TC-440

USA Model
E Model
Canada Model
GEP Model

STEREO TAPECORDER

SPECIFICATIONS

Power Requirements: AC 100, 110, 120, 127, 220 & 240 V 50/60 Hz, 45W (for General Export Model)
AC 117 V, 60 Hz, 45W (for USA & Canada Models)

Track System: Four-track 2-channel stereo

Reel Size: 7" (18 cm) maximum

Tape Speed: 7½ ips, 3¾ ips and 1⅞ ips (19 cm/s, 9.5 cm/s and 4.8 cm/s)

Recording Bias Frequency: approx. 160 kHz

Frequency Response:
SPECIAL
20 ~ 30,000 Hz (7½ ips, 19 cm/s)
20 ~ 23,000 Hz (3¾ ips, 9.5 cm/s)
NORMAL
20 ~ 25,000 Hz (7½ ips, 19 cm/s)
20 ~ 17,000 Hz (3¾ ips, 9.5 cm/s)
30 ~ 9,000 Hz (1⅞ ips, 4.8 cm/s)

Signal-to-Noise Ratio:
SPECIAL
greater than 56 dB
NORMAL
greater than 53 dB

Flutter and Wow: (RMS) weighted
less than 0.06% (7½ ips, 19 cm/s)
less than 0.1% (3¾ ips, 9.5 cm/s)
less than 0.2% (1⅞ ips, 4.8 cm/s)

Inputs:
Two MIC inputs
Impedance: low
Maximum sensitivity: -72 dB (0.19 mV)
Two AUX inputs
Impedance: 100 kΩ
Maximum sensitivity: -22 dB (62 mV)
REC/PB connector (for General Export Model)
Impedance: 2.2 kΩ
Standard input level: -33 dB (17.3 mV)

Outputs:
Two LINE OUTputs
load impedance: 10 kΩ and greater
Output level: 0 dB (0.775 V) with 100 kΩ load
HEADPHONE output
Impedance: 8Ω
Output level: -28 dB (30.8 mV)
REC/PB connector (for General Export Model)
Impedance: 10 kΩ
Output level: -1 dB (0.69 V)

Semiconductors: 1 IC, 27 transistors and 11 diodes

Dimensions: 16⁹⁄₁₆ (W) x 16³⁄₁₆ (H) x 8½" (D) (420 x 410 x 215 mm)

Weight: 27 lb 2 oz (12.3 kg)

E Model = General Export Model

SONY®

SERVICE MANUAL

TABLE OF CONTENTS

PRECAUTION

* *The SONY Model TC-440 has the common contents in the each of USA, Canada and General Export Models unless otherwise noted.*
* *No necessity of conversion for different power line frequency because of an AC servo motor.*
* *In this model, the FTS type screws (a sort of tapping screw) are used. A standard machine screw can be also used as a replacement.*
* *When replacing the flywheel, replace the both flywheels with a new pair to balance the drive mechanism.*
* *The base of the head base unit HBU-1 is made of a soft material (zinc). The parts installed on the base with the screw should not be removed because the screw tap may be damaged. If you remove the parts, take care not to damage the tap.*
* *When placing the machine front-side down, use a proper spacer to protect the tape path. (Fig. A)*

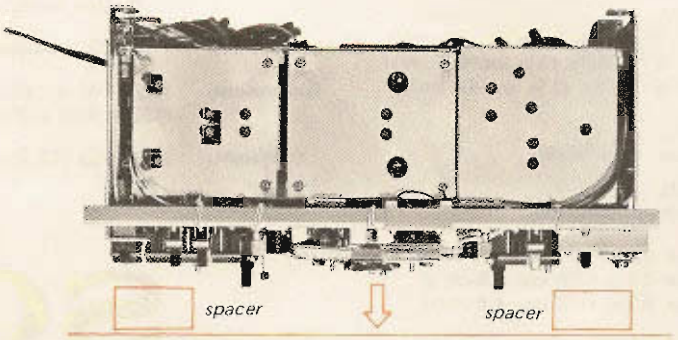


Fig. A. Tape path protection

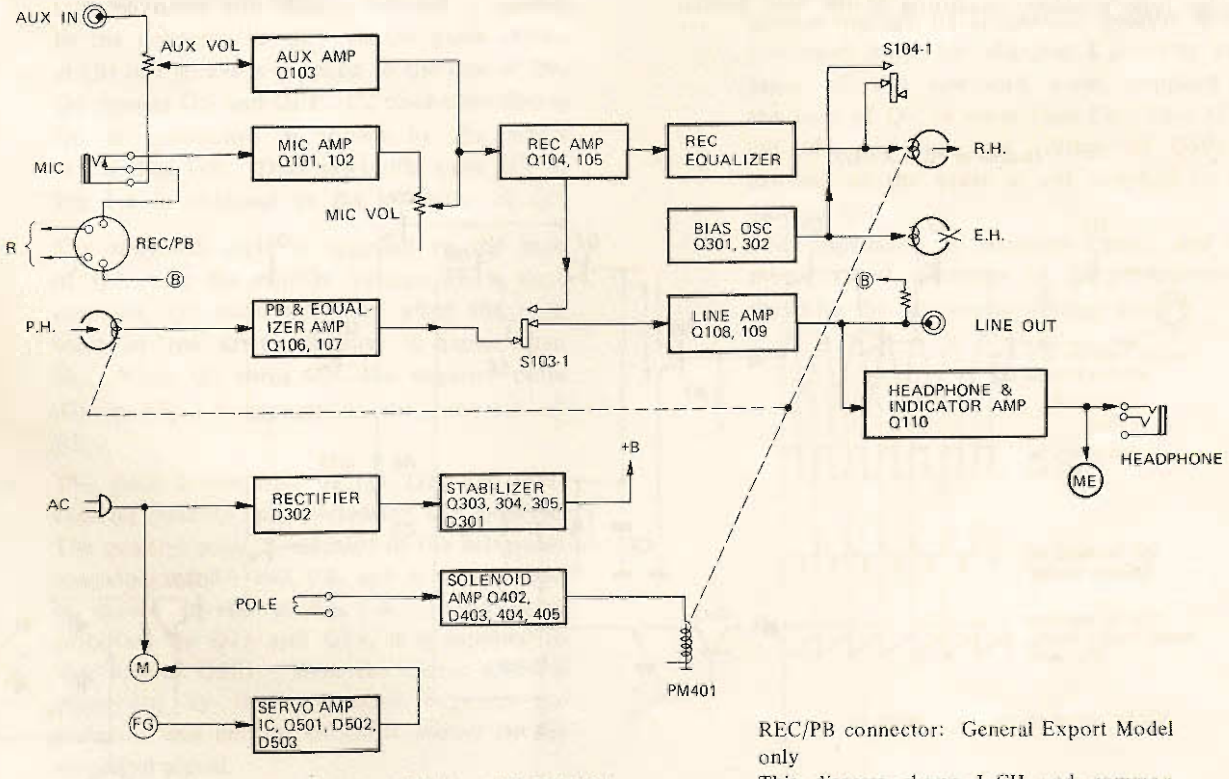
SECTION 1
OUTLINE

1-1. GENERAL DESCRIPTION

The SONY Model TC-440 is a three-head type stereo tape recorder deck which can be operated in either horizontal or vertical position. The main features are as follows:

* Dual Capstan Closed-Loop Tape Drive Mechanism assures positive tape-to-head contact regardless of external vibration.
* Roto Bi-lateral Head makes an uniform characteristic recording or playback in the forward and reverse directions because the same head operates in the both directions.
* Uniform tape speed with the AC Servo Motor.
* Auto Reverse System is performed with a sensing foil in the both record and playback modes.
* Auto-Shut-Off System is employed in the mechanism in addition to the electrical shut-off. The mechanism comes stop mode at the tape end.
* Separate volume control for AUX IN and MIC makes a mixing recording.
* SOS/ECHO recording can be made.
* Tension Regulator assures the stabilized tape running.
* NORMAL/SPECIAL TAPE SELECT Switch.

1-2. BLOCK DIAGRAM



S103-1: TAPE POSITION
S104-1: PB POSITION

REC/PB connector: General Export Model only
This diagram shows L-CH and common blocks. R-CH is same as L-CH.

1-3. CIRCUIT DESCRIPTION

AC Servo Circuit

In the Model TC-440, an AC servo amplifier circuit is employed to keep the tape speed constant.

1. Principle

See the block diagram in Fig. 1-1. The motor speed, determined by the voltage Em, can be varied by changing the voltage Er.

E (fixed) = Em + Er

When the motor speed is out of the specifications due to the external disturbances. The constant motor speed can be obtained again by varying the resistance R according to the speed deviation.

The frequency generator (FG), built in the motor, is used to detect the motor speed variation. The servo amplifier changes the resistance referring to the deviation. As the resistance R, the impedance R between the collector and emitter of the transistor (Q501) is used. See Fig. 1-2. The impedance R is varied by the base voltage. The constant motor speed can be obtained by varying the base voltage according to the motor speed deviation. The bridge type rectifier, consisting of the four diodes, makes the current flow through the transistor (Q501) in the direction as shown by the arrow.

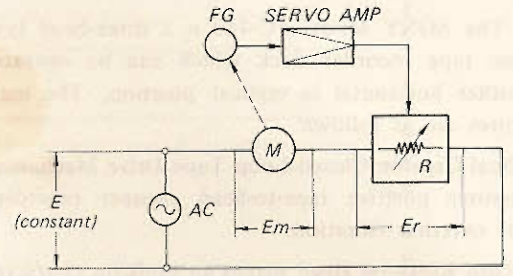


Fig. 1-1. Servo control system block diagram

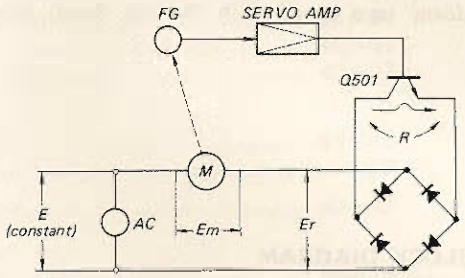


Fig. 1-2. Q501 for resistance R

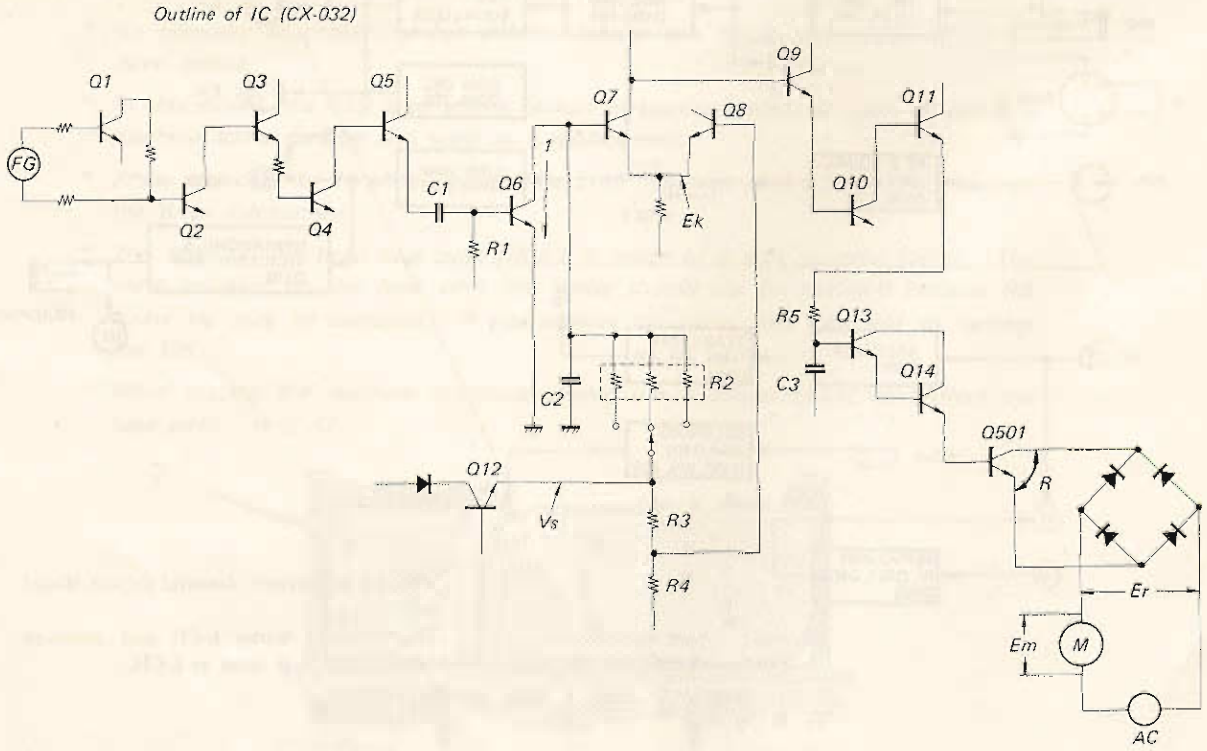


Fig. 1-3. Servo amplifier outline

2. Servo Amplifier Operation

Servo amplifier which varies the impedance R operates as follows. See Figs. 1-3 and 1-4.

1. The sine wave is generated from the frequency generator whose frequency is varied according to the motor speed, and is supplied to the bases of Q1 and Q2. As the bias voltages of Q1 and Q2 are set to saturation region, the sine wave supplied from the frequency generator is waveshaped to the square wave as shown at (A) in Fig. 1-4.
2. The square wave supplied from Q2 is amplified by Q3, Q4 and Q5. It is supplied to the differentiation circuit consisting of C1 and R1 to obtain the pulse as shown at (B) in Fig. 1-4, and is supplied to the base of Q6.
3. While the dc voltage Vs, stabilized by the stabilizer Q12, is voltage-divided by R3 and R4. Then it is applied to the base of Q8, to keep the emitter voltage Ek of Q8 (also that of Q7) constant.
4. Vs also charges C2 by the time constant of C2 and R2. The charged voltage is applied to the collector of Q6. As the pulse shown at (B) in Fig. 1-4 is supplied to the base of Q6, Q6 repeats ON and OFF. C2 discharges during Q6 is conductive as shown by the arrow 1 in Fig. 1-3. Thus sawtooth wave (C) in Fig. 1-4 is obtained at the collector of Q6.
5. The sawtooth wave is supplied to the base of Q7. As the emitter voltage Ek is kept constant, Q7 turns ON only when the peak value of the sawtooth wave is higher than Ek. When Q7 turns ON, the negative pulse (D) in Fig. 1-4 appears at the collector of Q7.
6. This pulse is amplified by Q9, Q10 and Q11, and its polarity is inverted to the positive. The positive pulse is supplied to the integrator consisting of R5 and C3, and is waveshaped as shown at (E) in Fig. 1-4. After being amplified by Q13 and Q14, it is supplied to the base of Q501. Here the motor speed is controlled by the impedance between the collector and emitter of Q501 varied by the amplified signal.

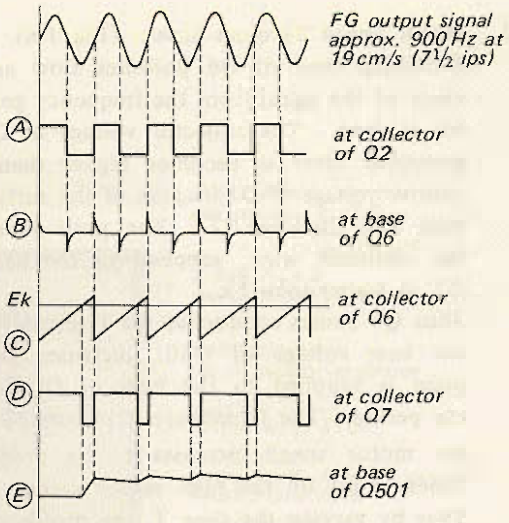


Fig. 1-4. Waveform at each point

3. Motor Speed Out of The Specified Value

1. Motor Speed Becomes Faster (Fig. 1-5).
   Switching time of Q6 becomes fast as the cycle of the signal from the frequency generator is short. The collector voltage of Q6 is grounded before it becomes higher than the emitter voltage Ek (constant) because of the too short time for charging C2. The peak value of the sawtooth wave, supplied to the base of Q7, is lower than Ek. Thus Q7 is cut off, and the base voltage of Q501 is lowered as the pulse is not supplied to the base of Q9.
   The impedance R becomes higher, and the motor speed decreases to its predetermined speed by the low motor voltage Em.

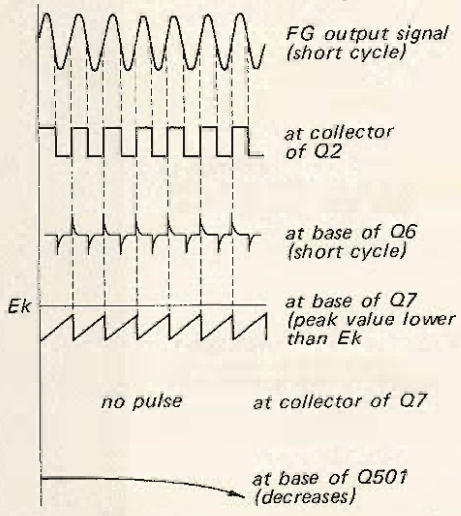


Fig. 1-5. When motor speed becomes faster

2. Motor Speed Becomes Slower (Fig. 1-6).
Switching time of Q6 becomes slow as the cycle of the signal from the frequency generator is long. The collector voltage of Q6 is grounded after it becomes higher than the emitter voltage of Q7 because of the sufficient time for charging C2. The peak value of the sawtooth wave, supplied to the base of Q7, is higher than Ek.
Thus Q7 comes conductive for T seconds, and the base voltage of Q501 increases as the pulse is supplied to the base of Q9 during the period. The impedance R is lowered, and the motor speed increases to its predetermined speed by the high motor voltage Em. Thus by varying the time T, the motor speed is determined. Time T can be controlled by changing the charging time of C2 (the inclination of the sawtooth wave). In this AC servo circuit, the time constant (C2 x R2) for charging time is adjusted by R2, to determine the specified tape speed.

4. Circuit Operation When Motor Starts Running

Just after the power switch is turned on, Q6 is still cut off as the signal is not supplied from the frequency generator (the motor is not running). C2 is charged rapidly, and the voltage higher than Ek is applied to the base of Q7. The base voltage of Q501 increases, and the AC voltage is applied to the motor to start rapid running. In the FF mode, the servo circuit does not operate and the AC voltage is applied to the motor directly to increase the motor speed.

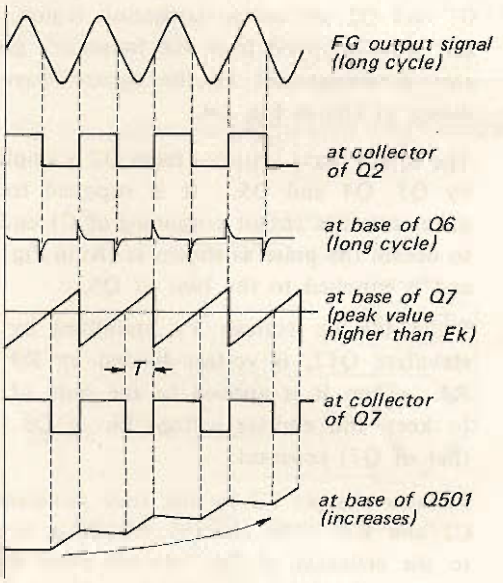
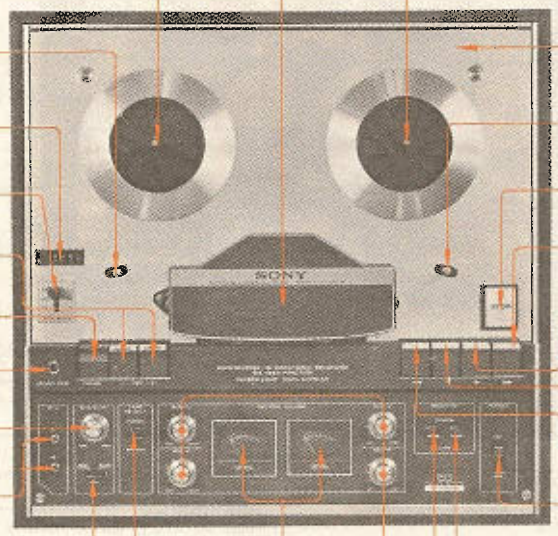


Fig. 1-6. When motor speed becomes slower

1-4. VIEWS

1. Cabinet Front View



X-34920-48
cover ass'y, head

X-34920-04
reel table ass'y, left

X-34920-04
reel table ass'y, right

3-492-204
cap A, tension regulator

X-34920-54-2
reel panel ass'y, complete

Y-20419-025
counter, tape index; type XI

3-492-204
cap A, tension regulator

3-492-307
knob, TAPE SPEED

X-34920-33
button ass'y, STOP

X-34920-32-1
button ass'y, control; REC

X-34920-32-1
button ass'y, function selector; FAST FORWARD

X-34920-50
button ass'y, PAUSE

X-34920-32-1
button ass'y, function selector; FWD

1-507-282
jack (J301), HEADPHONE

X-34920-32-1
button ass'y, function selector; REVERSE

X-34920-49
knob ass'y, volume control; SOS/ECHO

X-34920-32-1
button ass'y, function selector; FAST REVERSE

1-507-251
jack (J101, 201), miniature; MIC

1-513-345-41
switch (S304), POWER

1-514-835
switch (S106, 206), slide; SOS/ECHO

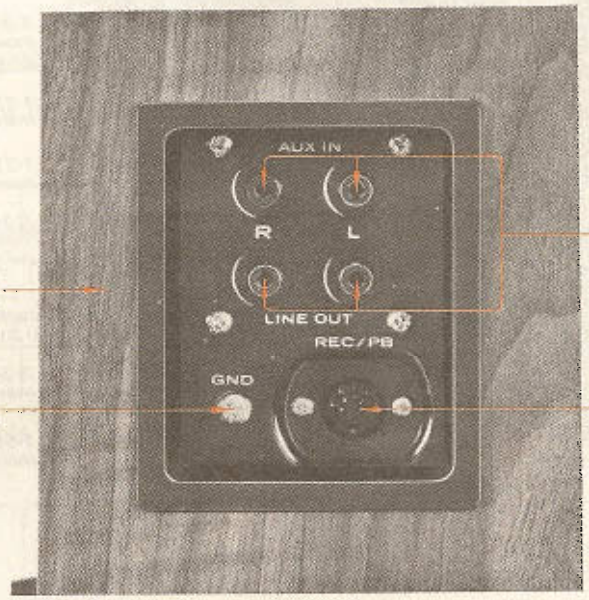
1-524-071
meter (ME101, 201), LEVEL

1-514-836
switch (S103, 203), slide; MONITOR

1-514-768
switch (S102, 202), slide; TAPE SELECT

X-34920-49
knob ass'y, volume control; AUX MIC

2. Cabinet Left Side View



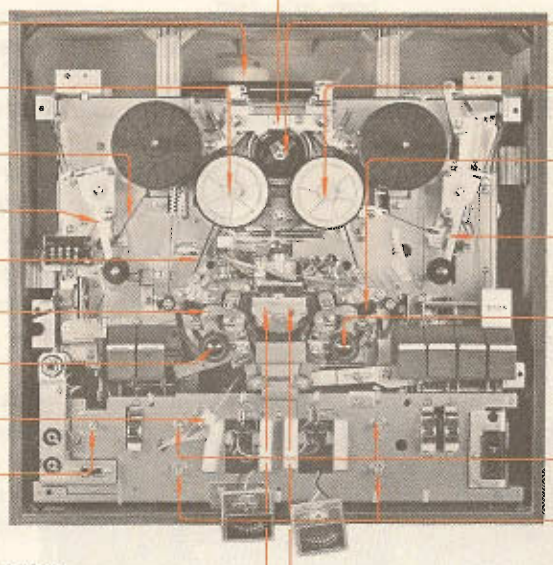
1-507-163
jack, 4-p; AUX IN & LINE OUT (CNJ101, 201, 102, 202)

X-34920-47
cabinet ass'y

7-685-559-31
terminal, GND; ⊕B 4x8

1-509-359
connector (CNJ), rec/pb (for General Export Model)

3. Chassis Front View



X-34920-40
block ass'y, brake

transistor (Q501), 2SC867

3-492-230
pulley, FAST REVERSE

3-472-189
belt (B), counter

X-34920-03
arm (B) ass'y, tension

3-492-231
belt, capstan

8-826-629-25
head (EH102, 202),
erase; EF18-2902A1

3-493-855
pinch roller

1-514-713
switch (S105, 205), muting

1-222-253
resistor (R167, 267),
variable 20 kΩ (A);
SOS/ECHO

8-829-142-20
head (PH101, 201), playback;
PP102-4202

3-492-227
wheel, limiter

3-492-230
pulley, FAST FORWARD

8-826-629-25
head (EH101, 201),
erase; EF18-2902A1

X-34920-02
arm (A) ass'y, tension

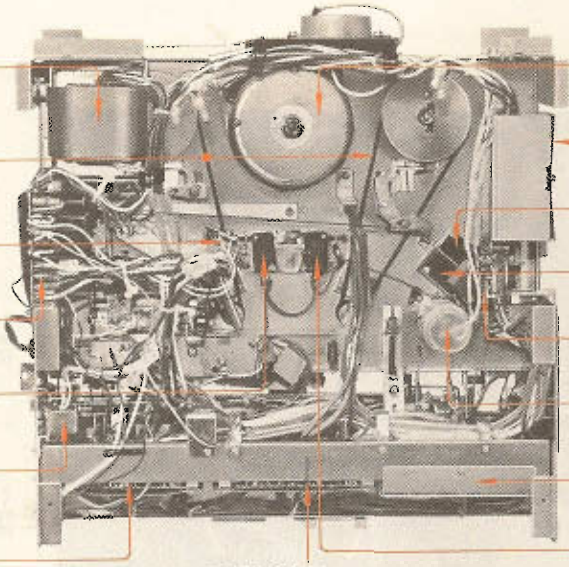
3-493-855
pinch roller

1-222-305
resistor (R165, 265),
variable 100 kΩ (A);
AUX

1-222-479
resistor (R166, 266),
variable 20 kΩ (C);
MIC

8-824-629-20
head (RH101, 201), record; RP102-2902

4. Chassis Back View



1-441-708
transformer (T301), power

3-472-332
belt, take-up

1-454-072
solenoid (PM401)

X-34920-74
mounted circuit board,
servo amp.

1-514-039-12
microswitch (S107), bias switch 2

1-454-073
solenoid (PM402)

X-34920-71
mounted circuit board,
playback amp.

X-34920-72
mounted circuit board,
record amp.

8-832-624-21
motor, IC-624G

X-34920-75
mounted circuit board,
power supply

1-514-057-10
microswitch (S404), servo on/off

1-514-057-10
microswitch (S305), bias switch 4

X-34920-76
mounted circuit board, equalizer
switch

1-117-036
capacitor (C406), motor starting;
0.5 μF + 1.5 μF

X-34920-73
mounted circuit board, bias osc.

1-514-039-12
microswitch (S207), bias switch 3

SECTION 2
DISASSEMBLY

2-1. REEL PANEL REMOVAL
(See Fig. 2-1.)

1. Remove the five control knobs, TAPE SPEED setting knob and head cover.
2. Remove the two head cover pins and four screws labeled ☆.

2-2. CABINET REMOVAL
(See Fig. 2-1.)

The cabinet can be removed by removing the six screws labeled ◉.

2-3. CIRCUIT BOARD REMOVAL
(See Fig. 2-2.)

1. Bias Osc. Circuit Board
   Remove the shield plate A by removing the one screw FTS ⊕ P 3x5 and remove the four screws ⊕ PSW 3x6.
2. Record Amp. Circuit Board
   Remove the four screws.
3. Playback Amp. Circuit Board
   Remove the four screws.

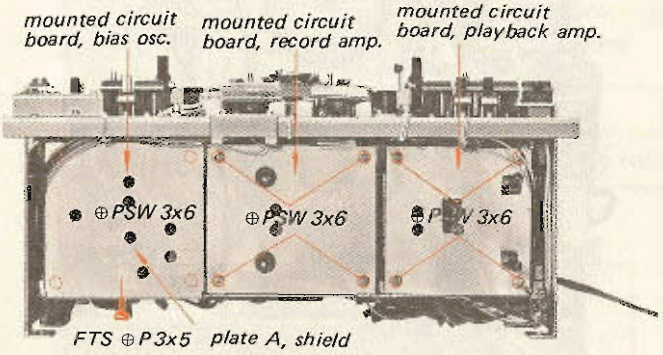


Fig. 2-2. Circuit board removal

4. Power Supply Circuit Board (See Fig. 2-3.)
   Remove the three screws.

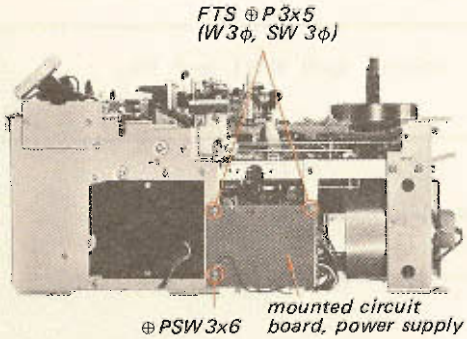


Fig. 2-3. Power supply circuit board removal

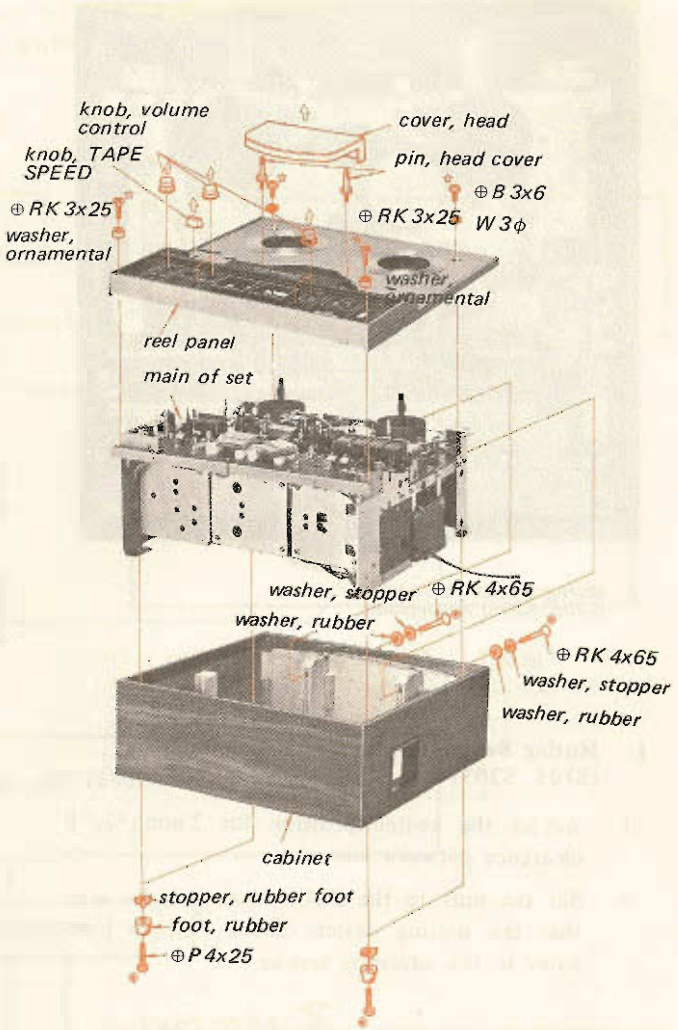


Fig. 2-1. Reel panel and cabinet removal

5. Servo Amp. Circuit Board (See Fig. 2-4.)
   Remove the one screw.

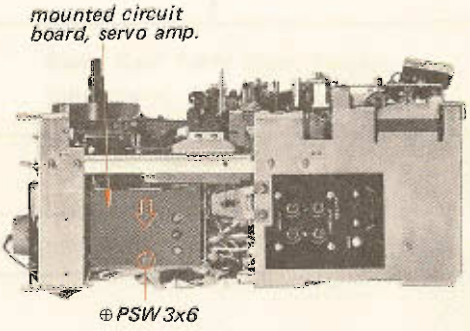


Fig. 2-4. Servo amp. circuit board removal

SECTION 3
ADJUSTMENTS

3-1. MECHANICAL ADJUSTMENT

1. Before Making Adjustments

1. Precaution

1. When a pushbutton of the function selector is depressed without tape threaded, the push-button may not be locked because the stop plunger is activated by the automatic shut-off switch. Function button can be locked in some of the machines in stop mode.
   When making adjustments, fix the actuator of the shut-off switch with a rubber band or a like.
2. Cleaning should be done before and after adjustments. See "Checks after Mechanical Adjustments".

2. Switches and Functions

1. S101, 201, 301 (Equalizer switch) select equalizer according to the tape speed.
2. S102, 202 (TAPE SELECT switch) change the amount of the negative feedbacks for the types of tape, the special and the normal tape.
3. S103, 203 (MONITOR switch) select SOURCE or TAPE monitor input.
4. S104, 204 (Record and playback switch) select REC or FWD mode.
5. S105, 205 (Muting switch) cut off the outputs in the FF and the FAST REVERSE mode.
6. S106, 206 (SOS/ECHO switch) select the ECHO or SOS (sound on sound) recording.
7. S107, 207 (Bias switches (2) and (3)) select the record bias in the FWD and in the REVERSE recording by synchronizing with the head rotation.
8. S302 (Erase head select switch) selects the erase head in the FWD and in the REVERSE recording.
9. S303 (Bias switch (1)) avoids recording click noise.
10. S304 (POWER switch) turns on or off the power.
11. S305 (Bias switch (4)) cuts off the recording bias in the FF and the FAST REVERSE mode.
12. S401 (Motor switch) turns on or off the motor power.
13. S402, 403 (FWD/REVERSE switch) change the motor running direction.
14. S404 (servo on/off switch) turns on or off the servo circuit, and select the motor speed in the FWD and the FF mode.
15. S405 (Shut-off switch) sets the unit to the STOP mode by driving the solenoid, when the end of the tape passes over the head.
16. S501 (TAPE SPEED switch) changes tape speed by selecting the servo circuit elements.

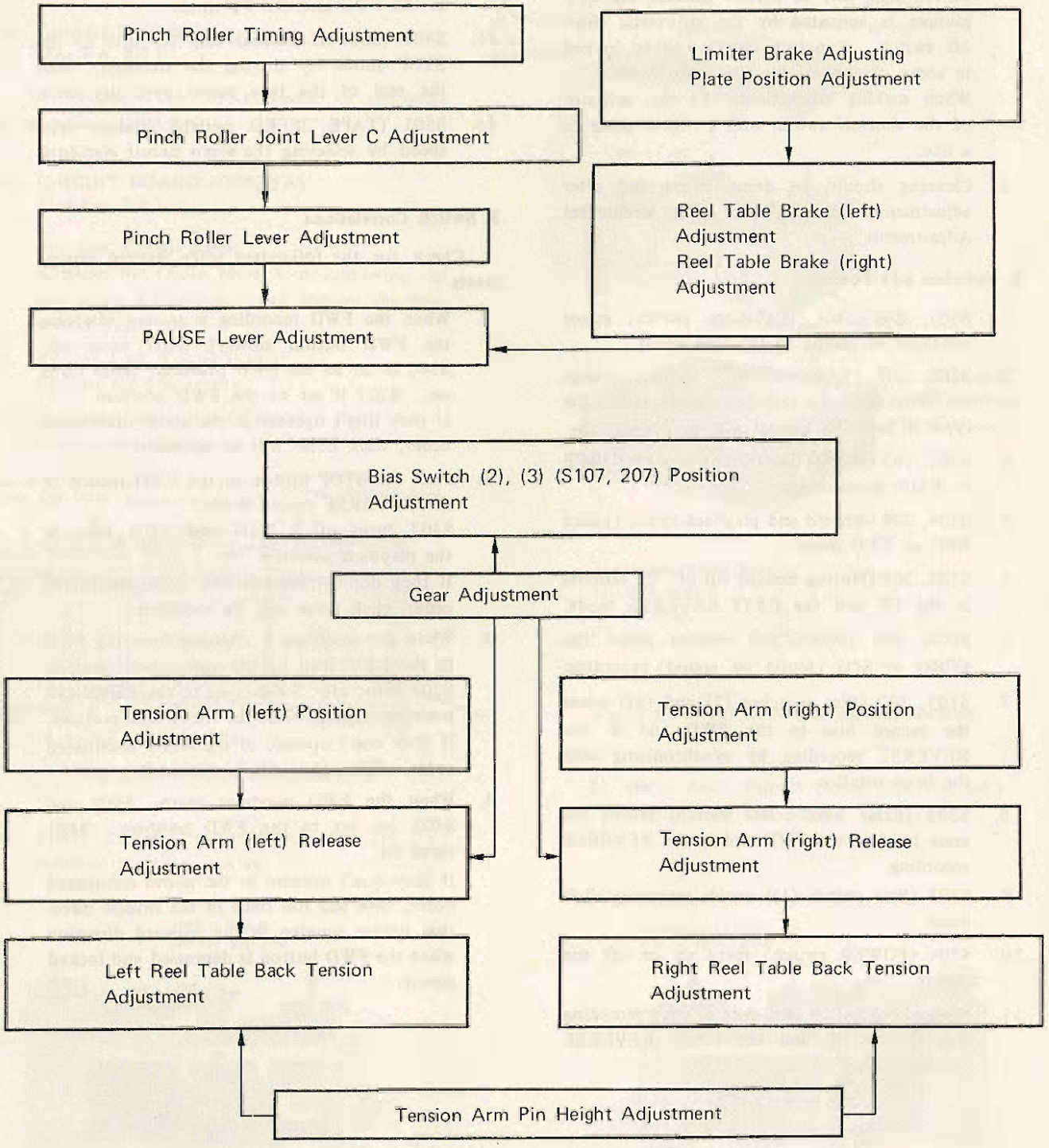
3. Switch Correlations

Check for the followings after making adjustments.

