

NO. 254

SEPTEMBER 1986

# **SERVICE MANUAL**

# **TRANSVIDEO TRV-16**

1. Also refer to the "Parts List (No. 278), TRANSVIDEO 16" for disassembly and reassembly.
2. The essential adjusting points at the time of reassembly have been described in detail in the items of "IV. DISASSEMBLY, REASSEMBLY AND TROUBLESHOOTING HINTS."
3. Use the "VIII. LIST OF TABLE FOR TROUBLES" in the case of trouble."

**ELMO CO., LTD.**

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## I. GENERAL INTRODUCTION

### I - 1 Features

The ELMO TRANSMVIDEO SERIES is a system to convert your film image into electronic image by means of a projector equipped with a built-in video camera. The video camera, employing CCD, has little irregularity in light quantity and excellent color replaying property, and projects the film directly, ensuring distinct image.

### I - 2 Specifications for TRANSMVIDEO 16 (hereafter TRV 16)

#### \* General specifications

Power source:	AC 60Hz or 50 Hz
Power consumption:	150 W
External dimension:	290 x 350 x 220 mm
Weight:	12 kg

#### \* Specifications for mechanism section

Film:	16 mm
Projection speed:	24 frames/sec.
Max. film capacity:	2000 ft. (600 m)
Film loading system:	Channel loading
Film control:	One-knob control
Motor:	Synchronous motor
Shutter:	5-blade shutter
Quick review:	OK
Loop restorer:	Automatic loop restorer

\* Specifications for video section

Television system: NTSC color system  
Image pick-up device: CCD (Charge Coupled Device)  
Color tone control: Manual adjustment possible  
Output level: 1 Vp-p/75 (US pin)  
Horizontal resolution: 240 TV lines,  
S/N: Over 46 dB (Y-signal)

\* Specifications for audio section

Playback system: Optical/magnetic playback  
Output level: 400 mV/600 Ω (US pin)  
Frequency characteristics: Optical – 50 Hz ~ 7 KHz Magnetic – 50 Hz ~ 12 KHz  
Earphone terminal: 3.5 mm receptacle provided

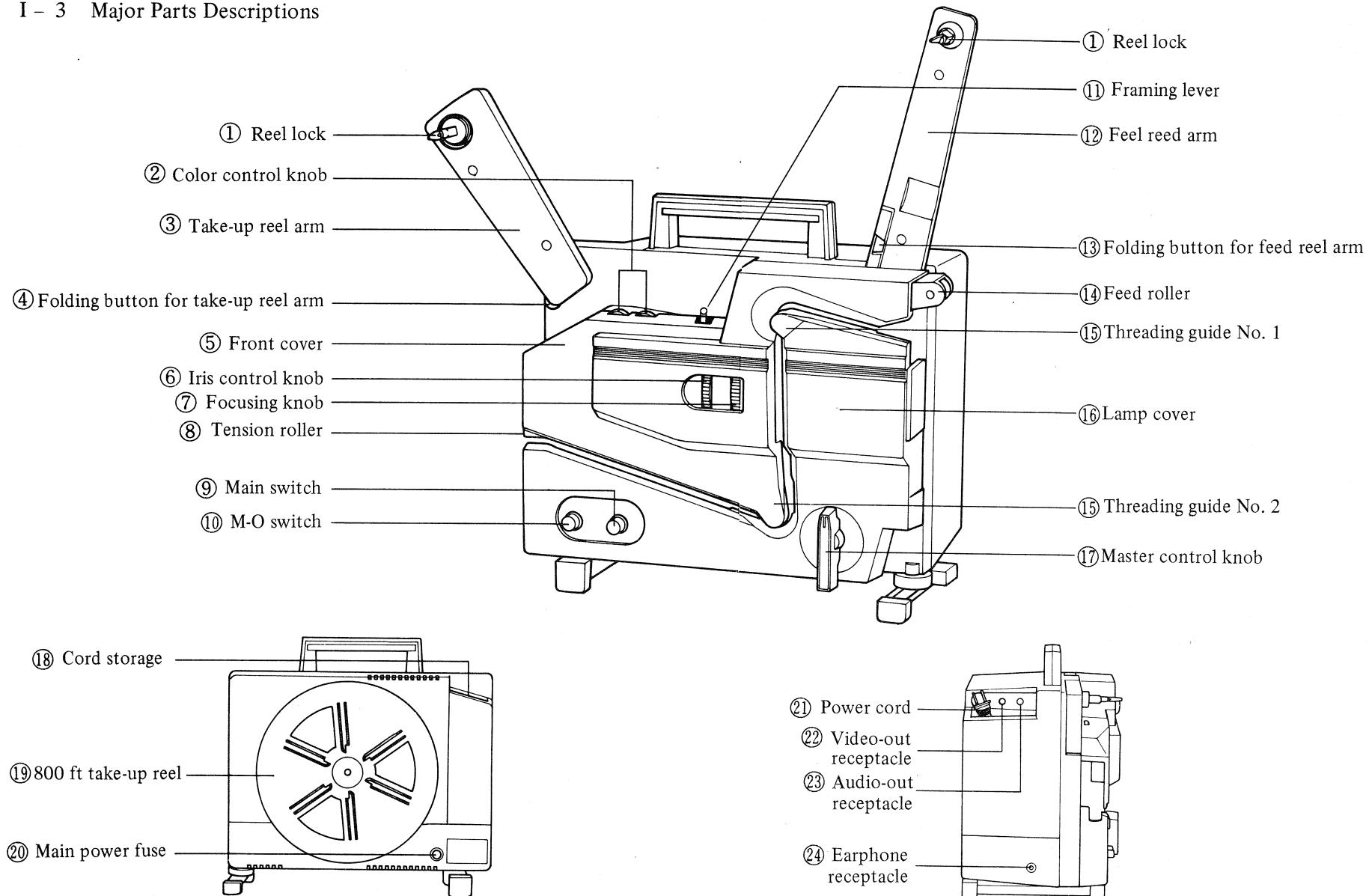
\* Specifications for optical section

Lens: F/1.4, f = 25 mm  
Iris adjustment: Fine adjustment possible  
Focusing: Fine adjustment possible  
Light source: 6V – 10W Halogen lamp (JDR)

\*Accessories

800 ft auto-reel, video/audio cable, brush, dust cover

### I - 3 Major Parts Descriptions



- ① Reel lock:  
This fixes the reel so that the reel may not get detached from the arm.
- ② Color control knob:  
This knob adjusts the color balance.
- ③ Take-up reel arm:  
This is used for retaining and driving of take-up reel.
- ④ Folding button for take-up reel arm:  
This button is depressed to fold the take-up reel arm.
- ⑤ Front cover:  
This is a cover to protect the light receiving and sound sections.
- ⑥ Iris control knob:  
This knob is used for adjusting the brightness of image.
- ⑦ Focusing knob:  
This knob is used for focusing the image.
- ⑧ Tension roller:  
This absorbs the irregular tension applied to the film during film take-up.
- ⑨ Main switch:  
This switch turns on/off the power supply to the projector main body.
- ⑩ M-O switch:  
This is a select switch to select the recording system.
- ⑪ Framing lever:  
This lever is used for adjusting the screen when boundary lines appear on the screen.
- ⑫ Feed reel arm:  
The arm holds the projecting film, and drives the reel for take-up.
- ⑬ Folding button for feed reel arm:  
This button is depressed to fold the feed reel arm.
- ⑭ Feed roller:  
This leads the film to the regular position in projector.
- ⑮ Threading guide No.:  
This is a film threading (loading) guide No.
- ⑯ Lamp cover:  
The lamp cover protects the lamp.
- ⑰ Master control knob:  
This knob is used for forward/reverse and stop operations of the projector.
- ⑱ Cord storage:  
The power cord is stored in it.
- ⑲ Take-up reel:  
Auto reel of 800 ft (240 m) is supplied.
- ⑳ Main power fuse:  
This prevents the flow of excess current into the electric circuit of the projector.
- ㉑ Power cord:  
This cord is connected directly to the main body to supply power.
- ㉒ Video-out receptacle:  
This is used for transmitting image signal to the television (monitor).
- ㉓ Audio-out receptacle:  
This is used for transmitting sound signal to the television (monitor).
- ㉔ Earphone receptacle:  
This is a receptacle to insert the earphone plug.

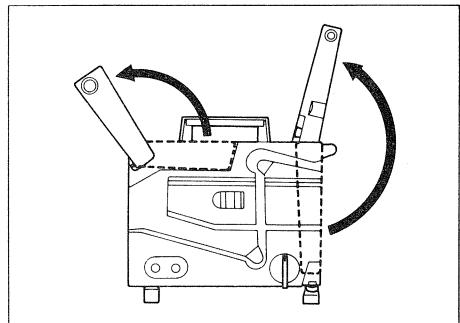
## I - 4 How to operate

### I - 4 - 1 Preparation

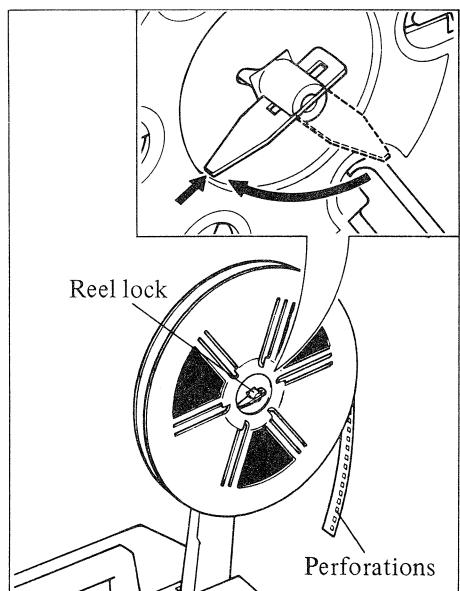
#### Setting-up

- 1 Set up the TRANSMVIDEO 16 (TRV-16) on a sturdy support and connect the power cord, which is stored in the cord storage, to the AC electrical outlet.

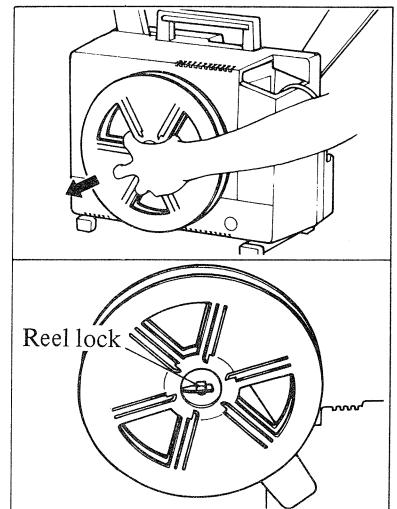
- 2 Pull up the feed reel arm and the take-up reel arm to maximum stop positions.



- 3 Install the feed reel with film, facing the film perforations toward yourself, on the feed reel spindle, and turn down the reel lock to secure the reel.

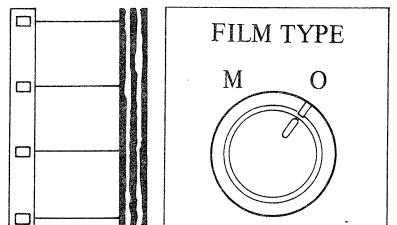


- 4 Install the supplied 800 ft (240 m) take-up reel, which is stored on the rear of the TRV-16, or an optional reel of more than 800 ft (240 m) film capacity on the take-up reel spindle. Be sure to lock the reel by using the reel lock. The reel capacity is max. 2000 ft (600 m).

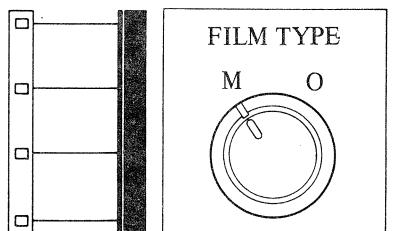


- 5 Set the M-O switch in accordance with the film to be converted.

A) optical sound film

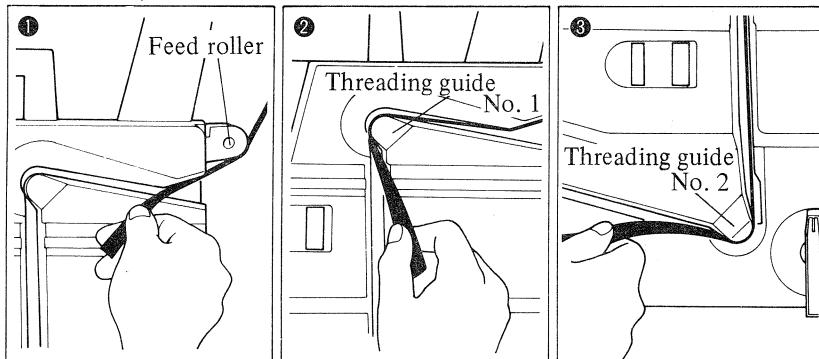


B) magnetic sound film

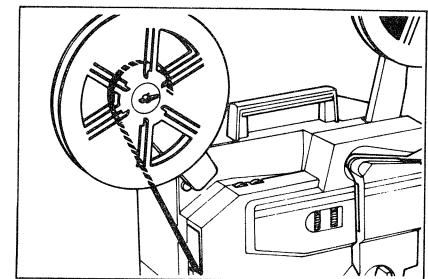


## I – 4 – 2 Film Loading

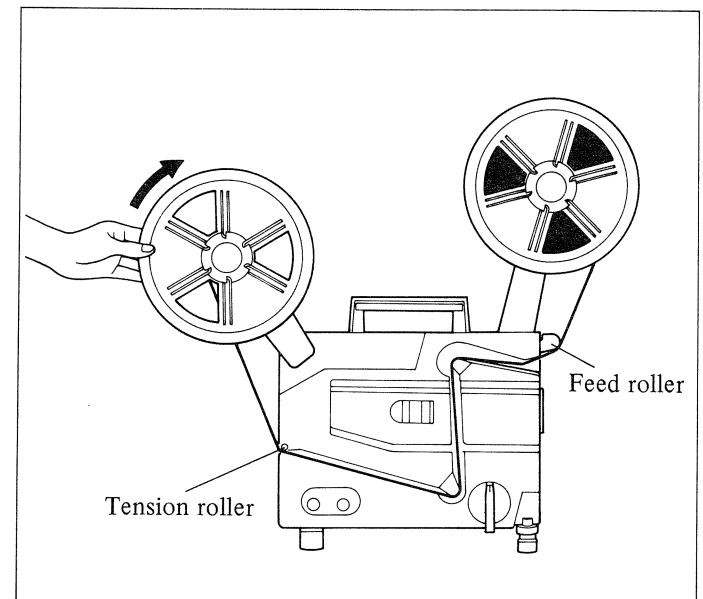
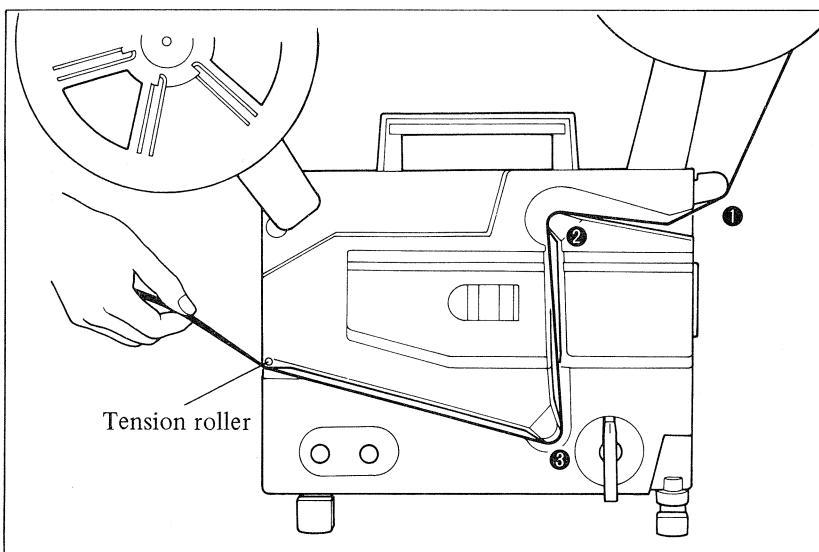
- 1 Hold the tip of the film leader between thumb and index finger – then pull the leader first through the feed roller, next over the No. 1 and No. 2 guides and finally over the tension roller.



