

E Model



STEREO TAPECORDER

Specifications

Power requirements : AC 100,110,117,125,220,240V;50/60 Hz;60W

Tape speeds : 7½ ips, 3¾ ips and 1½ ips
(19 cm/s, 9.5 cm/s and 4.75 cm/s)
with automatic switch for equalization changes.

Reel size : Up to 7" (18 cm)

Recording system : 4-track stereophonic or monophonic

Recording time : 4-track stereo
(with 1,800 ft tape)
1 hr 30 min at 7½ ips (19 cm/s)
3 hrs at 3¾ ips (9.5 cm/s)
6 hrs at 1½ ips (4.75 cm/s)

Frequency response : 40~18,000 Hz at 7½ ips (19 cm/s)
40~12,000 Hz at 3¾ ips (9.5 cm/s)
40~ 6,000 Hz at 1½ ips (4.75 cm/s)

Signal-to-noise ratio : Better than 46 db (at peak recording level)

Flutter and wow : Less than 0.17% at 7½ ips (19 cm/s)
Less than 0.3% at 3¾ ips (9.5 cm/s)
Less than 0.4% at 1½ ips (4.75 cm/s)

Harmonic distortion : Less than 3% at 0 db (0.775 mV) line output

Inputs : Microphone input (2)
-75 db (0.14 mV)
Impedance: low (will accommodate any microphone with 250Ω ~ 1KΩ impedance)

Auxiliary (Tuner) input (2)
-25 db (44 mV)
Impedance: approx. 100KΩ

Phono input (2)
-52.5 db (2 mV)

DIN Connector input (1)
Input Level: -47 dBs (3.4 mV)
Impedance: 10KΩ

Outputs : DIN Connector output (1)
Output Level: 0 dBs (0.775 V)
Impedance: 3.5KΩ

Line output (2)
Output Level: Playback 3 db (1.1V)
Recording 1 db (0.87V)
Impedance: will accommodate any amplifier with not less than 10KΩ

Binaural output (1)
Impedance: will accommodate any head phone with not less than 8Ω

Ext-S.P. output (1)
Output Level: 11.3 db (2.83V)
Impedance: for 8Ω speaker

Speaker : 5.2" (13 cm), 8Ω (2)

Power output : Max. 4 Watts, each channel

Transistors : 2SC402×12, 2SD28×4, 2SC401×6, 2SB383×2

Diodes : FR-1P ×2 1T22 ×2

Dimensions : Model 230 17 (W)×9½ (H)×14" (D)
(430×245×355 mm)

Weight : Model 230 29 lb. (13 kg)

SONY®

SERVICE MANUAL

Technical Feature

SONY Model TC-230 is Four Track Complete Stereo Tape recorder installed in walnut cabinet, which can be used as a Stereo Amplifier System.

Muting Circuit

The muting circuits (X_{112} , X_{212} for DIN Connector Amplifier and X_{111} , X_{211} for Power Amplifier) eliminate click noise caused by turning the Input Selector Switch. When switching over, the contacts S-102-3 built in the Input Selector Switch are closed for a moment and DC bias voltage is applied to the base of X_{111} , X_{112} , X_{211} and X_{212} . Therefore the respective circuit is grounded by decreased Collector-Emitter resistance of the Transistor.

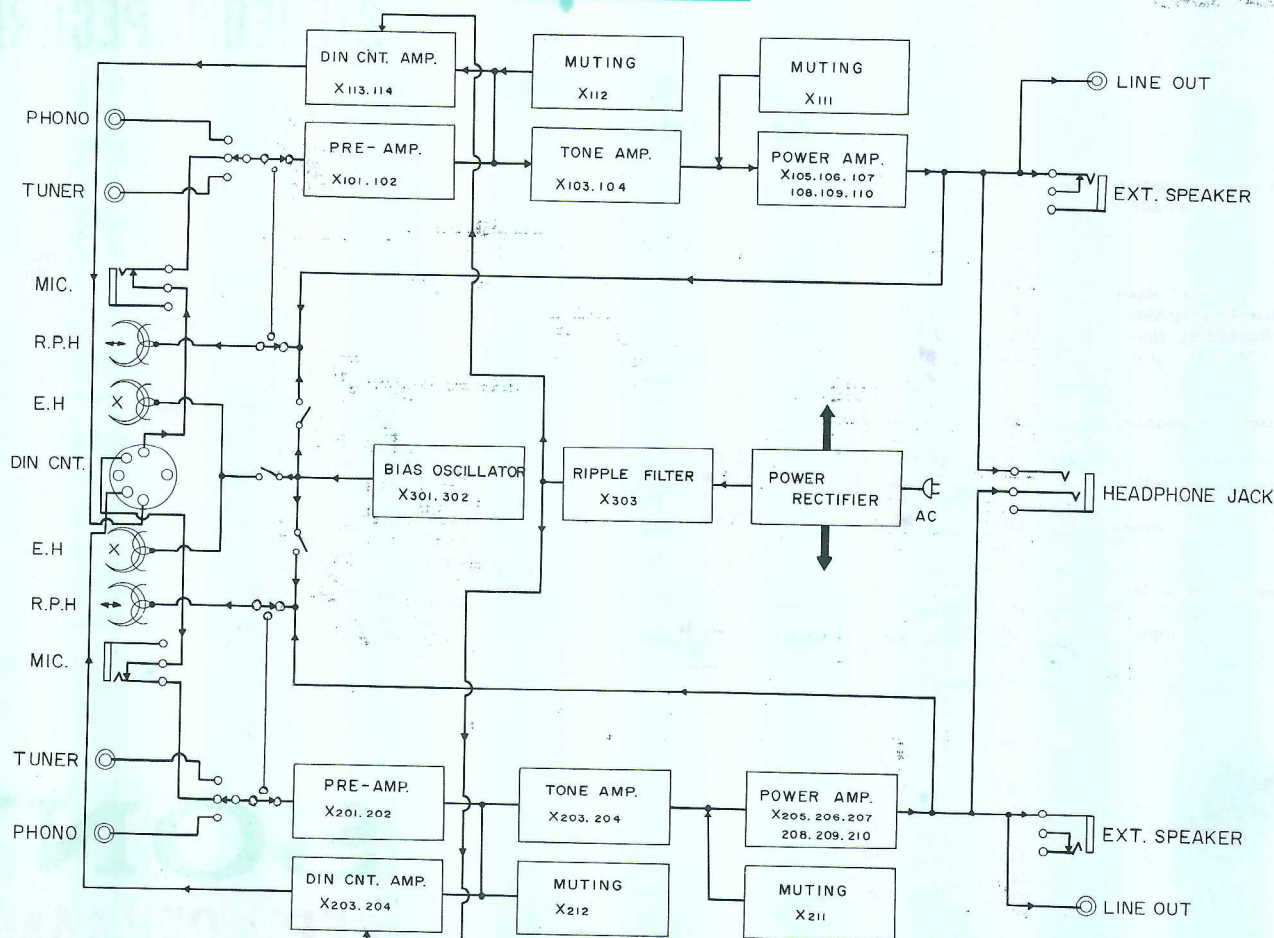
Ripple Filter

DC power source of DIN Connector Amplifiers (X_{113} , X_{114} , X_{312} and X_{214}) is applied through the Ripple Filter (X_{303}), which is available for obtaining less ripple with lower voltage drop and occupying less space.

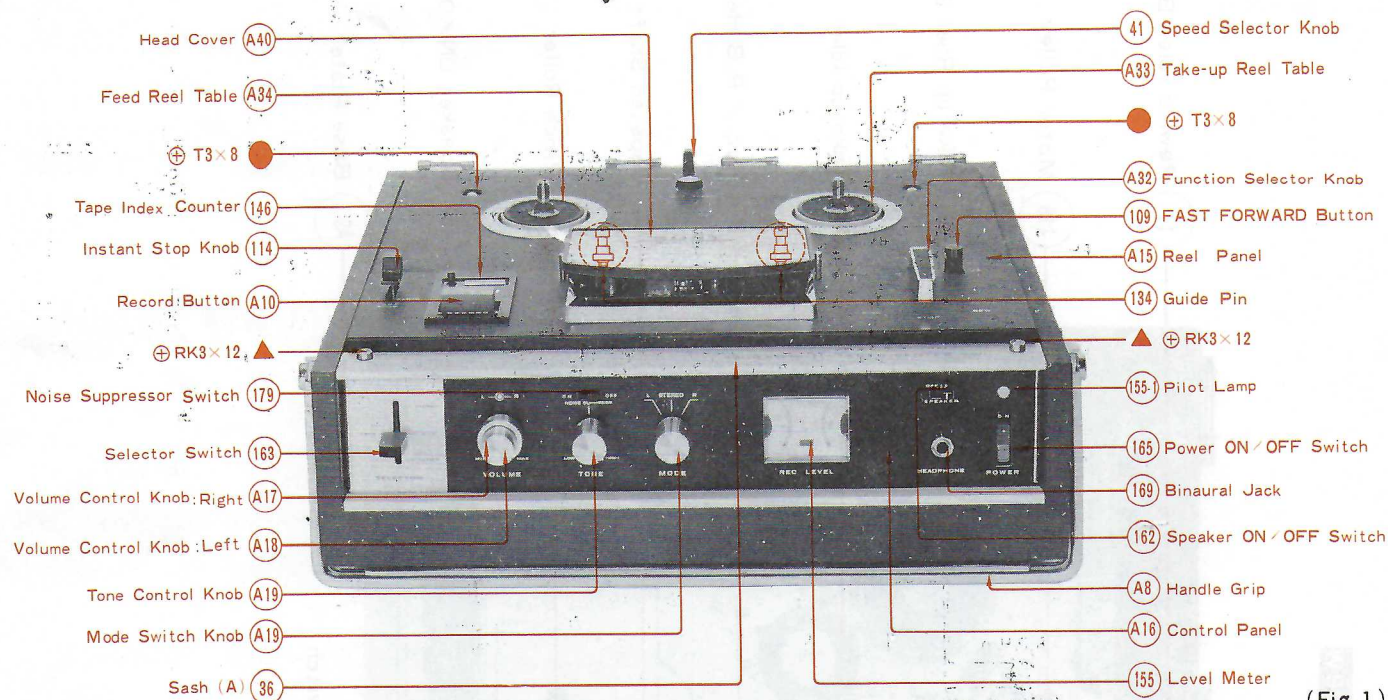
Drive Motor

The drive motor is a four pole vibration-proofed Induction Motor which is fixed to the chassis through vibration absorbers.

