SERVICE MANUAL

AKAI TAPE RECORDER

MODEL X-300

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I. SPECIFICATIONS

Style : Portable
Weight : 46.9 lbs (21.3 kg)
Dimensions : 13-3/8″(H)×16-1/8″(W)×9″(D) (340(H)×410(W)×230(D) mm) without foot. 15″(H)×16-1/8″(W)×10-1/8″(D) (385(H)×410(W)×265(D) mm) with foot.
Power Supply : AC 100 to 240 V, 50/60 Hz. (Interchangeable)
Recording System : Inline 4 track stereo, monaural recording by using Cross-field bias head.
Playback System : Inline 4 track stereo, monaural playback.
Tape Speed : 2 speeds: 7-1/2 ips (19 cm/s), 3-3/4 ips (9.5 cm/s) and 15 ips (38 cm/s) optional.
Tape Speed Deviation : Within ±0.5% at 7-1/2 ips. Within ±1.0% at 3-3/4 ips.
Wow and Flutter : Less than 0.08% R.M.S. at 7-1/2 ips.
(Playback only) : Less than 0.14% R.M.S. at 3-3/4 ips.
Frequency Response: 30 to 24,000 Hz ±3 dB at 7-1/2 ips. 30 to 18,000 Hz ±3 dB at 3-3/4 ips.
Signal to Noise Ratio : Better than 45 dB.
Distortion (Total Harmonic) : Within 3% at 1,000 Hz 0 VU recording.
Cross-talk : Less than −82 dB (Monaural) Less than −45 dB (Stereo)
Insulation Resistance : More than 50 M Ω
Insulation Durability : 1,000 V. A. C. for more than one minute duration.
Eraso Ratio : Less than −70 dB for all tracks.
Power Consumption: 55 VA (at non-signal) to 140 VA (at maximum output)
Fast Forward and Rewind Time : 45 seconds using 1,200 feet tape at 50 cycles. 36 seconds at 60 cycles.
Output level
Pre-amplifier Output : 1.228 V (0 VU) at using 1,000 cycles 0 VU recorded tape. Impedance: 1.5 K Ω
Main Output : 25 W at MUSIC POWER maximum on each channel.
(Speaker output) : 20 W at UNDISTORTED POWER OUTPUT maximum on each channel. Impedance: 8 Ω
Input
Line Input : 50 mV~2.5 V Impedance: 100 K Ω
Microphone Input : 0.5 mV~20 mV Impedance: 4 K Ω
Monitor System (in recording) : With Record/Playback Output Switch at "REC"
Can be monitored the program being recorded by using.
- built-in speakers
- stereo headphones
- external speakers
- crystal receiver

: With Record/Playback Output Switch at "P.B"
Can be monitored the recorded signals from the playback head by using.
- built-in speakers
- stereo headphones
- external speakers
- crystal receiver

Equalization : Correct equalization for playback of tapes recorded to the NAB curve.
Main Motor : Outer rotor hysteresis synchronous 2 speeds (6-12 pole) motor.
Condenser capacity 1.8 M.F
Power: More than 1/30 HP
Power factor: 75%
Revolution: 1,000-500 R.P.M. (50 Hz)
1,200-600 R.P.M. (60 Hz)
Torque Motor : Solid rotor motor
Condenser capacity: 3 M.F.
Power: More than 1/20 HP.
Power factor: 75%
Revolution: 1,120 R.P.M. (50 Hz)
1,344 R.P.M. (60 Hz)
Heads
Recording Head : Inline 4 track stereo and monaural.
Impedance: 135 Ω at 1,000 Hz
Gap: 4 microns
Playback Head : Inline 4 track stereo and monaural.
Impedance: 1,000 Ω at 1,000 Hz.
Gap: 2 microns.
Erase Head : Inline 4 track stereo
Impedance: 750 Ω at 90 K Hz.
Gap: 0.2 mm
Cross-Field Bias Head : Inline 4 track stereo.
Impedance: 750 Ω at 90 K Hz.
Gap: 0.2 mm
Record Level Indicator : Vertical indication model "A" VU meter.
Internal Speaker : 4″×6″ oval range dynamic speaker.
Impedance: 8 Ω
Nominal power input: 1.5 W
Maximum power input: 3.5 W
Frequency response: 100-12,000 Hz. ±10 dB.
Transistor used : 2SB443A×2, 2SB75B×6 } Playback amplifier
2SB443A×2, 2SB75B×6 } Recording amplifier
2SB75A×2, 2SB370AA×2, 2SB338A×4 (2SB471) } Main amplifier
Silicon diode used : SPN-01×1 Bridged silicon rectifier
5GB (SW05-01)×2
SL-150×1
Germanium used : IN-34×2
Reels used : Without adaptor, reels up to 10-1/2″ can be used.

II. MEASURING METHOD

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 c/s ±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 7-½″. 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 c/s 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 c/s 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 specifications on the first page.

FREQUENCY RESPONSE

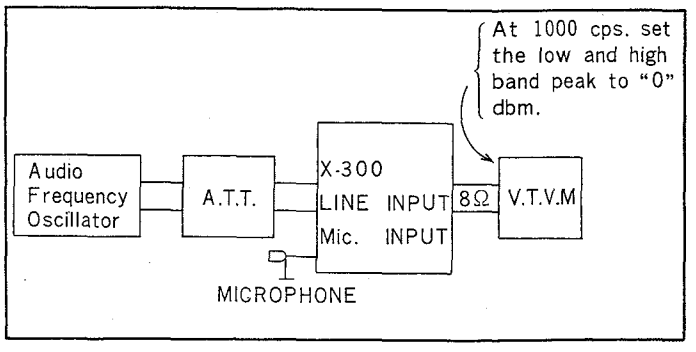
RECORD:

1) Give a sine wave of 1,000 c/s to the Line Input of the recorder to be tested through an attenuator from an audio frequency generator.
2) Set the Record/Playback Output Switch to "REC." 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 16 db by means of the attenuator.
4) Connect a microphone to the Microphone Input.
5) Start recording. Control the microphone input level and the spot frequency in the range of 30 to 25,000 c/s from the audio frequency generator and record by talking.

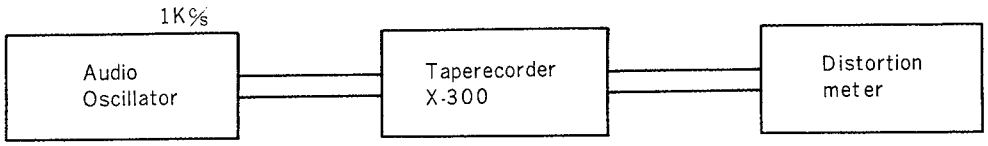
★ Remarks: After announcing the frequency of each point, the microphone volume should immediately be rotated back to minimum.

PLAYBACK:

6) Set the Record/Playback Output Switch to "P. B." and depress the Start Button until it locks.
7) Set the Equalizer Switch on 7-½″ or 3-¾″ position.
8) Place the Bass Control Button in the OUT position.
9) Terminate "External Speaker Output" of the recorder with 8Ω resistor and connect a Vacuum Tube Volt Meter (V.T.V.M with milli volts scale).
10) Playback the tape previously recorded.
11) Adjust the output level to "0" dbm at "1,000 c/s" as indicated on the V.T.V.M. by adjusting the loudness volume.
12) Playback the recorded spot frequencies with the conditions in (11); make a memo of output level and plot the value on a graph.



TOTAL HARMONIC DISTORTION FACTOR



Connect the measuring instrument as shown above, and record the 1,000 c/s 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).

SIGNAL TO NOISE RATIO

Place the Bass Control Button in the OUT position and playback a tape containing a 1,000 c/s sine wave recorded at "0" VU level on a standard recorder. Connect an 8 Ω resistor to the output terminals of the recorder and measure its output. Then remove the tape and measure the noise level under the same conditions. Convert into decibels each of the measured values.

POWER OUTPUT

Playback a tape containing a sine wave of 1,000 c/s recorded at 0 VU on a standard recorder. Measure the voltage at the output of the recorder to be tested when terminated with 8 Ω.

Then use the following formula:

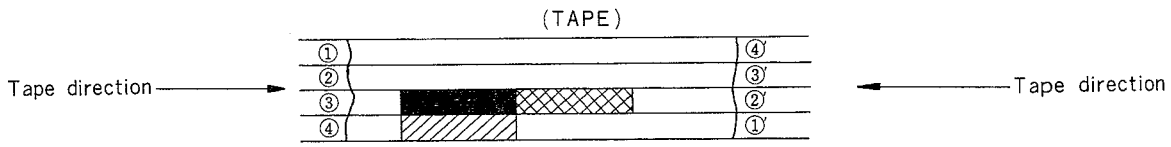
$$P = \frac{E^2}{R}$$

P = Desired output (W)

E = Measured voltage (R.M.S.)

R = 8 Ω

CROSS TALK (Cross talk between the tracks)



As shown in the figure, first record a 1,000 c/s sine wave on track No. 3 at +3 VU level. Next, remove the 1,000 c/s 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 c/s B.P.F. (Band Pass Filter, Sensitivity.... 1 : 1) and obtain a ratio between the two from the following formula.

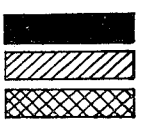
$$C = 20 \log \frac{E_0}{E_2 - E_1} \text{(db)}$$

C = Desired cross talk ratio (db)

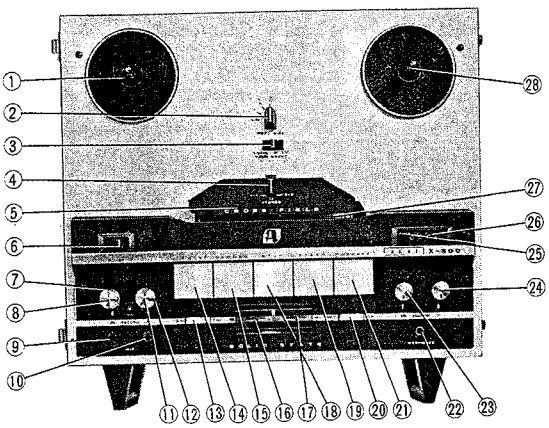
E_0 = 1,000 c/s signal output level

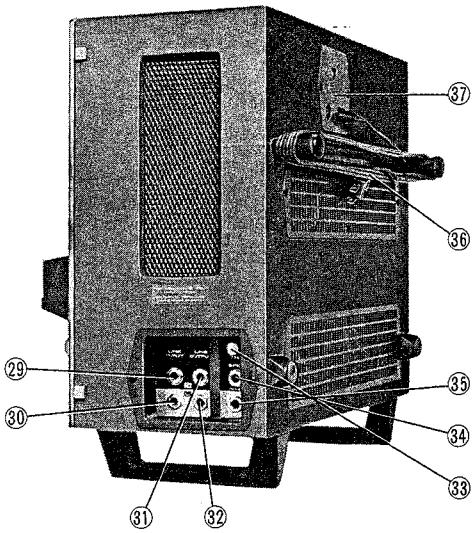
E_2 = 1,000 c/s cross talk output level

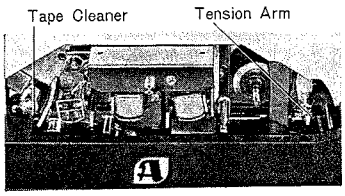
E_1 = No-input signal record level



III. LOCATION OF CONTROLS



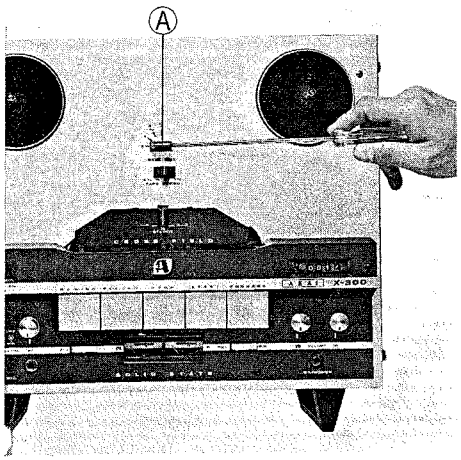




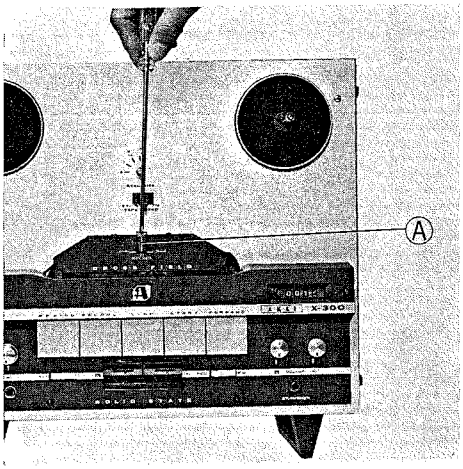
① Supply Reel Shaft
② Tape Tension Switch
③ Speed Change Switch
④ Track Selector Switch
⑤ Head Cover
⑥ Power/Automatic Shut-off Switch
⑦ Line Volume Control Knob (Left)
⑧ Microphone Volume Control Knob (Left)
⑨ Microphone Input Jack (Left)
⑩ Microphone Input Jack (Right)
⑪ Microphone Volume Control Knob (Right)
⑫ Line Volume Control Knob (Right)
⑬ Equalizer Switch
⑭ Rewind Button
⑮ Record Button
⑯ VU Meter (Left)
⑰ VU Meter (Right)
⑱ Stop Button
⑲ Start Button
⑳ Record/Playback Output Switch
㉑ Fast Forward Button
㉒ Stereo Headphone Jack
㉓ Volume Control Knob (Left)
㉔ Volume Control Knob (Right)
㉕ Reset Button
㉖ Index Counter
㉗ Pinch Wheel
㉘ Take-up Reel Shaft
㉙ Line Input Jack (Right)
㉚ Line Input Jack (Left)
㉛ Line Output Jack (Right)
㉜ Line Output Jack (Left)
㉝ Bass Control Button
㉞ External Speaker Jack (Right)
㉟ External Speaker Jack (Left)
㊱ AC Cord
㊲ Voltage Selector Switch

IV. PROCEDURE FOR REMOVAL

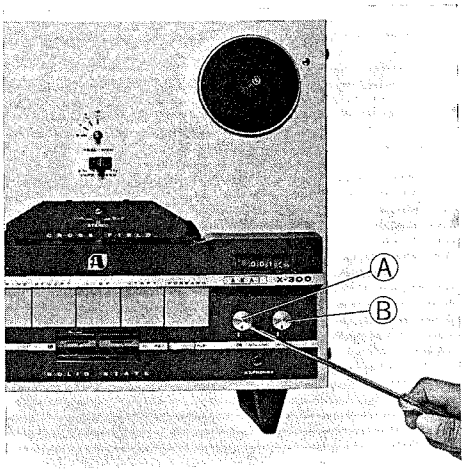
(1) Loosen the RETAINING SCREW of the KNOB (A) of TAPE TENSION SWITCH by using a phillips-headed screw driver and remove the KNOB by hand.



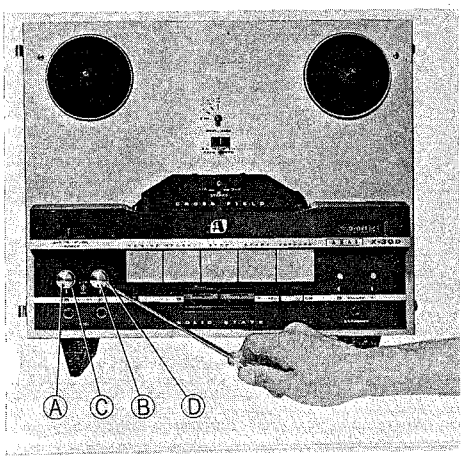
(2) Loosen the RETAINING SCREW ot the KNOB (A) of TRACK SELECTOR SWITCH by using a phillips-headed screw driver and remove the KNOB by hand.



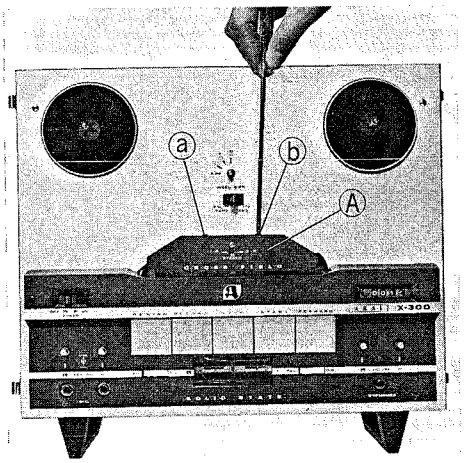
(3) Loosen the RETAINING SCREWS of the VOLUME CONTROL KNOBS ((A) and (B)) by using a phillips-headed screw driver and remove the KNOBS by hand.



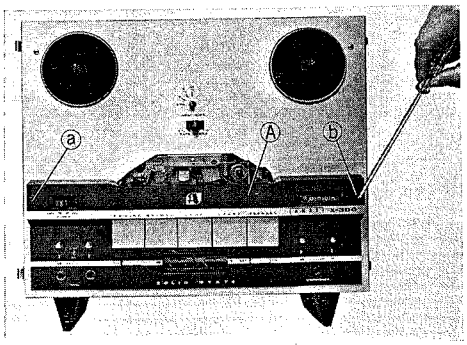
(4) Loosen the RETAINING SCREWS of the MICROPHONE VOLUME CONTROL KNOBS ((A) and (B)) and LINE VOLUME CONTROL KNOBS ((C) and (D)) by using a phillips-headed screw driver and remove the KNOBS by hand.



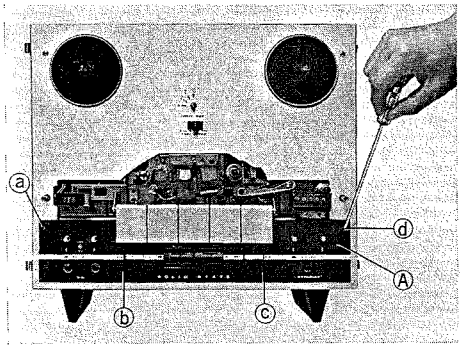
(5) Loosen the SCREWS ((a) and (b)) of the HEAD COVER (A) by using a phillips-headed screw driver and remove the HEAD COVER by hand.



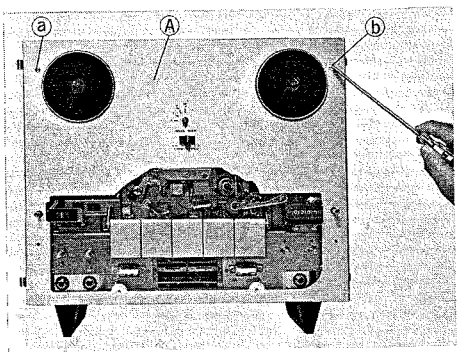
(6) Loosen the SCREWS ((a) and (b)) of the UPPER FRAME (A) by using a phillips-headed screw driver and remove the UPPER FRAME by hand.



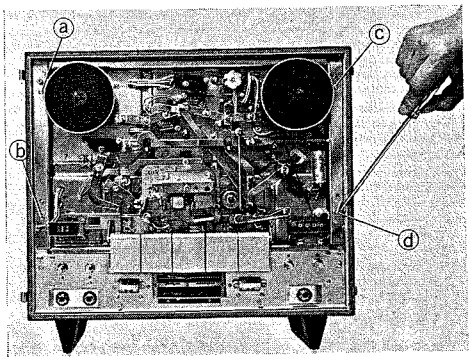
(7) Loosen the SCREWS ((a), (b), (c) and (d)) of the AMPLIFIER PANEL (A) by using a phillips-headed screw driver and remove the AMPLIFIER PANEL by hand.



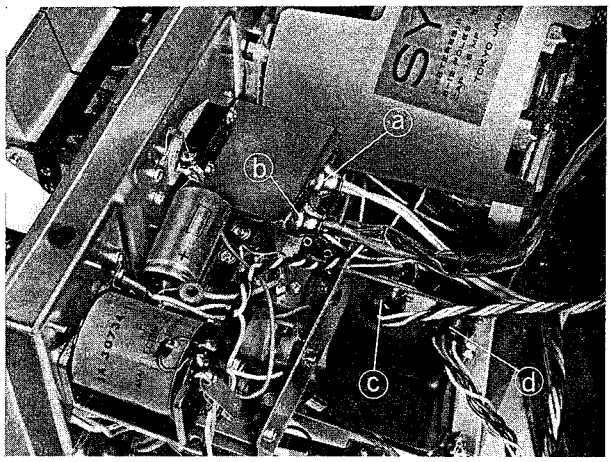
(8) Loosen the SCREWS ((a) and (b)) of the DECK PANEL (A) by using a phillips-headed screw driver and remove the MECHANISM PANEL by hand.

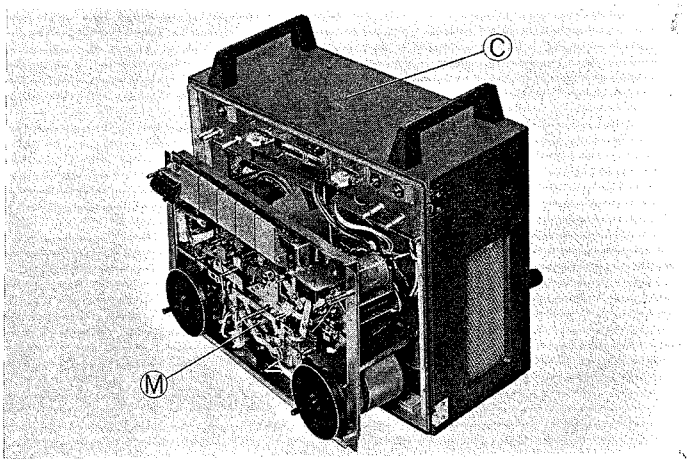


(9) Loosen the SCREWS ((a), (b), (c) and (d)) by using a phillips-headed screw driver.