- 2 After film loading is complete, wind the leader on the take-up reel.



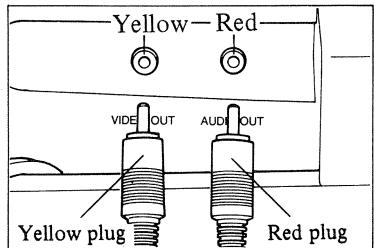
- 3 Make sure that the film is properly loaded through the channel by turning the take-up reel clockwise by hand to observe free movement.



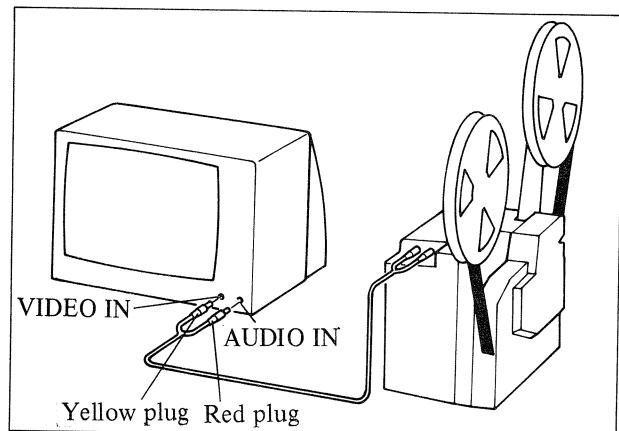
#### I - 4 - 3 Connection to Monitor TV

Connect the TRV-16 and a monitor TV with the supplied video/audio cable.

- 1 Connect the yellow plug to VIDEO OUT (Yellow) and the red plug to AUDIO OUT (Red) receptacles of the TRV-16 respectively.

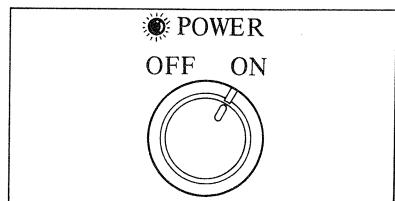


- 2 Connect the yellow plug to VIDEO IN and the red plug to AUDIO IN receptacles of a monitor TV respectively.

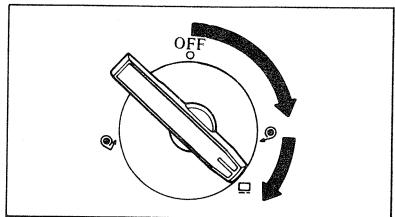


#### I - 4 - 4 Playback on Monitor TV

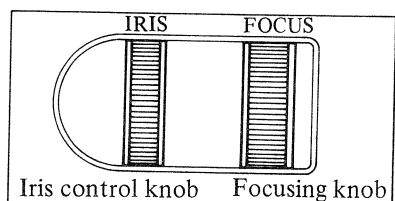
- 1 Turn on the main switch.



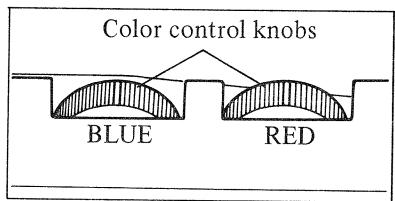
- 2 Turn the master control knob clockwise to  $\circlearrowright$ , and then turn it further to  $\square$  to start playback of the film image on a monitor TV.



- 3 Adjust focus with the focusing knob and brightness with the iris control knob respectively.

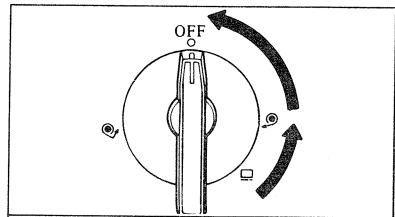


- 4 Adjust blue/red color tones with the color control knobs.



- 5 When playback is over, turn the master control knob to OFF.

Note: Do not leave the knob in mid position (between  $\circlearrowright$  and OFF).



- 6 If a frame line appears on the TV, adjust the framing knob to left or right. (P. 3 - ⑪)

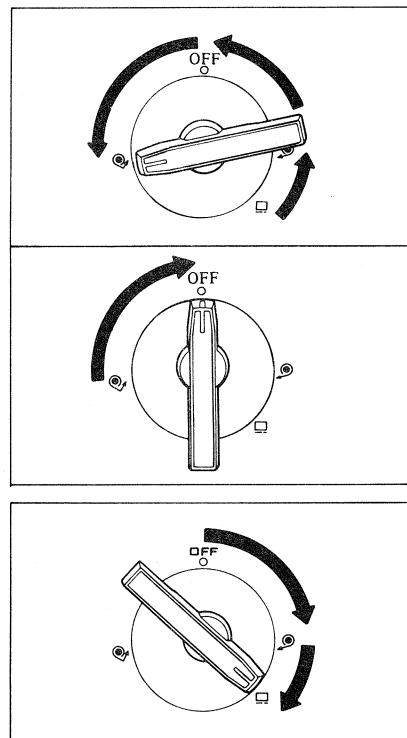
## I - 4 - 5 Quick Review

- 1 This feature is convenient to see specific scenes you wish to review instantly. Turn the master control knob counterclockwise from  all the way to  , and the film is quickly rewound through the channel. Turn the master control knob to OFF as you get the desired section for review.

Note: Do not leave the knob in mid position between  and OFF .

- 2 After making sure the film has stopped, turn the master control knob from OFF all the way to  through  . If the film slacken, wind up the loose portion by turning the take-up reel clockwise by hand, and then turn the master control knob.

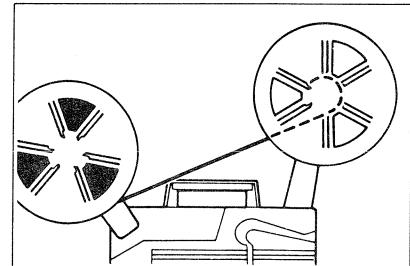
Note: (1) When the master control knob is set to  from OFF, the TRV-16 may start rewinding after a few seconds' pause depending on the film volume on the reel to be rewound. This is not a fault but a safety mechanism for rewinding. The TRV-16 is designed to increase motor torque gradually for the protection of film.  
(2) The "Quick Review" functions for the film of upto 1600 ft (480 m) in length.



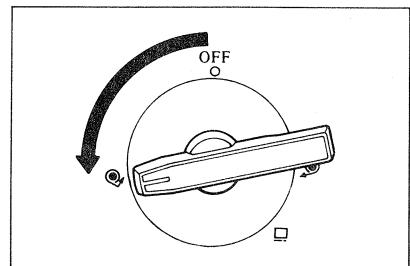
## I - 4 - 6 Film Rewinding

When the playback is over, rewind the film as follows.

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



- 2 Turn the master control knob to  .

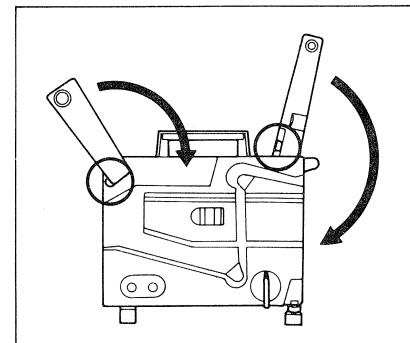


- 3 After the film is completely rewound, turn the master control knob to OFF.

- 4 Remove reels.

### Stowing

- Turn off the main switch.
- Return the power cord, video/audio cable to the cord storage.
- Fold the feed and the take-up arms by depressing the white and the silver folding buttons respectively.

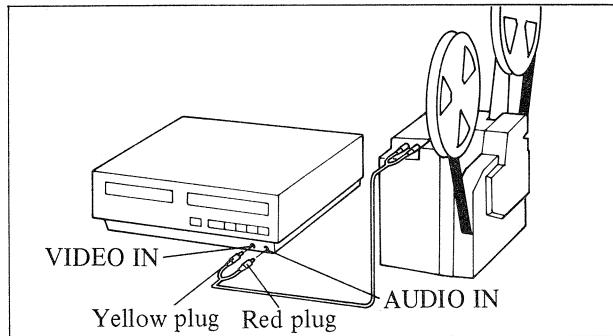


## I – 4 – 7 Recording with VCR

### Recording

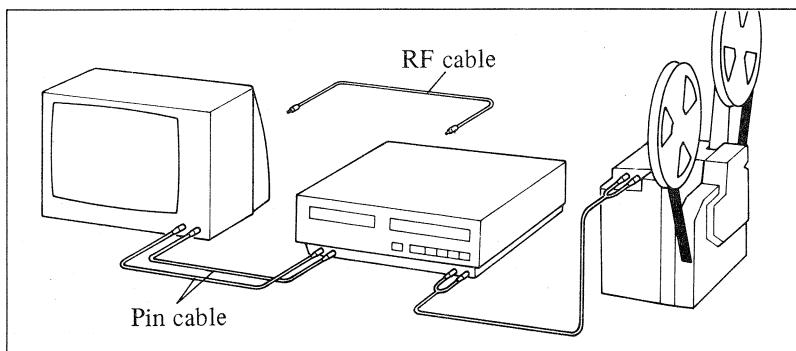
Connect the TRV-16 and a video cassette recorder (VCR) with the supplied video/audio cable.

Connect the yellow plug and the red plug to VIDEO IN and AUDIO IN of VCR respectively.



### Monitoring While Recording

Connect the TRV-16 to a VCR with the supplied video/audio cable as above. Connect the VCR to a monitor TV with a RF cable or video/audio pin cables.



## I – 5 Maintenance

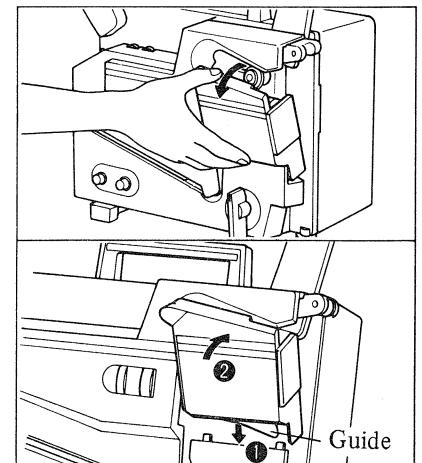
### I – 5 – 1 Cleaning

Clean the film path and related parts periodically; accumulation of dust and film particles in the film gate may scratch the film and decrease the image quality.

#### Removing and Installing Covers

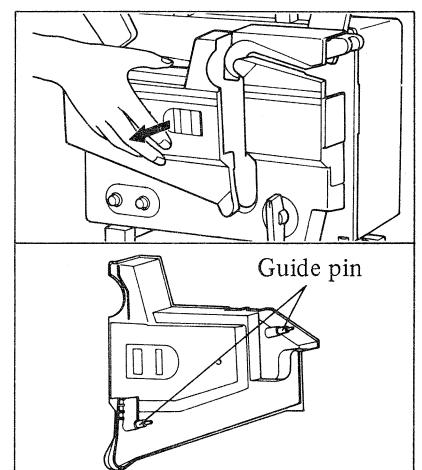
##### • Lamp House Cover

To remove, hold the cover as per the illustration and pull it out toward yourself. To install, align the guides at the bottom and push the upper part of the cover into place as per the illustration.



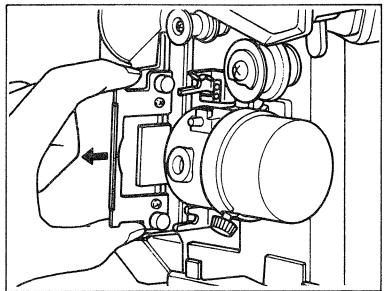
##### • Front Cover

To remove, hold the cover as per the illustration and pull it out toward yourself. To install the cover, align two guide pins with the corresponding holes, and push the cover into position.

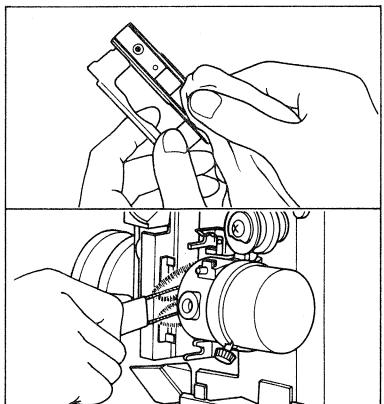


## Cleaning Film Gate

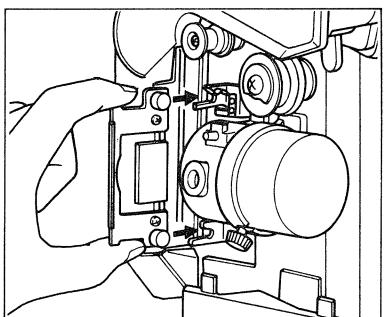
- 1 Remove the lamp house cover.



- 2 Hold the pressure plate as per the illustration and pull it out toward yourself to remove.



- 3 Clean the aperture and the pressure plate with the supplied brush and a soft lint-free cloth.

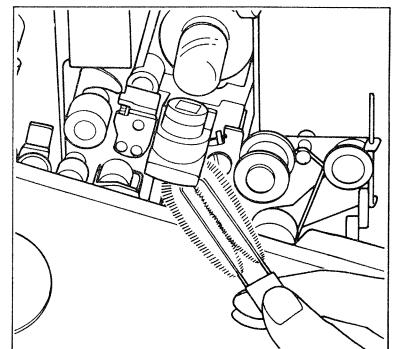


- 4 After cleaning, align the two pins at the upper and lower parts of the pressure plate holder with the corresponding slots on the pressure plate base and push it back.

## Cleaning Sound Lens, Solar Battery and Magnetic Head

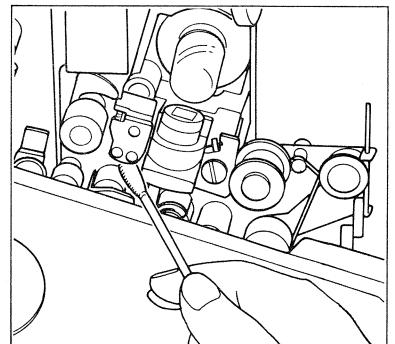
### • Optical Sound Playback

If dust adheres to sound lens or solar battery, the tone quality or volume will be decreased. Clean the sound lens and solar battery with the supplied brush.