Block Diagram

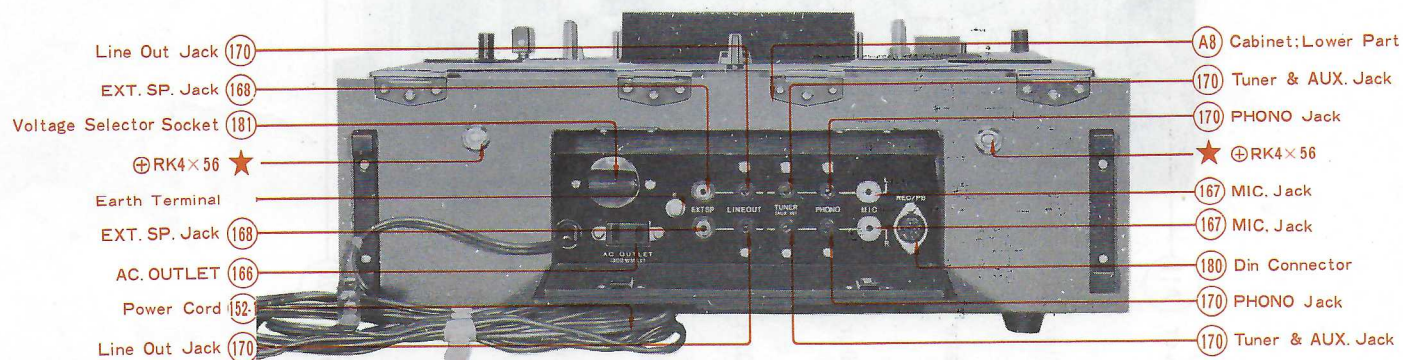


Cabinet Front View



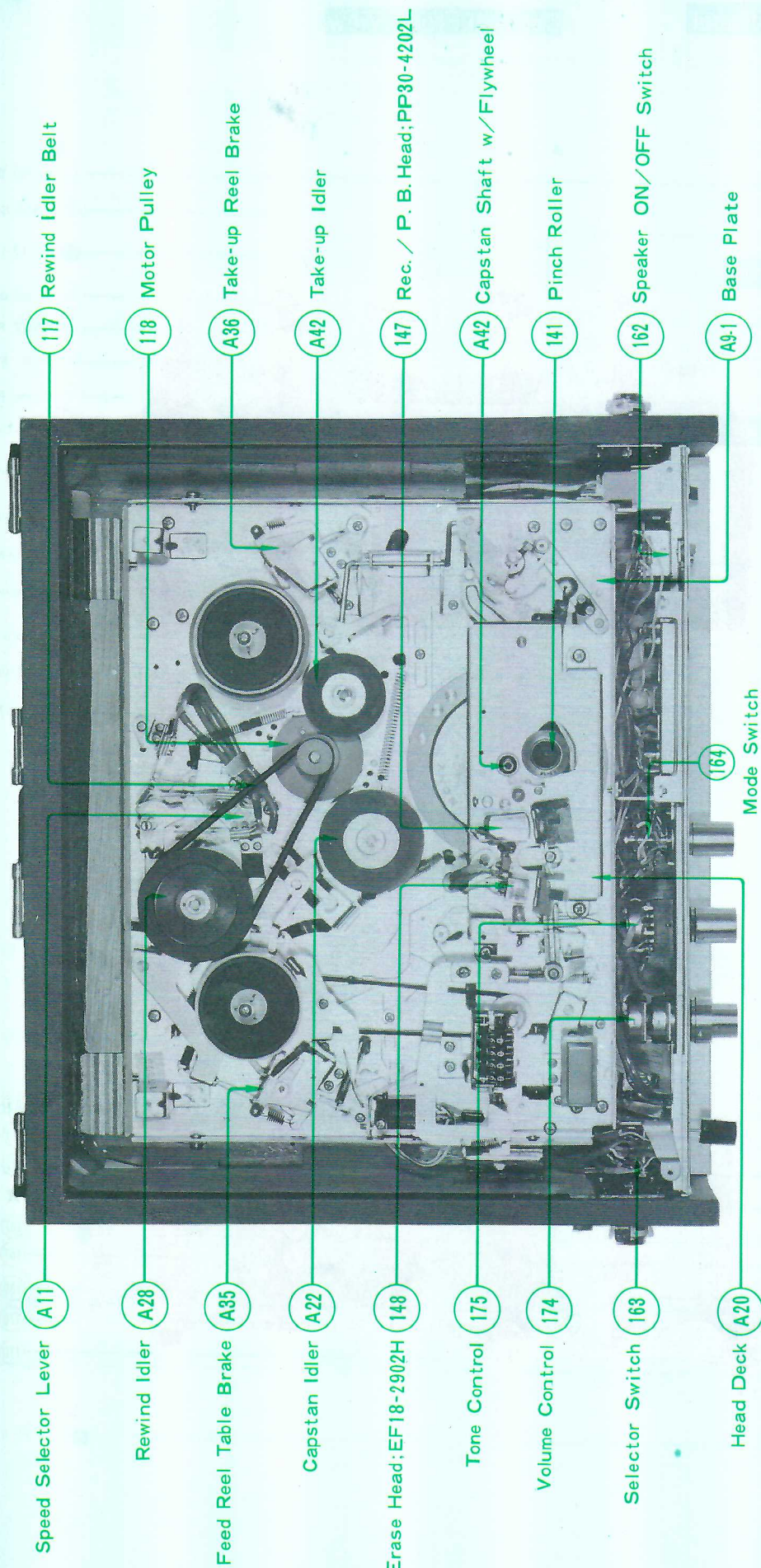
(Fig. 1)

Cabinet Back View



(Fig. 2)

Chassis Top View



Removal of Reel Panel

- (1) Remove the Function Selector Knob by unscrewing its setting screw.
- (2) Remove the TAPE SPEED Knob and INST STOP Knob by pulling straight up.
- (3) Unscrew the two setting screws fastening Head Cover and remove the Head Cover.
- (4) Remove the two Guide Pins, two Screws (▲ in Fig. 1 & 3) fastening the Sash and two Screws (● in Fig. 1 & 3) fastening Reel Panel.
- (5) Remove the Sash and Reel Panel

Removal of Chassis

- (1) Remove the four Screws fastening Rubber Feet on the bottom of Cabinet.
- (2) Remove the two Screws marked with ★ in Fig. 2 & 4 on the rear side of Cabinet.
- (3) Remove the Chassis by lifting up carefully.

Removal of Printed Circuit Boards

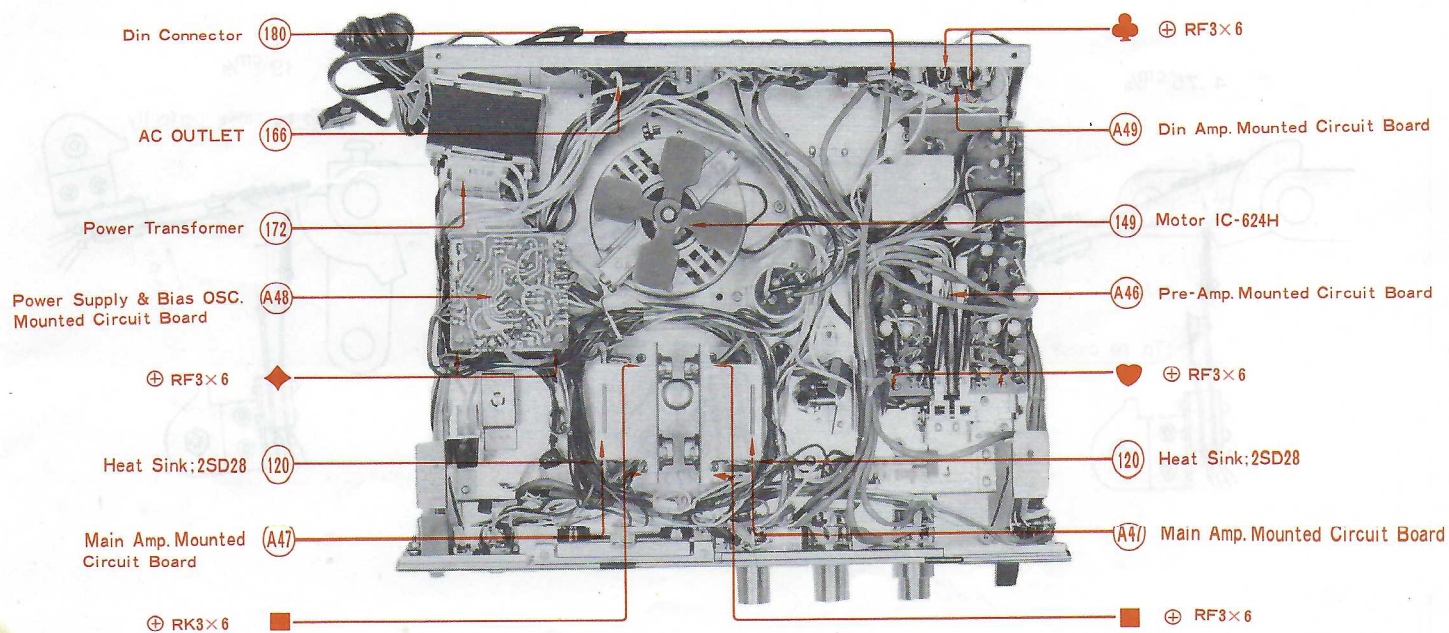
Circuit Board

Pre-Amplifier Circuit Board
Main Amplifier Circuit Board
Power Supply and Osc. Circuit Board
DIN Connector Amplifier

