 33 rpm position.
4. Adjust the height of the motor pulley so that the top of the motor pulley is 0.3 mm higher than the top edge of speed selector lever as shown in Fig. 4-1.

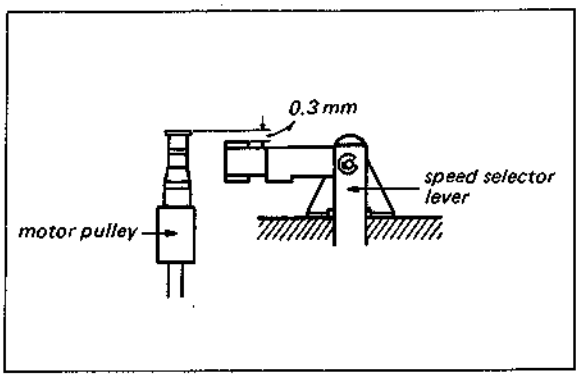


Fig. 4-1. Motor pulley height adjustment

Motor Starting Capacitor Replacement

Match the value of starting capacitor to local line frequency as follows:

	Description	Part No.
50 Hz	0.8 μF 250V MP capacitor	1-117-104-11
60 Hz	0.7 μF 250V MP capacitor	1-113-149-11

4-2. LUBRICATION

Apply two or three drops of oil to the shafts of the turntable and motor once a year.
If the oil should spill the surface of the motor pulley and the turntable drive surface, wipe it immediately with a soft cloth moistened with denatured alcohol.

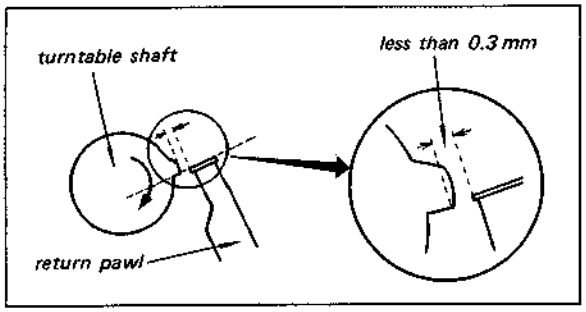


Fig. 3-18. Automatic return operation check (3)

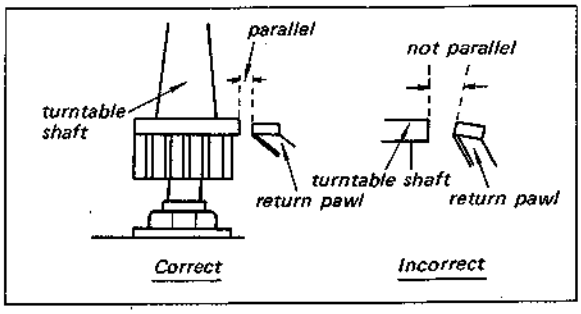


Fig. 3-19. Defective turntable and return pawl

3-6. MAIN CAM RETURN POSITION ADJUSTMENT

1. Mesh the teeth of main cam and turntable shaft by positioning the reject knob to REJECT.
2. Make sure that the turntable shaft is set to the position shown in Fig. 3-14, after main cam makes a complete clockwise turn.
3. If not, change tension of spring by loosening the main cam return position adjustment screw as shown in Fig. 3-15.

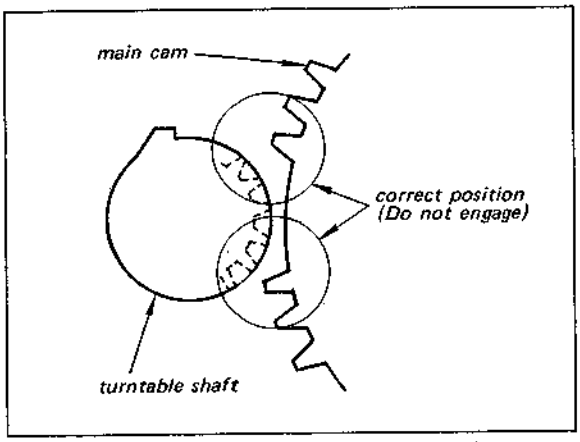


Fig. 3-14. Main cam return position adjustment (1)

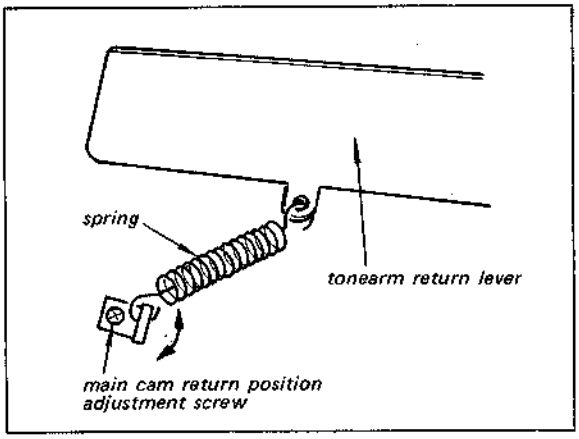


Fig. 3-15. Main cam return position adjustment (2)

3-7. AUTOMATIC RETURN OPERATION CHECK

1. Set the turntable shaft as shown in Fig. 3-16.
2. Move the return pawl as far as it will go in the arrow direction shown in Fig. 3-16.
3. Slowly rotate turntable shaft half a circle in counterclockwise direction shown in Fig. 3-17.

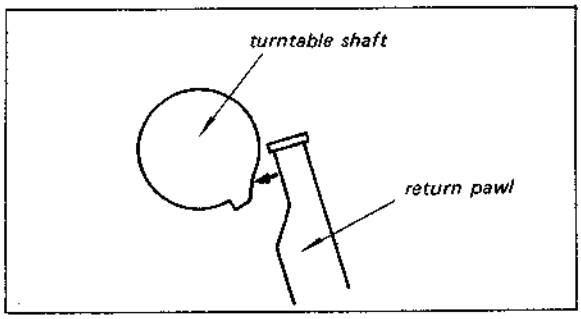


Fig. 3-16. Automatic return operation check (1)

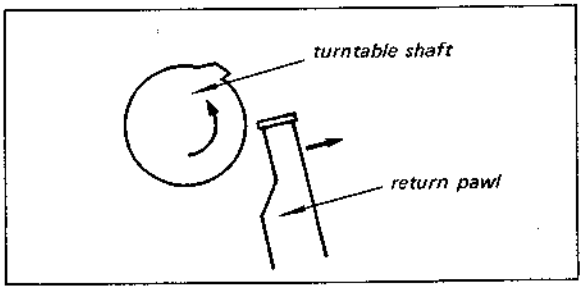


Fig. 3-17. Automatic return operation check (2)

4. Rotate the turntable shaft clockwise until the striker of turntable shaft and end of return pawl are positioned as shown in Fig. 3-18.
5. Make sure that the clearance between them is less than 0.3 mm as shown in Fig. 3-18.

   If the clearance is more than 0.3 mm, check for the following defective parts;

Probable cause (See Fig. 3-19.)	Remedy
deformed turntable shaft	replace turntable shaft
broken striker of turntable shaft	replace turntable shaft
tilted return pawl	replace return pawl

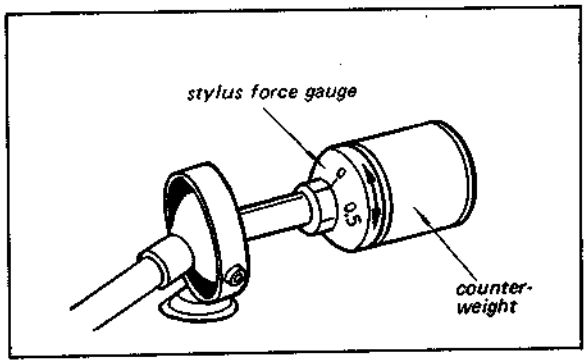


Fig. 3-9. Longitudinal balance adjustment

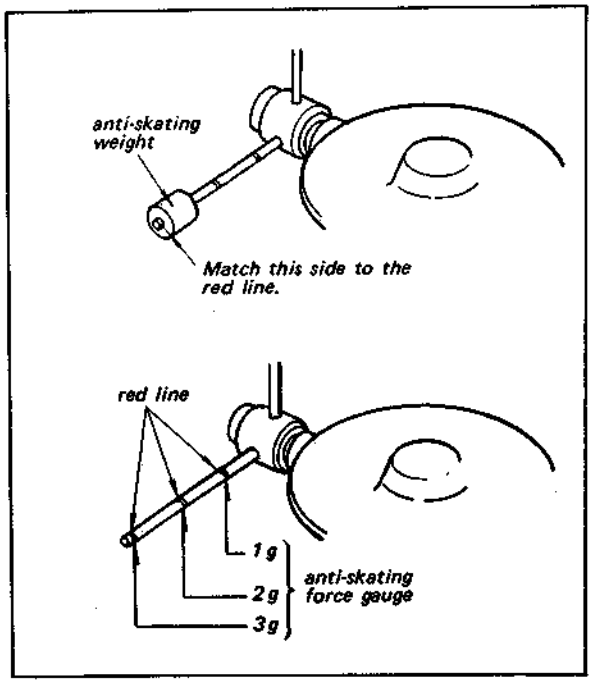


Fig. 3-10. Anti-skating force adjustment

Other Cartridge

1. Check the instructions given with the cartridge to determine the proper stylus force.
2. Turn the counterweight clockwise to obtain the proper (recommended) value of stylus force.
3. Set the anti-skating gauge to the same value set in step 2.

Note: For specific anti-skating force falling between two lines (for instance 1.5 g, etc.), slide the weight to the left or right to set it to the corresponding position between the lines as shown in Fig. 3-10.
When using a cartridge having a stylus force of less than 1 gram, take off the anti-skating weight.

3-5. MICROSWITCH POSITION ADJUSTMENT

1. Make sure that the shaft of the tonearm return lever is set correctly to the groove of main cam as shown in Fig. 3-11.
2. Put the tonearm on the its rest.
3. Check to see that the clearance between the motor on/off switch and tip of tonearm lever ass'y is 0.2mm to 0.5mm as shown in Fig. 3-12. If not, turn the adjustment screw as shown in Fig. 3-13.
4. When the tonearm is removed from its rest, check to see that the microswitch is "ON".
5. Repeat the above steps 2, 3 and 4, if necessary.
6. When the tonearm starts automatic return operation, confirm that the microswitch is "OFF".

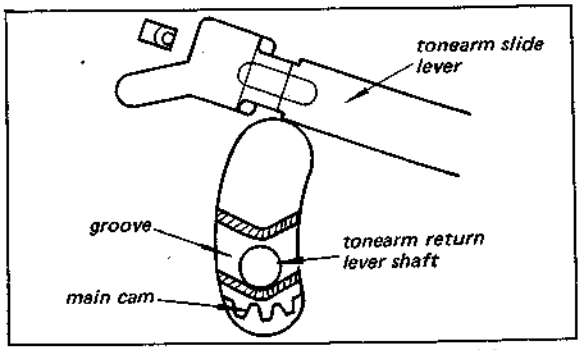


Fig. 3-11. Motor on/off switch position adjustment (1)

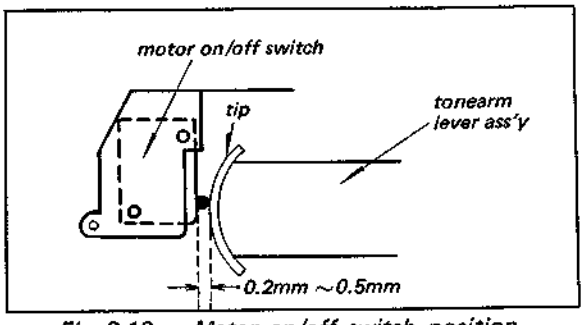


Fig. 3-12. Motor on/off switch position adjustment (2)

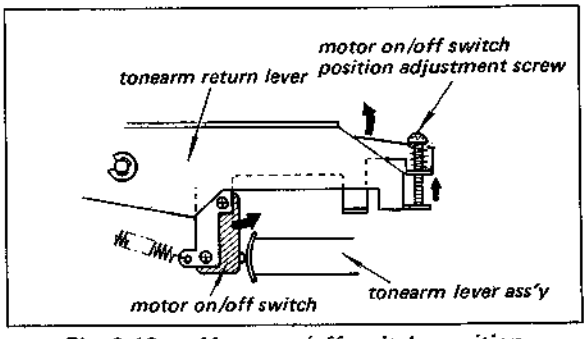


Fig. 3-13. Motor on/off switch position adjustment (3)

