

# SERVICE MANUAL

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**AKAI TAPE DECK**

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**MODEL**

**X-100D**

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# I. SPECIFICATIONS

STYLE : Portable

WEIGHT : 30 lbs (13.5 kg)

DIMENSIONS : 13-1/2" (H) × 13-1/2" (W) × 9" (D)  
(340 (H) × 340 (W) × 230 (D) mm)  
overall, case closed

POWER  
SUPPLY : 100, 110, 120, 200, 220, 240 V.A.C.

RECORDING  
SYSTEM : Inline 4-track stereo, monaural recording by using Cross-field bias head.

PLAYBACK  
SYSTEM : Inline 4-track stereo, monaural playback.

TAPE SPEED : 3 speeds ... 1-7/8 ips (4.75 cm/sec.),  
3-3/4 ips (9.5 cm/sec.), 7-1/2 ips (19 cm/sec.) and 15 ips (38 cm/sec.) optional.

TAPE SPEED  
DEVIATION : Less than ±1.5 % at all tape speeds.

WOW AND  
FLUTTER : Less than 0.15 % R.M.S. at 7-1/2 ips.  
(PLAYBACK  
ONLY) Less than 0.25 % R.M.S. at 3-3/4 ips.  
Less than 0.35 % R.M.S. at 1-7/8 ips.

FREQUENCY  
RESPONSE : 30 to 23,000 cps (HZ) ±3 db at 7-1/2 ips.  
30 to 18,000 cps (HZ) ±3 db at 3-3/4 ips.  
30 to 9,000 cps (HZ) ±3 db at 1-7/8 ips.

SIGNAL TO  
NOISE RATIO : Better than 45 db.

DISTORTION : Within 3 % at 1,000 cps (HZ) 0 VU  
(TOTAL  
HARMONICS) recording

CROSS-TALK : Less than -55 db (Monaural)  
Less than -43 db (Stereo)

INSULATION  
RESISTANCE : More than 50 MΩ

INSULATION  
DURABILITY : 1,000V. A.C. for more than one minute duration.

ERASE RATIO : Less than -70 db for all tracks.

POWER CON-  
SUMPTION : 55 VA

FAST FORWARD  
AND REWIND  
TIME : 90 seconds using 1,200 feet tape at 50 cycles. 75 seconds at 60 cycles.

OUTPUT  
LEVEL : 1.228 V (0 VU) at using 1,000 cps 0 VU recorded tape.

OUTPUT  
IMPEDANCE : 1.5 K Ω

OUTPUT LEVEL  
OF HEADPHONE  
JACK : 30~40 mV

OUTPUT  
IMPEDANCE OF  
HEADPHONE  
JACK : 8 Ω

INPUT LEVEL  
LINE INPUT : 50 mV~2.5 V  
MIC. INPUT : 0.5 mV~20 mV

MONITOR  
SYSTEM : Can be monitored the program being recorded by using  
{ Stereo headphone (8 Ω) ... stereo  
headphone jack  
Crystal receiver ..... line  
output jack

MOTOR : Hysteresis synchronous 2-speed motor  
Horse power ... 1/100 HP  
Power ratio ... 85 %  
Revolution ... 3,000 to 1,500 R.P.M. at  
50 cps (HZ)  
3,600 to 1,800 R.P.M. at  
60 cps (HZ)  
Condenser capacity ... 2.8 uF at 50  
cps (HZ)  
2.0 uF at 60  
cps (HZ)

HEADS  
RECORDING/  
PLAYBACK  
HEAD : Inline 4-track stereo/monaural.  
Gap ... 0.2 microns  
Impedance ... 1,000 Ω at 1,000 cps (HZ)

BIAS HEAD : Inline 4-track stereo.  
Gap ... 0.2 mm  
Impedance ... 500 Ω at 60 kc.

ERASE HEAD : Inline 4-track stereo.  
Gap ... 0.2 mm  
Impedance ... 300 Ω at 60 kc.

RECORD LEVEL  
INDICATOR : Vertical indication Model "A" VU meter ×2

EQUALIZA-  
TION : Correct equalization for playback of tapes recorded to the NAB curve.

TRANSISTOR  
USED : 2SB 443(A) ×2  
2SB 370A(B) ×1  
2SB 75(B) ×6  
2SB 75(F) ×2

SILICON  
DIODE USED : 5 GB or SW-05-01 ×2  
SD-101 ×2

REELS USED : Up to 7" reel

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## II. MEASURING METHOD

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### TAPE SPEED DEVIATION

1. Method involving use of pre-recorded tape.

Playback on the tape recorder to be tested tape pre-recorded at 1,000 cps  $\pm 0.1\%$  for measuring tape speed deviation. Connect the appropriate output to a frequency counter meter in order to measure the tape speed deviation from the resulting deviation of the measured frequency.

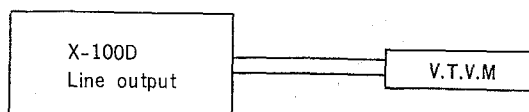
2. Method involving use of timing tape (designed for tape speed measurement).

This method utilizes a timing tape marked at intervals of  $7\frac{1}{2}$ ". The running time of the tape over 60 marked section is measured in order to calculate the deviation of the tape speed. In application of this method, however, it should be borne in mind that should the timing tape stretch or contract, measurement error is inevitable, so that it is necessary to measure the total length of the tape in advance.

### WOW AND FLUTTER

Playback the 3,000 cps pre-recorded tape whose wow and flutter level is guaranteed to be smaller than 0.07% for measurement by means of a wow meter. It is also possible for a 3,000 cps sine wave to be recorded and played for measurement by means of the wow meter. In this case, however, the wow meter indicates a value as much as twice the value given in the specification on the first page.

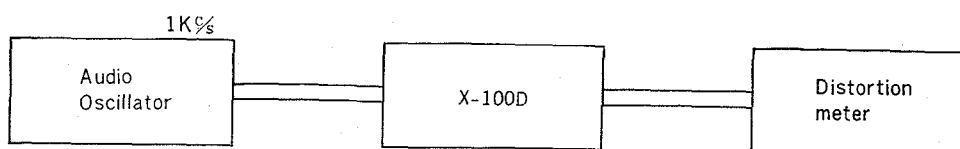
### SIGNAL TO NOISE RATIO



Set the Equalizer Switch on "7-1/2 ips" position and playback a tape containing a 1,000 cps 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 into decibels each of the measured values.

### TOTAL HARMONIC DISTORTION FACTOR



Connect the measuring instrument as shown above, and record the 1,000 cps 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 may 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

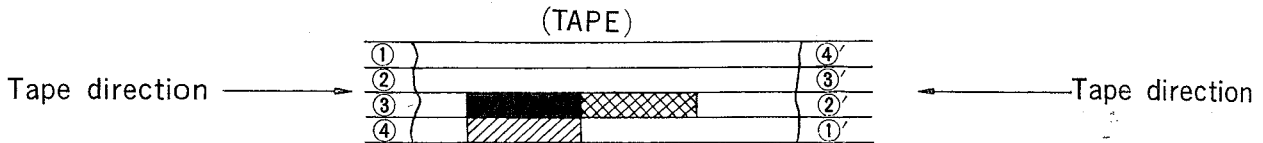
(Note: New tape of particularly good quality should be used for measurement of the distortion factor).

### POWER OUTPUT

Playback a tape containing a sine wave of 1,000 cps recorded at 0 VU on a standard recorder.

Connect a V.T.V.M. to the line output jack of the recorder and measure the voltage at the output of the recorder to be tested.

## CROSS TALK (Cross talk between the tracks)



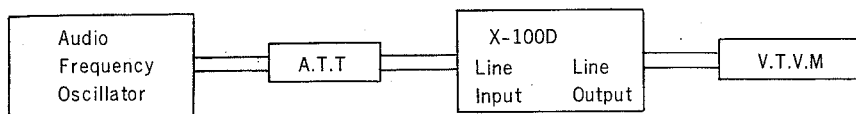
As shown in the figure, first record a 1,000 cps sine wave on track No. 3 at +3 VU level. Next, remove the 1,000 cps input signal and record under a non-input condition.

Then, playback the tape on track No. 3 and No. 1 (reversed condition of tape) through the 1,000 cps B.P.F. (Band Pass Filter, Sensitivity . . . 1 : 1) and obtain a ratio between the two from the following formula.

$$C = 20 \log \frac{E_0}{E_2 - E_1} \text{ (db)}$$

{	$C$ = Desired cross talk ratio (db) $E_0$ = 1,000 cps signal output level $E_2$ = 1,000 cps cross talk output level $E_1$ = No-input signal record level	
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## FREQUENCY RESPONSE



Connect the measuring instrument as in the above diagram, and measure the frequency response in the following sequence :

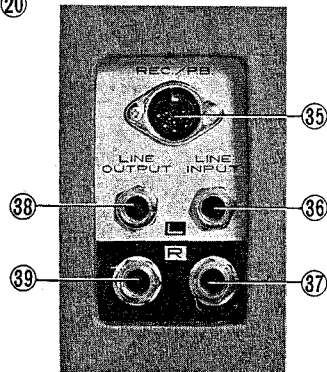
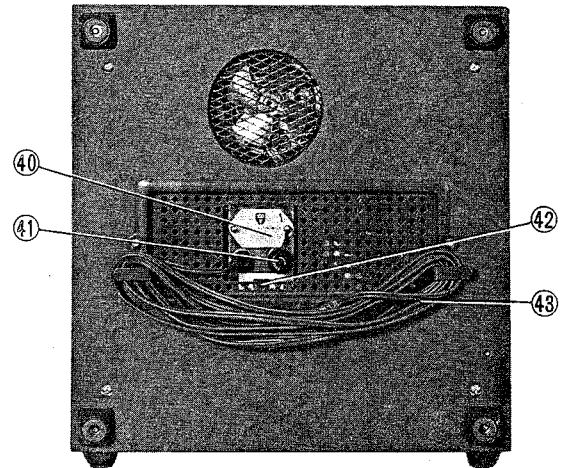
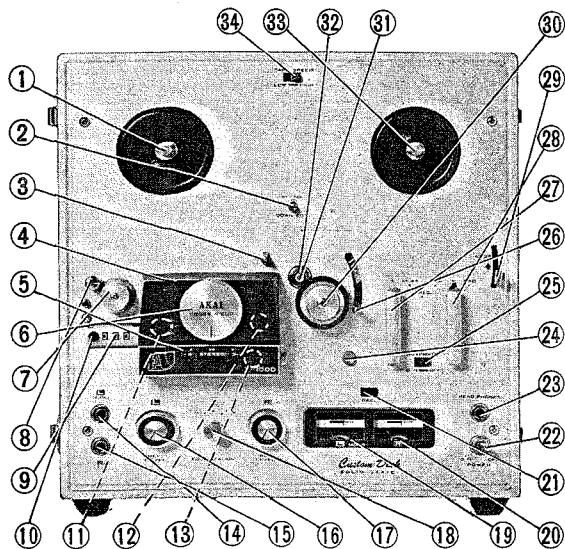
### RECORD :

- 1) Give a sine wave of 1,000 cps to the Line Input of the recorder to be tested through an attenuator from an audio frequency generator.
- 2) Set the Record/Playback Knob in to "Rec" position and adjust the line input volume so that the VU meter needle indicates "0" VU.
- 3) Under the condition described in (2), lower the input level 10 db by means of the attenuator.
- 4) Record the spot frequency in the range of 30 cps to 25,000 cps from the audio frequency generator.

### PLAYBACK :

- 5) Set the Record/Playback Knob in to "Play" position.
- 6) Set the Equalizer Switch on 7-1/2" or 3-3/4" position.
- 7) Connect a V.T.V.M. to the Line output.
- 8) Playback the tape previously recorded.
- 9) Adjust the output level to "0" dbm at 1,000 cps as indicated on the V.T.V.M. by the range selector of a V.T.V.M.
- 10) Playback the recorded spot frequencies with the conditions in (9) ; make a memo of output level and plot the value on a graph.

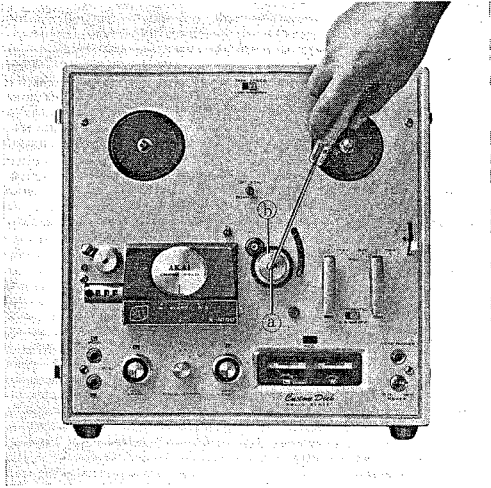
### III. LOCATION OF CONTROLS



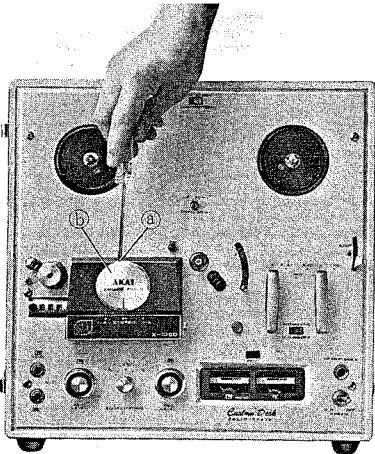
- |  |                               |
|--|-------------------------------|
| ① Supply Reel Shaft                    | ⑲ Stereo Headphone Jack       |
| ② Cycle Conversion Switch (A)          | ⑳ Recording Safety Button     |
| ③ Capstan Storage Post                 | ㉑ AS Switch                   |
| ④ Head Cover (A)                       | ㉒ AS Lever                    |
| ⑤ Head Cover (B)                       | ㉓ Record/Playback Knob        |
| ⑥ Track Selector Knob                  | ㉔ Fast-Forward/Rewind Knob    |
| ⑦ Tape Guide                           | ㉕ Instant Stop Lever          |
| ⑧ Tape Cleaner                         | ㉖ Pinch Wheel                 |
| ⑨ Index Counter                        | ㉗ Capstan Shaft               |
| ⑩ Reset Button                         | ㉘ Capstan                     |
| ⑪ Erase Head                           | ㉙ Take-Up Reel Shaft          |
| ⑫ Recording/Playback Head              | ㉚ Speed Change Switch         |
| ⑬ Bias Head                            | ㉛ Din Jack                    |
| ⑭ Microphone Jack (Left)               | ㉜ Line Input Jack (Left)      |
| ⑮ Microphone Jack (Right)              | ㉝ Line Input Jack (Right)     |
| ⑯ Recording Level Control Knob (Left)  | ㉞ Line Output Jack (Left)     |
| ⑰ Recording Level Control Knob (Right) | ㉟ Line Output Jack (Right)    |
| ⑱ Equalizer Knob                       | ㊱ Voltage Conversion Switch   |
| ⑲ VU Meter (Left)                      | ㊲ Fuse Post                   |
| ⑳ VU Meter (Right)                     | ㊳ Cycle Conversion Switch (B) |
| ㉑ Recording Lamp                       | ㊴ AC Cord                     |
| ㉒ Power Switch                         |                               |

## IV. DISASSEMBLY OF TAPE TRANSPORT UNITS & AMPLIFIERS

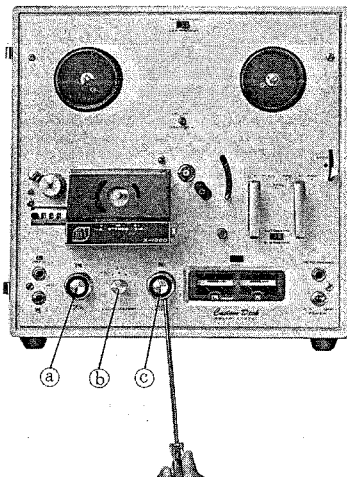
- (1) Loosen the RETAINING SCREW (a) of PINCH WHEEL (b) using a phillips-headed screw driver and remove the PINCH WHEEL by hand.



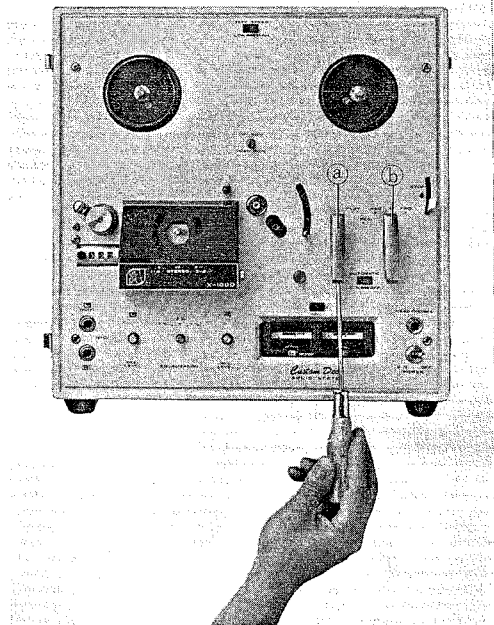
- (2) Loosen the RETAINING SCREW (a) of the TRACK SELECTOR KNOB (b) using a phillips-headed screw driver and remove the TRACK SELECTOR KNOB by hand.