Remove Screws marked with

- ♥ in Fig. 7
■ in Fig. 7
◆ in Fig. 7
♣ in Fig. 4

Chassis Bottom View

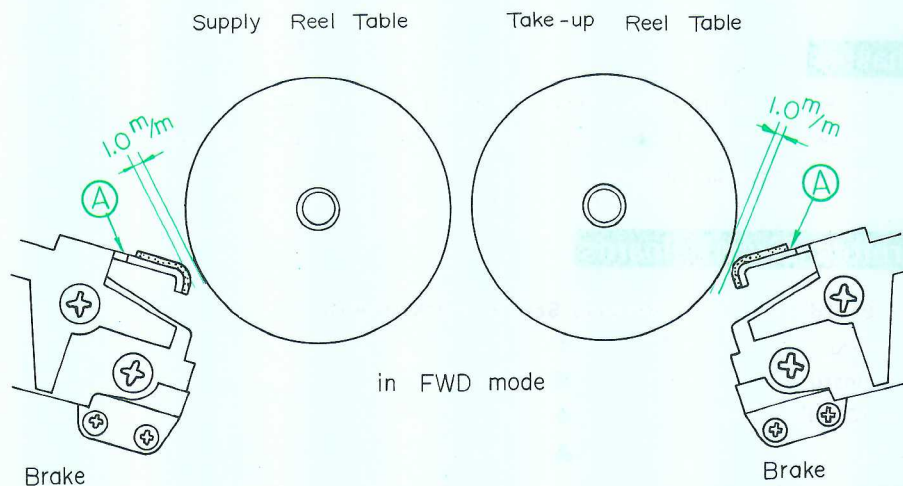


(Fig. 4)

Mechanical Adjustment

Brake Adjustment

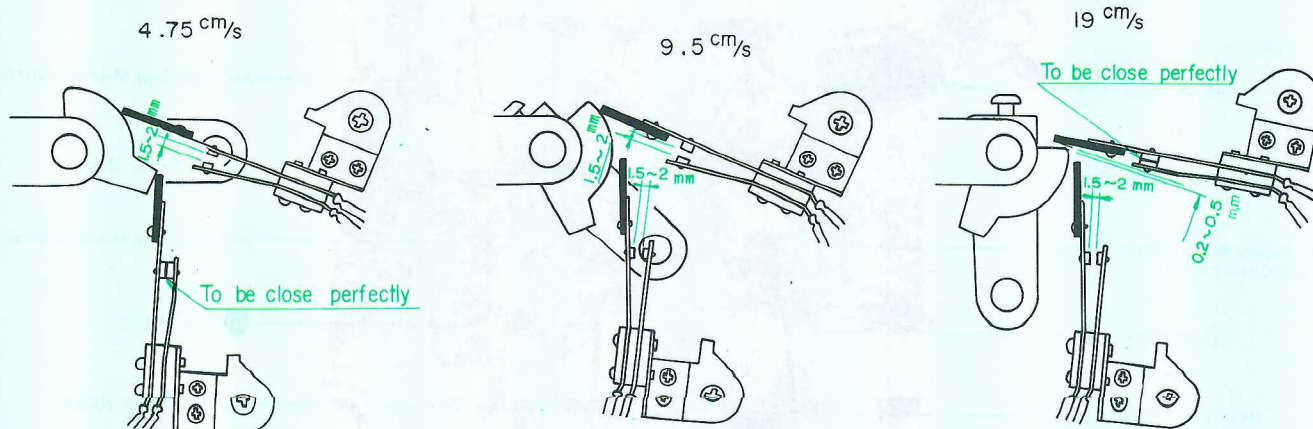
In the FORWARD mode, the clearance between Reel Table and Brake Shoe (both SUPPLY and TAKE-UP sides) should be approximately 1.0 mm. When adjusting, bend portion A in Fig. 5.



(Fig. 5)

Equalizer Switch Adjustment

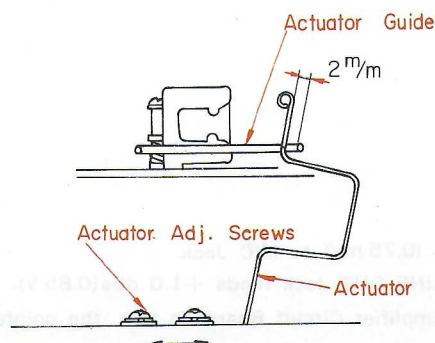
The contacts of Leaf Switches should be as shown in Fig. 6 for each tape speed. When adjusting, unscrew the Screws fixing the switch holder and adjust the position of the holder. After adjustment, tighten the Screws.



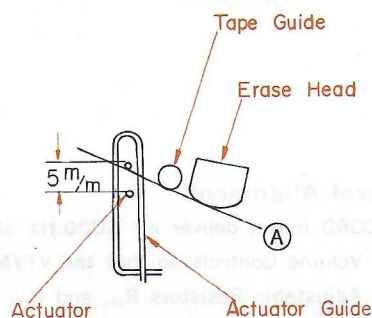
(Fig. 6)

Actuator Adjustment

- (1) Actuator Switch should be off at 2 mm from the end of Actuator Guide. (Fig. 7-A)
 - (2) Actuator Switch should be on at the outer position more than 5 mm from Line A. (Fig. 7-B)
- When adjusting, unscrew the Actuator Adjusting Screws (Fig. 7-A) and adjust the position of Actuator. After adjustment, tighten the Screws.



(Fig. 7-A)



(Fig. 7-B)

Caution

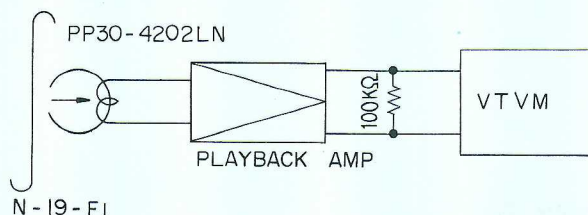
- ☆ In case Recorder for 60 Hz Power Line is modified to for 50 Hz or vice versa. Replace only Motor Pulley.
- ☆ Can of Transistor 2SD28 in output stage is common to Collector, therefore +24V is applied there. Do not contact the can to Heat Sink or other metal parts with tools.

Electrical Adjustment

The adjustment is to be performed at 19 cm/sec (7-1/2 ips) tape speed. Connect a VTVM and 100K ohm load resistor to LINE OUT Jack.

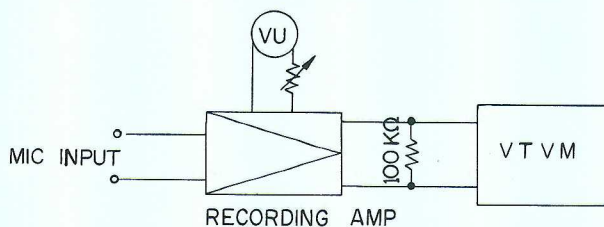
Azimuth Alignment

- (1) Playback a 10KHz tone on the first section of SONY Alignment Tape N-19-F1.
- (2) Adjust the Azimuth Alignment screw located on the right side of Playback Head for maximum reading on the VTVM.



Recording Level Alignment

- (1) In the RECORD mode, deliver an 1,000 Hz signal of -60 dBs (0.75 mV) to MIC Jack.
- (2) Adjust the Volume Controls so that the VTVM connected to LINE OUT Jack reads +1.0 dBs (0.85 V).
- (3) Adjust the Adjustable Resistors R_{151} and R_{251} located on Pre-Amplifier Circuit Board so that the pointer of Level Meter is just at the boundary between the Red portion and the Black portion.



Bias Oscillator Check

In RECORD mode with MODE Selector set to STEREO, measure voltage at each channel terminal of Erase Head and Record/Playback Head with V. T. V. M.

The voltage values should be:

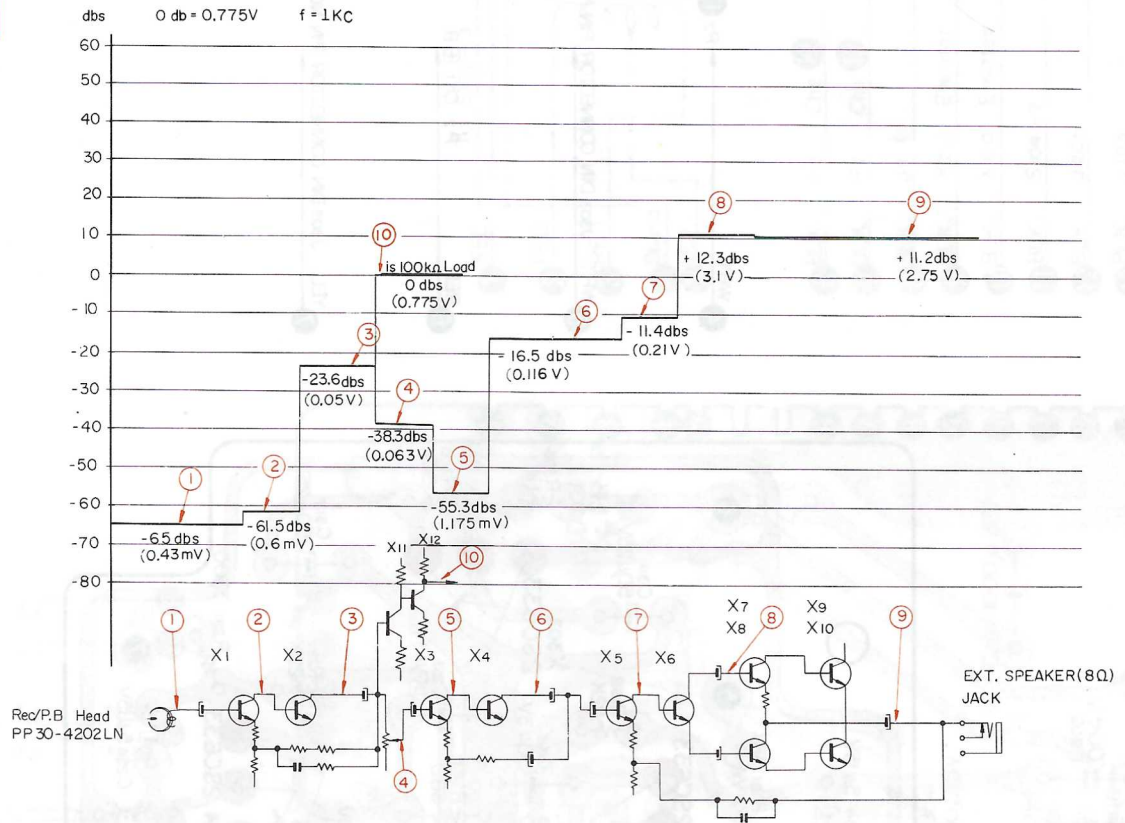
Erase Head : More than 30V

Record/Playback Head: $15V \pm 2V$

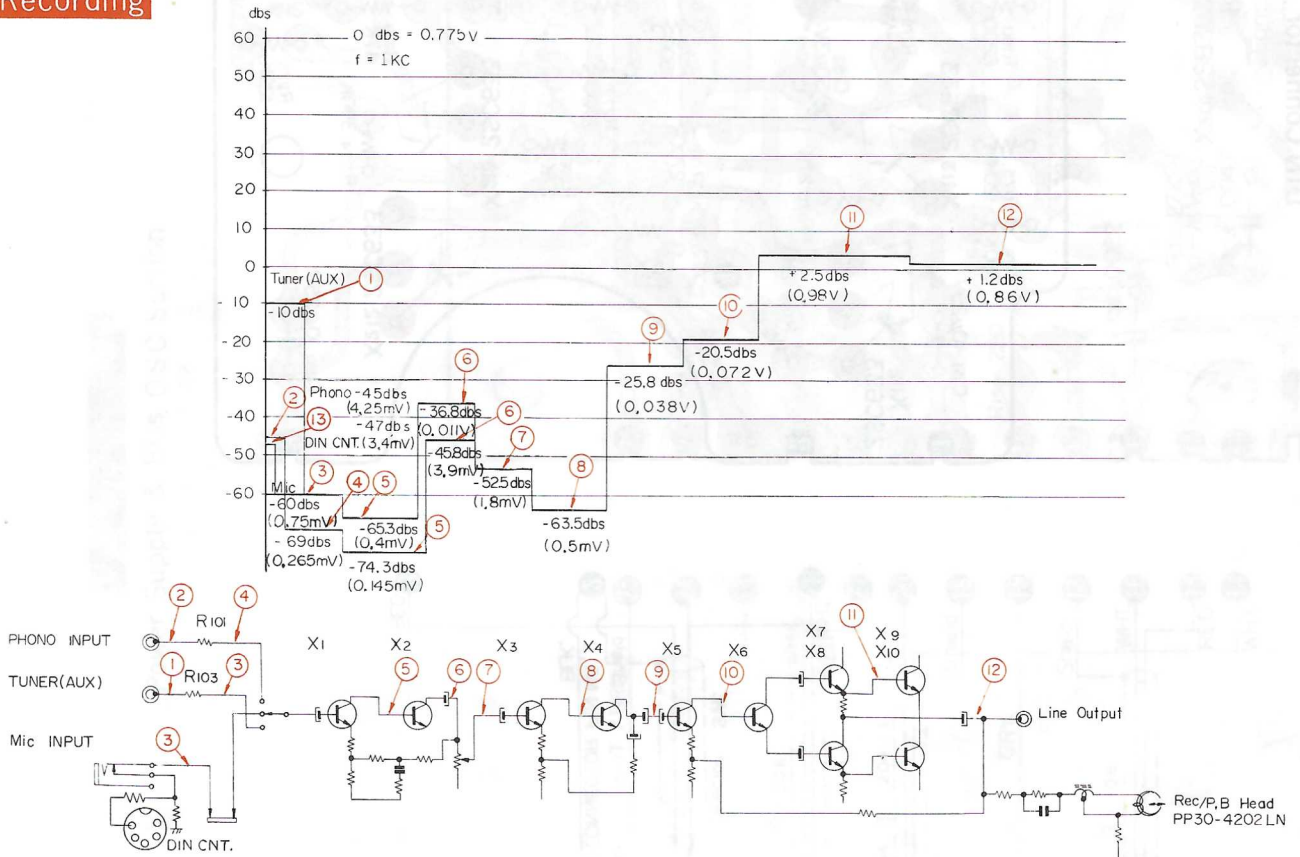
When getting out of the values specified above, adjust by changing taps of Bias Oscillator Transformers T_{302} and T_{303} .

Level Diagram

Playback



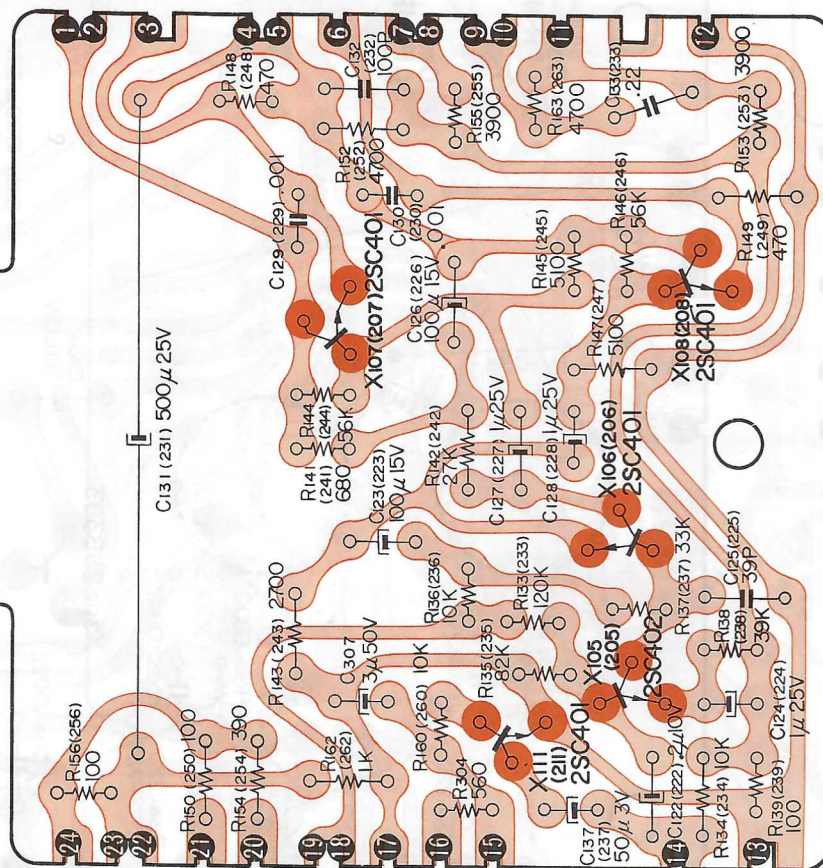
Recording



Mounting Diagram

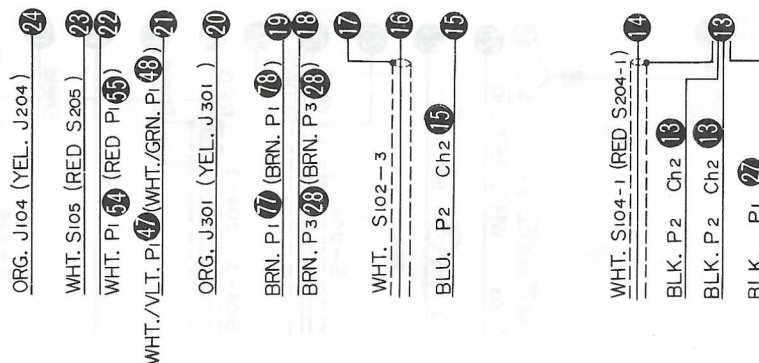
Main Amplifier Section

—Conductor Side—
P₂



() ; Ch2

R304 & C307 ; Ch1, Only



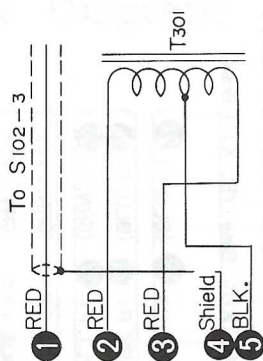
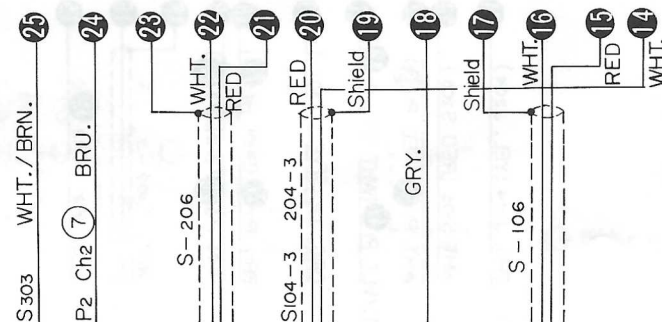
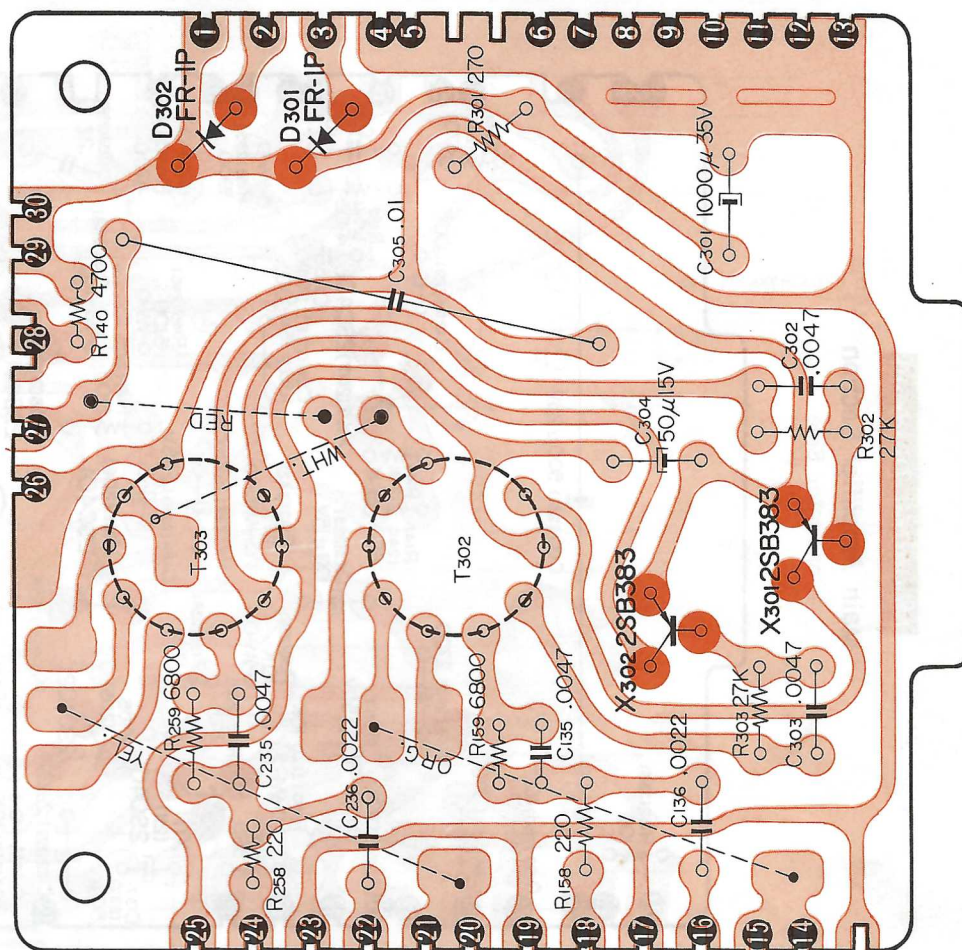
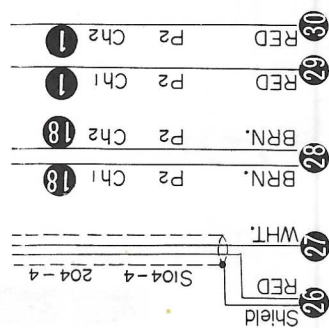
- 1 RED P3 29 (RED P3 30)
- 2 RED X109 Base (RED X209 Collector)
- 3 YEL. X109 Base (YEL. X209 Base)
- 4 GRN. X109 Emitter (GRN. X209 Emitter)
- 5 RED X110 Collector (RED X210 Collector)
- 6 YEL. X110 Base (YEL. X210 Base)
- 7 GRY. P3 18 (BLU. P3 24)
- 8 GRY. P1 24 (BLU. P1 26)
- 9 VLT. P1 52 (GRN. P1 53)
- 10 VLT. J105 (GRN. J205)
- 11 BLU. J105 (GRY. J205)
- 12 BLK. P3 6 (BLK. P3 7)