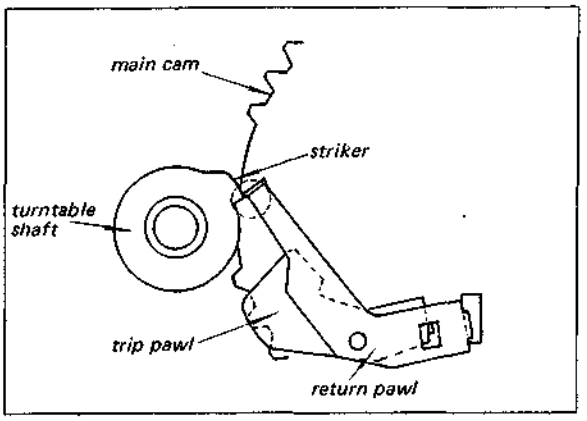


Fig. 3-5. Automatic return position adjustment (2)

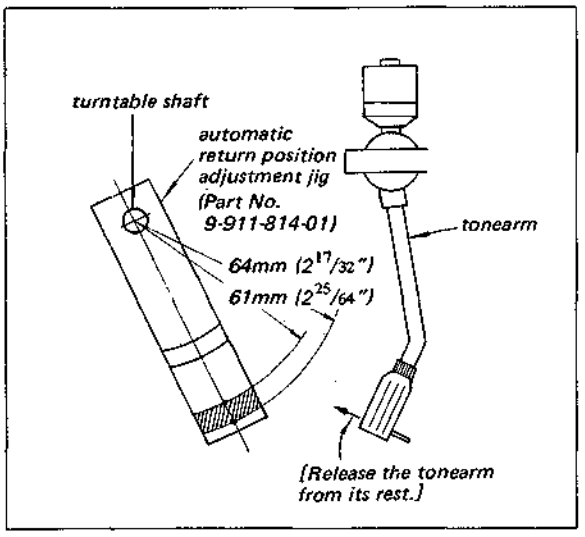


Fig. 3-6. Automatic return position adjustment (3)

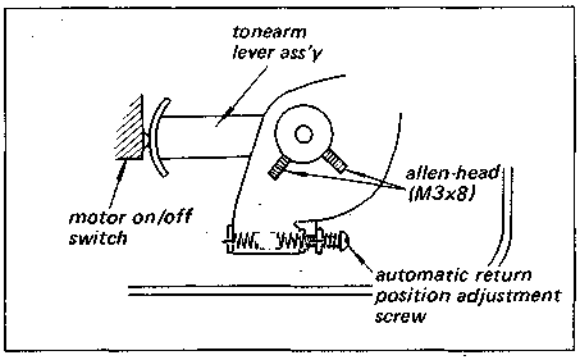


Fig. 3-7. Automatic return position adjustment (4)

3-3. STYLUS FORCE ADJUSTMENT

Preparation

1. Release the tonearm from its rest.
2. Horizontally balance the tonearm by turning the counterweight at the end of the tonearm, and set the stylus force gauge ring to "O" while holding the counterweight as shown in Fig. 3-9.

Supplied Cartridge (VL-30G)

Adjust the stylus force by turning the counterweight clockwise to obtain "3 g" reading on the stylus force gauge as shown in Fig. 3-8.

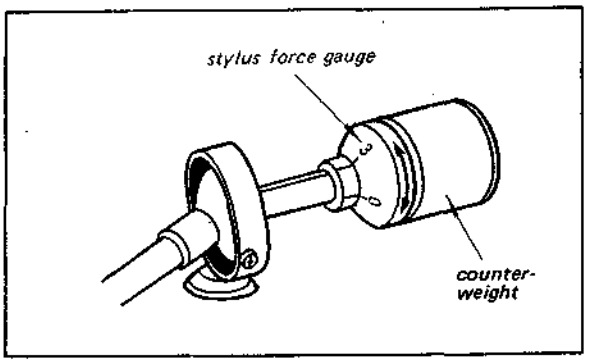


Fig. 3-8. Stylus force adjustment

Other Cartridge

1. Check the instructions given with the cartridge to determine the proper stylus force. Each graduation on the stylus force gauge represents 0.5 gram.
2. Adjust the stylus force by turning the counterweight clockwise to obtain the proper (recommended) value of stylus force.

3-4. ANTI-SKATING FORCE ADJUSTMENT

Preparation

1. Release the tonearm from its rest, and set the cueing lever to the "▼".
2. Horizontally balance the tonearm by turning the counterweight at the end of the tonearm, and set the stylus force gauge ring to "O" while holding the counterweight as shown in Fig. 3-9.

Procedure

Supplied Cartridge (VL-30G)

1. Turn the counterweight clockwise to obtain the "3 g" reading on the stylus force gauge as shown in Fig. 3-8.
2. Adjust the anti-skating force by matching its left side of the weight to the edge (3 g) of the three lines on the anti-skating force gauge as shown in Fig. 3-10.

SECTION 3
ADJUSTMENTS

3-1. TONEARM HEIGHT ADJUSTMENT

At Automatic Return Operation

1. When the tonearm automatically returns to the tonearm rest after playing, check to see that the clearance between the stylus tip and the record on the turntable is 4 to 10 mm ($^{6}/_{32}$" to $^{25}/_{64}$") as shown in Fig. 3-1.
2. If necessary, adjust the height of the tonearm lifting platform by loosening the its adjustment screw shown in Fig. 3-2.

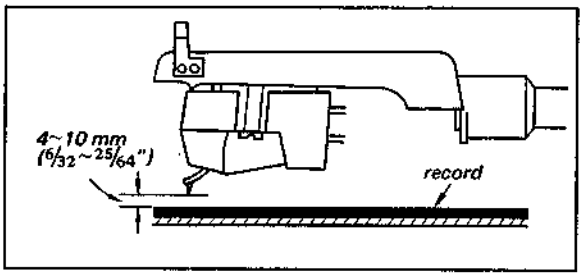


Fig. 3-1. Tonearm height adjustment (1)

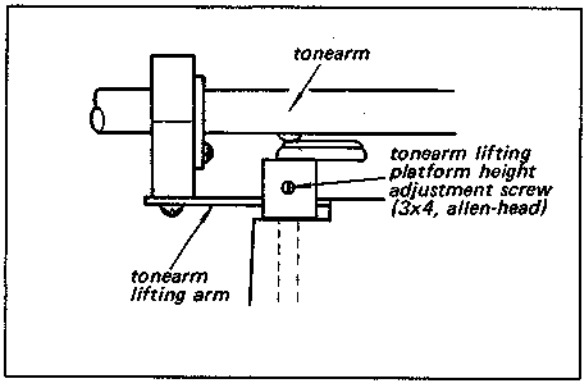


Fig. 3-2. Tonearm height adjustment (2)

At Manual Cueing Operation

1. Set the lifting lever to " ▼ " position.
2. Confirm that the clearance between the stylus tip and the record on the turntable is 4 to 10 mm ($^{6}/_{32}$" to $^{25}/_{64}$") as shown in Fig. 3-1.
3. If necessary, adjust the height of the tonearm lifting platform by loosening the tonearm height adjustment screw as shown in Fig. 3-3.

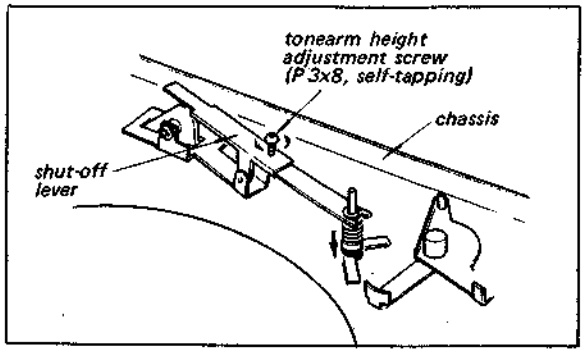


Fig. 3-3. Tonearm height adjustment (3)

3-2. AUTOMATIC RETURN POSITION ADJUSTMENT

1. Put the tonearm on the tonearm rest.
2. Pull the REJECT knob to toward you.
3. Mesh the teeth on turntable shaft and the main cam by rotating the turntable shaft clockwise.
4. Rotate the main cam once.
   The main cam and turntable shaft will disengage.
5. Move the trip pawl in the arrow direction in Fig. 3-4, as far as it goes.
6. Release the tonearm from its rest.
7. Bring the tonearm toward the turntable shaft.
8. When the return pawl touches the striker of turntable shaft as shown in Fig. 3-5, check that the distance between the stylus tip and the center of turntable shaft is 61 mm to 64 mm ($2^{25}/_{64}$ to $2^{17}/_{32}$") as shown in Fig. 3-6 by using adjustment jig (Part No. 9-911-814-01). If not, turn the automatic return position adjustment screw as shown in Fig. 3-7.

   If the automatic return works too early, turn the adjustment screw clockwise..... if too late, turn the screw counterclockwise.

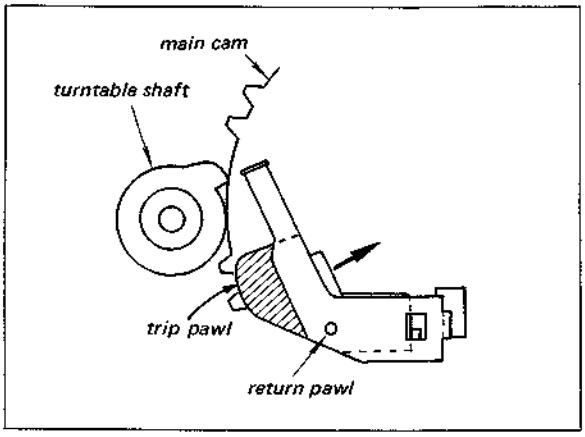


Fig. 3-4. Automatic return position adjustment (1)

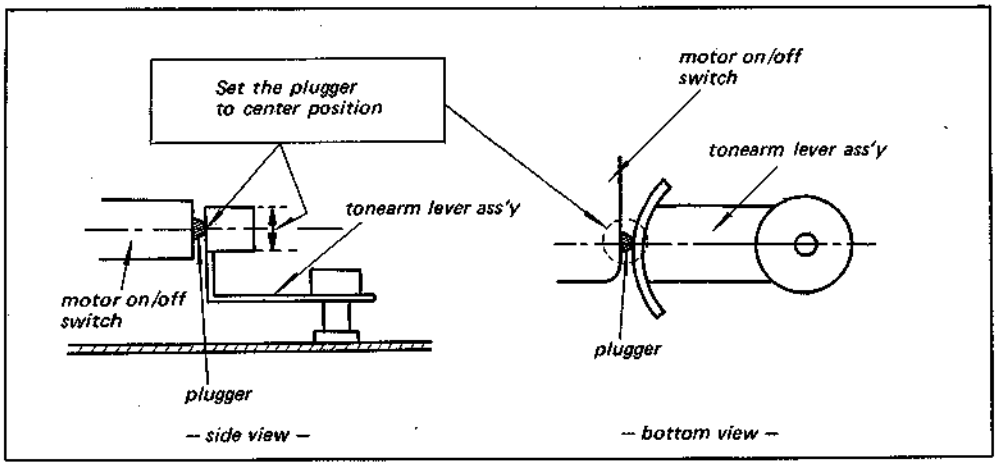


Fig. 2-19. Tonearm installation

5. Loosen the adjustment screw with a screwdriver as shown in Fig. 2-16.
6. Slide the shell head so that the distance between the stylus tip and the neck of the shell head is 52.5 mm ($2^{1}/_{16}$") as shown in Fig. 2-16.