(10) (11) Disconnect the PLUGS ((a), (b), (c) and (d)) carefully by hand, and remove the TAPE TRANSPORT MECHANISM ASSEMBLY (M) by slowly lifting it from the CASE (C) as shown in picture.

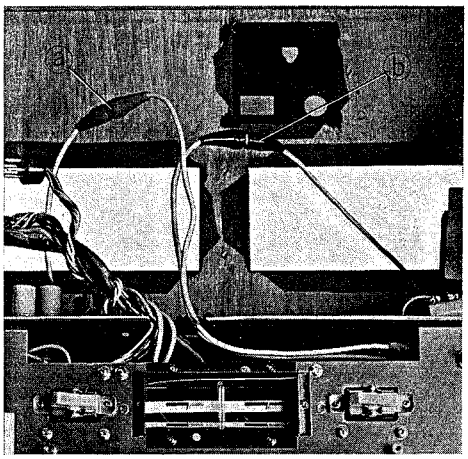


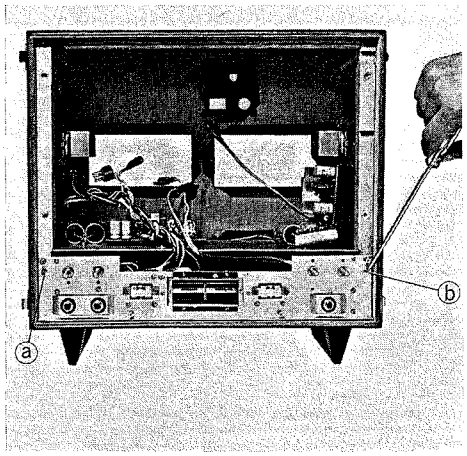


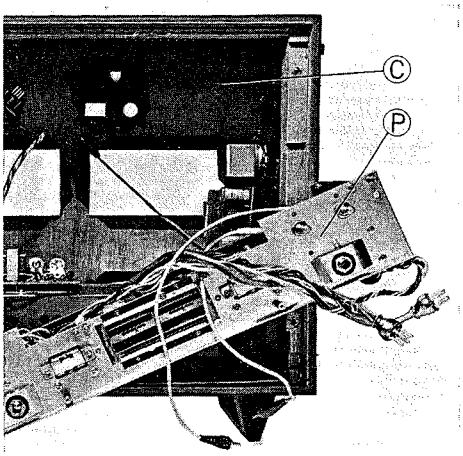
(12) Disconnect the PLUGS ((a) and (b)) carefully by hand.

(13) Loosen the SCREWS ((a) and (b)) by using a phillips-headed screw driver.

(14) Remove the PRE-AMPLIFIER BLOCK ASSEMBLY (P) by slowly lifting it from the CASE (C) as shown in picture.

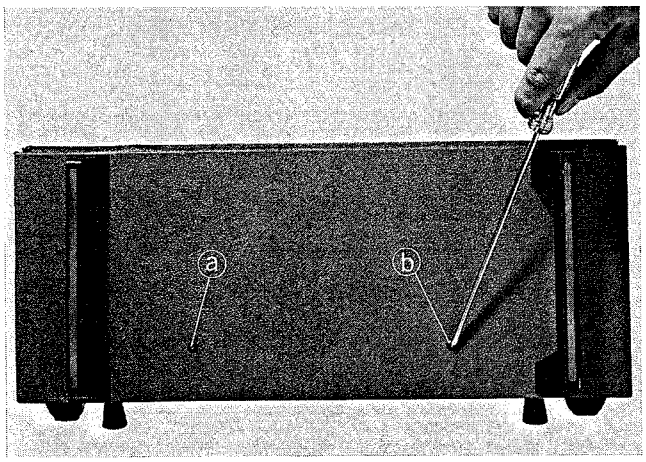


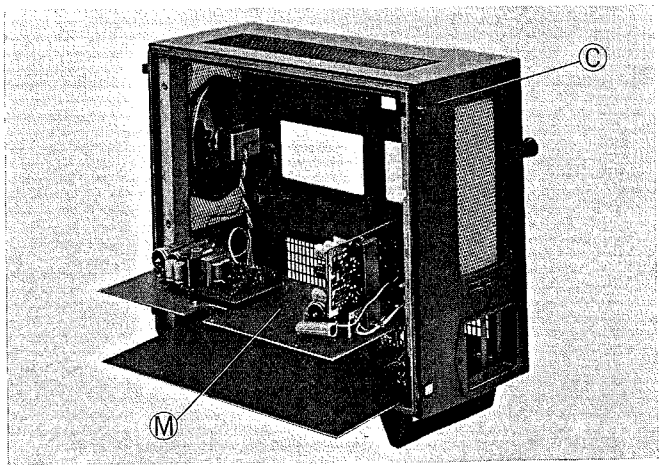




(15) Loosen the SCREWS ((a) and (b)) by using a phillips-headed screw driver.

(16) Remove the MAIN AMPLIFIER BLOCK ASSEMBLY (M) by slowly lifting it from CASE (C) as shown in picture.





V. TRANSPORT MECHANISM

1. PLAYBACK

1) Switch in the power by sliding the Knob ① in the direction of arrow as shown in Fig. 1; the capstan now starts turning.

2) Apply the tape to the capstan, and the tension arm moves to the blue-colored position shown in the drawing, with the result that the micro switch (SW309) is actuated. The coil of the miniature relay (MI-503P) is then excited to close the contact, followed by functioning of the plunger relay (3A-30734) which lowers an end of the Lock Lever A ② as shown in Fig. 2. The lock lever, accordingly, assumes the blue colored position shown in the drawing.

3) Depress now the Start Button ⑥ as shown in Fig. 3 to exert pressure on the brake lever and consequently on the Gear Switch ⑫, thereby actuating the micro switch (SW310). It follows that the plunger (3R-2538) which is provided on the reverse side of the chassis is energized to attract both the Lever B ⑩ and the Spoke ⑪ powerfully in the direction of arrow thereby to facilitate locking of the start button.

4) Concurrently with locking of the start button, the Gear ⑫ is slightly turned further by means of the notched end of the Brake Lever ⑨ and the micro switch (SW310) is turned off as the pin thereof enters the recessed portion of the Gear ⑫, thus de-energizing the plunger. The Spoke ⑪ is now released, but the start button remains locked.

5) According as the Brake Lever ⑨ slides in the direction of arrow as shown in the drawing, it presses upwardly the supporting point of the Lever ⑬, isolating the brake rubbers from the reel table and raising the pins of the micro switches (SW306 and SW307) to power the take-up motor and supply motor. These two torque motors are now initiated in action. Note that the voltage of different levels is applied to the torque motors depending on the size of the reel; the voltage is appropriately divided by the power transformer, changed over by the tape tension switch and applied to the motors.

6) The Pinch Wheel Arm ㉔ is interlocked with the Brake Lever ⑨. When this lever slides in the direction of arrow as shown in the drawing, the pinch wheel is pressed onto the capstan to let the tape start running.

7) At the same time when the Brake Lever ⑨ slides in the direction of arrow, the roller provided at the right-hand nd of the Tension Lever B ⑱ moves along the curved portion of the Brake Lever D2 which is provided at the middle part of the Brake Lever ⑨ while the Tension Lever B ⑱ moves in the direction of arrow shown in the drawing. The motion of the Tension Lever B ⑱ permits the Tension Lever A ⑳ to move freely in the direction of arrow through the action of the tension spring thereby to press the tape from below.

8) The Tape Cleaner Lever ⑲ on the other hand functions to press the tape from above, with the result that when the Tension Lever A ⑳ and the Tape Cleaner Lever ⑲ start, the tape is pinched from both sides so as to secure the tape in position.

9) The RF Lock Lever ⑭ moves to the left when the Brake Lever ⑨ slides in the direction of arrow, thereby locking the fast forward and the rewind buttons. This prevents failures in the transport mechanism which would otherwise occur in the transport mechanism while in playback operation.

2. STOP

1) In order to stop the tape in the course of playback or recording operation, depress the stop button, and the stop button lever pushes down the lever E which is provided on the keyboard so as to unlock the start button, the Brake Lever ⑨ and consequently all other levers restoring their original positions.

2) AUTOMATIC STOP

In the event the tape is cut apart or all wound on the take-up reel while in playback or recording operation, the Tension Arm ⑧ resumes the position of "STOP" so as to trip the micro switch (SW309). With the coil of the miniature relay (M1-503P) connected in parallel with a 200 μF condenser and 300 Ω resistor, the relay circuit has a time constant corresponding to some two seconds. It follows that the miniature relay and accordingly the plunger relay (3A-30734) are de-energized about two seconds after the tension arm has returned to the position of "STOP". The Lock Lever A ② restores its original position and lowers the lever E of keyboard, thereby unlocking the start button. The transport devices are thus brought at rest in an automatical fashion.

3) AUTOMATIC SHUT-OFF

If the Power Switch Knob ① is shifted to the "OFF" position during playback or recording operation, the power flows in through the micro switches (SW302 and SW303) although the micro switch (SW301) has been cut off, allowing all the levers to remain operative for playback or recording operation.

In the event the Tension Arm ⑧ resumes its original position with the tape unexpectedly cut apart or wound up entirely on the take-up reel, the start button becomes unlocked approximately two seconds after the arm has been brought in motion, making all the levers inoperative, just in the same manner as explained above.

Since the power switch has been kept in the "OFF" position, the micro switch (SW302) is cut off as soon as the start button is unlocked, thereby de-energizing the entire unit.

3. RECORDING

1) In order to perform a recording operation, depress both the Recording Button ④ and the Start Button ⑥ at a time, as shown in Fig. 3.

When the Recording Button ④ is pressed, the Recording Lever ㉒ is brought in motion so as to turn on the micro switch (SW304) and accordingly to initiate the oscillating circuit in action, as illustrated in Fig. 4. The Recording Button ⑥, when depressed, raises the Bias Head ㉑ to the vicinity of the Recording Head ㉓; the unit is now ready for recording operation.

2) With this, depress the Start Button ⑥ to lock the Brake Lever ⑨. The tape starts travelling for recording operation as described in the preceding section.

4. FAST FORWARDING

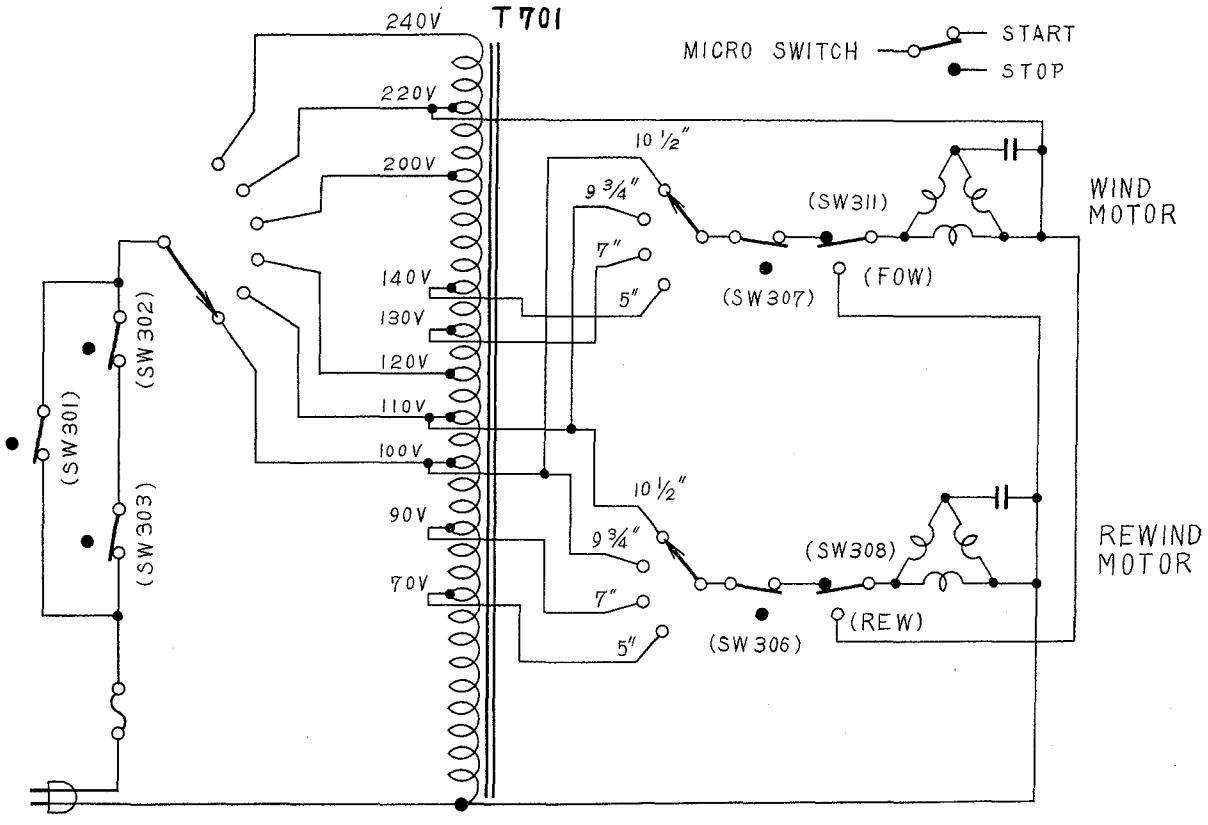
Depress the Fast Forward Button ⑦ as shown in Fig. 5, and the Right Brake Lever ⑰ is raised to turn on the micro switch (SW311) which works to supply the take-up motor with 220 volt power. This Brake Lever ⑰ further raises the supporting point of the Brake Lever B2 ⑱ with the result that both of the brake rubbers are released from the reel table; thus the fast forwarding is now operable. Note that the position of each of the levers set for fast forwarding operation is illustrated by a blue color mark in Fig. 5.

5. REWINDING

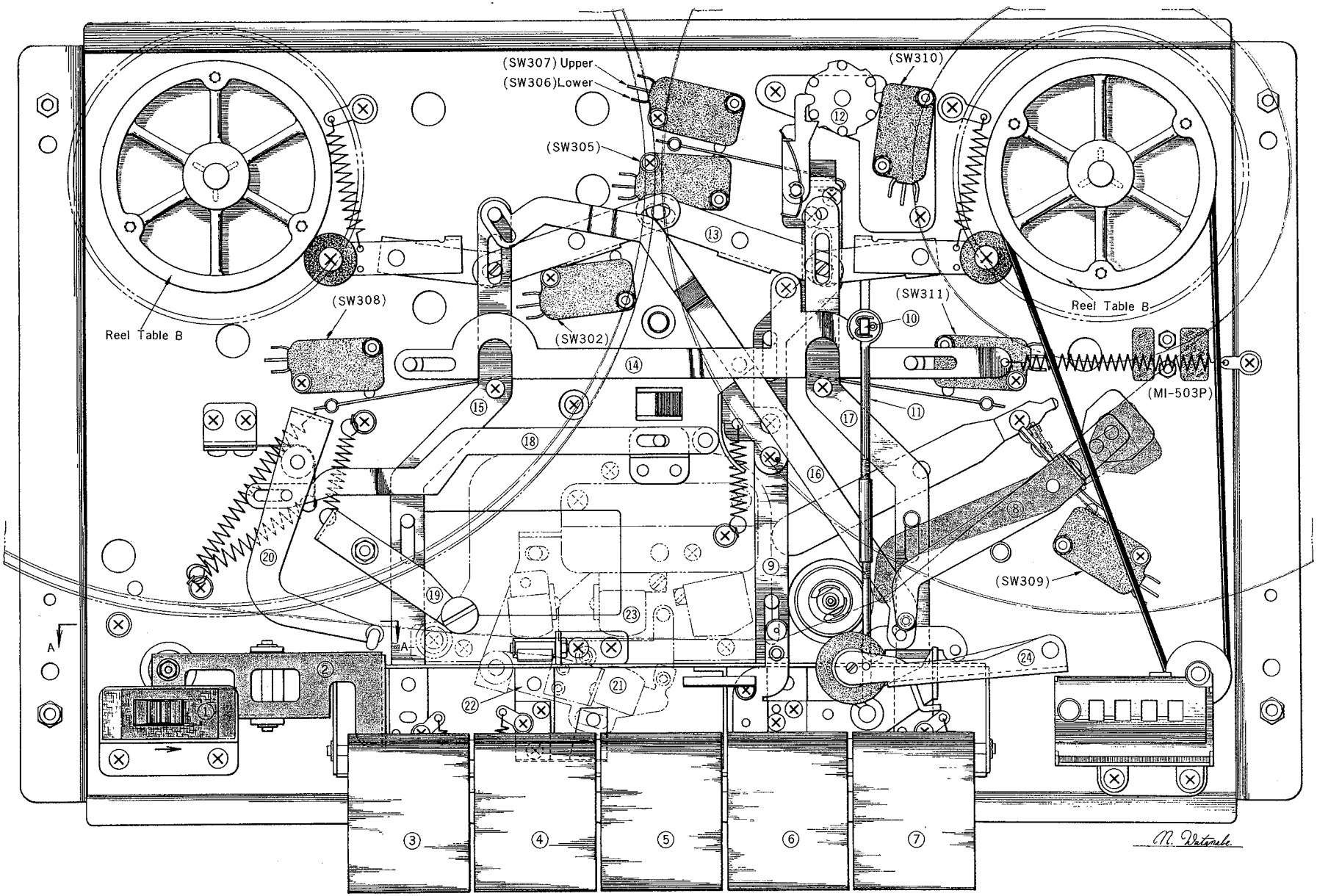
In order to effect rewinding operation, depress the Rewind Button ③. By so doing, the Left Brake Lever ⑮ as indicated red in Fig. 5 is raised to turn on the micro switch (SW308) which acts to supply 220 volt power to the rewind motor. Further, the supporting point of the brake lever B-2 is raised so as to release both of the brake rubbers from the reel table.

It may be added that the Shift Lever ⑯ running diagonally of the middle portion of the transport mechanism functions to raise the tape by the action of the tape shift pin. This facilitates the tape to start smoothly for playback, recording, fast forwarding and rewinding operation.