Mounting Diagram

Power Supply & Bias OSC Section

—Conductor Side—

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6. BLK. P2 Ch2 12

7. BLK. P2 Ch1 12

8. BLK. J301

9. BLK. X210 Emitter

10. BLK. X110 Emitter

11. BLK. S104 - 2

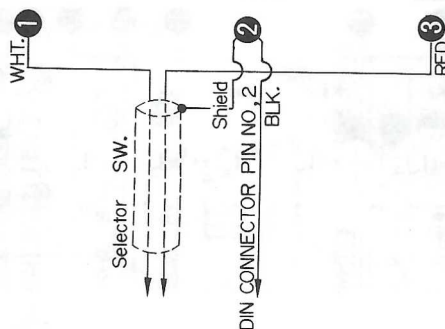
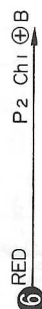
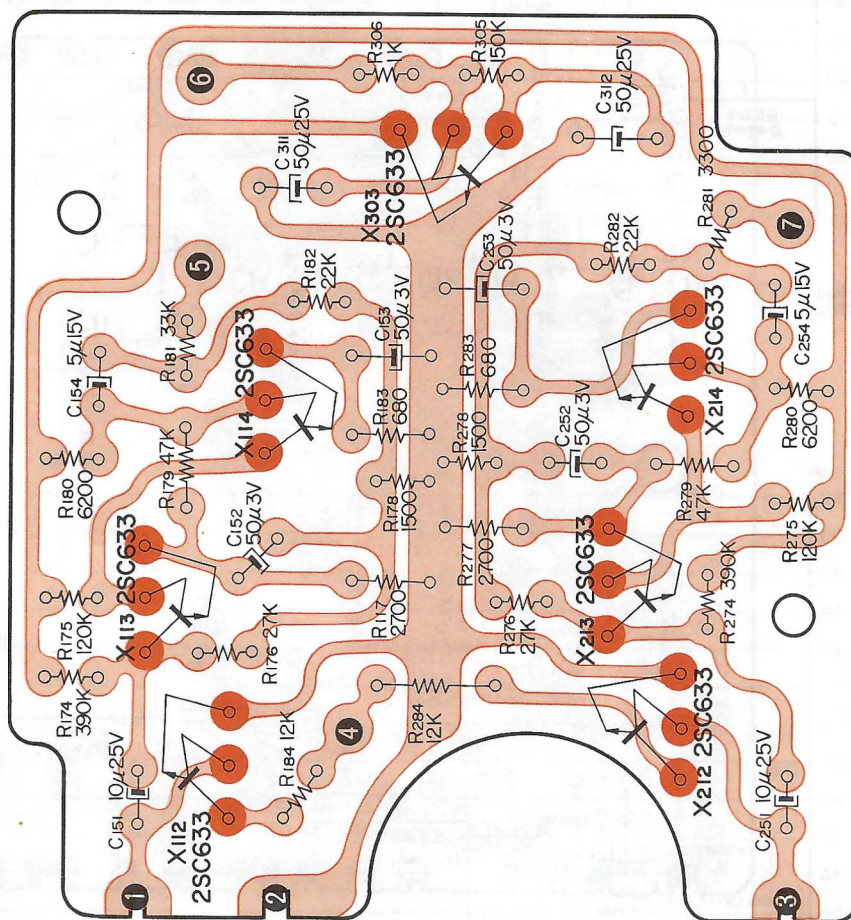
12. BLK. J205

13. BLK. J105

DIN Connector Amplifier Section

—Conductor Side—

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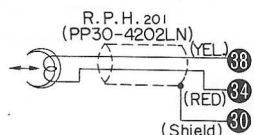
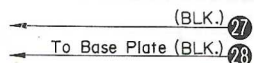
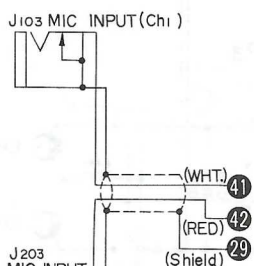
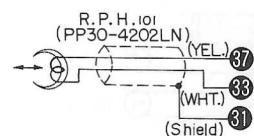
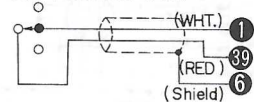
Mounting Diagram

Per-Amplifier Section

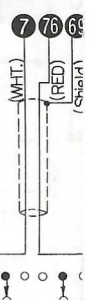
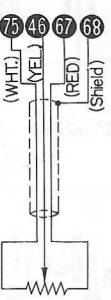
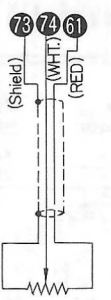
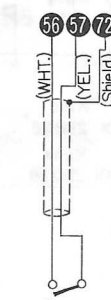
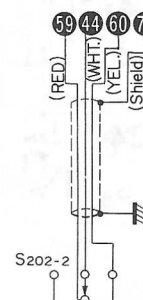
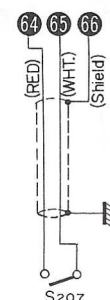
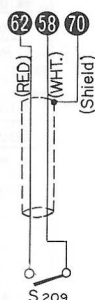
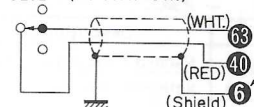
—Conductor Side—

P₁

S102-1 (Selector SW.)



S202-1 (Selector SW.)



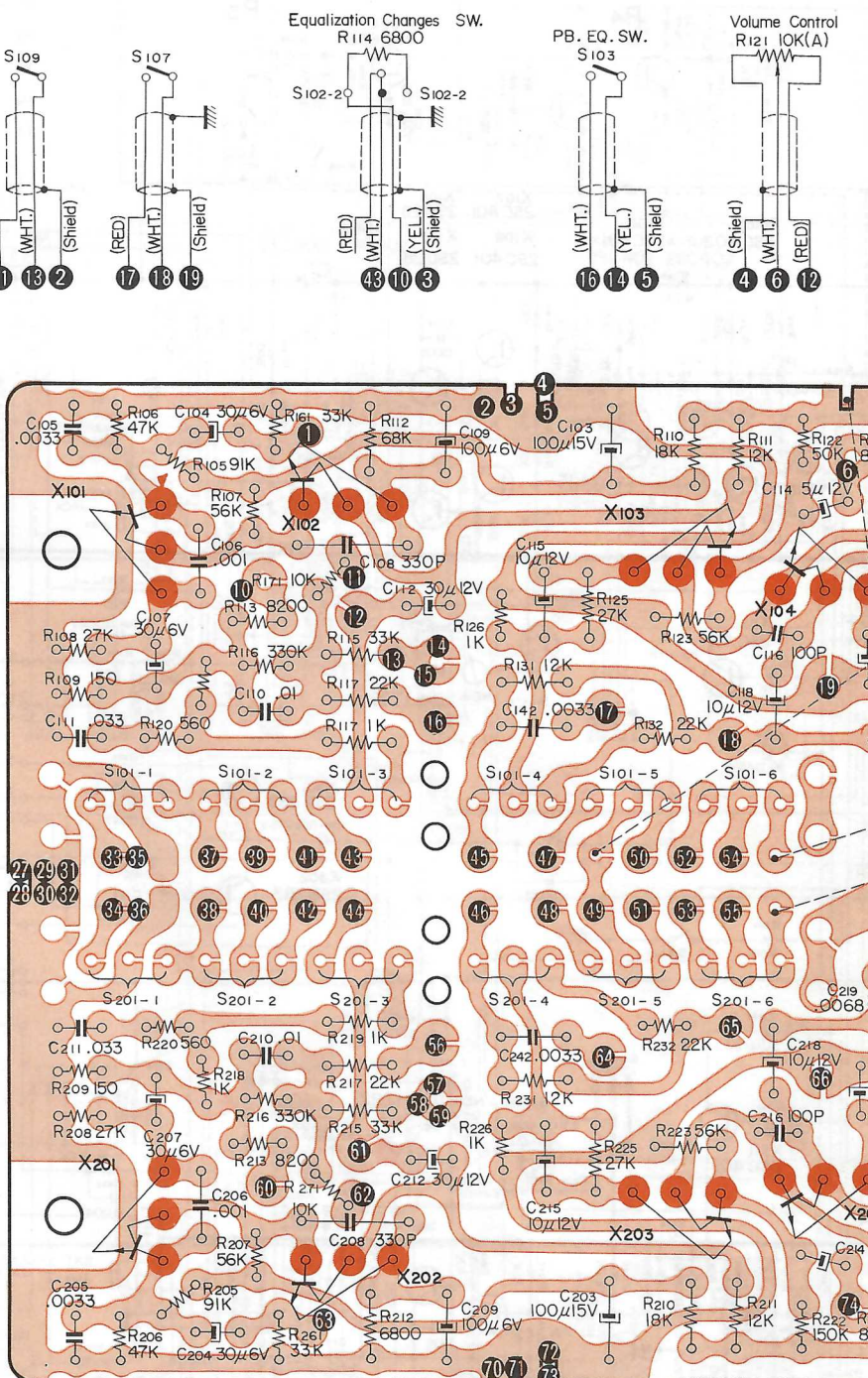
Noise Suppressor ON/OFF SW.