1. When the FWD recording is started (Depress the FWD button slowly), S107 turns off. S302 is set to the FWD position. S303 turns on. S207 is set to the FWD position.
   If they don't operate in the above mentioned order, click noise will be recorded.
2. Push the STOP button in the FWD record or the REVERSE record mode.
   S303 turns off. S104 and S204 turn to the playback position.
   If they don't operate in the above mentioned order, click noise will be recorded.
3. When the recording is changed from the FWD to the REVERSE by the auto reverse system, S207 turns off. S302 is set to the REVERSE position, next S107 to the REVERSE position.
   If they don't operate in the above mentioned order, click noise will be recorded.
4. When the FWD playback starts, S402 and S403 are set to the FWD position. S401 turns on.
   If they don't operate in the above mentioned order, tape will run once in the reverse direction before running in the forward direction when the FWD button is depressed and locked slowly.

4. Adjustment Correlation

Make the adjustments specified in the following in the order as shown by the arrows. When any adjustment is done, perform all the adjustments after that.



2. Adjustments

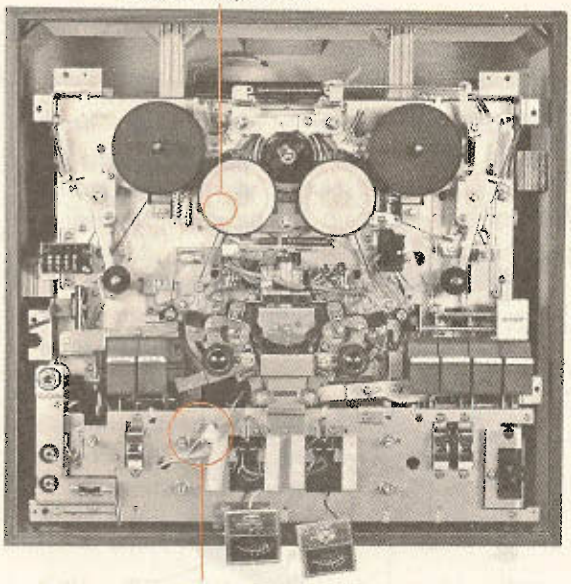
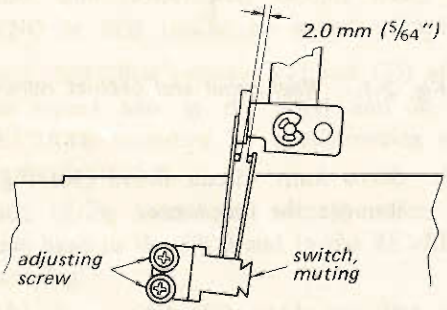


Fig. 3-1. Adjusting parts location

1. Muting Switch Position Adjustment (S105, S205)

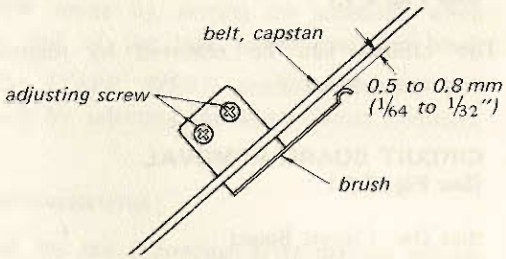
1. Adjust the switch position for 2 mm (5/64") clearance between leaves.
2. Set the unit to the STOP mode. Make sure that the muting switch closes. Apply lock paint to the adjusting screws.



– FWD (or REVERSE) mode –

2. Static Charge Grounding Brush Position Adjustment

1. Loosen the adjusting screws and adjust the brush position for the clearance of 0.5 to 0.8 mm (1/64 to 1/32") between the belt and the brush.
2. Set the unit to the FWD mode. Make sure that the belt and the brush do not touch each other due to the vibration of the belt. Apply lock paint to the adjusting screws.



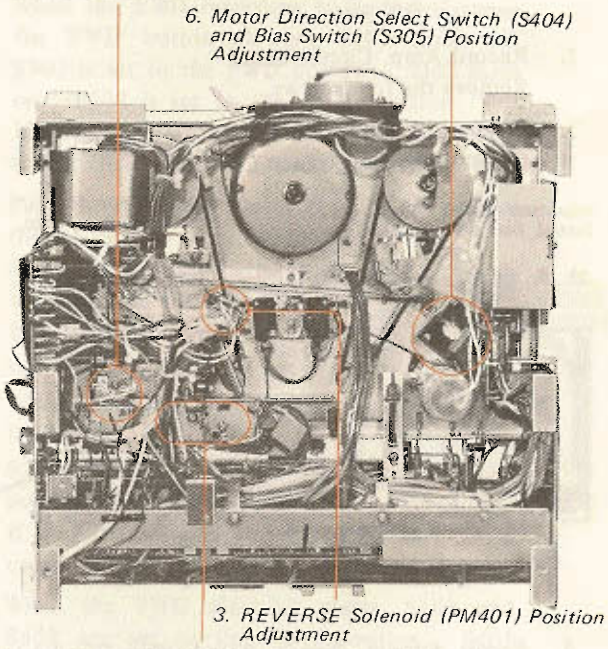
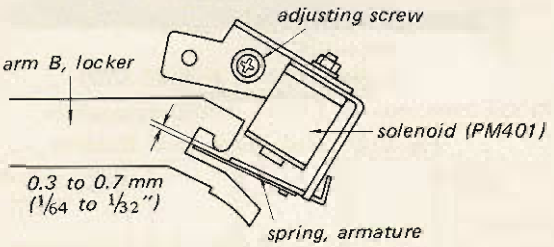


Fig. 3-2. Adjusting parts location

3. REVERSE Solenoid (PM401) Position Adjustment

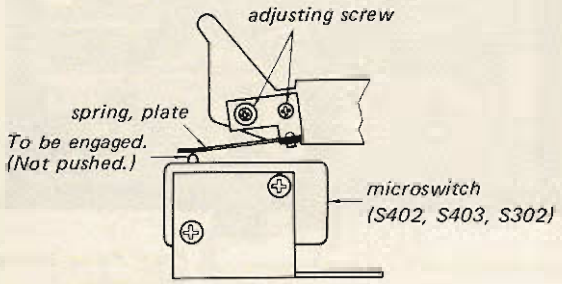
1. Set the unit to the STOP mode. Loosen the adjusting screw to position the solenoid for the clearance of 0.3 to 0.7 mm (1/64 to 1/32") between the armature spring of solenoid and the locker arm B.
2. Set the unit to the FWD mode with the tape having a sensing foil. Make sure that the mode is changed to REVERSE by the solenoid, when the pole is short-circuited by the foil on the tape end in the FWD mode.
3. Apply lock paint to the adjusting screw.



– STOP mode –

4. Plate Spring Position Adjustment

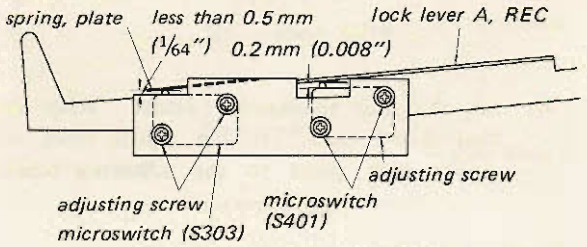
1. Loosen the adjusting screws and adjust the plate spring position as illustrated.
2. Check that the microswitch is pushed in FWD mode.
3. Apply lock paint to the adjusting screws.



– STOP mode –

5. Bias Switch (1) (S303) and Motor Switch (S401) Position Adjustment

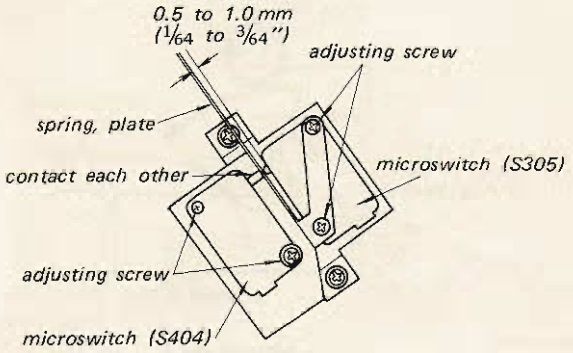
1. S303 Position Adjustment
   1) Loosen the adjusting screws and adjust the switch position so that the clearance between the switch and the plate spring is less than 0.5 mm (1/64").
   2) Push the STOP button slowly in the REC mode. Make sure that the REC button is released after S303 turns off.
   3) Apply lock paint to the adjusting screws.
2. S401 Position Adjustment
   1) Adjust the switch position for the clearance of 0.2 mm (0.008") between the switch and the REC lock lever A.
   2) Make sure that S401 turns on when the unit is set to the FF or the FAST REVERSE mode.
   3) Apply lock paint to the adjusting screws.



– FWD or REVERSE mode –

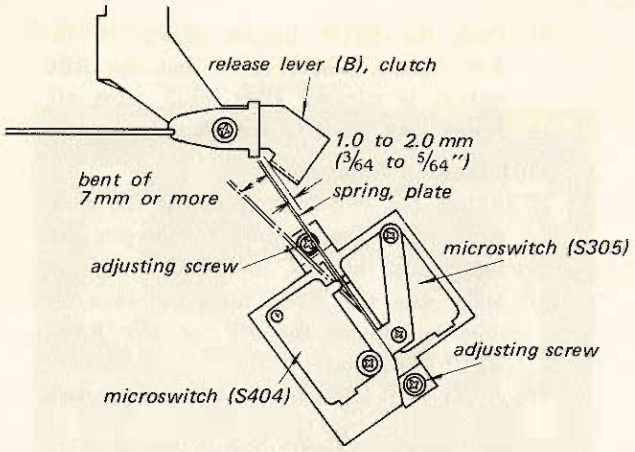
6. Servo On/Off Switch (S404) and Bias Switch (4) (S305) Position Adjustment

1. Loosen the adjusting screws for S305 and adjust the switch (S305) position for the clearance of 0.5 to 1.0 mm (1/64 to 3/64") between the switch and the plate spring.
2. After making adjustment of step 1, loosen the adjusting screws for S404 and adjust the switch (S404) position so that the switch contacts with the plate spring.



– STOP mode –

3. After making adjustments of steps 1 and 2, loosen the adjusting screws and adjust the microswitch bracket position for the clearance of 1.0 to 2.0 mm (3/64 to 5/64") between the plate spring and the clutch release lever (B). (See the illustration on next page.)

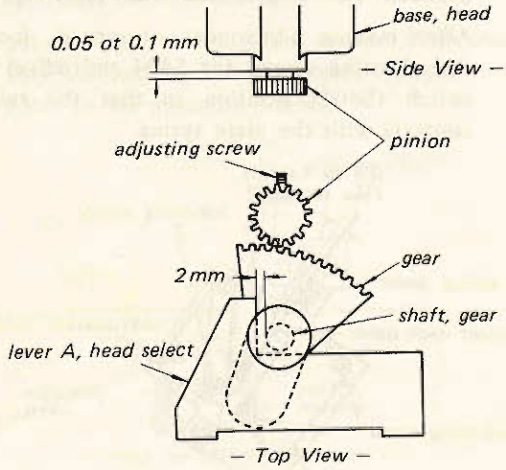


– STOP mode –

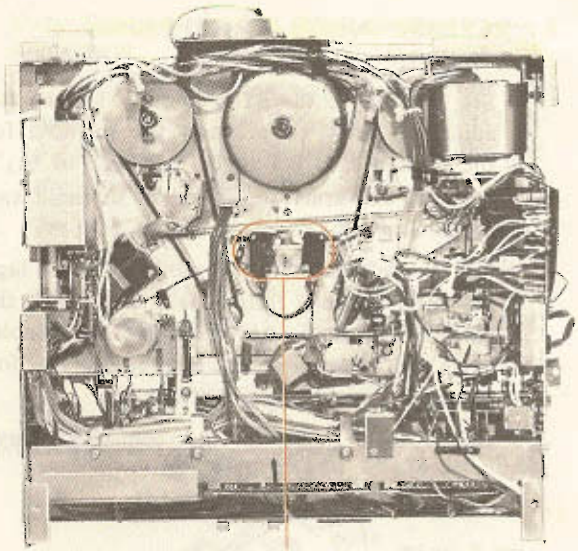
4. Set the unit to the FF mode. Make sure that S404 turns on and S305 turns off. Apply lock paint to the adjusting screws.

7. Gear Adjustment

1. Loosen the adjusting screw and adjust the pinion position so that the clearance between the pinion and the head base is 0.05 to 0.1 mm (0.002 to 0.004") and also that between the head select lever A and the gear shaft is 2 mm (5/64") in the FWD mode.
2. Apply lock paint to the adjusting screw.



– FWD mode –



8. Bias Switch (2, 3) (S107, S207) Position Adjustment

Fig. 3-3. Adjusting parts location

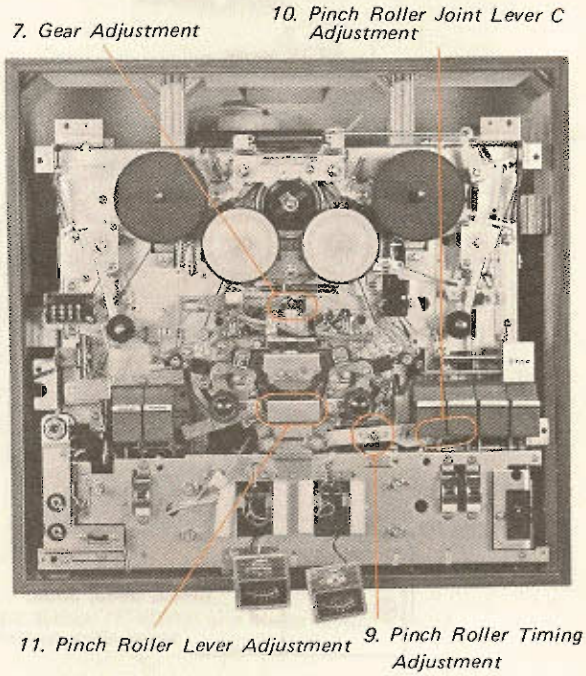
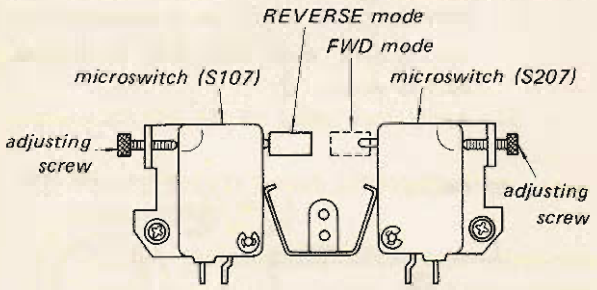


Fig. 3-4. Adjusting parts location

8. Bias Switch (2), (3) (S107, 207) Position Adjustment

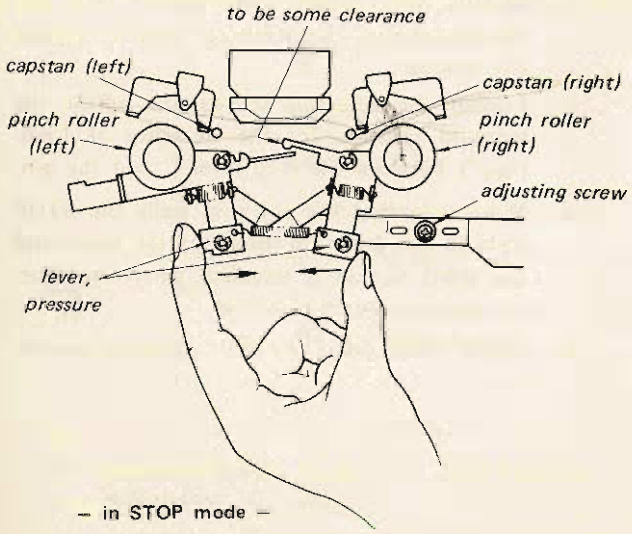
This adjustment should be made after the "Gear Adjustment".

1. Adjust the adjusting screw so that the microswitch S207 turns on in the FWD mode.
2. Set the unit to the REVERSE mode. Adjust the adjusting screw so that the microswitch S107 turns on.
3. Depress and lock the FWD button slowly. Make sure that the erase head select switch (S302) turns off after S107 turns off. (See illustration in the item 4 for S302.)
4. Apply lock paint to the adjusting screws.



9. Pinch Roller Timing Adjustment

1. Loosen the adjusting screw in STOP mode, push the pressure levers by hand as shown and tighten the screw.
2. Depress and lock the FWD button slowly and make sure that the right and left pinch rollers press the capstans at the same time.
3. Apply lock paint to the adjusting screw.

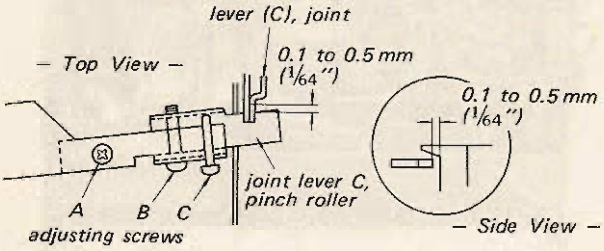


– in STOP mode –

10. Pinch Roller Joint Lever C Adjustment

This adjustment should be made after the "Pinch Roller Timing Adjustment".

1. Loosen the adjusting screws A and B in the STOP mode. Adjust the adjusting screw C for the clearance of 0.1 to 0.5 mm (1/64") between the pinch roller joint lever C and the joint lever (C).
2. Apply lock paint to the adjusting screw.

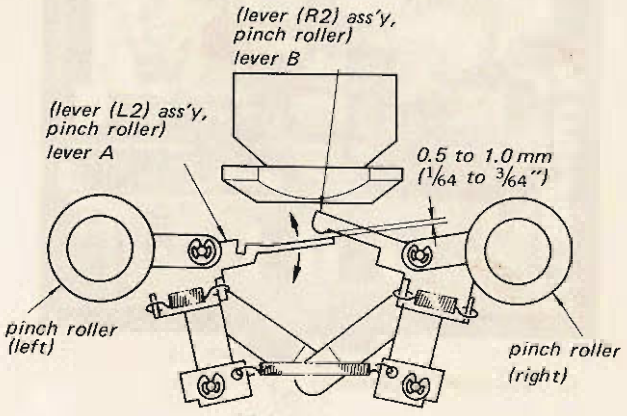


– STOP mode –

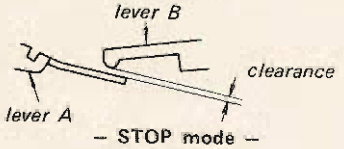
11. Pinch Roller Lever Adjustment

This adjustment should be made after the "Pinch Roller Joint Lever C Adjustment".

1. Set the unit to the FWD mode. Bend the lever A in the direction shown by the arrow so that the clearance between levers A and B is 0.5 to 1.0 mm (1/64 to 3/64").
2. Set the unit to the STOP mode. Make sure that there is some clearance between the levers A and B.
3. Apply lock paint to the adjusting screw.



– FWD mode –



– STOP mode –

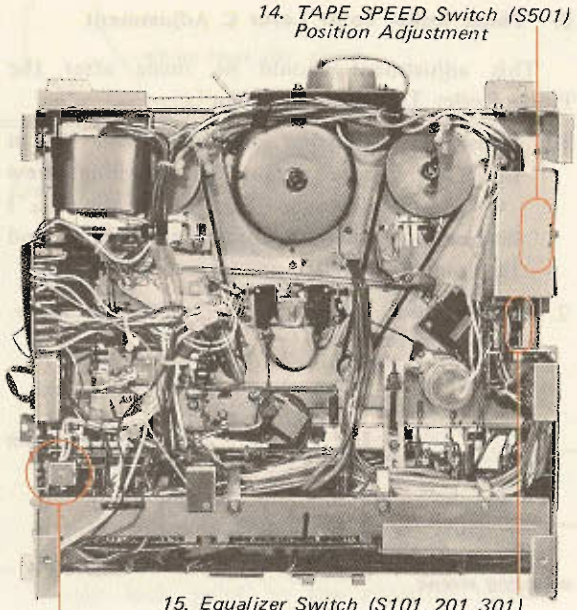


Fig. 3-5. Adjusting parts location

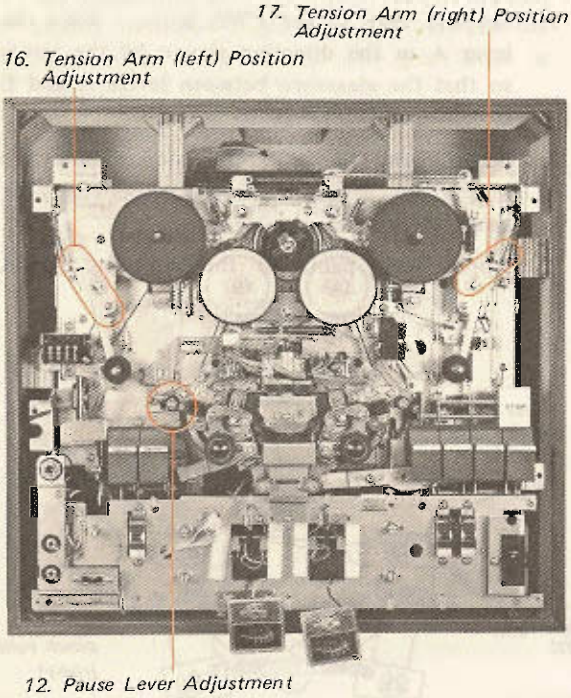
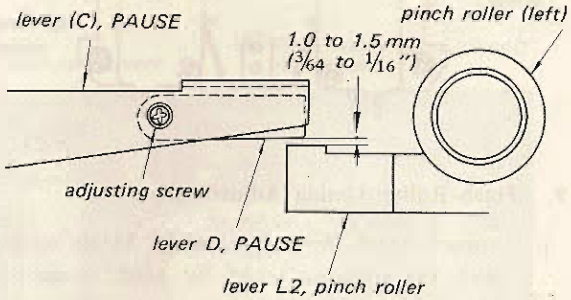


Fig. 3-6. Adjusting parts location

12. PAUSE Lever Adjustment

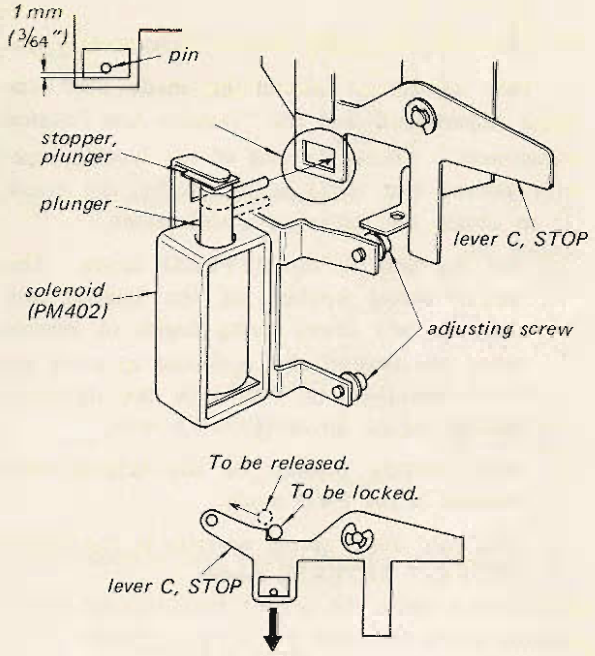
This adjustment should be made after the "Pinch Roller Lever Adjustment" and the "Reel Table Brake Adjustment".

1. Set the unit to the FWD mode. Adjust the adjusting screw for the clearance of 1.0 to 1.5 mm (3/64 to 1/16") between the PAUSE lever D and the pinch roller lever L2.
2. Check for the followings after making adjustment.
   1) Both right and left pinch rollers are disengaged from the capstan by 1.5 mm (1/16") or more when the PAUSE button is depressed.
   2) The brake is applied to the reel table after the pinch rollers are disengaged from the capstans, when depressing the PAUSE button slowly.
   3) Apply lock paint to the adjusting screw.



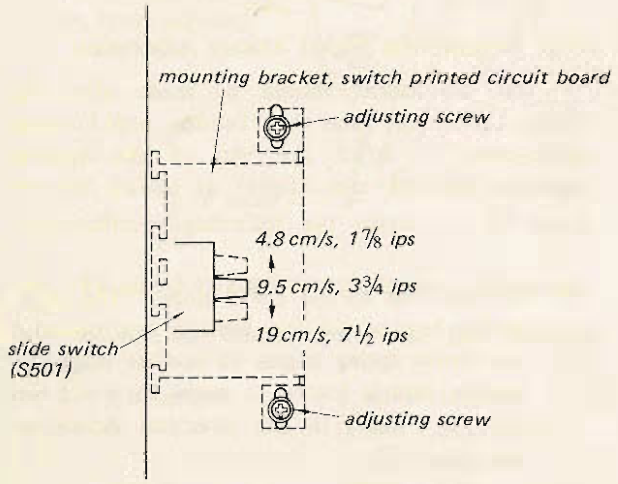
13. Shut-off Solenoid (PM402) Position Adjustment

1. Set the unit to the FWD mode. Pull out the plunger of the solenoid until it presses the stopper.
2. Loosen the adjusting screws and adjust the solenoid position for the clearance of 1 mm (3/64") between the stop lever C and the pin.
3. Make sure that the solenoid pulls the STOP lever in the direction shown by the arrow and the FWD button is released, when the shut-off switch (S405) turns on.
4. Apply lock paint to the adjusting screws.



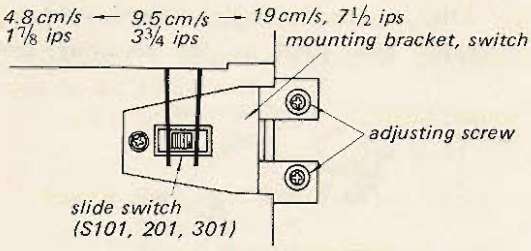
14. TAPE SPEED Switch (S501) Position Adjustment

1. Loosen the adjusting screws and adjust the servo amp. circuit board mounting bracket position so that the slide switch is certainly selected when the TAPE SPEED button is set to the 19 cm/s (7½ ips), 9.5 cm/s (3¾ ips) and 4.8 cm/s (1⅞ ips) positions.
2. Make sure that the slide switch changes perfectly, even when the TAPE SPEED knob is moved slowly. Apply lock paint to the adjusting screws.



15. Equalizer Switch (S101, 201, 301) Position Adjustment

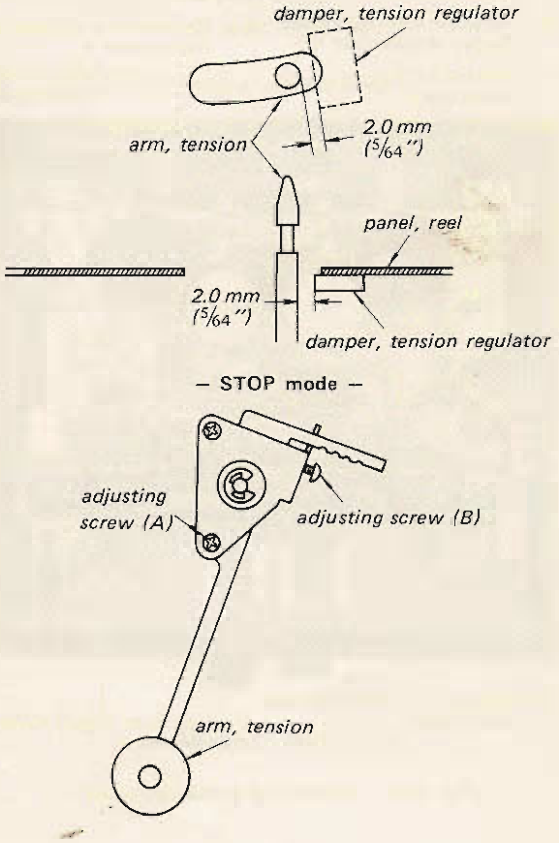
1. Loosen the adjusting screws and adjust the switch mounting bracket position so that the slide switch changes perfectly when the TAPE SPEED button is set to the 19 cm/s (7½ ips), 9.5 cm/s (3¾ ips) and 4.8 cm/s (1⅞ ips) positions.
2. Make sure that the slide switch is also certainly selected, even when the TAPE SPEED button is switched slowly. Apply lock paint to the adjusting screws.



— in 9.5 cm/s, 3¾ ips position —

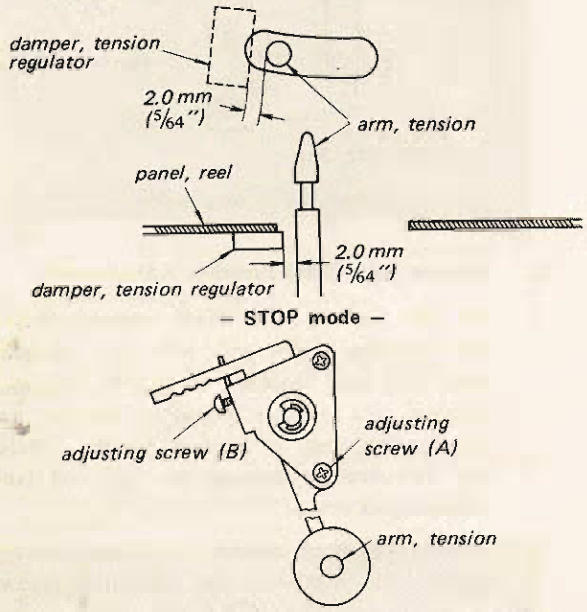
16. Tension Arm (left) Position Adjustment

1. Set the unit to the STOP mode. Adjust the adjusting screw (B) with the adjusting screw (A) kept loosened so that the clearance between the tension regulator damper and the tension arm is 2.0 mm (5/64"). (Watch the clearance by turning the left reel table counterclockwise.)
2. After adjustment, tighten the screw (A) and apply lock paint to the adjusting screws.



7. Tension Arm (right) Position Adjustment

1. Set the unit to the STOP mode. Adjust the adjusting screw (B) with the adjusting screw (A) kept loosened so that the clearance between the tension regulator damper and the tension arm is 2.0 mm (5/64"). (Watch the clearance by turning the right reel table counterclockwise.)
2. After adjustment, tighten the screw (A) and apply lock paint to the adjusting screws.



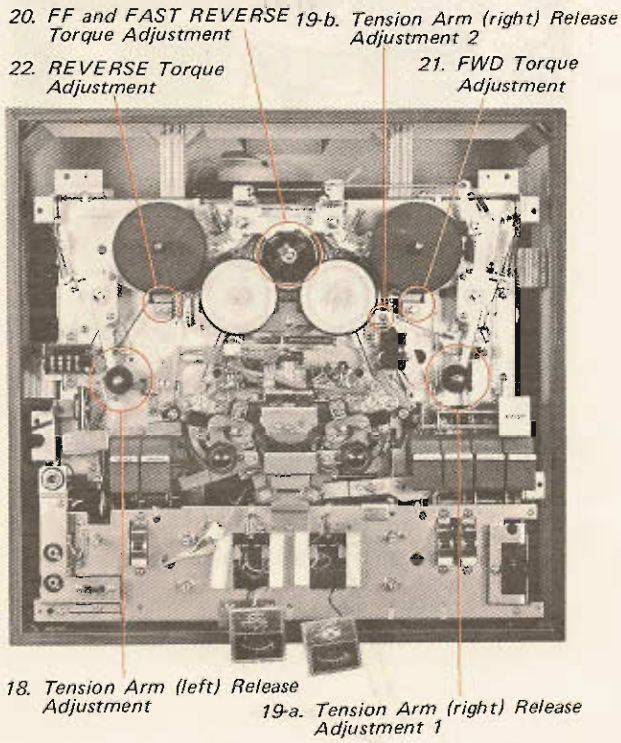
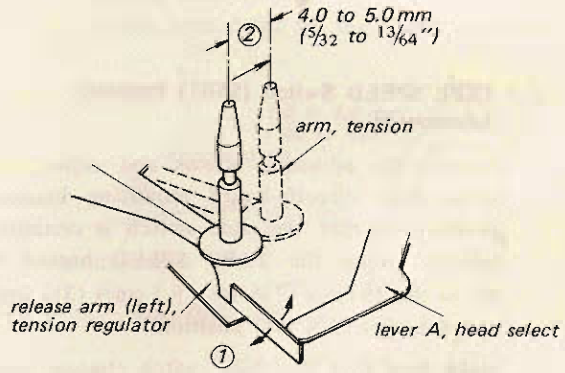


Fig. 3-7. Adjusting parts location

18. Tension Arm (left) Release Adjustment

This adjustment should be made after the "Gear Adjustment" and the "Tension Arm Position Adjustment". Bend the end of the tension regulator release arm (left) as shown by the arrow ① to obtain the following specifications.

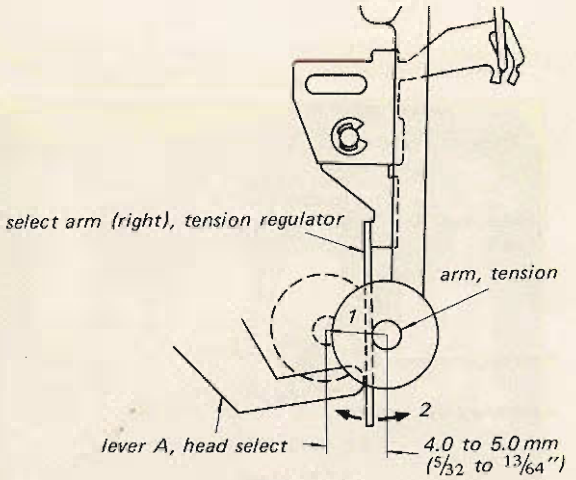
1. Set the unit to the REVERSE mode. The upper spring hooked on the tension arm operates and lower spring begins to operate when the tension arm is forced to move by 4 ~ 5 mm (5/32 to 13/64") in the direction shown by the arrow ②.
2. Both springs, hooked on the tension arm, operate in the FWD mode.
3. The only upper spring operates in the STOP, FF, FAST REVERSE modes.



19-a. Tension Arm (right) Release Adjustment 1

This adjustment should be made after the "Gear Adjustment" and the "Tension Arm Position Adjustment". Bend the top of the tension regulator selector arm (right) as shown by the arrow ① to obtain the following specifications.

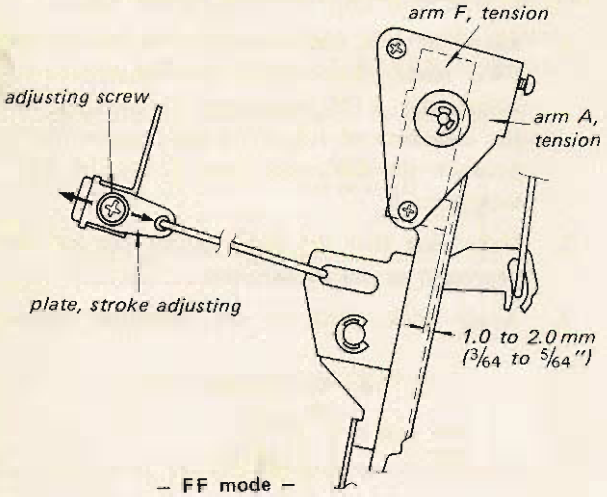
1. Set the unit to the FWD mode. The upper spring hooked on the tension arm operates and lower spring begins to operate when the tension arm is forced to move by 4 ~ 5 mm (5/32 to 13/64") in the direction shown by the arrow ②.
2. Both springs, hooked on the tension arm, operate in the REVERSE mode.
3. The only upper spring operates in the STOP, FF, FAST REVERSE modes.