MOTOR CONNECTION FOR DIFFERENT OPERATIONS AND VOLTAGES APPLIED TO THE MOTORS



PLAYBACK	WIND MOTOR	REWIND MOTOR
10½"	120 V	110 V
9¾"	110 V	100 V
7"	90 V	90 V
5"	80 V	70 V
FAST FORWARD	220 V	0
REWIND	0	220 V


(SW307) Upper
(SW306) Lower
(SW310)
(SW305)
(SW308)
(SW302)
(SW311)
Reel Table B
Reel Table B
(MI-503P)
(SW309)
A
A
①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
⑬
⑭
⑮
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㉓
㉔

Fig. 1

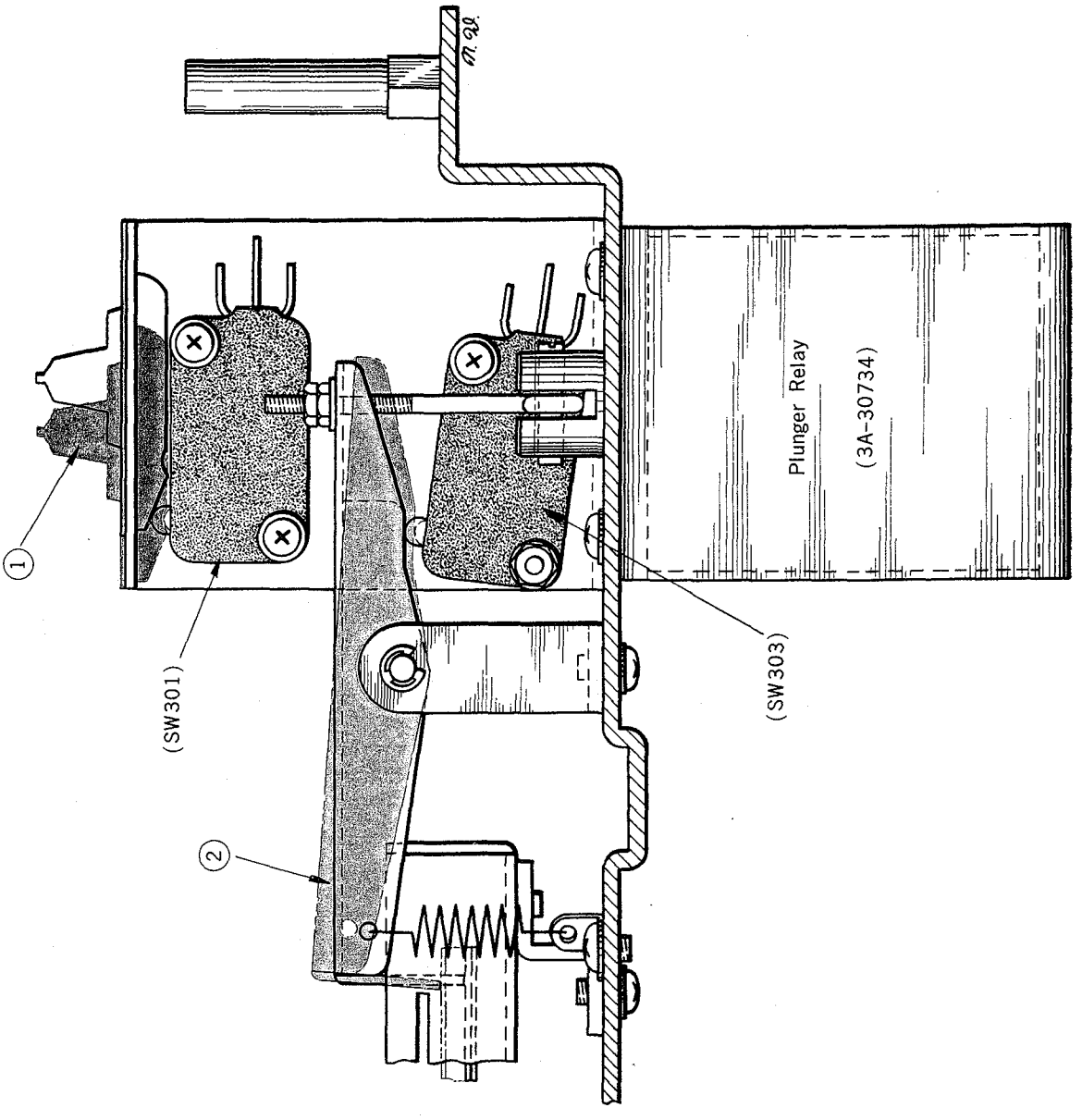


Fig. 2 (A-A)

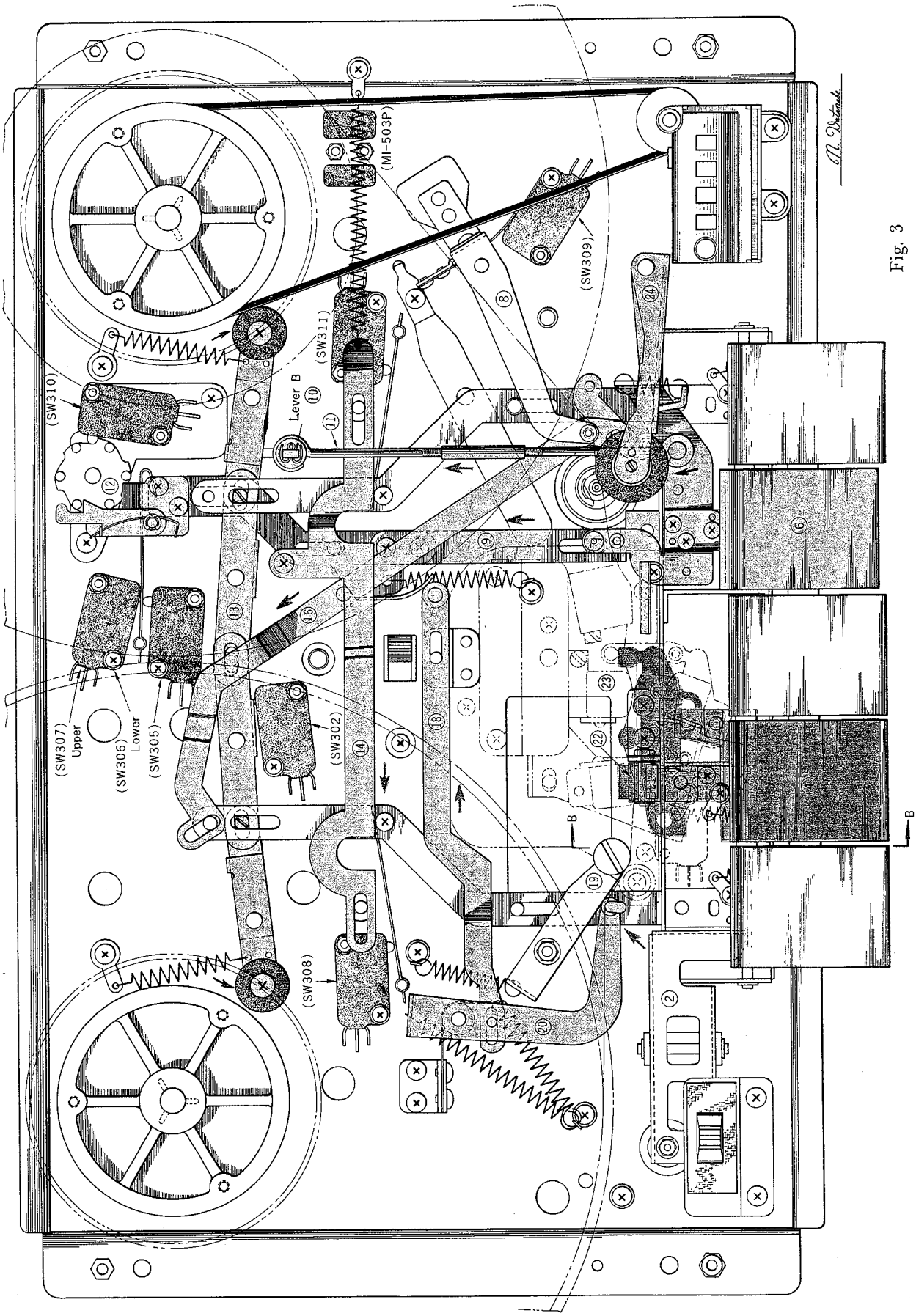

(MI-503P)
(SW309)
(SW311)
(SW310)
Lever B
(SW307)
Upper
(SW306)
Lower
(SW305)
(SW302)
(SW308)
B
B

Fig. 3

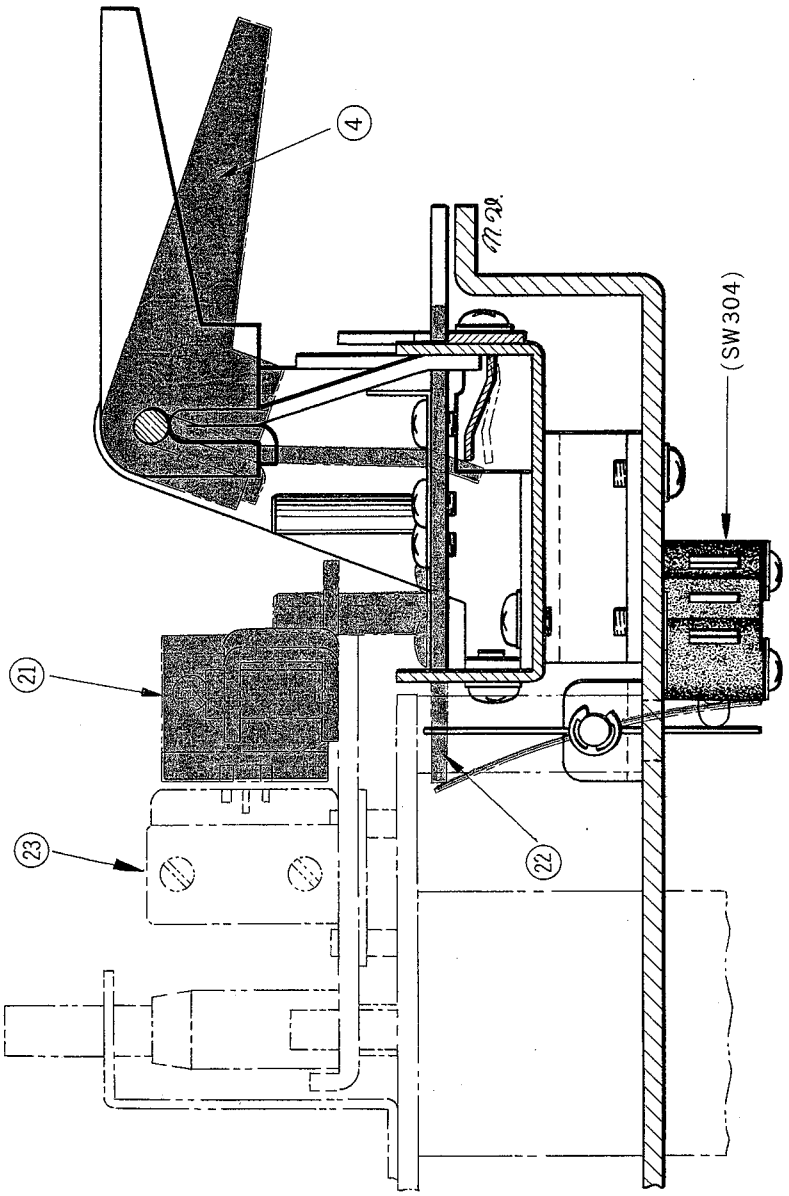


Fig. 4 (B–B)

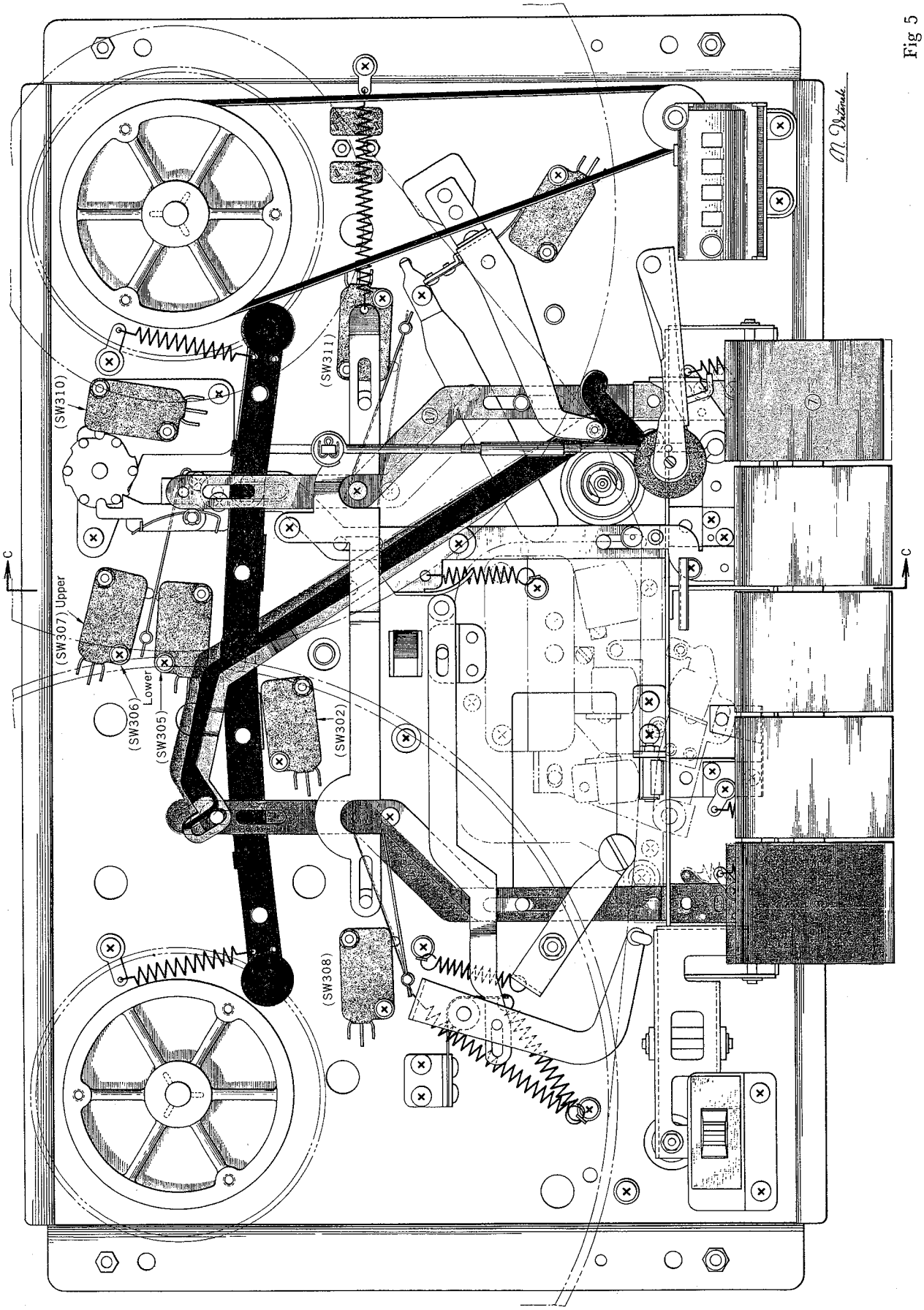


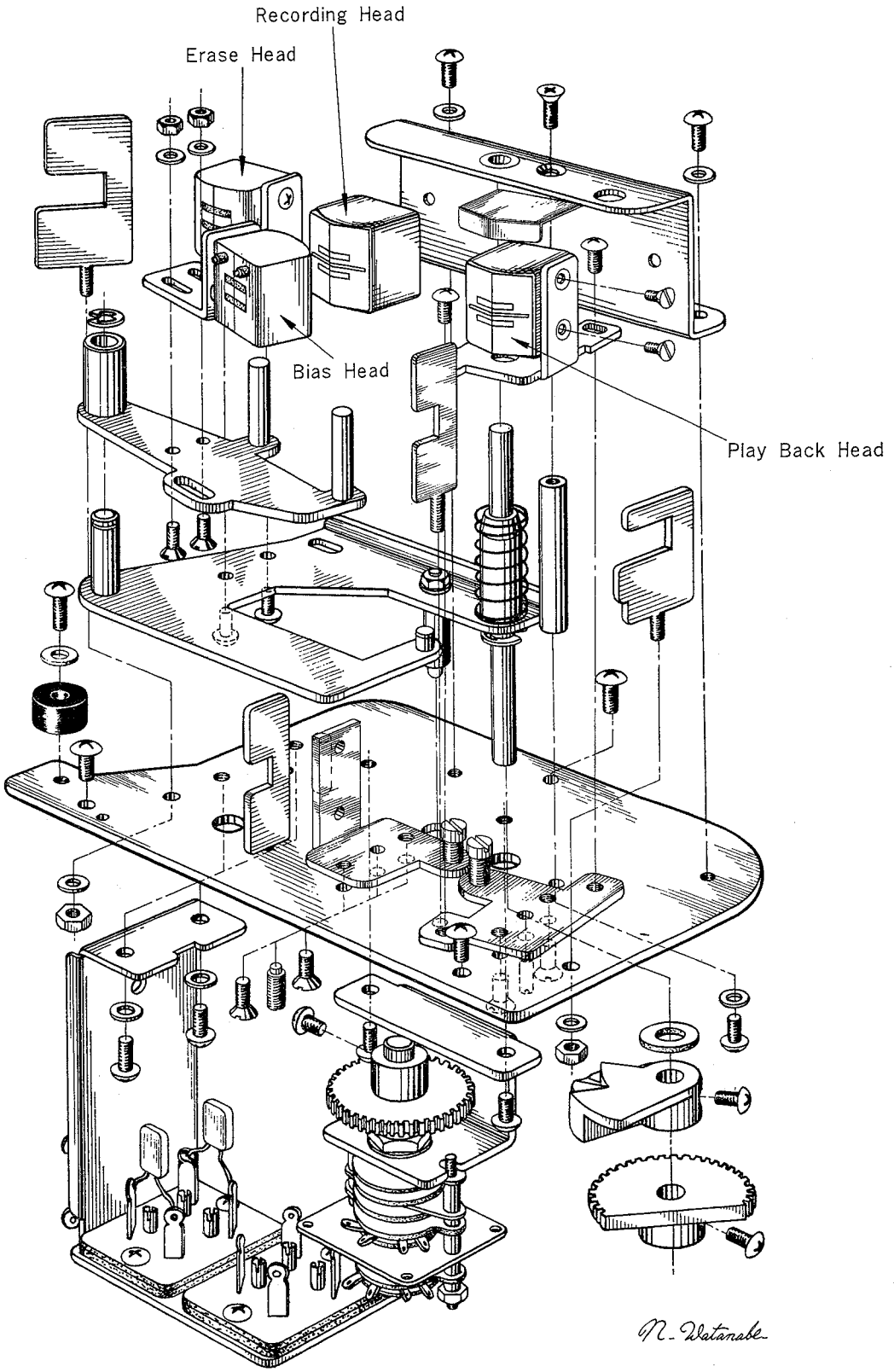
Fig 5

VI. MECHANISM ADJUSTMENTS

1. Adjustment of Heads

The head assembly has been closely checked and adjusted at the manufacturer's factory in respect of azimuth alignment and height. It is, therefore, recommended for the user to keep the set screw and other component parts completely intact except, for example, when the head is found worn. If, however, it is considered that adjustments are absolutely required on the head assembly, make them in accordance with the following instructions.

EXPLODED VIEW OF HEAD BLOCK



(A) HEIGHT

The relative position of each of the heads with respect to the head is illustrated in Fig. 6.

Adjust the erase and the bias heads by setting properly the position of the cam and the gear provided at the bottom of the head assembly.

Adjust the recording and the playback heads by the use of the set screw located at the bottom of the respective head member.

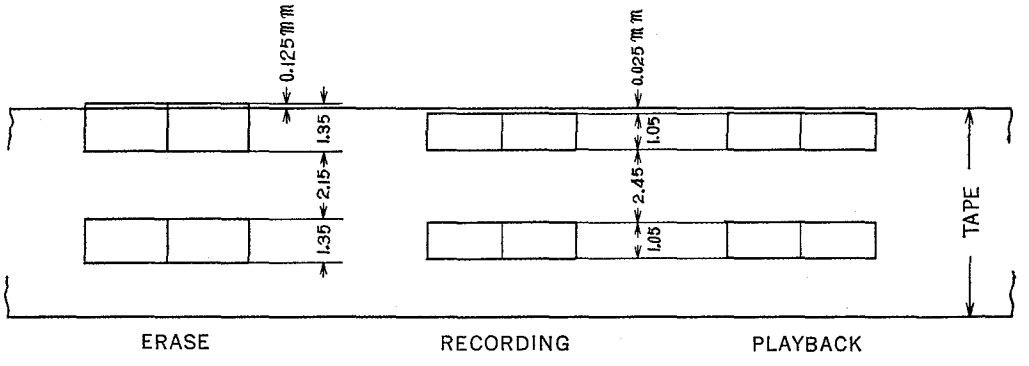


Fig. 6

(B) AZIMUTH ALIGNMENT

① In order to adjust the playback head, playback a pre-recorded tape of 8,000 Hz at 3-¾″/sec or 16 KHz at 7-½″/sec, connect a V.T.V.M. to the line output jack, and adjust the azimuth angle (θ) of the playback head with respect to the direction of the tape travel by loosening the screws ⓐ and ⓑ as shown in Fig. 7 thereby to determine an angle to give a maximum value of the line output voltage. When this is all complete, retighten the screws ⓐ and ⓑ and restore the head securely in position.

② With this, align the azimuth of the playback head by turning the screw ⓒ as shown in Fig. 7 and when the voltage of the line output has assumed a maximum value retighten the screw. Thus, the playback head has been completely oriented.

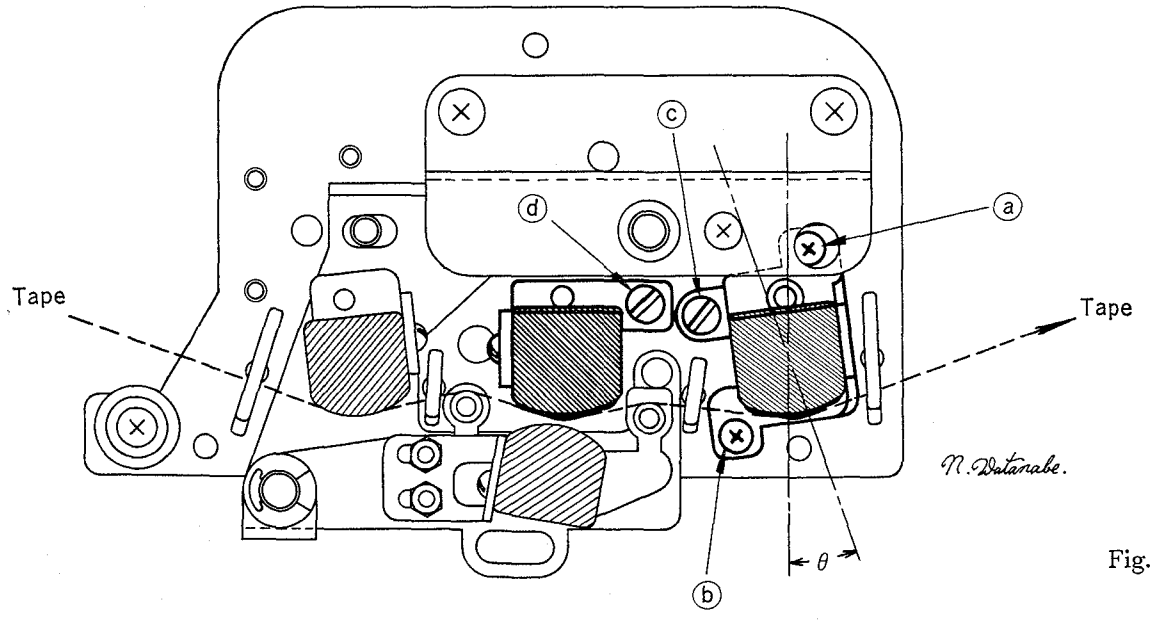


Fig. 7

③ For the purpose of adjusting the recording head, follow the instructions given below:

i) Supply the line input with the signal of 20 Hz, −16 VU.

ii) Mount a blank or unemployed tape on the head.

iii) Connect a V. T. V. M. to the line output.

iv) Shift the monitor switch to the playback side.

v) Perform recording operation and turn the screw ⓑ as shown in Fig. 7 until the pointer of the V. T. V. M. registers a maximum value.

