

SERVICE MANUAL

**AKAI CASSETTE
TAPE RECORDER**

MODEL CS-50

ALSO APPLICABLE TO MODEL **CS-50D**

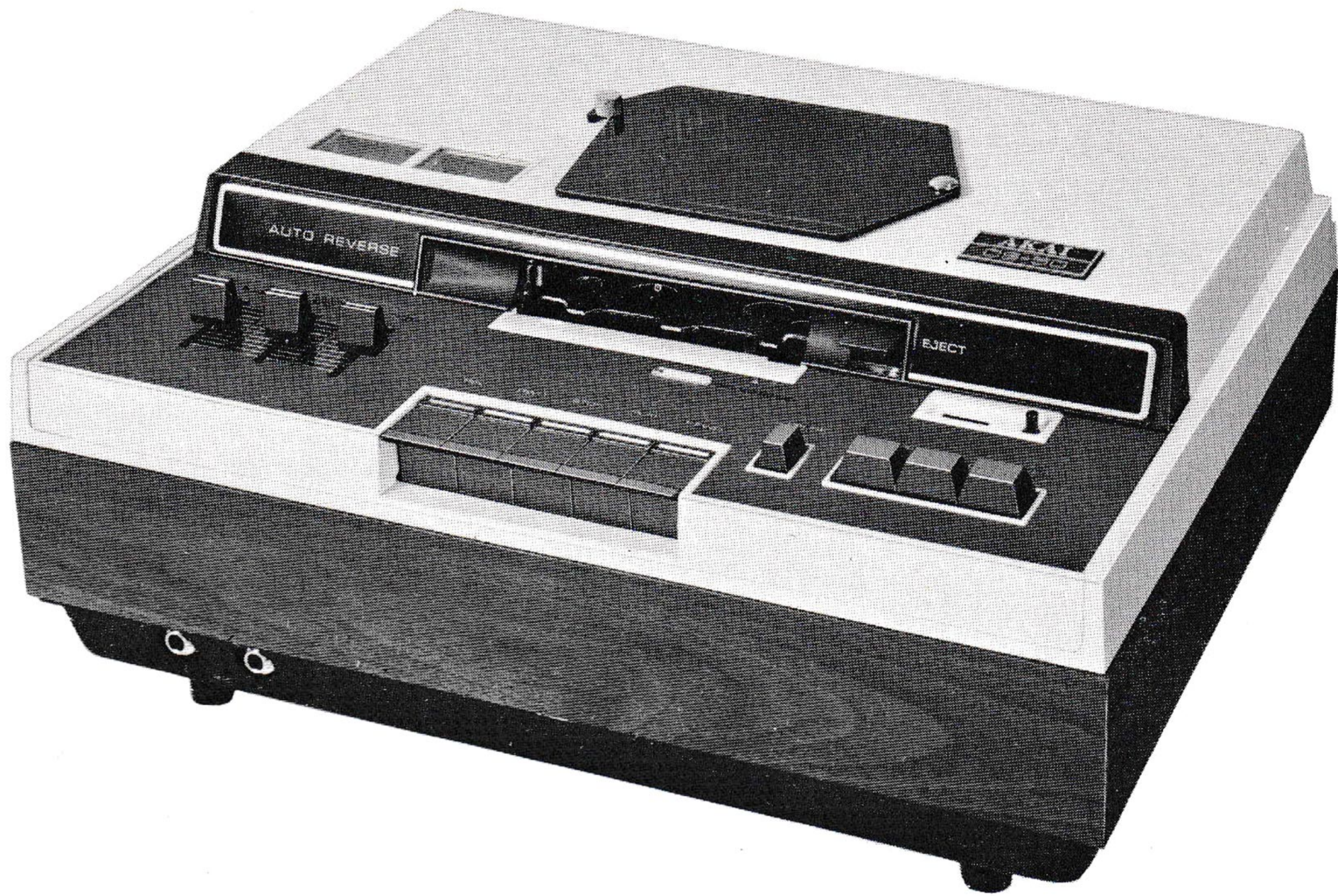


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When placing order for parts, please use separate
PARTS LIST or **PRICE LIST FOR PARTS**.

I. SPECIFICATIONS

WEIGHT	: 8.9 Kg (19.6 lbs.)	TRANSISTORS	
DIMENSIONS	: 15" (W) × 6-1/4" (H) × 11-1/4" (D) (375 × 160 × 287 mm)	USED	: 19 silicon transistors
POWER			2 2SC711 (B) (D)
CONSUMPTION	: 60 W		5 2SC968 (3) (4)
POWER SUPPLY	: AC 100 V to 240 V; 50/60 Hz.		4 2SC458 (C) (D)
RECORDING			4 2SC711 (E) (D)
SYSTEM	: In-Line 4-track stereo AC Bias System	IC USED	: 2 AA-072 or EHD-AA072D
PLAYBACK		SILICON DIODES	
SYSTEM	: In-Line 4-track stereo playback system	USED	: 5 IN34A
TAPE SPEED	: 1-7/8 ips		2 10D1
TAPE SPEED			1 10DC-1 (C BLK)
DEVIATION	: ±3 %		1 10DC-1 (C RED)
WOW AND		RECORDING	
FLUTTER	: Less than 0.27 % RMS	CAPACITY	: 2 hrs. stereo recording using a C-120 cassette tape
FREQUENCY		MONITOR	
RESPONSE	: 40 to 15,000 Hz (±4 dB)	SYSTEM	: Stereo Headphones (impedance 8 Ω)
SIGNAL TO		FAST FORWARD	
NOISE RATIO	: Better than 43 dB (37 dB when inverting)	AND REWIND	
DISTORTION	: Within 3 % at 1,000 Hz "O" VU	TIME	: 75 seconds using a C-60 (300 ft.) cassette tape
CROSS-TALK	: Less than -25 dB	RECORDING	
ERASE RATIO	: Less than -70 dB	LEVEL	
INSULATION		INDICATOR	: 2 VU Meters
RESISTANCE	: More than 50 MΩ (DC 500 V)		
INSULATION			
DURABILITY	: 1,000 V AC for more than one minute duration		
OUTPUT			
LINE OUTPUT	: 1.23 V (0 VU) ±2 dB using 333 Hz 0 VU recorded tape (Required load impedance more than 10 KΩ)		
DIN OUTPUT	: 0.4 V (required load impedance more than 10 KΩ)		
MAIN OUTPUT	: More than 4 W (Impedance 8 Ω)		
INPUT			
LINE INPUT	: 25 mV (Impedance 220 KΩ)		
DIN INPUT	: 3 mV (Impedance 25 KΩ)		
MIC INPUT	: 0.1 mV (Impedance 4.7 KΩ)		
MOTOR	: 4-pole Outer-rotor synchronous motor Voltage: 65 V (100 V while inverting) Revolutions: 1500 at 50 Hz 1800 at 60 Hz Condenser Capacity: 7 μF at 50 Hz 6 μF at 60 Hz		
RECORD/PLAY-			
BACK HEAD	: In-Line 4-track stereo Gap: 1/1000 mm Impedance: 1100 Ω ±15 % at 1 kHz		
ERASE HEAD	: In-Line 4-track stereo Gap: 0.1 mm Impedance: 730 Ω ±10 % at 100 kHz		
OSCILLATION			
FREQUENCY	: 100 kHz ±10 kHz		

II. MEASURING METHOD

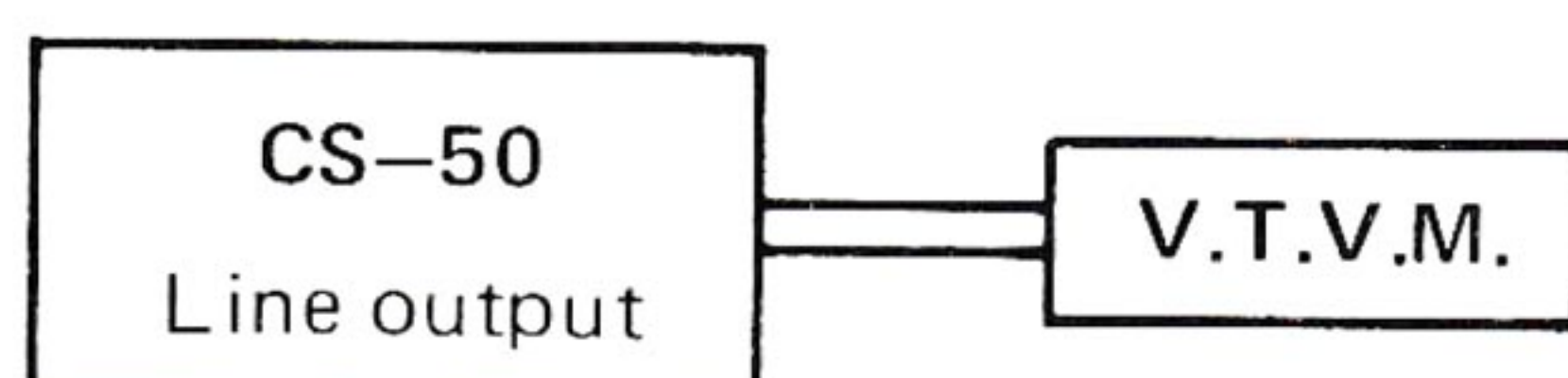
TAPE SPEED DEVIATION

1. Method involving use of pre-recorded tape.
Playback a tape pre-recorded at 1,000 Hz ($\pm 0.1\%$) on recorder to be tested.
Connect the appropriate output to a frequency counter meter in order to measure the tape speed deviation.

WOW AND FLUTTER

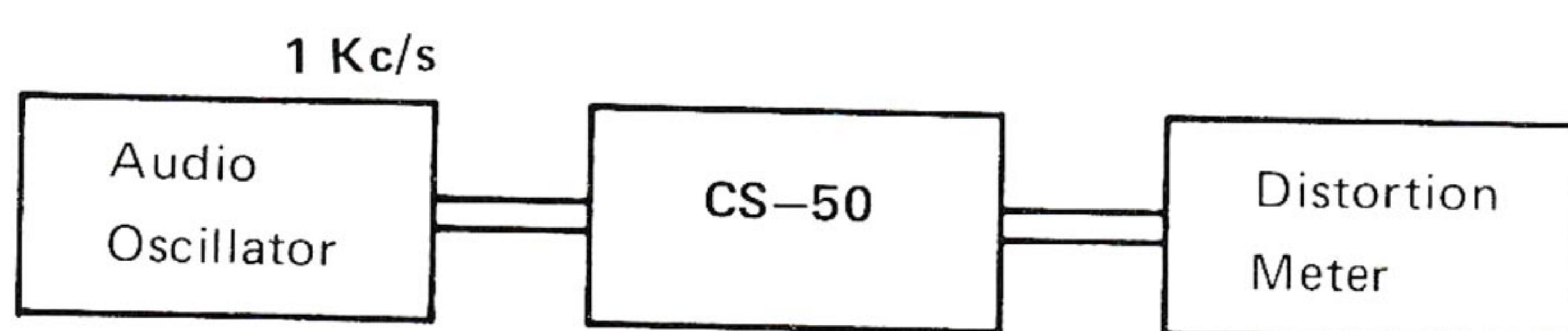
Playback a 3,000 Hz pre-recorded tape of which the wow and flutter is guaranteed to be smaller than 0.07% for measurement by means of a wow meter. It is also possible for a 3,000 Hz sine wave to be recorded and played back for measurement by means of the wow meter. In this case, however, the wow meter indicates a value as much as twice that given in the specifications.

SIGNAL TO NOISE RATIO



Playback a tape containing a 333 Hz sine wave recorded at "0" VU level on a standard recorder. Connect a V.T.V.M. to the line output jack of the recorder and measure its output. Then remove the tape and measure the noise level under the same condition. Convert each of the measured values into decibels.

TOTAL HARMONIC DISTORTION FACTOR



Connect the measuring instrument as shown above and record a 1,000 Hz sine wave at "0" VU. Playback the resultant signal and measure the overall distortion factor. Measure the noise level of the tape recorder with the tape removed; connect the audio oscillator directly to the distortion meter for measurement of the distortion factor of the oscillator.

The required distortion factor can be obtained from the results of the above measurement by the following formula:

$$d_0 = d - d_1 - d_2$$

where,

- d_0 = Required
- d = Overall distortion factor
- d_1 = Noise level
- d_2 = Distortion factor of the oscillator

Note:

(New tape of particularly good quality should be used for measurement of the distortion factor. FUJI C-60 LN tape is recommended).

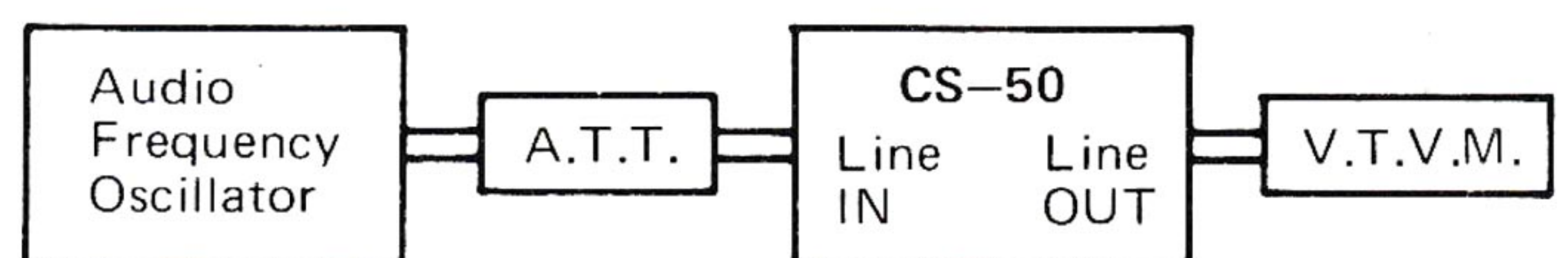
POWER OUTPUT

Playback a tape containing a sine wave of 333 Hz recorded at "0" VU on a standard recorder. Measure the voltage at the output of the recorder to be tested, then use the following formula:

$$P = \frac{E^2}{R}$$

P = Desired output (W)
E = Measured voltage (RMS)
R = 8Ω

FREQUENCY RESPONSE



Connect the measuring instrument as in the above diagram, and measure the frequency response in the following sequence: (Use a FUJI C-60 LN tape)
RECORD:

- 1) Introduce a sine wave of 1,000 Hz to the Line Input of the recorder to be tested, through an attenuator from an audio frequency generator.
- 2) Set machine to Record position and adjust the line input volume so that the VU meter needle indicates "0" VU.
- 3) Under the conditions described in (2), lower the input level 20 dB by means of the attenuator.
- 4) Record the spot frequency in the range of 40 Hz to 16,000 Hz from the audio frequency generator.

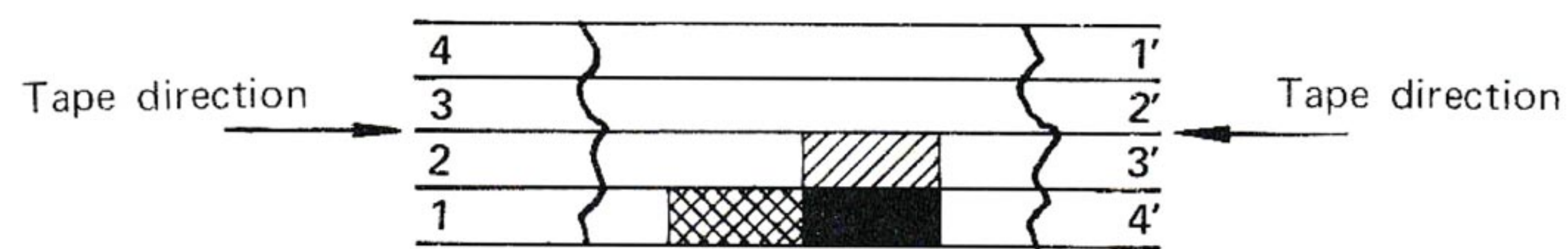
PLAYBACK:

- 5) Connect a V.T.V.M. to the Line Output.
- 6) Playback the tape previously recorded.
- 7) Adjust the output level to "0" dBm at 1,000 Hz as indicated on the range selector of the V.T.V.M.
- 8) Playback the recorded spot frequencies under the conditions in (7); make a memo of the output level and plot the value on a graph.

Note:

Frequency Response is adjusted by the Bias Voltage (VR-201, VR-202 semi-fixed resistors).

CROSS TALK (Cross talk between tracks)

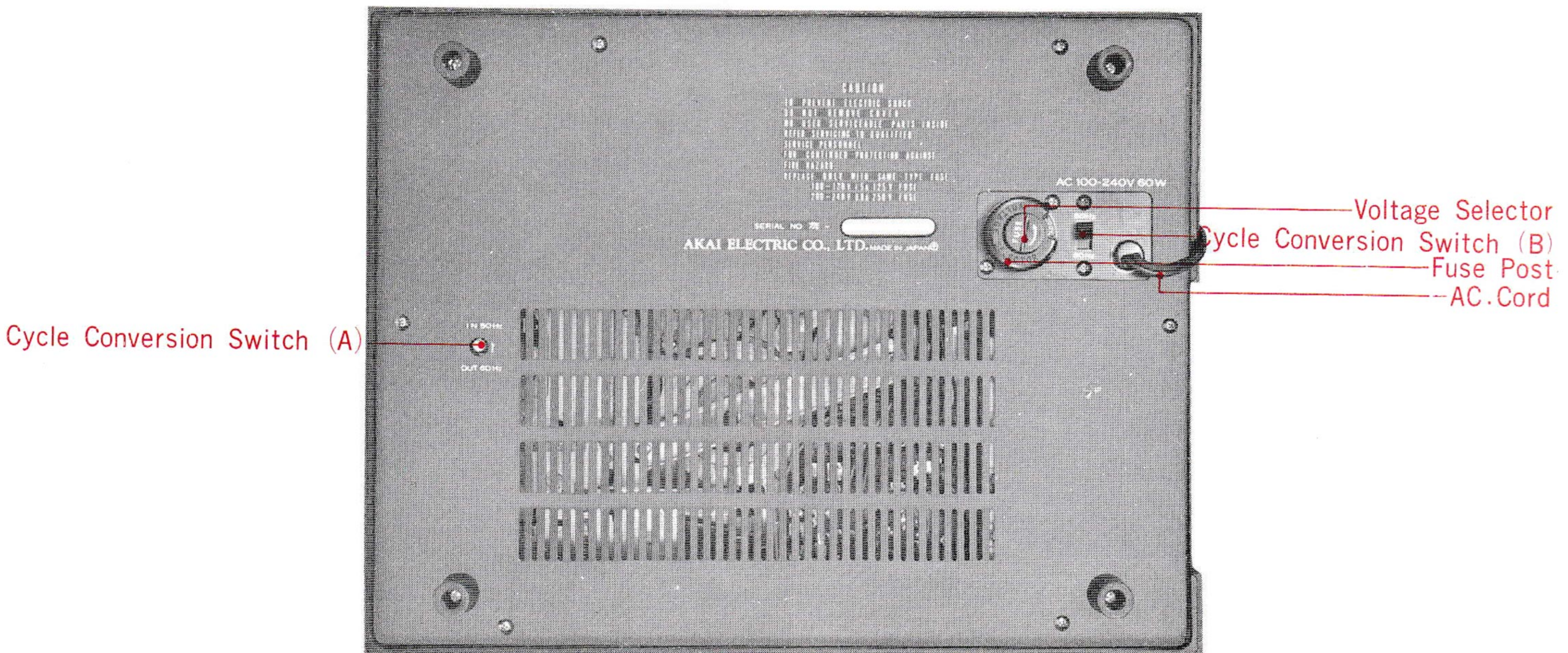
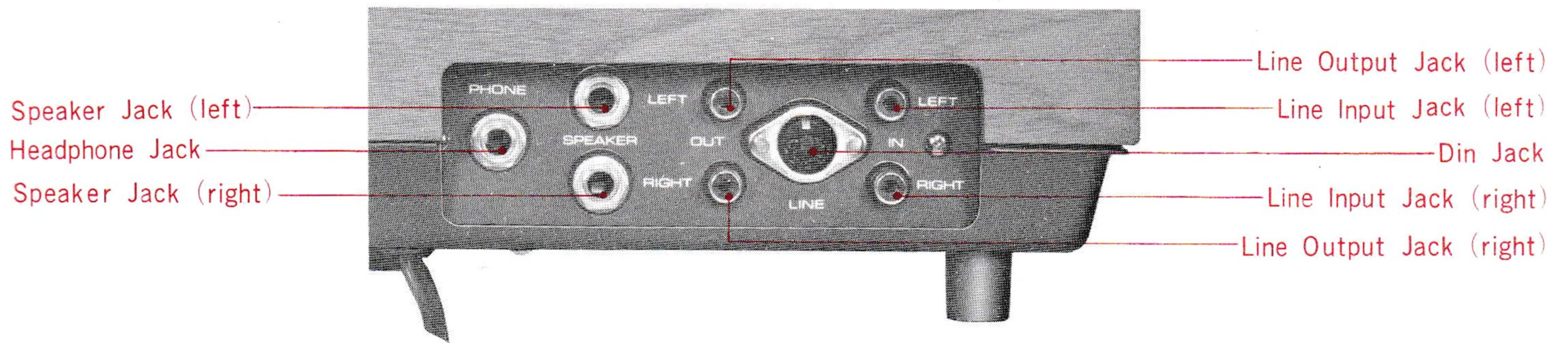
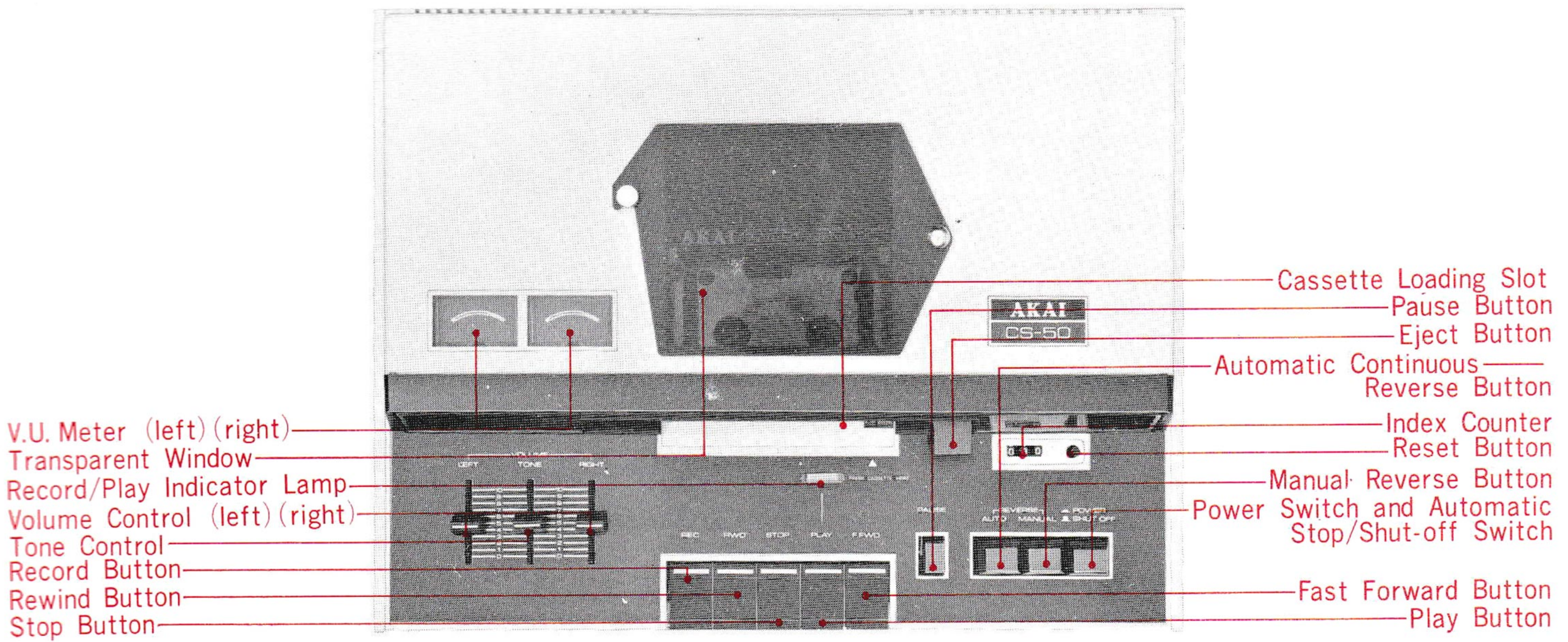


As shown in the figure, first record a 1,000 Hz sine wave on track No. 1' at +3 VU level. Next, remove the 1,000 Hz input signal and record under a non-input condition. Then, playback the tape on tracks No. 1 and 2 through the 1,000 Hz B.P.F. (Band Pass Filter, Sensitivity...1:1) and obtain a ratio between the two from the following formula:

$$C = 20 \log \frac{E_0}{E_2 - E_1}$$

- C = Desired crosstalk ratio (dB)
- E_0 = 1,000 Hz signal output level
- E_2 = 1,000 Hz crosstalk output level
- E_1 = Non-input signal record level