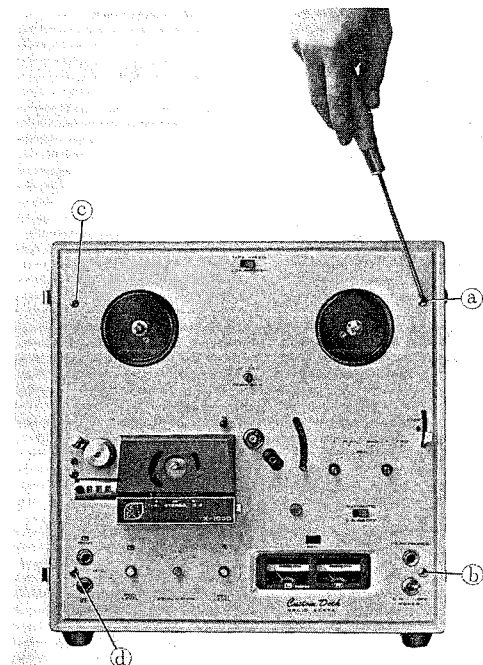
- (3) Loosen the RETAINING SCREWS of the KNOBS (a), (b) and (c) by using a minus-headed screw driver and remove the KNOBS by hand.



- (4) Loosen the RETAINING SCREWS of the DECK CONTROL KNOBS (a) and (b) by using a phillips-headed screw driver and remove the KNOBS by hand.

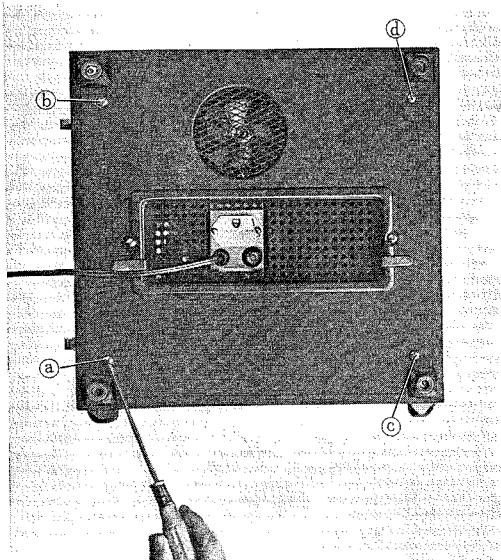


- (5) Loosen the SCREWS (marked from (a) to (d)) by using a phillips-headed screw driver and remove the DECK PANEL by hand.

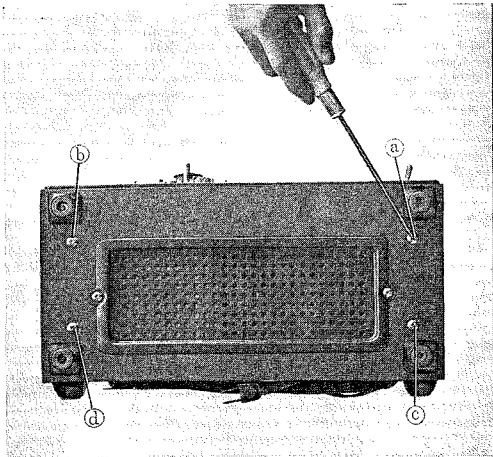




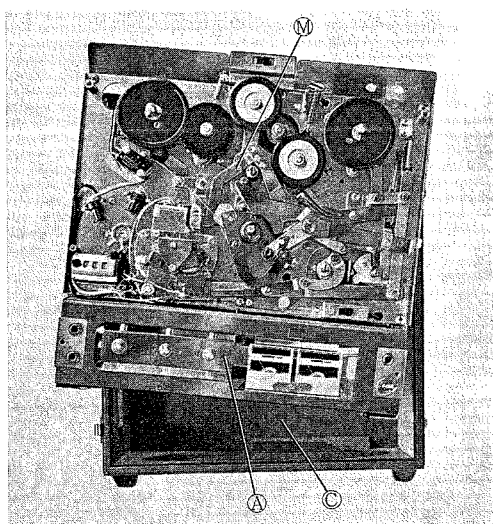
(6) Loosen the SCREWS (marked from (a) to (d)) by using a phillips-headed screw driver.



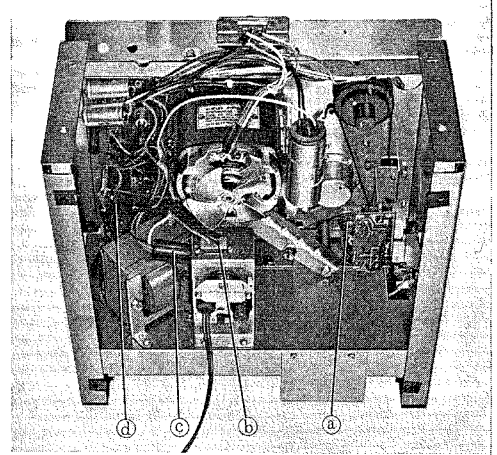
(7) Loosen the SCREWS (marked from (a) to (d)) by using a phillips-headed screw driver.



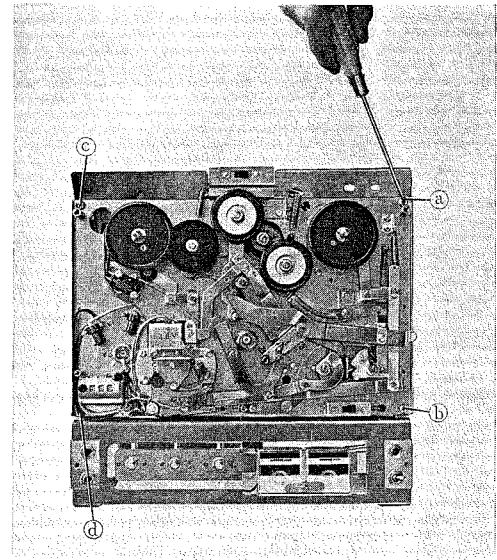
(8) Remove the TAPE TRANSPORT MECHANISM ASSEMBLY (M) and AMPLIFIER ASSEMBLY (A) by slowly lifting it from the CASE (C) as shown in picture.



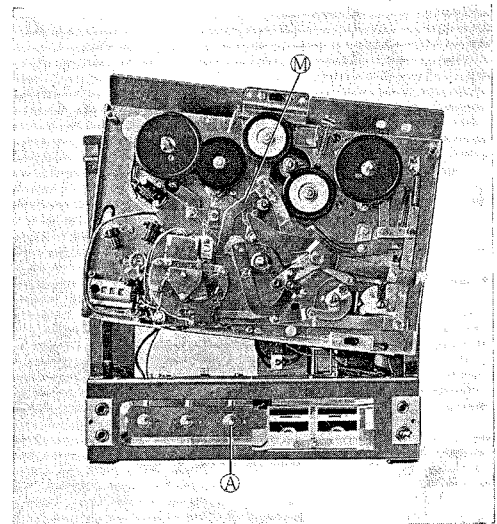
(9) Disconnect the PLUGS (marked (a) to (d)) carefully by hand.



(10) Loosen the SCREWS (marked from (a) to (d)) of the DECK FRAME by using a phillips-headed screw driver.



(11) Separate the TAPE TRANSPORT MECHANISM ASSEMBLY (M) from AMPLIFIER ASSEMBLY (A) carefully by hand.





## V. TRANSPORT MECHANISM

### Driving of Capstan

Figure 1.

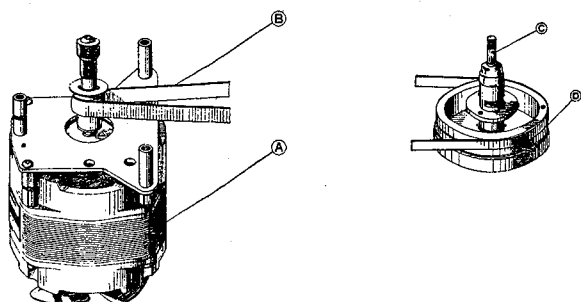


Fig. 1

- (A) Motor
- (B) Driving Belt (flat belt)
- (C) Capstan
- (D) Flywheel

High-speed rotation of *Motor* (A) is reduced by *Driving Belt* (B) and transmitted to *Capstan* (C), which is connected to *flywheel* with ample inertia and enables rated rotation by absorbing minor rotation distortion of motor itself.

Capstan Rotation	606 R.P.M. at 7-1/2" (19 cm) per sec.
	303 R.P.M. at 3-3/4" (9.5 cm) per sec.
	151.5 R.P.M. at 1-7/8" (4.75 cm) per sec.
Motor Rotation	3,000 to 1,500 R.P.M. at 50 cps.
	3,600 to 1,800 R.P.M. at 60 cps.

### Driving of Pinch Wheel

Put tape between rotating capstan and pinch wheel and push pinch wheel against capstan, this will transport the tape at rated speed. The appropriate pressure of pinch wheel is between 1,000 to 1,150 grams at the tape speed of 7-1/2" (19 cm) per second.

### Recording and Playback

Turn the *RECORD/PLAYBACK KNOB* (A) to "PLAY" position, and pinch wheel presses against capstan to move tape at the rated speed. At the same time, *Idler* (b) moves between *Motor Bushing* (C) and the *Take-Up Reel Spindle* (D) to transmit the motor rotation to (D) so that the tape is moved and wound on the take-up reel.

The *Take-up Reel Spindle Base* is made up of two plastic rollers (1 and 2) with a clutch felt in between. The *Idler* is rotating the plastic roller (2) under. Therefore, the tape-winding friction is adjusted by the slipping of the felt to enable rated winding of the tape.

On the other hand, the *Supply Reel Spindle* (H) has a *Brake Roller* (E) hung on the *Plastic Roller* (4) under which provides appropriate back tension by the clutch felt slipping to the rotation of the *Pulley* (3) above.

To prevent accidental erasure, the *Record Interlock Button* (F) must be depressed before the *RECORD/PLAYBACK KNOB* can be moved to the "REC" position. The *Safety device* (G) is depressed to enter the record mode.

(See figures 2 and 3)

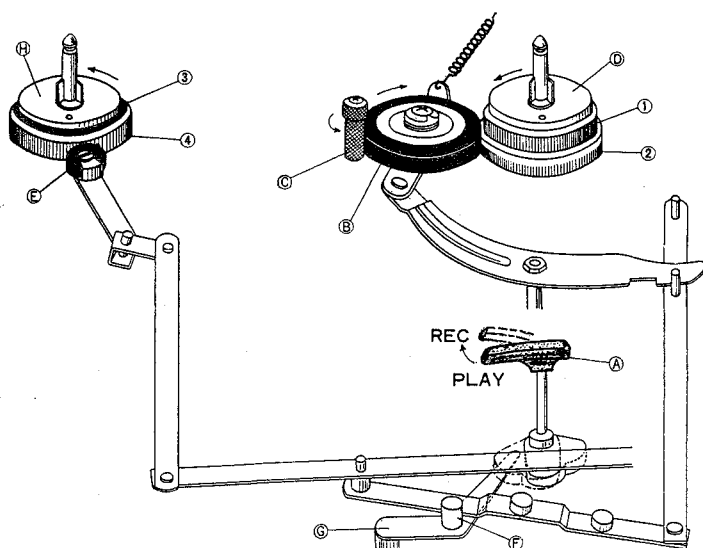


Fig. 2

Braked Rotation      Slipping Rotation

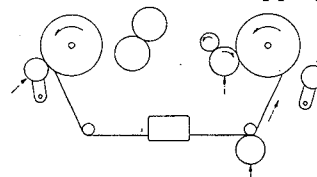


Fig. 3

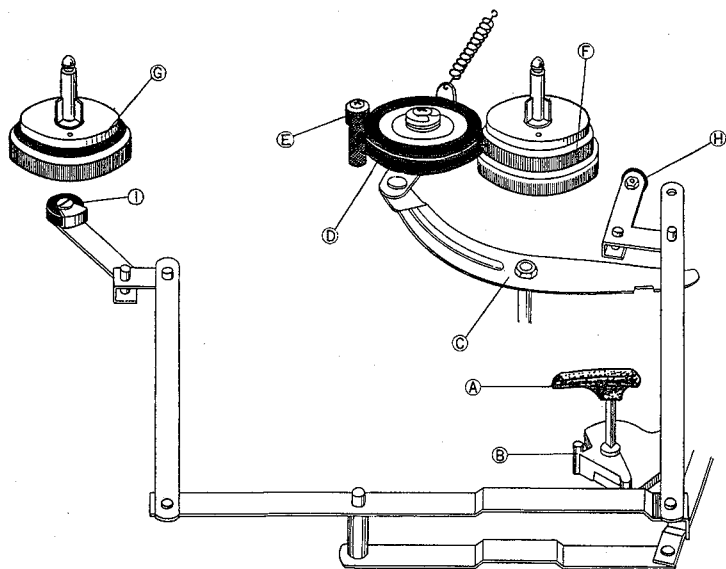


Fig. 4

### FAST-FORWARD MECHANISM

Turn the *FAST FWD-REWIND knob (A)* to "FAST FWD" position, and the *cam (B)* under the knob pushes up the *Lever (C)*. The *Idler (D)* moves into the space between the *Plastic Roller (F)* above the *Take-Up Reel Spindle* and the upper part of the rotating motor drive bushing to transmit the motor rotation to the take-up reel spindle. At the same time, *Brake Rollers (H)* and *(I)* come off the reel spindle to free the *Supply Reel Spindle (G)*, thereby allowing fast winding of the tape onto the take-up reel.

(See figures 4 and 5)

Free Rotation      High-Speed Rotation

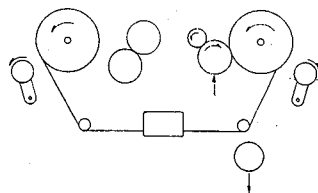


Fig. 5

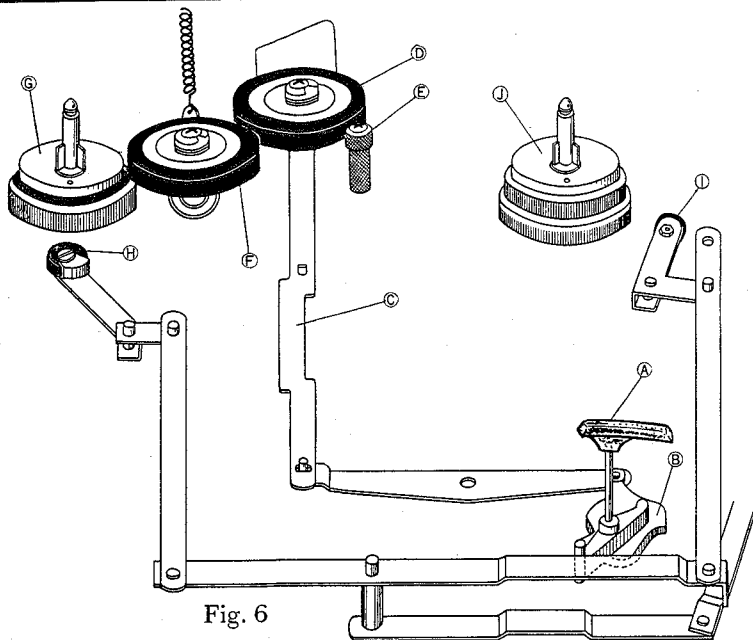


Fig. 6

### REWIND MECHANISM

Turn the *FAST FWD-REWIND knob (A)* to "REWIND" position, and the *cam (B)* under the knob pushes the *Lever (C)* up. The *Idler (D)* moves into the space between the upper part of the rotating *Motor drive bushing (E)* and the *Intermediate Pulley (F)* to transmit the high-speed rotation of the motor through the intermediate pulley to the *Supply Reel Spindle (G)*. At the same time, *Brake Rollers (H)* and *(I)* come off the reel spindle to free the *take-up reel spindle (J)*, thereby rewinding the tape into the supply reel at a fast speed.

(See figures 6 and 7)

High-Speed Rotation      Free Rotation

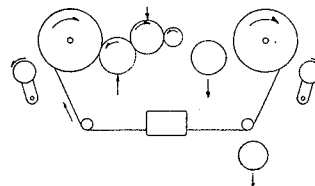


Fig. 7

Modes of Operation	Pinch Wheel	Take-up Idler Wheel	Rewind Idler Wheel	Take-up-side Brake	Supply side Brake
(a) STOP	×	×	×	○	○
(b) FAST-FORWARD	×	○	×	×	×
(c) REWIND	×	×	○	×	○
(d) RECORDING PLAYBACK	○	○	×	×	×

NOTES: ×-marks indicates "open" and ○-marks "engaged"

### STOP CONTROL

Push the stop lever to "STOP" position, *Brake Rollers (A)* and *(B)* depress reel spindles to stop rotation of the reel spindles.