– FWD mode –

19-b. Tension Arm (right) Release Adjustment 2

1. Set the unit to the FF mode. Loosen the adjusting screw and move the stroke adjusting plate in the direction shown by the arrow so that the clearance between the tension arm F and the tension arm A is 1.0 to 2.0 mm (3/64 to 5/64").
2. Apply lock paint to the adjusting screw.



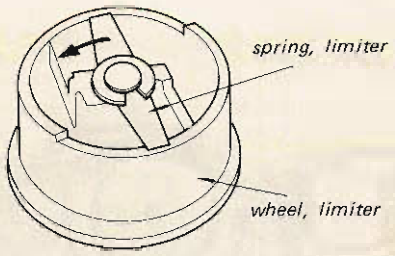
– FF mode –

20. FF and FAST REVERSE Torque Adjustment

Adjust the limiter spring for the specified torque.

FF torque:	1,300 ± 100 g·cm (160 ± 1.2 oz·inch)
FAST REVERSE torque:	1,300 ± 100 g·cm (160 ± 1.2 oz·inch)

Note: Torque becomes greater when turning the limiter spring in the direction shown by the arrow.

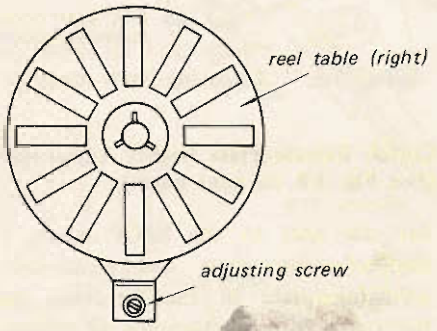


21. FWD Torque Adjustment

Adjust the adjusting screw for the specified torque in the FWD mode.

FWD torque: 375 ± 25 g·cm (4.6 ± 0.3 oz·inch)

Note: 1. Tape speed should be set to the 19 cm/s position.
2. Torque becomes greater when turning the screw clockwise



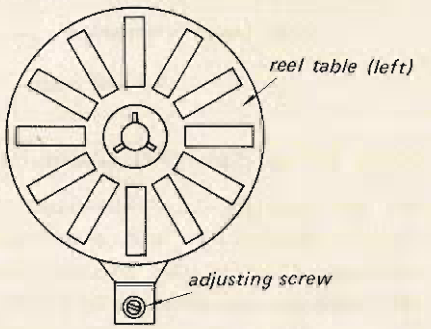
– FWD mode –

22. REVERSE Torque Adjustment

Adjust the adjusting screw for the specified torque in the REVERSE mode. (Torque becomes greater when turning the screw clockwise.)

REVERSE torque: 375 ± 25 g·cm (4.6 ± 0.3 oz·inch)

Note: Tape speed should be 19 cm/s (7½ ips).



– REVERSE mode –

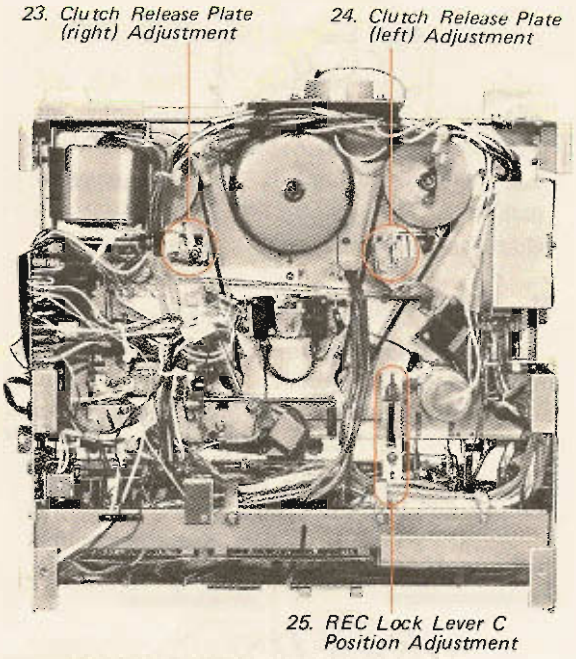
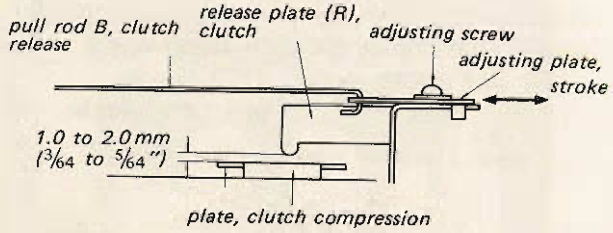


Fig. 3-8. Adjusting parts location

23. Clutch Release Plate (right) Adjustment (See Fig. 3-8 on next page.)

1. Set the unit to the STOP mode. Loosen the adjusting screw and move the stroke adjusting plate in the direction shown by the arrow for the clearance of 1.0 to 2.0 mm (3/64 to 5/64") between the clutch release plate (right) and the clutch compression plate.
2. Apply lock paint to the adjusting screw.

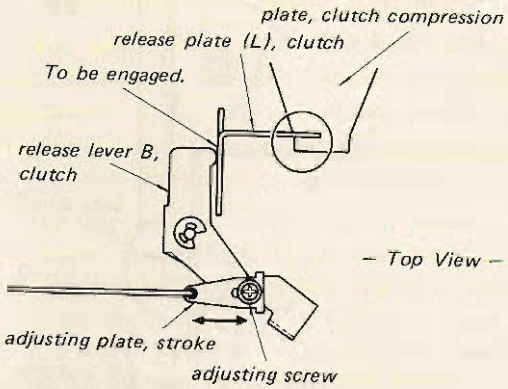
– Continued to next page –



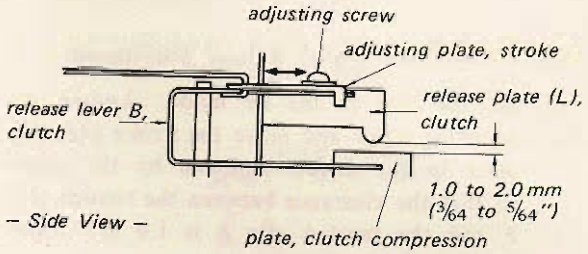
– STOP mode –

24. Clutch Release Plate (left) Adjustment

1. Set the unit to the STOP mode. Loosen the adjusting screw and move the stroke adjusting plate in the direction shown by the arrow for the clearance of 1.0 to 2.0 mm (3/64 to 5/64") between the clutch release plate (left) and the clutch pressure plate.
2. Apply lock paint to the adjusting screw.

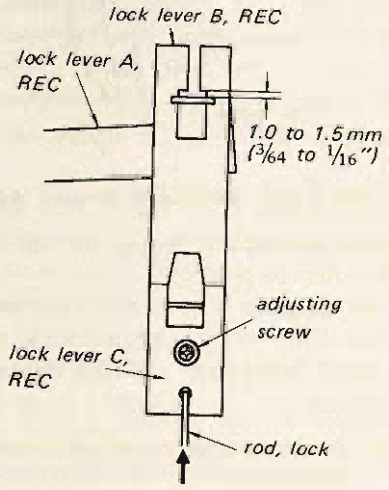


– STOP mode –



25. REC Lock Lever C Position Adjustment

1. Keep the lock rod pushed as shown in the FWD mode. Loosen the adjusting screw and adjust the REC lock lever C position for the clearance of 1.0 to 1.5 mm (3/64 to 1/16") between the REC lock lever A and the REC lock lever B.
2. Make sure that the REC button can not be depressed in the FWD mode.
3. Apply lock paint to the adjusting screw.



– FWD mode –

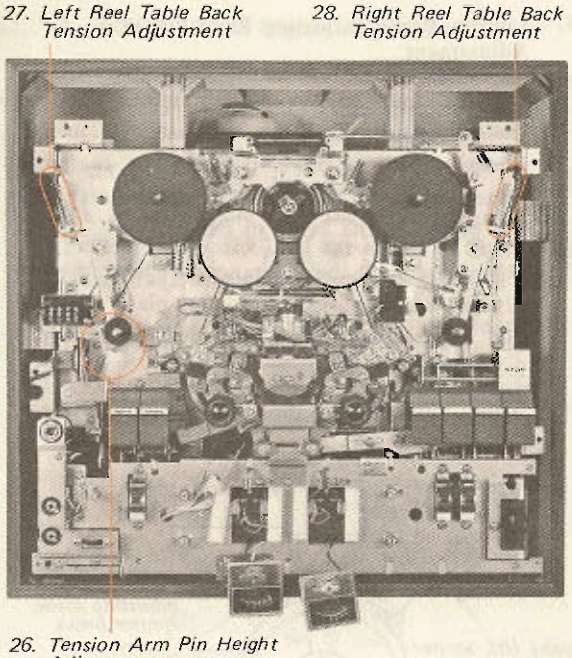
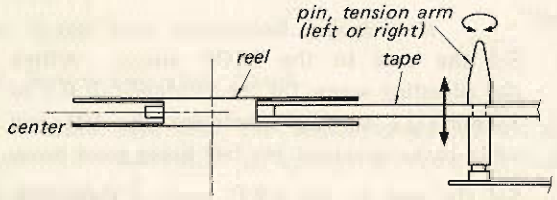


Fig. 3-9. Adjusting parts location

26. Tension Arm Pin Height Adjustment

1. Adjust the tension arm pins (left and right) so that the tape is taken up to the center of the reels in FWD and REVERSE modes.

Note: Use the reel with a small hub (R-7ES).



– FWD (or REVERSE) mode –

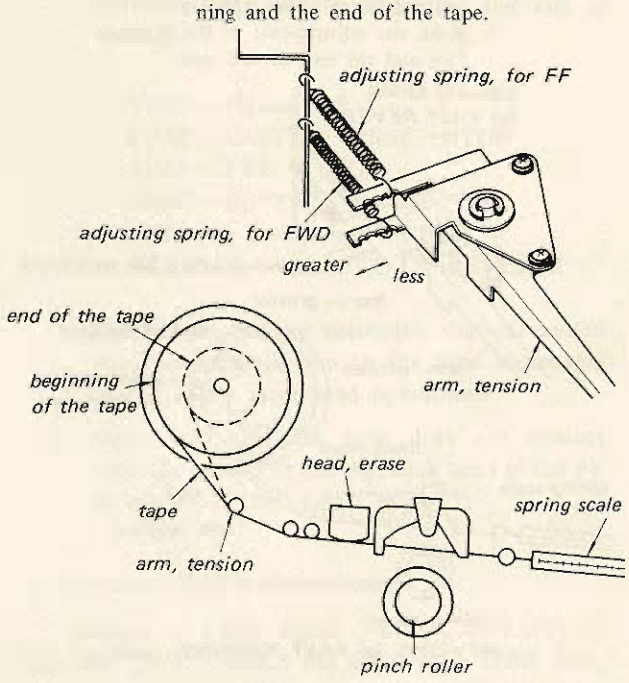
27. Left Reel Table Back Tension Adjustment

Make this adjustment after the "Tension Arm Release Adjustment" and the "Tension Arm Pin Height Adjustment".

1. FF Back Tension Adjustment
   Set the unit to the FF mode. Change the hooking position of the adjusting spring for FF to obtain the specified back tension. (Back tension changes by approx. 2 g (0.07 oz) a pitch of the hooking position.)
   FF back tension: 10 to 15 g, 0.35 to 0.53 oz

2. FWD Back Tension Adjustment
   Set the unit to the FWD mode. Change the hooking position of the adjusting spring for FWD to obtain the specified back tension. (Back tension changes by approx. 5 to 6 g, 0.18 to 0.21 oz a pitch of the hooking position.)
   FWD back tension: 50 to 60 g, 1.8 to 2.1 oz

Note: 1. Make the adjustments in the order from the FF to the FWD.
2. Use a reel with a small hub (R-7ES) and the SONY super 150 tape.
3. Make the adjustments at the beginning and the end of the tape.



– FWD (or FF) mode –

28. Right Reel Table Back Tension Adjustment

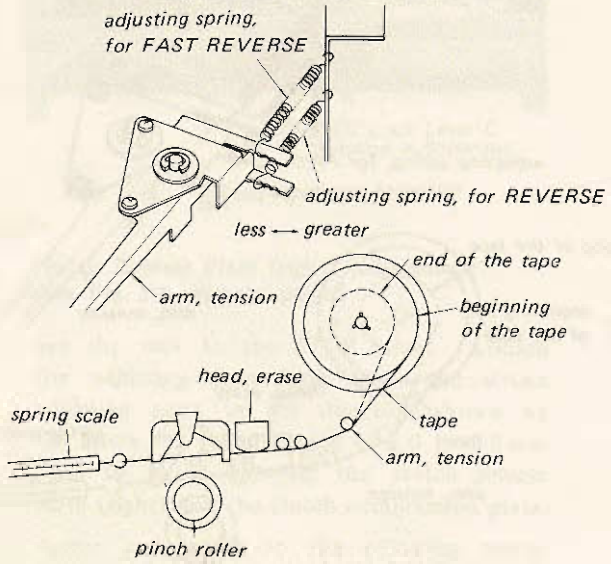
Make this adjustment after the "Tension Arm Release Adjustment" and the "Tension Arm Pin Height Adjustment".

1. FAST REVERSE Back Tension Adjustment
   Set the unit to the FAST REVERSE mode. Change the hooking position of the adjusting spring for FAST REVERSE to obtain the specified back tension. (Back tension changes by approx. 2 g (0.07 oz) a pitch of the hooking position.)
   FAST REVERSE back tension: 10 to 15 g, 0.35 to 0.53 oz

2. REVERSE Back Tension Adjustment
Set the unit to the REVERSE mode. Change the hooking position of the adjusting spring for REVERSE to obtain the specified back tension. (Back tension changes by approx. 5 to 6 g, 0.18 to 0.21 oz a pitch of the hooking position.)

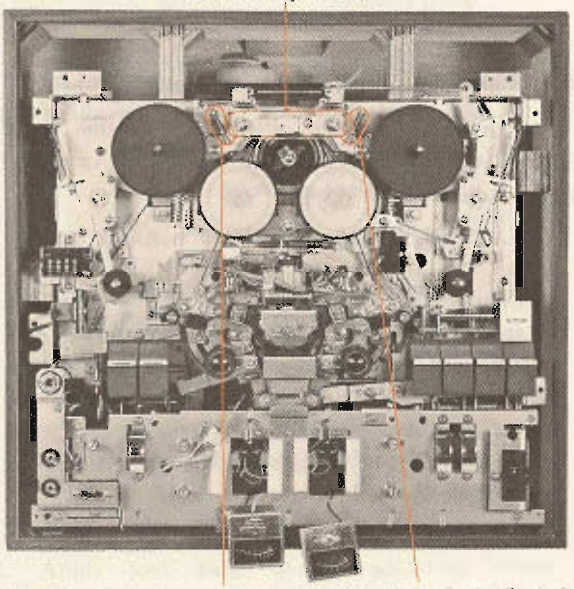
REVERSE back tension: 50 to 60 g, 1.8 to 2.1 oz

Note: 1. Make the adjustments in the order from the FAST REVERSE to the REVERSE.
2. Use a reel with a small hub (R-7ES) and the SONY super 150 tape.
3. Make the adjustments at the beginning and the end of the tape.



– REVERSE (or FAST REVERSE) mode –

29. Limiter Brake Adjusting Plate Position Adjustment

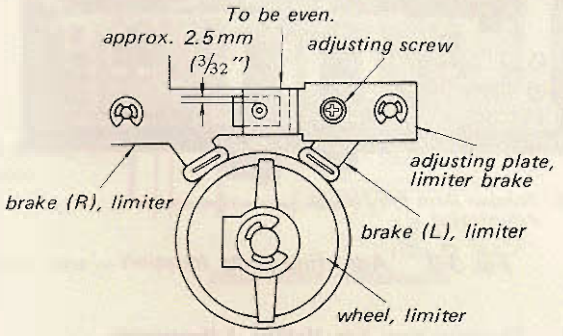


30. Reel Table Brake (left) Adjustment 31. Reel Table Brake (right) Adjustment

Fig. 3-10. Adjusting parts location

29. Limiter Brake Adjusting Plate Position Adjustment

1. Set the unit to the STOP mode. Loosen the adjusting screw and adjust the limiter brake adjusting plate position so that the upper ends of the limiter brake (left) and the plate are the same in height.
2. Make sure that the clearance between the pin of the limiter brake adjusting plate and the slot of the limiter brake (left) is approx. 2.5 mm (3/32").
3. Apply lock paint to the adjusting screw.

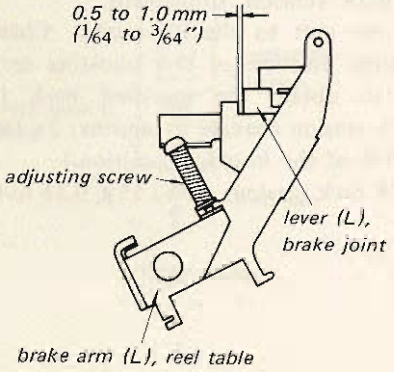


– STOP mode –

30. Reel Table Brake (left) Adjustment

This adjustment should be made after the "Limiter Brake Adjusting Plate Position Adjustment".

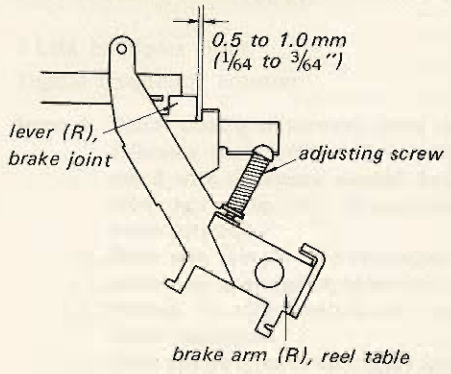
1. Set the unit to the STOP mode. Adjust the adjusting screw for the clearance of 0.5 to 1.0 mm (1/64 to 3/64") between the left reel table brake arm and the left brake joint lever.
2. Set the unit to the FWD mode. Make sure that the reel table is disengaged from the brake by 1.0 mm (3/64") or more. Depress the PAUSE button and lock it. Make sure that the reel table contacts with the brake after the pinch roller is disengaged from the capstan.
3. Apply lock paint to the adjusting screw.



31. Reel Table Brake (right) Adjustment

This adjustment should be made after the "Limiter Brake Adjusting Plate Position Adjustment".

1. Set the unit to the STOP mode. Adjust the adjusting screw for the clearance of 0.5 to 1.0 mm (1/64 to 3/64") between the right reel table brake arm and the right brake joint lever.
2. Set the unit to the FWD mode. Make sure that the reel table is disengaged from the brake by 1.0 mm (3/64") or more. Depress the PAUSE button and lock it. Make sure that the reel table contacts with the brake after the pinch roller is disengaged from the capstan.
3. Apply lock paint to the adjusting screw.



3. Check After Mechanical Adjustments

1. Button Operation Check

Make sure that the following operations are correctly done with a tape being equipped with a sensing foil.

1. Only the STOP and PAUSE buttons can be locked in the FWD, REVERSE, FF and FAST REVERSE modes.
2. The REC button can be locked in the STOP mode. When one of the REC buttons is depressed, another one that has already been locked should be released.
3. When the FWD or the REVERSE button is pulled wiht the REC button, both buttons can be locked. When the STOP button is pushed as it is, these locked buttons are released.
4. If any button but the PAUSE and the STOP button is pulled and locked when only the REC button is locked, the REC button is released.

2. Mechanism Driving Operation Check

1. Make sure that the tape runs in both directions (FWD and REVERSE) at speeds of 19 cm/s, 9.5 cm/s and 4.8 cm/s (7½ ips, 3¾ ips and 1⅞ ips.)
2. Make sure that the following operations are correctly done at the beginning and end of the tape.

   STOP → FF → STOP
   STOP → FAST REVERSE → STOP
   STOP → FWD → STOP
   STOP → REVERSE → STOP
   FWD → PAUSE → FWD
   REVERSE → PAUSE → REVERSE

   Make sure that the automatic shut-off switch does not operate due to the tape slackening during above mentioned operations.
3. Make sure that the tape does not contact with the record or the playback head in the FF or the FAST REVERSE mode.

3. Wow and Flutter Measurement

Deliver a 3 kHz signal (−60 dB, 0.77 mV) to the MIC jack. Record the signal on a blank tape. Play back the tape and measure wow (flutter) with a wow meter at LINE OUT jack.

STANDARD (rms)
19 cm/s (7½ ips): 0.1%
9.5 cm/s (3¾ ips): 0.15%
4.8 cm/s (1⅞ ips): 0.35%

4. Pinch Roller Pressure Measurement

500 to 1,000 g (1 lb 1.6 oz to 2 lb 3 oz) should be obtained at each pinch roller in both FWD and REVERSE modes.

5. Torque Measurement

Note: The torque is adjustable.

STANDARD

FWD torque: ——→	375 ± 25 g·cm (5.4 ± 0.36 oz·inch)
REVERSE torque: ←——	375 ± 25 g·cm (5.4 ± 0.36 oz·inch)
FF torque: ——→	1,300 ± 100 g·cm (18.6 ± 1.4 oz·inch)
FAST REVERSE torque:	1,300 ± 100 g·cm (18.6 ± 1.4 oz·inch)

6. Cleaning

After the adjustments, the following parts should be cleaned with a cloth dampened with denatured alcohol.

rotating parts
tape guides
heads
tape shifter

3-2. ELECTRICAL ADJUSTMENTS

1. Before Making Adjustments

1. Equipment Required

Audio frequency generator
Attenuator (600Ω)
VTVM
Oscilloscope
SONY alignment tapes:
J-19-F2 .... Level and equalizer adjustment
J-19-A2 .... Head azimuth adjustment
SPC-47 ..... Tape speed adjustment

Blank tapes: SONY SUPER 150 tape
SLH tape

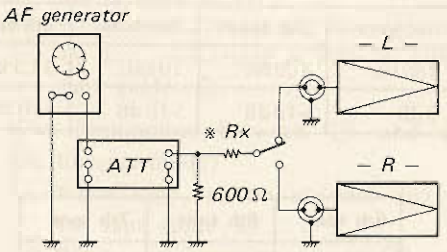
Resistors (1/4 W): 600Ω
10kΩ
100kΩ

1 kHz bandpass filter
Digital frequency counter

Note: 1. Before making adjustments clean the following parts with a cloth moistened with denatured alcohol; head core, tape guides, etc. Demagnetize heads perfectly.
2. Make sure that the tape path adjustments are done before adjustments.
3. Perform the adjustments in the mentioned sequences.
4. After making adjustments, apply lock paint to the adjustable parts.
5. The tape speed should be set to 19 cm/s (7½ ips) unless otherwise indicated.
6. TAPE SELECT switch should be set to the NORMAL position unless otherwise indicated.
7. ECHO/SOS switch should be set to the OFF position unless otherwise indicated.
8. When replacing any part, reference parts should be kept unremoved for adjustment. For example when replacing a head, remove the damaged head leaving other heads in place for reference. The reference parts for adjustments are rotary heads and tape guides.
When the reference parts are removed in the Head Unit adjustments, replace the head base unit HBU-1 (Y-34938-01-0). When the head base unit is replaced, make only the curl adjustment of the tape path adjustments, and perform the electrical adjustments on page 30 which starts from the head azimuth adjustments.

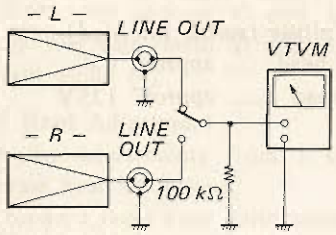
2. Connections

INPUT



※ Rx
MIC ..... short-circuited
AUX IN 10kΩ

OUTPUT



3. Standard Recording

Deliver the specified input signal level shown in the Table-1 to the MIC jack, unless otherwise indicated. Set the RECORD VOLUME control for the specified output signal level shown in the Table-2 in the SOURCE monitoring mode.

TABLE 1. SPECIFIED INPUT

	MIC	AUX IN
signal source impedance	300Ω	10kΩ
input signal level	0.77 mV -60 dB	0.24 V -10 dB

TABLE 2. SPECIFIED OUTPUT

	LINE OUT
load impedance	100kΩ
output signal level	0.77V/0 dB

4. SONY Alignment Tape

J-19-F2

1st tone	2nd tone	3rd tone	4th tone
400 Hz	400 Hz	10 kHz	12.5 kHz
0 dB	-10 dB	-10 dB	-10 dB

5th tone	6th tone	7th tone
7 kHz	80 kHz	40 Hz
-10 dB	-10 dB	-10 dB

J-19-A2 ..... 12.5 kHz, -10 dB

SPC-47 ..... 4 kHz, 0 dB

5. Bias Voltage (across the head)

record head .... approx. 9 V

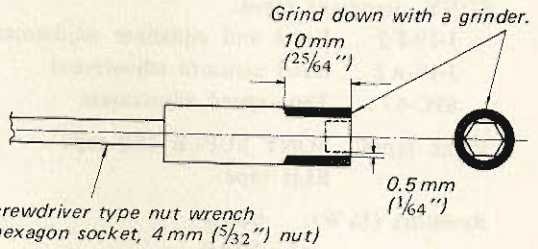
erase head ..... approx. 125 V

6. Tape Path Adjustments

Preface

(1) These adjustments should be made by referring to the well-adjusted head unit. When the rotary heads have been misadjusted or removed, replace the head unit assembly (Y-34938-04-0).

(2) A screwdriver type nut wrench (hexagon socket, 4 mm nut) is required. Grind down a wrench with a grinder as shown.



(3) Use the R-7ES reel and the SUPER 200 tape.

(4) After adjustments, perform the rotary head adjustments.

(5) Before adjustments, make sure that the tension arm pin height adjustment has been made. See MECHANICAL ADJUSTMENT.

(6) Perform the adjustments referring to Fig. 3-11.

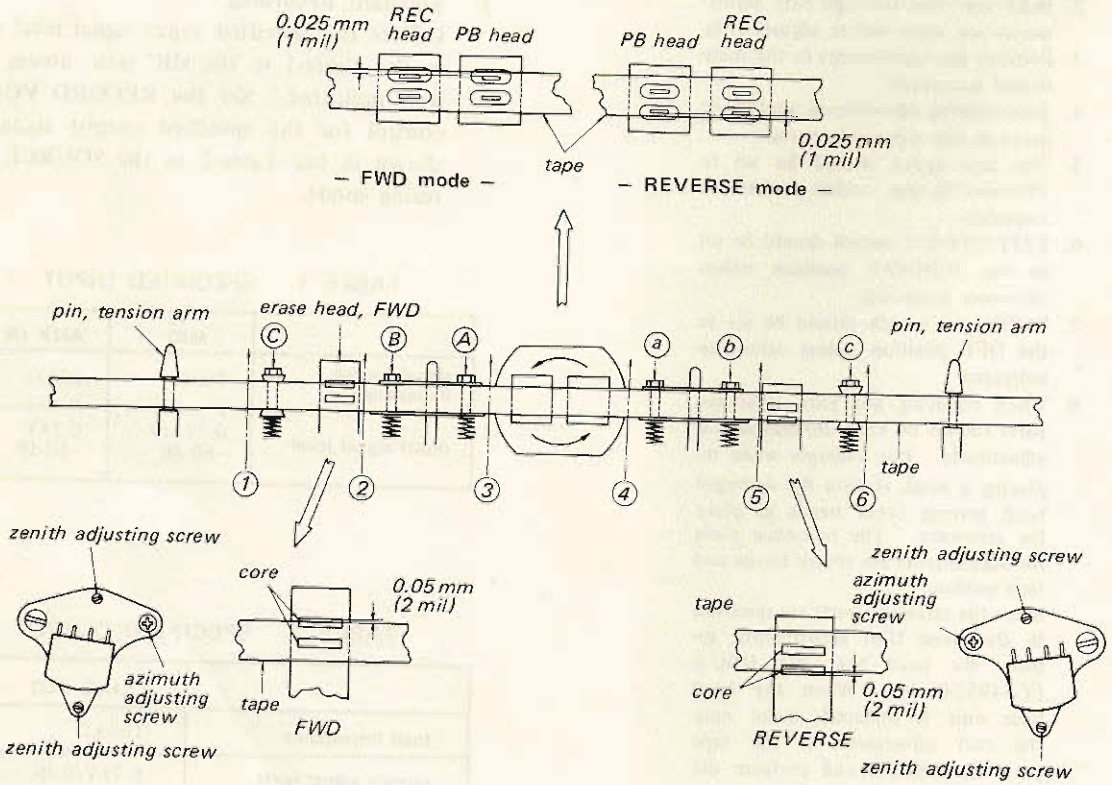


Fig. 3-11. Tape path adjustments

1. Proceed as follows to position the tape path in parallel with the heads.
   1) Set the unit to the forward mode. Adjust the tape guides Ⓐ and ⓐ to obtain the even height of the upper ends of the record and playback head cores.
   2) When a curl appears on the tape from ① to ⑥, adjust the tape guides Ⓑ, Ⓒ, ⓑ and Ⓒ provisionally to eliminate the curl. (See curl elimination.)
   3) As the tape path is affected by the provisional adjustment at step 2), repeat steps 1) and 2) a few times.
2. Proceed as follows to align the center line of the tape path and the center of rotary shaft of the head.
   1) Set the unit to the forward mode. Turn the tape guides Ⓐ and ⓐ counterclockwise by 12 degrees. Thus the upper edge of the tape is 0.025 mm (1 mil) higher than that of the head core. After above the tape guides Ⓐ and ⓐ should not be moved at all.
   2) When the curl appears on the tape from ① to ⑥, adjust the tape guides Ⓑ, Ⓒ, ⓑ and ⓒ provisionally to eliminate curl. (See curl elimination.)
3. Curl Elimination
   Curl appears as shown in Fig. 2-2 when the even height cannot be obtained between the tape guides. To eliminate curl, proceed as follows:

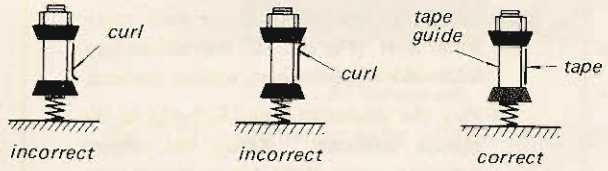


Fig. 3-12. Curl elimination

Curl between ① and ③ should be eliminated in the forward mode and that between ④ and ⑥ in the reverse mode.

Curl Elimination between ① and ③ (in the Forward mode)
1) When the curl appears at part ①, adjust the tape guide Ⓒ.
2) When curl appears at part ② affected by the adjustment at step 1, adjust the tape guide Ⓑ.
3) When curl appears at part ③ affected by the adjustment at step ②, adjust the tape guide Ⓑ.
4) When curl appears at part ② affected by the adjustment at step 3, adjust the tape guide Ⓒ.

Curl Elimination between ④ and ⑥ (in the Reverse mode)
1) When curl appears at part ⑥, adjust the tape guide ⓒ.
2) When curl appears at part ⑤ affected by the adjustment at step 1, adjust the tape guide ⓑ.
3) When curl appears at part ④ affected by the adjustment at step 2, adjust the tape guide ⓓ.
4) When curl appears at part ⑤ affected by the adjustment at step 3, adjust the tape guide ⓒ.

4. Erase Head Adjustment
   After the adjustments from 1 to 3, adjust the erase head as follows.
   The forward erase head adjustment should be made in the forward mode, and reverse erase head adjustment should be made in the reverse mode.

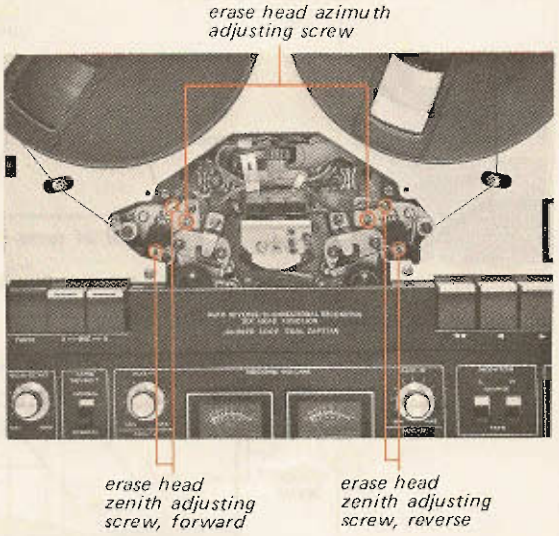


Fig. 3-13. Adjusting parts location

Adjustment of Forward Erase Head (in the Forward mode)
1) Adjust the two zenith adjusting screws, to obtain even contact between tape and head. See Fig. 3-14.

2) Turn the zenith adjusting screws in the same direction and same amount, to align the upper edge of the erase head core with the tape. Turn the zenith adjusting screws counterclockwise by 40 degrees. Thus upper edge of the head core becomes 0.05 mm (2 mil) higher than that of the tape. (See Fig. 3-11.)
3) Adjust the azimuth adjusting screw to set the erase head core in parallel with the upper edge of the tape.

Adjustment for Reverse Erase Head
(in the Reverse mode)

1) Adjust the zenith adjusting screws to obtain the even contact between the tape and the head as shown in Fig. 3-14.

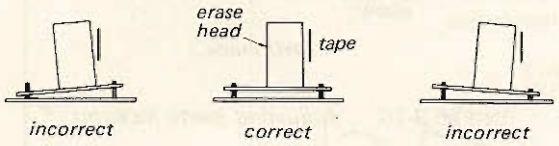


Fig. 3-14. Erase head zenith adjustment

2) Turn the zenith adjusting screws in the same direction and same amount, to align the lower edge of the erase head core with the tape. Turn the zenith adjusting screws clockwise by 40 degrees. Thus the lower edge of the head core becomes 0.05 mm (2 mil) lower than that of the tape. (See Fig. 3-11.)
3) Adjust the azimuth adjusting screw to set the erase head core in parallel with the lower edge of the tape.

7. Head Replacement in the Head Unit

Perform one of the following three methods with a care, as rotary heads are precisely assembled.

1. Damaged record head and normal playback head

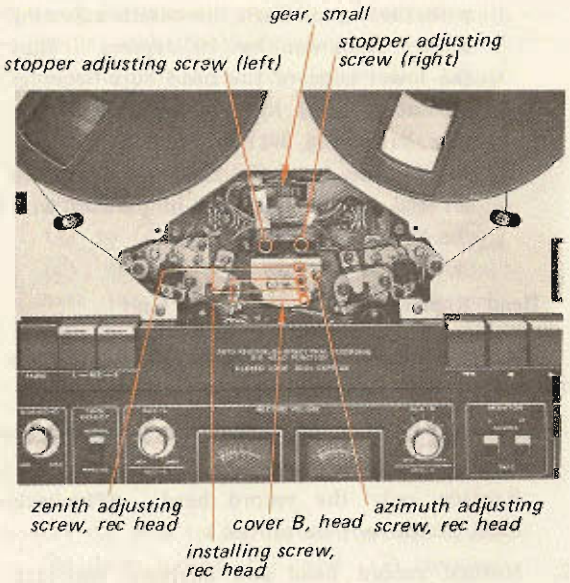
   Replace only the record head. (Playback head should not be moved.)

2. Normal record head and damaged playback head

   Replace only the playback head. (Record head should not be moved.)

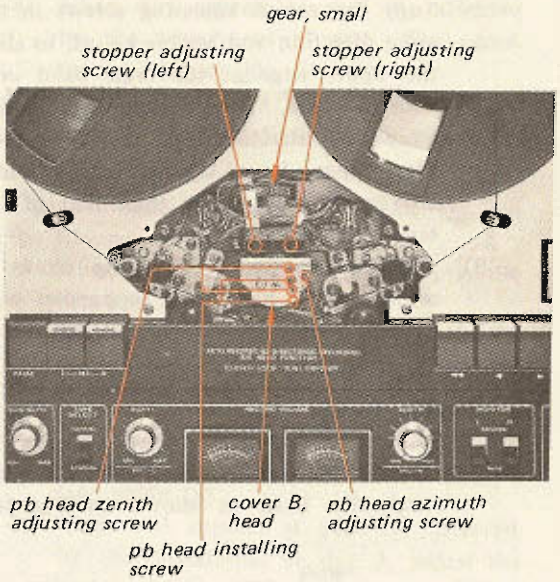
3. Defective record and playback heads

   Replace the head unit assembly. When a head or the head unit assembly is replaced, an adjustment should be made successively. The necessary adjustment is shown in the table on page 30 to 33.