### • Magnetic Sound Playback

Clean the magnetic head with a cotton swab.

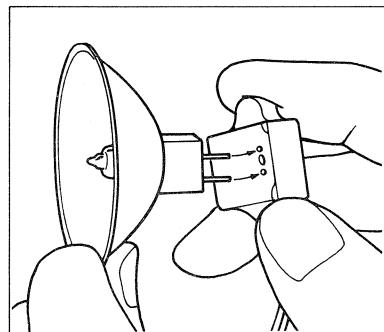
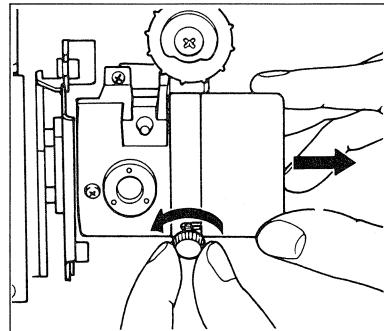


## I – 5 – 2 Replacing Lamps

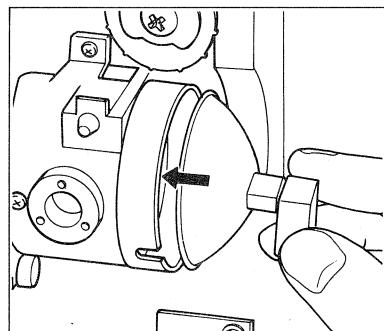
### Halogen Lamp

Use ELMO JDR 6V-10W lamp.

- 1 Remove the lamp house cover.
- 2 Remove the lamp holder by turning the attaching screw counterclockwise.



- 3 Remove the halogen lamp from lamp socket and insert a new lamp to the socket.

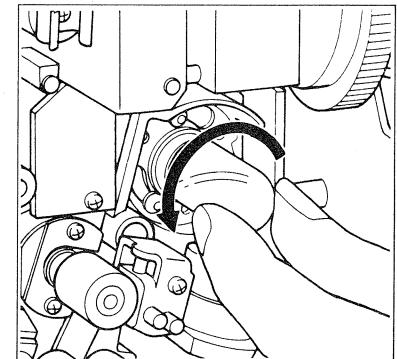


- 4 Install the lamp and then put the lamp holder and fix it with the screw.

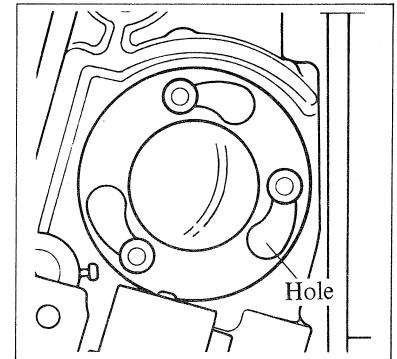
### Exciter Lamp

Use ELMO KE-040 4V, 0.75A or ANSI BRK lamp.

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



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



Note: It is advisable to keep a spare projection lamp and a spare exciter lamp handy for immediate replacement, should an unexpected break or burn-out develop during playback.

## I – 6 Trouble-shooting Hints

Q When the motor fails to operate;

A Check if the main switch is turned on.

A Check the power cord for proper connection.

Q When no playback picture is reproduced;

A Check if the iris control knob is not fully turned counterclockwise.

A Check the halogen lamp for blowout.

A Check the video cable for proper connection.

Q When no sound is reproduced;

A Check the audio cable for proper connection.

A Check the M-O switch for the correct position corresponding to the type of film used.  
(Magnetic or optical sound)

A Check if the film is not silent one.

A Check the exciter lamp for blowout.

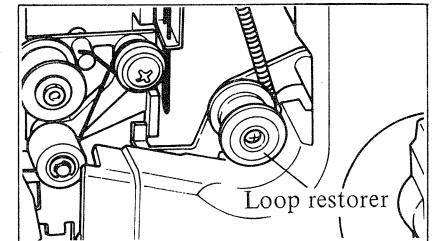
Q When the image quality cannot be properly focused;

A Check the film gate for proper position.

Q When the loop restorer operates continuously during projection;

A This may result from the damaged perforations of several frames, which make the slack length of the film between two sprockets so short that no loop can be restored.

In such a situation, turn the master control knob to OFF and turn it again all the way to  through 



### WARNING:

Unauthorized recording of copyrighted films may infringe on the rights of copyright owners and be contrary to copyright laws.

## II. CCD CAMERA SECTION

### II - 1 Outline of CCD:

The CCD (Charge Coupled Device) is a semiconductor image pick-up element applying the latest technology of large scale integrated circuit (LSI), and is used as a substitute for the image pick-up tube. In other words, it is one of the solid image pick-up elements. This image pick-up element is made by arranging numerous picture elements on the silicon PC board by using the semiconductor technology.

The solid image pick-up element generates charges in proportion to the quantity of incident light due to photoelectric effect, the charges are accumulated in the "potential well" formed by applying voltage to the CCD. The accumulated charges have a property to flow into the deeper neighboring "potential well." Hence, the charges are transferred in a "bucket relay" form in accordance with the voltage applied to the electrodes of CCD one after another. In other words, the CCD is capable of carrying out three functions, namely photoelectric conversion due to light, accumulation of signal charges and transfer of signal charges. This transfer system is called "charge transfer system." There are other solid image pick-up elements also, such as MOS, CPD, etc.

The TRANSMVIDEO 16 uses Toshiba CCD (TCD 2040), with the number of picture elements being  $398 (\text{W}) \times 492 (\text{H}) = 20 \times 10^4$  pieces, and the size of the image pick-up section being  $6.39 \times 4.88 \text{ mm}$  (equivalent to  $\frac{1}{2} \text{ inch}$ ).

\* Comparison between solid image pick-up element (CCD) and image pick-up tube camera:

	CCD	Image pick-up tube camera
1. Life	The CCD, being equivalent to the semiconductors such as transistor and IC, has long life and high reliability.	Like the vacuum tube, the image pick-up tube camera has economical deterioration of the heater due to beam radiation.
2. Residual image and seizure	The CCD has less residual image, and has no seizure even when the same object is photographed for a long time or when extremely strong light (such as spot light) is applied.	The residual image and seizure can not be avoided because of the property of photoelectric conversion film. Should the extremely strong light (such as sunrays) be mistakenly photographed, the image pick-up tube may have to be changed. Hence, due care is necessary.
3. Pattern distortion	With the picture elements properly arranged and the signals read out by scanning these elements, there is no pattern distortion.	Since the scanning is carried out by means of the electronic beam, it is difficult to scan correctly both the center and peripheral sections, resulting in color shading, etc.
4. Resistance against vibration and shock	Being a semiconductor, it has excellent resistance against vibration and shock.	Composed of glass tubes, filaments, electrodes, etc., it is vulnerable to vibration and shock.

5. Picture appearing time	Since there is no heater, the picture appears immediately after turning the power to ON.	The picture does not appear till the heater gets warmed up.
6. Size and weight	<p>It is small in size and light in weight.</p> <p>* External dimension: 25 mm (D) x 19 mm (W) x 10 mm (H) (including lead wire leg length)</p> <p>* Weight: 5 g</p>	<p>The length for sending out electronic beam and the space for deflecting coil are needed.</p> <p>* For <math>\frac{1}{2}</math>" image pick-up tube for EC-10:</p> <p>Tube dia.: 13.5 mm Total length: 92 mm Weight: 3 g (with coil:) 5.1 g Coil dia.: 22 mm</p>
7. When used in electro-magnetic field	It is not affected.	The electronic beam being likely to get affected, there are pattern distortion, color shade, etc.
8. Power consumption	Being a semiconductor, the power consumption is small, amounting to 1.5 – 2 W for the camera section only.	<p>The power consumption is 2.5 – 4 W because of the heater, deflecting coil, high voltage, etc.</p> <p>The diagram illustrates the internal components of a video camera. On the left, a block diagram shows a 'Lens' connected to a 'CCD' sensor, which outputs a 'Video signal' to a 'CCD drive circuit'. The 'CCD drive circuit' is represented by a rectangle with a zigzag line through it. On the right, a cross-sectional diagram of an image pickup tube shows a 'Lens' at the top, followed by a 'Deflecting coil' with a zigzag pattern. Below the coil is the 'Image pick-up tube', which contains a grid-like structure. An 'Amplifier' is shown at the bottom, receiving the 'Video signal' from the tube and outputting it.</p>

## II – 2 Principle of Function

### (1) Basic Structure:

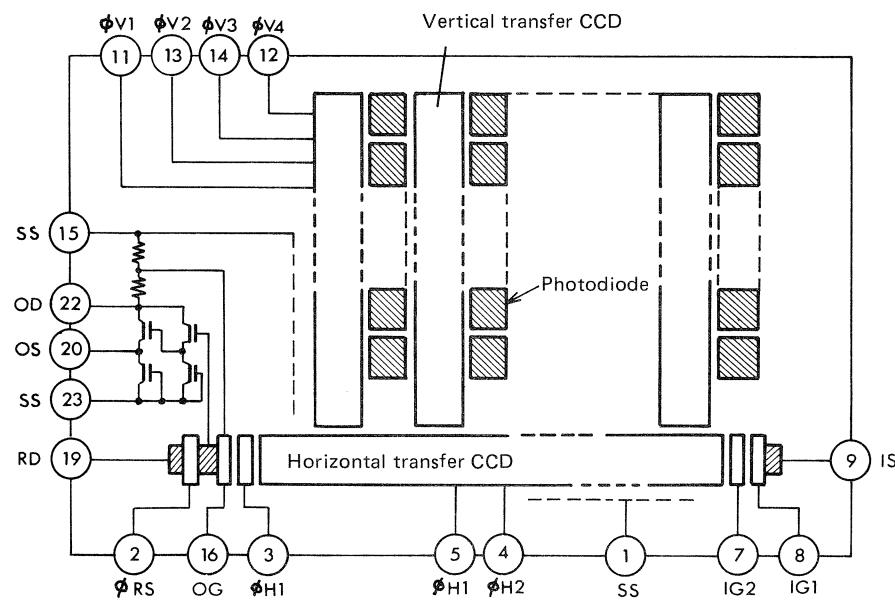
The color CCD (TCD 204C), adopted in TRV 16, has a total number of  $20 \times 10^4$  picture elements – 398 in horizontal direction and 492 in vertical direction – are properly arranged, with each element formed by photodiode photographic element. The picture elements generate signal charges in proportion to the intensity of light. Furthermore, each picture element is pasted with color filter to correspond with each other.

#### Vertical transfer CCD:

The vertical transfer CCD is located adjacent to each picture element in order to carry out vertical transfer. The signal charges generated by photodiode every 1/60 second in the picture elements are all shifted simultaneously into vertical transfer CCD. The transfer is thus repeated till the signal charges are transferred to the horizontal transfer CCD at the final stage.

#### Horizontal transfer CCD:

The signal charges, equivalent to the signal of 1 scanning line, are shifted from vertical transfer CCD, transferring the signal charges at a high speed, and reading them out through the output stage.



#### Transfer drive:

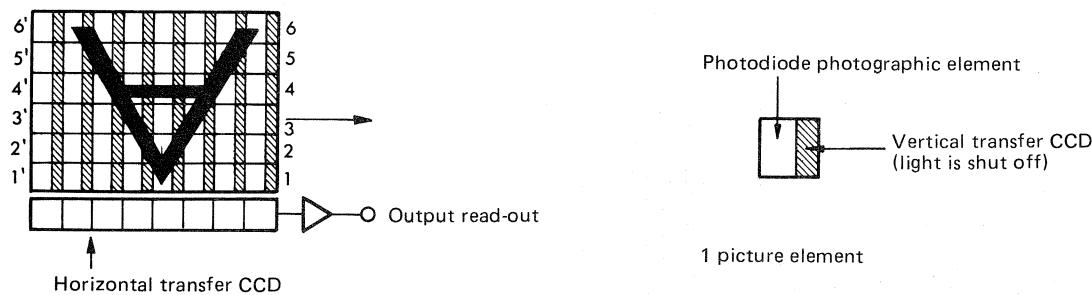
Vertical transfer:	$\phi V_1 - \phi V_4$	4-phase drive
Horizontal transfer:	$\phi H_1 / \phi H_2$	2-phase drive

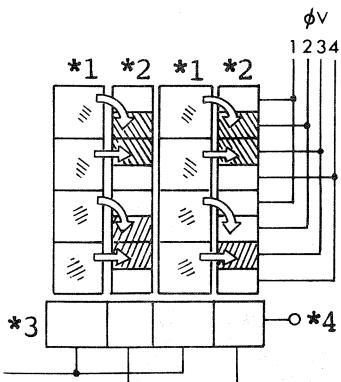
(2) Transfer System:

The signal charges are basically read out in the following manner.

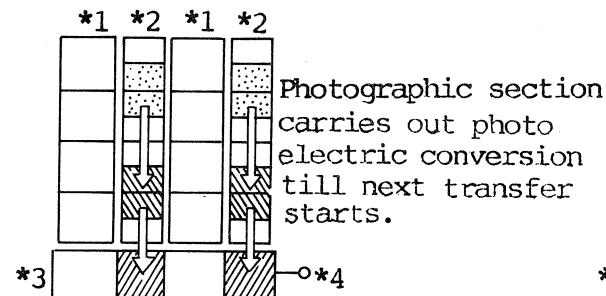
- 1) First of all, the signal charges, generated in the picture elements in proportion to the quantity of light, are all simultaneously shifted into vertical transfer CCD, with the voltage applied to the electrodes of vertical transfer CCD to prevent the signal charges from getting mixed up. The picture elements, with no signal charges, accumulate new signal charges until the next transfer starts.
- 2) The signal charges, transmitted to the vertical transfer CCD, are shifted to the horizontal transfer CCD by changing the voltage to the electrodes. The signal charges in  $1 - 1'$  are shifted to the horizontal transfer CCD, and the signal charges in  $2 - 2'$  to the vertical transfer CCD. In this way, the signal charges successively shift in the direction of the horizontal transfer CCD.
- 3) The signal charges in  $1 - 1'$ , transferred to the horizontal transfer CCD, are read out as output by changing the voltage to the electrodes. This read-out output becomes the signal of 1 scanning line.
- 4) After reading the signal charges in  $1 - 1'$ , the signal charges in  $2 - 2'$  are shifted to the empty horizontal transfer CCD in the manner mentioned above.
- 5) The operations in items 2) – 4) are continuously made to repeat the transfer in item 1) after the horizontal and vertical transfer CCDs become empty.

Since the signal charges of all picture elements are read out by one vertical scanning, the signal charges are shifted by applying the CCD drive pulse of  $\phi V_1 - \phi V_4$  to the vertical transfer CCD, carrying out operations in items 1) – 4) per 1/60 second (field accumulation), and the pulse of  $\phi H_1/\phi H_2$  to the horizontal transfer CCD.