As the brake rubber depresses the plastic rollers under the reel spindles, no friction works on the tape itself.

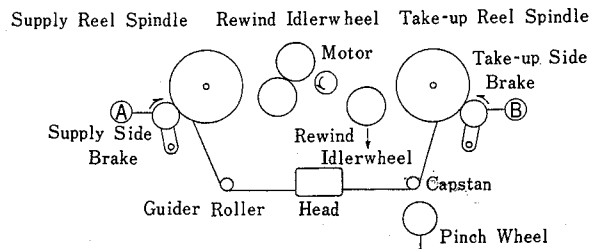


Fig. 8

## RECORD/PLAYBACK CHANGING MECHANISM

By turning the RECORD/PLAYBACK KNOB (N) to the recording position, the LEVER (a) pushes the RECORDING LEVER (b) and (c), as illustrated in dotted line, then the RECORD/PLAYBACK CHANGING SWITCH (SWI) turns to recording position.

If the LEVER (b) does not push the LEVER (c) properly, the SWI does not operate properly so may occur the abnormal oscillation and also can't record.

Then must adjust the LEVER (b) to proper position by loosening the SCREW (d).

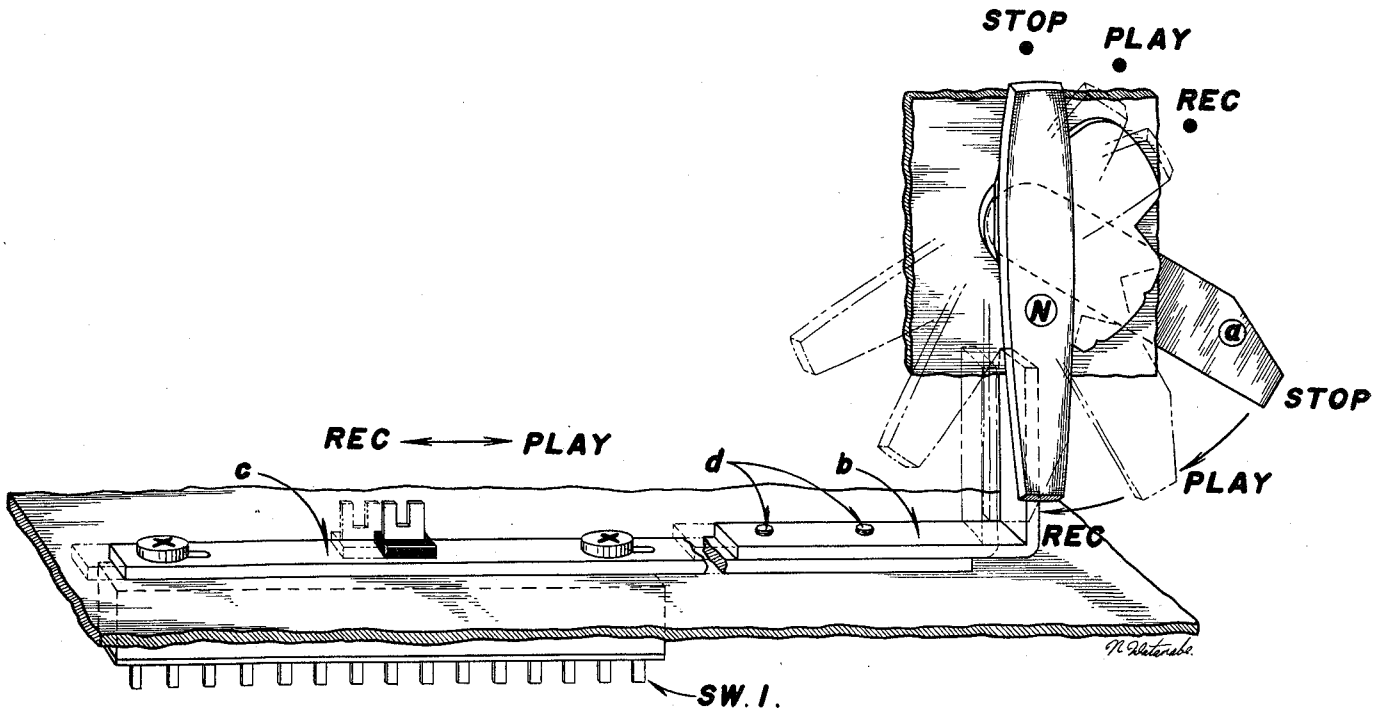


Fig. 9

## VI. ADJUSTMENT OF TAPE TRANSPORT UNIT

### 1. ADJUSTMENT OF PINCH WHEEL

It is important that the pinch wheel shaft is kept in complete alignment with the capstan shaft. A proper pinch wheel pressure is between 1,000 and 1,150 grams when the unit is operated at the tape speed of 7-1/2 ips. Any deviation from this specification will result in wow and flutter. Check pinch wheel pressure by a spring scale and, if necessary, adjust the pinch wheel load spring.

### 2. ADJUSTMENT OF TAKE-UP IDLER WHEEL

The take-up idler wheel must be kept in complete alignment with the take-up reel shaft. When the unit is set in fast forward condition, the idler wheel will contact to the upper knurled wheel of the take-up reel shaft assembly, and it will contact to the lower knurled wheel during record or play mode. Adjust idler wheel load spring so that the idler wheel pressure is kept between 50 and 80 grams. The idler wheel rapidly wears if the pressure is excessive. The slippage occurs if the pressure is smaller than the specification.

### 4. ADJUSTMENT OF INTERMEDIATE WHEEL

The intermediate wheel is located between the rewind idler wheel and the rubber ring which is used on the upper part of the supply reel shaft assembly. When the unit is set in rewind mode, it will contact to these parts simultaneously delivering torque of motor. An adequate pressure is 50 grams. Adjust the load spring of the intermediate wheel if the pressure is not sufficient.

### 5. ADJUSTMENT OF TAKE-UP REEL SHAFT ASSEMBLY

A felt clutch material is attached to the bottom side of the reel table base plate so that recording tape will not be stretched during fast forwarding operation due to excessive tension. To check the amount of friction of this part, place a 5-inch reel with recording tape wound by 60 m/m in diameter, and gently pull the end of tape upward using a spring scale. Adjust the conical spring so that the amount of tension at this part will be kept between 400 to 500 grams. Another felt clutch material is attached to the take-up drive wheel. It is to provide proper slipping operation during record or play mode. The procedure for checking friction of this part is same as the foregoing, and between 120 and 200 grams of friction will provide the best result. Adjust the star-shaped spring just under the take-up drive wheel. When the unit is set in rewind mode, the amount of friction of this part will greatly be reduced and will become 10 to 20 grams. Check to see whether this is satisfactory if not, readjust the star-shaped spring for Brake, and spring retainer washed accordingly. (See figure 1 (b) at left)

### 6. ADJUSTMENT OF SUPPLY REEL SHAFT ASSEMBLY

A felt clutch material is used between the lower side of the reel table base plate and the rewind rubber ring to protect recording tape from an excessive tension while rewinding operation. To check the amount of friction of this part, place onto the supply reel table a 5-inch reel with recording tape wound by 60 m/m in diameter and gently pull the end of tape upward by a spring scale. Adjust the conical spring so that the amount of tension is kept between 400 and 500 grams. Another felt clutch is attached to the rewind drive wheel to provide proper slipping operation during record or play mode. The procedure for checking friction of this part is same as the foregoing, and between 80 and 120 grams of friction will give the best result. When the unit is set in fast forward mode, the amount of friction will greatly be reduced and will become 10 to 20 grams.

Check to see whether this is proper, if not, readjust coil spring and spring retainer washer. (See figure 1 (a) at left)

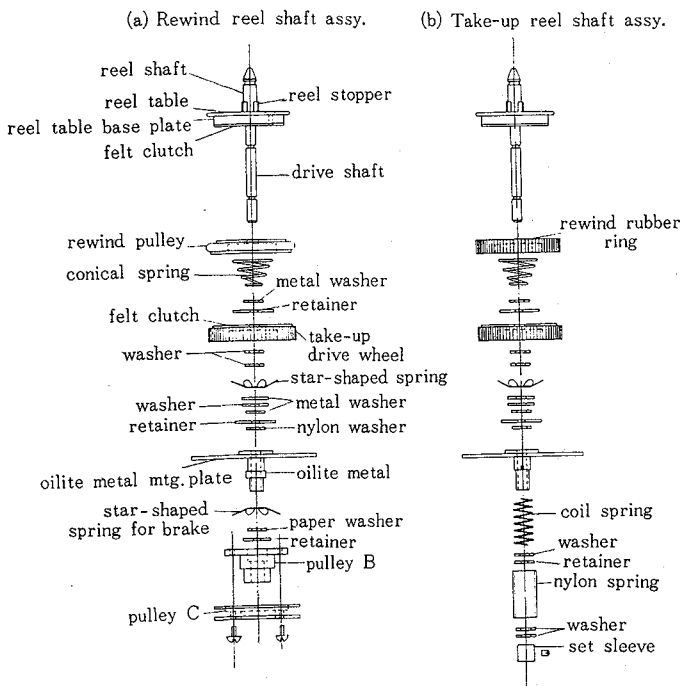
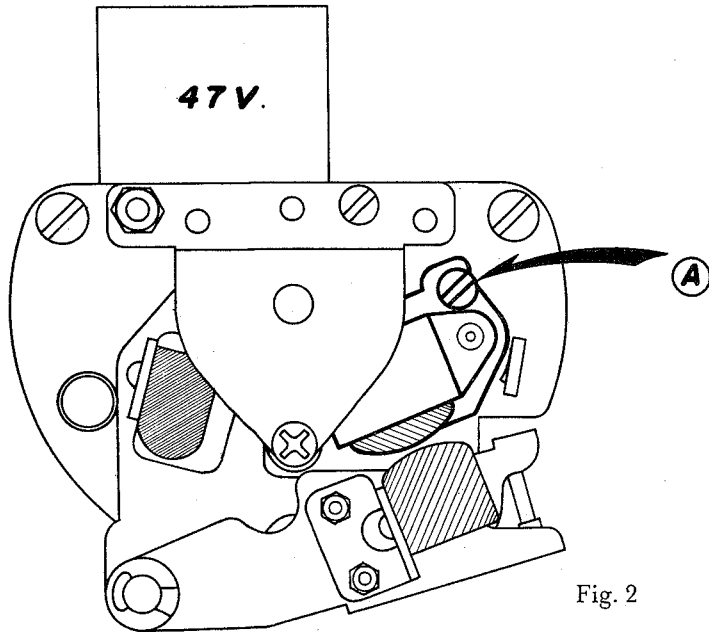


Fig. 1

### 3. ADJUSTMENT OF REWIND IDLER WHEEL

The rewind idler wheel must be kept in complete alignment with the rewind reel shaft. The amount of pressure to the knurled motor bushing should be maintained about 50 grams during rewind operation. Adjust both the idler load spring and rewind roller.

## 7. ADJUSTMENT OF HEAD



- a) Playback 15 kc/s or 16 kc/s recorded tape and set the azimuth alignment of the Recording/Playback Head by turning the screw (A) until the voltage of the Line Output or the VU meter reads at a maximum.
- b) Adjustment of Head Level.

Fig. 2

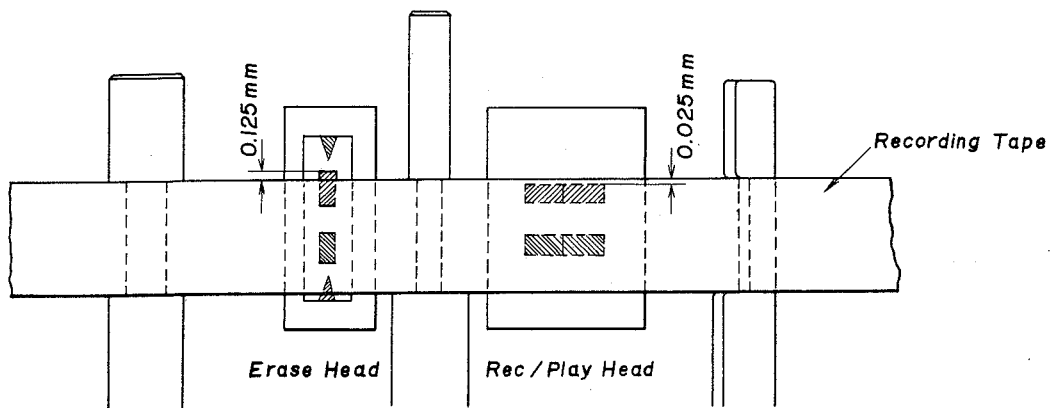


Fig. 3

- ① Position the Erase Head about 0.125 mm above the upper edge of the tape by adjusting the height of the cam provided in the lower part of the head assembly.
- ② Adjust the position of the Recording/Playback Head in a manner illustrated in figure 3 by adjusting the level control nut (A) at the lower part of the head assembly.

## VII. ADJUSTMENT OF AMPLIFIER

### 1. ADJUSTMENT OF RECORDING BIAS FREQUENCY

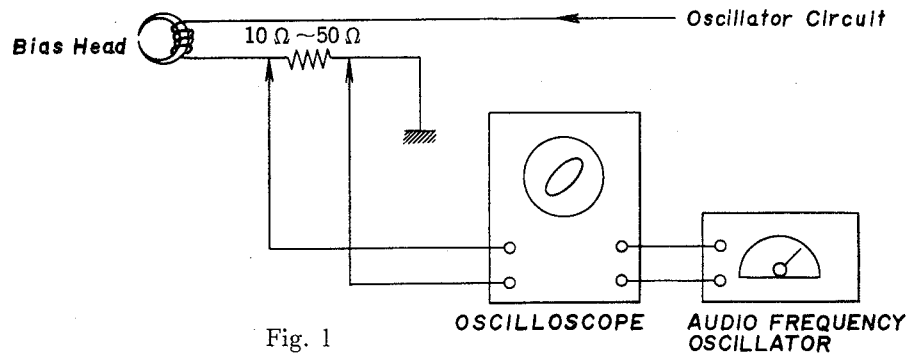


Fig. 1

- a) Connect the resistor ( $10\ \Omega$  or  $50\ \Omega$ ) in series with the bias head, and connect the signal from the resistor to the vertical input of the oscilloscope. The output of the audio frequency oscillator should be connected to the horizontal input of the oscilloscope. Proper Bias frequency of the recorder X-100D is obtained when the oscilloscope displays a circular or linear waveform with the frequency of the audio frequency oscillator in the neighbourhood of 60 kc/s. The frequency of the bias oscillator circuit can be adjusted by converting the value of the condenser (C 18. 10,000 PF).

### 2. ADJUSTMENT OF RECORDING BIAS VOLTAGE

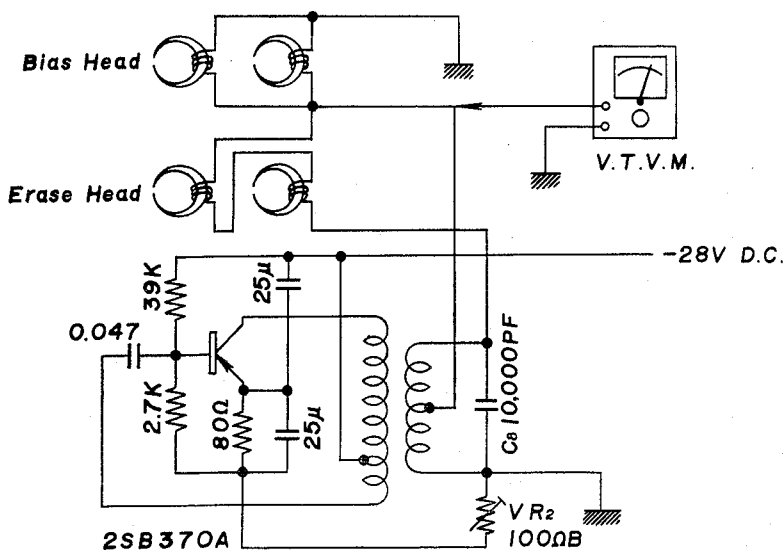


Fig. 2

- a) Connect the V.T.V.M. to the bias head and fix the recording bias voltage by adjusting the VR2 ( $100\ \Omega B$ ) in the bias oscillator circuit (located near the head assembly) until its readings becomes equal to the bias voltage stamped backside the head assembly. Normal bias voltage is between 42 V and 47 V, while acceptable terminal voltage of the erase head is between 18 V and 24 V.

---

### 3. ADJUSTMENT OF PLAYBACK GAIN

- a) Playback 0 VU tape recorded with 1,000 c/s signal information and adjust the semi-fixed resistor VR201 (20 K $\Omega$ B) of the preamplifier card so that the pointer of the VU meter registers on 0 VU point (intermediate between red and black).
- b) When performing the above adjustments, make sure that the equalization switch has been set in coincidence with the speed of the tape.