Equalization Changes SW.

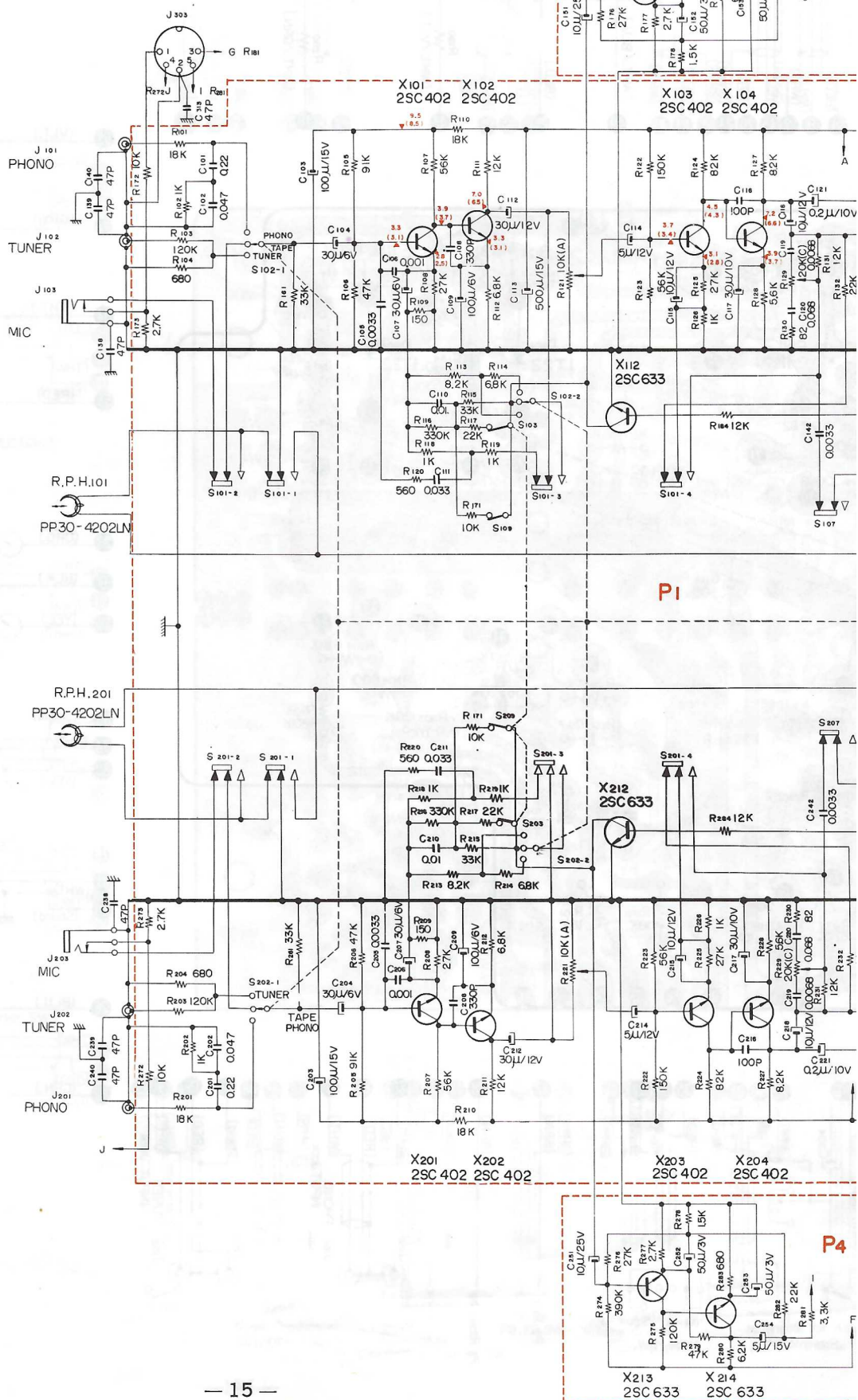
Volume Control (Ch)

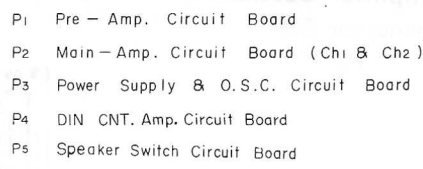
Tone Control (Ch)

Mode SW.



Circuit Schematic





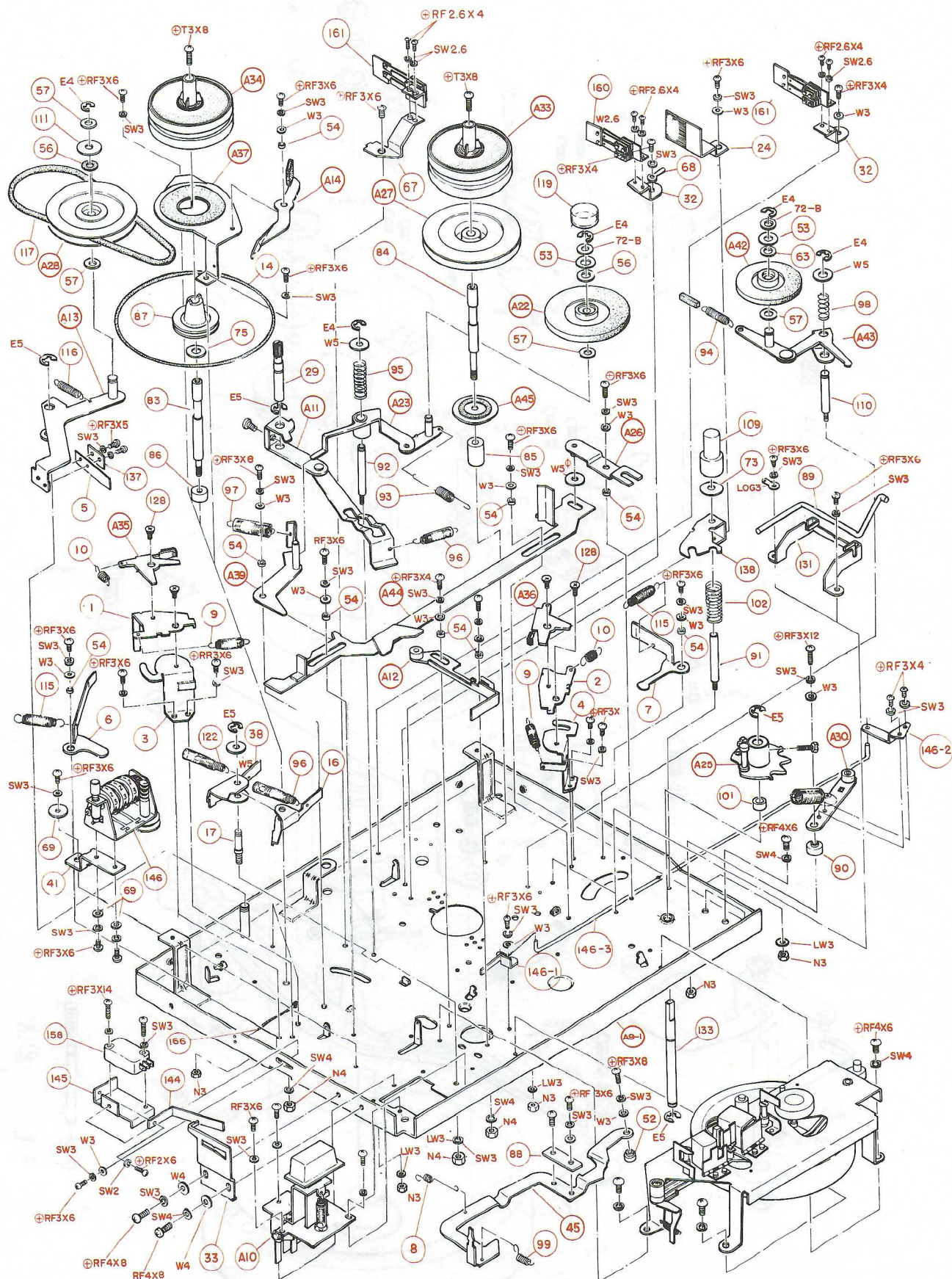
1 Switching Positions shown in this diagram are as per the table below:

Switch No	Description	Position
S 101, 201	Record / Playback Switch	Record
S 102, 202	Selector Switch	Tape & Micro
S 103, 203	Playback Equalizer Switch	19cm/s & 95cm/s
S 104, 204	Mode Switch	Stereo
S 105, 205	Speaker Switch	ON
S 106, 206	Record Equalizer Switch	95cm/s & 475cm/s
S 107, 207	Noise Suppressor ON/OFF Switch	ON
S 108, 208	Record/ Playback Switch	Record
S 109, 209	Playback Equalizer Switch	19 cm/s
S 301	Power Switch	OFF
S 302	Actuator Switch	OFF
S 303	Bias OSC ON/OFF Switch	OFF

2. Numbers in color show DC Voltage values measured with Circuit Tester in Playback mode and numbers in () show in Record mode.