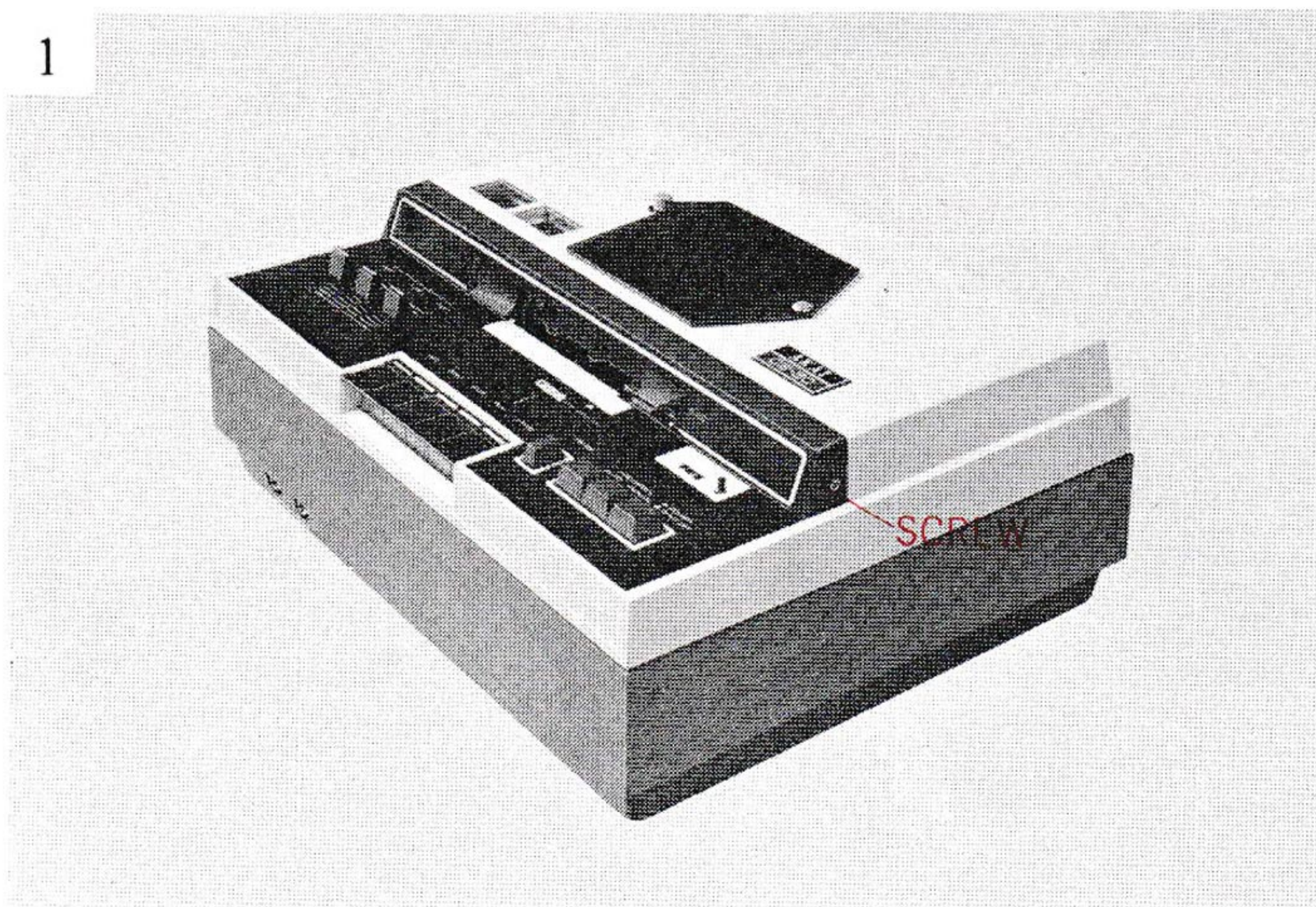
III. CONTROL LOCATIONS



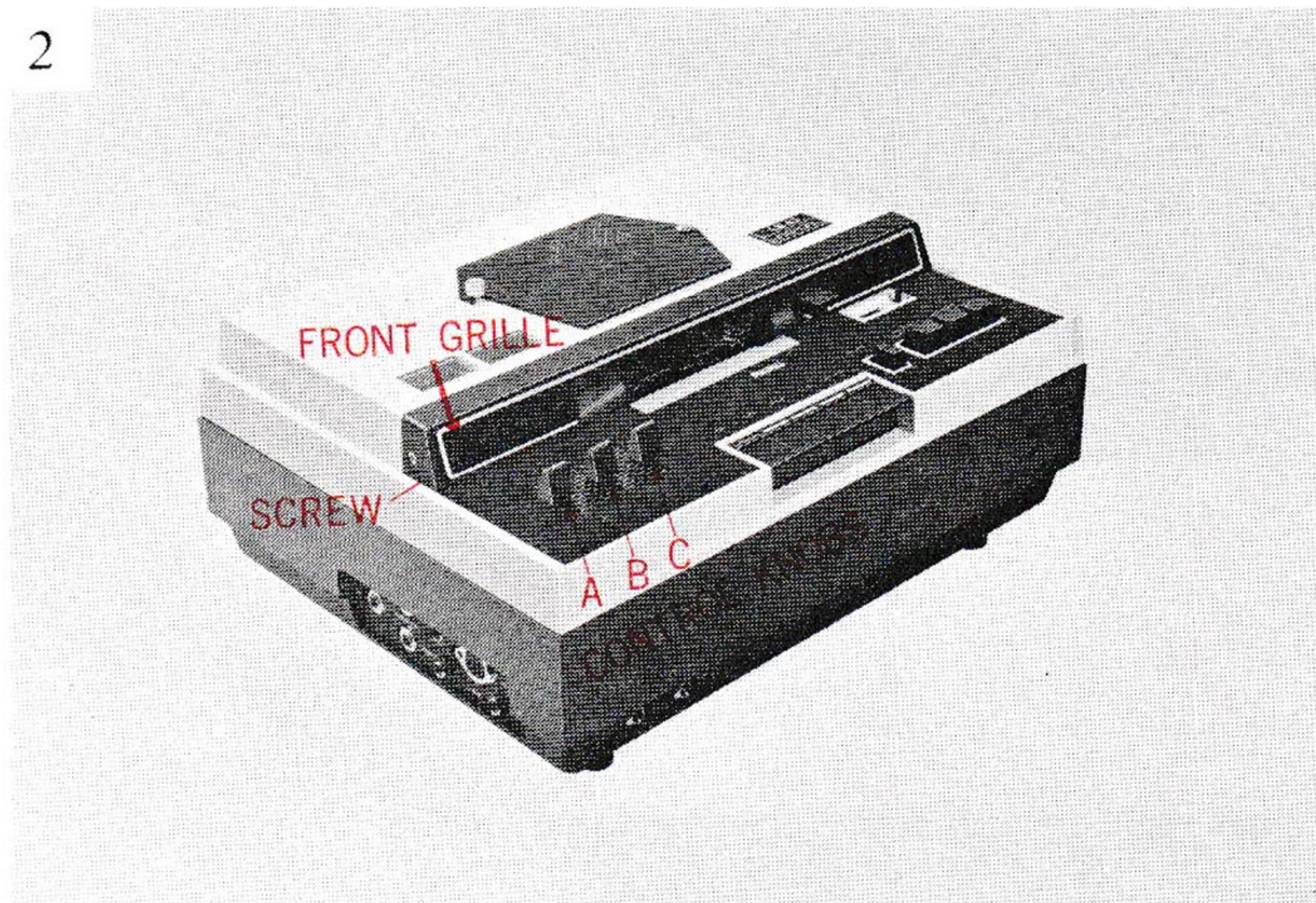
IV. DISASSEMBLY OF TAPE TRANSPORT UNITS AND AMPLIFIERS

In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reassemble in reverse order.

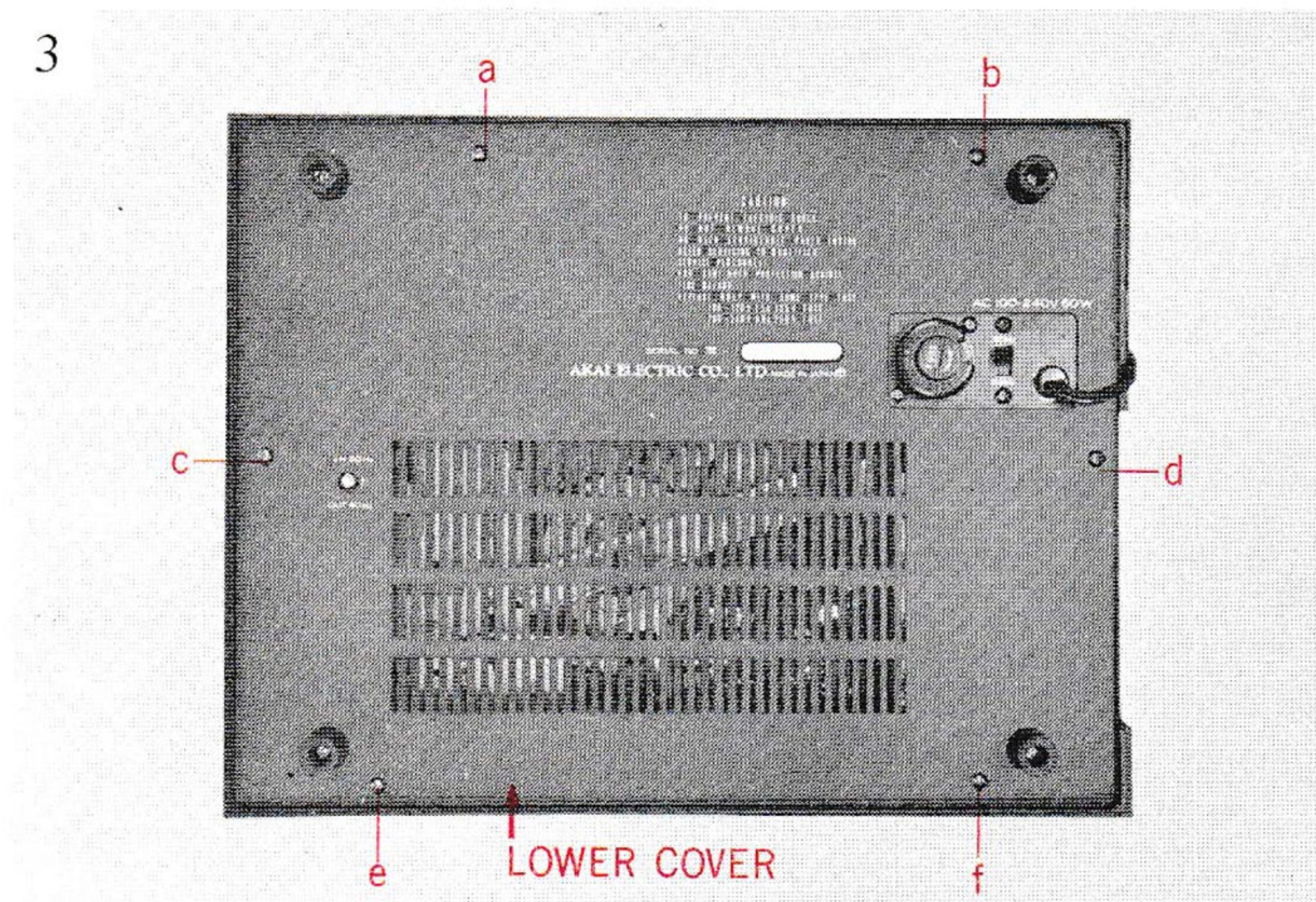
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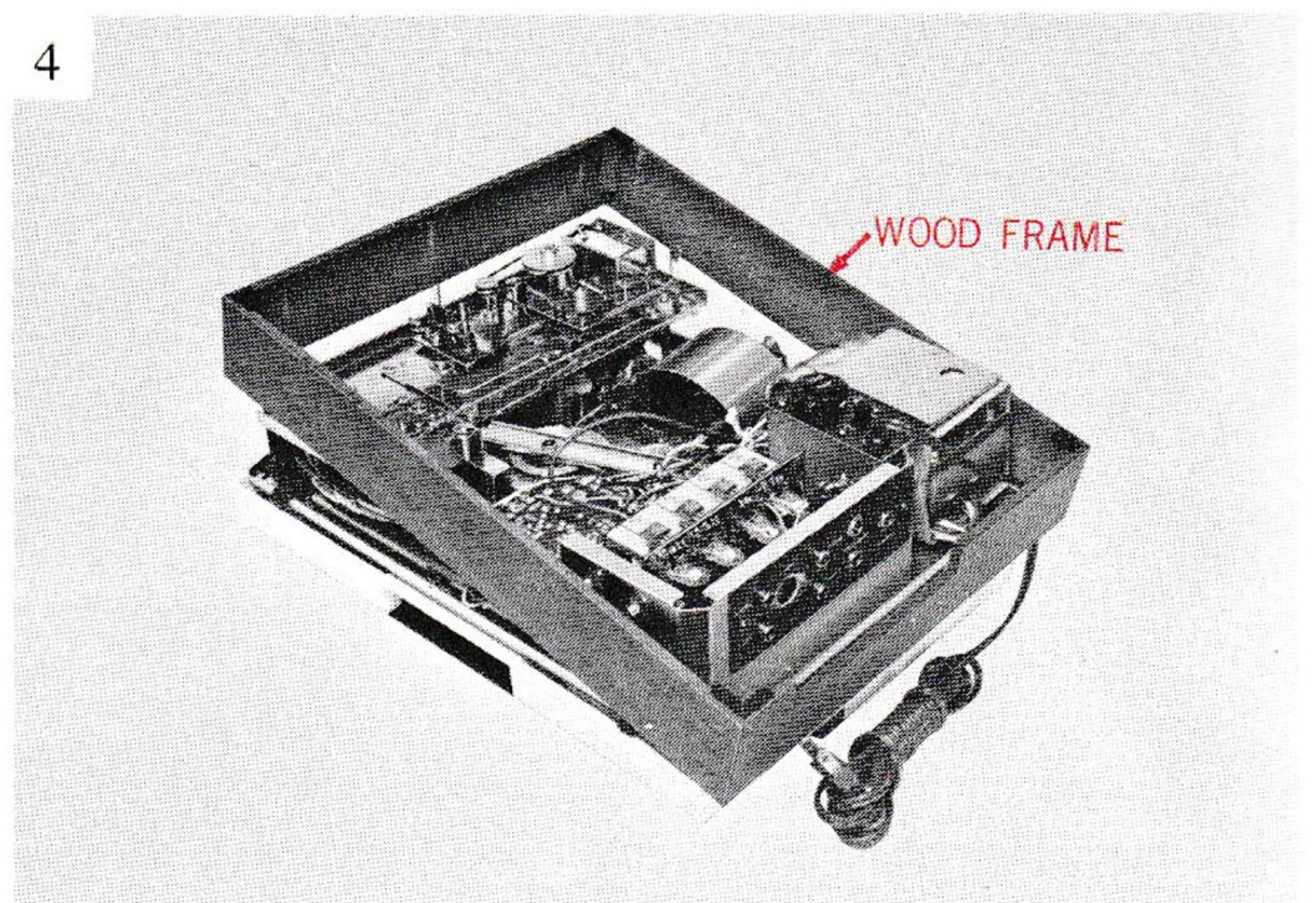
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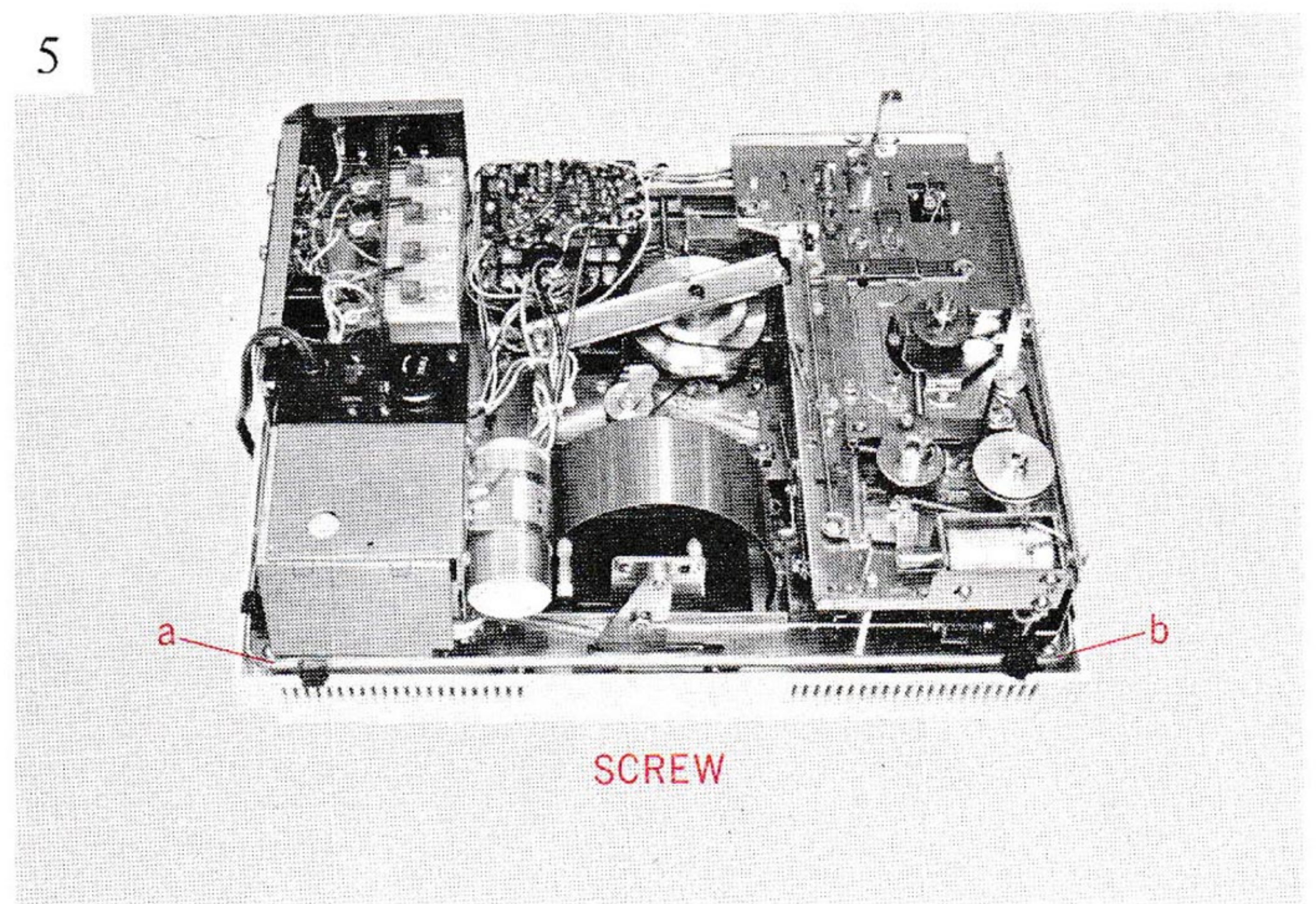
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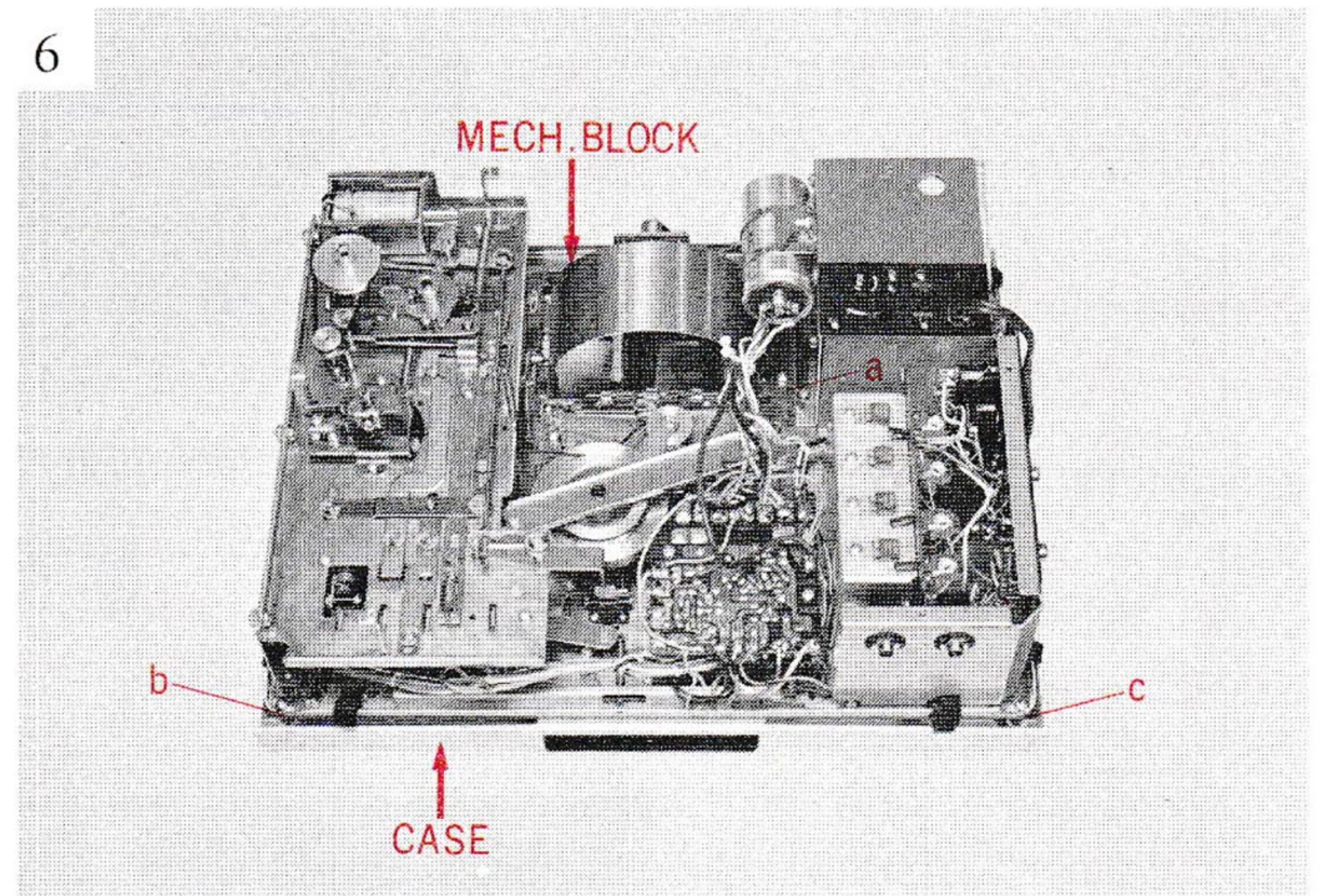
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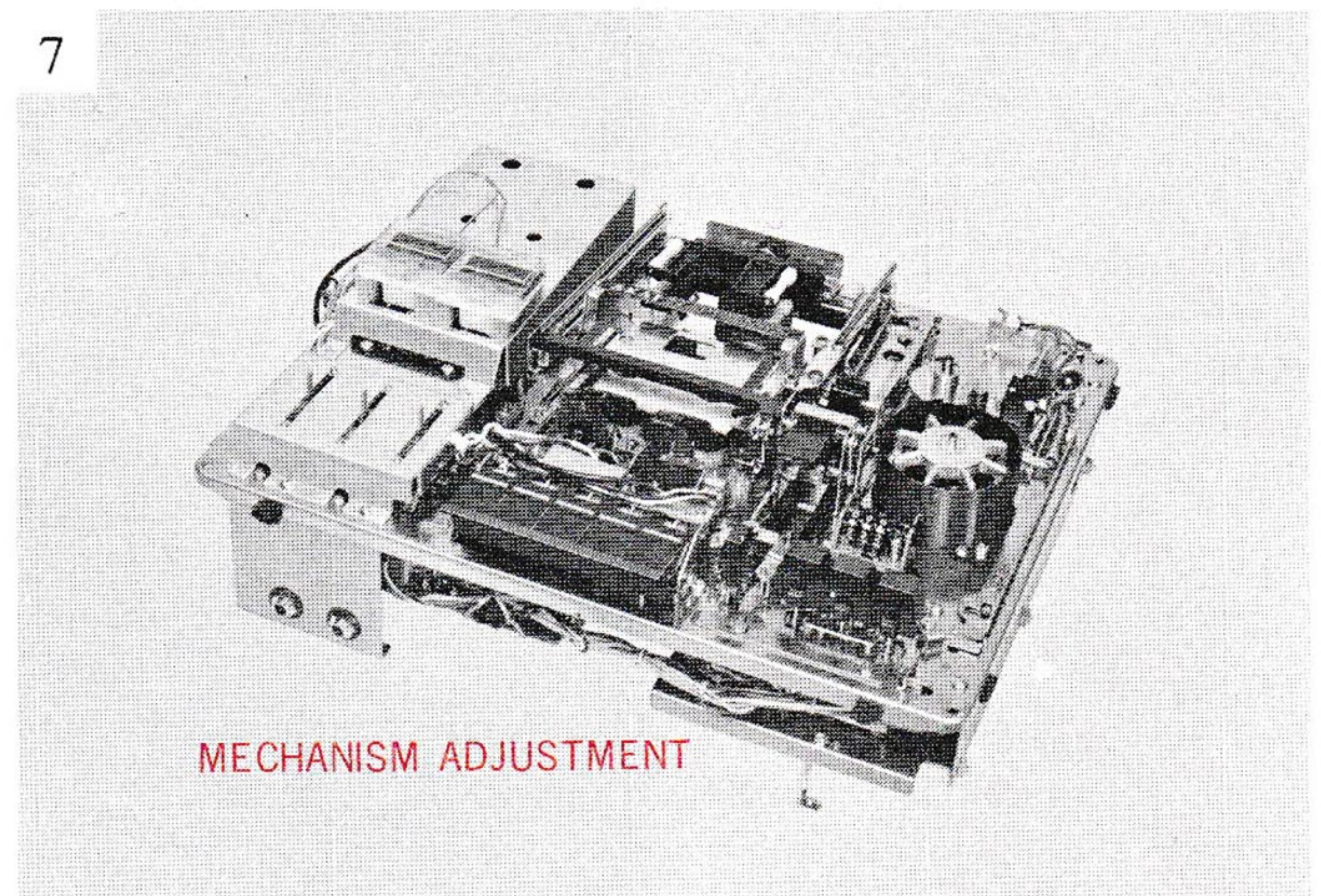
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6