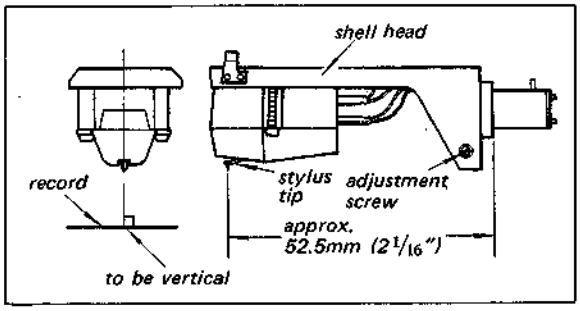


Fig. 2-16. Shell head position adjustment

2-10. TONEARM REPLACEMENT

1. Remove the turntable base as described in procedure 2-1.
2. Remove the shell head from the tonearm by loosening the collar as shown in Fig. 2-11.
3. Remove the counterweight from the tonearm.
4. Unsolder the four lead wires of tonearm at 4-P connector circuit board.
   Refer to Fig. 2-17, when reconnecting the lead wires to the 4-P connector circuit board.

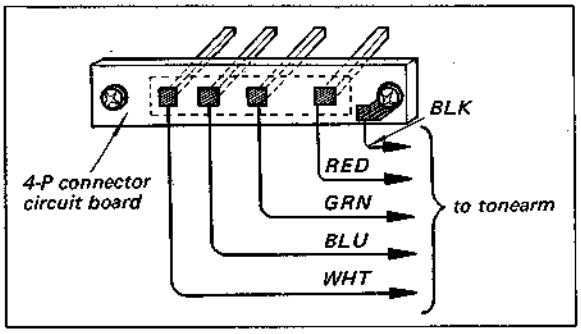


Fig. 2-17. Lead wire connection

5. Remove the tonearm lever ass'y by loosening the two allen-head screws as shown in Fig. 2-18.
6. Remove the hexagon nut securing the tonearm to the turntable base as shown in Fig. 2-18.
7. Install the new tonearm as described in the following steps.

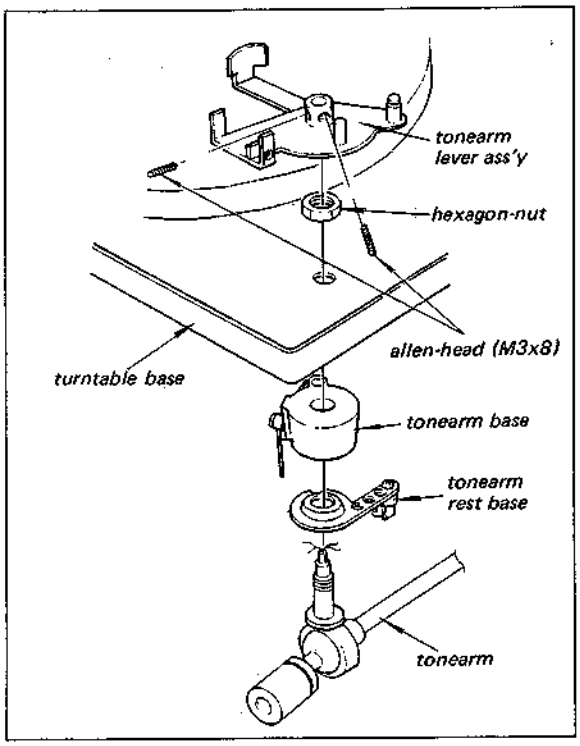


Fig. 2-18. Tonearm replacement

Tonearm Installation

a) Put the tonearm on the tonearm rest.

b) Adjust the height of tonearm by moving the tonearm up and down until the optimum result is obtained as shown in Fig. 2-19.

c) Tighten the two allen-head screws securing the tonearm lever.

d) After completing the replacement procedure, perform the automatic return position adjustment as described in procedure 3-2 on page 10.

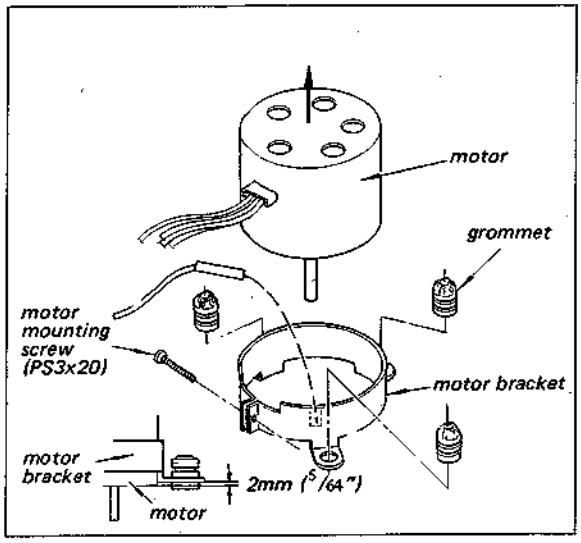


Fig. 2-10. Motor installation

2-8. STYLUS TIP REPLACEMENT

1. Remove the shell head from the tonearm by loosening the collar as shown in Fig. 2-11.
2. Pull off the worn-stylus tip in the arrow direction in Fig. 2-12, and insert the new stylus tip (ND-133G) into the cartridge.

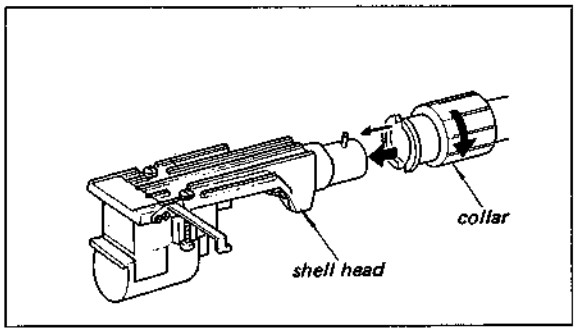


Fig. 2-11. Shell head removal

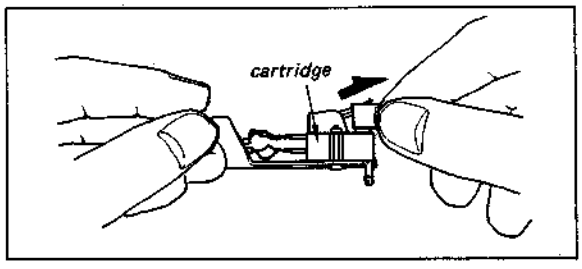


Fig. 2-12. Stylus tip replacement

2-9. CARTRIDGE REPLACEMENT

1. Remove the shell head from the tonearm by loosening the collar as shown in Fig. 2-11.
2. Unplug the four pin connectors at the cartridge as shown in Fig. 2-13.
3. Loosen the two cartridge mounting screws shown in Fig. 2-14.
4. Remove the defective cartridge, and install the new cartridge.
   Refer to the wiring diagram shown in Fig. 2-15, when installing it.

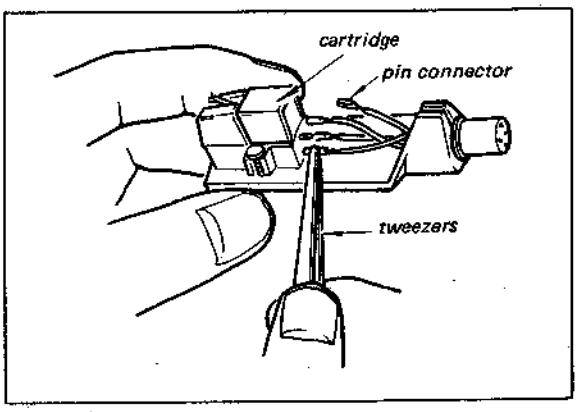


Fig. 2-13. Pin connector removal

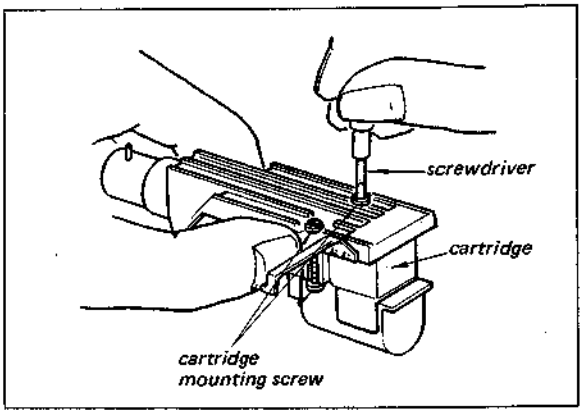


Fig. 2-14. Cartridge removal

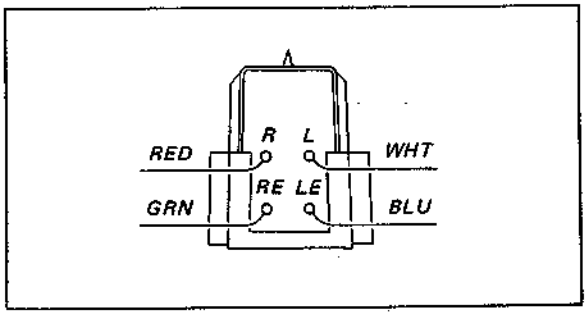


Fig. 2-15. Wiring diagram of cartridge

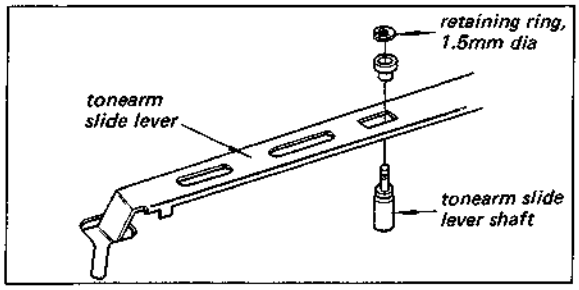


Fig. 2-5. Tonearm slide lever removal (1)

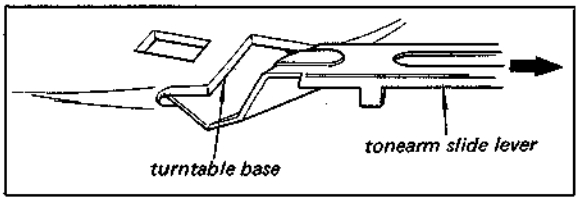


Fig. 2-6. Tonearm slide lever removal (2)

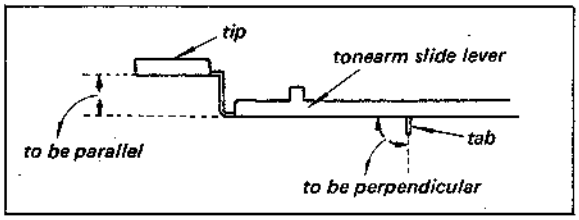


Fig. 2-7. Tonearm slide lever installation

2-6. TONEARM RETURN LEVER REPLACEMENT

1. Remove the turntable base as described in procedure 2-1.
2. Remove the retaining ring and two tension springs as shown in Fig. 2-8.
3. Apply grease (Part No. 7-662-001-11) to the tonearm lifting shaft and surface of the tonearm return lever's tab as shown in Fig. 2-8, when installing it.
4. After completing the replacement procedure, perform automatic return position adjustment as described in procedure 3-2 on page 10.

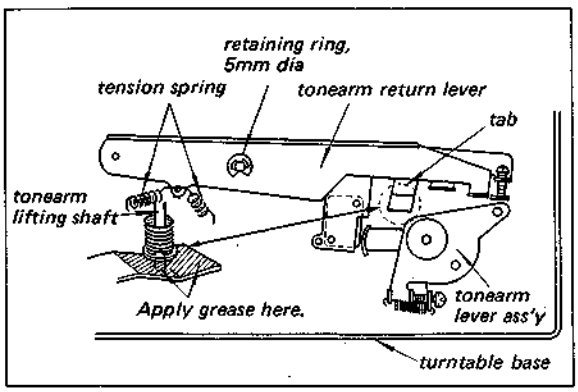


Fig. 2-8. Tonearm return lever replacement

2-7. MOTOR REPLACEMENT

1. Remove the turntable base as described in procedure 2-1.
2. Remove the motor pulley by loosening the allen-head screw.
3. Unsolder the four lead wires of the motor at the power supply board.
4. Remove the lead wire clamp by removing the self-tapping screw shown in Fig. 2-9.
5. Remove the motor bracket along with the motor by removing the three retaining rings and the three washers shown in Fig. 2-9.
6. Remove the motor in the arrow direction in Fig. 2-10 by loosening the motor mounting screw.
7. Install a new motor.
8. Adjust the height of the motor by moving the motor up and down so that the top of motor is 2mm ($^{5}/_{64}$") lower than the bottom part of motor bracket as shown in Fig. 2-10.
9. Tighten the motor mounting screw.
10. After completing the replacement procedures, perform motor pulley height adjustment as described in procedure 4-1 on page 15.

