NO. 246

March, 1985

SERVICE MANUAL

16-AL 16-AL OPTICAL

ELMO CO., LTD.

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CONTENTS

I INTRODUCTION

I -1 Features 1
I -2 Specifications 2
I -3 Major Parts Descriptions and Functions
I -3-1 Front 3
I -3-2 Rear and Side 5
I -3-3 Operation Switch Buttons 7
I -3-4 Remote Control 8
I -4 Preparation for Projection 9
I -5 Film Loading 10
I -6 Projection 11
I -7 Various Projection
I -7-1 Still Projection 12
I -7-2 Reverse Projection 12
I -7-3 When Using Extension Speaker 12
I -7-4 High-Normal Lamp Switch 12
I -7-5 Public Address System 12
I -7-6 Remote Control 13
I -8 Removing the Film during Midway Projection 13
I -9 Rewinding 14
I -10 Stowing 14
I -11 Maintenance
I -11-1 Cleaning Film Gate 15
I -11-2 Cleaning Solar Battery and Lens 15
I -11-3 Cleaning Projection Lens 15
I -12 Replacing Lamp and Fuse
I -12-1 Replacing Projection Lamp 16
I -12-2 Replacing Exciter Lamp 17
I -12-3 Replacing Fuse 17
I -13 When Changing the Projection Speed from 24 fps to 18 pcs or to Change Electric Current Cycles (50Hz-60Hz) 18
I -14 When Changing Voltage 18
I -15 Trouble-shooting Hints 18

II DRIVING MECHANISM

II -1 Driving Mechanism Functions
II -1-1 Self-loading Mechanism 20
II -1-2 Forward Projection Mechanism 22
II -1-3 Reverse Projection Mechanism 23
II -1-4 Film Take-up Mechanism 24
II -1-5 Film Rewinding Mechanism 26
II -1-6 Safety Mechanism 27
II -1-7 Automatic Loop Restorer Mechanism 28
II -1-8 Intermittent Film Feeding Mechanism 30
II -2 Disassembly and Reassembly
II -2-1 Film Thread Slot Section 32
II -2-2 Operation Switch Buttons Section 34
II -2-3 Film Take-up and Rewinding Section
Rewind Arm Assy 36
Shaft Reverse Tension and Magnet Clutch 38
First Sprocket and Worm Gear (1) Assy 38
Take-up Arm Assy 40
Second Sprocket and Worm Gear (2) Assy 40
II -2-4 Intermittent Film Feeding Section
Claw Section Frame Assy and Worm (2)
Aperture Plate and Pressure Plate 48
II -2-5 Motor Section
Motor (1) Assy and Fan 52
II -2-6 Transformer and Amplifier Section
Transformer Assy and Amplifier Assy 54
Control Plate Assy 54
II -2-7 Link Section
Lever Middle Tension 56

II-2-7 Lever Guide Roller (4) 56
Link (1) and Reverse Lever 58
Lever Guide Roller (3) 58
II-2-8 Loop Restorer Section
Friction Wheel 2 62
Link (1) Loop Setter 62
II-2-9 Flywheel Section
Shaft Flywheel 64
Flywheel and Lever Pad Roller 64
Lever Photo Diode 64
Sound Lens Assy 66
Lever Head Assy 66
Measurement of Sound Performance
Distortion, S/N Ratio, Wow/Flutter 69
Frequency Response 70

III ELECTRIC CIRCUIT

III-1 Outline of Electric Circuit 71
III-1-1 Electrical Specifications 71
III-2 Control Circuit 71
III-2-1 Block Diagram and Layut Drawing for External Parts 72
III-2-2 Signal Transfer for Forward Projection 73
III-2-3 Signal Transfer for Reverse Projection 74
III-2-4 Signal Transfer for Rewinding 74
III-2-5 Signal Transfer for Automatic Loading 75
III-2-6 Independent Circuits
Film Sensor Circuit 76
Signal Delay Circuit for Foward-Reverse Direct Change 77
Cam Motor Pulse Circuit 78
Duoble-Push Prevention Circuit 79
III-2-7 Timing Chart 80
III-3 Amplifier Circuit
III-3-1 Block Diagram for Amplifier Circuit 85
III-3-2 Signal Transfer for Optical Reproduction 86
III-3-3 Signal Transfer for Magnetic Reproduction 86
III-3-4 Microphone Circuit 87
III-3-5 Auxiliary Output Circuit 87
III-3-6 Exciter Lamp Circuit 87
III-3-7 Muting Circuit 88
III-3-8 Speaker Safety Circuit 89
III-3-9 Others 90
III-4 Electrical Circuit Trouble-shooting Hints
III-4-1 Control Circuit Trouble-shooting 91
III-4-2 Motor Circuit Trouble-shooting 98
III-4-3 Amplifier Circuit Trouble-shooting 101

IV TABLE FOR TROUBLES

V SPECIFICATIONS 109

VI TABLE FOR TEST INSTRUMENTS AND SPECIAL TOOLS 111

VII TEST FILM, OIL AND GREASE 113

VIII CONNECTION DIAGRAMS, LAYOUT DRAWINGS, WIRING DIAGRAMS

VIII-1 Layout Drawing for Mode Switch Circuit Board 114
VIII-2 Connection Diagram for Control Circuit
Layout Drawing for Circuit Board 115
VIII-3 Connection Diagram for Amplifier
Layout Drawing for Circuit Board 119
VIII-4 Wiring Diagram 121
VIII-5 Layout Drawing for Transformer Circuit Board 123

I INTRODUCTION

I – 1 FEATURES

- Newly Developed Self-Loading Mechanism
  By simply depressing the self-loading lever and inserting the film end into the thread slot, the film is pulled and loaded automatically through the most gentle film handling mechanism. The film automatically stops after threading through projector and, by winding the leader on the take-up reel, the projector is ready for projection.

- Push-Button Control
  The operation switch buttons for controlling Forward/Off/Reverse/Pause modes and Lamp On/Off are located on a panel and the LED indication is specially convenient while projecting in the dark.

- Pause Mode
  Pushing the pause button while forward projection allows instant stop and start projection. The comment in mid-projection or operation with some other 16mm/slide projector can be easily made.

- 720m Reel Capacity
  The projector accepts 720m reel and 60-minute non-stop projection is possible.

- High-Normal Lamp Brightness Control
  The high-efficiency and long-life ELC 24V-250W lamp is used. By switching the high-normal lamp switch, the choice of lamp brightness, NORM for normal image and HI for bright image is available.

- Safety Mechanism
  The projector automatically stops when the end of film passes the first sprocket in the film path. If the film breakage occurs during projection the safety mechanism works to have the broken film getaway from the film path and to stop the projector as well.

- Remote Control (Option)
  When the remote control is connected to the receptacle, the functions of Forward/Off/Reverse/Pause modes and Lamp On/Off can be remotely controlled.

- Front Cover with Speaker (Option)
  Two speakers are built in the front cover for the use as an extension speaker. 20m speaker cord is supplied.

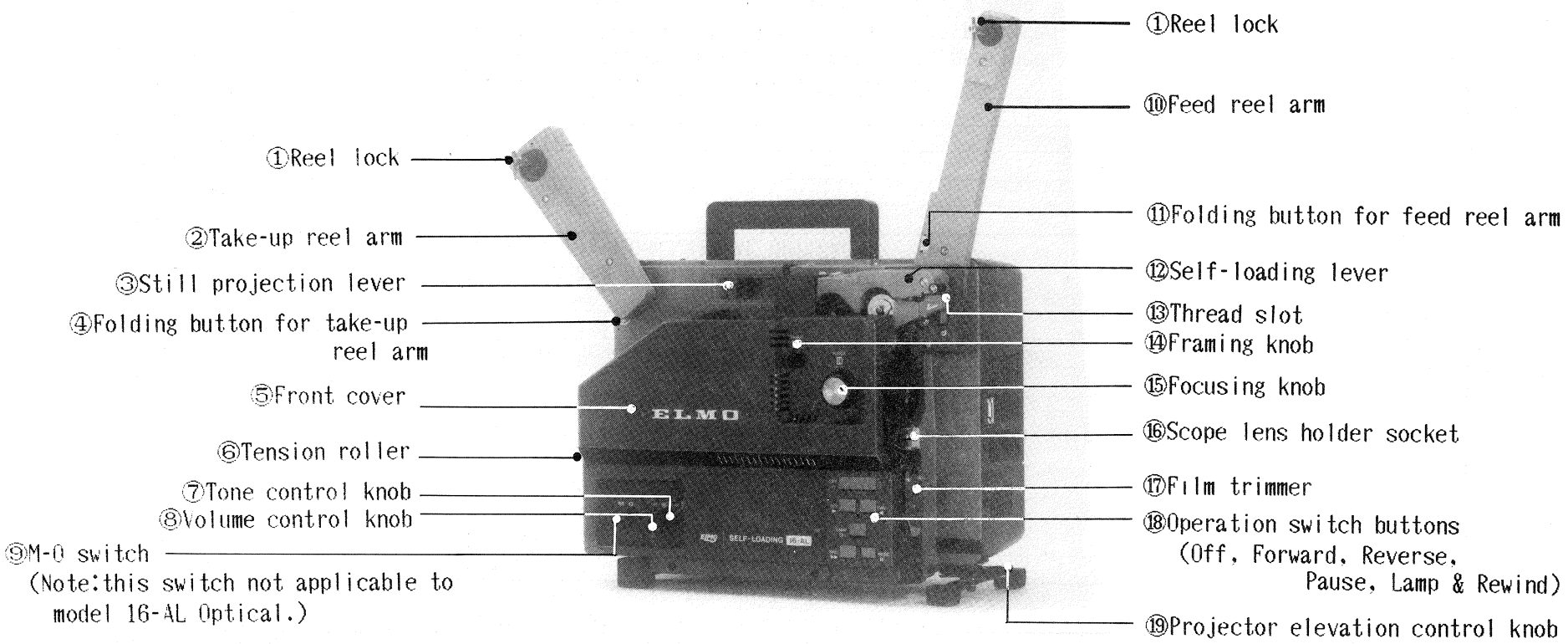
I-2 SPECIFICATIONS

Power surce	AC Single Phase. 50 and/or 60 Hz
Reel capacity	720m (2400ft) max. with accessory reel. 240m (800ft) standard reel with automatic take-up.
Projection speed	24fps (18fps. is also available by model)
Usable film	16mm Optical/Magnetic sound and silent films (16-AL optical is for optical and silent films)
Projection lens	50mm f/1.2
Projection lamp	24V-250W(ELC) Halogen lamp with cold mirror. High-Normal lamp switch is built-in. Spare lamp storage is provided.
Motor	Induction motor
Film threading	Self-Loading:Film automatically stops after threading through projector (for ease of attaching film to take-up reel).
Automatic loop restorer	Built in
Projection modes	Forward, Reverse and Still projection plus Pause.
High speed rewinding	Reel to Reel
Sound system	Magnetic and Optical playback...16-AL Optical playback...16-AL OPTICAL
Amplifier	All ICs
Music power output	Max. 30W(8Ω)
Continuous power output	25W
Public address	Built-in
Tone control	Built-in
Speaker Aux out	Built-in 12.5cm (5 in.) dynamic speaker. Extension speaker (8 ohm) receptacle is provided. Built-in;(600 ohm MAX 0dB) receptacle is provided.
Remote control	Built-in;Forward, Reverse, Pause, Stop and Lamp On/Off are controllable with the optional remote control with 26 ft. (8m) cord.
Weight	Projector 14kg (31 lbs) [16kg (35 lbs) with front cover]
Dimensions	L15.0 " (38cm)×H12.0 " (30.5cm)×W8.9" (22.5cm) [L15.0" (38cm)×H12.0 " (30.5cm)×W11.3 " (28.5cm) with front cover]

Design and specifications are subject to change without prior notic.

I－3 MAJOR PARTS DESCRITIONS AND FUNCTIONS

I－3－1 FRONT



①Reel lock
The reel locks are to lock the reels on the arm securely.

②Take-up reel arm
The arm is to hold and drive the take-up reel.

③Still projection lever
By setting the lever to "STILL" from "RUN" while normal projection, still projection is possible.

④Folding button for take-up reel arm
By depressing the button, the take-up reel arm can be folded for stowing.

⑤Front cover
The cover is to protect the projector sound and drive mechanism.

⑥Tension roller
The roller is to control the tension on film to be taken up on the take-up reel.

⑦Tone control knob
The knob is to adjust the sound tone. Turning it clockwise allows emphasizing higher tones.

⑧Volume control knob
The knob is to adjust the sound volume.

⑨M-O switch
The switch is to set the projector sound system in accordance with the film to be projected. M position for magnetic sound film and O position for optical sound film. (Not applicable to 16-AL Optical model.)

⑩Feed reel arm
The arm is to hold the feed reel and to drive the feed reel when rewinding.

⑪Folding button for feed reel arm
By depressing it, the feed reel arm can be folded for stowing.

⑫Self-loading lever
The lever is to load the film through projector. When it is depressed, the drive mechanism start running.

⑬Thread slot
The film is to be inserted into it when loading.

⑭Framing knob
When a frame line appears on the screen, turn the framing knob to eliminate the frame line.

⑮Focusing knob
The knob is to adjust the focus of image projected on the screen.

⑯Accessory shoe
The shoe is to attach such an accessory as the Elmo scope lens.

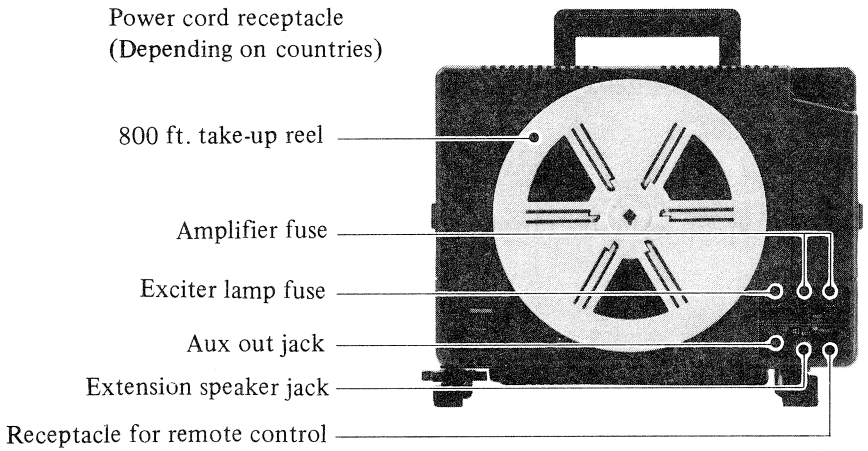
⑰Film trimmer
The trimmer is to trim the leader end to ensure smooth automatic threading.

⑱Operation switch buttons
The buttons are to control the projector functions of Forward/Off/Reverse/Pause modes and Lamp On/Off.

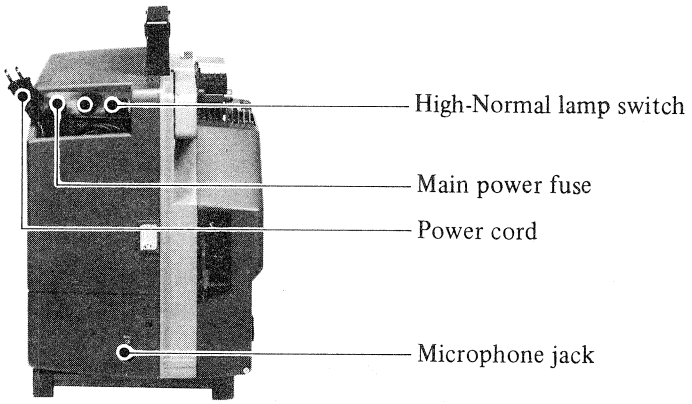
⑲Projector elevation control knob
The knob is to adjust the height of picture.

I－3－2 REAR AND SIDE

Rear



Side



⑳800ft take-up reel
The reel is to take up film.

㉑Amplifier fuse
The fuse is protect the amplifier from excessive current which may flow into the amplifier by accident.

㉒Exciter lamp fuse
The fuse is to protect the exciter lamp from excessive current which may flow into the exciter lamp by accident.

㉓Aux out jack
The jack is to reproduce sound through an external amplifier.

㉔Extension speaker jack
The jack is to connect an external extension speaker. When a plug is connected to the jack, the built-in speaker circuit will be automatically cut off.

㉕Receptacle for remote control
The receptacle is to use the remote control (option).

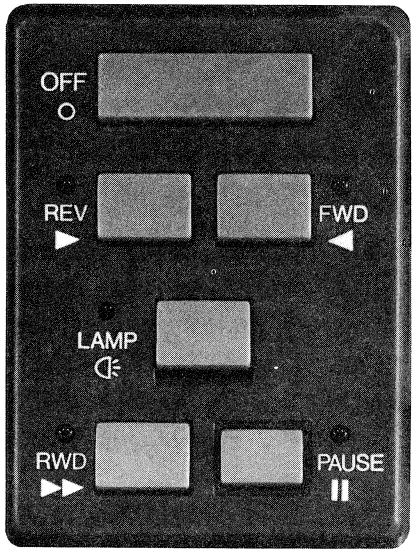
㉖High-Normal lamp switch
The switch is to set the lamp brightness to either normal position for normalimage or high position for brighter image.

㉗Main power fuse
The fuse is to protect the whole projector from excessive current which may flow into the projector by accident.

㉘Power cord
The cord is to supply power to the projector.

㉙Microphone jack
The jack is to connect a microphone for utiliziing for projector as a public address system.

I－3－3 OPERATION SWITCH BUTTONS



(1) OFF O — When the switch is pressed during forward projection/reverse projection/rewiding/pause mode/film loading, the projector stops.

(2) FWD ◀ — When the switch is pressed, the projector runs the film forward and the red LED above the FWD mark comes on. By pressing the forward switch during the reverse projection, direct change of projection mode from reverse to forward is possible.

(3) REV ▶ — When the switch is pressed, the projector runs the film in reverse and the red LED above the REV mark comes on.
By pressing the reverse switch during the forward projection, direct change of projection mode from forward to reverse is possible.

(4) LAMP — The switch is to turn the projection lamp ON or OFF. When the lamp switch is ON, the red LED above the LAMP mark comes on. With the lamp switch ON, the forward (reverse) projection can be done by pressing the forward (reverse) switch.

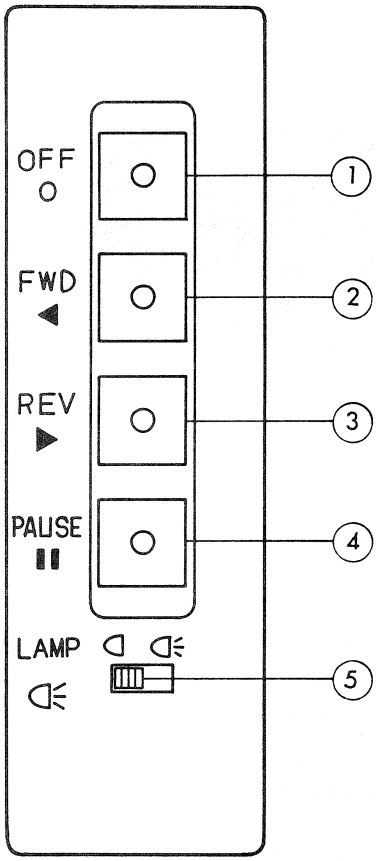
(5) RWD ▶▶ — By pressing the switch, high-speed rewinding of film from the take-up reel to the feed reel is possible. Rewind switch is not operative when the film remains in the film path.

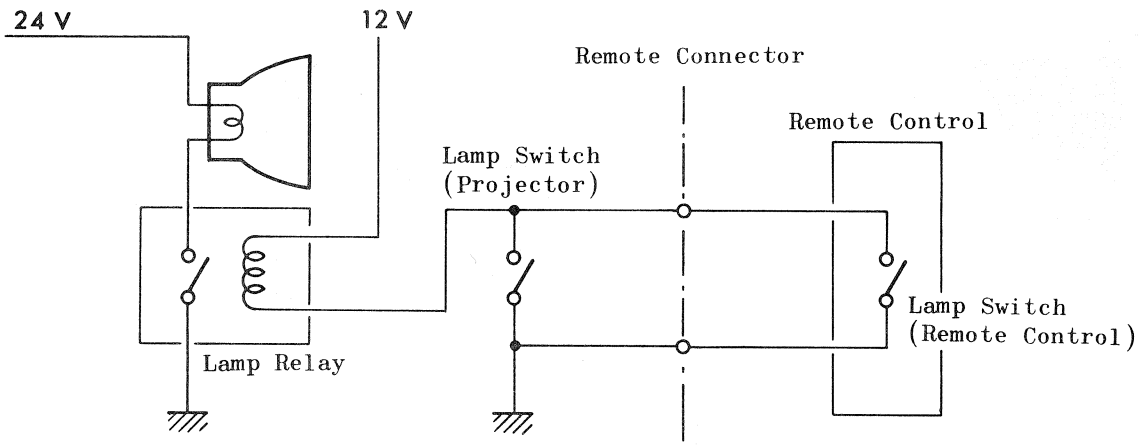
(6) PAUSE ⏸ — The switch is to stop and start the forward projection instantly. When the swetch is pressed during the forward projection, the projector stops running without releasing the film from sprockets on the film path (pause mode) and the red LED above the PAUSE mark comes on. Re-pressing the switch to release the pause mode let the projector re-start the forward projection instantly.
(The pause operation is not applicable to the reverse projection.)

I－3－4 REMOTE CONTROL

The operation procedure of switchs No.①, No. ②, No. ③, and No. ④ is exactly same with that of the operation switch buttons in the projector. (Refer to page 7.)

The switch No.⑤, LAMP is to turn the projection lamp ON or OFF as with the switch button LAMP in the projector, but the lamp switch in the remote control and the lamp switch in the projector are arranged in parallel in the circuit as shown in the following diagram. Therefore, when controlling the projector through the remote control, be sure to turn the lamp switch in the projector OFF.





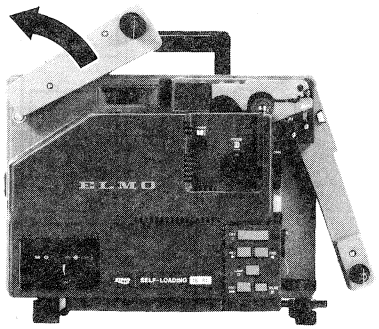
Lamp Switch Circuit

I－4 PREPARATION FOR PROJECTION

(1) Set up the projector and screen properly.
For steady projection, place the projector on a sturdy support at right angle to the screen.

(2) Connect the power cord, which is stored in the top side receptacle of the projector, to the AC electrical outlet.

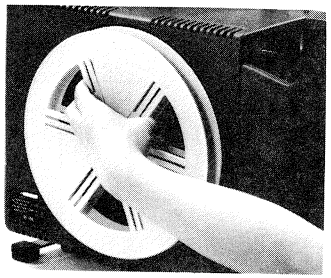
(3) Pull up the feed reel arm and take-up reel arm to maximum stop position.

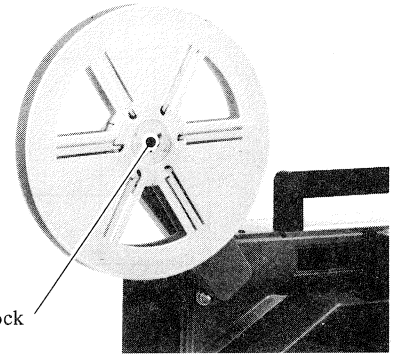


(4) Install the feed reel with film on the feed reel spindle, and turn down the reel lock.

(5) Adjust the height ot picture with the elevation control knob.

(6) Install the supplied take-up reel 240 m (800 ft.),which is stored on the rear of the projector, or an optional reel of more than 240 m (800 ft.) film capacity on the take up reel spindle. At this time, be sure to set the reel in correct position by turning down the reel locks. The reel capacity of the projector is max.720 m (2400 ft.)

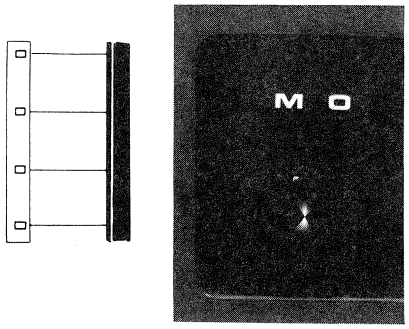




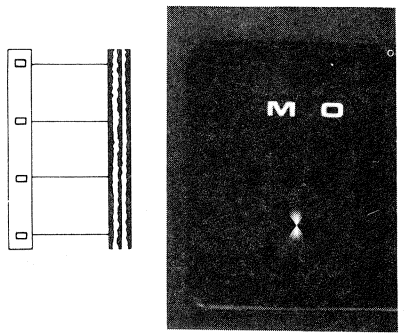
(7) Set the M-O switch in accordance with the film to be projected. Set it to M position for magnetic sound film and O position for optical sound film respectively.

Note: Not applicable to 16-AL Optical model.

Magnetic sound film



Optical sound film

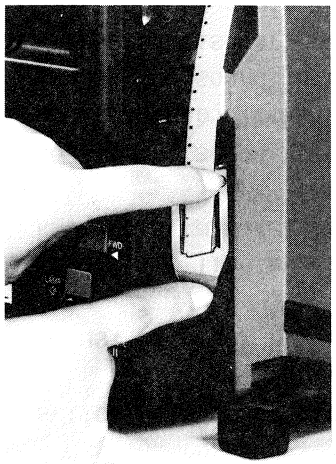


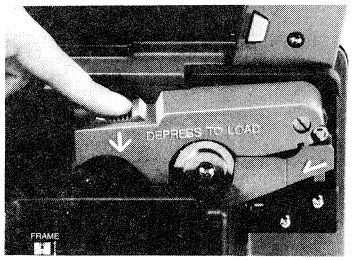
I－5 FILM LOADING

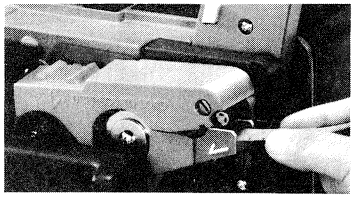
(1) Trim the leader end of the film with the Film Trimmer for smooth, automatic threading. Improper trimming of the film end may result in failure of smooth film threading. In case the film leader (about 1 m in length) is bent or twisted, or perforations are damaged, replace with a new leader or cut off the leader. Be sure to attach a proper lenght of film leader. Adequate leader will ensure smooth thread performance.

(2) Depress the green Self-loading Lever all the way in the arrow direction until it is locked. When it is locked, the motor starts running.

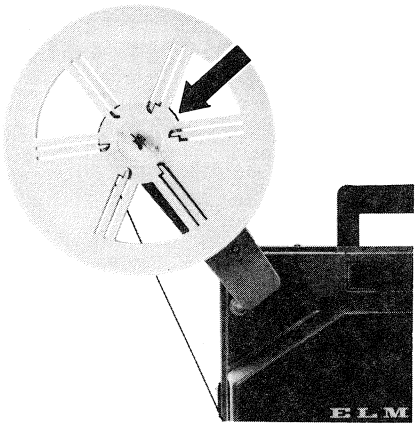
(3) Insetr the film end into the thread slot straight until it is pulled in.





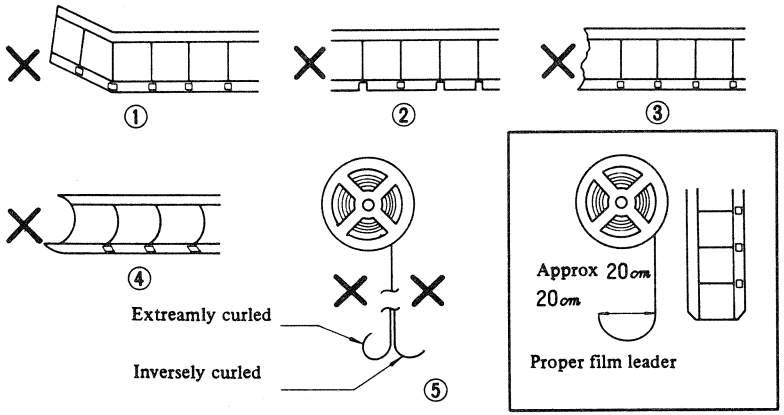


(4) Film automatically stops after threading through projector Wind the leader on the take-up reel.



Note: Check the following in case film fails to be threaded. properly.

① Is the film end bent?
② Are perforation damaged?
③ Is the film end jagged?
④ Is the film end twisted or warped?
⑤ Is the film end extremely curled?



I－6 PROJECTION

(1) Press the forward switch (FWD) and then press the lamp switch (LAMP) for projection.

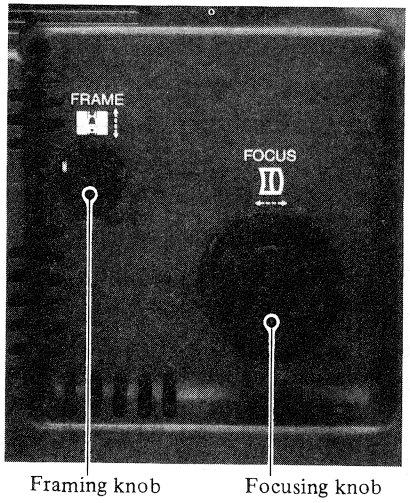
(2) Adjust focusing by turning the focusing knob.

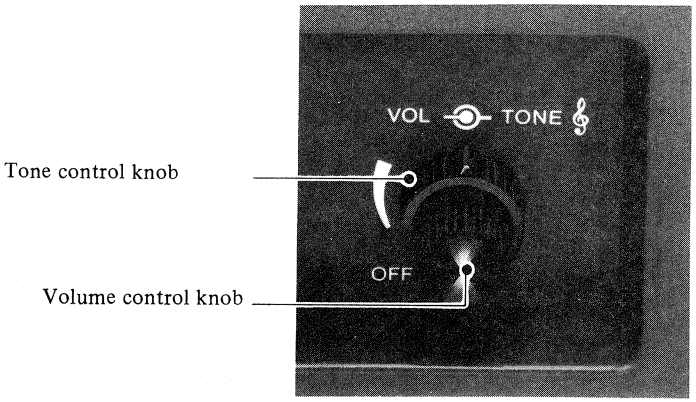
(3) If a frame line appears on the screen, turn the framing knob to eliminate the frame line.

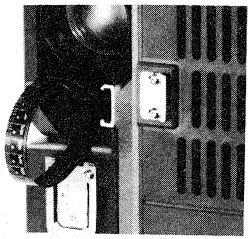
(4) Adjust the sound volume by turning the inner volume control knob clockwise.
Adjust the sound tone by turning the outer tone control knob clockwise or counterclockwise for treble control.
Tone control knob Volume control knob

(5) When the projection is completed, press the off switch (OFF).
(The projector automatically stops when the end of film passes the first sprocket in the film path, and you can take up the entire film onto the take-up reel by hand.)

Note: If the film breakage occurs during projection, a safety mechanism of the projector works to have the broken film getaway from the film path automatically. Press the off switch (OFF), remove the film from the film path and splice the broken film with a splicer.







I－7　VARIOUS PROJECTION

I－7－1　STILL PROJECTION

Set the Still Projection Lever to "STILL" from "RUN".

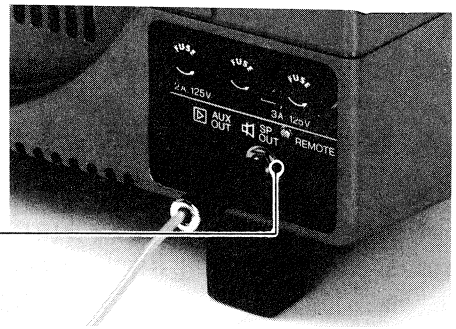
I－7－2　REVERSE PROJECTION

Press the reverse switch (REV), and then press the lamp switch (LAMP) for reverse projection.

I－7－3　WHEN USING EXTENSION SPEAKER

In the event you have occassion to use an optional extension speaker for a large audience in a large auditorium, connect the speaker plug to the extension speaker jack at the rear of the projector. This procedure will automatically shut off the built-in speaker circuit.

Extention speaker jack
(DIN type speaker jack is provided depending on the country)

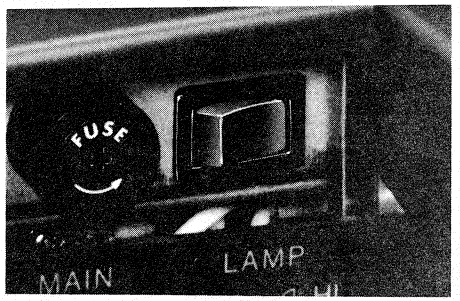


Extention speaker jack

(DIN type speaker jack is provided depending on the country)

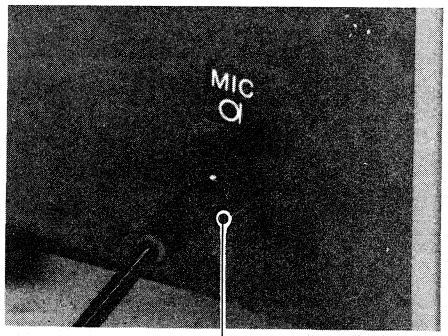
I－7－4　HIGH-NORMAL LAMP SWITCH

The switch is origianlly set to HI(High) position. With the switch set to NORM (Normal), a little lower voltage is applied to the lamp to prolong the lamp service life. When especially bright image is required, set the switch to HI to apply the rated voltage to the lamp.



I－7－5　PUBLIC ADDRESS SYSTEM

You can utilize the projector as a public address system during projection when an optional microphone is connected to the microphone jack at the rear left side of the projector. Use the microphone with an impedance of 500 Ω～10K Ω. Public address through a microphone during projection supersedes the sound from the projected film.

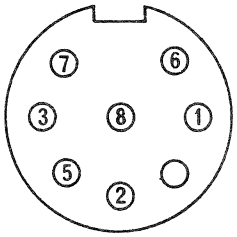


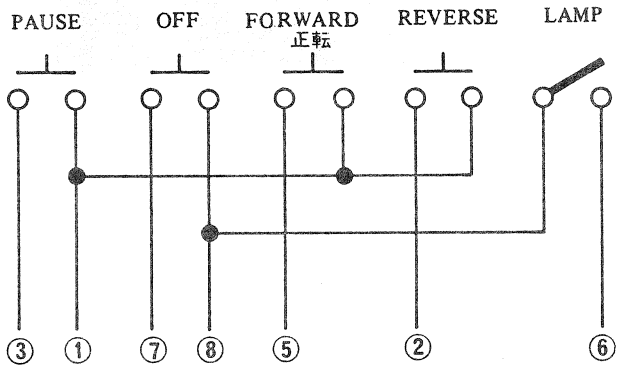
Microphone jack

I－7－6 REMOTE CONTROL

DIN 8P remote control receptacle is provided, and remote control operation is possible by connecting the Remote Control (Option) to this receptacle.

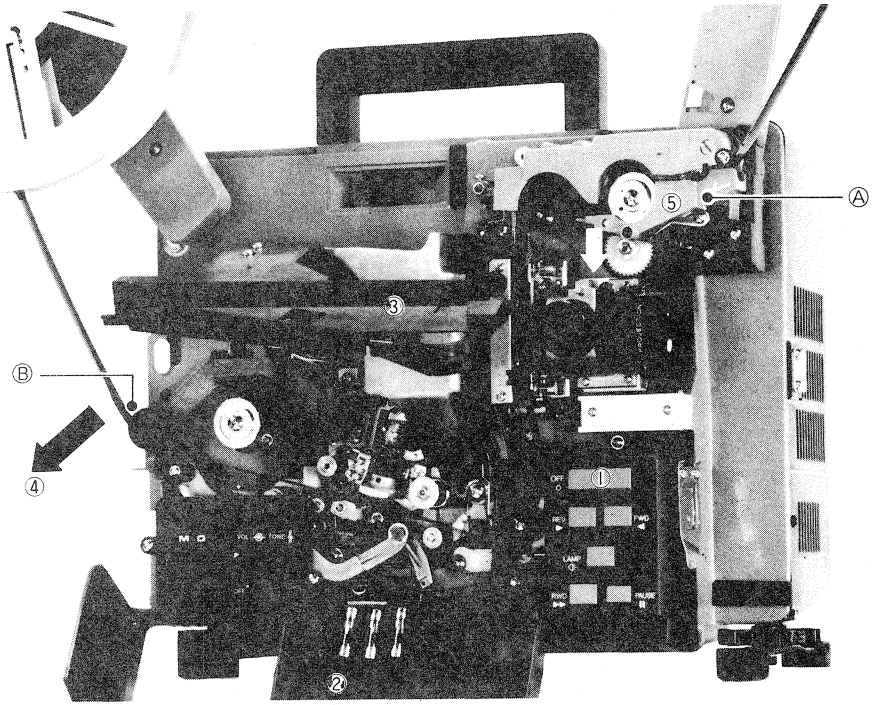
The schematic diagram below shows the remote cord connections.





I－8 REMOVING THE FILM DURING MIDWAY PROJECTION

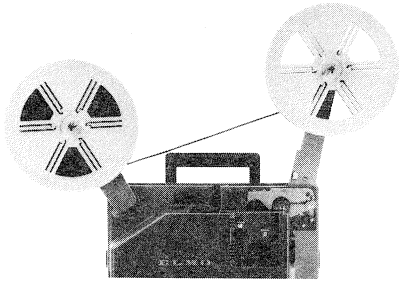
(1) Press the off switch (OFF) to stop the projector.
(2) Open the front cover.
(3) Open the auto-thread guide.
(4) Remove the film, pressing the tension roller (B) upward.
(5) Remove the film, pressing the first sprocket shoe (A) downward.



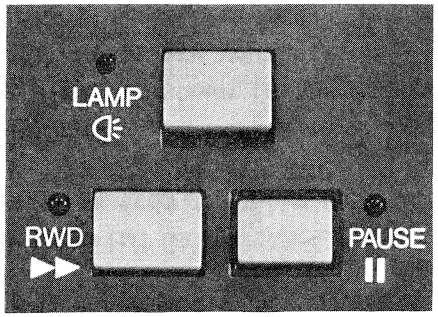
I－9 REWINDING

● When the projection is completed, rewind the film as follows.

(1) Insert the film end into the slot of the feed reel hub.



(2) Press the rewind switch (RWD)
In this case the projector may start rewinding only after a few seconds' pause depending on the length of film on the reel to be rewound. The projector is designed to increase rewinding torque gradually for the protection of film.

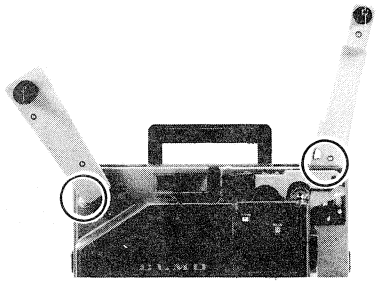


(3) After the film is fully rewound, press the off switch(OFF).

(4) Remove the reels from the feed reel and take-up reel arms.

I－10 STOWING

Disconnent the power cord first.



(1) Fold the feed reel and take-up reel arms by depressing the folding buttons.

(2) Return power cord and take-up reel to their stowing receptacles.

(3) Turn the elevation control knob fully counterclockwise. Never transport the projectror with the elevation leg extended.

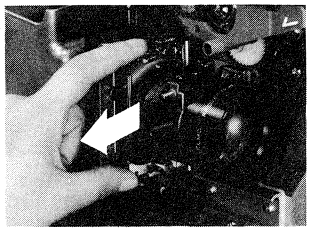
I－11 MAINTENANCE

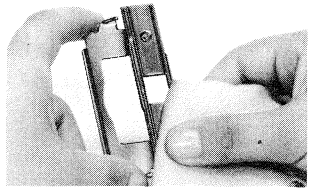
Clean the film path and lens prior to projection;accumulation of dust and film particles in the film gate will scratch the film and decrease the projected image quality. Open the front cover for cleaning.

I－11－1 CLEANING FILM GATE

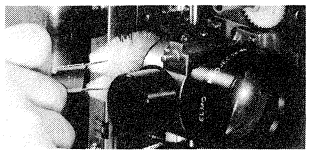
Be sure remove the film from the film path when cleaning the film gate.

Hold the pressure plate as shown in the picture and pull it out toward yourself, and the pressure plate can be removed.

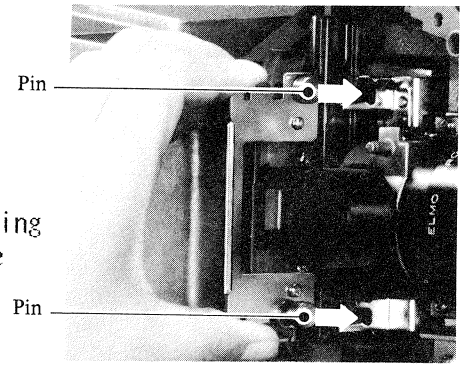




Use the stiff cleaning brush (supplied) to clean film gate, then wipe clean with lint-free cloth.



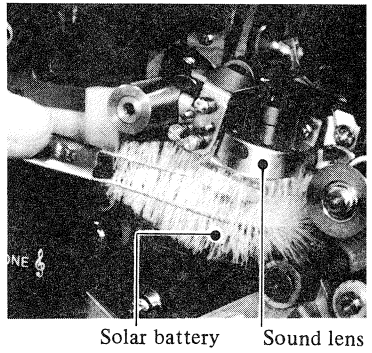
After the cleaning is over, align the two pins at the upper and lower patrs of the pressure plate holder with the corresponding slots on the pressure plate base and push it back to place.



I－11－2 CLEANING SOLAR BATTERY AND LENS

Brush off the rollers, solar battery and sound lens with the brush supplied.

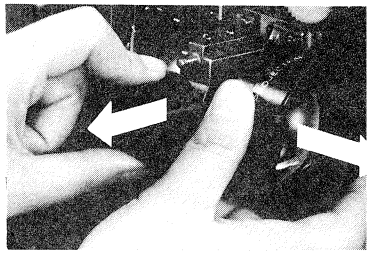
Note: If a dust adheres to sound lens or solar battery, the tone quality or volume will be decreased.



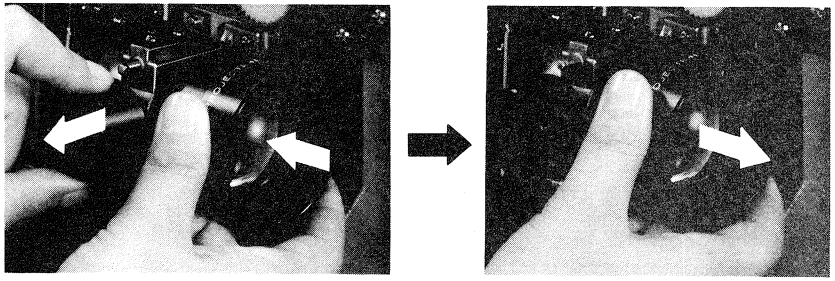
I－11－3 CLEANING PROJECTION LENS

To remove the projection lens, pull it out straight while pulling the focusing knob toward yourself.

To remove the dust, wipe the lens surface gently with soft, clean, lint-free cloth.



To put the lens back, push it all the way to position while pulling the focusing knob toward yourself, and pull it until a click is heard. This click sound means that the pin at the end of the focusing knob is positively inserted into the groove of the lens holder.



Make sure the lens can move back and forth smoothly by turning the focusing knob.

I－12 REPLACING LAMP AND FUSE

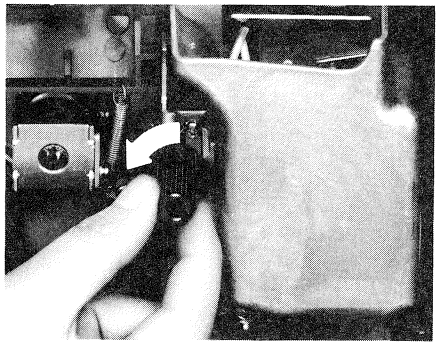
BE SURE TO DISCONNECT THE POWER CORD WHEN REPLACING LANP AND FUSE.

I－12－1 REPLACING PROJECTION LAMP

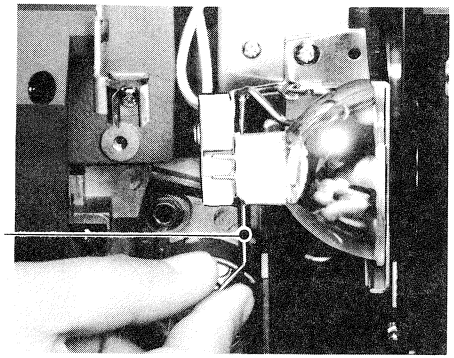
The type of projection lamp to be used is JCR24V-250W or ANSI ELC or Osram 64653.

(1) Open the front cover.

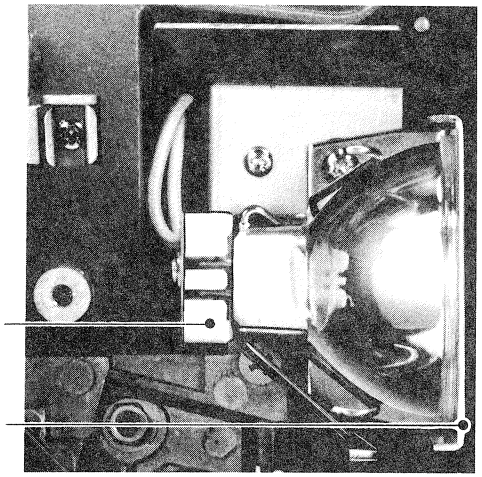
(2) Remove the lamp cover by loosening the screw.



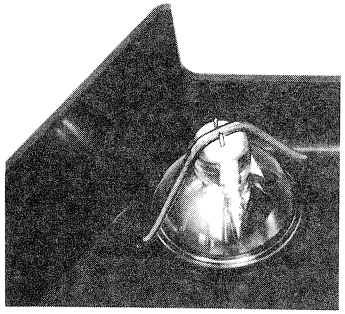
(3) Eject the blown lamp by pushing down the eject lever to the left.



(4) To put a new lamp, push it into the socket as ahown in the picture. At this time, be sure to insert the lamp firmly into its socket. if it is inserted halfway into the socket, the optimum projection performance can't be achieved or the socket may be burned out.



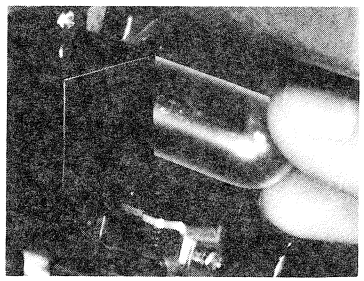
It is advisable to keep a spare projection lamp handy for immediate replacement, should an unexpected break or burn-out develops during projection. A spare projection lamp can be stored on the back side of the front cover.



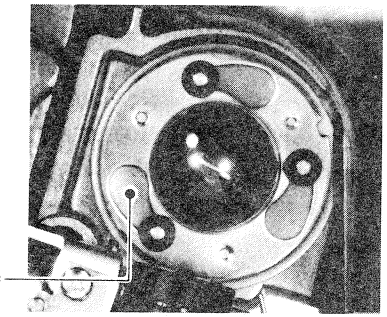
I－12－2 REPLACING EXCITER LANP

The type of exciter lamp to be used is KE-040 or ANSI BRK.

(1) Remove the blown exciter lamp by turning its head counterclockwise.



(2) To put the new exciter lamp, align the three prongs on the socket with the holes on the lamp flange and turn the lamp head clockwise until it locks into place.

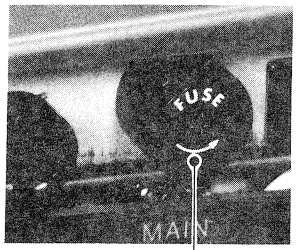


Hole on the lamp flange

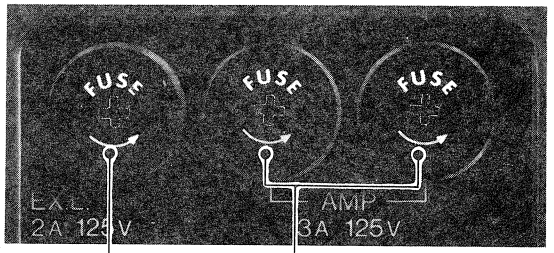
I－12－3 REPLACING FUSE

To remove the fuse holders, turn the holder heads counterclockwise with a Philips head screwdriver.

IMPORTANT
Use the fuse with specified value for each of the three as indicated.



Power (main) fuse



Exciter lamp fuse

Amplifier fuse

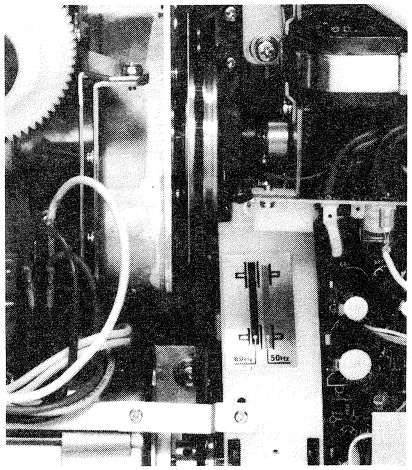
- Check the exciter lamp fuse for blowout when no sound is reproduced with optical sound film. At this time, be sure also to check the exciter lamp filament for blowout.

- Check the amplifier fuse for blowout when no sound is reproduced with either magnetic or optical film.

- When the power (main) fuse is blown out, no power is supplied to any part of the projector. Check the power (main) fuse for failure when the projector does not operate even with the power cord properly connected and the forward switch (FWD) pressed.

I－13 WHEN CHANGING THE PROJECTION SPEED FROM 24FPS TO 18 FPS OR TO CHANGE ELECTRIC CURRENT CYCLES (50Hz-60Hz)

- For 50 Hz, 24/18 fps model:The projector is originally fixed for 24 fps. operation. To change to 18 fps., remove the rear cover by loosening four screws and change the projection speed as shown in the picture.
- For 50/60Hz, 24 fps model:Electric current cycles of the projector are adjusted to either 60Hz or 50Hz at the factory for specific destined countries.
  But to change electric current cycles (50Hz～60Hz),remove the rear cover by loosening four screws and change the belt position as indicated.



Note: One belt is utilized to change electric cycles or projection film speed. When belt is used to change electric current cycles, the same belt cannot be used for change of film speed - or vice versa. The power cord should be detached from electric outlet WITHOUT FAIL, before removing rear cover.

I－14 WHEN CHANGING VOLTAGE

When changing voltage, the power cord should be detached from electric outlet － WITHOUT FAIL

After removing rear cover, take out the connection wire and plug it into the indicated voltage terminal to be used. There is a single voltage model projector available to comply with electrical regulations in specific countries. For this model the above instructions are not applicable.

I－15 TROUBLE- SHOOTING HINTS

WHEN THE MOTOR FAILS TO OPERATE:

- Check the power cord for proper connection.
- Check the power (main) fuse for blowout.

WHEN THE LAMP IS NOT LIT ON:

- Check the lamp filament for bolwout.
- Check the lamp for proper connection with its socket.

WHEN NO SOUND IS REPRODUCED:

- Check the volume control knob if turned clockwise.
- Check the M-O switch for the correct position corresponding to the type of film used (magnetic or optical sound). (Not applicable to 16-AL Optical)
- Check the exciter lamp if lit. (only in case of optical sound film)
- Check the exciter lamp fuse for blowout.
- Check the amplifier fuse for blowout.
- Check if a dust adheres to sound lens or solar battery.

WHEN THE IMAGE CAN'T BE PROPERLY FOCUSED:

- Check the projection lens for correct alignment, with the pin at the rear of the focusing knob, with the groove in the projection lens.

WHEN THE LOOP RESTORER OPERATES CONTINUOUSLY DURING PROJECTION:

- This may reault from the damaged perforations of several frames, which make the slack length of the film between the two sprockets so short that no loop can be restored. In such a problem, press the off switch (OFF) to stop the projector and press the forward switch (FWD) again.

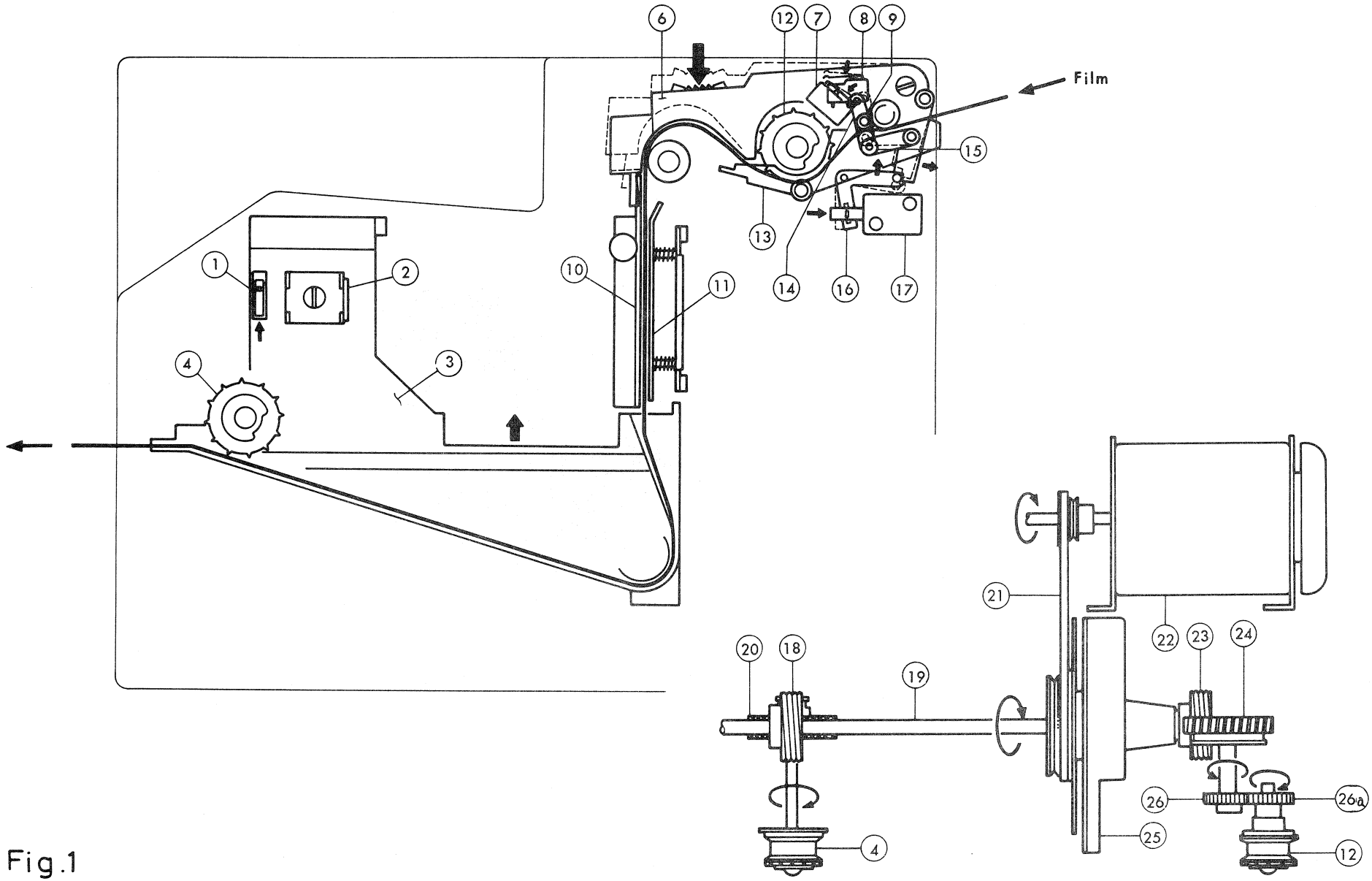

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Fig.1

Ⅱ DRIVING MECHANISM

Ⅱ－1 Driving Mechanism Functions

Ⅱ-1-1 Self-Loading Mechanism

When the loop former ⑥ is pushed down, the microswitch ⑧ gets pressed, turning the switch to ON.

↓

The solenoid ② activates, causing the film guide ③ to be drawn to the base frame and turning the microswitch ① to ON.

→ The motor ㉒ starts, setting the feed unit assy ㉕ to start through the V belt main ㉑.

↓

The solenoid ⑰ functions to activate the lock assy loop former ⑯, forming the film path by locking the loop former ⑥.

The worm 1 ㉓ →worm gear (1) assy ㉔ →gear 1st sprockets ㉖, (26a) start rotating, causing the first sprocket ⑫ to rotate.

The middle shaft (2) assy ⑲→ worm 2 ⑲ →worm gear (2) assy ⑳ start rotating, causing the second sprocket ④ to rotate.

↓

Film is inserted.

↓

Driven by the first sprocket ⑫, the film is sent off from the main body through the loop former ⑥→aperture plate ⑩→pressure plate assy ⑪→ film guide ③, and when the film extends out from 70cm to 1m, the self-loading automatically gets released (cancelled).

↓

☆ In order to interrupt the self-loading state in the middle, depress the operation button OFF, which then releases the loop former and brings the motor to a stop.

☆ The self-loading does not operate even by depressing the loop former when the operation switch unit is functioning.

• This machine is equipped in the front of the first sprocket ⑫ with fixed roller film loading ⑨ and sensor roller film loading ⑮. The microswitch ⑦ gets activated when the film passes through these rollers. Furthermore, this microswitch works as a timer switch at self-loading, and releases the self-loading state when the film extends out from 70cm to 1m from the main body. This also works as an auto stop switch at the time of forward/reverse projection.

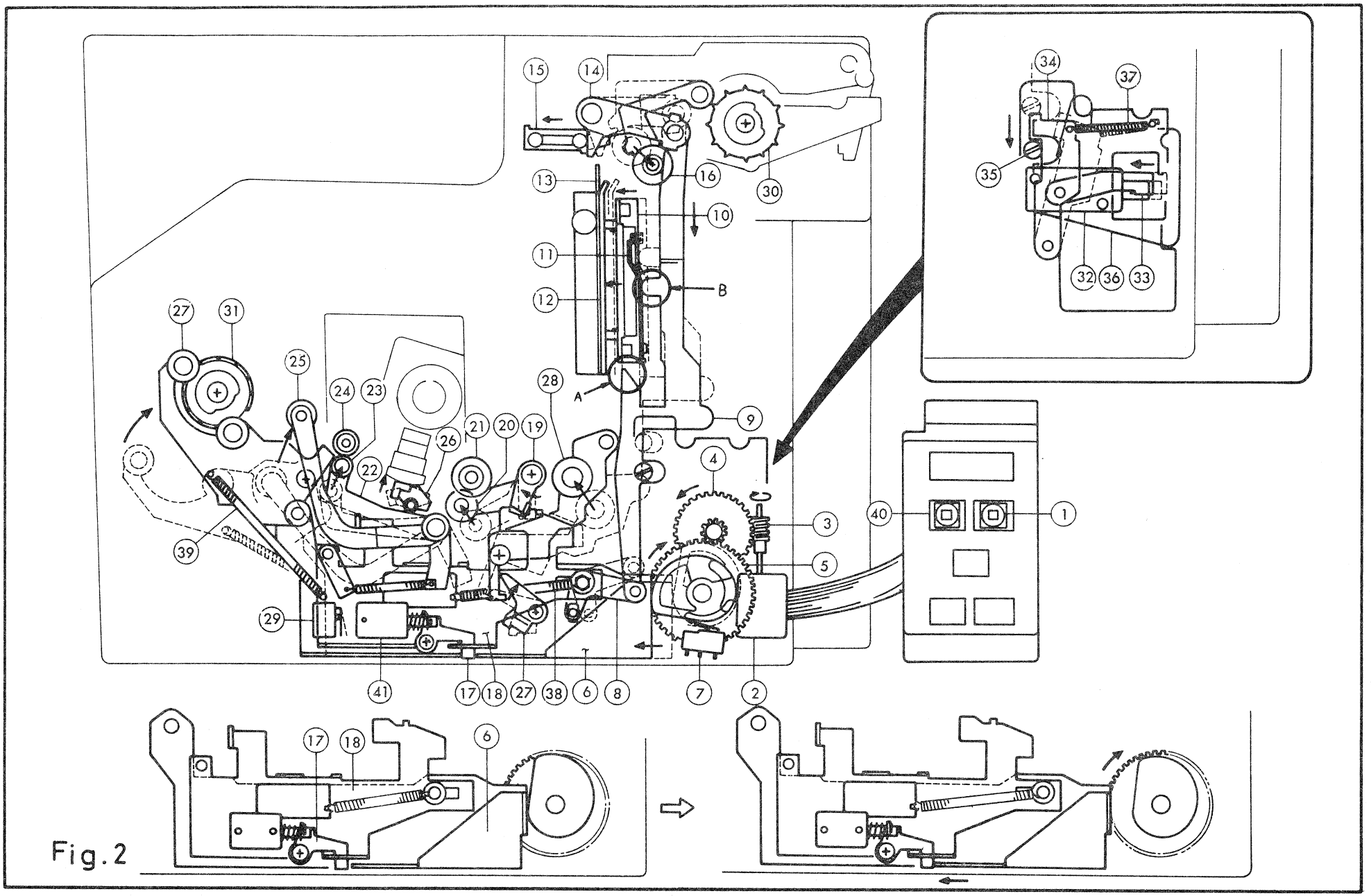
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Fig. 2

Ⅱ-1-2 From Forward Projection to Stop Mechanism

When the operation button FWD is pressed, the switch ① turns to ON, starting the cam motor ② and rotating the worm remote ③ and gear (1) remote ④, and then causing the opration cam ⑤ to rotate.

The link (1) ⑥ touches the cam unit of the operation cam ⑤, and starts shifting as the cam rotates.

The opration cam ⑤ continues rotating, and presses the microswitch ⑦ at each rotation (turn), bringing the cam motor ② to a stop.

At projection the cam face of the operation cam ⑤ is most widely apart from the link (1) ⑥.

The link (2) sprocket shoe (2) ⑧ rotates, shifting the link (1) guide roller (2) ⑨ downward, and presses the pressure plate ⑫ closely against the aperture plate ⑬ by pushing the spring holder (1) ⑪ with B portion as the A portion of ⑨ departs from the holder (2) pressure plate ⑩ Furthermore, the holders assy link (1) ⑭ linked to ⑨ pushes the stop lever guide roller (2) ⑮ to release (set free) the guide roller (2) ⑯ from the loop forming position.

The select lever ⑰ gets pressed, activating the reverse lever ⑱.

The lever brake roller (2) ⑲ gets pressed, bringing the brake roller (2) assy ⑳ in close contact to the brake roller (3) assy ㉑.

The second sprocket presser ㉗ is set.

The lever pressure roller ㉒ is activated to bring the pad roller assy ㉓ in colse contact to the shaft flywheel assy ㉔, and then the lever middle tension ㉕ and lever assy photo diode ㉖ are activated for bringing to projecting position.

The lever guide roller (3) ㉘ is unlocked by moving the lock plate guide roller (3) ㉗.

The microswitch ㉙ is pressed when the link (1) ⑥ has shifted to the vicinity of its end point for turning the switch to ON.

The main motor starts and rotates the sprockets ㉚ and ㉛ and the resr reel shaft.

The solenoid ㉜ activates to lock the roller link lock ㉟ with the lock plate link (1) ㉞ connected to the link lock plate ㉝.

The lever guide roller (3) ㉘ and the guide roller (2) ⑯ are the rollers for securing the loops above and below the film gate, and the timing is delayed so that the rollers activate only after the film gets engaged to the second sprocket ㉛.

Stop Function:

On depressing the operation button OFF or turning the power to OFF, the power to the solenoid ㉜ is cut off, disconnecting the lock plate link (1) ㉞ by means of the tension of spring guide roller (3) ㊲ applied to the solenoid ㊱. Then the link (1) ⑥ returns to the original position due to the tension of spring tension roller ㊳ applied to reverse lever ⑱ and the tension of spring guide roller (3) ㊴ applied to lever second sprocket presser, returning each roller to the OFF position.

II-1-3 Reverse Projection Mechanism

On depressing the operation button REV, the switch ㊵ turns to ON, which sets the cam motor ② to start, and the machine to continue operation for forward projection until the link (1) ⑥ activates.

↓

On turning the switch ㊵ to ON, the solenoid ㊶ activates to disconnect the select lever ⑰ from the link (1) ⑥ (for approximately 2 seconds) setting the reverse lever ⑱ to OFF position and, accordingly, causing no function related to reverse lever ⑱ (see "Forward Projection Mechanism" on page 22) to be carried out.

↓

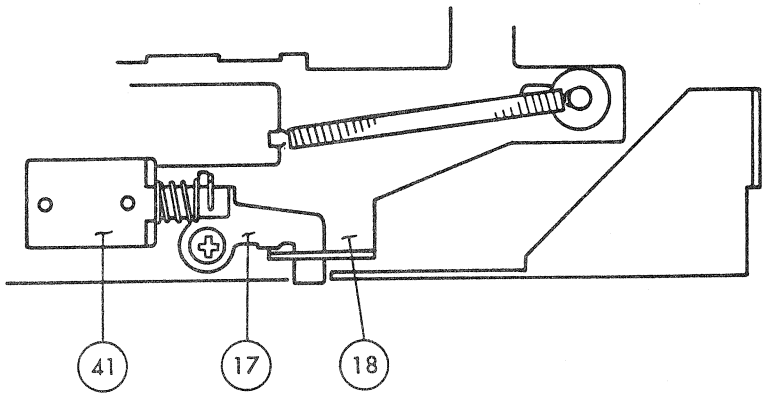
The switch is turned to ON by depressing the microswitch ㉙ when the link (1) ⑥ has shifted to the vicinity of its end point.

↓

The main motor then starts in reverse direction to rotate the front arm reel shaft.

↓

Other mechanisms are the same as in the case of Forward Projection Mechanism.



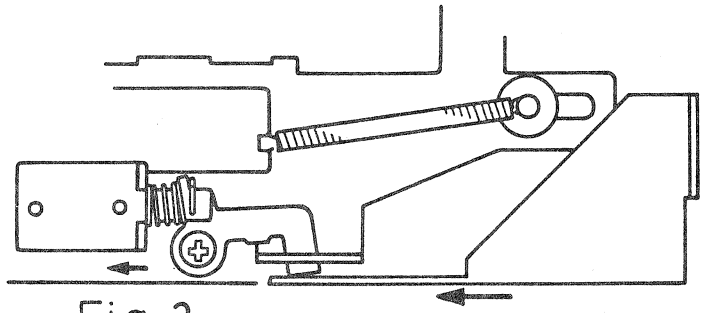


Fig.3

II-1-4 Film Take-up Mechanism

The film is taken up, as shown in Fig. 4, by turning the main motor ①→claw section frame assy ②→middle shaft (2) assy ③→worm (2) ④→worm gear (2) assy ⑤→pulley (2) assy take-up ⑥→pulley shaft take-up ⑦→belt ⑧→pulley (2) upper take-up ⑨, and rotating the reel.

The pulley (2) assy take-up ⑥ has roller clutch press-fit at the bearing to transmit the rotation in only one direction (of take-up).

Refer to "Disassembly, Reassembly and Adjustment" on page 36 for the take-up tension.

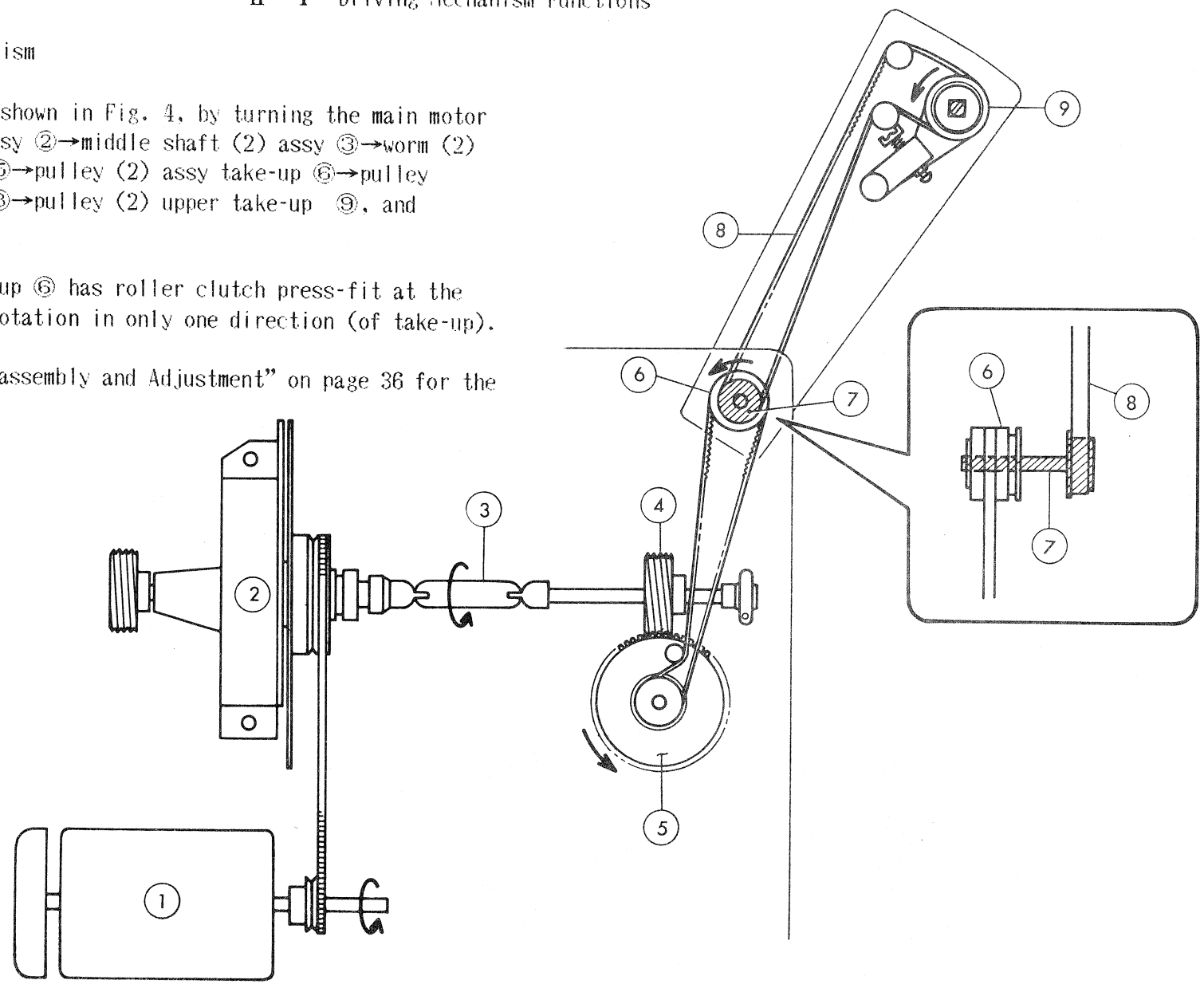
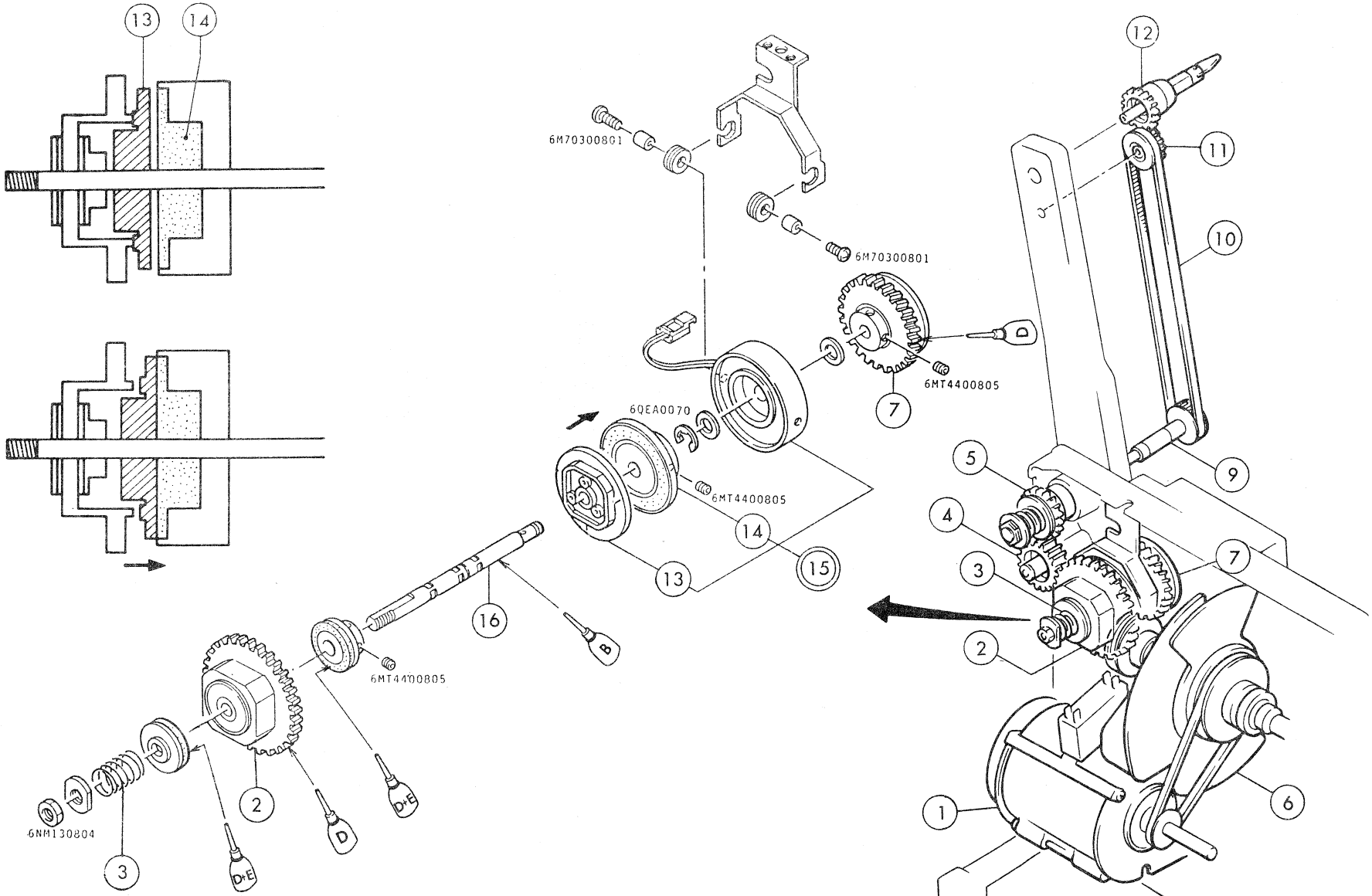


Fig.4


13
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6M70300801
6M70300801
12
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6MT4400805
7
6QEA0070
6MT4400805
14
15
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3
2
9
7
16
B
6MT4400805
6NM130804
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Fig.5

Ⅱ-1-5 Film Rewinding Mechanism

A: Take-up at Reverse Projection

The film is rewound by means of the transmission of rotation from main motor ① to reel shaft assy rewind ⑫ through claw section frame assy ⑥, worm (1), worm gear (1) assy ⑦, gear (1) assy rewind ②, middle gear rewind ④, gear (2) rewind ⑤, pulley shaft rewind ⑨, STS belt ⑩ and sync. pulley rewind ⑪.