7



V. TROUBLE SHOOTING CHART

SECTION "A" TROUBLE WITH AMPLIFIER

1. Playback Problems

Symptom	Trouble
<p>No sound from Line-Out (No B+ voltage supply)</p> <p>(B+ voltage supply)</p>	<p>1. Silicon diode D301 or D302 defective</p> <p>2. R408 (470) or R413 (100) defective</p> <p>3. R302 (1 K 1 W) defective (Deck only)</p> <p>1. Checks transistors TR-101, 102, and 103</p> <p>2. Check IC 101 (AA072 or EHD-AA072D)</p> <p>3. Playback Head open circuit or head lead wire loose</p>
<p>No sound from speaker (No B+ voltage supply)</p> <p>(B+ voltage supply)</p>	<p>1. Silicon diode D301 or D302 defective</p> <p>1. Check transistors TR-401, 402, 403, and 404</p> <p>2. Check Transformer T-401</p>
<p>Sound, but volume insufficient (B+ voltage low)</p> <p>(B+ voltage normal)</p>	<p>1. Silicon diode D301, or 302 defective</p> <p>2. R302 (1 K 1 W) defective (Deck only)</p> <p>3. C303 (1000/25) defective (Deck only)</p> <p>1. Check for dirty head</p> <p>2. Check Transistors TR-101, 102, and 103</p> <p>3. Check IC-101</p>
<p>Loud hum noise (Hum is decreased if playback head is grounded)</p> <p>(No change even when playback head is grounded)</p> <p>(Inductive pick-up)</p>	<p>1. Playback Head shield insulation defective (Replace).</p> <p>1. Adjust hum backing coil (induction coil 220 μH)</p> <p>2. Pilot lamp power source (5.5 V AC) terminal polarity switched (left and right)</p> <p>3. Ground spring floating (adjust panel and main volume holding screws) (located near main volume)</p> <p>4. C301, C409, or C402 defective</p> <p>1. Ground the recorder</p> <p>2. Change the set position of recorder</p>
<p>Reverberating-like noise from speaker when stop key is firmly depressed</p>	<p>1. Hum backing coil is touching stop lever. Adjust position of hum backing coil.</p>
<p>Irregular scratching or crackling noise</p>	<p>1. Playback Head defective</p> <p>2. Transistor or IC defective</p>
<p>Squeaking noise</p>	<p>1. Dirty head surface</p> <p>2. Tape itself defective</p>
<p>Hissing Noise (Noise present when playing tape)</p> <p>(Not caused by tape)</p>	<p>1. Head is magnetized</p> <p>2. Tape itself noisy</p> <p>1. TR-101, 102, 103, 401, 402, or 403 or IC-101 defective</p>
<p>Lack of treble</p>	<p>1. Dirty head surface</p> <p>2. Head angle incorrect</p> <p>3. Head worn out</p> <p>4. Tape itself defective</p>

Symptom	Trouble
Sound distorted	<ol style="list-style-type: none"> 1. Dirty head surface 2. Defective transistor or capacitors 3. Head worn out

2. Recording Problems

Symptom	Trouble
<p>Recording Faulty (VU Meter does not indicate)</p> <p>(VU Meter indication normal)</p>	<ol style="list-style-type: none"> 1. Faulty adjustment of Micro Switch (SW 3) (No B+ voltage) 2. VU Meter coil open circuit or lead wire loose. 3. Defective input jack 4. Rec/Play Slide Switch not functioning properly <ol style="list-style-type: none"> 1. Transistor TR-204, or 205 (2SC968) defective 2. Head lead wire loose connection 3. Components of oscillator circuit or oscillator coil defective
<p>Sound distorted (VU meter functions normally, recording monitor through headphones also normal)</p> <p>(VU meter functions normally, but recording monitor through headphones abnormal)</p>	<ol style="list-style-type: none"> 1. Faulty recording bias circuit 2. Dirty head surface <ol style="list-style-type: none"> 1. Over-recording input level 2. Defective input equipment 3. VU Meter lost sensitivity
Faulty erasing	<ol style="list-style-type: none"> 1. Erase head defective 2. Dirty head surface 3. Erasing bias voltage low (Check TR-204, or 205 oscillator coil)
Erasing noise (popping noise)	<ol style="list-style-type: none"> 1. Defective recording tape 2. Transistor TR-204, or 205 defective 3. Head magnetized 4. Bias voltage out of adjustment
<p>Recording sensitivity low (VU Meter functions normally)</p> <p>(VU Meter does not indicate properly)</p>	<ol style="list-style-type: none"> 1. Dirty head surface 2. Head defective 3. Bias voltage out of adjustment 4. Transistor TR-103 defective 5. Record level (VR-102 2 KB) out of adjustment 6. Tape itself defective <ol style="list-style-type: none"> 1. Loose connection of the input jack 2. VU Meter sensitivity low 3. Rec/Play Slide Switch does not function properly.
VU Meter fluctuation when stop key is depressed at Rec Mode (volume max.) (Less than 0 VU OK)	<ol style="list-style-type: none"> 1. Rec/Play Slide Switch faulty contact (Replace).
Sound fades or drops out	<ol style="list-style-type: none"> 1. Dirty head surface 2. Head defective 3. Tape itself defective 4. Recording bias voltage out of adjustment

Symptom	Trouble
Much difference in recording levels between left and right channels	<ol style="list-style-type: none"> 1. Difference sensitivity of the line volume itself. 2. Recording level out of adjustment
Meter indication at Rec mode under no-signal input condition (volume max.) (needle jumps)	<ol style="list-style-type: none"> 1. Polarity of erase head switched (+ and -) 2. Erase Head defective 3. Check pre-amp card (CS-5028)
Main Volume (VR-3) Scratching noise	<ol style="list-style-type: none"> 1. Volume itself defective 2. C 108 (1/25) or C 114 (1/25) defective

SECTION "B" TROUBLE WITH TAPE TRANSPORT

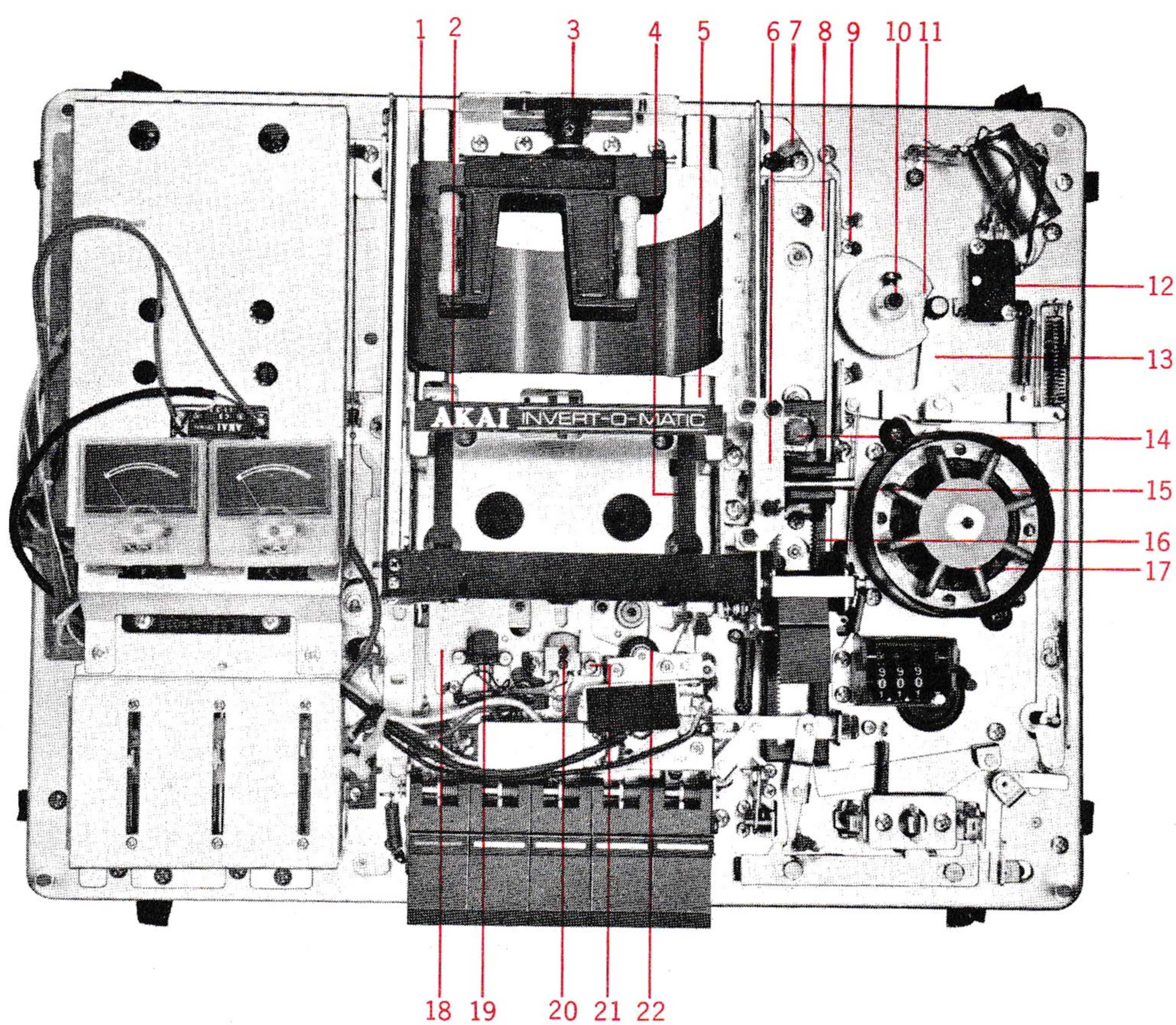
MECHANISM

Symptom	Trouble
<p>Capstan does not rotate (Trouble with motor)</p> <p>(Trouble with power transmission mechanism)</p>	<ol style="list-style-type: none"> 1. Broken field coil 2. Defective motor starting capacitor (C3) 3. Foreign matter between rotor and stator <ol style="list-style-type: none"> 1. Broken flywheel belt 2. Flywheel belt off of driving position 3. Motor bushing slipping on motor position 4. Oil adhering to motor bushing and/or flywheel
<p>Capstan rotates in stop position, but tape does not advance when switched to play position (Trouble with motor)</p> <p>(Trouble with power transmission mechanism)</p>	<ol style="list-style-type: none"> 1. Decreased motor torque 2. Defective C-3 3. Motor bushing slipping on motor shaft <ol style="list-style-type: none"> 1. Flywheel belt stretched 2. Oil adhering to motor bushing and/or flywheel 3. Oil adhering to flywheel shaft and/or pinch wheel 4. Insufficient pinch wheel pressure
<p>Play key does not lock when depressed</p>	<ol style="list-style-type: none"> 1. Manual Reverse Switch at "on" position (manual lever not working properly) 2. Faulty lock plate adjustment (Ref. Section 5-3) 3. Plunger coil lead wire grounded 4. Plunger coil at operating position (TR-203 defective) 5. D201 or D202 defective 6. CDS defective
<p>Noise from mechanism at play or stop mode</p>	<ol style="list-style-type: none"> 1. Belt retainer touching flywheel belt (Ref. Section 9-12) 2. Foreign matter adhering to center pulley (A) or (B) or center pulley has convex or concave places on edge 3. Center pulley itself needs lubricating 4. Idler (A) touching reel table (Faulty adjustment of take-up reel lever (B)) 5. Noise coming from washer at speed reducing pulley (B) 6. Belt switch roller touching belt (Ref. Section 6-3) 7. Motor shield prop and rotor touching 8. Noise coming from motor itself
<p>Invert-0-Matic operation faulty (Cassette does not move to position for inverting when Auto or Manual Reverse switch is depressed)</p> <p>(Cassette catches during inverting procedure or after being inverted)</p>	<ol style="list-style-type: none"> 1. Main gear damaged or deposit of foreign matter on main gear 2. Lock blocking cassette receptacle (in front of receptacle on head side) (Depress operating lever by hand and return to position) 3. Meshing of slide rack gear faulty (Ref. Section 3-8, and 9-6) <ol style="list-style-type: none"> 1. Cassette guide too narrow (Widen) 2. Slide rack stop spring too strong (Ref. Section 9-10) 3. Slide stand bent (Ref. Section 3-8) 4. Turn-over branch adjustment faulty (Ref. Section 3-1) 5. Because cassette receptacle is bent, turnover branch is touching receptacle (Ref. Section 3-3) 6. Tape is touching cassette guide (Ref. Section 3-6) 7. Tape is touching hook (bend hook) 8. Because SW-4 adjustment is faulty, 100 V voltage is not being supplied

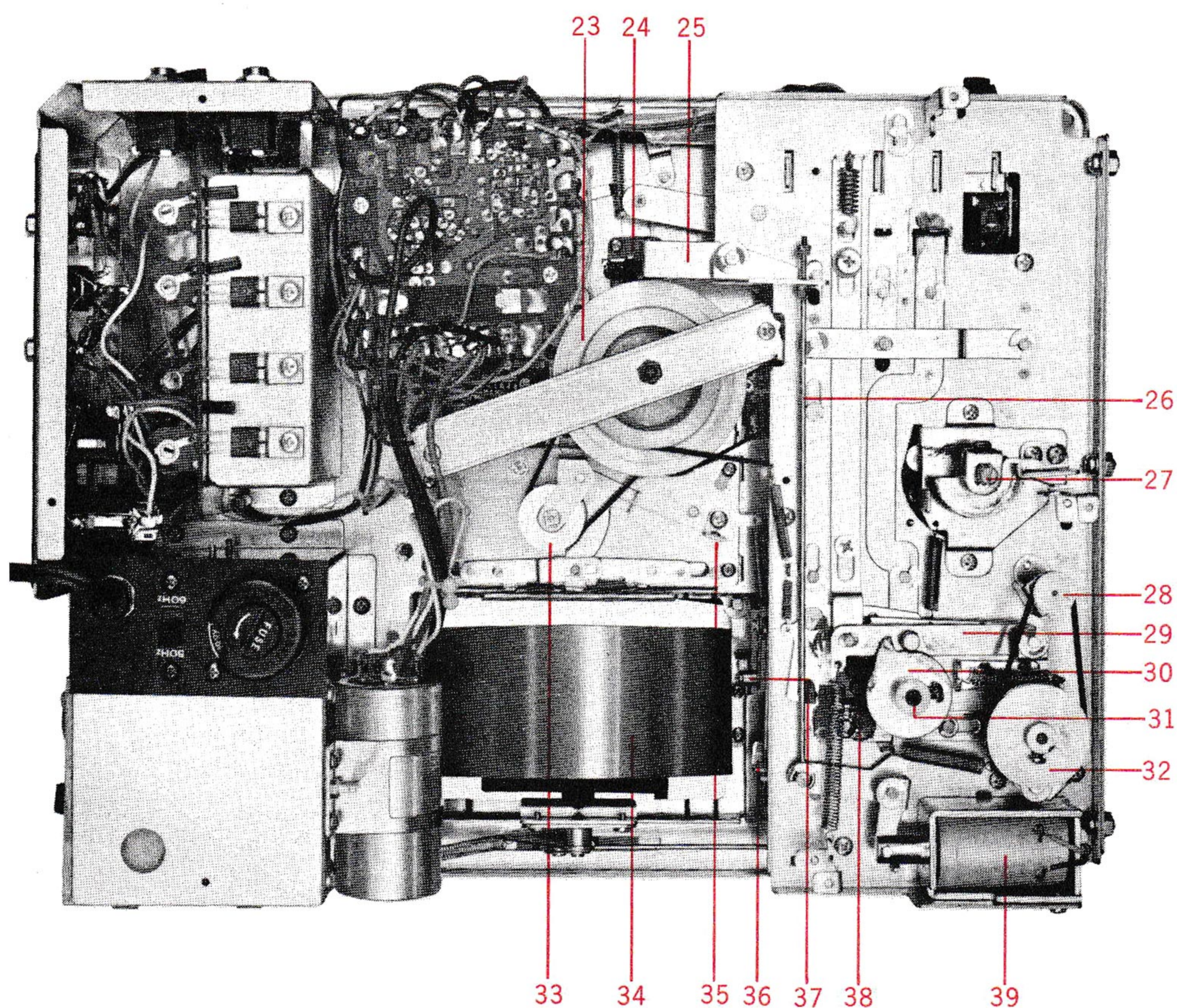
Symptom	Trouble
<p>(Cassette catches when returning from inverting mechanism)</p> <p>Cassette catches above head when returning from inverting mechanism (rests on head instead of returning to normal position)</p> <p>Only main motor rotates, but tape does not move at all (does not move when Play, Rec, FF, or Rwd key is depressed) (Spindles do not move whether cassette is in receptacle or not)</p>	<ol style="list-style-type: none"> 1. Cassette guide resting on top of cassette (cassette guide too narrow, hook and cassette receptacle too narrow) 2. Main gear damaged or foreign matter adhering to main gear (Ref. Section 3-8) 3. Slide rack gear caught (Ref. Section 3-8, 9-6) <ol style="list-style-type: none"> 1. Faulty adjustment of rack joint (Ref. Section 3-5) 2. Because recording safety lever (B) is bent, head blocks' fixed position is too far toward cassette receptacle. Replace recording safety lever (B). 3. Install new cassette brake <ol style="list-style-type: none"> 1. Because recording safety lever (B) is bent, tape is not set to proper position. 2. Because recording safety lever (B) is bent, it is boring into lower portion of head stand block plate. At play mode, when Rec Key is strongly depressed, recording safety lever bends. Replace recording safety lever or recording safety bracket.
<p>Automatic Reverse does not function</p>	<ol style="list-style-type: none"> 1. Plunger adjustment imperfect (Ref. Section 9-3) 2. Head lock plate not working smoothly. (Replace lock lever and auto stop lever) 3. Revolutions of secondary gear sluggish <div data-bbox="811 1241 1856 1671" data-label="Diagram"> </div> <ol style="list-style-type: none"> 4. Gear stop lever too strong (Adjust with spring). 5. Start spring bent or faulty adjustment (Ref. Section 5-1 and 9-3)
<p>Manual Reverse does not function</p>	<ol style="list-style-type: none"> 1. Plunger adjustment faulty (Ref. Section 9-3) 2. Start spring bent (Ref. Sections 5-1, and 9-3) 3. Manual lever does not operate smoothly 4. (Ref. Section 1-1)
<p>Power Switch does not lock</p> <p>Pinch roller does not lock after cassette is inverted</p>	<ol style="list-style-type: none"> 1. Adjust switch lock cam <ol style="list-style-type: none"> 1. SW-2, SW-6 faulty adjustment (Ref. Section 5-3) 2. Play cam and Auto play lever (A) and (B) not working together with head stand operating lever 3. C2-2 (47/16) Faulty capacity (Replace)
<p>Cassette does not drop into place perfectly after being inverted</p>	<ol style="list-style-type: none"> 1. Lock joint stop adjustment faulty (Ref. Section 3-5) 2. Confirm that there is about a 0.5 mm space (leeway) between cassette and cassette receptacle frame when cassette is in receptacle 3. Eject lever is touching slide stand
<p>At play mode, when Pause Button is depressed to "on" position, pinch roller releases</p>	<ol style="list-style-type: none"> 1. SW-1 adjustment faulty (Ref. Section 2-1)

Symptom	Trouble
Auto Reverse switch does not lock	<ol style="list-style-type: none"> 1. Auto lever lock prop bent 2. Auto stop lever adjustment faulty (Ref. Section 1-1)
Cassette inverts over and over instead of returning to play or rec mode.	<ol style="list-style-type: none"> 1. Main gear stop lever not operating (adjust with spring or replace lever)
Considerable wow as tape begins to wind	<ol style="list-style-type: none"> 1. Pinch roller pressure tension weak (tension of pinch roller spring insufficient). Replace pinch roller spring with new 200 gr spring (old tension spring 160 gr).
Wow/Flutter (irregular tape movement)	<ol style="list-style-type: none"> 1. Decreased motor torque 2. Defective motor starting capacitor (C-3) 3. Flywheel belt stretched and slipping 4. Unbalanced flywheel rotation 5. Rubber on pinch wheel deteriorated 6. Dust on heads 7. Insufficient pinch wheel pressure 8. Tape itself defective
Unit does not operate in FF or Rwd mode	<ol style="list-style-type: none"> 1. Oil adhering to take-up pulley belt 2. Loose center pulley (A) and (B) 3. Slippage due to oil adhering to center pulley (A) or (B) or reel table 4. Position of center pulley incorrect (Ref. Section 7-4)
Brake does not function properly	<ol style="list-style-type: none"> 1. Brake lever does not function properly (spring may be loose) 2. Slippage due to oil adhering to side of reel table.
Periodical "clacking" noise during rewinding or fast forwarding tape	<ol style="list-style-type: none"> 1. Center pulley (A) or (B) needs lubricating or foreign matter adhering to center pulley 2. Reel table shaft needs oiling
Squeaking noise when playing tape	<ol style="list-style-type: none"> 1. Deposit of dust on head 2. Recording tape is being charged with static electricity 3. Excessive heat (head surface) after continued operation 4. Old and worn-out recording tape 5. Inferior recording tape
Cycle change switch will not move	<ol style="list-style-type: none"> 1. Cycle conversion lever needs lubricating 2. Eccentric or bent cycle conversion lever 3. Flywheel belt not on driving track of belt switch roller 4. Loose motor bushing or oil on motor bushing
Auto Stop does not function	<ol style="list-style-type: none"> 1. TR-201, 203 defective 2. SW 2 faulty contact 3. C203 (10/25) defective 4. D203 (IN 34A) defective

VI. MECHANISM ADJUSTMENT



1. TURN-OVER GUIDE
2. CASSETTE GUIDE
3. TURN-OVER DRIVE GEAR
4. GUIDE PLATE
5. SLIDE TABLE
6. JOINT STAY
7. STAND ANGLE
8. PARALLEL SLIDE RACK
9. STOPPER SPRING
10. MAIN GEAR SHAFT
11. AUTO-STOP CAM
12. MICRO SWITCH
13. AUTO-STOP LEVER
14. PINION GEAR
15. RACK JOINT
16. SLIDE RACK
17. MAIN MOTOR
18. HEAD BASE
19. ERASE HEAD
20. REC./PB. HEAD
21. TAPE GUIDE
22. PINCH WHEEL



23. FLYWHEEL
24. LOCK TABLE
25. AUTO-STOP LEVER
26. STOP SPOKE
27. CYCLE CONVERSION
28. SPEED REDUCING PULLEY
29. AUTO-PLAY LEVER A
30. AUTO-PLAY CAM
31. MAIN GEAR SHAFT
32. SPEED REDUCING PULLEY A
33. CENTER PULLEY
34. TURN-OVER GUIDE
35. PLATE SPRING
36. LIFT CAM LEVER
37. LIFT LEVER
38. START SPRING
39. PLUNGER SOLENOID

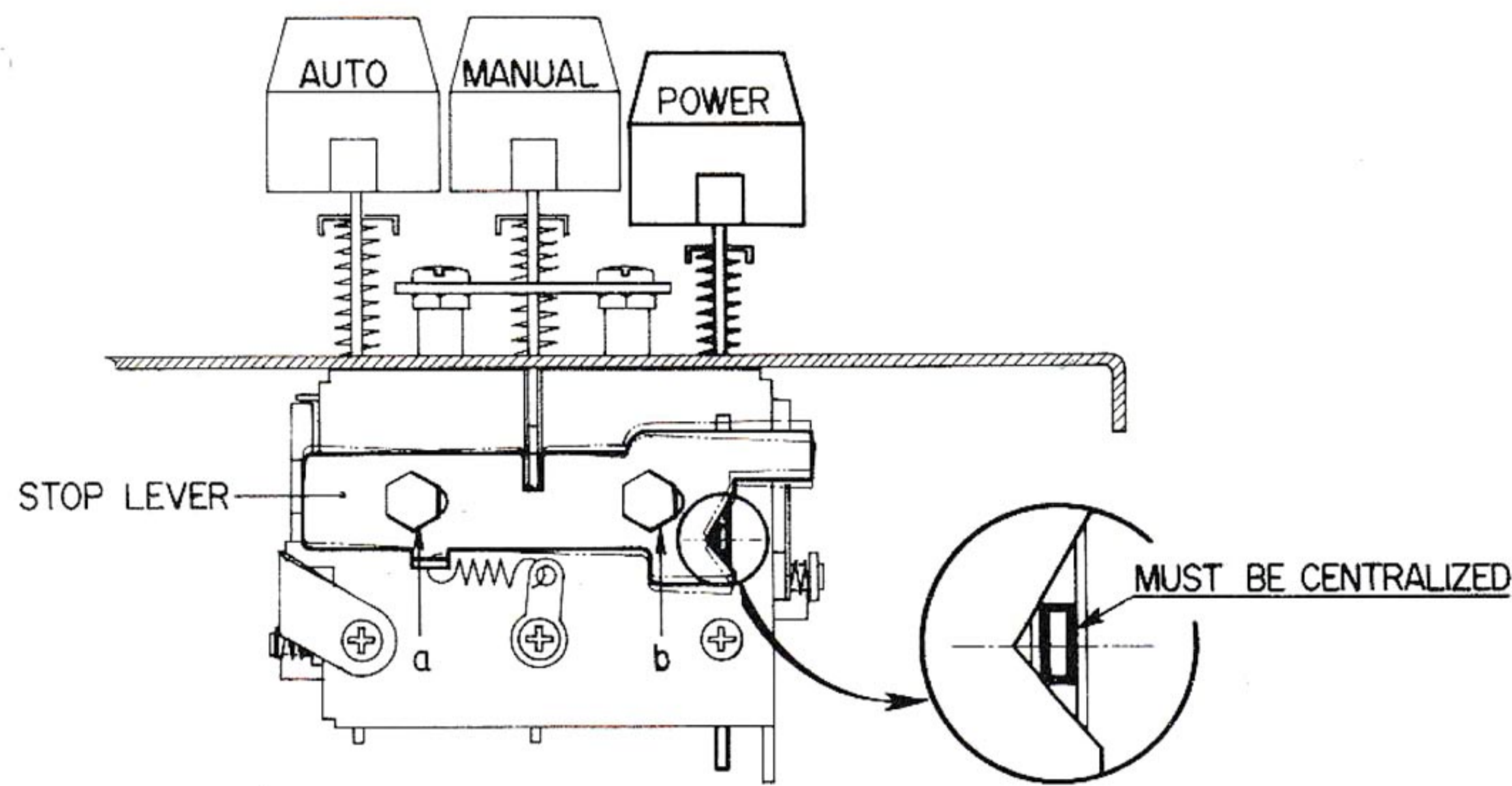


Fig. 1

1. CONTROL BUTTONS BLOCK

1-1 AUTOMATIC STOP LEVER ADJUSTMENT (See Fig. 1)

With Power Switch turned ON, adjust (a) and (b) so that the position of the Stop Lever is in the center of the stop lever notch.