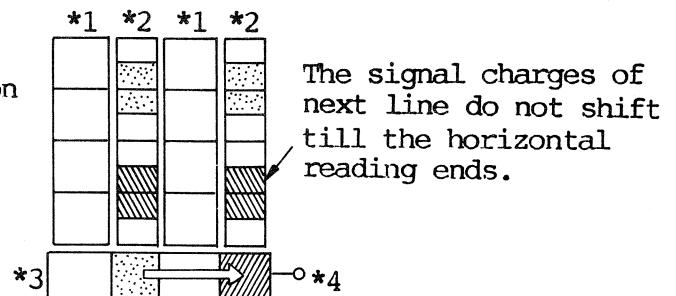




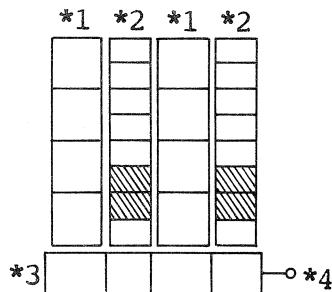
(1) From photographic section to vertical transfer ccd



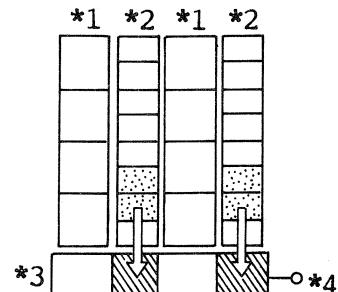
(2) From vertical transfer ccd to horizontal transfer ccd



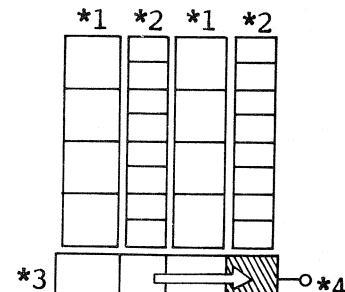
(3) Read out of one scanning line signal



(4) End of one scanning line



(5) Transfer of next line signal charges



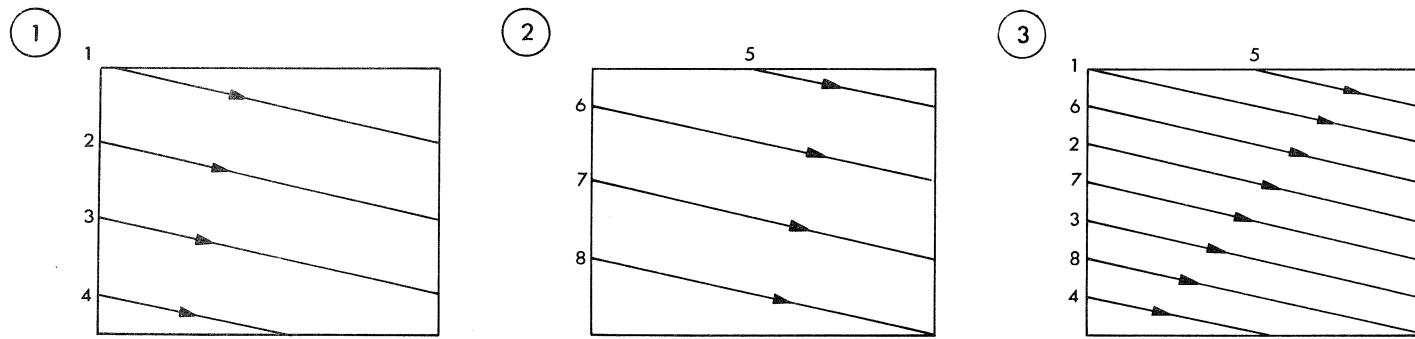
(6) Read out of next one scanning line signal

remarks,  
\*1: photographic section  
\*2: vertical transfer - ccd  
\*3: horizontal transfer - ccd  
\*4: read out

\* The standard television system in Japan consists of a total number of 525 scanning lines and 30 pieces of pictures per second, with the aspect ratio of the picture being 3 : 4.

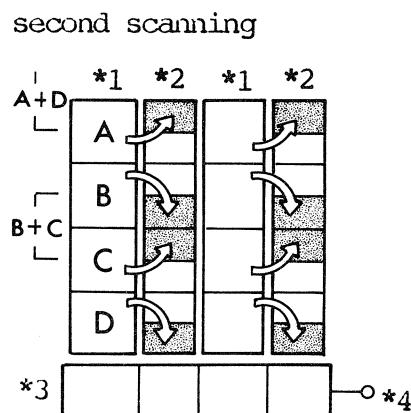
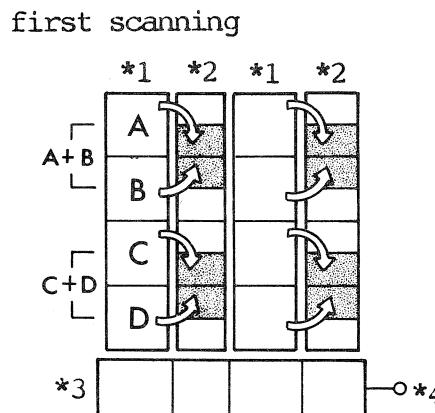
The scanning system is the interlaced scanning of 2 : 1. As shown in the Fig., scanning is first carried out by skipping 1 – 4, and then between 5 – 8 and section of preceding scanning till the scanning of the whole picture is completed. At the first scanning, 262.5 pieces of scanning lines are scanned while the remaining 262.5 are scanned at the second scanning, the scanning time in both cases being 1/60 second. In other words, 2 pieces of rough pictures have to be piled to complete one piece of picture, with the needed for this being  $1/60 \times 2 = 1/30$  second.

The rough picture after 1 vertical scanning is called 1 field, and the picture completed by 2 vertical scanning is called 1 frame.



In CCD, this interlaced scanning is taken into consideration, and the photographic signal charges are read out.

In TRV16, CCD is used at field accumulation mode, that is, 2 neighboring picture elements are simultaneously added to produce the signal corresponding to one horizontal scanning line, and the interlaced scanning is carried out by changing the simultaneously added vertical picture elements at the first and second vertical scanning as shown in the Figs.



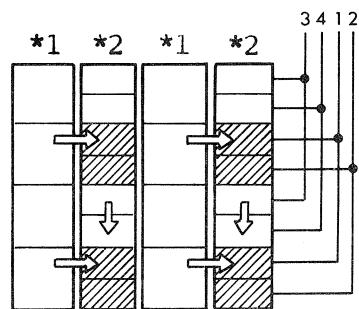
**remarks,**  
 \*1: photographic section  
 \*2: vertical transfer - ccd  
 \*3: horizontal transfer - ccd  
 \*4: read out

Supplementary explanation

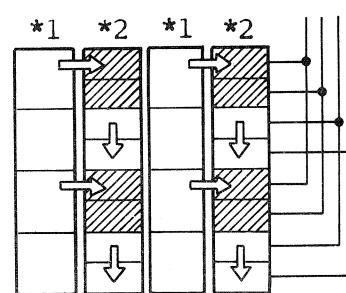
● Frame accumulation:

There is also the signal charge read-out system as shown in the Figs. below in order to carry out interlaced scanning.  
This system is adopted in ELMO's CCD monochromatic (black & white) camera 8400.

first vertical scanning



second vertical scanning



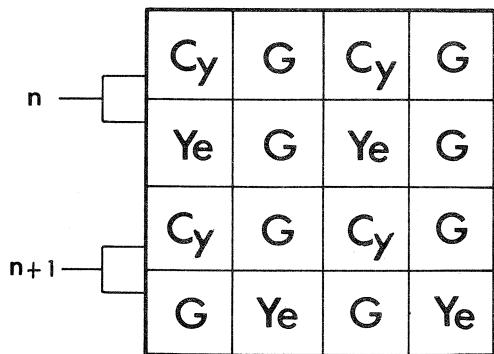
remarks, \*1: photographic section

\*2: vertical transfer - ccd

(3) Color CCD Camera Main Body:

The monoplate type color CCD camera has color filters piled on the chip in mosaic form. There are various types of color systems such as frequency separation system, Bayer system, color difference succession system, etc.

The TRV 16 uses the frequency separation system with the features such as excellent resolution of brightness signal, high sensitivity, easier signal processing circuit, etc. Furthermore, the color filters are piled on the picture elements of CCD, and are arranged to correspond with the elements. Below is shown the arrangement of color filters.



	Color	Feature
Cy :	Cyanic (bluish green)	The filter eliminates the red component of light, letting the blue and green components pass (permeate).
Ye :	Yellow	The filter eliminates the blue component of light, letting the red and green components pass.
G :	Green	The filter permeates the green component of light.

When monochromatic photography is done by using the CCD color camera, the light components passing through the filters are as shown below.

B		B	
R		R	
G	G	G	G
G	G	G	G

(a) n-line

B	R	B	R
G	G	G	G
G	G	G	G

(b) n + 1 line

Expressing these components by formulas (equations);

$$S_n = \frac{1}{2} \left\{ 4G + B + R + \frac{4}{\pi} (B + R) \sin \omega t \right\} \quad (A)$$

$\omega$ : Repeated space frequency of the color filter

$$S_{n+1} = \frac{1}{2} \left\{ 4G + B + R + \frac{4}{\pi} (B - R) \sin \omega t \right\} \quad (B)$$

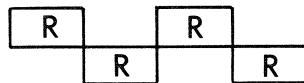
The brightness signal  $Y_H$  is obtained by passing the DC components of both equations through the LPF (low-pass filter), and the green (color) signal  $Y_L$  by limiting the bands of these DC components.

$$Y_H = \frac{1}{2} (4G + B + R)$$

Next, the signal with red or blue component can be obtained by adding/subtracting the AC components of the above equations.

B		B	
B		B	
R	R	R	R
2G	2G	2G	2G
2G	2G	2G	2G

(a) + (b)



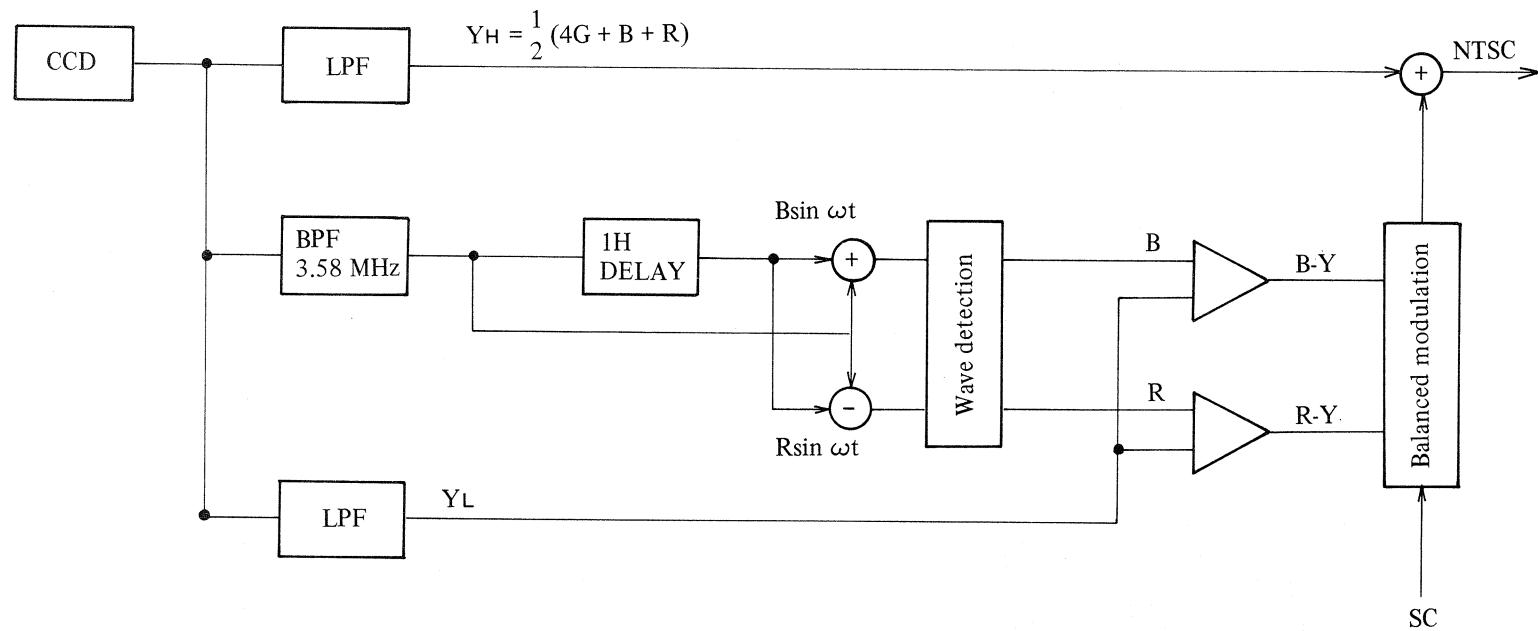
(a) - (b)

$$n + (n + 1) = \frac{4}{\pi} B \sin \omega t$$

$$n - (n + 1) = \frac{4}{\pi} R \sin \omega t$$

Here,  $\omega = 3.58$  MHz due to the arrangement of picture elements. Hence, the carrier waves of 3.58 MHz are multiplexed with R and B signals, which are amplitude-modulated  $(B + R)$  and  $(B - R)$ , in the form of frequency interleaf in the DC component composed of  $\frac{1}{2} (4G + B + R)$ .