The rewind tension at reverse projection is adjusted by means of the tensional pressure of spring reverse tension ③ in the tension mechanism in Fig. 5.
Needless to say that the rewind tension is also largely influenced by the gears succeeding the tension mechanism and the load such as the tension of the belt ⑪ in the front arm, etc..
Refer to "Disassembly, Reassembly and Adjustment" on page 36 for rewind tension at reverse projection.

B: Reel-to-reel Rewinding

The rotational mechanism from the main motor is the same as at the reverse projection. However, in order to carry out high speed rewinding, the magnetic clutch ⑮ is activated to nullify the above mentioned tension mechanism.

Depress the operation switch RWD.

↓

Carry out reverse projection rewinding for approximately 2 seconds in order to avoid exerting large load onto the film.

↓

The magnetic clutch ⑮ activates after approximately 2 secpnds, causing ⑬ to be drawn to ⑭ and the gear (1) assy rewind ② to be fixed to the shaft reverse tension ⑯, making it impossible for the tension mechanism to function.

↓

The next procedures are the same as in the case of reverse projection.

II－1 Driving Mechanism Functions

II-1-6 Safety Mechanism

The rotation from drive motor is transmitted to triangle cam shaft assy ⑤ through pulley shutter ①, pulley (1) clutch ②, pulley (2) clutch ③ and boss pulley (2) clutch ④.

Set the knob still projection ⑥ to STILL.

↓

The power is then transmitted from the select lever still proj. ⑦ to click spring ⑧, lever (1) assy clutch mover ⑨ and lever (2) assy clutch mover⑩, and since the pins caulked at the ends of ⑨ and ⑩ are fitted to the groove of pulley (2) clutch ③, the pulley (2) clutch ③ sides over the boss pullty (2) clutch ④ to disconnect the engagement with the pulley (1) clutch ②. With the transmission of rotation from the motor being as shown above. the disconnection of ② and ③ causes the tramsission of rotation to the triangle cam shaft assy ⑤ to stop. meaning thereupon that the claw section frame assy stops functioning. making the film feeding impossible. Needless to say that the first as second sprockets also stop functioning.

↓

If the film stops this way, it may get burned due to the heat of projection lamp and the heat resisting glass is inserted in the following manner.

↓

The operation is made in the order of select lever still proj. ⑦→lever (1) assy still proj. ⑪→lever (2) assy still proj. ⑫→safety shutter assy ⑬ (heat resisting glass)

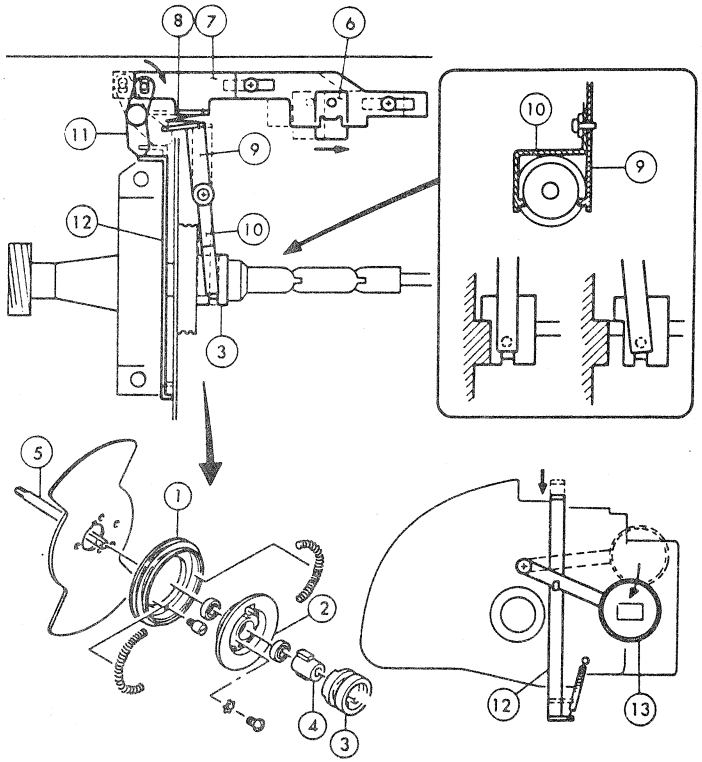


Fig.6

II-1-7　Automatic Loop Restorer Mechanism

The automatic loop restorer activates to secure proper loop when the film loop under the film gate, at forward projection, gets small due to misfeeding resulting in the damage to performation, etc. However, this loop restorer does not function for the loop above (at the top of) the film gate or for the loop at reverse projection.

When the loop gets small, the film pushes up the link (2) loop setter assy ① to rotate the holder link (2) assy ②.

↓

This pushes up the lever (1) loop setter assy ③, coaxially interlocked with ②, disconnecting the claw fitted to the friction wheel (2) ④.

↓

The friction wheel (2) ④ then touches the rubber roller of worm gear (1) assy ⑥ due to the tensional pressure (spring tension) of spring loop setter ⑤.

↓

Since the worm gear (1) ⑥ is rotating, the knurled part of friction wheel (2) ④ cuts into into the rubber roller, causing ④ to rotate.

↓

The link (1) loop setter⑦ aligned to friction wheel (2) ④ shifts downward to push down the lever guide roller (3) ⑧, and accordingly the guide roller (1) ⑨ installed on ⑧ pushes down the film to secure appropriate loop.

↓

The friction wheel (2) ④ then fits with the claw of ③ and stops after taking one turn.

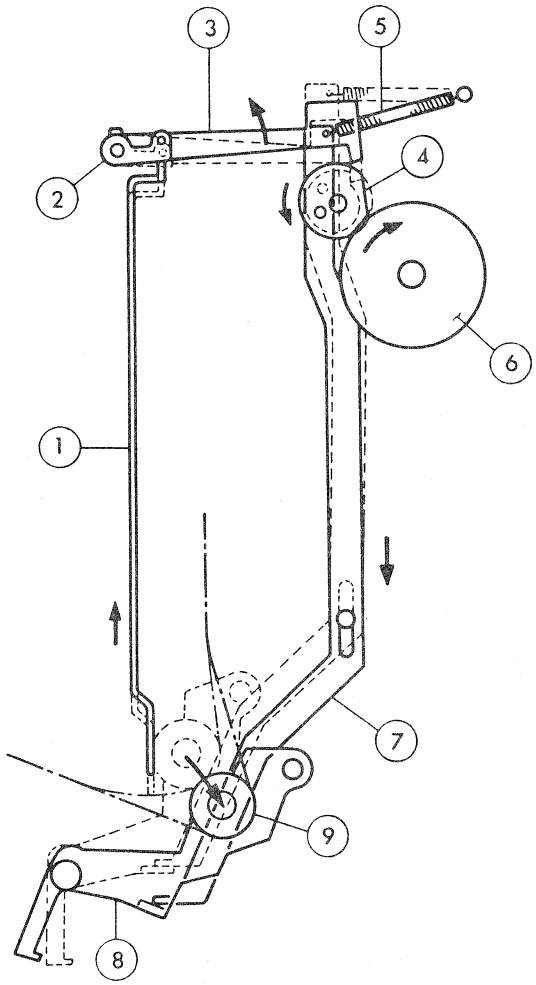
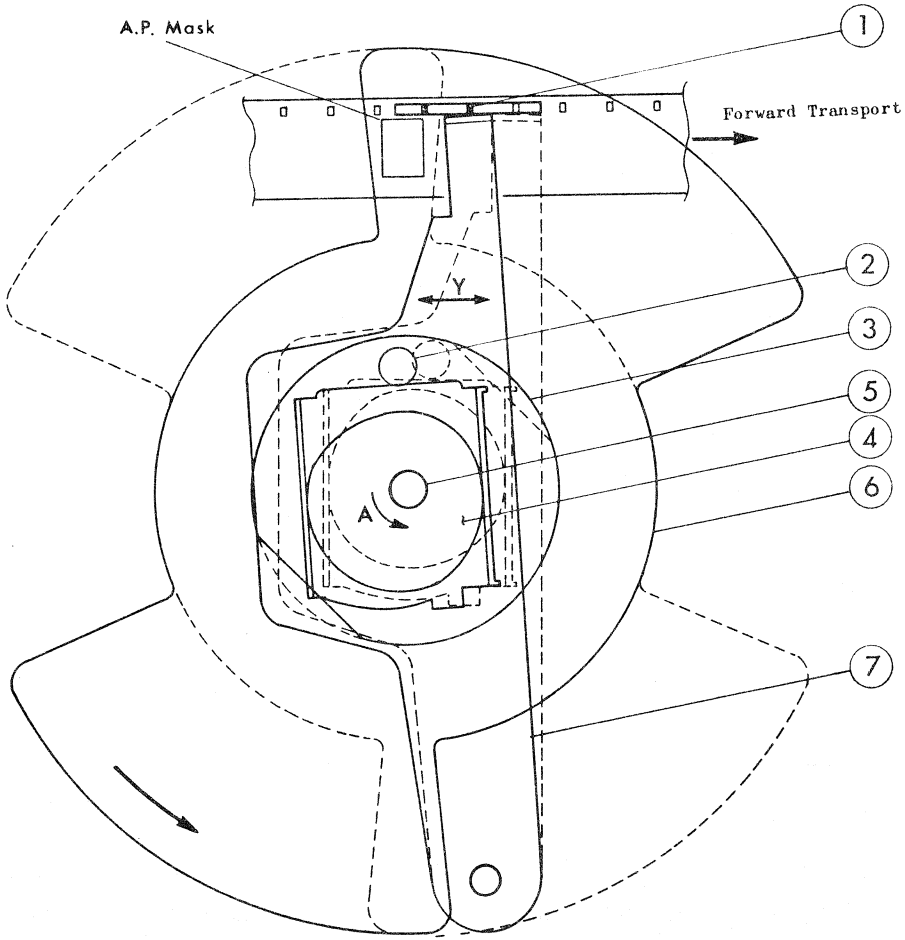


Fig.7



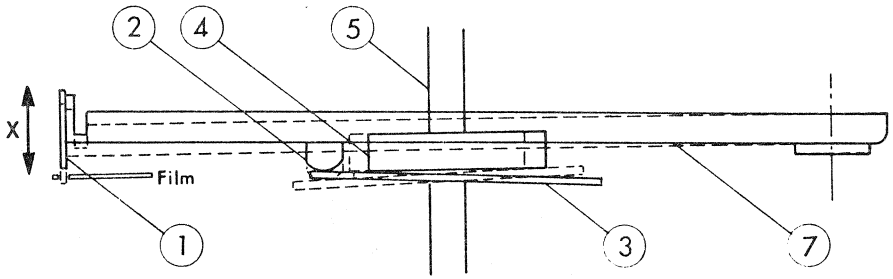


Fig.8

Ⅱ-1-8 Intermittent Film Feeding Mechanism

The rotation from motor is transmitted to the triangle cam shaft assy ⑤, starting the film feeding mechanism to rotate (in the arrow mark[A]direction at forward projection).

The triangle cam ④ installed in the triangle cam shaft assy ⑤ rotates.

Since the triangle cam ④ is internally contacted with claw (1) assy ⑦, ⑦ functions in arrow mark[Y]direction when ④ rotates.

The face cam ③ installed in the triangle cam shaft assy ⑤ rotates.

Since the claw pin ② attached to claw (1) assy ⑦ is closely contacted with the triangle cam shaft assy ⑤, ⑦ funcrions in arrow mark[X]direction when ⑤ rotates.

The shutter ⑥ is installed so as to block the aperture mask when claw (1) assy ⑦ functions in arrow mark[Y] direction.

When the claw (1) assy ⑦ functions in arrow mark[X]and [Y]directions, the claw ① installed in ⑦ functions symmetrically to feed the film.

The relation among claw ①, triangle cam ④, face cam ③ and shutter ⑥ is shown in Fig. 9.
a: Back feed part b: Film feed part c: Shutter angle closing part

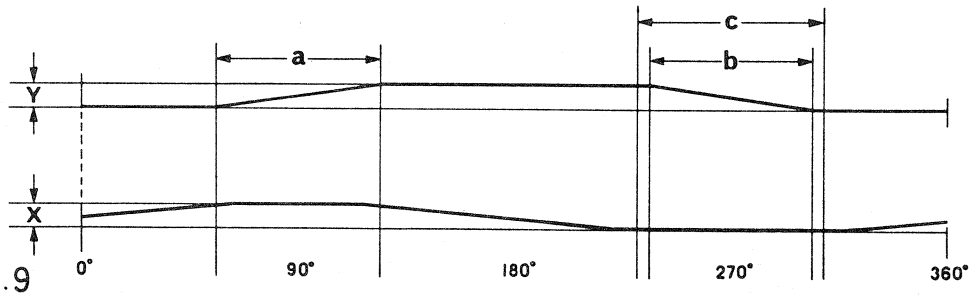
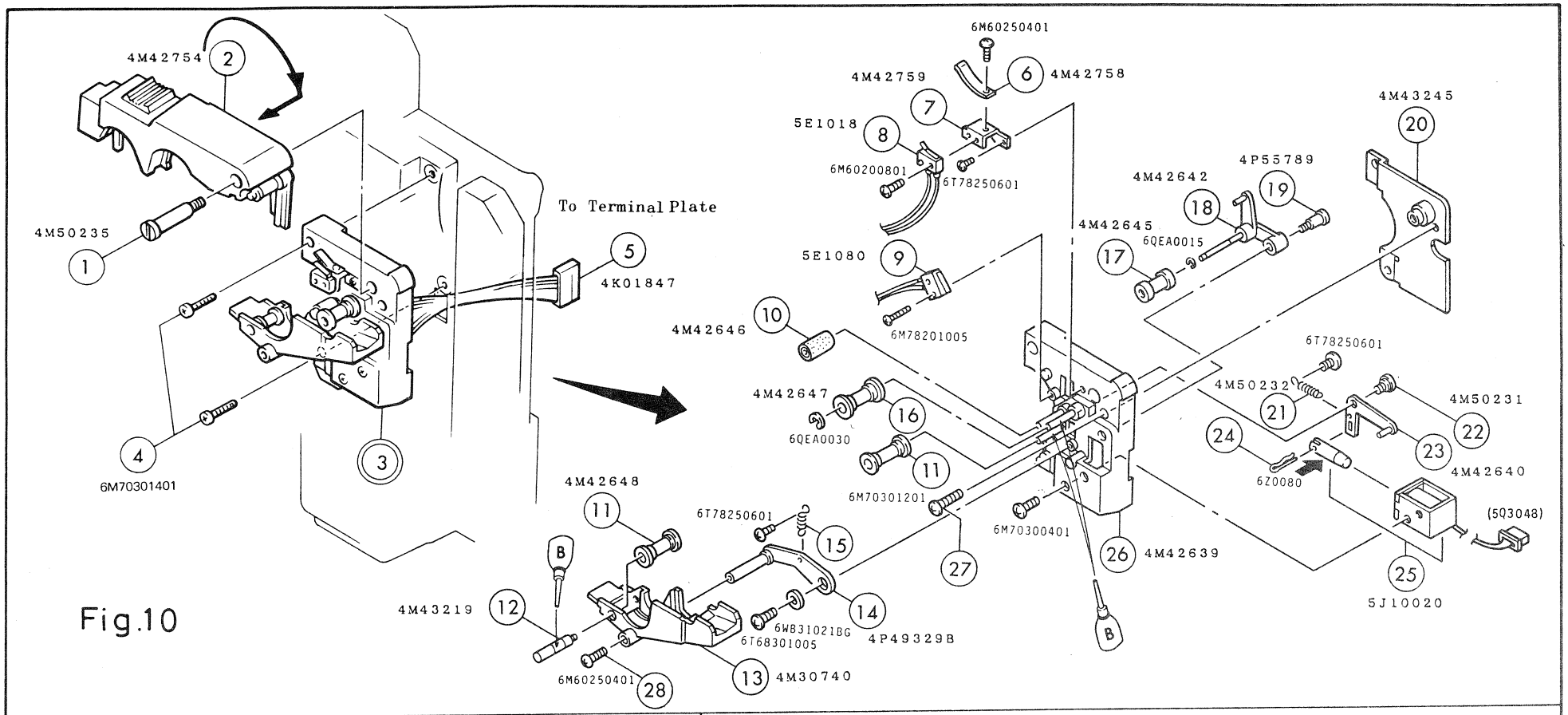


Fig.9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2
4M50235
1
4
6M70301401
3
To Terminal Plate
5
4K01847
6M60250401
4M42759
6
4M42758
7
5E1018
8
6M60200801
6T78250601
5E1080
9
6M78201005
4M42646
10
4M42647
16
6QEA0030
11
6M70301201
4M42648
11
6T78250601
15
B
4M43219
12
6WB31021BG
6T68301005
14
4P49329B
6M60250401
28
13
4M30740
27
6M70300401
26
4M42639
B
4M43245
20
4M42642
18
4P55789
19
4M42645
6QEA0015
17
6T78250601
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21
4M50231
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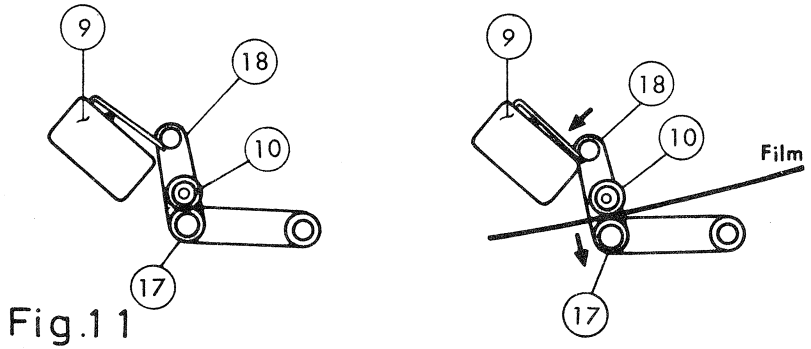
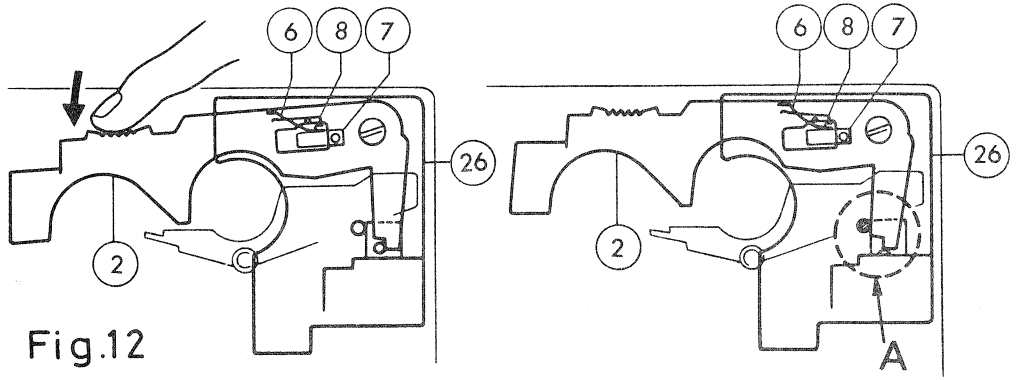
24
23
6Z0080
4M42640
(5Q3048)
25
5J10020
Fig.10


9
18
10
17
Fig.11
9
18
10
Film
17


6
8
7
26
2
Fig.12
6
8
7
26
2
A

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-1 Film Thread Slot Section
Loop former assy ②, Shoe first sprocket ⑬

Hints for Trouble-shooting

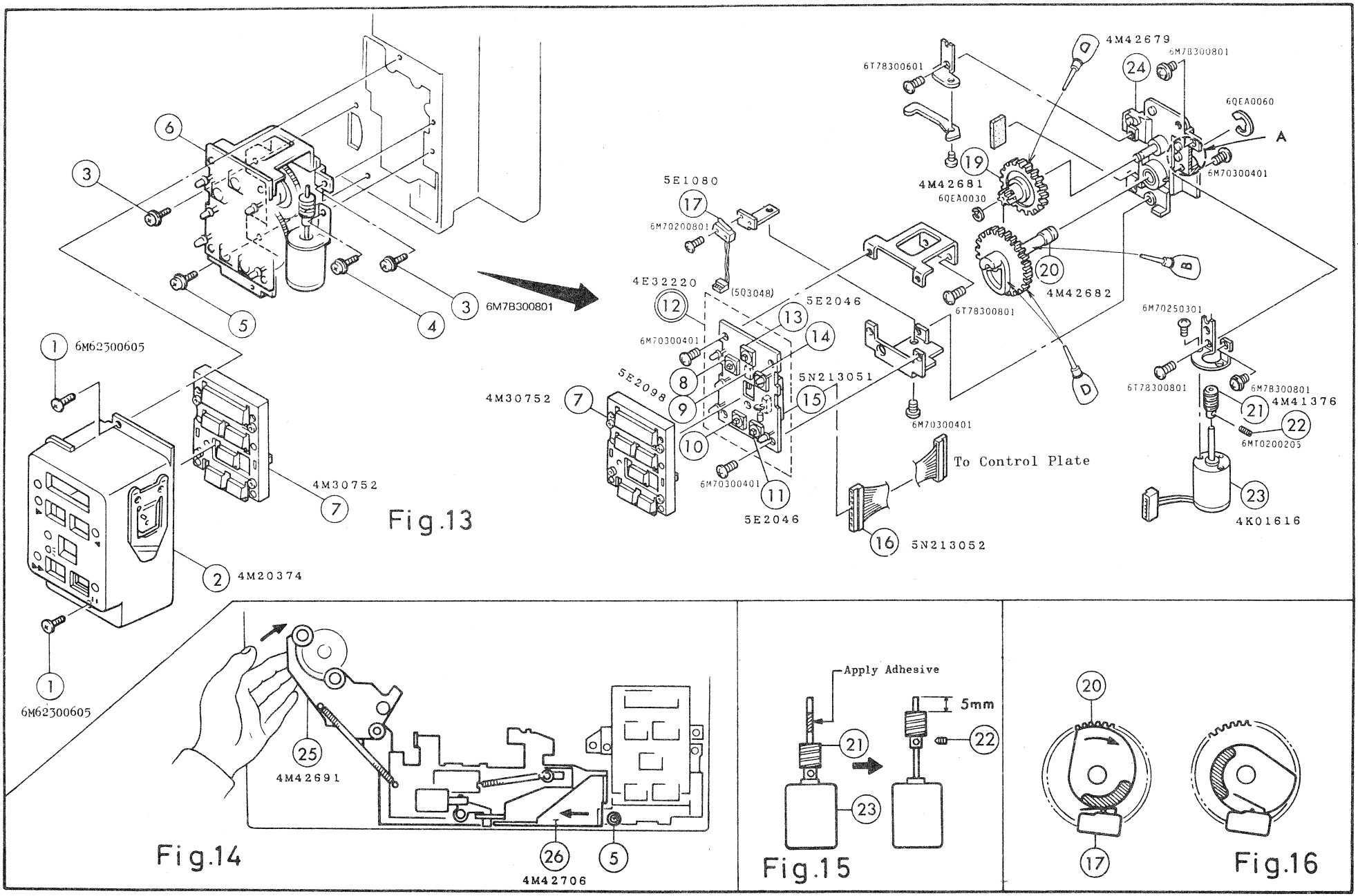
Trouble symptom	Cause
Self-loading mechanism fails to function (motor does not rotate).	Defective ⑧ or inadequate fitting position.
Failure in upkeeping of self-loading state (i.e. the loop former assy can not be locked.)	Disconnection of ㉕
Self-loading mechanism continues operating.	Inadequate fitting position of ⑧, defective ⑥
Auto stop does not activate at self-loading.	Defective ⑨ or inadequate fitting position
Auto stop does not activate at forward/reverse projection.	Defective ⑨ or inadequate fitting position
Scratch (flaw) of film	Uneven rotation of ⑩, ⑪, ⑯ and ⑰, flaw and abrasion of ⑬

Disassembly

1. Remove the back cover.
2. Take out ⑤ from the terminal plate at the back of the built-in speaker.
3. Remove ①, and then ② by rotating in the direction of arrow mark.
4. Unscrew 2 pieces of screws ④, and remeve ③ by spreading ⑬ downward.
5. Unscrew 1 piece of screw 28; ⑬ and ⑪ x 2 can then be removed simultaneously.
6. For further disassembly, refer to Fig. 10.

Reassembly

1. Carry out reassembly in the reverse order of disassembly, making sure that rollers and roller shafts are free from flaws, and that the rollers have smooth rotation.
2. Make sure that the lever ⑱ functions lightly and turns switch ⑨ to ON when film is loaded between ⑩ and ⑰, and returns to its original position only due to the dynamical stability of switch ⑨ when the film is removed. (See Fig.11.)
3. Firmly tighten the screw ①, and make sure that ② moves lightly.
4. Adjust the fitting position of switch ⑧ so that the switch turns to ON when ② is pushed down and to OFF when released. Futrhermore, when the presser ② is released, see to it that ② returns due to the tensional pressure of ⑥ till it touches the stopper ㉖ as A-part in Fig. 12. In case ② does not return, adjust by bending ⑥.
5. Install ㉔ connecting plunger ㉕ to ㉓ in the durection of arrow mark in Fig. 10.
6. Be careful so as not to mix up by mistake the 2 pieces of screws ④ and the screw ㉗.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4M20374
6M7B300801
5E1080
6M70200801
(5Q3048)
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6M70300401
5E2098
5N213051
5E2046
6M70300401
6M70300401
5N213052
To Control Plate
4M42679
6T78300601
6M7B300801
6QEA0060
A
4M42681
6QEA0030
6M70300401
4M42682
6T78300801
B
D
6M70250301
6T78300801
6M7B300801
4M41376
6MT0200205
4K01616
Fig.13
25
4M42691
26
5
4M42706
Fig.14
Apply Adhesive
5mm
21
22
23
Fig.15
20
17
Fig.16

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-2 Operation Switch Buttons Section
Mode switch ⑫, Cam motor assy ㉓

Hints for Trouble-shooting

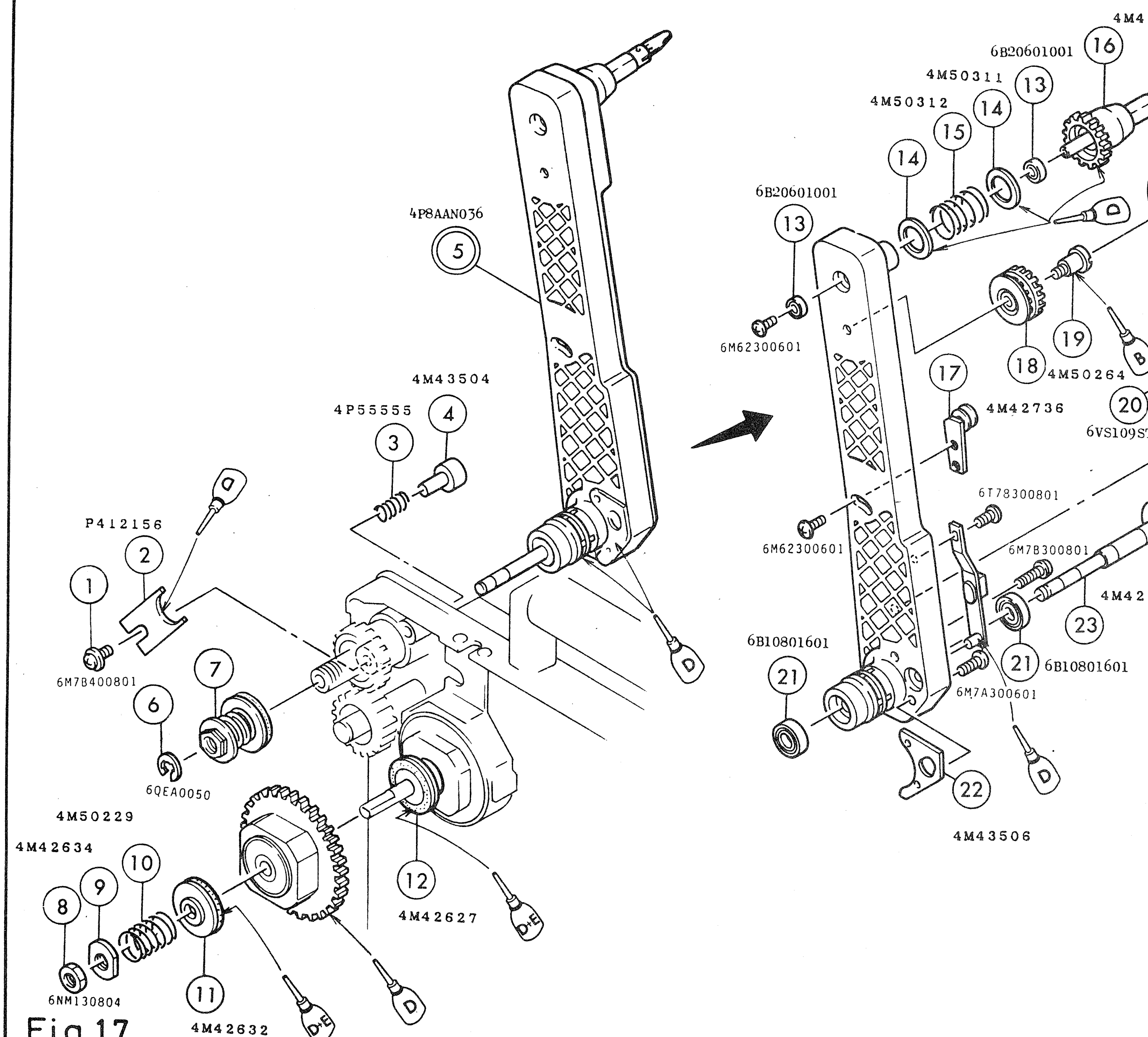
Trouble symptom	Cause
Failure in forward projection	Defective ⑭ or/and cord disconnection and inadequate contact of ⑮ and ⑯
Failure in reverse projection	Defective ⑧ or/and cord disconnection and inadequate contact of ⑮ and ⑯
Failure in high speed rewinding	Defective ⑩ or/and 〃
Failure in pause mechanism	Defective ⑪ or/and 〃
Lamp does not light up.	Defective ⑨ or/and 〃
Mechanism unit does not set to projection.	Defective ㉓ or/and 〃
Cam motor ㉓ does not stop.	Defective ⑰ and inadequate fitting position

Disassembly

1. Remove ② by unscrewing 2 pieces of screws ①.
2. Pull out connector ⑯.
3. Unscrew 2 pieces of screws ③ as well as screw ④.
4. Lift ㉕ up with your finger as shown in Fig. 14, and move link (1) ㉖ to projecting position, then unscrew the screw ⑤ to remove ⑥.
5. For further disassembly refer to Fig. 13.

Reassembly

1. Carry out reassembly in the rverse order of disassembly, making sure that the gear units ⑲ and ⑳, cam units and shafts have no scratches (flaws), burrs, etc. and have light and smooth rotation.
2. When replacing the cam motor ㉓, ㉑ must be attached anew to the new cam motor. Since the ㉑ is attached to the shaft of ㉓ by means of adhesive (lock tight) and screw ㉒, remove the ㉑ by loosening the screw ㉒ and melting the adhesive by applying heat. For attaching ㉑ anew, apply adhesive to the shaft of ㉓ with the ㉑ kept at lowered position as shown in the left-hand-side of Fig. 15, then raise the ㉑ to the position shown in the right-hand-side of Fig. 15, and tihgten the screw ㉒ firmly after applying screw lock.
3. Install the switch ⑰ so that it turns to ON/OFF due to the cam face ⑳ marked with oblique line in Fig. 16.
4. When inserting ⑥ into the base frame, see to it that the A-part of ㉔ is closely contacted with the base frame.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4M50311
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4M50312
14
15
14
6M62300601
6B20601001
13
4P8AAN036
5
6M62300601
19
18
4M50264
17
4M42736
20
6VS109STS
6T7830080
6WB32003BG
4M43504
4P55555
4
3
6T78300801
6M62300601
6M7B300801
P412156
2
1
4M42737
23
6B10801601
21
21
6B10801601
6M7B400801
7
6
6M7A300601
6QEA0050
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9
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12
4M42627
11
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4M42632

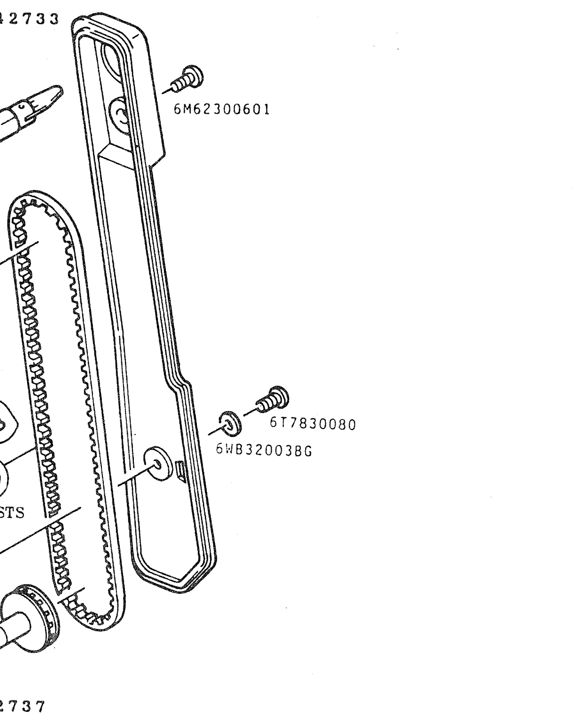


Fig.17

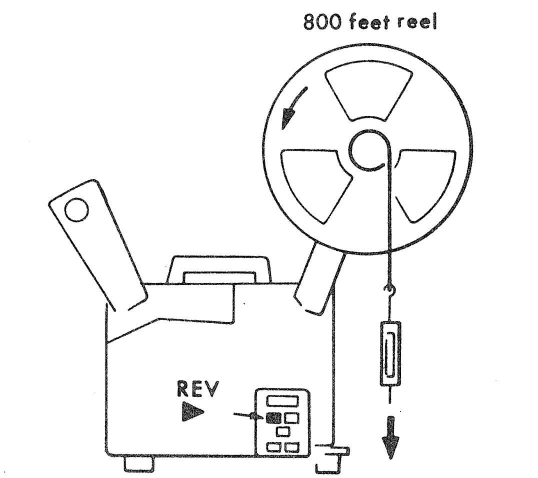

800 feet reel
REV

Fig.18

Ⅱ-2-3 Film Take-up and Rewinding Section

Rewind arm assy ⑤

Hints for Trouble-shooting.

Trouble symptom	Cause
Failure in rewinding	Weak tension of ⑩, broken gear units ⑯ and ⑱
Rewind arm can not be fixed	Worn-out ④ and ㉒
Film droops at forward projection	Inadequate tension of ⑳, excessively weak tension of ⑮)

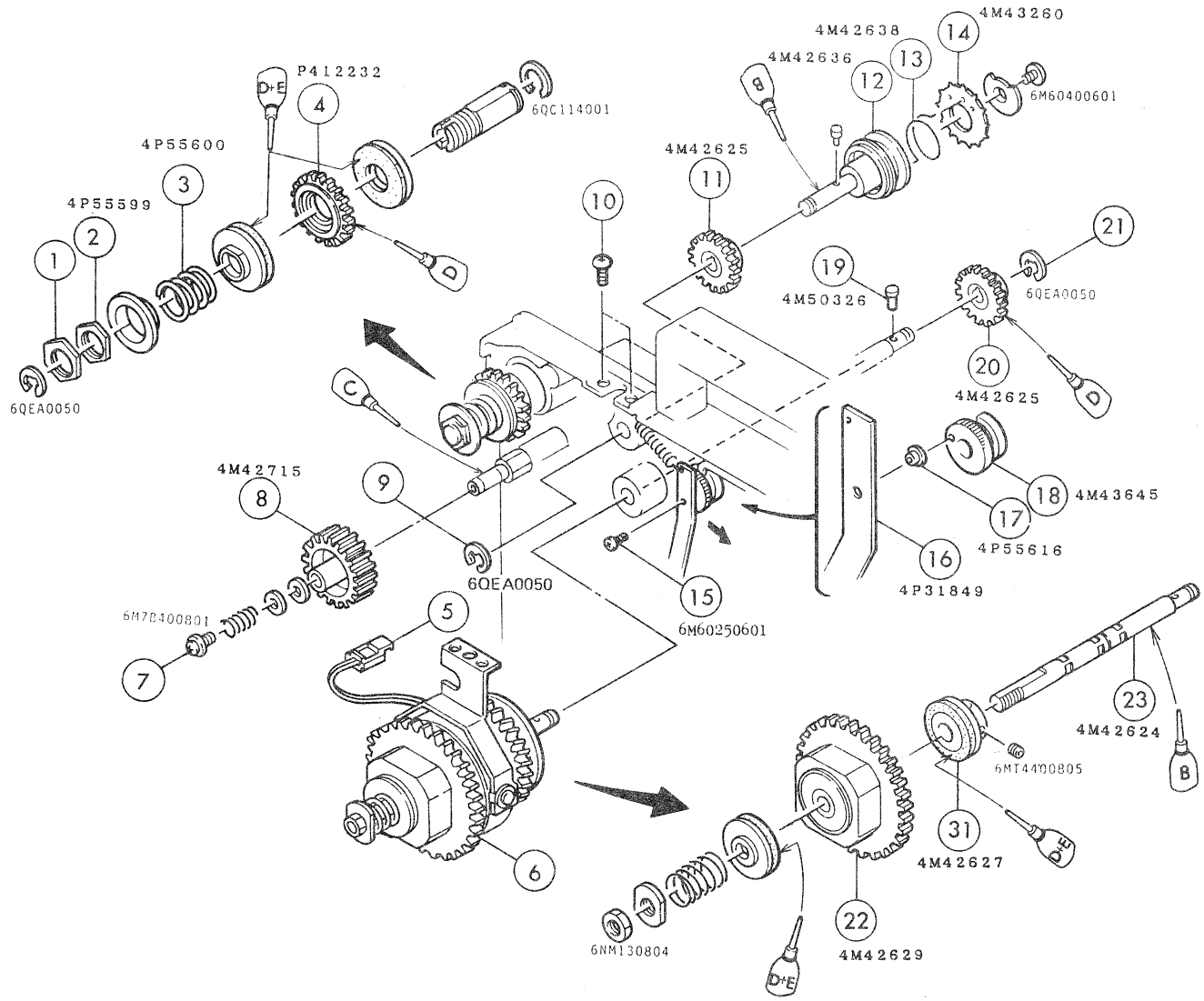
Disassembly

1. Remove the back cover.
2. Remove the film thread slot section. (Refer to page 32.)
3. Remeve the E ring ⑥ and take out ⑦.
4. Remove ② by unscrewing the screw ①, and then take out ⑤. (Here, take care since ③ and ④ may fly out.)
5. For further disassembly refer to Fig. 17.

Reassembly

1. Carry out reassembly in the reverse order of disassembly.
2. Disengage the belt ⑳ to make sure that ㉓ has even and smooth rotation. Change the bearing ㉑ if there is unevenness in rotation. Confirm ⑯ alse in the same manner.
3. Since ④ inserts into the dent ㉒ to fix ⑤ at projecting position, be sure to replace ④ and ㉒ when they get worn out.
4. Adjust the tension of ⑳ at fitting position of ⑰ so that the film may not droop when the projector is stopped at or during forward projection. The spring ⑮ is also for preventing the film from drooping.
5. Measure the rewinding tension.
   Measuring method: Draw the spring balancer (P048) in the direction of arrow mark at reverse projection state, referring to Fig. 18.
   Permissible range: 200 ～300g
   Adjusting method: Adjust the tension of ⑩ by means of the tightness of ⑨, and fix ⑥ with ⑧ after the tension reaches the permissible range.

Caution: In order to prevent static electricity due to reel, film, etc., the reel →reel shaft →arm → base are electrically conduited in this machine by applying conductive paints to the inner side of take-up and rewind arms. Hence, confirm the conduity between reel shaft and base frame when replacing the arm (below 100 M Ω).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6QEA0050
4M42625
4M42715
6QEA0050
6M60250601
4M43645
4P55616
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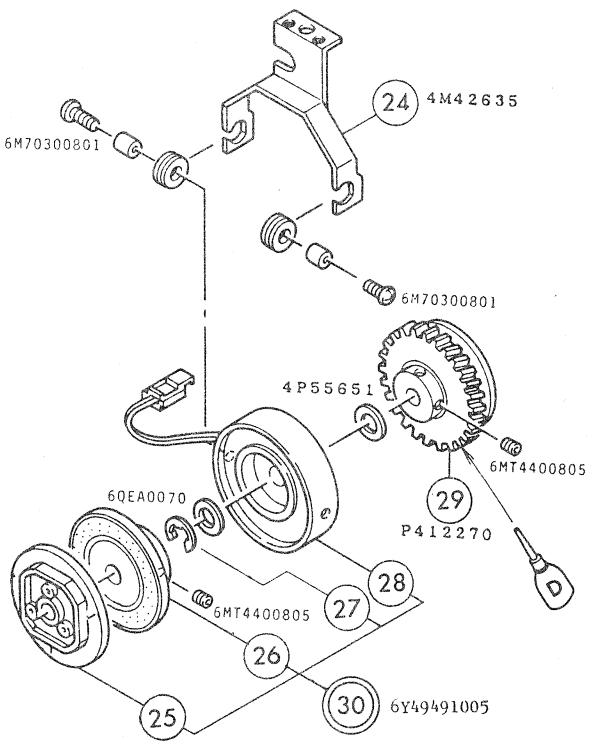
4M42629
D+E

Fig.19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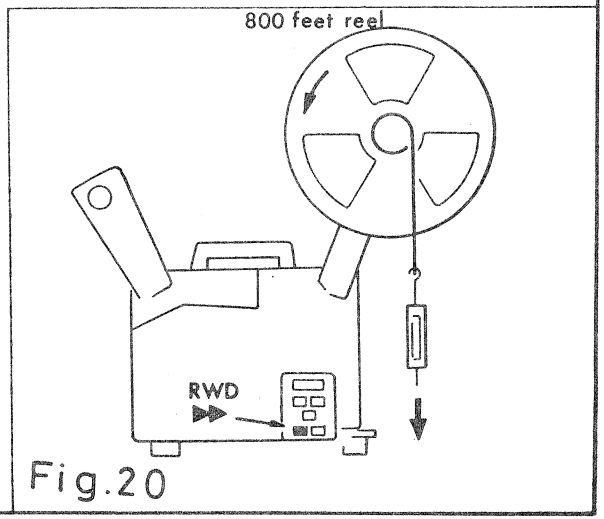

800 feet reel
RWD

Fig.20

Ⅱ-2-3 Film Take-up and Rewinding Section

Shaft reverse tension ⑥, Magnet clutch ㉚, First sprocket ⑫, Worm gear (1) assy ㉙

Hints for Trouble-shooting

Trouble symptom	Cause
Failure in high speed rewinding	Defective ㉚ and inadequate fitting position, weak tension of ③, breakage of ④, ⑧, ㉒ and ㉙.
Excessively large wow flutter	Abrasion of ⑪, ⑭, ⑳ and ㉙, defective fixing position of ㉔
Film scratch	Scratch and deformation of ⑫ and ⑭
Auto loop setter fails to function	Adrasion of rubber pulley unit ㉙ and adhesion of oil
Excessively large noise	Abrasion and breakage of gears

Disassembly

1. Remove the back cover.
2. Remove the film thread slot section. (Refer to page 32.)
3. Remove ⑦ and then ⑧ before taking out ⑤ from the terminal plate.
4. Remove the E ring ㉑ and then ⑳, before taking out ⑲.
5. Unscrew the 2 pieces of screws ⑩.
6. Unscrew the screw ⑮, and take out ⑥ from the base frame while shifting ⑯ in the direction of arrow mark . Here, carefully remove ⑰ located between ⑯ and ⑱ so as not to drop it.
7. For further disassembly refer to Fig. 19.

Reassembly

1. Make sure that the gears as well as ⑫ and ⑭ have no scratches, abrasion and deformation.
2. Replace the rubber pulley unit ㉙ if it is worn out or/and deformed, and wipe off the adhered oil.
3. Reassembly of⑥-- (a) Insert ㉗ into ㉓, and carry out reassembly, with this E ring as the base (standard).
   (b) See Fig. 19 to close fit ㉖ into ㉗.
   (c) Inesrt ㉕ and ㉘, and then fix ㉛ and ㉙ at a position leaving no back-lash and ensuring light rotation.
4. Carry out further reassembly in the reverse order of disassembly; when tightening the 2 pieces of screws ⑩, remove the film feeding assy parts (see page 4-2) and fix where ⑥ has the lightest rotation.
5. Measure the high speed rewinding tension.
   Measuting method: Draw the spring balancer (P048) in the direction of arrow mark referring to Fig. 20.
   Adjusting method: Adjust the tension of ③ by means of the tighthess of ②, and fix ② with ① after the tension reaches the permissible range.
   Permissible range: 800 ～1000g

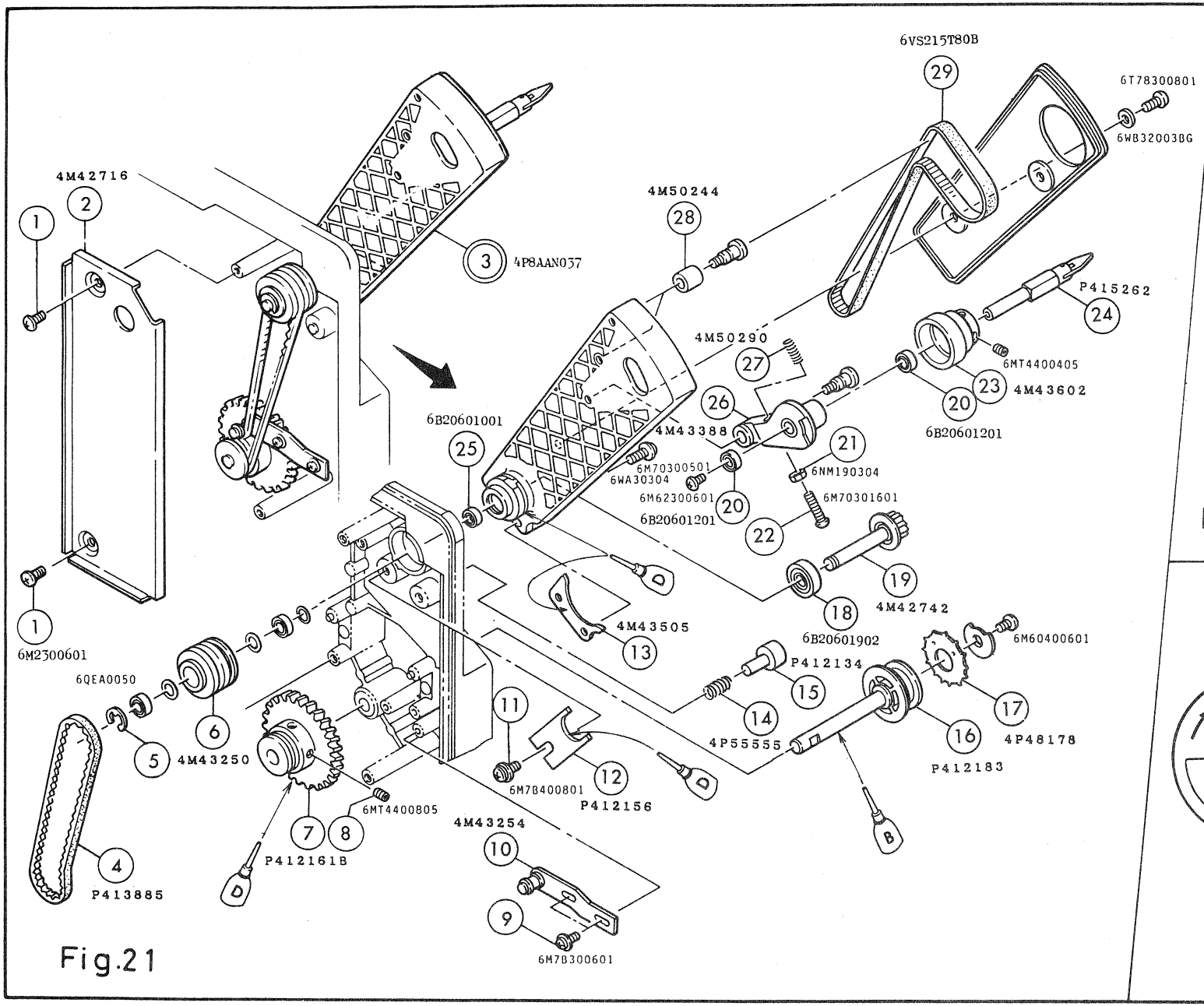


Fig.21

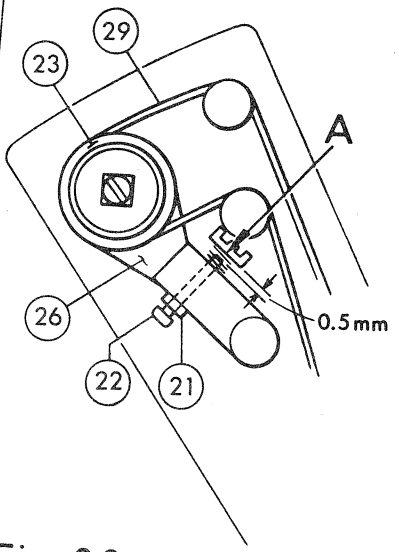


Fig.22

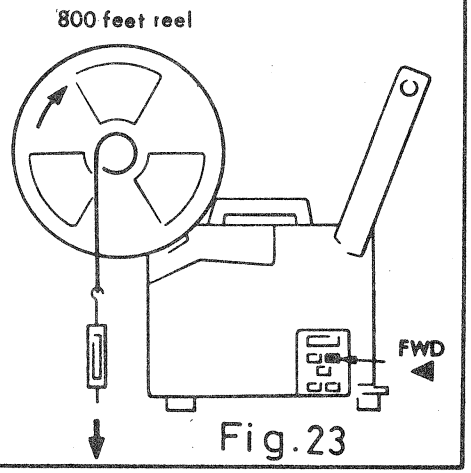


Fig.23

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-3 Film Take-up and Rewinding Section

Take-up arm assy ③, Second sprodet ⑯, Worm gear (2) assy ⑦

Hints for Trouble-shooting

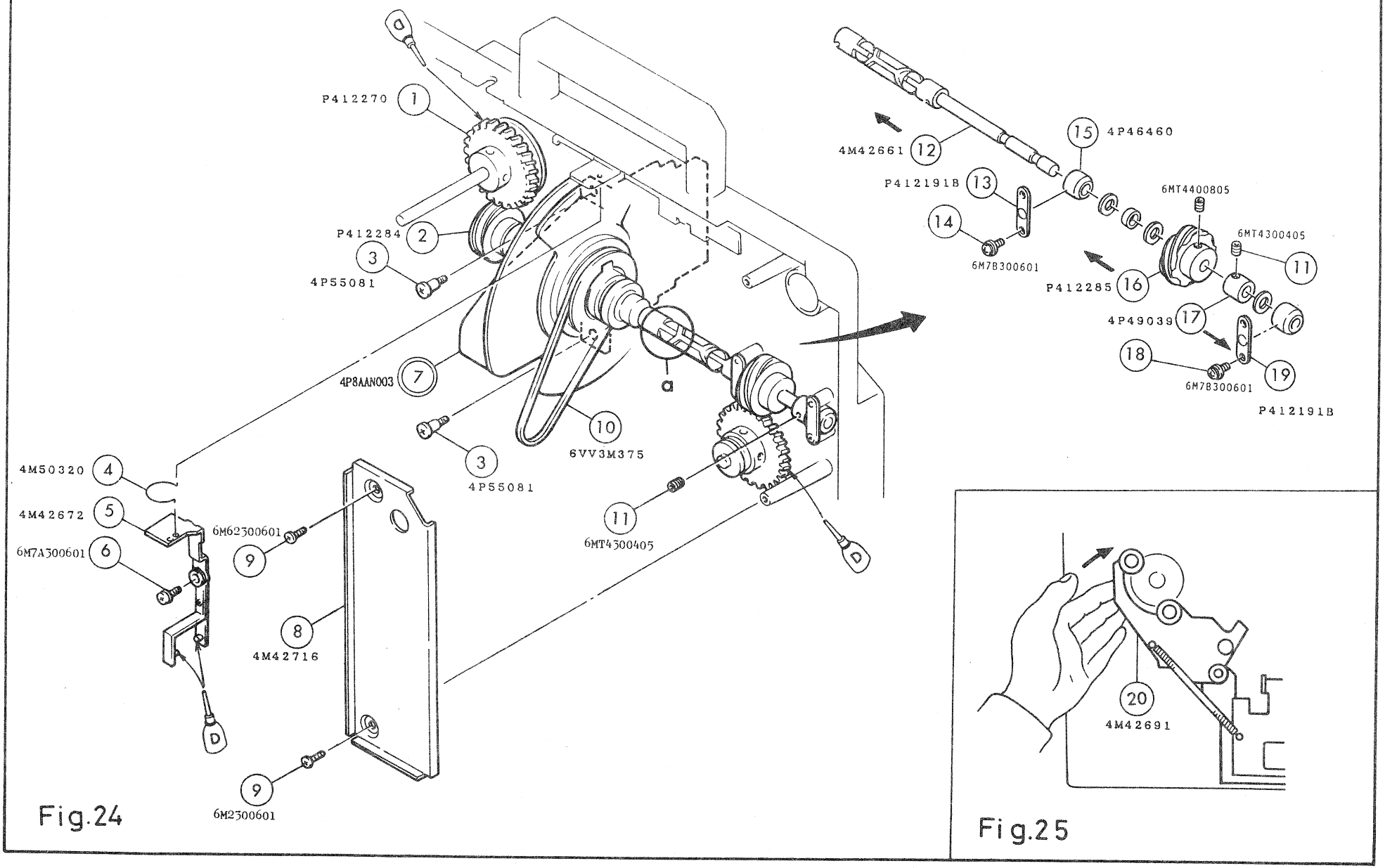
Trouble symptom	Cause
Failure in take-up	Weak tension of ㉗
Take-up arm can not be fixed	Abrasion of ⑬ and ⑮
Abnormal noise at high speed rewinding	inadequate fitting position of the screw㉒
Excessively large wow flutter	Deterioration of ④, and scratch and defomation of ⑦, ⑯ and ⑰.
Film scratch	Scratch and deformation of ⑯ and ⑰

Disassembly

1. Remove the back cover.
2. Unscrew the 2 pieces of screws ① and remove ②.
3. Loosen the 2 pieces of screws ⑨, shift ⑩ sidewise, and disengage the belt ④.
4. Remove the E ring ⑤, and take out ⑥.
5. Unscrew the screw ⑪, and remove ⑫ to take out ③, taking care so as not to drop ⑭ and ⑮.
6. Loosen the 2 pieces of screws ⑧, and remove ⑦ to take out ⑯.
7. For further disassembly refer to Fig. 21.

Reassembly

1. Install ㉔, ㉓ and ㉖ after confirming that the pulley ㉓ face has no scratch, and make sure that the rotation is even and light. In case the rotation is heavy or/and uneven, replace the bearing ⑳. Similarly check and replace, if necessary, the bearings ⑱ and ㉕ if ⑲ has abnormal rotation.
2. Wipe off the oil adhered to the belt ④, and replace the belt if scratched.
3. Make sure that there are no scratches, abrasion and deformation in ⑦, ⑯ and ⑰.
4. Cotrol the movement of ㉗ so that the inner surfaces of the belt ㉙ may not come in contact with each other at high speed rewinding. Tighten ㉒ and fix with the nut ㉑ leaving a clearance of 0.5mm between [A] section and end of screw ㉒ as shown in Fig. ㉒, with the belt ㉙ in engaged state.
5. Measure the take-up tension.
   Measuring method: Draw the bar spring balancer (C067) in the direction of arrow mark, referring to Fig. 23.
   Permissible range: 100 ～150g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P412284
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7
3
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10
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11
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a
4M50320
4
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5
6M7A300601
6
6M62300601
9
8
4M42716
9
6M2300601
D
4M42661
12
P412191B
13
14
6M7B300601
15
4P46460
6MT4400805
6MT4300405
11
P412285
16
4P49039
17
18
6M7B300601
19
P412191B
20
4M42691

Fig.24

Fig.25

Ⅱ-2-4 Intermittent Film Feeding Section
Claw section frame assy ⑦, Worm (2) ⑯

Hints for Trouble-shooting.

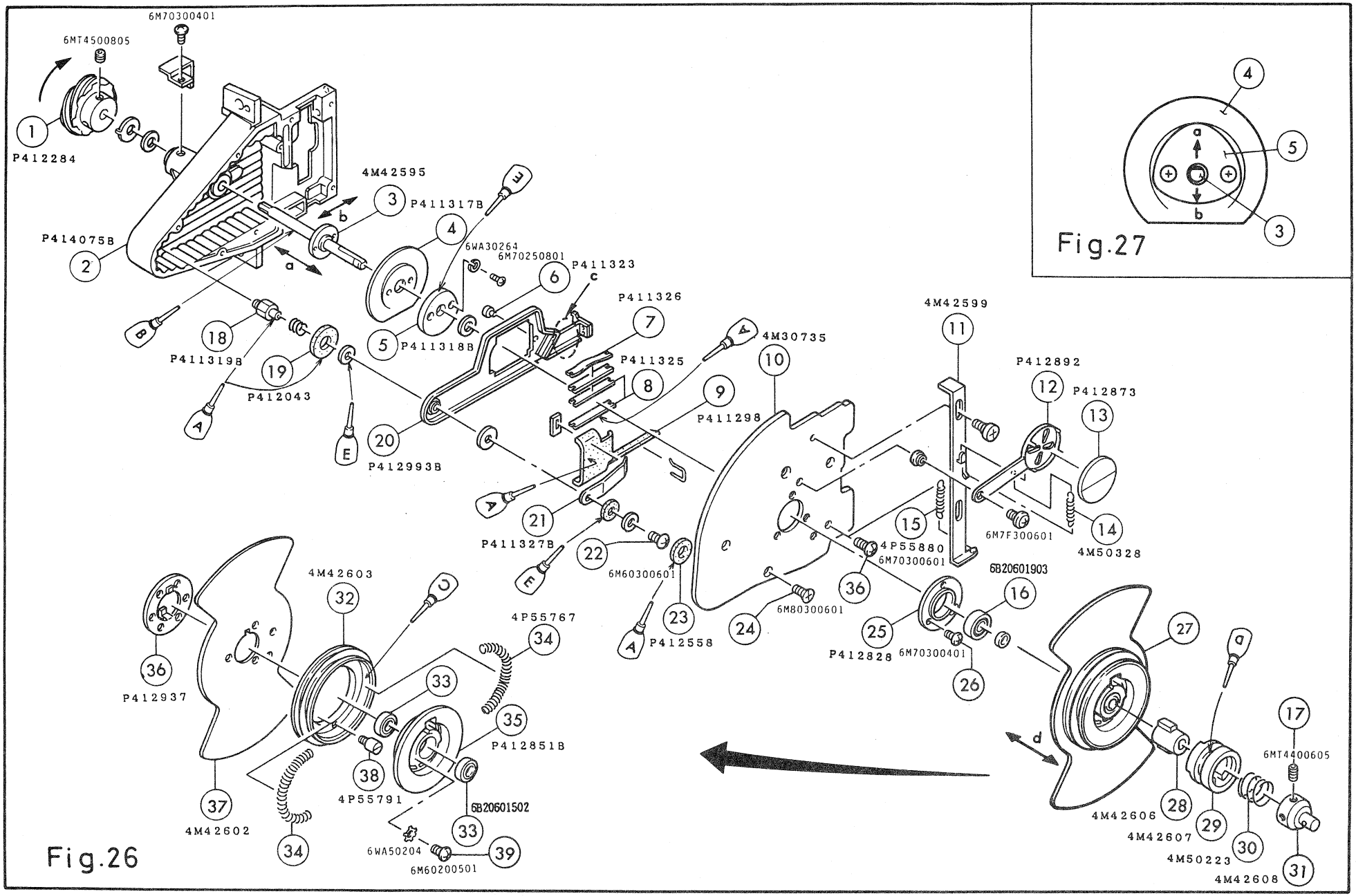
Trouble symptom	Cause
Unstable projection speed	Inadequate fitting position of ⑦, deterioration of ⑩ and adhesion of oil
Excessively large wow flutter	Scratch and abrasion of ⑯, inadequate fitting position of ⑦

Disassembly

1. Remove the back cover, and then the 12 MF condenser (polyest film 12 MF/220 V) installed at the top of the motor.
2. Unscrew the 2 pieces of screws ⑨, and remeove ⑧.
3. Remove ⑤ by unscrewing the screw ⑥, taking care so as not to drop ④.
4. Remove ⑫ at a section by loosening the 2 pieces of screws ⑪.
5. Unscrew the 2 pieces of screws ③.
6. Take out ⑦ by lifting up the lever second sprocket ⑳ in Fig. 25 to the projecting position. The claw section frame assy ⑦ can now be removed.
7. Remove ⑬ and ⑲ by unscrewing ⑭ and ⑱ in order to remove worm (2) ⑯.
   Note: When unscrewing ⑭, slightly shift the fitting position of the relay installed on the power transformer.

Reassembly

1. Carry out reassembly in the reverse order of disassembly.
2. Engage the belt ⑩, and then install ⑦, providing back-lash in ① and ②.
3. Insert ④ after installing ⑤ to the base.
4. Fit ⑫ into the joint of ⑦, and tighten ⑪ while pressing ⑰ in the direction of arrow mark.
5. Install ⑯ pressing it in the direction of arrow mark so as to leave back-lash between ⑮ and ⑯.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6MT4500805
1
P412284
P414075B
2
4M42595
3
P411317B
4
6WA30264
6M70250801
P411323
6
c
P411326
7
P411325
8
4M30735
10
9
P411298
5
P411318B
18
P411319B
19
P412043
A
B
E
20
P412993B
21
P411327B
22
6M60300601
23
P412558
24
6M80300601
4M42599
11
P412892
12
P412873
13
15
6M7F300601
14
4M50328
4P55880
6M70300601
36
6B20601903
16
25
P412828
6M70300401
26
27
a
d
17
6MT4400605
28
4M42606
29
4M42607
30
4M50223
31
4M42608
4M42603
32
D
4P55767
34
33
35
P412851B
38
4P55791
6B20601502
33
6WA50204
6M60200501
39
34
37
4M42602
36
P412937
Fig.26

4
5
a
b
3
Fig.27

Ⅱ-2-4 Intermittent Film Feeding Section

Disassembly and Adjustment of Claw Section Frame Assy Hints for Trouble-shooting

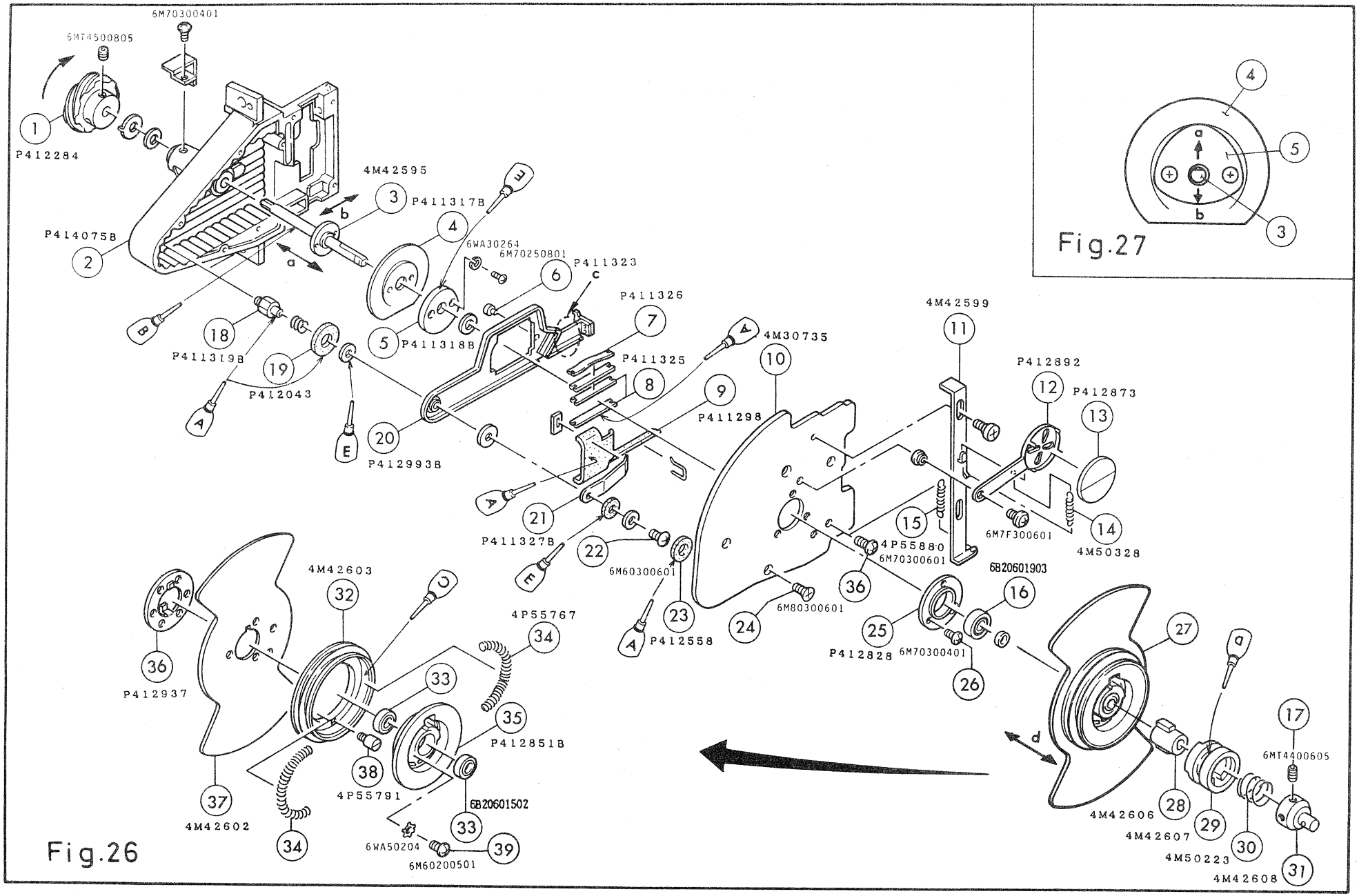
Trouble symptom	Cause
Screen turbulence (bouncing)	Inadequate fitting position of ①, abrasion of ⑦, ⑧, ⑳, ㉑ and bearing metal ②
Screen turbulence (back feed)	Excessively long lead allowance of claw ⑳, abrasion of ⑥
Film shifting	Excessively short lead allowance of claw ⑳, abrasion of bearing ⑳
Screen running (tailing of image)	Inadequate fitting position of ㊲
Unstable projection speed	Inadequate fitting position of ①, inadequate fitting position of ㉕
Excessively large noise at film feeding	Scratch in ① and inadequate fitting position of ①, abrasion of ⑦ and ⑧, scratches in ④ and ⑤, run out of grease and oil at each part, abrasion of ⑯ and ㉝.
STILL-RUN change-over cannot be made or is not smooth	Scratches and deformation of ㉘ and ㉙, malfunction of ⑪
Film gets burned at STILL projection	Breakage and malfunction of ⑬

Disassembly

1. Loosen the 2 pieces of screws ⑰, remove ㉛, and successively take (pull) out ㉚, ㉙, ㉘ and ㉗.
2. Remove ⑩ by unscrewing the 4 pieces of screws ㉔, 3 pieces of ㉖ and the screw ㉔.
3. For further disassembly refer to Fig. ㉖.

Reassembly: Confirm the following point 1 ～5 before carrying out reassembly.

1. Make sure that the bearing metal ② is not worn out. Replace ② if it is worn out creating back-lash in the direction of b-axis between ② and ③.
2. Make sure that the cam faces ④ and ⑤ have no scratches; replace the cam face having scratches.
3. Make sure that ⑥ is not worn out. If worn out, remove it from ⑳ and replace with a new one using quick set adhesives (ALPHA CYANDACRYLATE QUICK SET ADHESIVE)
4. Make sure that the bearings ⑱ and ⑳ are not worn out; replace if the bearing is worn out.
5. Make sure that the tooth surface of ① is not worn out or scratched; replace ① if the tooth surface is worn out or scratched.
6. Install ① so that ③ has no back-lash in the direction of a-axis and has smooth rotation.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1
P412284
P414075B
2
4M42595
3
P411317B
4
6WA30264
6M70250801
P411323
6
P411326
7
5
P411318B
18
P411319B
19
P412043
20
P412993B
P411325
8
9
P411298
4M30735
10
4M42599
11
P412892
12
P412873
13
14
4M50328
15
6M7F300601
4P55880
6M70300601
36
6M80300601
24
6M60300601
22
23
P412558
21
P411327B
6B20601903
16
25
P412828
6M70300401
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4M42606
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4M42607
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4M50223
30
4M42608
31
6MT4400605
17
4M42603
32
4P55767
34
33
35
P412851B
38
4P55791
6B20601502
33
6WA50204
6M60200501
39
34
37
4M42602
36
P412937
a
b
c
d
A
B
E

Fig.26

4
5
a
b
3

Fig.27

7. Install ④ and ⑤ as shown in Fig. 27, taking care so that ⑤ may not face to wrong direction.
8. The back-lash, if between ⑤ and ⑧ may be attributed to worn-out ⑦ and ⑧: In such case, replace the ⑦ and ⑧.
9. Adjustment of protrudent length of claw tip: Adjust by bending C section of ⑳ so that the claw tip (lead) ⑳ has no inclination and extends out by 0.9 ～ 1.0mm from rail face of aperture plate.

Caution: It is desired that the triangle can ⑤ be soaked in silicon oil for one full day (24 hrs.) before replacing.

10. Adjustment of claw stroke
    Make sure that the stroke of ⑳ is such that it does not contact (touch) the film when the claw tip comes out of the perforation after the film is set on the aperture plate and fed by turning ① in the direction of arrow mark, and also when the claw tip is entering the next perforation. Adjust the stroke by shifting ⑤ in Fig. 27 to [b] direction if the stroke is small, and to [a] direction if the stroke is large. (The shaft hole of ⑤ is approximately 0.05mm larger than shaft aperture of ③.)
11. When installing ㉕ and ⑯, rotate ① and fix the 3 pieces of screws ㉖ where the rotation is lightest.
12. Make sure that ⑫ covers the aperture mask when lever ⑪ is pressed down, and that ⑪ and ⑫ return to their original position due to the tension of ⑭ and ⑮ when the lever ⑪ is released.
13. Replace ㉘ if it has scratches or burrs since ㉔ slides over ㉘.
14. The 2 pieces of springs ㉞ are for buffing the precipitous load on ㉙ and ㉟ at STILL-RUN change-over or/and at the start of projection.
15. Press ㉗ with ㉛ and tighten ⑰ so that ㉗ has no back-lash in [d] direction and has light rotation.
16. Adjustment for screen running (adjustment of shutter ㊲)
    Adjust by loosening the screw ㉙ and then shifting ㉟ and ㊲, as shown in Fig. 28, so that the sutter ㊲ blocks the aperture mask (shuts off the light) while the film is being fed by the claw ⑳.