Caution:

If this adjustment is not correct, neither the MANUAL Reverse Switch nor the AUTOMATIC Reverse Switch will lock into position.

1-2 AUTOMATIC LEVER LOCK PROP ADJUSTMENT

With Power Switch and Automatic Reverse Switch at "ON" position, adjust lock prop so that when the power switch is turned off, the Automatic Reverse Switch will automatically return to "Off" position.

1-3 MANUAL REVERSE BUTTON ADJUSTMENT

The Manual Reverse Switch is correctly positioned if it enters the groove on the stop lever smoothly (Refer to Fig. 1).

2. PAUSE BUTTON BLOCK

2-1 MICRO-SWITCH (SW-1) ADJUSTMENT

Adjust Micro Switch retaining screw so that the Micro Switch is activated when the Pause Button is depressed.

3. TURN-OVER BLOCK

3-1 TURN-OVER BRANCH VERTICAL MOVEMENT ADJUSTMENT (See Fig. 2)

When the tape is reversed from normal play to reverse play, the turn-over branch inverts and reverses the tape. After reverse is effected (during reverse playback mode), adjust screws (a) and (b) so that the bottom edge of the cassette tape is higher than the slide Table.

3-2 TURN-OVER BRACKET PARALLEL ADJUSTMENT

Insert washers at the 4 screws (left and right) on the under side of bracket and adjust screws so that as the tape reverses (from normal to reverse), the bracket is parallel with the cassette receptacle.

3-3 CASSETTE RECEPTACLE PARALLEL ADJUSTMENT

Line up cassette receptacle frame (on which "AKAI INVERT-O-MATIC" is written), so that it is parallel with machine (If this frame is crooked, the apparatus will not work smoothly), and position frame as far to the right (toward motor) as possible. Tighten the two cassette frame holding screws so that they are in the center of the oblong holes on the cassette frame base.

3-4 JOINT STAY ROLLER ADJUSTMENT (See Fig. 3)

As shown in the above illustration, adjust left hand nuts (c) and (d) so that the space between stationary nuts (a) and (b) and slide frame is 0.1 mm.

Note:

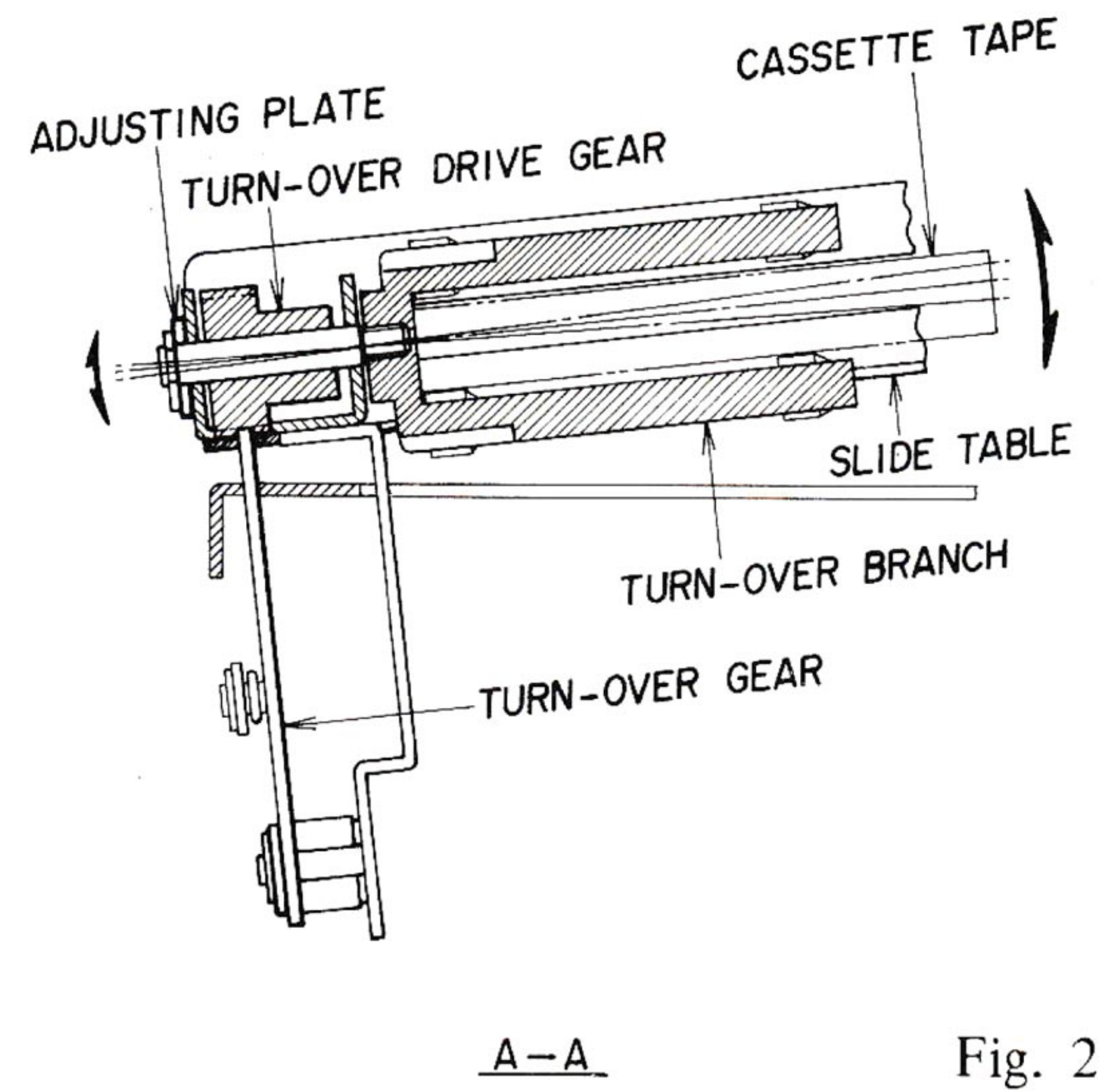
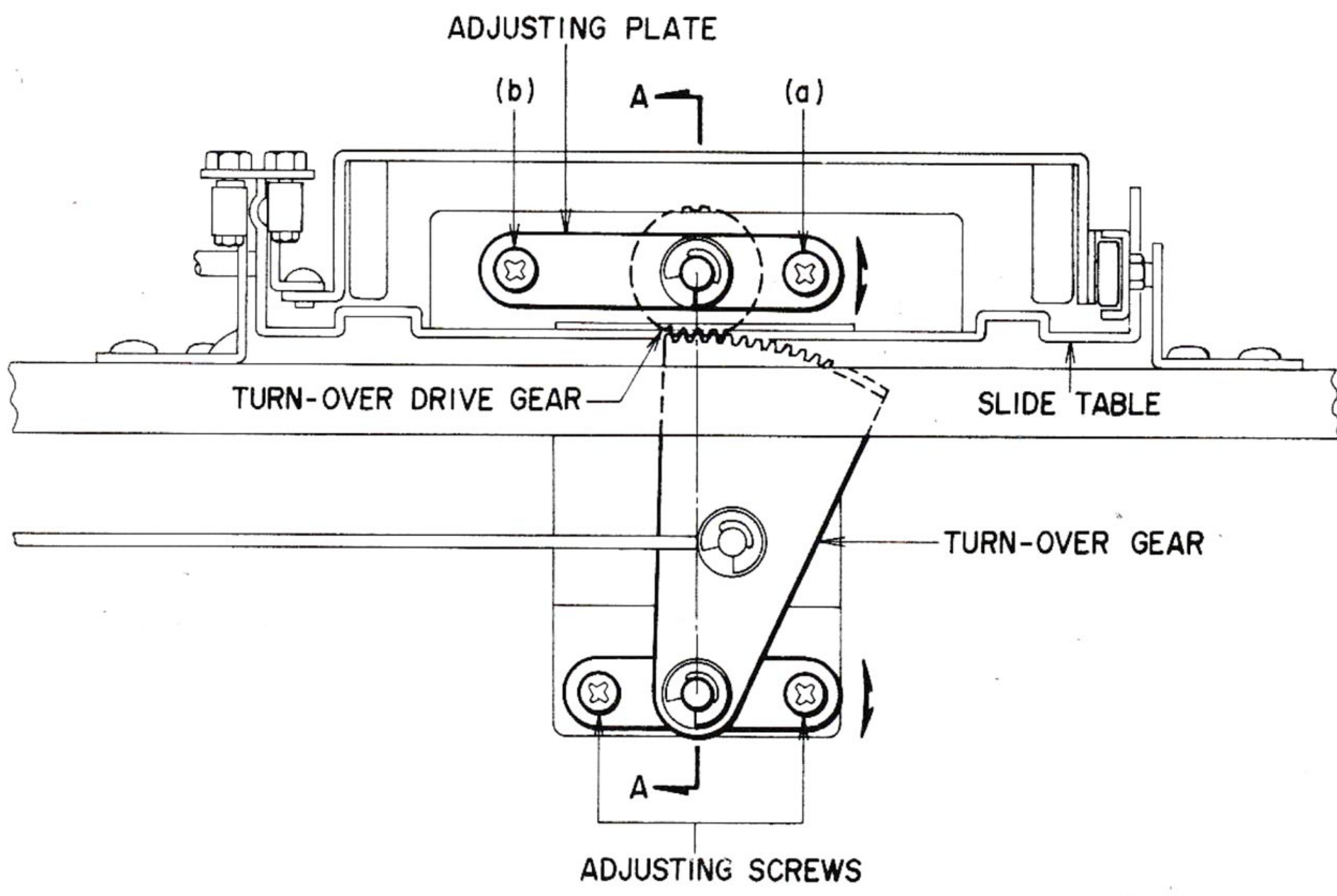
By using a plate spring as on the Model CS-50, this adjustment is more simplified.

3-5 RACK JOINT ADJUSTMENT (See Fig. 3)

Adjust screws (e) & (f) so that the rack joint locks smoothly as the cassette is returned after having been inverted.

3-6 TURN-OVER GUIDE ADJUSTMENT (See Fig. 4)

With tape at inverted condition, bend turn-over guide to left (in direction of amp) so that the cassette tape does not touch the cassette guide as it inverts.



A-A

Fig. 2

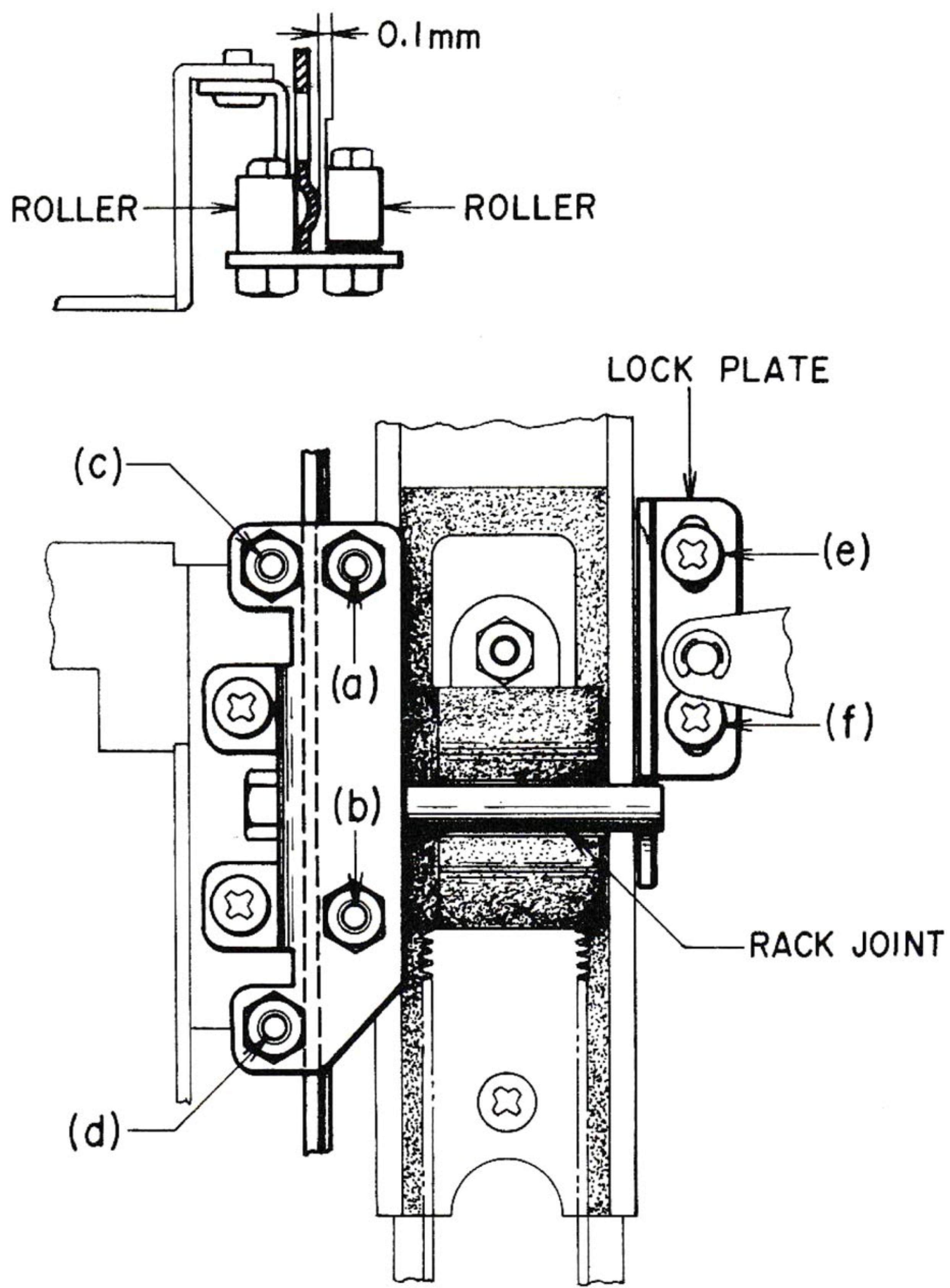


Fig. 3

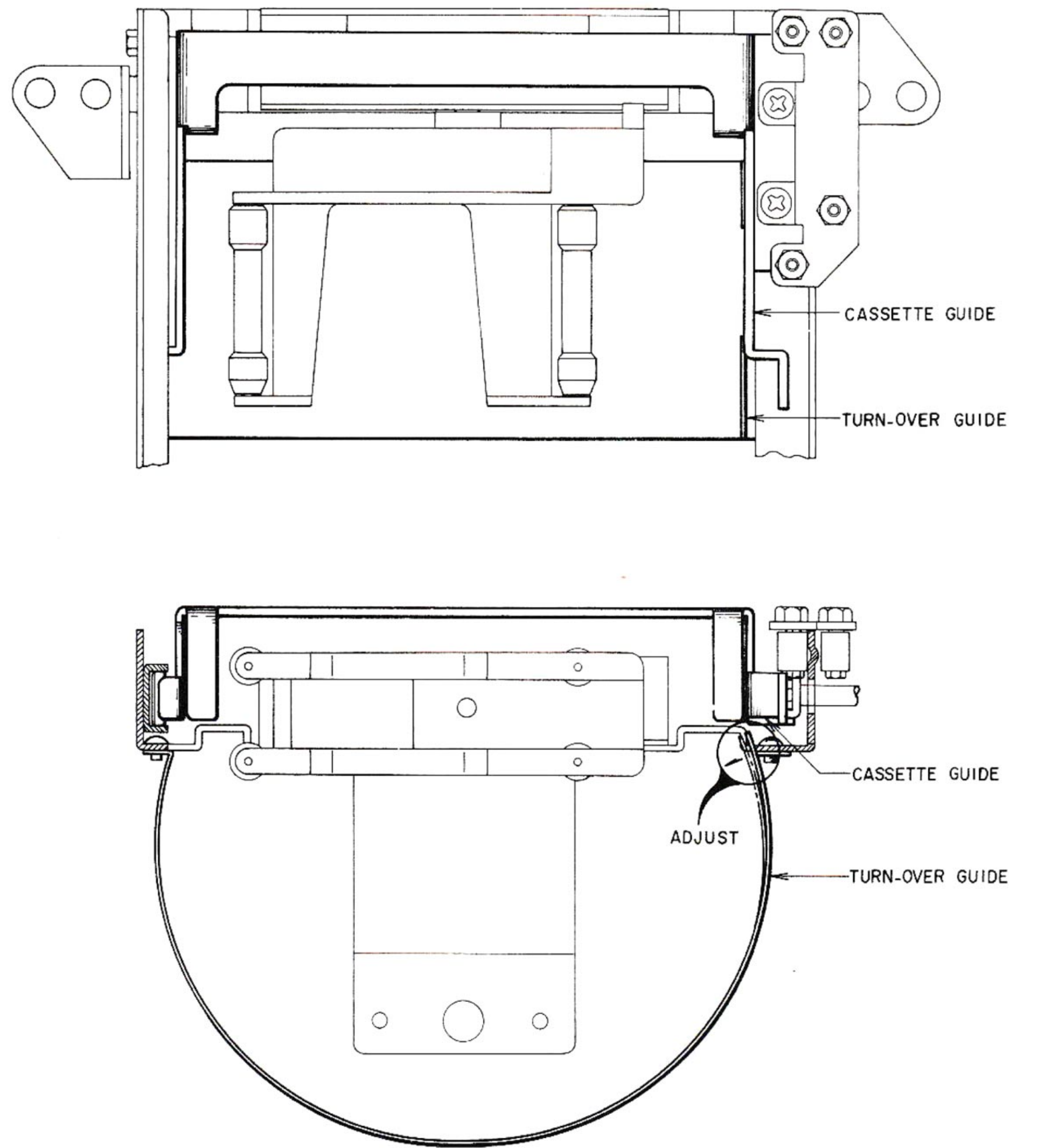


Fig. 4

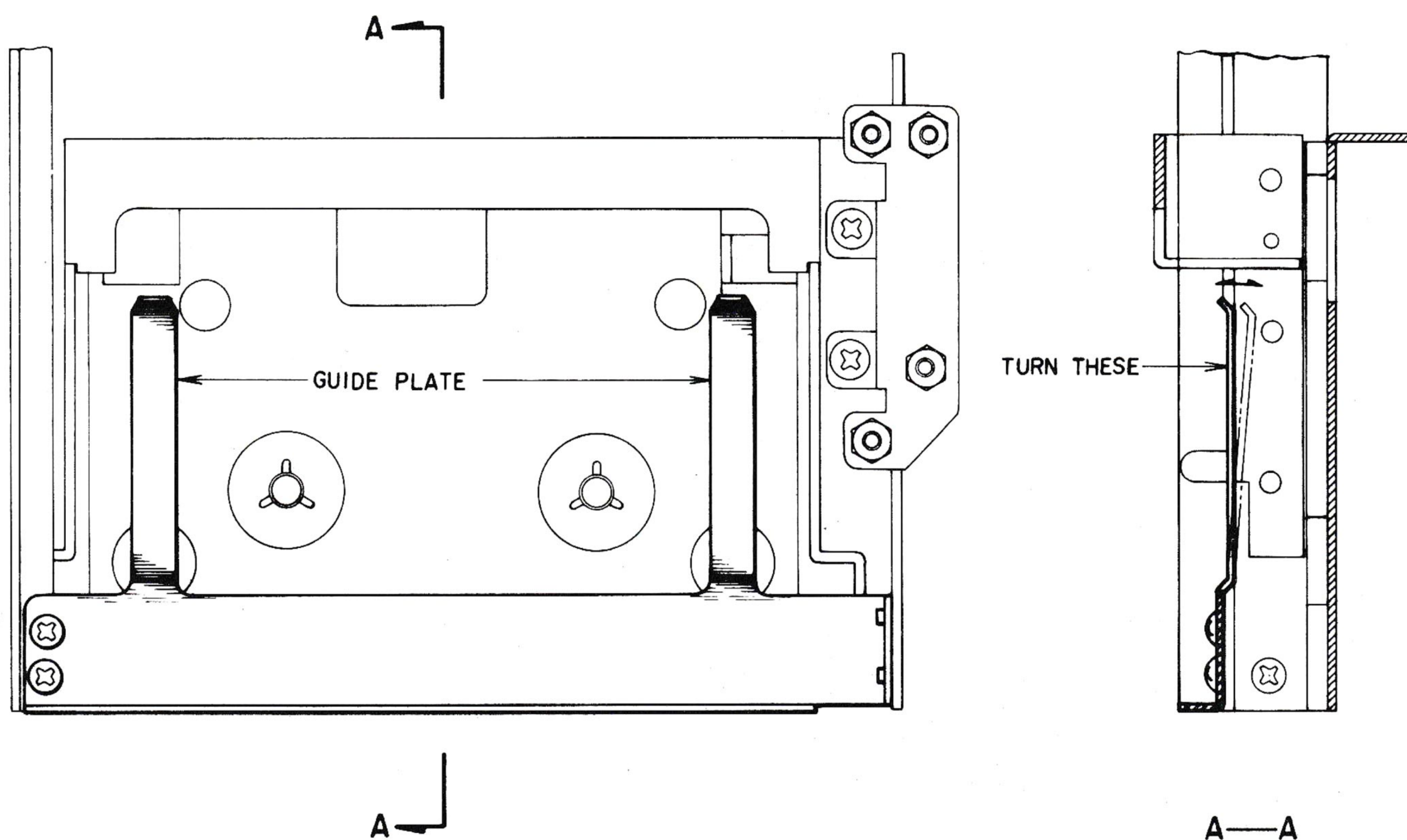


Fig. 5

3-7 GUIDE PLATE ADJUSTMENT (See Fig. 5)

When the tape is inserted in cassette holder, there should be a certain amount of up and down movement. However, if the movement is too great and "clatter" considerable, the Eject Button becomes difficult to operate.

3-8 SLIDE CONDITION ADJUSTMENT

With Slide Rack and Pinion apart (not making contact), cassette frame should operate smoothly.