– REVERSE mode –

Fig. 3-15. Adjusting parts location



– FWD mode –

Fig. 3-16. Adjusting parts location

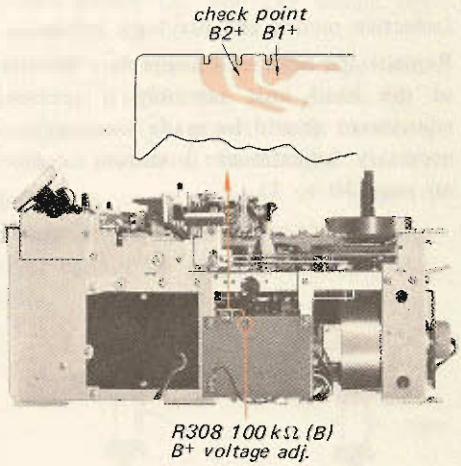


Fig. 3-17. Adjusting parts location and test point

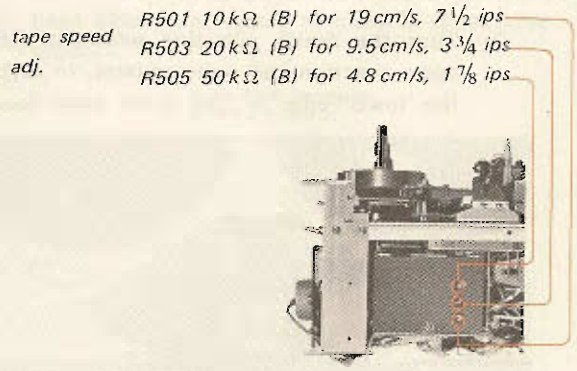


Fig. 3-18. Adjusting parts location

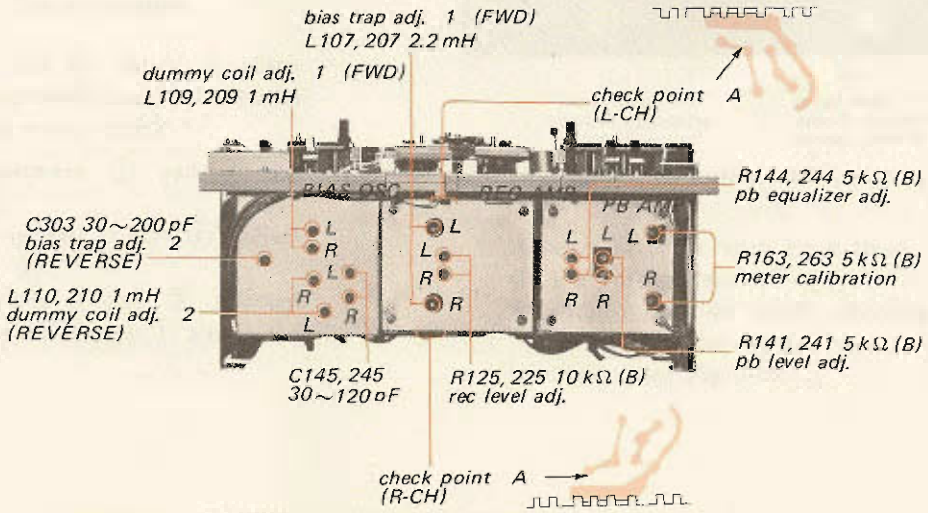
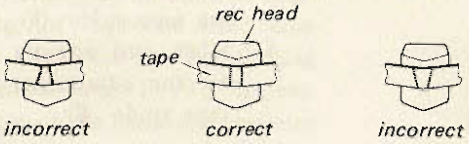
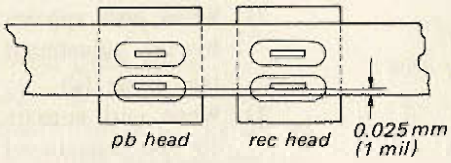
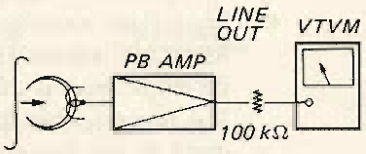
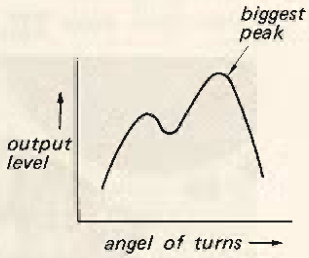
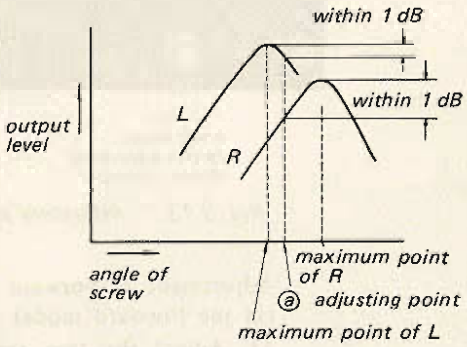
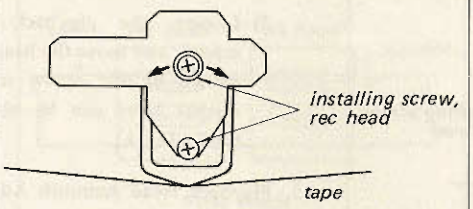
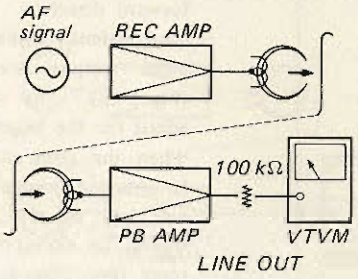
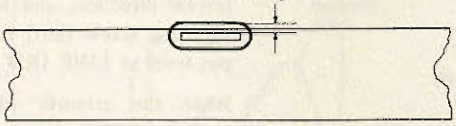
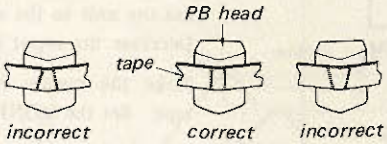
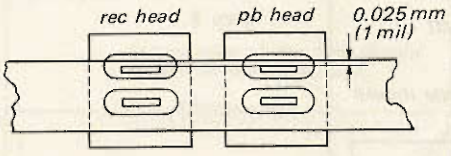


Fig. 3-19. Adjusting parts location and test point

Head Replacement – Continued –

Replacement Item	Connection and Standard	Procedures
1. Record Head Replacement	 Fig. a. Rec head zenith adjustment  – REVERSE mode – Fig. b. Rec head height adjustment  Fig. c. PB head azimuth adjustment  Fig. d. PB head azimuth adjustment  Fig. e. PB head azimuth adjustment	1. Head Replacement Take off the head cover B (Fig. 3-15) by removing the two screws. Replace the record head. (Don't adjust the zenith adjusting screws and the azimuth adjusting screw.) 2. Head Zenith Adjustment Adjust the two zenith adjusting screws so that the head contacts with the tape correctly as shown in Fig. a in the reverse record mode (Fig. 3-15). 3. Head Height Adjustment Turn the zenith adjusting screws in the same direction and equal amounts to align the bottom of the head core with the lower edge of the tape in the reverse record mode. Next turn them counterclockwise by 12 degrees. Thus the bottom of the head core becomes 0.025 mm (1 mil) higher than the lower edge of the tape. See Fig. b and Fig. 3-15. 4. Playback Head Azimuth Adjustment 1) Set the MONITOR switch to TAPE. Play the alignment tape (J-19-A2) in the forward direction. Adjust the azimuth adjusting screw of the playback head for maximum output level at LINE OUT (Fig. 3-16). As several peaks appear, adjust for the biggest peak (Fig. d). When the same maximum level cannot be obtained at same position at both channels, take the mid angle of the screw. It should be within 1 dB from each maximum level (Fig. e). If the satisfactory value cannot be obtained, replace the head. 2) Play the alignment tape (J-19-A2) in the reverse direction. Adjust the stopper adjusting screw (left) for maximum output level at LINE OUT (Fig. 3-15). 5. Tape Contact Adjustment of Record Head 1) Deliver a 20 kHz signal to the MIC jack. Set the unit to the standard record mode. Decrease the input level by 20 dB. 2) Make the reverse recording onto a blank tape. Set the MONITOR switch to TAPE. 3) Loosen the record head installing screw, and move the head in the direction shown by the arrows so that maximum output level can be obtained at LINE OUT (Fig. f).

Replacement Item	Connection and Standard	Procedures
	 *Fig. f. Tape contact adjustment of record head*  *Fig. g. Test setup* *Upper edge of the tape should be within the range.*  – FWD mode – *Fig. h. Final check*	6. Record Head Azimuth Adjustment 1) Deliver a 20 kHz signal to the MIC jack. Set the unit to the standard record mode. Decrease the input level by 20 dB. 2) Make the reverse recording onto a blank tape. Set the MONITOR switch to TAPE. 3) Adjust the azimuth adjusting screw for maximum output level at LINE OUT (Fig. 3-15). 4) When the azimuth adjusting screws are turned by many turns, repeat Step 3 "Head Height Adjustment" and this Step. 7. Final Check After making adjustments, check to see that the upper edge of the tape is positioned as shown in Fig. f. If it is necessary, repeat from the Step 3 "Head Height Adjustment" to the Step 6 "Record Head Azimuth Adjustment."
2. Playback Head Replacement	 *Fig. i. PB head zenith adjustment*  – FWD mode – *Fig. j. PB head height adjustment*	1. Head Replacement Take off the head cover B (Fig. 3-16) by removing the two screws, and replace the playback head. (Don't turn the zenith and azimuth adjusting screws.) 2. Head Zenith Adjustment Adjust the two zenith adjusting screws so that the head contacts with tape as shown in Fig. i in the forward playback mode (Fig. 3-16). 3. Head Height Adjustment Turn the zenith adjusting screws of the playback head in the same direction and equal amounts to align the top core of the playback head is even with the upper edge of the tape in the forward playback mode. Next turn them counterclockwise by about 12 degrees. Thus the top of the head core is 0.025 mm (1 mil) lower than the upper edge of the tape. See Fig. j and Fig. 3-16. 4. Tape Contact Adjustment of Playback Head 1) Set the MONITOR switch to TAPE. Play the alignment tape (J-19-A2) in the forward direction.

Replacement Item	Connection and Standard	Procedures

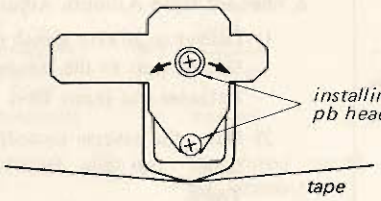


Fig. k. Tape contact adjustment of pb head

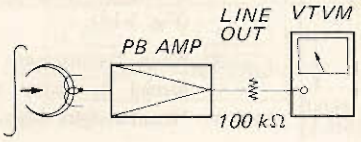


Fig. l. Test setup

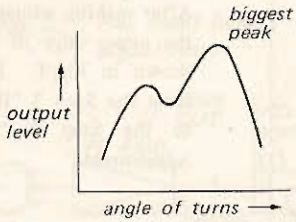


Fig. m. PB head azimuth adjustment

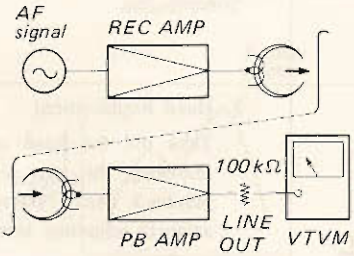


Fig. n. Test setup

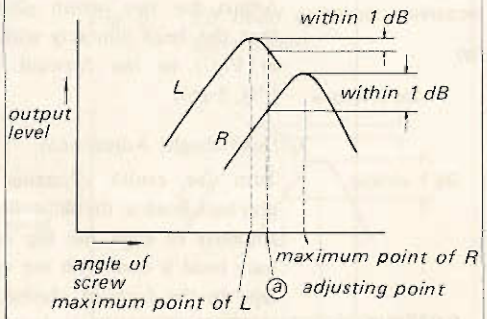
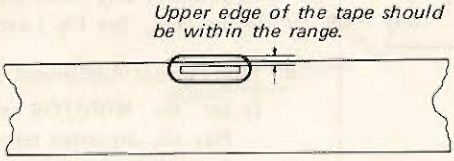


Fig. p. PB head azimuth adjustment



– FWD mode –

Fig. q. Final check

2) Loosen the playback head installing screws, and move the head in the direction shown by the arrow so that maximum output level can be obtained at LINE OUT (Fig. k).

5. Playback Head Azimuth Adjustment

1) Set the MONITOR switch to TAPE, and play the alignment tape (J-19-A2) in the forward direction. Adjust the playback head azimuth adjusting screws for maximum output level at LINE OUT (Fig. 3-16). As several peaks appear, adjust for the biggest peak (Fig. m).
When the same maximum level cannot be obtained at same position at both channels, take the mid angle of the screw. It should be within 1 dB from each maximum level (Fig. p). If the satisfactory value cannot be obtained, replace the head.

2) Play the alignment tape (J-19-A2) in the reverse direction, and adjust the stopper adjusting screw (left) for maximum output level at LINE OUT (Fig. 3-15).

3) When the azimuth adjusting screw or stopper adjusting screw is turned by many turns, repeat Step 3 "Head Height Adjustment" and Step 5 "Playback Head Azimuth Adjustment."

6. Record Head Azimuth Adjustment

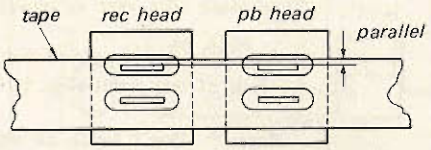
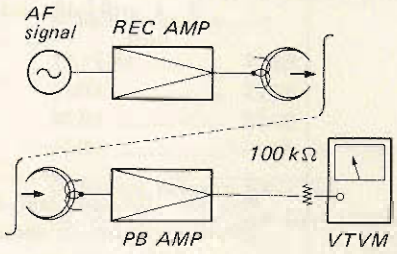
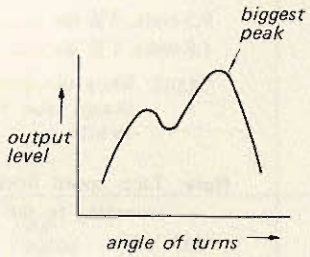
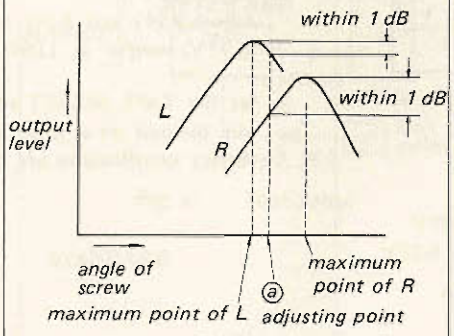
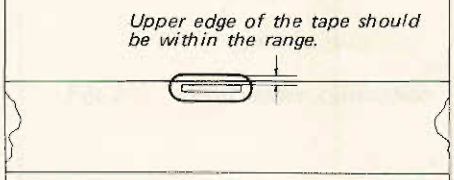
1) Deliver a 20 kHz signal to the MIC jack. Set the unit to the standard record mode. Decrease the input level by 20 dB.

2) Make the reverse recording on a blank tape. Set the MONITOR switch to TAPE.

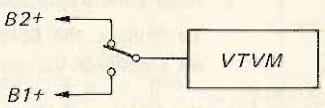
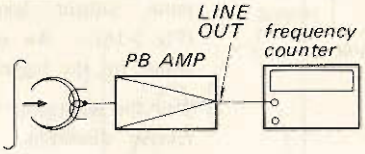
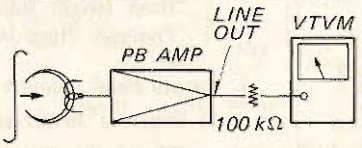
3) Adjust the record head azimuth adjusting screw for maximum output level at LINE OUT.

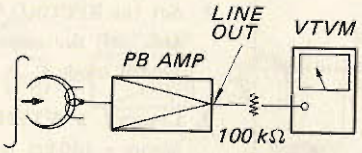
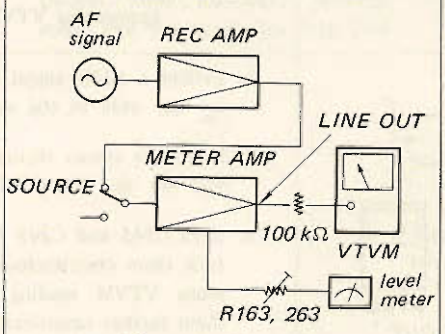
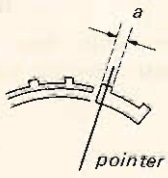
7. Final Check

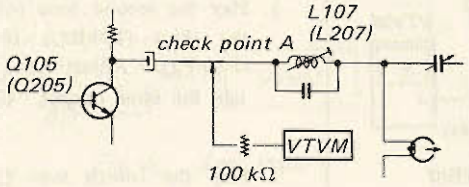
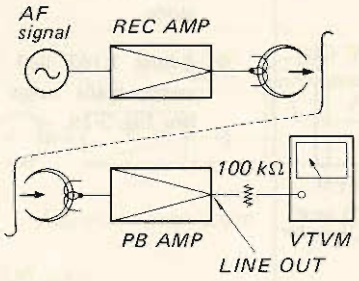
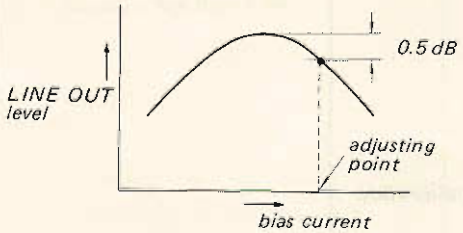
After the adjustments, check to see that the upper edge of the tape is positioned as shown in Fig. q in the forward record (playback) mode.
If it is necessary, repeat Step 3 through Step 6.

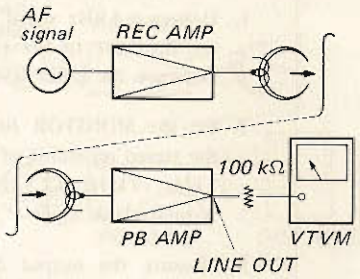
Replacement Item	Connection and Standard	Procedures
3. Head Unit Replacement Note: When the head base unit (HBU-1) is replaced, start the adjustments from Step 2 "Head Height Adjustment".	 – FWD mode – *Fig. r. Head height adjustment*  *Fig. s. Test setup*  *Fig. t. PB head azimuth adjustment*  *Fig. u. PB head azimuth adjustment*  – FWD mode – *Fig. v. Final check*	1. Head Unit Replacement To replace the head unit, remove the two set screws of the small gear (Fig. 3-15). 2. Head Height Adjustment Adjust the stopper adjusting screw (right) to align the record head and playback head, and the upper edge of the tape in the forward record (playback) mode. See Fig. r and 3-16. 3. Playback Head Azimuth Adjustment 1) Set the MONITOR switch to TAPE, and play the alignment tape (J-19-A2) in the forward direction. Adjust the playback head azimuth adjusting screw for maximum output level at LINE OUT (Fig. 3-16). As several peaks appear, adjust for the biggest peak (Fig. t). 2) Play the alignment tape (J-19-A2) in the reverse direction. Adjust the stopper adjusting screw (left) for maximum output level at LINE OUT (Fig. 3-15). When the same maximum level cannot be obtained at same position at both channels, take the mid angle of the screw. It should be within 1 dB from each maximum level (Fig. u). If the satisfactory value cannot be obtained, replace the head. 3) When the azimuth adjusting screw is turned by many turns, repeat Step 2 "Head Height Adjustment" and Step 3 "Playback Head Azimuth Adjustment." 4. Record Head Azimuth Adjustment 1) Deliver a 20 kHz signal to the MIC jack, and set the unit to the standard record mode. Decrease the input level by 20 dB. 2) Make the reverse recording on a blank tape, and set the MONITOR switch to TAPE. 3) Adjust the record head azimuth adjusting screws for maximum output level at LINE OUT (Fig. 3-15). 5. Final Check After the adjustments, make sure that the upper edge of the tape is positioned as in Fig. v in the forward playback mode. If it is necessary, repeat from Step 2 "Head Height Adjustment" to Step 4 "Record Head Azimuth Adjustment."

2. Adjustments

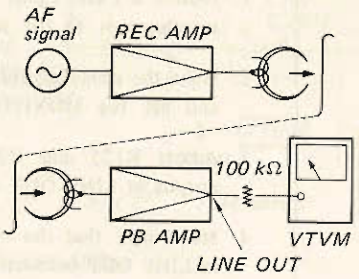
Adjustment Item	Connection and Standard	Procedures
B+ Voltage Adjustment	 *Fig. w. Test setup* STANDARD B2+ ..... +23 V dc B1+ ..... +26.5 V dc (for reference)	1. Make sure that ac power voltage is correct. 2. Adjust R308 (power voltage adj.) for +23 V dc at test point (Fig. 3-17). **Note:** * Don't touch an adjustment driver to the chassis. * The reading of a VTVM does not vary immediately according to the turning of resistor. * A well-calibrated VOM also can be used.
Tape Speed Adjustment	 *Fig. x. Test setup* STANDARD 19 cm/s, 7½ ips ..... 4,000 Hz 9.5 cm/s, 3¾ ips ..... 2,000 Hz 4.8 cm/s, 1⅞ ips ..... 1,000 Hz	Play the alignment tape SPC-47. Adjust the following resistors to obtain the correct reading on a digital frequency counter at each tape speed (Fig. 3-18). 19 cm/s, 7½ ips ..... R501, *R502 9.5 cm/s, 3¾ ips ..... R503 4.8 cm/s, 1⅞ ips ..... R505 *R502: When the speed is lower than standard, change the resistor from 43 kΩ to 39 kΩ. **Note:** Tape speed does not vary immediately according to the turning of resistor.
Playback Level Adjustment	 *Fig. y. Test setup* STANDARD NORMAL ..... 0 dB, 0.77 V SPECIAL ..... −2.6 dB, 0.57 V Difference between the channels ..... less than 1 dB	1. Play the first tone (400 Hz, 0 dB) of the tape (J-19-F2). Adjust R141 and R241 to obtain the 0 dB (0.77 V) output at LINE OUT (Fig. 3-19). 2. Set the TAPE SELECT switch to SPECIAL with the unit set as it is. Make sure that the correct specifications are obtained.

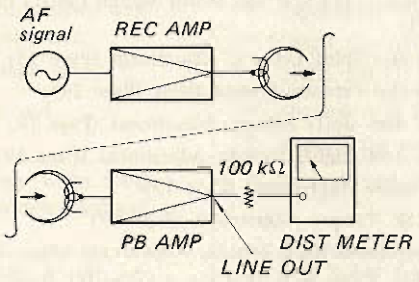
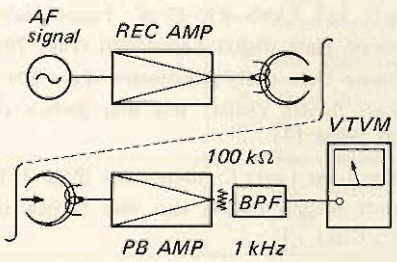
Adjustment Item	Connection and Standard	Procedures
Playback Equalizer Adjustment	 *Fig. z. Test setup* **STANDARD** Output level deviation from 400 Hz at each frequency. 12.5 kHz ..... ±2 dB 7 kHz ..... ±2 dB 80 Hz ..... ±2 dB 40 Hz ..... −3 dB to −7 dB Difference between FWD and REVERSE ..... less than 1 dB	1. Play the second tone (400 Hz, −10 dB) and the third (10 kHz, −10 dB) of the tape (J-19-F2). Adjust R144 and R244 to obtain the same output. (Fig. 3-19.) 2. Play the fourth tone (12.5 kHz, −10 dB), the fifth (7 kHz, −10 dB), the sixth (80 Hz, −10 dB), and the seventh (40 Hz, −10 dB) with the unit set as it is. Make sure that the correct output level deviation can be obtained at each frequency by comparing with the level of the second tone. If the correct deviation cannot be obtained, check for the azimuth adjustment. 3. The output difference between the forward playback and the reverse playback modes should be less than 1 dB. 4. Perform the playback level adjustment again after the adjustment.
Level Meter Calibration	 *Fig. a′. Test setup* **STANDARD**  *Fig. b′. Level meter calibration*	1. Deliver a 1 kHz signal to the MIC jack, and set the unit to the standard record mode. 2. Adjust R163 and R263 so that the level meter reads range "a" shown in Fig. b′. See Fig. 3-19.

Adjustment Item	Connection and Standard	Procedures
Bias Trap Adjustment (1) (for forward recording)	 *Fig. c'. Test setup* **STANDARD** Minimum VTVM reading	1. Set the RECORD VOLUME control to MIN, and set the unit to the forward stereo record mode. 2. Connect a VTVM to the check point A across a 100 kΩ resistor (Fig. 3-19). 3. Adjust L107 and L207 for a minimum reading on the VTVM (Fig. 3-19). **Note:** Shielded wire should not be used for VTVM. Use a non-magnetic screw driver.
Bias Trap Adjustment (2) (for reverse recording)	**Test Setup** Same as in Fig. c'. **STANDARD** Minimum VTVM reading	1. Set the RECORD VOLUME control to MIN, and set the unit to the reverse stereo record mode. 2. Connect a VTVM to the test point A across a 100 kΩ resistor (Fig. 3-19). 3. Adjust C303 for a minimum reading on the VTVM (Fig. 3-19). 4. When the same minimum reading cannot be obtained at same position at both channels, take the mid value. **Note:** Shielded wire should not be used for connecting VTVM.
Record Bias Adjustment	 *Fig. d'. Test setup* **STANDARD**  *Fig. e'. Record bias adjustment*	1. Deliver a 1 kHz signal to the MIC jack, and set the unit to the standard record mode. 2. Make the stereo recording on a blank tape, and set the MONITOR switch to TAPE. 3. Turn C145 and C245 fully clockwise. Then turn them counterclockwise so that a maximum VTVM reading is obtained. Turn them farther counterclockwise, and set them where the VTVM reads 0.5 dB lower value than the maximum. See Fig. c' and Fig. 3-19.

Adjustment Item	Connection and Standard	Procedures
Record Level Adjustment	 *Fig. f'. Test setup* STANDARD Output level: 0 dB, 0.77V (Difference between channels: less than 1 dB) Difference between FORWARD and REVERSE: less than 1 dB	1. Deliver a 1 kHz signal to the MIC jack, and set the unit to the standard record mode. 2. Make the stereo recording onto a blank tape, and set the MONITOR switch to TAPE. 3. Adjust R125 and R225 for 0 dB (0.77V) output at LINE OUT (Fig. 3-19). 4. Make sure that the output level difference at LINE OUT between the forward recording and the reverse one is less than 1 dB.
Dummy Coil Adjustment (1) (for forward recording)	Test Setup Same as Fig. f'. STANDARD Output level difference between stereo and monaural: less than 2 dB	1. Deliver a 20 kHz signal to the MIC jack, and set the unit to the standard record mode. Decrease the input level by 20 dB. 2. Make the forward stereo recording onto a blank tape, and set the MONITOR switch to TAPE. Read the output at LINE OUT. 3. Set the unit to the forward monaural recording for channel L with the unit set as it is. Adjust L209 so that the output at LINE OUT is the same with that measured at Step 2. 4. Perform the same adjustment with the unit set to the forward monaural recording for channel R. Adjust L109.
Dummy Coil Adjustment (2) (for reverse recording)	Test Setup Same as Fig. f'. STANDARD Output level difference between stereo and monaural: less than 2 dB	1. Deliver a 20 kHz signal to the MIC jack, and set the unit to the standard record mode. Decrease the input level by 20 dB. 2. Make the reverse stereo recording onto a blank tape, and set the MONITOR switch to TAPE. Measure the output at LINE OUT. 3. Set the unit to the reverse monaural recording for channel L with the unit set as it is. Adjust L210 so that the output level at LINE OUT is the same as that in Step 2. 4. Perform the same adjustment with the unit set to the reverse monophonic recording for channel R. Adjust L110.

3. Check After Adjustments

Check Item	Connection and Standard	Procedures
Overall Frequency Response Check	 *Fig. g'. Test setup* **STANDARD** NORMAL tape 1 kHz ..... reference level 50 Hz ..... ±3 dB 100 Hz ..... ±3 dB 5 kHz ..... ±3 dB 7 kHz ..... ±3 dB 12.5 kHz .... ±3 dB 18 kHz ..... +3 dB, −6 dB SPECIAL tape 1 kHz ..... reference level 50 Hz ..... ±3 dB 100 Hz ..... ±3 dB 5 kHz ..... ±3 dB 7 kHz ..... ±3 dB 12.5 kHz .... ±3 dB 18 kHz ..... ±3 dB Output level difference between FWD and REVERSE: less than 1 dB	1. Deliver a 1 kHz signal to the MIC jack, and set the unit to the standard record mode. Decrease the input level by 20 dB. 2. Set the MONITOR switch to TAPE. Make the stereo recording of 1 kHz, 50 Hz, 100 Hz, 5 kHz, 7 kHz, 12.5 kHz and 18 kHz on a normal blank tape. 3. Measure the output deviation at each frequency referring to the 1 kHz signal playback output level. 4. Thread the SPECIAL tape. Set the TAPE SELECT switch to SPECIAL. Perform the Step 1 through Step 3. 5. If the correct specifications cannot be obtained, make the following adjustments; record and playback head azimuth adjustments, playback equalizer adjustment, and record bias adjustment.
Overall Signal-to-Noise Ratio Measurement	Test Setup Same as Fig. g'. **STANDARD** greater than 46 dB	1. Deliver a 1 kHz signal to the MIC jack, and make the standard stereo recording onto a blank tape. 2. Connect a 300Ω dummy resistor to the MIC jack in parallel. Continue the recording with no input signal. 3. Set the MONITOR switch to TAPE and play back the tape. Measure the output difference (signal-to-noise ratio) between the recorded and the erased parts of the tape.

Check Item	Connection and Standard	Procedures
Overall Distortion Measurement	 *Fig. h'. Test setup* **STANDARD** less than 1.5%	1. Deliver a 1 kHz signal to the MIC jack, and make the stereo recording onto a blank tape. 2. Set the MONITOR switch to TAPE, and measure the distortion of playback output at LINE OUT.
Erase Ratio Measurement	 *Fig. i'. Test setup* **STANDARD** greater than 70 dB	1. Deliver a 1 kHz signal to the MIC jack, and set the unit to the standard record mode. Increase the input level by 10 dB, and make the recording onto a blank tape. 2. Rewind the recorded part of the tape a half. Connect a 300 Ω dummy resistor to the MIC jack in parallel. Make the recording with no input signal (erasing). 3. Set the MONITOR switch to TAPE and play back the tape. Measure the output difference (erase ratio) between the recorded and erased parts of the tape through a 1 kHz band-pass filter.
Crosstalk Measurement between Tracks	**Test Setup** Same as Fig. i'. **STANDARD** greater than 65 dB	1. Deliver a 333 Hz signal to the MIC jack, and set the unit to the standard record mode. Decrease the input level by 10 dB. Make the stereo recording onto a blank tape. 2. Invert the reels and play back the tape with the MONITOR switch set to TAPE. Measure the output leak from the first and third tracks to the second through a bandpass filter connected to the LINE OUT (R). Make the same measurement for the leak from the third track to the fourth track. 3. If the correct specification cannot be obtained, perform the record and playback head height and azimuth adjustments.

3-3. TROUBLESHOOTING

Trouble	Remedy
Tape does not run in FWD and REVERSE modes.	* Bias Switch (1) (S303) and Motor Switch (S401) Position Adjustment (Page 13) * Pinch Roller Joint Lever C Adjustment (Page 15) * Pinch Roller Pressure Measurement (Page 24) * Tension Arm (left) Release Adjustment (Page 18) * Tension Arm (right) Release Adjustment (Page 19) * FWD Torque Adjustment (Page 19) * REVERSE Torque Adjustment (Page 19) * Left Reel Table Back Tension Adjustment (Page 21) * Right Reel Table Back Tension Adjustment (Page 21) * Reel Table Brake (left) Adjustment (Page 23) * Reel Tabel Brake (right) Adjustment (Page 23) * Clean the rotating parts.
FAST FWD or FAST REVERSE cannot be made.	* Clean the rotating parts. * Left Reel Table Back Tension Adjustment (Page 21) * Right Reel Table Back Tension Adjustment (Page 21) * Reel Table Brake (left) Adjustment (Page 23) * Reel Table Brake (right) Adjustment (Page 23) * FAST FWD and FAST REVERSE Torque Adjustment (Page 19) * Clutch Release Plate (right) Adjustment (Page 20) * Clutch Release Plate (left) Adjustment (Page 20) * Servo on/off Switch (S404) and Bias Switch (4) (S305) Position Adjustment (Page 13)
FAST FWD happens in FWD mode. FAST REVERSE happens in REVERSE mode.	* Pinch Roller Joint Lever C Adjustment (Page 15) * Servo on/off Switch (S404) and Bias Switch (4) (S305) Position Adjustment (Page 13)
Tape runs in REVERSE direction in spite of the FWD button functioned. FAST REVERSE happens in spite of the FAST FWD button functioned. FWD recording erases REVERSE track or vice versa.	* Plate Spring Position Adjustment (Page 13)
Auto REVERSE cannot be made.	* Clean the sensing pole. * Check the lead wire to the pole. * Check whether the sensing foil length is sufficient (approx. 2 cm, $^{25}/_{32}$ inches or more). * REVERSE Solenoid (PM401) Position Adjustment (Page 13)
PAUSE cannot be made.	* Pinch Roller Lever Adjustment (Page 15) * Reel Table Brake (left) Adjustment (Page 23) * Reel Table Brake (right) Adjustment (Page 23) * PAUSE Lever Adjustment (Page 16)
Excessive Wow and Flutter	* Replace the flywheel. * Replace the pinch roller. * Replace the reel table. * Left Reel Table Back Tension Adjustment (Page 21) * Right Reel Table Back Tension Adjustment (Page 21) * Reel Table Brake (left) Adjustment (Page 23) * Reel Table Brake (right) Adjustment (Page 23) * Replace the tension spring if necessary, after Pinch Roller Pressure Adjustment (Page 24) * Pinch Roller Joint Lever C Adjustment (Page 15) * Clean the rotating parts. * Replace the belt.

Trouble	Remedy
Tape speed does not correspond with TAPE SPEED knob indication. Too low or too fast tape speed.	* Tape Speed Adjustment (Page 34) * Check the voltages at servo amp. circuit. * TAPE SPEED switch (S501) Position Adjustment (Page 34)
Tape edge touches the reel.	* Tension Arm Pin Height Adjustment (Page 21) * Replace the reel table.
Tape slackens excessively when FWD or REVERSE button is depressed and locked.	* Pinch Roller Timing Adjustment (Page 15)
Tape slackens excessively in the following operations: STOP → FWD → STOP STOP → REVERSE → STOP STOP → FAST FWD → STOP STOP → FAST REVERSE → STOP FWD → PAUSE → FWD REVERSE → PAUSE → REVERSE	* Reel Table Brake Adjustment (Page 23)
Head does not turn. Head does not turn smoothly.	* Replace the tension spring (Part No. 3-492-236) applied to the sector gear. * Apply the silicon oil No. 3,000 to the rotary head shaft. * Gear Adjustment (Page 14)
Tape curls.	* Curl Elimination (Page 27)
Recording is impossible.	* Clean the head. * Check the record head. * Bias Switch (2) (3) (S107, 207) Position Adjustment (Page 15) * Bias Switch (1) (S303) and Motor Switch (S401) Position Adjustment (Page 13) * Check the record amp. circuit.
Recording is made on different track. Recorded signal on different track is played back.	* Record and Playback * Heads Heights Adjustments (Pages 30 and 31)
No playback sound.	* Clean the head. * Check the playback head. * Check the playback amp. circuit.
Erasing is impossible. Different track is erased.	* Plate Spring Position Adjustment (Page 13) * Gear Adjustment (Page 14) * Erase Head Adjustment (Pages 27 and 28) * Check erase bias voltage. (Page 26)
Low output in high frequency range	* Overall Frequency Response Check (Page 38) * Clean the head. * Head Azimuth Adjustment (Pages 30 and 31) * Record Bias Adjustment (Page 36) * Playback Equalizer Adjustment (Page 35) * Equalizer Switch (S101, 201, 301) Position Adjustment (Page 17) * Check the record and playback amps. circuits.
Excessive Crosstalk	* Crosstalk Measurement between Tracks * Head Height Adjustment (Pages 30 and 31)
Excessive Level Variation	* Adjust the tape guides. (Page 27) * Tape Contact Adjustments of Record and Playback Heads. (Pages 30, 31 and 32)
Click Noise	* Check "Switch Correlations." (Page 10) * Switch Position Adjustments (See Mechanical Adjustment.)
Static Noise	* Static Charge Grounding Brush Position Adjustment (Page 12) * Apply electrification absorber liquid to the belts.