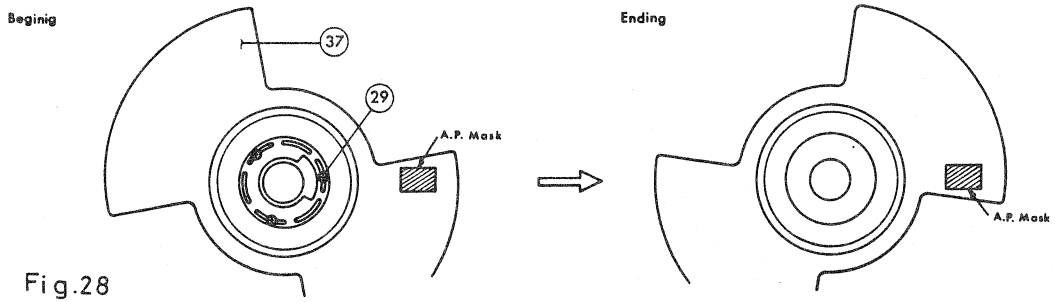


Fig.28

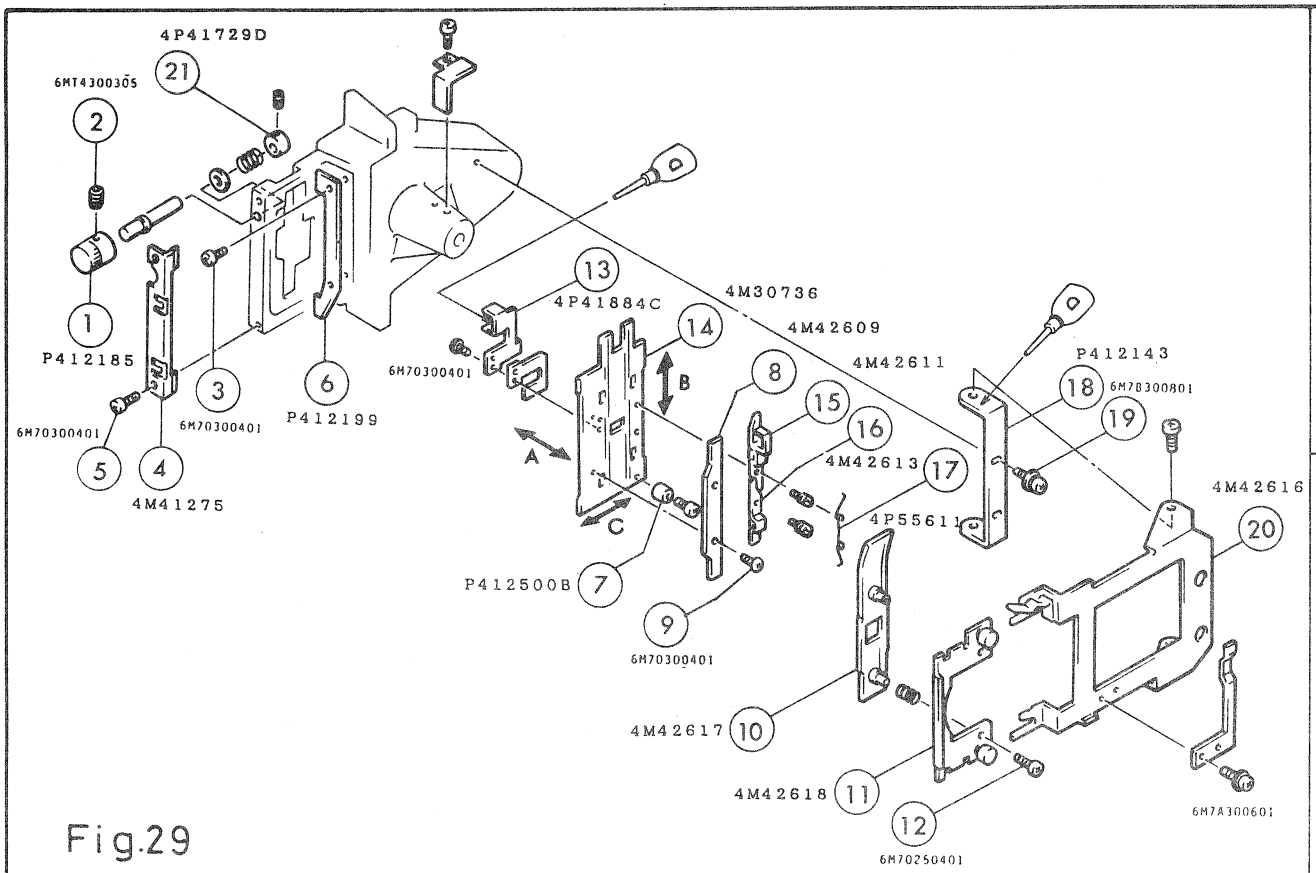


Fig.29

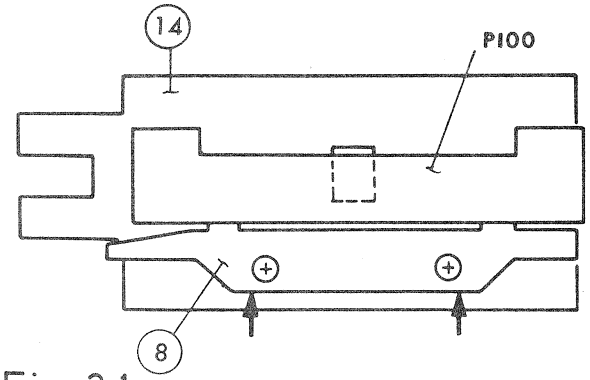


Fig.31

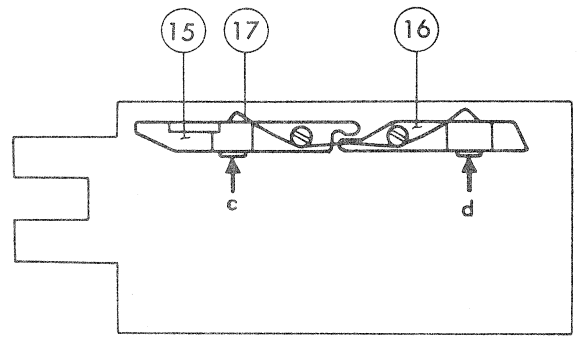


Fig.32

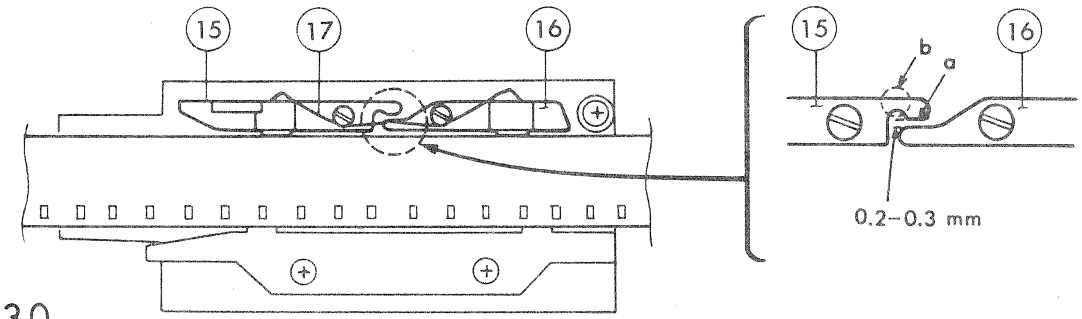


Fig.30

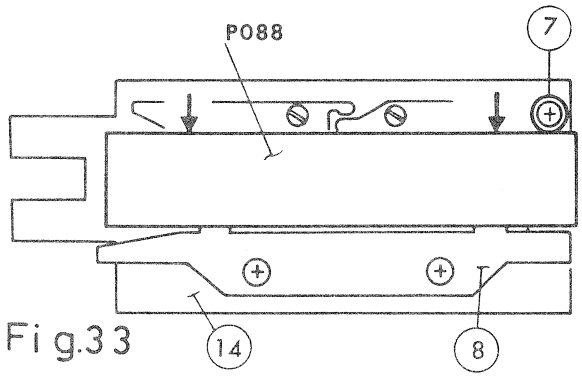


Fig.33

Ⅱ-2-4 Intermittent Film Feeding Section
Aperture plate⑭, Pressure plate⑩

Hints for Troubleshooting.

Troubly symptom	Cause
Screen turbulence (transverse turbulence)	Inadequate tension of ⑰, Inadequate fitting position of⑦ ⑧, ⑮ and ⑯
Screen trubulence (bouncing)	Abrasion of ⑧, ⑮ and ⑯, malfunction of ⑩
Film gets caught during self-loading	Inadequate fitting position of ⑳
Screen gets chipped	Inadequate fitting position of ⑧ and ⑩
Exposure	Inadequate fitting position of ⑩
Scratch of film	Scratches and abrasion of ⑩ and ⑭
Masking adjustment can not be made	Inadequate fitting position of ⑬

Disassembly

1. Carry out disassembly referring to Fig. 29.

Reassembly

1. Replace ⑭ if it has scratch or/and abrasion
2. Apply the film guide aperture installing gauge (P 100) to ⑭, as shown in Fig. 31, and press ⑧ in the direction of arrow mark to install it parallel to the rail ⑭.
3. Install ⑮, ⑯and ⑰ to ⑭, and apply the film to make sure that the clearance between ⑮ and ⑯ is 0.2 ～ 0.3mm as shown in Fig. 30. Grind off a section of ⑮ if the clearance is small, and bend by applying heat to [b] section ⑮ if the clearance is large.
4. Measure the tension of ⑰.
   Measuring method: Measure the tension at [c] and [d] points by using a dial tension gauge (063) as shown in Fig. 32. When measuring the tension at [c] point, keep ⑯ pressed in [d] direction in order to avoid the interference from ⑯.
   Permissible range: 45～55g
   Adjusting method: Carry out adjustment by bending ⑰.
5. Apply fixed guide installing gauge (P088) to ⑭, as shown in Fig. 33, and lightly press in the direction of arrow mark to fit ⑦ closely to the gauge.

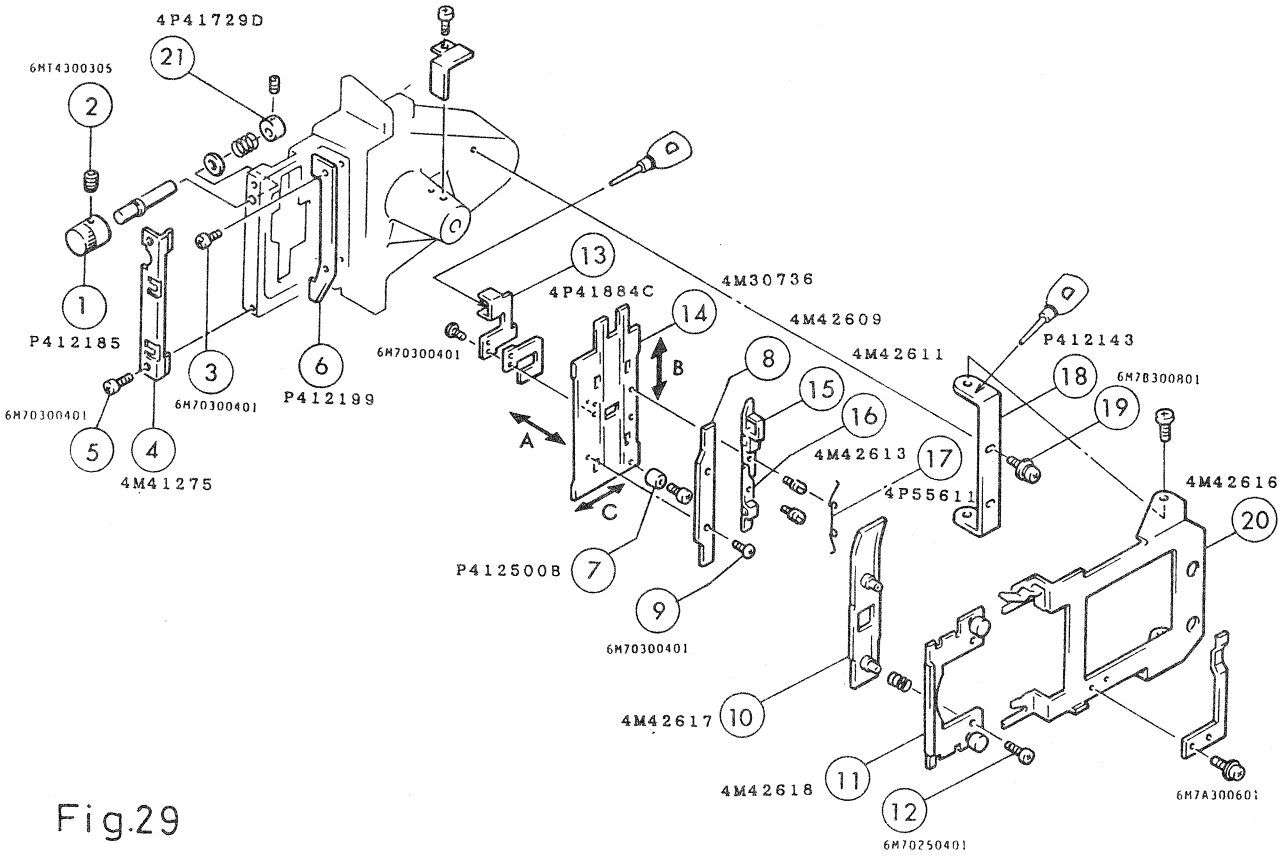


Fig.29

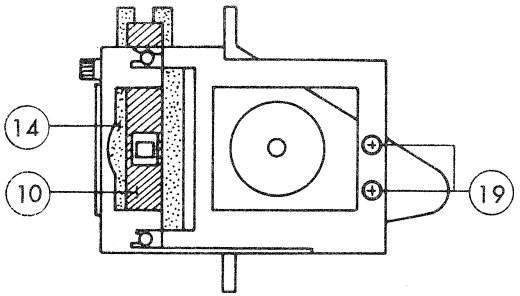


Fig.35

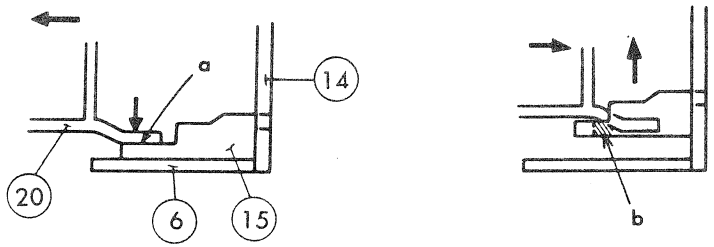


Fig.34

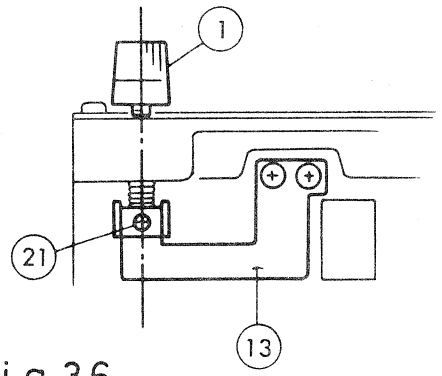


Fig.36

Ⅱ-2-4 Intermittent Film Feeding Section
Aperture plate ⑭, Pressure plate ⑩

6. Install ⑭ to the frame by means of ④ and ⑥, seeing to it that ⑭ has no back-lash in the arrow mark [A] and [C] directions in Fig. 14 and that it moves smoothly in the arrow mark [B] direction on turning the knob ①.
7. Adjust by beans of 2 pieces of screws ⑲ so that the masks ⑩ and ⑭ are set in the positions shown in Fig. 35, and after installing them to the main body, set the machine to PROJECTION to confirm that the screen has no chipping or/and exposure.
8. Since the film at self-loading is fed by first sprocket and accordingly, the feeding claw of film feeding section is not used, see to it that ⑩ and ⑭ in Fig. 29 are not closely contacted and that ⑮ and ⑯ are also open. Here,adjust the opening as well as the timing of opening of ⑮ and ⑯. Make adjustment by bending a section so that ⑮ gets pressed by ⑥ just before the a section of ⑳ comes off ⑮ when ⑳ is opened, and when ⑳ ia closed there is a gap in [b] section to keep ⑳ and ⑮ apart as shown in Fig. 34.
9. Masking adjustment: Adjustment is made by correcting the deflection between film perforation and screen or by correcting the gap difference between forward/reverse feeding claw and perforation, and the correction is made in two ways: feeding claw moving system and aperture plate moving system. In this machine, however, the aperture moving system is adopted for correction.
   a) Install ① to an appropriate position so that the stopper of the knob ① and the fitting screw ㉑ are coaxially located as shown in Fig. 36.
   b) Make sure that there is no back-lash in slots (grooves) ⑬ and ㉑ in Fig. 36. In case there is back-lash, correct by bending the slot.
   c) Next install to the main body, project the film (P086), and adjust the upper and lower masking.
   d) Adjust by shifting the position of ⑬ in Fig. 36 so that the second line of the target outermost circle of the next coma is visible when the masking at forward projection is set all the way down to the lower side.

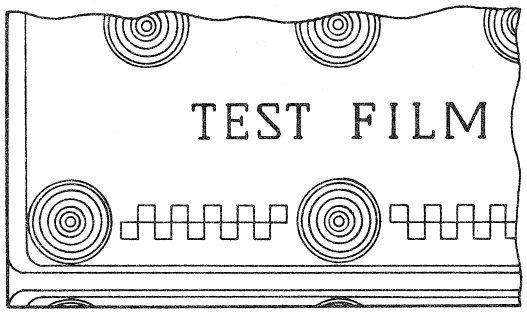
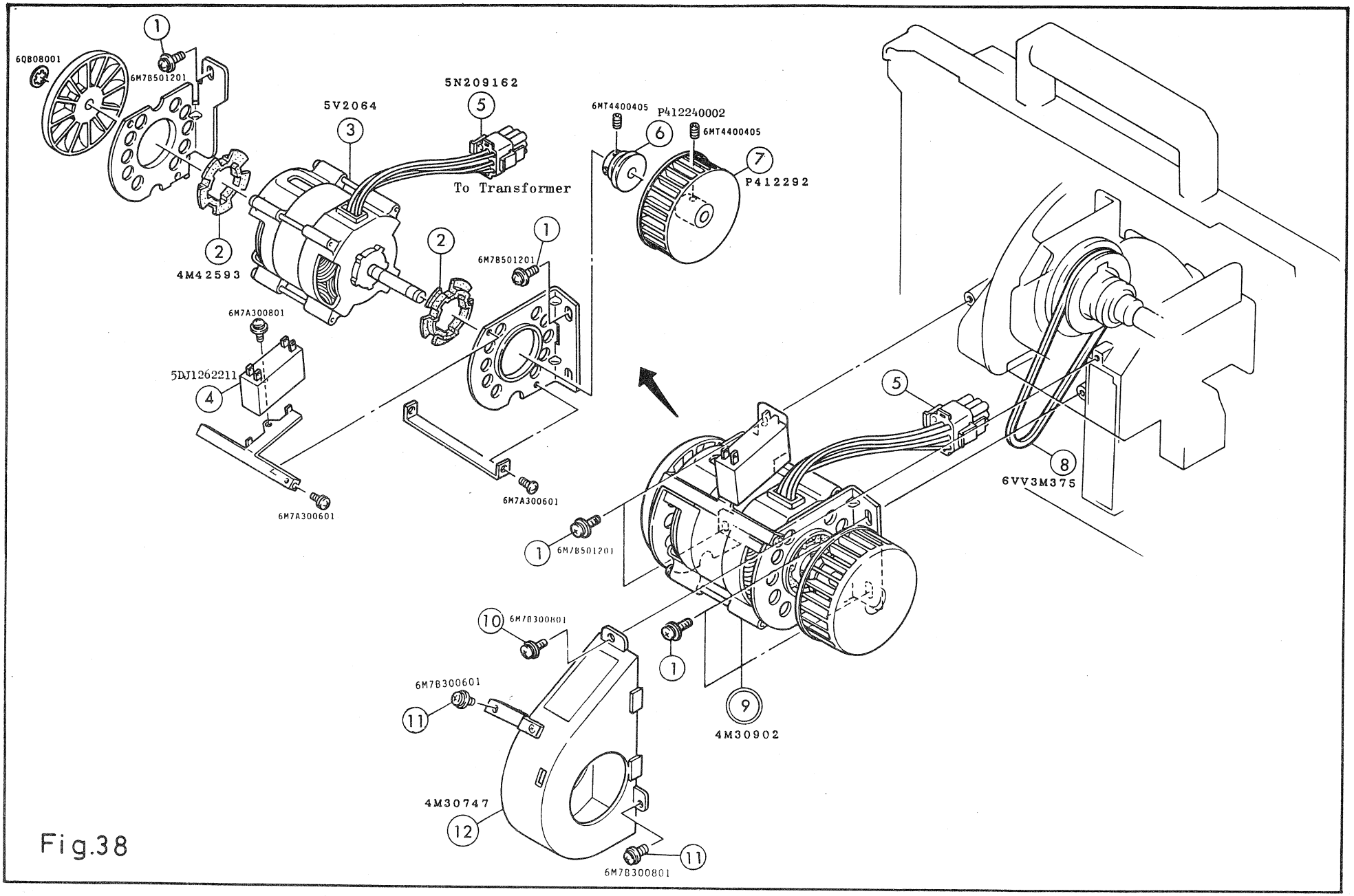


Fig.37


6Q808001
6M7B501201
5N209162
5V2064
To Transformer
6MT4400405
P412240002
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P412292
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5DJ1262211
6M7A300601
6M7B501201
6M7A300601
6M7B501201
6VV3M375
6M7B300801
6M7B300601
4M30902
4M30747
6M7B300801

Fig.38

Ⅱ-2-5 Motor Section
Motor (1) assy ⑨ and Fan ⑦

Hints for Trouble-shooting: Refer to Hints for Trouble-shooting" of [ELECTRIC CIRCUIT in item Ⅲ]:

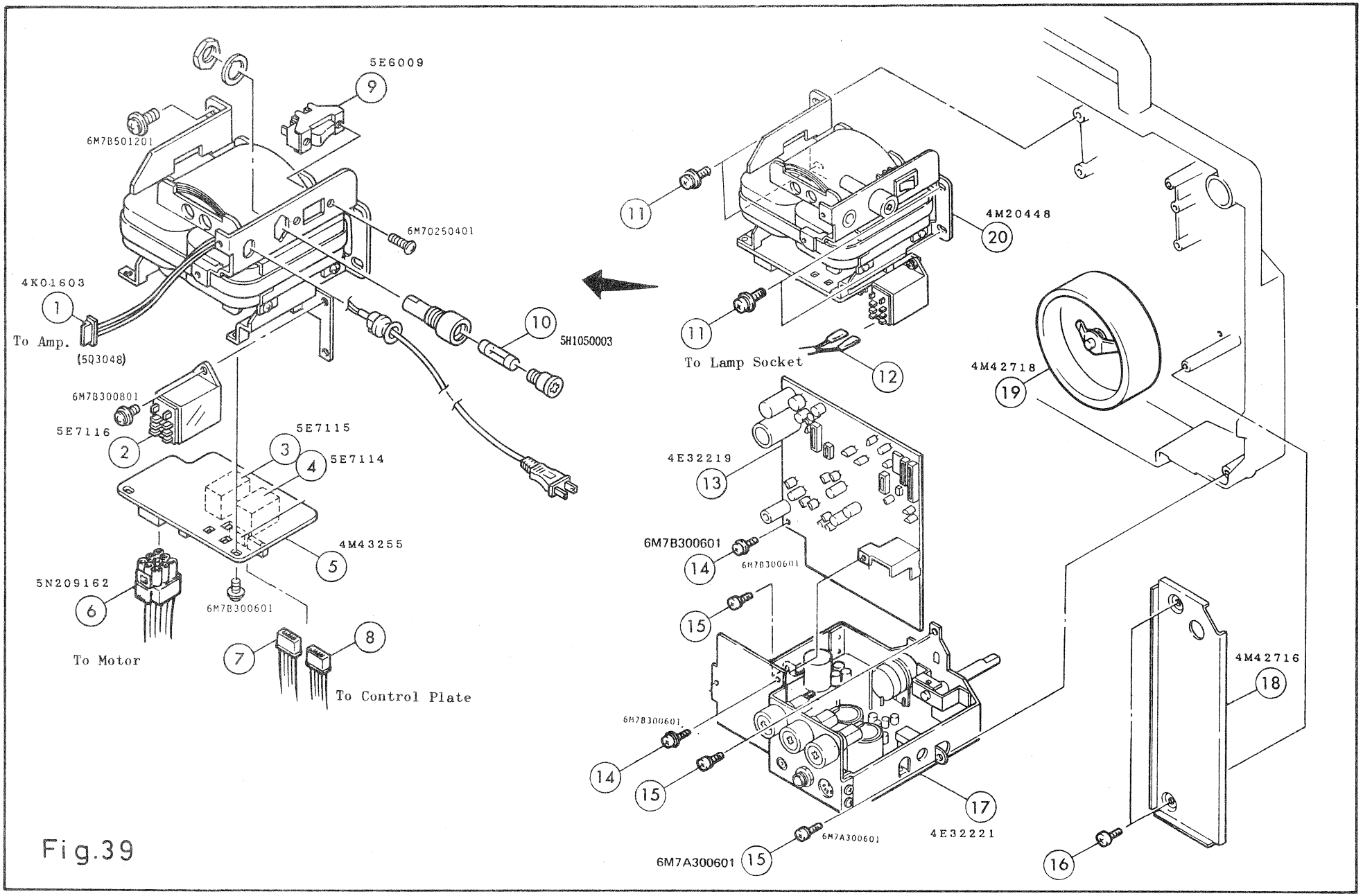
Trouble symptom	Cause
Motor fails to operate.	Defective ③ and ④, inadequate contact of ⑤
Unstable projection speed	Inadequate cleaning of ⑥ and ⑧
Abnormal noise	Deterioration of ② and breakage of ⑦

Disassembly

1. Remove the back cover.
2. Pull out ⑤ from transformer terminal plate.
3. Remove ⑫ by unscrewing 3 pieces of screws ⑩ and ⑪ x 2.
4. Remove ⑨ by unscrewing 4 pieces of screws ①.
5. For further disassembly, refer to Fig. 38.

Reassembly

1. Thoroughly wipe off the dusts such as oil, etc. from ⑥ and ⑧, and replace if ⑧ has cracks, etc.
2. Make sure that ② is not deteriorated.
3. Make sure that the fan ⑦ is not broken. (Replace the fan if even a single blade is missing or is broken.)
4. Temporarily tighten ⑥ and ⑦, engage ⑧, and install ⑨ to the base.
5. Rotate ⑦, and fix after making sure that it does not tiych the base.
6. Fix ⑥, making sure that there is no torsion (twist) in ⑧ and that ⑧ is at straight lines with shutter pulley.
7. Install ⑫, and insert ⑤.


5E6009
9
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4K01603
1
To Amp.
(5Q3048)
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6M7B300801
5E7116
2
5E7115
3
4
5E7114
4M43255
5
5N209162
6
6M7B300601
To Motor
7
8
To Control Plate
11
4M20448
20
11
To Lamp Socket
12
4M42718
19
4E32219
13
6M7B300601
14
6M7B300601
15
6M7B300601
14
15
17
4E32221
6M7A300601
15
6M7A300601
4M42716
18
16

Fig.39

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-6 Transformer and Amplifier Section
Transformer assy ⑳, Amplitier assy ⑰ and Control plate assy ⑬

Hints for Troubleshooting: Refer to ["ELECTRIC CIRCUIT" in item Ⅲ] for the description and trouble-shooting hints of control plate

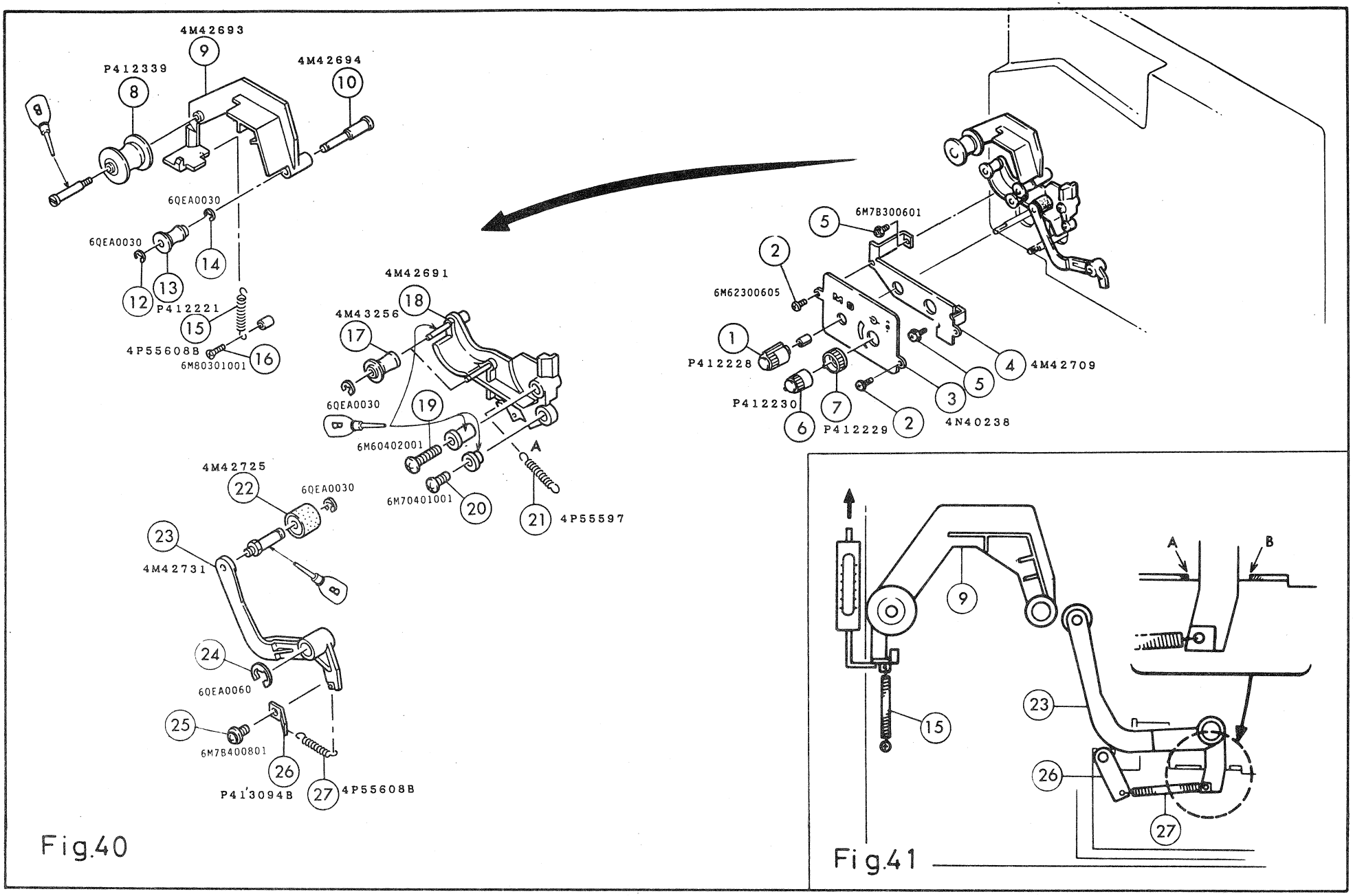
Trouble symptom	Cause
Failure in power supply	Disconnection of ⑩
Motor fails to operate.	Defective ④, Inadequate contact or/and cord disconnection of connectors ⑥ and ⑦
Motor does not change over from normal to reverse operation or vice versa.	Defective ③
Amplifier fails to function	Inadequate contact or/and cord disconnection of ①
Lamp does not light up	Defective ②, inadequate contact or/and cord disconnection of ⑫
Failure in change-over of lamp L-H	Defective ⑨
Control circuit fails to function	Inadequate contact or/and cord disconnection of ⑧

Disassembly

* Removing the amplifier ⑰ and control plate
1. Remove the back cover.
2. Remove ⑱ by unscrewing 2 pieces of screws ⑯.
3. Pull out the M-O change-over knob, amplifier double knobs (1) and (2).
4. Pull out the connectors 2P, 5P and 6P from the amplifier.
5. Pull out the connectors 2P, 3P,4P,8P and 13P from the control plate.
6. Pull out the connectors 5Pand 4P from ⑪ and 2 pieces of blue and white cords from relay ② on ⑪ and ② sides respectively
7. Remove ⑰ by unscrewing 3 pieces of screws ⑮.
8. Pull out 7P connectors on ⑬ side and 2P connector on ⑰ side, and unscrew 3 pieces of screws ⑭ in order to remove ⑬ from ⑰.

* Removing the transformer ⑳
1. Remove the back cover, and then ⑱ by unscrwing 2 pieces of screws ⑯.
2. Pull out ⑥, ⑦, ⑧ and ⑫.
3. Remove ⑳ by unscrewing 4 pieces of screws ⑪.

Reassenmbly
1. Carry out reassembly in the reverse order of disassembly, making sure the connectors have no defective contact and that the cords have no scratch or/and disconnection.
2. After installing ⑰, make sure that the cords do not touch the flywheel ⑲ and that the M-O change-over activates accurately.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9
P412339
8
4M42694
10
6QEA0030
6QEA0030
14
12
13
P412221
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4P55608B
6M80301001
16
4M42691
18
4M43256
17
6QEA0030
19
6M60402001
6M70401001
20
A
21
4P55597
4M42725
22
6QEA0030
23
4M42731
24
6QEA0060
25
6M7B400801
26
P413094B
27
4P55608B
6M7B300601
5
2
6M62300605
1
P412228
P412230
6
7
P412229
2
3
5
4
4M42709
4N40238
A
B
9
15
23
26
27

Fig.40

Fig.41

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-7 Link Section

Lever middle tension ㉓, Lever guide roller (4) ⑨ and Lever (2) second sprocket ⑱

Hints for Trouble-shooting·

Toruble symptom	Cause
Film scratch (on film surface)	Uneven rotation of rollers
Film scratch (on perforation)	Improper tension of ⑮
Excessively large wow flutter	Uneven rotation and abrasion of ㉒, misadjustment of tension of ㉗

Disassembly

1. Remove the front cover.
2. Remove ①～⑦ referring to Fig. 40.
3. Remove ㉓ by unscrewing the screw ㉕ and the E ring ㉔.
4. Unscrew the screw ⑯.
5. Pull out ⑨ after removing ⑫～⑭.
6. Take care since ⑩ is screwed at the back of the base (rear of worm gear (2) assy).
7. Take out the spring ㉑ on [A] side in order to remove ⑲, ⑳ and ⑱ simultaneously.
8. For further disassembly, refer to Fig. 40.

Reassembly

1. Make sure that the rollers and shaft have no scratch, burrs etc. and that the rollers have even and smooth rotation.
2. For further reassembly, refer to Fig. 40.
3. Measure the tension of ⑮ by using the bar spring balancer (P048) as shown in Fig. 41. The permissible tension range is 500～600g ; replace the spring having tension higher or lower than this value.
4. Adjust the tension of ㉗ so that the lever ㉓, on feeding the film, stands almost at the center from [A] and [B] points as shown in Fig. 41. (Check optical as well as magnetic reproduction.)

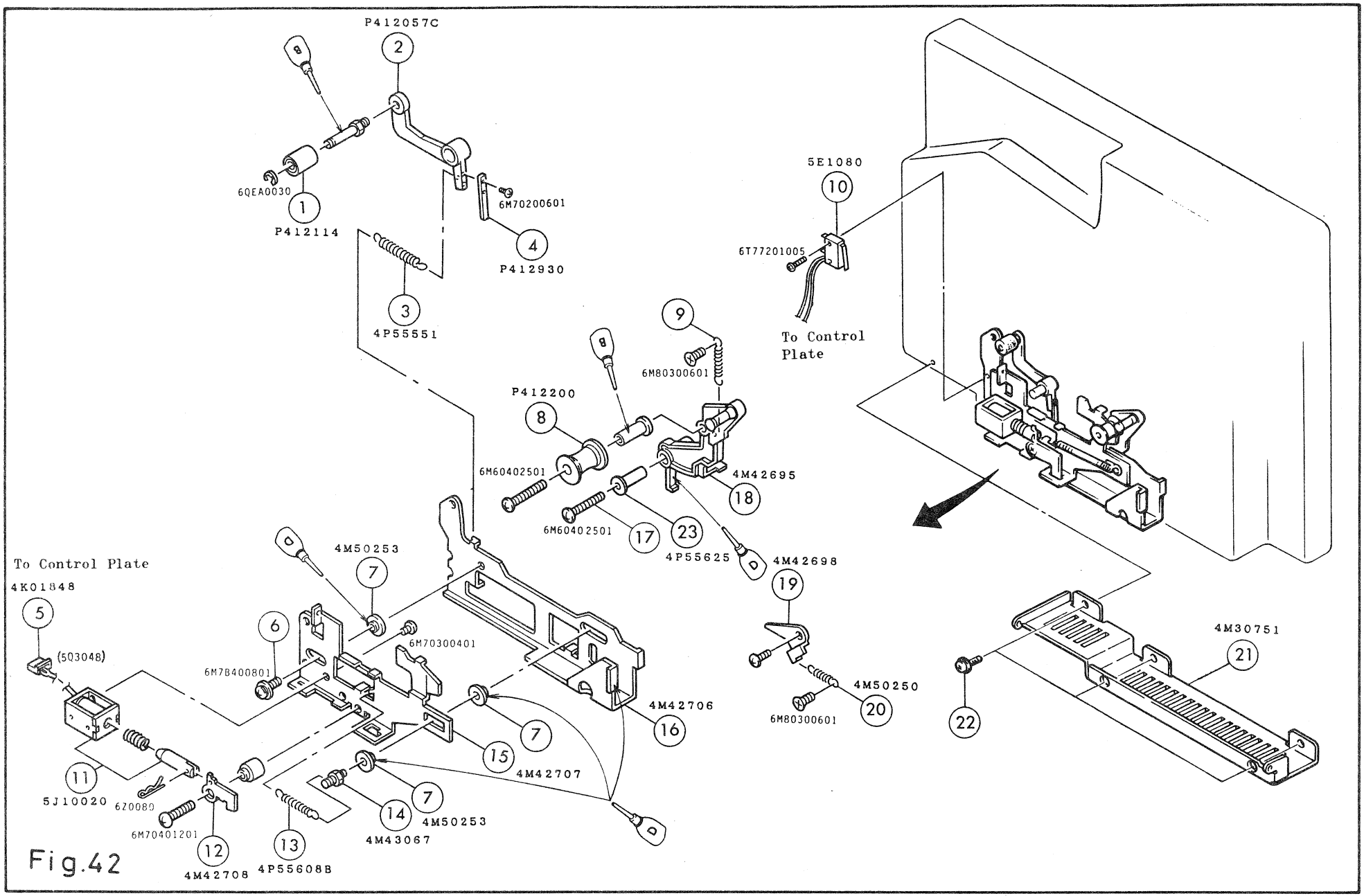

P412057C
2
6QEA0030
1
P412114
6M70200601
4
P412930
3
4P55551
5E1080
10
6T77201005
To Control Plate
9
6M80300601
P412200
8
6M60402501
4M42695
18
6M60402501
17
23
4P55625
4M42698
19
4M50250
20
6M80300601
To Control Plate
4K01848
5
(5Q3048)
4M50253
7
6M70300401
6
6M7B400801
4M42706
16
7
15
4M42707
11
5J10020
6Z0080
6M70401201
12
4M42708
13
4P556088
14
7
4M50253
4M43067
4M30751
21
22

Fig.42

Ⅱ-2-7 Link Section

Link (1) ⑯, Reverse lever ⑮, Lever guide roller (3) ⑱ and Lever pressure roller ②

Hints for Trouble-shooting.

Trouble symptom	Cause
Motor fails to operate	Defective ⑩
Failure in reverse porjection	Inadequate contact of ⑤ and cord disconnection, defective ⑪
The machines does not set to self-loading state	Malfunction of ⑯, weak tension of ⑬ and ⑳
Excessively large wow flutter	Scratch and uneven rotation of ①, improper tension of ③
Film scratch	Scratch and uneven rotation of ① and ⑧

Disassembly

1. Remove the front cover and the operation cover.
2. Remove ①～⑤ in Fig. 40 on page 55.
3. Remove ㉑ by unscrewing 3 pieces of screws ㉒.
4. Remove the spring ⑬.
5. Remove the assy of ⑮ by taking out ⑥ and ⑭, taking care so as not to cut the cord of connector ⑤ connected to the control plate.
6. Pull out ② by taking out ③ on [A] side.
7. Remove ⑯ by unscrewing the screw ⑲ in Fig. 40 on page 55.
8. Take out ⑨ on [B] side, and then ⑰ before removing ⑱.
9. For further disassembly, refer to Fig. 42.

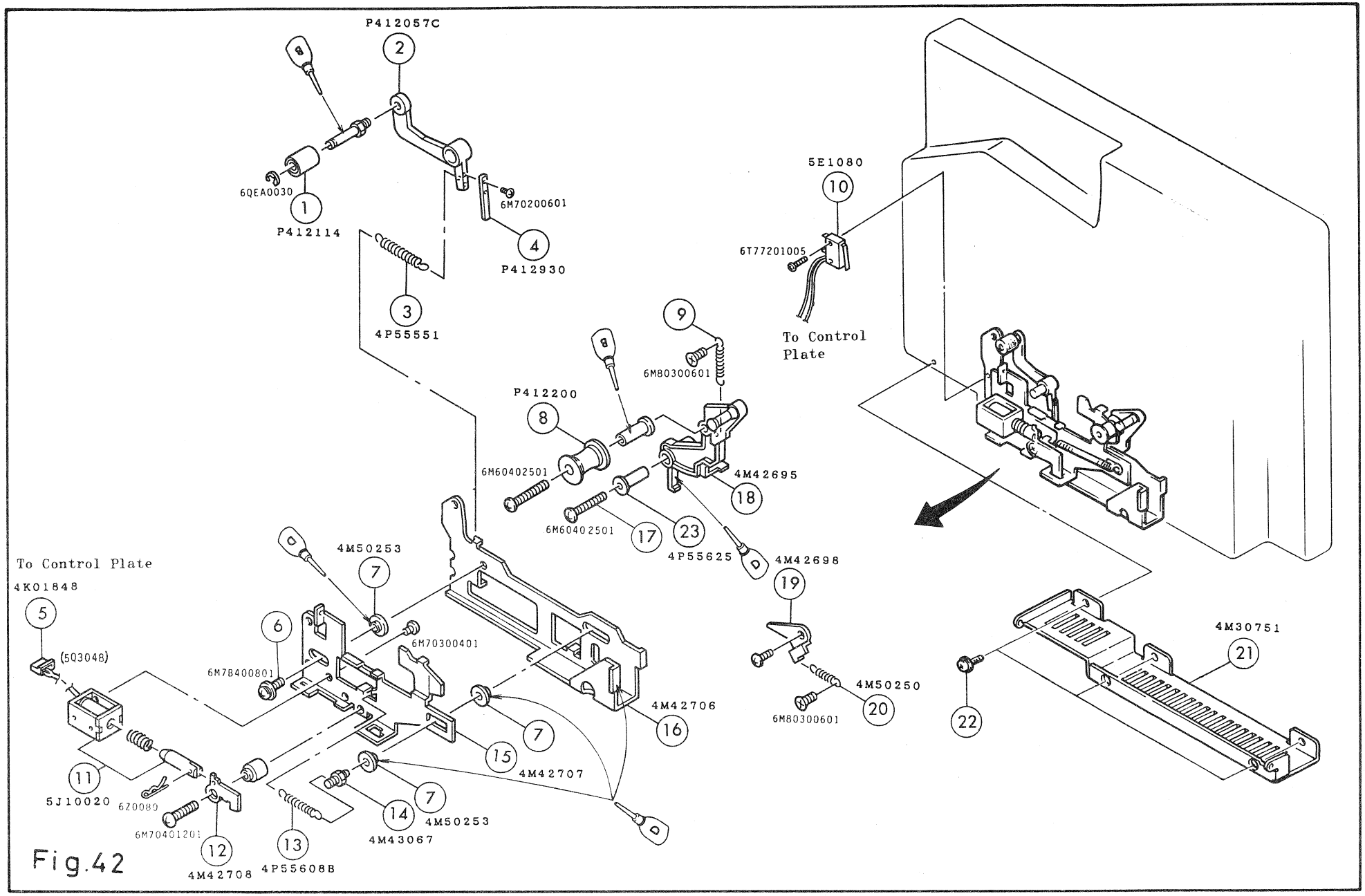

P412057C
2
6QEA0030
1
P412114
6M70200601
4
P412930
3
4P55551
5E1080
10
6T77201005
To Control Plate
9
6M80300601
P412200
8
6M60402501
4M42695
18
6M60402501
17
23
4P55625
4M42698
19
4M50253
7
To Control Plate
4K01848
5
(5Q3048)
6
6M70300401
6M7B400801
4M42706
16
7
15
4M42707
11
5J10020
6Z0080
7
14
4M50253
4M43067
6M70401201
12
13
4M42708
4P55608B
4M50250
20
6M80300601
4M30751
21
22

Fig.42

Ⅱ－2 Disassembly and Reassembly

Reassembly

1. Refer to "Driving Mechanism Functions in Ⅱ-1" for the functions of links and levers.
2. Wipe off the dust from ① and ⑧, and replace if scratched, then install and make sure that they have smooth rotation.
3. Reassemble ② and ④ in Fig. 43 so that the oblique-line sections fall on the same surface (i.e. the oblique-line sections are cofacial).
4. Install ⑱ and make sure that it moves lightly. Apply the tension ⑨, making sure that ⑱ touches the stopper 27 in Fig. 43. Measure the tension of ⑨ at arrow mark [A] position in Fig. 43 by using a dial tension gauge (C063). Replace ⑨ if the tension is higher or lower than the permissible tension range of 20～30g.
5. Install ⑲ by hooking it to ⑱. (See the dotted-line diagram in Fig. 43.)
6. Install ⑯ to the base by means of ㉖, and adjust the fitting position of ⑩ so that the switch ⑩ is pressed by ⑯ when ㉕ is pressed as shown by the arrow mark (forward projection state).
7. After installing all parts to the base, set to forward projection to measure the tension of ③ at the arrow mark [B] position in Fig. 43 by using a bar spring balancer (C067). Replace ③ if the tension is higher or lower than the permissible tension range of 200 ～ 300g. Furthermore, make sure that all links have normal functions repeating the forward projection-stop-reverse projection operations.

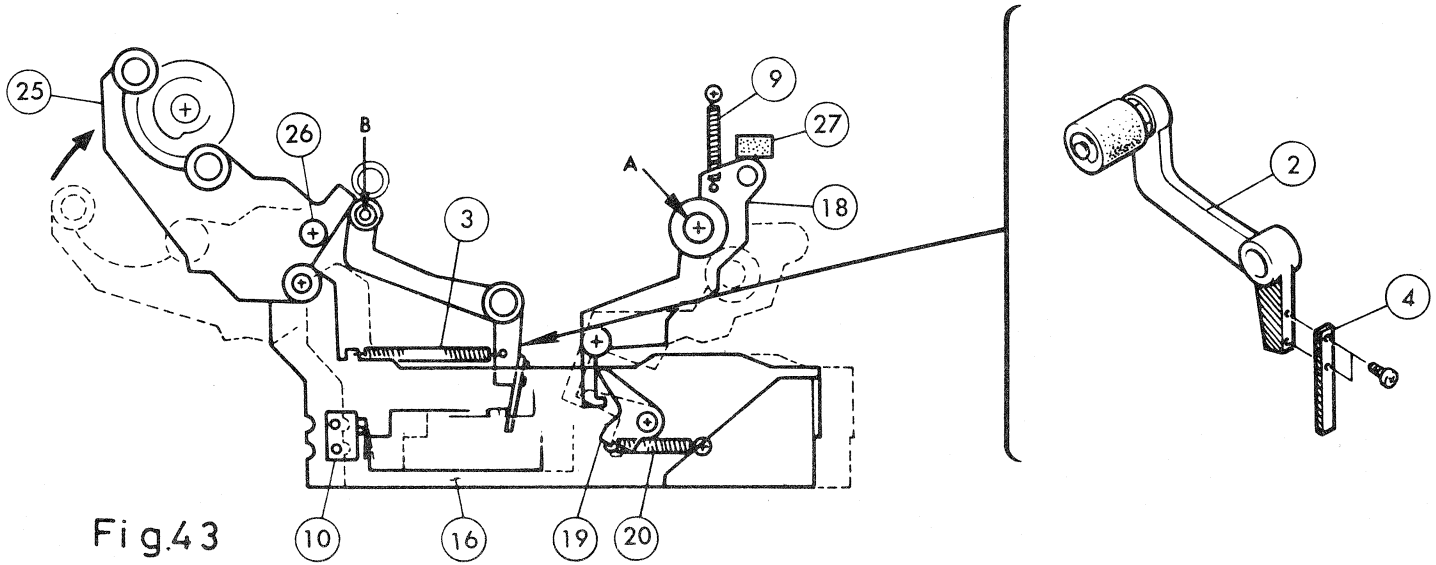


Fig.43

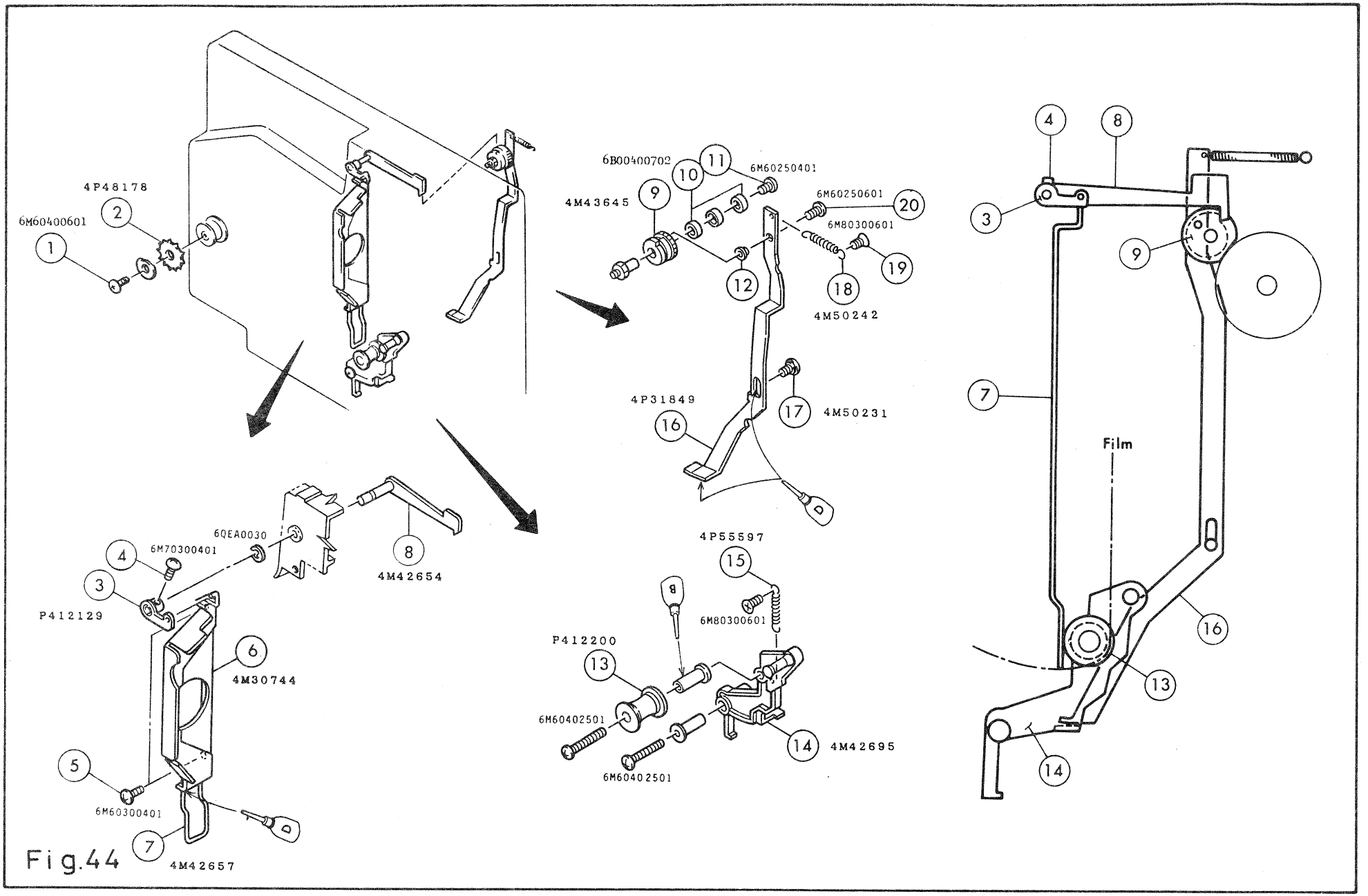

4P48178
6M60400601
1
2
6B00400702
10
11
6M60250401
4M43645
9
6M60250601
20
6M80300601
12
18
19
4M50242
4P31849
16
17
4M50231
4P55597
6QEA0030
8
4M42654
4
6M70300401
3
P412129
6
4M30744
5
6M60300401
7
4M42657
15
6M80300601
P412200
13
6M60402501
14
4M42695
6M60402501
4
8
3
9
7
Film
16
13
14

Fig.44

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-8 Loop Restorer Section: Refer to "Automatic Loop Restorer Mechanism in Ⅱ-1-7."
Friction wheel (2) loop restorer ⑨ and Link (2) loop restorer ⑯

Hints for Trouble-shooting

Trouble symptom	Cause
Loop restorer fails to function	Misadjustment of ③
	excessively strong (high) tension of ⑮ (see page 60)
	adhesion of oil onto ⑨
	uneven rotation of ⑨ due to defective ⑩
	inadequate fitting position of ②
Loop restorer continues functioning	Misadjustment of ③

Disassembly

1. Remove the back cover.
2. Remove the claw section frame assy. (Refer to page 42.)
3. Remove ⑯ by unscrewing ⑲, ⑰ and ⑳ successively. (Unscrew ⑳ carefully so as not to drop ⑫.)
4. Pull out ⑨ by unscrewing ⑪.
5. Remove ③ by loosening ④.
6. Remove ⑥ and ⑦ by unscrewing 2 pieces of screws ⑤.
7. For further disassembly, refer to Fig. 44.

Reassembly

1. Wipe off oil from ⑨ before installing with ⑪, making sure that ⑨ has smooth rotation. If the rotation is not smooth, it may be attributed to defect in ⑩.
2. Carry out further reassembly in the reverse order of disassembly.
3. Adjust the timing for loop restorer start.
   a) Feed the film, and stop temporarily by depressing the PAUSE switch, make the lower loop one coma shorter and restart.
   b) Repeat this operation till the lower loop gets gradually smaller until it begins to touch the roller ⑬ installed to ⑭. Then fix ③ with ④ so that, just before the roller ⑬ starts to rotate, the film touches the bottom of ⑦, pushing up ⑧ and unlocking ⑨ to set the loop restorer to function. In case the loop restorer fails to function even when the film touches ⑬ generating vibration sound, carry out film alignment by loosening ① and rotating ② slowly.

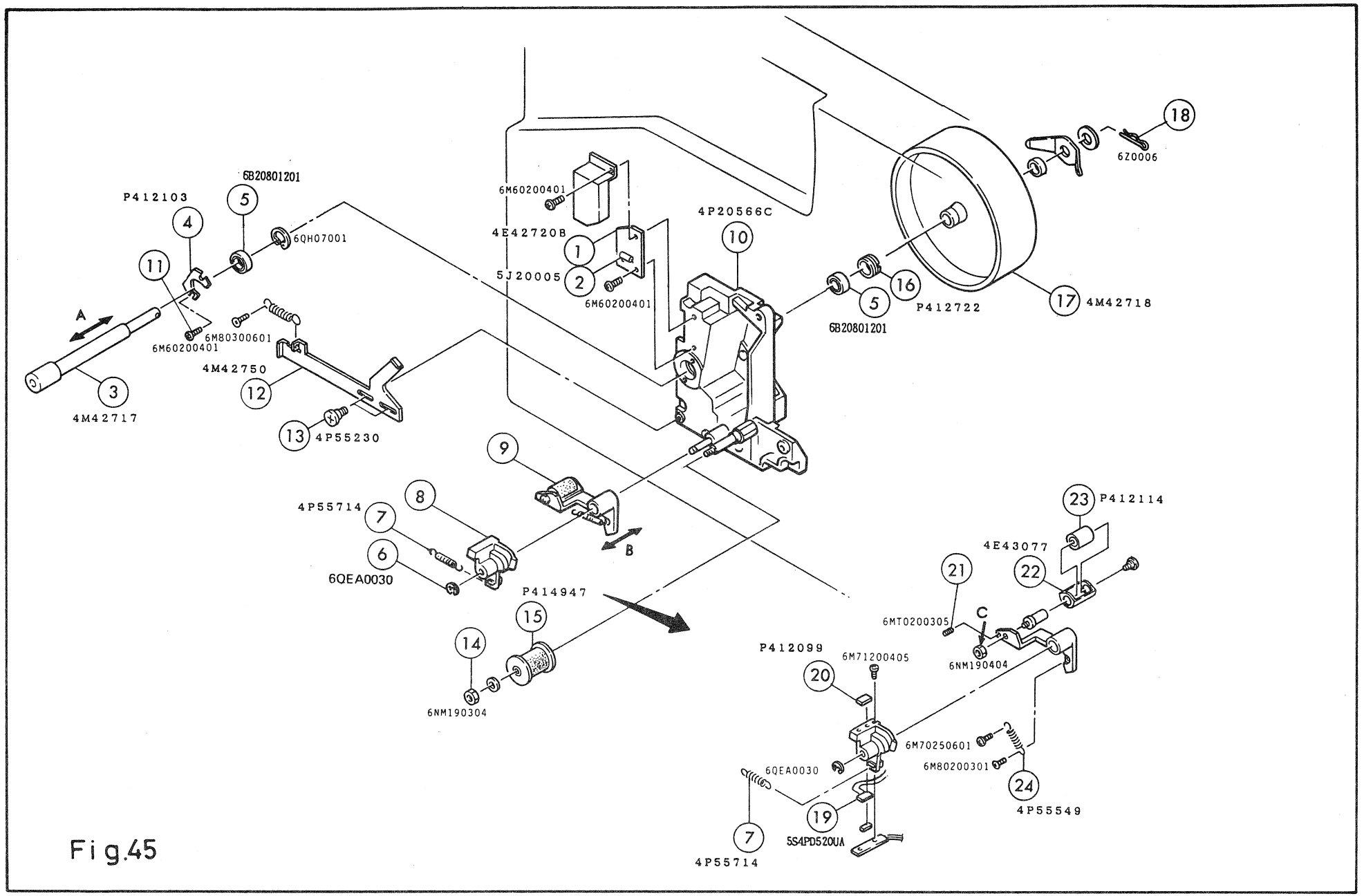

6B20801201
P412103
5
4
6QH07001
11
A
6M80300601
6M60200401
4M42750
12
3
4M42717
13
4P55230
6M60200401
4E42720B
1
5J20005
2
6M60200401
4P20566C
10
18
6Z0006
16
5
6B20801201
P412722
17
4M42718
9
8
4P55714
7
6
6QEA0030
B
P414947
15
14
6NM190304
23
P412114
4E43077
21
22
6MT0200305
C
6NM190404
P412099
6M71200405
20
6M70250601
6QEA0030
6M80200301
24
4P55549
19
5S4PD520UA
7
4P55714

Fig.45

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-9 Flywheel Section

Shaft flywheel assy ③, Flywheel ⑰, Lever pad roller ⑨ and Lever assy photo diode ⑧

Hints for Trouble-shooting.

Trouble symptom	Cause
Excessevely large wow flutter	Uneven rotation of ③, ⑤ and ⑮, eccentric ⑰.
Optical reproducing sound does not come out.	Disconnection of ⑲
Insufficient optical reproducing sound	Malfunction of ⑧, dust in ⑳
Insufficient magnetic reproducing sound	Uneven rotation of 23, improper tension of㉔
Improper S/N ratio	Inadequate fitting positions of ② and ㉑

Disassembly

1. Remove the back cover and the amplifier assy.
2. Pull out ⑰ by taking out ⑱.
3. Remove ④ by unscrewing ⑪, and then pull out ③.
4. Remove ⑫ by unscrewing 2 pieces of screws ⑬.
5. Remove ⑧ and ⑨ by unscrewing ⑥.
6. For fnther disassembly, refer fo Fig. 45.

Reassembly

1. Make sure that ③ has no scratch and that the two pieces of bearings ⑤ have no abnormality in rotation. Then tighten ⑯ so that ③ has no back-lash in the direction of arrow mark A and has smooth rotation.
2. ⑮ not only holds the film feeding position but also works as the impedance roller, and accordingly improper setting of its fitting position may resuly in unstable traveling of the film and may directly cause deterioration in properties such as wow flutter, etc. Hence, make a thorough check to see that there is no scratch or/and deterioration of rubber face, and then tighten ⑭ so that ⑮ has no back-lash in the direction of arrow mark B and has smooth rotation.
3. Install ㉓ carefully so that there is no scratch or/and deterioration of rubber face and the rotation is smooth.
4. Refer to "Measuremet of S/N Ratio" on page 69 for deciding the position of ㉒. Slightly move (rotate) ㉒, and fix with (21) where S/N ratio is largest. Similarly, after soldering ② to ①, search for the position where S/N ratio is largest by slighty moving (rotating) ②.
5. Measure the tension of ㉔ at the arrow mark C position by using a dial tension gauge (C062), with the machine set for magnetic reproduction projection. Replace ㉔ if the tension is higher or lower than the permissible tension range of 20～25g
6. Make sure that ⑳ has no dust such as oil, etc.

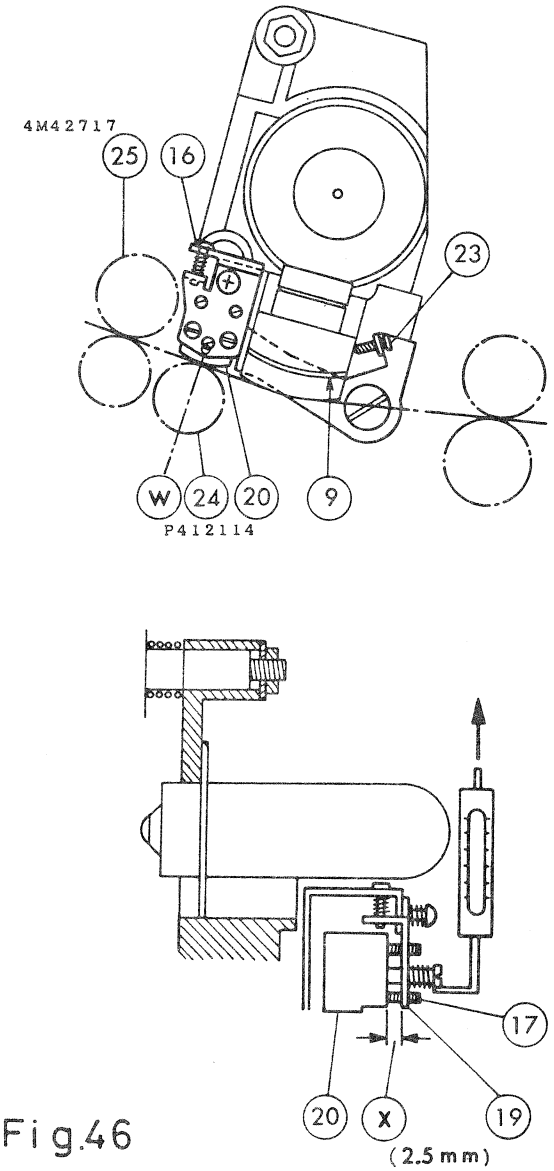

4M42717
25
16
23
W
24
20
9
P412114
17
20
X
19
(2.5 mm)

Fig.46

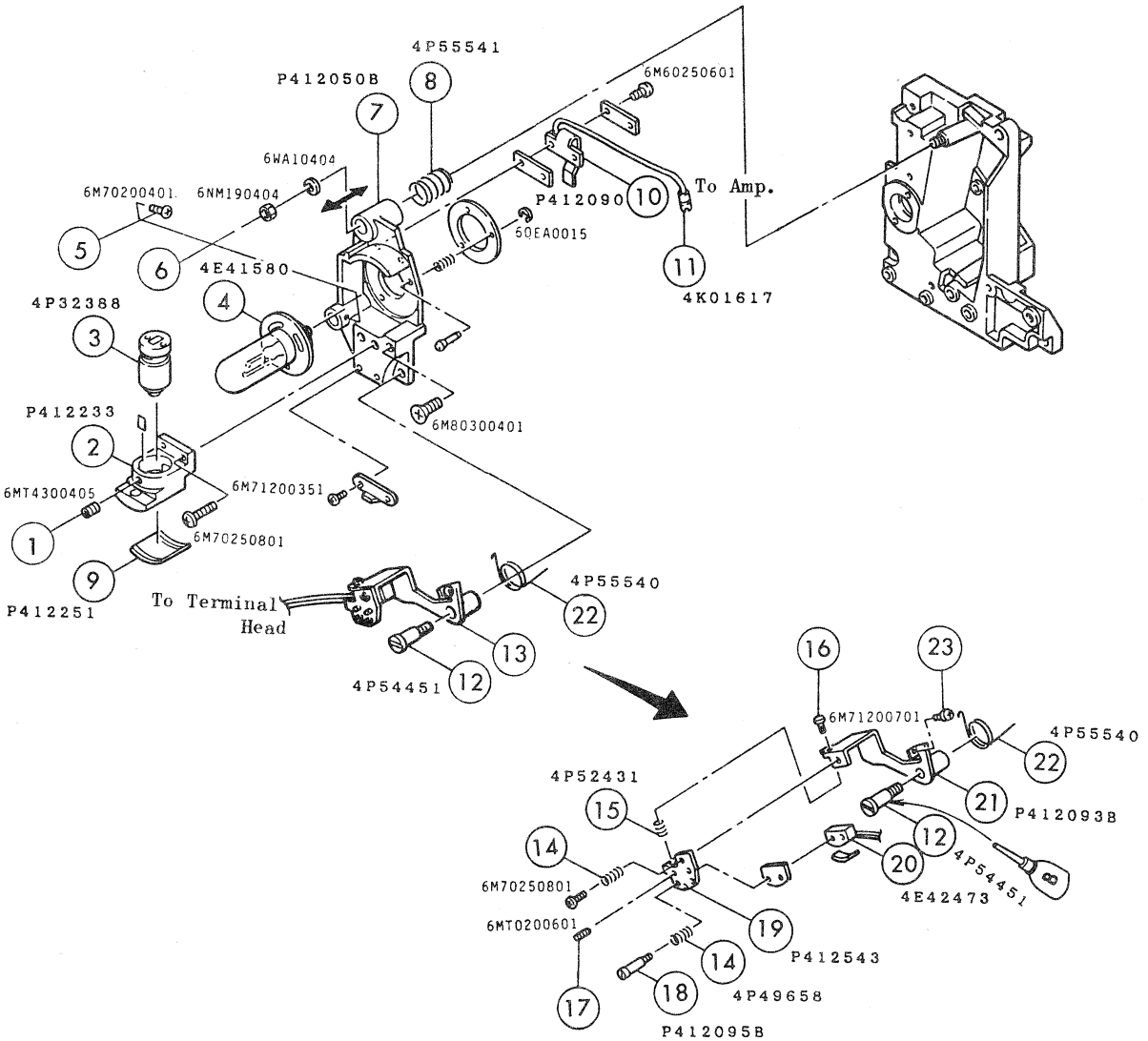

4P55541
P412050B
8
7
6M60250601
6WA10404
6M70200401
6NM190404
P412090
10
To Amp.
5
6
60EA0015
11
4K01617
4E41580
4
4P32388
3
6M80300401
P412233
2
6MT4300405
6M71200351
1
6M70250801
9
P412251
To Terminal Head
4P55540
22
13
4P54451
12
16
23
6M71200701
4P55540
22
4P52431
15
21
P412093B
14
12
20
4P54451
6M70250801
4E42473
6MT0200601
19
P412543
14
17
18
4P49658
P412095B

Fig.47

Ⅱ－2 Disassembly and Reassenbly

Ⅱ-2-9 Flywheel Section
Sound lens assy ③ and Lever head assy ⑬

Hints for Trouble-shooting·

Trouble symptom	Cause
Optical reproducing sound does not come out	Disconnection of ④
Insufficient optical reproducing sound.	Inadequate fitting positions of ③ and ⑦
Exciter lamp does not light up	Inadequate contact of ⑩ and ⑪
Magnetic reproducing sound does not come out	Disconnection of ⑳
Insufficient magnetic reproducing sound.	Inadequate fitting positions of ⑦ and ⑳, improper tension of ㉒

Disassembly

* DO NOT remove ② from ⑦ since it is installed with special gauge.

1. Remove the front cover.
2. Remove the link (1) and the reverse lever. (Refer to page 58.)
3. Remove the lever pad roller. (Refer to page 64.)
4. Pull out ⑬ by unscrewing ⑫.
5. Loosen ⑤, unscrew ⑥ and take out ⑦.
6. For further dissassembly, refer to Fig. 47.

Reassembly

* Magnet Head

1. Carry out reassembly in the reverse order of desassembly.
2. Adjust by means of the screw ㉓ so that the lead allowance of ⑳ extends out approximately 0.2mm on the pad roller assy ㉔ side from the virtual film feeding line connecting flywheel assy ㉕ to 9. (See Fig. 46.)
3. Make adjustment so that the center (gap) of ⑳ comes on the center line W of ㉔. (See Fig. 46.)
4. Adjust by means of 3 pieces of screws ⑰ so that the gap x between ⑳ and ⑲ is approximately 2.5mm. (See Fig. 46.)
5. Measure the tension of ㉒ at the position shown in Fig. 46 by using a bar spring balancer (C043). Adjust by bending ㉒ if the tension is higher or lower than the permissible tension range of 60～100g
6. After the adjustments in 2～5 are made, make the magnetic azimuth alignment film (P040) move at VR position allowing no distortion in output wave, and search for the position allowing mo distortion in output is maximum by slightly turning (fi (fine adjustment) the 3 pieces of screws ⑰, before fixing with screw lock.
   Max. output: Over 14 V

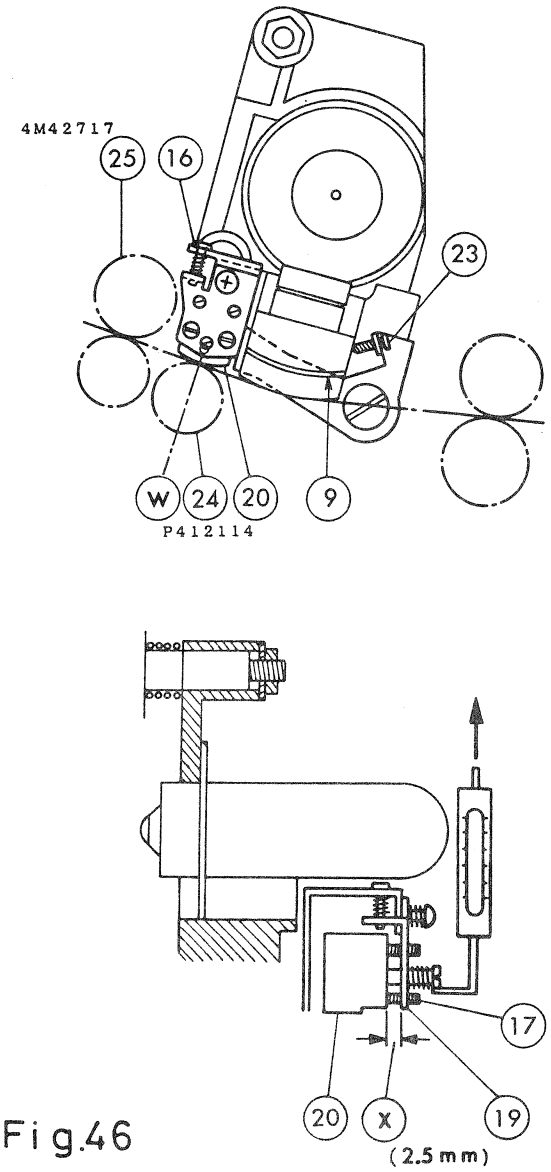

4M42717
25
16
23
W
24
20
9
P412114
17
20
X
19
(2.5 mm)

Fig.46

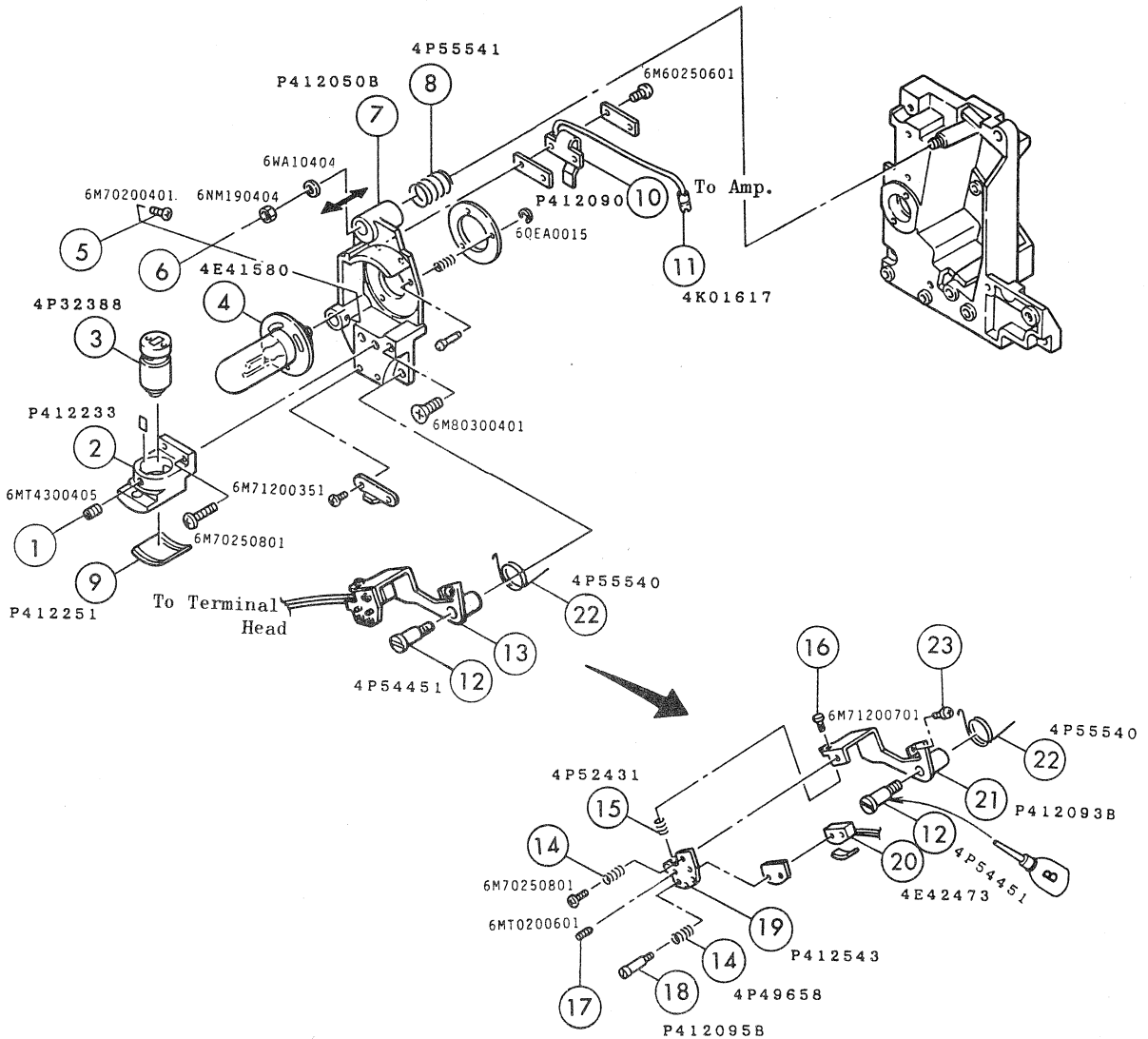

4P55541
P412050B
8
7
6M60250601
6WA10404
6M70200401
6NM190404
5
6
P412090
10
To Amp.
6QEA0015
11
4K01617
4E41580
4
4P32388
3
6M80300401
P412233
2
6MT4300405
6M71200351
1
6M70250801
9
P412251
To Terminal Head
4P55540
22
13
4P54451
12
16
23
6M71200701
4P55540
22
4P52431
15
21
P412093B
12
4P54451
B
14
20
4E42473
6M70250801
19
6MT0200601
P412543
14
17
18
4P49658
P412095B

Fig.47

Ⅱ－2 Disassembly and Reassembly

Sound Lens Assy

1. Make sure that lens surface ③ is not stained with oil, dust, etc. Replace if the inner lens of ③ is clouded (obscured) or/ and stained.
2. Extend ③ by approximately 9mm from ②, and temporarily tighten with ①. (See Fig. 48.)
3. Make the sound focus film (P035) move at VR position allowing no distortion in output wave, then search for the position where reproduction output is maximum by slightly moving ③ up and down and left and right, before tightening ①.
   Max. output: Over 14 V
4. Make buzz track adjustment before the previous item 3 if (7) is disassembled from the base.
   Shift ⑦ back and forth (arrow mark direction) with the nut ⑥ while making the optical buzz track film (P032) move at max. VR of the amplifier, and find the position where both low sound zone 300 Hz and high sound zone 1 kHz of the film can not be heard, before fixing with the screw ⑤. The optical buzz track film (P032) is recorded as shown in Fig. 49.