- A. If Slide does not work smoothly with slide rack and pinion separated,
 - a) Joint stay roller adjustment is faulty.
 - b) Slide stand is bent.
 - c) Cassette receptacle adjustment is faulty.
 - d) Slide rack and joint not uniform.
 - e) Slide part of transport table convex or concave.
- B. If slide rack and pinion meshing (gearing together) is poor,
 - a) Slide rack gear is jagged (edges rugged).
 - b) Is pinion running idle? (pinion must be glued to pinion shaft).
 - c) If the meshing of slide rack and pinion is poor, adjust with the two pinion stopper screws. (See Fig. 6)
 - d) Confirm that main and secondary gears are gearing together properly. (Sometimes foreign matter adheres to gear cogwheel).

C. Main gear itself not working properly (does not rotate smoothly).

- a) Main gear clearance adjustment faulty (0.5 mm).
- b) Tie Rod and turn-over lever adjustment faulty.
- c) Poor alignment of main chassis and sub-chassis.
- d) If meshing (gearing together) of speed reducing pinion and main gear is poor, adjust speed reducing pinion.

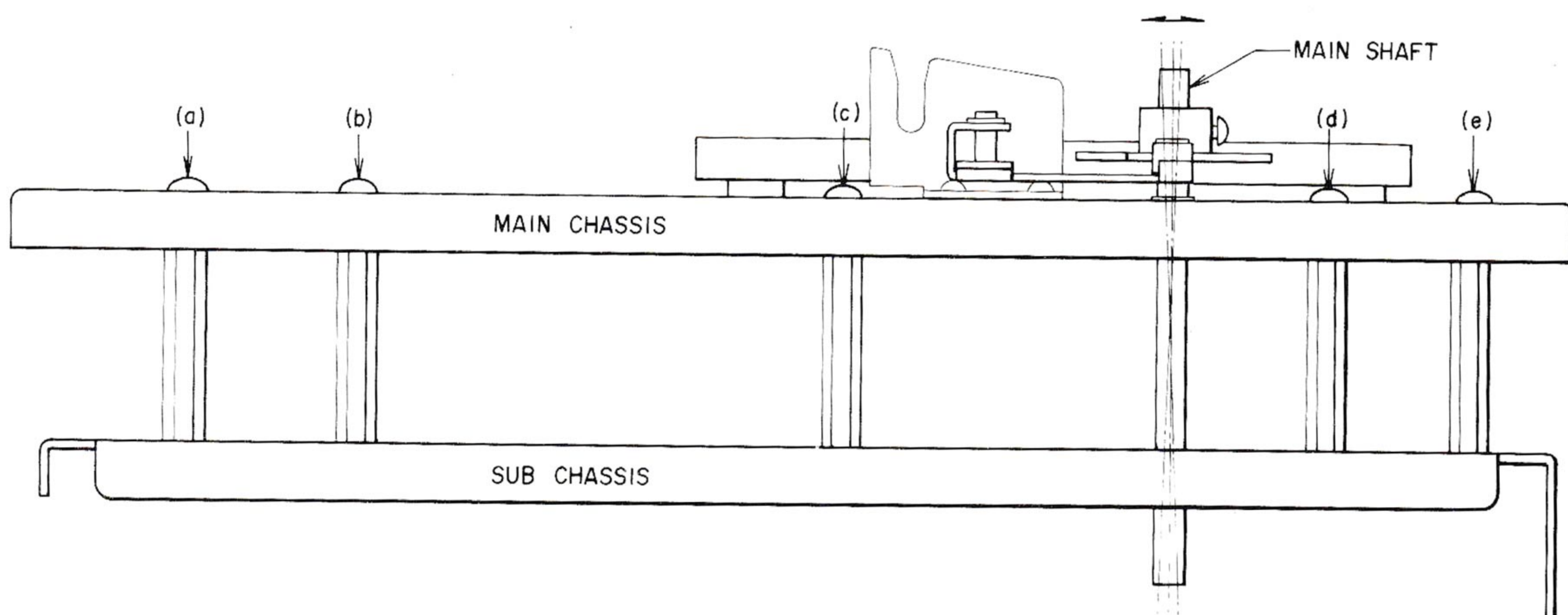
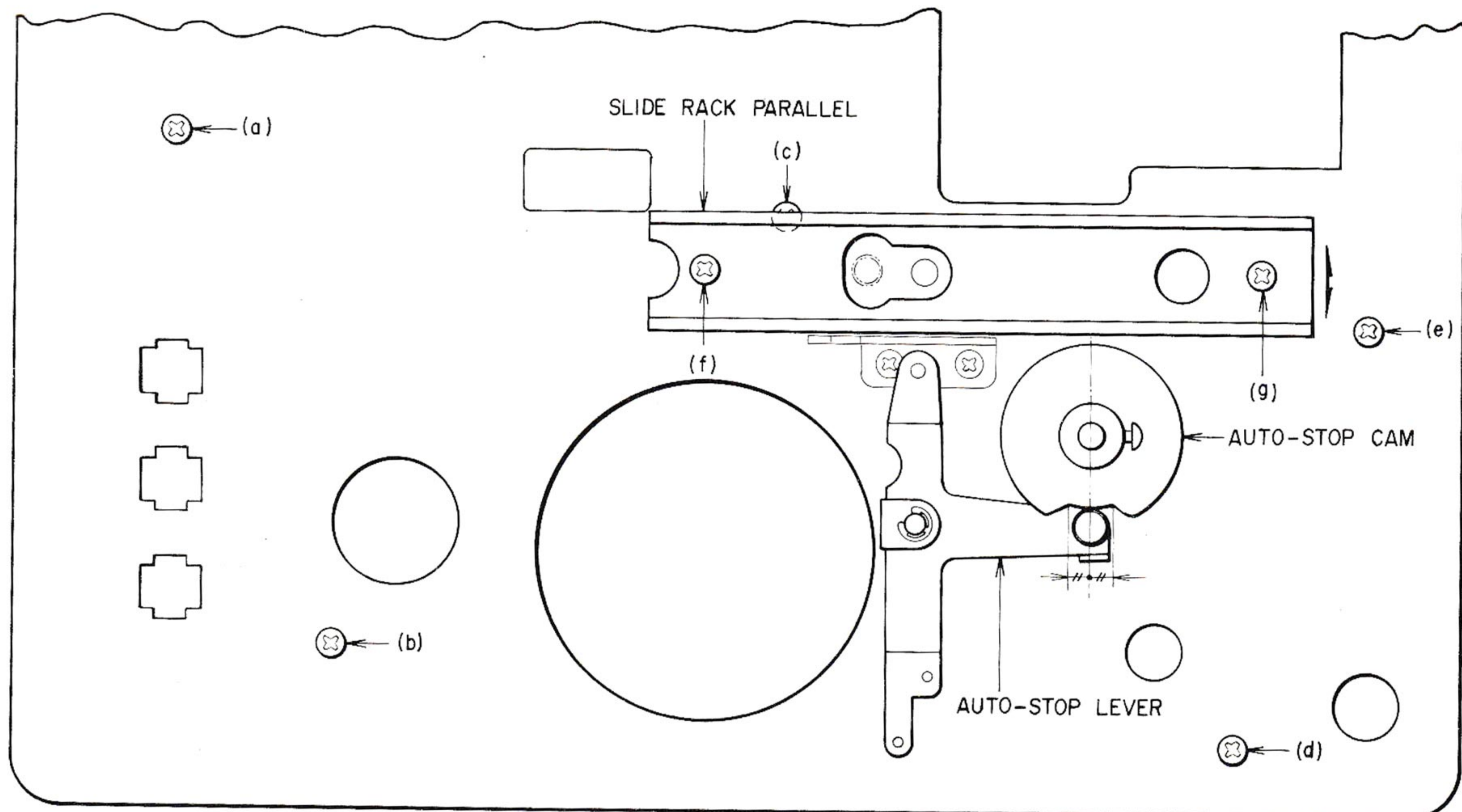


Fig. 6

4. HEAD BLOCK

- 4-1 HEAD TABLE TRANSPORT ADJUSTMENT
Depress Stop Key and Play Key simultaneously. Release Play Key. Adjust screw so that the Play Key returns smoothly when released. (This adjustment is seldom necessary).

5. SUB-CHASSIS BLOCK

- 5-1 STOP SPOKE ADJUSTMENT (See Fig. 7)
To adjust stop spoke, turn on Power Switch and Automatic Reverse Switch (but, without AC voltage). With main and pinion gear at neutral position, turn main gear to full counter-clockwise position and pull stop spoke toward plunger so that plunger inserts. Adjust the adjustment nut located in 0.3 mm space between start spring and start prop.

- 5-2 AUTOMATIC PLAY CAM ADJUSTMENT
Adjust screw (a) so that the space between the automatic play cam and automatic play lever is 3 mm. (Ref. Section 5-1)

- 5-3 HEAD STAND LEVER ADJUSTMENT (See Fig. 8)
With Play Key depressed, adjust the two lock plate (black part) screws so that the "loose play" of play key is 0.5 mm. Pinch Roller tension pressure is determined by this adjustment can be made with pinch roller spring (spring tension is between 160 and 200 gr). Pinch Roller tension is between 180 and 230 grams. At this time, confirm that the lever being pushed by Micro Switches (SW 2 and SW 6) are correctly positioned.

Caution:

If push prop of micro-switch presses too firmly against micro-switch, it is not reaching the head stand locking position.

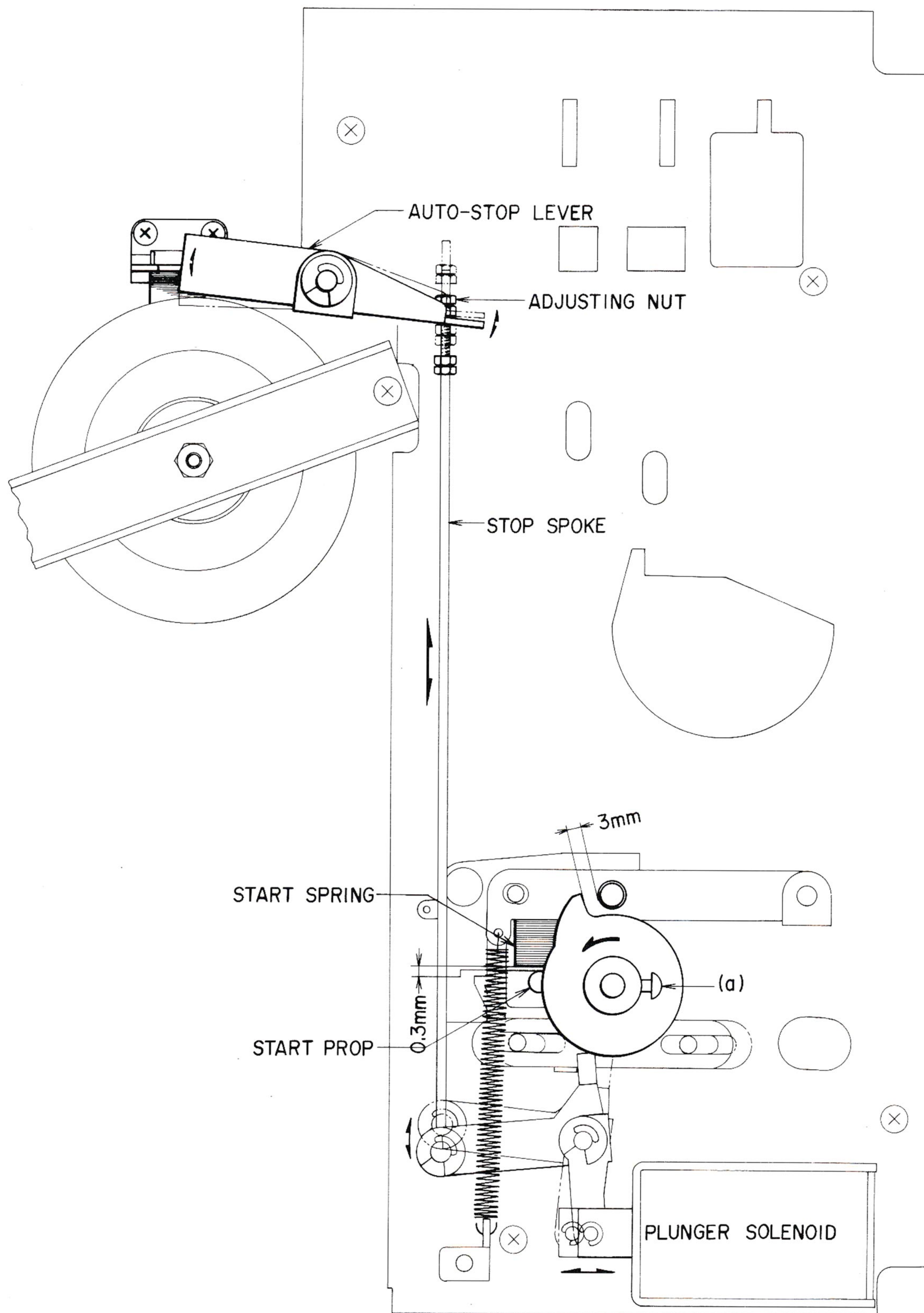


Fig. 7

6. CYCLE CONVERSION BLOCK

6-1 BELT SWITCH GUIDE ADJUSTMENT

When cycles are switched and with belt switch cam perfectly locked into position, tighten belt switch guide screw.

6-2 BELT SWITCH CAM ADJUSTMENT

When cycles are switched, with switch guide perfectly locked into position, tighten belt cam screw.

6-3 BELT SWITCH ROLLER HEIGHT ADJUSTMENT

Tighten screw after positioning belt so that it comes to the exact center of the switch roller.

Caution:

Confirm that roller and belt does not touch at stop position.

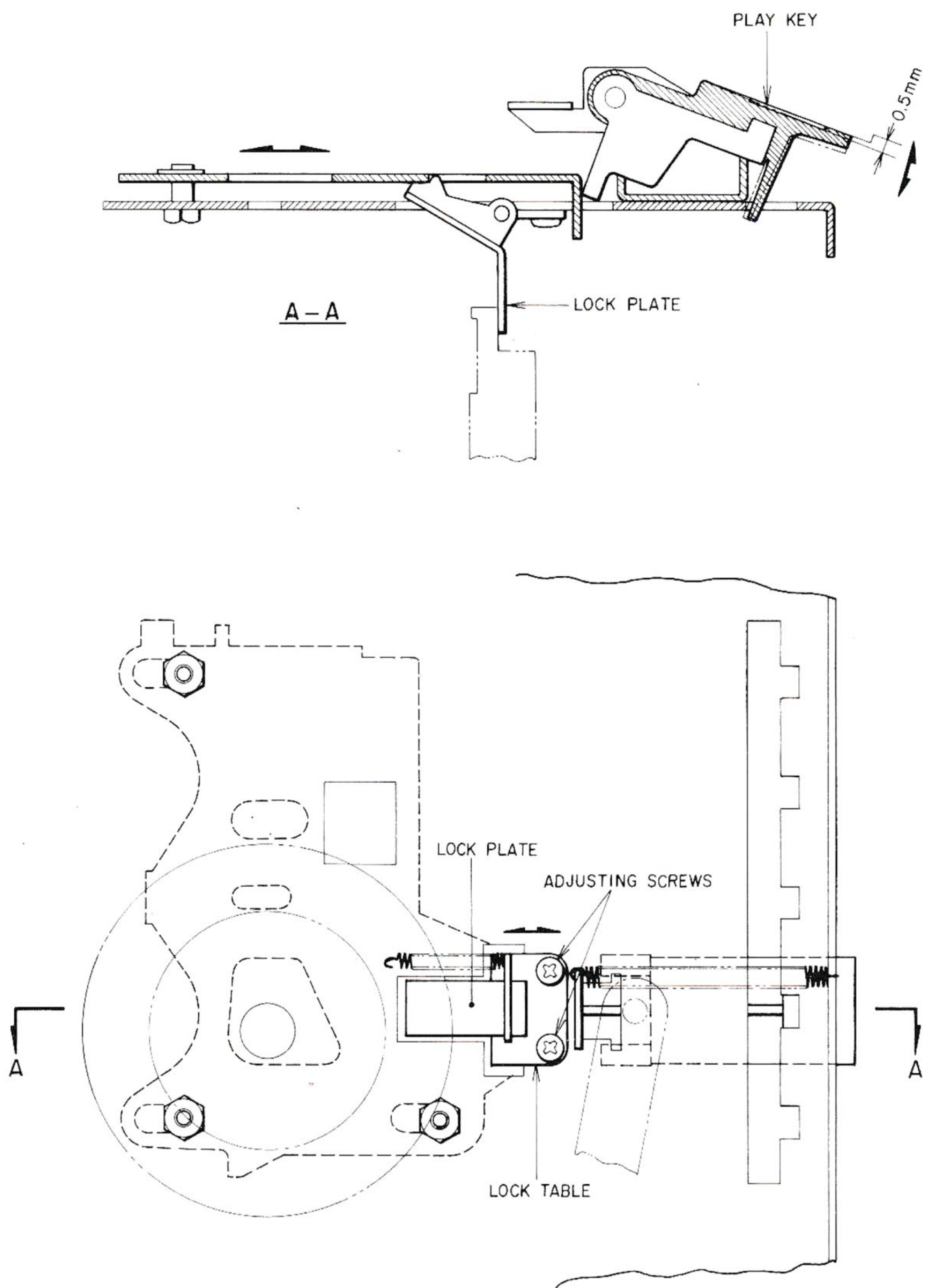


Fig. 8

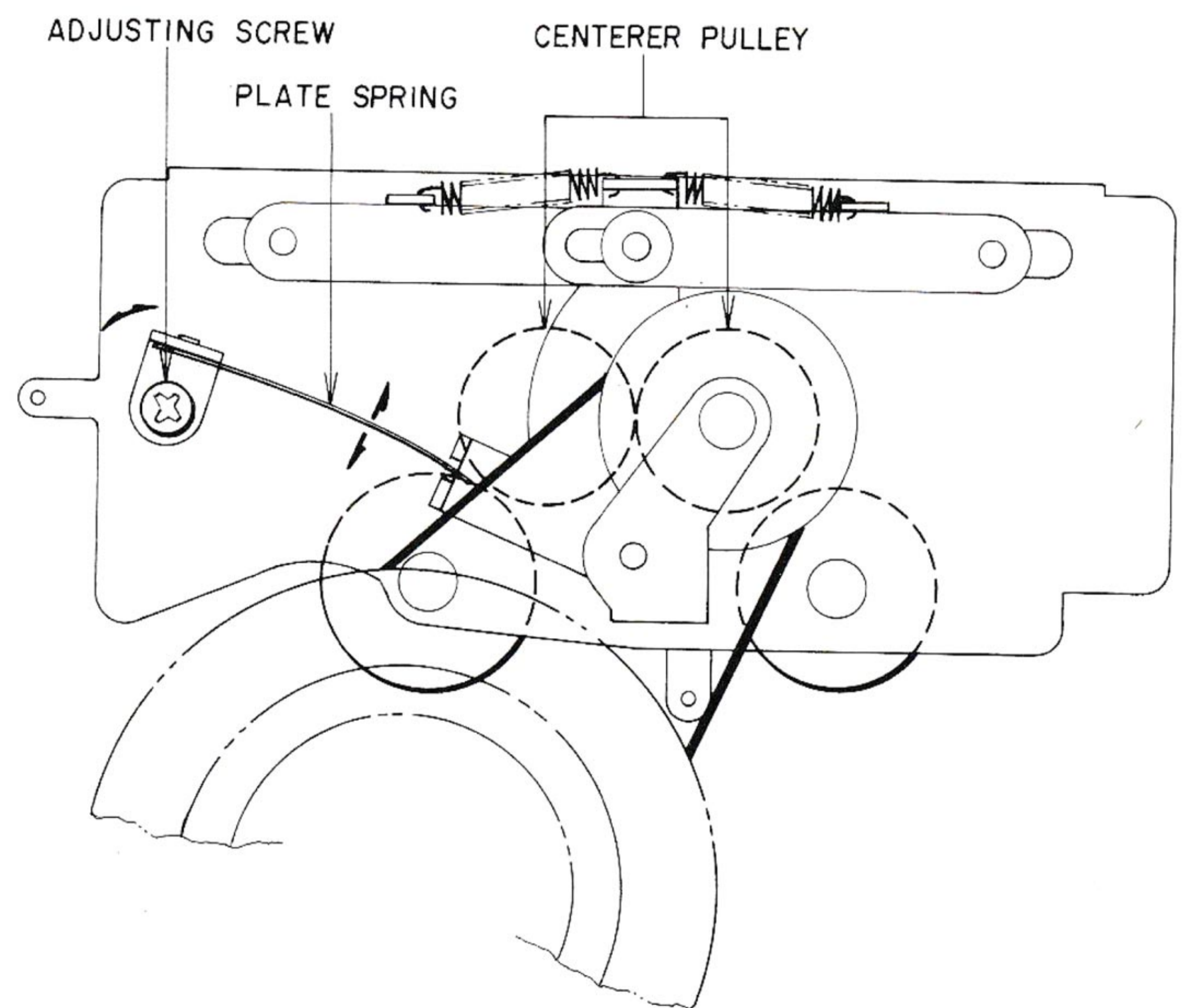


Fig. 9

7. REEL TABLE BLOCK

7-1 CENTER PULLEY NEUTRAL POSITION ADJUSTMENT (See Fig. 9)

Depress either Rewind Key and Stop Key, or FF Key and Stop Key simultaneously. Adjust plate spring adjustment screw so that Center Pulley (A) or (B) separates from reel table when Fwd or FF Key returns to normal position.