IMPORTANT: Adjust the recording head after the playback head has been completely adjusted.

X-300 BACK SIDE VIEW

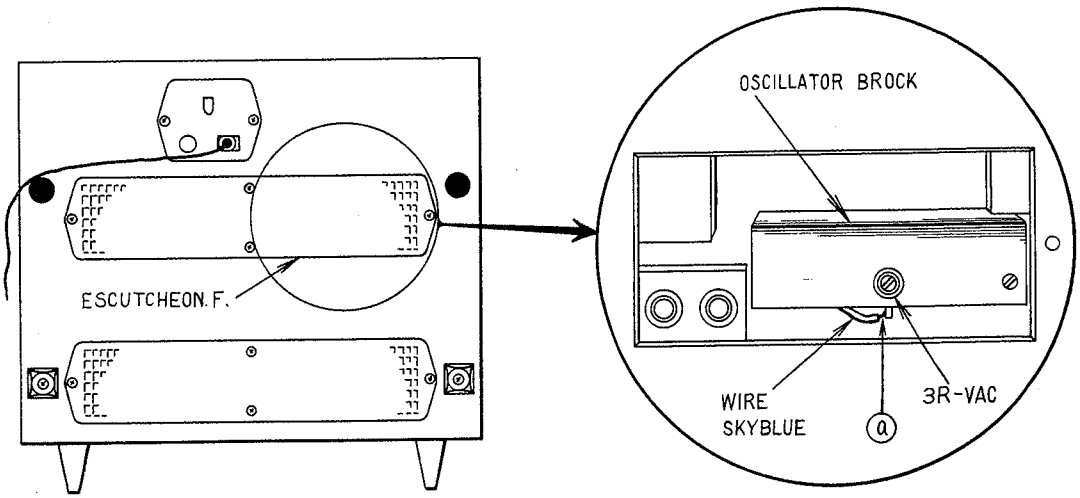


Fig. 8

2. ADJUSTMENT OF BIAS VOLTAGE

For adjustment of the bias voltage, remove the escutcheon F provided on the back of the case as shown in Fig. 8, connect a V. T. V. M. in between the terminal (a) of the voltage adjustment coil (3A-VAC) in the oscillator block and the chassis, set the unit so as to perform recording operation, and now adjust the screw of the 3R-VAC so that the V. T. V. M. indicates 40 volts.

3. ADJUSTMENT OF START BUTTON MECHANISM

By depressing the start button, as illustrated in Fig. 9, the lever A presses the lever C2 which further presses the brake lever C. Then the supply lever A attached to the end of the brake lever C presses the pin of the switch gear, with the result that the switch gear is rotated to turn ON the micro switch (SW310).

With this micro switch once actuated, the plunger relay (3R-2538) is energized to attract the plunger lever B in the direction of arrow. The spoke, which is connected with the plunger lever B, draws the keyboard arm and presses the pinch wheel against the capstan, facilitating the start button to be locked. Concurrently with locking of the start button, the pin of the switch gear is further depressed so that the micro switch (SW310) is tripped as the pin thereof enters the recessed portion of the switch gear.

It follows that the plunger relay (3R-2538) is de-energized to release the spoke. The start button having already been locked, however, the start button mechanism remains as it has been. For this purpose, make the following adjustments.

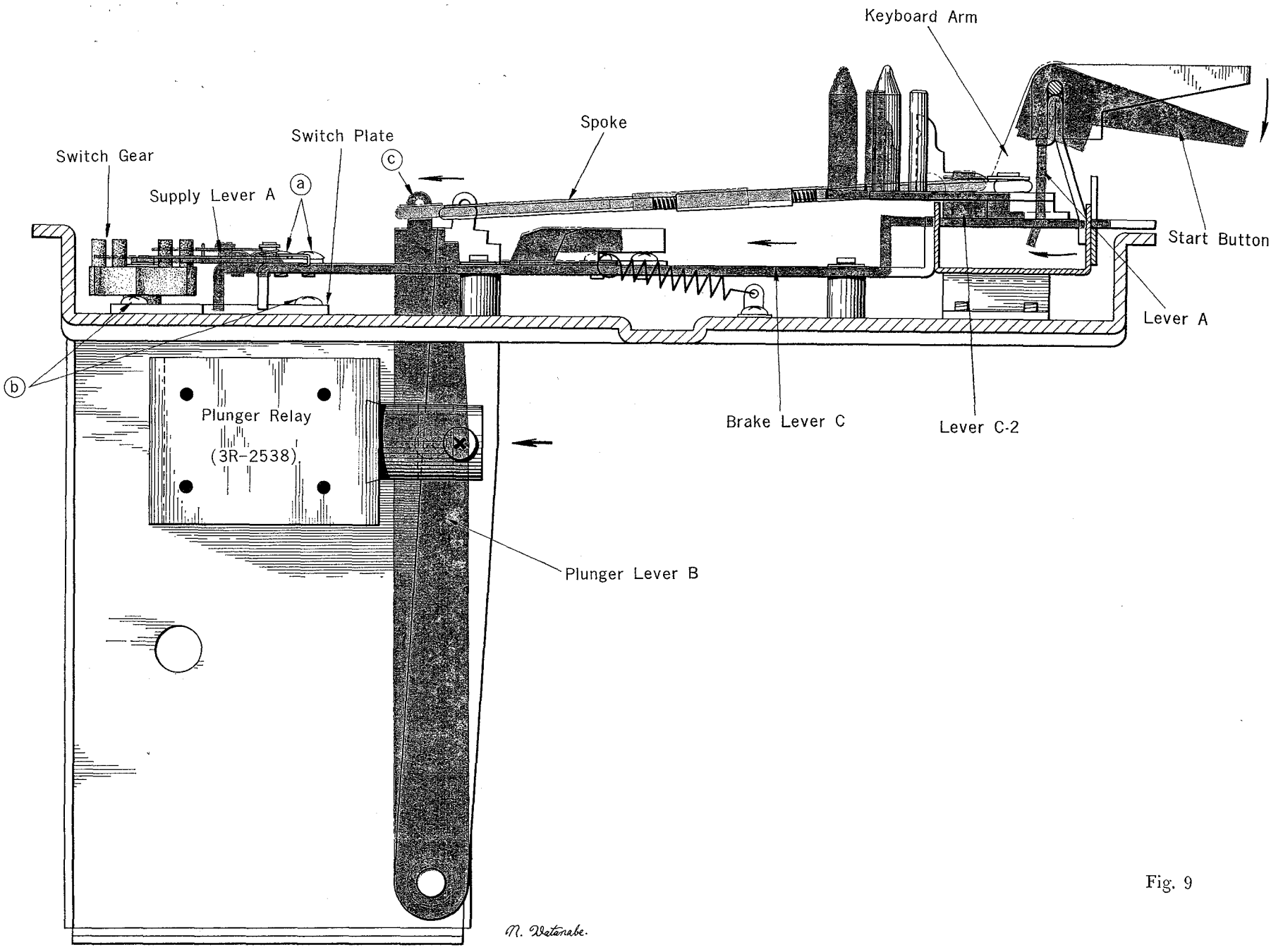

Keyboard Arm
Spoke
Switch Plate
Switch Gear
Supply Lever A
a
c
Start Button
Lever A
b
Plunger Relay
(3R-2538)
Brake Lever C
Lever C-2
Plunger Lever B
N. Watanabe.

Fig. 9

1) Adjustment of supply lever A and switch plate

Determine a proper relative position of the supply lever A and the switch plate after loosening the associated screws ⓐ and ⓑ so that, with the power switched off, the switch gear commences to turn as soon as the start button is depressed and at the same time when the start button is locked the switch gear turns one-sixth revolution thereby to trip the micro switch (SW310).

2) Adjustment of plunger B and spoke

Turn on the power switch, and remove the pin and the washer which are provided at the end of the plunger lever B to remove the spoke from the end ⓒ of the plunger lever B. Then, depress the start button deeply to lock the lever A. Get the contact of the micro switch (SW310) to be shorted so as to energize the plunger relay (3R-2538). The result is that the plunger lever B is fully attracted in the direction of arrow as shown in the drawing.

Now, set the ring provided at the end of the spoke so that the internal side of the ring comes 0.2 to 0.3 mm short of the end of the plunger lever B. This is done by turning the shaft of the spoke either clockwise or counter-clockwise. This adjustment is intended for ensuring of the start button at the time when it is depressed.

After completion of this adjustment, restore the pin and washer at the end of the plunger lever B and check if the supply lever A and the switch plate have been correctly adjusted.

4. ADJUSTMENT OF REEL TABLE

1) For adjustment of the height of the reel table, move the reel table B vertically by loosening the set screw of this table with use of a screw driver inserted into the round hole in the directions designated at ⓐ and ⓑ with the reel table A already removed, as shown in Fig. 10.

2) When adjustment on the reel table B is complete, be careful not to allow for clearance between the top portion of the motor shaft and the middle portion of the reel table A with use of properly chosen (in terms of number and thickness) nylon washers ⓒ which are provided at the center of the reel table A.

3) Upon completion of the above adjustments, retighten the set screw of the reel table A to hold it securely in position.

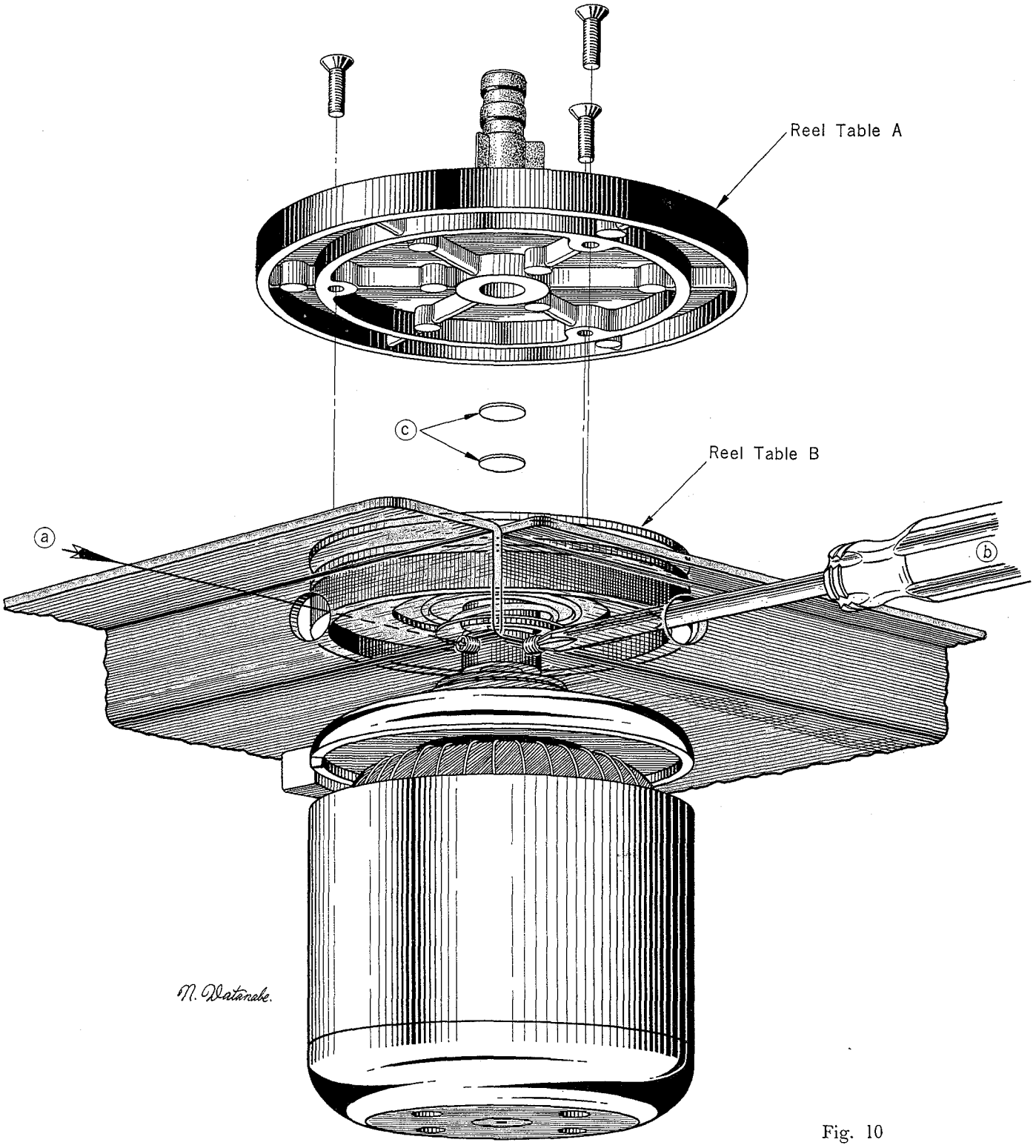


Fig. 10

VII. AMPLIFIER ADJUSTMENTS

1. ADJUSTMENT OF PLAYBACK OUTPUT LEVEL (PRE-AMPLIFIER)

a) Connect VTVM (use one with Milli-Volt scale) to line output as shown in Fig. 11.
b) Playback an Ampex 250 c/s test tape (7.5″/s). Adjust VR201 (semi-fixed resistor, 20 kΩ) so that the Line Output Level of Channel 2 indicates 1.228 V. At this point, the VU meter should indicate 0 VU ±0.5 VU.
c) Then, adjust the Line Output Level of Channel 1 in the same manner as followed in the adjustment of the level of CH-2. This adjustment should be done, however, while the Head Selector set to the 3-2 monaural position.

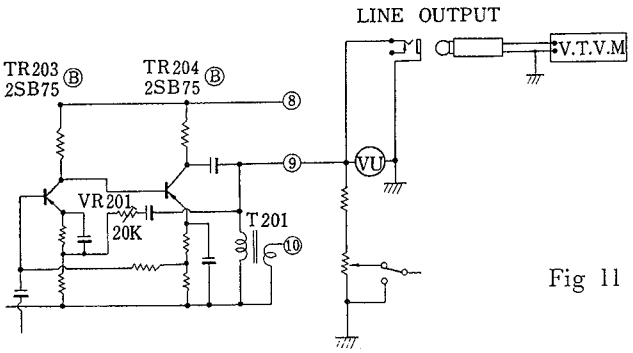


Fig 11

2i ADJUSTMENT OF RECORDING EQUALIZATION CHARACTERISTICS

a) Set a testing blank tape (SCOTCH-111) on the machine.
b) Set Equalizer Switch in the 7-1/2″ position.
c) Supply 1,000 c/s sine wave of the Audio Frequency Oscillator to the Line Input of the X-300 through the Attenuator (ATT) as shown in Fig. 12.
d) Set the X-300 in "record" mode. Set the tape into "record" motion at the tape speed of 7-1/2″, and set the Playback Output Button in "IN" position (thereby placing the machine in the playback monitoring while recording).
e) Adjust the Line Volume so that the pointer of the VU meter resiters on 0 VU (intermediate between red and black).
f) Operate the ATT to attenuate the input signal at 16 db so that the input signal of the Line Input reads −16 db.
g) After this adjustment, shift the frequency of Audio Frequency Oscillator and adjust the resistor VR-102 (500 ohms (B) semi-fixed resistor) so that the Line Output Level in 1 k c/s is equal to that in 10 K c/s).

CHECK

In the (f) state, shift the signal frequency of Audio Frequency Oscillator to 18,000 c/s, and it will be noted that the Line Output Level of the X-300 is set at −6 db or lower, as compared with the level at 1,000 c/s. Furthermore, when Equalizer Switch has been shifted to 3-3/4″ with the tape running at the speed of 3-3/4″, the Line Output Levels for 1,000 c/s and 10,000 c/s will be equal.

In the event that the equalization characteristics should deviate from the above standards after proper adjustments, such deviation may be due to mal-adjusted heads, and hence the heads should be readjusted according to the instructions on the Adjustment of Heads.

3. ADJUSTMENT OF RECORDING INPUT LEVEL

a) Connect VTVM to Line Output.
b) Supply 1,000 c/s sine wave of Audio Frequency Oscillator to the Line Input of the X-300.
c) Set a testing blank tape (SCOTCH-111) on the machine. Set the X-300 in "record" mode, and set the tape in motion at the speed of 7-1/2″.
d) Set the Playback Output Button in "IN" position.
e) Manipulate the Line Volume (10 kΩA) to adjust the Recording Input Level so that the indicator voltage of VTVM connected to Line Output reads 1.228 V.
f) In the state of (e), re-set the Playback Output Button. Then, set the Record Output Button in "IN" position and operate VR-101 (10 kΩB) so that the indicator of the VU meter of the X-300 will point at the volume unit of "0".

* If this later adjustment has been correctly accomplished, the VU meter should indicate the same value also when the operation of the output button is shifted from the Record Output Button to the Playback Output Button.

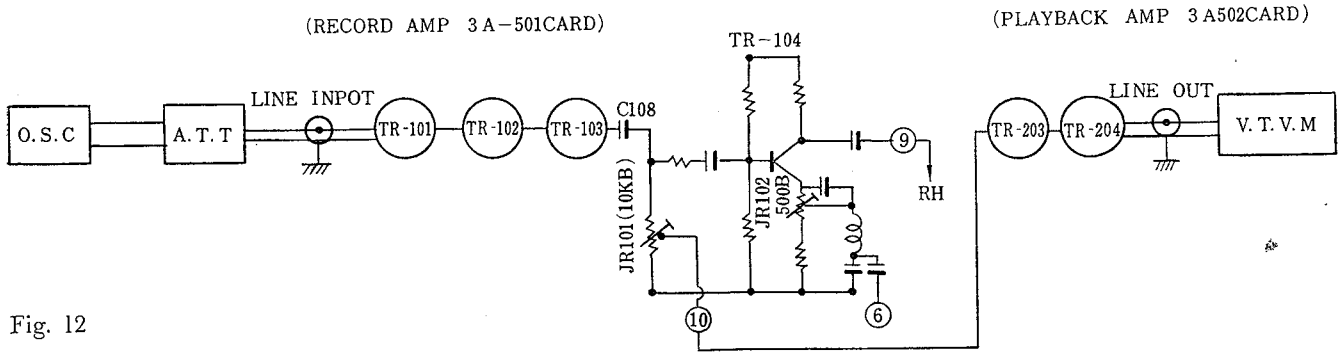


Fig. 12

4. ADJUSTMENT OF D.C. BIAS FOR POWER TRANSISTORS 〔2SB338 (A)〕

Set the ammeter as shown in Fig. 13. Operate VR-401 and VR-402 so that the amperage at absence of signal will be 50 mA.

(Adjustment will be facilitated by the insertion of a shortcircuited plug into the External Speaker Jack).