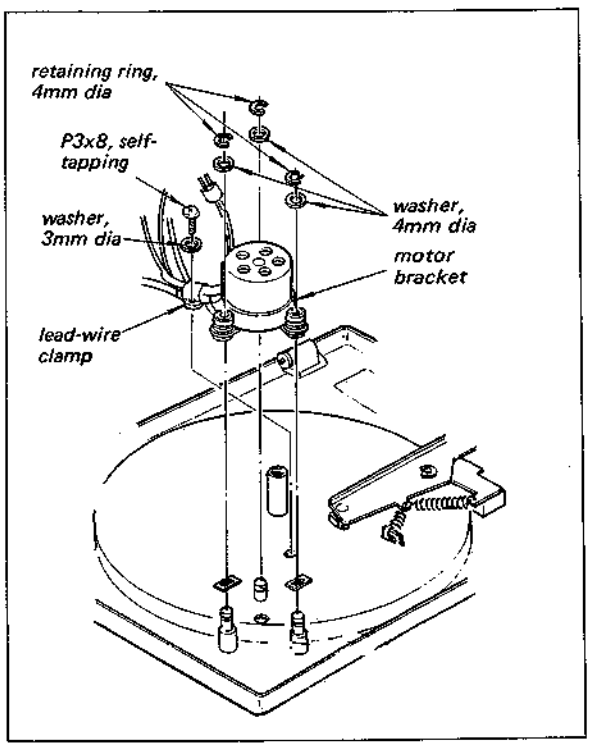


Fig. 2-9. Motor removal

4. Apply grease (Part No. 7-662-001-11) on the turntable shaft as shown in Fig. 2-2, when reinstalling it.
5. After completing the above installation, make sure that turntable shaft turns smoothly.

2-3. TURNTABLE THRUST BEARING REMOVAL

1. Remove the turntable base as described in procedure 2-1.
2. Remove the turntable shaft as described in procedure 2-2.
3. Remove the washer and nut as shown in Fig. 2-2.

   This frees the thrust bearing.

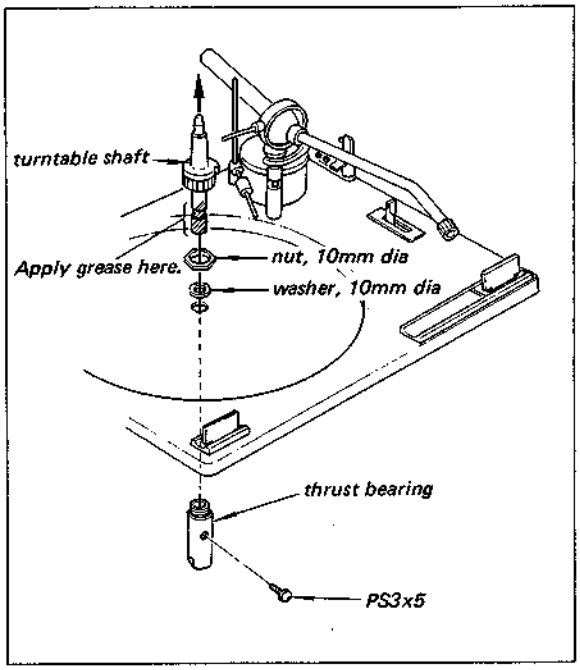


Fig. 2-2. Turntable shaft and thrust bearing removal

2-4. MAIN CAM REPLACEMENT

1. Remove the retaining ring as shown in Fig. 2-3.
2. Remove the defective main cam.
3. Install a new one.
4. After replacing the cam, make sure that

a) grease (Part No. 7-662-001-11) is applied on the tonearm return lever shaft (See Fig. 2-3).
b) the tonearm return lever collar is correctly plugged to the shaft of tonearm return lever (See Fig. 2-3).
c) the tonearm return lever shaft is positioned in the groove of the main cam.

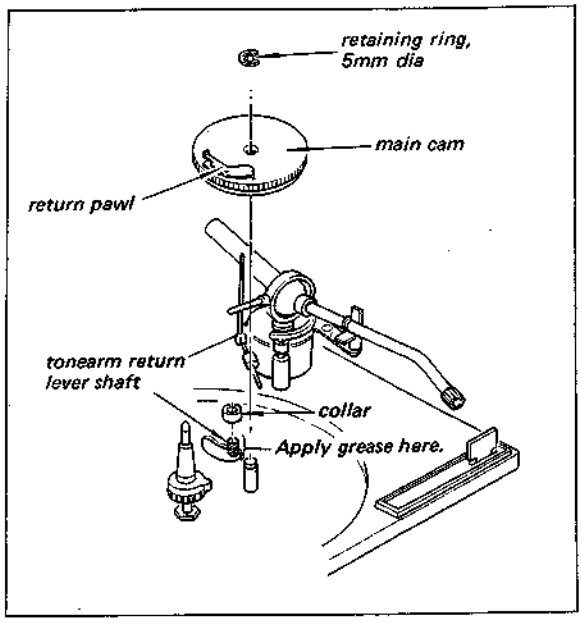


Fig. 2-3. Main cam replacement

2-5. TONEARM SLIDE LEVER REPLACEMENT

1. Remove the turntable base as described in procedure 2-1.
2. Remove the main cam as described in procedure 2-4.
3. Remove the tonearm lifting lever by removing the retaining ring as shown in Fig. 2-4.
4. Remove the retaining ring as shown in Fig. 2-5.
5. Remove the tonearm slide lever in the arrow direction in Fig. 2-6.
6. Install a new tonearm slide lever after making sure the following points:

a) The tip of tonearm slide lever is parallel to the tonearm slide lever as shown in Fig. 2-7.
b) The tab of tonearm slide lever is perpendicular to the tonearm slide lever as shown in Fig. 2-7.

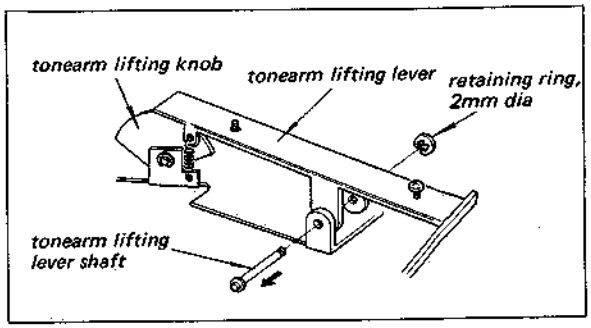


Fig. 2-4. Tonearm lifting lever removal

SECTION 2
DISASSEMBLY AND REPLACEMENT

Note: All screws are Phillips type (cross recess type) unless otherwise indicated.

2-1. TURNTABLE BASE REMOVAL

Remove ❶ ~ ❻ shown in Fig. 2-1. This frees the turntable base.

2-2. TURNTABLE SHAFT REMOVAL

1. Remove the turntable base as described in procedure 2-1.
2. Place the turntable base upside down.
   Place a support between the turntable base and the service bench to keep pressure off the tone-arm.
3. Pull out the turntable shaft by removing the set screw as shown in Fig. 2-2.

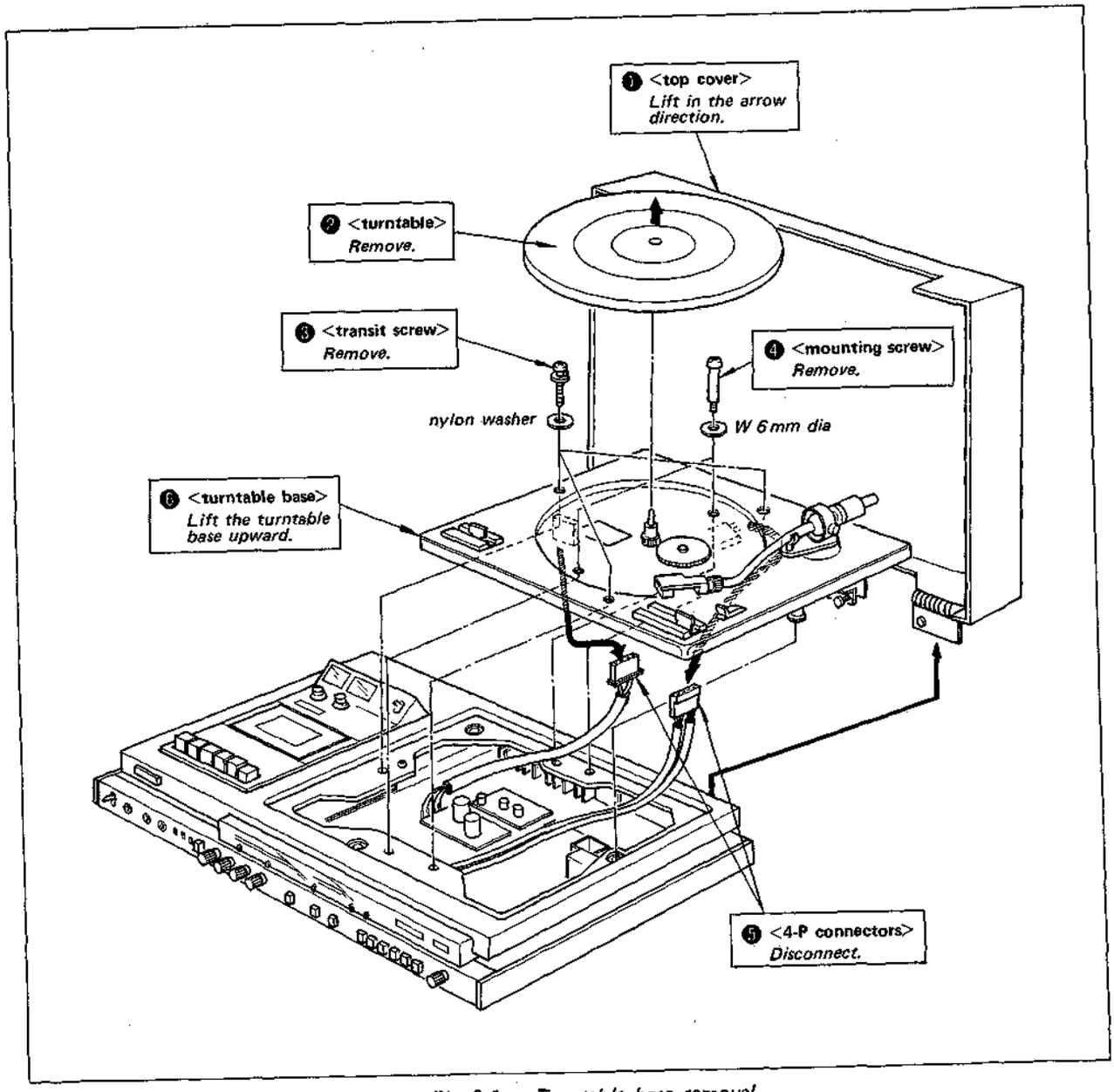


Fig. 2-1. Turntable base removal

This enables the motor (4) to complete the last half cycle of rejecting operation after the tonearm has moved back to its rest (12). When the main cam (8) comes to its last movement, the tonearm return lever (10) is moved back to its original position cutting off power to the motor (4) as shown in Fig. 1-8, because the motor on/off switch (3) is pressed by the leg of the tonearm lever ass'y (1) while the tonearm return lever (10) lowers the tonearm lifting shaft (11) (See Fig. 1-8.).

Now the tonearm returns to its rest (12).