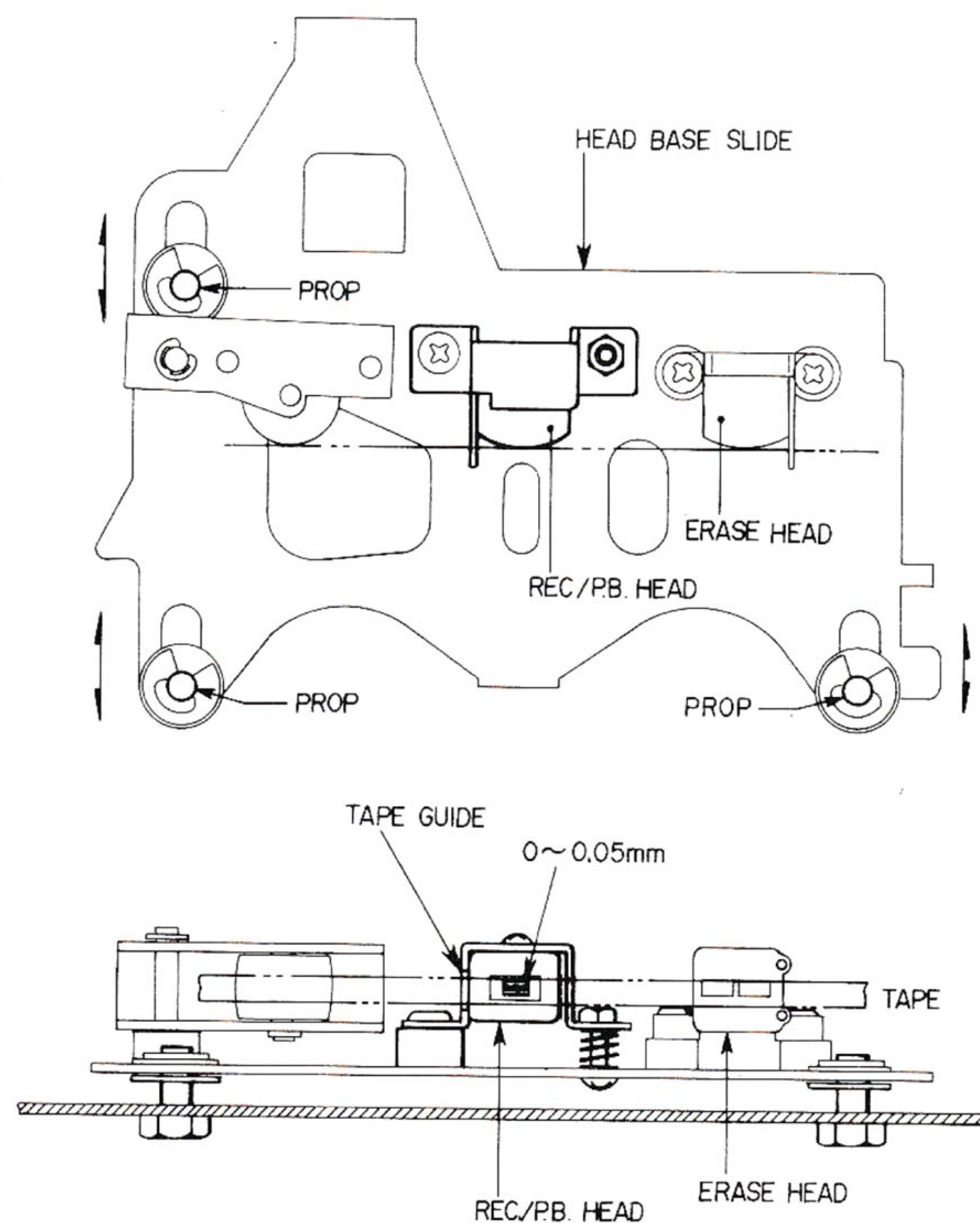


Fig. 10

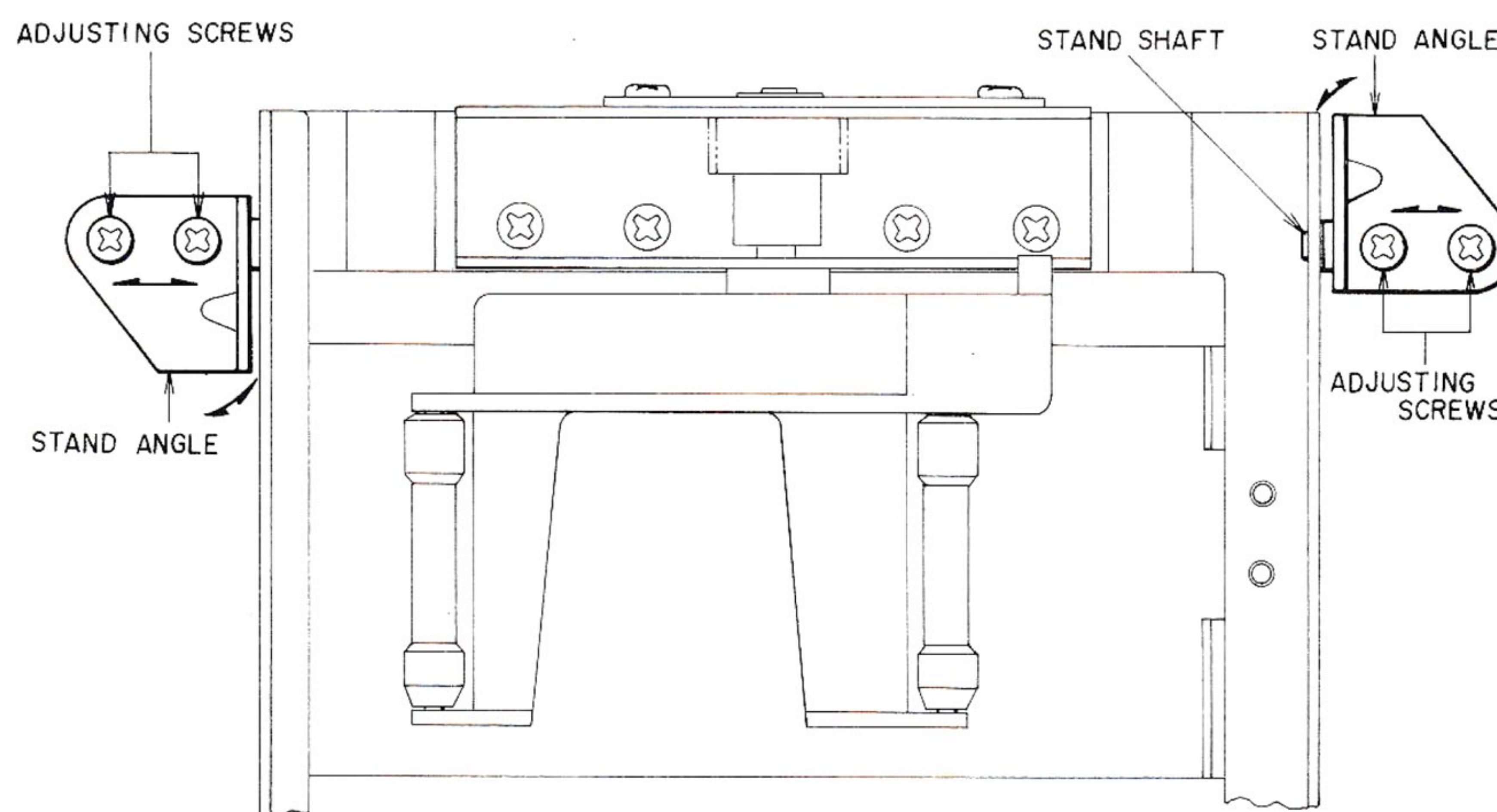


Fig. 11

8. MECHANISM FRAME BLOCK

8-1 CAPSTAN WHEEL CLEARANCE ADJUSTMENT

Adjust capstan holder prop so that there is a clearance of 0.5 mm (insert washer) between capstan holder prop and center part of capstan wheel.

8-2 SLIDE CONDITION ADJUSTMENT WHEN INSTALLING HEAD PLATE BLOCK

Position head plate in the 3 shaft positions as illustrated in Fig. 10.

8-3 MICRO-SWITCH (SW-2 and SW-6) ADJUSTMENT

Adjust both switches so that they work perfectly in relation to the micro-switch pressure lever.

8-4 RECORDING MICRO-SWITCH (SW-3) ADJUSTMENT

Depress Rec Key and Stop Key simultaneously. Adjust Micro Switch so that when Rec Key is released, it returns smoothly and Micro Switch so that when Rec Key is released, it returns smoothly and Micro Switch (SW-3) is activated to "On" condition.

Caution:

If Micro Switch is pushed too firmly, the return of recording lever will not be smooth.

8-5 SLIDE RACK PARALLEL ADJUSTMENT (See Fig. 6)

Adjust rail retaining screws (f) and (g) so that the slide rack works smoothly. Slide rack must be parallel with eject stand.

8-6 EJECT BUTTON LEVER ADJUSTMENT

Adjust the two screws beneath eject button (on eject button frame) so that when the Eject Button is operated, the eject lever enters notch on frame smoothly.

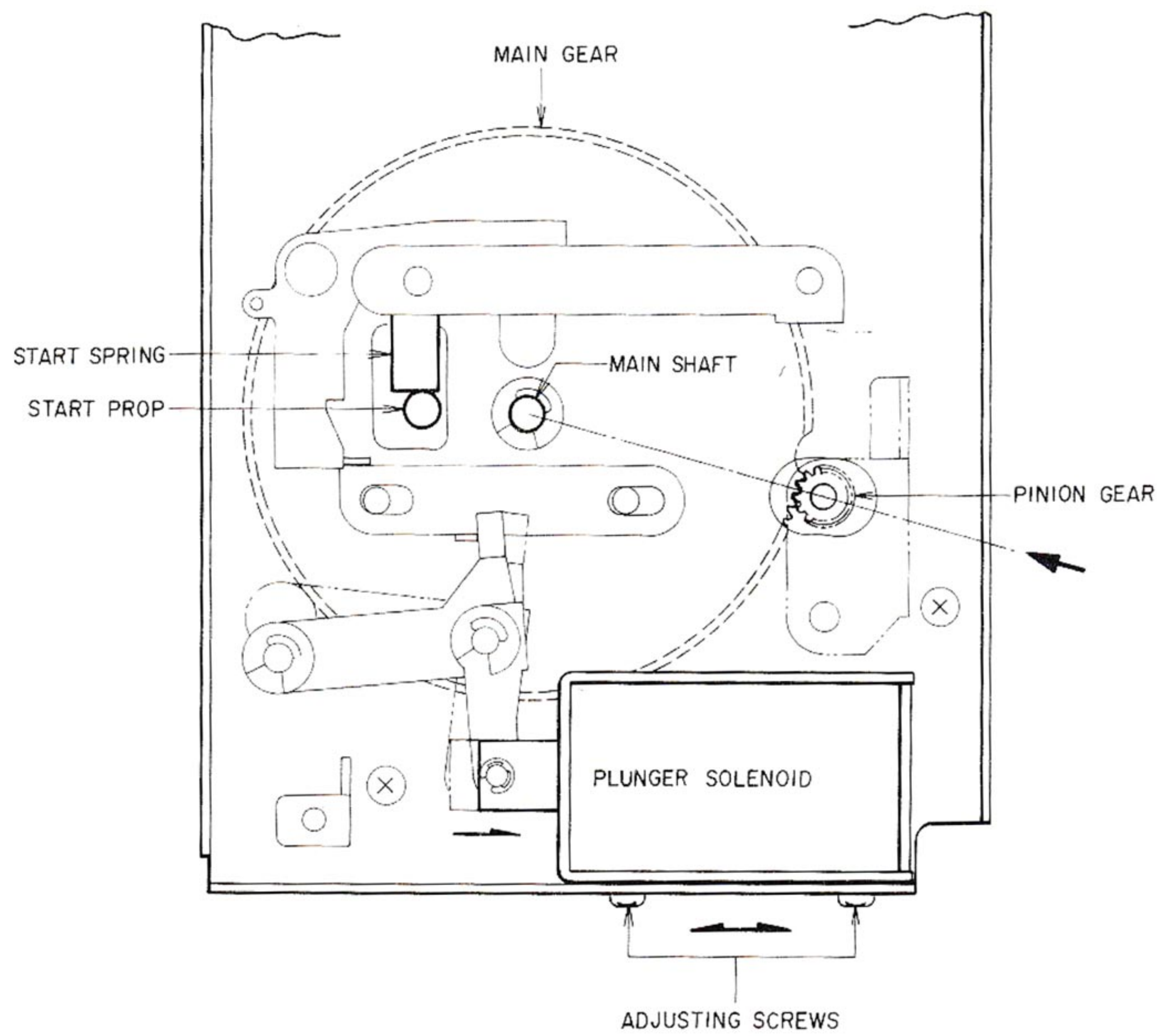


Fig. 12

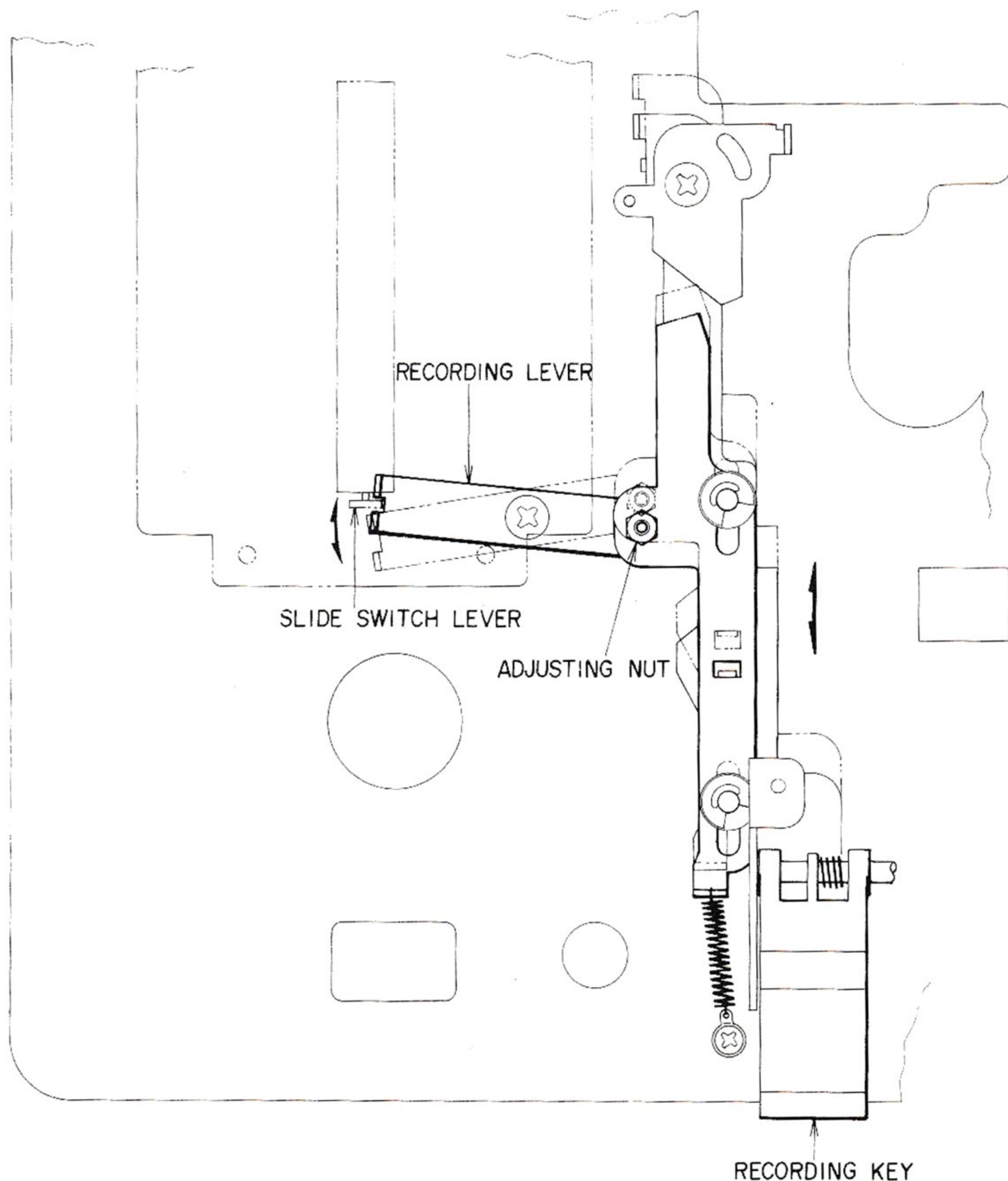


Fig. 13

9. GENERAL ADJUSTMENTS

9-1 TURN-OVER BLOCK VERTICAL RATTLE ADJUSTMENT (See Fig. 11)

Adjust the two stand shafts which support the turn-over block so that the up and down movement is light.

9-2 TURN-OVER CAM POSITION ADJUSTMENT (See Fig. 6)

- Confirm that main and pinion gears are meshing (gearing together) properly.
- The automatic stop cam should come to the center of automatic stop lever (E).

9-3 PLUNGER POSITION ADJUSTMENT (See Fig. 12 & 7)

With Power Switch and Automatic Reverse Switch at "On" position, (but without AC Voltage) mesh pinion gear with main gear two teeth away from neutral position in direction in which gear turns.

Next, with plunger fully inserted and at position where start spring and main gear start support has made contact, tighten the 3 plunger screws on side of plunger.

9-4 RELATIVE POSITION ADJUSTMENT OF RECORDING LEVER AND RECORDING/PLAYBACK SLIDE SWITCH (See Fig. 13)

With Rec Key at depressed position, adjust nut so that Recording Lever and Slide Switch enters record position perfectly.

Caution:

Slide Switch should operate at a 0.5 mm degree of looseness at recording mode, and a 1 mm degree of looseness at playback mode.

9-5 TURN-OVER BLOCK GEAR SYNCHRONIZATION ADJUSTMENT

A. Relation of Turn-Over Drive Gear to Turn-Over Gear

Adjust the two screws on Bottom of turn-over gear so that two teeth of the drive gear are perfectly meshed with the turn-over drive gear.

Caution:

Turn-over branch must be at parallel position with turn-over bracket when at normal position.

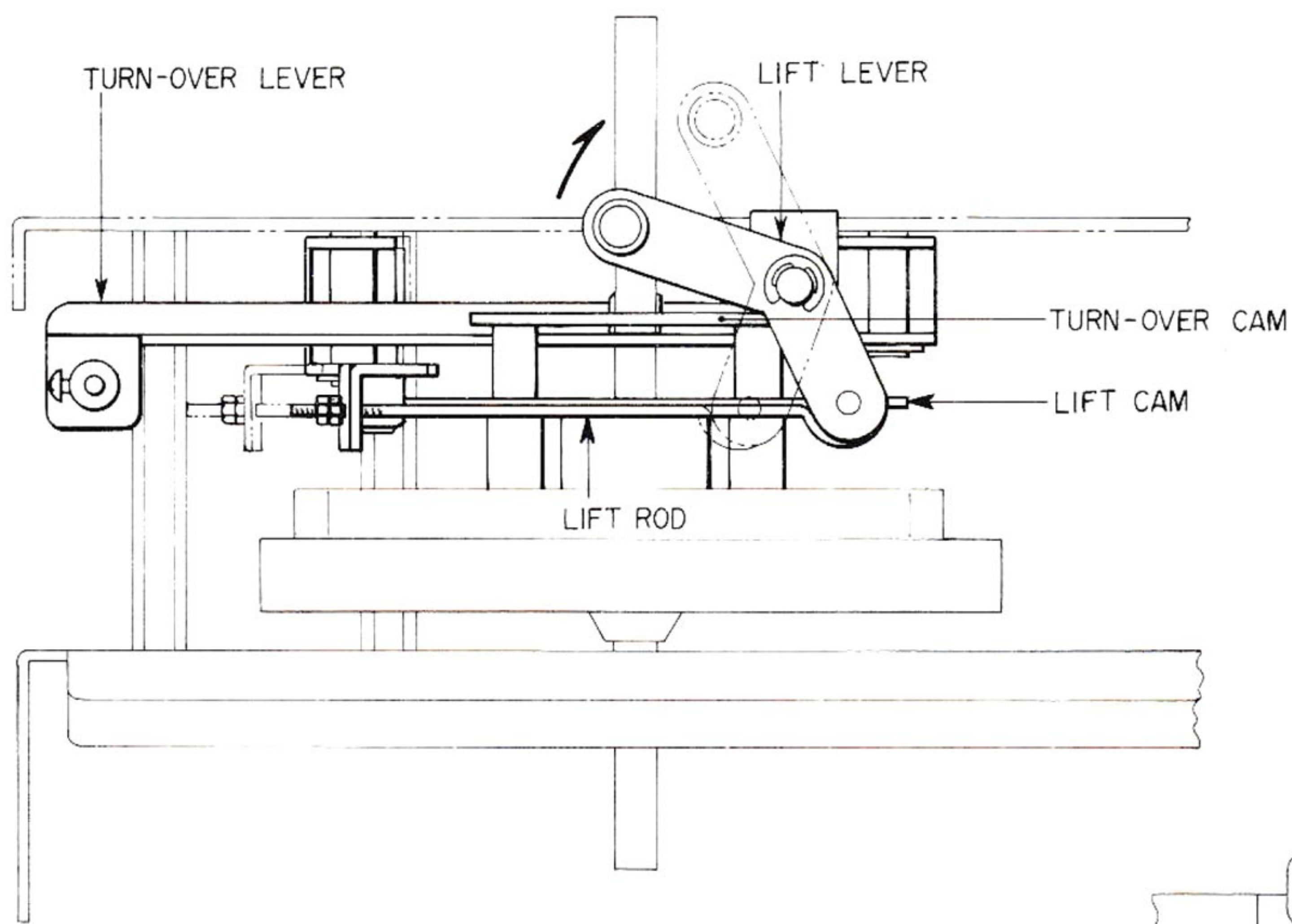
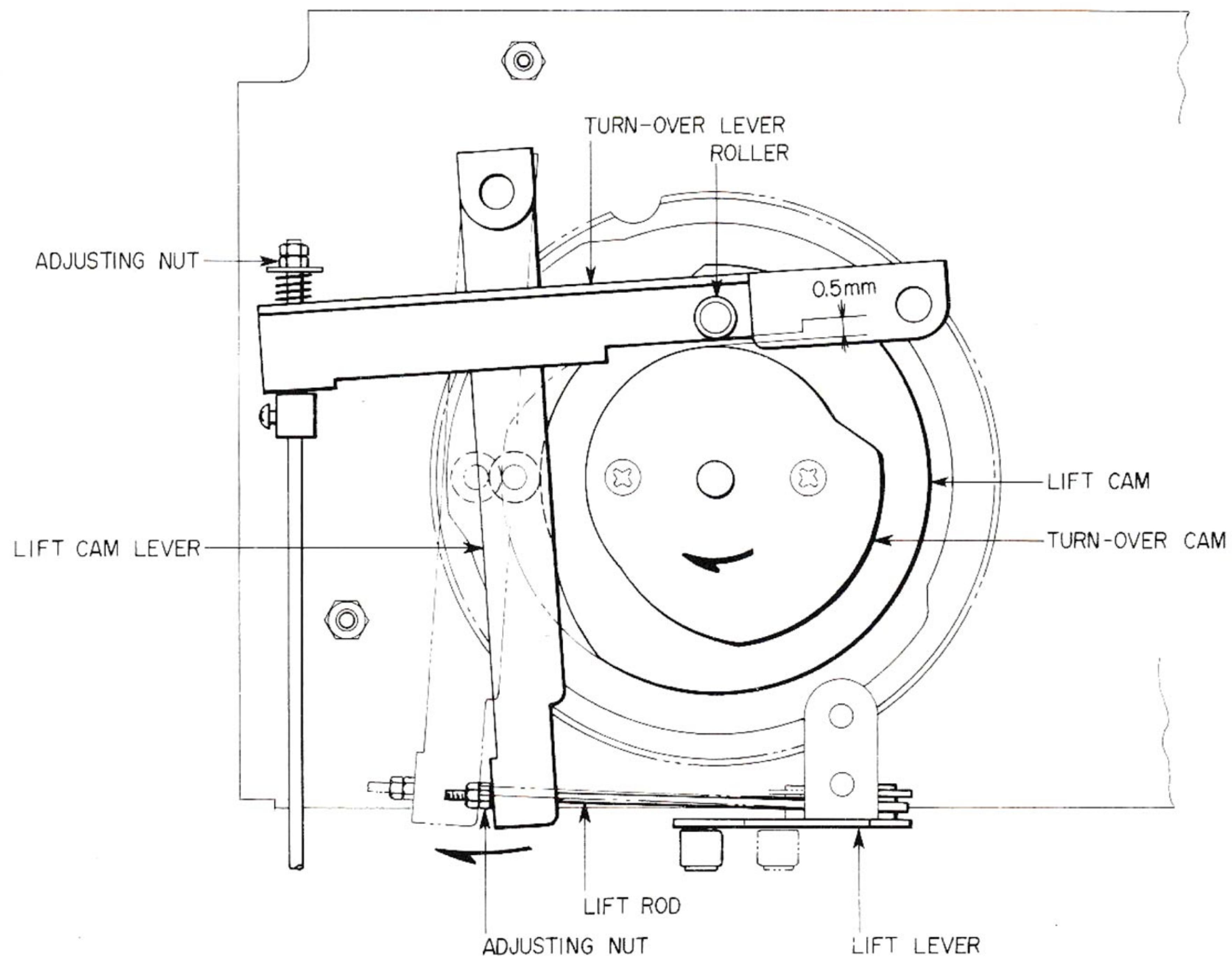