### 4. ADJUSTMENT OF RECORDING LEVEL

- a) The recording level should be adjusted after the playback gain has been adjusted in the manner described.
- b) Set a standard tape (SCOTCH-111) on the recorder X-100D and put it in a recording mode of operation.
- c) Connect the signal of 1,000 c/s from the audio oscillator to the line input of the recorder X-100D, and adjust the volume control so that the pointer of the VU meter registers on 0 VU (intermediate between red and black).
- d) Now record the tape and check on playback whether the pointer of the VU meter comes on the 0 VU point.
- e) If the pointer of the VU meter fails to register with 0 VU, repeat the recording and playback by adjusting the semi-fixed register VR101 (2 K $\Omega$ B) of the recording preamplifier until the 0 VU reading is obtained both on recording and playback.



## VIII. MAINTENANCE PROCEDURES

### 1. LUBRICATION INSTRUCTION

For maximum service life and optimum performance, lubricate the parts identified below after each 500 hours of operation. Use only light machine oil of good quality.

Motor	
Flywheel Assembly	
Rewind Idler Wheel and Wind Take-Up Idler.	1 drop
Intermediate Idler	1 drop
Pinch Wheel	1 drop

Also apply a liberal film of light machine grease to each roller surface of all levers and cams.

**CAUTION:** DO NOT OVER-LUBRICATE, AND WIPE OFF EXCESS OIL BY A COTTON SWAB SOAKED IN ALCOHOL. OTHERWISE, THE OVER-FLOWED LUBRICANT MAY BE SCATTERED DURING OPERATION. THE RUBBER COMPONENT PARTS WILL BE DETERIORATED.

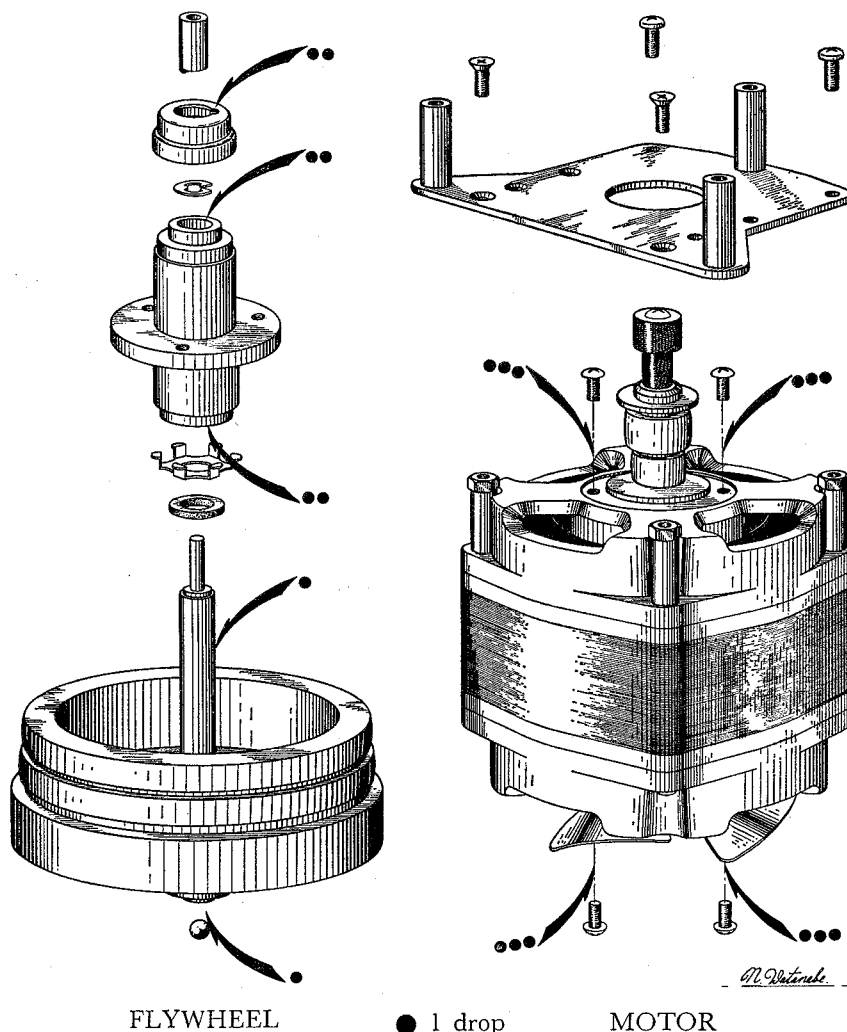


Fig. 1

### 2. CLEANING TAPE HEADS AND OTHER PARTS

Wipe surface of tape heads, guide roller bearing, capstan bushing and pinch wheel periodically with a soft cloth soaked in alcohol or carbon-tet.

## IX. LIST OF REPLACEMENT PARTS

Parts No.	Nomenclature
C1-001	Deck Panel
002	Knob, Track Selector Control
002a	Screw, Retaining Track Selector Control Knob
003	Head Cover (Main)
004	Head Cover (Sub)
005	Base, Head Cover
006a	Capstan Rest
006b	Capstan Holder
007a	Top Plate, Tape Guide
007b	Table, Tape Guide
007c	Bearing, Tape Guide
007d	Bottom Plate, Tape Guide
008	Tape Cleaner, Complete
008a	Felt, Tape Cleaner
009	Prop A, Head Cover
010	Prop C, Head Cover
011	Escutcheon, Meter
012	Escutcheon, Recording Lamp
<b>DECK FRAME</b>	
C2-001	Deck Frame
002	Head Assembly, Complete
002a	Erase Head
002b	Record/Playback Head
002c	Bias Head
002d	$\mu$ Spring, D
002e	Tape Guide (No.17)
002f	Tape Guide (N-3)
002g	Tape Guide (N-2)
002h	Table, Head
002i	4 T Cam
002j	Gear B, Head
002k	Spring, Field Table
002l	Holder, Spring
002m	Nut, Head Lever
002n	Up-Down Table, Field
002o	Table, Field
002p	Spring, Field Table
002q	Micro Angle Table
002r	4 T Shaft
002s	Upper Plate, Head
002t	Screw, Angle Adjustment
002u	Plate, retaining Erase Head
002v	Plate, retaining Record/Playback Head
002w	Side Plate, Bias Head
002x	Rotary Switch
002y	Gear A, Head
002z	4 T Switch Table

Parts No.	Nomenclature
C2-003	Tape Counter, Complete
003a	Pulley, Counter
003b	Belt, Counter
004	Supply Reel Assembly, Complete
004a	Plate (Large), Reel
004b	Shaft A, Reel
004c	Rubber Ring
004d	Rewind Pulley
004e	Spring G (Left)
004f	Washer
004g	Thrust Washer Pin, Reel
004h	Take-up Roller, C
004i	Holder, Reel (Star Type Spring)
004j	Nylon Washer
004k	Washer
004l	Washer
004m	Thrust Washer Pin, Reel
004n	Washer
004o	Washer
004p	Metal Fitting, Reel
004q	Holder, Reel (Star Type Spring)
004r	Washer
004s	Washer Pin
004t	Pulley B2, Reel
004u	Screw, without Head 4 x 7
004v	Pulley C, Reel
004w	Screw Flat .3 x 6
004x	Screw
005	Take-up Reel Assembly, Complete
005a	Take-up Roller, A
005b	Spring G (Right)
005c	Take-up Roller, D
005d	Spring F3
005e	Washer
005f	Washer
005g	Set Sleeve
005h	Screw, without Head 3 x 3.2
005i	Nylon Tube
006a	AS Lever, Complete
006b	Spring, AS Lever
006c	Plate, AS Lever (with Prop)
007a	Instant Stop Lever, A
007b	Spring, Instant Stop Lever
007c	Stopper, Instant Stop Lever
007d	Holder B, Instant Stop Lever
007e	Screw, Retaining Instant Stop Lever
008a	Recording Safety Button
008b	Cam Stopper
008c	Fiber, Cam Stopper
008d	Insulator Plate, Cam Stopper
009a	Pinch Wheel
009b	Metal Cap, Pinch Wheel
009c	Screw, Pinch Wheel
009d	Lever, Pinch Wheel
009e	Shaft C, Pinch Wheel
009f	Spring, Pinch Wheel

Parts No.	Nomenclature
C2-009g	Shaft A, Cam Roller
009h	Cam Roller, B
010a	Lever, Take-up Brake Roller
010b	Rubber (Small), Brake
010c	Screw, Brake Roller
010d	Shaft, Brake Lever
011a	Lever, Supply Brake Roller
011b	Rubber (Large), Brake
011c	Screw, Brake Roller
011d	Shaft, Brake Lever
012a	6 P Slide Switch ESS-22C-NB (Automatic Switch)
012b	Plate, Automatic Switch
013a	Speed Change Switch
013b	Table, Speed Change Switch
014	Idler Wheel, A
015	Internal Wheel
016a	Lever, A (with Lever E)
016b	Shaft, Lever A
016c	Spring, D
017a	Lever, B (with Lever D)
017b	Cam Roller, A
017c	Cam Roller, B
017d	Spring, B
018a	Lever, C3
018b	Spring, D
019a	Lever, G (with Lever H-D)
019b	Metal, Lever G
019c	Shaft B, Idler
019d	Spring, Lever H-D
020a	Lever, K
020b	Screw
020c	Torsion Spring, D
020d	Bush
021a	Lever, FA
021b	Cam Roller, A
022	Lever, F (for Motor)
023	Lever, A2
024	Field Lever, A
025	Field Lever, B
026	Field Lever, D
027	Field Lever, E
028	Prop A, Panel

Parts No.	Nomenclature
C2-029	Holder B, Spring
030	Pin B, Spring
031	Stopper C, Lever G
032	Hum Bucking Coil
033	Cycle Change Switch
034	Micro Switch V-1A
035	3 P Lug Plate
036	4 P Jack
037	Variable Resistor 100 ohms B-W 183K
038a	Lever, Belt Change
038b	Stopper, Belt Change Lever
038c	Spring, Belt Change Lever
038d	Spring B, Belt Change Lever
040	Table, Oscillator Card Block
041	Supporting Angle

#### MOTOR BLOCK

C3-001	Motor, Complete
001a	+ Screw Semi-Cubic 3 x 15
001b	Stepped Pulley
001c	Motor Pulley
001d	Holder L, Motor
001f	Motor Fan
001g	Screw, without Head
001h	Prop A, Motor
001i	Prop B, Motor
001j	MP Condenser $2\mu + 0.8\mu$ 300 VAC
001k	Holder, MP Condenser
001l	+ Screw Flat Mould 4 x 50
001m	External Shield Plate, Motor
002a	MP Condenser $1\mu$ 300 VAC
002b	5P Lug Plate
003	Drive Belt

#### FLYWHEEL

C4-001	Flywheel, Complete
001a	Capstan
001b	Main Metal Cap, B
001c	Washer Pin
001d	Main Metal Case, B
001e	Spring, Main Metal
001f	Nylon Washer
001g	Main Shaft C
001i	4 mm Ball Bearing
001j	Nylon Plate
001k	Plate B, Flywheel
001l	Washer
001m	Spring Washer
001n	Washer

Parts No.	Nomenclature
C4-001o	5 mm Wing Nut
001p	Screw, Flywheel Adjustment
001q	5 mm Nut
001r	Prop B, Flywheel
001s	Prop A, Flywheel

#### SWITCH BLOCK

C5-001	Switch Block, Complete
001a	Knob, Record/Play & Rewind Forward Fast
001b	Screw
001c	Cam, A-2
001d	Cam, B
001e	Cam Roller, A
001f	Switch Table, A
001g	Spring, E
001h	Lever, I
001i	Screw
001j	4 mm Nut
001k	Rotary Switch S-133-B
001l	Fast/Forward Rewind Shaft
001m	Plate, Cam
001n	Spring, K
001o	Cam, C
001p	+ Screw Flat Mould 4 x 6
001q	Shield, Mechanism Switch
001r	Switch Table, B
001s	Washer
001t	Cam
001u	Washer
001v	Washer Pin
002a	Wired Resistor 5W 170 ohms
002b	5P Lug Plate

#### CASE BLOCK

C6-001	Case
002a	Table, Rubber Foot
002b	Rubber Foot
002c	+ Semi-Cubic 3 x 6
003	Ventilator (Panel Escutcheon)
004	Ventilator
005a	Speaker Chassis, A
005b	Speaker Chassis, B
006	Speed Nut

#### AMPLIFIER

C7-001	Amp. Chassis
001a	Lug Plate, 2L2
001b	Lug Plate, 1L1
001c	Lug Plate, 1L
002	Power Transformer (T-1)
002a	Angle, Transformer
003a	Holder, Jack
003b	Name Plate, Jack

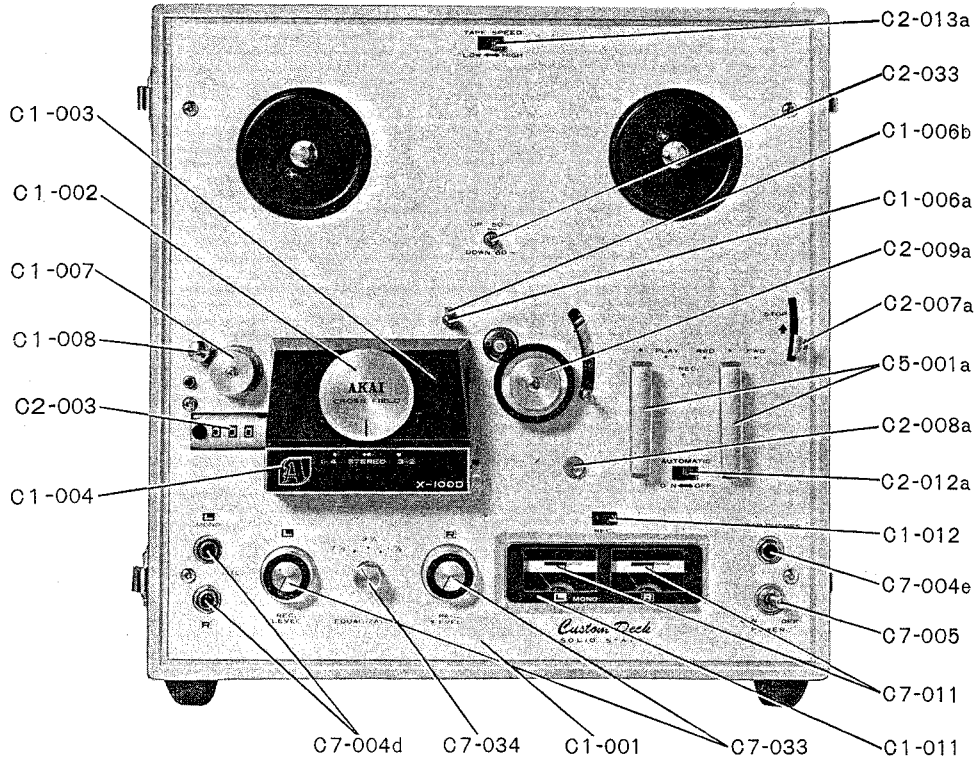
Parts No.	Nomenclature
C7-004a	DIN Jack (J11)
004b	2 Pole E1 Jack (J7-9)
004c	2 Pole E Jack (J6-8)
004d	2 Pole E1 Jack (J5) (Mic.)
004e	3 Pole E Jack (J) (Headphone)
005	Toggle Switch ST-110A (Power Switch)
006a	Plate D, Jack
006b	Plate C, Jack
007	Variable Resistor 10K ohms (A) (VR1)
008	Rotary Switch F-243
008a	Shield Holder
009a	Amplifier Lever, A
009b	Amplifier Lever, B
009c	Spring B
010a	Lamp Socket (Swan Type)
010b	Pilot Lamp
011	VU Meter
012a	Holder D, Multi Jack
012b	10P Multi Jack
012c	Prop, Multi Jack
013a	Resistor 1/4P 680 ohms K
013b	Resistor 1/4P 100K ohms
013c	Resistor 1/4P 15K ohms
013d	Wired Resistor 2W 80 ohms
013e	Resistor 1W 1.2K ohms
013f	Resistor 2.2K ohms
014a	Polyester Condenser 35WV 680PF
014b	Tubular Type Electrolytic Condenser 500 $\mu$ F 25WV
014c	Tubular Type Electrolytic Condenser 200 $\mu$ F 25WV
014d	Tubular Type Electrolytic Condenser 500 $\mu$ F 50WV
015	Holder, Card
016	Shield
017	Silicon Diode 5 GB
018	Angle, Voltage Change
019	6P Slide Switch ESS-22A-NB
020	Name Plate, Cycle Change
021	Socket, Voltage Change
022	Hexangular Prop, Selector
023	Plug S, Voltage Change