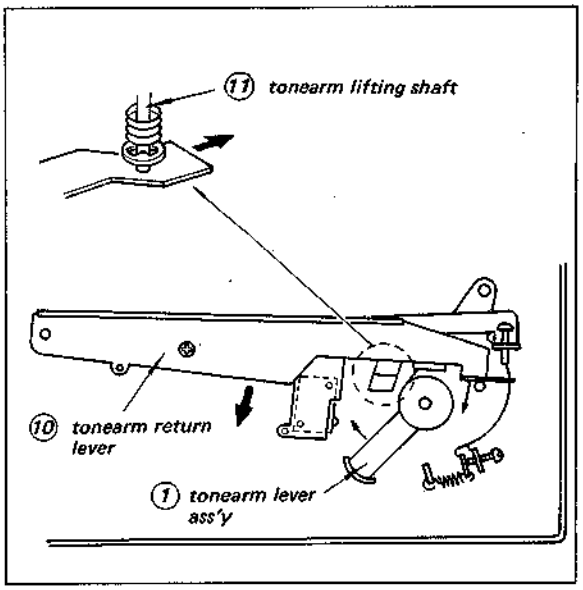


Fig. 1-7. Tonearm return lever movement (1)

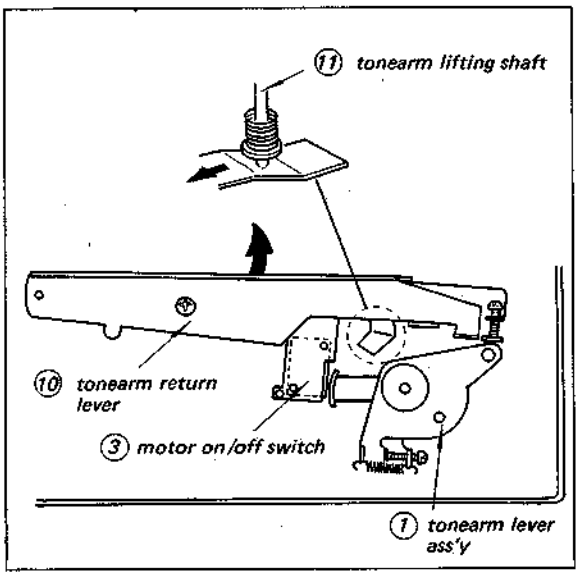


Fig. 1-8. Tonearm return lever movement (2)

1-3. MANUAL REJECT OPERATION

Note: Circled numbers refer to those in Fig. 1-1 and Fig. 1-2.

The tonearm can be rejected anywhere on the record by using the manual reject lever (13).

Referring to Fig. 1-9, the reject lever (8) pushes the tonearm slide lever (6) towards the turntable center. This triggers the automatic return mechanism as previously described.

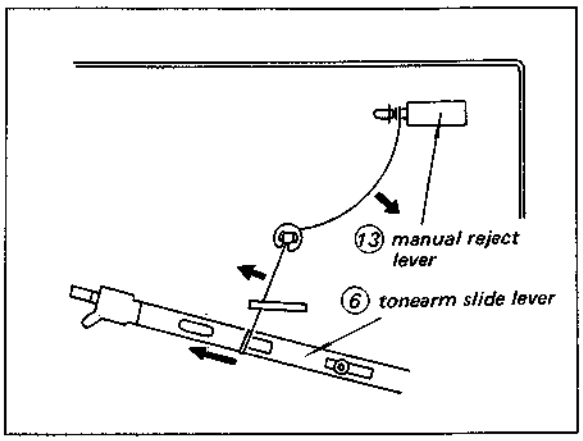


Fig. 1-9. Reject lever movement

1-2. AUTOMATIC RETURN OPERATION

Note: Circled numbers refer to those in Fig. 1-1 and Fig. 1-2.

The turntable starts to revolve when the tonearm is lifted from its rest and moved towards the lead-in groove of the record. This is because the tonearm ass'y (1) which is attached to the end of the tonearm shaft (2) rotates and removes the pressure from the tip of the motor on/off switch (3) as shown in Fig. 1-3.

When the stylus tip closes to the lead-out record groove, the collar (5) on the tonearm lever ass'y pushes against the tonearm slide lever (6) and it slides towards the turntable center as shown in Fig. 1-4.

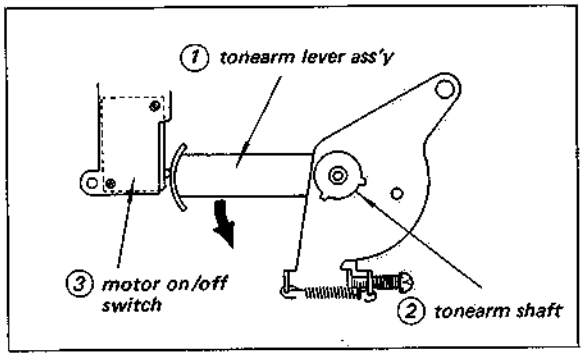


Fig. 1-3. Tonearm lever ass'y movement

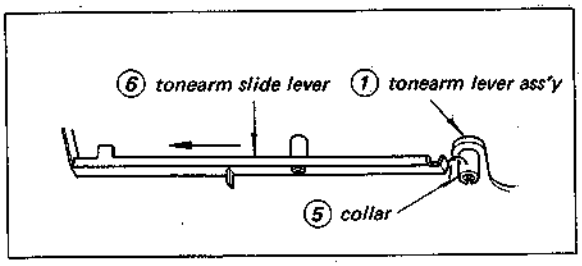


Fig. 1-4. Tonearm slide lever movement

When the stylus tip enters the lead-out groove, the tonearm slide lever (6) pushes the trip pawl (9) on the main cam (8) towards the turntable center along with the return pawl (7) by means of friction between them as shown in Fig. 1-5.

The return pawl is simply mounted on the trip pawl (9) .

The return pawl (7) enters path of the striker on the revolving turntable shaft (14) when the stylus enters the eccentric lead-out groove as shown in Fig. 1-6.

As the main cam (8) rotates, it moves the tonearm return lever (10) , causing the tonearm lever ass'y (1) to pivot and to raise the tonearm lifting shaft (11) as shown in Fig. 1-7.

The motor on/off switch (3) is still free from the tonearm lever ass'y (1) at this point.

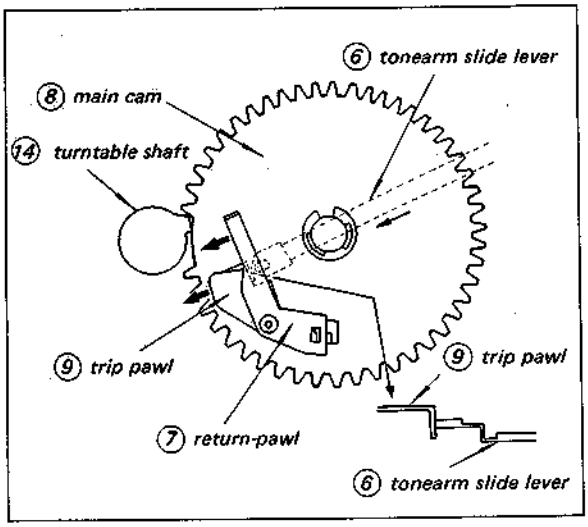


Fig. 1-5. Return pawl movement

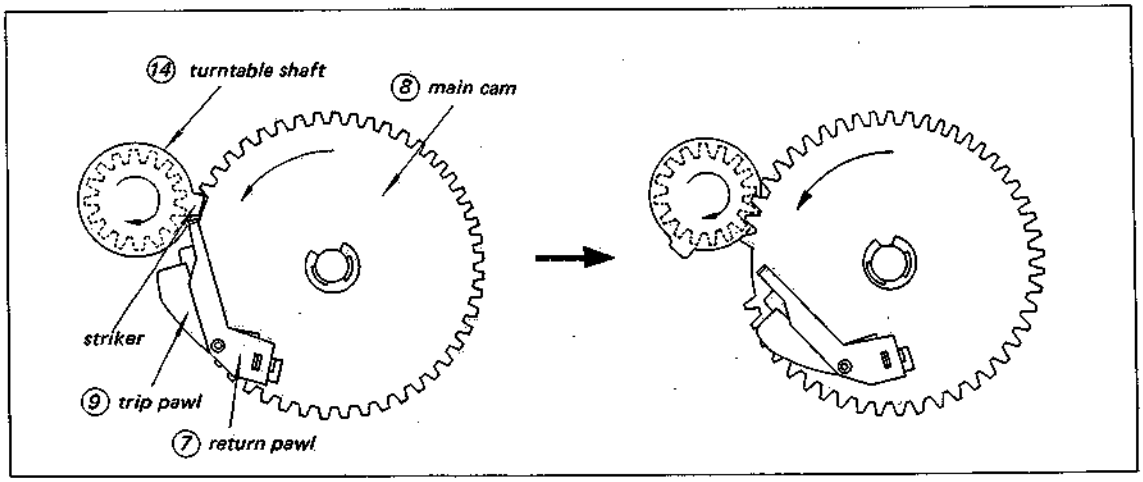


Fig. 1-6. Main cam movement

SECTION 1
TECHNICAL DESCRIPTION

1-1. OPERATING INSTRUCTIONS

(See Fig. 1-1 and 1-2.)

To Play Automatically

1. Place a record onto the turntable.
2. Set the speed selector knob to the desired speed.
3. Set the lifting lever to " ▼ ".
4. Release the tonearm from its rest. Now the turntable will start rotating.
5. Bring the tonearm to the desired position of record.
6. Set the lifting lever to " ▼ ".

Note: The cueing device also can raise or lower the tonearm at any selected point.

7. After playing the record, the tonearm will return to its rest and the unit will shut off automatically.

To Reject

To reject a record at any position when the unit is in operation, move the reject knob to "REJECT". The tonearm will return to its rest and the unit will shut off automatically.