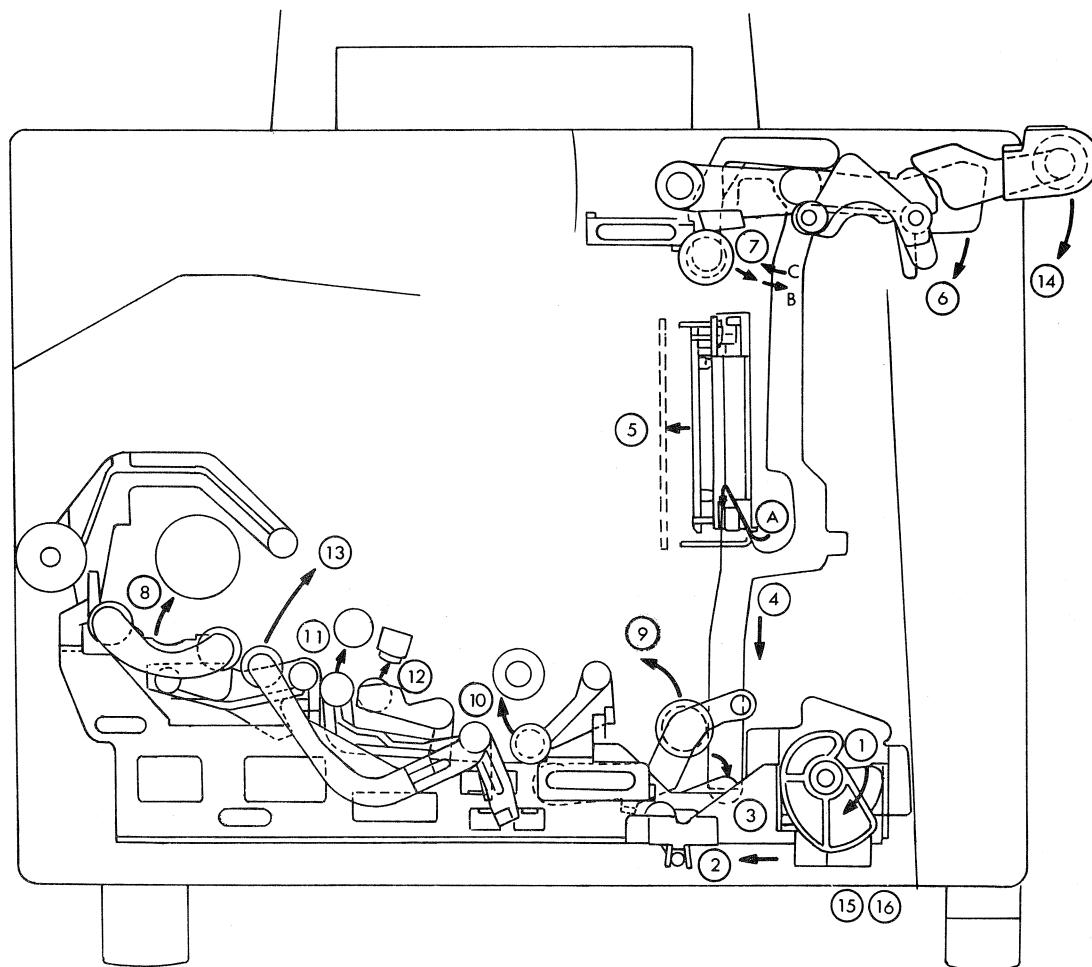
The circuit structure is shown below.



### III. DRIVING MECHANISM FUNCTIONS

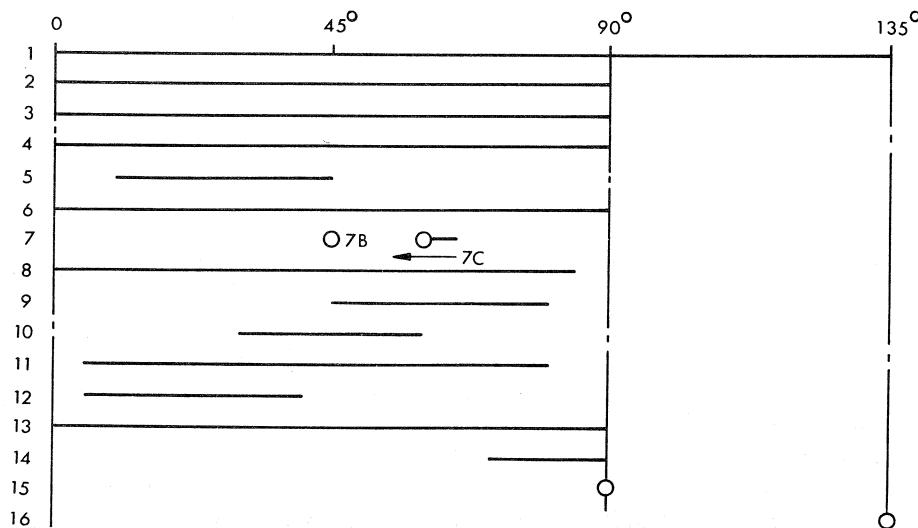
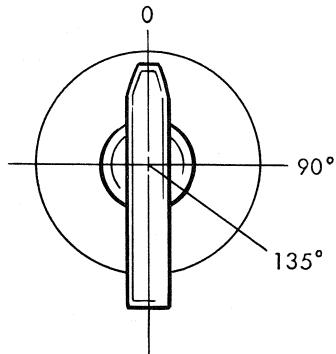
#### III – 1 Forward Projection Mechanism

The functions and timing charts of connecting link and levers as the knob main is rotated are given below.

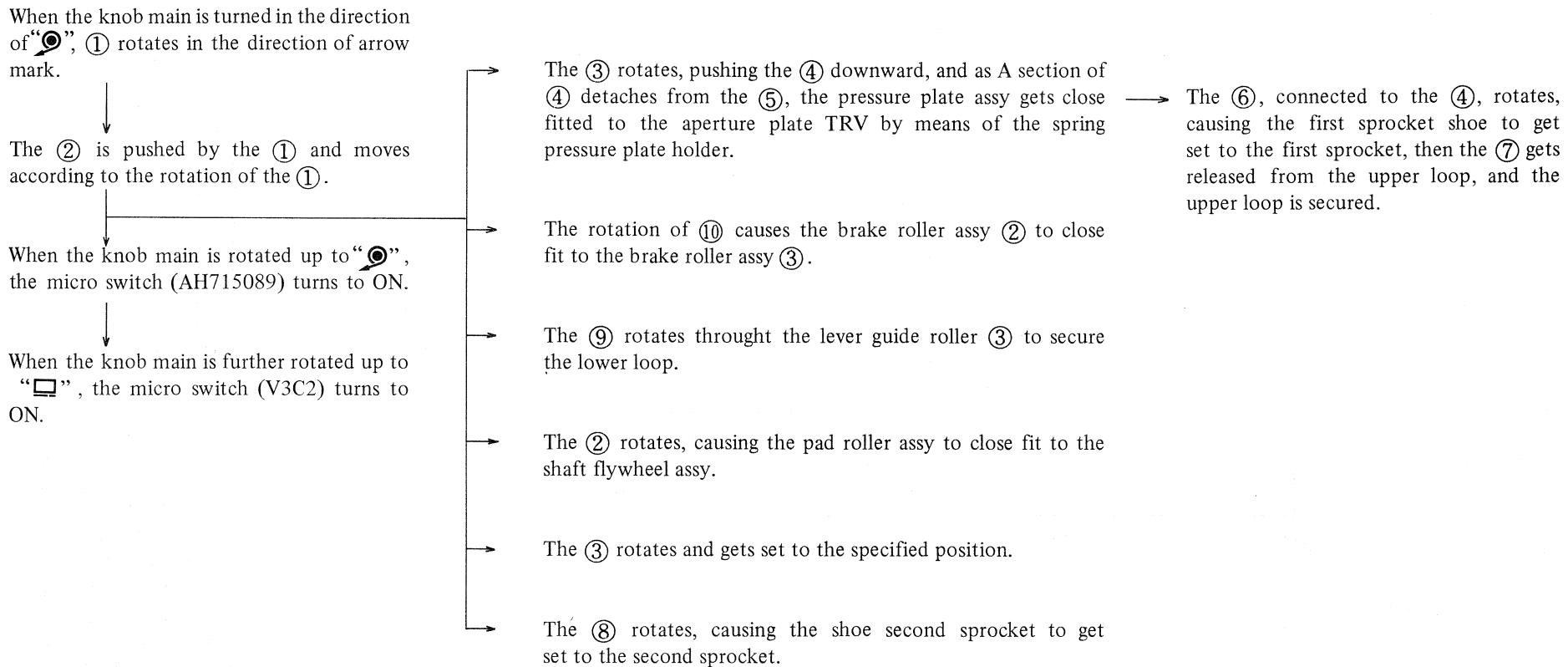


Names:

1. Cam link (1)
2. Link (1)
3. Link (2) sprocket shoe (2)
4. Link (1) sprocket shoe
5. Pressure plate Assy
6. Lever sprocket shoe
7. Guide roller (2)
8. Roller second sprocket
9. Guide roller (3)
10. Pad roller assy
11. Brake roller assy (2)
12. Pad roller assy
13. Lever middle tension
14. Guide roller (1)
15. Microswitch (AH715089)
16. Microswitch (V3C2)



Link Rod Functional Flow Chart:



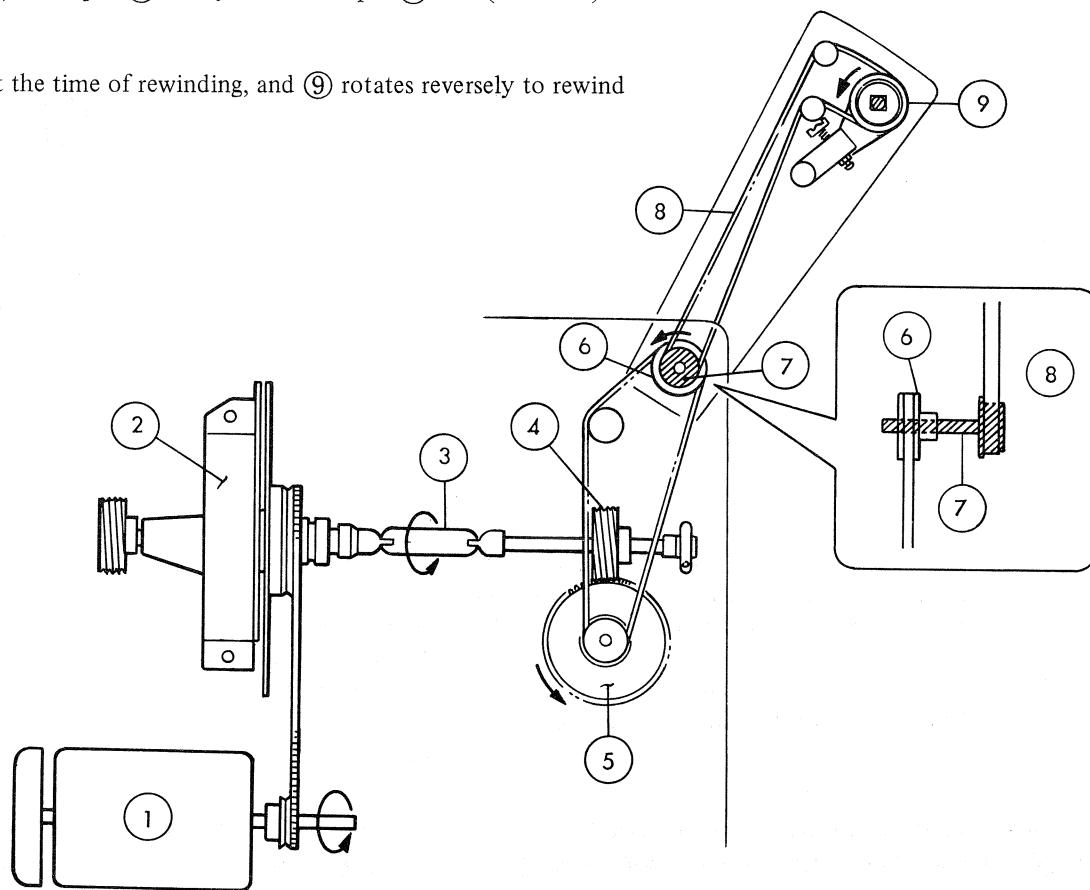
The ⑦ and ⑨ are the rollers to secure the upper and lower loops at the film gate, and the timing is delayed so that the rollers activate only after the film is set to the sprockets.

### III – 2 Film Take-up Mechanism

The rotation is transmitted in the following order, and rotates the reel to take up the film:

- ① Main motor → ② Claw section frame assy → ③ Middle shaft (2) assy → ④ Worm (2) →
- ⑤ Worm gear (2) assy → ⑥ V-pulley (2) take-up → ⑦ Pulley shaft take-up → ⑧ Belt (215MXL) →
- ⑨ Pulley (2) upper take-up

The motor rotates in reverse direction at the time of rewinding, and ⑨ rotates reversely to rewind the film.



### III – 3 Film Rewinding Mechanism

The rotation is transmitted in the following order to rewind the film:

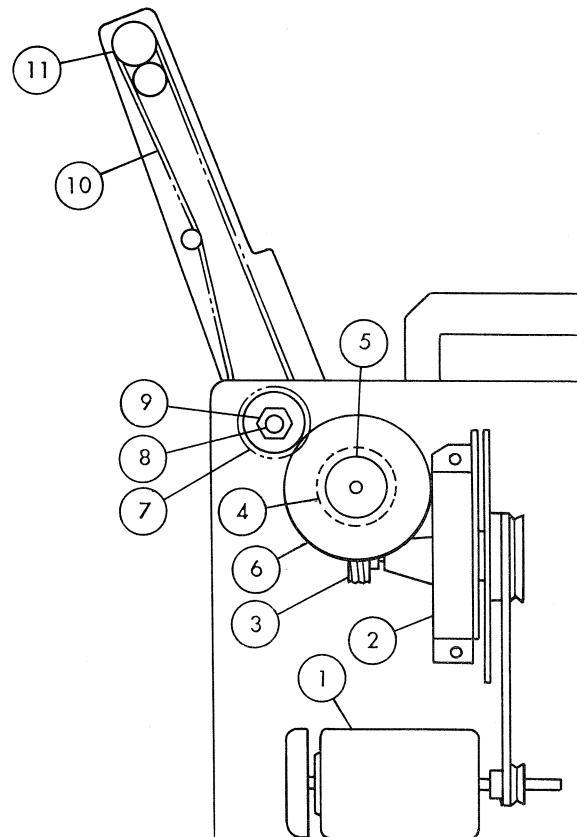
- ① Main motor → ② Claw section frame assy → ③ Worm (1) → ④ Worm gear (1) assy → ⑤ Magnet clutch → ⑥ Gear (1) rewind → ⑦ Gear (2) rewind → ⑧ Friction plate assy → ⑨ Pulley shaft rewind → ⑩ Synchro belt → Rewind squareshaft assy

\* Rewind slip mechanism:

The rewind slip tension is controlled by adjusting the spring frictional plate with the nut frictional plate.