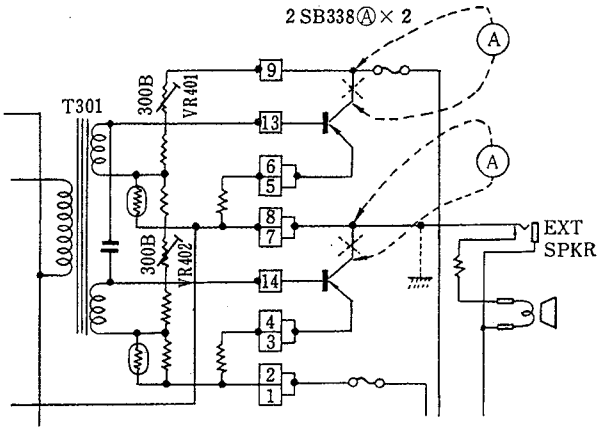


Fig. 13

VIII. REPLACEMENT PARTS TABLE

Parts No.	Nomenclature
	TOP PANEL
01-001	Deck Panel
002	Upper Panel
003	Knob, Track Selector
004	Cover, Head
005	Knob, Reel Size
006	Knob, Speed Change
	DECK FRAME
02-001	Deck Frame
001a	Shaft A, Brake
001b	Prop, Shut Off
001c	Prop, Pinch Wheel
001d	Shaft, Cleaner
001e	Prop B, Oscillator Card
001f	Prop, C Lever
001g	Prop, Brake Lever
001h	Prop B, Brake Lever
001i	Stopper, Shut Off
001j	Prop, Panel
001k	Prop B, Panel
001l	Foot, Keyboard
001m	Prop B, Head Cover
001n	Prop A, Head
001o	Prop B, Head
002a	Lever, Micro Switch
002b	Lever C, Micro Switch
002c	Shaft, Micro Switch
003a	Table, Recording Lever
003b	Recording Lever
004a	Micro Switch VV-15-1A
004b	Micro Switch MLA-20, for Shut Off
005a	Plate, Switch
005b	Gear, Switch
006	Brake Lever C, Complete
006a	Lever C, Brake
006b	Lever D2, Brake
006c	Supply Lever A & B
006d	Spring, Lever C
007a	Lever A-1, Brake
007b	Lever (Left), Brake
007c	Rubber, Brake
007d	Screw, retaining Brake Rubber
007e	UN Spring, D
008a	Lever A-1, Brake
008b	Lever (Right), Brake
008c	Rubber, Brake
008d	Screw, retaining Brake Rubber
008e	UN Spring, D

Parts No.	Nomenclature
02-009a	Lever B-2, Brake
009b	Shaft C, Brake
009c	Lever B, Brake
010	Left Brake Lever
010a	Shaft B, Brake
011	Right Brake Lever
011a	Shaft B, Brake
012	Stopper, Flywheel
013a	RF Lock Lever
013b	Prop, RF Lock Lever
013c	Shaft, RF Lock Lever
013d	Spring, RF Lock Lever
03-001	Tape Shifter Block, Complete
001a	Shift Table (with Shift Metal)
001b	Shift Spring
001c	Shaft, Micro Switch
001d	Shift Arm
002	Shift Lever
04-001	Tension Arm Block, Complete
001a	Shut Off Arm
001b	Shut Off Spring
001c	Balance Arm
002	Relay Switch MH1PM-1
003a	Resistor 1/4 P 300 ohms K
003b	Resistor 1/4 P 15 K ohms
003c	Condenser CETX 200 M 50 W
05-001a	Frame, Keyboard
001b	Lever E, Keyboard
001c	Spring, Keyboard
002a	Side Plate (Small), Keyboard
002b	Spring E, Keyboard
002c	Holder, Keyboard Spring
003a	Recording Lever B
003b	Spring, Keyboard
003c	Lever C2, Keyboard
003d	Arm, Keyboard
003e	Spork, adjusting Keyboard
003f	Nut, for Spork
003g	Lever B, Plunger
003h	Spring, Keyboard
003i	Plunger Relay
003j	Board, Plunger
004a	Lever B, Keyboard
004b	Spring, Keyboard
005a	Keyboard
005b	Lever A, Keyboard
005c	Shaft, Keyboard

Parts No.	Nomenclature
05-006a	Safety Lever
006b	UN Spring, D
007	Plate B, Keyboard
06-001	Plunger Relay, Complete
002a	3 P Lug Plate
002b	Resistor 50 ohms
003	Plunger Joint
004a	Lock Lever, B
004b	Lock Lever, A
004c	Spring, Lock Lever
004d	Shaft, Lock Lever
005	Main Switch Table
005a	Micro Switch
005b	Insulator Plate, Main Switch
006a	Knob B, Power
006b	Knob A, Power
006c	Spacer, Power Knob
007a	Resistor 1/4 P 200 ohms K
007b	Tubular Type Condenser CETX 500 μF 25 WV
007c	UZ Plug
007d	Silicon Diode SL-150
07-001	Pinch Wheel Lever Block
002	Arm, Pinch Wheel
003	Pinch Wheel
004	Shaft, Pinch Wheel
005	Spring, Pinch Wheel
08-001	Tape Cleaner Block
002	Lever, Cleaner
003	Felt
004	Holder, Felt
005	Screw, Felt
006	Spring, Tape Cleaner
09-001	Tension Lever Block
001a	Lever A, Tension
001b	Lever B, Tension
002	Lever C, Tension
003a	Spring, Tension
003b	Spring D
004a	Angle A, Switch

Parts No.	Nomenclature
09–004b	Plate A, Switch
004c	Spacer B, Switch
10–001	Reel Plate, Complete
001a	Shaft, Reel
001b	Spring, Reel
001c	Holder, Reel
001d	Plate, Reel
002	Reel Table A, Complete
002a	Table A, Reel
002b	Table B, Reel
002c	Conical Spring, Reel Table
002d	Nylon Washer
002e	Washer Pin
11–001	Index Counter, Complete
001a	Pulley, Counter
001b	Belt, Counter
001c	Screw, without Head
001d	Plate, Counter

HEAD BLOCK

12–001	Head Assembly, Complete
002	Erase Head
003	Recording Head
004	Bias Head
005	Playback Head
006	Rotary Switch W21-263
007	Shield Plate, Switch

MAIN MOTOR

13–001	Main Motor, Complete
001a	CF Shaft
001b	Shield Plate
002a	20P Slide Switch FS-601N
002b	Table, Switch
003	DF Condenser 1.8 μF 350 VAC

TORQUE MOTOR

14–001	Take-up Motor, Complete
002	Supply Motor, Complete
003	Bearing 608VV
004a	Condenser 3 μF 300 VAC
004b	Plate, Condenser

POWER BLOCK

15–001	Power Block, Complete
15–002	Chassis Complete, Transformer
002a	2P Holder
002b	2P Jack
002c	TV Consent (3P)
002d	UZ Socket
002e	3P Lug Plate
002f	4P Socket
002g	TV Consent (5P)
003	Power Transformer
004	Electrolytic Condenser (Lug Type) CELG 500 μF 50 WV
005a	Fuse Post
005b	Fuse, 2A
006a	AC Cord
006b	Rubber Bush, AC Cord
007a	Socket, Voltage Change
007b	Plug, Voltage Change
008a	Silicon Diode 5 GB
008b	Silicon Diode SPN-01
009a	Chassis B, Tránsformer
009b	Rotary Switch Y-124
010a	Resistor 1/4P 100 ohms K
010b	Resistor 1/4P 82 ohms K
011	Holder, Transformer Chassis

CASE

16–001	Case
002	Holder
003a	Nut A
003b	Nut B
003c	Nut C
004	Escutcheon, A
005	Russ Plate, Speaker
006	Speaker
007	Russ Plate B, for Ventilation
008a	Rubber Foot
008b	Table, Rubber Foot
009	3R Rubber Foot
010	Escutcheon, B
011	Escutcheon, F

AMPLIFIER PANEL BLOCK

17–001	Amplifier Panel
002a	Knob, Mic. Volume Control
002b	Knob, Line Volume Control
002c	Knob, Volume Control
002d	Screw, without Head 3×5

PRE-AMPLIFIER BLOCK

18–001	Frame, Amplifier
002a	Lamp Socket
002b	Holder, Lamp Socket
002c	Pilot Lamp SQ-1 Swan Type 8V 0.25A
003a	10P Multi Jack
003b	Holder C, Multi Jack
004a	10P Multi Jack
004b	Holder A, Multi Jack
005	Prop, Pre-amplifier
006a	Seesaw Switch (Rec./P.B.)
006b	Seesaw Switch (Equalizer)
006c	Prop C, Switch
007	VU Meter
008a	Escutcheon A, Meter
008b	Escutcheon B, Meter
009a	Variable Resistor, Duplex (D24N-10K ohms A×2)
009b	Variable Resistor (V24N-10K ohms A)
010a	3P Lug Plate
010b	5P Lug Plate
011a	2-pole E Jack (Mic.)
011b	3-pole E Jack (Headphone)
012	Side Plate (Right), Amplifier
013a	Name Plate, Line Jack
013b	2-pole E Jack
014a	Side Plate (Left), Amplifier
014b	5P Lug Plate
015	Holder, Printed Card
016	Holder, 10P Multi Jack
017a	Tubular Type Electrolytic Condenser CETG 1,000 μF 25 WV
017b	Tubular Type Electrolytic Condenser CETX 500 μF 25 WV
017c	Tubular Type Electrolytic Condenser CETX 200 μF 25 WV

Parts No.	Nomenclature
18-018a	Resistor 1/4P 120 ohms K
018b	Resistor 1/4P 820 ohms K
018c	Resistor 1/4P 3K ohms J
018d	Resistor 1/4P 6.8K ohms K
018e	Resistor 1/4P 10K ohms K
018f	Resistor 1/4P 39K ohms K
018g	Resistor 1/4P 100K ohms K
019	Germanium Diode IN-34A
020a	TV Consent Plug (5P)
020b	4P Plug
020c	Connector Plug (Black)
020d	Connector Plug (Red)

RECORD CARD

19-001	Record Card, Complete
002	Printed Plate, Record Card
003a	Transistor 2SB 443 (A)
003b	Transistor 2SB 75 (B)
003c	Transistor 2SB 75 (F)
004a	Tubular Type Electrolytic Condenser 30 μF 3WV
004b	Tubular Type Electrolytic Condenser 100 μF 3WV
004c	Tubular Type Electrolytic Condenser 100 μF 6V
004d	Tubular Type Electrolytic Condenser 10 μF 10WV
004e	Tubular Type Electrolytic Condenser 100 μF 10V
004f	Tubular Type Electrolytic Condenser 10 μF 25WV
004g	Mylar Condenser 0.033 μF 50V K
004h	Mylar Condenser 0.047 μF 50V K
004i	Mylar Condenser 0.1 μF 50V K
005a	Resistor 1/4P 100 ohms K
005b	Resistor 1/4P 220 ohms J
005c	Resistor 1/4P 300 ohms J
005d	Resistor 1/4P 560 ohms J
005e	Resistor 1/4P 1.2K ohms J
005f	Resistor 1/4P 1.5K ohms J
005g	Resistor 1/4P 3K ohms K
005h	Resistor 1/4P 3.3K ohms K
005i	Resistor 1/4P 10K ohms K
005j	Resistor 1/4P 10K ohms J
005k	Resistor 1/4P 15K ohms J
005l	Resistor 1/4P 22K ohms J
005m	Resistor 1/4P 100K ohms J
006a	Semi-fixed Resistor 500 ohms (B)
006b	Semi-fixed Resistor 10K ohms (B)
007	Peaking Coil 300 μH
008	Name Plate, Record Card

Parts No.	Nomenclature

PLAYBACK CARD

20-001	Playback Card, Complete
002	Printed Plate, Playback Card
003a	Transistor 2SB 443 (A)
003b	Transistor 2SB 75 (B)
003c	Transistor 2SB 75 (F)
004a	Tubular Type Electrolytic Condenser 30 μF 3WV
004b	Tubular Type Electrolytic Condenser 100 μF 3WV
004c	Tubular Type Electrolytic Condenser 100 μF 6V
004d	Tubular Type Electrolytic Condenser 10 μF 10WV
004e	Tubular Type Electrolytic Condenser 100 μF 10V
004f	Tubular Type Electrolytic Condenser 10 μF 25WV
004g	Tubular Type Electrolytic Condenser 50 μF 25WV
004h	Mylar Condenser 0.01 μF 50V J
004i	Mylar Condenser 0.22 μF 35V K
005a	Resistor 1/4P 100 ohms K
005b	Resistor 1/4P 220 ohms J
005c	Resistor 1/4P 270 ohms J
005d	Resistor 1/4P 300 ohms J
005e	Resistor 1/4P 560 ohms J
005f	Resistor 1/4P 1.5K ohms J
005g	Resistor 1/4P 1.8K ohms K
005h	Resistor 1/4P 2.2K ohms K
005i	Resistor 1/4P 3K ohms K
005j	Resistor 1/4P 3.3K ohms K
005k	Resistor 1/4P 4.7K ohms J
005l	Resistor 1/4P 6.8K ohms K
005m	Resistor 1/4P 10K ohms K
005n	Resistor 1/4P 10K ohms J
005o	Resistor 1/4P 15K ohms J
005p	Resistor 1/4P 100K ohms J
006	Semi-fixed Resistor 20K ohms (B)
007	Headphone Transformer 7K ohms: 8 ohms
008	Name Plate, Playback Card

MAIN AMPLIFIER BLOCK

21-001	3R Radiative Plate (with Amplifier Shield)
002	Plate, Jack
002a	Push Button Switch VE-22E
002b	2-pole E-1 Jack
003	Name Plate, Speaker Jack
004a	18P Multi Jack

Parts No.	Nomenclature
21-004b	Prop, Multi Jack
005	Holder B, Amplifier Card
006a	4P Lug Plate
006b	5P Lug Plate
008	18P Multi Jack
009	Holder A, Amplifier Card
010	3P Lug Plate
011a	Tubular Type Electrolytic Condenser CETG 1,000 μF 25 WV
011b	Tubular Type Electrolytic Condenser CETG 500 μF 50 WV
011c	Tubular Type Electrolytic Condenser CETG 1,000 μF 25 WV
011d	Tubular Type Electrolytic Condenser CETG 1,000 μF 25 WV
012a	Resistor 1/2P 68 ohms K
012b	Wired Resistor 5 WL 24 ohms K
013a	Holder, Fuse
013b	Fuse 1A
014	Transistor 2SB 338A (or 2SB 471)
015	Special Screw, Power Transistor
016	Rubber Bush
017	4P Plug
018	Tip, Speaker
019a	Tip Connector Jack (Red)
019b	Tip Connector Jack (Black)
020a	Holder B, Multi Jack
020b	Plate, Multi Jack Holder

MAIN AMPLIFIER CARD

22-001	Main Amplifier Card, Complete
002	Printed Plate, Main Amplifier Card
003	Radiative Plate
004	Radiative Plate, Transistor
005	Holder D, Printed Plate
006a	Tubular Type Electrolytic Condenser 100 μF 25V
006b	Tubular Type Electrolytic Condenser 50 μF 6WV
006c	Tubular Type Electrolytic Condenser 500 μF 6V

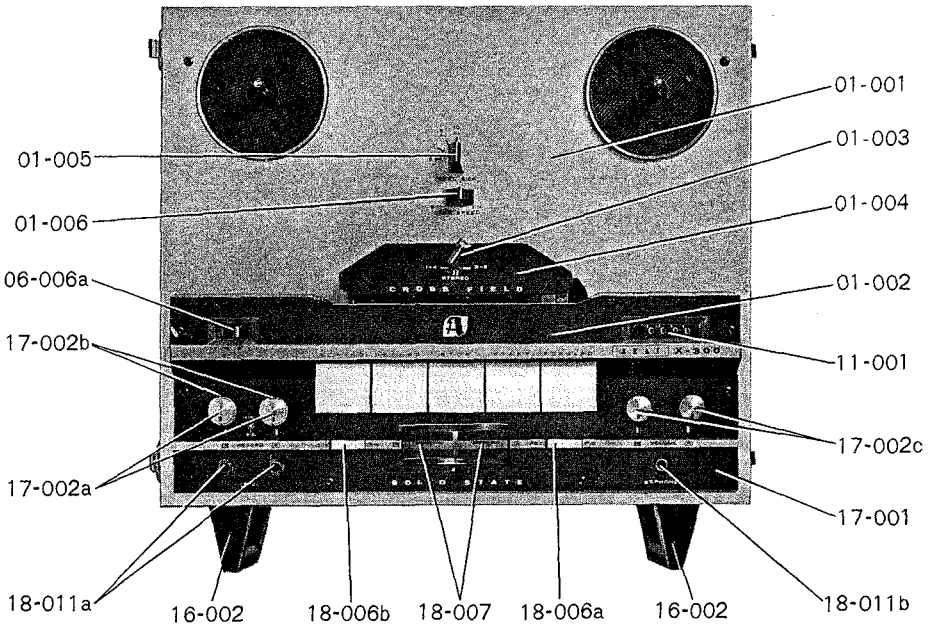
Parts No.	Nomenclature
22–006d	Tubular Type Electrolytic Condenser 50 μF 10 WV
006e	Mylar Condenser 0.015 μF 50 V K
006f	Mylar Condenser 0.022 μF 50 V K
006g	Plastic Condenser 50 WV
007a	Resistor 1/4 P 12 ohms K
007b	Resistor 1/4 P 150 ohms K
007c	Resistor 1/4 P 150 ohms J
007d	Resistor 1/4 P 220 ohms J
007e	Resistor 1/4 P 1.8 K ohms J
007f	Resistor 1/4 P 1.2 K ohms J
007g	Resistor 1/4 P 3.3 K ohms K
007h	Resistor 1/4 P 6.8 K ohms J
007i	Resistor 1/4 P 33 K ohms J
007j	Resistor 1/4 P 39 K ohms J
007k	Resistor 1/4 P 100 K ohms K
007l	Resistor 1/2 P 680 ohms K
007m	Resistor 1/4 P 12 K ohms
008	Wired Resistor 3/4 WL 0.5 ohms K
009	Semi-fixed Resistor 300 ohms (B)
010	Driver Transformer N-35-2052
011a	Transistor 2SB 75 (A)
011b	Transistor 2SB 370 A (A)
012	Thermister 13D27

OSCILLATOR CARD

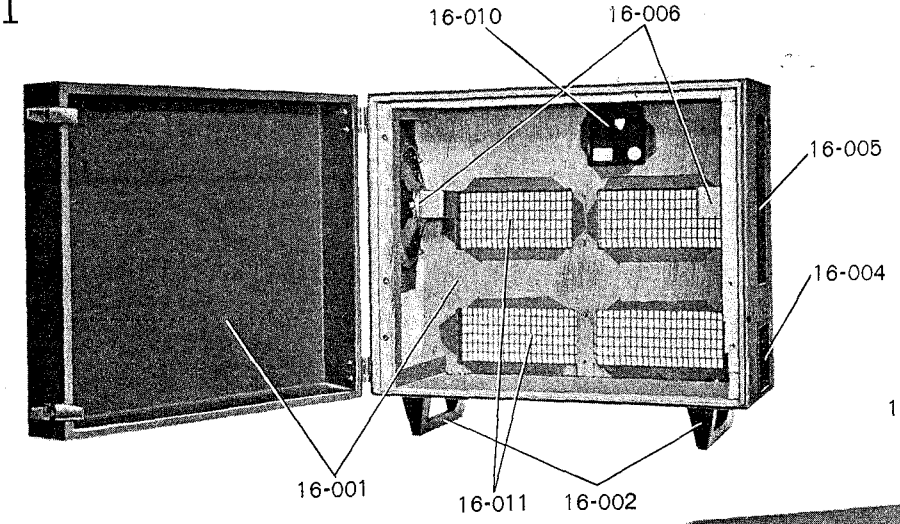
23–001	Oscillator Card Block, Complete
002	Printed Plate, Oscillator Card
003	Chassis, Oscillator
004	Prop A, Switch
005	Radiative Plate
006	Transistor 2SB 370 A (B)
007a	Tubular Type Electrolytic Condenser 100 μF 6 V
007b	Oil Condenser 0.01 μF 400 WV
007c	Plastic Condenser 0.068 μF 100 WV
008a	Resistor 1 W 36 ohms J
008b	Resistor 1/4 P 20 K ohms J
008c	Resistor 1/4 P 3 K ohms J
009	Oscillator Coil
010	Voltage Adjustment Coil