3-4. CHECK AFTER PARTS REPLACEMENT

Parts	Part No.	Check Item
brush, static charge grounding	3-492-193	Static Charge Grounding Brush Position Adjustment (Page 12)
gear, pinion	3-493-851	Bias Switch (S107, 207) Position Adjustment (Page 14) Gear Adjustment (Page 15)
gear, sector	3-493-873	
lever B ass'y, pinch roller joint	X-34920-09	Pinch Roller Timing Adjustment (Page 15) Pinch Roller Joint Lever C Adjustment (Page 15)
lever C ass'y, pinch roller joint	3-492-178	
lever C, pause	3-492-189	PAUSE Lever Adjustment (Page 16)
lever D, pause	3-492-190	
parts having relations with tape tension		Tension Arm (left) Position Adjustment (Page 17) Tension Arm (right) Position Adjustment (Page 18) Tension Arm (left) Release Adjustment (Page 18) Tension Arm (right) Release Adjustment (Page 18) Tension Arm Pin Height Adjustment (Page 21) Left Reel Table Back Tension Adjustment (Page 21) Right Reel Table Back Tension Adjustment (Page 21 and 22)
release plate (R), clutch	3-492-183	Clutch Release Plate (right) Adjustment ((Page 20)
pull rod, tension regulator	3-492-208	
plate, stroke adjusting	3-492-207	
release plate (L), clutch	3-492-182	Clutch Release Plate (left) Adjustment (Page 20)
lever B, clutch release	3-492-185	
plate, stroke adjusting	3-492-207	
lever A ass'y, record lock	X-34920-21	REC Lock Lever C Position Adjustment (Page 20)
lever B, record lock	3-492-211	
lever C, record lock	3-492-210	
parts included in the brake block ass'y	X-34920-40	Limiter Brake Adjusting Plate Position Adjustment (Page 22) Reel Table Brake (left) Adjustment (Page 23) Reel Table Brake (right) Adjustment (Page 23)
bracket ass'y, motor direction selector plate spring	X-34920-15	Plate Spring Position Adjustment (Page 13)
microswitch (S302), erase head selector	1-514-881	
switch (S402, 403), motor direction selector	1-514-057-00 -10 -00 General Export -10 USA	
switch (S303), bias (1)	1-504-057-00 -10 -00 General Export -10 USA	Bias Switch (1) (S303) and Motor Switch (S401) Position Adjustment (Page 13)
switch (S401), motor	1-514-057-00 -10 -00 General Export -10 USA	
lever (B), clutch release	3-492-185	Servo on/off Switch (S404) and Bias Switch (4) (S305) Position Adjustment (Page 13)
plate, stroke adjusting	3-492-207	
microswitch (S305), bias (4)	1-514-057-00 -10 -00 General Export -10 USA	
microswitch (S404), play/fast	1-514-057-00 -10 -00 General Export -10 USA	

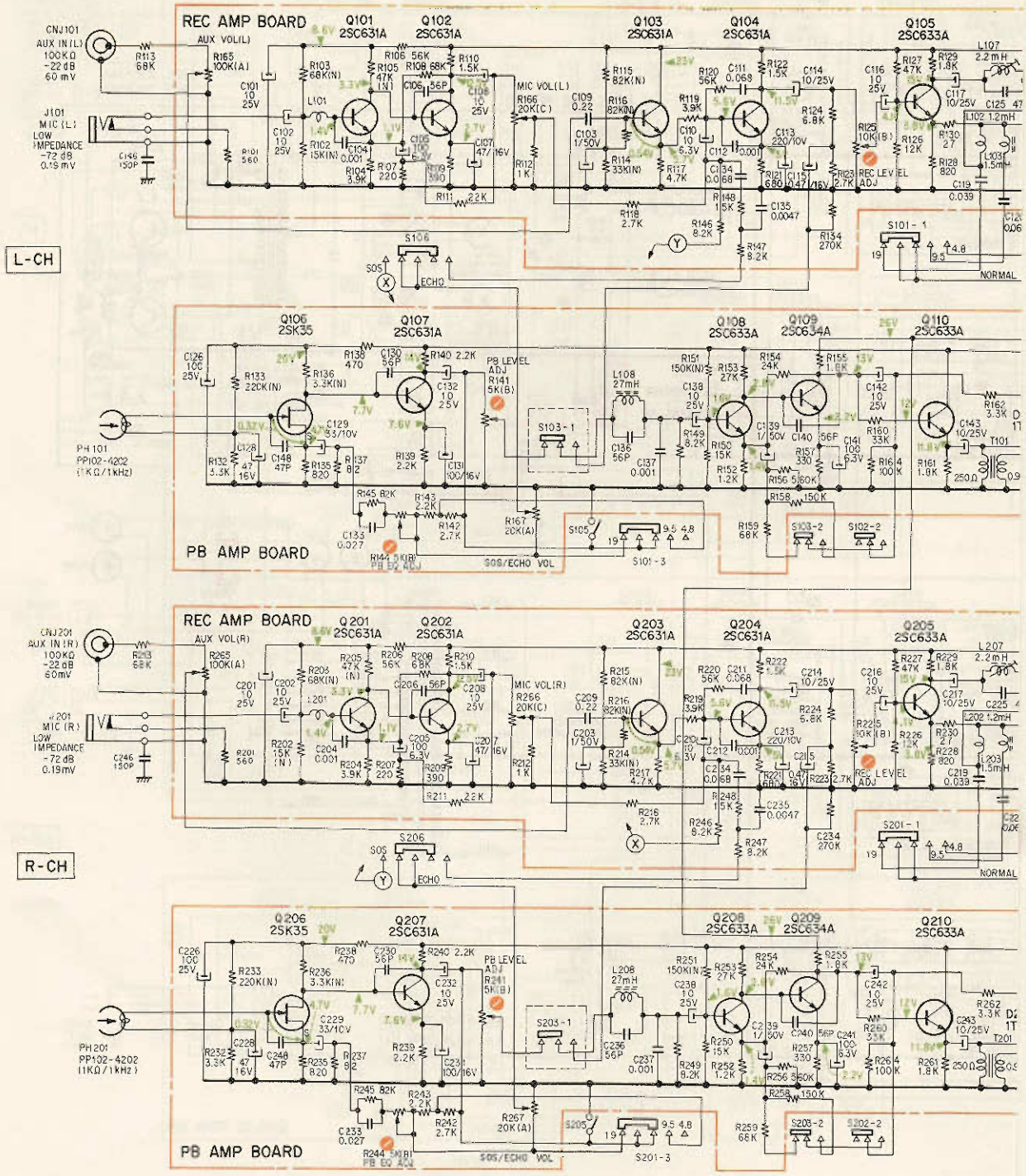
Parts	Part No.	Check Item
lever A ass'y, speed selector	X-34920-16	TAPE SPEED Switch (S501) Position Adjustment (Page 17) Equalizer Switch (S101, S201, S301) Position Adjustment (Page 17)
slide plate ass'y, speed	X-34920-23	
parts in servo amp. circuit		
switch (S101, 201, 301), equalizer	1-514-634	
limiter wheel	3-492-227	FF and FAST REVERSE Torque Adjustment (Page 19)
spring, plate; limiter	3-492-228	
motor	8-832-624-21	
reel table ass'y	X-34920-04	FWD Torque Adjustment (Page 19) REVERSE Torque Adjustment (Page 19) Tension Arm Pin Height Adjustment (Page 21)
motor	8-832-624-21	
switch (S105, 205), muting	1-514-713	Muting Switch (S105, 205) Position Adjustment (Page 12)
solenoid (PM401), REVERSE	1-454-072	REVERSE Solenoid (PM401) Position Adjustment (Page 13)
microswitch (S107, 207), bias (2), (3)	1-514-039	Bias Switch (2), (3) (S107, 207) Position Adjustment (Page 15)
solenoid (PM402), shut-off	1-454-073	Shut-off Solenoid (PM402) Position Adjustment (Page 16)
parts having relations with tape path		Tape Path Adjustment (Pages 26, 27 and 28)
head, record	8-824-629-20	Tape Path Adjustment (Pages 26, 27 and 28) See the Items Heads and Head Unit Replacements (Pages 28, 29, 30, 31, 32 and 33) Playback Level Adjustment (Page 34) Playback Equalizer Adjustment (Page 35) Record Bias Adjustment (Page 36) Record Level Adjustment (Page 37) Overall Frequency Response Check (Page 38) Crosstalk Measurement between Tracks (Page 39)
head, playback	8-829-142-20	
head unit ass'y	Y-34938-04	
head base unit ass'y (HBU-1)	Y-34938-01	
head, erase	8-826-629-25	Erase Head Adjustment (Pages 27 and 28) Erase Ratio Measurement (Page 39)
parts having relations with record amp. circuit		Record Level Adjustment (Page 37) Bias Trap Adjustment (1) (Page 36)
parts having relations with playback amp. circuit		Playback Level Adjustment (Page 34) Playback Equalizer Adjustment (Page 35)
parts having relations with bias osc. circuit		Record Bias Adjustment (Page 36) Bias Trap Adjustment (2) (Page 36)
parts having relations with servo amp. circuit		Tape Speed Adjustemnt (Page 34)
parts having relations with power supply		B+ Voltage Adjustment (Page 34)
motor	8-832-624-21	Tape Speed Adjustment (Page 34) Wow and Flutter Measurement (Page 24)
level meter	1-524-071	Level Meter Calibration (Page 35)

SECTION 4
DIAGRAMS

4-1. SCHEMATIC & MOUNTING DIAGRAM

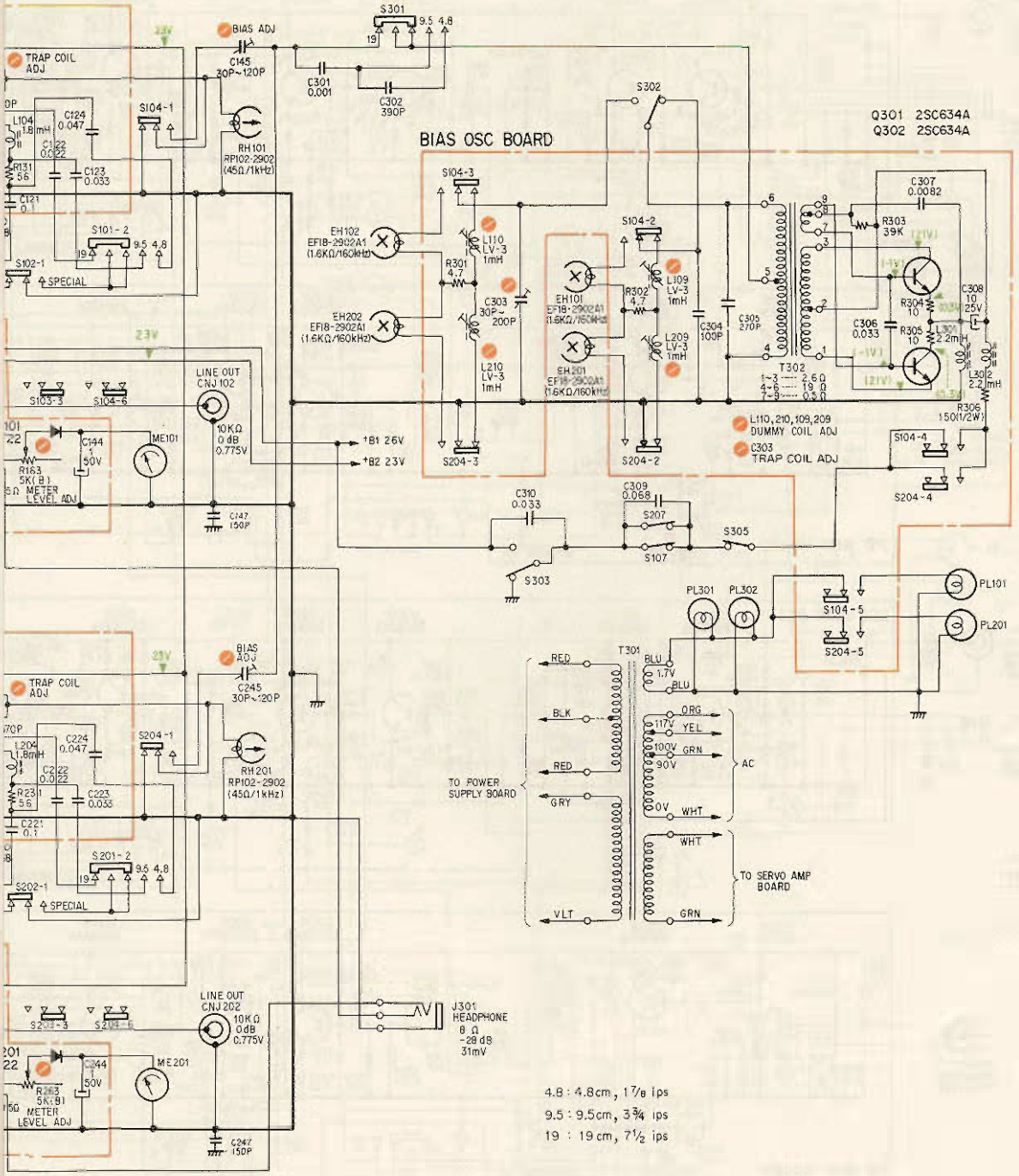
SCHEMATIC DIAGRAM-1

Record & Playback Amp. & Bias Osc Section
(USA/Canada Model)



Notes:

1. All resistors and capacitors are rated in Ω and μF unless otherwise specified.
2. The letter (A), (B) or (C) suffixed to rating value of variable resistor or semifixed resistor indicates its characteristic.
3. Resistor whose rating value is suffixed with the letter (N) is low-noise resistor.
4. Values showing coil impedance are dc resista
5. Voltage values shown are measured with a Values in ( ) are in record mode.
6. ⏚ : grounded to chassis.
7. ● : adjustable.
8. Switch positions are as the table following:

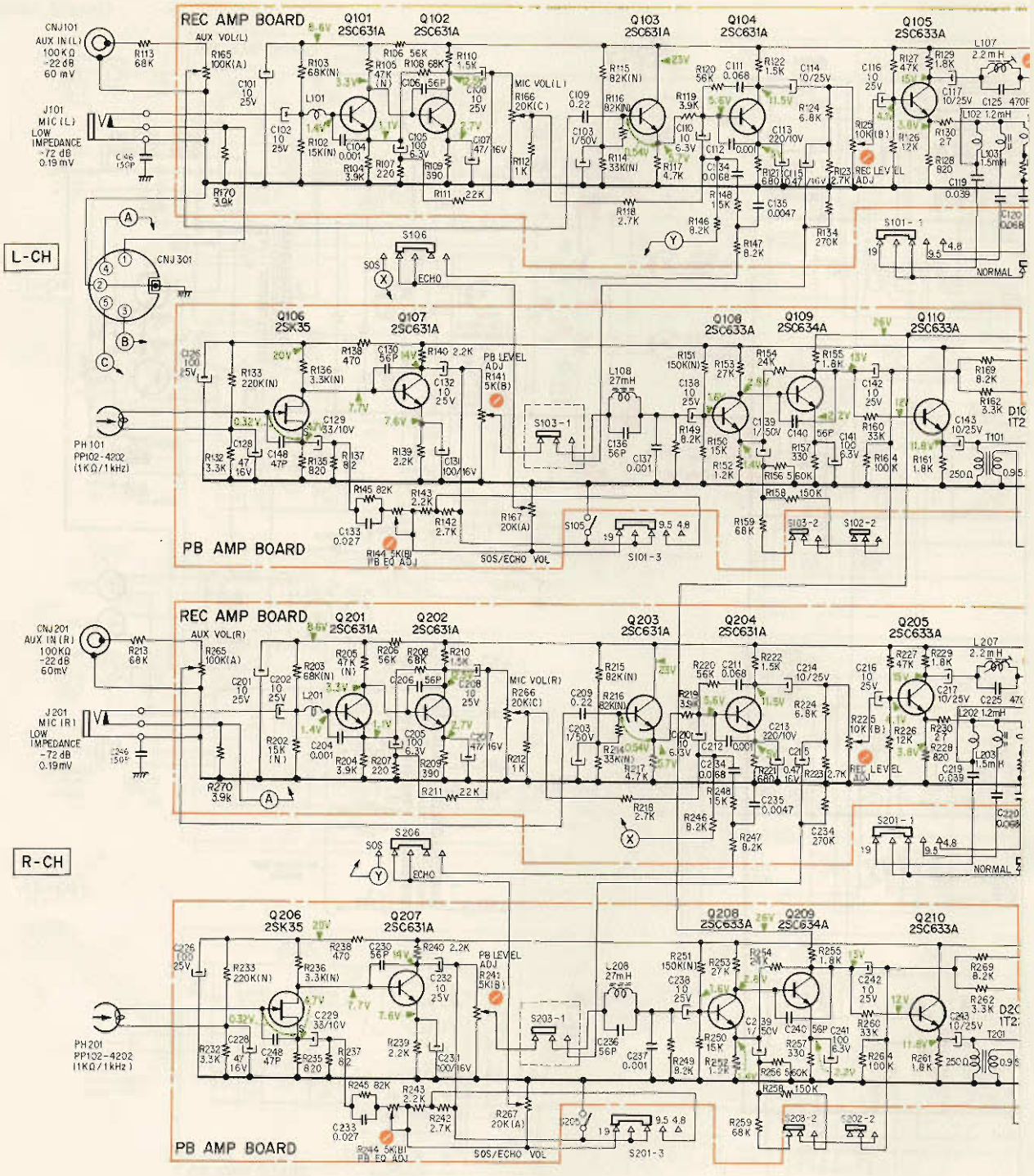


nce.

dc voltmeter of 20kΩ/V.

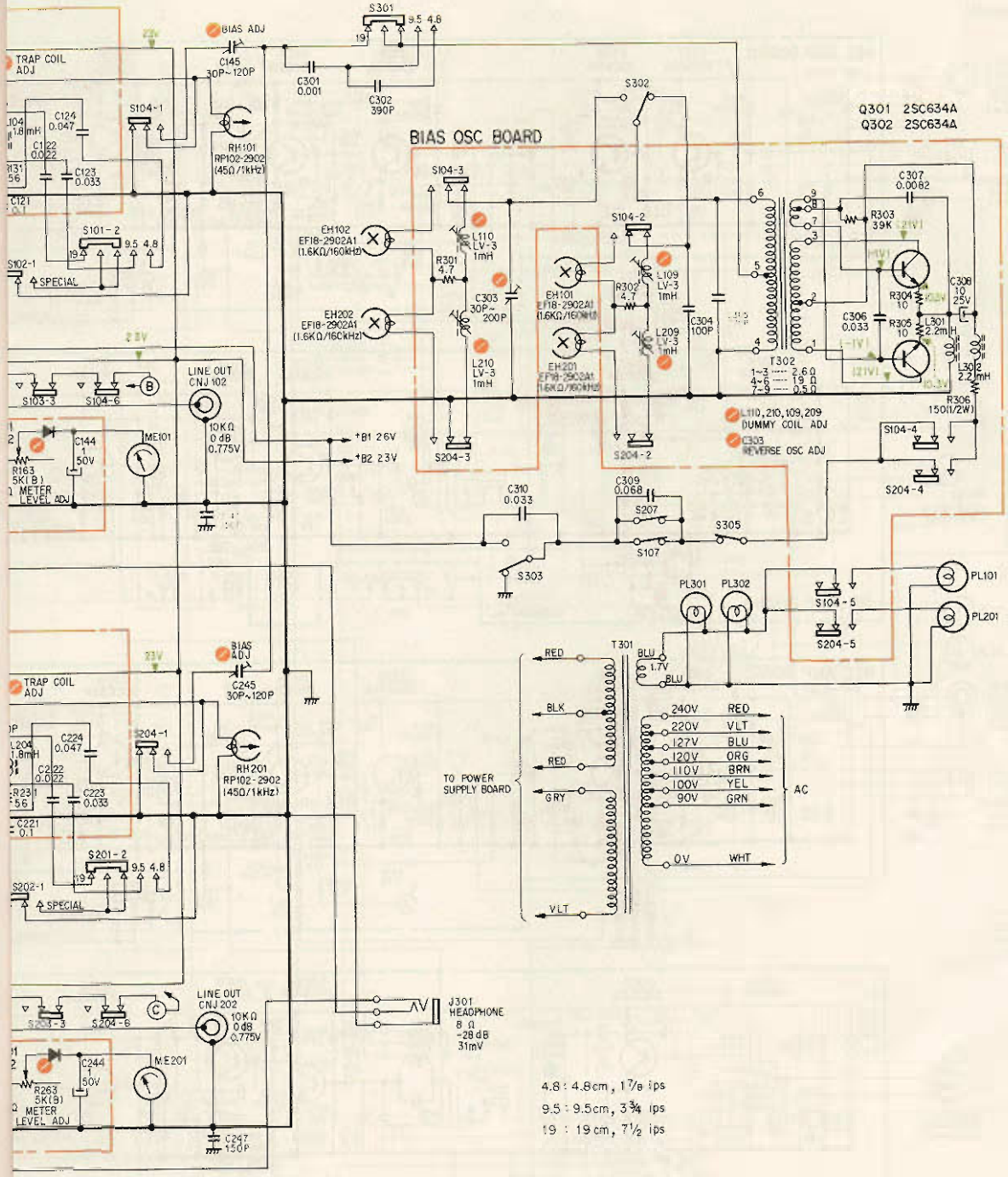
Ref. No.	Description	Position	Ref. No.	Description	Position
S101, 201, 301	Equalizer	7½ ips, 19cm	S106, 206	SOS/ECHO	OFF
			S107, 207	Bias (2), (3)	ON
S102, 202	TAPE SELECT	NORMAL	S302	Erase Head Selector	FWD
S103, 203	MONITOR	TAPE	S303	Bias (1)	OFF
S104, 204	Rec/PB	PB	S304	POWER	ON
S105, 205	Muting	OFF	S305	Bias (4)	ON

Record & Playback Amp. & Bias Osc Section
(General Export Model)



Notes:

1. All resistors and capacitors are rated in Ω and μF unless otherwise specified.
2. The letter (A), (B) or (C) suffixed to rating value of variable resistor or semifixed resistor indicates its characteristic.
3. Resistor whose rating value is suffixed with the letter (N) is low-noise resistor.
4. Values showing coil impedance are dc resistar
5. Voltage values shown are measured with a dc Values in ( ) are in record mode.
6. ⏚ : grounded to chassis.
7. ● : adjustable.
8. Switch positions are as the table following:



4.8 : 4.8cm, 1⅞ ips
9.5 : 9.5cm, 3¾ ips
19 : 19cm, 7½ ips

ıce.
voltmeter of 20kΩ/V.

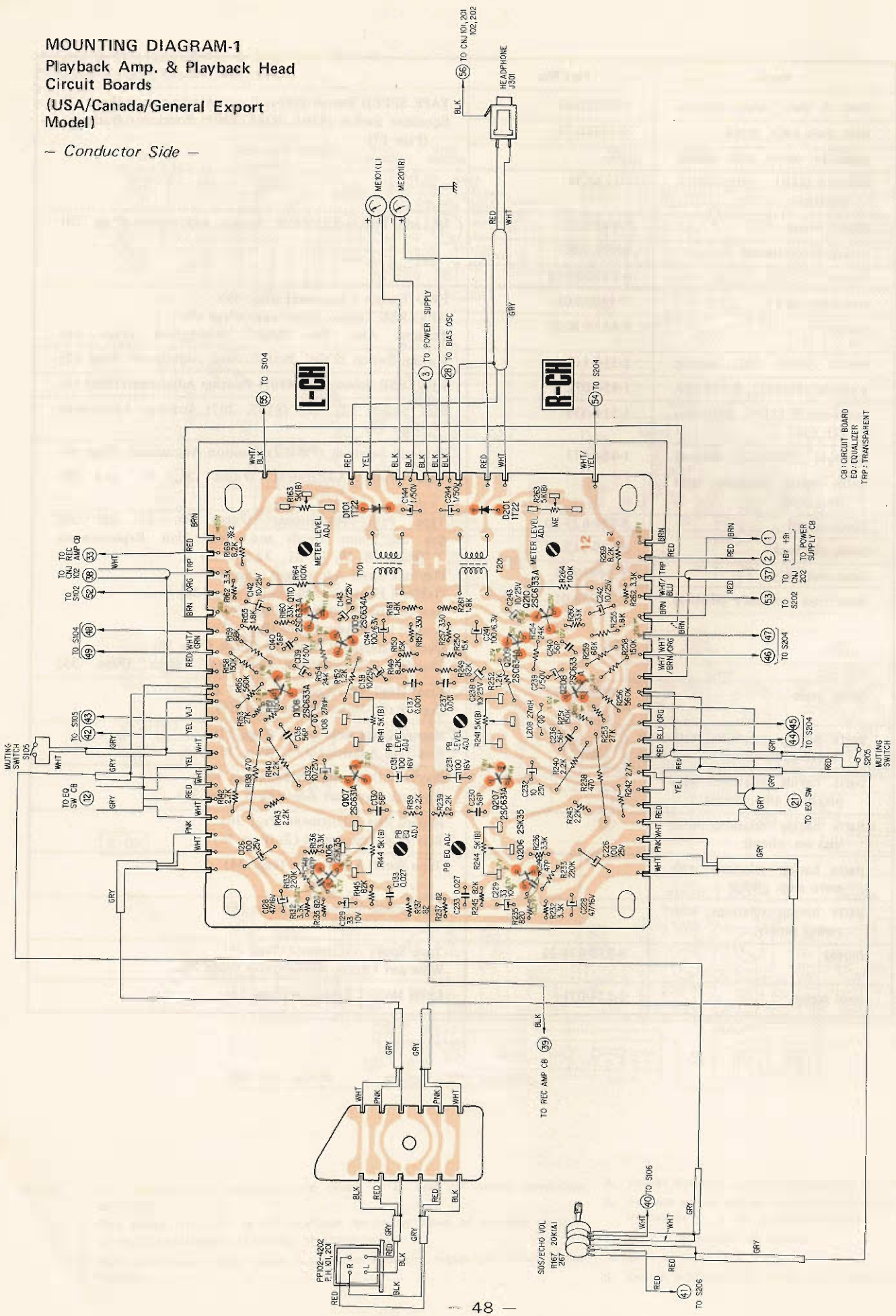
Ref. No.	Description	Position	Ref. No.	Description	Position
S101, 201, 301	Equalizer	7½ ips, 19cm	S106, 206	SOS/ECHO	OFF
			S107, 207	Bias (2), (3)	ON
S102, 202	TAPE SELECT	NORMAL	S302	Erase Head Selector	FWD
S103, 203	MONITOR	TAPE	S303	Bias (1)	OFF
S104, 204	Rec/PB	PB	S304	POWER	ON
S105, 205	Muting	OFF	S305	Bias (4)	ON

MOUNTING DIAGRAM-1

Playback Amp. & Playback Head Circuit Boards

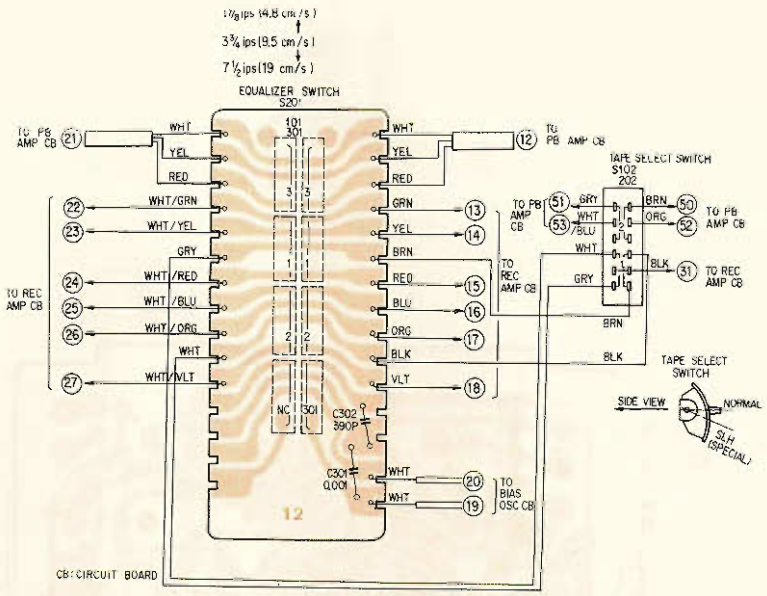
(USA/Canada/General Export Model)

– Conductor Side –



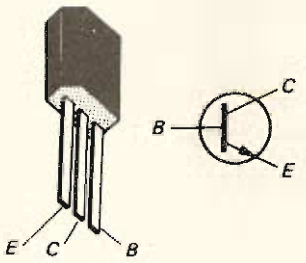
Equalizer Switch Circuit Board
(USA/Canada/General Export Model)

– Conductor Side –

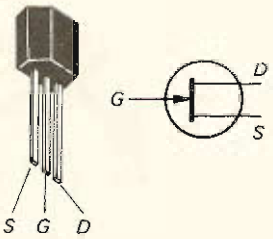


– Semiconductor Electrode –

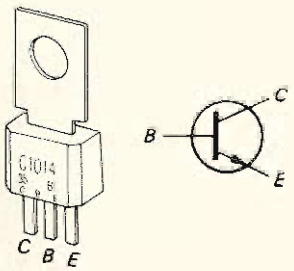
Q101 ~ 105, 107 ~ 110, 301 ~ 302
Q201 ~ 205, 207 ~ 210, 304 ~ 305



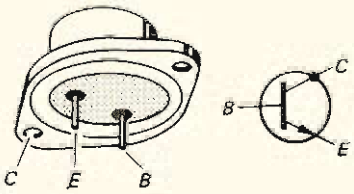
Q106, 206



Q303, 402

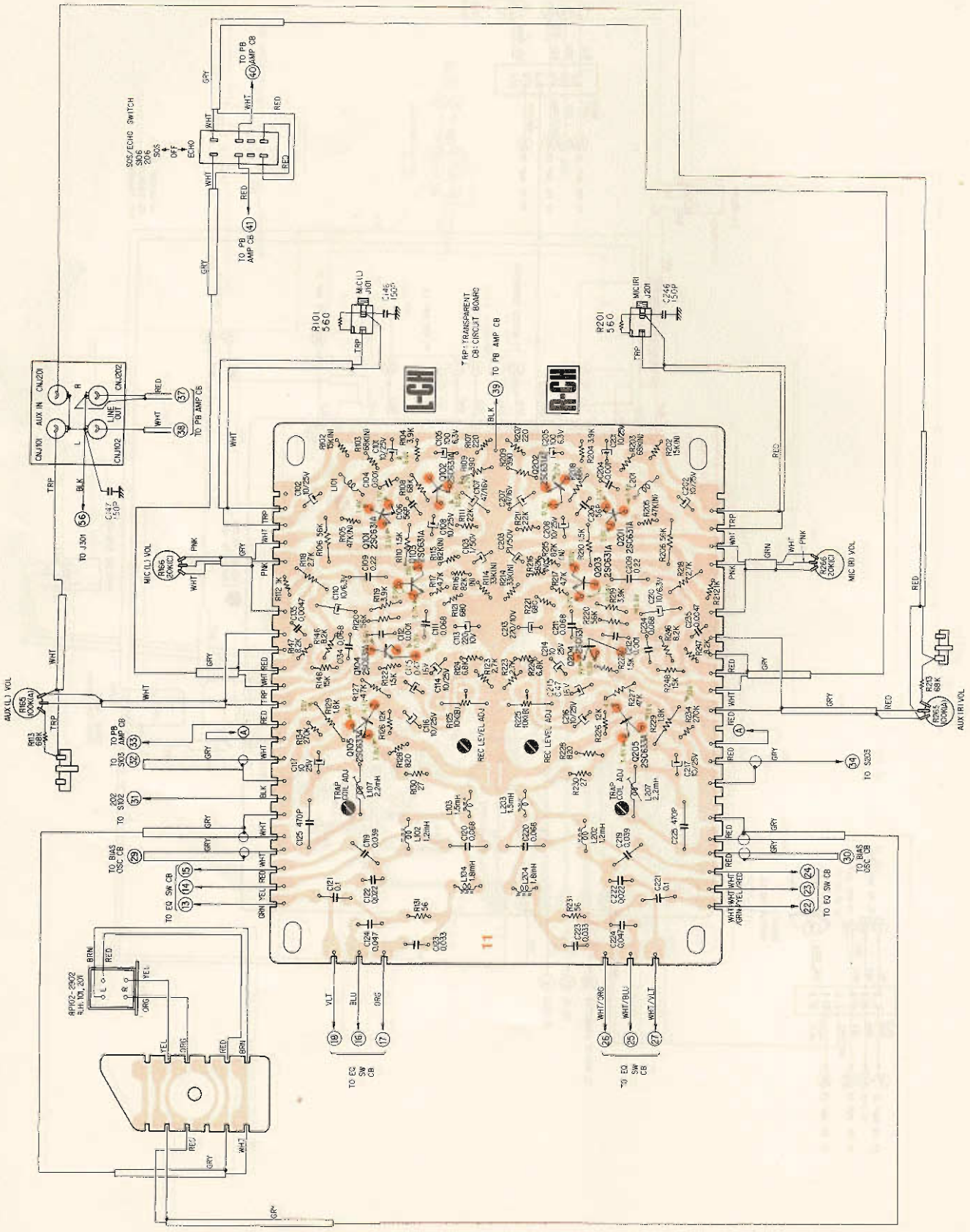


Q501



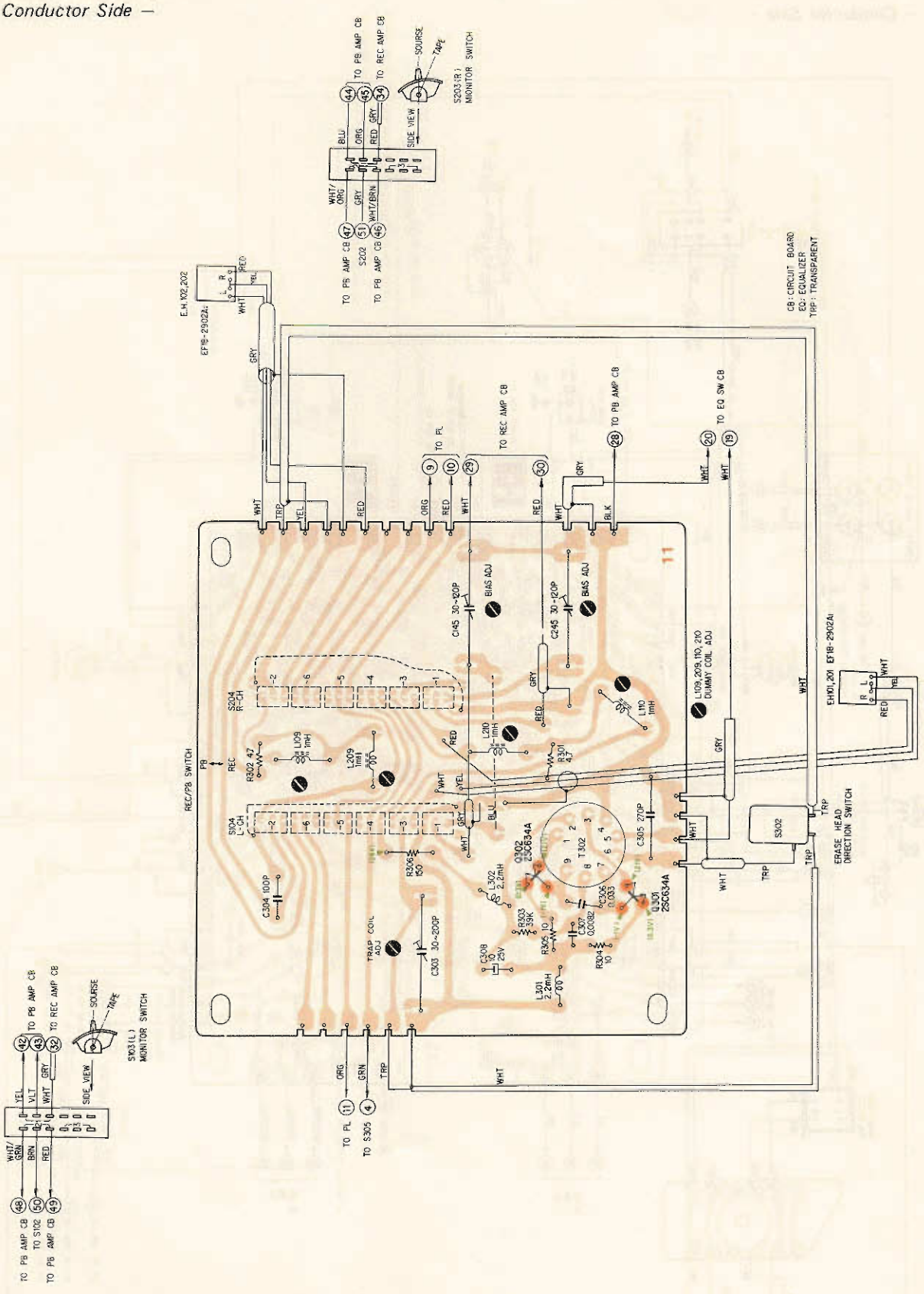
Record Amp. & Record Head Circuit Boards
(USA/Canada Model)