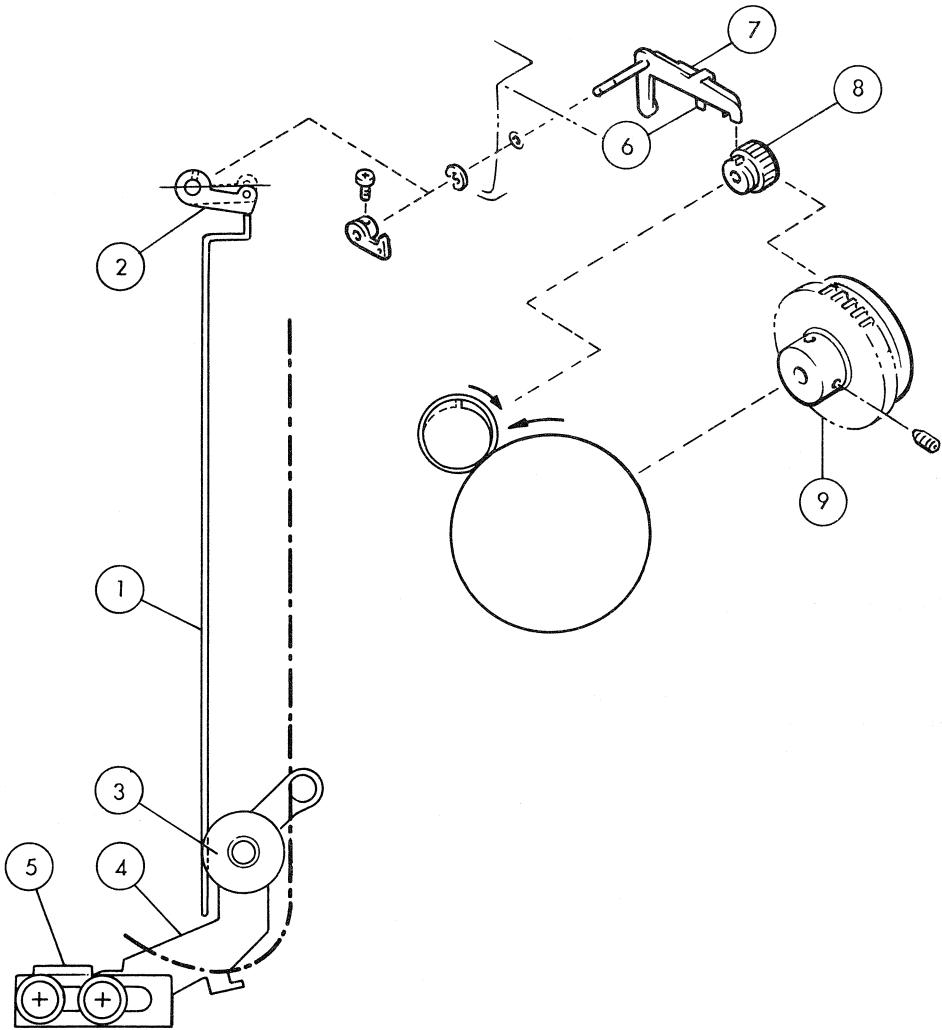
\* Magnet clutch:

Rapid rewinding may cause film cut if there is the slack, etc. in the film. Hence, the torque of the magnet clutch (ZCF-10C) is switched in two-stage to adjust the tension.



### III – 4 Auto Loop Restorer Mechanism

When the film loop at the bottom of film gate gets smaller during forward projection due to erroneous film feeding such as damage of perforation, etc., the auto loop restorer activates to form appropriate loop. However, this loop restorer does not activate for the loop at the top of the film gate.

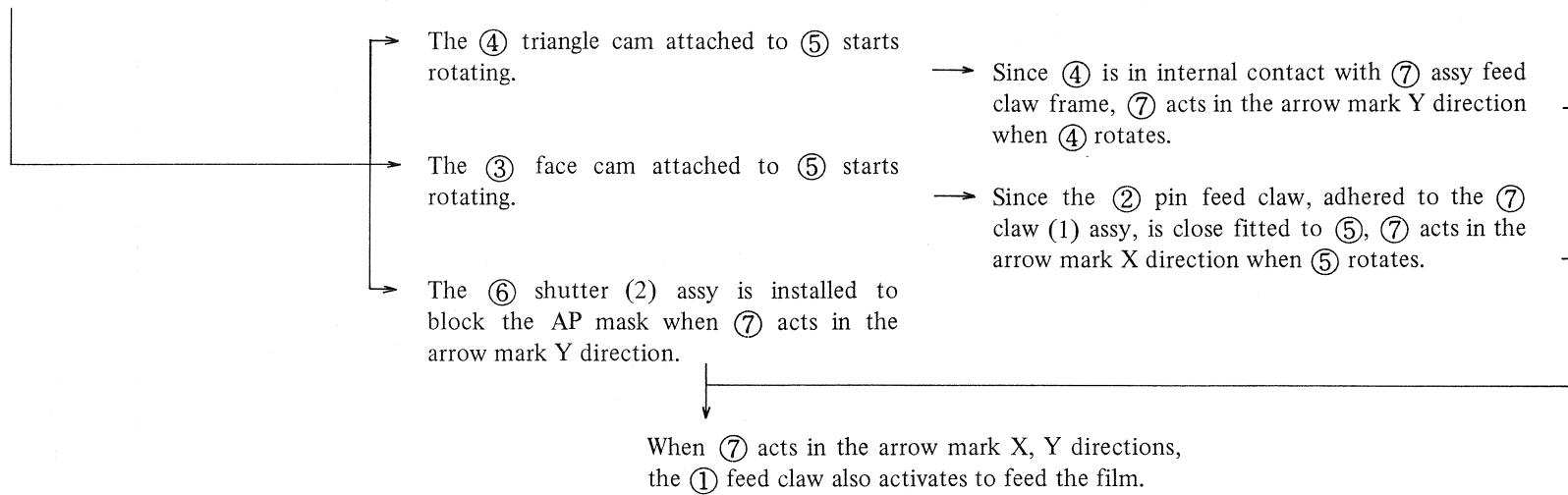


When there is no more loop at the bottom of the film gate, the film pushes ① up, causing ② to move upward (in the broken line direction) and ⑧ to get detached from the claw ⑥. In the meantime, ⑦ provides rotation to ⑧, and ⑧ rotates due to ⑨, causing ③ to get pushed downward to form appropriate loop. The ⑧ takes 1 turn before being stopped by ⑥.

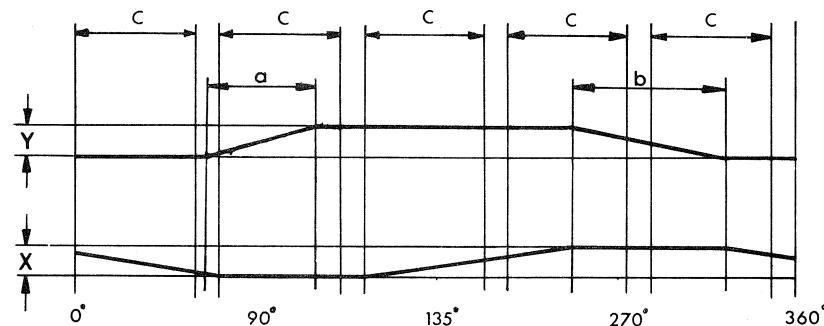
### III - 5 Intermittent Film Feeding Section

Below is the functin flow chart.

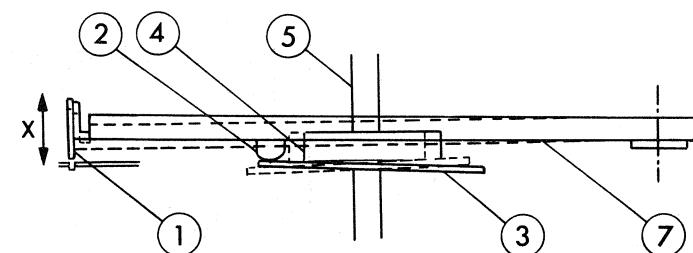
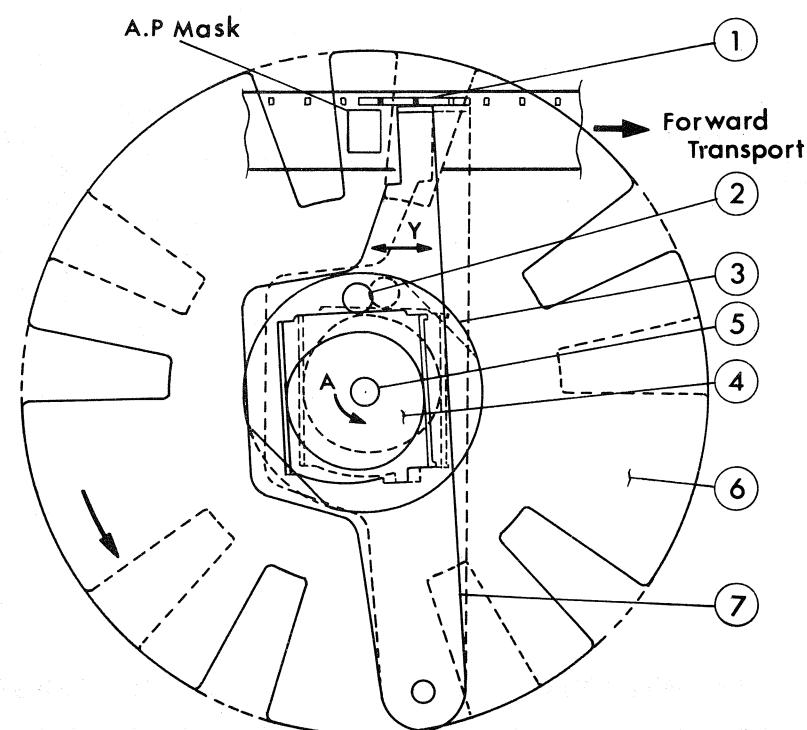
The rotation is transmitted from the motor to the ⑤ triangular cam shaft assy (in the direction of arrow mark during forward projection).



Below is the timing chart.



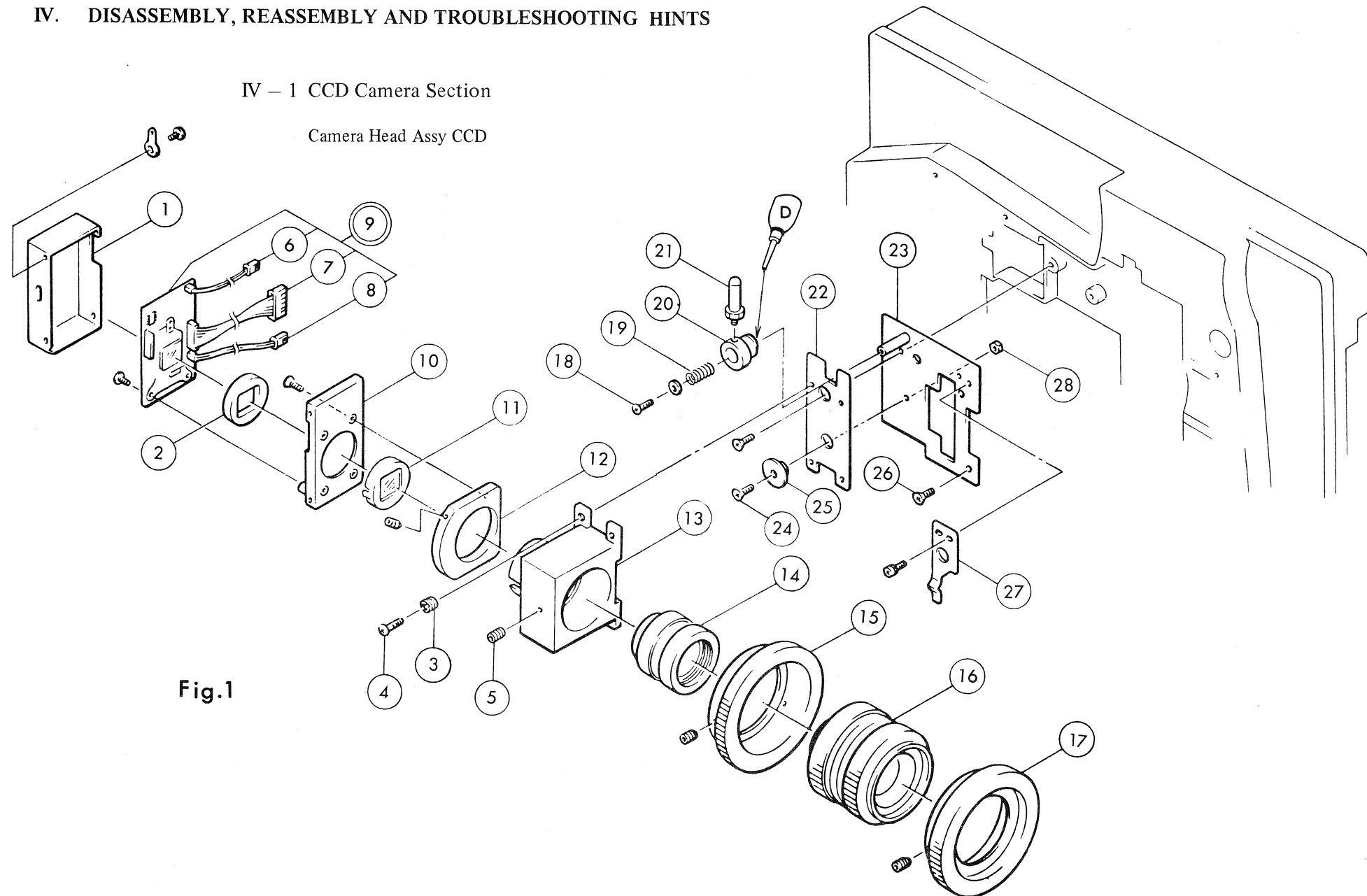
X: Surface cam  
Y: Triangle cam  
a : Back feed  
b : Film feed  
c : Shutter open/close



- 1 Claw (1)  
2 Pin claw (1)  
3 Face cam  
4 Triangle cam  
5 Triangle cam shaft assy  
6 Shutter (2) assy  
7 Claw (1) assy

#### IV. DISASSEMBLY, REASSEMBLY AND TROUBLESHOOTING HINTS

##### IV – 1 CCD Camera Section



## IV – 1 CCD Camera Section

### Camera Head Assy CCD

- Disassembly:
1. Disconnect the connectors ⑥, ⑦, and ⑧.
  2. Unscrew ④ to remove ⑬ assy parts from ⑫.
  3. Refer to Fig. 1 in order to disassemble ⑬ assy parts.
  4. Unscrew ⑯ to remove ⑰ assy parts.
  5. Unscrew ⑭ to remove ⑫ from ⑬; take care since ⑮ also gets removed simultaneously.
  6. Unscrew ⑮ to remove ⑬ from the base main body.
- Reassembly:
1. Be sure to take measures against electrostatic destruction by using electrostatic mat, wrist strap, etc. at the time of repairing or/and replacing PC boards and electric parts.
  2. Since ⑨, ⑪ and ⑯ are optical parts, take due care so that they may not get stained or contaminated with dust.
  3. Refer to the "Camera Section Connection Diagram" for inserting the connectors, taking due care of the direction, number of pins, etc.
  4. Make focus adjustment by using ⑤ before fixing.
  5. Should missing screen or exposure be found, check ⑫ ~ ⑯ for misinstallation, and correct accordingly.

Note: Should some trouble be found in electric circuits and optical section of CCD camera, send the whole unit of the camera section (camera head assy CCD, camera box) to the followings; do not carry out replacement or/and adjustment by yourself.

USA: Elmo Mfg. Corp.

Canada: Elmo Canada Mfg. Corp.

\* Fitting of screen angle (See Fig. 1)

Apply the SMPTE test film, and fit the film center with the monitor center mark, confirming the fitness through under-scanning.

1. Loosen the camera head fixing positions (screws) ③ and ④ for adjustment.
2. After adjustment, fix the adjusting screw holder and projection lens by tightening ④.