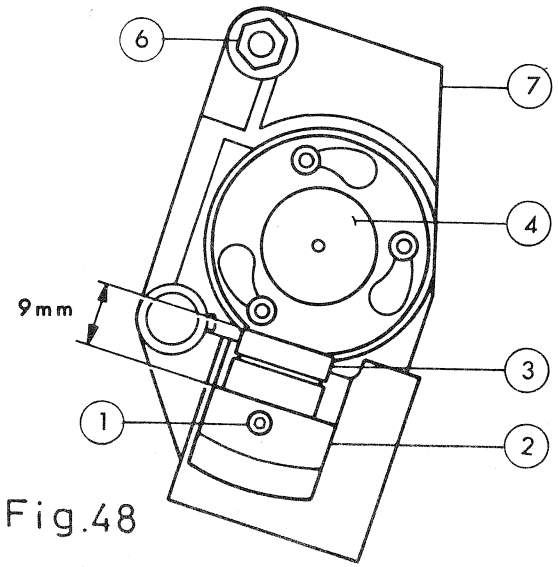


Fig.48

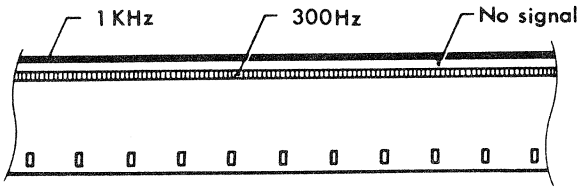


Fig.49

Ⅱ－2 Disassembly and Reassembly

Ⅱ-2-9 Flywheel Section

Measurement of Sound Performance

1. Distortion factor (both optical and magnetic): Less Than 5%
   Applicable film: Optical 400Hz signal level film (P033)
   Magnetic 400Hz signal level film (P037)
   Measuring apparatus: Distortion (factor) meter (P0849)
   Measuring method: Project the P033 (P037) film, with the tone control knob at center posotion, and turn the VR knob until the rated output (25 W-14V) is obtained. Then read the distortion factor range from the distortion meter.

2. S/N ratio (both optical and magnetic): More Than 40 dB when lamp is lit up
   Applicable film: Optical 400Hz signal lever film (P033)
   Magnetic 400Hz signal level film (P037)
   Measuring apparatus: Distortion meter
   Measuring method: Project the P033 (P037) film, with the tone control knob at center position, and trun the VR knob until the rated output (25W-14V) -2 dB is obtained, then stop projection and remove the fiim. Read the level range of distortion meter when sitting for reprojection.

3. Measurement of flutter (both optical and magnetic): Less Than 0.5%
   Applicable film: Optical flutter film (P034) and magnetic flutter film (P038)
   Measuring apparatus: Wow flutter meter (P083)
   Measuting method: Project the P034 (P038) film, and read the JIS WEIGHTED range of wow flutter meter.

4. Measurement of frequency response

Applicable film: Optical multi-frequency film (P036) and magnetic multi-frequency film (P039)

Measuring apparatus: Distortion meter

Measuring method: Project the P036 (P039) film, and set by means of VR knob so that the level range of distortion meter at 400Hz signal is 4 V (12 dB), and read further signals at this position to make sure that they fall within the range of Fig. 50.

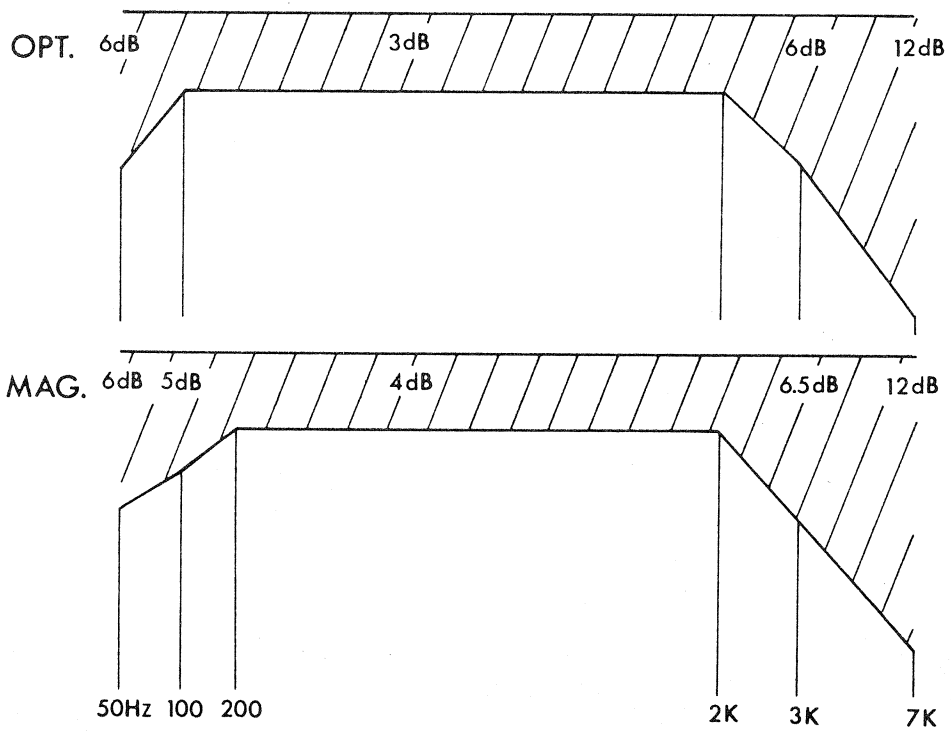


Fig.50

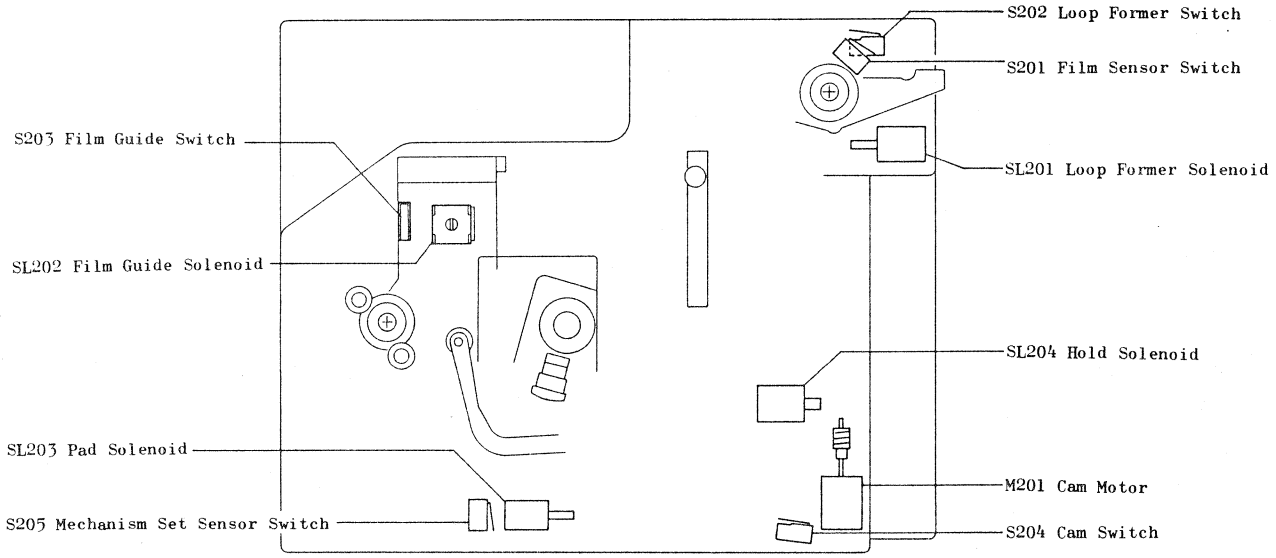
Ⅲ－1 Outline of Electric Circuit

Ⅲ-1-1 Electrical Specifications

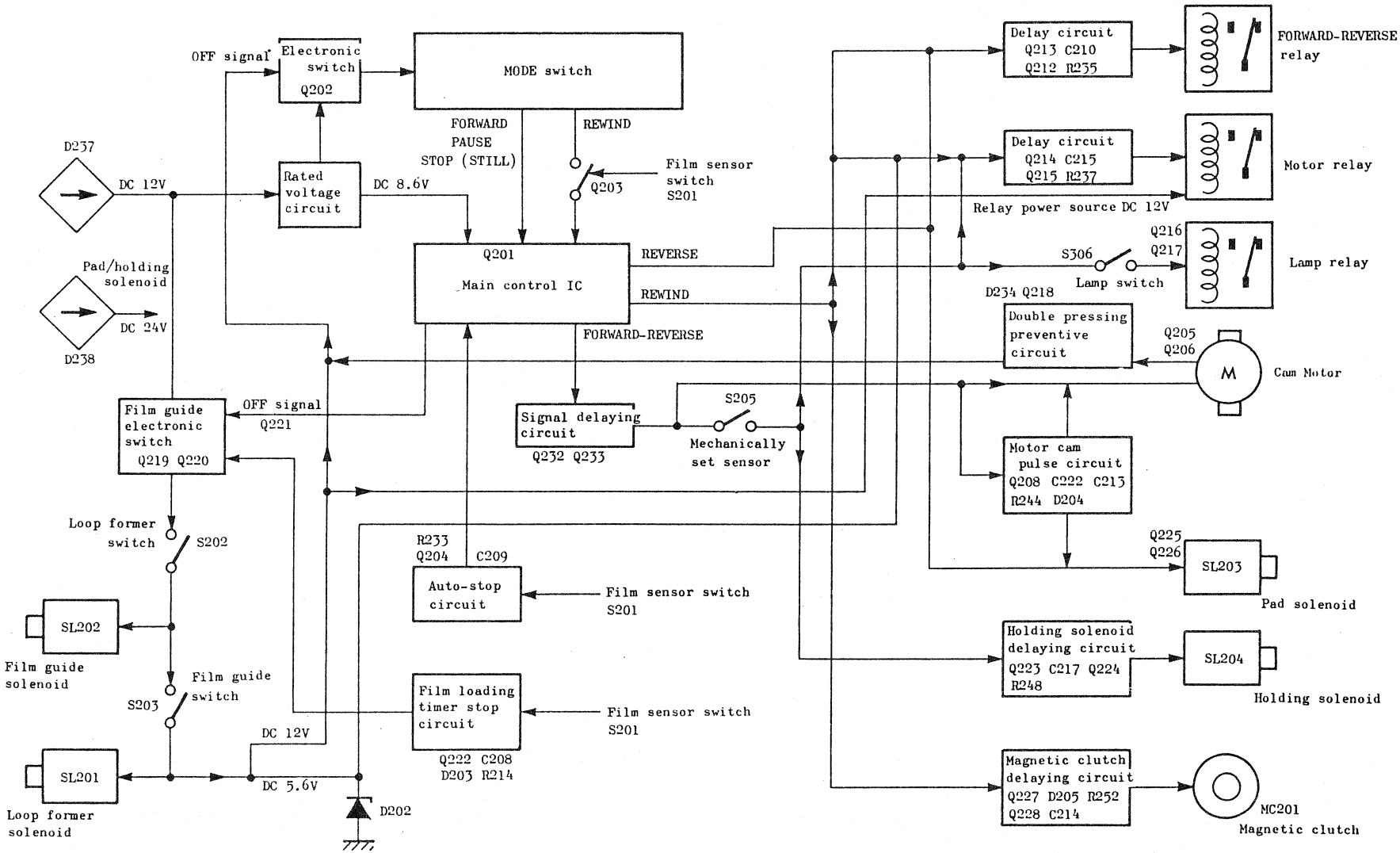
1. Adoption of push-button switch by logical control
2. Adoption of safety mechanism that stops projector when film is taken up on completion of projection
3. Adoption of timer stop mechanism that releases the self loading mechanism in a specified time interval after film is inserted into the film slot
4. Adoption of remote control mechanism that enables all functions other than rewinding
5. Adoption of pause mechanism that enables quick start or/and stop
6. Adoption of mute circuit interlocked with exciter lamp in amplifier circuit
7. Adoption of 30 W amplifier with external speaker safety circuit

Ⅲ－2 Control Circuit

Ⅲ-2-1 Block Diagram and Layout Drawing for External Parts



III-2 Control Circuit



Ⅲ－2 Control Circuit

See Connection Diagram E 21349 and Layout Drawing for description of control circuti.

The main controller of the control circuit for this machine is Q201 (TC9143P), which is an IC for logic control.

Ⅲ-2-2 Signal Transfer for Forward Projection

1. Depress the FWD switch (S302).

2. Pin ④ of Q201 turns to "H" (high), and FWD signal (pin ⑬ "H") is transmitted from pin ⑬.

3. The "H" signal from pin ⑬ passes through D217 and Q232, and turns Q206 to ON. When Q206 turns to ON, the cam motor starts rotating, and the link (1) starts to move, turning the mechanical set sensor (S205) to ON near the end point of travel.and then turning the holding solenoid (SL204) and motor relay (RY101) successively to ON. The delay in turning the motor relay (RY101) to ON is for rotating the motor only after setting the film to both sprockets in order to hold (keep) the loop of the film between first and second sprockets. This delay circuit is composed of Q211, Q210, D243, C216, R222 and R255. The motor relay (RY101) is approximately 0.5 seconds delayed than the holdeing solenid (SL204). (See Fig.54, "Timing Chart" on page 80.)

4. Turn the lamp to ON/OFF by manipulating the LAMP switch (S306) on operation switch plate (board). This switch (S306) is a holding type push-button switch, and when RWD is depressed, with this switch turned to ON, the lamp lights up, indicating that the machine is ready for projection.

5. When PAUSE switch (S304) is depreessed during forward projection, Q209 turns to ON whereas Q210 base gets grounded, turning Q210 to OFF, which then causes Q211 to turn to OFF and the power sources of lamp relay (RY103) and motor relay (RY101) to cut off. This causes the lamp to extinguish and the motor to stop, with the links still set for forward projection.

6. In order to stop the projector, depress the OFF switch (S301), which grounds the pin ⑥ of Q201 and sets the pin ⑬ to "L" (low), causing the lamp to extinguish and the motor to stop. The holding solenoid (SL204) gets released approximately 1 second after the motor has stopped. This delay is for securing appropriate loop length of the film between first and second sprockets. The circuit for this delay is determined by means of the time constant of C217, R248 and R249. (See Fig. 54, "Timing Chart" on page 80.)

Ⅲ-2-3 Signal Transfer for Reverse Projection

1. When REV switch (S303) is depressed, the pin ③ of Q201 gets set to "H" and the REVERSE signal ("H") transmitted from the pin ⑭ sets the pad solenoid (SL203) to function for several seconds, simultaneously setting the motor circuit to REVERSE mode by activating the motor FWD-REV relay (RY102). Other functions are similar to those at "Signal" Transfer for Forward Projection." However, the PAUSE mechanism does not function at reverse projection.

Ⅲ-2-4 Signal Transfer for Rewinding

1. On depressing the RWD switch (S305), the pin ② of Q201 is set to "H" only when there is no film in the film path, and REWIND signal ("H") transmitted from the pin ⑮ successively turns FORWARD-REVERSE relay (RY102) and motor relay (RY101) to ON, causing the magnetic clutch (MC201) to activate after several seconds. This delay (of several seconds till the magnetic clutch activates after the motor starts rotation) is used for taking up the slack of the film, with the rewind tension of reverse projection used as the initial torque for rewinding.
   (The pin ② of Q201 does not set to "H" when there is film in the film path since Q203 in this case is turned to OFF.)

2. In order to stop rewinding, depress the OFF switch (S301), which grounds the pin ⑥ of Q201 and sets the pin ⑮ to "L", releasing the magnetic clutch (MC201), motor relay (RY101) and FORWARD-REVERSE relay (RY102).
   As for the motor control relay timing, the timing is set for reversing the motor in a manner that the FORWARD-REVERSE relay (RY102) first turns to ON and then the motor relay (RY101). when motor stops, the motor relay first turns to OFF and then the FORWORD-REVERSE relay turns to OFF. This is for preventing the relay contact from getting burned. the delay circuit being composed of C201, R235, C215 and R237. (Refer to Fig. 56. "Timing Chart" on page 81 for the timing.)

Ⅲ-2-5 Signal Transfer for Self-Loading

1. On pressing down the loop former, the loop former switch (S202) turns to ON, activating the film guide solenoid (SL202) to pull the film guide.

2. When the film guide is set to the film path on base frame, the film guide switch (S203) turns to ON, activating the loop former solenoid (SL201) and locking the loop former in self-loading state. In the mean time the DC 12 V signal from the film guide switch (S203) as well as the signal reduced to 5.6V by D202 activates the motor relay (RY101). The DC 12V signal passes to the base of Q202 to turn it to OFF, which then cuts off the power supply to the MODE switch so that the MODE switch may not get activated during the time the loop former is locked (i.e. during self-loading).

3. When the loop former is locked and the motor rotates to start feeding film from the film gate, the film sensor switch (S201) turns to ON and changes C 208 so far grounded in R213 (100 Ω), finally turning Q222 to ON after elapse of the specified time.

4. When Q222 truns to ON, the base of Q220 is grounded, turning Q222 as well as Q219 to OFF. This results in the cut-off of power supply to solenoid relays, stopping the projector and releasing the loop former.

5. The loop former release time can be adjusted by means of R214. Set (the timer stop mechanism) so that the projector stops when the film lead (end) extends out by 70 ～ 100cm from the projector.
   The OFF switch (S301) can also be used for release/stop.

Ⅲ-2-6 Independent Circuits

- Film Sensor Circuit

When there is no film in the film path, the film sensor switch (S201) is at "CLOSE" position. This switch controls the following three circuits.

1. It uses Q203 as a switch by controlling the base potential of Q203, and turns the REWIND switch signal to ON or OFF.

2. It detects the loop former release time (timer stop circuit) at self-loading.

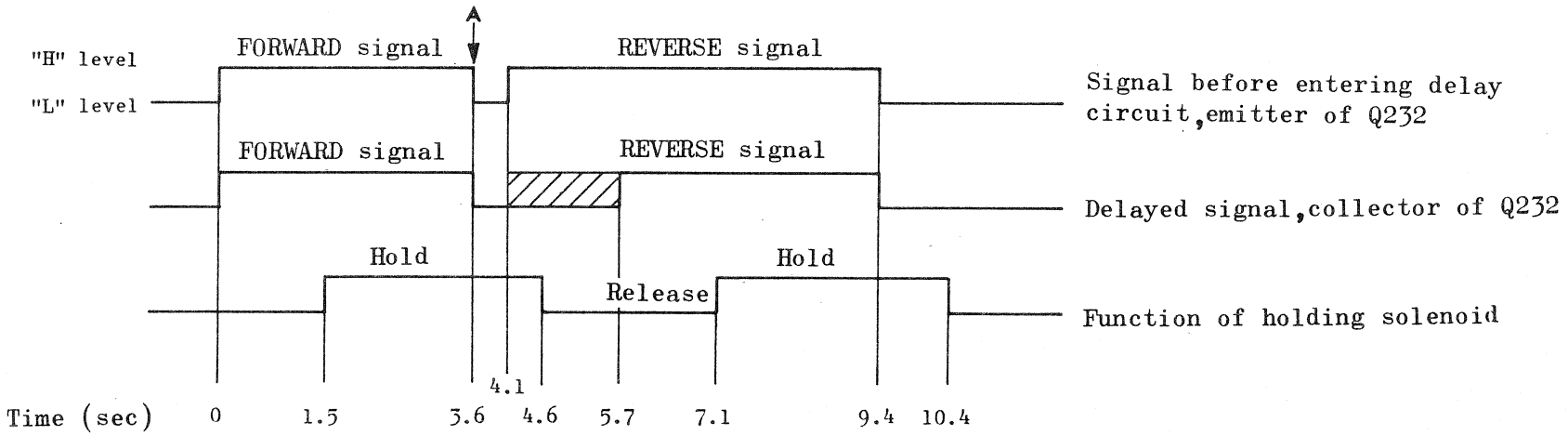
3. It turns Q204 to ON and stops the projector (automatic stop circuit) when the film, at forward/reverse projection, deverts from this sensor and is out of the film path.

* Automatic stop circuit
When projection starts, with the film set to the film path (i.e. film sensor switch "S201" in "OPEN" state), and the FOWARD (REVERSE) signal is transmitted, the signal passes through R230, R231 and D226 before getting charged in C209. When the projection completes and the path has no film in it, the film sensor switch (S201) turns to CLOSE, grounding the emitter of Q204 through D225. The charges in C209 then flow to the base of Q204 through R233, turning Q204 to ON for several seconds. The Q204 then grounds the pin ⑧ of Q201, which is the auto-stop terminal.
Accordingly when this terminal is grounded, Q201 is set to STOP mode, causing the projector to stop.

- Signal Delay Circuit for Forward-Reverse Direct Change

When the mode (FORWARD-REVERSE) is changed directly, Q201 (TC9143P) takes 0.5 second to pass through STOP mode before shifting from the preceding mode (ex. FORWARD) to the next mode (ex. REVERSE). It takes 1 second, after the mode is set to STOP, for the holding solenoid (SL204) to get released. Changing the mode directly from FORWARD to REVERSE with the circuit intact i.e. with the holding solenoid not yet released, causes the motor only to rotate reversely while the pressure roller, tension roller and brake roller remain held up in FORWARD position (keeping the film in pressed state), resulting in damage to the film. To avoid this, the machine is equipped with the following signal delay citcuit. When REV switch (S303) is depressed ("A") during forward projection, the REVERSE signal "H" transmitted from the pin ⑭ of Q201 controls the base voltage of Q232 by means of Q233 (timer IC), and delays the REVERSE signal "H" from the emitter for several seconds before transmitting from the collector. The portion marked with oblique lines in the "Timing Chart" below is the delay time.

Direct Change Timing Chart



• Cam Motor Pulse Circuit
Composed of Q208, D204, C222, C213 and R244, the pulse circuit has the following two functions.

1. It sends pulse signal for the cam motor to start. When the projector is at stop position, the operation cam ① is at [A] position shown in Fig. 51, turning the cam switch to ON with the rib section. On receiving the FORWARD (REVERSE) signal, the pulse circuit transmits 1 pulse to the base of Q206, turning Q206 to ON and rotating the cam motor for 1 pulse time (1.5 ~2 secs.). During that period, the rib section of ① that is pushing ② is shifted to [B] position to turn ② to OFF. In other words, the pulse from the pulse circuit rotates the cam motor only for changing over the cam switch (S204) from N. O. to N. C. When the cam switch is set to N. C., the negative side of motor gets grounded, causing the motor to rotate continuously. Then ① shifts the link (1), and after taking one turn (rotation), it pushes ② with the rib section, setting ② from N. C. to N. O. This causes the resistance R306 (120 Ω, 2W) to be connected between the two terminals of the motor and applies brake to the motor, stopping ① at a specified position.

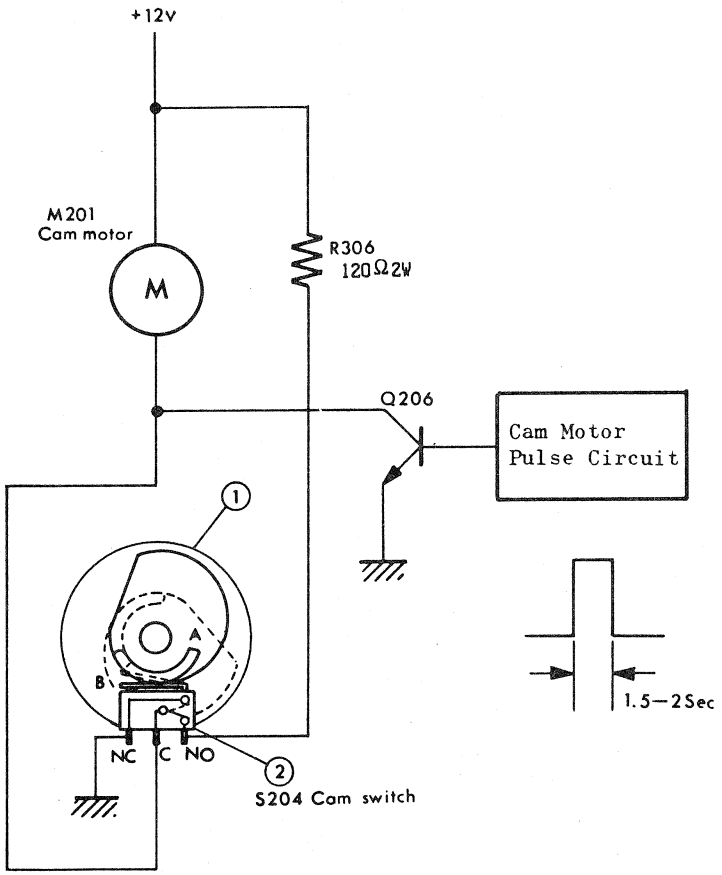


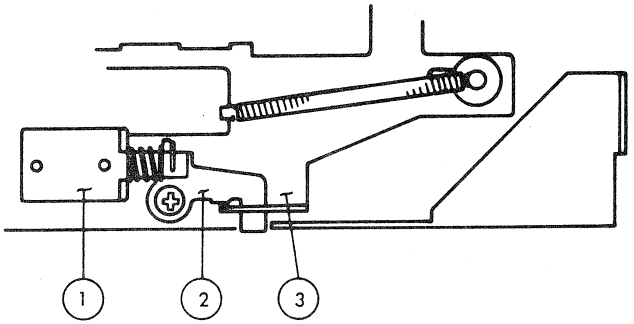
Fig.51

2. It determines the operation time of pad solenoid (SL203) at reverse projection. The middle tension roller, pad roller and brake roller must be held at projection STOP position at reverse projection. Since these rollers operate as the reverse lever shifts, the pulse circuit activates the pad solenoid ① to prevent the reverse lever ② from moving during the time the end of link (1) ③ shifts from [A] to [B] as shown in Fig. 52. It shall be noted here that 24 V is applied to the solenoid with rated voltage of 12 V in order that the pad solenoid might activate more surely. Accordingly, voltage is applied only for a short time (1 pules time = 1.5 ~ 2 sec.) to prevent the solenoid from getting heated up. Refer to "Reverse Projection Mechanism in Ⅱ-1-3" on page 23 for the functions of links.

   The cam motor pulse circuit determines the pulse width time by means of R244 and C213.

- Duoble-push Prevention Circuit
  The Q218 and Q202 prevent the REV switch from functioning even when it is depressed while the operation cam is started by depressing the FWD switch. Since the pin ⑫ of P206 is grounded during the time the operation cam is running, R226 divides the base potential of Q218 through D234, turning Q218 to ON and then Q202 (power switch for MODE switch circuit) to OFF.

Stop Position



Reverse Position

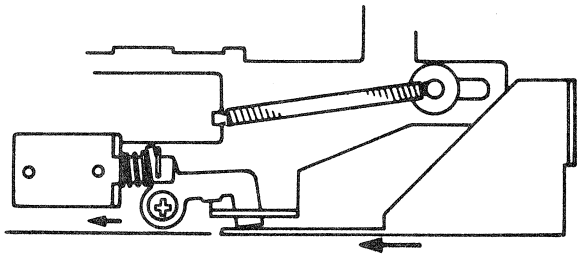


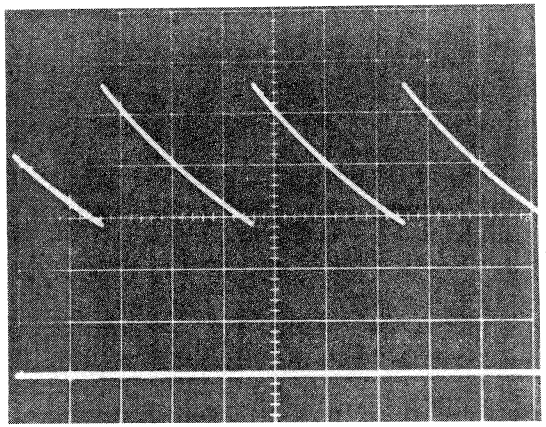
Fig.52

Ⅲ-2-7 Timing Chart

Because of logic control, the timing of representative points are indicated.

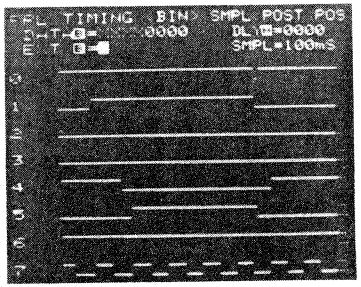
Fig. 53 shows the clock frequency of Q201 (TC9143P), which is 67Hz as can be read from the figure. (Calculated value: 72Hz)

The Hi-Low voltage of each point is measured in Fig. 54. It shall be noted here that the slenoids activare at LOW volatge. The figures in the chart indicate time (unit: second).



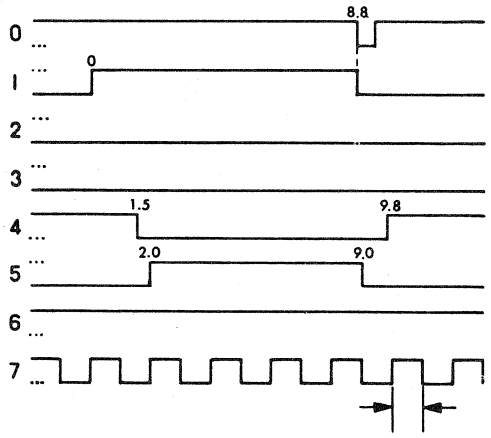
Q201 TC9143P Clock 5ms/DIV 1V/DIV

Fig.53



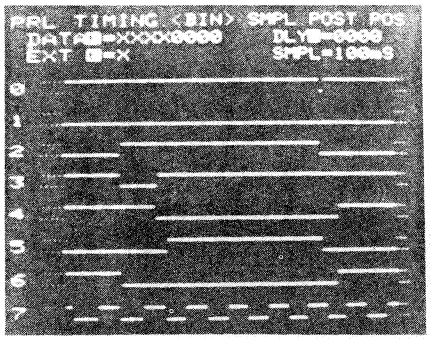
Forward Mode

Fig.54



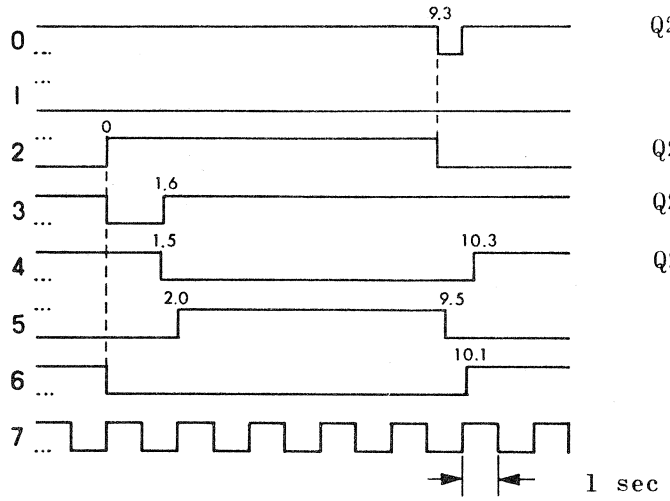
	Measuring Point	Signal
0	Q201 ⑥	Stop
1	Q201 ⑬	Forward
2	Q201 ⑭	Reverse
3	Q201 ⑮	Reweind
4	Q224 ⓒ	Holding Solenoid
5	Q	Motor Relay
6	P	Forward-Reverse Relay
7		

III-2 Control Circuit

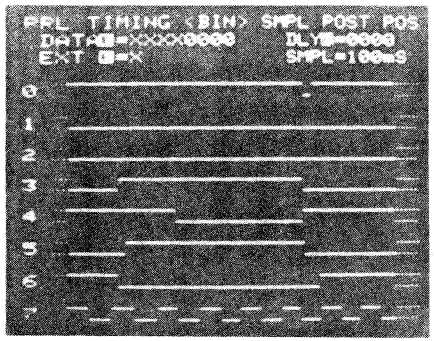


Reverse Mode

Fig.55

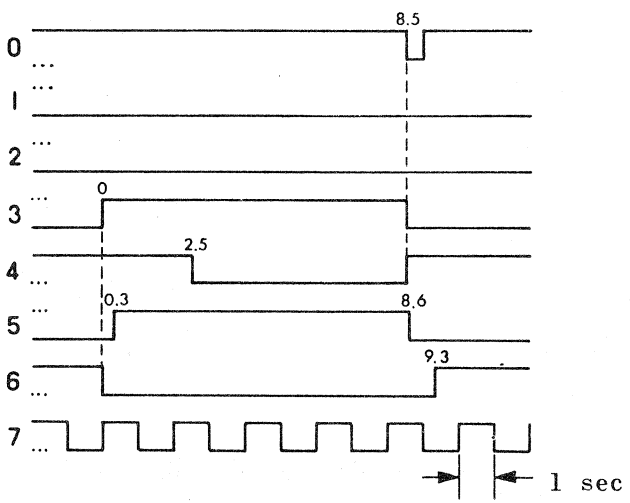


Measuring Point		Signal
Q201	⑥	Stop
		Forward
Q201	⑭	Reverse
Q226	ⓒ	Pad Solenoid
Q224	ⓒ	Holding Solenoid
Q		Motor Relay
P		Forward-Reverse Relay

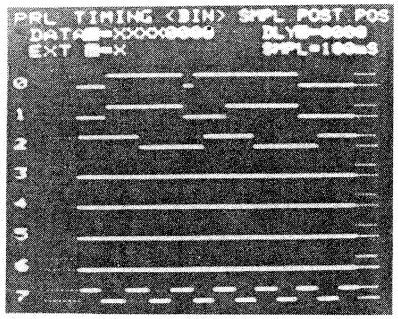


Reweind Mode

Fig.56

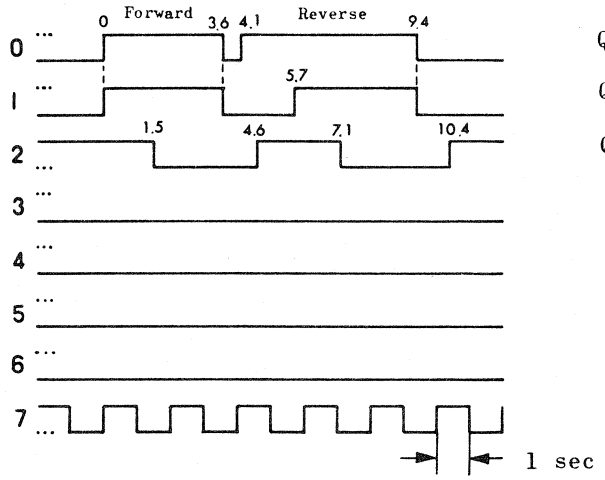


Measuring Point		Signal
Q201	⑥	Stop
		Forward
		Reverse
Q201	⑮	Reweind
Q228	ⓒ	Magnetic Clutch
Q		Motor Relay
P		Forward-Reverse Relay

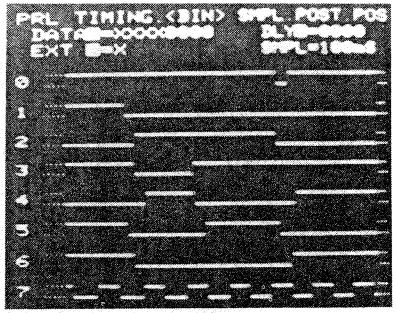


Signal Delay Position
At Forward ↔ Reverse Direct Change

Fig.5.7

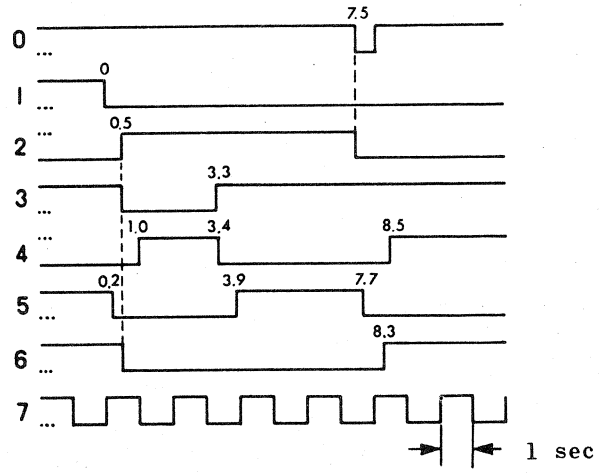


Measuring Point		Signal
Q232	(E)	Signal Delaying Circuit
Q232	(C)	Signal Delaying Circuit
Q224	(C)	Holding Solenoid



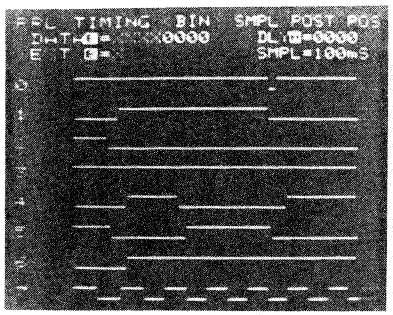
Forward → Reverse Direct Change

Fig.58



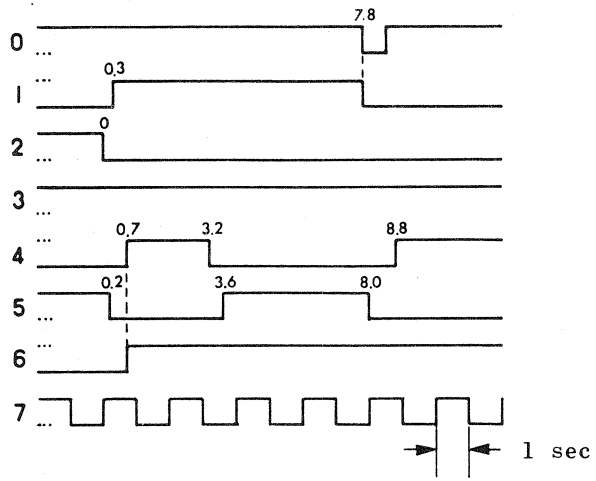
Measuring Point		Signal
Q201	(6)	Stop
Q201	(15)	Forward
Q201	(14)	Reverse
Q226	(C)	Pad Solenoid
Q224	(C)	Holding Solenoid
Q		Motor Relay
P		Forward-Reverse Relay

III-2 Control Circuit

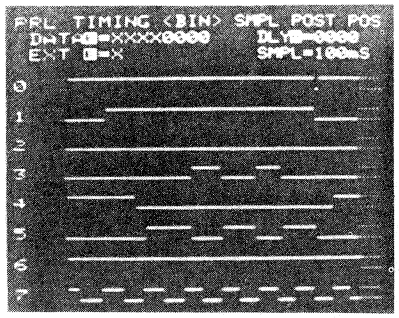


Reverse → Forward Direct Change

Fig.59

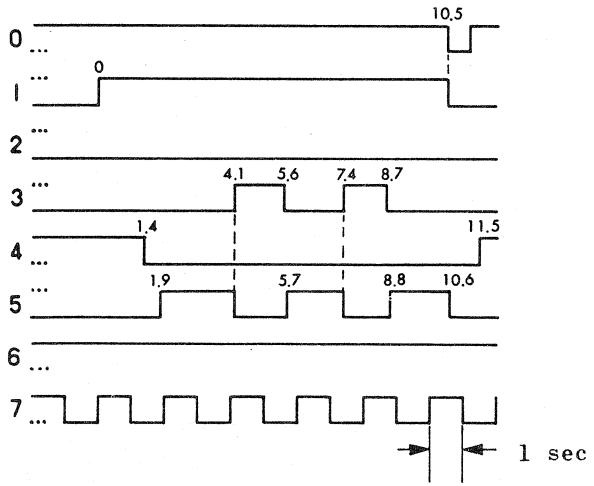


Measuring Point		Signal
Q201	⑥	Stop
Q201	⑬	Forward
Q201	⑭	Reverse
		Pad Solenoid
Q224	Ⓒ	Holding Solenoid
Q		Motor Relay
P		Forward-Reverse Relay



Forward → Pause

Fig.60

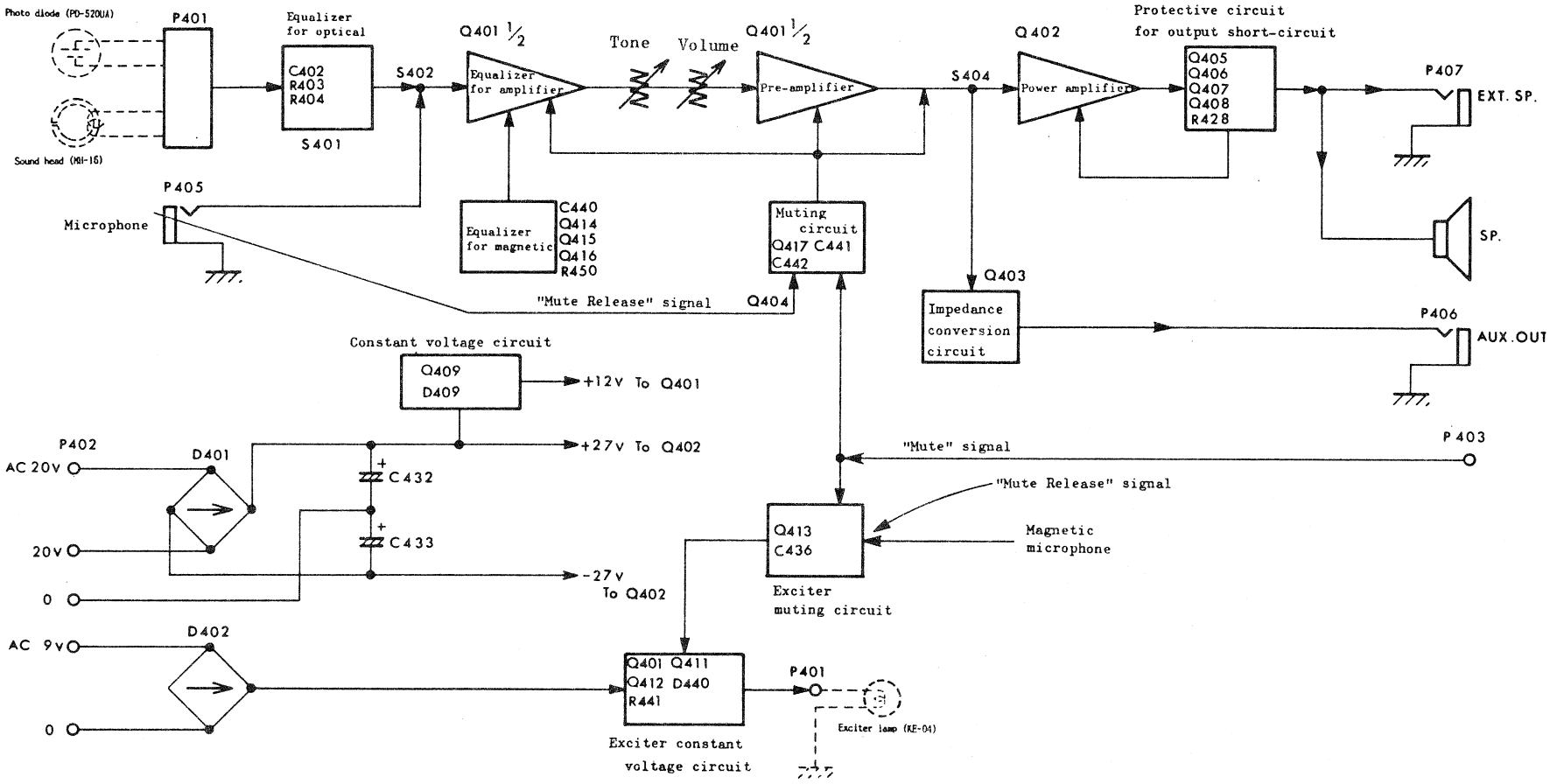


Measuring Point		Signal
Q201	⑥	Stop
Q201	⑬	Forward
		Reverse
Q201	⑩	Pause
Q224	Ⓒ	Holding Solenoid
Q		Motor Relay
P		Forward-Reverse Relay

Ⅲ－3 Amplifier Circuit

This is an all IC amplifier with the rated output 25 W and the maximum output 30 W. The power IC (STK080) in the amplifier is driven by two power sourses (+ and -). The + power source with 12 V constant voltage is used as the power source for pre-IC. The equalizer amplifier and preamplifier are of 1-chip composition using 2 ch IC (TA7325P), having the gain of 40 dB respectively.

Ⅲ-3-1 Block Diagram for Amplifier Circuit



Ⅲ－3 Amplifier Circuit

Ⅲ-3-2 Signal Transfer for Optical Reproduction

The signal from solar battery (with load resistance: 22 k Ω) has its high zone uplifted (approx. 10 kHz + 4 dB) by the equalizer circuit composed of C402, R403 and R404, and amplified further (approx. + 40 dB) by the equalizer amplifier before entering into tone control circuit. The tone control circuit is a C-R type tone circuit and is used in numerous 16mm amplifiers. The circuit is a TREBLE variable circuit, and has the property (response) of max. + 5 dB, min. -10dB at 10kHz.
The signal, after passing through the tone circuit, gets into preamplifier to undergo flat amplification approx. + 40 dB before entering into power amplifier. The signal, amplified by the power amplifier, then passes through R 428(0.47Ω) before reaching the speaker. The R 428 is a resistance to detect the excess current of the output line when the output (sperker) is shorted.
Refer to page -- for short circuit protective circuit.

Ⅲ-3-3 Signal Transfer for Magnetic Reproduction

The signal from magnet head (with load resistance: 100 kΩ) undergoes LC resonance in C439 (1000 PF) to uplift 9 kHz. The semi-fixed resistance R458 (50k-B) located in series with C439 is a damping resistance, and adjusts the uplifting quantity (rate) of 9 kHz. The equalizer for magnetic reproduction from the equalizer curve with time constant of 70 μs by using the NFB (negative feed back) circuit of the equalizer amplifier. This circuit is composed of C440, R450 and R408, and increases the gain at 400 Hz signal reproduction by 15 dB higher than at optical reproduction by shorting R443.
The change-over from equalizer circuit for optical reproduction to equalizer circuit for magnetic reproduction and vice versa is carried out by means of the transistors Q414, Q415 and Q416. The signal transfer after the signal passes through the equalizer amplifier is the same as in the case of signal transfer for optical reproduction.

Ⅲ－3 Amplifier Circuit

Ⅲ-3-4 Microphone Circuit

When the microphone is inserted into the microphone jack (P405), the switch of S402 changes the circuits then cuts off the signal for optical and magnetic reproductions and connects the microphone circuit. It also breaks off the power source to the transistor (Q414) for magnetic equalizer circuit change-over, and composes the equalizer circuit special to the microphone. Furthermore, since Q401 is turned to OFF due to the muting function in cases other than forward projection, the S402 "-1" also turns Q404 to ON and grounds the muting signal in order to cut off the muting circuit.
When the exciter lamp is lit up, the base of Q411 is grounded to extinguish the lamp by turning Q413 in the exciter circuit to ON.

Ⅲ-3-5 Auxiliary Output Circuit

The auxiliary output terminal (P406) transmits signal by means of the jack with size ϕ3.5mm. The signal then carries out impedance conversion of the preamplifier output by means of 1-step emitter follower circuit, corresponding to the load of 600 Ω. The optput level can by varied by the VOLUME, with max. 0 dBm obtainable at the load of 600 Ω.
When the auxiliary output terminal is used, the S404 changes over and the power IC is cut off so that no sound comes from the built-in or/and external speaker.

Ⅲ-3-6 Exciter Lamp Circuit

This circuit forms 4 V power source for exciter by means of the constant voltage circuit (Q410, Q411, Q412 and D410。
The 4 V emitter output of Q410 can be adjusted (regulated) by means of the semi-fixed resistance R441 (1k-B). The circuit, getting interlocked with sound muting circuit, also turns the exciter lamp on or off. This is done by turning the output of Q410 to ON or OFF by controlling the base voltage of Q411 in constant voltage circuit by means of Q413. The exciter lamp is made to extinguish instantaneously and to light up gradually with the time constants of C436 and R437, thus carrying out muting by means of exciting lamp as well as the other muting circuits for preventing unfavorable sound from the speaker.
The exciter lamp is lit up only during forward projection.

Ⅲ-3-7 Muting Circuit

Muting signal is transmitted from the pin ⑪ of Q201 in control circuit. This signal is "L" (low) only for FORWARD mode; for other modes it is "H" (high).
The signal transmitted from ⑪ of Q201 passes into amplifier and exciter circuits through P403. In amplifier circuit, the signal transfers into the pin ⑨ of Q401 (TA7325P). This circuit is used because when a voltage over 0.9 V is applied in the pin ⑨ of Q401, it turns the power (output) to OFF by cutting off the bias circuit in the IC. However, since this circuit alone can not prevent the unfavorable sound from the speaker, muting is carried out by turning Q417 to ON. The above circuits are set not to operate when microphone is used at modes other than FORWARD.
Refer to "Microphone Circuit" on preceding page.
The signal in the exciter circuit transfers to the base of Q413, grounding the base of Q411 by turning Q413 to ON and then turning Q410 to OFF. It also mutes the exciter, when microphone is used, by turning Q413 to ON. Fig. 61 shows the timing chart for mute signal (upper curve), exciter voltage (center curve) and sound output (lower curve). The points of measurement are ① of P403 for mute signal, emitter of Q401 for exciter voltage and SP. OUT for sound output.
When muting circuit is turned to ON (left-hand-side in Fig. 61), the voltage of mute signal rises up, muting the exciter first and then (shortly later) the sound output. This delay of approximately 0.1 second is due to C441 and C442 for the countermeasure against unfavorable sound.
When muting circuit is turned to OFF. (i.e. when muting is released) as shown on the right-hand-side of Fig. 61, the sound and exciter rise up approximately 2 seconds after the voltage of mute signal drops to "L." This delay is for eliminating the sound irregularity at the time of rise of flywheel.

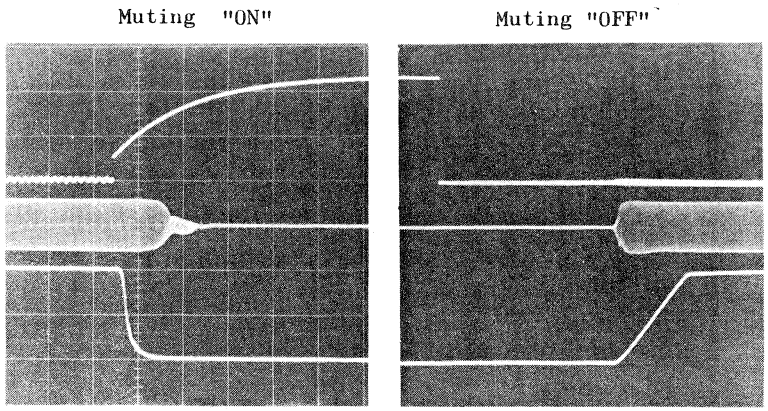


Fig.61

Ⅲ－3 Amplifier Circuit

Ⅲ-3-8 Speaker Safety Circuit

Most of the conventional projector amplifiers, with output less than 20 W, could be safely protected from power short circuit simply by means of the fuse because of the large internal endurance of the IC. However, since the 30 W output of this projector makes the internal endurance of power IC inadequate, the projector is provided with a current control type electronic safety circuit, the function of which is described below.

Since this circuit is vertically symmetrical with the pin ⑦ of power IC (STK 080) and carries out same function, only half cycle of the circuit will be described here.

When the speaker output is grounded (earthed), the short-circuit current flows through R428 (0.47 Ω). Supposing this current to be 2.6 A, a voltage of 1.2 VRMS (0.47Ω x 2.6 A = 1.2 V) generates at both terminals of R428, and since Q406 is not turned to ON, this voltage gets divided in R427 and R456, causing the current to flow to the base of Q405 and turning Q405 to ON. This grounds the pin ⑨ of Q402 and distributes the base current of IC driver, and thus the output current of IC is controlled (limited) to 2.6 A. Fig. 62 shows the power source and signal curves when output is shorted. The points of measurement are the pin ⑧ of Q402 at positive side of the power source (0.5 V/DIV) in the case of upper curve, the pin ⑦ of Q402 at 400 Hz signal (VOL-MAX) in the case of center curve and the pin ⑥ of Q402 at negative side of the power source (0.5 V/DIV) in the case of lower curve.

The power current at one side, with the input 40 dB VOL-MAX (22 VRMS - 8Ω), is 1.2 A AC (and is 0.8 A AC at the rated value of 14 V RMS-8 Ω). Here, if both terminals of the load (8 Ω) are shorted, the sound output (actually of 1.2 V RMS) gets virtually reduced to zero, as shown in the right-hand-side of Fig. 62, with the power current at one side in this case being 1.3 A. Furthermore, there is no change in the power ripple. In other words, the power current is controlled to 1.3 A by means of the safety circuit, which activates and controls the output current of the pin ⑦ of Q402. Hence, the IC is safe from getting heated up and the power source fuse does not break off even when both terminals (ends) of speaker are shorted by mistake.

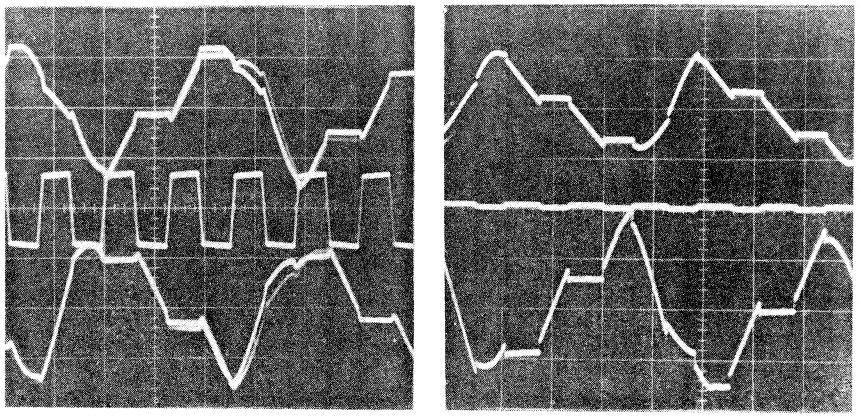


Fig.62

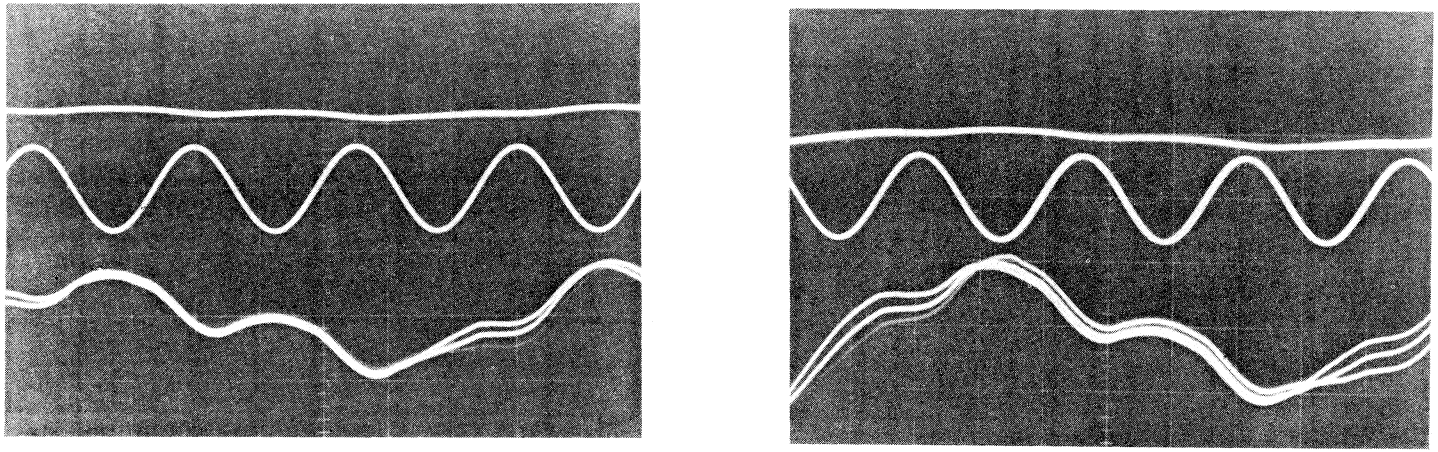
Ⅲ-3-9 Others

The positive power 27 V for amplifier is provided by the pin ⑧ of 8 P DIN jack (P301) for remote control. The maximum current capacity is·300 mA, and within this range it can also be used as the power source for other circits. However, when using for other circuits, use the external earth of DIN jack, not the pin ⑤ of DIN jack. Fig. 63 shows the curves of power voltage (upper curve), 400 Hz signal wave (center curve) and power ripple (lower curve) when 300 mA is passed.

When pin 8 of 8p DIN jack has no load

1 mSec/DIV

When 300 mA is passed

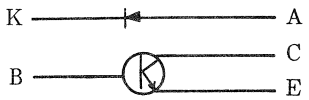


DC power voltage	5V/DIV	26.3V	⟶	25.0V	Upper curve
400 Hz SP output curve	Distotion	0.3%	⟶	0.4%	Center curve
Power ripple	0.5V/DIV		⟶		Lower curve

Fig.63

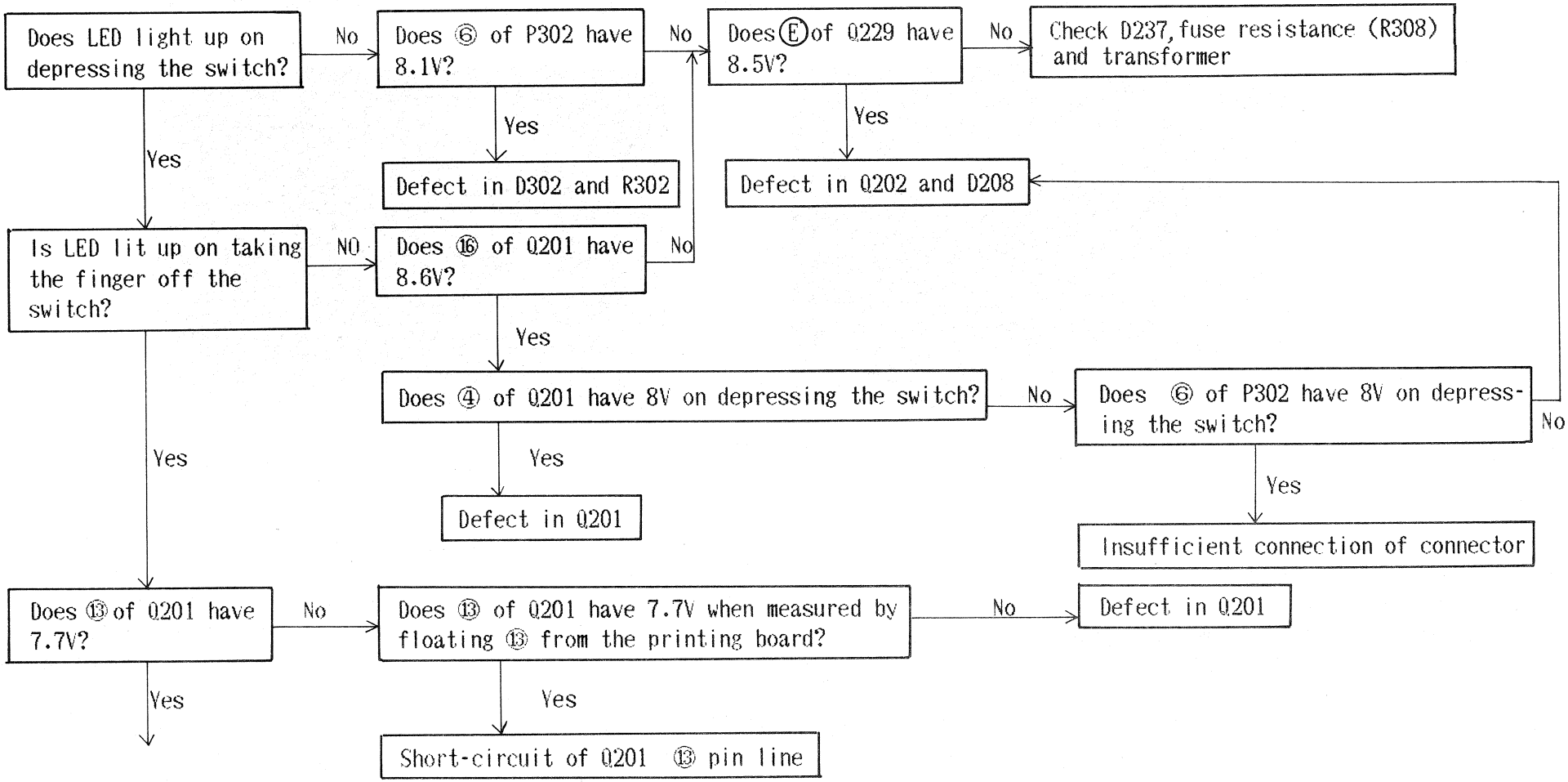
Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

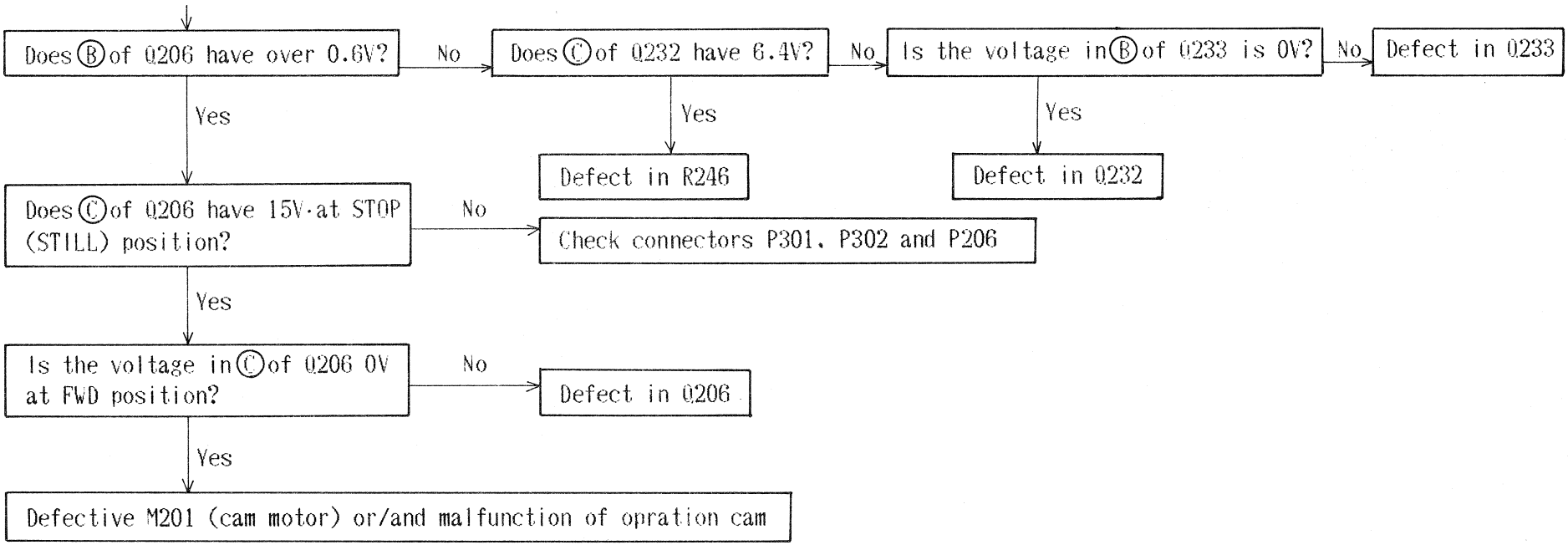
Notes: The numbers inside ○ in the sentences indicate the numbers of IC and connector terminals.
Ⓐanode of diode, Ⓚcathode of diode,
Ⓑbase of transistor, Ⓒcorrector of transistor,
Ⓔemitter of transistor.



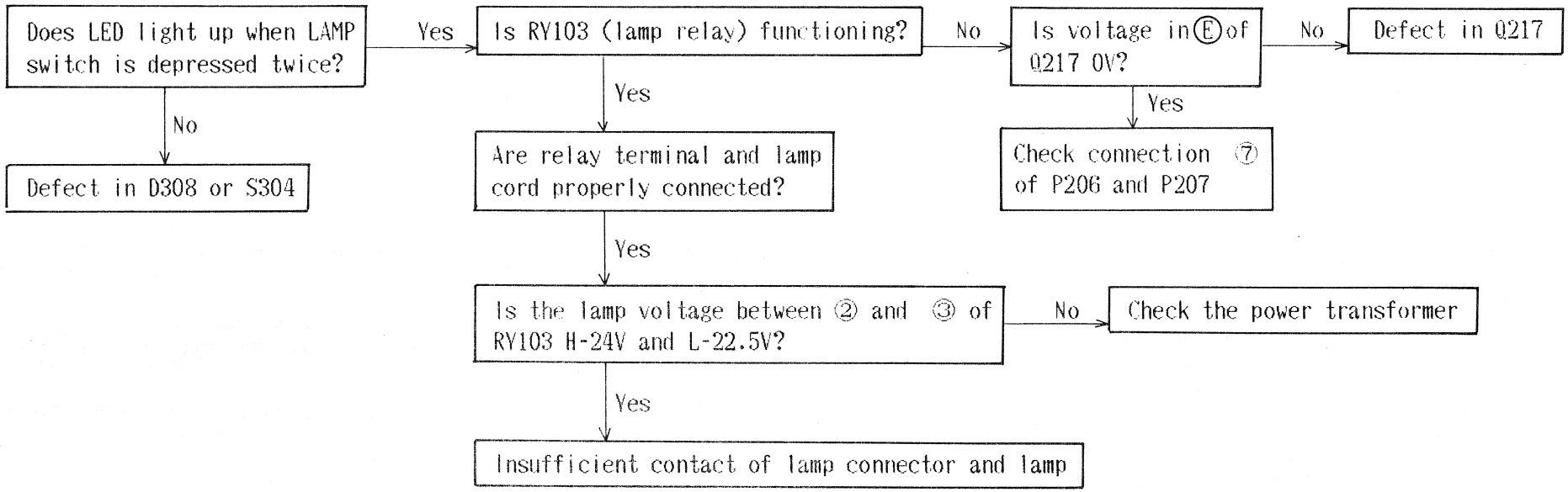
Ⅲ-4-1 Control Circuit Trouble-shooting

The circuit does not function even when FWD (REV) switch is depressed. (Check the connection of connectors P206 and P302.)