– Conductor Side –



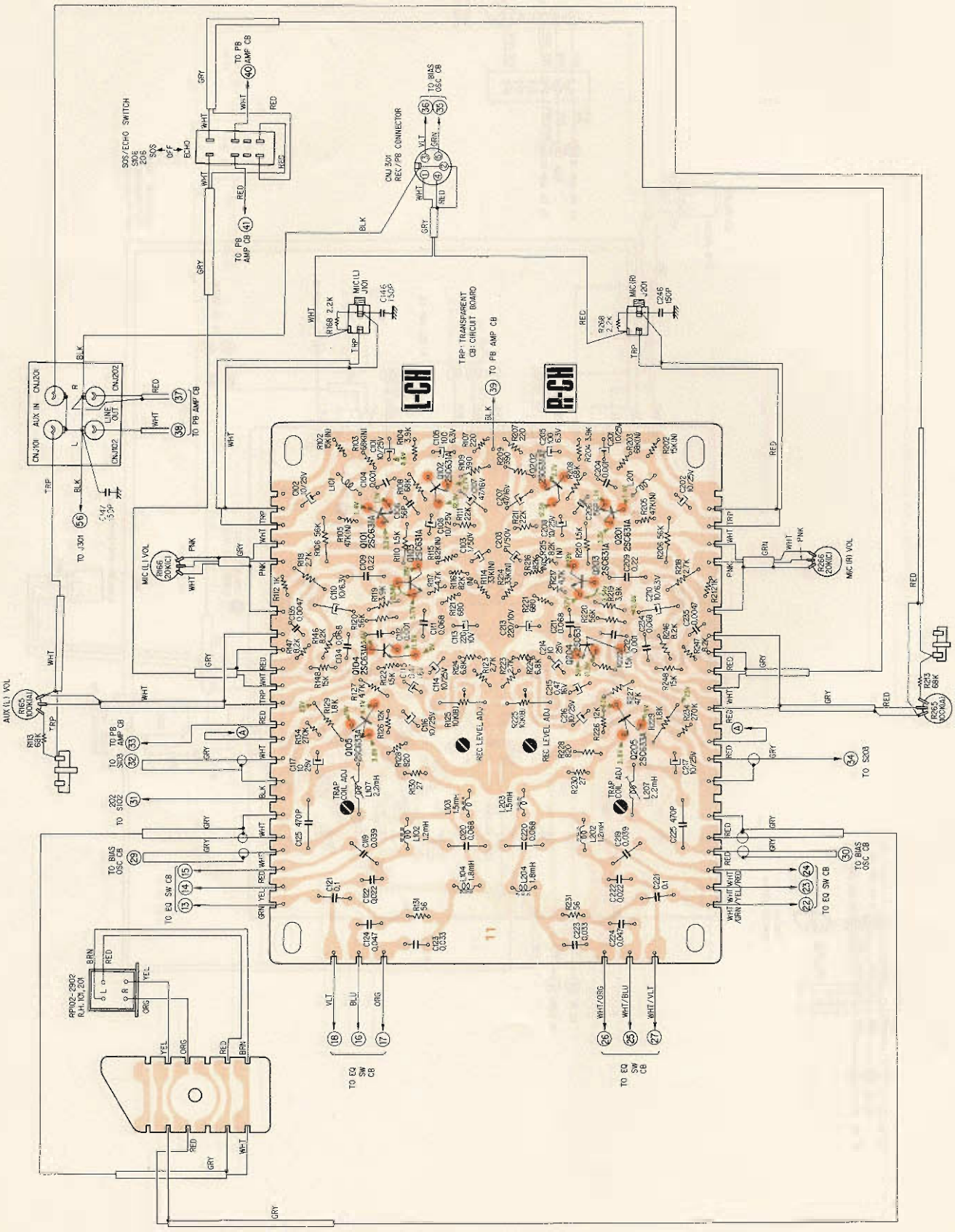
Bias Osc. Circuit Board (USA/Canada Model)

— Conductor Side —



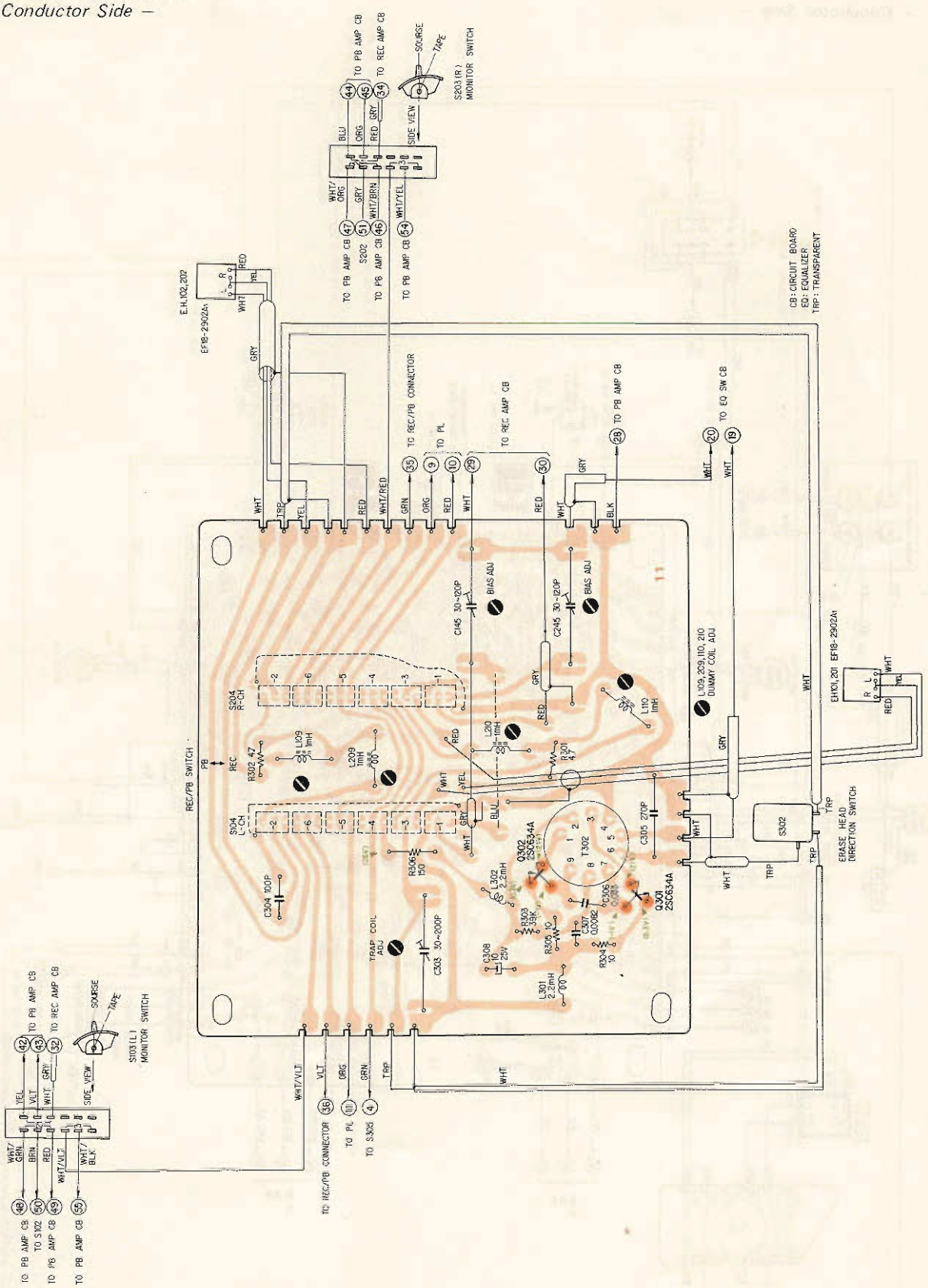
Record Amp. & Record Head Circuit Boards
(General Export Model)

— Conductor Side —



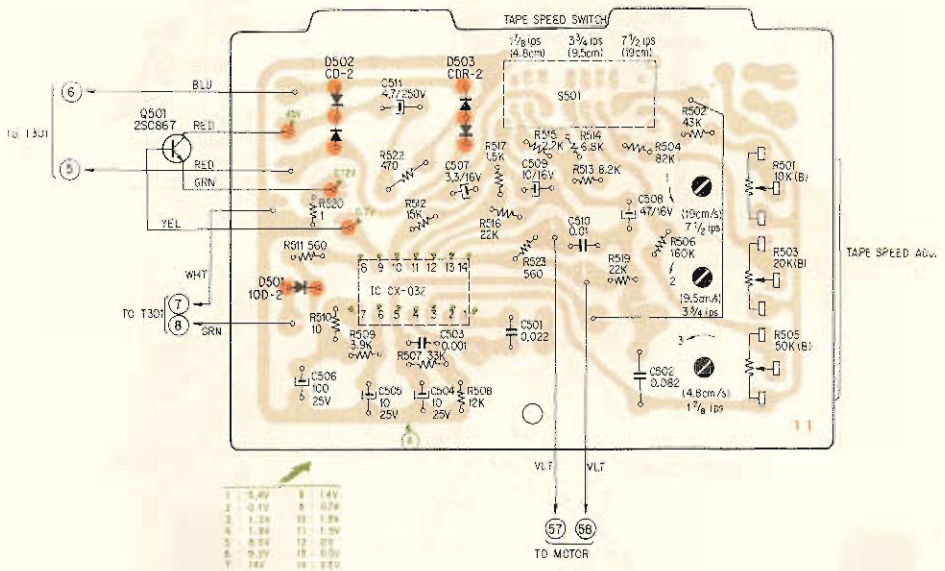
Bias Osc. Circuit Board
(General Export Model)

— Conductor Side —



Servo Amp. Circuit Board
(USA/Canada/General Export Model)

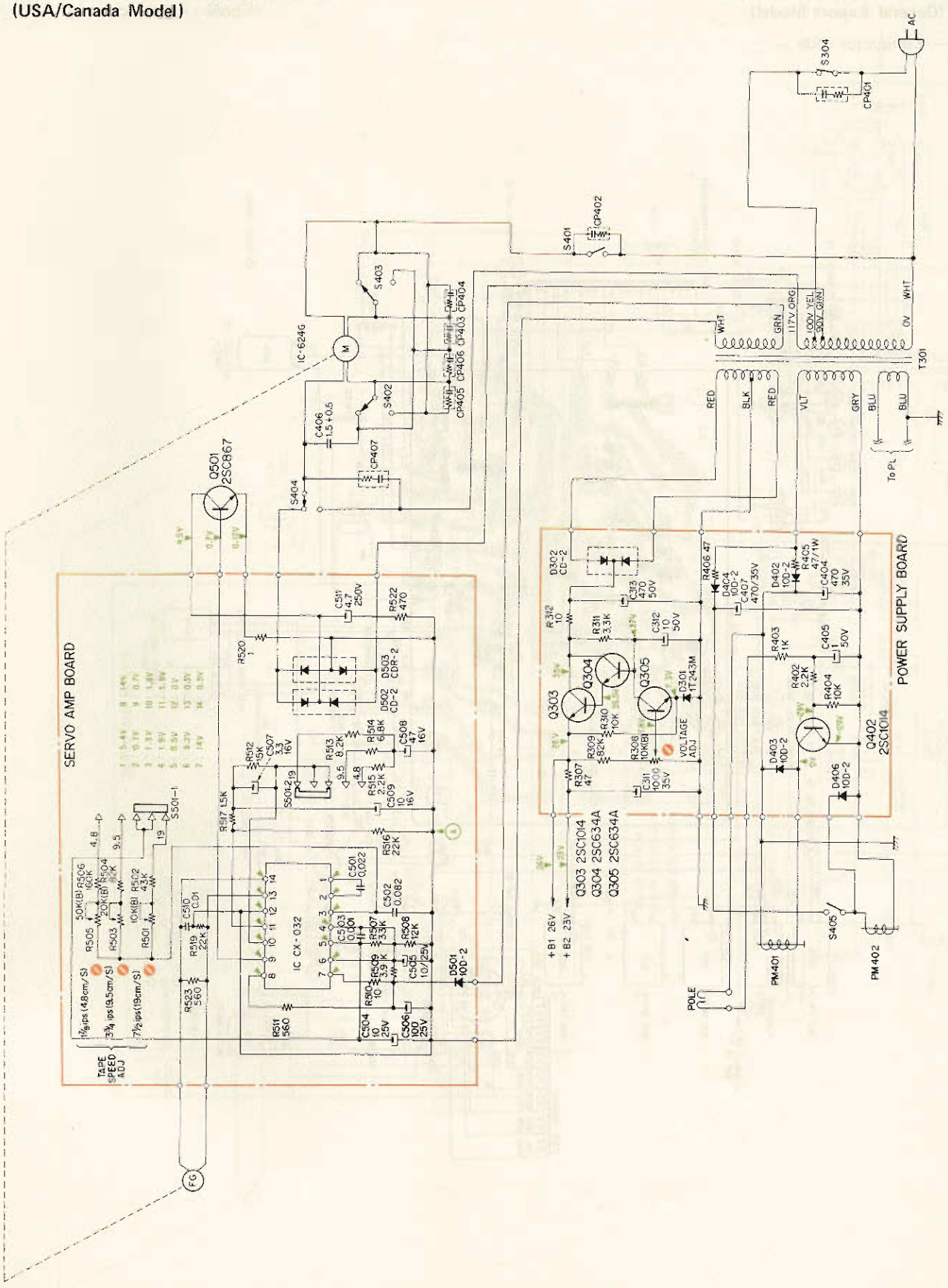
– Conductor Side –



Note: Voltage values are measured to the point Ⓐ.

SCHEMATIC DIAGRAM-2

Servo Amp. & Power Supply Section
(USA/Canada Model)



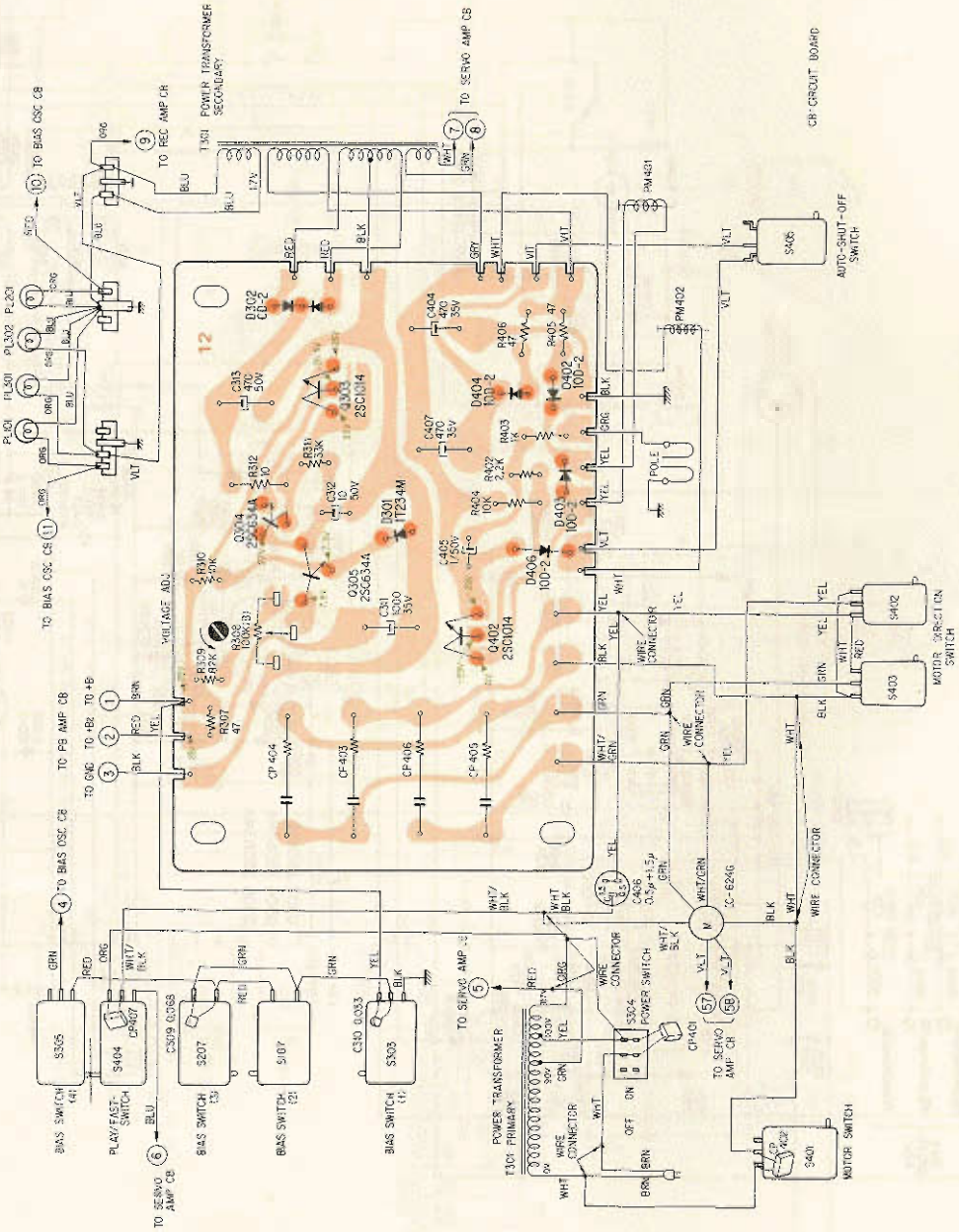
Ref. No.	Description	Position
S401	Motor	OFF
S402, 403	Motor Direction	REVERSE

MOUNTING DIAGRAM-2

Power Supply Circuit Board
(USA/Canada Model)

– Conductor Side –

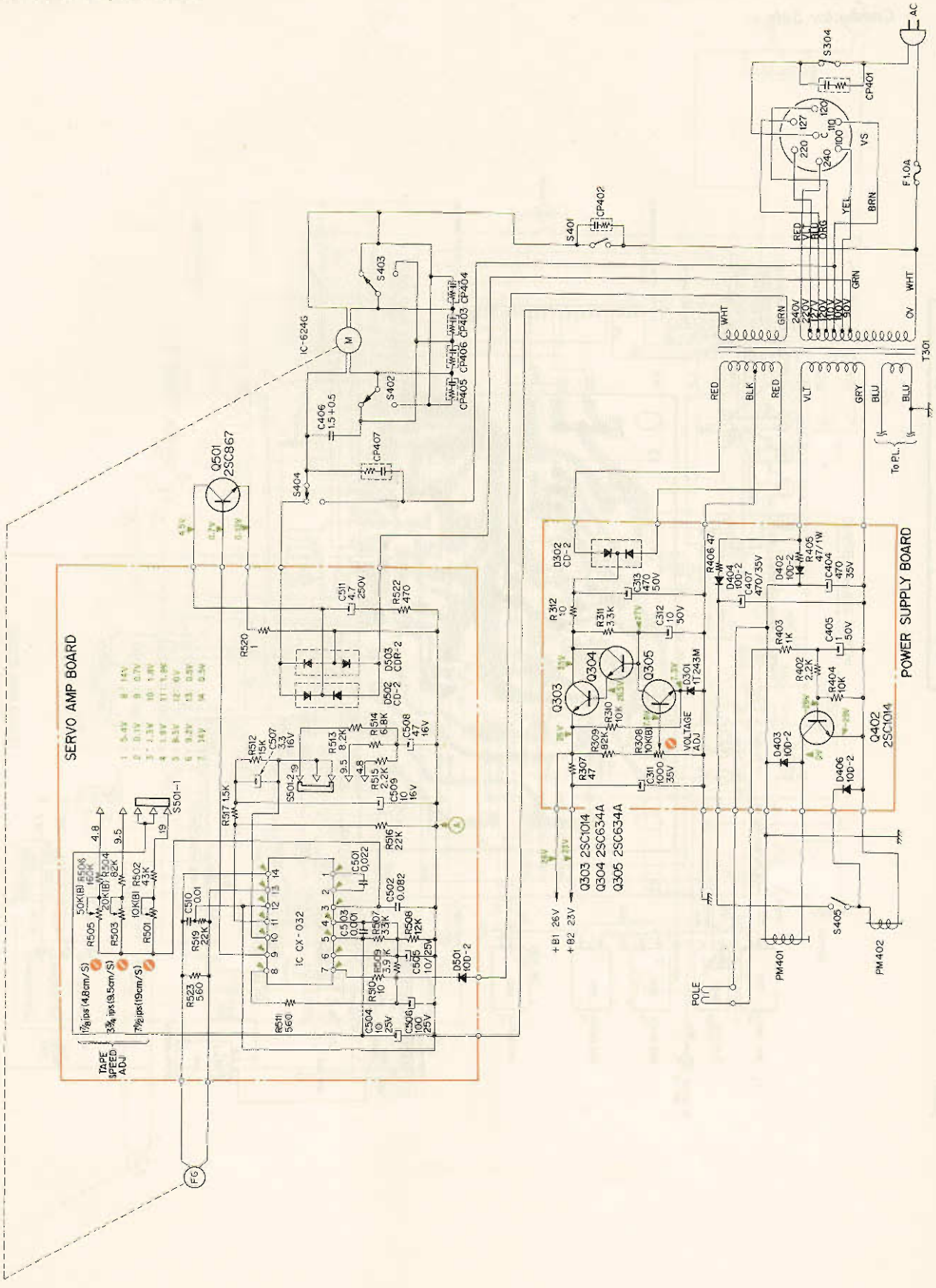
S404	Servo on/off	ON
S405	Auto Shut-off	OFF
S501	TAPE SPEED	7½ ips, 19 cm



4. CANADA Model include a fuse in power supply circuit.

SCHEMATIC DIAGRAM-3

Servo Amp. & Power Supply Section
(General Export Model)

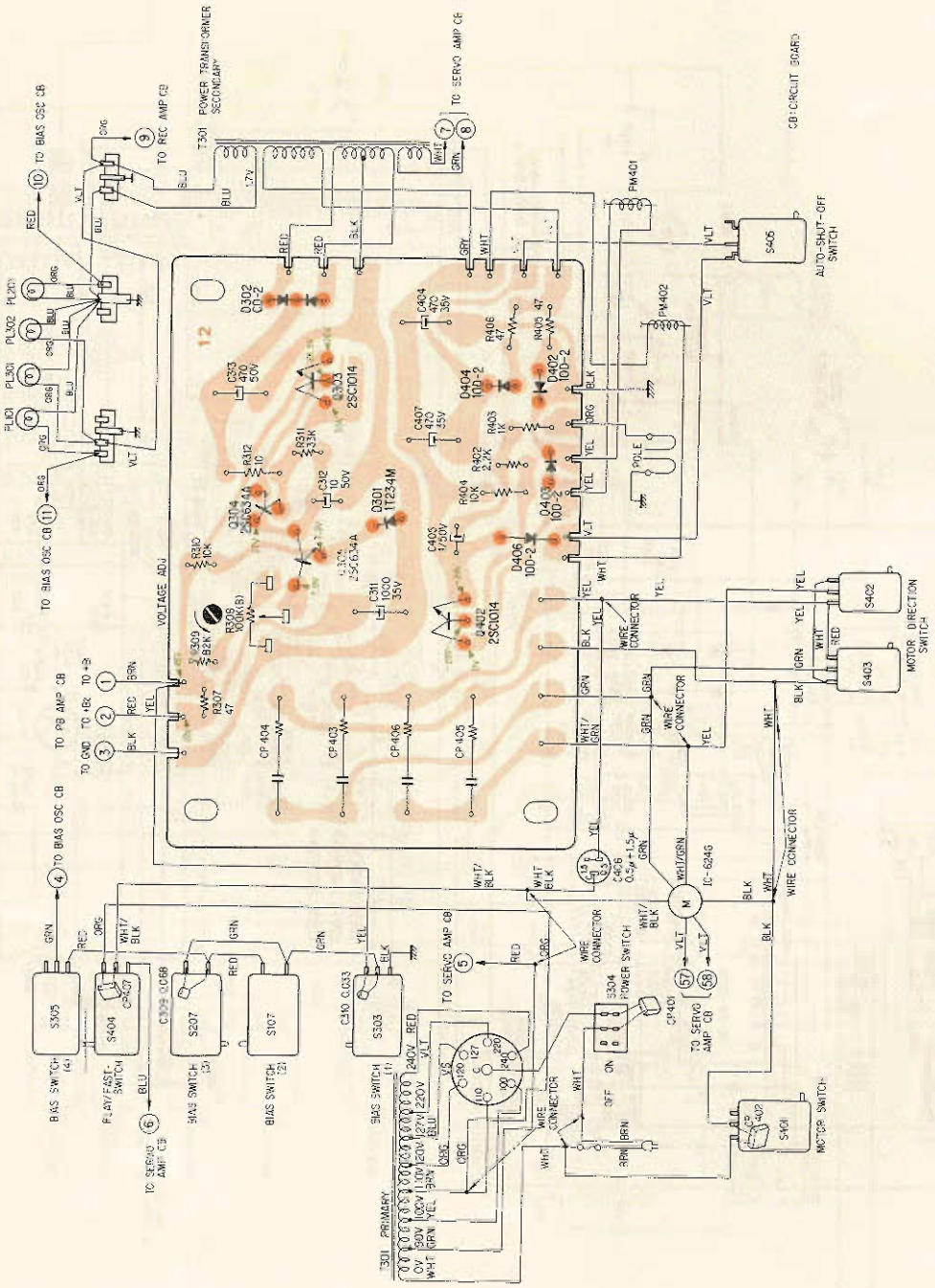


MOUNTING DIAGRAM-3

Power Supply Circuit Board
(General Export Model)

– Conductor Side –

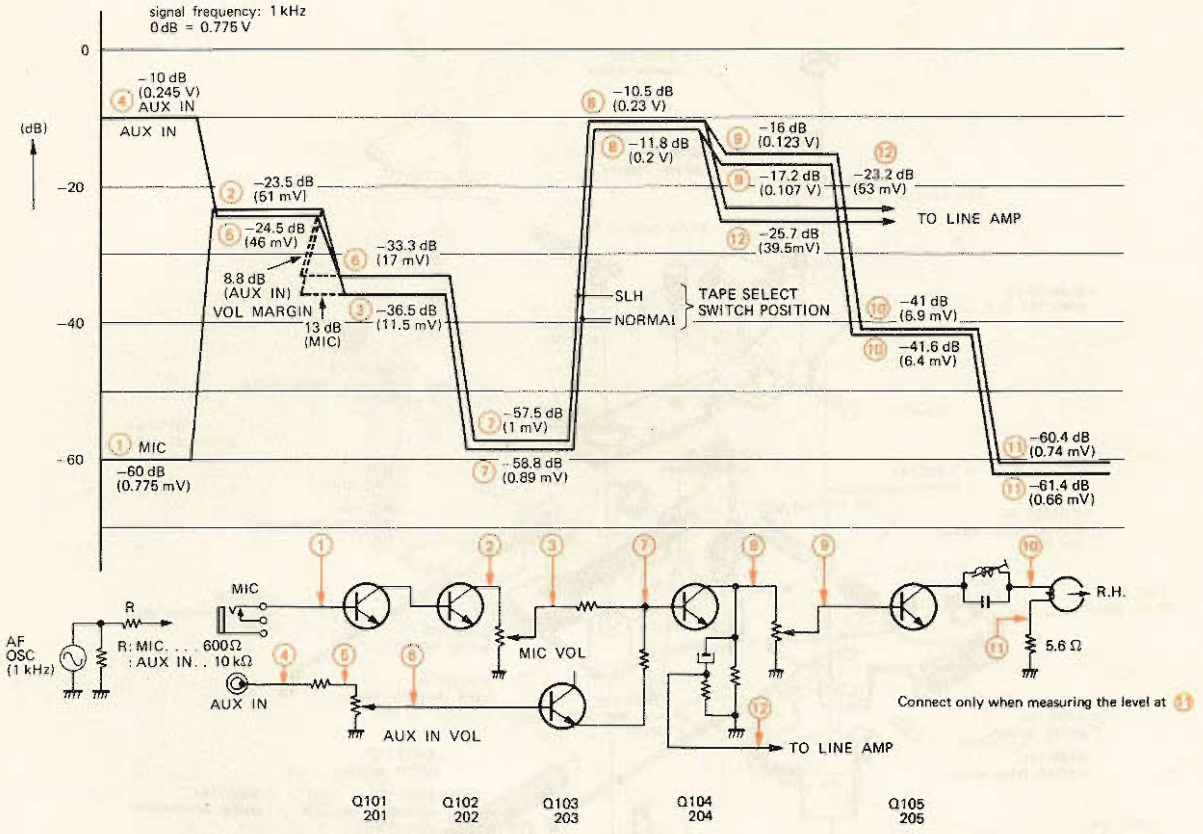
	Motor Direction	REVERSE
S402, 403		
S404	Servo on/off	ON
S405	Auto Shut-off	OFF
S501	TAPE SPEED	7½ ips, 19 cm



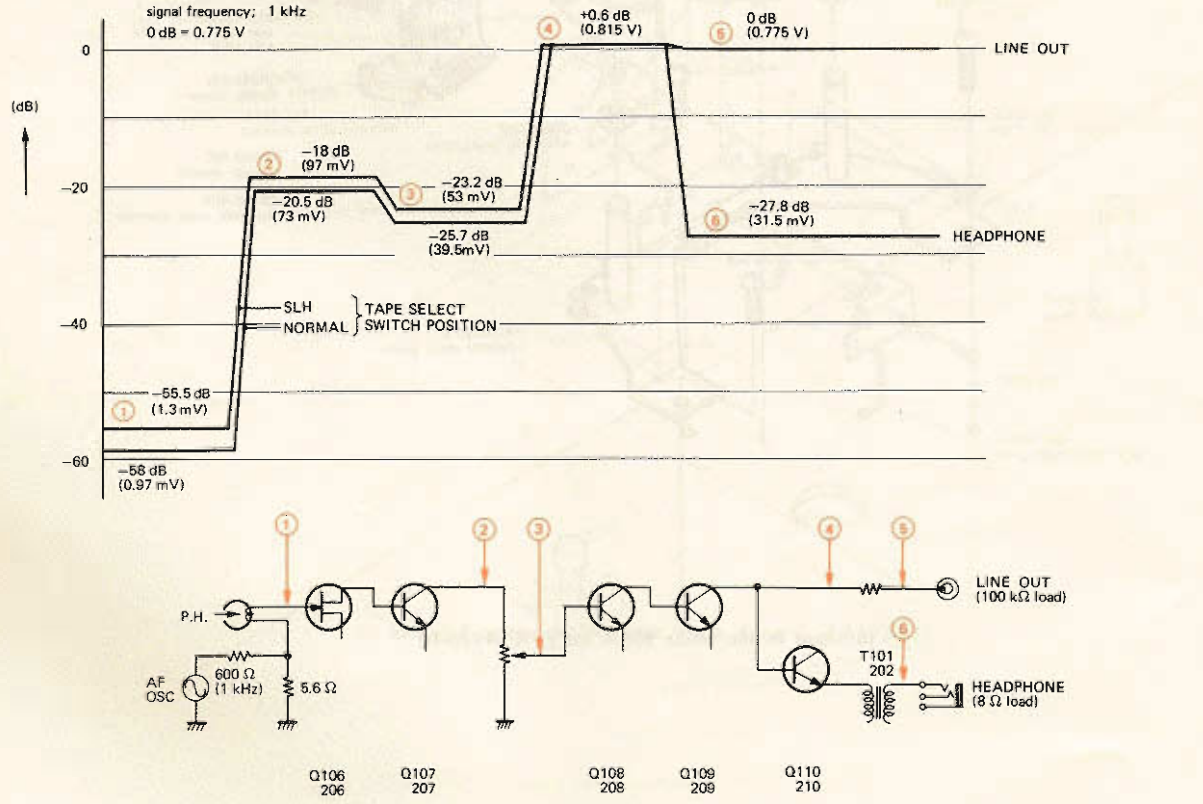
2. Voltage values are measured to the point (V).
3. Switch positions are as following:

4-2. LEVEL DIAGRAM

Record



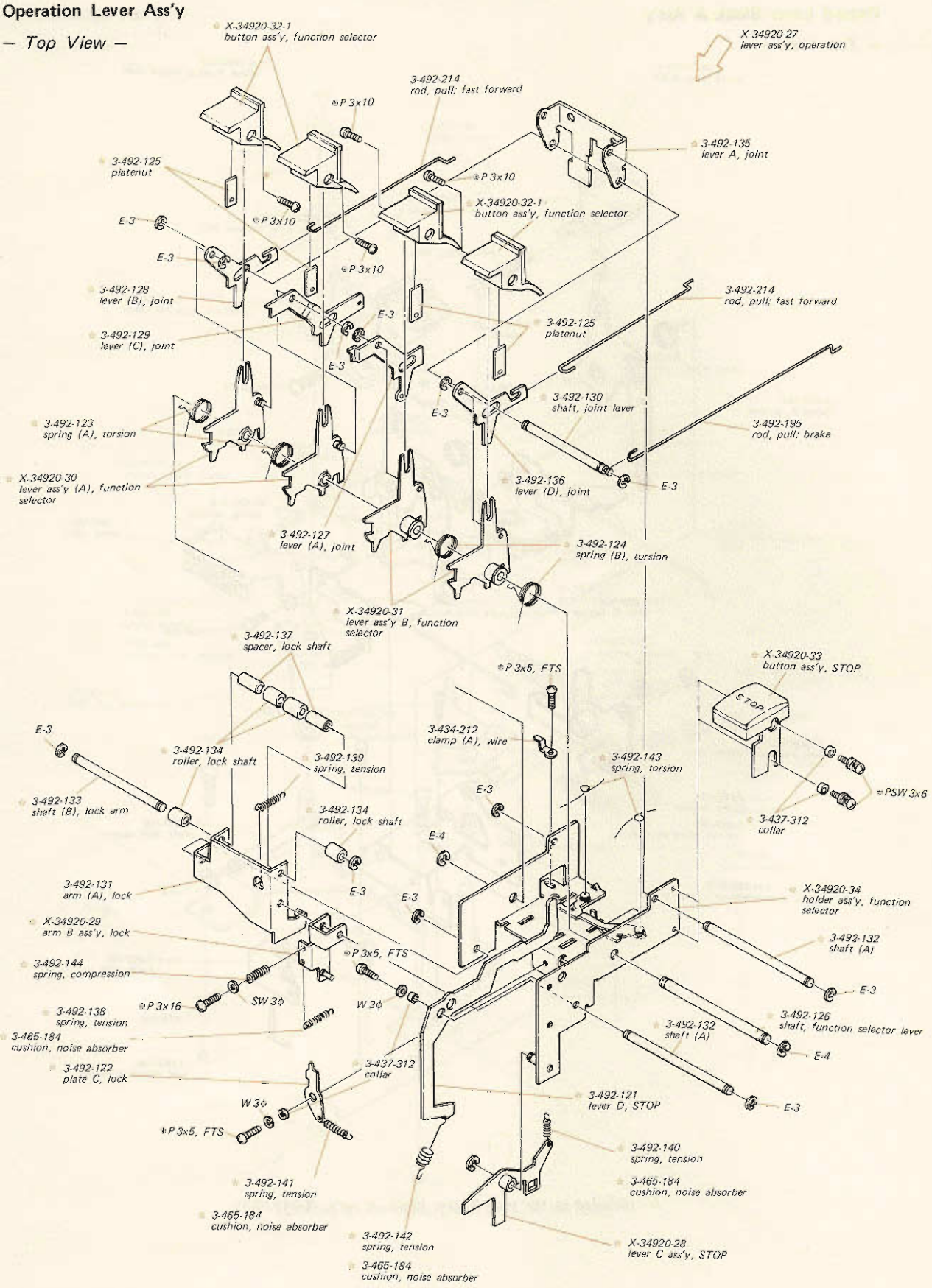
Playback



SECTION 5
EXPLODED VIEW

Operation Lever Ass'y

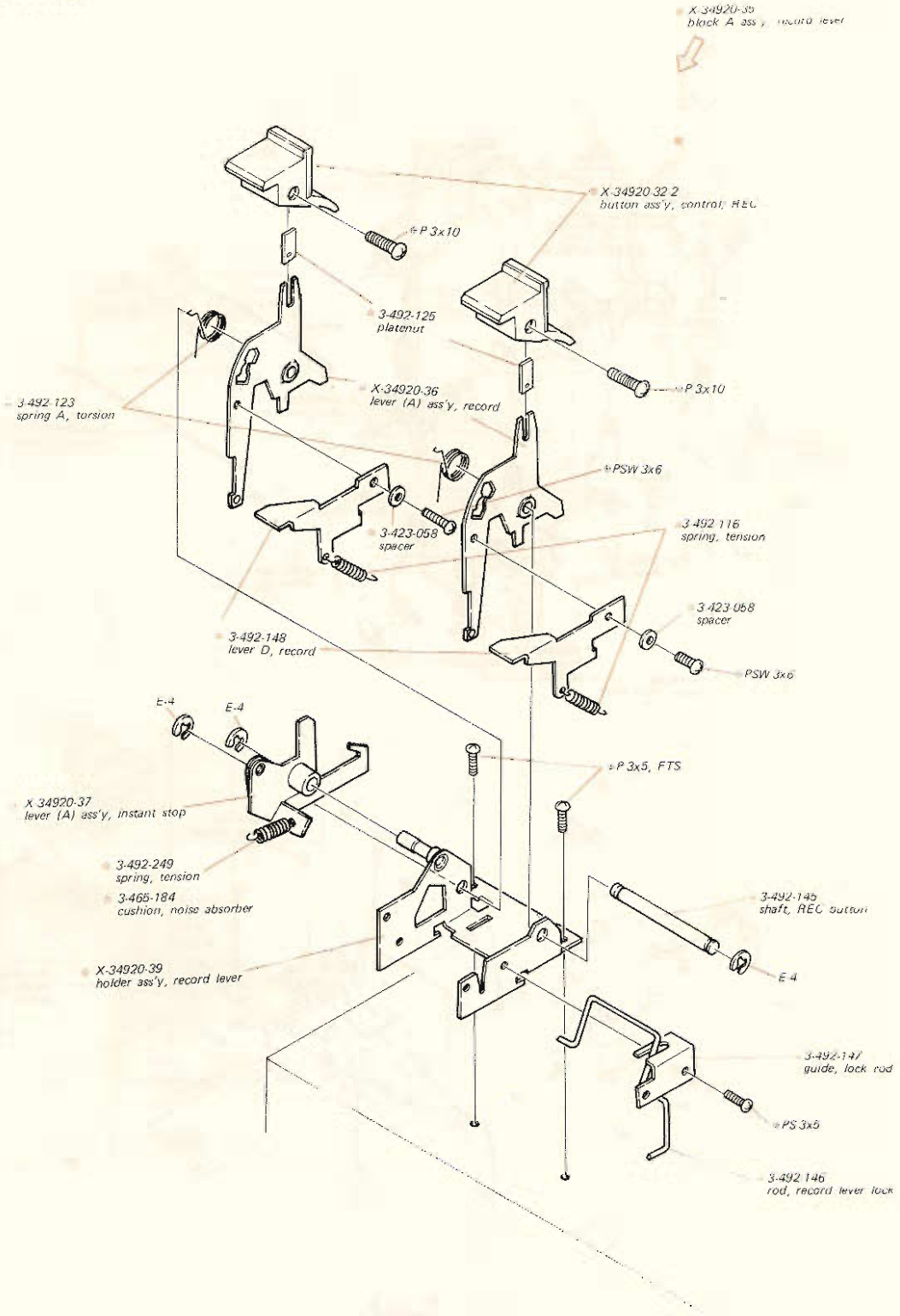
— Top View —



☆: included in the operation lever ass'y, X-34920-27

Record Lever Block A Ass'y

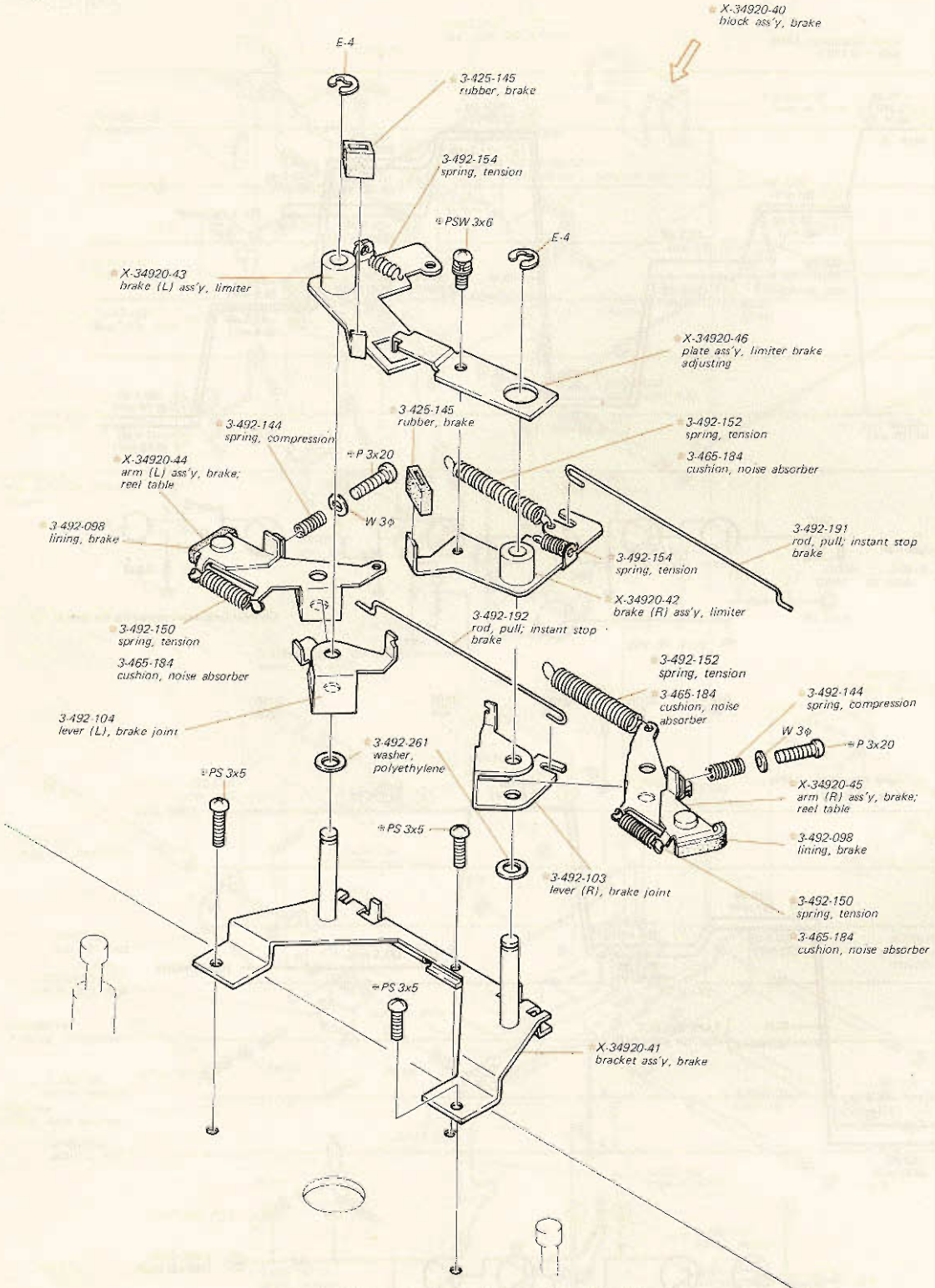
– Top View –



★: included in the record lever block A ass'y, X-34920-35

Brake Block Ass'y

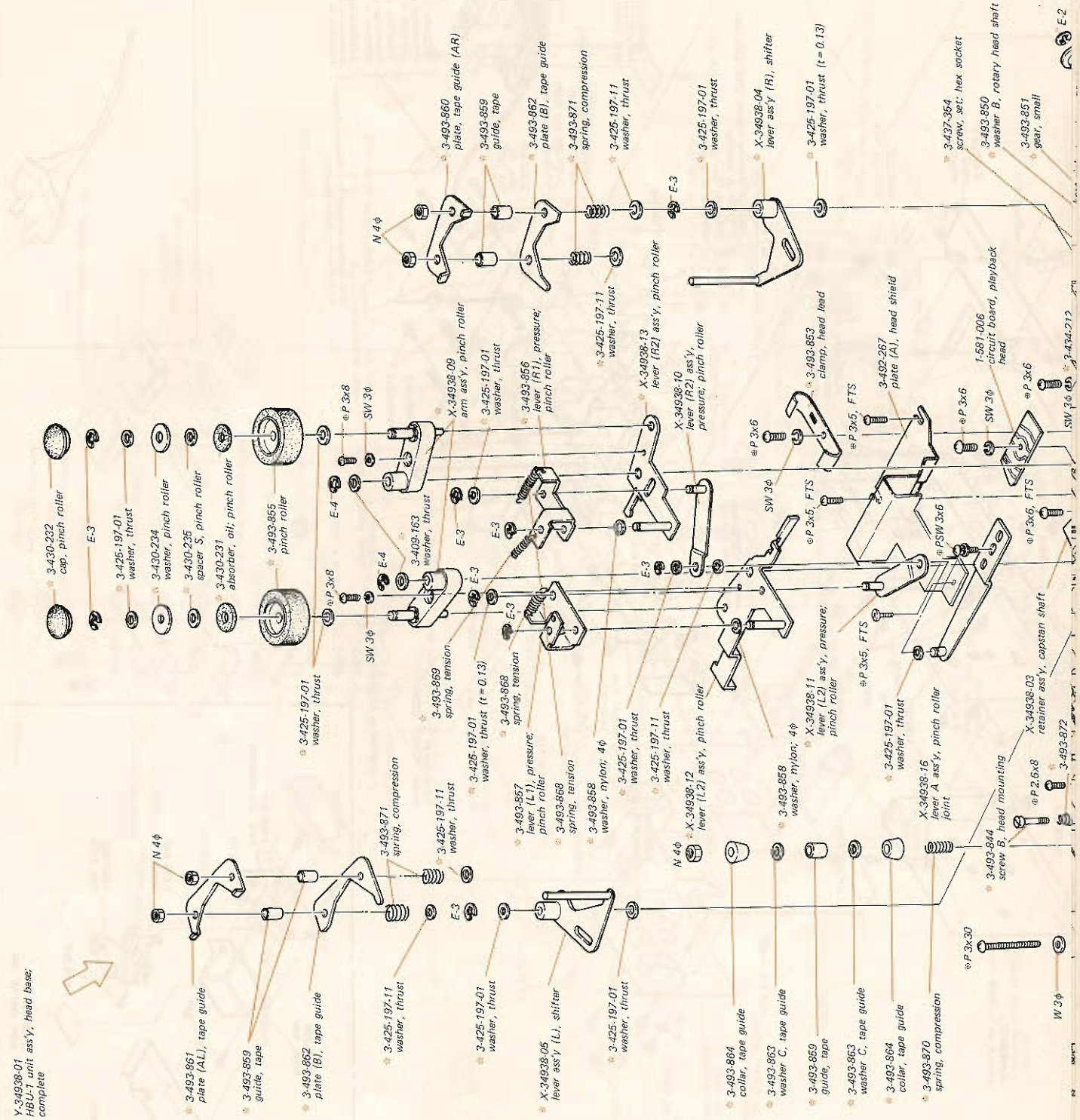
– Top View –

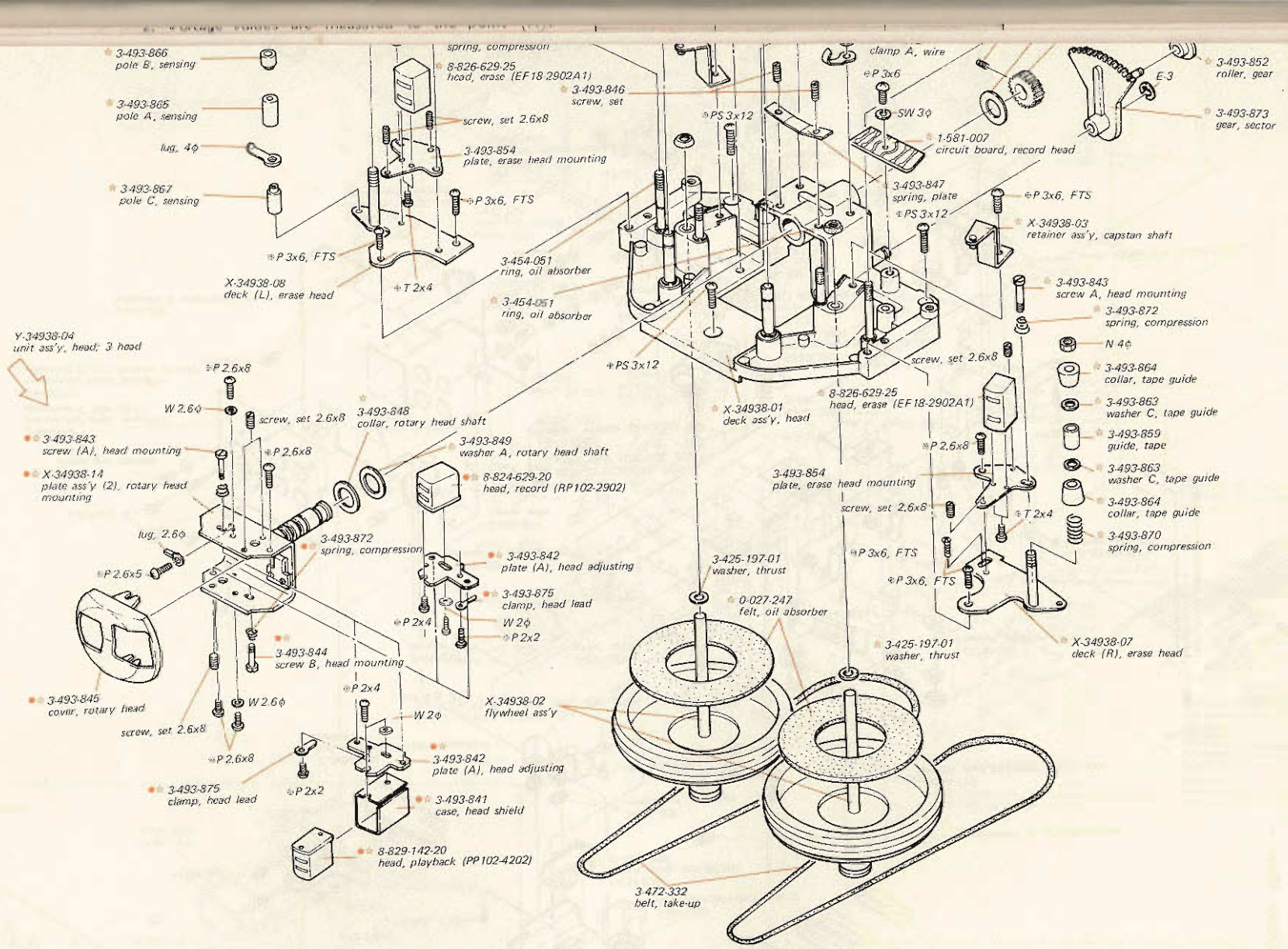


☆: included in the brake block ass'y, X-34920-40

Head Base Unit HBU-1

– Top View –



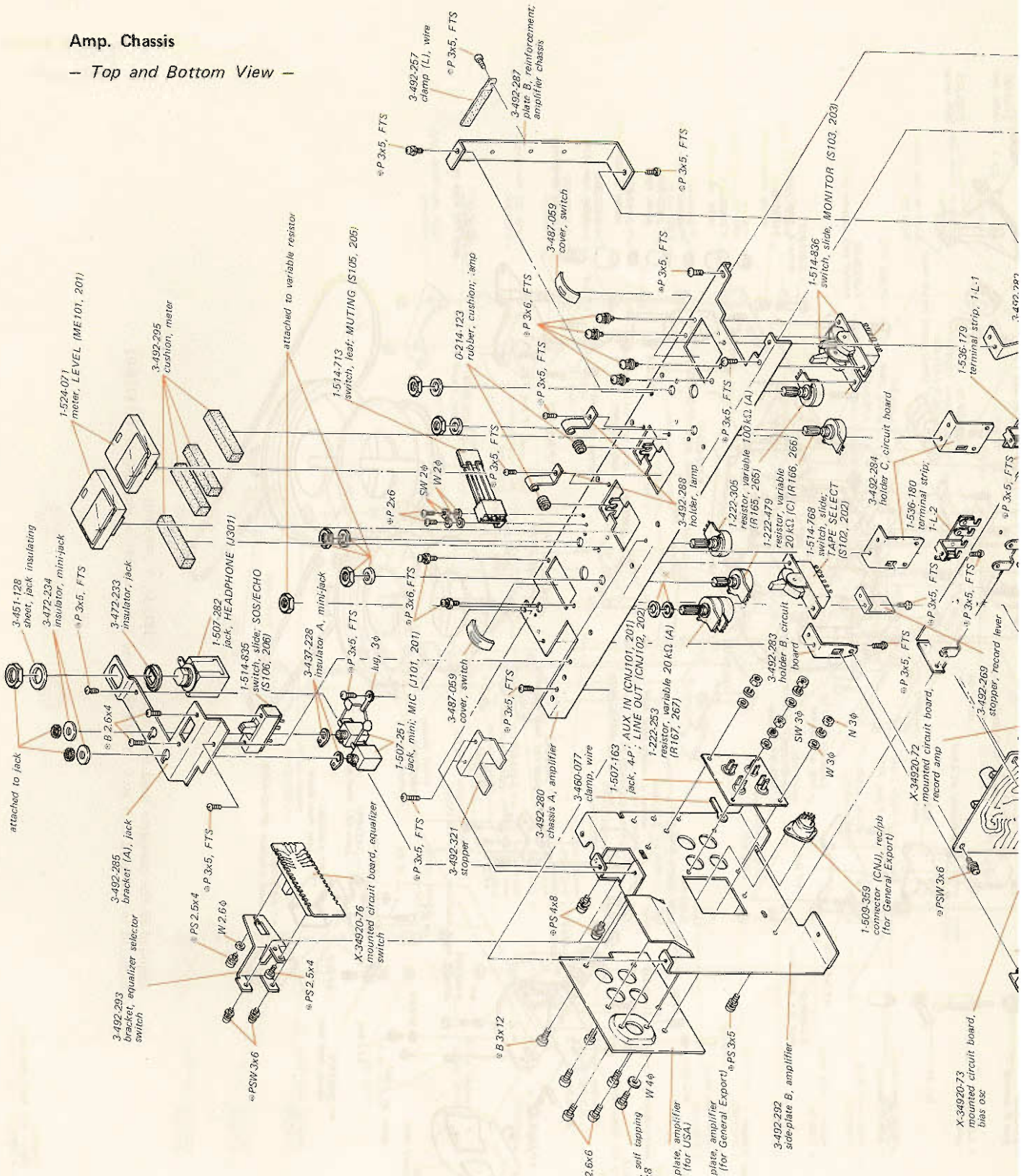


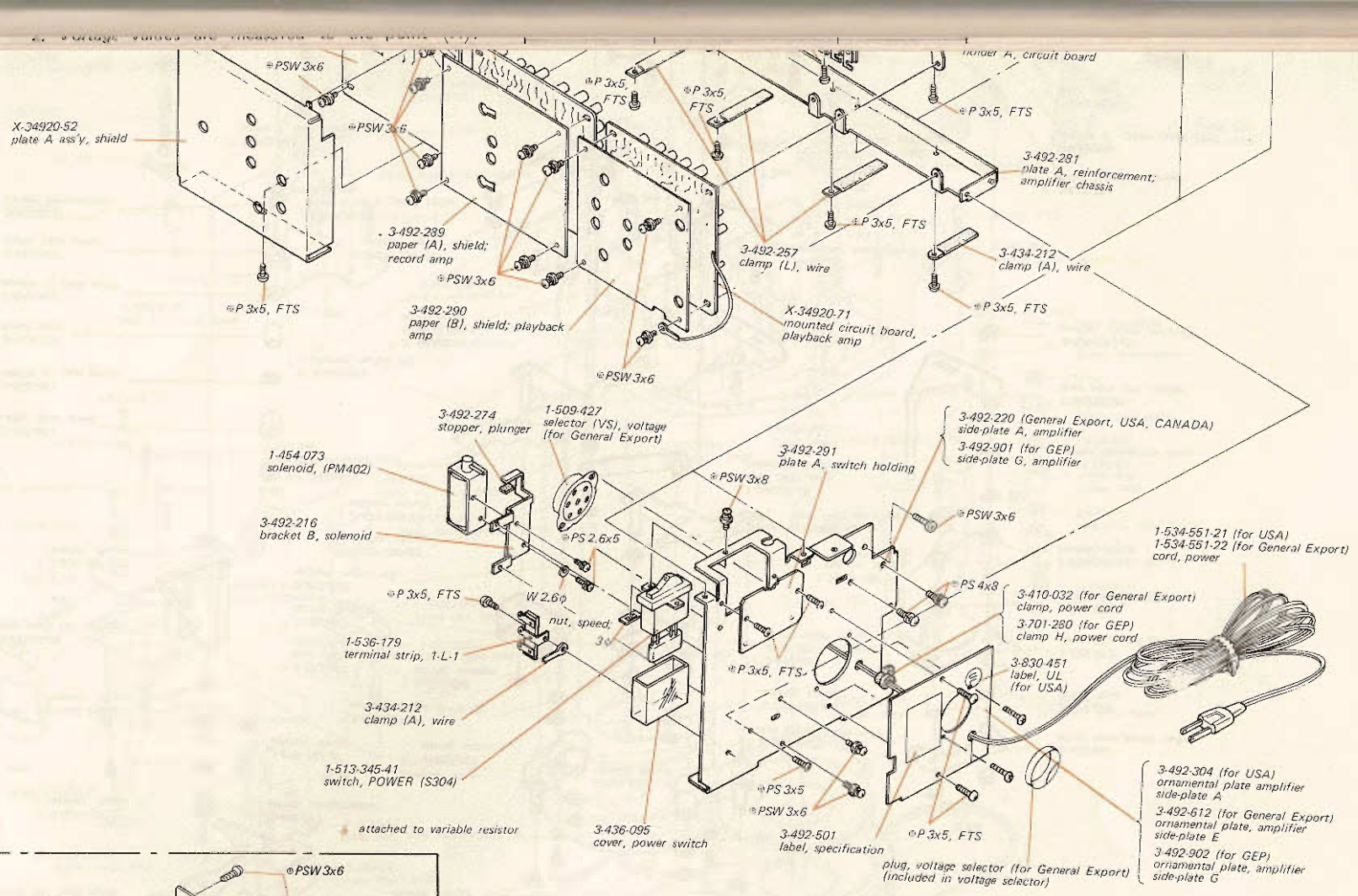
☆: included in the complete head base unit ass'y, (HBU-1), Y-34938-01
●☆: included in the head unit ass'y, Y-34938-04 and this assembly is included in Y-34938-01

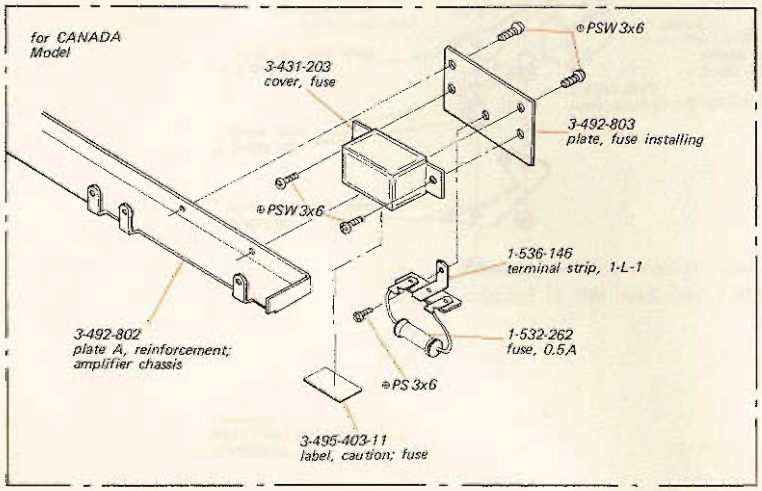
1-534-587 cord, power (for GEP)

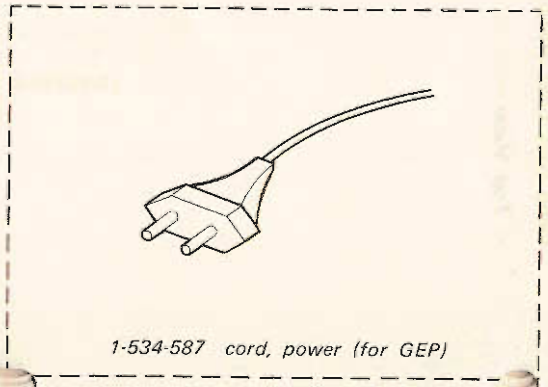
Amp. Chassis

– Top and Bottom View –

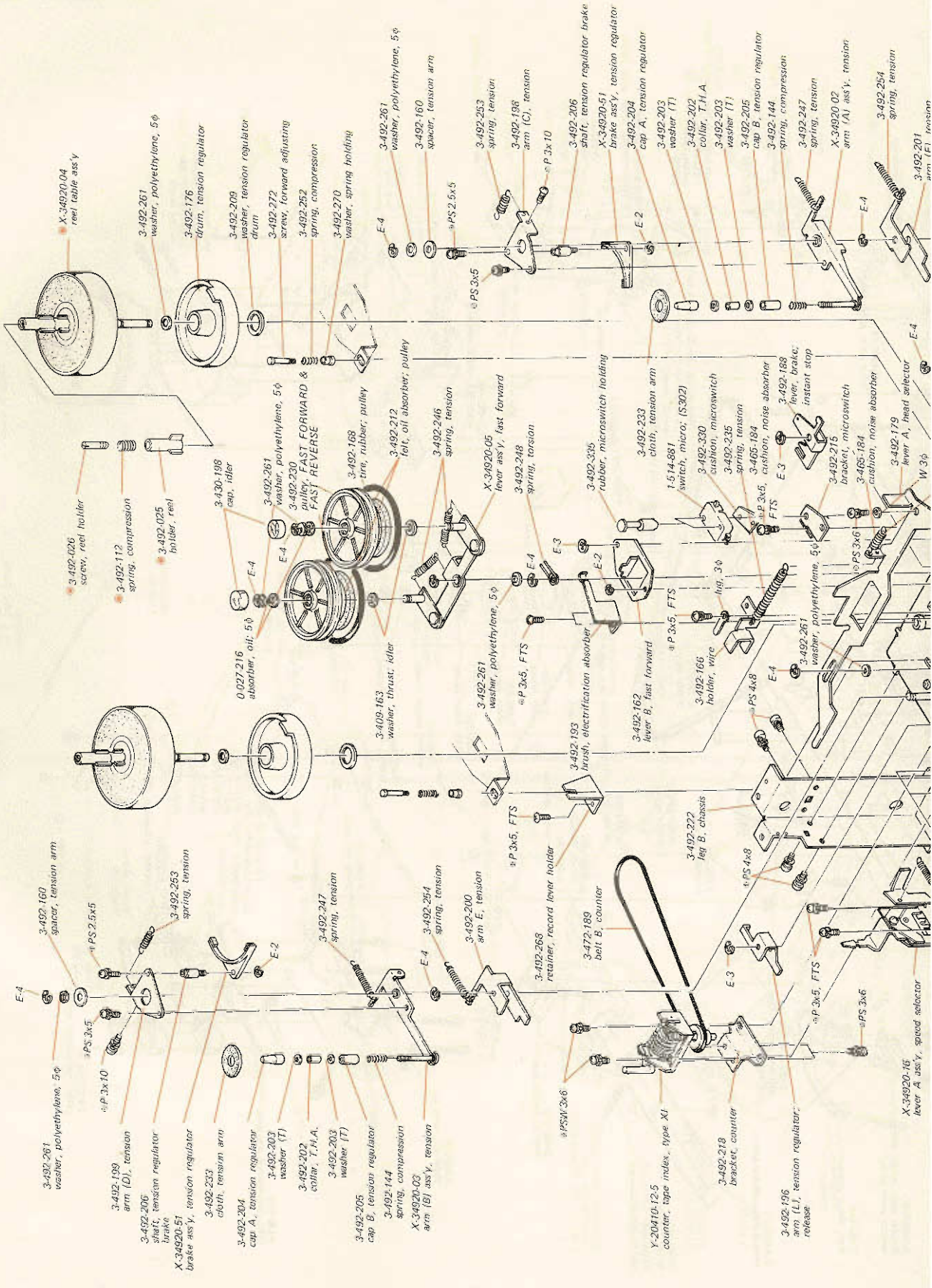


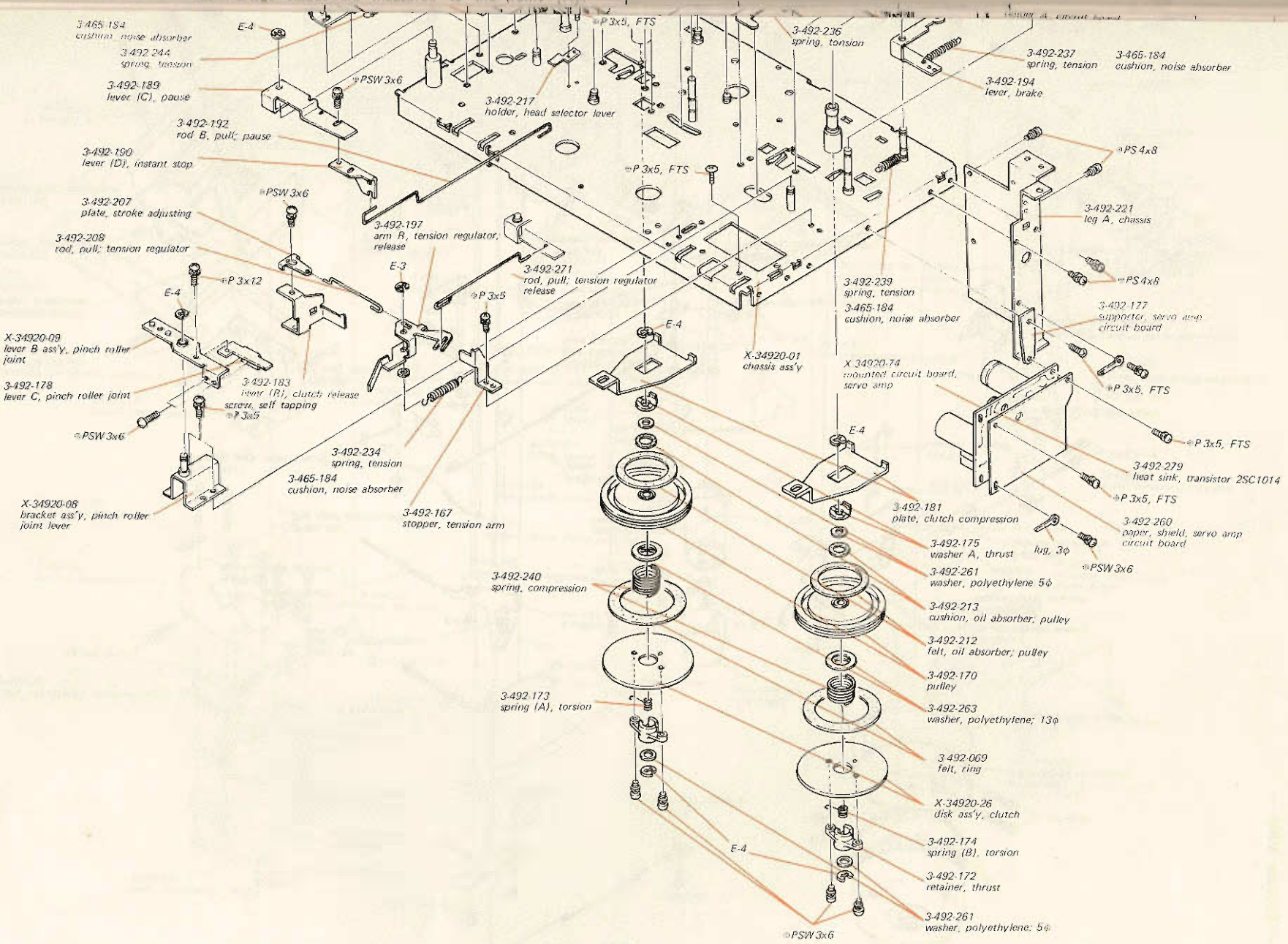

holder A, circuit board
⊕P 3x5, FTS
⊕PSW 3x6
X-34920-52
plate A ass'y, shield
⊕P 3x5, FTS
3-492-281
plate A, reinforcement; amplifier chassis
3-492-289
paper (A), shield; record amp
3-492-257
clamp (L), wire
3-434-212
clamp (A), wire
3-492-290
paper (B), shield; playback amp
X-34920-71
mounted circuit board, playback amp
3-492-274
stopper, plunger
1-509-427
selector (VS), voltage (for General Export)
3-492-220 (General Export, USA, CANADA)
side-plate A, amplifier
3-492-901 (for GEP)
side-plate G, amplifier
1-454 073
solenoid, (PM402)
3-492-291
plate A, switch holding
⊕PSW 3x8
3-492-216
bracket B, solenoid
⊕PS 2.6x5
1-534-551-21 (for USA)
1-534-551-22 (for General Export)
cord, power
⊕PS 4x8
3-410-032 (for General Export)
clamp, power cord
3-701-280 (for GEP)
clamp H, power cord
W 2.6φ
nut, speed;
1-536-179
terminal strip, 1-L-1
3-830 451
label, UL (for USA)
3-434-212
clamp (A), wire
1-513-345-41
switch, POWER (S304)
3-436-095
cover, power switch
⊕PS 3x5
3-492-501
label, specification
plug, voltage selector (for General Export) (included in voltage selector)
3-492-304 (for USA)
ornamental plate amplifier side-plate A
3-492-612 (for General Export)
ornamental plate, amplifier side-plate E
3-492-902 (for GEP)
ornamental plate, amplifier side-plate G
attached to variable resistor


for CANADA Model
⊕PSW 3x6
3-431-203
cover, fuse
3-492-803
plate, fuse installing
⊕PSW 3x6
1-536-146
terminal strip, 1-L-1
3-492-802
plate A, reinforcement; amplifier chassis
1-532-262
fuse, 0.5A
⊕PS 3x6
3-495-403-11
label, caution; fuse


1-534-587 cord, power (for GEP)

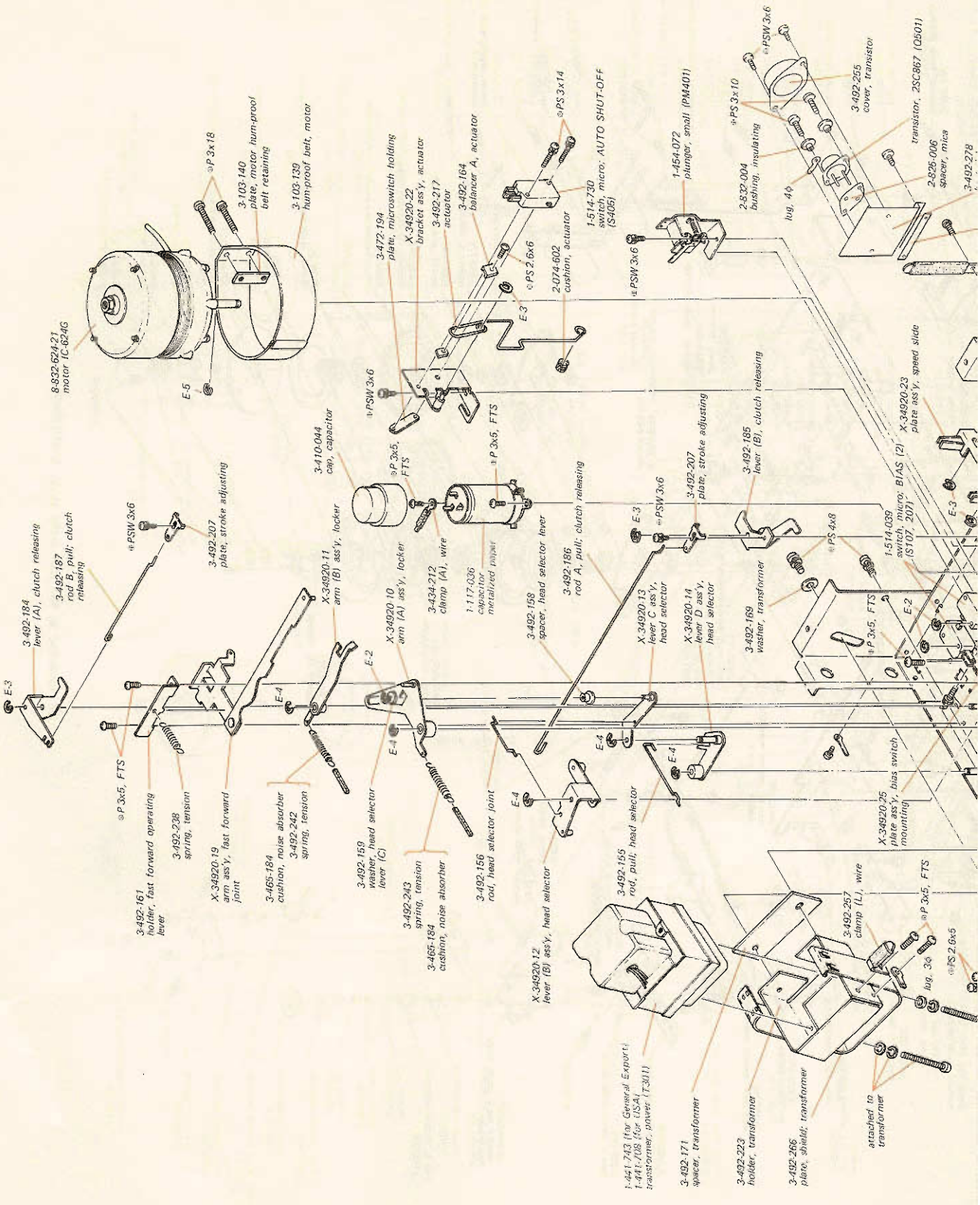
Chassis — *Top View* —

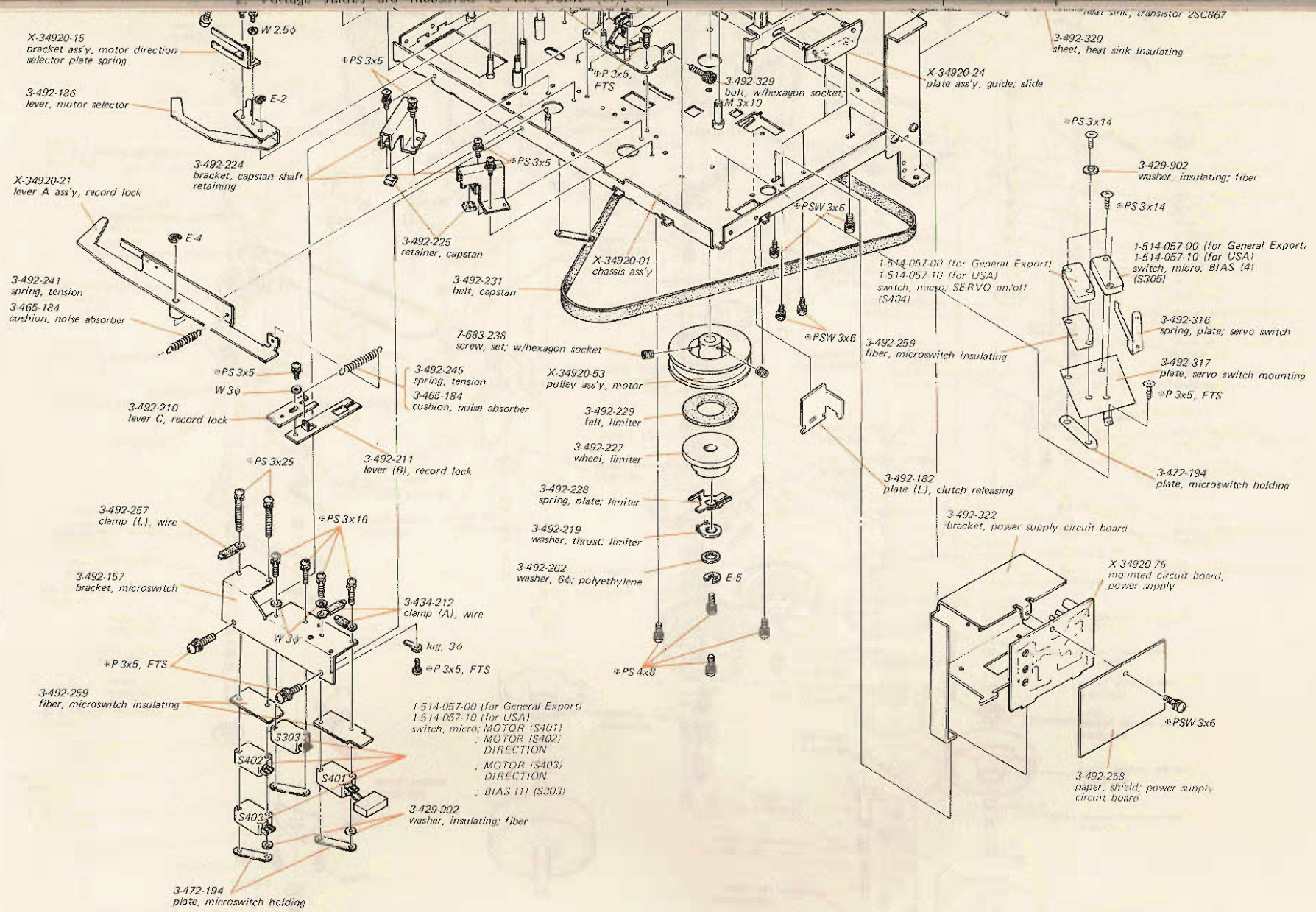




●: included in the reel table ass'y, X-34920-04.