Parts No.	Nomenclature
C7-024	Name Plate, AC Change
-025	Closed Nut
026	2P Jack (J3)
027a	Fuse Post
027b	Fuse, 1A
028	Cord Support
029	Rubber Bush, AC Cord
030	AC Cord (10 Feet)
031	Chip Jack (Red)
032	4P Connector Socket
033	Knob A (Rec. Level)
034	Knob B (Equalizer)
035	4P Plug
<b>CARD BLOCK</b>	
C8-001	Switch Block Card, Complete (CD 501)
002	Printed Plate, Switch Block
003	Slide Switch SL-1021
004	Transistor 2SB 171 (B)
005a	Resistor RD 1/8P 330 ohms K
005b	Resistor RD 1/8P 56K ohms K
005c	Resistor RD 1/8P 22K ohms K
005d	Resistor RD 1/8P 5.6K ohms K
005e	Resistor RD 1/8P 6.8K ohms K
005f	Resistor RD 1/8P 1K ohms K
005g	Resistor RD 1/8P 15K ohms K
005h	Resistor RD 1/8P 820 ohms K
005i	Resistor RD 1/8P 35K ohms K
005j	Resistor RD 1/8P 3K ohms J
006a	Polyester Film Condenser 220P 350WV (K)
006b	Condenser MEL 0.033P 50V (K)
006c	Condenser 0.01P 50V (K)
006d	Condenser 0.047P 50V (K)
006e	Condenser 0.1P 50V (K)
006f	Condenser 3 $\mu$ 25V
006g	Condenser 100 $\mu$ 3V
006h	Condenser 10 $\mu$ 10V
007	Variable Resistor 2KB. V10K
008	Peaking Coil 300 $\mu$ H
009	Diode IN34A
010	4P Plug

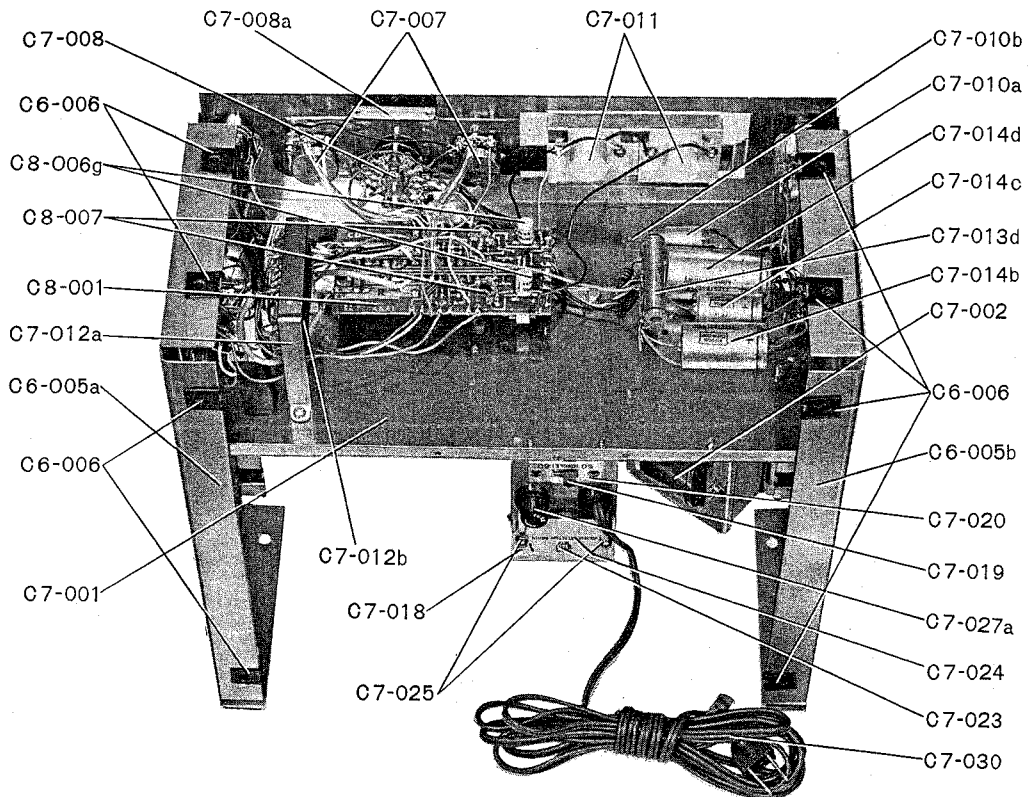
Parts No.	Nomenclature
C9-001	CD-502 Card, Complete
002	Printed Plate, CD-502 Card
003a	Transistor 2SB 347
003b	Transistor 2SB 173 (B)
003c	Transistor 2SB 171 (B)
004a	Resistor RD 1/4P 100K ohms K
004b	Resistor RD 1/4P 10K ohms K
004c	Resistor RD 1/4P 3K ohms K
004d	Resistor RD 1/4P 300 ohms K
004e	Resistor RD 1/4P 6.8K ohms K
004f	Resistor RD 1/4P 3.3K ohms K
004g	Resistor RD 1/4P 2.2K ohms K
004h	Resistor RD 1/4P 15K ohms K
004i	Resistor RD 1/4P 560 ohms K
004j	Resistor RD 1/4P 100 ohms K
004k	Resistor RD 1/4P 1.5K ohms K
004l	Resistor RD 1/4P 560 ohms K
004m	Resistor RD 1/4P 220 ohms K
004n	Resistor RD 1/4P 1.8K ohms K
005	Variable Resistor V10K 5-Type B-20K
006a	Condenser 30 $\mu$ 3V
006b	Condenser 100 $\mu$ 3V
006c	Condenser 100 $\mu$ 10V
006d	Condenser 10 $\mu$ 10V
006e	Condenser 100 $\mu$ 3V
006f	Condenser 10 $\mu$ 25V
006g	Condenser 50 $\mu$ 25V
006h	Condenser 100 $\mu$ 6V
007	Headphone Transformer 7K : 8 ohms
C10-001	CD-503 Card, Complete
002	Printed Plate, 503 Card
003	Oscillator Coil
004	Transistor 2SB 370A (B)
005a	Resistor RD 1/8P 2.7K ohms K
005b	Resistor RD 1/8P 3.9K ohms K
005c	Resistor 2L 80 ohms K
006a	Condenser CEMX 25 $\mu$ or 30 $\mu$ 25V
006b	Plastic Condenser 10,000P 500V V
006c	Polyester Film Condenser 0.047 (K) 50V
007	Radiative Table
008	Radiative Plate