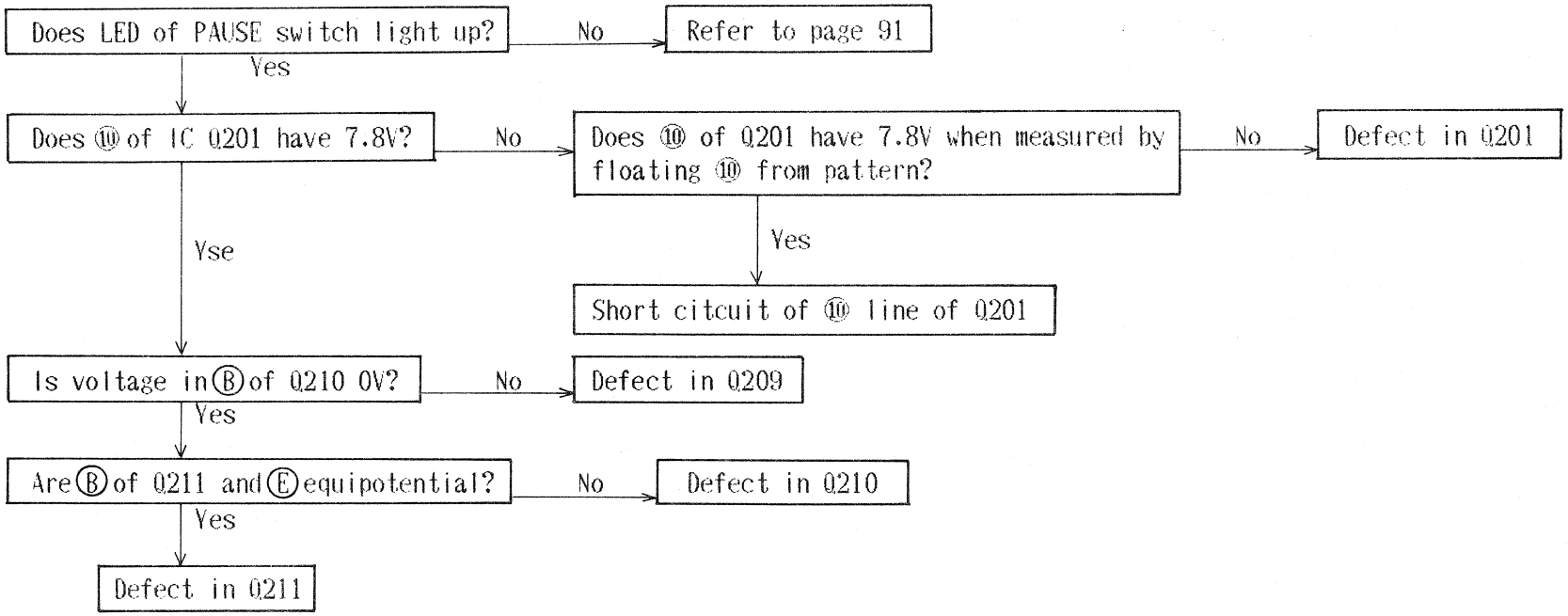


• Lamp does not light up even when LAMP switch is depressed (normal film feed)

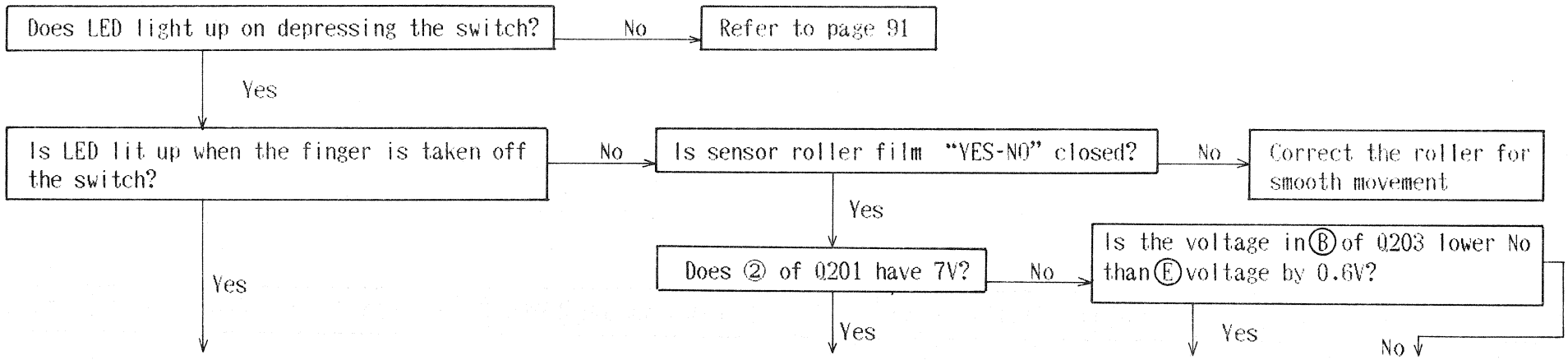


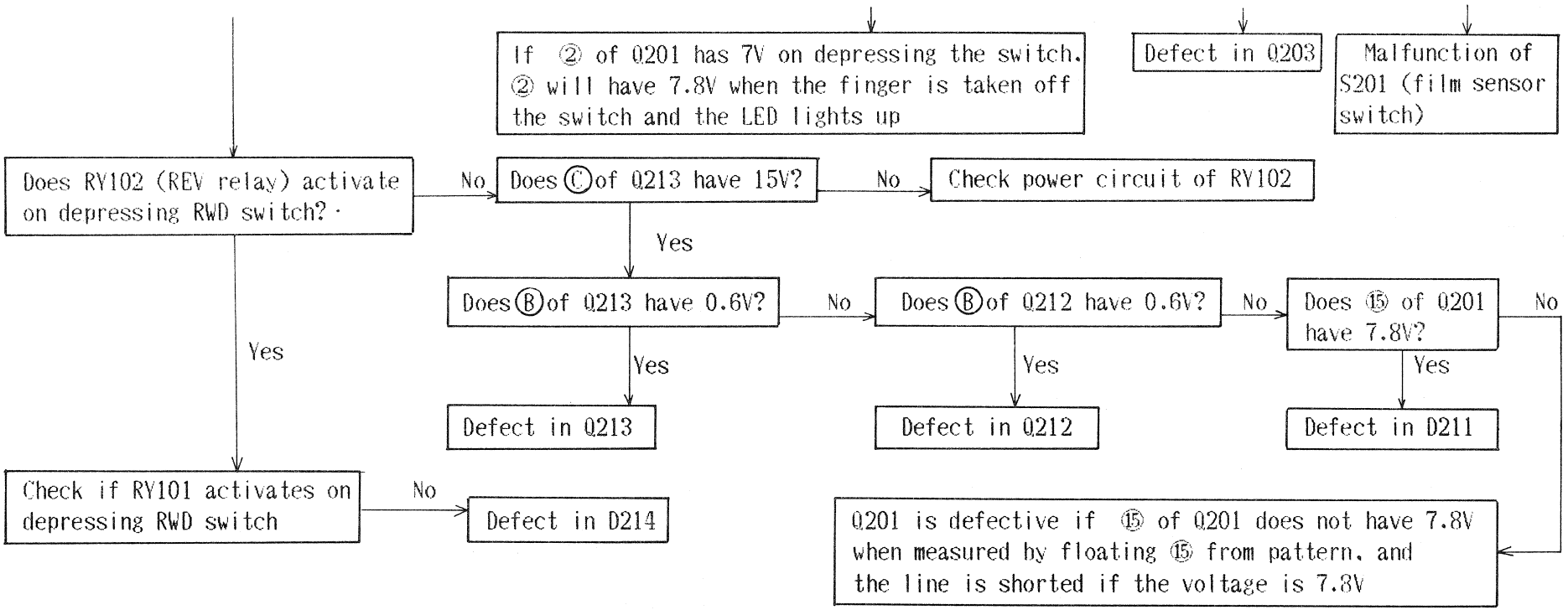
Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- Does not set to PAUSE

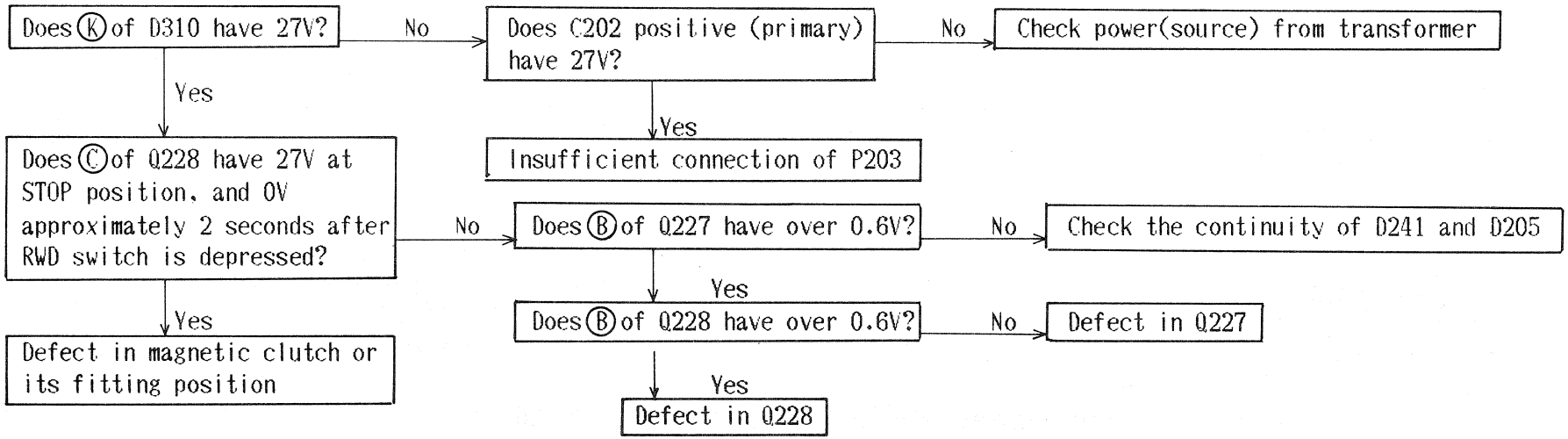


- Does not operate even when rewind switch (RWD) is depressed. (FWD and REV being normal)



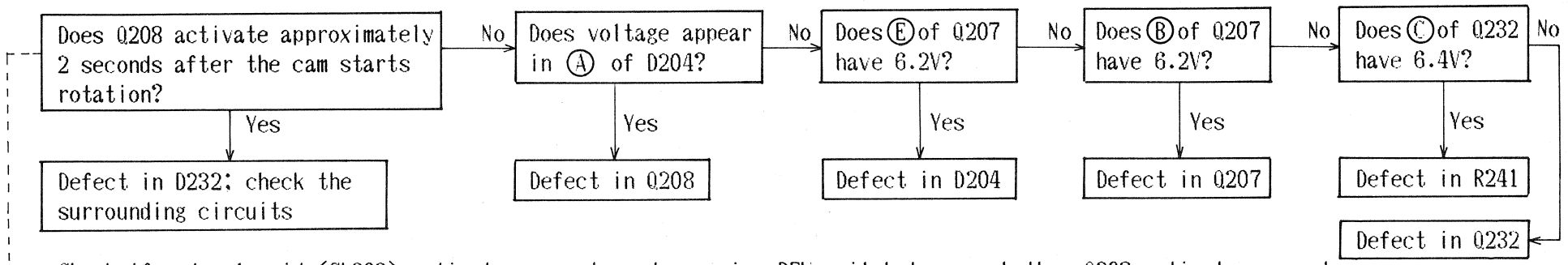


• Magnetic clutch (MC201) fails to function at rewinding

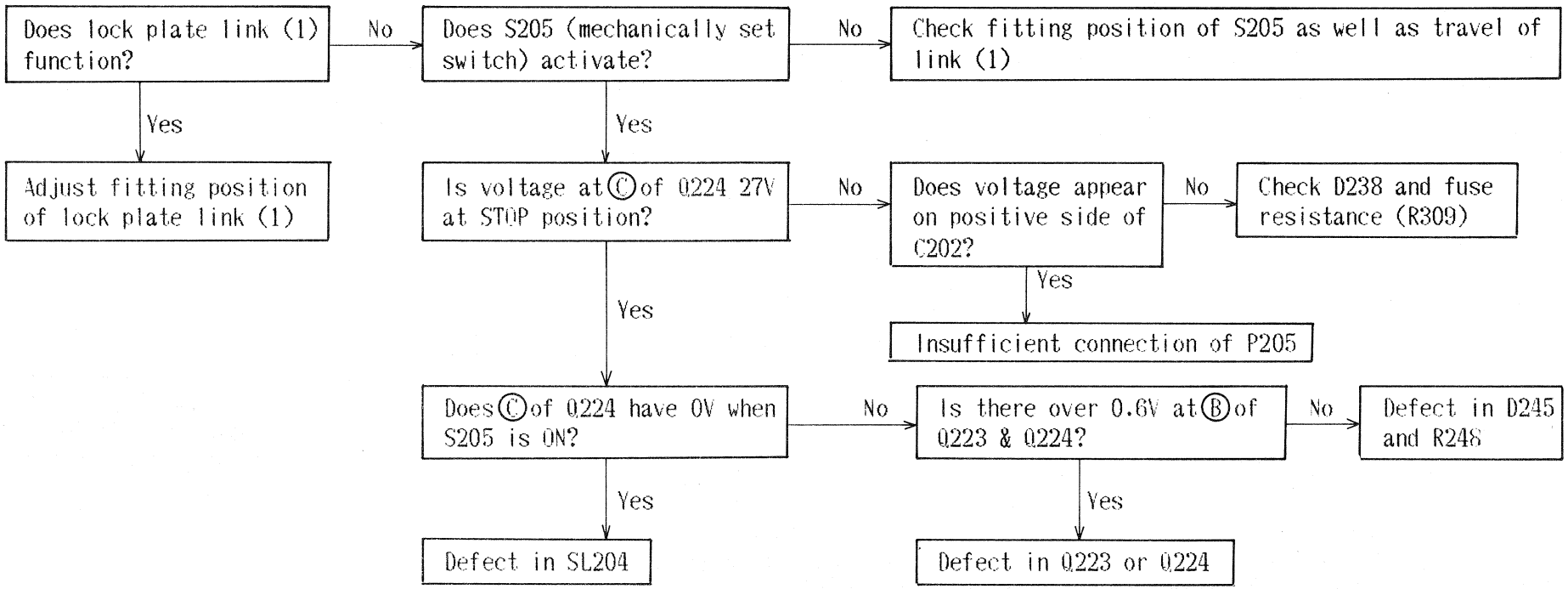


Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- Operation cam continues rotating

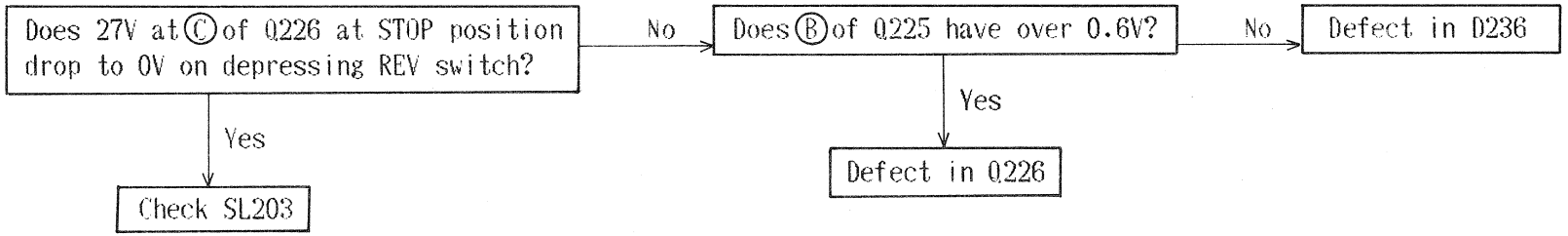


- Link does not lock.



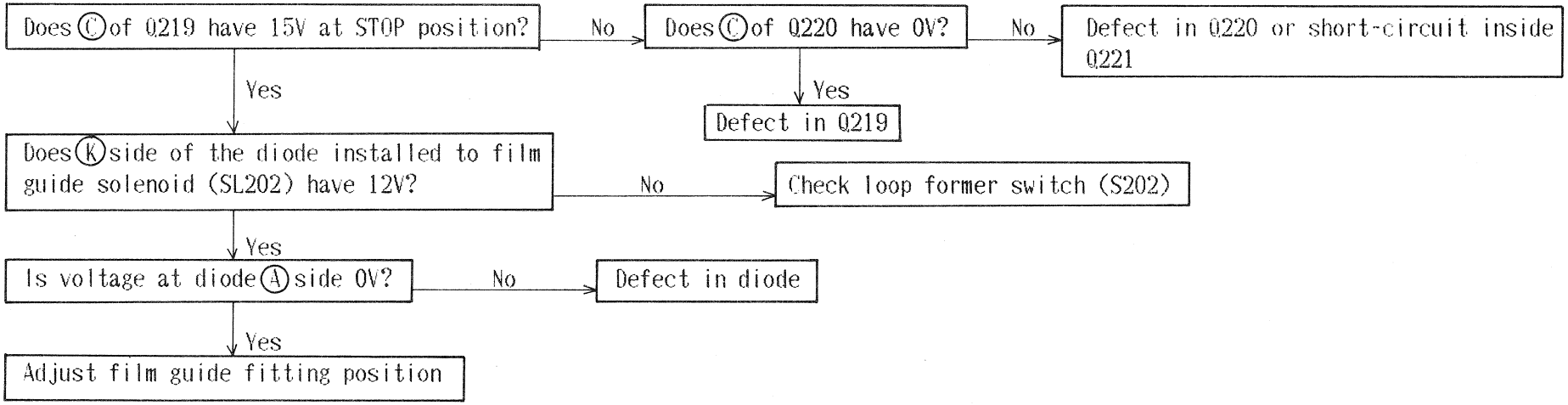
Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- SL203 (pad solenoid) does not draw at reverse projection.



- SL203 (pad solenoid) continues drawing at reverse projection → Defect in D233

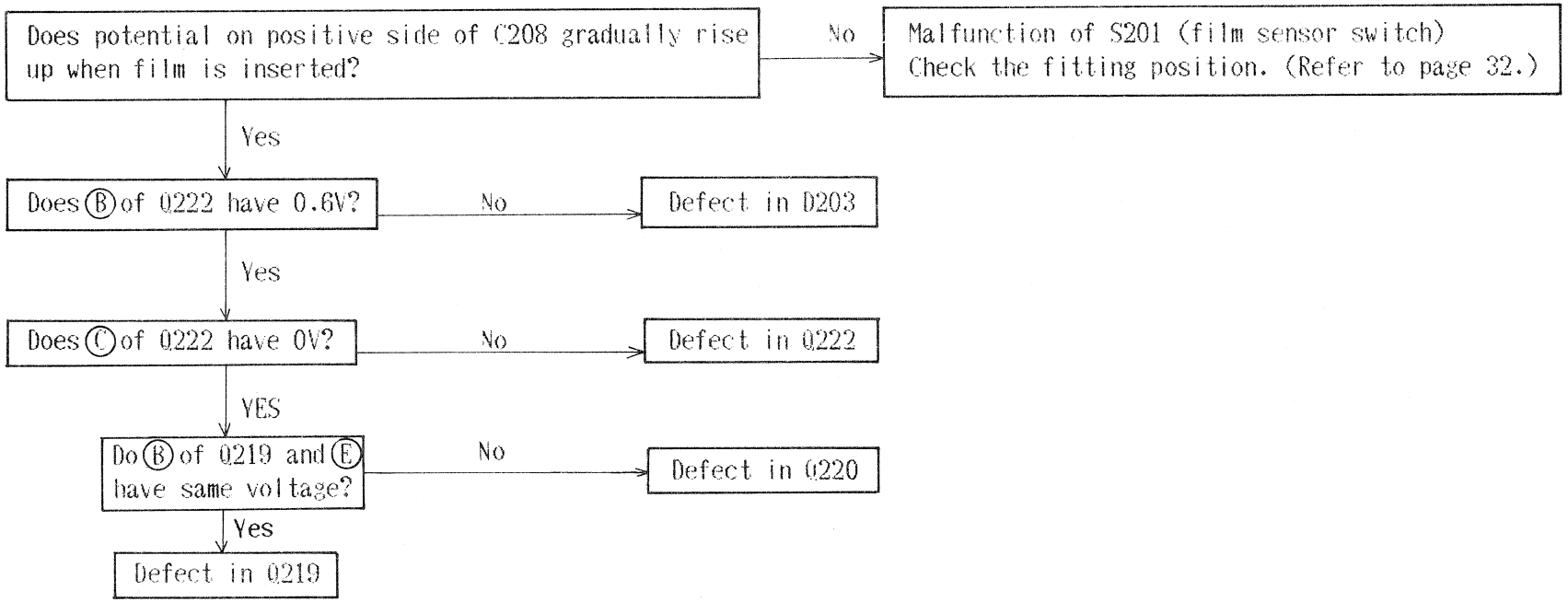
- Does not set to loading position even when LOOP FORMER is depressed (with forward/reverse being normal).



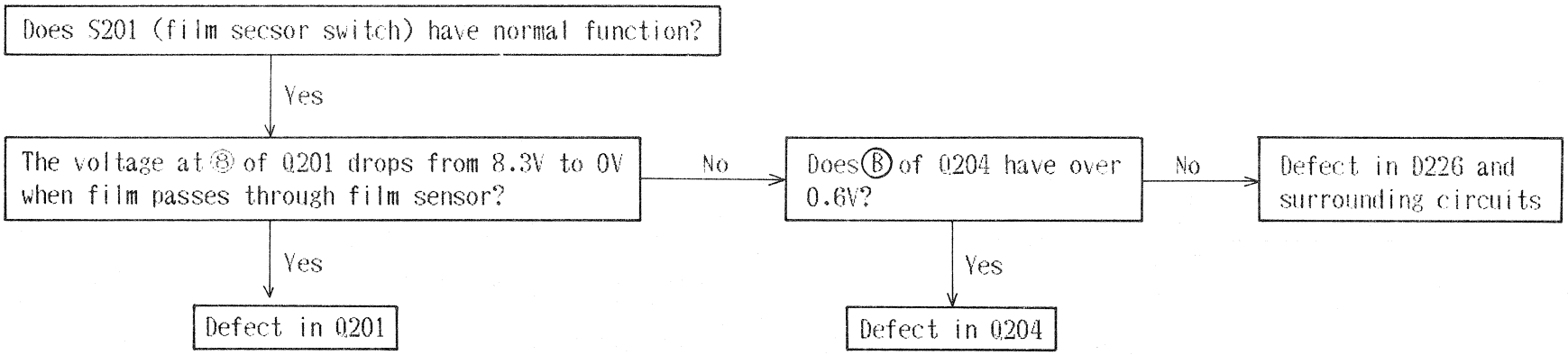
Adjust the film guide fitting position so that the film guide, at automatic loading, is drawn to the base frame side due to SL202 until the guide touches the ends (tips) of shaft lever guide roller (4) and shaft brake roller (3), without interfering the guide roller (4), holder sound lens, guide roller (1) on lever, guide roller (3), film guide pin, etc. Furthermore, adjust the fitting position of holding plate plunger film guide so that the winding section of SL202 and plunger comfortably fit with each other. It is, however, necessary (desirable) to replace the film guide itself when the gap between stopper i.e. shaft brake roller(3) and film guide, on pressing the holding plate plunger film guide fitting section at "automatic loading" position, is over 1mm, since in such case film guide is supposed to have large distortion.

Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- Automatic stop (timer stop) mechanism does not function.

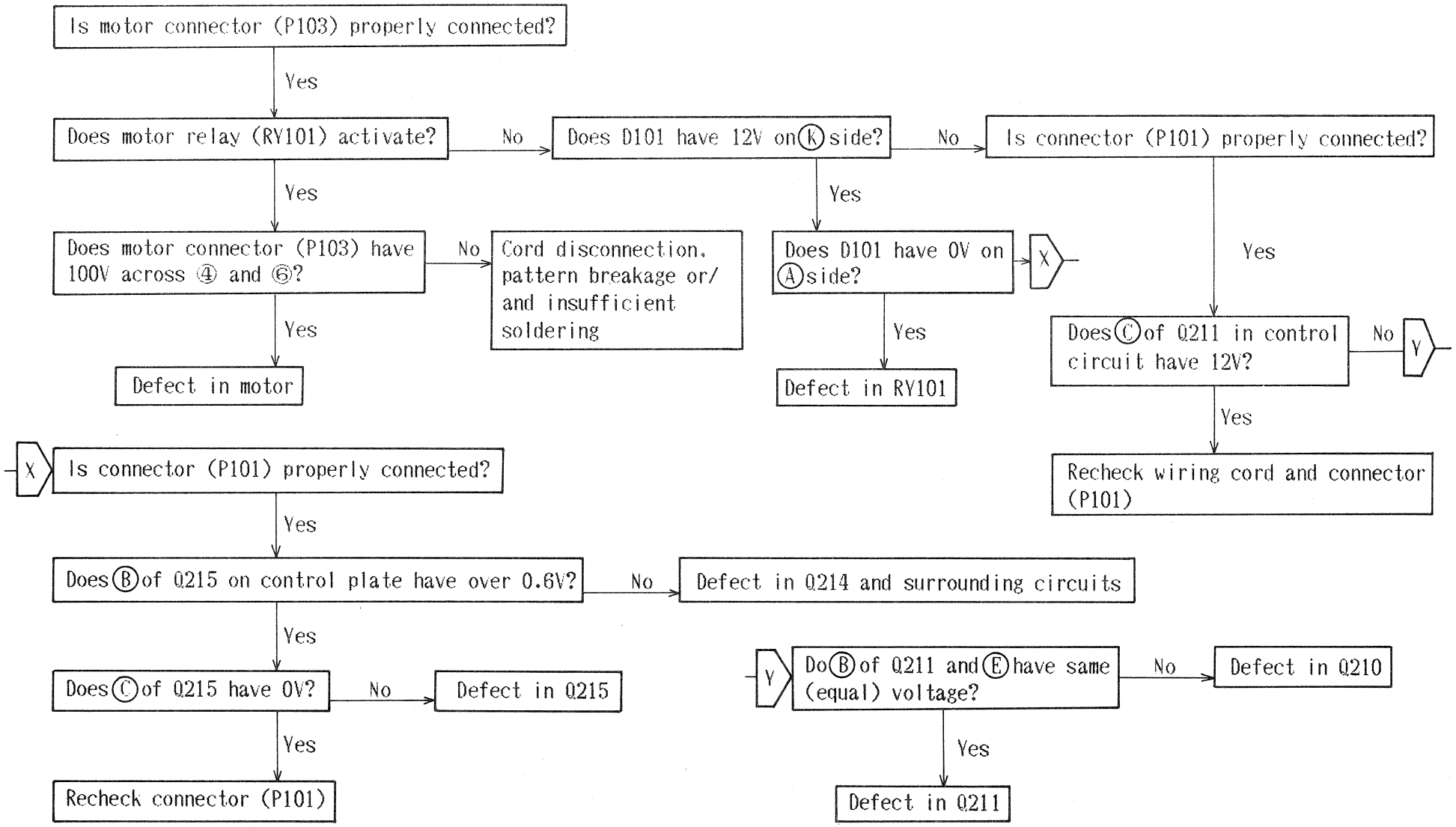


- AUTO STOP does not activate on completion of projection.



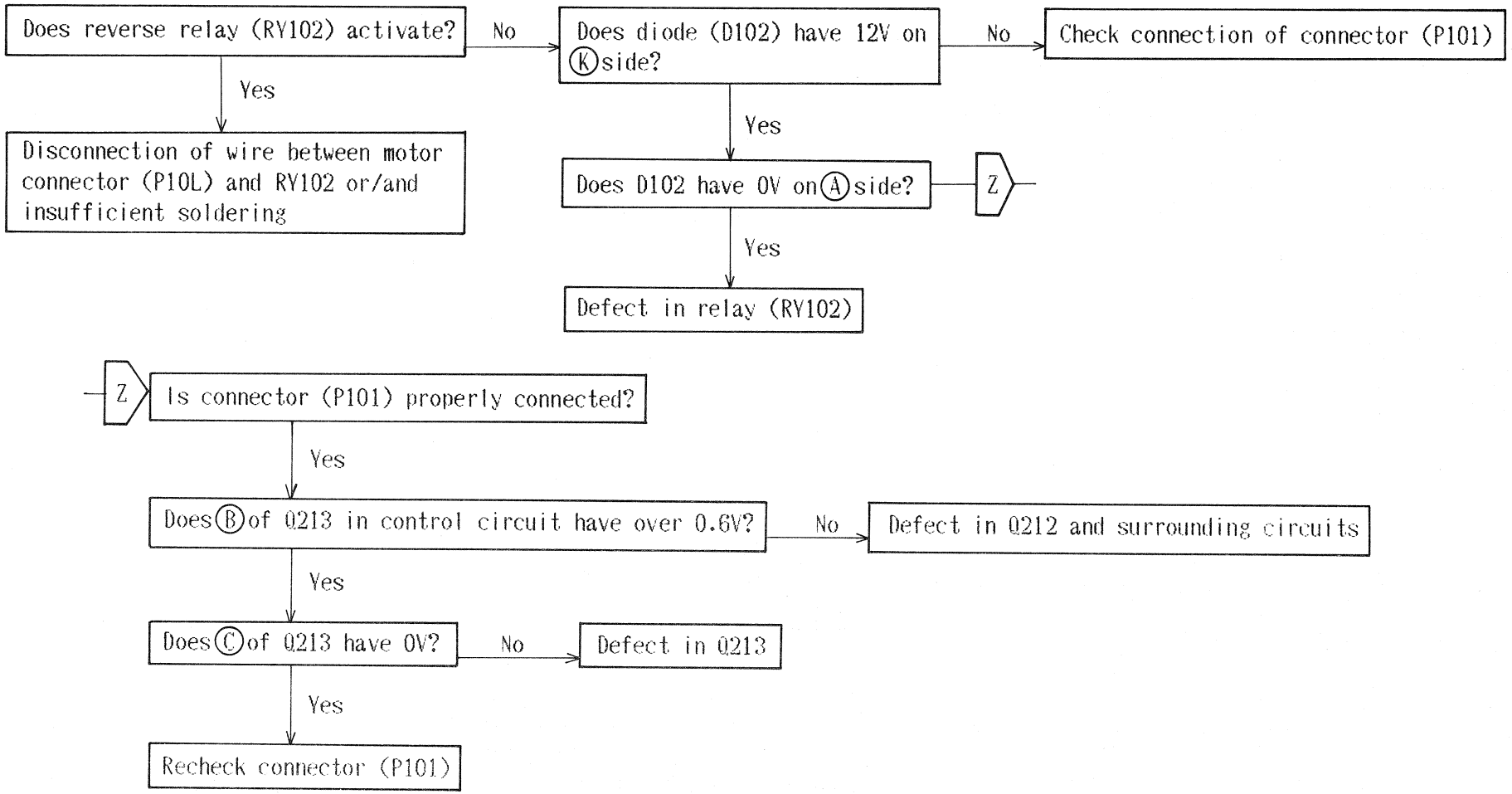
Ⅲ-4-2 Motor Circuit Trouble-shooting

- Forward (reverse) motor fails to operate (with links properly locked).



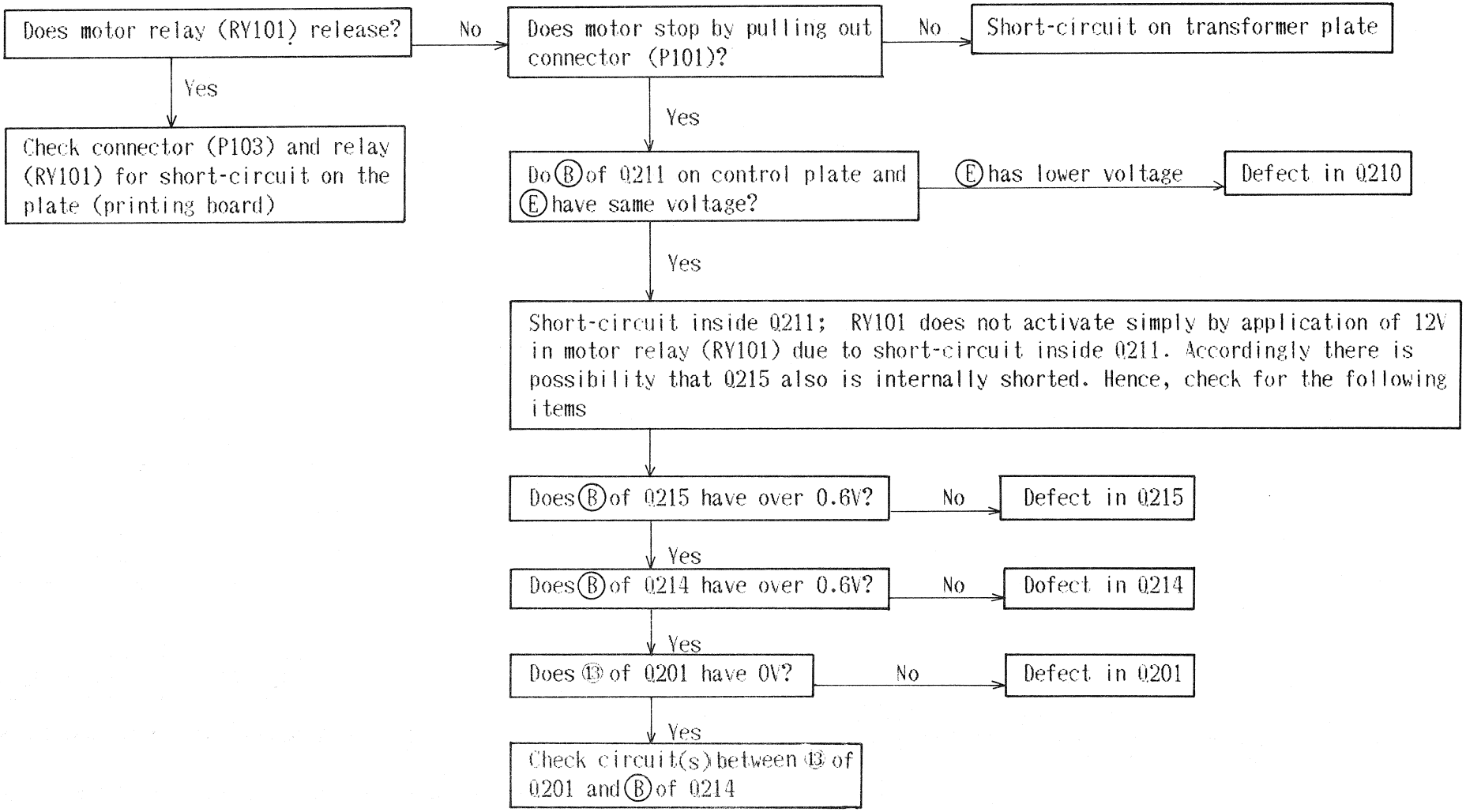
Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- Motor has forward (normal) rotation even when REV switch is depressed.



Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

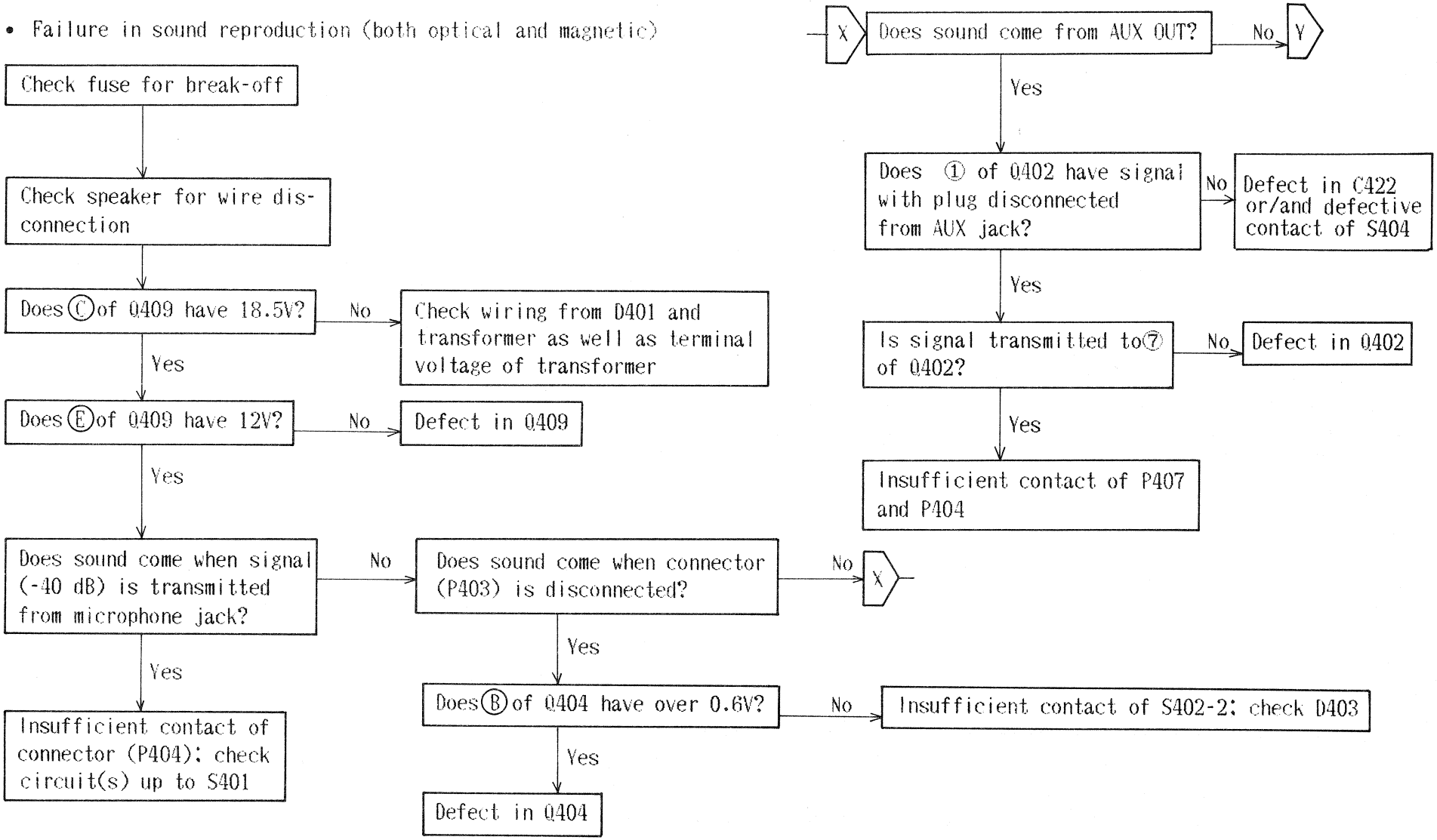
- Motor fails to stop (while links return to STOP positions).

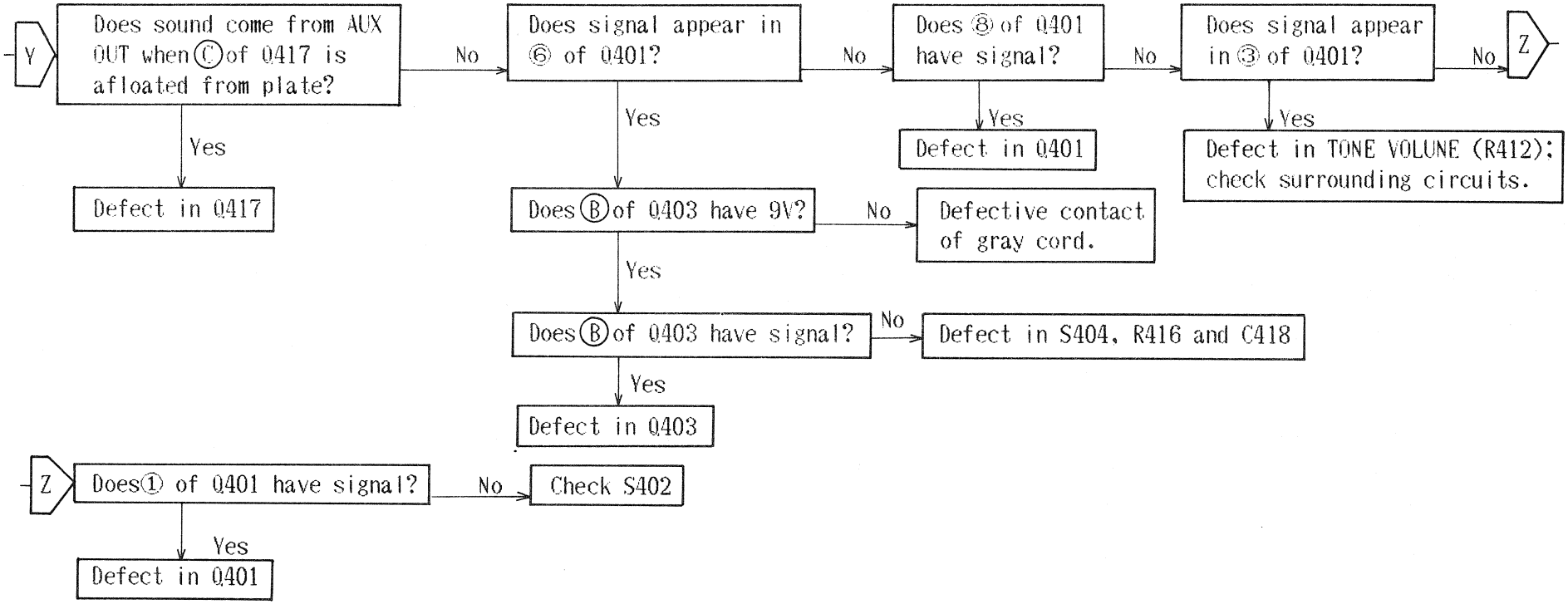


Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

Ⅲ-4-3 Amplifier Circuit Trouble-shooting

- Failure in sound reproduction (both optical and magnetic)





- Internal speaker fails to reproduce sound (sound reproduction is normal when external speaker is used).

Check voice coil of speaker for disconnection

↓

Check to see that cords are properly connected to speaker terminals

↓

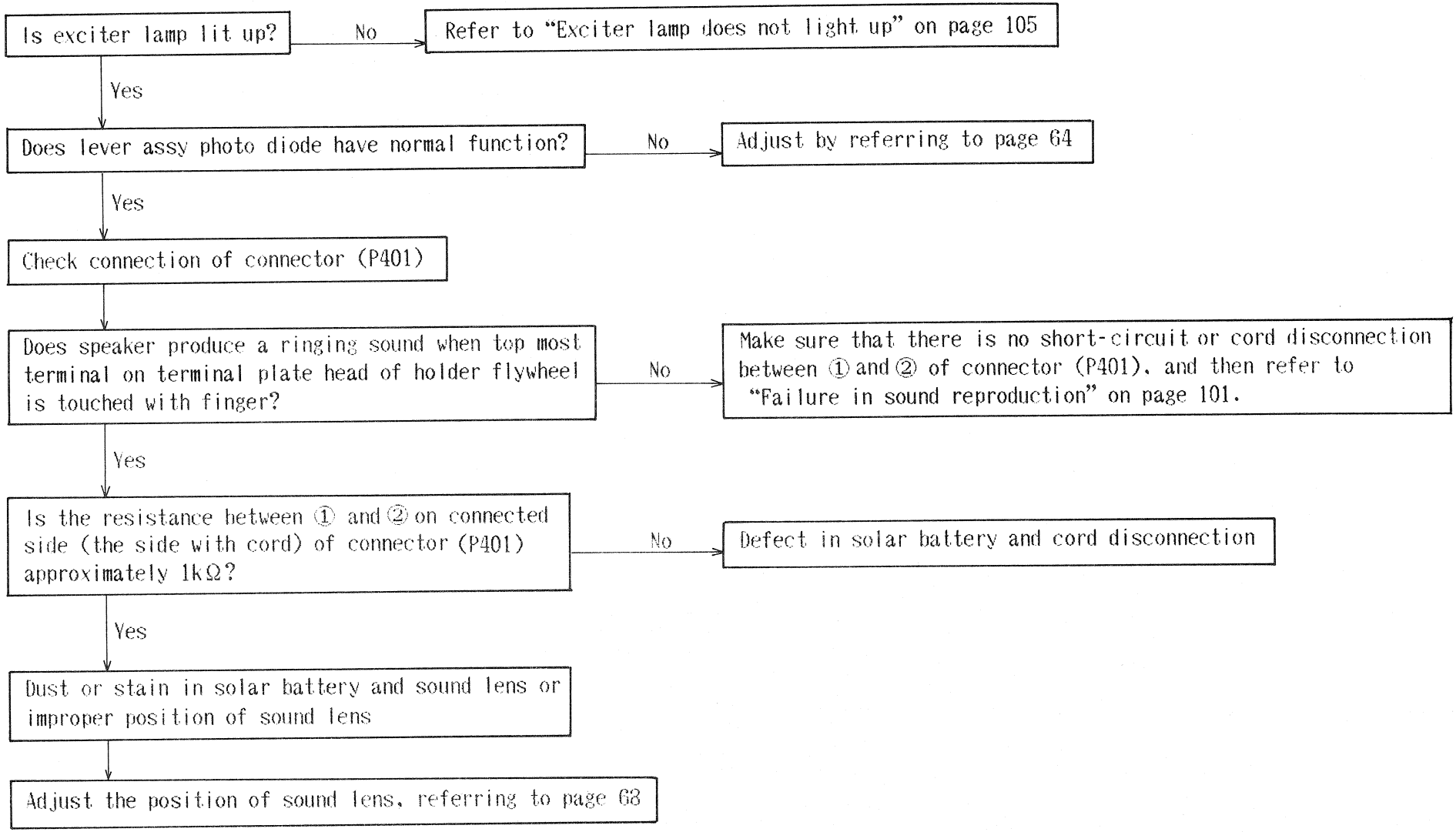
Check to see that connector (P404) is properly connected

↓

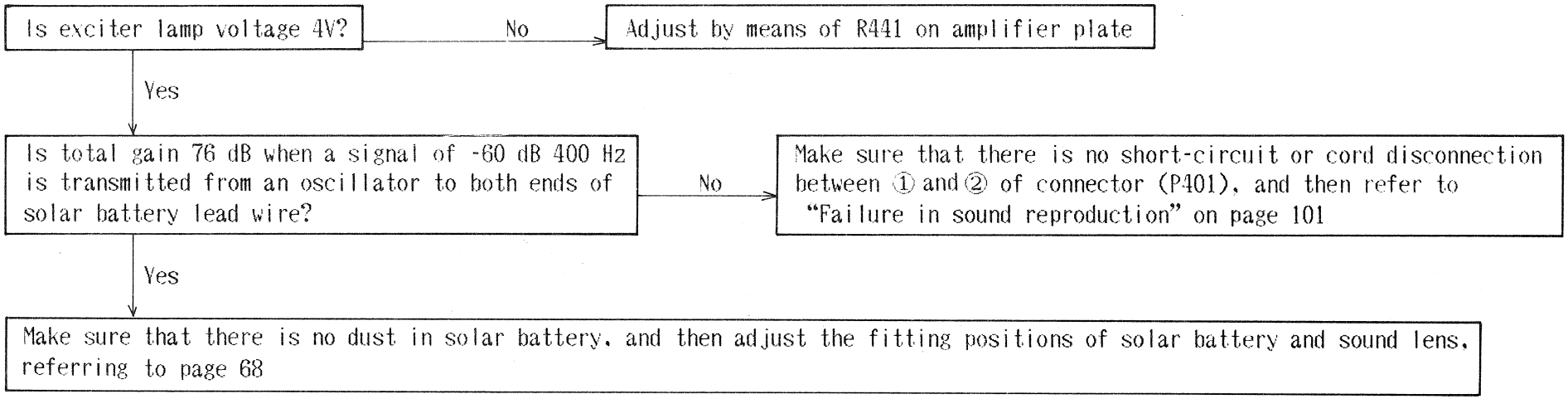
Check to see that switch circuit of external speaker jack (P407) has proper contact

Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

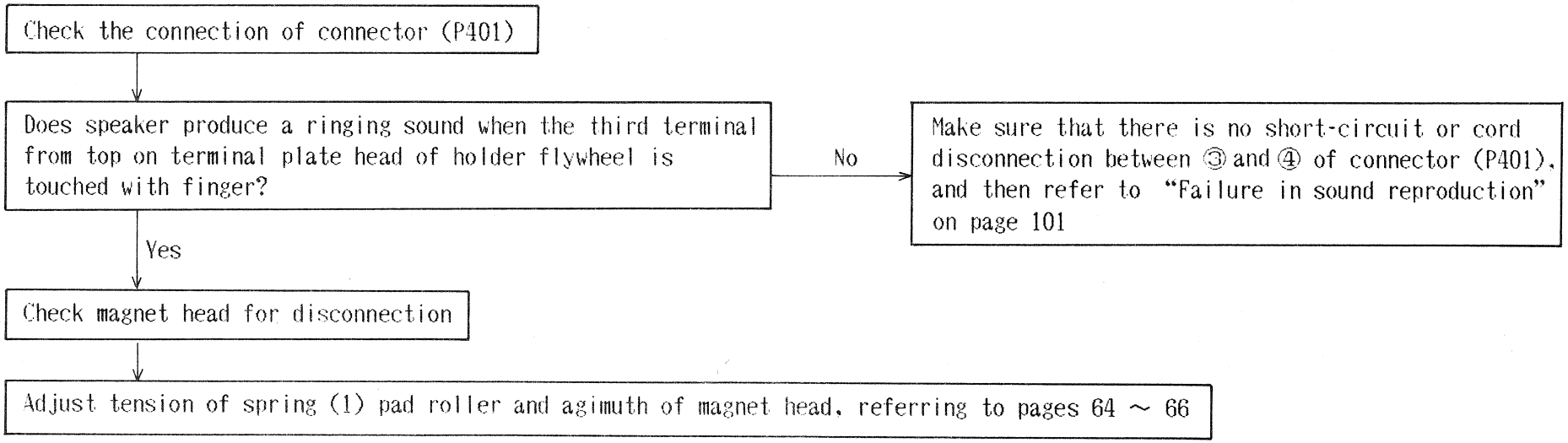
• Failure in optical reproduction (with normal magnetic and microphone sound reproduction)



• Optical reproduction sound is small (with normal magnetic and microphone reproduction sound).

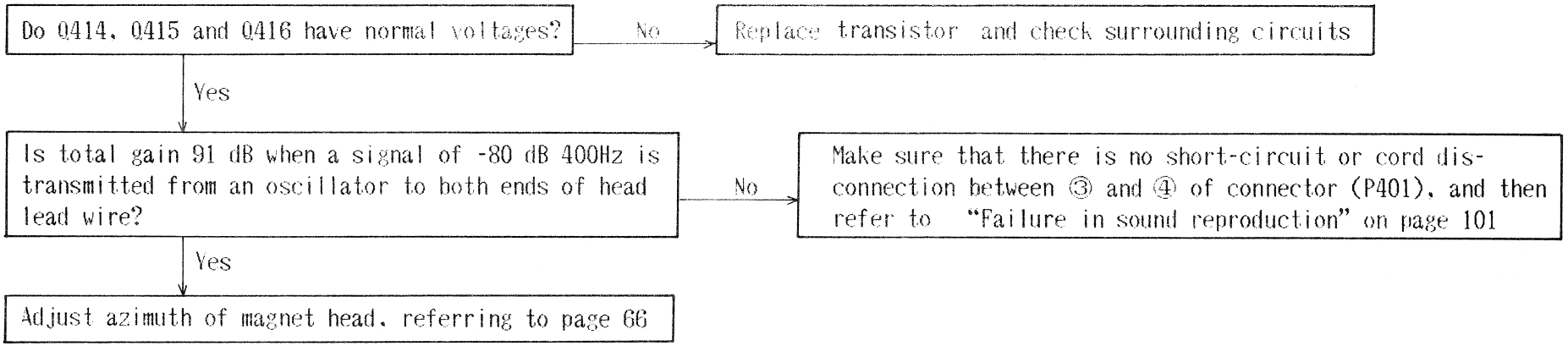


• Failure in magnetic reproduction (of sound)

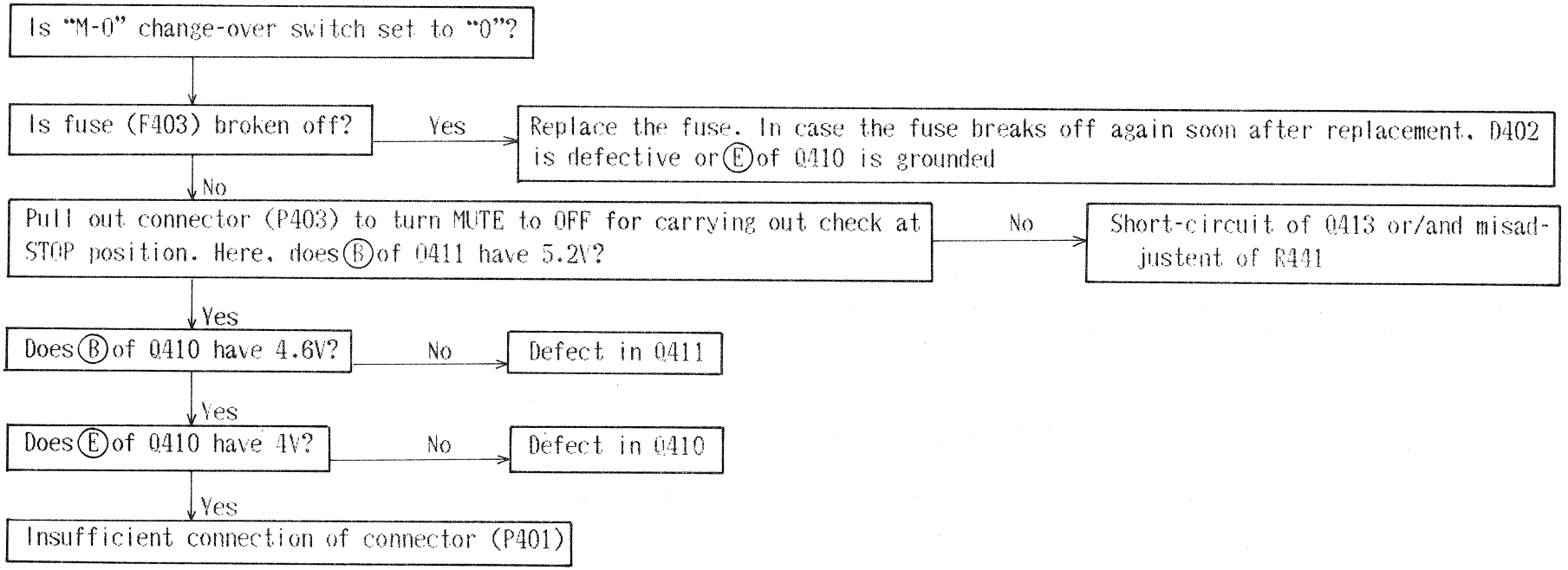


Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

• Magnetic reproduction sound is small (low).



• Exciter lamp does not light up. (Exciter lamp does not light at mode(s) other than FWD because of muting function).

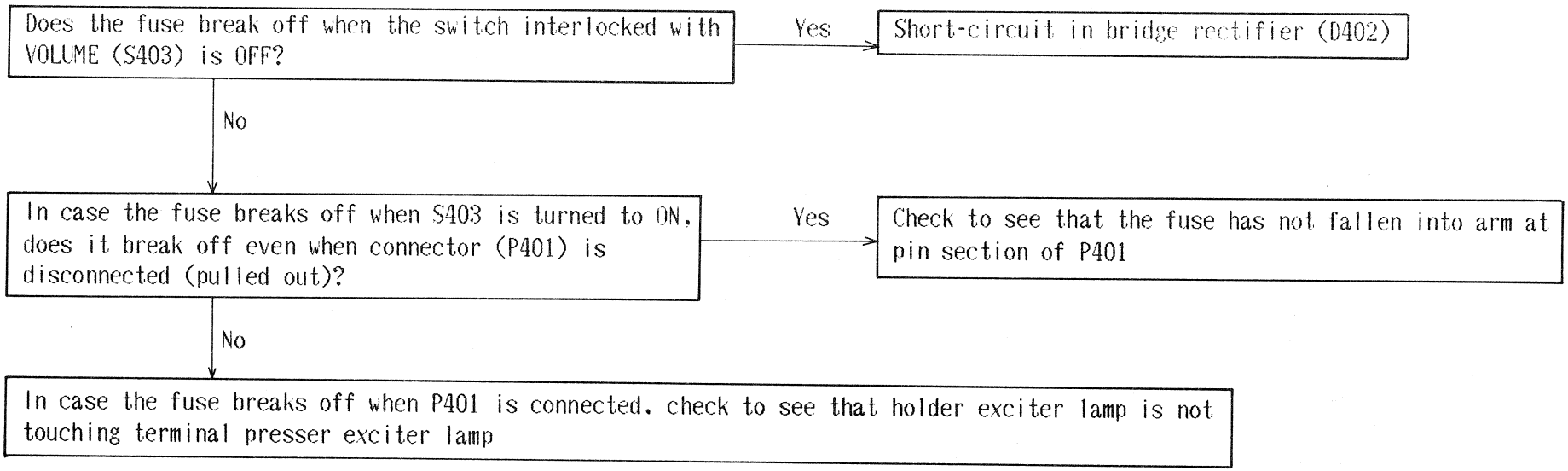


Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- Amplifier fuses (F401 and F402) break off.

Short-circuit in bridge rectifier (D401)
↓
Short-circuit inside the power IC (Q402)

- Exciter fuse (F403) breaks off.



- Sound does not come out when microphone is used (with opeical and magnetic reproduction being normal).

Defect in microphone itself or in microphone jack (P405), S402-1 and S402-2

Ⅲ－4 Electrical Circuit Trouble-Shooting Hints

- Noise at optical reproduction

Check to see that the earth (black cord) of solar battery is not excessively slackened

↓

Check to see that the shielding wire of connector (P401) on the shielding side is not excessively slackened

↓

Check to see that the shielding wire of terminal plate head on the shielding side is not touching the holder flywheel (i.e. the shielding wire is not grounded at two points)

↓

Check to see that the fitting screws of printing board amplifier and chassis are not slackened.

↓

Check Q410 and Q411 if exciter power source has excessive ripples

- Noise at magnetic reproduction

Check to see that the cancel coil fitting position is proper → Refer to page 64 to adjust the fitting position

↓

Check to see that the shielding wire of connector (P401) on the shielding side is not excessively slackened

↓

Check to see that the shielding wire of terminal plate head on the shielding side is not touching the holder flywheel (i.e. the shielding wire is not grounded at two points)

↓

Check to see that the fitting screws of printing board amplifier and chassis are not slackened

Ⅳ TABLE FOR TROUBLES

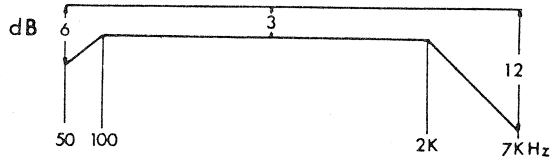
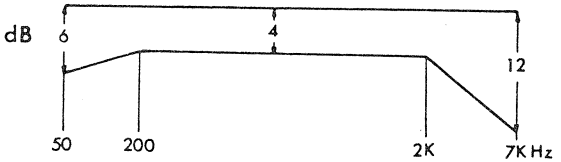
	Trouble	Page
Intermittent film feeding section	Screen turbulence (bouncing)	44,46,48
	Screen turbulence (back feed)	44,46,48
	Screen running (tailing of image)	44,46
	Film shifting	44,46
	Auto loop setter fails to fuction	38,62
	Loop restorer continues functioning	62
	Screen gets chipped	48
	Exposure	48
	Masking adjustment can not be made	48
	Still-run change-over can not be made	44
	Still-run change-over is not smooth	44
	Film gets burned at still projection	44
	Excessively large noise at film feeding	44
	Scratch (flaw) of film	32,38,48,56,58
	Auto stop does not activate at self-loading	32,97
Film thread slot section	Self-loading mechanism fails to function (motor does not rotate)	32
	Does not set to loading position even when loop former is depressed	96
	Self-loading mechanism continues operating	32
	Auto stop does not activate at self-loading	32
	Film gets caught during self-loading	48,97
	Failure in upkeeping of self-loading	32,58
Film take-up and rewinding section	Failure in take-up	40
	Take-up arm can not be fixed	40
	Failure in rewinding	36
	Rewind arm can not be fixed	36
	Failure in high speed rewinding	34,38,92,94
	Film droops at forward projection	36

	Trouble	Page
Sound section	Failure in sound reproduction	101
	Opticcal reproduction sound does not come out	64,66,103
	Defective optical reproducing sound	64,66
	Optical reproduction sound is small	64,104
	Magenetic reproducing sound does not come out	64,66,104
	Defective magentic reproducing sound	64,66
	Magentic reproduction sound is small	64,66,105
	Internal sperker fails to reproduce sound	102
	Amplifier fuses break off	105
	Exciter fuse breaks off	106
	Exciter lamp does not light up	66,105
	Noise at optical reproduction	107
	Noise at magnetic reproduction	107
	Improper S/N ration	64
	Sound does not come out when microphone is used	106
	Excessively large wow flutter	38,40,42,56,58
Motor, lamp and control circuit section	Motor fails to operate	34,52,54,58,91
	Motor fails to stop	100
	Motor does not change over from normal to reverse operation or vice versa	54,99
	Unstable projection speed	42,44,52
	Lamp does not light up	34,54,92
	Failure in change-over of lamp L-H	54
	Control circit fails to function	54,91-100
	Failure in reverse projection	34,58
	Mechanism unit does not set to projection	34
	Cam motor fails to operate	34
	Operation cam continues rotating	95
	Link does not lock	95
	Failure in pause mechanism	34,93

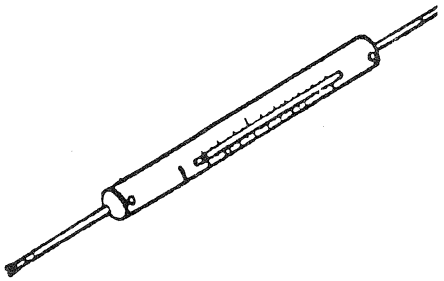
V TOLERANCE

Item		Tolerance	Remarks
Pressure of side presser spring		45 - 55g	Refer to page 50.
Protrudent lengh of claw tip		0.9 - 1.1mm	Refer to page 44.
Framing adjustable amount		3 : 7	Refer to page 50.
Unsteady picture in forwarding	upward/downward	less than 3mm	Project a registration film (P086) at 24 fps. The picture size is 1 meter width.
	rightward/leftward	less than 2mm	
Projector speed in forwarding		23 - 25fps	
Tension at take-up side		100 - 150g	Refer to page 40.
Tension at rewinding side		200 - 300g	Refer to page 36.
		800 -1000g	Refer to page 38.
Pressure of head lever spring		60 - 100g	Refer to page 66.
Pressure of middle tension lever spring		30 - 70g	Refer to page 56.
Pressure of guide roller (4) lever spring		500 - 600g	Refer to page 56.
Pressure of pressure roller lever spring		200 - 300g	Refer to page 60.
Pressure of guide roller (3) lever spring		20 - 30g	Refer to page 60.
Pressure of pad roller spring		20 - 25g	Refer to page 64.
Film scratch		After projecting the film 10 times. there shouldn't be scratch affecting the picture.	

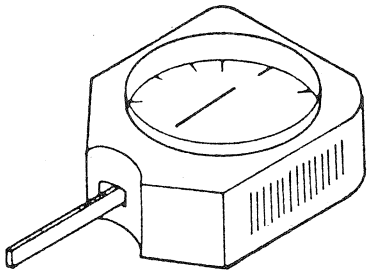
V TOLERANCE

Item			Tolerance	Remarks
Amplifier output	Maximum	Optical	over 30W	
		Magnetic	over 30W	
	Rating	Optical	over 25W	
		Magnetic	over 25W	
Distorion factor		Optical	less than 5%	Refer to page 69.
		Magnetic		
S/N ratio		Optical	over 40dB	Refer to page 69.
		Magnetic		
Wow/Flutter		Optical	less than 0.5%	Refer to page 69.
		Magnetic		
Frequency response		Optical		Refer to page 70
		Magnetic		

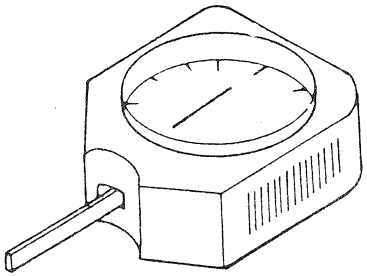
VI TESTING INSTRUMENTS & TOOLS



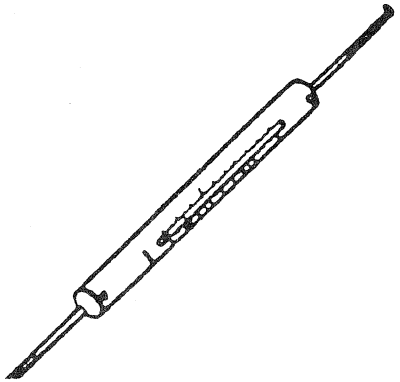
Code No. : C043
Name : Bar Spring Scale 110g
Use : to measure the spring pressure
Page : 66
Weight : 40g
Dimensions: 10 dia. x 280mm



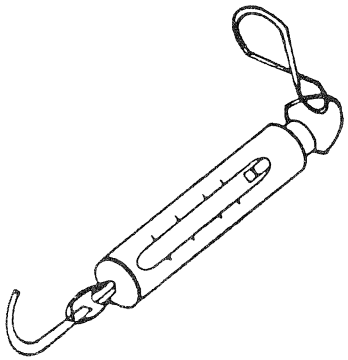
Code No. : C062
Name : Dial Tension Gauge 30g
Use : to measure the spring pressure
Page : 64
Weight : 60g
Dimensions: 20 x 48 x 90mm



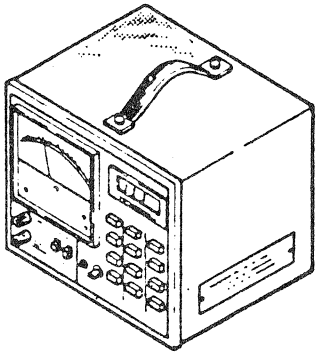
Code No. : C063
Name : Dial Tension Gauge 100g
Use : to measure the spring pressure
Page : 48,60
Weight : 60g
Dimensions: 20 x 48 x 90mm



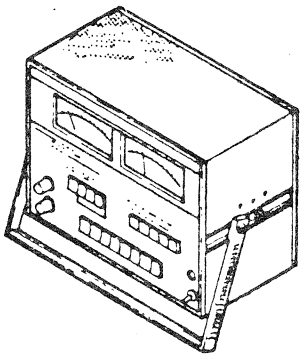
Code No. : C067
Name : Bar Spring Scale 500g
Use : to measure the spring pressure
Page : 40,60
Weight : 40g
Dimensions: 10 dia. x 280mm



Code No. : P048
Name : Bar Spring Scale 1 kg
Use : to measure the spring pressure
Page : 36,38,56
Weight : 110g
Dimensions: 37 dia. x 180mm



Code No. : P083
Name : Wow/Flutter Meter
Use : to measure wow and flutter
Page : 69
Weight : 5.5 kg
Dimensions: 200 x 160 x 140mm



Code No. : P084

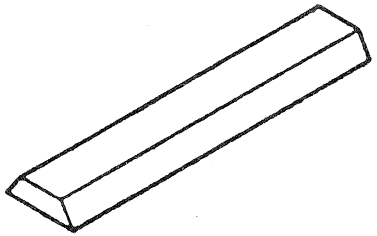
Name : Distortion Meter

Use : to measure the distortion factor

Page : 69,70

Weight : 6 kg

Dimensions: 270 x 200 x 250mm



Code No. : P088

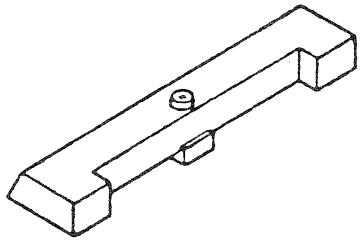
Name : Fixed Guide Attach Gauge

Use : to attach the fixed guide

Page : 48

Weight : 60g

Dimensions: 70 x 16 x 4.5mm



Code No. : P100

Name : Lateral Guide Attach Gauge

Use : to attach the film guide (1)

Page : 48

Weight : 35g

Dimensions: 65 x 15.5 x 6.5mm

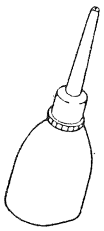
Ⅷ TEST FILM, OIL & GREASE

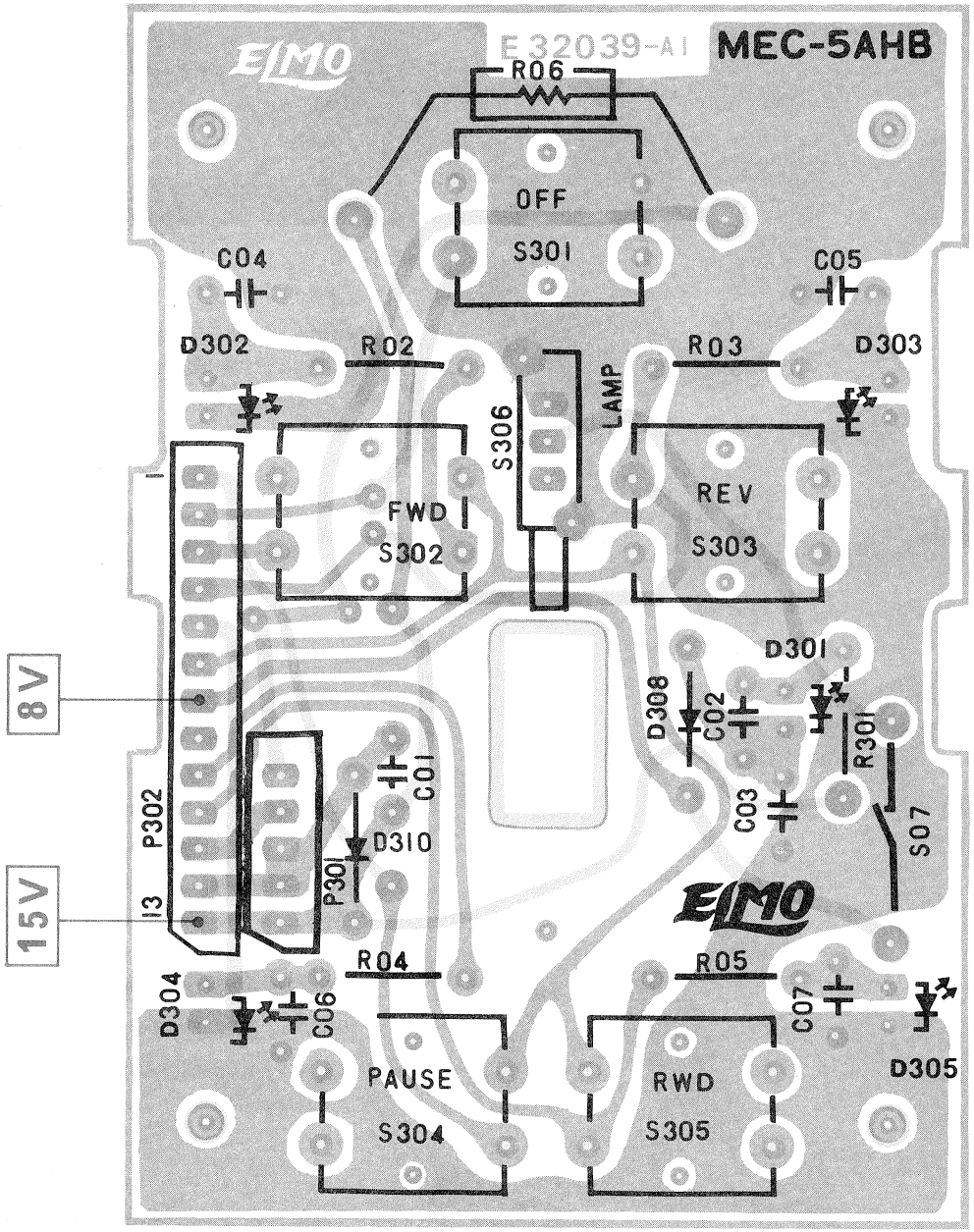
A. Test Film

Code No.	Film Name	Page
P032	Optical buzz track film	68
P033	Optical signal level film, 400Hz	69
P034	Optical flutter film	69
P035	Optical sound focus film	68
P036	Optical multi-frequency film	70
P037	Magnetic signal level film, 400Hz	69
P038	Magnetic flutter film	69
P039	Magnetic multi-frequency film	70
P040	Magnetic azimuth alignment film	66
P086	Registration film	109

B. Oil & Grease

In the figure, there is the mark  (Ex. Fig.19) which shows the point to be lubricated and the kind of oil or grease by letters, A, B, C, D & E in the mark.

Mark		Brand Name
	A	SILICON OIL TSF433
	B	VEEDOL 20 - 40
	C	PERMALUB H3002
	D	ALVANIA GREASE 2
	E	SILICON GREASE YG6080


E32039-A1
MEC-5AHB
R06
OFF
S301
C04
C05
D302
R02
R03
D303
S306
LAMP
FWD
S302
REV
S303
8V
15V
P302
13
1
P301
C01
D310
D301
D308
C02
R301
C03
S07
R04
R05
D304
C06
C07
D305
PAUSE
S304
RWD
S305

The figures indicated in ▭ printed in red color show details of voltage at each points, which details are as follows;

upper figures:voltage at self-loading

center figures:voltage at rewinding

lower figures:voltage at pause

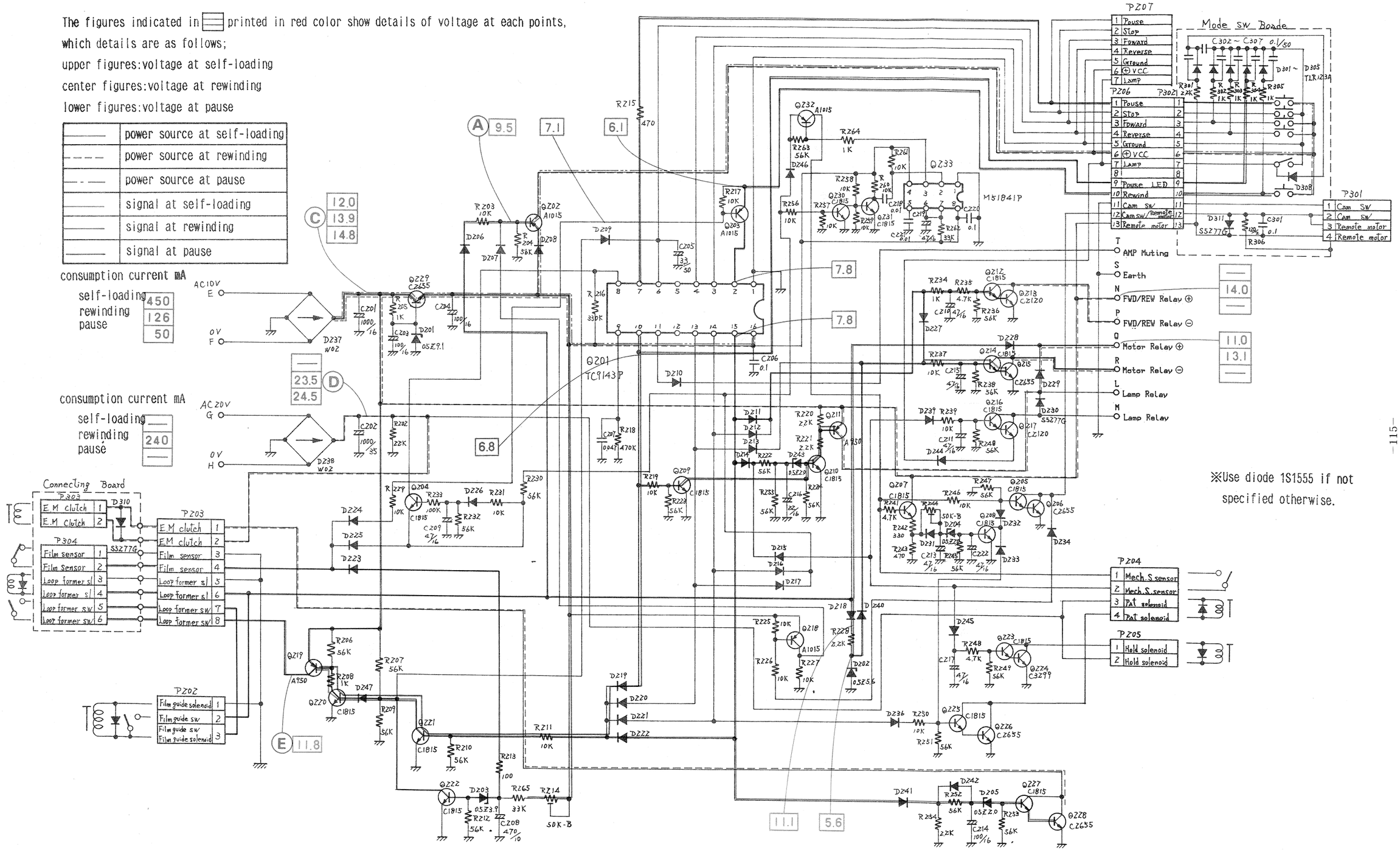
———	power source at self-loading
- - - -	power source at rewinding
—·—·—	power source at pause
———	signal at self-loading
———	signal at rewinding
———	signal at pause

consumption current mA

self-loading	450
rewinding	126
pause	50

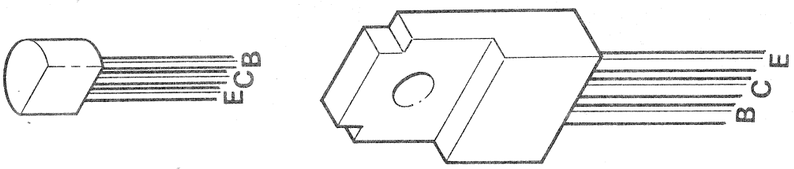
consumption current mA

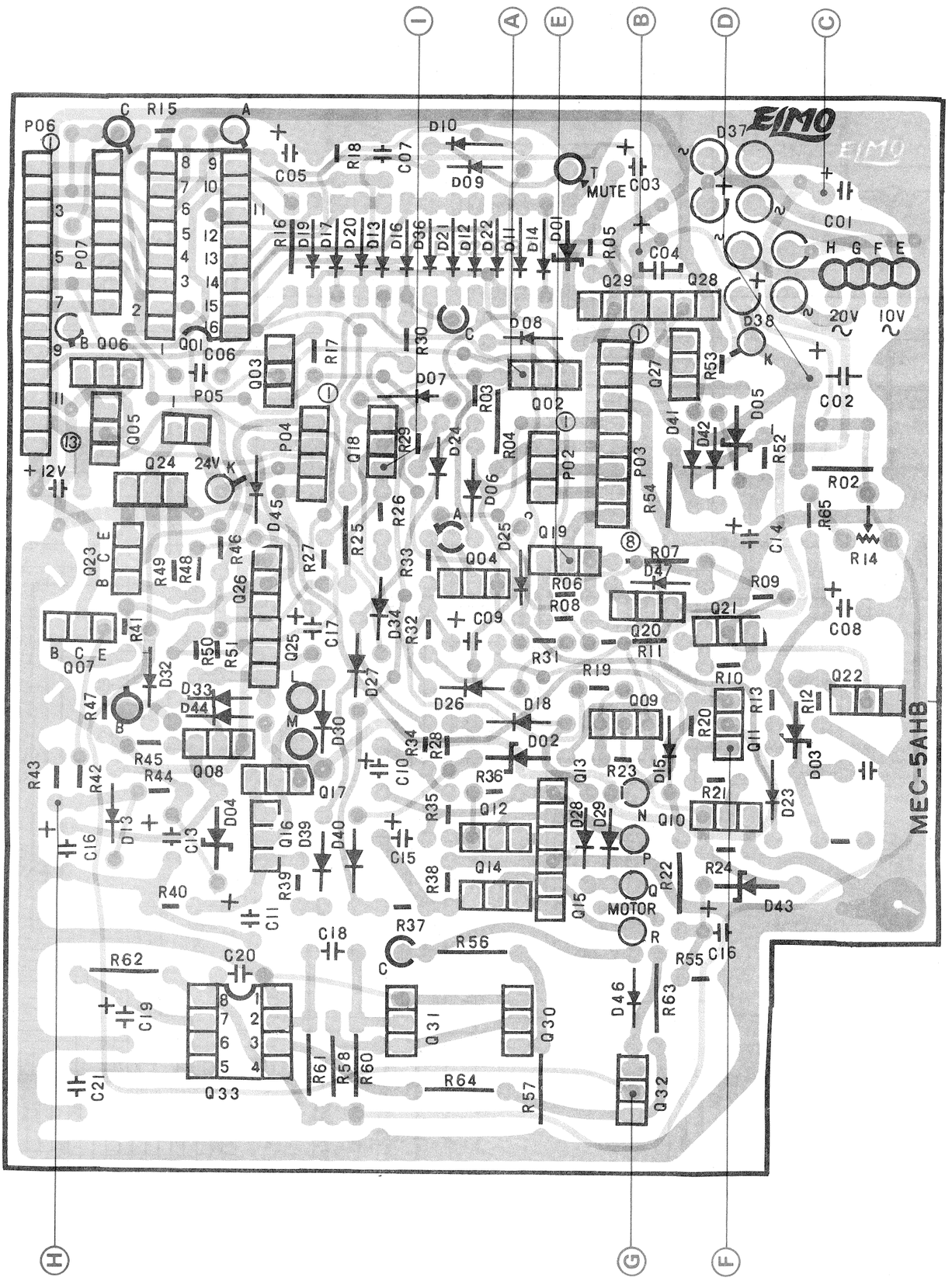
self-loading	—
rewinding	240
pause	—



※Use diode 1S1555 if not specified otherwise.