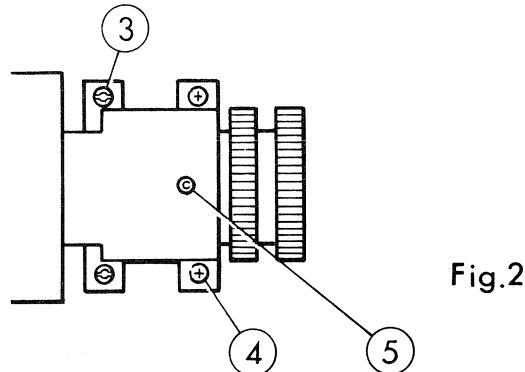


Fig.2

\* Focusing

Procedures of adjustment

1. Set the iris control ring to open, and then shut approximately 3 steps of the click.
2. Set the lens focus ring to 1 m.
3. Project the test film, and focus by turning the lens while observing the monitor.
4. Tighten with ⑤ when focusing is done.
  - (1) Scale ring adjustment: In this adjustment, the focusing surface splits and changes before getting focused near the center by turning the ring.
  - (2) Resolution of 2.5 M as well as reading up to 3 M is possible when IN NEGA SCYCLE is applied. The iris here shall open to the extent the white fades away.
  - (3) The screw in the Fig. 2 shall have screw lock coating.

\* Adjustment of replay screen inclination (See Fig. 1)

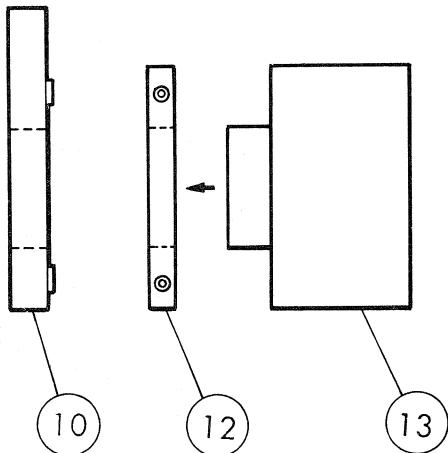


Fig.3

1. Connect cross line generator and monitor TV to TRV 16 to produce cross line on the test film.
2. See to is that the horizontal line of cross line coincides with the horizontal line of the test film; adjust by turning ⑫ (rotate the surrounding of boss section of (3)).
3. After the two lines coincide with each other, fix with stop screw ⑬.

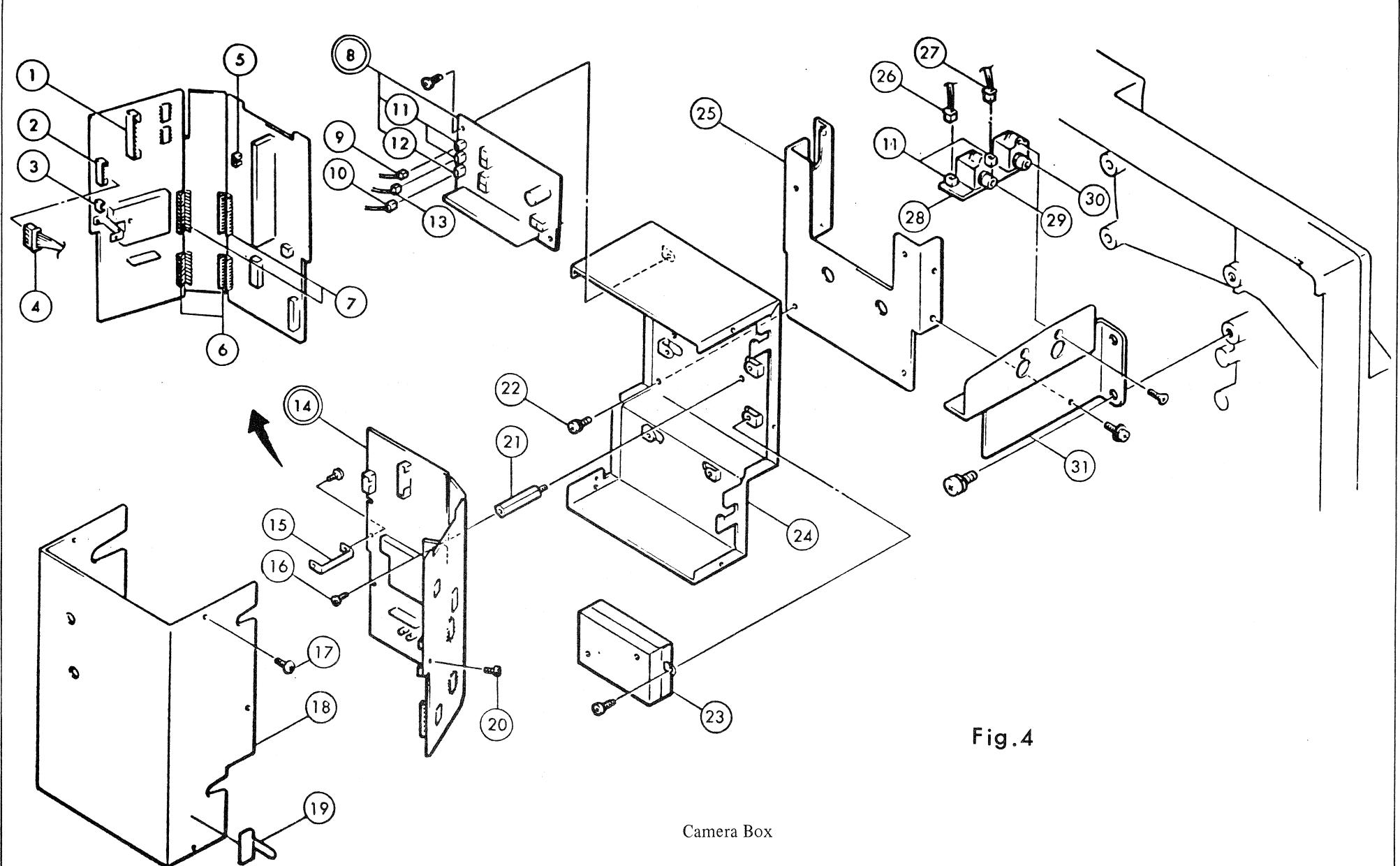


Fig.4

Camera Box

## Camera Box

### Disassembly:

1. Be sure to take measures against electrostatic destruction such as electrostatic mat, wrist strap, etc.
2. Remove ⑯ and ⑰ from ⑪.
3. Unscrew ⑯, and remove ⑱ from ⑲.
4. Unscrew ⑳, and open the PC board and disconnect the connector.
5. Unscrew ⑯ to remove ⑯.
6. See Fig. 4 for the above disassembly.

### Reassembly:

1. Carry out reassembly in the reverse order of disassembly.
2. Take utmost care so as not drop parts attached to the PC board during mounting and dismantling.
3. Refer to the Camera Connection Diagram, and make confirmation at the time of connecting the connectors.
4. Put the lead wires together, so that they extend out of the notch of ⑱.
5. After adjustment and reassembly, make sure that the video output level is  $1 \text{ Vp-p} \pm 4 \text{ dB}$  by using an oscilloscope.

#### IV – 2 Intermittent Film Feeding Section

##### Intermittent Film Feeding Section & Worm

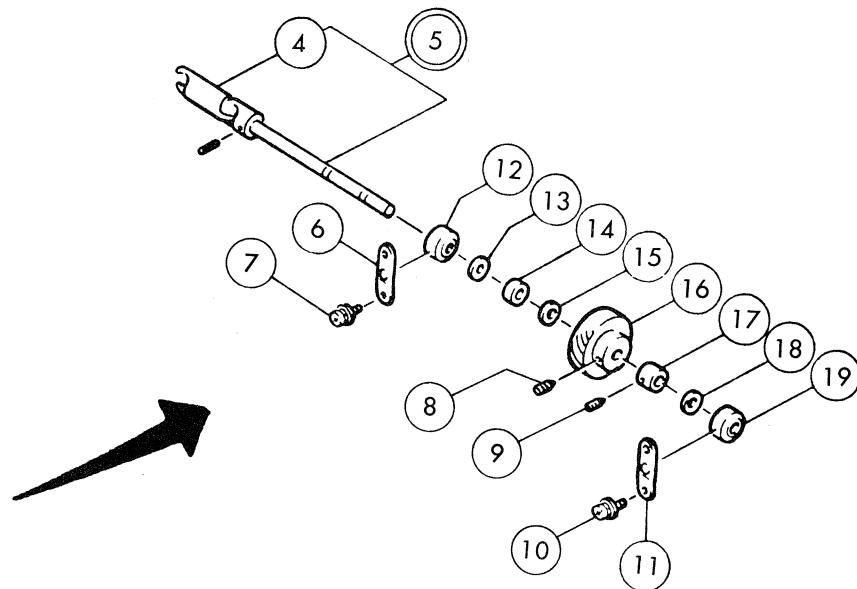
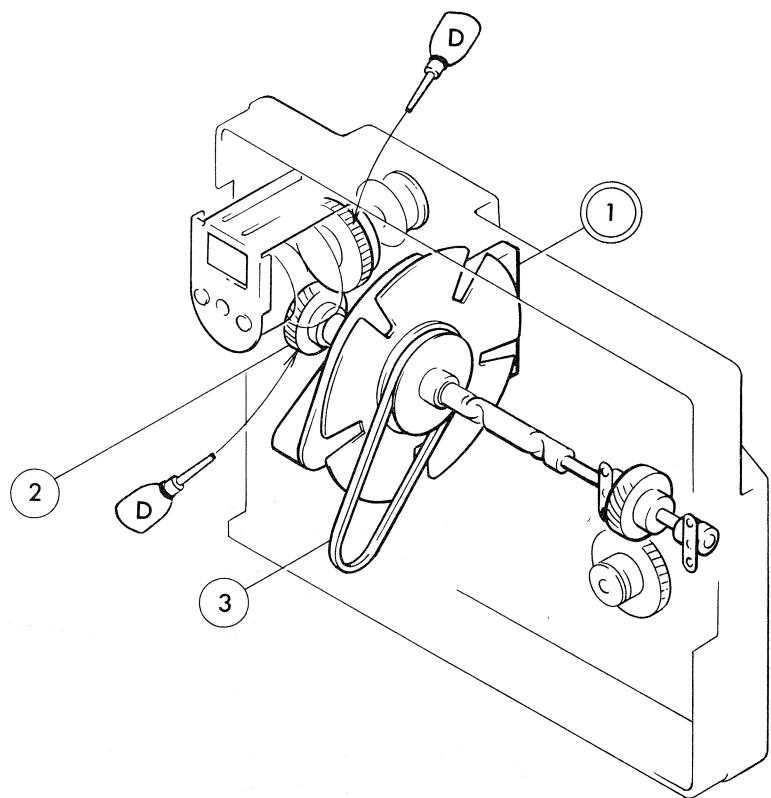


Fig.5

## Intermittent Film Feeding Assy, Worm

Troubleshooting hints:

Symptom	Cause
Slow motor rotation	Defective fixing position of ①.
Abnormal noise is heard.	Defective fixing position of ⑯, and defective installation of ⑥ and ⑪

Disassembly:

1. Unscrew ⑦ and ⑩, and remove ⑥ and ⑪ from the base main body.
2. Loosen ⑧ and ⑨, and pull out ⑫ ~ ⑯ from ⑤.
3. Remove the joint connecting ① and ④.
4. Unscrew ⑥ in Fig. 6, and remove ① from the base main body.

Reassembly:

1. Check to see that ② has backlash with ⑬ in Fig. 12, and see to it that ⑯ in Fig. 6 does not interfere with other parts, etc.
2. Install ⑤ to ①, taking care that ⑯ and ⑰ do not get slackened.
3. In case the joint of ⑤ is not connected horizontally, loosen ⑨ and move ⑤, so that it is adjusted horizontally.

Claw (2) Assy, Worm

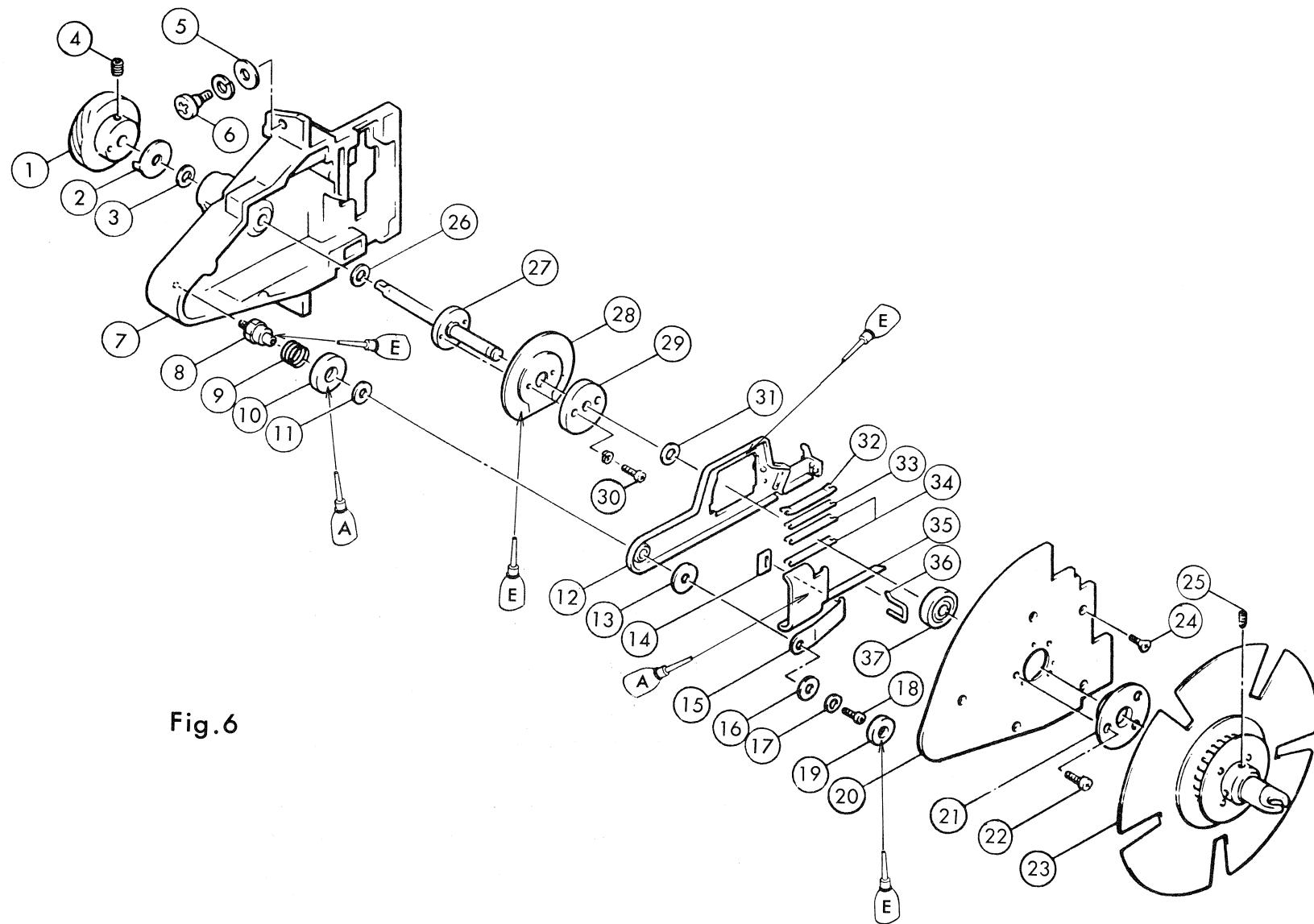


Fig.6

Claw (2) Assy and Worm

Troubleshooting hints:

Symptom	Cause
Oscillation of screen (longitudinal oscillation)	Defective fixing position of ① or/and wear of ④
Oscillation of screen (rear feed)	Excessively long extension allowance of claw ⑫
Flow of film	Excessively short extension allowance of claw ⑫
Flow of shutter (image trails)	Defective fixing position of ⑬
Unstable rotation	Defective fixing position of ①
Large feeding sound	Defective fixing position of ①, wear of ④, shortage of grease in ⑧, ⑫, ⑯ and ⑰, and shortage of oil in ⑩, ⑯ and ⑮

Disassembly:

1. Loosen ⑯ to remove ⑬.
2. Unscrew ⑪ to remove ⑩, and then ⑭ to remove ⑯.
3. Unscrew ⑮, ⑯ ~ ⑯ and ⑰ ~ ⑰ to remove ⑫.
4. Carry out further disassembly referring to Fig. 6.