IX. EXPLODED VIEW OF COMPONENT PARTS

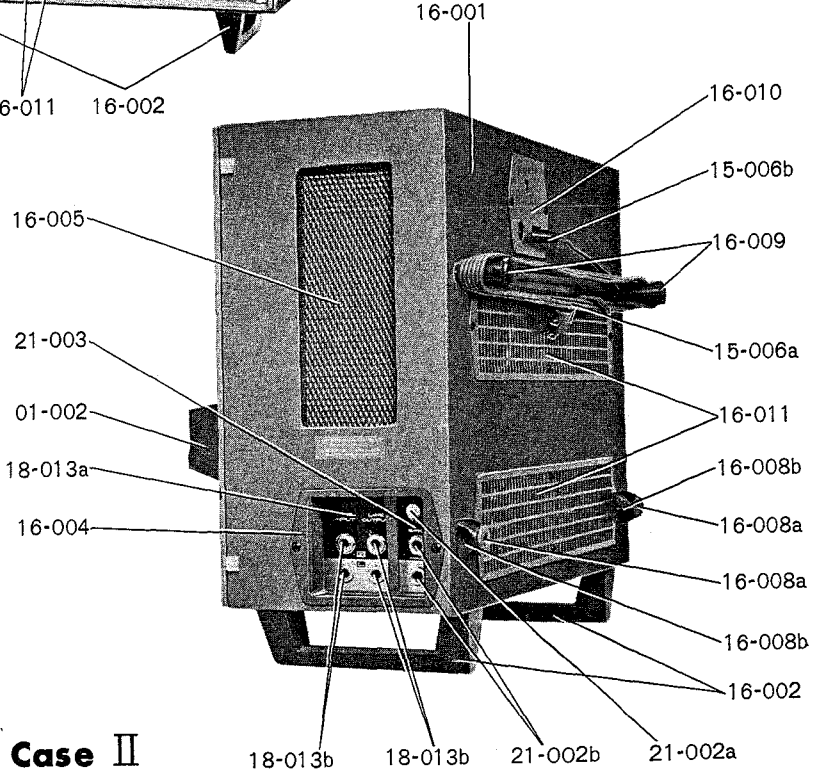
Front Panel



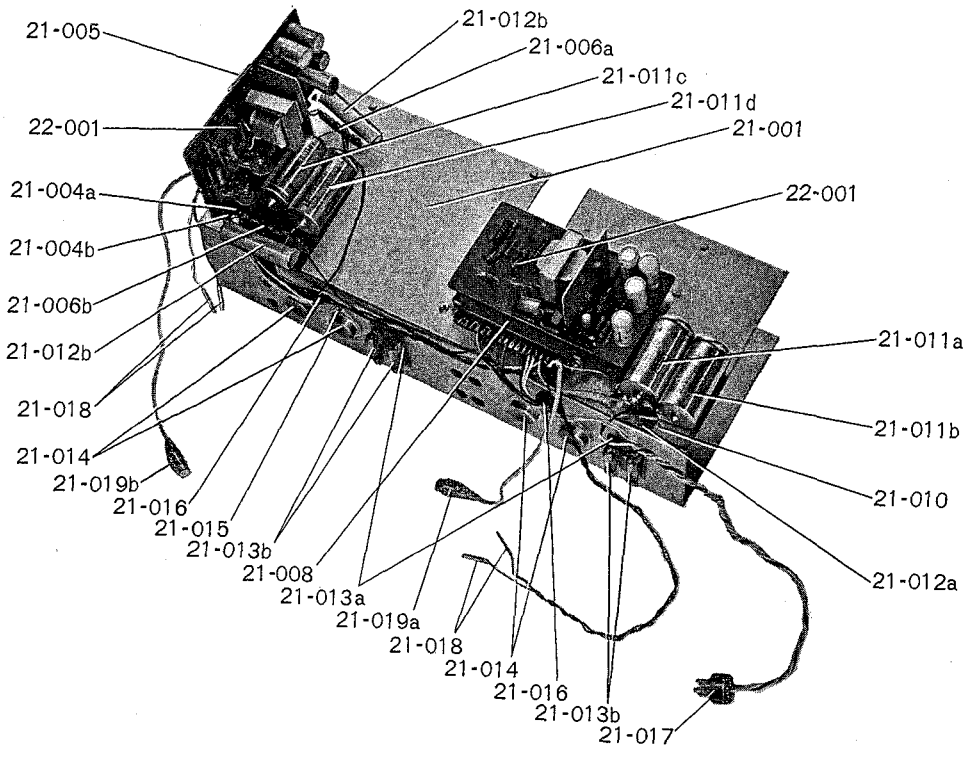
Case I



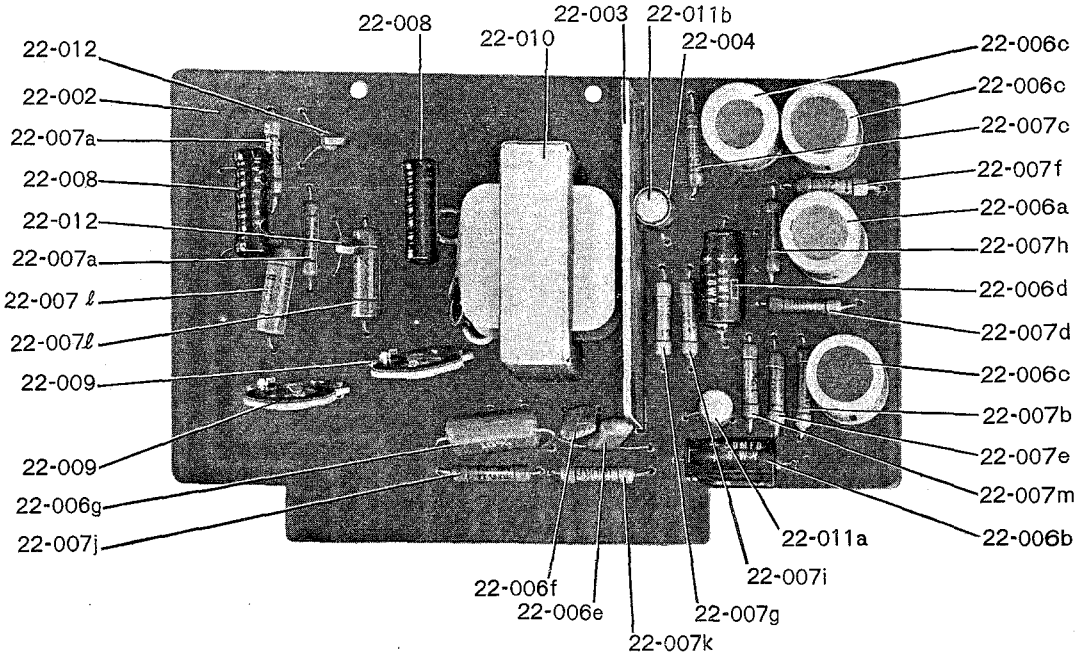
Case II



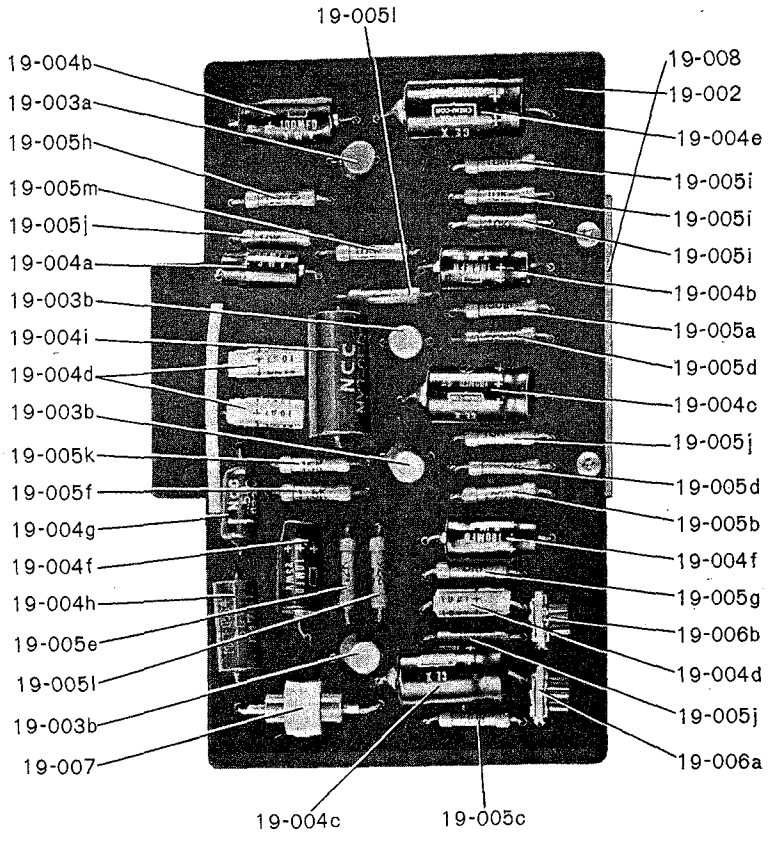
Main Amplifier Block



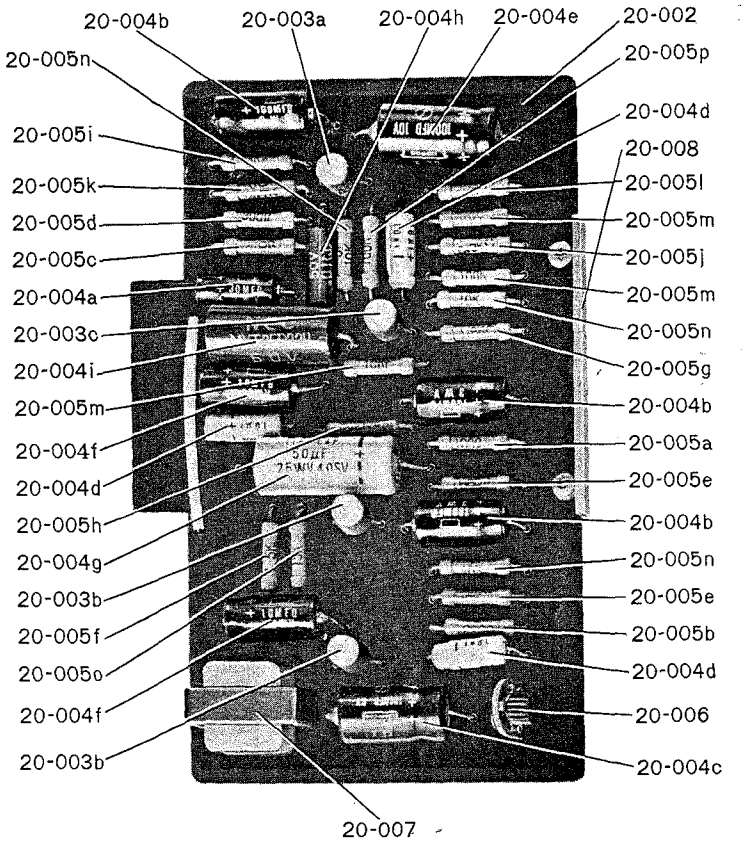
Main Amplifier Card Block



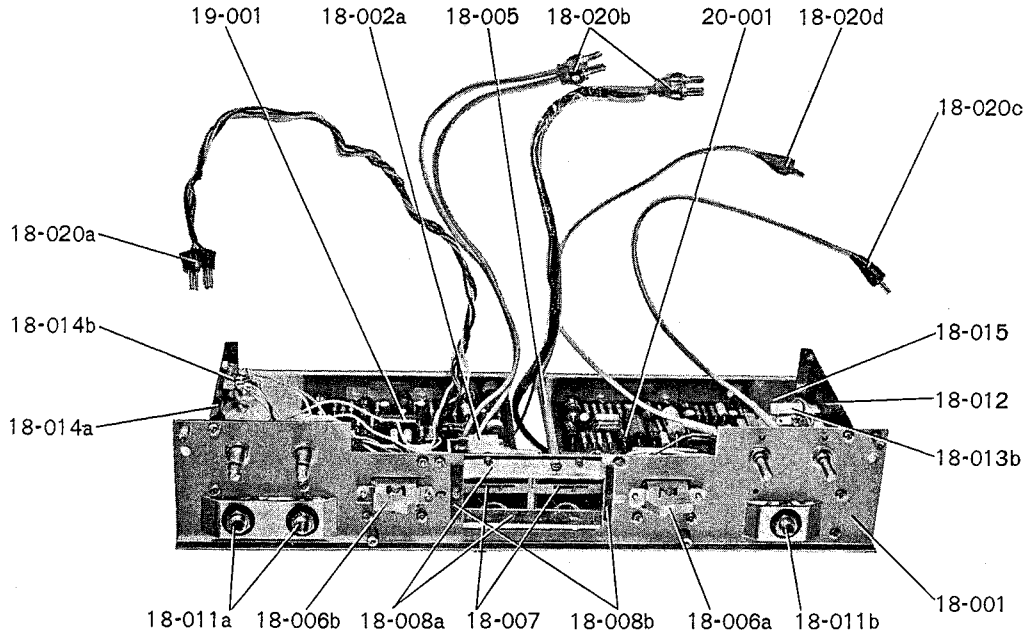
Recording Amplifier Card Block



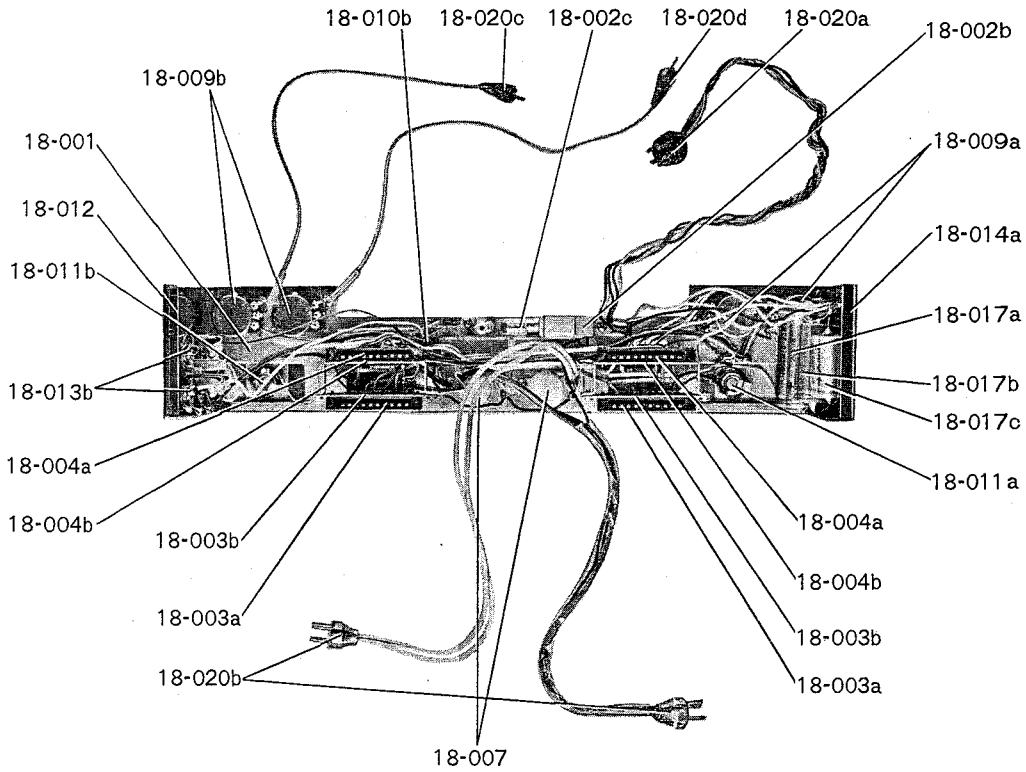
Playback Amplifier Card Block



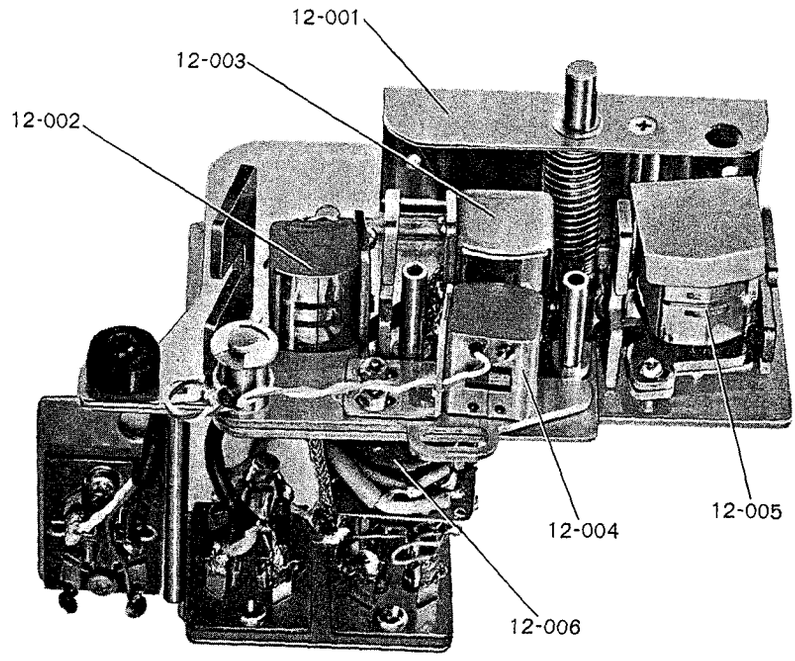
Pre-Amplifier Block Ⅰ



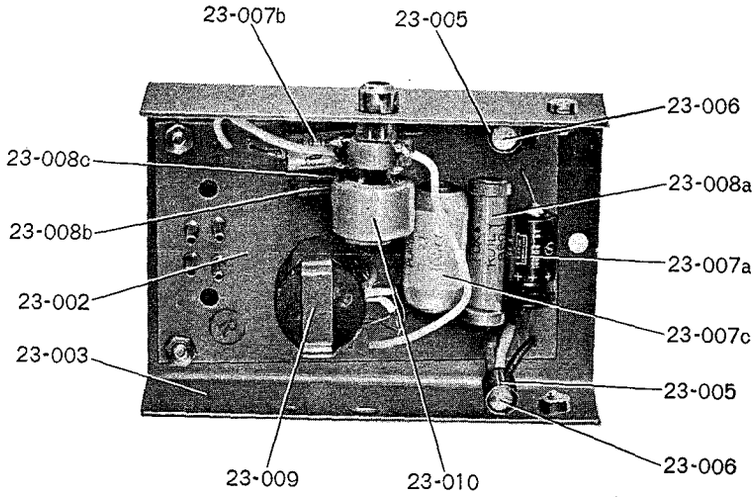
Pre-Amplifier Block Ⅱ



Head Assembly

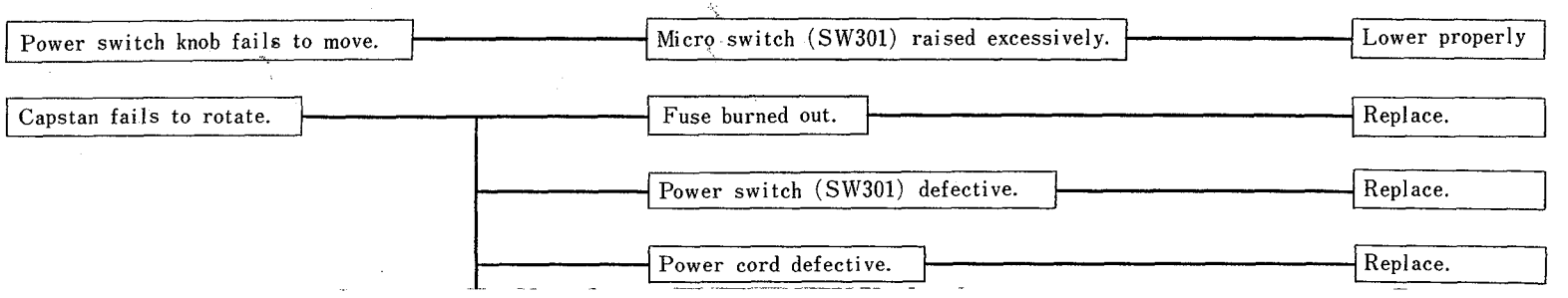


Oscillator Card Block



MEMO :

TROUBLES WITH TAPE TRANSPORT MECHANISM.



TROUBLES WITH TAPE TRANSPORT MECHANISM.

Power switch knob fails to move.	Micro switch (SW301) raised excessively.	Lower properly
Capstan fails to rotate.	Fuse burned out.	Replace.
	Power switch (SW301) defective.	Replace.
	Power cord defective.	Replace.
	Motor defective.	Replace.
	Flywheel stopper too low; stopper pin in contact with flywheel.	Repair stopper.
Start button cannot be depressed.	RF lock lever bent; brake lever hooked on lock lever.	Repair lock lever.
Start button fails to lock.	Micro swith (SW301) control gear maladjusted.	Readjust gear and brake lever.
	Attraction of plunger relay (3A—30734) insufficient; lock lever A unoperable.	Replace plunger relay.
	Attraction of plunger relay (3R—2538) insufficient; plunger lever poorly working.	Replace plunger relay.
	Shorten spoke by 0.1 to 0.25mm.	
Stop button unoperable.	Roller provided to tension lever B hooked at the bottom of brake lever D2.	Adjust curved portion of brake lever D2.
Tension arm unoperable.	Keyboard lever E twisted at the middle; lock lever A unoperable though lowered.	Replace keyboard lever E.
Fast forward unoperable.	Forward button fails to lock	Attraction of plunger relay (3A—30734) insuffient. — Replace.
	Forward button locks	Micro switch (SW—311) defective. — Replace.
		Take-up motor defective — Replace.
Rewind unoperable.	Rewind button fails to lock	Attraction of plunger relay (3A—30734) insufficient. — Replace.
	Rewind button locks	Take-up motor defective. — Replace
		Rewind motor defective — Replace
Excess wow and flutter.	Reel size selector incompatible with reel size.	Adjust.
	Capstan shaft defective.	Replace.
Tape speed too low.	Capstan shaft loose.	Retighten capstan.
	Main motor defective.	Replace.
	Power voltage too low.	Adjust.
	Capstan shaft set at 60 Hz in 50 Hz area.	Replace with 50 Hz shaft.