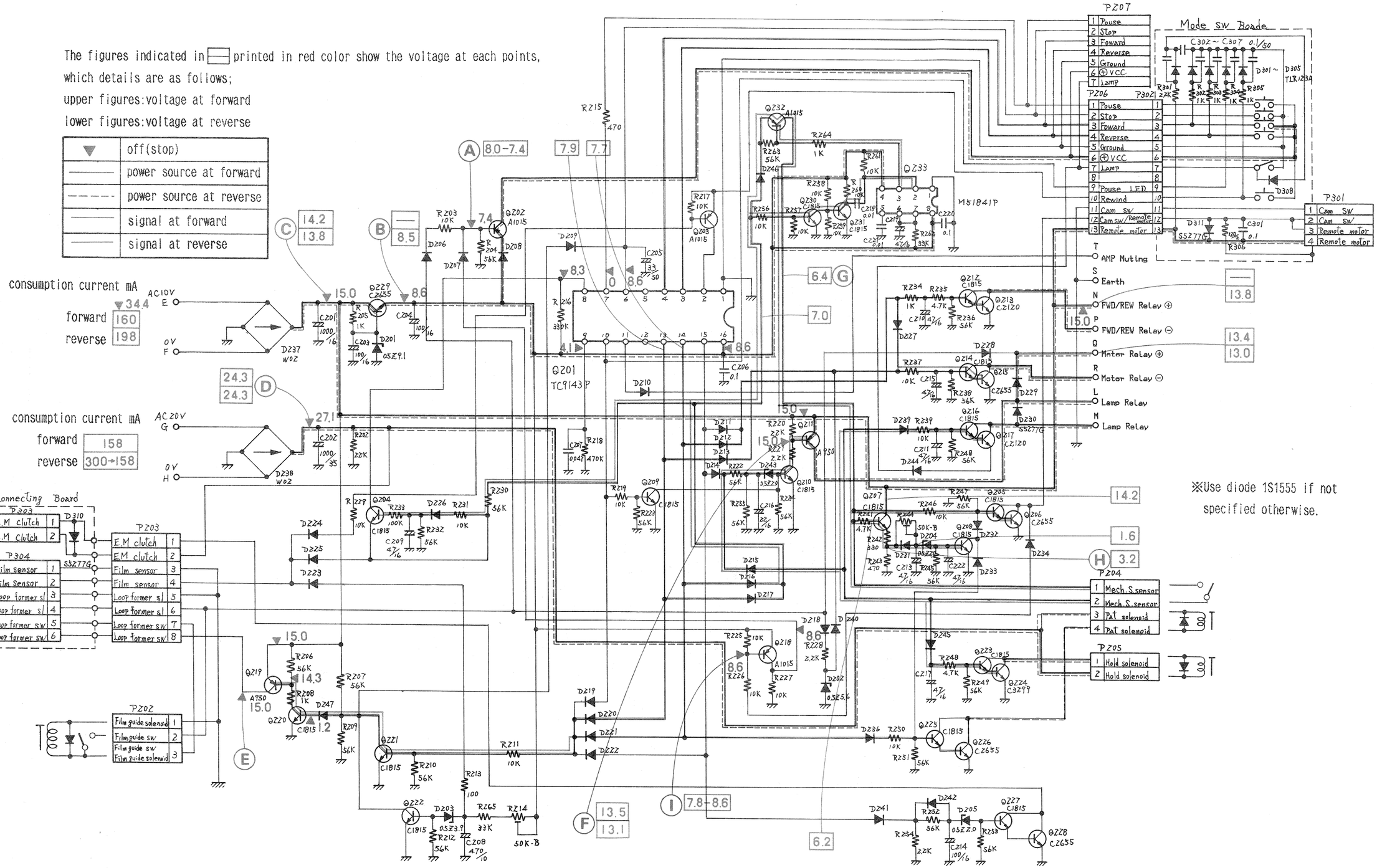
Schematic Diagram for Control Circuit E21349


E C B
B C E


EIMO
MEC-5AHB
MUTE
MOTOR
+12V
24V
20V
10V
P06
P07
P05
P04
P03
P02
P01
Q01
Q02
Q03
Q04
Q05
Q06
Q07
Q08
Q09
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
Q29
Q30
Q31
Q32
Q33
D01
D02
D03
D04
D05
D06
D07
D08
D09
D10
D11
D12
D13
D14
D15
D16
D17
D18
D19
D20
D21
D22
D23
D24
D25
D26
D27
D28
D29
D30
D31
D32
D33
D34
D36
D37
D38
D39
D40
D41
D42
D43
D44
D45
D46
C01
C02
C03
C04
C05
C06
C07
C08
C09
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
R02
R03
R04
R05
R06
R07
R08
R09
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42
R43
R44
R45
R46
R47
R48
R49
R50
R51
R52
R53
R54
R55
R56
R57
R58
R60
R61
R62
R63
R64
R65

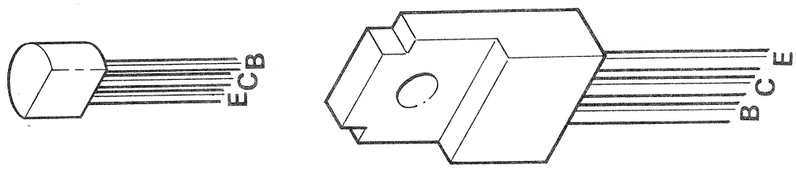
The figures indicated in ☐ printed in red color show the voltage at each points, which details are as follows;
upper figures:voltage at forward
lower figures:voltage at reverse

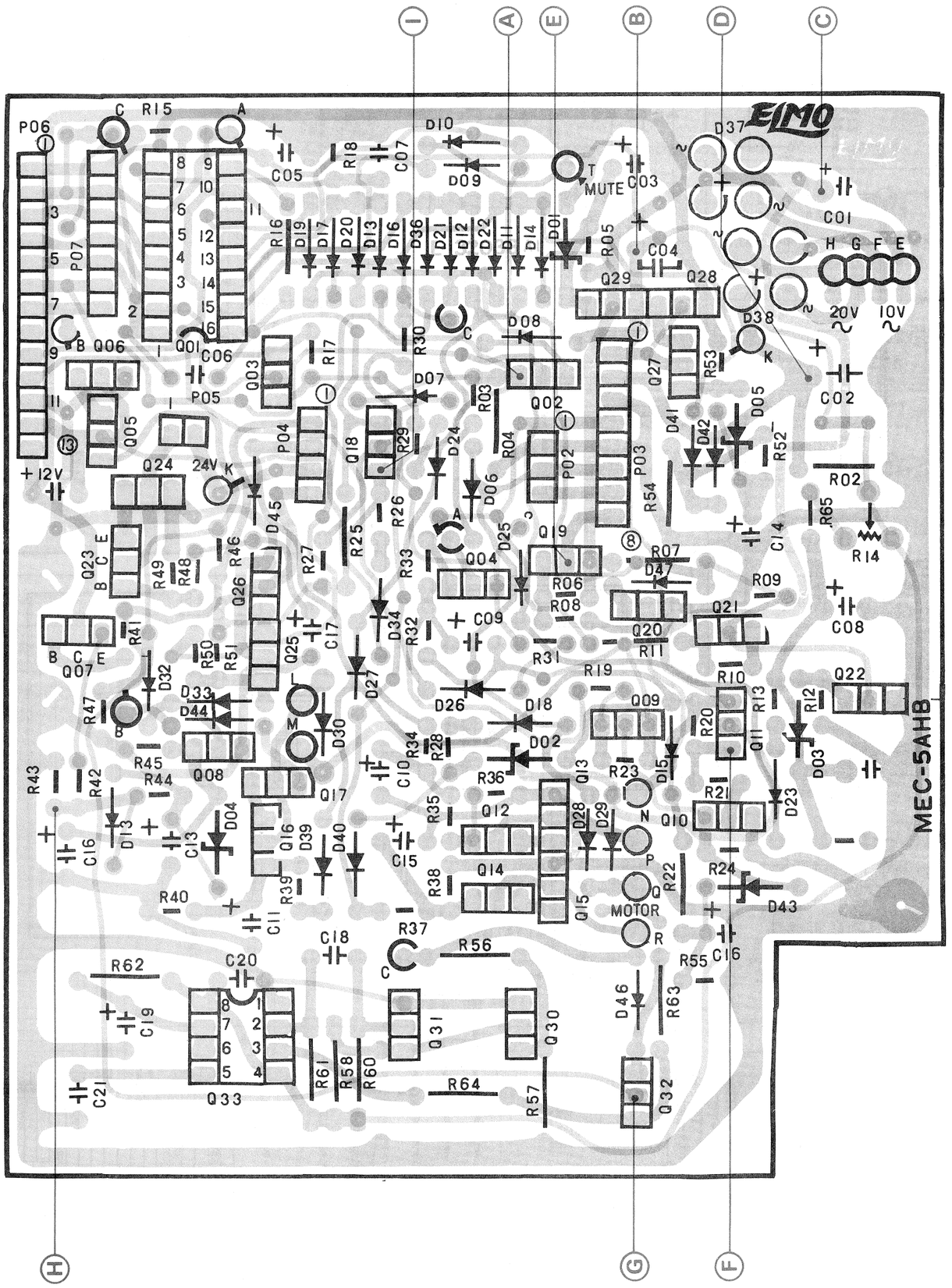
▼	off(stop)
──	power source at forward
- - - -	power source at reverse
══	signal at forward
══	signal at reverse

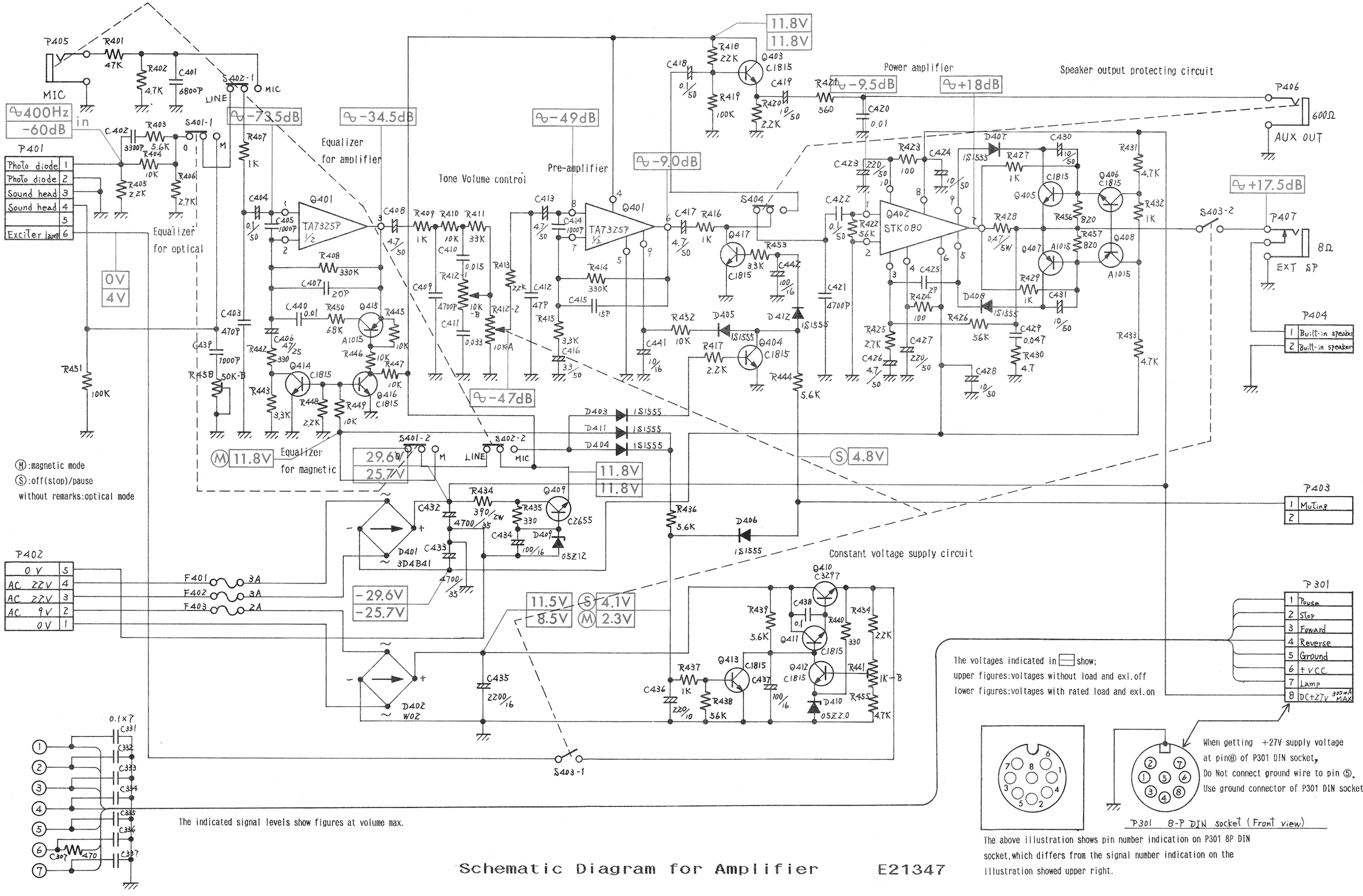


※Use diode 1S1555 if not specified otherwise.

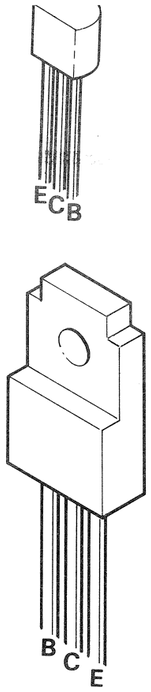
Schematic Diagram for Control Circuit E21349


E C B
B C E


MEC-5AH8
ELMO
MUTE
MOTOR
+12V
20V
10V
24V

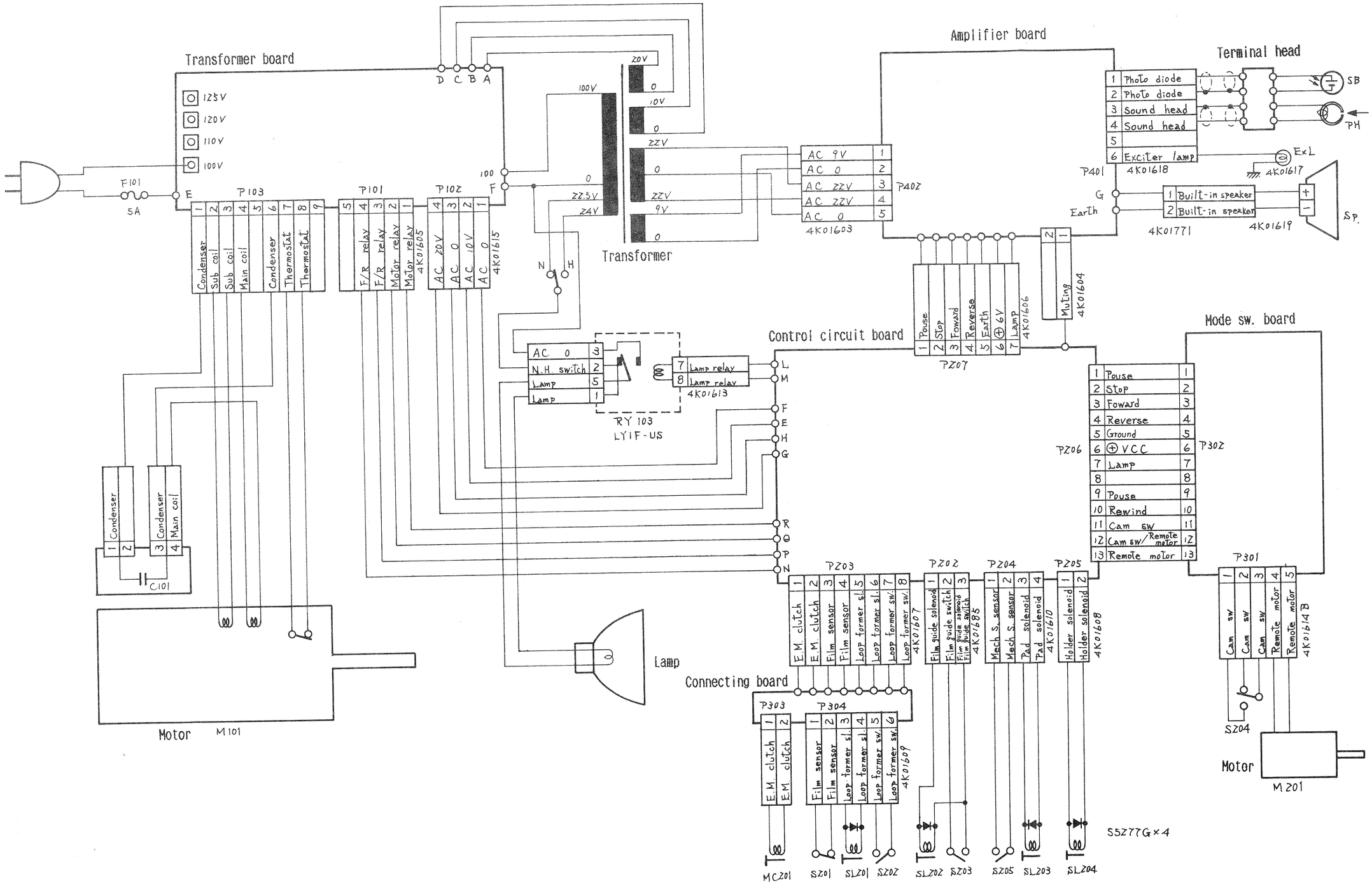


Schematic Diagram for Amplifier E21347

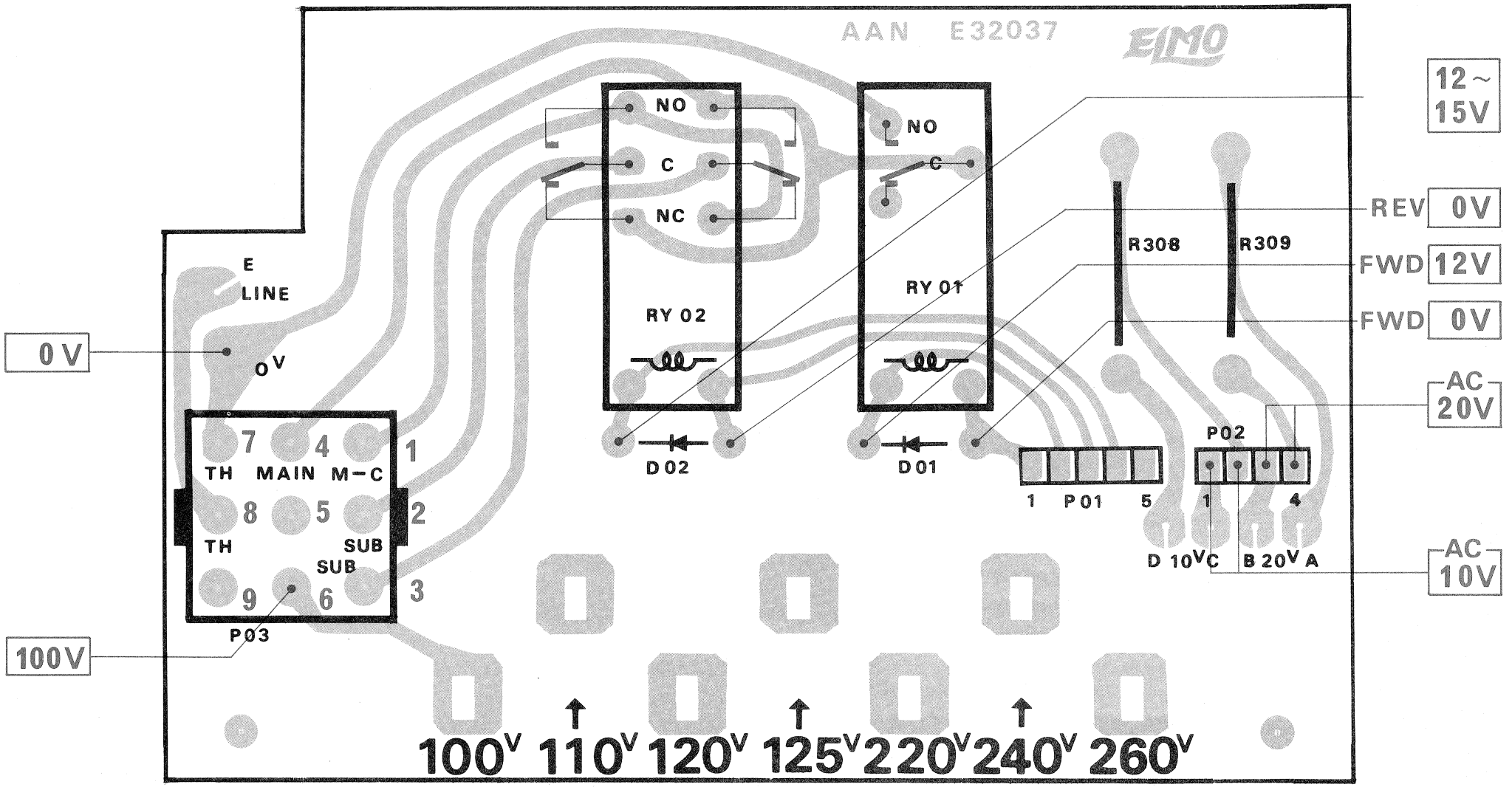


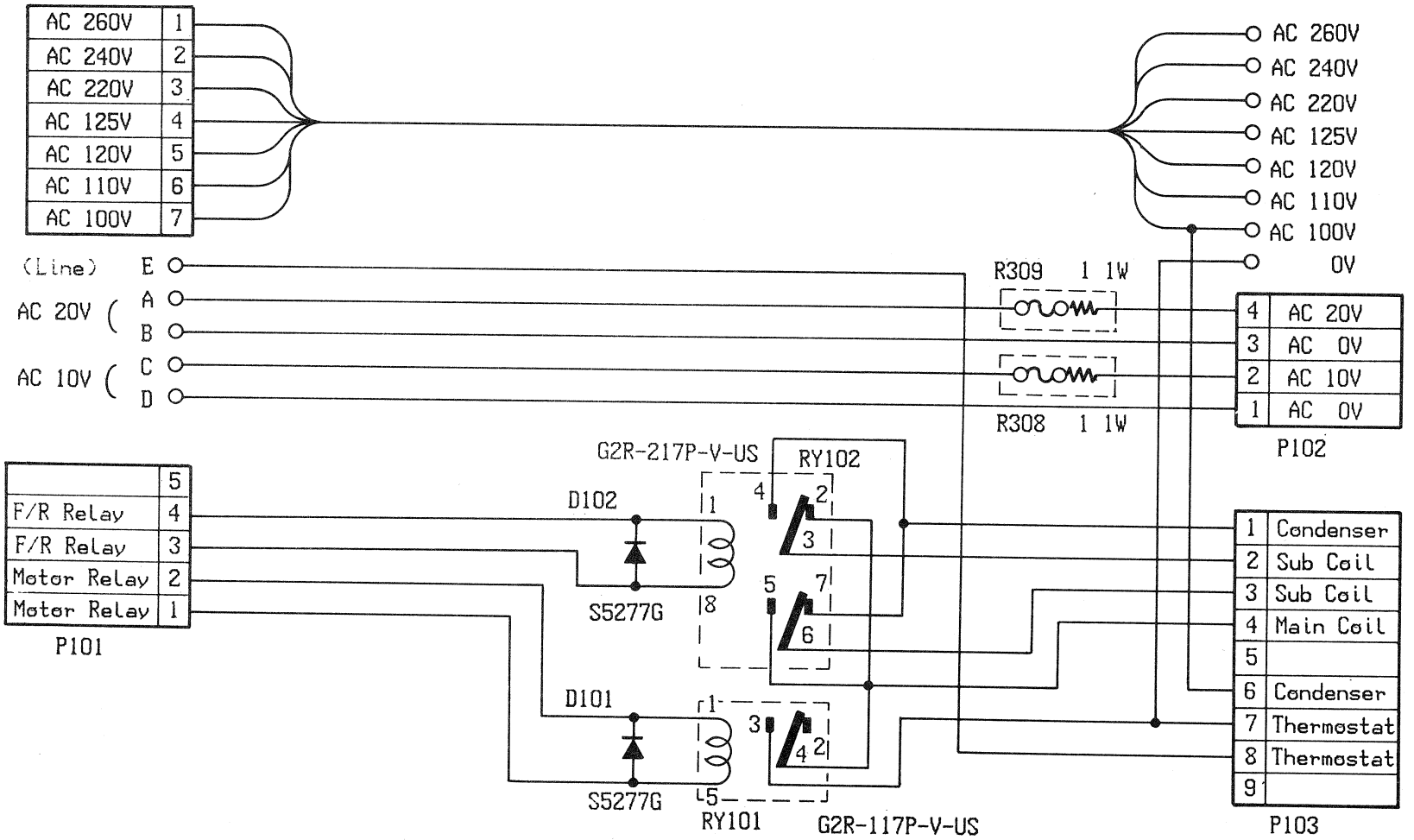
amplifier board

The voltages indicated in ▭ show;
upper figures:voltages without load and exl.off
lower figures:voltages with rated load and exl.on
Ⓢ:off(stop)/pause
Ⓜ:magnetic mode



Schematic Diagram for Machine E21352


AAN E32037
EIMO
12~15V
REV 0V
FWD 12V
FWD 0V
AC 20V
AC 10V
0V
100V
E
LINE
OV
NO
C
NC
RY 02
RY 01
D02
D01
R308
R309
P02
1 P01 5
1
4
D 10V C
B 20V A
7 4 1
TH MAIN M-C
8 5 2
TH SUB
SUB
9 6 3
P03
100V 110V 120V 125V 220V 240V 260V



Schematic Diagram for Transformer 4E43847

PARTS LIST

16-AL　16-AL OPTICAL

No 256

April, 1988

Introduction

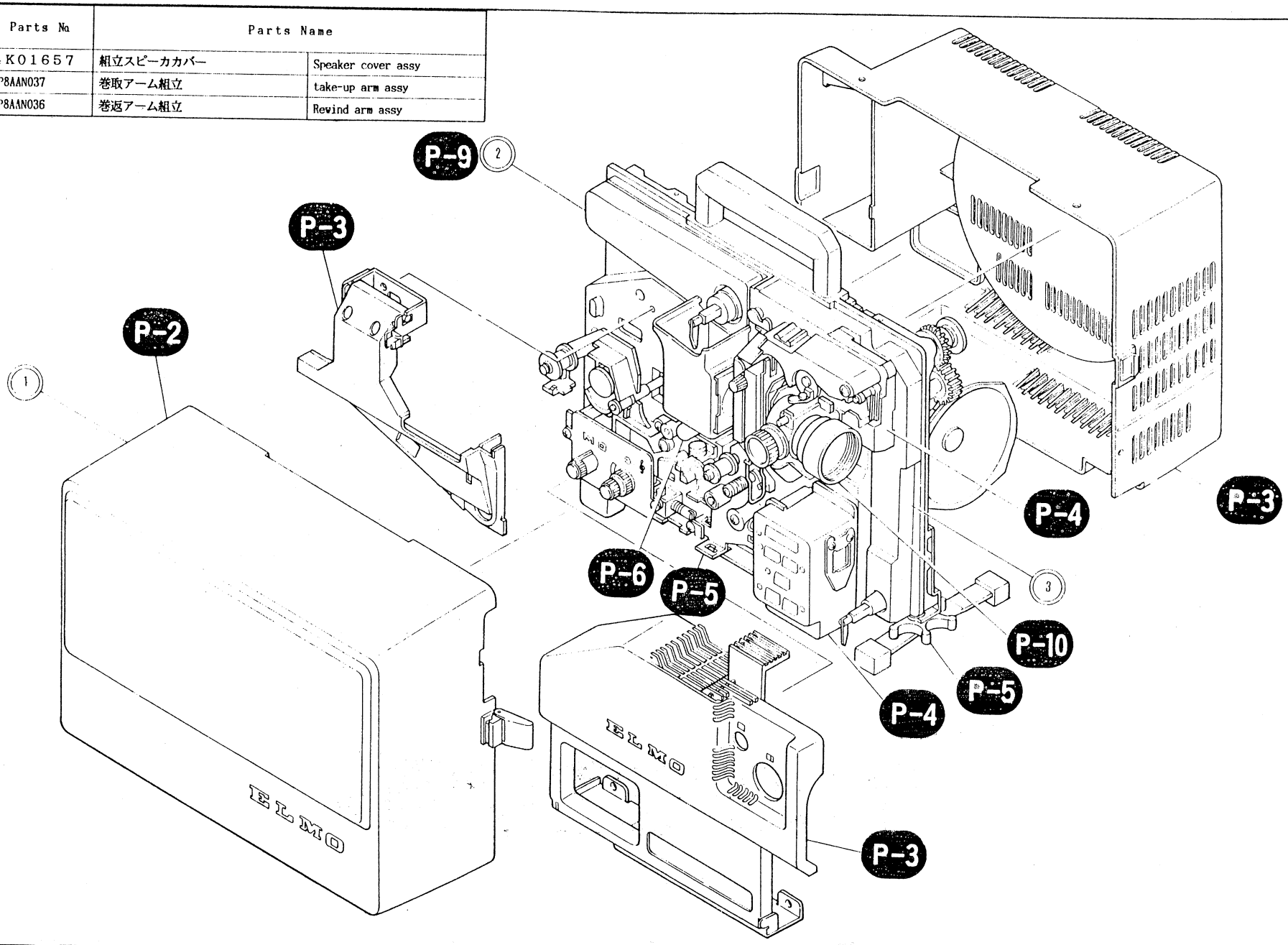
1. This parts list shows all of the spare parts for Elmo 16-AL and 16-AL Optical projectors.
2. Both the Double-encircled and the Single-encircled illustration numbers marked with # are the exclusive spare parts for 16-AL Optical projector.
3. On page 1, you can find the assembly parts with its parts number and the page to be referred to.
4. The spare parts marked with Double-encircled illustration number can be supplied as the assembly shape.
5. The parts number for conventional parts such as screws, nuts and E-rings is shown direct near its illustration.
6. The spare parts number encircled with a circlet in the column "Illustration No." is for Japanese market use.
   Please refer to page 12 and 13 for your market use.
7. Schematic diagram and its details are shown on page 15, 16 and 17.
8. The spare parts number index is on page 14.
9. The model name marked with # in the column "Common Use Model" indicates an improved model.
10. The figure in the brackets next to the illustration of a connector is the spare parts number for its connector-pin.
11. In some countries, the speaker cover assy. Parts No.4K01657 is offered as an optional item.

はじめに

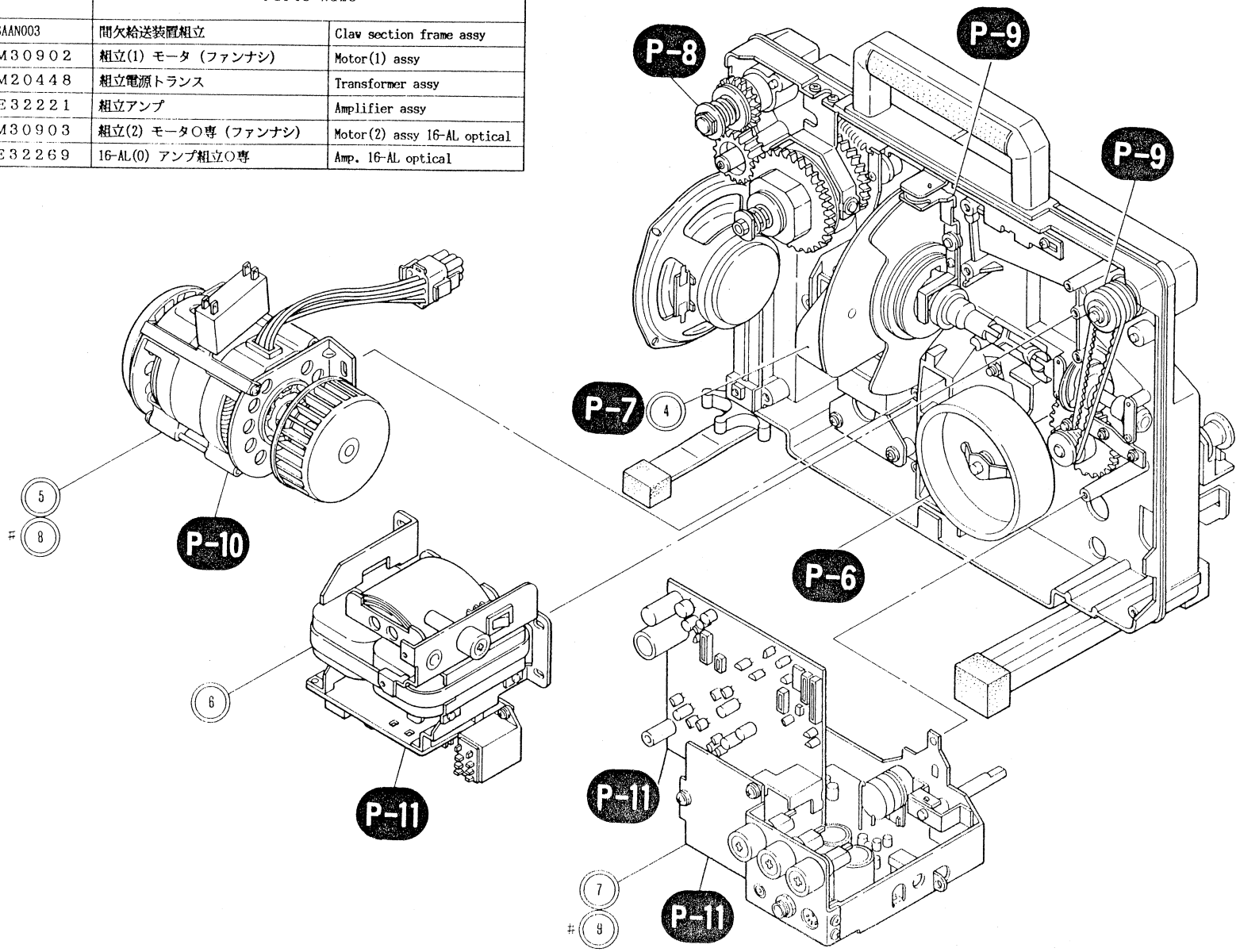
1. このパーツリストには、16-AL及び16-ALOPTICAL の補修用部品が記載してあります。
2. 図中の＃印は、その部品のOPTICAL 専用部品です。
3. １ページにユニット別の分解図があり、各々の記載ページが表示してあります。索引としてご利用下さい。
4. イラスト番号が二重丸で表示してある部品は、組立品として供給できます。
5. ネジ・ナット・Ｅリング等基本部品の部品番号は、図中に直接表示してあります。
6. イラスト番号欄に○印が付記されている部品は、国内用とは異る国外部品があり12ページに、また国外のみ使用する部品は、13ページに表示してあります。
7. 結線図は、そこに使用されている部品の明細と共に、15、16、17ページにあります。
8. 部品番号索引は、14ページにあります。
9. 共用機種欄の※印は、その機種の改訂機との共用を表しています。
10. コネクタ横、カッコ内の数字は、そこに使用されているコネクタピンの部品番号です。

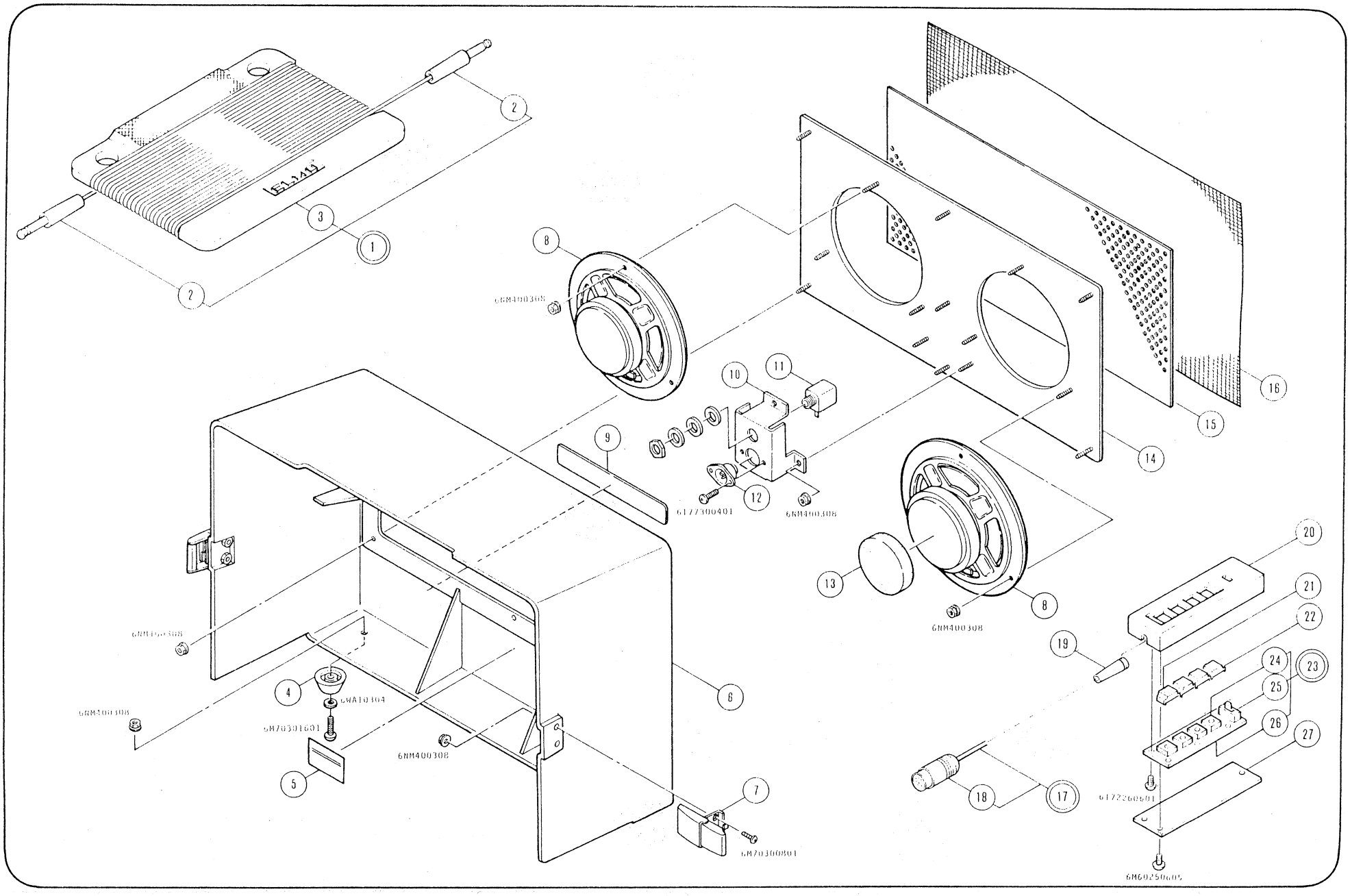
ELMO CO., LTD.

Illust No	Parts No	Parts Name	
1	4K01657	組立スピーカカバー	Speaker cover assy
2	4P8AAN037	巻取アーム組立	take-up arm assy
3	4P8AAN036	巻返アーム組立	Rewind arm assy

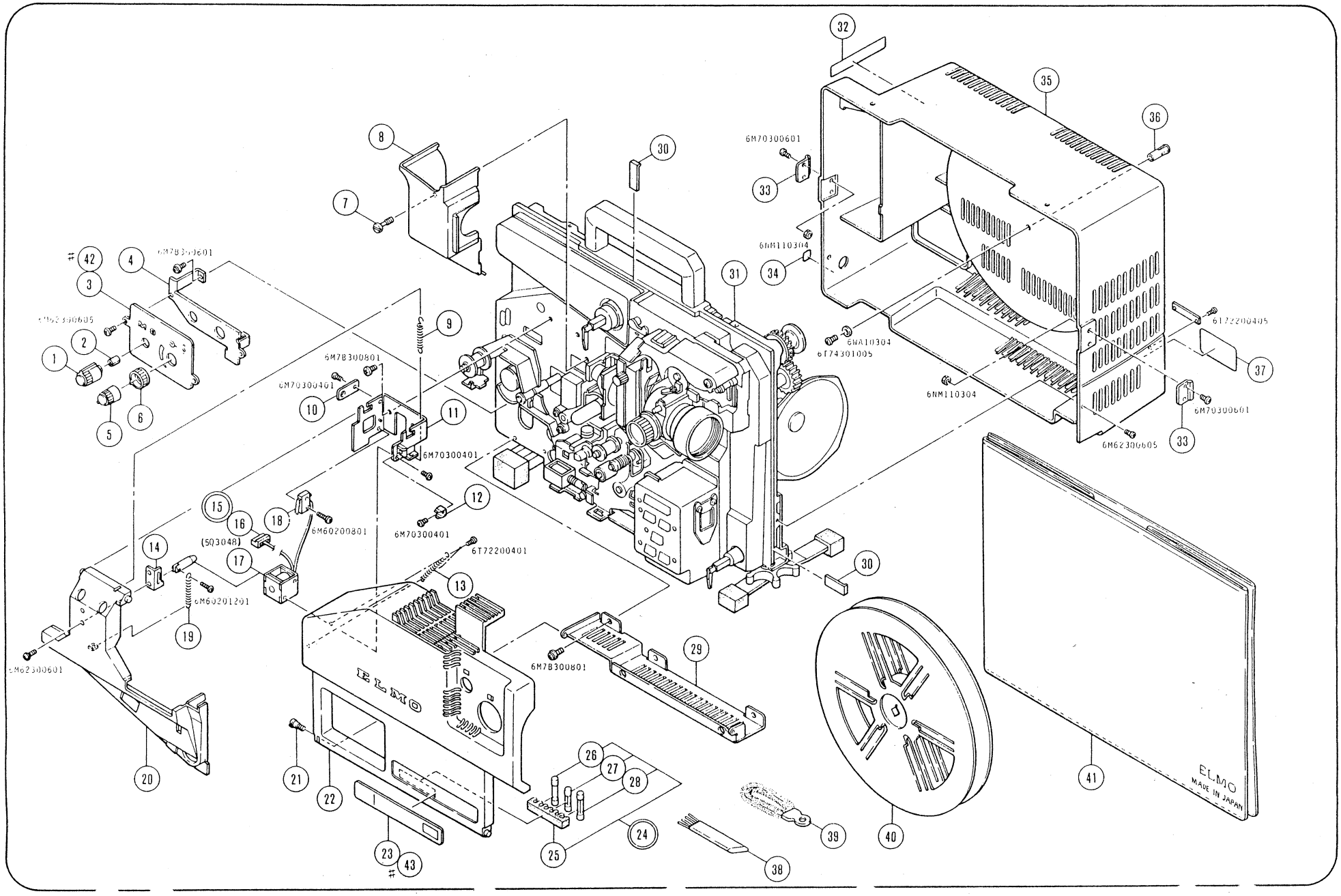


Illust No	Parts No	Parts Name	
④	4P8AAN003	間欠給送装置組立	Claw section frame assy
⑤	4M30902	組立(1) モータ (ファンナシ)	Motor(1) assy
⑥	4M20448	組立電源トランス	Transformer assy
⑦	4E32221	組立アンプ	Amplifier assy
⑧	4M30903	組立(2) モータO専 (ファンナシ)	Motor(2) assy 16-AL optical
⑨	4E32269	16-AL(0) アンプ組立O専	Amp. 16-AL optical



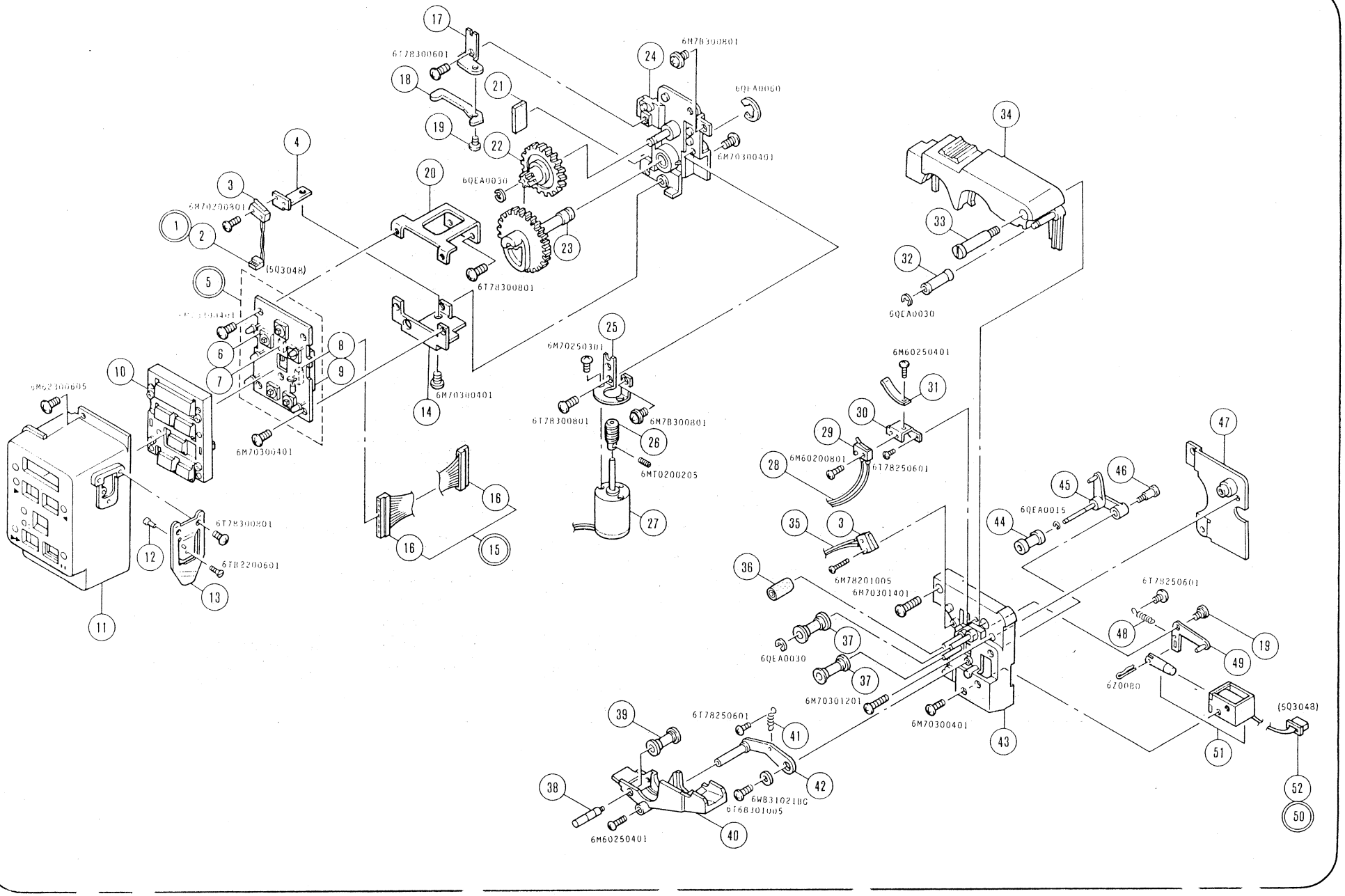

1
2
2
3
8
6NM400308
9
10
11
12
6177300401
6NM400308
13
8
6NM400308
14
15
16
6NM400308
4
6WA10104
6M70301601
5
6NM400308
6
6NM400308
7
6M70300801
17
18
19
20
21
22
23
24
25
26
27
6172260501
6M60250605

Illust No	Parts No	Parts Name		Common Use Model
①	4K01692	スピーカコード	Speaker cord	
②	5N50211	6.34mm A型プラグ P-2272	Plug 6.4mm (P2272)	※16-AA XP-550
3	4P20482	コード巻	Cord reel	XP-550 XP-350
4	4P41991	ゴム足	Rubber leg	XP-550 HP-702
5	4N40259	定格ラベル スピーカ	Rating label speaker	
6	4M10066	スピーカカバー	Speaker cover	
7	6Y26300191	パッチン錠 本体	Lock 1	
8	5V1030	スピーカ	Speaker	
9	4N40258	銘板 スピーカカバー	Plate speaker cover	
10	4M43061	取付板 スピーカコネクタ	Holder speaker connector	
11	5N50412	6.34mm ジャック S-G7622-12	Jack 6.4mm (S-G7622-12)	16-AA
12	5N202112	2P-DINコネクタ LSE-1	2-P DIN connector 1 (LSE-1)	16-AA 16-F
13	4M43502	パッド スピーカ	Pad speaker	
14	4M30754	取付板 スピーカカバー	Holder speaker cover	
15	4M43064	プロテクタ スピーカカバー	Protector speaker cover	
16	4M43063	ネット スピーカカバー	Net speaker cover	
17	4P8AAN074	リモートコード組立	Remote cord assy	
18	5N208231	8P-DINプラグ TCP0586-01	6-P DIN plug (TCP0586-01)	
19	4M43343	コードブッシュ リモコン	Bush remote	
20	4M30753	本体 リモート装置	Case remote control	
21	P414565002	ボタン(2) スイッチ	Button(2) switch	16 CL DELUXE K-120SM
22	P414565	ボタン(1) スイッチ	Button(1) switch	16-CL DELUXE K-120SM
23	4P8AAN073	組立プリント基板 リモート装置	Circuit plate assy remo.	
24	4E43111	ズーミングスイッチ	Zooming switch	16 CL DELUXE K-120SM
25	5E5073	スライドスイッチ ESD-1467	Slide switch (ESD-1467)	
26	4E43820	プリント基板 リモート	Circuit plate remote	
27	P414652	底板 リモート装置	Button plate remote	16-CL DELUXE K-120SM


ELMO
ELMO
MADE IN JAPAN
6M70300601
6M7B300801
6M70300401
6M60200801
6T72200401
6M60201201
6M62300601
6M62300605
6NM110304
6NA10304
6T74301005
6T72200405
(5Q3048)

Illust No	Parts No	Parts Name		Common Use Model
1	P412228	ツマミ M-O切換	Knob M-O switch	16-CL 16-CL(X)
2	6Z0057	ツマミ 固定スプリング X-5200	Hold. spring knob (X-5200)	16-CL 16-CL(X)
3	4N40238	銘板 M-O	Plate M-O	
4	4M42709	取付板 銘板	Holder plate	
5	P412230	二重ツマミ(2) アンプ	Knod amplifier 2	16-CL 16-CL(X)
6	P412229	二重ツマミ(1) アンプ	Knod amplifier 1	16-CL 16-CL(X)
7	4P55646	ネジ(2) 遮熱筒	Screw(2) lamp house	16-CL
8	4M20368	ランプカバー	Lamp cover	
9	4P55596	バネ(1) ガイドローラ(4)	Spring(1) guide roller 4	16-CL 16-CL(X)
10	4M43366	止メ板 ホルダフィルムガイド	Stopper holder film guide	
11	4M42712	ホルダ フィルムガイド	Holder film guide	
12	P412676	金具 カバーロック	Lock cover	16-AA ST-600
13	4M50267	バネ スペアランプ	Spring spare lamp	
14	4M42757	保持板 プランジャフィルムガイド	Holder solenoid film guide	
15	4K01855	コード SL202.S203 組立	SL202 S203 cord assy	
16	5N203572	3P・ハウジング 5264	3-P connector 2(5264)	
17	5J10019	ソレノイド TDS-08B 57Ω	Solenoid (TDS-08B 57Ω)	
18	5E1080	マイクロスイッチ SS-5GL-F	Micro switch (SS-5GL-F)	
19	4M50256	バネ プランジャフィルムガイド	Spring solenoid film guide	
20	4M30746	組立 フィルムガイド	Film guide assy	
21	4P55893	取付ネジ 機構部カバー	Screw machine cover	GS-800
㉒	4M10064	前カバー	Front cover	
23	4N40240	銘板(1) 前カバー	Plate(1) front cover	
㉔	4K01700	スペアヒューズホルダ(1) 組立	Spare fuse holder assy	
25	P415189	ホルダ スペアヒューズ	Holder spare fuse	
㉖	5H1020007	ヒューズ 2A	Fuse (2A)(UL)	16-CL
㉗	5H1030009	ヒューズ 3A	Fuse (3A)(UL)	※16-CL DELUXE
㉘	5H1050003	ヒューズ 5A	Fuse (5A)(UL)	16-CL
29	4M30751	底板	Bottom plate	
30	4M43253	プロテクタ	Protector	

Illust No	Parts No	Parts Name		Common Use Model
31	4P8AAN072	ベースフレーム メタル付	Base frame	
㉜	4N40260	ラベル(1) ヒューズ	Label(1) fuse	
33	4M43062	取付金具 スピーカカバー	Holder speaker cover	
34	4N40257	ラベル マイク	Label mike	
㉟	4M10065	後カバー	Rear cover	
36	P412245	リール止メ軸 裏カバー	Reel shaft rear cover	16-CL
㊲	4N40316	定格銘板(1)	Rating plate 1	
38	P413991	角ブラシ	Cleaning brush	16-CL 16-AA
39	4K00502	アパーチュア ブラシ	Aperture brush	16-CL 16-AA
40	4P20584	組立800 フィートリール	Reel 240m	16-CL
㊶	4K01691	ビニールカバー(2)	Dust cover 2	
42	4N40239	銘板 O専	Plate O 16-AL optical	
43	4N40268	銘板(2) 前カバー O専	Plate(2) 16-AL optical	


6T78300601
6M78300801
6QEA0060
6M70300401
6QEA0030
6M70250301
(5Q3048)
6T78300801
6M70300401
6M78300801
6MT0200205
6M60250401
6M60200801
6T78250601
6QEA0015
6M78201005
6M70301401
6M70301201
6M70300401
6T78250601
6Z0080
(5Q3048)
6M60250401
6T78250601
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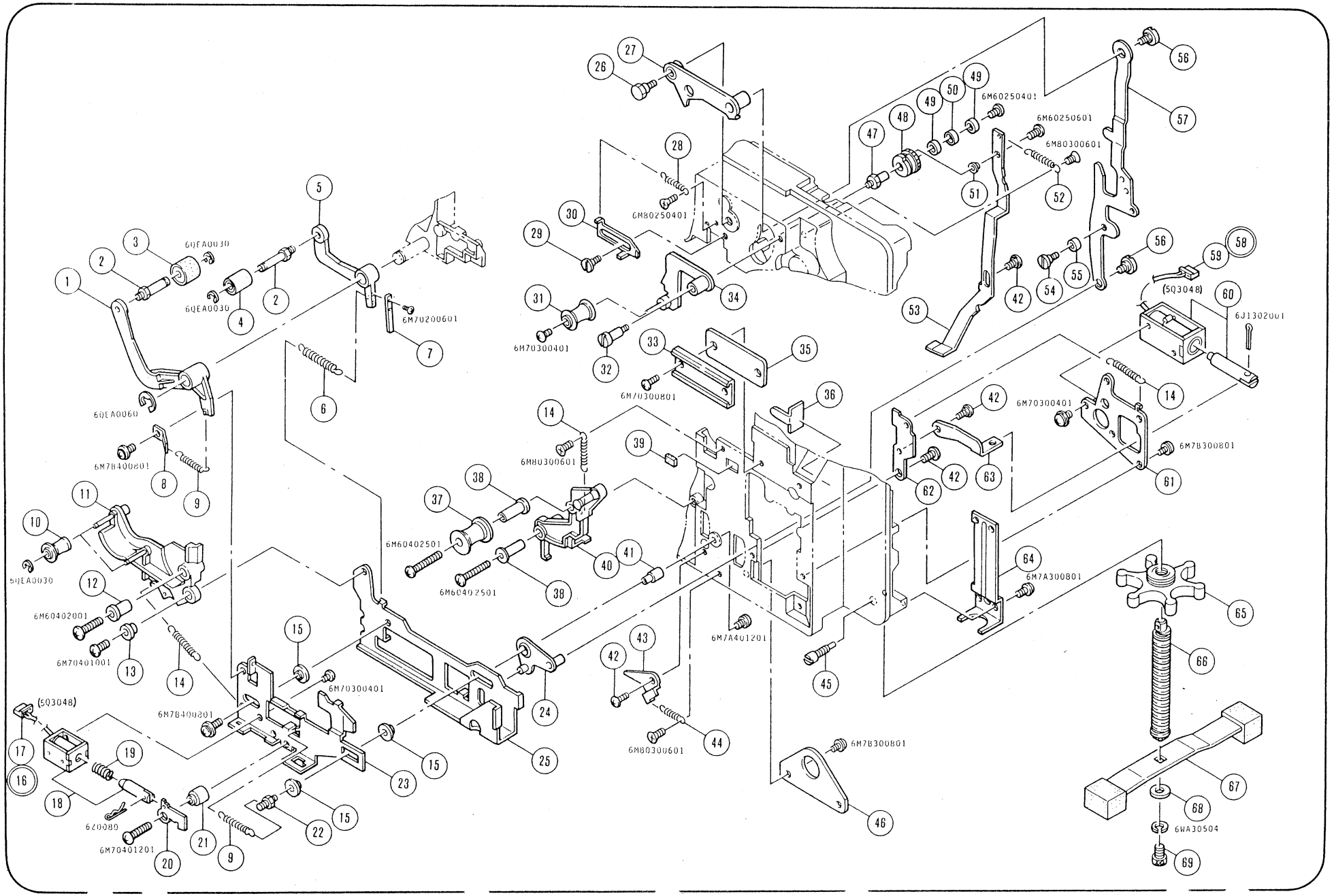
6T68J01005

Illust No	Parts No	Parts Name		Common Use Model
1	4K01850	コード マイクロスイッチ組立	S204 cord assy	
2	5N205312	5P・ハウジング 5264	5-P connector 2(5264)	
3	5E1080	マイクロスイッチ SS-5GL-F	Micro switch (SS-5GL-F)	GS-1200
4	4M42690	取付板 マイクロSW操作カム	Holder micro sw cam	
5	4E32220	組立モードスイッチ	Mode sw assy	
6	5E2046	タクトスイッチ KHC10901	Switch (KHC10901)	SC-30
7	5E2098	プッシュスイッチ ESB60505	Push switch (ESB60505)	
8	5N205311	5P・ウェハ 5267-05A	5-P connector 1(5267-05A)	
9	5N213051	13P・ウェハ 5267-13A	13-P connector 1(5267-13A)	
10	4M30752	ボタン 操作カバー	Button operation cover	
(11)	4M20374	操作カバー	Operation cover	
12	4P55132	ピン フィルムカッタ	Film cutter pin	16-AA 16-A
13	4P46559B	フィルムカッタ	Film cutter	16-AA 16-A
14	4M42689	取付板(2) 操作基板	Holder(2) operation board	
15	4K01602	連結コード(1) 組立	Connector cord(1) assy	
16	5N213052	13P・ハウジング 5264	13-P connector 2(5264)	
17	4M42684	取付板 解除レバーフィルムガイド	Holder release lever	
18	4M42685	解除レバー フィルムガイド	Release lever	
19	4M50231	取付ネジ ロック板	Screw lock plate	
20	4M42688	取付板(1) 操作基板	Holder(1) operation board	
21	4M42680	ダンパ 連桿(1)	Damper link 1	
22	4M42681	ギヤ(1) リモート	Gear(1) remote	
23	4M42682	操作カム	Operation cam	
24	4M42679	組立ホルダ 操作カム	Holder assy operation cam	
25	4M42686	ホルダ リモートモータ	Holder remote motor	
26	4M41376	ウォーム リモート	Worm gear remote	16 CL DELUXE 16-CL(X) DELUXE
27	4K01616	カム モータ組立	Cam motor assy	
28	4K01854	コードS202 組立	S202 cord assy	
29	5E1018	マイクロスイッチ SS-5GL-13	Micro switch (SS-5GL-13)	16-AAR AS-3000A
30	4M42759	ホルダSW. 挿入口	Holder slot sw.	