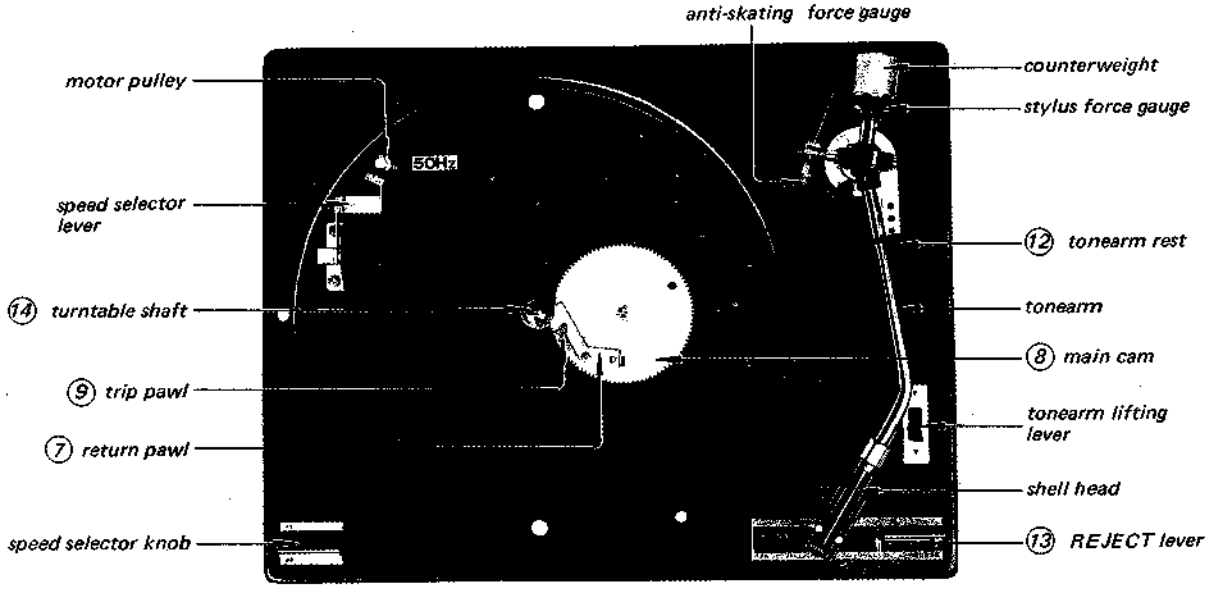


Fig. 1-1. Top view

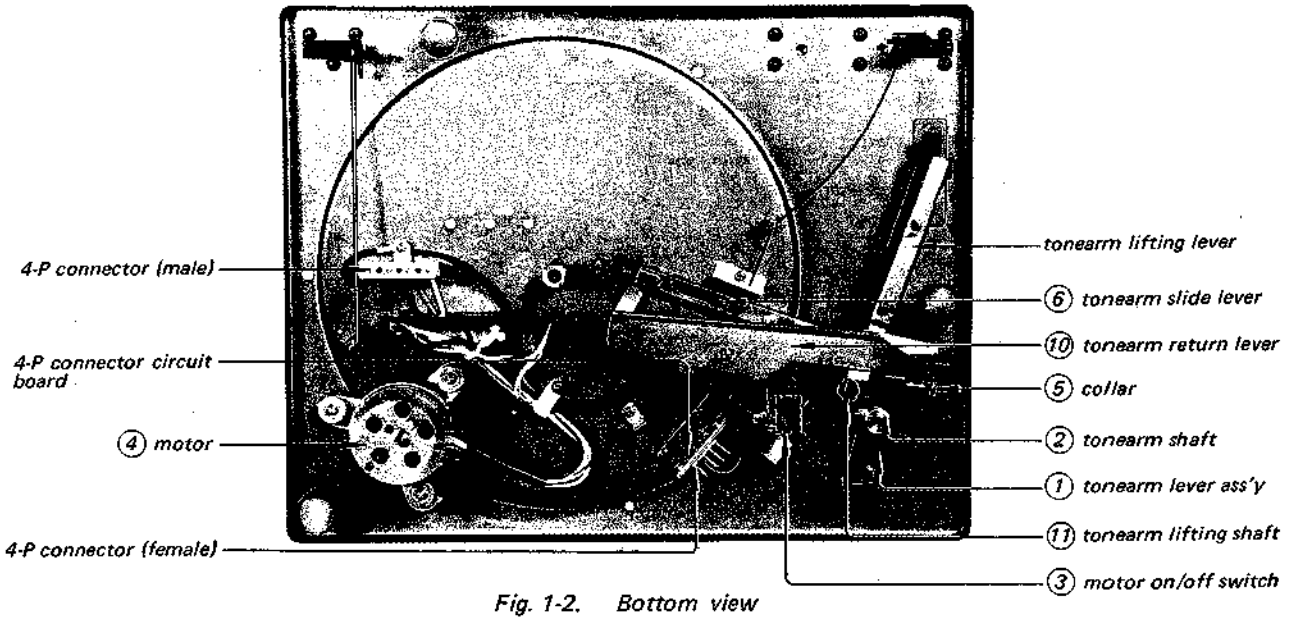


Fig. 1-2. Bottom view

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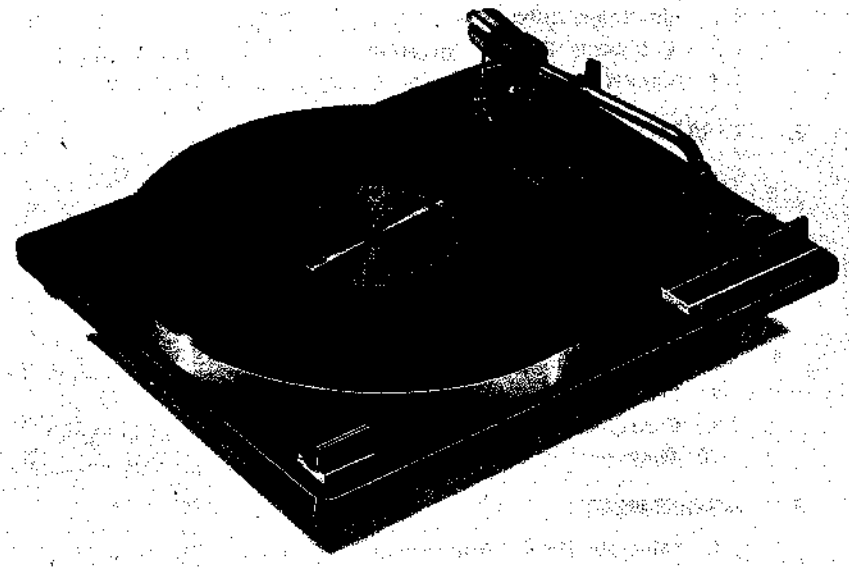
Note: This player is installed in the HMK-70.

TTS-360

AEP Model
UK Model



STEREO RECORD PLAYER

SPECIFICATIONS

RECORD PLAYER

Speeds:	$33^{1}/_{3}$, 45 rpm
Drive system:	belt-drive
Wow and flutter:	±0.09% weighted (DIN 45507)
Signal-to-noise ratio:	Greater than 63 dB weighted (DIN 45544)
Turntable platter:	30 cm ($11\,^{3}/_{16}$ inch) dia, die-cast aluminum alloy, 1 kg (2 lb 3 oz)
Motor:	4-pole hysteresis synchronous (HA1-2)

TONEARM (PUA-305)

Type:	Statically balanced
Arm length:	295 mm ($11\,^{5}/_{8}$ inches), overall
	216.5 mm ($8\,^{17}/_{32}$ inches), pivot-to-stylus
Overhang:	16.5 mm ($^{21}/_{32}$ inches)
Stylus-force adjustment range:	0 to 3 g, 0.5 g increments
Anti-skating force compensation range:	0 to 3 g, 0.5 g increments
Cartridge weight range:	4 to 12 g
Shell head weight:	10.5 g

CARTRIDGE

Type:	Magnetic type VL-30G
Optimum stylus force:	3 g
Stylus:	Conical 0.5 mil diamond (SONY ND-133G)
Weight:	6 g

SONY®
SERVICE MANUAL
in 106

SECTION 7
EXPLODED VIEWS

(1)