RECORDING SYSTEM TROUBLES (AMPLIFIER)

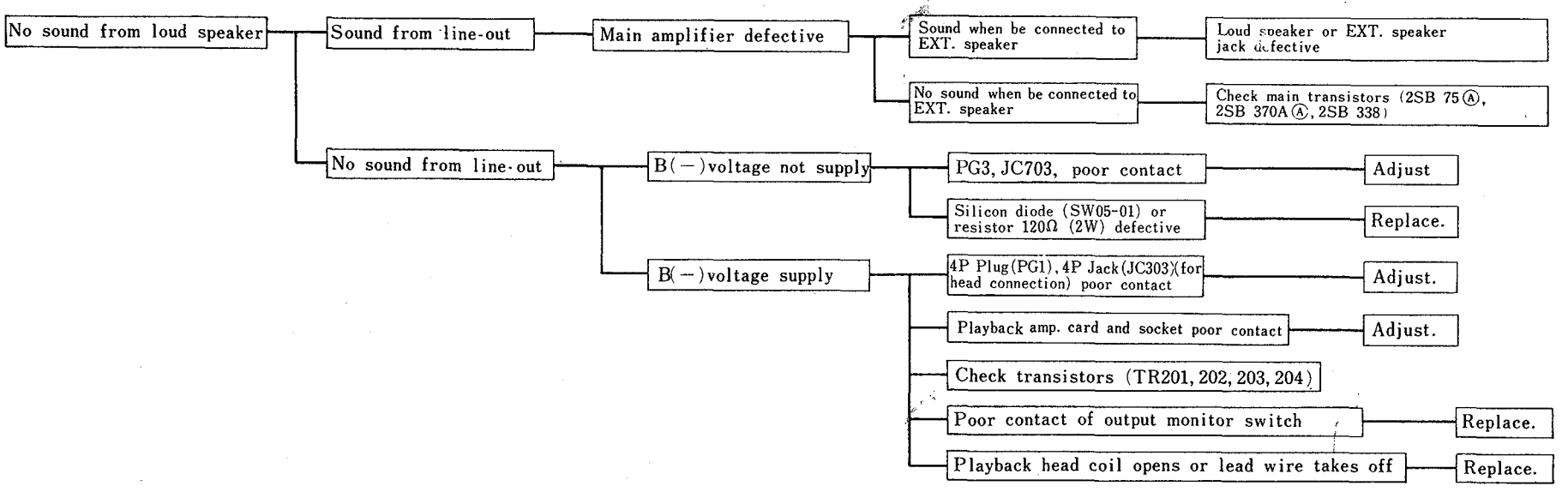
- No recording possible
  - Micro SW.(SW304) defective — Replace
  - VU meter does not indicate.
    - VU meter defective or lead wire defective — Replace and adjust
    - Input jack contacts not making properly. — Replace
    - Record monitor switch contacts out of adjustment — Adjust
    - Transistors (TR101, 102, 103) defective — Replace
  - VU meter indication is normal.
    - Transistor (TR104) or C112 defective — Replace
    - Recording head defective — Replace.
    - Components of oscillator circuit or oscillator coil defective. — Replace.
- Sound is distorted.
  - Sound undistorted at RECORD MONITOR SW "IN"
    - Record bias voltage incorrect — Readjust.
    - Record bias voltage adjustment coil (3R-VAC) disconnected — Replace.
    - L101 (peaking coil) defective — Replace.
    - Recording head defective — Replace.
  - Sound distorted at RECORD MONITOR SW "IN"
    - TR101, 102, 103 defective — Replace.
    - Condensers of TR101, 102, 103 circuit defective — Replace.
    - Excessive input due to decreased sensitivity of the VU meter — Replace
- Faulty erasing
  - Does not erase at all.
    - Erase head defective — Check and replace
    - Excessive amount of dust adhering to surface of erase head — Clean.
  - Incomplete erasure
    - Erasing voltage low
      - Transistor 2SB 370A Ⓑ defective — Replace.
      - Oscillator coil (3A-OSL) defective — Replace.
      - Erase head coil defective. — Replace.
- Still noisy
  - Transistor 2SB 75 Ⓕ of recording amp. defective — Replace.
  - Bias oscillator wave-form distorted
    - Oscillatior circuit balance faulty — Transistor (2SB 370A Ⓑ) or oscillator coil defective — Replace.
  - Head magnetized — Demagnetize head
  - Tape itself defective — Replace.
  - Bias voltage out of adjustment — Readjust.
- Recording sensitivity low
  - Sound normal at RECORD MONITOR SW "IN"
    - Dust adhering to head surface — Clean.
    - Bias voltage out of adjustment — Readjust.
    - TR104 (25B 75 Ⓑ) defective — Replace.
    - Tape itself defective — Replace.
  - Sound low at RECORD MONITOR SW "IN"
    - TR101, 102, 103 defective — Replace.
    - Input jack contacts not making properly. — Adjust
    - TR101, 102, 103 circuit CR defective — Replace.
    - VU meter sensitivity low — Replace.
- Sound fades or drops out.
  - Dust adhering to the head surface — Clean.
  - Tape itself dirt — Replace.
  - Back tension too weak — Adjust.
  - Recording bias voltage too low — Adjust.
  - Unusual wear of head — Replace.
- Large difference between left and right levels when recording.
  - Large deviation from line V.R.(VR4) curve — Replace.
  - Recording level out of adjstment — Readjust.

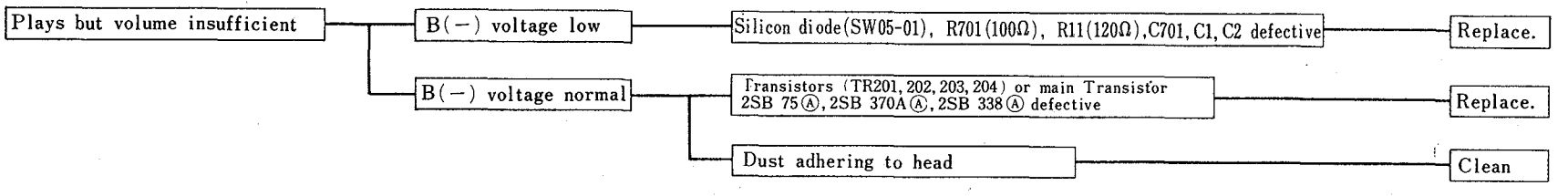
TROUBLE IN BOTH RECORDING AND PLAYBACK (AMPLIFIER)

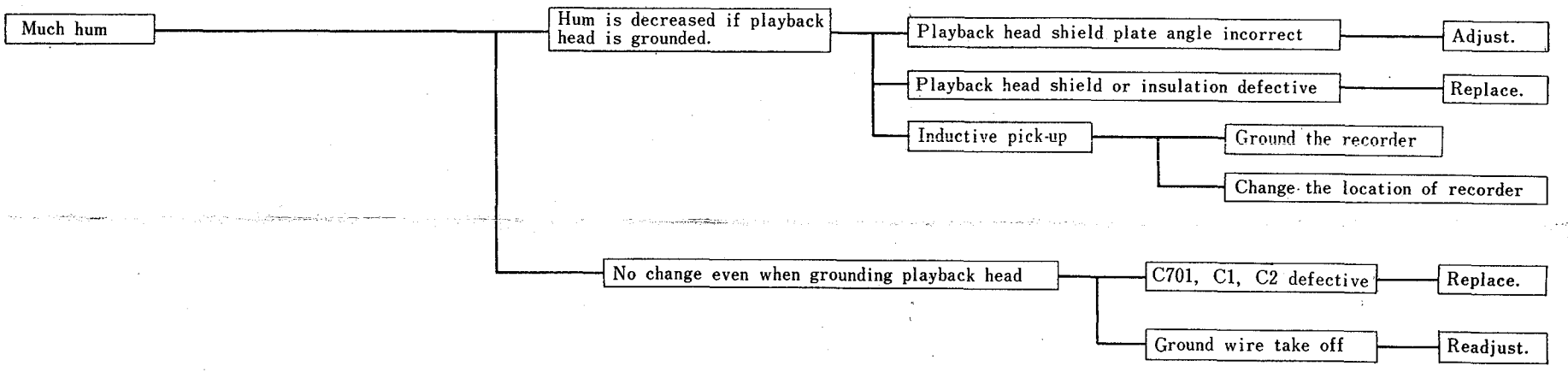
- Excessive crosstalk
  - Head not properly positioned — Adjust
  - Head shield defective — Replace.
  - Head lead cable cable shield defective — Adjust

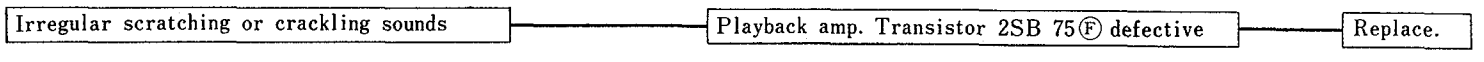
X. TROUBLE SHOOTING CHART

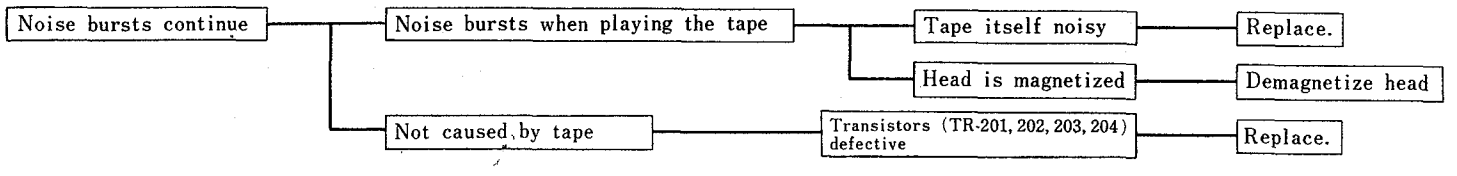
TROUBLE WITH PLAYBACK SYSTEM (AMPLIFIER)

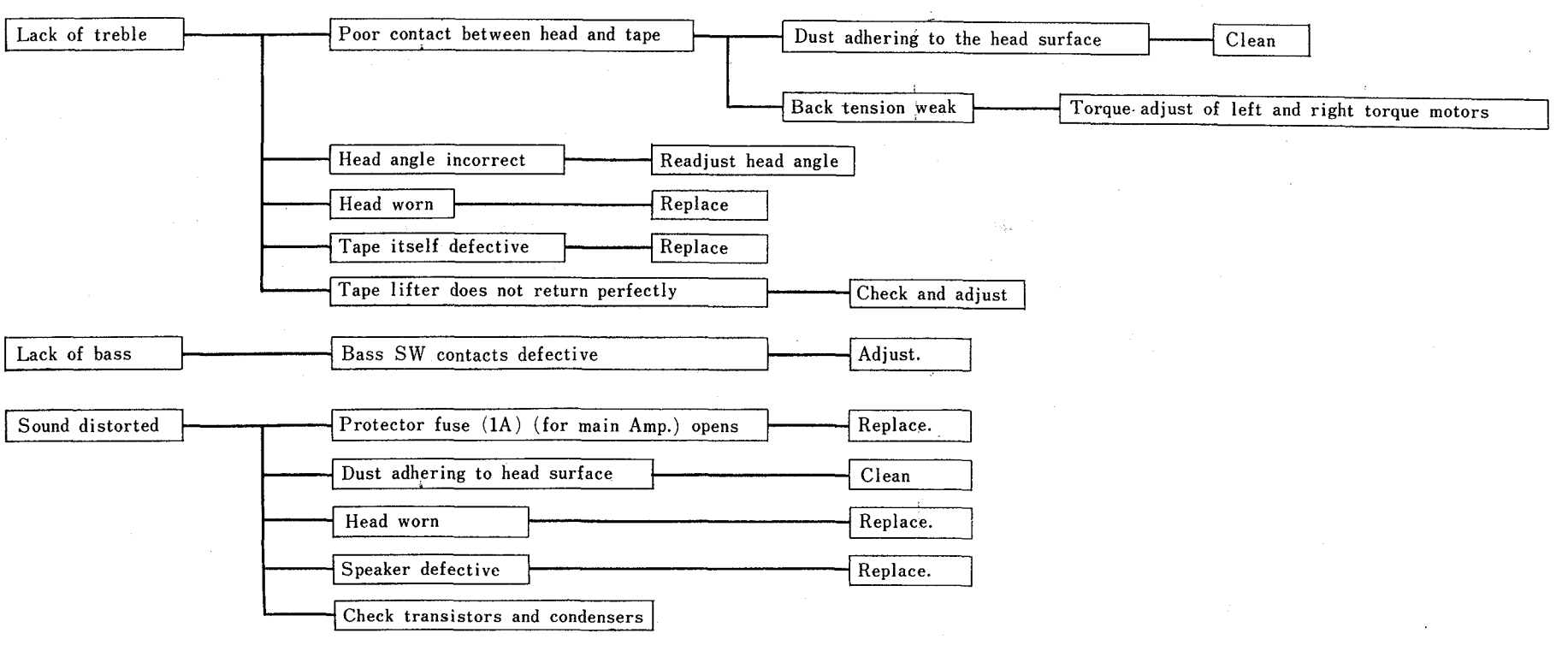


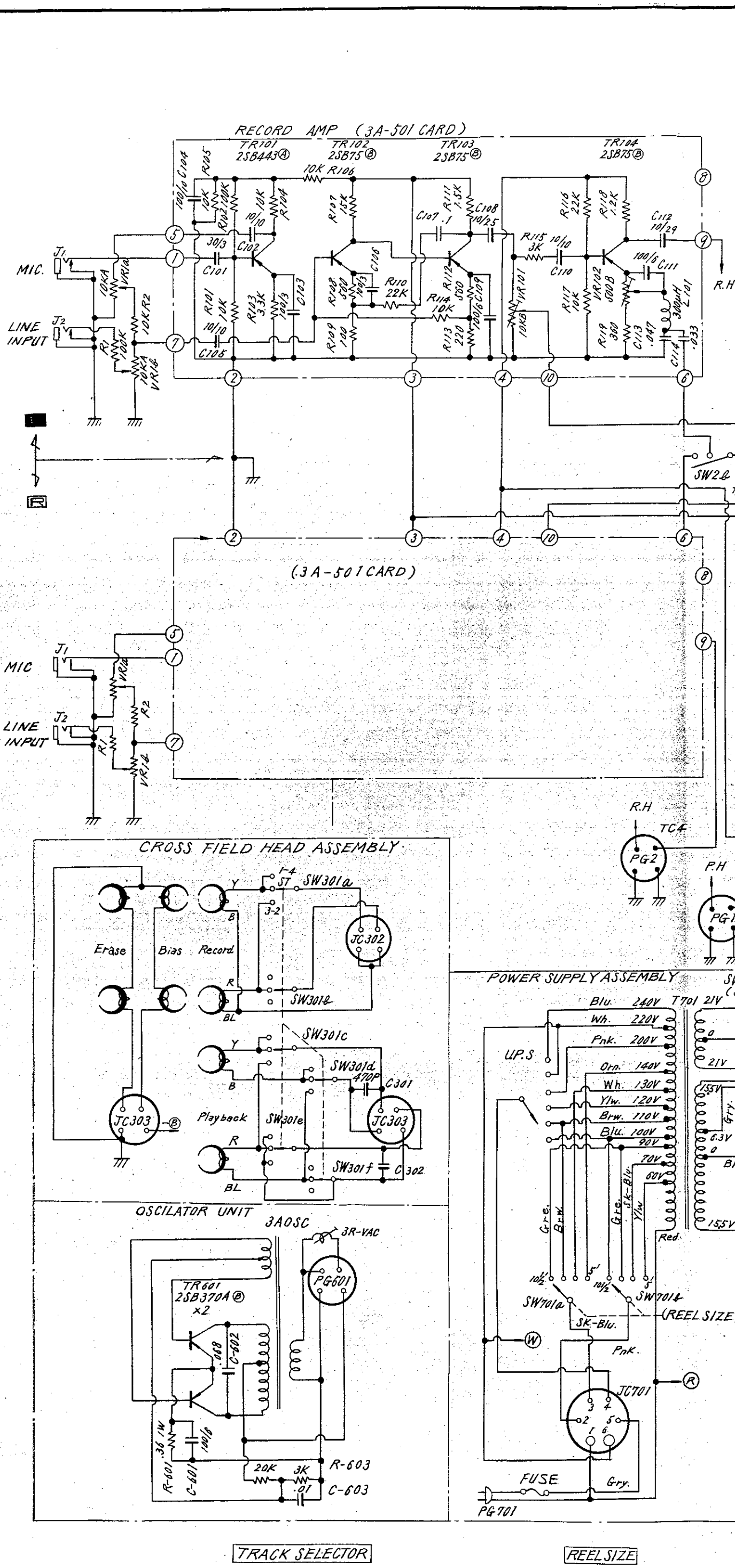


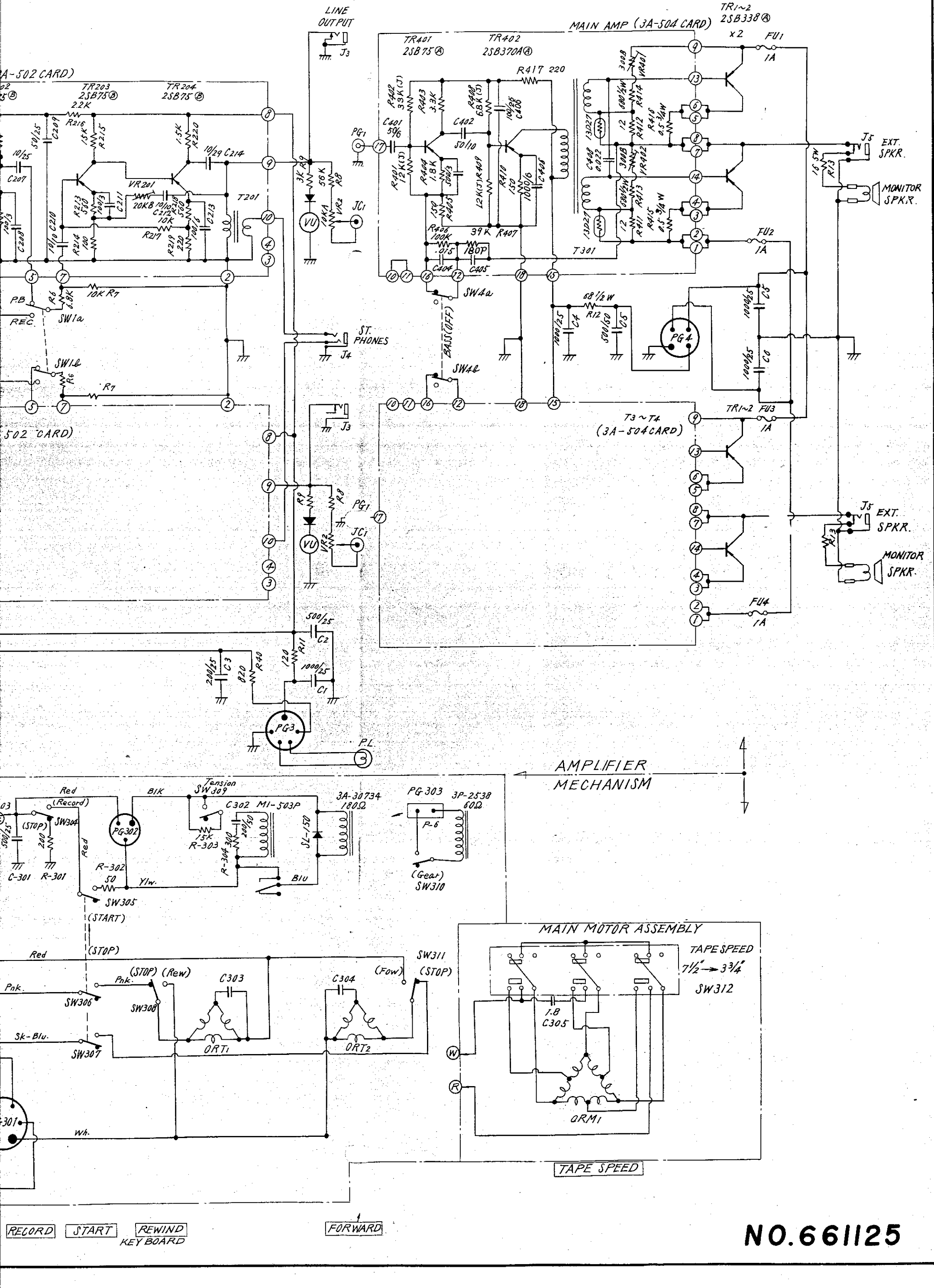




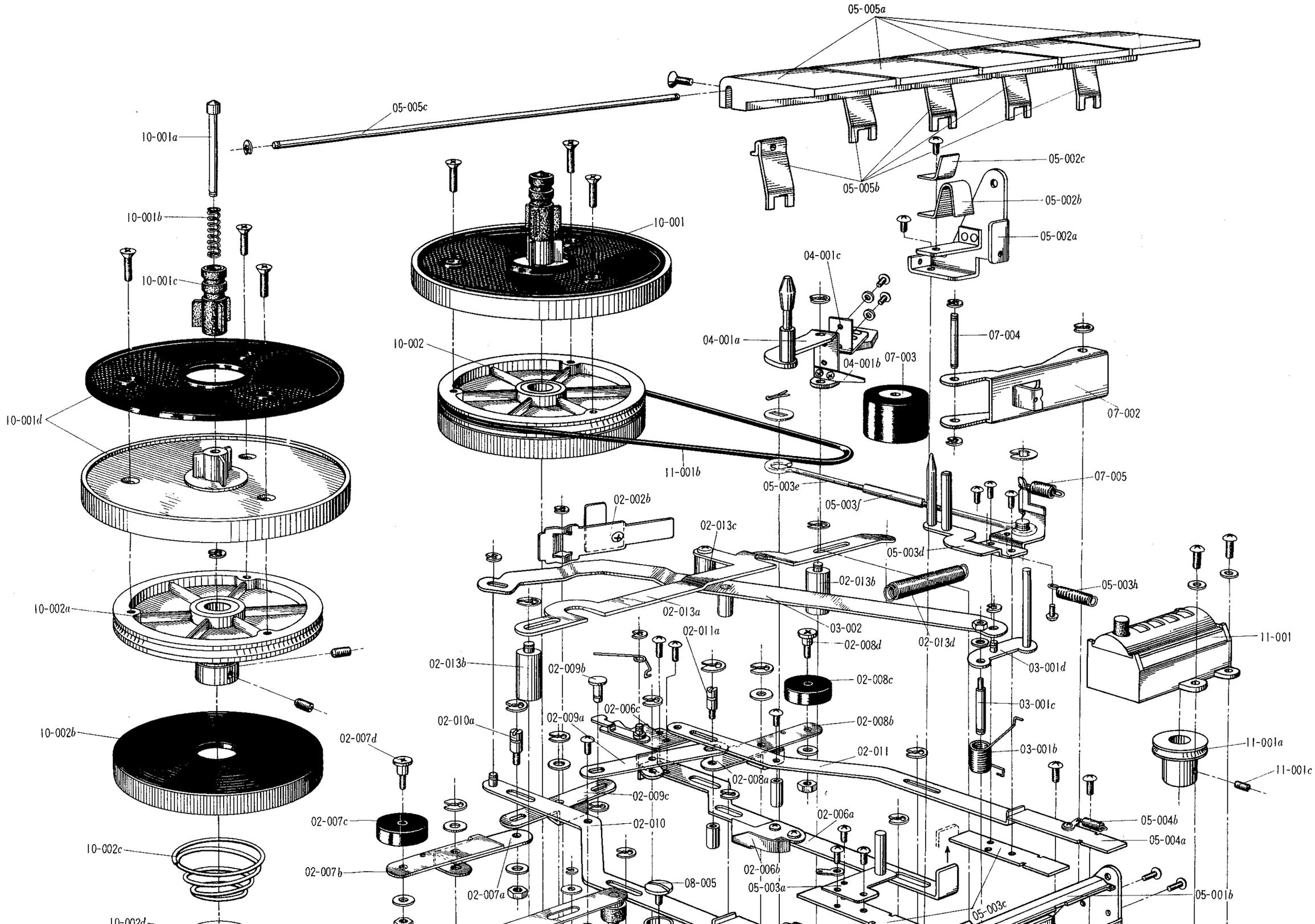





RECORD AMP (3A-501 CARD)
TR101 2SB443Ⓐ
TR102 2SB75Ⓑ
TR103 2SB75Ⓑ
TR104 2SB75Ⓑ
MIC.
LINE INPUT
J1
J2
R.H
(3A-501 CARD)
MIC
LINE INPUT
R.H
TC4
PG2
P.H
PG1
TC2
CROSS FIELD HEAD ASSEMBLY
Erase
Bias
Record
Playback
SW301a
SW301b
SW301c
SW301d
SW301e
SW301f
JC302
JC303
C301
C302
OSCILATOR UNIT
3AOSC
TR601 2SB370AⒷ ×2
PG601
3R-VAC
R-601
C-601
C-602
R-603
C-603
POWER SUPPLY ASSEMBLY
UP.S
T701
SD1
SD2
SD3
SPN-01
C-701
R-702
JC701
JC702
JC703
JC704
JC705
SW05-01 (SGB)
SW701a
SW701b
(REEL SIZE)
FUSE
PG701
PLAYBACK AMP (3A-
TR201 2SB443Ⓐ
TR202 2SB75Ⓑ
P.H
3¾ ON
SW2a
SW2b
(3A-5
(Power)
SW301
(Brake)
SW302
(Lock)
SW303
PG30
TRACK SELECTOR
REEL SIZE
POWER S.W