Illust No	Parts No	Parts Name		Common Use Model
31	4M42758	戻シバネ ループフォーマ	Spring loop former	
32	4M42697	サブローラ レバーガイドローラ(3)	Aux. roller lever guide 3	
33	4M50235	取付ネジ ループフォーマ	Screw loop former	
34	4M42754	組立ループフォーマ	Loop former assy	
35	4K01849	コードS201 組立	S201 cord assy	
36	4M42646	固定ローラ フィルム在否	Fixed roller film loading	
37	4M42647	ガイドローラ 挿入口	Guide roller slot	
38	4M43219	軸 ローラ	Shaft roller	
39	4M42648	ローラ スプロケット押工	Roller sprocket presser	
40	4M30740	シュー 第1スプロケット	Shoe first sprocket	
41	4M50234	バネ 取付板シュー(1)	Spring holder shoe 1	
42	4P49329B	取付板 シュー(1) 組立	Shoe holder 1	16-AA 16-A
43	4M42639	組立取付板 挿入口	Holder assy slot	
44	4M42645	センサローラ フィルム在否	Sensor roller film loading	
45	4M42642	組立センサレバー フィルム在否	Sensor assy film loading	
46	4P55789	ネジ ローラフィルムガイド	Sc. film guide roller	GS-1200 ST-600
47	4M43245	組立補強板 挿入口	Support assy slot	
48	4M50232	戻シバネ ロック板	Spring lock plate	
49	4M42640	組立ロック板 ループフォーマ	Lock assy loop former	
50	4K01847	コードSL201 組立	SL201 cord assy	
51	5J10020	ソレノイド TDS-06A 77Ω	Solenoid (TDS-06A 77Ω)	
52	5N206452	6P・ハウジング 5264	6-P connector 2(5264)	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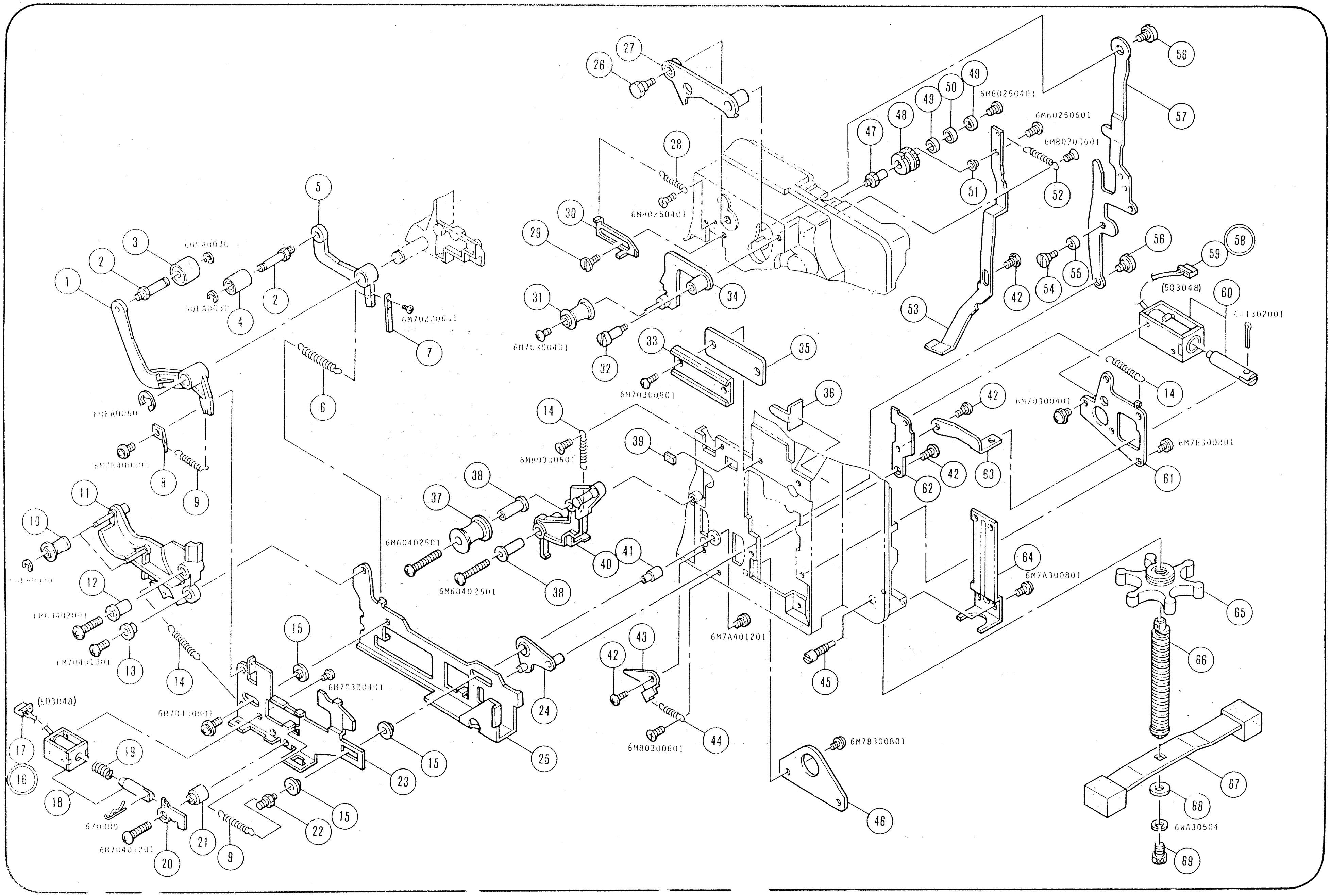
Illust No	Parts No	Parts Name		Common Use Model
1	4M42731	レバー 中間テンション	Lever middle tension	
2	P412106	軸 プレッシャローラ	Shaft pressure roller	16-CL 16-CL(X)
3	4M42725	組立制動ローラ(2)	Brake roller(2) assy	
4	P412114	組立パッドローラ	Pad roller assy	16-CL 16-CL(X)
5	P412057C	レバー プレッシャローラ	Lever pressure roller	16-CL 16-CL(X)
6	4P55551	バネ プレッシャローラ	Spring pressure roller	16-CL 16-CL(X)
7	P412930	ストッパ(1) レバープレッシャローラ	Stopper(1) lever pressure	16-CL 16-CL(X)
8	P413094B	固定板 バネ中間テンション	Plate spring mid. tension	16-CL 16-CL(X)
9	4P55608B	バネ 中間テンションローラ	Spring tension roller	16-CL 16-CL(X)
10	4M43256	ローラ(2) 第2スプロケット押工	Roller(2) second sprocket	
11	4M42691	組立レバー 第2スプロケット押工	Lever(2) second sprocket	
12	4P55545	間座 6mm×15mm	Metal 6mm×15mm	16-CL 16-CL(X)
13	4M42756	軸 レバー第2プロケット押工	Shaft 2nd sprocket press.	
14	4P55597	バネ ガイドローラ(3)	Spring guide roller 3	16-CL 16-AA
15	4M50253	段付間座(1)	Washer 1	
16	4K01848	コードSL203 組立	SL203 cord assy	
17	5N204492	4P・ハウジング 5264	4-P connector 2(5264)	
18	5J10020	ソレノイド TDS-06A 77Ω	Solenoid (TDS-06A 77Ω)	
19	4M50251	バネ ソレノイド	Spring solenoid	
20	4M42708	セレクトレバー	Select lever	
21	4M50252	軸 セレクトレバー	Shaft select lever	
22	4M43067	バネ掛ケ間座 リンク(2)	Spring fixing screw	
23	4M42707	逆転レバー	Reverse lever	
24	P415214	組立リンク(2) スプロケットシュー(2)	Link(2) sprocket shoe 2	16-CL ※16-CL(X)
25	4M42706	連桿(1)	Link 1	
26	4M50241	取付ネジ 取付板リンク(1)	Screw holder link 1	
27	4M42652	組立取付板リンク(1)	Holder assy link 1	
28	4P55637	バネ ストッパレバー	Spring stopper lever	16-CL 16-CL(X)
29	4P55648	段付ネジ ストッパレバー	Screw stopper lever	16-CL SC-18
30	P412204B	ストッパ レバーガイドローラ(2)	Stopper lever roller 2	16-CL 16-CL(X)

Illust No	Parts No	Parts Name		Common Use Model
31	P412215	ガイドローラ(2)	Guide roller 2	16-CL 16-CL(X)
32	4P55584	段付ネジ レバーガイドローラ(2)	Screw guide roller 2	16-CL 16-CL(X)
33	4P41758B	エルモスコープレンズ取付座	Scope lens mount	※16-AA ※16-F
34	4M42649	組立レバー ガイドローラ(2)	Lever guide roller 2	
35	4M43068	間座 エルスコホルダ	Washer scope lens mount	
36	5G6030	ステッカ T-23	Sticker (T-23)	
37	P412200	ガイドローラ(1)	Guide roller 1	16-CL 16-CL(X)
38	4P55625	間座 ガイドローラ(1)	Washer guide roller 1	16-CL 16-CL(X)
39	P413143	ストッパ ガイドローラ(3)	Stopper guide roller 3	16-CL 16-CL(X)
40	4M42695	組立レバー ガイドローラ(3)	Lever guide roller 3	
41	4M42705	間座 リンク(2)	Washer link 2	
42	4M50231	取付ネジ ロック板	Screw lock plate	
43	4M42698	ロック板 レバーガイドローラ(3)	Lock plate guide roller 3	
44	4M50250	バネ ロック板レバーガイドローラ(3)	Spring lock plate guide 3	
45	4M42622	廻り止メピン アオリ棒	Pin tilting leg	
46	4M43244	補強板 ホルダ操作カム	Support holder cam	
47	P412236	軸(1) ループセッタ	Shaft(1) loop setter	16-CL 16-CL(X)
48	4M43645	摩擦車(2) ループセッタ	Friction wheel 2	
49	6B00400702	ラジアル玉軸受 4×7×2・P	B-bearing (SSL-740) 4-7	16-CL 16-AA
50	4P55657	間座(1) 摩擦車	Washer(1) friction wheel	16-CL 16-CL(X)
51	4P55616	間座 摩擦車	Washer friction wheel	16-CL 16-CL(X)
52	4M50242	バネ ループセッタ	Spring loop setter	
53	4P31849	リンク(1) ループセッタ	Link(1) loop setter	16-CL 16-CL(X)
54	4M50239	取付ネジ ローラリンクロック	Screw Link lock	
55	4M50238	ローラ リンクロック	Roller link lock	
56	4P55598	段付ネジ リンク(1) スプロケットシュー	Screw link 1	16-CL 16-CL(X)
57	4M30742	リンク(1) ガイドローラ(2)	Link(1) guide roller 2	
58	4K01846	コードSL204 組立	SL204 cord assy	
59	5N202772	2P・ハウジング 5264	2-P connector 2(5264)	
60	5J10018	ソレノイド TDS-09SL 151Ω	Solenoid (TDS-09SL 151Ω)	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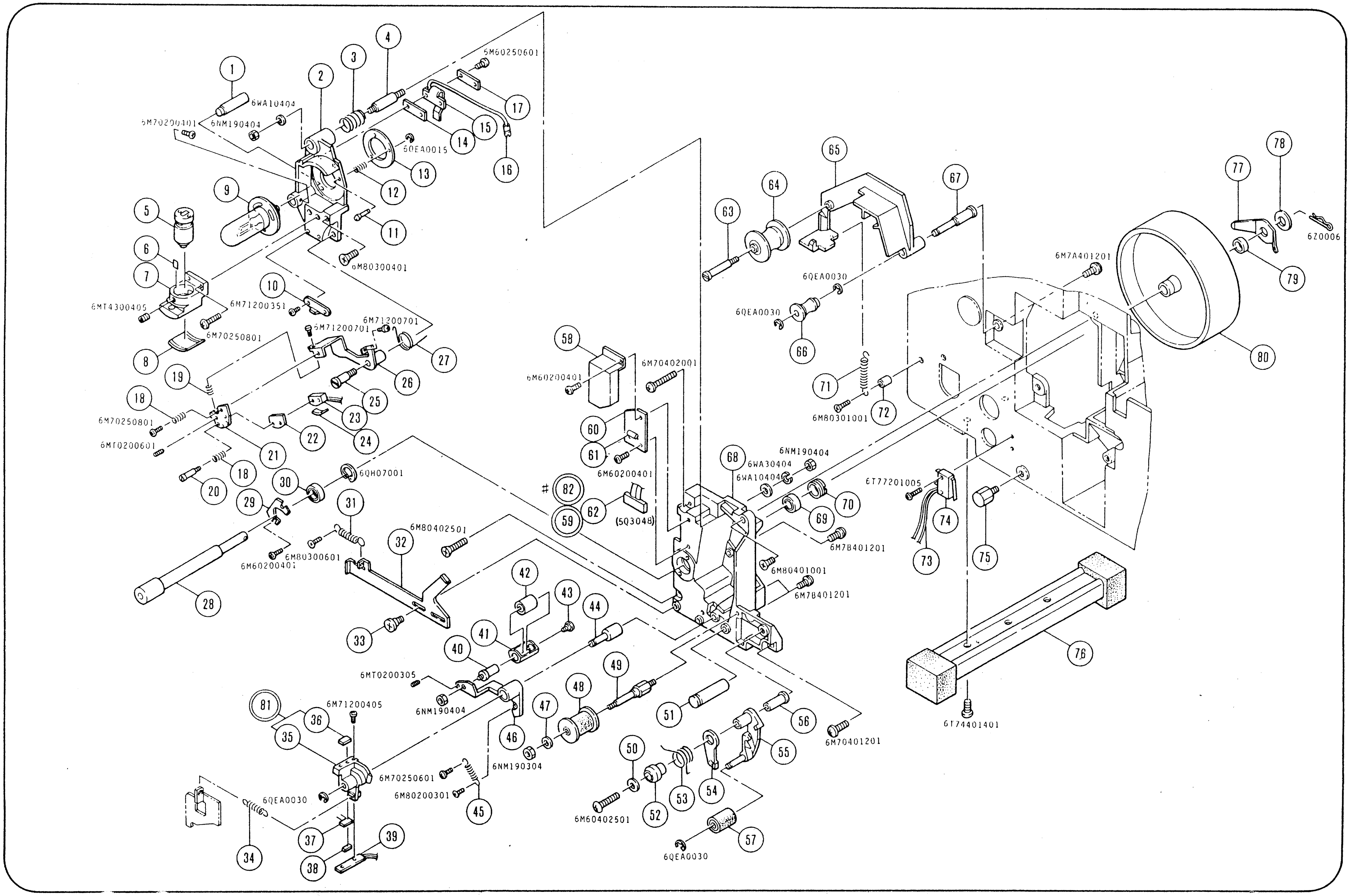
6WA30504

Illust No	Parts No	Parts Name		Common Use Model
61	4M42660	取付板 ソレイド TDS09SL	Holder solenoid	
62	4M42658	ロック板 リンク(1)	Lock plate link 1	
63	4M42659	連桿 ロック板	Link lock plate	
64	P412243	取付金具 アオリ棒	Metal tilting leg	16-CL 16-CL(X)
65	4M42623	アオリツマミ	TilTing konb	
66	4M42621	アオリ棒	TilTing leg	
67	P412153B	前足	Front leg	16-CL ※16-AA
68	4P55664	ワッシャ アオリ棒	Washer tilting leg	16-CL 16-CL(X)
69	6FM3050125	六角穴付ボルト M5×12	Hexagon hole. bolt M5×12	16-CL ※GS-1200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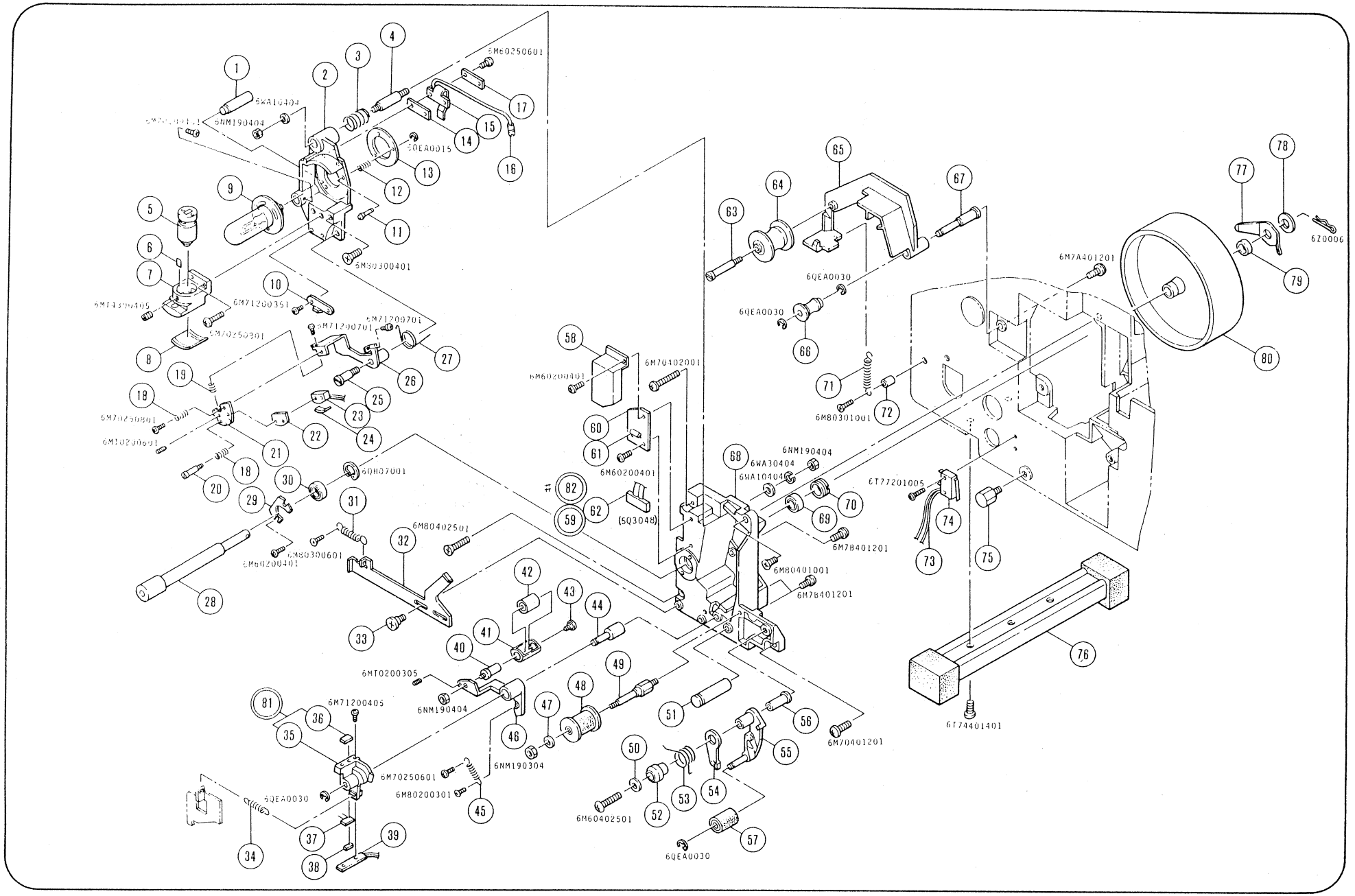
#

Illust No	Parts No	Parts Name		Common Use Model
1	P412101	軸(2) ホルダエキサイタランプ	Shaft(2) exciter lamp	16-CL 16-CL(X)
2	P412050B	ホルダ エキサイタランプ	Holder exciter lamp	16-CL 16-CL(X)
3	4P55541	バネ ホルダエキサイタランプ	Spring holder exc. lamp	16-CL 16-CL(X)
4	P412100	軸(1) ホルダエキサイタランプ	Shaft(1) exciter lamp	16-CL 16-CL(X)
5	4P32388	組立サウンドレンズ(2)	Sound lens assy	※16-CL ※16-CL(X)
6	4M41176	固定板 サウンドレンズ	Plate sound lens	※16-CL
7	P412233	ホルダ サウンドレンズ	Holder sound lens	16-CL 16-CL(X)
8	P412251	フィルムガイド ホルダサウンドレンズ	Film guide sound lens	16-CL 16-CL(X)
9	4E41580	エキサイタランプ KE-04	Exciter lamp (KE-04)	16-CL 16-AA
10	4M43066	ストッパ レバーフォトダイオード	Stopper lever photo diode	
11	4P55539	ピン エキサイタランプ	Pin exciter lamp	16-CL 16-CL(X)
12	4P53365	エキサイタソケットスリーブピンバネ	Spring sleeve pin	16-CL 16-CL(X)
13	4P53364	エキサイタソケットスリーブ座板	Mount exciter lamp	16-CL 16-CL(X)
14	P412090	絶縁紙(1) エキサイタランプ	Isolator(1) exciter lamp	16-CL 16-CL(X)
15	P412092B	端子押工 エキサイタランプ	Terminal exciter lamp	16-CL 16-CL(X)
16	4K01617	エキサイタ 電源コード組立	Exciter power cord	
17	P412091	絶縁紙(2) エキサイタランプ	Isolator(2) exciter lamp	16-CL 16-CL(X)
18	4P49658	バネ(4) ヘッド	Head spring 4	16-CL 16-AA
19	4P52431	サウンドヘッド取付板押工バネ	Head plate press spring	16-CL 16-CL(X)
20	P412095B	ネジ ヘッド	Screw head	16-CL 16-CL(X)
21	P412543	取付板 ヘッドMH-16	Holder head	16-CL 16-CL(X)
22	P412439	座板 ヘッドMH-16	Mount head	16-CL 16-CL(X)
23	4E42473	組立(1) 磁気ヘッドMH-16	Sound head (MH-16)	16-CL 16-AA
24	4E42767	カバー(2) 磁気ヘッドMH-16	Cover(2) sound head	16-CL 16-CL(X)
25	4P54451	セレクタレバー軸	Selector lever shaft	16-CL 16-CL(X)
25	P412093B	組立レバー ヘッド	Lever head assy	16-CL 16-CL(X)
27	4P55540	バネ ヘッドレバー	Spring head lever	16-CL 16-CL(X)
28	4M42717	組立軸 フライホイル	Shaft flywheel assy	
29	P412103	押工板 ボールベアリング	Pressing plate bearing	16-CL 16-CL(X)
30	6B20801201	ラジアル玉軸受 8×12×3.5-P0	B-bearing (SSL-1280ZZH)	16-CL 16-CL(X)

Illust No	Parts No	Parts Name		Common Use Model
31	4P55978	バネ レバー(1) M-0切換	Spring lever(1) M-0	16-CL ※16-CL(X)
32	4M42750	レバー(1) M-0切換	Lever(1) M-0 switch	
33	4P55230	ネジ(1) ループフォーマ	Loop former screw 1	16-CL 16-AA
34	4P55714	バネ ヘッド押工(1)	Spring head presser 1	ST-180 ST-600
35	4M42729	レバー フォトダイオード	Lever photo diode	
36	P412099	カバー フォトダイオード	Cover photo diode	16-CL 16-CL(X)
37	5S4PD520UA	光電素子 PD-520UA	Photo diode (PD-520UA)	16-CL ※16-AA
38	P412421	パッド 光電池	Photo cell pad	16-CL 16-CL(X)
39	4M42730	ホルダ フォトダイオード	Holder photo diode	
40	4E43078	軸 パッドローラ	Shaft pad roller	16-CL 16-CL(X)
41	4E43077	カバー パッドローラ	Cover pad roller	16-CL 16-CL(X)
42	P412114	組立パッドローラ	Pad roller assy	16-CL 16-CL(X)
43	4E50872	段付ネジ パッドローラ	Screw pad roller	16-CL 16-CL(X)
44	4M42727	軸 レバーパッドローラ	Shaft lever pad roller	
45	4P55549	バネ(1) パッドローラ	Spring(1) pad roller	16-CL 16-CL(X)
46	4M42726	レバー パッドローラ	Lever pad roller	
47	4P55642	ワッシャ 角棒巻返	Washer square shaft	16-CL 16-CL(X)
48	P414947	組立制動ローラ(3)	Brake roller(3) assy	16-CL
49	P414950	軸 制動ローラ(3)	Shaft brake roller 3	16-CL
50	4P55658	間座 レバー制動ローラ(2)	Washer brake roller 2	16-CL 16-CL(X)
51	4P55548	軸 パッドローラレバー	Shaft pad roller lever	16-CL 16-CL(X)
52	4M50259	間座 バネ制動ローラ(2)レバー	Washer spring B. roller 2	
53	4M42724	バネ チャージレバー	Spring lever	
54	4M42723	チャージレバー制動ローラ(2)	Lever brake roller 2	
55	4M42720	組立レバー 制動ローラ	Lever brake roller assy	
56	4P55545	間座 6mm×15mm	Metal 6mm×15mm	16-CL 16-CL(X)
57	4M42725	組立制動ローラ(2)	Brake roller(2) assy	
58	4E42721B	カバー 端子板	Cover terminal	16-CL 16-CL(X)
59	4K01853	コード 端子板ヘッド(2) 組立	Terminal cord(2) assy	
60	4E42720B	端子板 ヘッド	Terminal head	16-CL 16-CL(X)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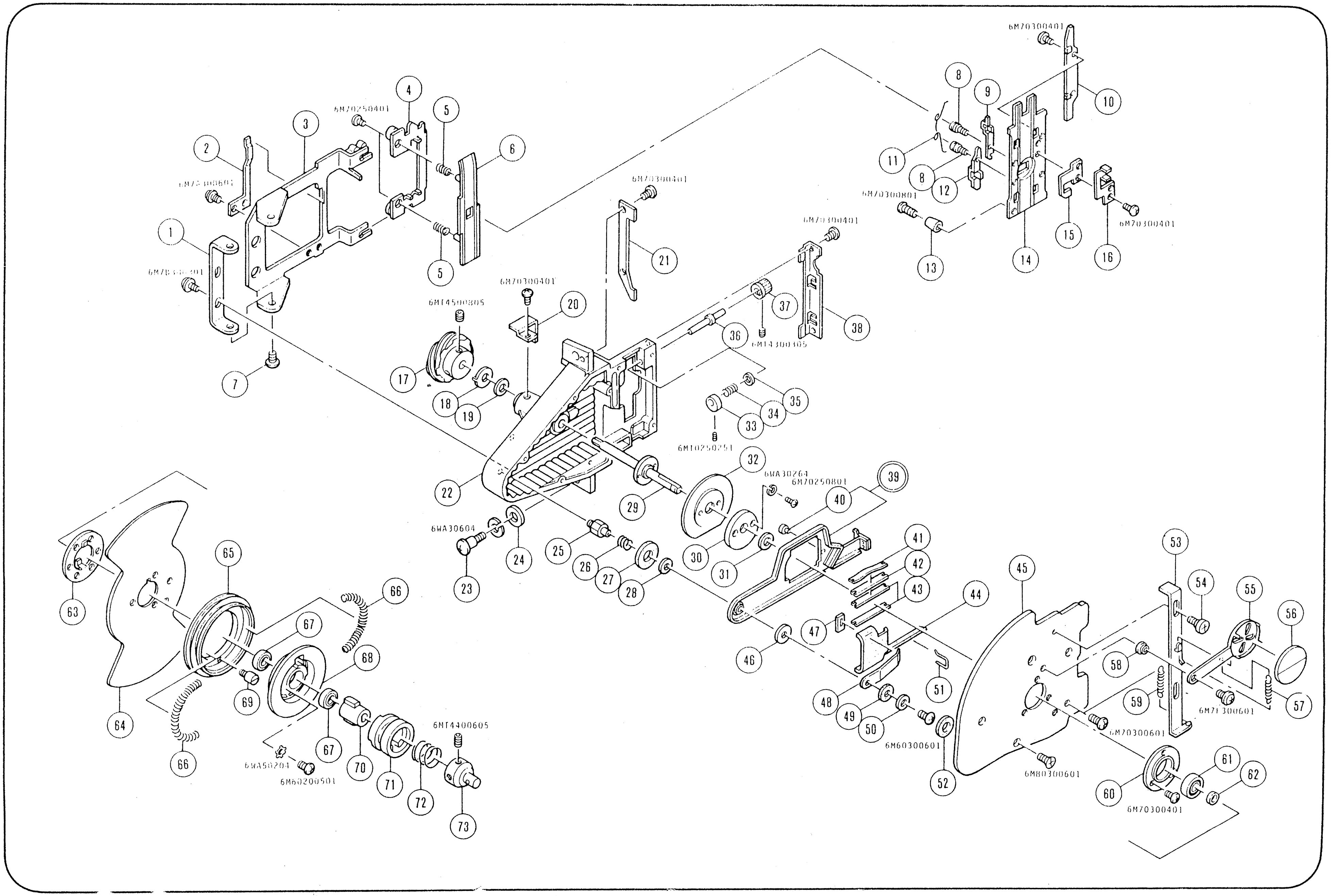
Illust No.	Parts No.	Parts Name		Common Use Model
61	5J20005	キャンセルコイル HCR-004	Cancel coil	16-CL 16-CL(X)
62	5N206452	6P・ハウジング 5264	6-P connector 2(5264)	16-CL 16-CL(X)
63	4P55595	段付ネジ ガイドローラ(4)	Screw guide roller 4	16-CL 16-CL(X)
64	P412339	ガイドローラ(4)	Guide roller 4	16-CL 16-CL(X)
65	4M42693	レバー ガイドローラ(4)	Lever guide roller 4	
66	P412221	ローラ 第2スプロケット押工	Roller second sprocket	16-CL 16-CL(X)
67	4M42694	軸 レバーガイドローラ(4)	Shaft lever guide roller 4	
68	4P20566C	ホルダ フライホイル	Holder flywheel	16-CL
69	6B20601201	ラジアル玉軸受 6×12×4・P0	B-bearing (SSL-1260ZZ)	16-CL 16-CL(X)
70	P412722	リングナット サウンドドラム	Ring nut sound drum	16-CL 16-CL(X)
71	4P55608B	バネ 中間テンションローラ	Spring tension roller	16-CL 16-CL(X)
72	4P56118	スペーサ ベースフレーム	Spacer base frame	16-CL ※16-CL(X)
73	4K01851	コードS205 組立	S205 cord assy	
74	5E1080	マイクロスイッチ SS-5GL-F	Micro switch (SS-5GL-F)	
75	4M50309	座 連桿(1)	Mount link 1	
76	P414946	後足(2)	Rear leg	16-CL ※16-CL(X)
77	4P46467	バネ フライホイル	Flywheel spring	16-CL 16-AA
78	4P52527	モータ取付ネジワッシャ	Motor fix screw washer	16-CL 16-AA
79	4P55844	間座 ウォーム	Washer worm	16-CL ※GS-800
80	4M42718	フライホイル	Flywheel	
81	4M42728	組立レバー フォトダイオード	Lever assy photo diode	
82	4K01852	コード 端子板(1)組立	Terminal cord(1) assy	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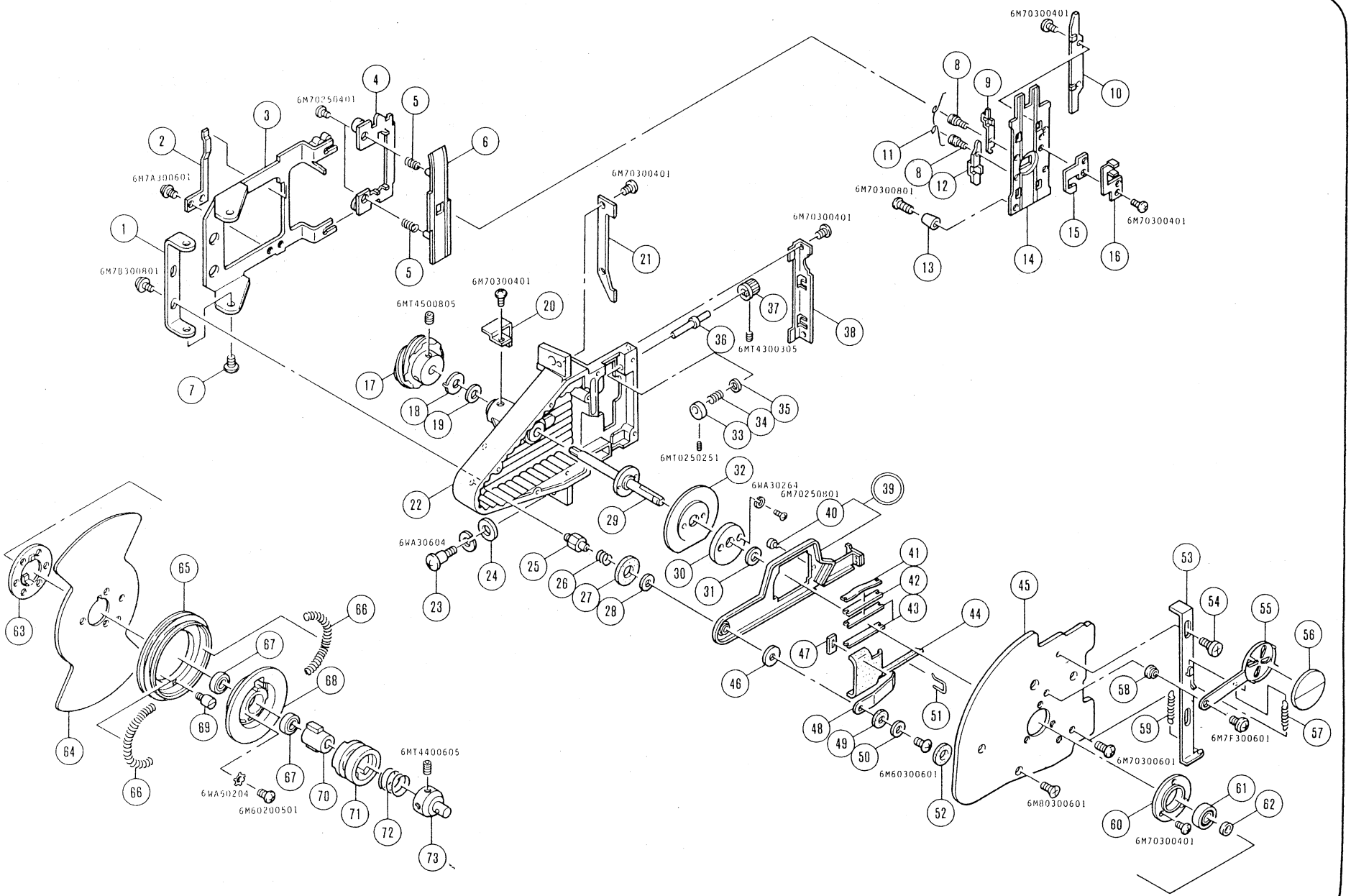
Illust No	Parts No	Parts Name		Common Use Model
1	P412143	取付板 プレッシャプレート	Holder pressure plate	16-CL 16-CL(X)
2	4M43243	板バネ ホルダ(1)プレッシャプレート	Spring holder(1) P.P	
3	4M42616	組立ホルダ(1) プレッシャプレート	Holder(1) pressure plate	
4	4M42618	組立ホルダ(2) プレッシャプレート	Holder(2) pressure plate	
5	4P55653	プレッシャプレートバネ	Pressure plate spring	16-CL 16-AA
6	4M42617	組立プレシャプレート	Pressure plate assy	
7	4P55804	段付ネジ 連桿	Screw link	16-CL K-120SM
8	4M42615	段付ネジ フィルム横押工	Screw film side pressure	
9	4M42611	組立フィルム横押工(1)	Film side pressure 1	
10	4M42609	組立フィルムガイド AP部	Film guide assy	
11	4P55611	バネ フィルム横押工	Spring film side pressure	16-CL ※16-F
12	4M42613	組立フィルム横押工(2)	Film side pressure 2	
13	P412500B	固定ガイド アパーチュアプレート	Settle guide	16-CL ※16-CL(X)
14	4M30736	アパーチュアプレート	Aperture plate	
15	4M43247	中間遮熱板	Heat shielding plate	
16	4P41884C	マスキングカムガイド	Masking guide	16-CL ※16-F
17	P412284	ウォーム(1)	Worm 1	16-CL 16-CL(X)
18	4P55452	座金 ウォーム	Sprocket worm washer	16-CL 16-F
19	4P54650	円筒カム軸ワッシャ(2)	Cam shaft washer 2	16-CL 16-AA
20	P413915	油ヨケ 給送部	Oil guard claw frame	16-CL 16-CL(X)
21	P412199	押工板 アパーチュアプレート	A.P. pressing plate	16-CL 16-CL(X)
22	P414075B	間欠給送装置(2) フレーム組立	Frame claw unit	※16-CL ※16-CL(X)
23	4P55081	ネジ フレーム給送部	Frame screw	16-CL 16-AA
24	4P52527	モータ取付ネジワッシャ	Motor fix screw washer	16-CL 16-AA
25	P411319B	軸 送り爪(1)支点	Fulcrum shaft claw	16-CL 16-AA
26	P410661	制動バネ 中間ギア	Middle gear brake spring	16-CL 16-AA
27	P412043	フェルト 支点送り爪	Felt fulcrum claw	16-CL 16-AA
28	P411322	ワッシャ 送り爪軸	Washer claw shaft	16-CL 16-AA
29	4M42595	組立軸 三角カム	Triangle cam shaft assy	
30	P411318B	三角カム	Triangle cam	16-CL ※16-AA

Illust No	Parts No	Parts Name		Common Use Model
31	4P54541	スプロケットシャフト間座(1)	Washer (0.1×6.1×9.5)PBP	16-CL 16-CL(X)
32	P411317B	面カム	Face cam	16-CL ※16-AA
33	4P41729D	マスキングカム	Masking cam	16-CL ※16-F
34	4P52855	マスキングバネ	Masking spring	16-CL 16-F
35	4P52856	マスキング座金	Masking washer	16-CL 16-F
36	P412189	軸 マスキング	Shaft masking	16-CL 16-CL(X)
37	P412185	ツマミ マスキング	Knod masking	16-CL 16-CL(X)
38	4M41275	取付板 アパーチュアプレート	Holder aperture plate	
39	P412993B	組立(2) 送り爪(1)	Claw(1) assy	16-CL 16-CL(X)
40	P411323	ピン 送り爪	Claw pin	16-CL 16-F
41	P411326	バネ 送り爪枠	Spring slide plate claw	16-CL 16-AA
42	P412193	間座 送り爪枠	Washer slide plate claw	16-CL 16-AA
43	P411325	送り爪枠	Slide plate claw	16-CL 16-AA
44	P411298	フェルト	Oil cloth 1	16-CL 16-F
45	4M30735	蓋 給送部	Frame lid	
46	4P55055B	間座 アオリバネ	Tilting spring washer	16-CL 16-AA
47	4P55650	間座 バネ送り爪	Washer claw spring	16-CL 16-AA
48	P411327B	バネ 送り爪	Spring claw	16-CL 16-AA
49	4P55945	ワッシャ(2) 送り爪軸	Washer(2) claw shaft	16-CL 16-CL(X)
50	4P56099	ワッシャ(3) 送り爪軸	Washer(3) claw shaft	※16-CL ※16-AA
51	P411507	固定バネ 油含ミ	Fix spring oil cloth	16-CL 16-F
52	P412558	上側フェルト 支点送り爪	Felt fulcrum claw	16-CL 16-AA
53	4M42599	レバー(2) 停止映写	Lever(2) stop	
54	4P55230	ネジ(1) ループフォーマ	Loop former screw 1	16-CL 16-AA
55	P412892	組立セフティシャッタ	Safety shutter assy	16-AA
56	P412873	防熱ガラス	Heat proof glass	16-AA
57	4M50328	バネ レバー(2)停止映写	Spring lever(2) stop	
58	4P55764	間座 レバーセフティシャッタ	Washer lever	16-AA
59	4P55880	バネ セフティシャッタ	Safety shutter spring	※16-AA
60	P412828	ホルダ ベアリング	Holder ball bearing	16-AA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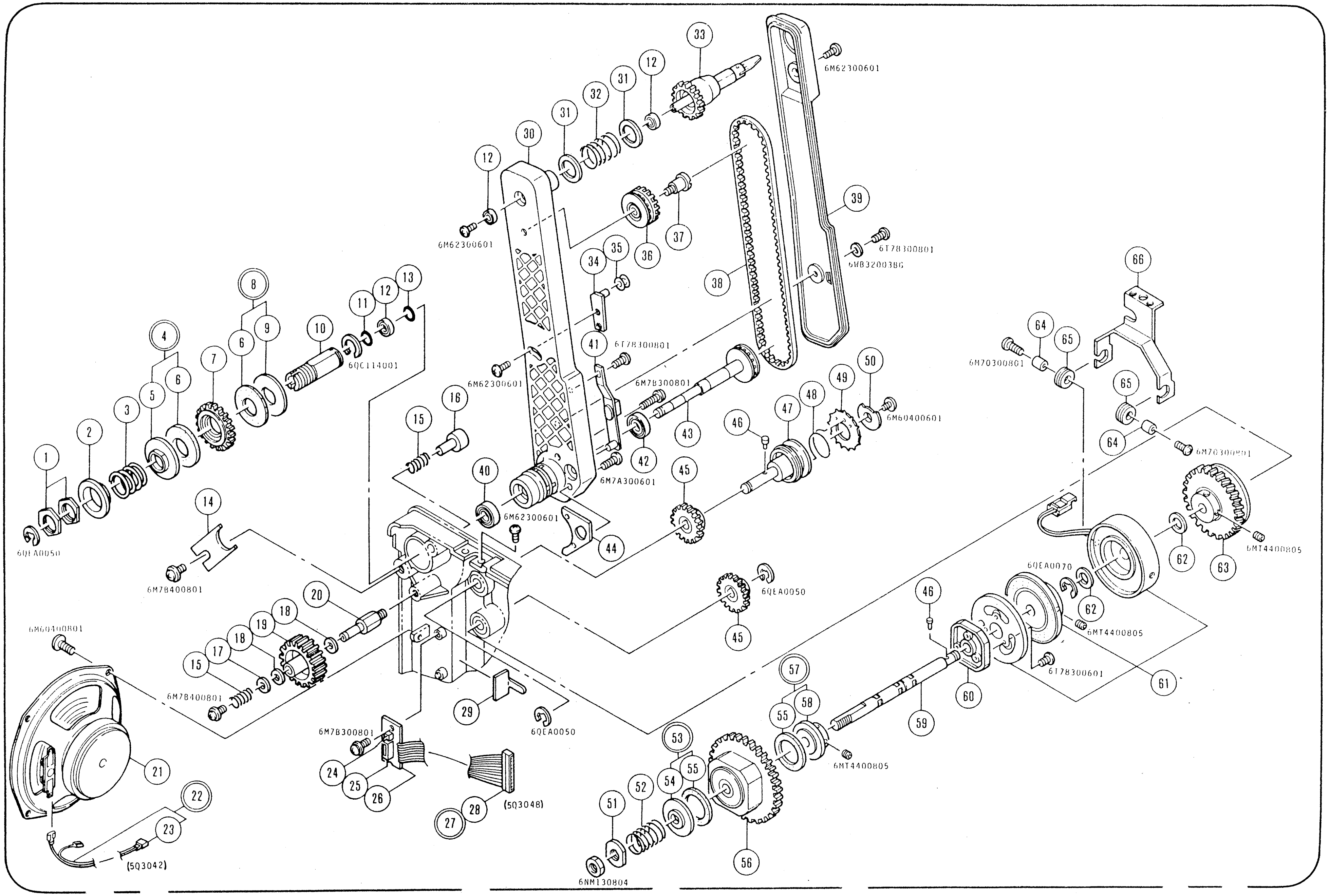
Illust No	Parts No	Parts Name		Common Use Model
61	6B20601903	ラジアル玉軸受 6×19×6・PO	B-bearing (626-2NK) 6-19	16-CL 16-AA
62	4P51407	間欠給送装置 フレーミング間座	Framing washer claw uint	※16-AA
63	P412937	ホルダ シャッタ羽根	Holder shutter	16-AA
⑭	4M42602	シャッタ羽根	Shutter	
⑮	4M42603	プーリ シャッタ 50HZ・60HZ	Pulley shutter 50HZ・60HZ	
66	4P55767	制動バネ プーリシャッタ	Brake spring pulley	16-AA
67	6B20601502	ラジアル玉軸受 6×15×5・PO	B-bearing (NMB-R1560ZZ)	16-AA 16-A
68	P412851B	プーリ(1) クラッチ	Pulley(1) clutch	16-AA
69	4P55791	取付ネジ カバー機構部	Screw cover machine	16-AA
70	4M42606	ボス プーリ(2) クラッチ	Boss pulley(2) clutch	
⑰	4M42607	プーリ(2) クラッチ	Pulley(2) clutch	
72	4M50223	バネ プーリ(2) クラッチ	Spring pulley(2) clutch	
73	4M42608	ボス ユニバーサルジョイント	Boss universal joint	



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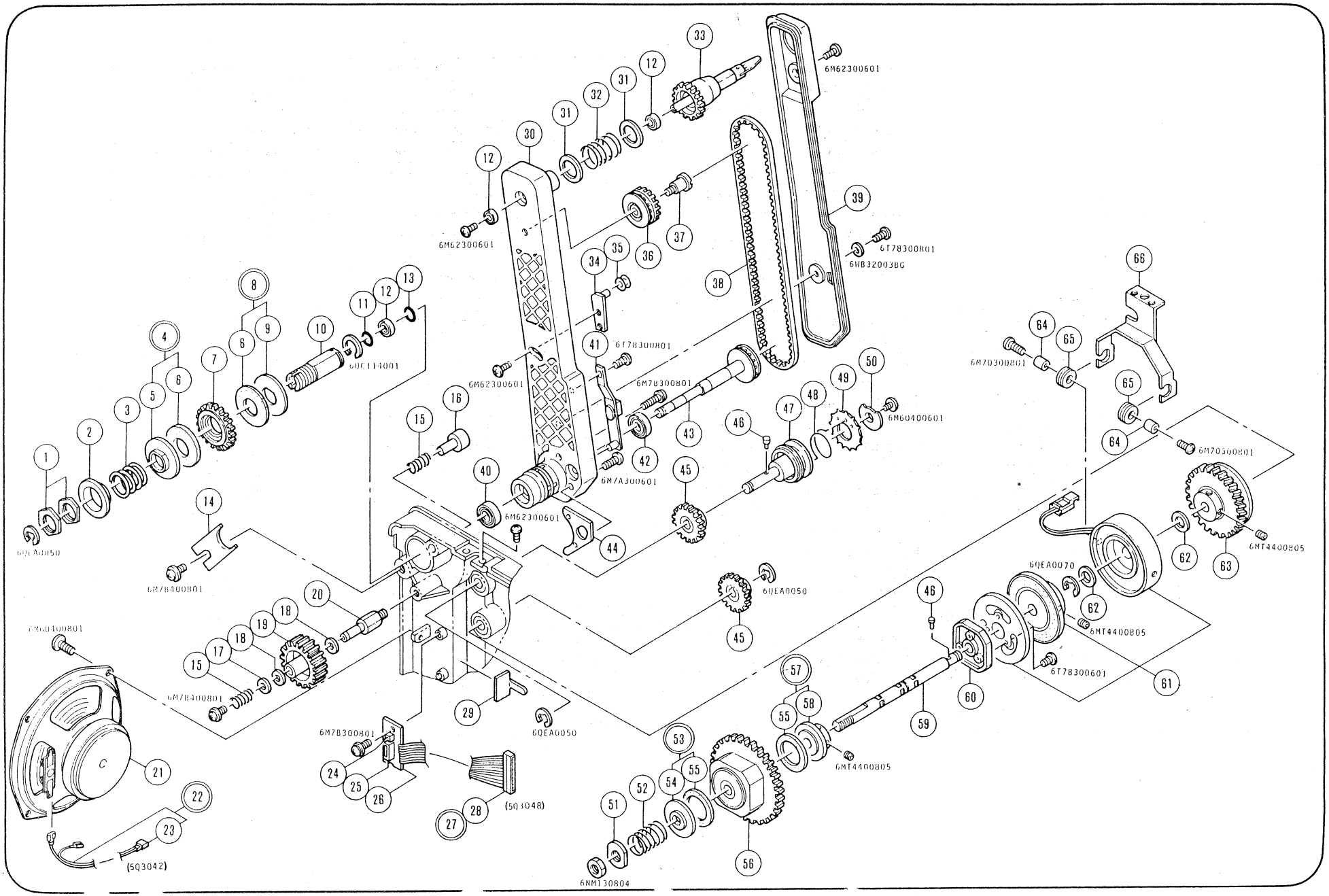
Illust No	Parts No	Parts Name		Common Use Model
1	4P55599	ナット 摩擦板	Nut friction plate	16-CL 16-CL(X)
2	P412328	摩擦板(4)	Friction plate 4	16-CL 16-CL(X)
3	4P55600	バネ 摩擦板	Spring friction plate	16-CL 16-CL(X)
4	P412261	組立摩擦板	Friction plate assy	16-CL 16-CL(X)
5	P412262	摩擦板(1)	Friction plate 1	
6	P412263	摩擦板(2)	Friction plate 2	
7	P412232	ギヤ(2) 巻返	Gear(2) rewind	16-CL 16-CL(X)
8	P412316	組立摩擦板(3)	Friction plate (3) assy	16-CL 16-CL(X)
9	P412317	摩擦板(3)	Friction plate 3	
10	4M42739	組立ボス 摩擦板	Boss friction plate assy	
11	4M50327	ワッシャ 7.6×10×0.4	Washer (7.6×10×0.4)	
12	6B20601001	ラジアル玉軸受 6×10×3·P0	B-bearing (MR106ZZ)	
13	4M50321	ワッシャ 6.1×8.5×0.3	Washer (6.1×8.5×0.3)	
14	P412156	ロックバネ ボスアーム	Lock spring boss arm	16-CL 16-CL(X)
15	4P55555	バネ アームボタン	Spring arm button	16-CL 16-AA
16	4M43504	ボタン アーム巻返	Button arm rewind	
17	4P52527	モータ取付ネジワッシャ	Motor fix screw washer	16-CL 16-AA
18	4P54650	円筒カム軸ワッシャ(2)	Cam shaft washer 2	16-CL 16-AA
19	4M42715	中間ギヤ 巻返	Middle gear rewind	
20	4M43252	軸 中間ギヤ巻返	Shaft middle gear rewind	
21	5V1029	スピーカ 16Ω	Speaker 16Ω	
22	4K01619	連結コード(6) 組立	Connector cord(6) assy	
23	5N202651	2P·ミニスポクスプラグ 5240-021	2-P connector 1(5240-021)	16-CL DELUXE 16-CL(X)
24	5N202801	2P·コネクタ B2P-SHF-1AA	2-P connector 1(B2P-SHF-1AA)	
25	5N206451	6P·ウェハ 5267-06A	6-P connector 1(5267-06A)	
26	4E43844	プリント基板 中継コネクタ	Terminal plate	
27	4K01857	コード 中継基板(1) 組立	Terminal cord(1) assy	
28	5N208262	8P·ハウジング 5264	8-P connector 2(5264)	
29	5G6010	ステッカ T-18	Sticker (T-18)	
30	4M20370	アーム 巻返	Arm rewind	

Illust No	Parts No	Parts Name		Common Use Model
31	4M50311	ワッシャ 制動バネ巻返アーム	Washer spring rewind arm	
32	4M50312	制動バネ 巻返アーム	Spring rewind arm	
33	4M42733	組立リール軸 巻返	Reel shaft assy rewind	
34	P412384	組立アーム ガイドローラ巻返	Guide roller rewind assy	16-CL 16-CL(X)
35	P412212	ベルトローラ 巻返	Roller belt rewind	16-CL 16-CL(X)
36	4M42736	シンクロプーリ 巻返アーム	Sync. pulley rewind	
37	4M50264	軸 シンクロプーリ巻返	Shaft sync. pulley rewind	
38	6VS109STS	STSベルト 4.5M 109	STS belt (4.5M 109)	
39	4M30748	カバー アーム巻返	Cover rewind arm	
40	6B10801601	ラジアル玉軸受 8×16×5·P0	B-bearing (688ZZ)	
41	P412265002	組立ボタン アーム(1) 巻返	Button arm rewind assy	
42	6B20801901	ラジアル玉軸受 5×19×6·P0	B-bearing (698ZZ)	
43	4M42737	プーリ軸 巻返	Pulley shaft rewind	
44	4M43506	補強板 アーム巻返側	Support rewind arm	
45	4M42625	伝達ギヤ 第1スプロット	Gear 1st sprocket	
46	4M50326	ピン スプロケット軸	Pin sprocket shaft	
47	4M42636	第1スプロケット	First sprocket	
48	4M42638	バネ 第1スプロケット	Spring first sprocket	
49	4M43260	歯 第1スプロケット	Cog first sprocket	
50	P412141	キャップ スプロケット	Cap sprocket	16-CL 16-CL(X)
51	4M42634	調節板 逆転スリップ	Adjustor reverse tension	
52	4M50229	バネ 逆転スリップ	Spring reverse tension	
53	4M42632	組立ボス(2) 摩擦板	Boss(2)assy friction plate	
54	4M42633	ボス(2) 摩擦板	Boss(2) friction plate	
55	4M50226	摩擦板	Friction plate	
56	4M42629	組立ギヤ(1) 巻返	Gear(1) assy rewind	
57	4M42627	組立ボス(1) 摩擦板	Boss(1)assy friction plate	
58	4M42628	ボス(1) 摩擦板	Boss(1) friction plate	
59	4M42624	軸 逆転スリップ	Shaft reverse tension	
60	4M42626	継手 電磁クラッチ	Joint magnet clutch	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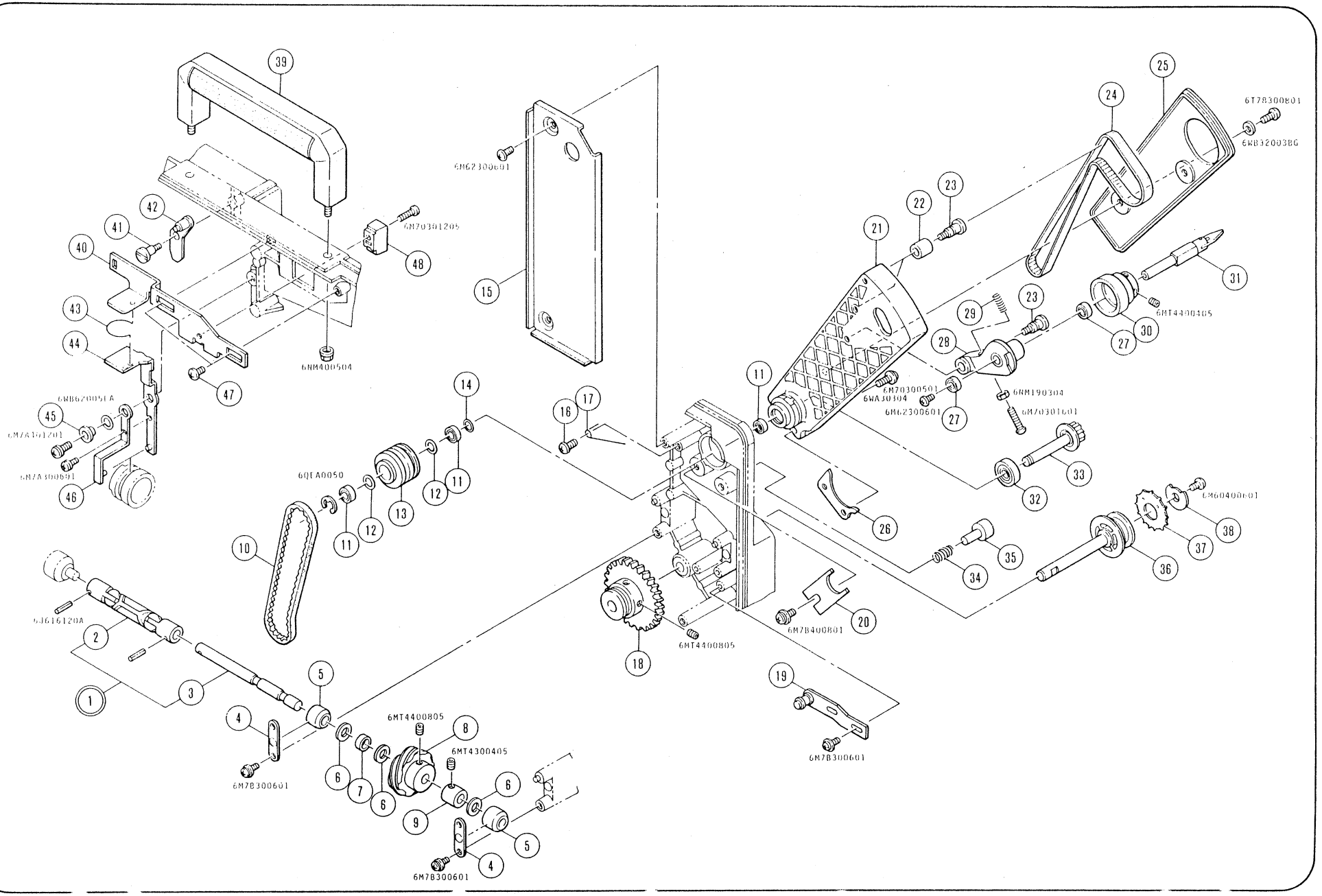
Illust No	Parts No	Parts Name		Common Use Model
61	6Y49491005	電磁クラッチ TMCT-15	Magnet clutch (TMCT-15)	
62	4P55651	テフロンワッシャ 8.1×14×0.3	Washer (8.1×14×0.3) PTFE	16-CL 16-CL(X)
63	P412270	組立ウォームギヤ(1)	Worm gear(1) assy	16-CL 16-CL(X)
64	4P55607	間座 防震ゴム	Washer vib. proof rubber	16-CL 16-CL(X)
65	4E42016	防震ゴム モータ	Vibration proof rubber	16-CL 16-F
66	4M42635	ホルダ 電磁クラッチ	Holder magnet clutch	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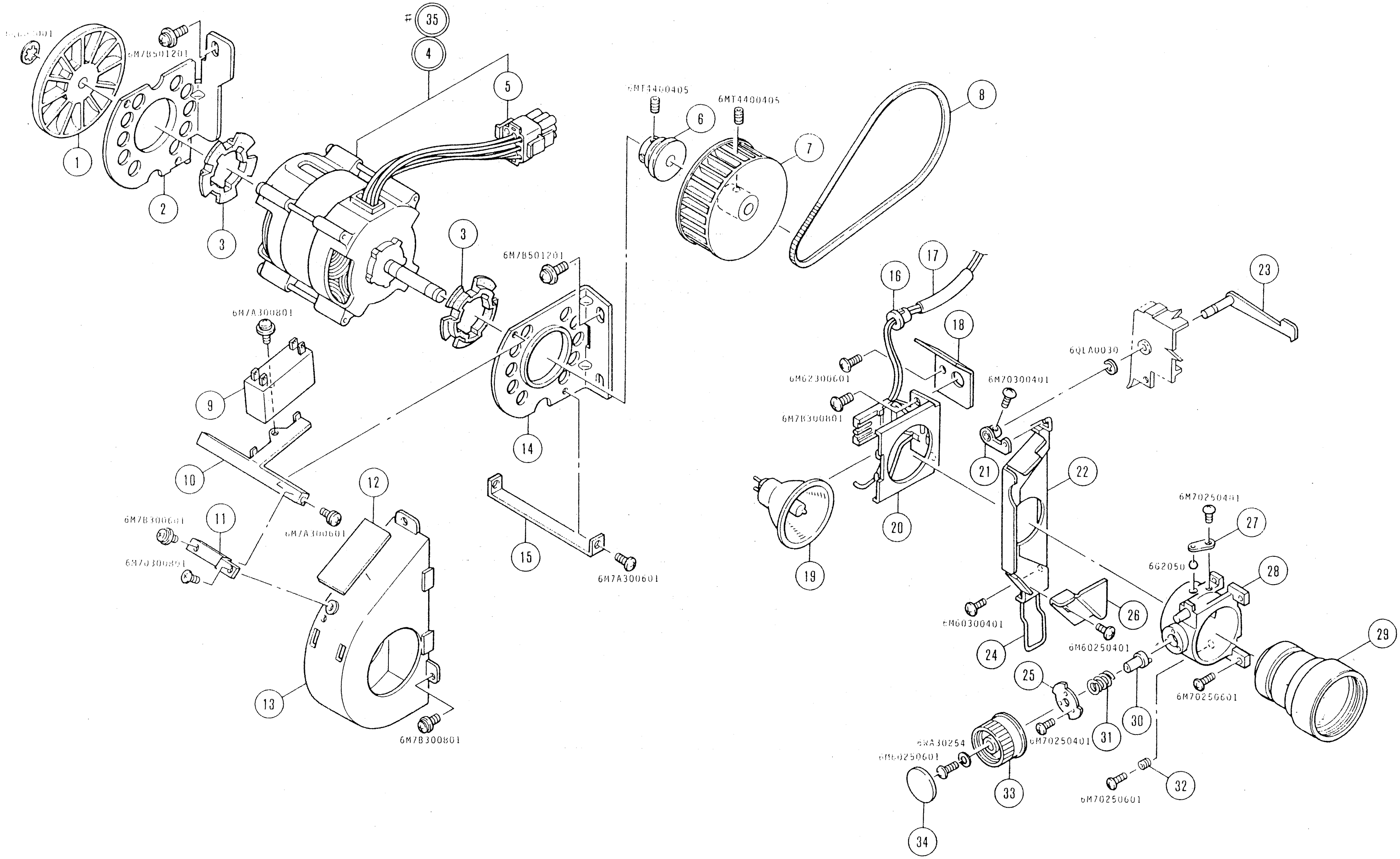
Illust No	Parts No	Parts Name		Common Use Model
1	4M42661	組立中間軸(2)	Middle shaft(2) assy	
2	4M42663	穴アケ ユニバーサルジョイント	Universal joint	
3	4M42662	中間軸(2)	Middle shaft 2	
4	P412191B	メタル押工	Metal presser	16-CL 16-CL(X)
5	4P46460	メタル 中間軸	Middle shaft metal	16-CL 16-CL(X)
6	4P54650	円筒カム軸ワッシャ(2)	Cam shaft washer 2	16-CL 16-AA
7	4P51407	間欠給送装置 フレーミング間座	Framing washer claw unit	※16-AA
8	P412285	ウォーム(2)	Worm 2	16-CL
9	4P49039	間座 主軸	Main shaft washer	16-CL 16-A
10	P413885	Vベルト 巻取	V belt take-up	16-CL(X)
11	6B20601001	ラジアル玉軸受 6×10×3·P0	B-bearing (MR106ZZ)	
12	4M50327	ワッシャ 7.6×10×0.4	Washer (7.6×10×0.4)	
13	4M43250	組立プーリ(2) 巻取	Pulley(2) assy take-up	
14	4M50321	ワッシャ 6.1×8.5×0.3	Washer (6.1×8.5×0.3)	
15	4M42716	アテ板 裏カバー	Rear cover plate	
16	4P55230	ネジ(1) ループフォーマ	Loop former screw 1	16-CL 16-AA
17	4M50310	アースバネ 巻取アーム	Spring take-up arm	
18	P4121618	組立ウォームギヤ(2)	Worm gear(2) assy	※16-CL ※16-CL(X)
19	4M43254	組立取付板 ベルト案内ローラ	Holder belt guide roller	
20	P412156	ロックバネ ボスアーム	Lock spring boss arm	
21	4M20371	アーム 巻取	Arm take-up	
22	4M50244	ベルト 案内ローラ	Belt guide roller	
23	4P55605	段付ネジ レバーアーム	Screw lever arm	16-CL ※16-AA
24	6VS215T80B	歯形ベルト MM-215T80-BL	Belt (MM-215T80-BL)	
25	4P20576B02	アーム(2) 巻取	Arm(2) take-up	
26	4M43505	補強板 アーム巻取側	Support take-up Arm	
27	6B20601201	ラジアル玉軸受 6×12×4·P0	B-bearing (SSL-1260ZZ)	16-CL 16CL(X)
28	4M43388	組立レバー アーム巻取	Lever arm take-up assy	
29	4M50290	制動バネ 巻取	Brake spring take-up	
30	4M43602	プーリ(2) 上巻取	Pulley(2) upper take-up	

Illust No	Parts No	Parts Name		Common Use Model
31	P415262	組立角棒シャフト 巻取	Square shaft take-up assy	16-CL ※16-CL(X)
32	6B20601902	ラジアル玉軸受 6×19×6·P0	B-bearing (626ZZ)	
33	4M42742	プーリ軸 巻取	Pulley shaft take-up	
34	4P55555	バネ アームボタン	Spring arm button	16-CL 16-AA
35	P412134	ボタン アーム巻取	Button arm take-up	16-CL 16-CL(X)
36	P412183	第2スプロケット	Second sprocket	16-CL 16-CL(X)
37	4P48178	16mmスプロケット	Sprocket	16AA 16-A
38	P412141	キャップ スプロケット	Cap sprocket	16-CL 16CL(X)
39	4M30842	組立吊手	Carrying handle assy	
40	4M42677	切換レバー 停止映写	Select lever still proj.	
41	4M50317	取付ネジ レバー(1)停止映写	Screw lever(1) still proj.	
42	4M43331	組立レバー(1) 停止映写	Lever(1) assy still proj.	
43	4M50320	クリックバネ	Click spring	
44	4M42672	組立レバー(1) クラッチ寄セ	Lever(1)assy clutch mover	
45	4M50247	間座 レバークラッチ寄セ	Washer clutch mover	
46	4M42674	組立レバー(2) クラッチ寄セ	Lever(2)assy clutch mover	
47	4M50231	取付ネジ ロック板	Screw lock plate	
48	4M42678	ツマミ 停止映写	Knob still projection	



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6M60300401
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6M70250601
6WA30254
6M60250601
6M70250401
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6M70250601
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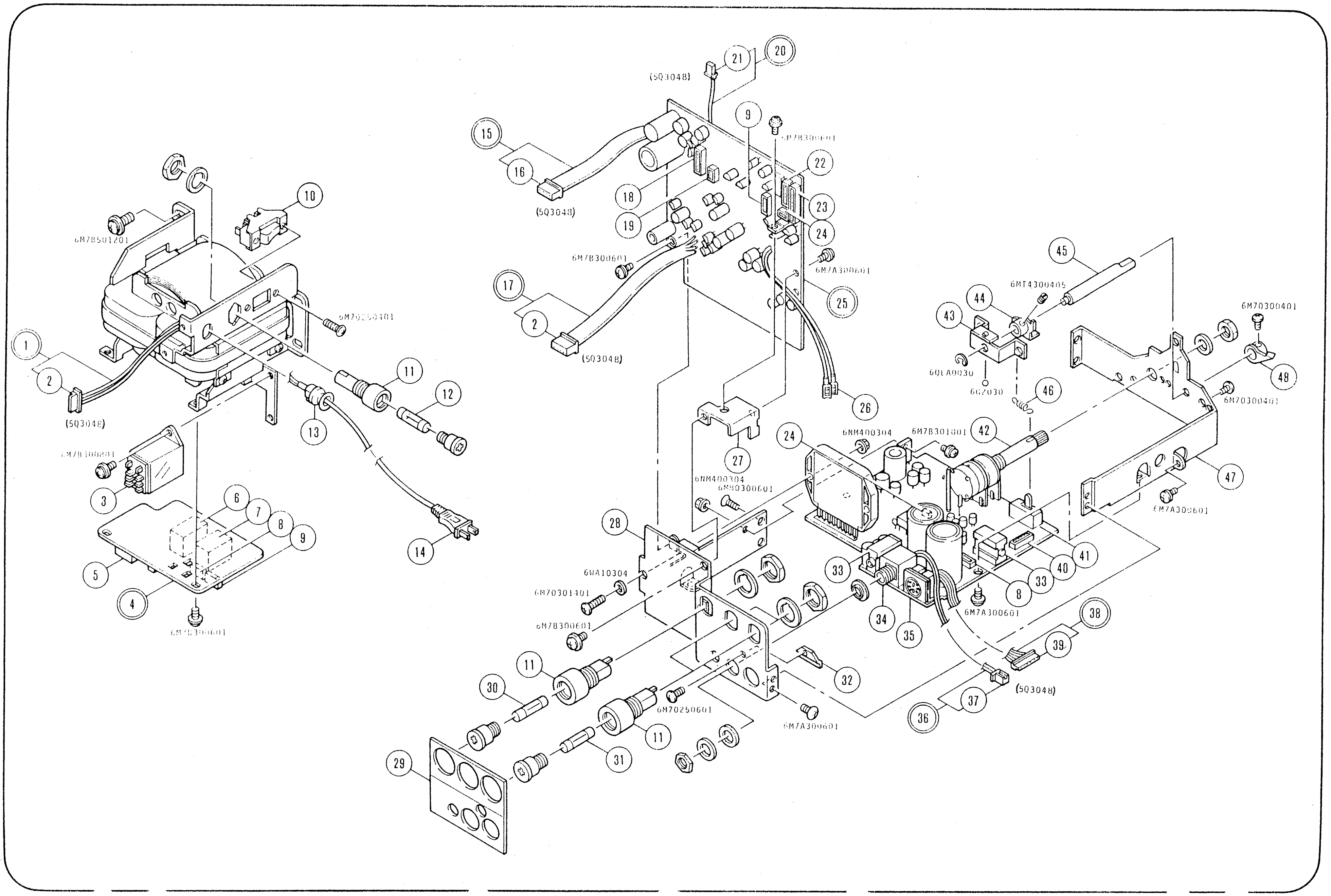
Illust No	Parts No	Parts Name		Common Use Model
1	6Z0137	モータ ファン	Motor fan	
2	4P31848	ホルダ(2) モータ	Holder(2) motor	16-CL
3	4M42593	防震ゴム(2) モータ	Rubber vibration proof 2	
4	5V2065	モータ 8IC2P-4	Motor (8IC2P-4)	
5	5N209162	9P・プラグハウジング 1-480706-0	9-P connector (1-480706-0)	
⑥	P412240002	プーリ(1) モータ	Pulley(1) motor	
7	P412292	ファン	Fan	16-CL
8	6VV3M375	Vベルト メイン 3M375	V belt main (3M375)	16-CL 16-CL(X)
⑨	5DJ1262211	ポリエステルコンデンサ 12MF220V	Polyest film 12MF/220V	16-CL 16-AA
10	4M42594	ホルダ コンデンサ	Holder condenser	
11	P412437	ホルダ ファンケーシング	Holder fan casing	16-CL
12	4N01937	銘板 ベルト切換指示	Belt changing indicator	16-CL 16-AA
13	4M30747	ファンケーシング	Fan casing	
14	P412259	ホルダ(1) モータ	Holder(1) motor	16-CL
15	4M42755	ホルダ(3) モータ	Holder(3) motor	
16	5G5038	スナップブッシング SB-375-3	Cord bush (SB-375-3)	16-CL
17	4E50862	絶縁チューブ ランプコード	Isolator lamp cord	
18	4M43128	遮熱板 ランプソケット	Heat shield lamp socket	
19	5LA2402514	映写ランプ JCR 24V 250W	Lamp (24V-250W)	16-CL 16-CL(X)
20	5N1038	ランプソケット SS221-01	Lamp socket (SS221-01)	
21	P412129	組立ホルダ リンク(2)	Holder link(2) assy	16-CL 16-CL(X)
22	4M30744	シャッタカバー	Shutter cover	
23	4M42654	組立レバー(1) ループセッタ	Lever(1) loop setter assy	
24	4M42657	リンク(2) ループセッタ	Link(2) loop setter assy	
25	4M42752	フォーカシング座 映写レンズ	Focusing mount	
26	4M42656	シャッタカバー(2)	Shutter cover 2	
27	4P55663	バネ レンズホルダ	Spring lens holder	CS-1200 ST-1200HD
28	4M30756	ホルダ 映写レンズ	Holder projection lens	
29	4LB0514	映写レンズ F1.2-50mm	Lens (F1.2-50mm)	16-CL 16-AA
30	4M42751	軸 フォーカシングツマミ	Shaft focusing knob	

Illust No	Parts No	Parts Name		Common Use Model
31	4P55631	バネ フォーカシングツマミ	Spring focusing knob	16-CL 16-AA
32	4M50093	調節ネジ ホルダ映写レンズ	Screw holder proj. lens	※16-CL ※16-CL(X)
33	4M42710	ツマミ フォーカシング	Knob focusing	
34	4M42711	塞ギ板 ツマミフォーカシング	Lid knob focusing	
35	5V2064	モータ 8IC 2P-3 シールナシ	Motor (8IC 2P-3) 16-AL opt.	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6M7B301001
6M80300601
6WA10304
6M70301401
6M70250601

Illust No	Parts No	Parts Name		Common Use Model
1	4K01603	連結コード(2)組立	Connector cord(2) assy	
2	5N205312	5P・ハウジング5264	5-P Connector 2(5264)	
③	5E7116	リレーLY1F-US DC12V	Relay (LY1F-US DC12V)	
4	4M43255	組立プリント基板 電源トランス	Circuit board assy trans	
5	5N209151	9P・ピンアッセンブリ350432-1	9-P connector 1(350432-1)	
6	5E7115	リレー G2R-217P-U-US	Relay (G2R-217P-U-US)	
7	5E7114	リレー G2R-117P-V-US	Relay (G2R-117P-V-US)	
8	5N205311	5P・ウェハ 5267-05A	5-P connector 1(5267-05A)	
9	5N204491	4P・ウェハ 5267-04A	4-P connector 1(5267-04A)	
10	5E6009	波動スイッチ WD31019	Seesaw switch (WD-31019)	16-CL 16-AA
⑪	5H2016	ヒューズホルダ S-N2059	Fuse holder (S-N2059)	16-CL 16-AA
⑫	5H1050003	ヒューズ 5A	Fuse (5A)(UL)	16-CL
13	5G5059	ストレインリリーフブッシングSR-5N-5	Cord bush (SR-5N-5)	
⑭	4K00746B	電源コード(1)	Power cord	16-CL
15	4K01615	連結コード(7)組立	Connector cord(7) assy	
16	5N204492	4P・ハウジング 5264	4-P connector 2(5264)	
17	4K01605	連結コード(4)組立	Connector cord(4) assy	
18	5N208261	8P・ウェハ 5267-08A	8-P connector 1(5267-08A)	
19	5N203571	3P・ウェハ 5267-03A	3-P connector 1(5267-03A)	
20	4K01604	連結コード(3)組立	Connector cord(3) assy	
21	5N202772	2P・ハウジング 5264	2-P connector 2(5264)	
22	5N207171	7P・ウェハ 5267-07A	7-P connector 1(5267-07A)	
23	5N213051	13P・ウェハ 5267-13A	13-P connector 1(5267-13A)	
24	5N202771	2P・ウェハ 5267-02A	2-P connector 1(5267-02A)	
25	4E32219	組立制御回路	Control plate assy	
26	4K01613	連結コード(8)組立	Connector cord(8) assy	
27	4M42749	ホルダ 制御基板	Holder control plate	
㉘	4M20373	シャーシ(2) アンプ	Chassis(2) amplifier	
㉙	4N40241	銘板(1) アンプ	Plate(1) amplifier	
㉚	5H1020007	ヒューズ 2A	Fuse (2A)(UL)	16-CL

Illust No	Parts No	Parts Name		Common Use Model
㉛	5H1030009	ヒューズ 3A	Fuse (3A)(UL)	※16-CL DELUXE
32	4M43003	押工板 アンプコネクタ	Clasp amp. connector	
33	5N50782	3.5mmジャック S-G8031	Jack 3.5mm (S-G8031)	
㉞	5N50412	6.34mmジャック S-G7622-12	Jack 6.4mm (S-G7622-12)	16・AA
35	5N208232	8P・DINジャック TCS-4480-01	8-P DIN (TCS-4480-01)	
36	4K01711	連結コード(9)組立	Connector cord(9) assy	
37	5N202642	2P・ソケットハウジング5102-02	2-P connector 2(5102-02)	OMNI250 16-CLDELUXE
38	4K01606	連結コード(5)組立	Connector cord(5) assy	
39	5N207172	7P・ハウジング5264	7-P connector 2(5264)	
40	5N206451	6P・ウェハ5267-06A	6-P connector 1(5267-06A)	
41	5E5072	M-O切換スイッチ SL106-1	M-O select sw (SL-106-1)	
42	5R4Z0014A1	可変抵抗10KΩA型・10KΩB型	VR 10K A-type+10K B-type	16-CL 16-CL(X)
43	4M42699	ホルダ SW・M-O切換	Holder M-O select sw	
44	4M42701	組立レバー SW・M-O切換	Lever assy M-O select sw.	
45	4M42700	軸 SW・M-O切換	Shaft M-O select sw.	
46	4M50255	バネ M-O切換	Spring M-O select	
47	4M20372	シャーシ(1) アンプ	Chassis(1) amplifier	
48	P412207	組立レバー(2) M-O切換	Lever(2) M-O switch assy	16-CL 16CL(X)

EXPORT TYPE

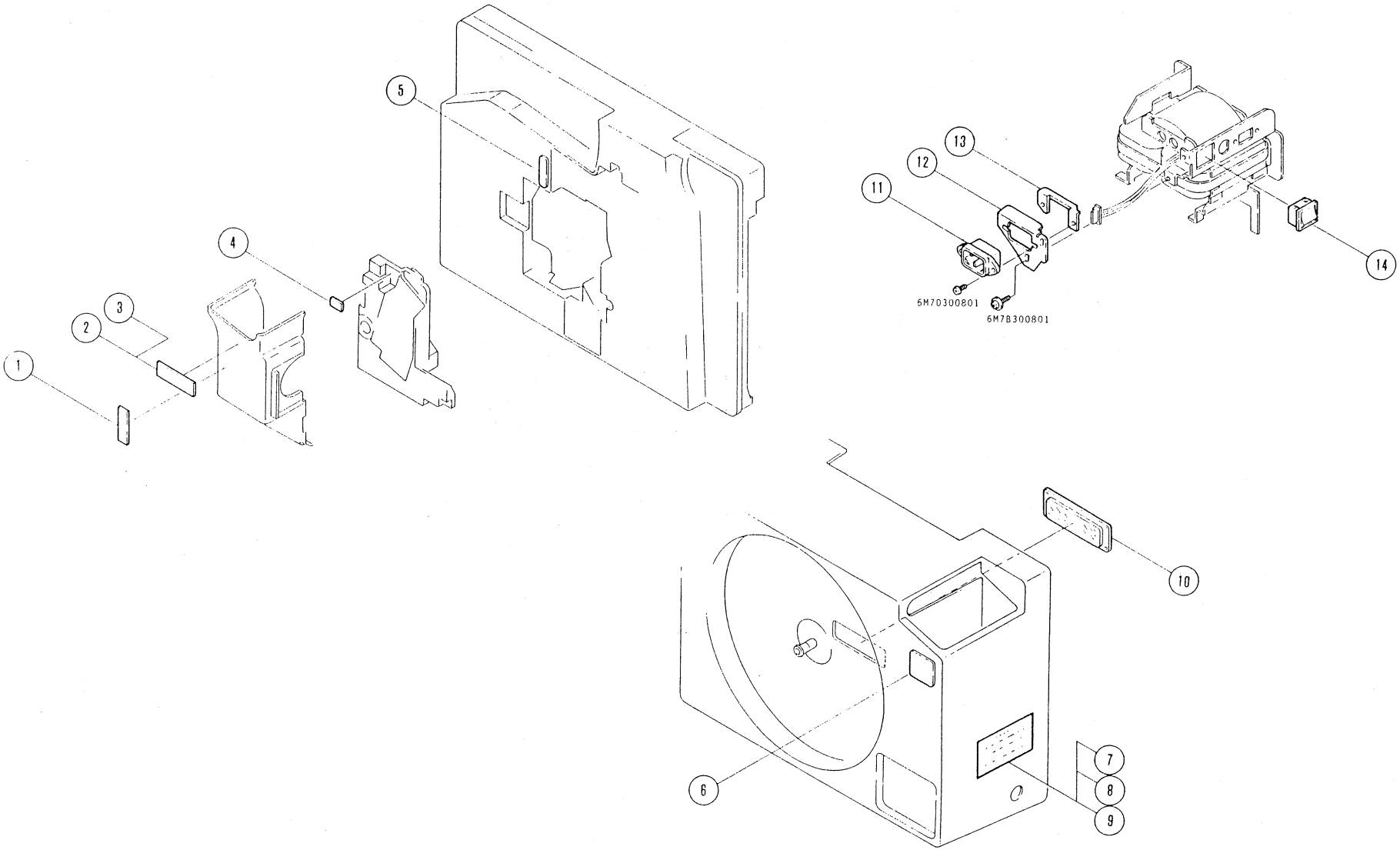
Item No	Page and Illustration No	Parts No	Parts Name	Remaks
1	1−4	4P8AAM013	Claw section frame assy	50Hz 18f/s / 24f/s
				Europe
				Option for other countries
2		4P8AAN050		50Hz/60Hz W/3-Blade shutter
				Canada Korea U.S.A.
3		4P8AAN003		50Hz/60Hz W/2-Blade shutter
				Other countries
				Option for the above countries
4	1−5	4M30902	Motor(1) assy	Canada U.S.A. General export
5		4M30918	Motor(3) assy	Others
6	1−6	4M20448002	Transformer assy	Canada U.S.A.
7		4M20451002	Transformer assy	General export
8		4M20451	Transformer assy	Others
9	1−7	4E32221	Amplifier assy	Canada U.S.A.
10		4E32221002	Amplifier assy	Others
11	1−8	4M30903	Motor(3) assy 16-AL optical	Canada U.S.A.
12		4M30919	Motor(4) assy 16-AL optical	Others
13	1−9	4E32269	Amplifier assy 16-AL optical	Canada U.S.A.
14		4E32269002	Amplifier assy 16-AL optical	Others
15	2−1	4K01692	Speaker cord	Canada U.S.A.
16		4K00506	Speaker cord	Others
17	2−2	5N50211	6.4mm Plag A (P-2272)	Canada U.S.A.
18		5N202101	2-P DIN Connec. (LS-70Z)	Others
19		5N202572	2-P DIN plag (LK91-U1)	Others
20	3−22	4M43468	Front cover assy	Austria Denmark France
				Holland Hungary Norway
				W.Germany
21		4M10064	Front cover	Others

Item No	Page and Illustration No	Parts No	Parts Name	Remaks
22	3−24	4K01700	Spare fuse holder assy	Canada U.S.A.
23		4K01702	Spare fuse holder assy	General export
24		4K01701	Spare fuse holder assy	Others
25	3−26	5H1020007	Fuse (2A)(UL)	Canada U.S.A.
26	11−30	5H1020008	Midget fuse (2A)(5×20)	Others
27	3−27	5H1030009	Fuse (3A)(UL)	Canada U.S.A.
28	11−31	5H1031004	Midget fuse (3.15A)	Others
29	3−28	5H1050001	Midget fuse (5A)	General export
30	11−12	5H1050003	Fusu (5A)(UL)	Canada U.S.A.
31		5H1031004	Midget fuse (3.15A)	Others
32	3−32	4N40260	Label(1) fuse	Canada U.S.A.
33		4N40266	Label(2) fuse	General export
34		4N40267	Label(3) fuse	Others
35	3−35	4M10065	Rear cover	Canada U.S.A.
36		4M10065003	Rear cover	General export
37		4M10065002	Rear cover	Others
38	3−37	4N40317	Rating plate 2	Canada U.S.A.
39		4N40318	Rating plate 3	Austria Denmark England
				Finland France Holland
				Hungary kuwait Norway
				S.Africa Sweden Switzerland
				W.Germany
40		4N40319	Rating plate 4	Australia New Zealand
41		4N40320	Rating plate 5	Brazil China Colombia
				Curacao Guiana Guyana
				Korea Libya Mexico
				Panama Peru Philippines
				Saudiarabia Tahiti Venezuela
42		4N40321	Rating plate 6	Others

EXPORT TYPE

Item No	Page and Illustration No	Parts No	Parts Name	Remaks
43	3−41	4K01690	Dust cover 1	W. Sp. cover
44		4K01691	Dust cover 2	W/O Sp. cover
45	4−11	4M20452	Operation cover	Austria Denmark France
				Holland Hungary Norway
				W. Germany
46		4M20374	Operation cover	Others
47	7−64	4M30832	Shutter (3-blade)	Canada Korea U.S.A.
48		4M42602	Shutter (2-blade)	Others
49	7−65	4M42603	Pulley Shutter 50·60Hz	Brazil Canada China
				Colombia Curacao Guiana
				Guyana Korea Libya
				Mexico Panama Peru
				Philippines Saudiarabia Tahiti
				U.S.A. Venezuela
50		4M43116	Pulley Shutter 50Hz 18·24	Others
51	7−71	4M43117	Pulley(3) Clutch	Canada Korea U.S.A.
52		4M42607	Pulley(2) Clutch	Others
53	10−6	P412240002	Pulley(1) Motor	Brazil Canada China
				Colombia Curacao Guiana
				Guyana Korea Libya
				Mexico Panama Peru
				Philippines Saudiarabia Tahiti
				U.S.A. Venezuela
54		P412342002	Pulley(2) Motor	Others
55	10−9	5DJ1262211	Polyest film 12MF 220V	General export Canada U.S.A.
56		5DJ1262511	Polyest film 12MF 250V	Others
57	11−3	5E7116	Relay (LYIF-US DC12V)	General export Canada U.S.A.
58		5E7118	Relay (JCZA-TM DC12V)	Others
59	11−11	5H2016	Fuse holder (S-N2059)	Canada U.S.A.
60		5H2017	Fuse holder (Na19601)	Others

Item No	Page and Illustration No	Parts No	Parts Name	Remaks
61	11−11	5H2016	Fuse holder (S-N2059)	Canada U.S.A.
62	(Amp)	5H2015	Fuse holder (S-N2250)	Others
63	11−14	4K00285B	Power cord	Switzerland
64		4K00747	Power cord 2	Canada U.S.A.
65		4K00755	Power cord 5	England Israel S.Africa
66		4K00756	Power cord 6	Australia Fiji Newguinea
				New Zealand
67		4K00757	Power cord 7	Kenya Oman Malaysia
				Malta Singapore Tahiti
68		4K00759	Power cord 9	Brazil Greece HangKong
				Indonesia Italy Jordan
				Korea Kuwait Mexico
				Morocco Panama Peru
				Philippines Reunion Saudiarabia
				Taiwan U.S.A. Uruguay
69		4K01205	Power cord 3	U.S.A(Multi-Voltage Type)
70		4K00754	Power cord 4	Others
71	11−28	4M20373	Chassis(2) amplifier	Canada U.S.A.
72		4M20375	Chassis(3) amplifier	Others
73	11−29	4N40241	Plate(1) amplifier	Canada U.S.A.
74		4N40249	Plate(2) amplifier	Others
75	11−34	5N50412	Jack 6.4mm (S-G7622-12)	Canada U.S.A.
76		5N202132	2-P DIN connector (LB-3H)	Others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Item No	Parts No	Parts Name	Remarks
1	4N02528	Plate caution	
2	4N02571	Plate(2) lamp cover	Finland
3	4N03108	Plate lamp cover	Austria Holland Hungary
			W.Germany
4	4N02547B	Plate exciter rating	
5	4N40261	Indication plate(2) lamp	
6	4N02143	Plate caution	Canada U.S.A.
7	4N00437	Cover plate 2	Denmark
8	4N01890	Caution plate cover	Australia Austria England
			Finland France Holland
			Hungary Kuwait Newzealand
			Norway S.Africa Sweden
			Switzerland W.Germany
9	4N03309	Caution plate back cover	Canada U.S.A.
10	P412446	Window voltage changing	Except Canada U.S.A.
11	5N203352	Power cord socket (NC-174)	Except Canada U.S.A.
12	4M41701	Holder(1) socket	Except Canada U.S.A.
13	4M41702	Holder(2) socket	Except Canada U.S.A.
14	5E6023	Main switch (1802-0121)	Except Canada U.S.A.