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

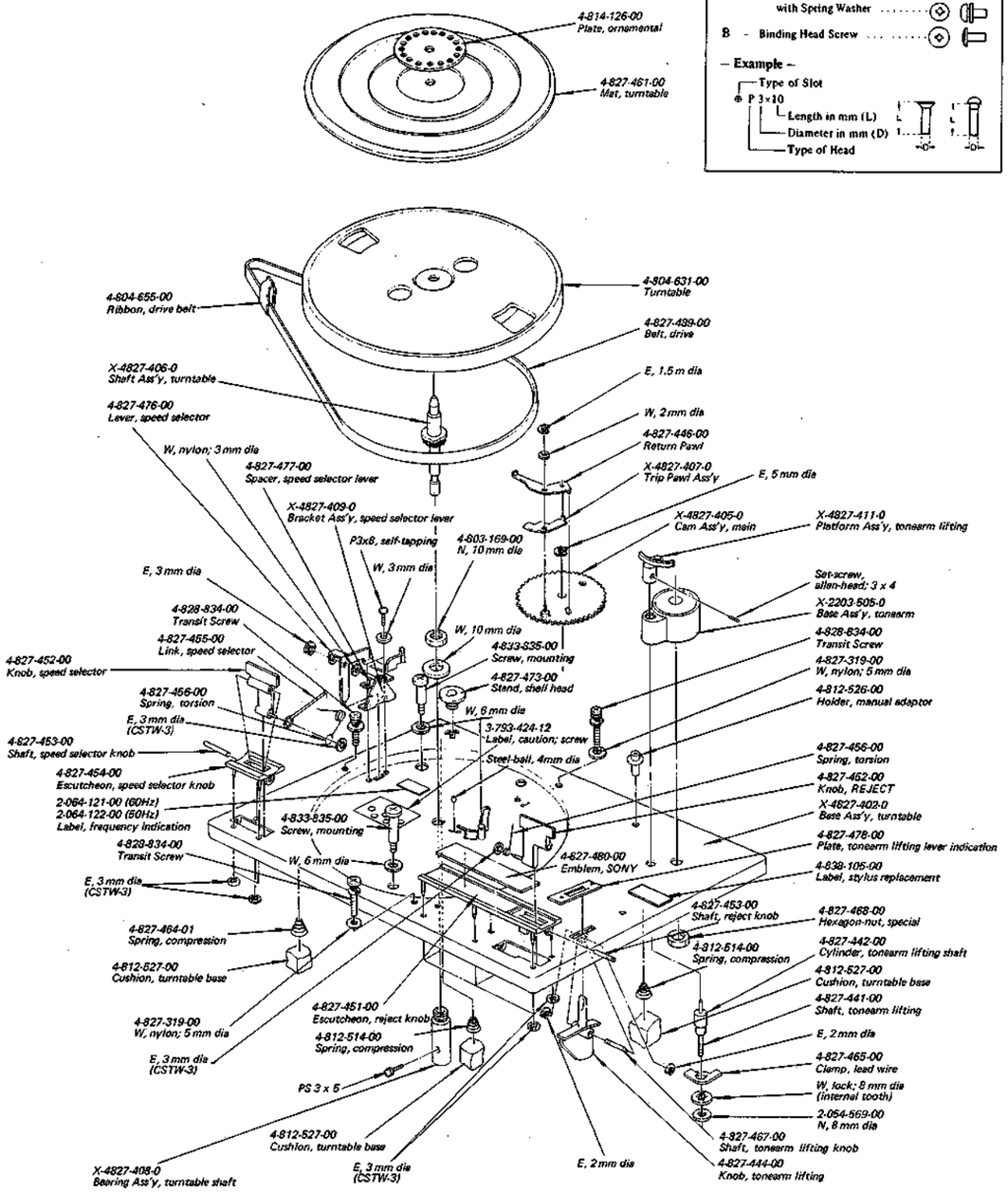
— Hardware Nomenclature —

P – Pan Head Screw

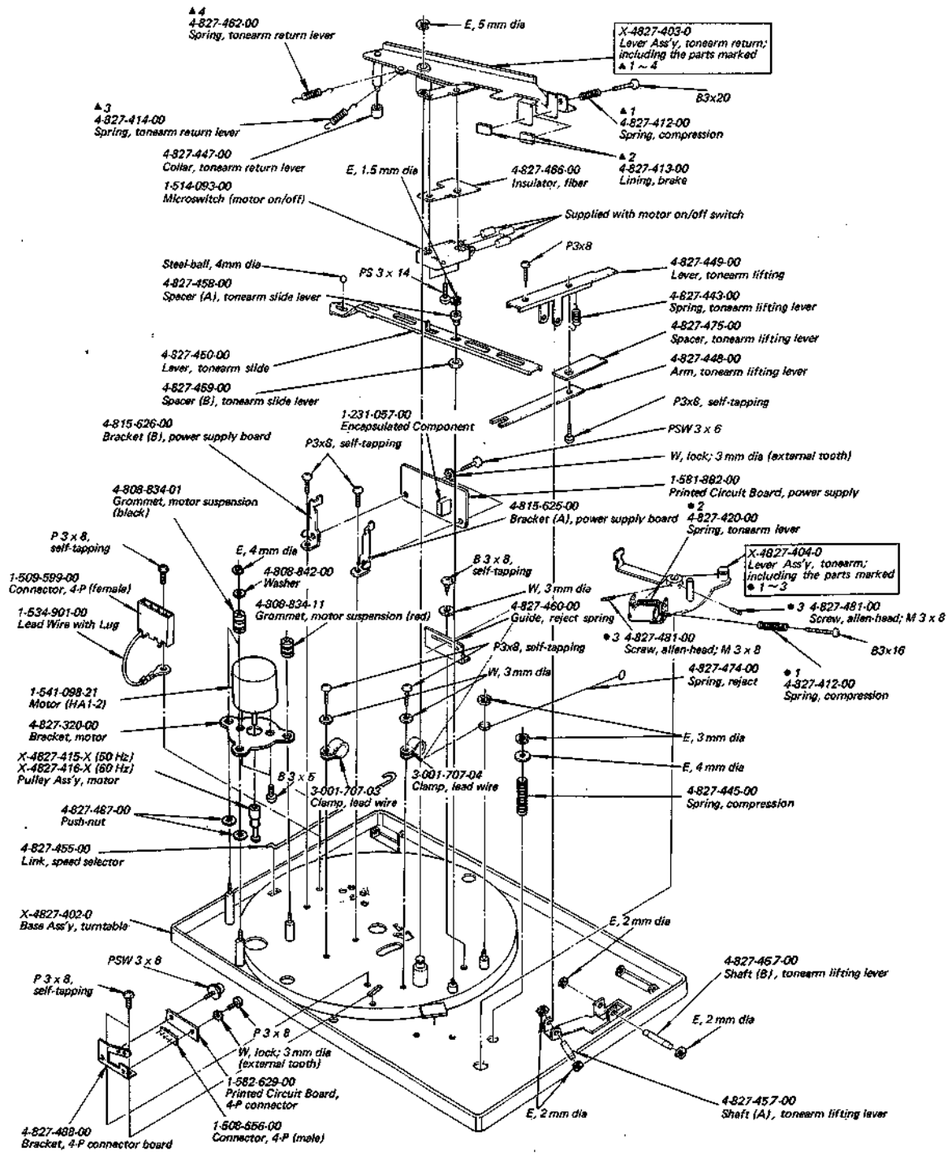
PS – Pan Head Screw with Spring Washer

B – Binding Head Screw

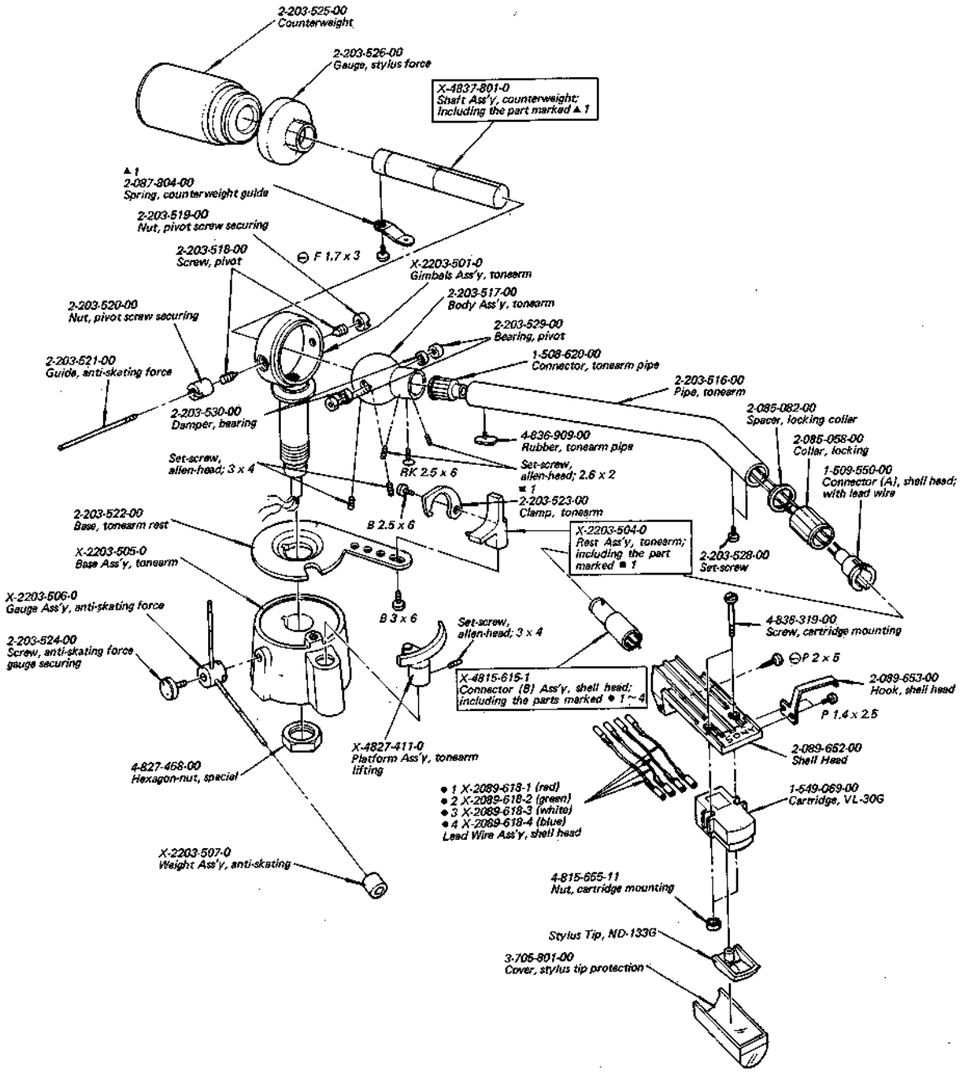
– Example –
Type of Slot
P 3×10
Length in mm (L)
Diameter in mm (D)
Type of Head



(2)



(3)
– Tonearm (PUA-305) Section –



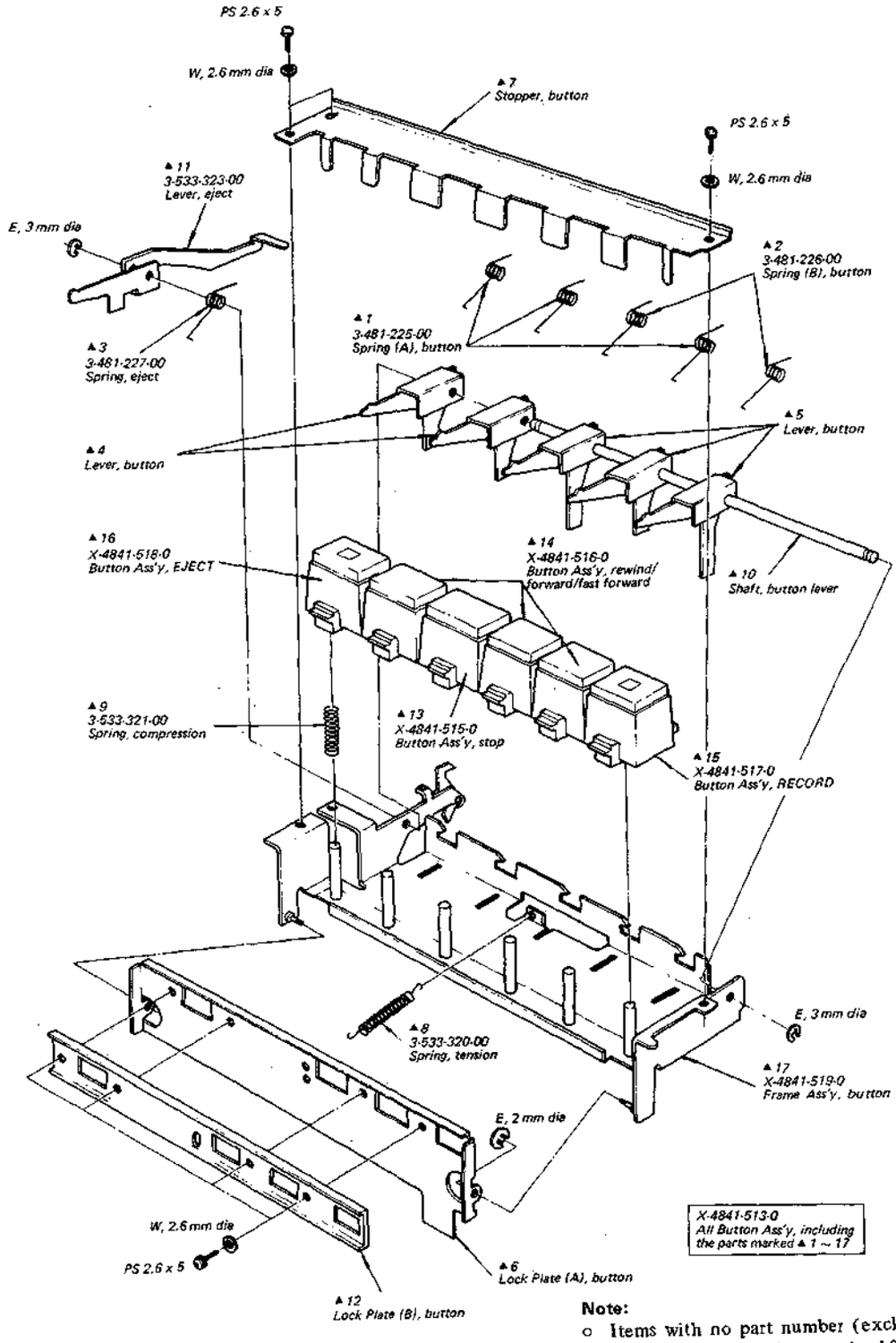
SECTION 8
ELECTRICAL PARTS LIST

Part No.	*Description*	*Part No.*	*Description*
1-113-149-11	Capacitor, metalized paper; 0.7 μF/250 V (for 60 Hz)	1-509-599-00	Amplok, 4-p (female)
		1-514-093-00	Microswitch (motor on/off)
1-117-104-11	Capacitor, metalized paper; 0.8 μF/250 V (for 50 Hz)	1-534-901-00	Load Wire with Lug
		1-541-098-21	Motor, HA1-2
1-231-057-00	Encapsulated Component	1-581-882-00	Printed Circuit Board, power supply
1-508-620-00	Connector (male)	1-582-629-00	Printed Circuit Board, 4-p connector
1-508-656-00	Connector, 4-p (male)	1-549-069-00	Cartridge, VL-30G
1-509-550-00	Connector (female)		Stylus, ND-133G

Sony Corporation

9-958-040-02
5H0630-3
Printed in Japan

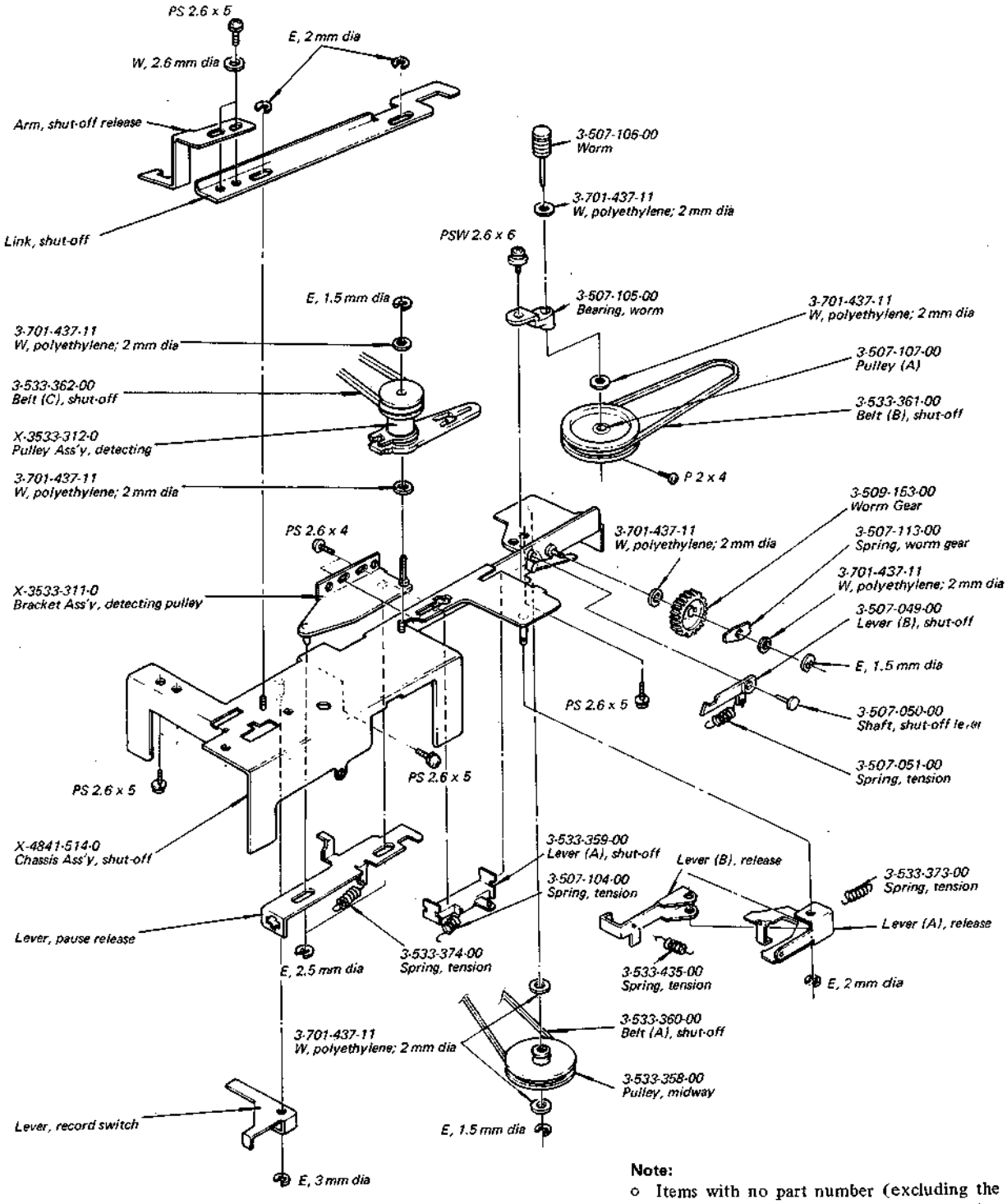
(2)