LINE OUTPUT
J3
MAIN AMP (3A-504 CARD)
TR1~2 2SB338Ⓐ x2
FU1 1A
TR401 2SB75Ⓐ
TR402 2SB370Aⓐ
R417 220
PG1
C401 5%
R402 33K(J)
R403 3.3K
R408 6.8K(J)
C406 100/25
C402 50/10
R401 12K(J)
R404 1.8K
C403 300P
R409 12K(J)
R410 150
C408 1000/6
R405 150
R406 100K
C404 .075
C405 180P
39K R407
T301
SW4a
BASS(OFF)
SW4b
68 1/2W R12
C4 1000/25
C5 500/50
PG4
C5 1000/25
C6 1000/25
J5 EXT. SPKR.
R13 16.5W
MONITOR SPKR.
FU2 1A
TR1~2 FU3 1A
T3~T4 (3A-504CARD)
FU4 1A
(3A-502 CARD)
TR203 2SB75Ⓑ
TR204 2SB75Ⓑ
2.2K R216
15K R215
1.5K R220
C209 50/25
10/25 C207
C208 100/3
10/10 C210
VR201 20KB
C211 100/3
C212 10/10
R218 560
C213 100/6
10/29 C214
T201
R213 560
R214 100
R217 10K
R219 220
3K R9
56K R8
VR2 10KA
JC1
VU
P.B
REC.
SW1a
R6 2.8K
10K R7
SW1b
ST. PHONES
J4
C2 500/25
R11 120
C3 200/25
R40 820
C1 1000/25
PG3
P.L.
Red (Record)
BlK
Tension SW309
C302 MI-503P
3A-30734 180Ω
PG-303 3P-2538 60Ω
P-6
(Gear) SW310
SW304 (STOP)
PG-302
15K R-303
200/50
R-304 300
SL-150
R-302 50
Ylw.
Blu
C-301
R-301
200
500/25
SW305 (START)
Red
(STOP)
SW311 (STOP)
(Fow)
Pnk.
SW306
(STOP) (Rew)
SW308
C303
C304
Sk-Blu.
SW307
ORT1
ORT2
Wh.
MAIN MOTOR ASSEMBLY
TAPE SPEED 7½" → 3¾"
SW312
1.8 C305
ORM1
TAPE SPEED
RECORD
START
REWIND
KEY BOARD
FORWARD
AMPLIFIER MECHANISM

NO.661125


05-005a
05-005c
10-001a
10-001b
10-001c
10-001d
10-001
10-002
10-002a
10-002b
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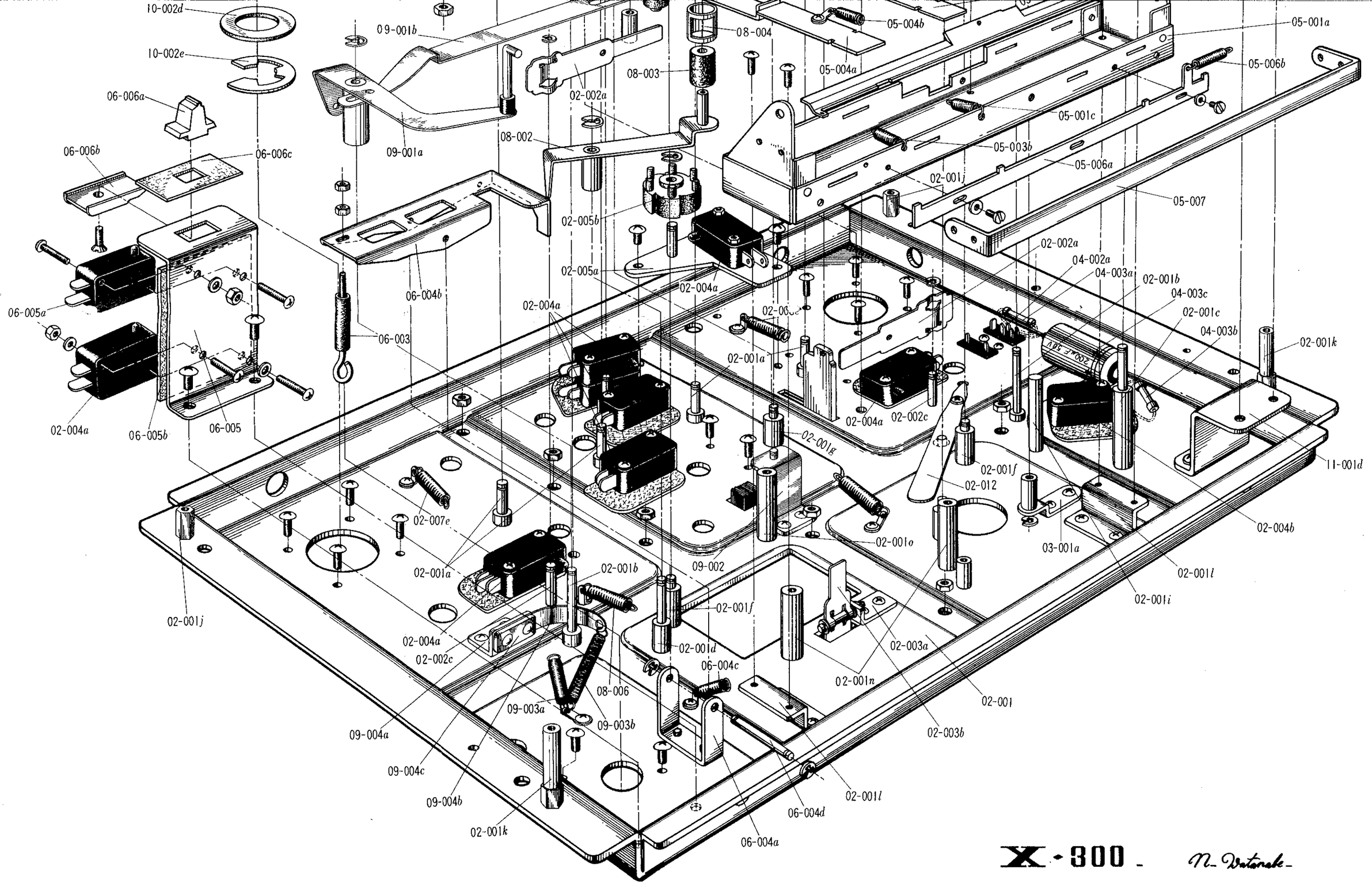
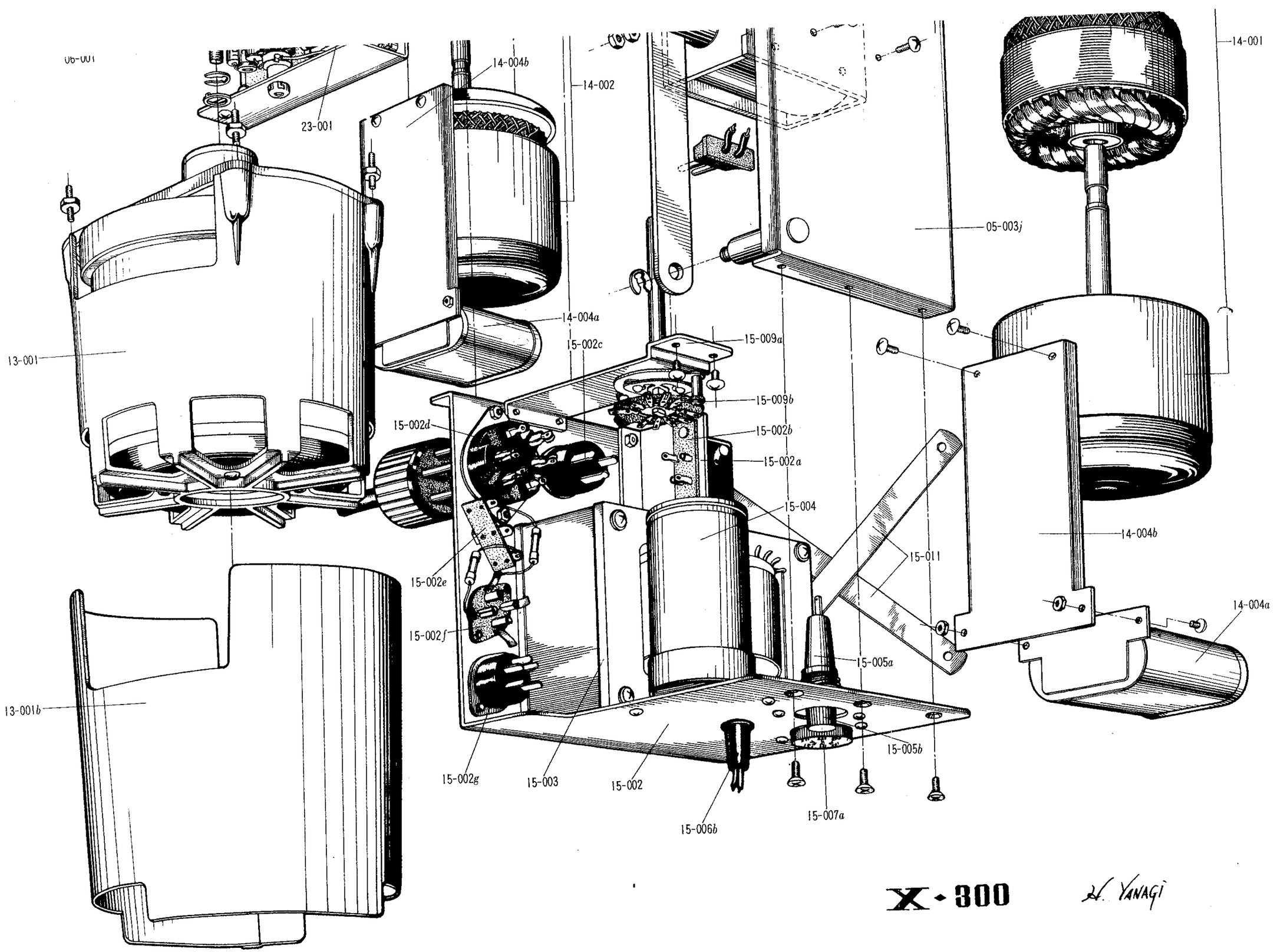
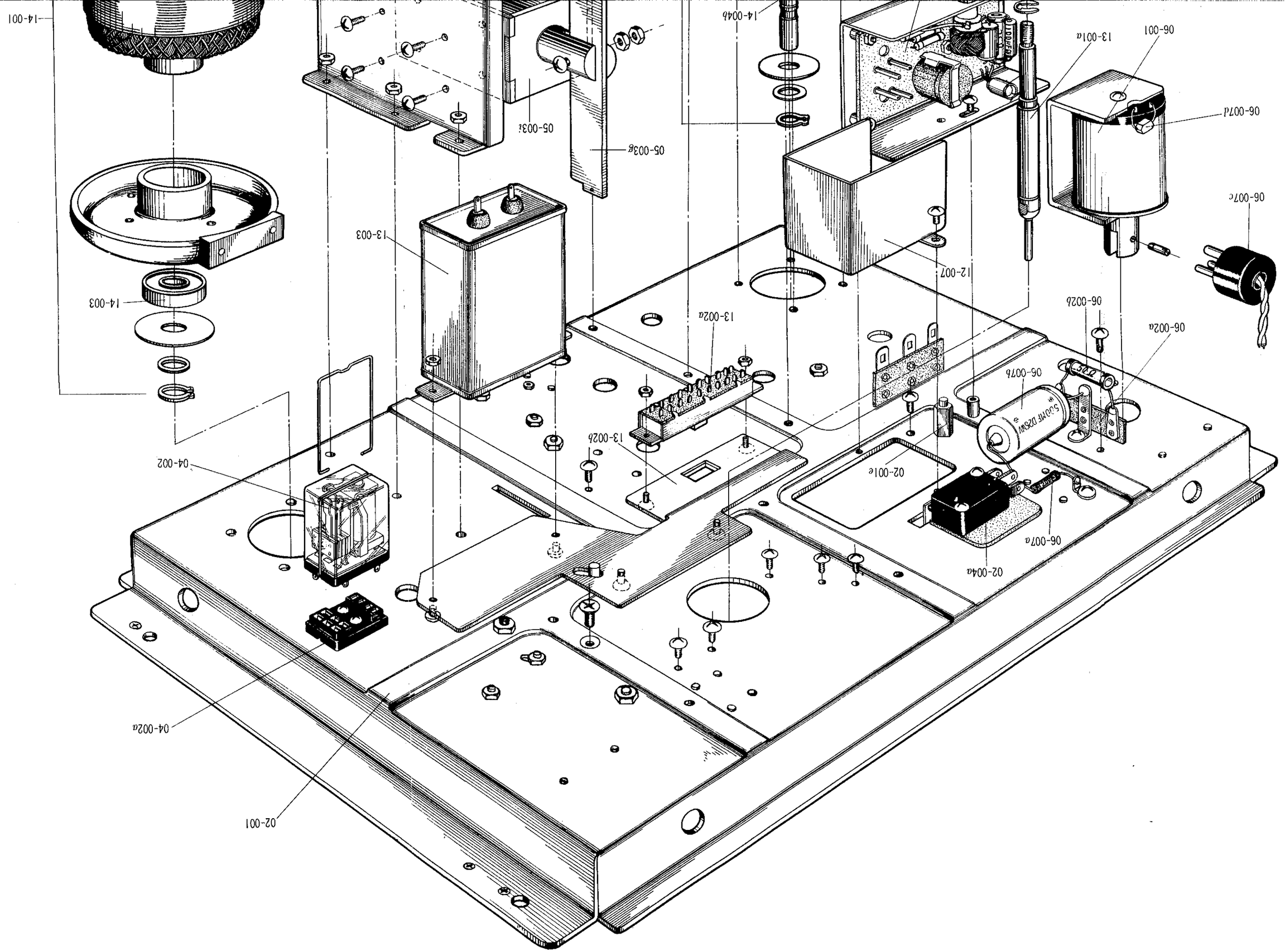
10-002d
11-001b
05-005b
05-002c
05-002b
05-002a
04-001c
04-001a
04-001b
07-003
07-004
07-002
07-005
05-003e
05-003f
05-003d
05-003h
02-002b
02-013c
02-013b
02-013a
02-013d
03-002
02-011a
02-008d
02-008c
02-008b
02-008a
02-011
03-001d
03-001c
03-001b
11-001
11-001a
11-001c
02-013b
02-009b
02-006c
02-009a
02-010a
02-009c
02-010
02-007d
02-007c
02-007b
02-007a
08-005
02-006a
02-006b
05-003a
05-003c
05-004b
05-004a
05-001b



X-300 N. Watanabe



X-300 K. YANAGI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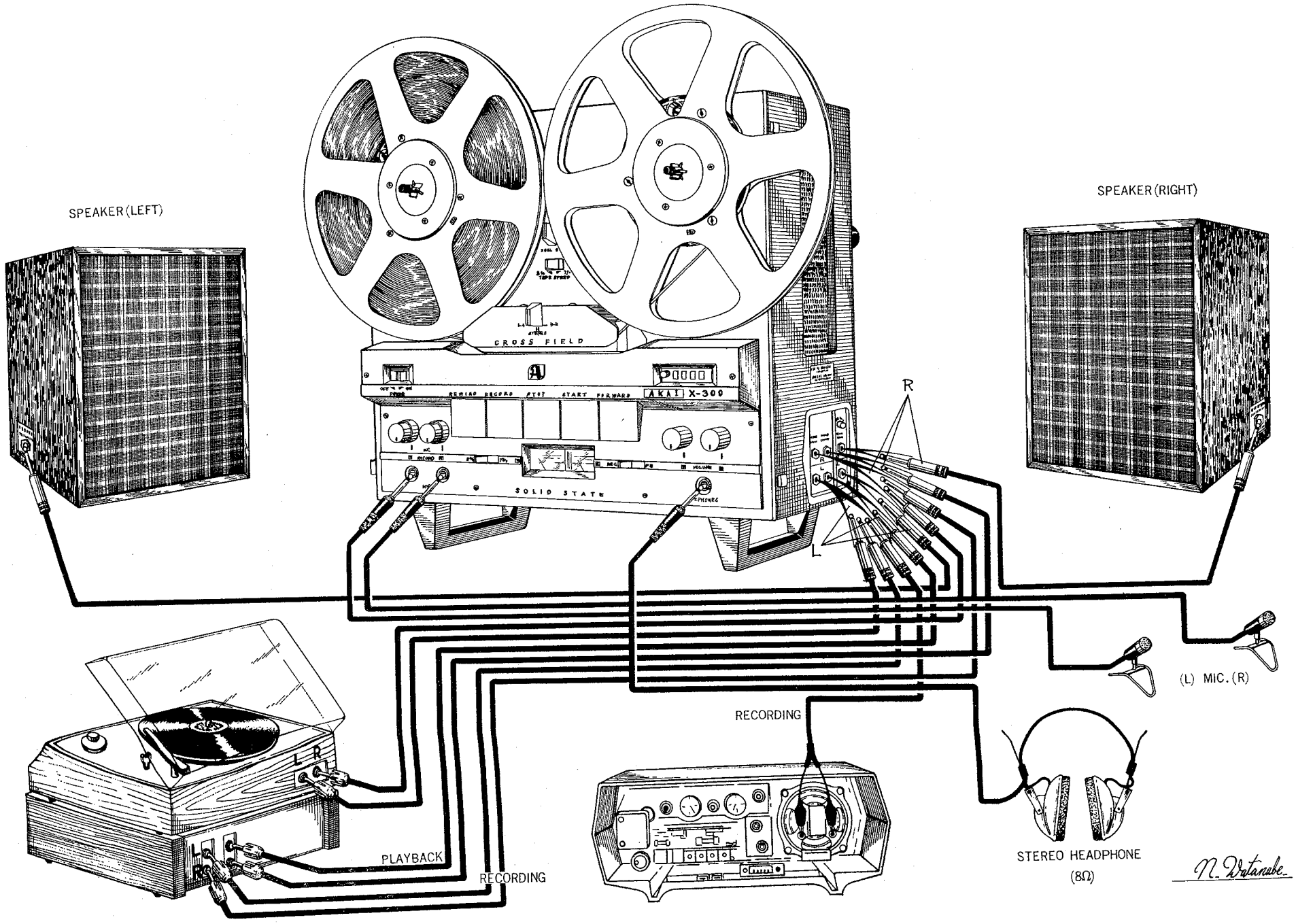
05-003f
05-003g
14-004b
13-001a
06-001
06-007d
06-007c
12-007
14-003
13-003
13-002a
06-002b
06-002a
06-007b
13-002b
02-001e
06-007a
02-004a
04-002
04-002a
02-001

XII. CONNECTING DIAGRAM



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