Fig. 14

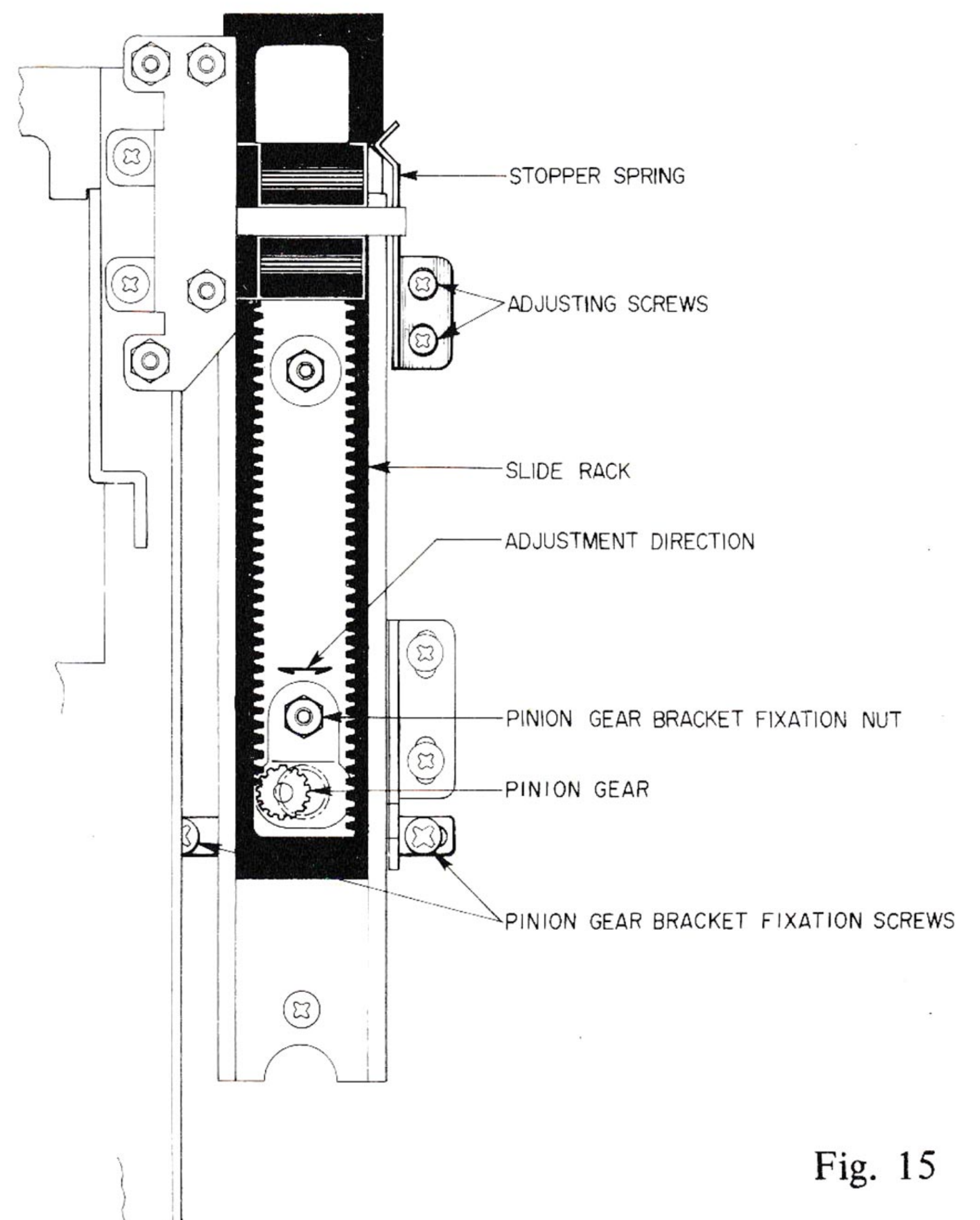


Fig. 15

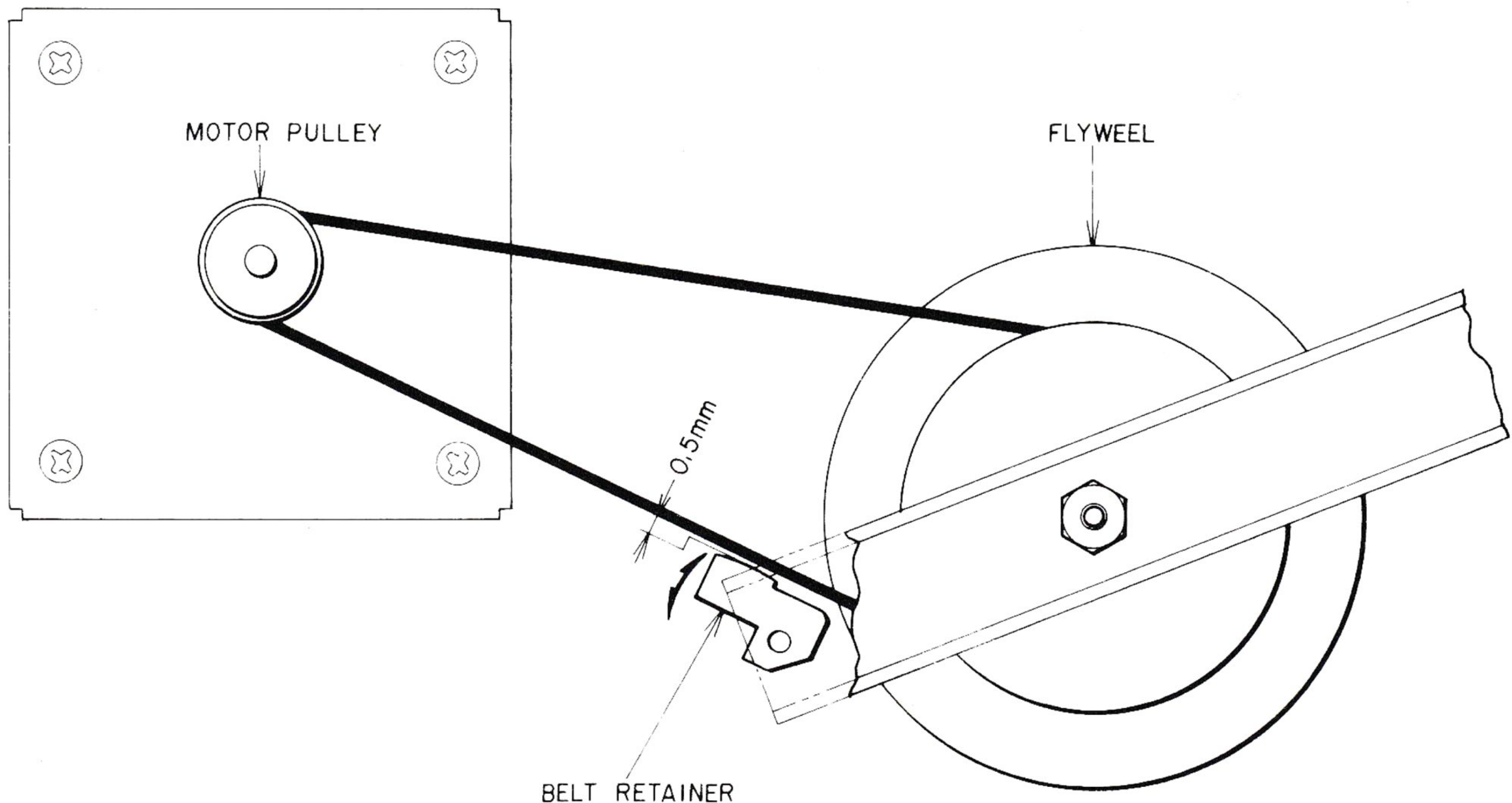


Fig. 16

B. Tie Rod Adjustment (See Fig. 14)

With turn-over branch in correct position, adjust turn-over spring (on end of tie rod) so that the space between the roller (which is attached to and moves the turn-over lever) and the turn-over cam is 0.5 mm.

Caution:

If the space is more than 1 mm, when the turn-over branch inverts, it is unsteady (it vibrates). If less than 0.5 mm, the revolutions of the main gear are not smooth.

C. LIFT CAM ADJUSTMENT (See Fig. 14)

With cassette holder at lifted position (after eject button has been depressed), adjust lift rod so that the protrusion of reel table cap through holes in reel table is from 0 to 0.5 mm above the reel table surface.

Caution:

If cassette holder table is too high, when cassette is inverted and reset, the tape protrudes too much toward the head side.

9-6 SLIDE RACK GEAR SYNCHRONIZATION ADJUSTMENT (See Fig. 15)

For the proper meshing (gearing together) of the slide rack and pinion, adjust pinion bracket fixation nut so that the pinion inserts rather shallowly on the left hand side of the slide rack, and rather deeply on the right hand side of the slide rack.

9-7 MAIN GEAR CLEARANCE

With washer, adjust so that clearance is 0.5 mm.

9-8 TURN-OVER VOLTAGE MICRO SWITCH ADJUSTMENT

The motor voltage is 65 V at normal play. By means of the micro switch, the voltage is increased to 100 V at inverting time (voltage returns to normal after tape is inverted). Adjust micro switch retaining screw so that the micro switch works as stated above.

9-9 AUTOMATIC STOP LEVER ADJUSTMENT

When recording, if Automatic Reverse Key returns to normal position after inverting, no adjustment is necessary. If it does not return, a relative lever is bent. Check levers and straighten.

9-10 SLIDE RACK STOP SPRING ADJUSTMENT (See Fig. 15)

At the point where slide rack gear and pinion gear separates, turn off power switch (during turn-over mode) and adjust the two screws at base of stop spring so that the stop spring fits into groove on slide rack.

9-11 CASSETTE INSERTION ADJUSTMENT

When Eject Button is gently operated, cassette should eject to position where felt square is located (at top of pilot light). If it fails to come to this position, a relative lever is bent. Check levers and straighten.

9-12 BELT RETAINER ADJUSTMENT (See Fig. 16)

Position belt retainer so that there is a space of 0.5 mm between belt and belt retainer.

VII. AMPLIFIER ADJUSTMENT

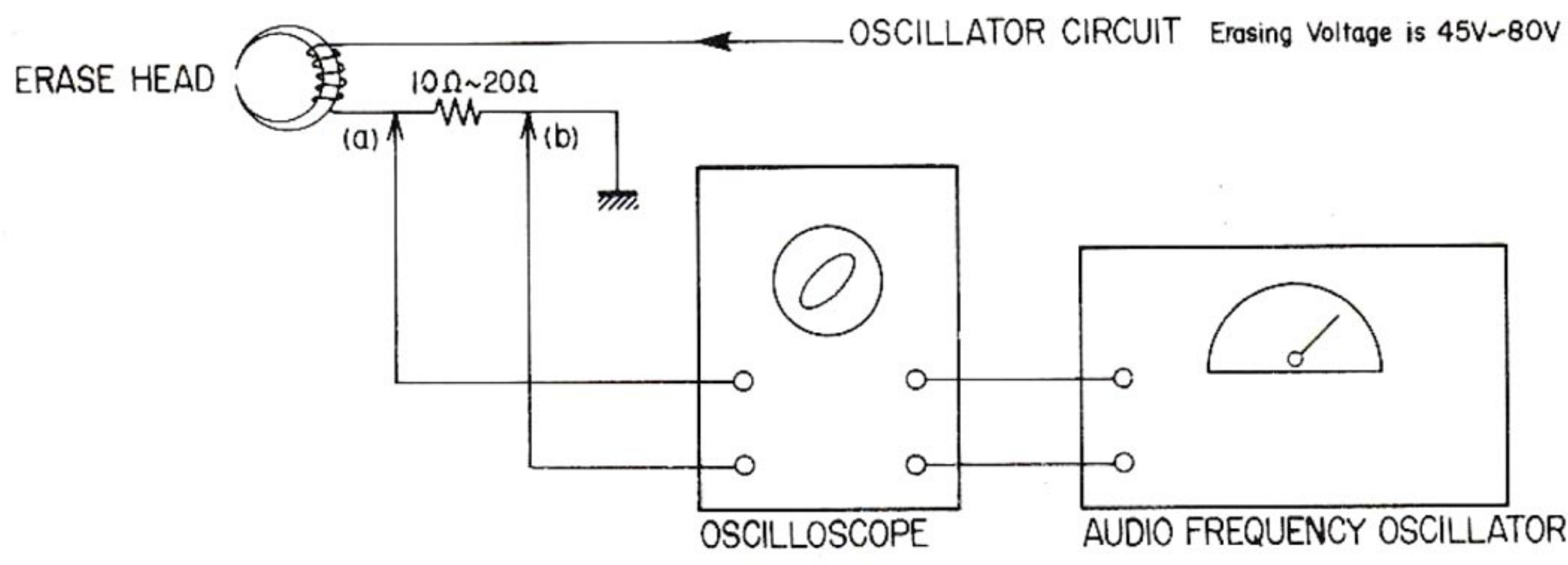


Fig. 1

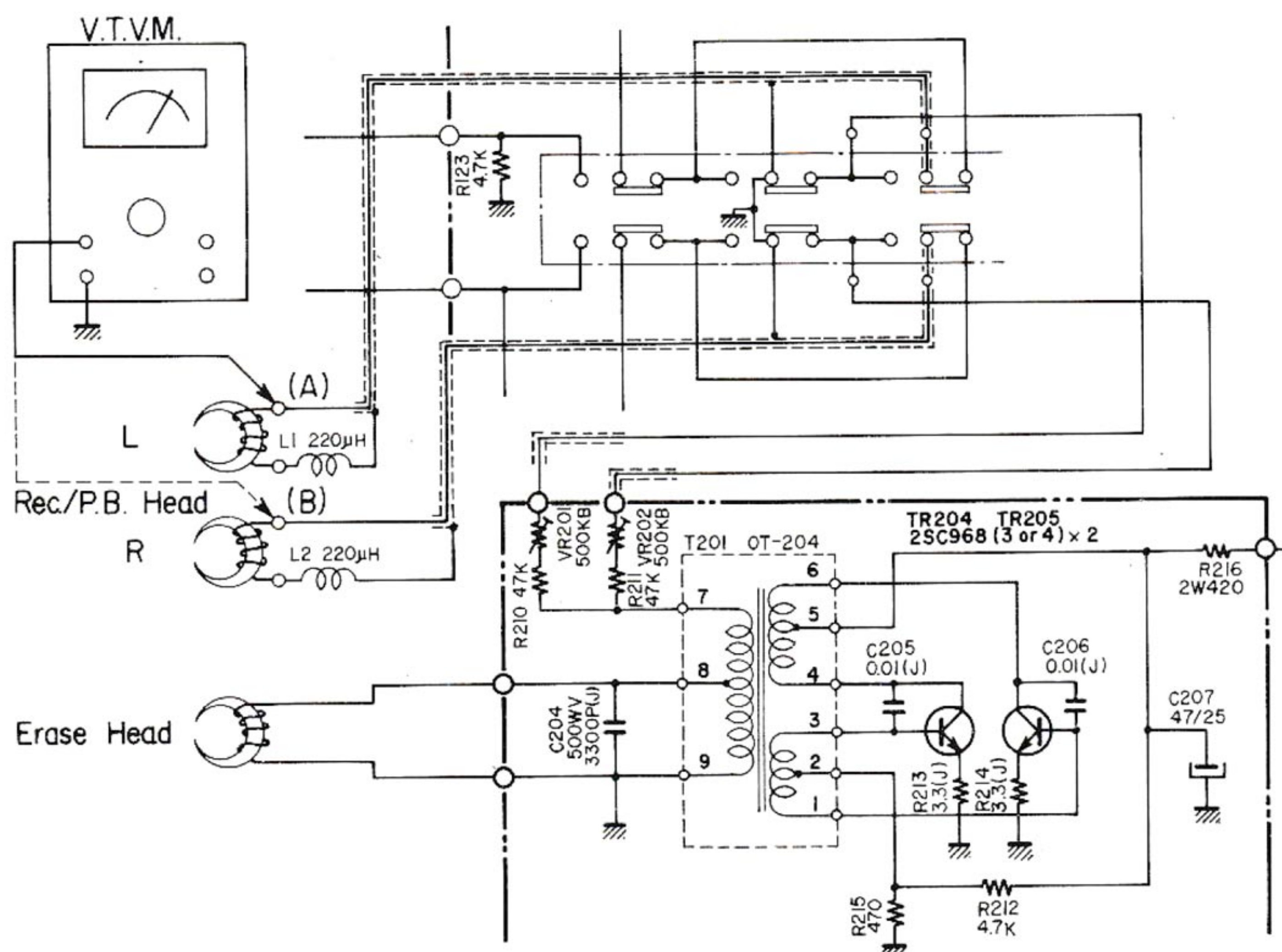


Fig. 2

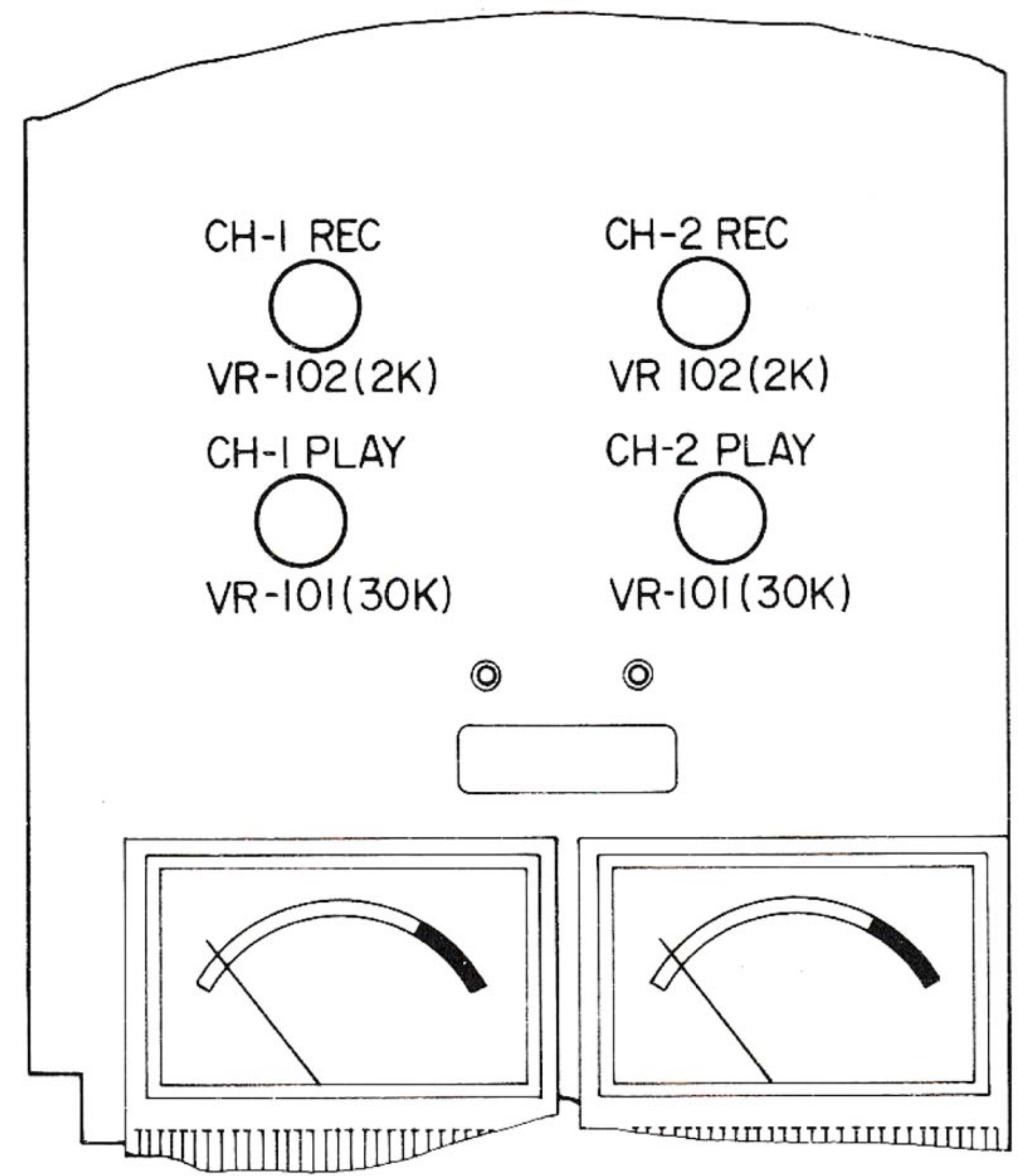


Fig. 3

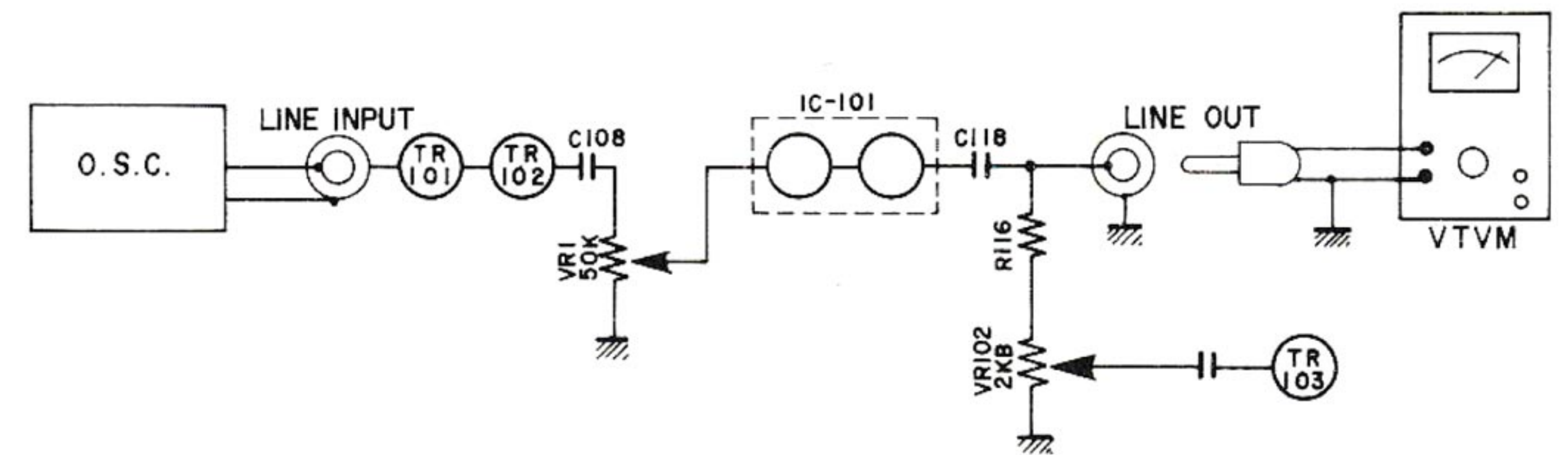


Fig. 4

1. ADJUSTMENT OF RECORDING BIAS FREQUENCY (See Fig. 1)

- Put on the resistor 10 or 50 Ω in series with the Erase Head and connect the Vertical Input Terminal of the Oscilloscope to points (A) and (B).
- Feed in a sine wave signal from an Audio Frequency Oscillator to the Horizontal Input of the Oscilloscope and tune the Dial of the Audio Frequency Oscillator until the Oscilloscope displays a circular or linear pattern. Then read the figure on the Dial of the Audio Frequency Oscillator.
- If it reads 100 kHz (± 10 kHz), the Recording Bias Frequency is correct.
- If incorrect, it may be adjusted by inserting another condenser (C-204) value (3300 PF)

2. ADJUSTMENT OF RECORDING BIAS VOLTAGE (See Fig. 2)

Connect a V.T.V.M. to point (A) or (B) and adjust the recording Bias Voltage by turning VR-201, VR-202 in the bias oscillator circuit. Proper bias voltage is 8 to 15 V.
(The Bias Voltage is adjusted by the Frequency Response)

3. ADJUSTMENT OF LINE OUTPUT LEVEL

- (A) Playback Output Level (Pre-Amplifier Adjustment) (See Figs. 3 & 4)
- Connect a high sensitivity V.T.V.M. to the Line Output Jack.
 - Playback a 333 Hz pre-recorded tape.
 - Adjust VR-101 (left and right) semi-fixed resistor 30 KB of the pre-amplifier so that the Line Output Voltage is 1.228 V +4 dB (± 1.5 dB).

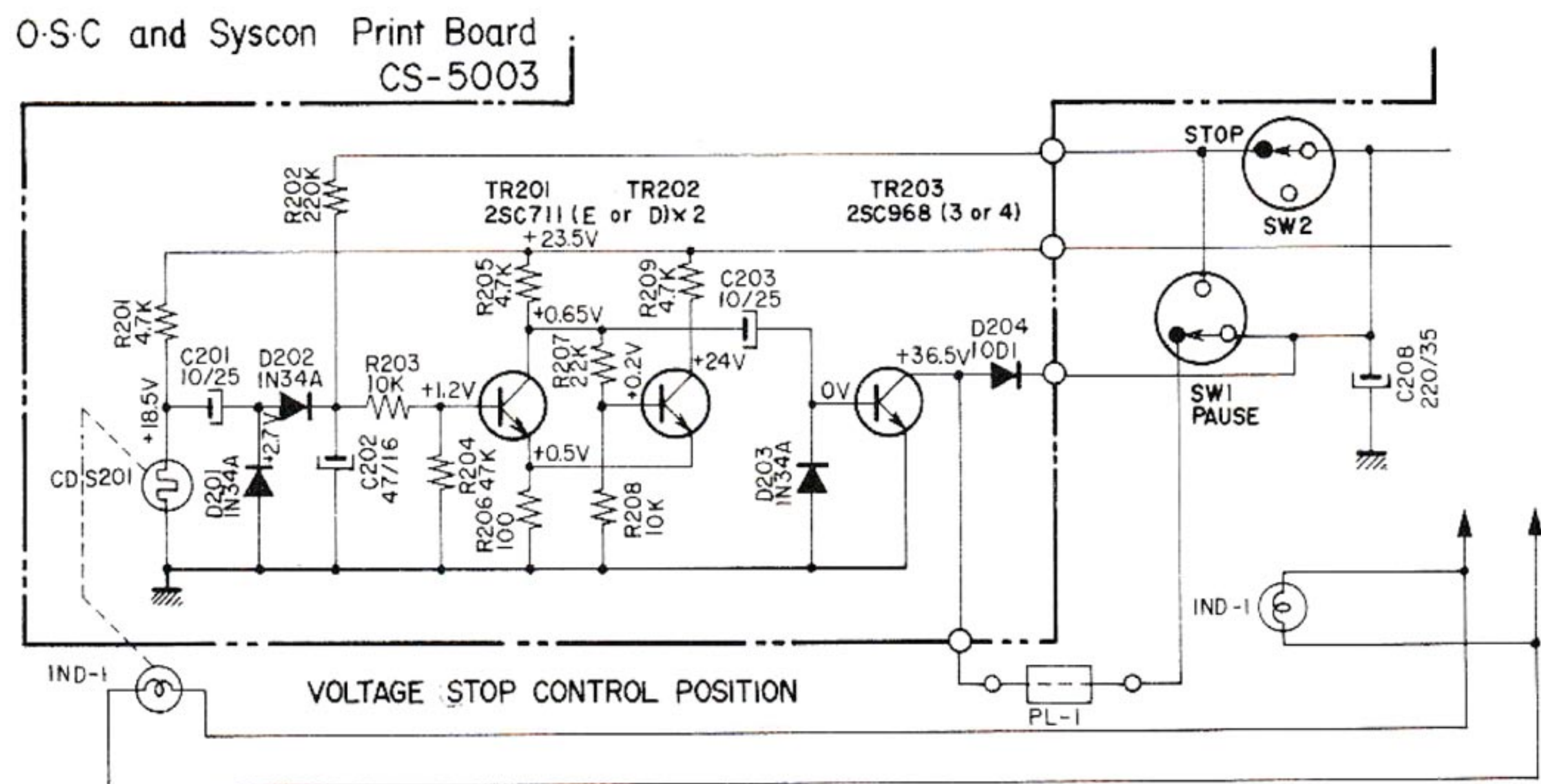


Fig. 5

(B) Recording and Playback

- a) Connect V.T.V.M. to the Line Output Jack and put on a Fuji C-60 LN Tape.
 - b) Set machine to "REC" position.
 - c) Feed in a 1,000 Hz sine wave signal from an Audio Frequency Oscillator to the Line Input of the CS-50 and turn Recording Level Control VR-3 (100 KB) until the Line Output Level reaches "0" VU 1.228 V (+4 dB).
 - d) After a few seconds of recording, rewind the tape back to the starting position. Then playback the tape.
 - e) If the line Output Level does not reach "0" VU, turn the Volume VR-102 (2 KB) until the Line Output Level reaches "0" VU.
- Repeat this process 2 or 3 times (from item c)

4. CASSETTE AUTO-STOP CIRCUIT OPERATING PRINCIPLE (See Fig. 5)

The CDS employs a pilot light (electric eye). When the light is lit, there is a 4.7 KΩ and CDS resistance portion, and a square waveform is produced



D-201 and D-202 produces a double voltage and TR-201 is turned "On". At this time, the C-203 becomes a (-) electrical potential and because it is not being charged with electricity, there is no voltage at the base of TR-203, thus TR-203 is turned "Off".