3. Sections marked with★are included in Pre-Amplifier.

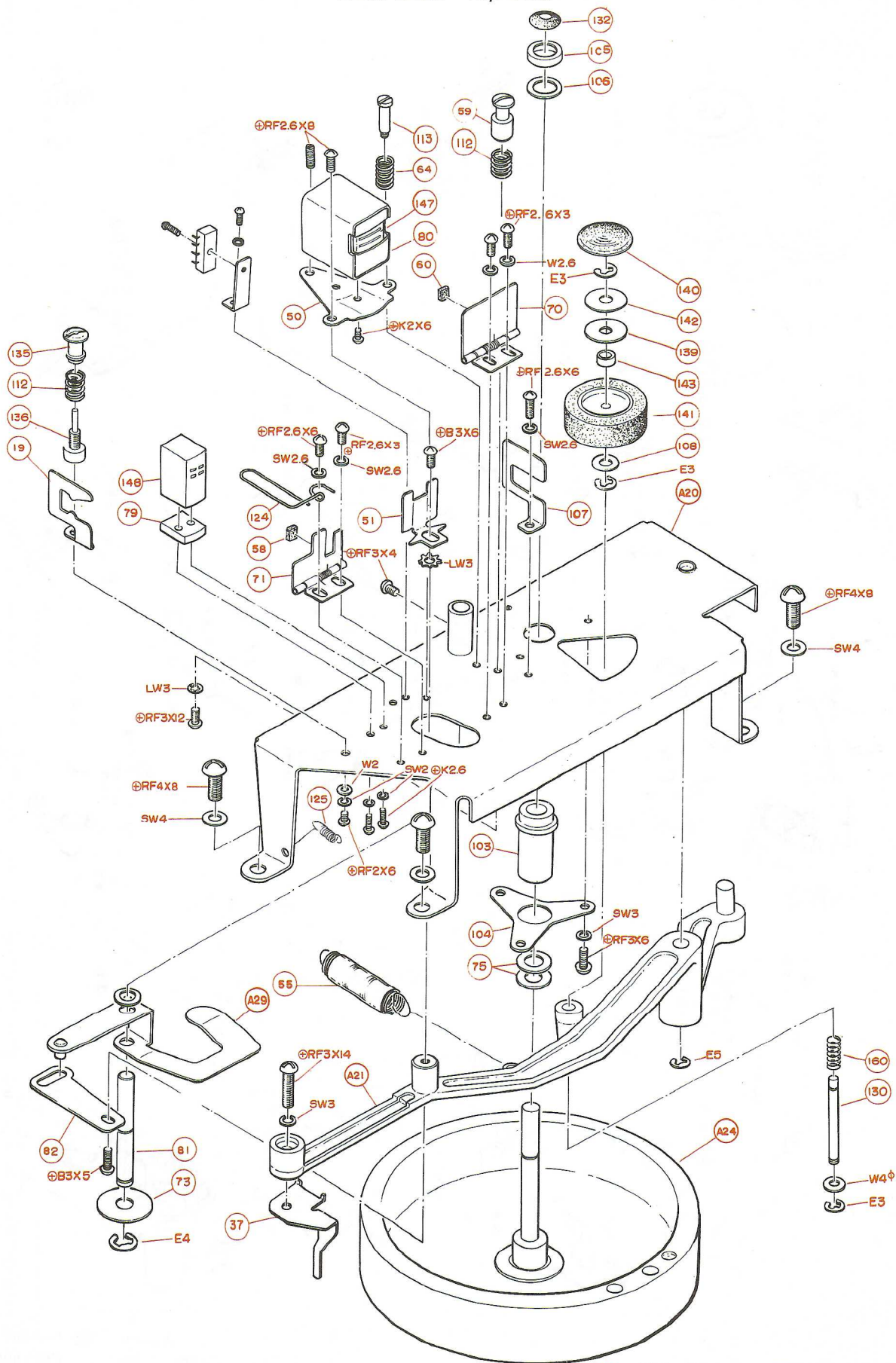
Exploded Diagram Tape Transport Mechanism—Top View



- W: Plain Washer
SW: Spring Washer
LW: Lock Washer
N: Nut
- Number encircled shows Reference No. which is listed in Complete Spare Parts List attached hereto.

Exploded Diagram

Head Deck—Top View

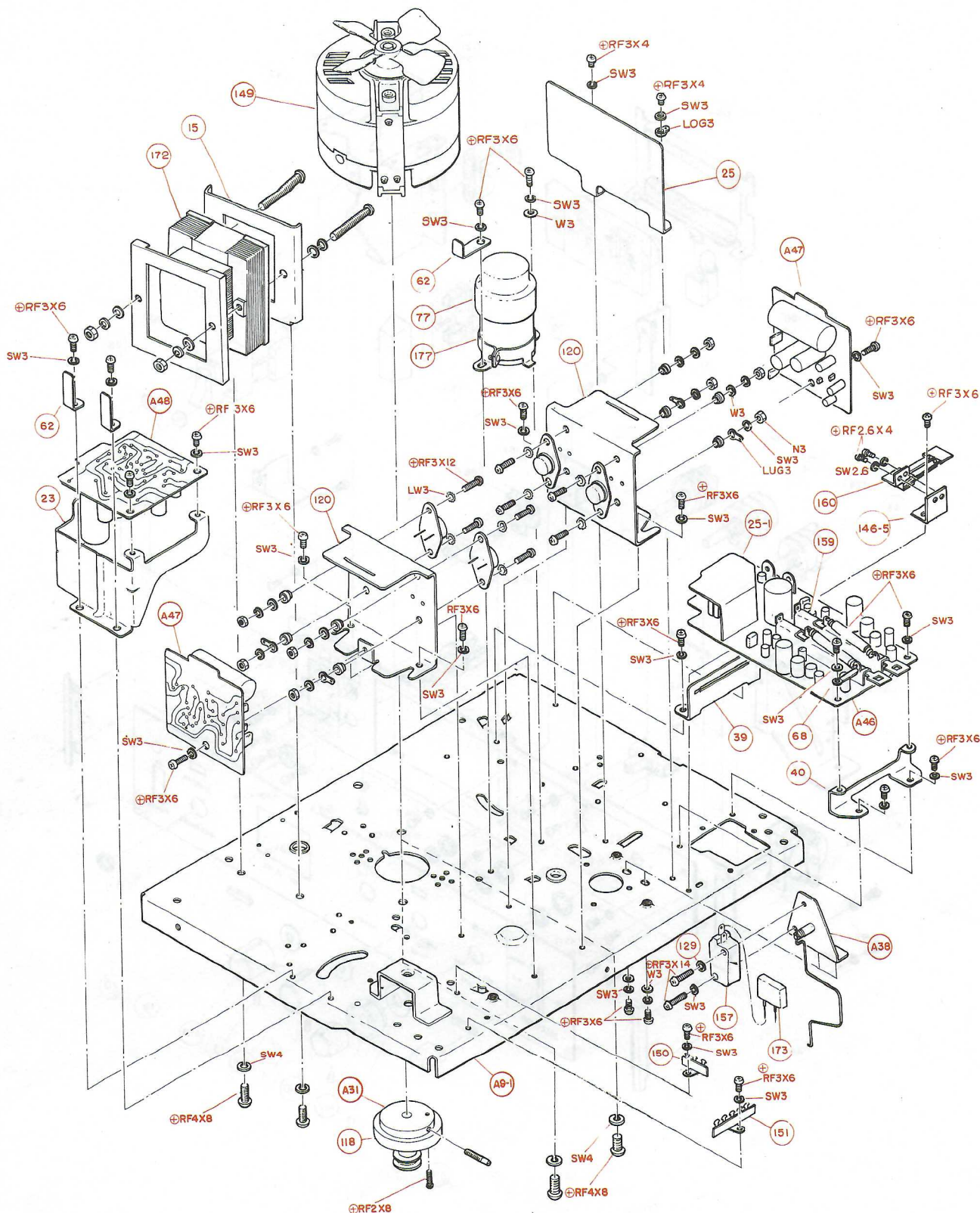


W: Plain Washer
SW: Spring Washer
LW: Lock Washer
N: Nut

Number encircled shows Reference No. which is listed in Complete Spare Parts List attached hereto.