# X. EXPLODED VIEW OF COMPONENT PARTS

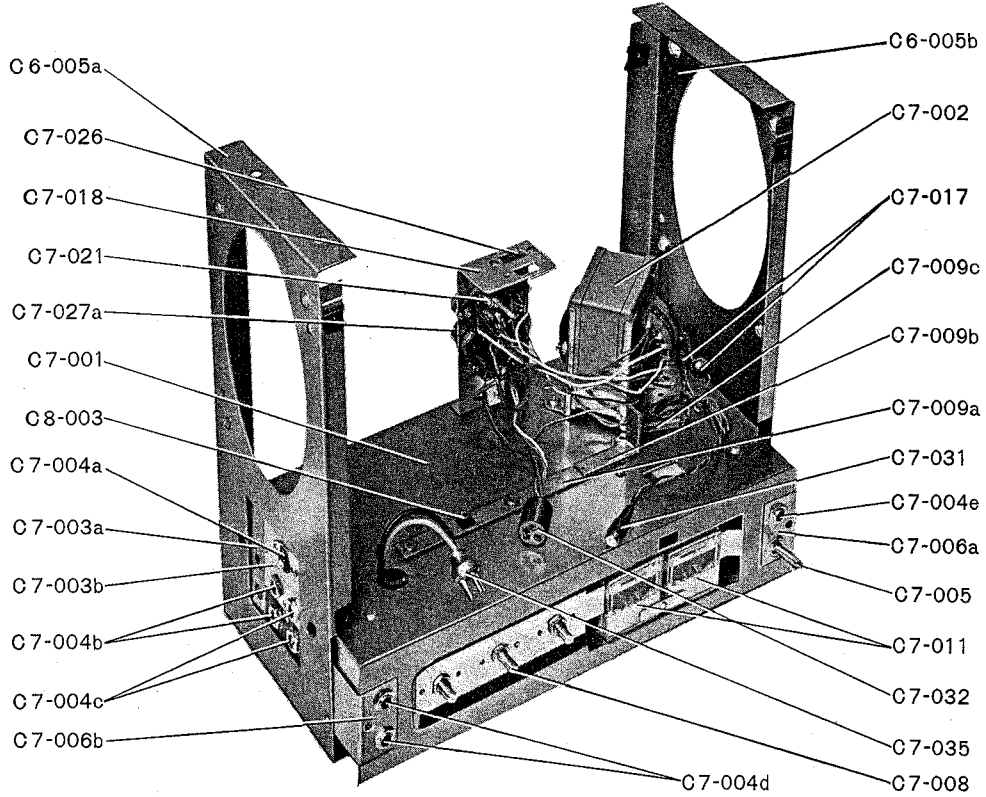
## FRONT PANEL



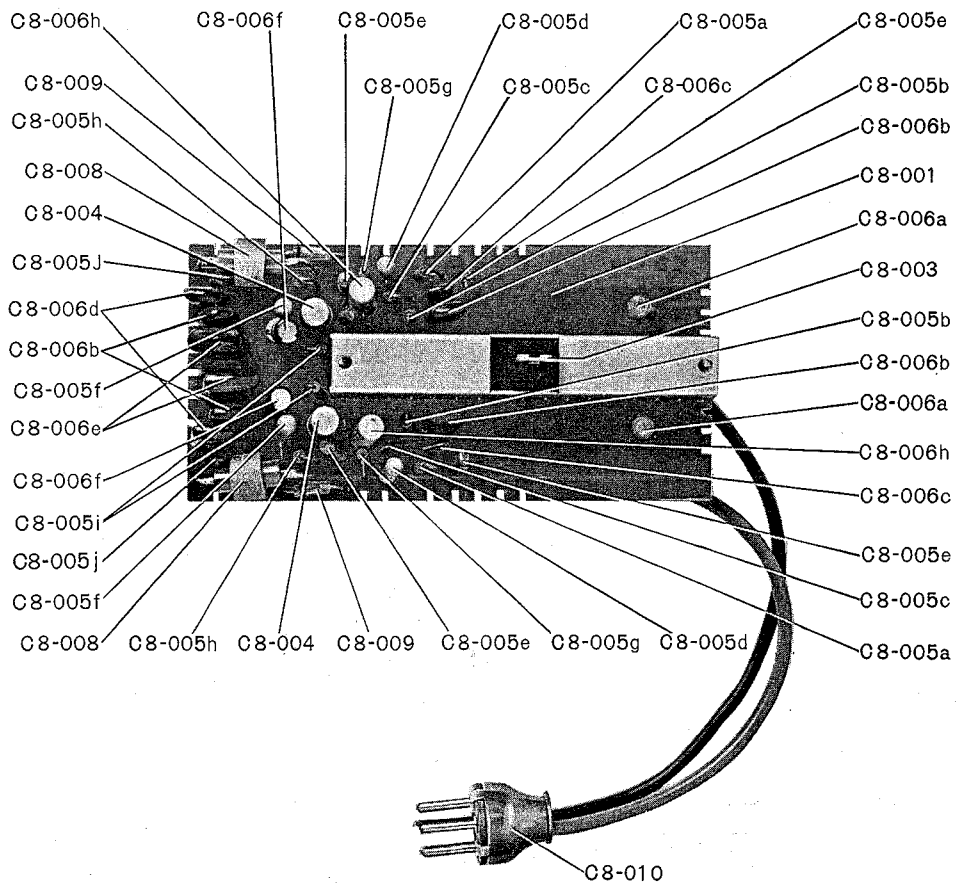
## AMPLIFIER



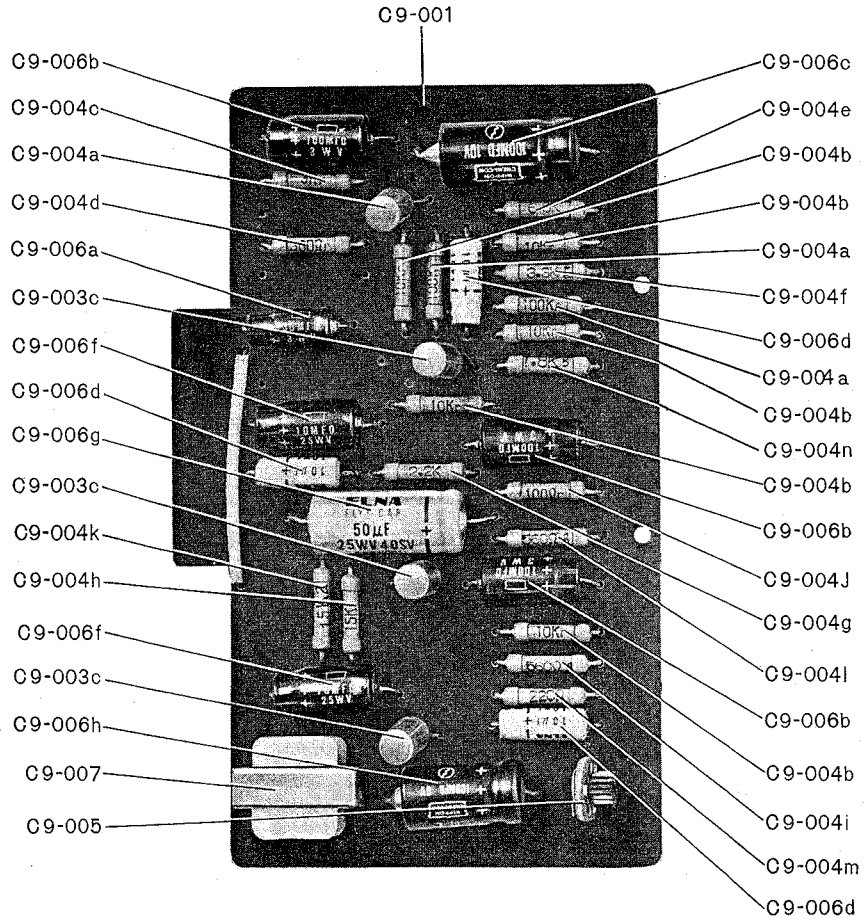
## AMPLIFIER



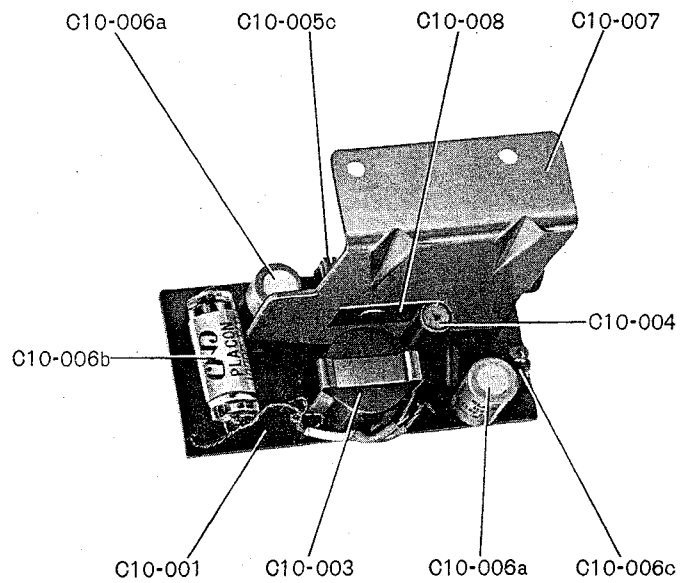
## CD-501 Card Block



**CD-502 Card Block**



**CD-503 Card Block**

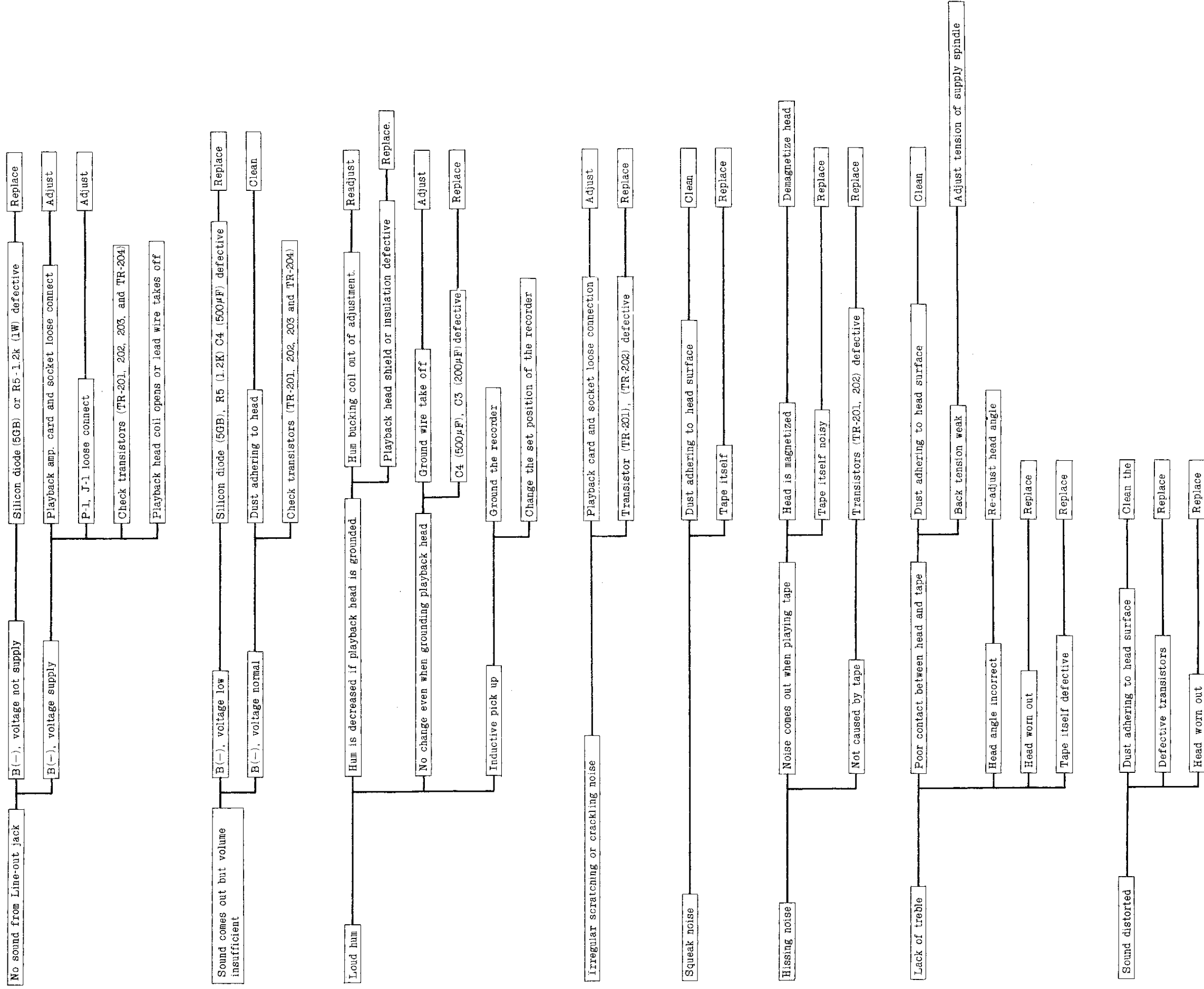




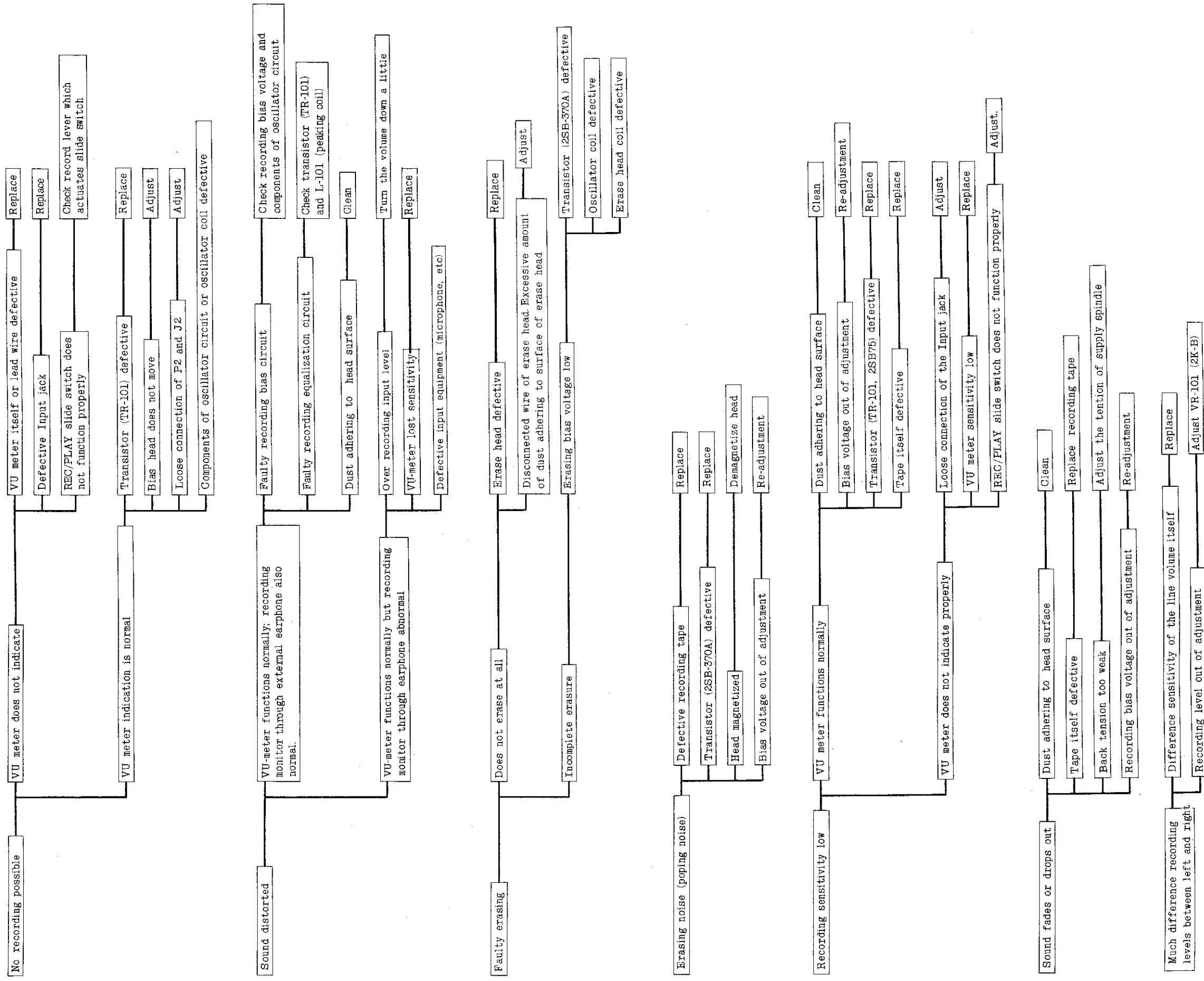
## XI. TROUBLE SHOOTING CHART

### SECTION "A" TROUBLES WITH AMPLIFIER

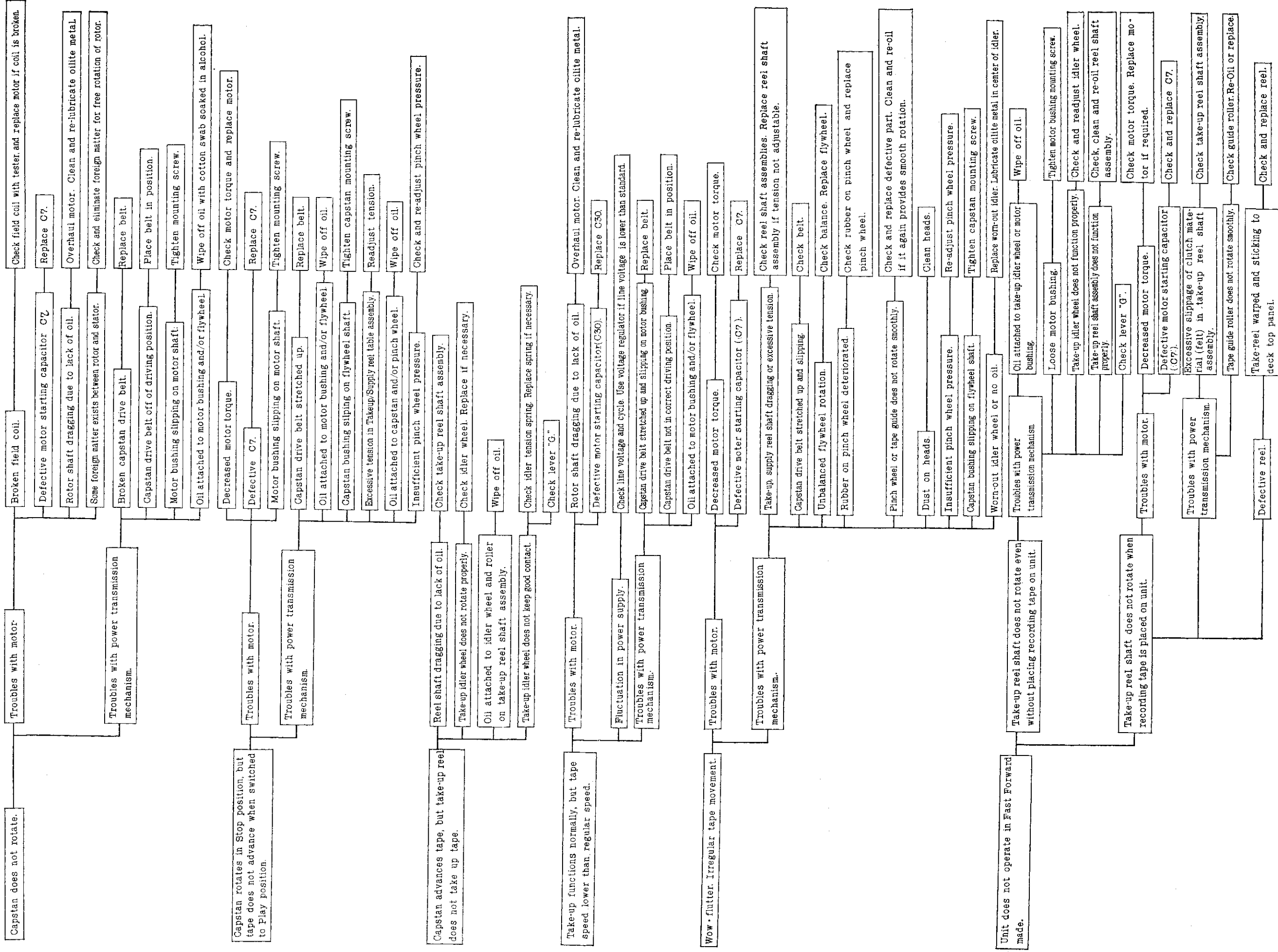
#### 1. Playback problems. (Unit set in play position.)



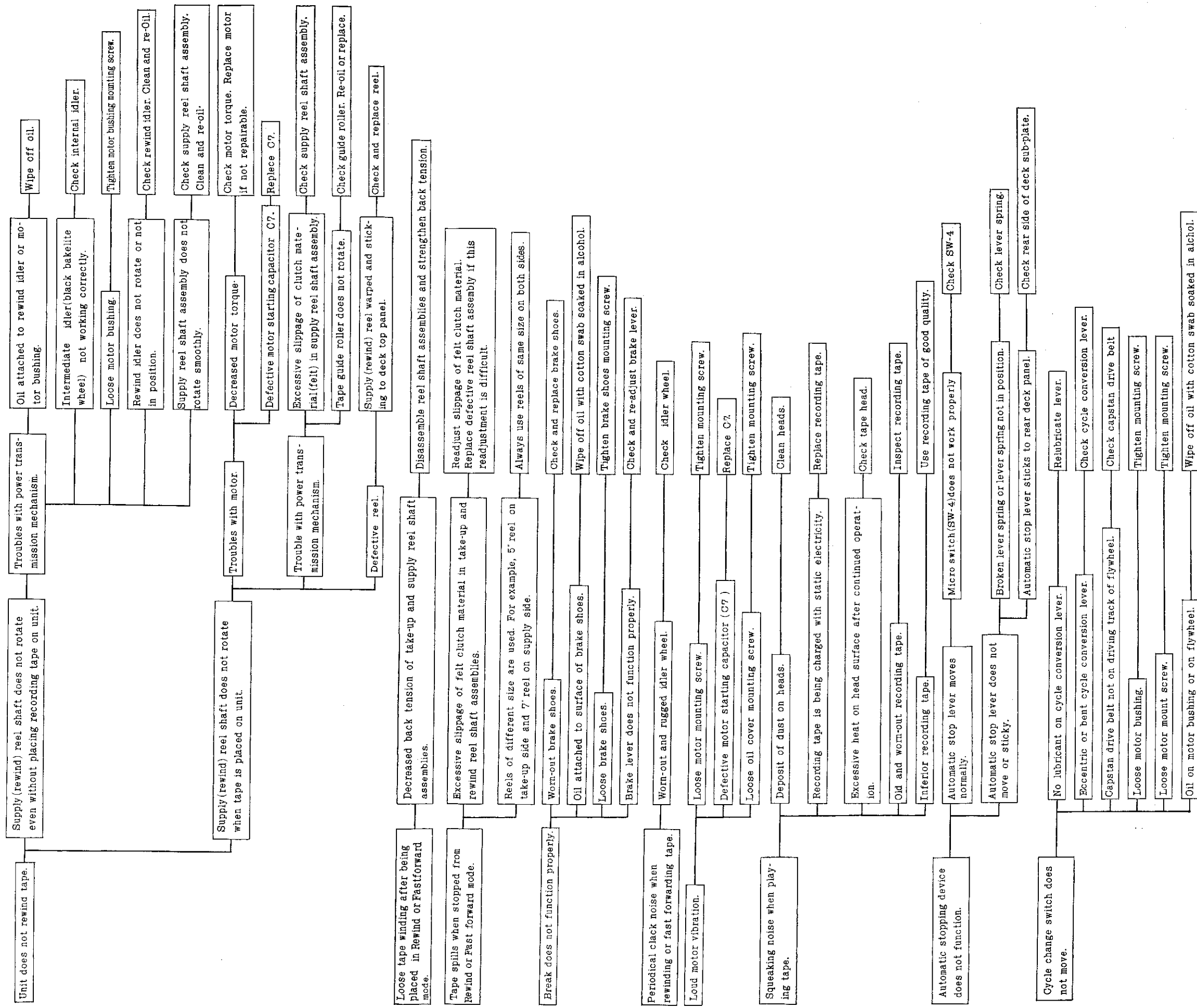
**2. Recording problems.**  
**(Unit plays back pre-recorded tapes okay, but recording not satisfactory.)**



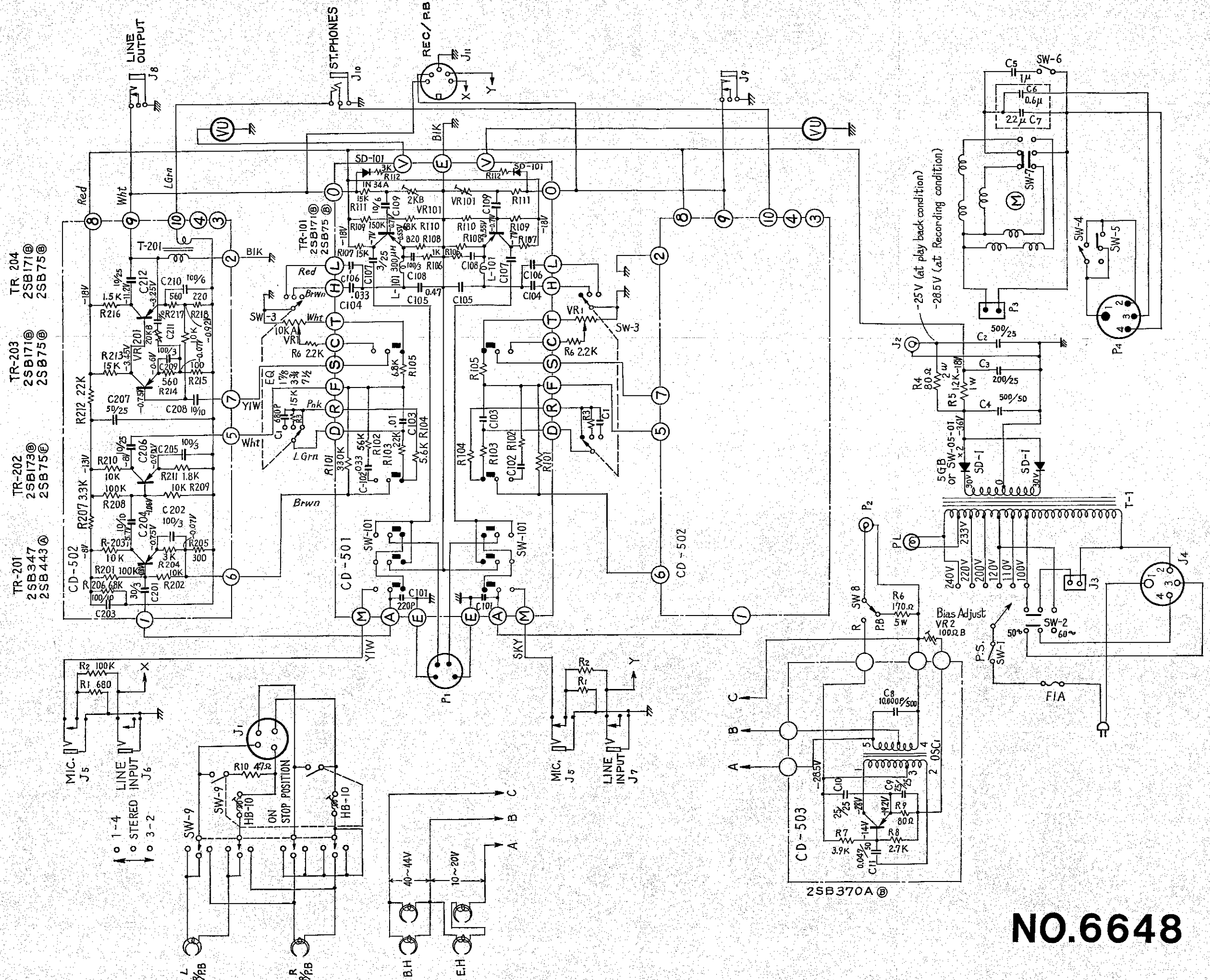
## SECTION "B" TROUBLES WITH TAPE TRANSPORT MECHANISM.