When the light is not lit, the CDS resistance portion becomes high and TR-201 is turned "Off". At this time, C-203 becomes a (+) electrical potential and because it is being charged with electricity (for about 0.2 seconds), electricity flows to the base of TR-203, TR-203 is turned "On", and Plunger (PL 1) is turned "On". TR-202 is stabilized. (See Fig. 5).

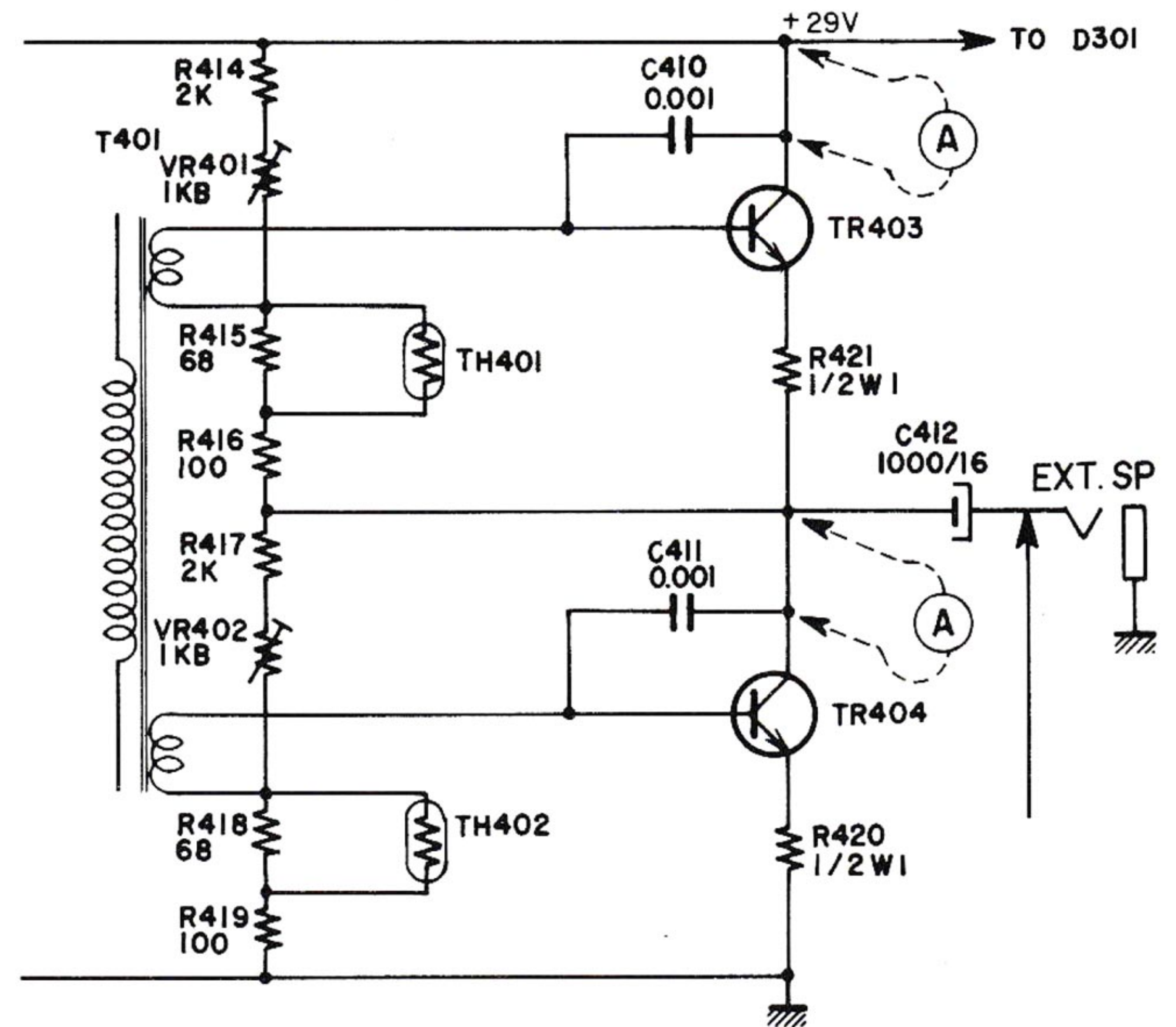


Fig. 6

5. ADJUSTMENT OF DC COLLECTOR CURRENT FOR POWER TRANSISTORS 2SC1013 WITH NO INPUT SIGNAL (See Fig. 6)

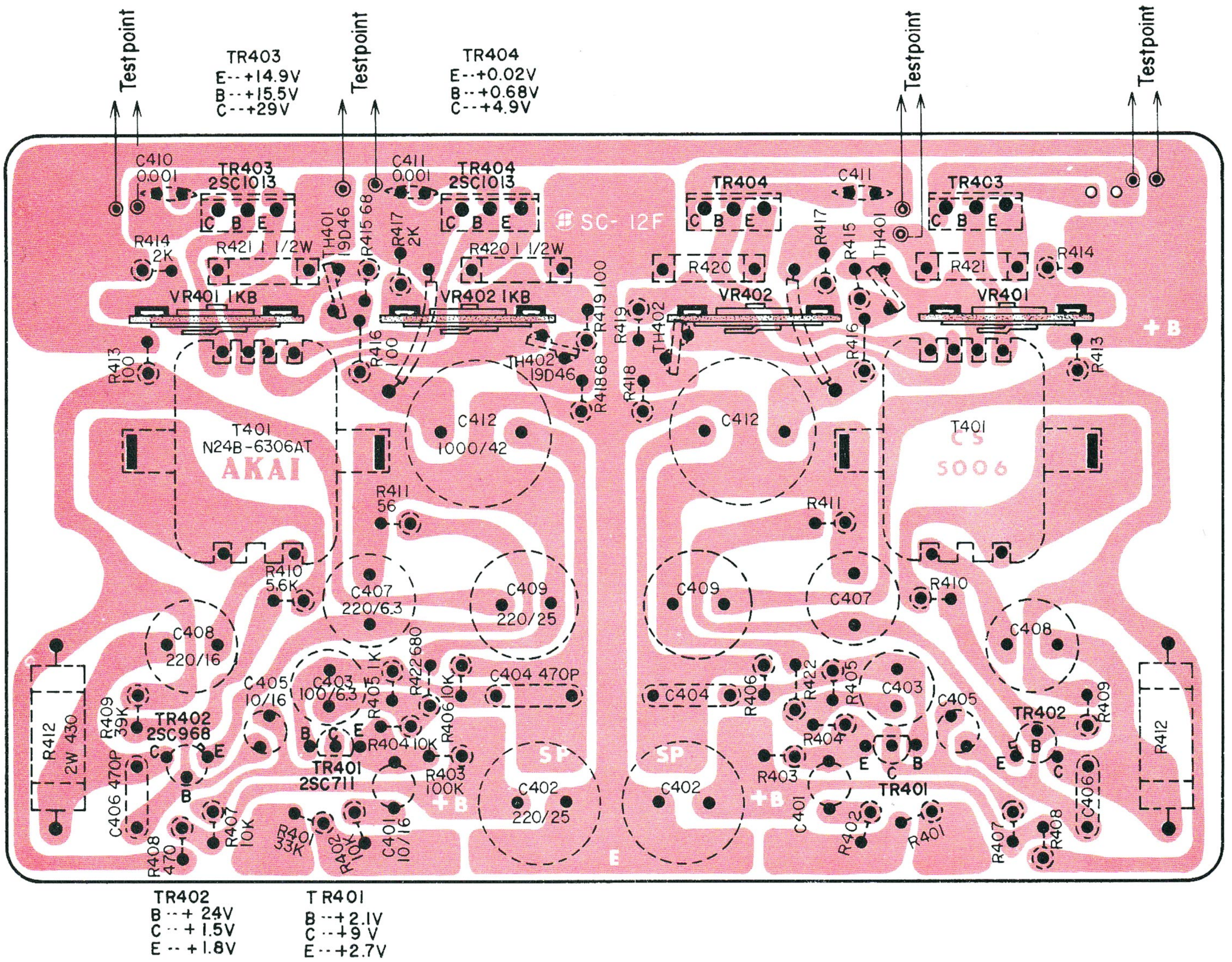
- a) Remove solder between test points a & b, and c & d.
- b) Connect an Ammeter (use one with milli-ampere scale) between test points a & b, and c & d.
- c) Set VR-401 and VR-402 to Minimum.
- d) Turn VR-401 and VR-402 so that the ammeter readings are 16 mA to 18 mA.

Caution:

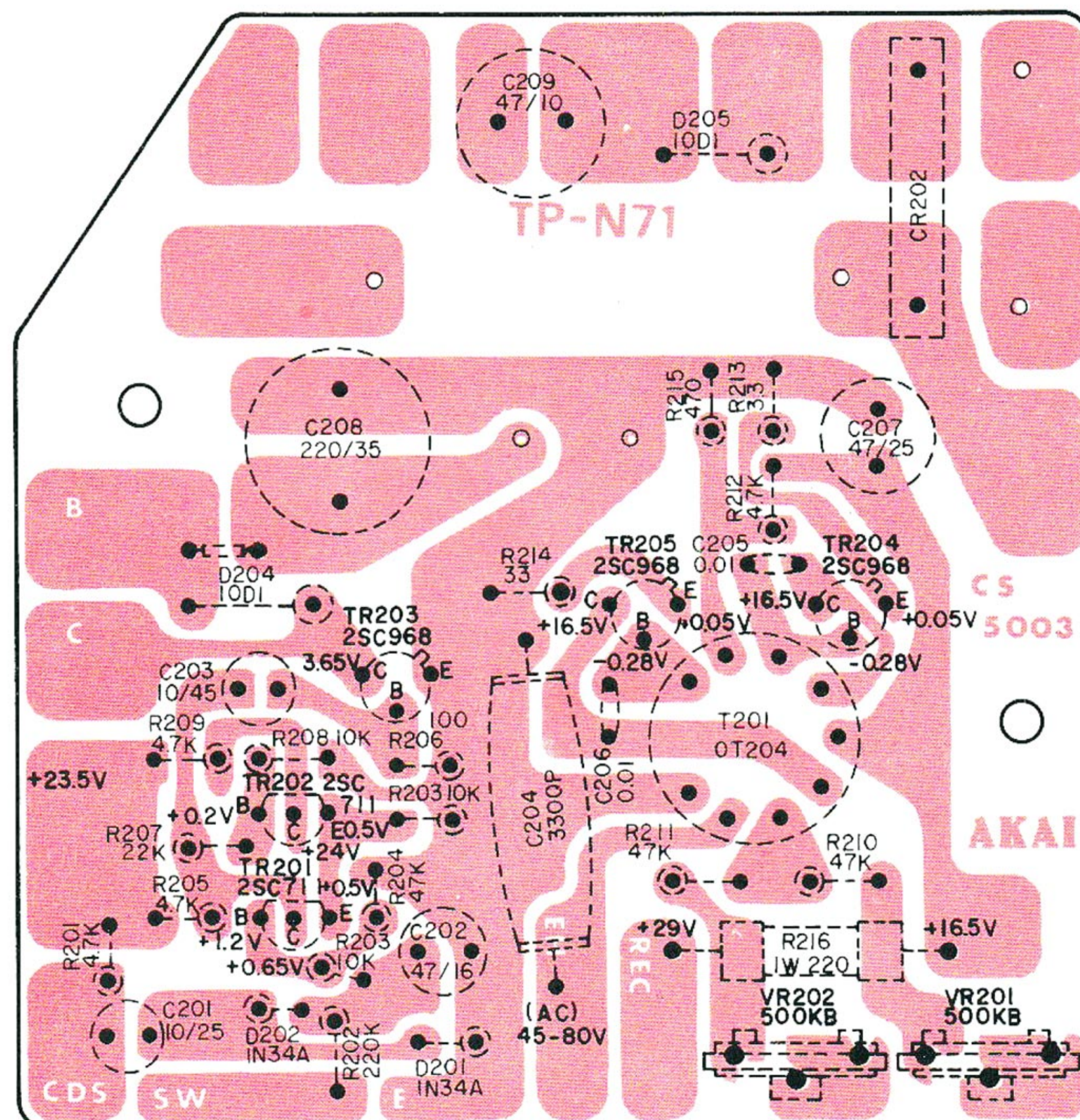
Be careful not to adjust beyond 20 mA.

VIII. COMPOSITE VIEWS OF COMPONENTS

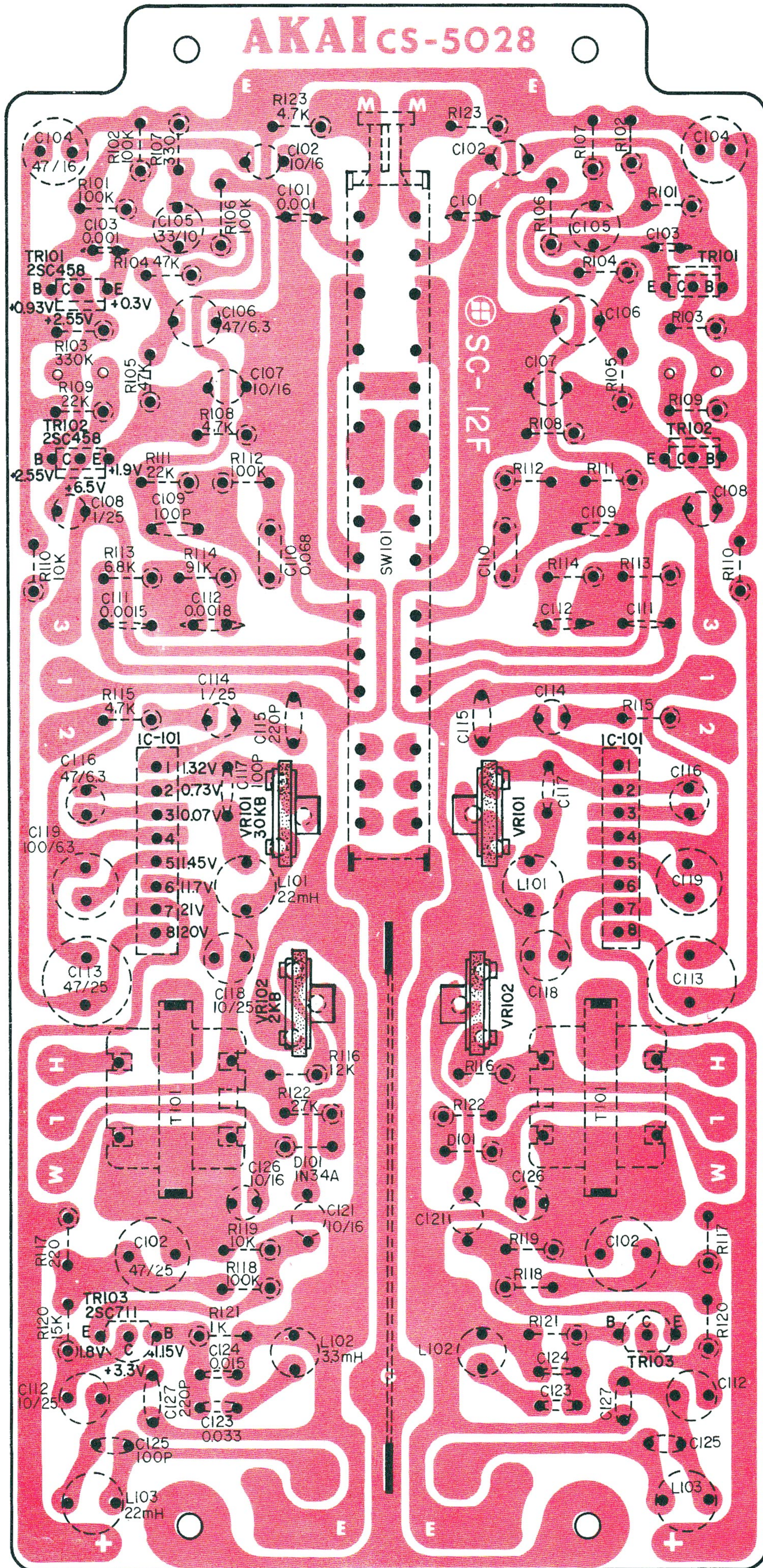
POWER AMPLIFIER P.C. BOARD (CS-5006)



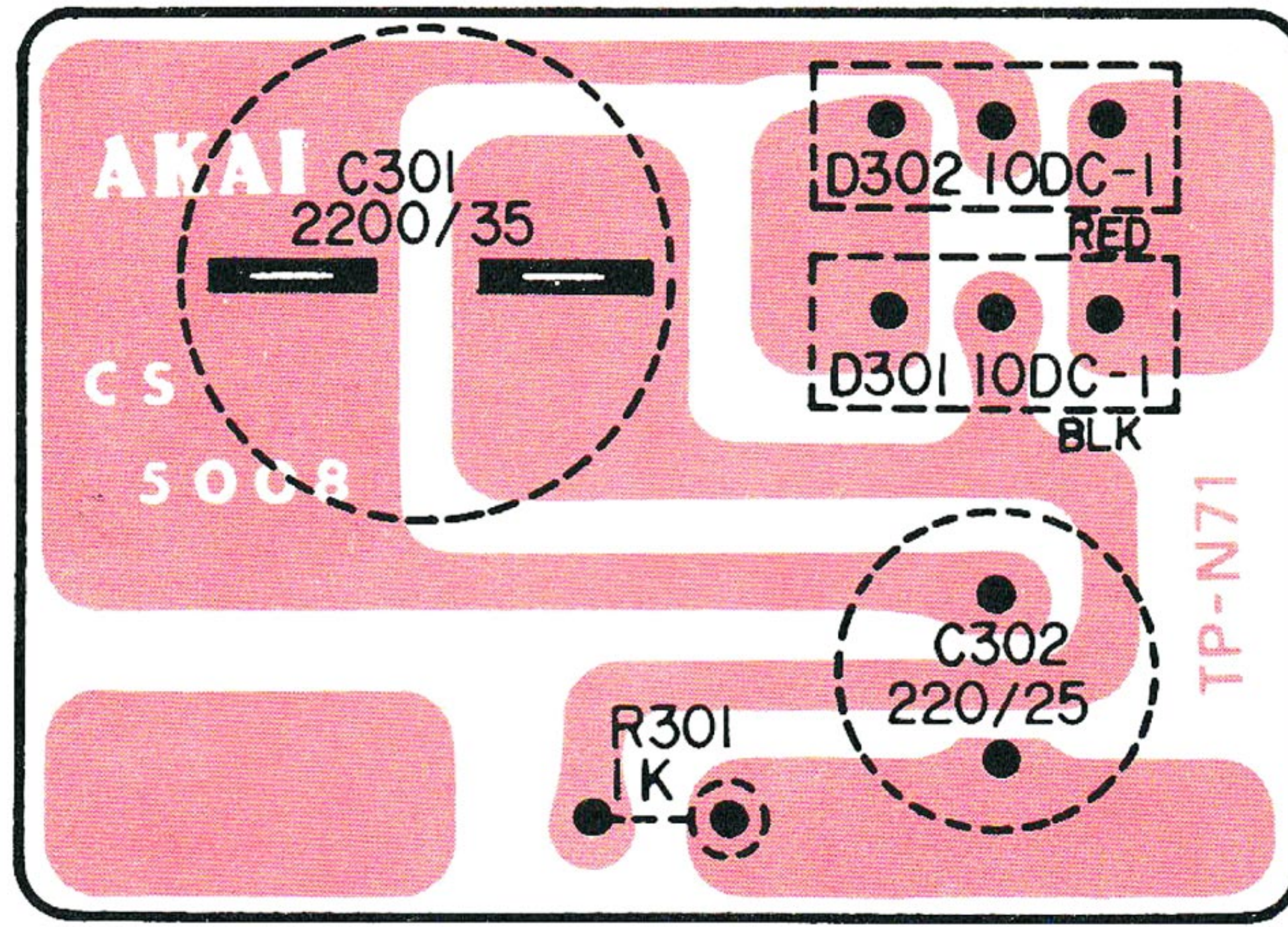
OSCILLATOR, SYSTEM CONTROL P.C. BOARD (CS-5003)



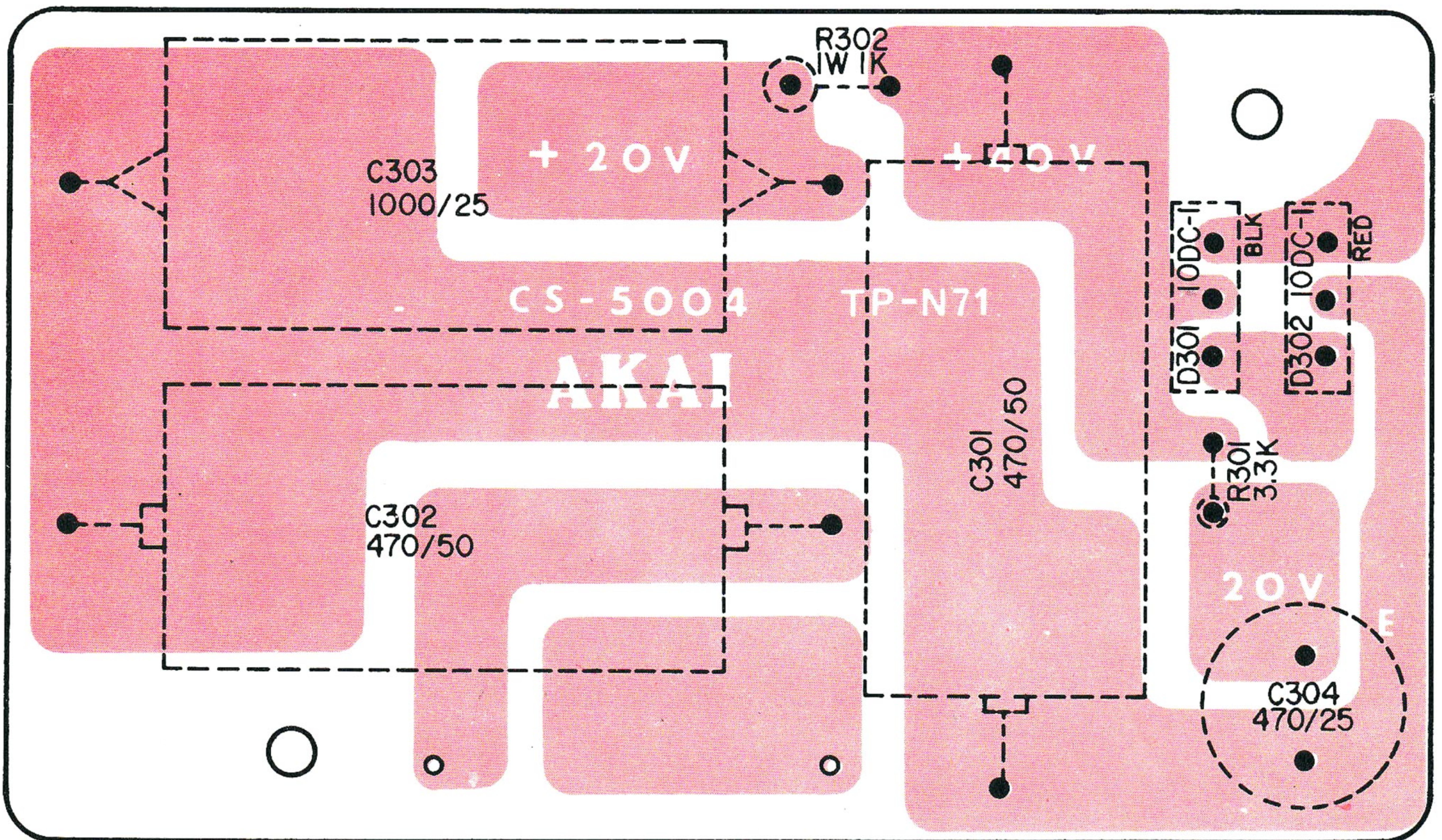
PRE-AMPLIFIER P.C. BOARD (CS-5028)



POWER SOURCE P.C. BOARD (CS-5008)



POWER SOURCE P.C. BOARD (D) (CS-5004)



AKAI

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