PARTS NUMBER INDEX

Parts No	Parts Name		Page and Illustration No.
P410661	制動バネ 中間ギア	Middle gear brake spring	7－26
P411298	フェルト	Oil cloth 1	7－44
P411317B	面カム	Face cam	7－32
P411318B	三角カム	Triangle cam	7－30
P411319B	軸 送り爪(1)支点	Fulcrum shaft claw	7－25
P411322	ワッシャ 送り爪軸	Washer claw shaft	7－28
P411323	ピン 送り爪	Claw pin	7－40
P411325	送り爪枠	Slide plate claw	7－43
P411326	バネ 送り爪枠	Spring slide plate claw	7－41
P411327B	バネ 送り爪	Spring claw	7－48
P411507	固定バネ 油含ミ	Fix spring oil cloth	7－51
P412043	フェルト 支点送り爪	Felt fulcrum claw	7－27
P412050B	ホルダ エキサイタランプ	Holder exciter lamp	6－2
P412057C	レバー プレッシャローラ	Lever pressure roller	5－5
P412090	絶縁紙(1) エキサイタランプ	Isolator(1) exciter lamp	6－14
P412091	絶縁紙(2) エキサイタランプ	Isolator(2) exciter lamp	6－17
P412092B	端子押工 エキサイタランプ	Terminal exciter lamp	6－15
P412093B	組立レバー ヘッド	Lever head assy	6－26
P412095B	ネジ ヘッド	Screw head	6－20
P412099	カバー フォトダイオード	Cover photo diode	6－36
P412100	軸(1) ホルダエキサイタランプ	Shaft(1) exciter lamp	6－4
P412101	軸(2) ホルダエキサイタランプ	Shaft(2) exciter lamp	6－1
P412103	押工板 ボールベアリング	Pressing plate bearing	6－29
P412106	軸 プレッシャローラ	Shaft pressure roller	5－2
P412114	組立パッドローラ	Pad roller assy	5－4 6－42
P412129	組立ホルダ リンク(2)	Holder link(2) assy	10－21
P412134	ボタン アーム巻取	Button arm take-up	9－35
P412141	キャップ スプロケット	Cap sprocket	8－50 9－38
P412143	取付板 プレッシャプレート	Holder pressure plate	7－1
P412153B	前足	Front leg	5－67

Parts No	Parts Name		Page and Illustration No.
P412156	ロックバネ ボスアーム	Lock spring boss arm	8－14 9－20
P412161B	組立ウォームギヤ(2)	Worm gear(2) assy	9－18
P412183	第2スプロケット	Second sprocket	9－36
P412185	ツマミ マスキング	Knod masking	7－37
P412189	軸 マスキング	Shaft masking	7－36
P412191B	メタル押工	Metal presser	9－4
P412193	間座 送り爪枠	Washer slide plate claw	7－42
P412199	押工板 アパーチュアプレート	A.P. pressing plate	7－21
P412200	ガイドローラ(1)	Guide roller 1	5－37
P412204B	ストッパ レバーガイドローラ(2)	Stopper lever roller 2	5－30
P412207	組立レバー(2) M-O切換	Lever(2) M-O switch assy	11－48
P412212	ベルトローラ 巻返	Roller belt rewind	8－35
P412215	ガイドローラ(2)	Guide roller 2	5－31
P412221	ローラ 第2スプロケット押工	Roller second sprocket	6－66
P412228	ツマミ M-O切換	Knob M-O switch	3－1
P412229	二重ツマミ(1) アンプ	Knod amplifier 1	3－6
P412230	二重ツマミ(2) アンプ	Knod amplifier 2	3－5
P412232	ギヤ(2) 巻返	Gear(2) rewind	8－7
P412233	ホルダ サウンドレンズ	Holder sound lens	6－7
P412236	軸(1) ループセッタ	Shaft(1) loop setter	5－47
P412240002	プーリ(1) モータ	Pulley(1) motor	10－6 12－53
P412243	取付金具 アオリ棒	Metal tilting leg	5－64
P412245	リール止メ軸 裏カバー	Reel shaft rear cover	3－36
P412251	フィルムガイド ホルダサウンドレンズ	Film guide sound lens	6－8
P412259	ホルダ(1) モータ	Holder(1) motor	10－14
P412261	組立摩擦板	Friction plate assy	8－4
P412262	摩擦板(1)	Friction plate 1	8－5
P412263	摩擦板(2)	Friction plate 2	8－6
P412265002	組立ボタン アーム(1) 巻返	Button arm rewind assy	8－41
P412270	組立ウォームギヤ(1)	Worm gear(1) assy	8－63

PARTS NUMBER INDEX

Parts No	Parts Name		Page and Illustration No.
P412284	ウォーム(1)	Worm 1	7－17
P412285	ウォーム(2)	Worm 2	9－8
P412292	ファン	Fan	10－7
P412316	組立摩擦板(3)	Friction plate (3) assy	8－8
P412317	摩擦板(3)	Friction plate 3	8－9
P412328	摩擦板(4)	Friction plate 4	8－2
P412339	ガイドローラ(4)	Guide roller 4	6－64
P412342002	プーリ(2) モータ	Pulley(2) Motor	12－54
P412384	組立アーム ガイドローラ巻返	Guide roller rewind assy	8－34
P412421	パッド 光電池	Photo cell pad	6－38
P412437	ホルダ ファンケーシング	Holder fan casing	10－11
P412439	座板 ヘッドMH-16	Mount head	6－22
P412446	表示窓 電圧切換	Window voltage changing	13－10
P412500B	固定ガイド アパーチュアプレート	Settle guide	7－13
P412543	取付板 ヘッドMH-16	Holder head	6－21
P412558	上側フェルト 支点送り爪	Felt fulcrum claw	7－52
P412676	金具 カバーロック	Lock cover	3－12
P412722	リングナット サウンドドラム	Ring nut sound drum	6－70
P412828	ホルダ ベアリング	Holder ball bearing	7－60
P412851B	プーリ(1) クラッチ	Pulley(1) clutch	7－68
P412873	防熱ガラス	Heat proof glass	7－56
P412892	組立セフティシャッタ	Safety shutter assy	7－55
P412930	ストッパ(1) レバープレッシャローラ	Stopper(1) lever pressure	5－7
P412937	ホルダ シャッタ羽根	Holder shutter	7－63
P412993B	組立(2) 送り爪(1)	Claw(1) assy	7－39
P413094B	固定板 バネ中間テンション	Plate spring mid. tension	5－8
P413143	ストッパ ガイドローラ(3)	Stopper guide roller 3	5－39
P413885	Vベルト 巻取	V belt take-up	9－10
P413915	油ヨケ 給送部	Oil guard claw frame	7－20
P413991	角ブラシ	Cleaning brush	3－38

Parts No	Parts Name		Page and Illustration No.
P414075B	間欠給送装置(2) フレーム組立	Frame claw unit	7－22
P414565	ボタン(1) スイッチ	Button(1) switch	2－22
P414565002	ボタン(2) スイッチ	Button(2) switch	2－21
P414652	底板 リモート装置	Button plate remote	2－27
P414946	後足(2)	Rear leg	6－76
P414947	組立制動ローラ(3)	Brake roller(3) assy	6－48
P414950	軸 制動ローラ(3)	Shaft brake roller 3	6－49
P415189	ホルダ スペアヒューズ	Holder spare fuse	3－25
P415214	組立リンク(2) スプロケットシュー(2)	Link(2) sprocket shoe 2	5－24
P415262	組立角棒シャフト 巻取	Square shaft take-up assy	9－31
4E32219	組立制御回路	Control plate assy	11－25
4E32220	組立モードスイッチ	Mode sw assy	4－5
4E32221	組立アンプ	Amplifier assy	1－7 12－9
4E32221002	組立アンプ	Amplifier assy	12－10
4E32269	16-AL(0) アンプ組立○専	Amp. 16-AL optical	1－9 12－13
4E32269002	16-AL(0) アンプ組立○専	Amplifier assy 16-AL optical	12－17
4E41580	エキサイタランプ KE-04	Exciter lamp (KE-04)	6－9
4E42016	防震ゴム モータ	Vibration proof rubber	8－65
4E42473	組立(1) 磁気ヘッドMH-16	Sound head (MH-16)	6－23
4E42720B	端子板 ヘッド	Terminal head	6－60
4E42721B	カバー 端子板	Cover terminal	6－58
4E42767	カバー(2) 磁気ヘッドMH-16	Cover(2) sound head	6－24
4E43077	カバー パッドローラ	Cover pad roller	6－41
4E43078	軸 パッドローラ	Shaft pad roller	6－40
4E43111	ズーミングスイッチ	Zooming switch	2－24
4E43820	プリント基板 リモート	Circuit plate remote	2－26
4E43844	プリント基板 中継コネクタ	Terminal plate	8－26
4E50862	絶縁チューブ ランプコード	Isolator lamp cord	10－17
4E50872	段付ネジ パッドローラ	Screw pad roller	6－43
4K00285B	電源コード	Power cord	12－63

PARTS NUMBER INDEX

Parts No	Parts Name		Page and Illustration No.
4K00502	アパーチュア ブラシ	Aperture brush	3－39
4K00506	スピーカコード	Speaker cord	12－16
4K00746B	電源コード(1)	Power cord	11－14
4K00747	電源コード(2)	Power cord 2	12－64
4K00754	電源コード(4)	Power cord 4	12－70
4K00755	電源コード(5)	Power cord 5	12－65
4K00756	電源コード(6)	Power cord 6	12－66
4K00757	電源コード(7)	Power cord 7	12－67
4K00759	電源コード(9)	Power cord 9	12－68
4K01205	電源コード(3)	Power cord 3	12－69
4K01602	連結コード(1) 組立	Connector cord(1) assy	4－15
4K01603	連結コード(2)組立	Connector cord(2) assy	11－1
4K01604	連結コード(3)組立	Connector cord(3) assy	11－20
4K01605	連結コード(4)組立	Connector cord(4) assy	11－17
4K01606	連結コード(5)組立	Connector cord(5) assy	11－38
4K01613	連結コード(8)組立	Connector cord(8) assy	11－26
4K01615	連結コード(7)組立	Connector cord(7) assy	11－15
4K01616	カム モータ組立	Cam motor assy	4－27
4K01617	エキサイタ 電源コード組立	Exciter power cord	6－16
4K01619	連結コード(6) 組立	Connector cord(6) assy	8－22
4K01657	組立スピーカカバー	Speaker cover assy	1－1
4K01690	ビニールカバー(1)	Dust cover 1	12－43
4K01691	ビニールカバー(2)	Dust cover 2	3－41 12－44
4K01692	スピーカコード	Speaker cord	2－1 12－15
4K01700	スペアヒューズホルダ(1) 組立	Spare fuse holder assy	3－24 12－22
4K01701	スペアヒューズホルダ組立	Spare fuse holder assy	12－24
4K01702	スペアヒューズホルダ組立	Spare fuse holder assy	12－23
4K01711	連結コード(9)組立	Connector cord(9) assy	11－36
4K01846	コードSL204 組立	SL204 cord assy	5－58
4K01847	コードSL201 組立	SL201 cord assy	4－50

Parts No	Parts Name		Page and Illustration No.
4K01848	コードSL203 組立	SL203 cord assy	5－16
4K01849	コードS201 組立	S201 cord assy	4－35
4K01850	コード マイクロスイッチ組立	S204 cord assy	4－1
4K01851	コードS205 組立	S205 cord assy	6－73
4K01852	コード 端子板(1)組立	Terminal cord(1) assy	6－82
4K01853	コード 端子板ヘッド(2) 組立	Terminal cord(2) assy	6－59
4K01854	コードS202 組立	S202 cord assy	4－28
4K01855	コード SL202.S203 組立	SL202 S203 cord assy	3－15
4K01857	コード 中継基板(1) 組立	Terminal cord(1) assy	8－27
4LB0514	映写レンズ F1.2-50mm	Lens (F1.2-50mm)	10－29
4M10064	前カバー	Front cover	3－22 12－21
4M10065	後カバー	Rear cover	3－35 12－35
4M10065002	後カバー	Rear cover	12－37
4M10065003	後カバー	Rear cover	12－36
4M10066	スピーカカバー	Speaker cover	2－6
4M20368	ランプカバー	Lamp cover	3－8
4M20370	アーム 巻返	Arm rewind	8－30
4M20371	アーム 巻取	Arm take-up	9－21
4M20372	シャーシ(1) アンプ	Chassis(1) amplifier	11－47
4M20373	シャーシ(2) アンプ	Chassis(2) amplifier	11－28 12－71
4M20374	操作カバー	Operation cover	4－11 12－46
4M20375	シャーシ(3) アンプ	Chassis(3) amplifier	12－72
4M20448	組立電源トランス	Transformer assy	1－6
4M20448002	組立電源トランス	Transformer assy	12－6
4M20451	組立電源トランス	Transformer assy	12－8
4M20451002	組立電源トランス	Transformer assy	12－7
4M20452	操作カバー	Operation cover	12－45
4M30735	蓋 給送部	Frame lid	7－45
4M30736	アパーチュアプレート	Aperture plate	7－14
4M30740	シュー 第1スプロケット	Shoe first sprocket	4－40

PARTS NUMBER INDEX

Parts No	Parts Name		Page and Illustration No.
4M30742	リンク(1) ガイドローラ(2)	Link(1) guide roller 2	5－57
4M30744	シャッタカバー	Shutter cover	10－22
4M30746	組立 フィルムガイド	Film guide assy	3－20
4M30747	ファンケーシング	Fan casing	10－13
4M30748	カバー アーム巻返	Cover rewind arm	8－39
4M30751	底板	Bottom plate	3－29
4M30752	ボタン 操作カバー	Button operation cover	4－10
4M30753	本体 リモート装置	Case remote control	2－20
4M30754	取付板 スピーカカバー	Holder speaker cover	2－14
4M30756	ホルダ 映写レンズ	Holder projection lens	10－28
4M30832	シャッタ羽根 3枚	Shutter (3-blade)	12－47
4M30842	組立吊手	Carrying handle assy	9－39
4M30902	組立(1) モータ (ファンナシ)	Motor(1) assy	1－5 12－4
4M30903	組立(2) モータ○専 (ファンナシ)	Motor(2) assy 16-AL optical	1－8 12－11
4M30918	組立(3) モータ (ファンナシ)	Motor(3) assy	12－5
4M30919	組立(4) モータ○専 (ファンナシ)	Motor(4) assy 16-AL optical	12－12
4M41176	固定板 サウンドレンズ	Plate sound lens	6－6
4M41275	取付板 アパーチュアプレート	Holder aperture plate	7－38
4M41376	ウォーム リモート	Worm gear remote	4－26
4M41701	ホルダ(1) ソケット	Holder(1) main switch	13－12
4M41702	ホルダ(2) ソケット	Holder(2) main switch	13－13
4M42593	防震ゴム(2) モータ	Rubber vibration proof 2	10－3
4M42594	ホルダ コンデンサ	Holder condenser	10－10
4M42595	組立軸 三角カム	Triangle cam shaft assy	7－29
4M42599	レバー(2) 停止映写	Lever(2) stop	7－53
4M42602	シャッタ羽根	Shutter	7－64 12－48
4M42603	プーリ シャッタ 50HZ・60HZ	Pulley shutter 50HZ・60HZ	7－65 12－49
4M42606	ボス プーリ(2) クラッチ	Boss pulley(2) clutch	7－70
4M42607	プーリ(2) クラッチ	Pulley(2) clutch	7－71 12－52
4M42608	ボス ユニバーサルジョイント	Boss universal joint	7－73

Parts No	Parts Name		Page and Illustration No.
4M42609	組立フィルムガイド AP部	Film guide assy	7－10
4M42611	組立フィルム横押工(1)	Film side pressure 1	7－9
4M42613	組立フィルム横押工(2)	Film side pressure 2	7－12
4M42615	段付ネジ フィルム横押工	Screw film side pressure	7－8
4M42616	組立ホルダ(1) プレッシャプレート	Holder(1) pressure plate	7－3
4M42617	組立プレシャプレート	Pressure plate assy	7－6
4M42618	組立ホルダ(2) プレッシャプレート	Holder(2) pressure plate	7－4
4M42621	アオリ棒	TilTing leg	5－66
4M42622	遅り止メピン アオリ棒	Pin tilting leg	5－45
4M42623	アオリツマミ	TilTing konb	5－65
4M42624	軸 逆転スリップ	Shaft reverse tension	8－59
4M42625	伝達ギヤ 第1スプロット	Gear 1st sprocket	8－45
4M42626	継手 電磁クラッチ	Joint magnet clutch	8－60
4M42627	組立ボス(1) 摩擦板	Boss(1)assy friction plate	8－57
4M42628	ボス(1) 摩擦板	Boss(1) friction plate	8－58
4M42629	組立ギヤ(1) 巻返	Gear(1) assy rewind	8－56
4M42632	組立ボス(2) 摩擦板	Boss(2)assy friction plate	8－53
4M42633	ボス(2) 摩擦板	Boss(2) friction plate	8－54
4M42634	調節板 逆転スリップ	Adjustor reverse tension	8－51
4M42635	ホルダ 電磁クラッチ	Holder magnet clutch	8－66
4M42636	第1スプロケット	First sprocket	8－47
4M42638	バネ 第1スプロケット	Spring first sprocket	8－48
4M42639	組立取付板 挿入口	Holder assy slot	4－43
4M42640	組立ロック板 ループフォーマ	Lock assy loop former	4－49
4M42642	組立センサレバー フィルム在否	Sensor assy film loading	4－45
4M42645	センサローラ フィルム在否	Sensor roller film loading	4－44
4M42646	固定ローラ フィルム在否	Fixed roller film loading	4－36
4M42647	ガイドローラ 挿入口	Guide roller slot	4－37
4M42648	ローラ スプロケット押工	Roller sprocket presser	4－39
4M42649	組立レバー ガイドローラ(2)	Lever guide roller 2	5－34

PARTS NUMBER INDEX

Parts No.	Parts Name		Page and Illustration No.
4M42652	組立取付板リンク(1)	Holder assy link 1	5－27
4M42654	組立レバー(1) ループセッタ	Lever(1) loop setter assy	10－23
4M42656	シャッタカバー(2)	Shutter cover 2	10－26
4M42657	リンク(2) ループセッタ	Link(2) loop setter assy	10－24
4M42658	ロック板 リンク(1)	Lock plate link 1	5－62
4M42659	連桿 ロック板	Link lock plate	5－63
4M42660	取付板 ソレイド TDS09SL	Holder solenoid	5－61
4M42661	組立中間軸(2)	Middle shaft(2) assy	9－1
4M42662	中間軸(2)	Middle shaft 2	9－3
4M42663	穴アケ ユニバーサルジョイント	Universal joint	9－2
4M42672	組立レバー(1) クラッチ寄セ	Lever(1)assy clutch mover	9－44
4M42674	組立レバー(2) クラッチ寄セ	Lever(2)assy clutch mover	9－46
4M42677	切換レバー 停止映写	Select lever still proj.	9－40
4M42678	ツマミ 停止映写	Knob still projection	9－48
4M42679	組立ホルダ 操作カム	Holder assy operation cam	4－24
4M42680	ダンパ 連桿(1)	Damper link 1	4－21
4M42681	ギヤ(1) リモート	Gear(1) remote	4－22
4M42682	操作カム	Operation cam	4－23
4M42684	取付板 解除レバーフィルムガイド	Holder release lever	4－17
4M42685	解除レバー フィルムガイド	Release lever	4－18
4M42686	ホルダ リモートモータ	Holder remote motor	4－25
4M42688	取付板(1) 操作基板	Holder(1) operation board	4－20
4M42689	取付板(2) 操作基板	Holder(2) operation board	4－14
4M42690	取付板 マイクロSW操作カム	Holder micro sw cam	4－4
4M42691	組立レバー 第2スプロケット押工	Lever(2) second sprocket	5－11
4M42693	レバー ガイドローラ(4)	Lever guide roller 4	6－65
4M42694	軸 レバーガイドローラ(4)	Shaft lever guide roller 4	6－67
4M42695	組立レバー ガイドローラ(3)	Lever guide roller 3	5－40
4M42697	サブローラ レバーガイドローラ(3)	Aux. roller lever guide 3	4－32
4M42698	ロック板 レバーガイドローラ(3)	Lock plate guide roller 3	5－43

Parts No.	Parts Name		Page and Illustration No.
4M42699	ホルダ SW・M-O切換	Holder M-O select sw	11－43
4M42700	軸 SW・M-O切換	Shaft M-O select sw.	11－45
4M42701	組立レバー SW・M-O切換	Lever assy M-O select sw.	11－44
4M42705	間座 リンク(2)	Washer link 2	5－41
4M42706	連桿(1)	Link 1	5－25
4M42707	逆転レバー	Reverse lever	5－23
4M42708	セレクトレバー	Select lever	5－20
4M42709	取付板 銘板	Holder plate	3－4
4M42710	ツマミ フォーカシング	Knob focusing	10－33
4M42711	塞ギ板 ツマミフォーカシング	Lid knob focusing	10－34
4M42712	ホルダ フィルムガイド	Holder film guide	3－11
4M42715	中間ギヤ 巻返	Middle gear rewind	8－19
4M42716	アテ板 裏カバー	Rear cover plate	9－15
4M42717	組立軸 フライホイル	Shaft flywheel assy	6－28
4M42718	フライホイル	Flywheel	6－80
4M42720	組立レバー 制動ローラ	Lever brake roller assy	6－55
4M42723	チャージレバー制動ローラ(2)	Lever brake roller 2	6－54
4M42724	バネ チャージレバー	Spring lever	6－53
4M42725	組立制動ローラ(2)	Brake roller(2) assy	5－3 6－57
4M42726	レバー パッドローラ	Lever pad roller	6－46
4M42727	軸 レバーパッドローラ	Shaft lever pad roller	6－44
4M42728	組立レバー フォトダイオード	Lever assy photo diode	6－81
4M42729	レバー フォトダイオード	Lever photo diode	6－35
4M42730	ホルダ フォトダイオード	Holder photo diode	6－39
4M42731	レバー 中間テンション	Lever middle tension	5－1
4M42733	組立リール軸 巻返	Reel shaft assy rewind	8－33
4M42736	シンクロプーリ 巻返アーム	Sync. pulley rewind	8－36
4M42737	プーリ軸 巻返	Pulley shaft rewind	8－43
4M42739	組立ボス 摩擦板	Boss friction plate assy	8－10
4M42742	プーリ軸 巻取	Pulley shaft take-up	9－33

PARTS NUMBER INDEX

Parts No.	Parts Name		Page and Illustration No.
4P48178	16㎜スプロケット	Sprocket	9－37
4P49039	間座 主軸	Main shaft washer	9－9
4P49329B	取付板 シュー(1) 組立	Shoe holder 1	4－42
4P49658	バネ(4) ヘッド	Head spring 4	6－18
4P51407	間欠給送装置 フレーミング間座	Framing washer claw uint	7－62 9－7
4P52431	サウンドヘッド取付板押工バネ	Head plate press spring	6－19
4P52527	モータ取付ネジワッシャ	Motor fix screw washer	6－78 7－24 8－17
4P52855	マスキングバネ	Masking spring	7－34
4P52856	マスキング座金	Masking washer	7－35
4P53364	エキサイタソケットスリーブ座板	Mount exciter lamp	6－13
4P53365	エキサイタソケットスリーブピンバネ	Spring sleeve pin	6－12
4P54451	セレクタレバー軸	Selector lever shaft	6－25
4P54541	スプロケットシャフト間座(1)	Washer (0.1×6.1×9.5)PBP	7－31
4P54650	円筒カム軸ワッシャ(2)	Cam shaft washer 2	7－19 8－18 9－6
4P55055B	間座 アオリバネ	Tilting spring washer	7－46
4P55081	ネジ フレーム給送部	Frame screw	7－23
4P55132	ピン フィルムカッタ	Film cutter pin	4－12
4P55230	ネジ(1) ループフォーマ	Loop former screw 1	6－33 7－54 9－16
4P55452	座金 ウォーム	Sprocket worm washer	7－18
4P55539	ピン エキサイタランプ	Pin exciter lamp	6－11
4P55540	バネ ヘッドレバー	Spring head lever	6－27
4P55541	バネ ホルダエキサイタランプ	Spring holder exc. lamp	6－3
4P55545	間座 6㎜×15㎜	Metal 6㎜×15㎜	5－12 6－56
4P55548	軸 パッドローラレバー	Shaft pad roller lever	6－51
4P55549	バネ(1) パッドローラ	Spring(1) pad roller	6－45
4P55551	バネ プレッシャローラ	Spring pressure roller	5－6
4P55555	バネ アームボタン	Spring arm button	8－15 9－34
4P55584	段付ネジ レバーガイドローラ(2)	Screw guide roller 2	5－32
4P55595	段付ネジ ガイドローラ(4)	Screw guide roller 4	6－63
4P55596	バネ(1) ガイドローラ(4)	Spring(1) guide roller 4	3－9

Parts No.	Parts Name		Page and Illustration No.
4P55597	バネ ガイドローラ(3)	Spring guide roller 3	5－14
4P55598	段付ネジ リンク(1) スプロケットシュー	Screw link 1	5－56
4P55599	ナット 摩擦板	Nut friction plate	8－1
4P55600	バネ 摩擦板	Spring friction plate	8－3
4P55605	段付ネジ レバーアーム	Screw lever arm	9－23
4P55607	間座 防震ゴム	Washer vib. proof rubber	8－64
4P55608B	バネ 中間テンションローラ	Spring tension roller	5－9 6－71
4P55611	バネ フィルム横押工	Spring film side pressure	7－11
4P55616	間座 摩擦車	Washer friction wheel	5－51
4P55625	間座 ガイドローラ(1)	Washer guide roller 1	5－38
4P55631	バネ フォーカシングツマミ	Spring focusing knob	10－31
4P55637	バネ ストッパレバー	Spring stopper lever	5－28
4P55642	ワッシャ 角棒巻返	Washer square shaft	6－47
4P55646	ネジ(2) 遮熱筒	Screw(2) lamp house	3－7
4P55648	段付ネジ ストッパレバー	Screw stopper lever	5－29
4P55650	間座 バネ送り爪	Washer claw spring	7－47
4P55651	テフロンワッシャ 8.1×14×0.3	Washer (8.1×14×0.3) PTFE	8－62
4P55653	プレッシャプレートバネ	Pressure plate spring	7－5
4P55657	間座(1) 摩擦車	Washer(1) friction wheel	5－50
4P55658	間座 レバー制動ローラ(2)	Washer brake roller 2	6－50
4P55663	バネ レンズホルダ	Spring lens holder	10－27
4P55664	ワッシャ アオリ棒	Washer tilting leg	5－68
4P55714	バネ ヘッド押工(1)	Spring head presser 1	6－34
4P55764	間座 レバーセフティシャッタ	Washer lever	7－58
4P55767	制動バネ プーリシャッタ	Brake spring pulley	7－66
4P55789	ネジ ローラフィルムガイド	Sc. film guide roller	4－46
4P55791	取付ネジ カバー機構部	Screw cover machine	7－69
4P55804	段付ネジ 連桿	Screw link	7－7
4P55844	間座 ウォーム	Washer worm	6－79
4P55880	バネ セフティシャッタ	Safety shutter spring	7－59

PARTS NUMBER INDEX

Parts No.	Parts Name		Page and Illustration No.
4P55893	取付ネジ 機構部カバー	Screw machine cover	3－21
4P55945	ワッシャ(2) 送り爪軸	Washer(2) claw shaft	7－49
4P55978	バネ レバー(1) M-O切換	Spring lever(1) M-O	6－31
4P56099	ワッシャ(3) 送り爪軸	Washer(3) claw shaft	7－50
4P56118	スペーサ ベースフレーム	Spacer base frame	6－72
4P8AAM013	間欠給送装置組立	Claw section frame assy	12－1
4P8AAN003	間欠給送装置組立	Claw section frame assy	1－4 12－3
4P8AAN036	巻返アーム組立	Rewind arm assy	1－3
4P8AAN037	巻取アーム組立	take-up arm assy	1－2
4P8AAN050	間欠給送装置組立	Claw section frame assy	12－2
4P8AAN072	ベースフレーム メタル付	Base frame	3－31
4P8AAN073	組立プリント基板 リモート装置	Circuit plate assy remo.	2－23
4P8AAN074	リモートコード組立	Remote cord assy	2－17
5DJ1262211	ポリエステルコンデンサ 12MF220V	Polyest film 12MF/220V	10－9 12－55
5DJ1262511	ポリエステルコンデンサ 12MF250V	Polyest film 120MF 250V	12－56
5E1018	マイクロスイッチ SS-5GL-13	Micro switch (SS-5GL-13)	4－29
5E1080	マイクロスイッチ SS-5GL-F	Micro switch (SS-5GL-F)	3－18 4－3 6－74
5E2046	タクトスイッチ KHC10901	Switch (KHC10901)	4－6
5E2098	プッシュスイッチ ESB60505	Push switch (ESB60505)	4－7
5E5072	M-O切換スイッチ SL106-1	M-O select sw (SL-106-1)	11－41
5E5073	スライドスイッチ ESD-1467	Slide switch (ESD-1467)	2－25
5E6009	波動スイッチ WD31019	Seesaw switch (WD-31019)	11－10
5E6023	波動スイッチ 1802-0121	Main switch (1802-0121)	13－14
5E7114	リレー G2R-117P-V-US	Relay (G2R-117P-V-US)	11－7
5E7115	リレー G2R-217P-U-US	Relay (G2R-217P-U-US)	11－6
5E7116	リレーLY1F-US DC12V	Relay (LY1F-US DC12V)	11－3 12－57
5E7118	リレー JCZA-TM DC12V	Relay (JCZA-TM DC12V)	12－58
5G5038	スナップブッシング SB-375-3	Cord bush (SB-375-3)	10－16
5G5059	ストレインリリーフブッシングSR-5N-5	Cord bush (SR-5N-5)	11－13
5G6010	ステッカ T-18	Sticker (T-18)	8－29

Parts No.	Parts Name		Page and Illustration No.
5G6030	ステッカ T-23	Sticker (T-23)	5－36
5H1020007	ヒューズ 2A	Fuse (2A)(UL)	3－26 11－30 12－25
5H1020008	ミゼットヒューズ 2A 5×20	Midget fuse (2A)(5×20)	12－26
5H1030009	ヒューズ 3A	Fuse (3A)(UL)	3－27 11－31 12－27
5H1031004	ミゼットヒューズ 3.15A	Midget fuse (3.15A)	12－28
5H1031004	ミゼットヒューズ 3.15A	Midget fuse (3.15A)	12－31
5H1050001	ミゼットヒューズ 5A	Midget fuse (5A)	12－29
5H1050003	ヒューズ 5A	Fuse (5A)(UL)	3－28 11－12 12－30
5H2015	ヒューズホルダ S-N2250	Fuse holder (S-N2250)	12－62
5H2016	ヒューズホルダ S-N2059	Fuse holder (S-N2059)	11－11 12－59 12－61
5H2017	ヒューズホルダ No.19601	Fuse holder (No.19601)	12－60
5J10018	ソレノイド TDS-09SL 151Ω	Solenoid (TDS-09SL 151Ω)	5－60
5J10019	ソレノイド TDS-08B 57Ω	Solenoid (TDS-08B 57Ω)	3－17
5J10020	ソレノイド TDS-06A 77Ω	Solenoid (TDS-06A 77Ω)	4－51 5－18
5J20005	キャンセルコイル HCR-004	Cancel coil	6－61
5L42402514	映写ランプ JCR 24V 250W	Lamp (24V-250W)	10－19
5N1038	ランプソケット SS221-01	Lamp socket (SS221-01)	10－20
5N202101	2P･DINコネクタ LS-70Z	2-P DIN Connec. (LS-70Z)	12－18
5N202112	2P･DINコネクタ LSE-1	2-P DIN connector 1 (LSE-1)	2－12
5N202132	2P･DINコネクタ LB-3H	2-P DIN connector (LB-3H)	12－76
5N202572	2P･DINプラグ LK91-U1	2-P DIN plag (LK91-U1)	12－19
5N202642	2P･ソケットハウジング5102-02	2-P connector 2(5102-02)	11－37
5N202651	2P･ミニスポクスプラグ 5240-021	2-P connector 1(5240-021)	8－23
5N202771	2P･ウェハ 5267-02A	2-P connector 1(5267-02A)	11－24
5N202772	2P･ハウジング 5264	2-P connector 2(5264)	5－59 11－21
5N202801	2P･コネクタ B2P-SHF-1AA	2-P connector 1(B2P-SHF-1AA)	8－24
5N203352	電源コンセント	Power cord socket (NC-174)	13－11
5N203571	3P･ウェハ 5267-03A	3-P connector 1(5267-03A)	11－19
5N203572	3P･ハウジング 5264	3-P connector 2(5264)	3－16
5N204491	4P･ウェハ 5267-04A	4-P connector 1(5267-04A)	11－9

PARTS NUMBER INDEX

Parts No	Parts Name		Page and Illustration No.
4M42749	ホルダ 制御基板	Holder control plate	11−27
4M42750	レバー(1) M-O切換	Lever(1) M-O switch	6−32
4M42751	軸 フォーカシングツマミ	Shaft focusing knob	10−30
4M42752	フォーカシング座 映写レンズ	Focusing mount	10−25
4M42754	組立ループフォーマ	Loop former assy	4−34
4M42755	ホルダ(3) モータ	Holder(3) motor	10−15
4M42756	軸 レバー第2プロケット押工	Shaft 2nd sprocket press.	5−13
4M42757	保持板 プランジャフィルムガイド	Holder solenoid film guide	3−14
4M42758	戻シバネ ループフォーマ	Spring loop former	4−31
4M42759	ホルダSW. 挿入口	Holder slot sw.	4−30
4M43003	押工板 アンプコネクタ	Clasp amp. connector	11−32
4M43061	取付板 スピーカコネクタ	Holder speaker connector	2−10
4M43062	取付金具 スピーカカバー	Holder speaker cover	3−33
4M43063	ネット スピーカカバー	Net speaker cover	2−16
4M43064	プロテクタ スピーカカバー	Protector speaker cover	2−15
4M43066	ストッパ レバーフォトダイオード	Stopper lever photo diode	6−10
4M43067	バネ掛ケ間座 リンク(2)	Spring fixing screw	5−22
4M43068	間座 エルスコホルダ	Washer scope lens mount	5−35
4M43116	プーリ シャッタ 50Hz 18/24コマ	Pulley Shutter 50Hz 18·24	12−50
4M43117	プーリ(3) クラッチ	Pulley(3) Clutch	12−51
4M43128	遮熱板 ランプソケット	Heat shield lamp socket	10−18
4M43219	軸 ローラ	Shaft roller	4−38
4M43243	板バネ ホルダ(1)プレッシャプレート	Spring holder(1) P.P	7−2
4M43244	補強板 ホルダ操作カム	Support holder cam	5−46
4M43245	組立補強板 挿入口	Support assy slot	4−47
4M43247	中間遮熱板	Heat shielding plate	7−15
4M43250	組立プーリ(2) 巻取	Pulley(2) assy take-up	9−13
4M43252	軸 中間ギヤ巻返	Shaft middle gear rewind	8−20
4M43253	プロテクタ	Protector	3−30
4M43254	組立取付板 ベルト案内ローラ	Holder belt guide roller	9−19

Parts No	Parts Name		Page and Illustration No.
4M43255	組立プリント基板 電源トランス	Circuit board assy trans	11−4
4M43256	ローラ(2) 第2スプロケット押工	Roller(2) second sprocket	5−10
4M43260	歯 第1スプロケット	Cog first sprocket	8−49
4M43331	組立レバー(1) 停止映写	Lever(1) assy still proj.	9−42
4M43343	コードブッシュ リモコン	Bush remote	2−19
4M43366	止メ板 ホルダフィルムガイド	Stopper holder film guide	3−10
4M43388	組立レバー アーム巻取	Lever arm take-up assy	9−28
4M43468	前カバー	Front cover assy	12−20
4M43502	パッド スピーカ	Pad speaker	2−13
4M43504	ボタン アーム巻返	Button arm rewind	8−16
4M43505	補強板 アーム巻取側	Support take-up Arm	9−26
4M43506	補強板 アーム巻返側	Support rewind arm	8−44
4M43602	プーリ(2) 上巻取	Pulley(2) upper take-up	9−30
4M43645	摩擦車(2) ループセッタ	Friction wheel 2	5−48
4M50093	調節ネジ ホルダ映写レンズ	Screw holder proj. lens	10−32
4M50223	バネ プーリ(2) クラッチ	Spring pulley(2) clutch	7−72
4M50226	摩擦板	Friction plate	8−55
4M50229	バネ 逆転スリップ	Spring reverse tension	8−52
4M50231	取付ネジ ロック板	Screw lock plate	4−19 5−42 9−47
4M50232	戻シバネ ロック板	Spring lock plate	4−48
4M50234	バネ 取付板シュー(1)	Spring holder shoe 1	4−41
4M50235	取付ネジ ループフォーマ	Screw loop former	4−33
4M50238	ローラ リンクロック	Roller link lock	5−55
4M50239	取付ネジ ローラリンクロック	Screw link lock	5−54
4M50241	取付ネジ 取付板リンク(1)	Screw holder link 1	5−26
4M50242	バネ ループセッタ	Spring loop setter	5−52
4M50244	ベルト 案内ローラ	Belt guide roller	9−22
4M50247	間座 レバークラッチ寄セ	Washer clutch mover	9−45
4M50250	バネ ロック板レバーガイドローラ(3)	Spring lock plate guide 3	5−44
4M50251	バネ ソレノイド	Spring solenoid	5−19

PARTS NUMBER INDEX

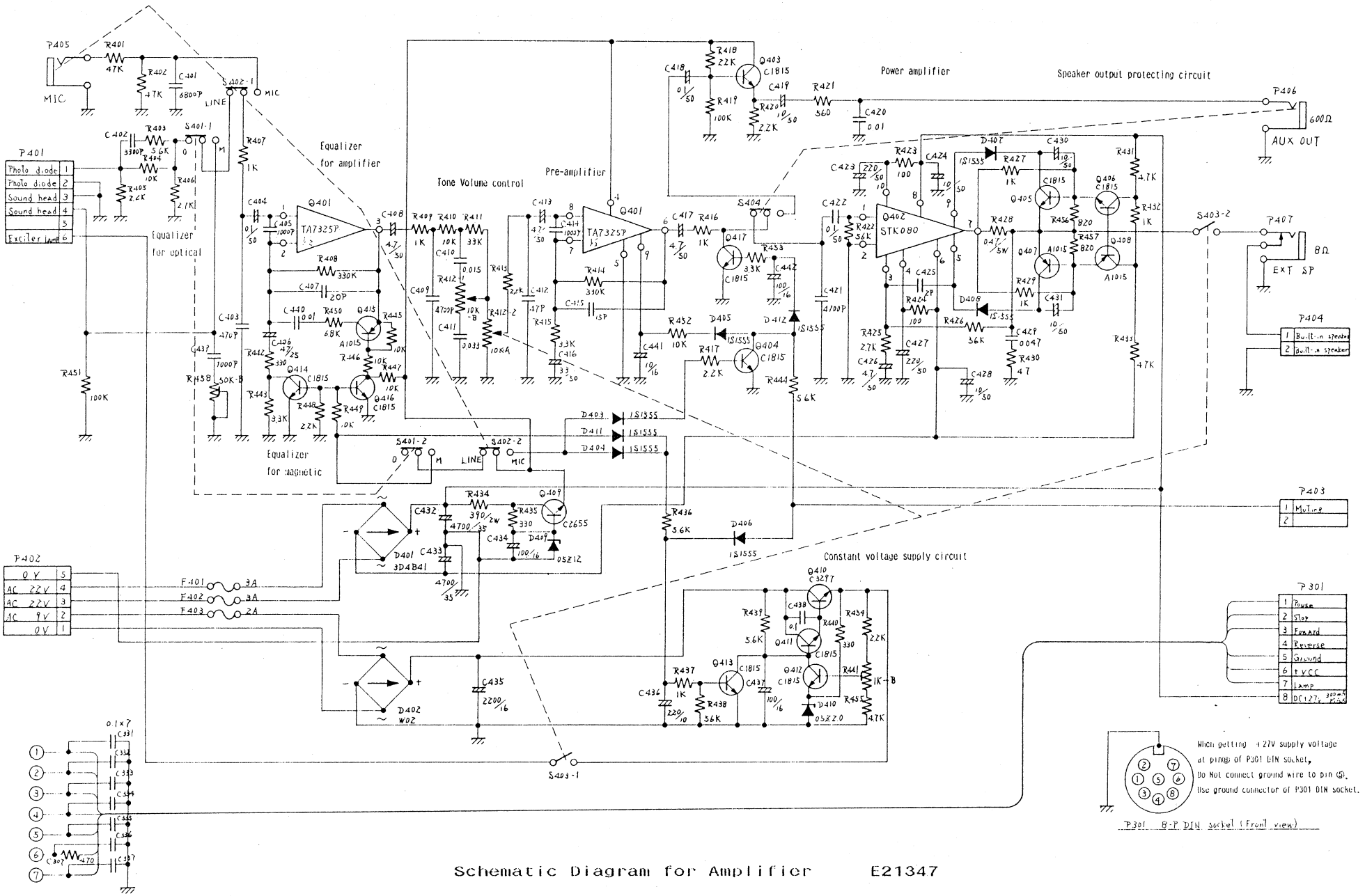
Parts No	Parts Name		Page and Illustration No.
4M50252	軸 セレクトレバー	Shaft select lever	5－21
4M50253	段付間座(1)	Washer 1	5－15
4M50255	バネ M-O切換	Spring M-O select	11－46
4M50256	バネ プランジャフィルムガイド	Spring solenoid film guide	3－19
4M50259	間座 バネ制動ローラ(2)レバー	Washer spring B. roller 2	6－52
4M50264	軸 シンクロプーリ巻返	Shaft sync. pulley rewind	8－37
4M50267	バネ スペアランプ	Spring spare lamp	3－13
4M50290	制動バネ 巻取	Brake spring take-up	9－29
4M50309	座 連桿(1)	Mount link 1	6－75
4M50310	アースバネ 巻取アーム	Spring take-up arm	9－17
4M50311	ワッシャ 制動バネ巻返アーム	Washer spring rewind arm	8－31
4M50312	制動バネ 巻返アーム	Spring rewind arm	8－32
4M50317	取付ネジ レバー(1)停止映写	Screw lever(1) still proj.	9－41
4M50320	クリックバネ	Click spring	9－43
4M50321	ワッシャ 6.1×8.5×0.3	Washer (6.1×8.5×0.3)	8－13 9－14
4M50326	ピン スプロケット軸	Pin sprocket shaft	8－46
4M50327	ワッシャ 7.6×10×0.4	Washer (7.6×10×0.4)	8－11 9－12
4M50328	バネ レバー(2)停止映写	Spring lever(2) stop	7－57
4N00437	DEMCO カバー銘板(2)	Cover plate 2	13－7
4N01890	カバー注意銘板	Caution plate cover	13－8
4N01937	銘板 ベルト切換指示	Belt changing indicator	10－12
4N02143	銘板 注意ヒューズ	Plate caution	13－6
4N02528	指示銘板 遮熱筒取付ネジ	Plate caution	13－1
4N02547B	銘板 エキサイタランプ指示	Plate exciter rating	13－4
4N02571	銘板 ランプ交換	Plate(2) lamp cover	13－2
4N03108	銘板 ランプ交換 FWU	Plate lamp cover	13－3
4N03309	銘板 裏カバー注意	Caution plate back cover	13－9
4N40238	銘板 M-O	Plate M-O	3－3
4N40239	銘板 O専	Plate O 16-AL optical	3－42
4N40240	銘板(1) 前カバー	Plate(1) front cover	3－23

Parts No	Parts Name		Page and Illustration No.
4N40241	銘板(1) アンプ	Plate(1) amplifier	11－29 12－73
4N40249	銘板(2) アンプ	Plate(2) amplifier	12－74
4N40257	ラベル マイク	Label mike	3－34
4N40258	銘板 スピーカカバー	Plate speaker cover	2－9
4N40259	定格ラベル スピーカ	Rating label speaker	2－5
4N40260	ラベル(1) ヒューズ	Label(1) fuse	3－32 12-32
4N40261	指示ラベル ランプ交換	Indication plate(2) lamp	13－5
4N40266	ラベル(2) ヒューズ	Label(2) fuse	12－33
4N40267	ラベル(3) ヒューズ	Label(3) fuse	12－34
4N40268	銘板(2) 前カバー O専	Plate(2) 16-AL optical	3－43
4N40316	定格銘板(1)	Rating plate 1	3－37
4N40317	定格銘板(2)	Rating plate 2	12－38
4N40318	定格銘板(3)	Rating plate 3	12－39
4N40319	定格銘板(4)	Rating plate 4	12－40
4N40320	定格銘板(5)	Rating plate 5	12－41
4N40321	定格銘板(6)	Rating plate 6	12－42
4P20482	コード巻	Cord reel	2－3
4P20566C	ホルダ フライホイル	Holder flywheel	6－68
4P20576B02	アーム(2) 巻取	Arm(2) take-up	9－25
4P20584	組立800 フィートリール	Reel 240m	3－40
4P31848	ホルダ(2) モータ	Holder(2) motor	10－2
4P31849	リンク(1) ループセッタ	Link(1) loop setter	5－53
4P32388	組立サウンドレンズ(2)	Sound lens assy	6－5
4P41729D	マスキングカム	Masking cam	7－33
4P41758B	エルモスコープレンズ取付座	Scope lens mount	5－33
4P41884C	マスキングカムガイド	Masking guide	7－16
4P41991	ゴム足	Rubber leg	2－4
4P46460	メタル 中間軸	Middle shaft metal	9－5
4P46467	バネ フライホイル	Flywheel spring	6－77
4P46559B	フィルムカッタ	Film cutter	4－13

PARTS NUMBER INDEX

Parts No	Parts Name		Page and Illustration No.
5N204492	4P・ハウジング 5264	4-P connector 2(5264)	5－17 11－16
5N205311	5P・ウェハ 5267-05A	5-P connector 1(5267-05A)	4－8 11－8
5N205312	5P・ハウジング 5264	5-P connector 2(5264)	4－2 11－2
5N206451	6P・ウェハ 5267-06A	6-P connector 1(5267-06A)	8－25 11－40
5N206452	6P・ハウジング 5264	6-P connector 2(5264)	4－52 6－62
5N207171	7P・ウェハ 5267-07A	7-P connector 1(5267-07A)	11－22
5N207172	7P・ハウジング5264	7-P connector 2(5264)	11－39
5N208231	8P・DINプラグ TCP0586-01	6-P DIN plug (TCP0586-01)	2－18
5N208232	8P・DINジャック TCS-4480-01	8-P DIN (TCS-4480-01)	11－35
5N208261	8P・ウェハ 5267-08A	8-P connector 1(5267-08A)	11－18
5N208262	8P・ハウジング 5264	8-P connector 2(5264)	8－28
5N209151	9P・ピンアッセンブリ350432-1	9-P connector 1(350432-1)	11－5
5N209162	9P・プラグハウジング 1-480706-0	9-P connector (1-480706-0)	10－5
5N213051	13P・ウェハ 5267-13A	13-P connector 1(5267-13A)	4－9 11－23
5N213052	13P・ハウジング 5264	13-P connector 2(5264)	4－16
5N50211	6.34㎜ A型プラグ P-2272	Plug 6.4㎜ (P2272)	2－2 12－17
5N50412	6.34㎜ ジャック S-G7622-12	Jack 6.4㎜ (S-G7622-12)	2－11 11－34 12－75
5N50782	3.5㎜ジャック S-G8031	Jack 3.5㎜ (S-G8031)	11－33
5R4Z0014A1	可変抵抗10KΩA型・10KΩB型	VR 10K A-type+10K B-type	11－42
5S4PD520UA	光電素子 PD-520UA	Photo diode (PD-520UA)	6－37
5V1029	スピーカ 16Ω	Speaker 16Ω	8－21
5V1030	スピーカ	Speaker	2－8
5V2064	モータ 8IC 2P-3 シールナシ	Motor (8IC 2P-3) 16-AL opt.	10－35
5V2065	モータ 8IC2P-4	Motor (8IC2P-4)	10－4
6B00400702	ラジアル玉軸受 4×7×2・P	B-bearing (SSL-740) 4-7	5－49
6B10801601	ラジアル玉軸受 8×16×5・PO	B-bearing (688ZZ)	8－40
6B20601001	ラジアル玉軸受 6×10×3・PO	B-bearing (MR106ZZ)	8－12 9－11
6B20601201	ラジアル玉軸受 6×12×4・PO	B-bearing (SSL-1260ZZ)	6－69 9－27
6B20601502	ラジアル玉軸受 6×15×5・PO	B-bearing (NMB-R1560ZZ)	7－67
6B20601902	ラジアル玉軸受 6×19×6・PO	B-bearing (626ZZ)	9－32

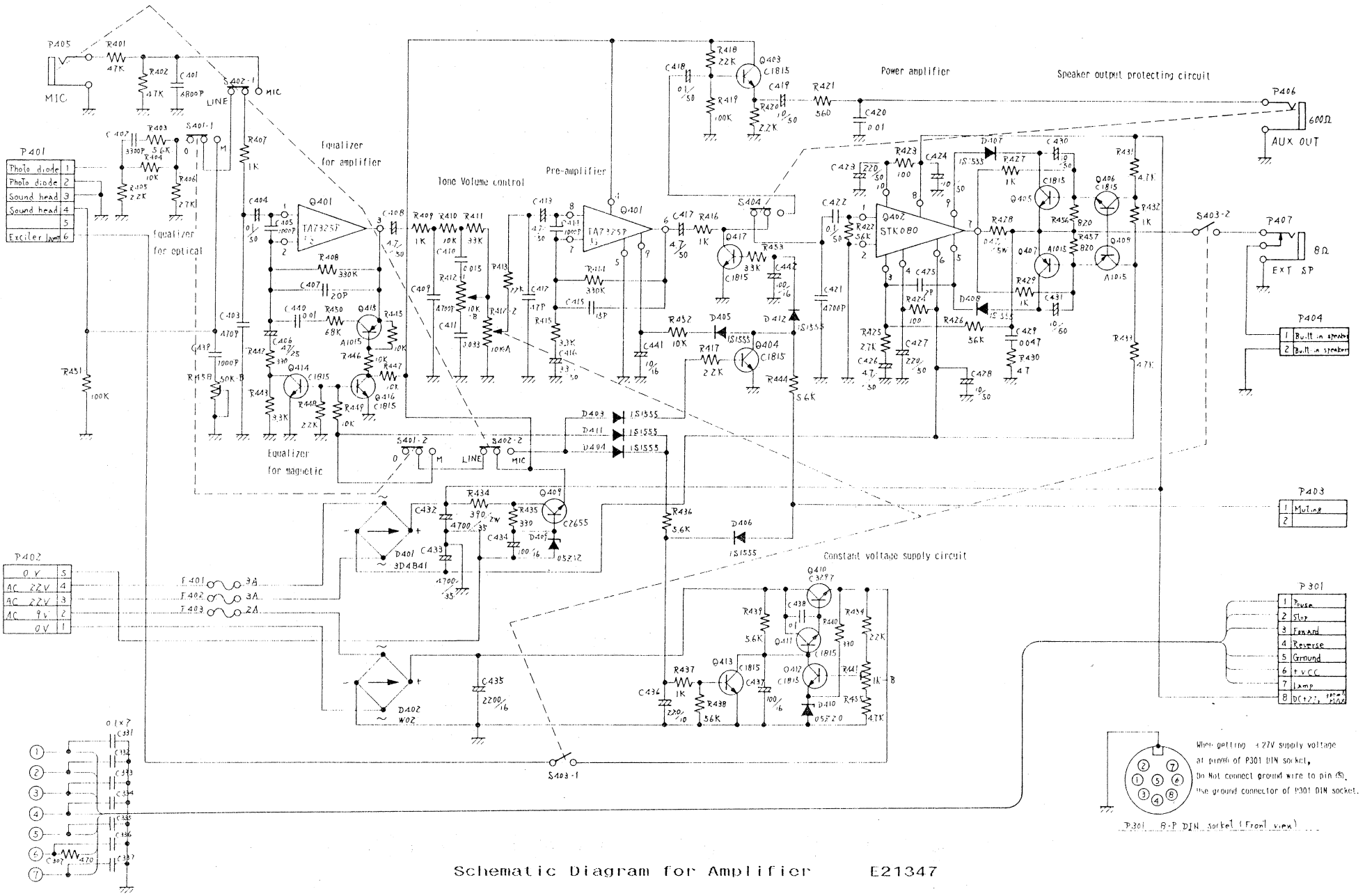
Parts No	Parts Name		Page and Illustration No.
6B20601903	ラジアル玉軸受 6×19×6・PO	B-bearing (626-2NK) 6-19	7－61
6B20801201	ラジアル玉軸受 8×12×3.5・PO	B-bearing (SSL-1280ZZH)	6－30
6B20801901	ラジアル玉軸受 5×19×6・PO	B-bearing (698ZZ)	8－42
6FM3050125	六角穴付ボルト M5×12	Hexagon hole. bolt M5×12	5－69
6VS109STS	STSベルト 4.5M 109	STS belt (4.5M 109)	8－38
6VS215T80B	歯形ベルト MM-215T80-BL	Belt (MM-215T80-BL)	9－24
6VV3M375	Vベルト メイン 3M375	V belt main (3M375)	10－8
6Y26300191	パッチン錠 本体	Lock 1	2－7
6Y49491005	電磁クラッチ TMCT-15	Magnet clutch (TMCT-15)	8－61
6Z0057	ツマミ 固定スプリング X-5200	Hold. spring knob (X-5200)	3－2
6Z0137	モータ ファン	Motor fan	10－1



Schematic Diagram for Amplifier E21347

ELECTRIC PARTS LIST

Item	Parts No	Parts Name		Circuit Diagram No
IC	5ASTK080	IC	(STK080)	Q402
	5ATA7325P		(TA7325P)	Q401
Tr	5S1A010151	Transistor	(2SA1015Y)	Q407 Q408 Q415
	5S1C1815Y		(2SC1815)	Q403~Q406 Q411~Q414 Q416 Q417
	5S1C2655Y		(2SC2655Y)	Q409
	5S1C3297Y		(2SC3297Y)	Q410
D	5S21S1555L	Diede	(IS555-2B-5)	D403~D408 D411 D412
ZD	5S205Z20ZL	Zener didoe	(0.5Z 2.0Z·LB-5)	D410
	5S205Z12YL		(0.5Z 1.2Y·LB-5)	D409
REC	5S23D4B41L	Rectifier	(3D4B41·LC-2)	D401
	5S2W02		(W02)	D402
VR	5R4Z0014A1	VR	10KΩ B-type·10KΩ A-type	R412
	5R8Z0013BK	Semi Fix R.	1KΩ B-type	R441
	5R8Z0054BE		50KΩ B-type	R458
SW	5E5072	M-O switch	(SL106-1)	S401

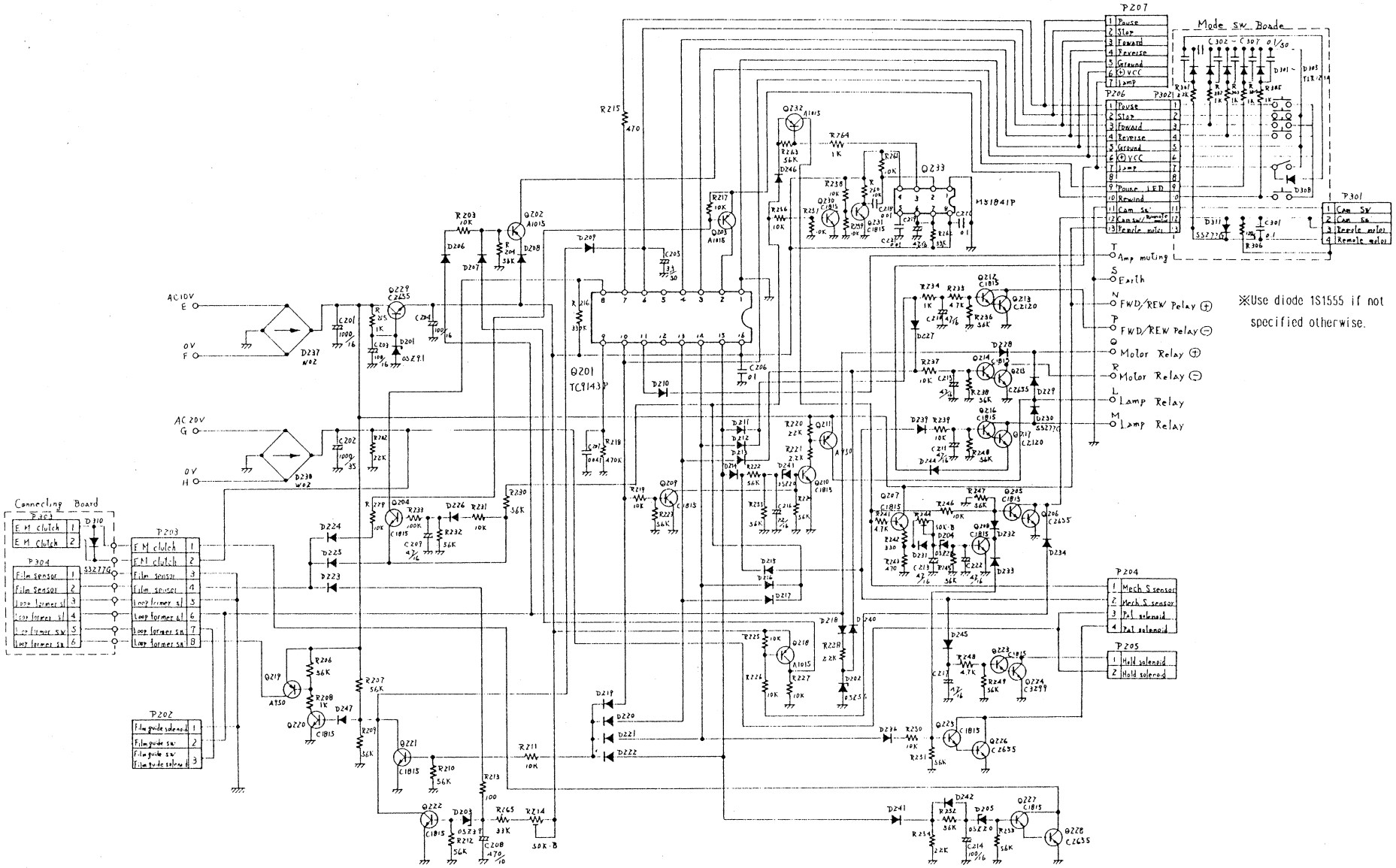


Schematic Diagram for Amplifier E21347

ELECTRIC PARTS LIST

Item	Parts No	Parts Name	Circuit Diagram No
0Ω	5R1B000001	0Ω	
0.47Ω	5R2A047K81	Cement R. 0.47Ω 5W	R428
4.7Ω	5R1C047J41	C.film fix R. 4.7Ω 1/4W	R430
100Ω	5R1B001241	100Ω 1/4W	R423 R424
330Ω	5R1B033141	330Ω 1/4W	R440
	5R1C033141	330Ω 1/4W	R435 R442
390Ω	5R5B039171	Metal Film R. 390Ω 2W	R434
470Ω	5R1C047141	C.film fix R. 470Ω 1/4W	R307
560Ω	5R1C056141	560Ω 1/4W	R421
820Ω	5R1C082141	820Ω 1/4W	R456 R457
1KΩ	5R1C001341	1KΩ 1/4W	R416 R427 R429 R432
	5R1B001341	1KΩ 1/4W	R407 R409 R437
2.2KΩ	5R1C022241	2.2KΩ 1/4W	R405 R448 R454
	5R1B022241	2.2KΩ 1/4W	R413 R417 R420
2.7KΩ	5R1C027241	2.7KΩ 1/4W	R406 R425
3.3KΩ	5R1C033241	3.3KΩ 1/4W	R415 R443 R453
4.7KΩ	5R1B047241	4.7KΩ 1/4W	R455
	5R1C047241	4.7KΩ 1/4W	R402 R431 R433
5.6KΩ	5R1B056241	5.6KΩ 1/4W	R436
	5R1C056241	5.6KΩ 1/4W	R403 R439 R444
6.8KΩ	5R1C068241	6.8KΩ 1/4W	R450
10KΩ	5R1C001441	10KΩ 1/4W	R404 R445~R447 R449 R452
	5R1B001441	10KΩ 1/4W	R410
22KΩ	5R1C022341	22KΩ 1/4W	R418
33KΩ	5R1C033341	33KΩ 1/4W	R411
47KΩ	5R1C047341	47KΩ 1/4W	R401
56KΩ	5R1C056341	56KΩ 1/4W	R426
	5R1B056341	56KΩ 1/4W	R422 R438
100KΩ	5R1C001541	100KΩ 1/4W	R419 R451
330KΩ	5R1C033441	330KΩ 1/4W	R408 R414

Item	Parts No	Parts Name	Circuit Diagram No
2PF	5DQ0200511	Ceramic con 2PF 50V	C425
15PF	5DQ1500511	15PF 50V	C415
20PF	5DQ0210512	20PF 50V	C407
47PF	5DQ4700512	47PF 50V	C412
470PF	5DQ4710514	470PF 50V	C403
1000PF	5DQ0130513	1000PF 50V	C405 C414 C439
3300PF	5DJ3320512	Polyest film 3300PF 50V	C402
4700PF	5DJ4720512	4700PF 50V	C409 C421
6800PF	5DJ6820512	6800PF 50V	C401
0.01MF	5DJ0140514	0.01MF 50V	C420 C440
0.015MF	5DJ1530515	0.015MF 50V	C410
0.033MF	5DJ3330512	0.033MF 50V	C411
0.047MF	5DJ4730515	0.047MF 50V	C429
0.1MF	5DB0150513	Al.elect con 0.1MF 50V	C404 C418 C422
	5DQ0150513	Ceramic con 0.1MF 50V	C331~C337 C438
3.3MF	5DB3350516	Al.elect con 3.3MF 50V	C416
4.7MF	5DB4750513	4.7MF 50V	C408 C413 C417 C426
10MF	5DB0171604	10MF 16V	C441
	5DB0170514	10MF 50V	C419 C424 C428
	5DB0170515	10MF 50V	C430 C431
47MF	5DB4762503	47MF 25V	C406
100MF	5DB0181604	100MF 16V	C434 C437 C442
220MF	5DB2270113	220MF 10V	C436
	5DB2270511	220MF 50V	C423 C427
2200MF	5DB2281604	2200MF 16V	C435
4700MF	5DB4783503	4700MF 35V	C432 C433

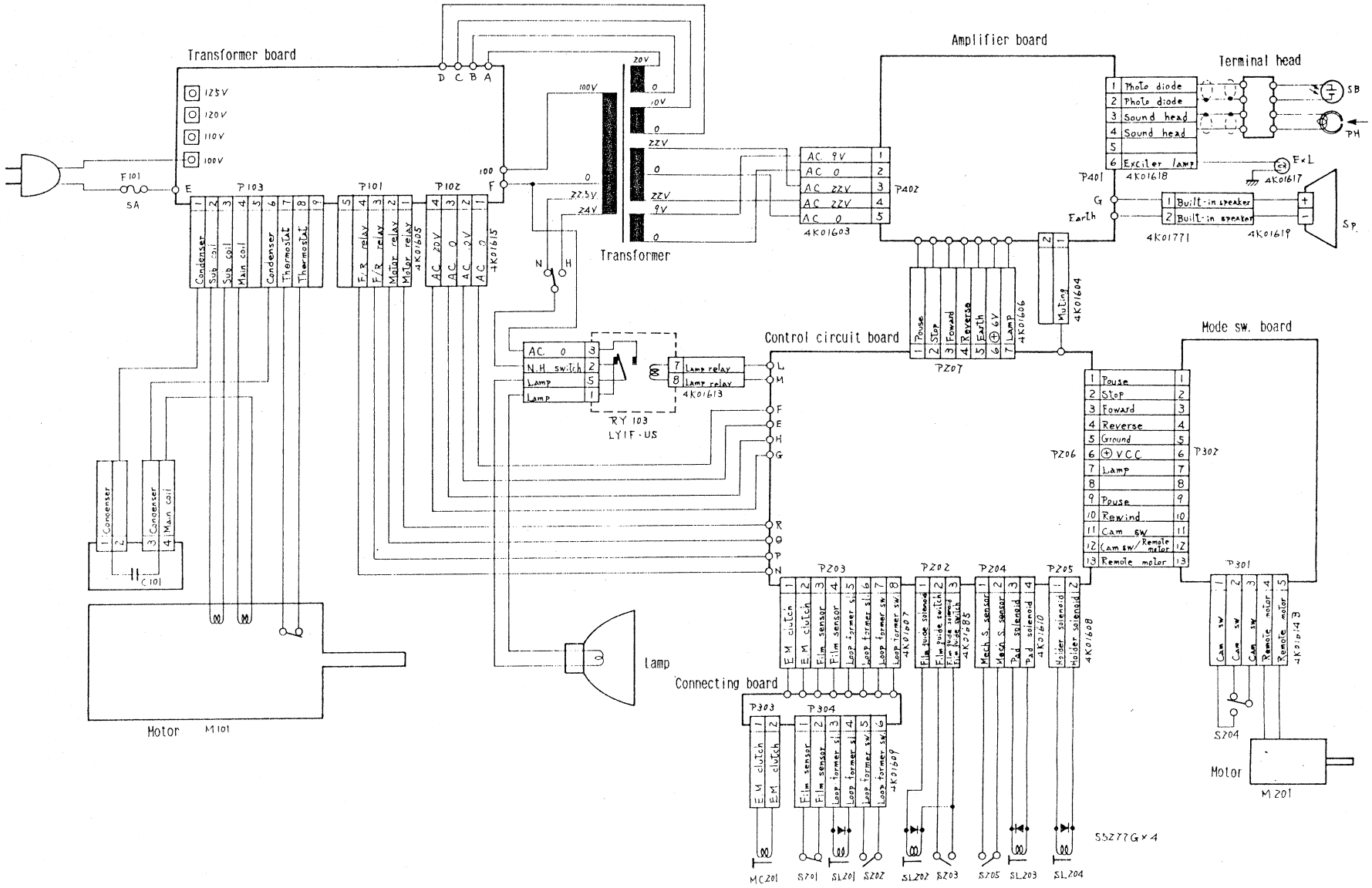


Schematic Diagram for Control Circuit E21349

ELECTRIC PARTS LIST

Item	Parts No	Parts Name	Circuit Diagram No
IC	5AM51841P	IC (M51841P)	Q233
	5ATC9143P	(TC9143P)	Q201
Tr	5S1A950Y	Transistor (2SA950Y)	Q211 Q219
	5S1A01015Y	(2SA1015Y)	Q202 Q203 Q218 Q232
	5S1C1815Y	(2SC1815Y)	Q204 Q205 Q207~Q210 Q212 Q214 Q216
			Q220~Q223 Q225 Q227 Q230 Q231
	5S1C2120Y	(2SC2120Y)	Q213 Q217
	5S1C2655Y	(2SC2655Y)	Q206 Q215 Q226 Q228 Q229
	5S1C3299Y	(2SC3299Y)	Q224
ZD	5S205Z0ZL	Zener diode (0.5Z 2.0Z)	D204 D205 D243
	5S205Z91YL	(0.5Z 9.1Y)	D201
	5S205Z39YL	(0.5Z 3.9Y)	D203
	5S205Z56YL	(0.5Z 5.6Y)	D202
D	5S2S5277GL	Diode (S5277G)	D230 D310 D311
	5S2IS1555L	(IS1555)	D206~D229 D231~D234 D236 D239~D242
			D244~D247 D308
REC	5SZW03	Rectifier (W02)	D237 D238
LED	5S2TLR123	LED (TLR123)	D301~D305
0.01MF	5DJ0140514	Polyest film 0.01MF 50V	C218 C221
0.047MF	5DJ4730515	0.047MF 50V	C207
0.1MF	5DQ0150513	Ceramic con 0.1MF 50V	C206 C220 C301~C307
3.3MF	5DB3350516	Al.elect con 3.3MF 50V	C205
22MF	5DB2261604	22MF 16V	C216
47MF	5DB4761604	47MF 16V	C209~C211 C213 C215 C217 C219 C222
100MF	5DB0181604	100MF 16V	C203 C204 C214
470MF	5DB4770113	470MF 10V	C208
1000MF	5DB0191602	1000MF 16V	C201
	5DB0193503	1000MF 35V	C202

Item	Parts No	Parts Name	Circuit Diagram No
0Ω	5R1B000001	0Ω	
100Ω	5R1C001241	C. film fix R. 100Ω 1/4W	R213
120Ω	5R5B012171	Metal film R. 120Ω 2 W	R306
330Ω	5R1C033141	C. film fix R. 330Ω 1/4W	R242
470Ω	5R1C047141	470Ω 1/4W	R215 R243
1KΩ	5R1B001341	1KΩ 1/4W	R301~R305
	5R1C001341	1KΩ 1/4W	R205 R208 R234 R264
2.2KΩ	5R1B022241	2.2KΩ 1/4W	R254
	5R1C022241	2.2KΩ 1/4W	R220 R221 R228
4.7KΩ	5R1C047241	4.7KΩ 1/4W	R235 R241 R248
10KΩ	5R1B001441	10KΩ 1/4W	R211 R225 R227
	5R1C001441	10KΩ 1/4W	R203 R217 R219 R226 R229 R231 R237 R239
			R246 R250 R256~R261
22KΩ	5R1B022341	22KΩ 1/4W	R202
33KΩ	5R1B033341	33KΩ 1/4W	R262 R265
56KΩ	5R1B056341	56KΩ 1/4W	R204
	5R1C056341	56KΩ 1/4W	R206 R207 R209 R210 R212 R222~R224 R230
			R232 R236 R238 R240 R245 R247 R249
			R251~R253 R255 R263
100KΩ	5R1C001541	100KΩ 1/4W	R233
330KΩ	5R1B033441	330KΩ 1/4W	R216
470KΩ	5R1C047441	470KΩ 1/4W	R218
VR	5R8Z0054BE	Semi fix R. 50KΩ B-type	R244
	5R8Z0054BF	50KΩ B-type	R214



Schematic Diagram for Machine E21352