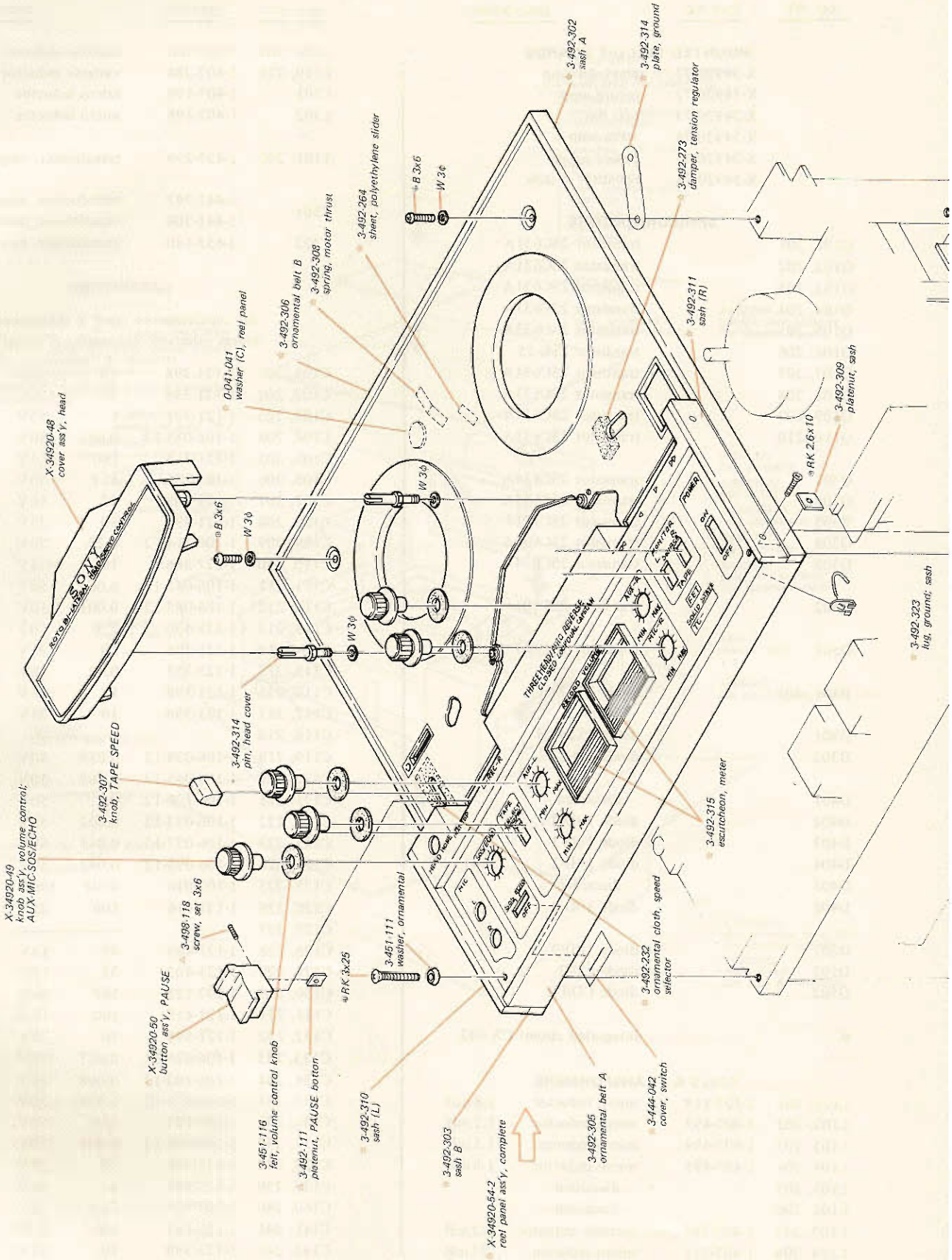
Chassis — *Bottom View* —

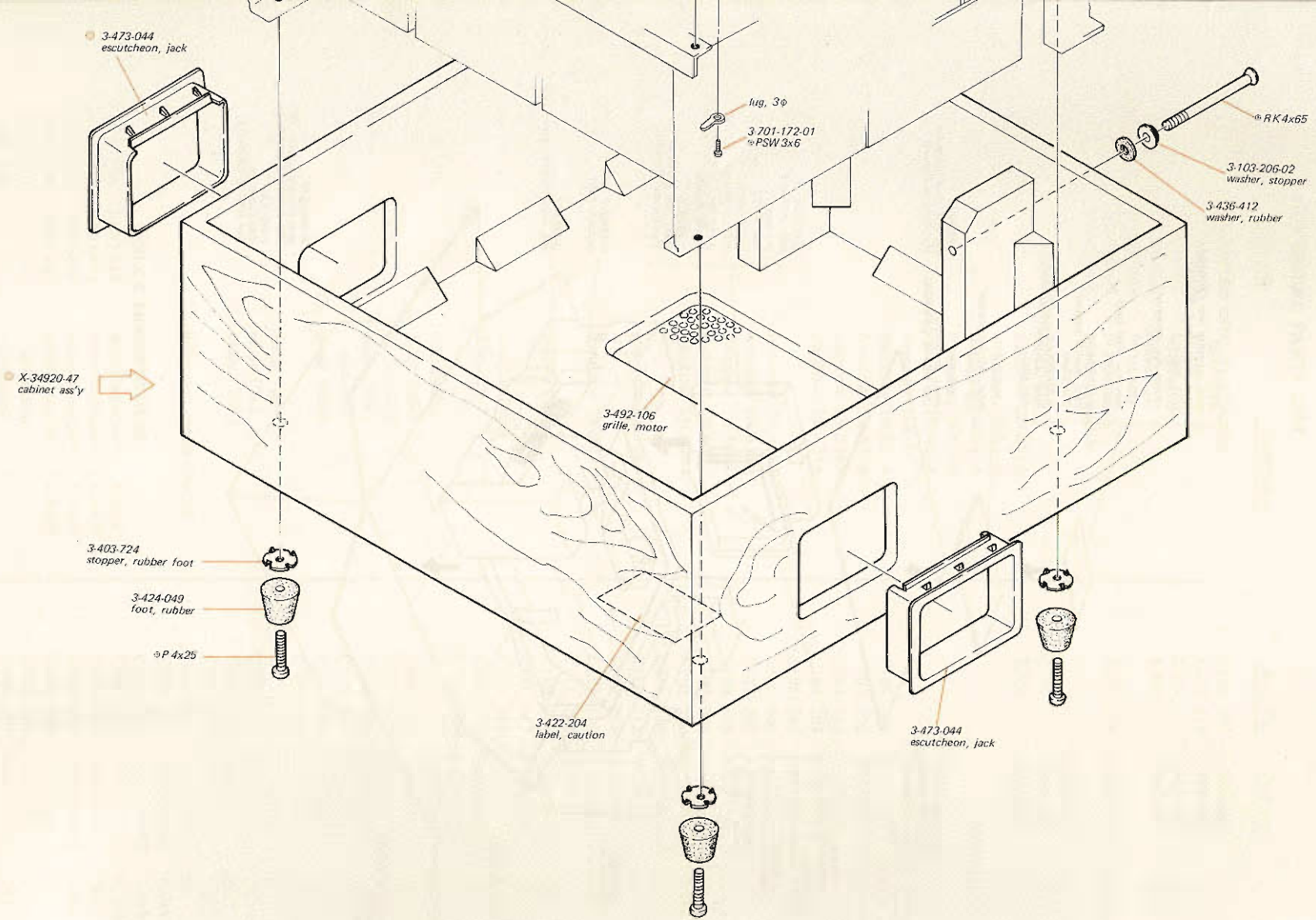



X-34920-15
bracket ass'y, motor direction selector plate spring
W 2.5φ
3-492-186
lever, motor selector
E-2
3-492-224
bracket, capstan shaft retaining
PS 3x5
P 3x5, FTS
3-492-329
bolt, w/hexagon socket; M 3x10
X-34920 24
plate ass'y, guide; slide
heat sink, transistor 2SC867
3-492-320
sheet, heat sink insulating
PS 3x14
3-429-902
washer, insulating; fiber
PS 3x14
X-34920-21
lever A ass'y, record lock
E-4
3-492-225
retainer, capstan
PSW 3x6
X-34920-01
chassis ass'y
1-514-057-00 (for General Export)
1-514-057-10 (for USA)
switch, micro; BIAS (4) (S305)
3-492-241
spring, tension
3-465-184
cushion, noise absorber
3-492-231
belt, capstan
1-514-057-00 (for General Export)
1-514-057-10 (for USA)
switch, micro; SERVO on/off (S404)
3-492-316
spring, plate; servo switch
1-683-238
screw, set; w/hexagon socket
PSW 3x6
3-492-259
fiber, microswitch insulating
3-492-317
plate, servo switch mounting
P 3x5, FTS
PS 3x5
W 3φ
3-492-245
spring, tension
3-465-184
cushion, noise absorber
X-34920-53
pulley ass'y, motor
3-492-210
lever C, record lock
3-492-211
lever (B), record lock
3-492-229
felt, limiter
3-492-227
wheel, limiter
3-472-194
plate, microswitch holding
PS 3x25
3-492-182
plate (L), clutch releasing
3-492-228
spring, plate; limiter
3-492-322
bracket, power supply circuit board
3-492-257
clamp (L), wire
PS 3x16
3-492-219
washer, thrust; limiter
3-492-157
bracket, microswitch
3-492-262
washer, 6φ; polyethylene
E 5
X 34920-75
mounted circuit board, power supply
3-434-212
clamp (A), wire
W 3φ
lug, 3φ
P 3x5, FTS
PS 4x8
P 3x5, FTS
3-492-259
fiber, microswitch insulating
1-514-057-00 (for General Export)
1-514-057-10 (for USA)
switch, micro; MOTOR (S401), MOTOR (S402) DIRECTION, MOTOR (S403) DIRECTION, BIAS (1) (S303)
S303
S402
S401
S403
PSW 3x6
3-492-258
paper, shield; power supply circuit board
3-429-902
washer, insulating; fiber
3-472-194
plate, microswitch holding

Cabinet & Reel Panel

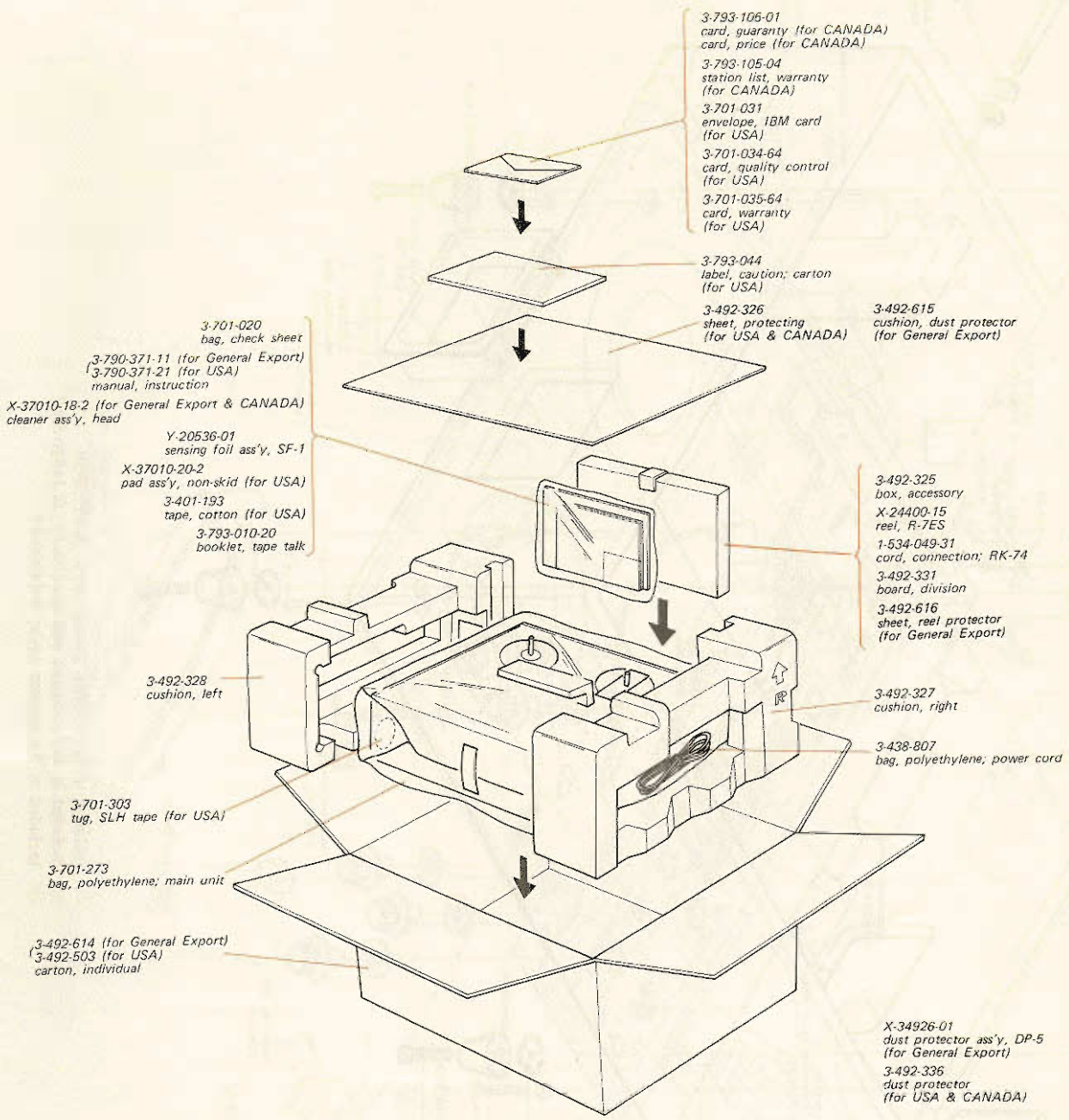
– Top View –





△: included in the PAUSE button ass'y, X-34920-50
☆: included in the complete reel panel ass'y, X-34920-54-2
◎: included in the cabinet ass'y, X-34920-47

Packing


3-793-106-01
card, guaranty (for CANADA)
card, price (for CANADA)
3-793-105-04
station list, warranty
(for CANADA)
3-701-031
envelope, IBM card
(for USA)
3-701-034-64
card, quality control
(for USA)
3-701-035-64
card, warranty
(for USA)
3-793-044
label, caution; carton
(for USA)
3-492-326
sheet, protecting
(for USA & CANADA)
3-492-615
cushion, dust protector
(for General Export)
3-701-020
bag, check sheet
3-790-371-11 (for General Export)
3-790-371-21 (for USA)
manual, instruction
X-37010-18-2 (for General Export & CANADA)
cleaner ass'y, head
Y-20536-01
sensing foil ass'y, SF-1
X-37010-20-2
pad ass'y, non-skid (for USA)
3-401-193
tape, cotton (for USA)
3-793-010-20
booklet, tape talk
3-492-325
box, accessory
X-24400-15
reel, R-7ES
1-534-049-31
cord, connection; RK-74
3-492-331
board, division
3-492-616
sheet, reel protector
(for General Export)
3-492-328
cushion, left
3-492-327
cushion, right
3-438-807
bag, polyethylene; power cord
3-701-303
tug, SLH tape (for USA)
3-701-273
bag, polyethylene; main unit
3-492-614 (for General Export)
3-492-503 (for USA)
carton, individual
X-34926-01
dust protector ass'y, DP-5
(for General Export)
3-492-336
dust protector
(for USA & CANADA)

SECTION 6
PARTS LIST

6-1. ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	
		MOUNTED CIRCUIT BOARDS	
	X-34920-71	playback amp	
	X-34920-72	record amp	
	X-34920-73	bias osc	
	X-34920-74	servo amp	
	X-34920-75	power supply	
	X-34920-76	equalizer switch	
		SEMICONDUCTORS	
Q101, 201		transistor 2SC631A	
Q102, 202		transistor 2SC631A	
Q103, 203		transistor 2SC631A	
Q104, 204		transistor 2SC631A	
Q105, 205		transistor 2SC633A	
Q106, 206		transistor 2SK-35	
Q107, 207		transistor 2SC631A	
Q108, 208		transistor 2SC633A	
Q109, 209		transistor 2SC634A	
Q110, 210		transistor 2SC633A	
Q301		transistor 2SC634A	
Q302		transistor 2SC634A	
Q303		transistor 2SC1014	
Q304		transistor 2SC634A	
Q305		transistor 2SC634A	
Q402		transistor 2SC1014	
Q501		transistor 2SC867	
D101, 201		diode 1T22	
D301		diode 1T243M	
D302		diode CD-2	
D401		– discarded –	
D402		diode 10D-2	
D403		diode 10D-2	
D404		diode 10D-2	
D405		– discarded –	
D406		diode 10D-2	
D501		diode 10D-2	
D502		diode CD-2	
D503		diode CDR-2	
IC		integrated circuit CX-032	
		COILS & TRANSFORMERS	
L101, 201	1-407-519	micro inductor	1.8 mH
L102, 202	1-407-493	micro inductor	1.2 mH
L103, 203	1-407-494	micro inductor	1.5 mH
L104, 204	1-407-495	micro inductor	1.8 mH
L105, 205		– discarded –	
L106, 206		– discarded –	
L107, 207	1-407-286	variable inductor	2.2 mH
L108, 208	1-407-211	micro inductor	27 mH
L109, 209	1-407-284	variable inductor	1 mH
L110, 210	1-407-284	variable inductor	1 mH
L301	1-407-198	micro inductor	2.2 mH
L302	1-407-198	micro inductor	2.2 mH
T101, 201	1-427-299	transformer, output	
T301	1-441-743	transformer, power (General Export)	
	1-441-708	transformer, power (USA)	
T302	1-433-140	transformer, bias osc	

CAPACITORS

All capacitors are rated in microfarads unless otherwise indicated. (P = μμF)

C101, 201	1-121-398	10	25 V	electrolytic
C102, 202	1-121-398	10	25 V	electrolytic
C103, 203	1-121-391	1	50 V	electrolytic
C104, 204	1-106-085-12	0.001	50 V	mylar
C105, 205	1-121-413	100	6.3 V	electrolytic
C106, 206	1-107-125	56 P	50 V	silvered mica
C107, 207	1-121-409	47	16 V	electrolytic
C108, 208	1-121-398	10	25 V	electrolytic
C109, 209	1-106-114-12	0.22	50 V	mylar
C110, 210	1-127-366	10	6.3 V	electrolytic, alox
C111, 211	1-106-045-12	0.068	50 V	mylar
C112, 212	1-106-085-12	0.001	50 V	mylar
C113, 213	1-121-420	220	10 V	electrolytic
C114, 214	1-121-398	10	25 V	electrolytic
C115, 215	1-127-355	0.47	16 V	electrolytic, alox
C116, 216	1-121-398	10	25 V	electrolytic
C117, 217	1-121-398	10	25 V	electrolytic
C118, 218				
C119, 219	1-106-039-12	0.039	50 V	mylar
C120, 220	1-106-045-12	0.068	50 V	mylar
C121, 221	1-106-106-12	0.1	50 V	mylar
C122, 222	1-106-033-12	0.022	50 V	mylar
C123, 223	1-106-037-12	0.033	50 V	mylar
C124, 224	1-106-098-12	0.047	50 V	mylar
C125, 225	1-107-016	470 P	500 V	silvered mica
C126, 226	1-121-416	100	25 V	electrolytic
C127, 227				
C128, 228	1-121-409	47	16 V	electrolytic
C129, 229	1-121-402	33	10 V	electrolytic
C130, 230	1-107-125	56 P	50 V	silvered mica
C131, 231	1-121-415	100	16 V	electrolytic
C132, 232	1-121-398	10	25 V	electrolytic
C133, 233	1-106-035-12	0.027	50 V	mylar
C134, 234	1-106-102-12	0.068	50 V	mylar
C135, 235	1-106-074-12	0.0047	50 V	mylar
C136, 236	1-107-125	56 P	50 V	silvered mica
C137, 237	1-106-058-12	0.001	50 V	mylar
C138, 238	1-121-398	10	25 V	electrolytic
C139, 239	1-121-391	1	50 V	electrolytic
C140, 240	1-107-125	56 P	50 V	silvered mica
C141, 241	1-121-413	100	6.3 V	electrolytic
C142, 242	1-121-398	10	25 V	electrolytic

Ref. No.	Part No.	Description		
C143, 243	1-121-398	10	25V	electrolytic
C144, 244	1-121-391	1	50V	electrolytic
C145, 245	1-141-069	120P		trimmer
C146, 246	1-107-135	150P	50V	silvered mica
C147, 247	1-107-135	150P	50V	silvered mica
C148, 248	1-107-123	47P	50V	silvered mica
C301	1-106-001-12	0.001	50V	silvered mica
C302	1-107-232	390P	50V	silvered mica
C303	1-141-010	30P ~ 200P		trimmer
C304	1-107-144	100P	1,000V	silvered mica
C305	1-107-254	270P	1,000V	silvered mica
C306	1-106-094-12	0.033	50V	mylar
C307	1-106-080-12	0.0082	50V	mylar
C308	1-121-398	10	25V	electrolytic
C309	1-106-159-12	0.068	50V	mylar
C310	1-106-151-12	0.033	50V	mylar
C311	1-121-388	1,000	35V	electrolytic
C312	1-121-738	10	50V	electrolytic
C313	1-121-810	470	50V	electrolytic
C314				
C315				
C404	1-121-361	470	35V	electrolytic
C405	1-121-391	1	50V	electrolytic
C406	1-117-036	1.5 + 0.5	250V	metalized paper
C407	1-121-361	470	35V	electrolytic
C501	1-106-090-12	0.022	50V	mylar
C502	1-108-550	0.082	50V	mylar
C503	1-106-058-12	0.001	50V	mylar
C504	1-121-398	10	25V	electrolytic
C505	1-121-398	10	25V	electrolytic
C506	1-121-416	100	25V	electrolytic
C507	1-127-304	3.3	16V	electrolytic, alox
C508	1-121-409	47	16V	electrolytic
C509	1-127-307	10	16V	electrolytic, alox
C510	1-106-082-12	0.01	50V	mylar
C511	1-121-900	4.7	250V	electrolytic

RESISTORS

All resistors are ¼W carton type, unless otherwise indicated.

Ref. No.	Part No.		
R101, 201	1-244-667	560Ω	(USA)
R102, 202	1-242-701-09	15kΩ	
R103, 203	1-242-717-09	68kΩ	
R104, 204	1-242-687	3.9kΩ	
R105, 205	1-242-713-09	47kΩ	
R106, 206	1-242-715	56kΩ	
R107, 207	1-242-657	220Ω	
R108, 208	1-242-717	68kΩ	
R109, 209	1-242-663	390Ω	
R110, 210	1-242-677	1.5kΩ	
R111, 211	1-242-705	22kΩ	
R112, 212	1-242-673	1kΩ	
R113, 213	1-242-717	68kΩ	
R114, 214	1-242-709-09	33kΩ	
R115, 215	1-242-719-09	82kΩ	
R116, 216	1-242-719-09	82kΩ	
R117, 217	1-242-689	4.7kΩ	
R118, 218	1-242-683	2.7kΩ	
R119, 219	1-242-687	3.9kΩ	
R120, 220	1-242-715	56kΩ	
R121, 221	1-242-669	680Ω	
R122, 222	1-242-677	1.5kΩ	
R123, 223	1-242-683	2.7kΩ	
R124, 224	1-242-693	6.8kΩ	
R125, 225	1-221-401	10kΩ (B)	semifixed
R126, 226	1-242-699	12kΩ	
R127, 227	1-242-713	47kΩ	
R128, 228	1-242-671	820Ω	
R129, 229	1-242-679	1.8kΩ	
R130, 230	1-242-635	27Ω	
R131, 231	1-242-643	56Ω	
R132, 232	1-242-685-09	3.3kΩ	
R133, 233	1-242-729	220kΩ	
R134, 234	1-242-731	270kΩ	
R135, 235	1-242-671	820Ω	
R136, 236	1-242-685-09	3.3kΩ	(low noise)
R137, 237	1-242-647	82Ω	
R138, 238	1-244-665	470Ω	
R139, 239	1-242-681	2.2kΩ	
R140, 240	1-242-681	2.2kΩ	
R141, 241	1-221-748	5kΩ (B)	semifixed
R142, 242	1-242-683	2.7kΩ	
R143, 243	1-242-681	2.2kΩ	
R144, 244	1-221-748	5kΩ (B)	semifixed
R145, 245	1-242-719	82kΩ	
R146, 246	1-242-695	8.2kΩ	
R147, 247	1-242-695	8.2kΩ	
R148, 248	1-242-701	15kΩ	
R149, 249	1-242-695	8.2kΩ	
R150, 250	1-242-701	15kΩ	
R151, 251	1-242-725-09	150kΩ	(low noise)
R152, 252	1-242-675	1.2kΩ	
R153, 253	1-242-707	27kΩ	
R154, 254	1-242-706	24kΩ	
R155, 255	1-242-679	1.8kΩ	
R156, 256	1-248-739	560kΩ	
R157, 257	1-242-661	330Ω	
R158, 258	1-242-725	150kΩ	
R159, 259	1-242-717	68kΩ	
R160, 260	1-242-709	33kΩ	
R161, 261	1-242-679	1.8kΩ	
R162, 262	1-242-685	3.3kΩ	
R163, 263	1-221-748	5kΩ (B)	semifixed
R164, 264	1-242-721	100kΩ	
R165, 265	1-222-305	100kΩ (A)	(AUX VOL)
R166, 266	1-222-479	20kΩ (C)	(MIC VOL)
R167, 267	1-222-253	20kΩ (A)	(SOS/ECHO)
R168, 268		– discarded	
R169, 269	1-242-695	8.2kΩ	(General Export)
R170, 270	1-244-687	3.9kΩ	(General Export)
R301	1-242-617	4.7Ω	

Ref. No.	Part No.	Description		
R302	1-242-617	4.7Ω		
R303	1-242-711	39kΩ		
R304	1-242-625	10Ω		
R305	1-242-625	10Ω		
R306	1-257-853	150Ω	½W	
R307	1-257-841	47Ω	½W	
R308	1-221-315	100kΩ (B)		semifixed
R309	1-242-719	82kΩ		
R310	1-242-697	10kΩ		
R311	1-242-709	33kΩ		
R312	1-257-825	10Ω	½W	
R401		———		
R402	1-242-681	2.2kΩ		
R403	1-242-673	1kΩ		
R404	1-242-697	10kΩ		
R405	1-258-041	47Ω	1W	
R406	1-206-122	47Ω	2W	metal oxide film
R501	1-221-401	10kΩ (B)		semifixed
R502	1-242-712	43kΩ		
R503	1-221-952	20kΩ (B)		semifixed
R504	1-242-719	82kΩ		
R505	1-221-953	50kΩ (B)		semifixed
R506	1-242-726	160kΩ		
R507	1-242-709	33kΩ		
R508	1-242-699	12kΩ		
R509	1-242-687	3.9kΩ		
R510	1-242-625	10Ω		
R511	1-257-867	560Ω	½W	
R512	1-242-701	15kΩ		
R513	1-242-691	5.6kΩ		
R514	1-242-693	6.8kΩ		
R515	1-242-681	2.2kΩ		
R516	1-242-705	22kΩ		
R517	1-242-681	1.5kΩ		
R518		———		
R519	1-242-705	22kΩ		
R520	1-244-801	1Ω	½W	
R521		———		
R522	1-206-153	470Ω	3W	metal oxide film
R523	1-242-667	560Ω		

SWITCHES

S101, 201	1-514-634	slide, equalizer
S102, 202	1-514-768	slide, TAPE SELECT
S103, 203	1-514-836	slide, MONITOR
S104, 204	1-514-453	slide, rec/pb
S105, 205	1-514-713	leaf, muting
S106, 206	1-514-835	slide, SOS/ECHO
S107, 207	1-514-039	micro, bias (2) (3)
S301	1-514-634	slide, equalizer
S302	1-514-881	micro, erase head selector
S303	1-514-057	micro, bias (1)
S304	1-513-345-41	seesaw, POWER
S305	1-514-057	micro, bias (4)
S401	1-514-057	micro, motor
S402	1-154-057	micro, motor direction selector
S403	1-514-057	micro, motor direction selector
S404	1-514-057	micro, servo on/off
S405	1-514-730	micro, auto shut-off switch
S501	1-514-633	slide, TAPE SPEED

Note: 1-514-057 is to be suffixed with -01 in the USA Model.

JACKS

J101, 201	1-507-251	miniature, MIC
J301	1-507-282	binaural, HEADPHONE
CNJ101, 201	1-507-163	phono, AUX IN
CNJ102, 202	1-507-163	phono, LINE OUT

ENCAPSULATED COMPONENTS C-R

CP401	1-231-057	0.033μF + 120Ω	500V
CP402	1-101-534	0.1μF + 120Ω	500V
CP403	1-231-057	0.033μF + 120Ω	500V
CP404	1-231-057	0.033μF + 120Ω	500V
CP405	1-231-057	0.033μF + 120Ω	500V
CP406	1-231-057	0.033μF + 120Ω	500V
CP407	1-101-534	0.1μF + 120Ω	500V

MISCELLANEOUS

PM401	1-454-072	solenoid (small)
PM402	1-454-073	solenoid (large)
PL101, 201	1-518-093-21	lamp
PL301	1-518-093-21	lamp
PL302	1-518-093-21	lamp
ME101, 201	1-524-071	meter, level
	1-534-551-22	cord, power (General Export)
	1-534-526-21	cord, power (USA)
	1-535-045	terminal, amplifier
	1-535-506	connector, wire
	1-536-179	terminal strip; 1L1 (C type)
	1-536-180	terminal strip; 1L2 (C type)
	8-824-629-20	head, record (RP102-2902)
	8-826-629-25	head, erase (EF18-2902A1)
	8-829-142-20	head, playback (PP102-4202)
M	8-832-624-21	motor, (IC-624G)
CNJ301	1-509-359	connector, rec/pb (General Export)
F	1-532-135	fuse (General Export)
	1-532-262	fuse (CANADA)
	1-533-007	holder, fuse (General Export)
VS	1-509-427	selector, voltage (General Export)

6-2. HARDWARES

Part No.	Description
	SCREWS
7-621-255-24	⊕ P 2 x 4
7-621-259-36	⊕ P 2.6 x 5
7-621-259-55	⊕ P 2.6 x 8
7-621-281-15	⊕ P 2 x 2
7-621-455-25	⊕ T 2 x 4
7-621-712-51	⊖ SC 2.6 x 6
7-621-712-52	⊖ SC 2.6 x 6
7-621-712-61	⊖ SC 2.6 x 8
7-621-712-62	⊖ SC 2.6 x 8
7-621-771-31	⊕ B 2.6 x 4
7-682-126-01	⊕ P 2 x 6
7-682-149-01	⊕ P 3 x 10
7-682-151-01	⊕ P 3 x 14
7-682-153-01	⊕ P 3 x 20
7-682-155-14	⊕ P 3 x 30
7-682-550-13	⊕ B 3 x 12
7-682-633-01	⊕ B 2.5 x 4
7-682-646-01	⊕ PS 3 x 5
7-685-144-31	⊕ P 3 x 5, tapping (FTS)
7-685-144-51	⊕ P 3 x 5, tapping (FTS)
7-685-145-31	⊕ P 3 x 6
7-685-559-31	⊕ B 4 x 8, tapping (FTS)
	NUTS
7-622-108-02	3φ
7-622-408-11	3φ, speed
7-684-014-01	4φ (middle)

Part No.	Description
	WASHERS
7-623-105-02	2φ (middle)
7-623-105-12	2φ
7-623-107-02	2.6φ (small)
7-623-107-12	2.6φ (small)
7-623-108-02	3φ (small)
7-623-108-12	3φ (middle)
7-623-110-02	4φ
	SPRING WASHERS
7-623-205-26	2φ
7-623-207-22	2.6φ
7-623-208-22	3φ
7-623-208-27	3φ
	LUG PLATES
7-623-507-11	2.6φ
7-623-510-11	4φ
	GROUNDING LUG
7-623-508-01	3φ
	RETAINING RINGS
7-624-104-01	E-2
7-624-106-01	E-3
7-624-108-01	E-4

Sony Corporation

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