Exploded Diagram

Electrical Parts—Bottom View

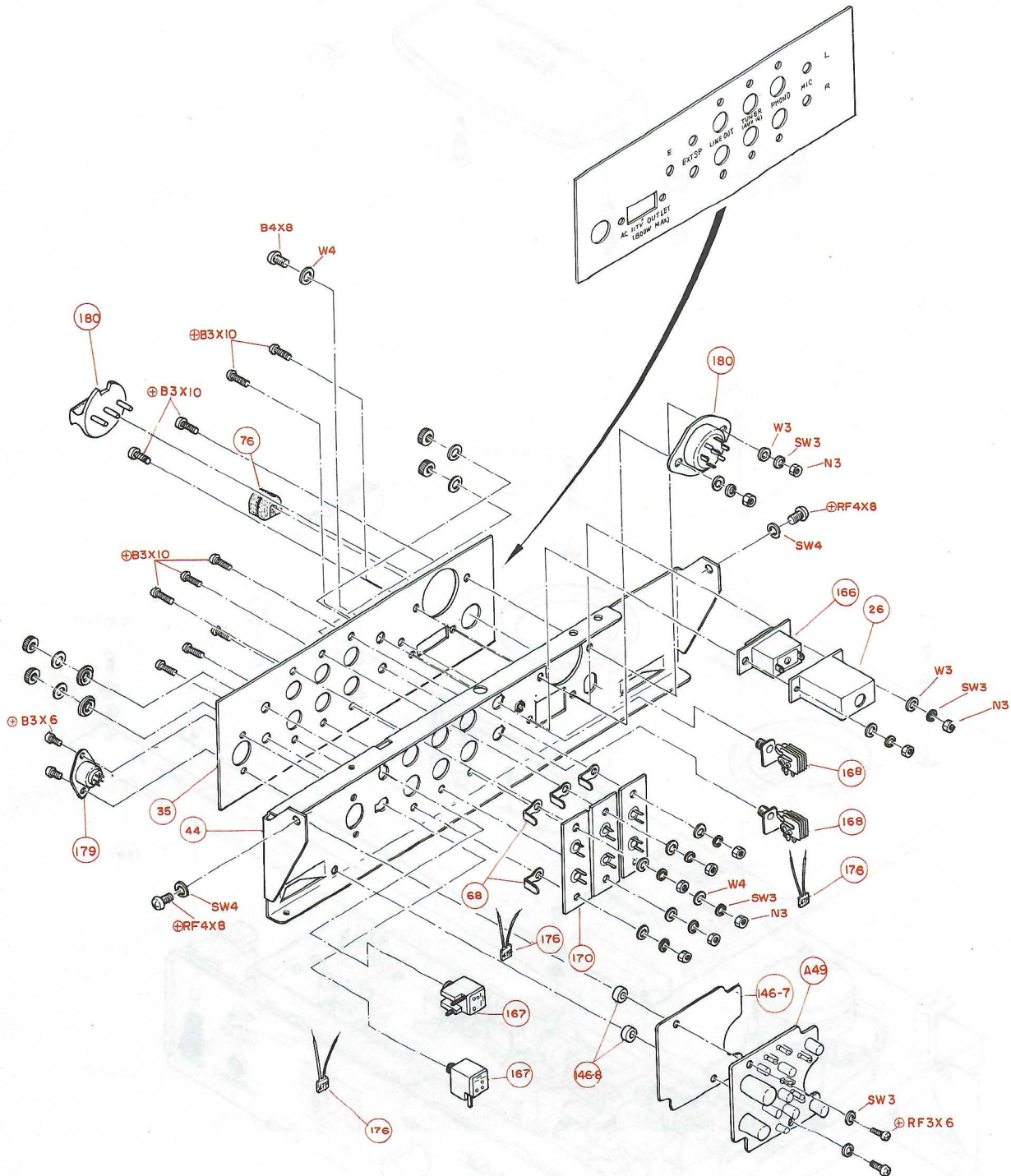


W: Plain Washer
 SW: Spring Washer
 LW: Lock Washer
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Exploded Diagram

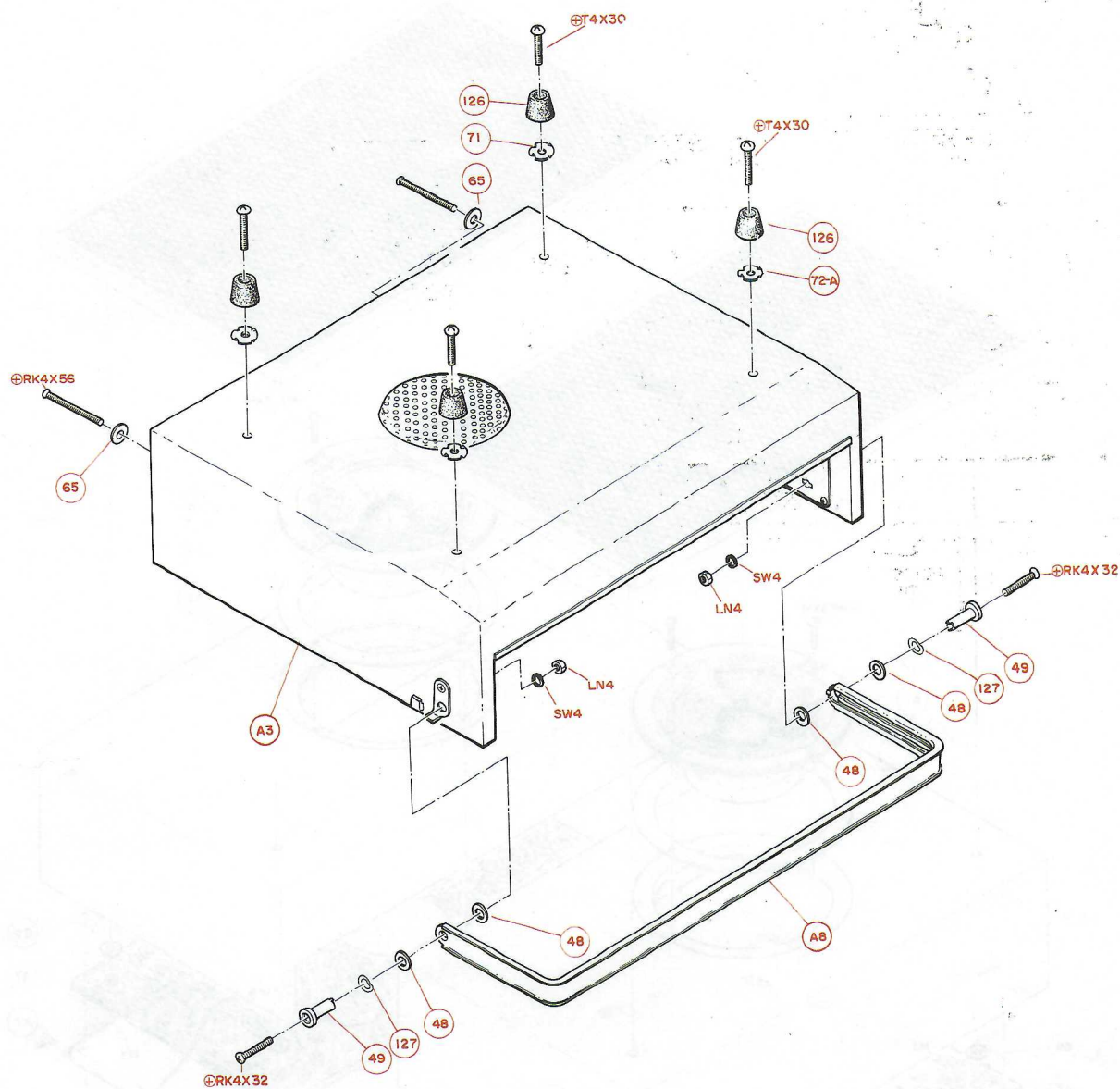
Rear Panel—Top View



W: Plain Washer
 SW: Spring Washer
 LW: Lock Washer
 N: Nut

Number encircled shows Reference No. which is listed in Complete Spare Parts List attached hereto.

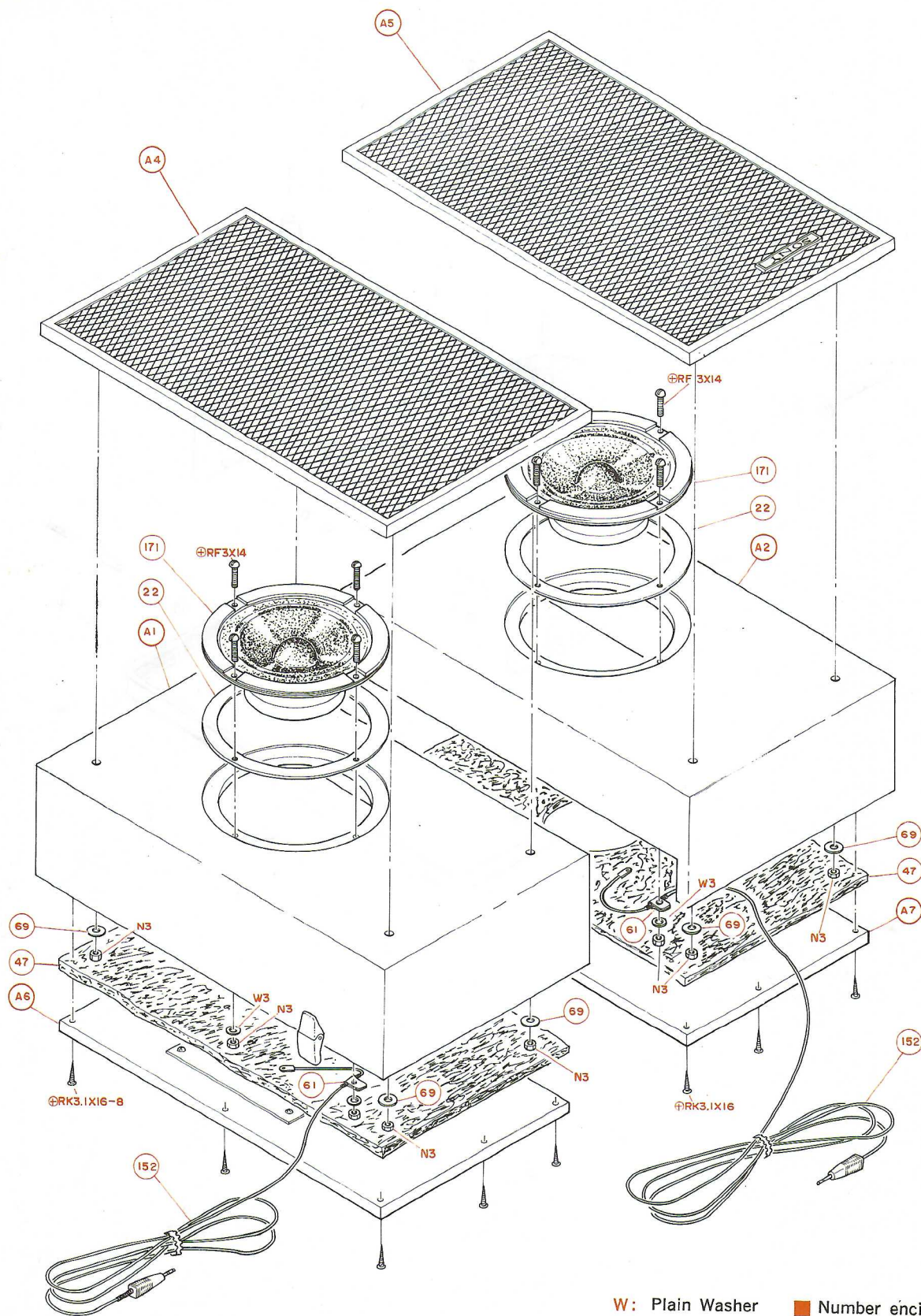
Exploded Diagram



W: Plain Washer
SW: Spring Washer
LW: Lock Washer
N: Nut

■ Number encircled shows Reference No. which is listed in Complete Spare Parts List attached hereto.

Exploded Diagram
Lid Speakers—Top View



W: Plain Washer
SW: Spring Washer
LW: Lock Washer
N: Nut

Number encircled shows
Reference No. which is
listed in Complete Spare
Parts List attached hereto.

SONY CORPORATION