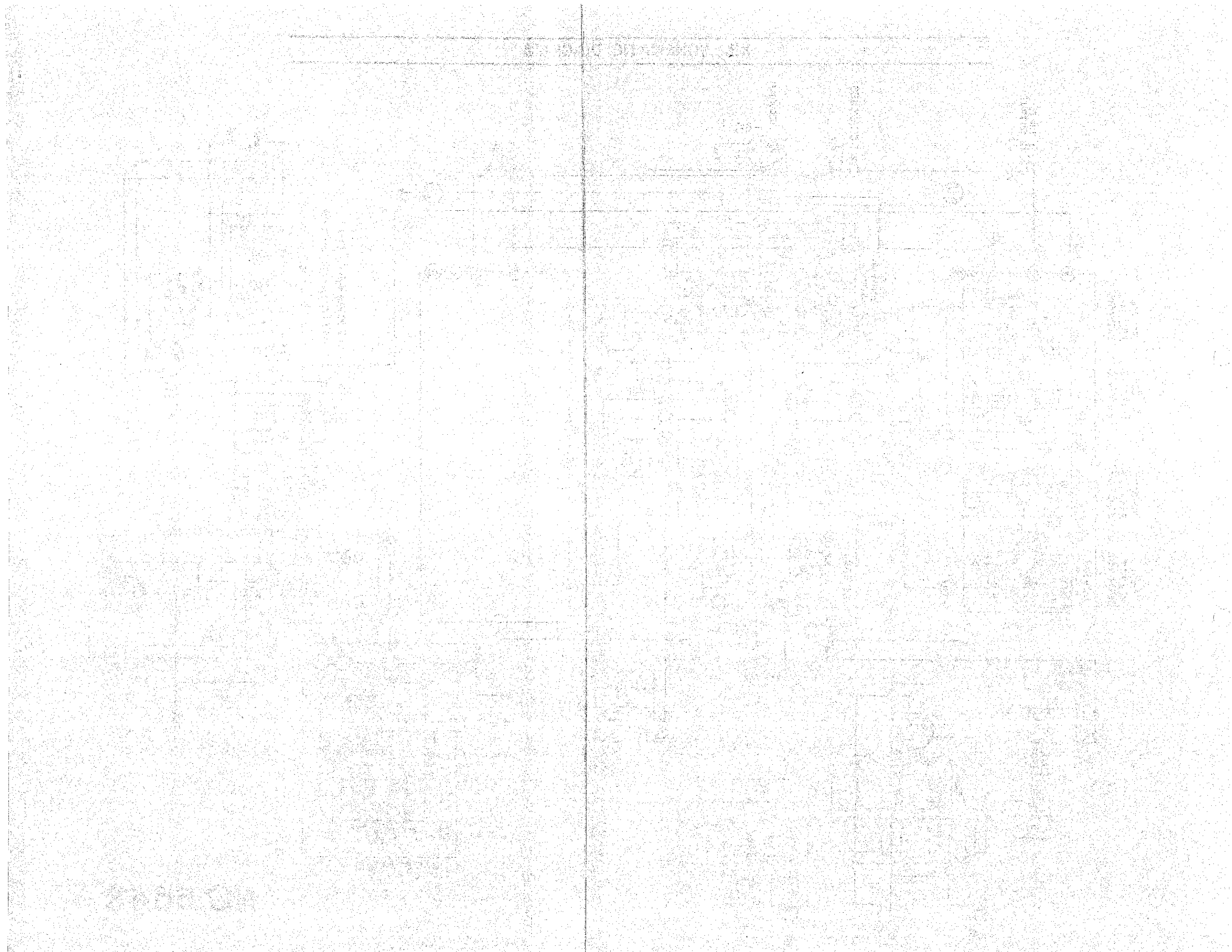
## SECTION "B" TROUBLES WITH TAPE TRANSPORT MECHANISM.

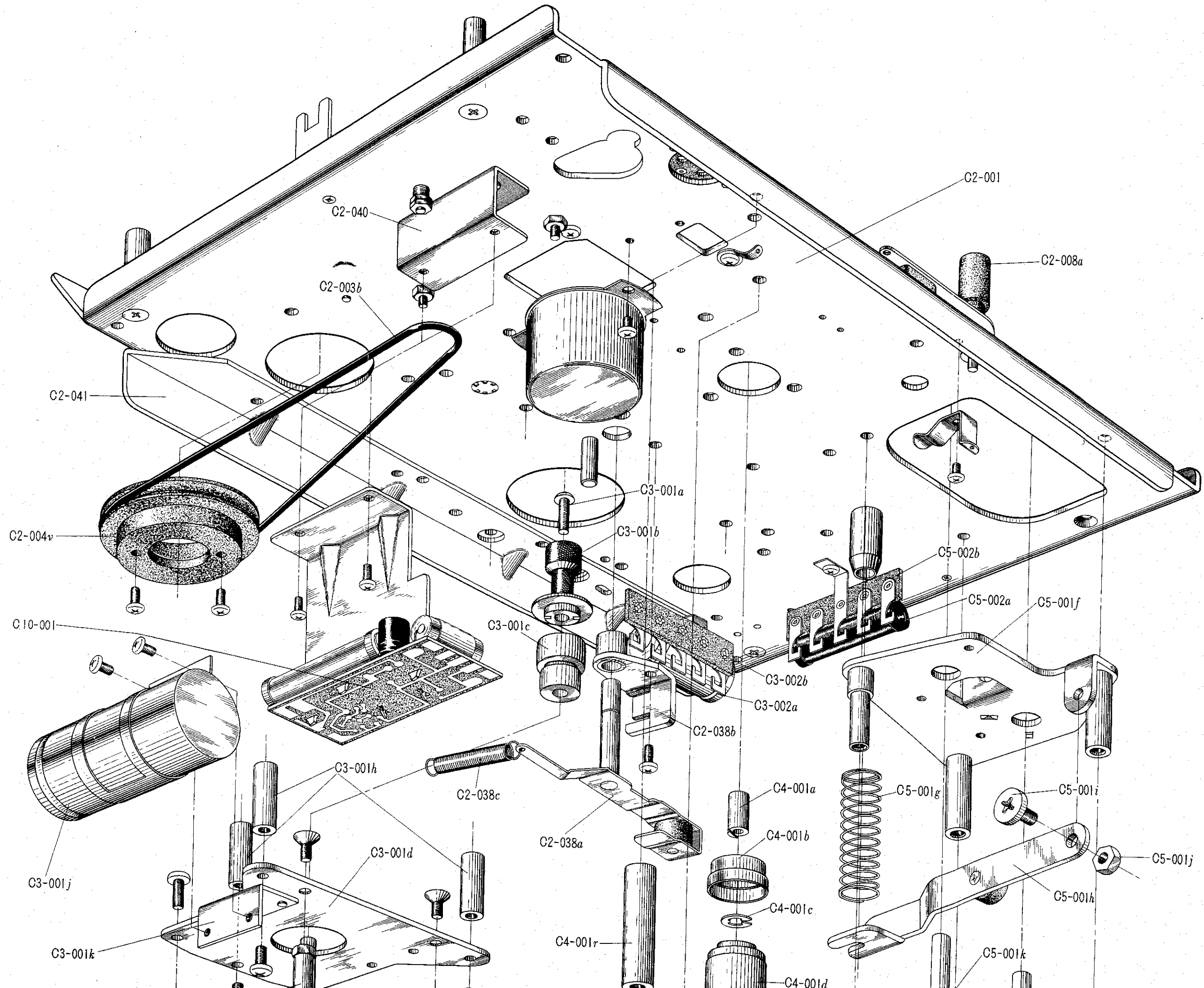


## XII. SCHEMATIC DIAGRAM

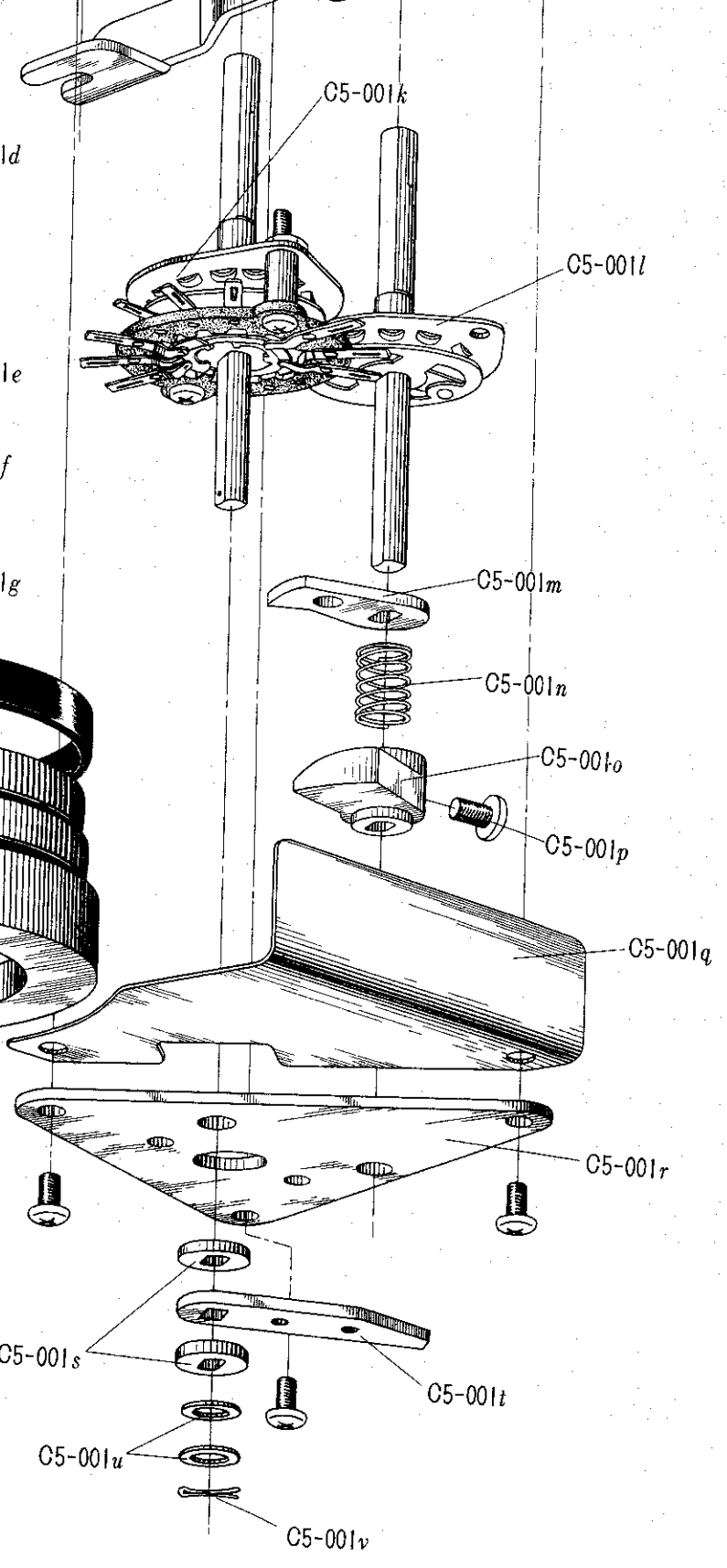
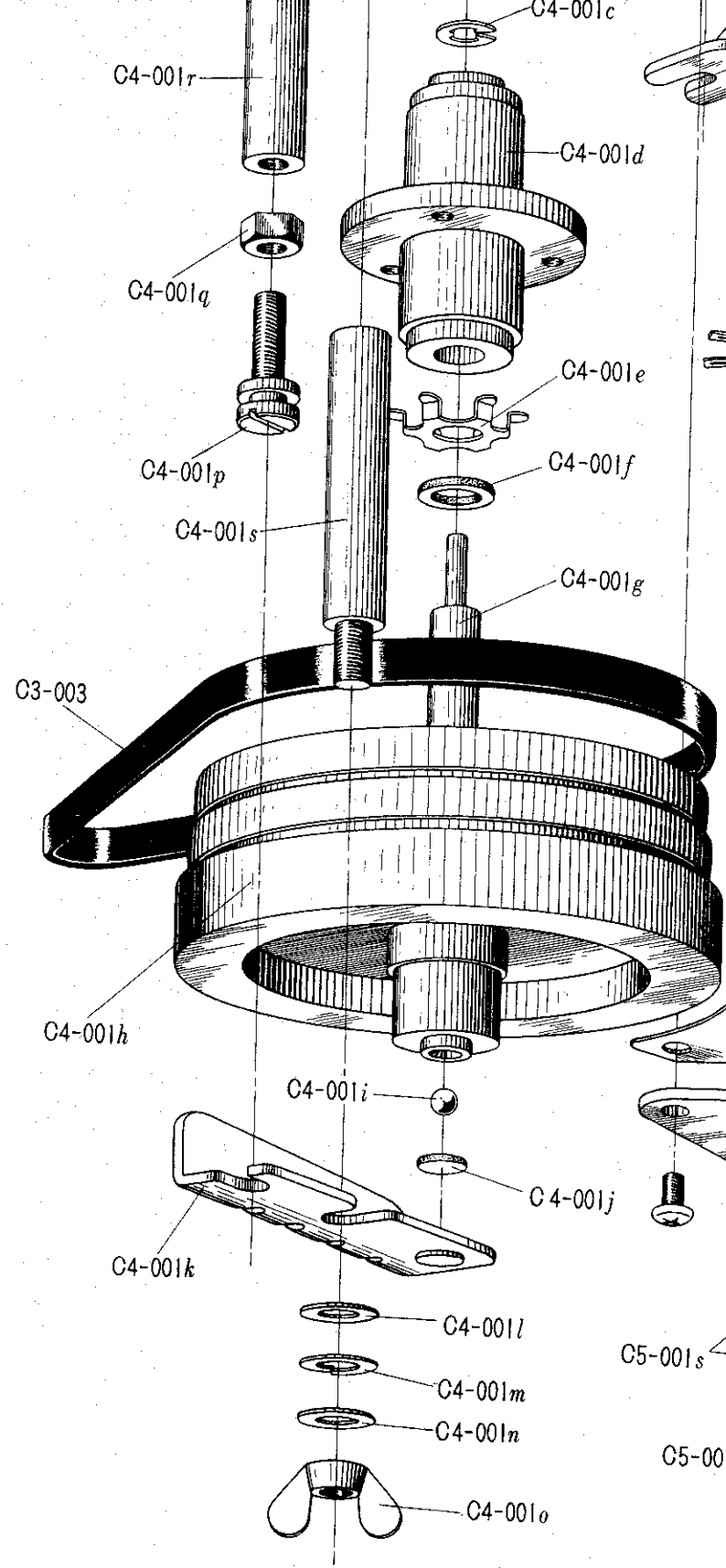
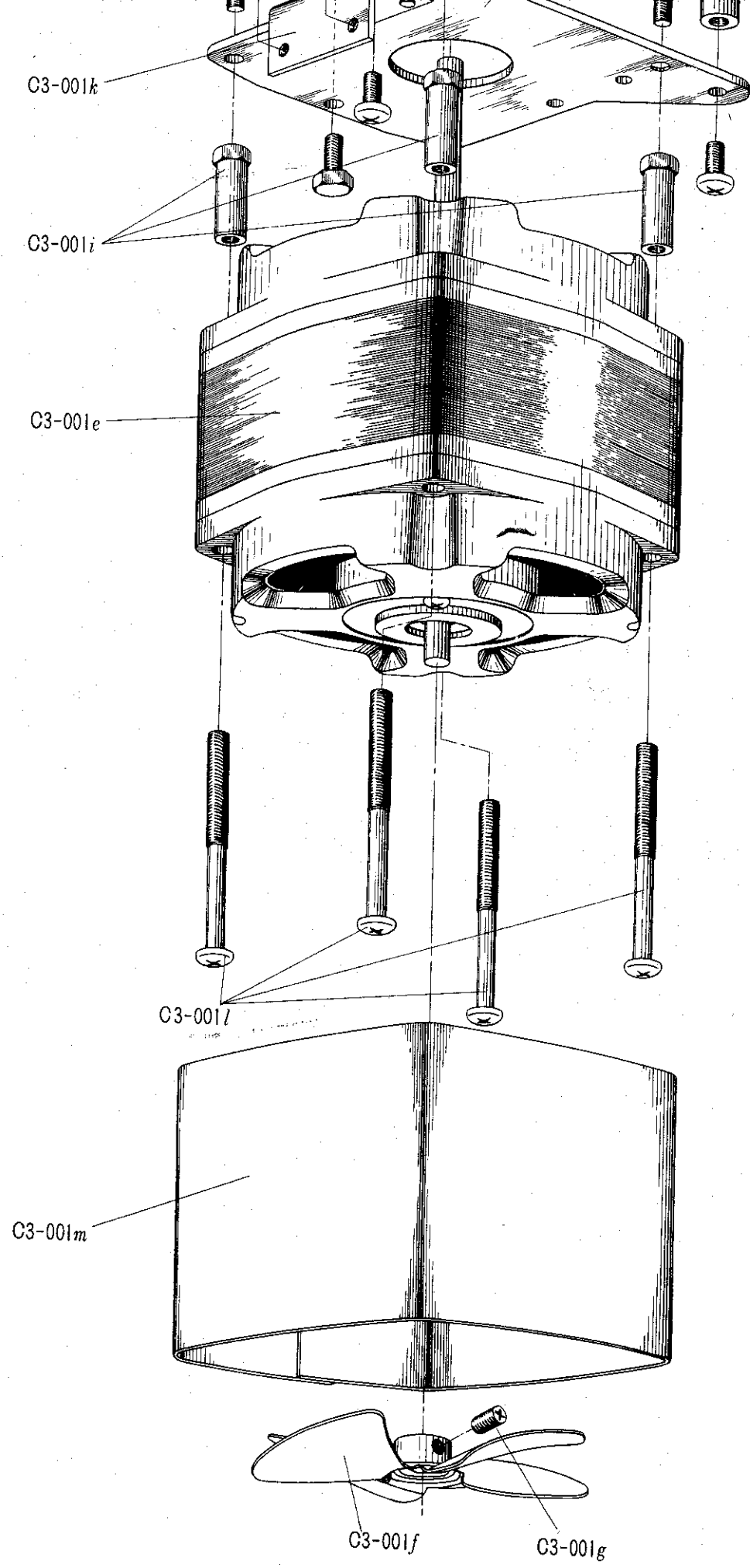