Note:

- Items with no part number (excluding the hard wares*) are seldom required for routine service and are not stocked at local part depots.
  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

(3)



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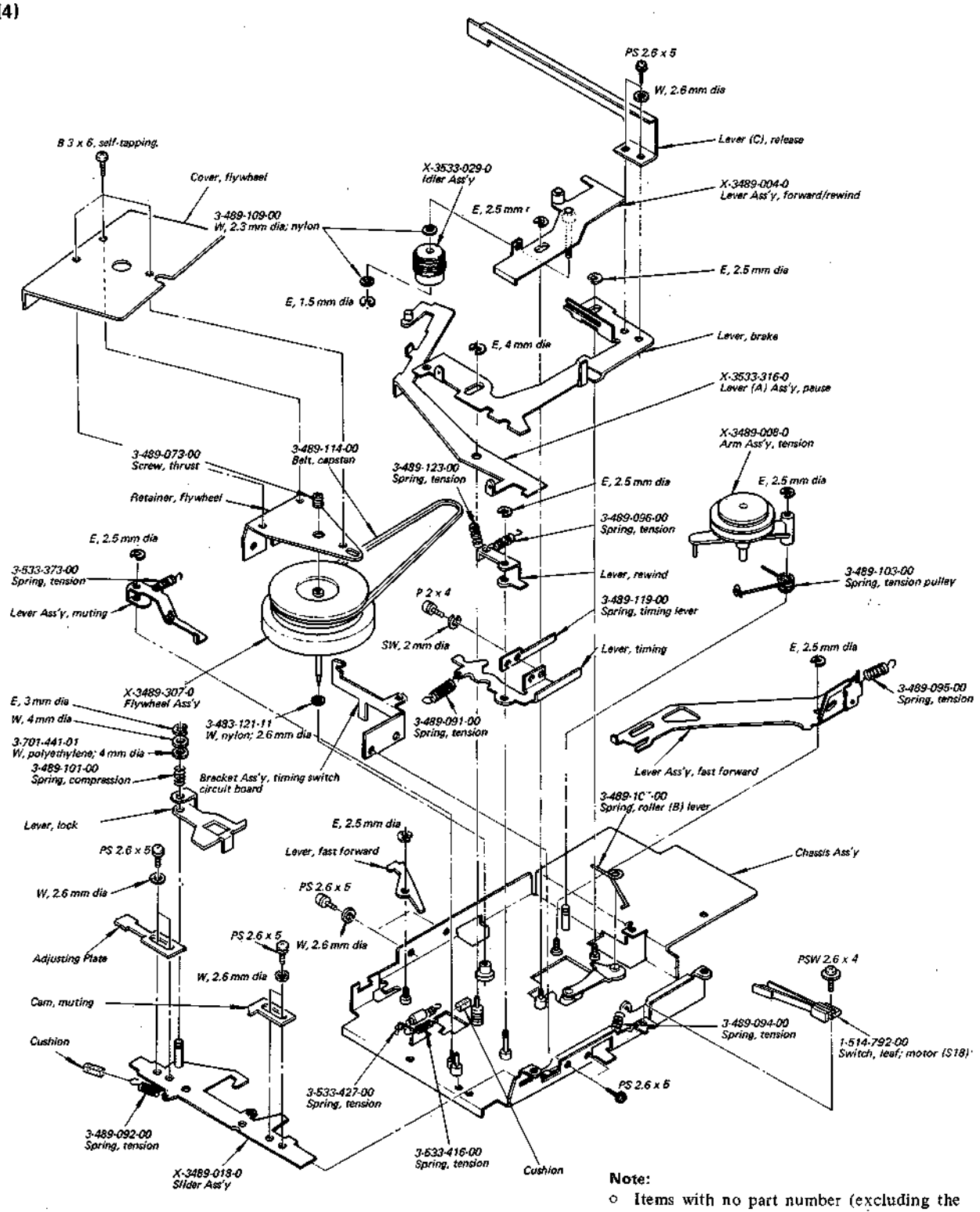
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

(4)



Note:

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  Allow extra time for delivery of these parts.
  * The hard wares (screws, nuts, washers and bolts) are stocked at local part depots.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	*Part No.*	*Description*
	COMPLETE CIRCUIT BOARDS	
	A-2014-028-A	Bias Osc
	A-2023-070-A	Switch
	A-2025-015-A	MIC Jack
	SEMICONDUCTORS	
	Transistors	
Q1~Q4		2SC634A
Q51		2SC1124
Q52		2SA678
Q53,Q54		2SC634A
Q501(Q601)		2SC632A
Q502(Q602)		2SC632A
Q503(Q603)		2SC632A
Q504(Q604)		2SC634A
Q505(Q605)		2SC633
Q506(Q606)		2SC1364
Q507(Q607)		2SC632A
Q508(Q608)		2SC633A
Q509(Q609)		2SC634A
	ICs	
IC501(IC601)		TA7122AP
	Diodes	
D1,D2		1T22A
D3,D4		1S1555
D51		10D-2
D52		RD8·2E
D501(D601)		1T22A
D502(D602)		1S1555
D503(D603)		V06C

Ref. No.	*Part No.*	*Description*
	COIL AND INDUCTORS	
L51,L52	1-407-561-00	Microinductor, 33 mH
L53,L54	1-407-240-00	Microinductor, 22 mH
L501(L601)	1-407-661-xx	Microinductor, 470 μH
L502(L602)	1-407-203-xx	Microinductor, 5.6 mH
L503(L603)	1-407-197-xx	Microinductor, 1.8 mH
L504(L604)	1-407-200-xx	Microinductor, 3.3 mH
	1-464-005-00	Unit, bias osc

CAPACITORS

Capacitors here are in μF and electrolytic type unless otherwise noted. (p = μμ)
The working voltages of 50 volts or less are omitted except for electrolytic type.

C1	1-129-896-11	0.012	100 V	polyethylene
C2	1-129-701-11	0.01	100 V	polyethylene
C3	1-129-899-11	0.056	100 V	polyethylene
C4	1-108-573-12	0.0056		mylar
C5	1-107-103-11	6p		silvered mica
C6	1-121-651-11	10	16 V	
C7	1-108-234-12	0.0047		mylar
C8	1-131-205-11	2.2	25 V	tantalum
C9	1-129-794-11	0.0033	100 V	polyethylene
C10	1-131-197-11	3.3	16 V	tantalum
C51,C52	1-107-130-11	91p		silvered mica
C53	1-121-357-11	100	35 V	
C54	1-108-244-12	0.033		mylar
C55	1-121-352-11	47	10 V	
C56,C57	1-121-426-11	470	16 V	
C58	1-121-152-11	22	50 V	
C59	1-121-420-11	220	10 V	
C60	1-106-347-12	0.0015	200 V	mylar
C61,C62	1-107-016-11	470p	500 V	silvered mica
C63,C64	1-107-137-11	180p		silvered mica
C65,C66	1-107-129-11	82p		silvered mica
C67,C68	1-107-102-11	5p		silvered mica

Ref. No.	Part No.			Description
C521(C621)	1-121-651-11	10	16V	
C522(C622)	1-121-395-11	4.7	25V	
C523(C623)	1-107-095-11	270p		silvered mica
C524(C624)	1-107-085-11	100p		silvered mica
C525(C625)	1-121-402-11	33	10V	
C526(C626)	1-107-111-11	15p		silvered mica
C527(C627)	1-121-651-11	10	16V	
C528(C628)	1-121-398-11	10	25V	
C529(C629)	1-121-416-11	100	25V	
C530(C630)	1-131-212-11	0.33	35V	tantalum
C531(C631)	1-107-085-11	100p		silvered mica
C532(C632)	1-107-127-11	68p		silvered mica
C533(C633)	1-108-576-12	0.0075		mylar
C534(C634)	1-121-402-11	33	10V	
C535(C635)	1-121-392-11	3.3	25V	
C536(C636)	1-121-398-11	10	25V	
C537(C637)	1-121-404-11	33	25V	
C538(C638)	1-121-391-11	1	50V	
C539(C639)	1-121-391-11	1	50V	
C540(C640)	1-121-398-11	10	25V	
C541(C641)	1-121-726-11	0.47	50V	
C542(C642)	1-121-392-11	3.3	25V	
C543(C643)	1-121-395-11	4.7	25V	
C544(C644)	1-121-391-11	1	50V	
C545(C645)	1-121-404-11	33	25V	
C546(C646)	1-108-251-12	0.1		mylar
C547(C647)	1-107-111-11	15p		silvered mica
C548(C648)	1-108-227-12	0.001		mylar
C549(C649)	1-121-402-11	33	10V	
C550(C650)	1-121-413-11	100	6.3V	
C551(C651)	1-121-391-11	1	50V	
C552(C652)	1-121-726-11	0.47	50V	
C553(C653)	1-107-242-11	390p		silvered mica
C554(C654)	1-107-095-11	270p		silvered mica
C555(C655)	1-121-419-11	220	6.3V	
C556(C656)	1-108-597-12	0.056		mylar
C557(C657)	1-121-402-11	33	10V	
C558(C658)	1-108-237-12	0.0068		mylar
C559(C659)	1-121-415-11	100	16V	
C560(C660)	1-121-395-11	4.7	25V	
C561(C661)	1-108-587-12	0.022		mylar
C562(C662)	1-108-360-12	0.039		
C563(C663)	1-108-591-12	0.033		mylar
C564(C664)	1-108-589-12	0.027		mylar
C565(C665)	1-108-587-12	0.022		mylar
CT51,CT52	1-141-069-xx	trimmer		

RESISTORS

All resistors are in Ω. ¼W, ±5%, carbon or composition type (except special type) are omitted.
Check schematic diagram for the resistance values. (k = 1000, M = 1000k)

R5	1-210-853-11	6.2k	±2%	carbon
R7	1-210-850-11	300	±2%	carbon
R11,R12	1-210-855-11	33k	±2%	carbon
R13	1-210-852-11	5.6k	±2%	carbon
R55	1-206-674-11	2.7k	2W	metal-oxide
R60	1-217-279-11	330	3W	wirewound
R63	1-202-559-11	270	½W	composition
RV501 (RV601)	1-221-311-00	5k, adjustable (PB LEVEL ADJ)		
RV502 (RV602)	1-221-383-00	10k, adjustable (PB LEVEL ADJ)		
RV503 (RV603)	1-222-306-00	20k (A), variable (REC VOLUME)		
RV504 (RV604)	1-221-383-00	10k, adjustable (REC LEVEL ADJ)		
RV505 (RV605)	1-221-663-00	2k, adjustable (PB LEVEL ADJ)		

SWITCHES

S10,S11	1-514-976-00	Slide (REC/PB)
S12	1-516-441-00	Slide (DOLBY)
S13	1-516-298-00	Slide (TAPE SELECT)
S14	1-516-441-00	Slide (LIMITER)
S15	1-513-273-00	Slide (TIMING)
S16	1-514-346-00	Leaf (PAUSE)
S17	1-514-346-00	Leaf (MUTING)
S18	1-514-792-00	Leaf (motor)

Ref. No.	Part No.	Description
	MISCELLANEOUS	
J1,J2	1-507-421-00	Jack, MIC
PL8,PL9	1-518-169-xx	Lamp, LEVEL meter; 4.5V 40 mA
PL10	1-518-115-xx	Lamp, CASSETTE ON; 4.5V 40 mA
PL11	1-518-115-xx	Lamp, PAUSE; 4.5V 40 mA
PL12	1-518-115-xx	Lamp, REC; 4.5 V 40 mA
ME	1-524-078-21	Meter, LEVEL
	1-506-373-00	Plug, ISS switch
	8-825-506-00	Head, erase (EF135-36)
	8-825-584-00	Head, record/playback (PF145-3602A6)
	8-834-015-01	Motor (D-015G)

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