NO.6648



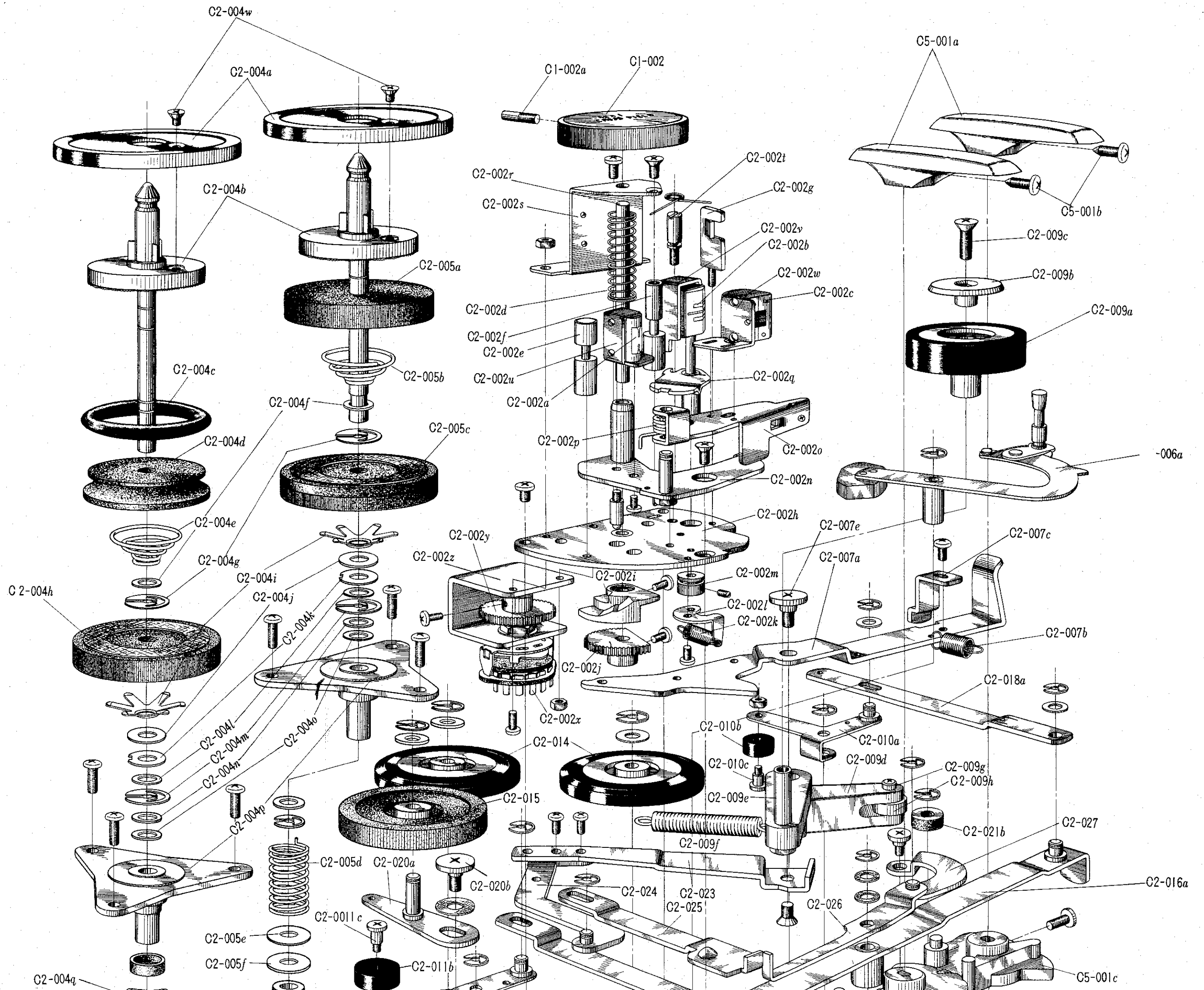


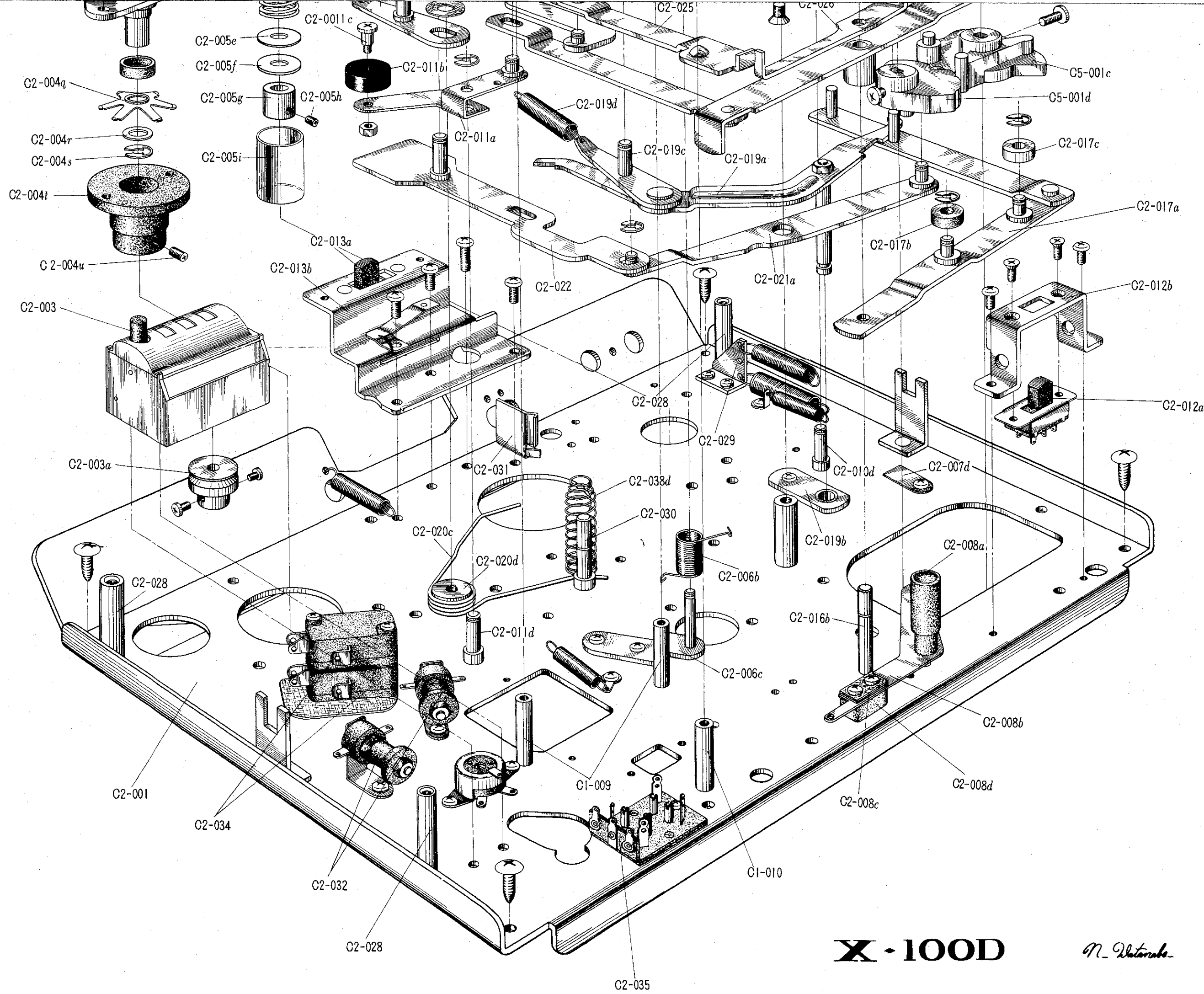




**X-100D**

*N. Watanabe*

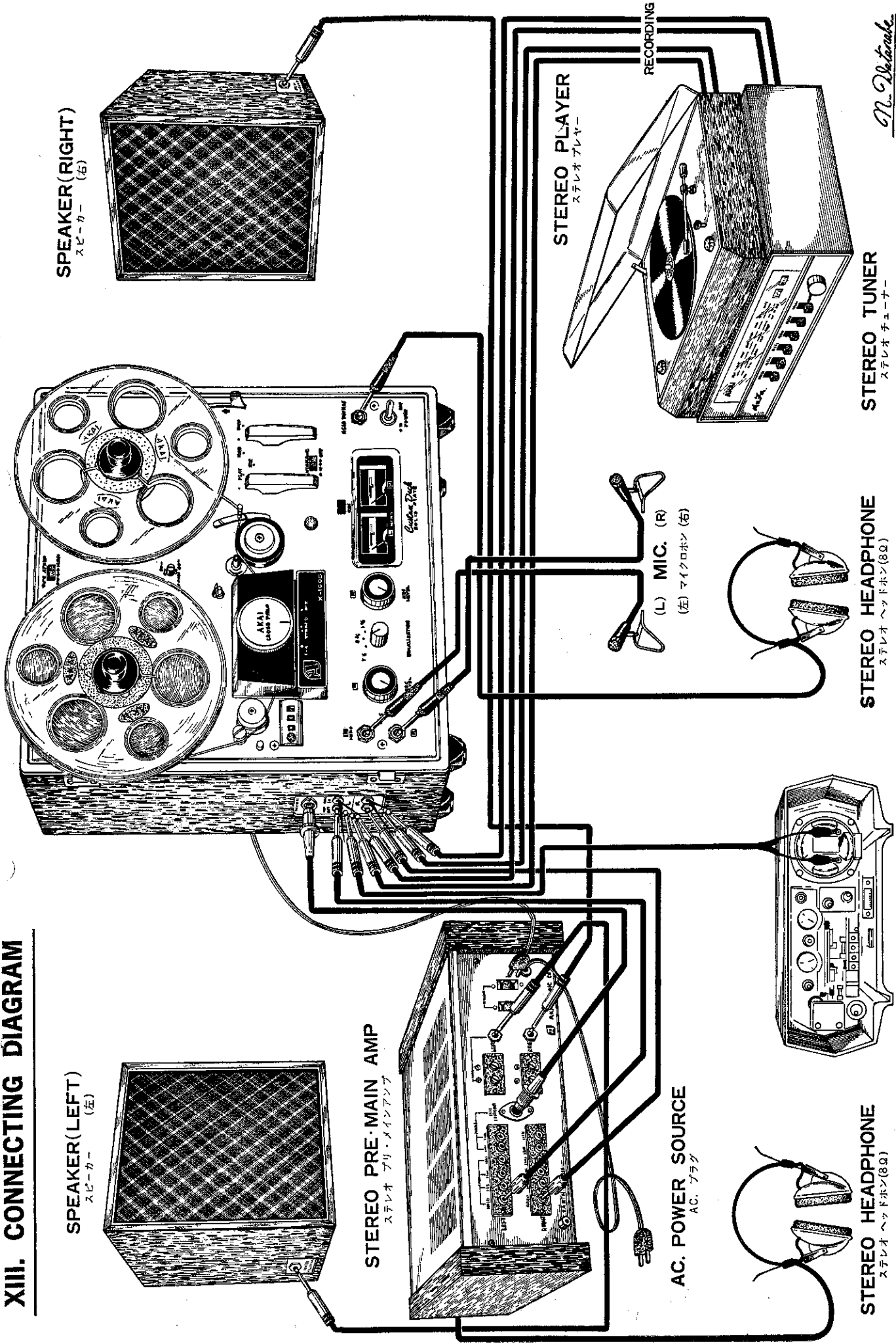




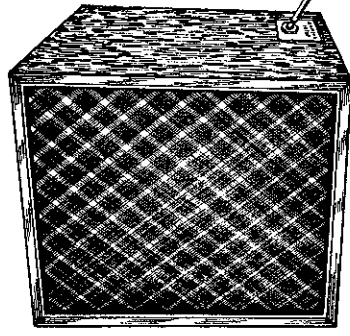
**X-100D**

*M. Waterhouse*

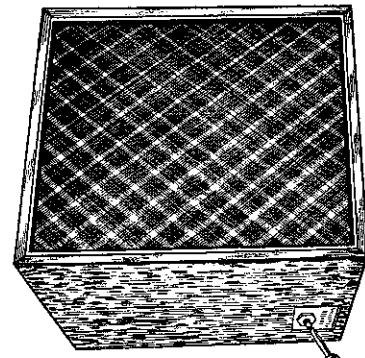
# XIII. CONNECTING DIAGRAM



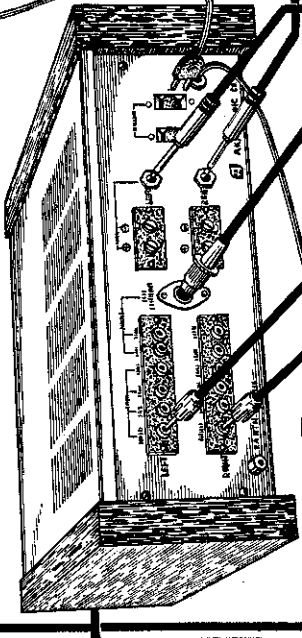
**SPEAKER (RIGHT)**  
スピーカー (右)



**SPEAKER (LEFT)**  
スピーカー (左)

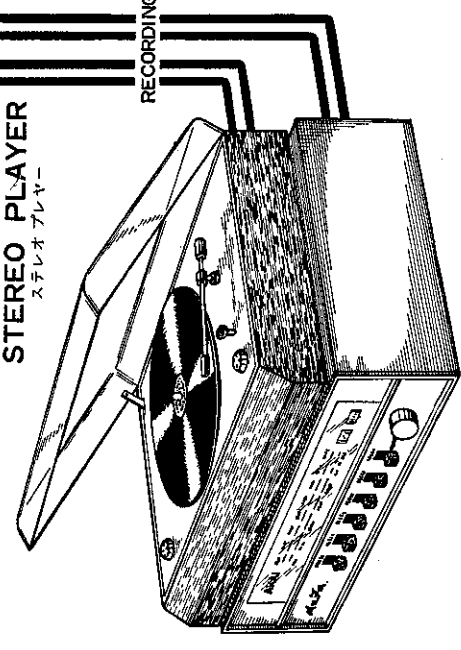


**STEREO PRE-MAIN AMP**  
ステレオ プリ・メインアンプ



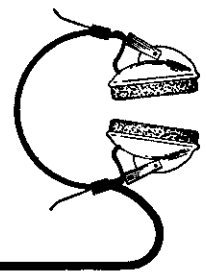
**AC. POWER SOURCE**  
AC. フラグ

**STEREO PLAYER**  
ステレオ プレイヤー

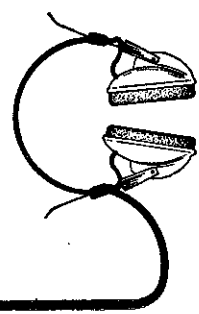


**STEREO TUNER**  
ステレオ チューナー

**STEREO HEADPHONE**  
ステレオ ヘッドホン(8Ω)



**STEREO HEADPHONE**  
ステレオ ヘッドホン(8Ω)



**(L) MIC. (R)**  
(左) マイクホン (右)



*M. Nishimura*