Reassembly:

Carry out reassembly in the reverse order of disassembly.

\* Measurement of screen oscillation: The permissible longitudinal oscillation is above 1.5 mm and lateral oscillation below 1 mm when SMPTE P16-RT test film is replayed on a TV with the screen width of 50 cm.

\* Test of film flow: The normal state shall have no flow of film when replay is carried out by using SMPTE 16-RT test film.

Aperture Plate TRV, Pressure Plate Assy

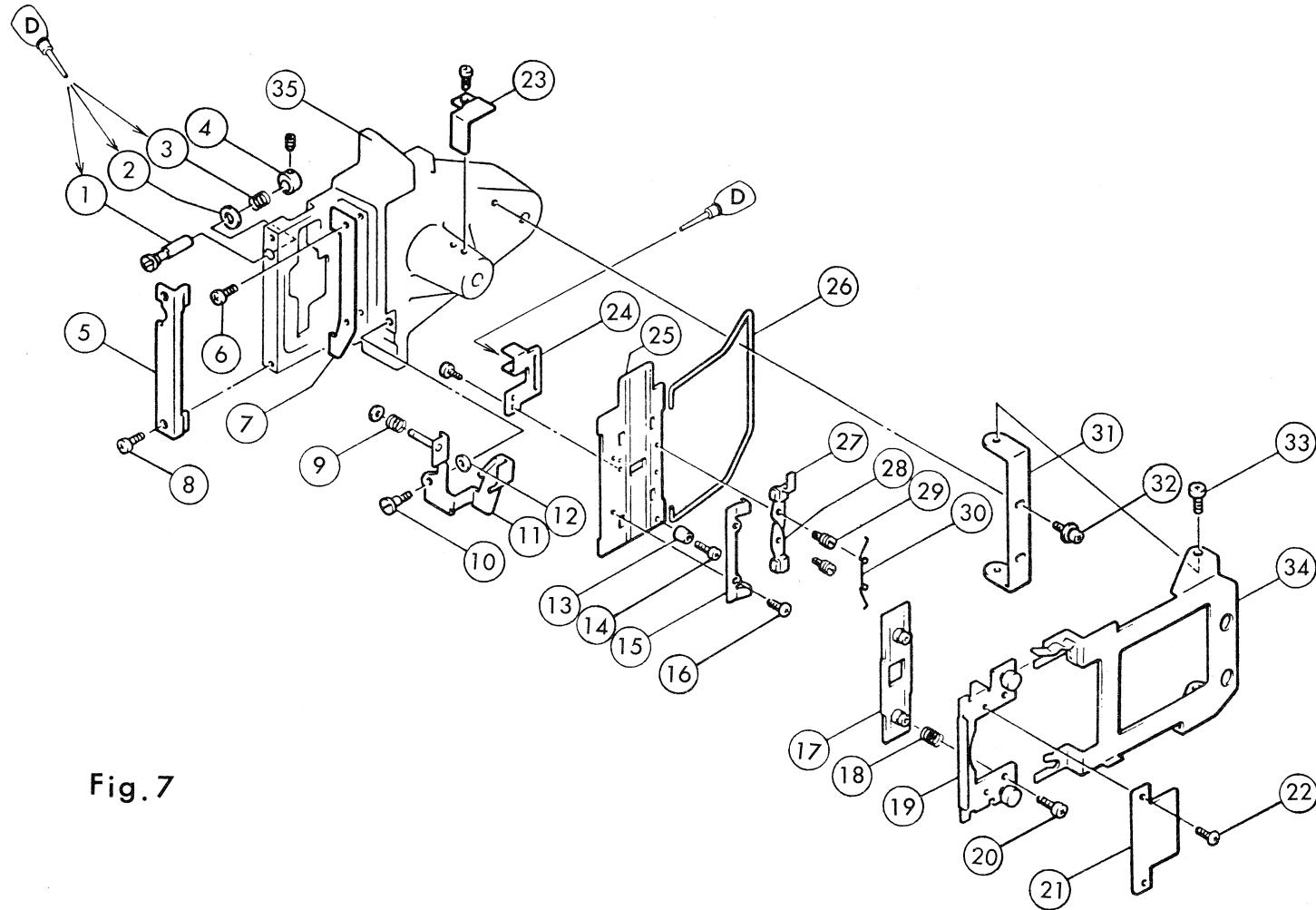


Fig. 7

## Aperture Plate TRV, Pressure Plate Assy

Troubleshooting hints:

Symptom	Cause
Oscillation of screen (lateral oscillation)	Defective spring tension of ⑩, defective installation and adjustment of ⑦ and ⑧, and defective fixing position of ⑬ and ⑮
Failure in film setting	Defective fixing position of ⑯, and defective installation and adjustment of ⑬ and ⑮
Film gets curled.	Excessively high spring tension of ⑩
Film gets scratched.	Burr and scratch (flaw) of ⑯ and ㉕

Disassembly:

1. Pull out ⑯ assy parts from ④.
2. Unscrew ② and ⑩ to disassemble ⑯ ~ ㉕ as shown in Fig. 7.
3. Unscrew ③ to remove ⑪ and ⑫ from ㉕.
4. Unscrew ⑩ and ㉙ to remove ⑦ and ⑧.
5. Unscrew ⑭ and ⑯ to remove ⑬ and ⑮.
6. Remove ㉕ and ㉖ from ㉕.
7. Carry out the above disassembly referring to Fig. 7.

Reassembly:

1. See to it that the film pressing surface ⑯ has no scratch and that ⑮ faces to correct direction (see Fig. 8), and after reassembly, check the function of ⑯.
2. Make sure that the spring tension of ⑩ at ⑦ and ⑧ is 40 ~ 50 g and that ⑦ and ⑩ have less slackening (play) and can move smoothly (lightly). Furthermore, see to it that the gap between ⑦ and ⑧ is 0.2 mm (see Fig. 9-a).
3. See to it that Albania grease is applied to ①, ② and ③, and confirm that ① rotates smoothly after installation, enabling framing adjustment.
4. See to it that the center off-set of mask and image in the left and right directions, when SMPTE 16-RT test film is projected, is below 0.1 mm when converted in film dimension.

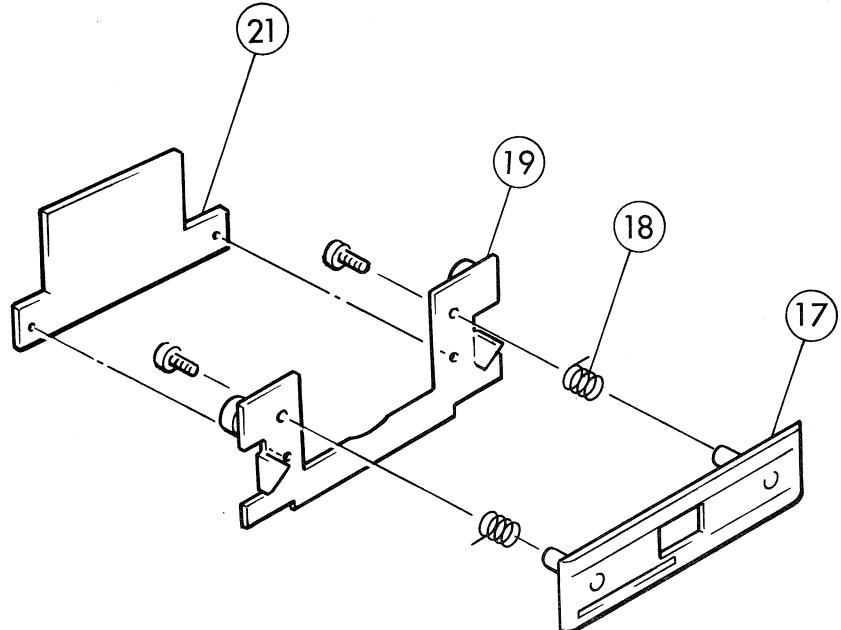


Fig.8

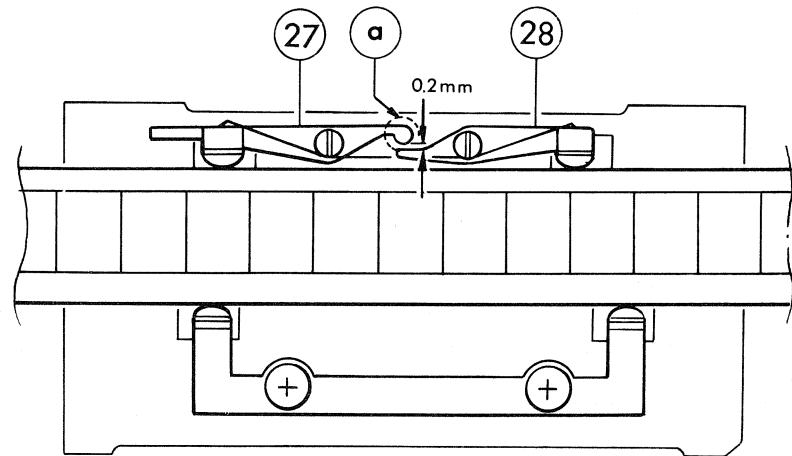


Fig.9

Aperture Plate TRV (See Fig. 7)

1. Apply the lateral guide fixing gauge (P087) to ⑮ in order to install ⑯.
2. Apply the fixed guide fixing gauge (P088) to ⑮ in order to install ⑯.
3. Install ⑰ and ⑱, apply the film as shown in Fig. 9, and adjust by bending the "a" section with the film lateral guide adjusting screw driver (P028), so that the space in-between is 0.2 mm.
4. Measurements of the spring tension of ⑲ should be 40 ~ 50 g by using a dial tension gauge (C063).

IV – 3 Film Take-up and Rewinding Section

Friction Plate Assy, Rewind Arm Assy

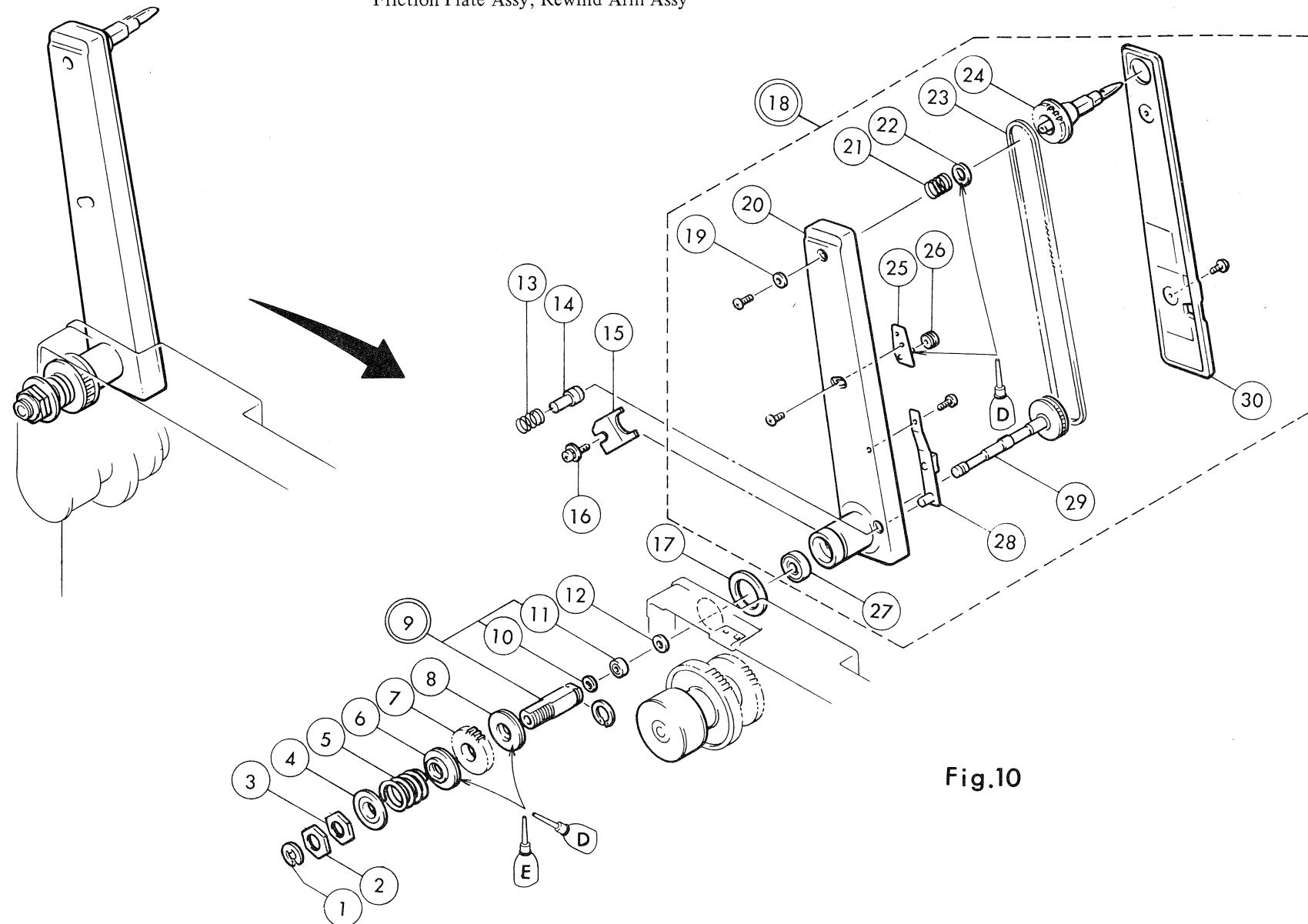


Fig.10

### Friction Plate Assy, Rewind Arm Assy

Troubleshooting hints:

Symptom	Cause
Fails to rewind.	Inadequate spring tension of ⑤ and damage of ⑦
Film slackens and dangles before the projection lens during projection or when the projection is stopped.	Improper spring tension of ⑪ and defect or/and deterioration in tension of ⑬

Disassembly:

1. Take off ① to remove the assy parts ② ~ ⑪. See Fig. 10 for disassembly.
2. Remove ⑫.
3. Pull out ⑯ to remove ⑮.
4. Set the knob main to " □ " to pull out ⑯.
5. Refer to Fig. 10 for further disassembly.

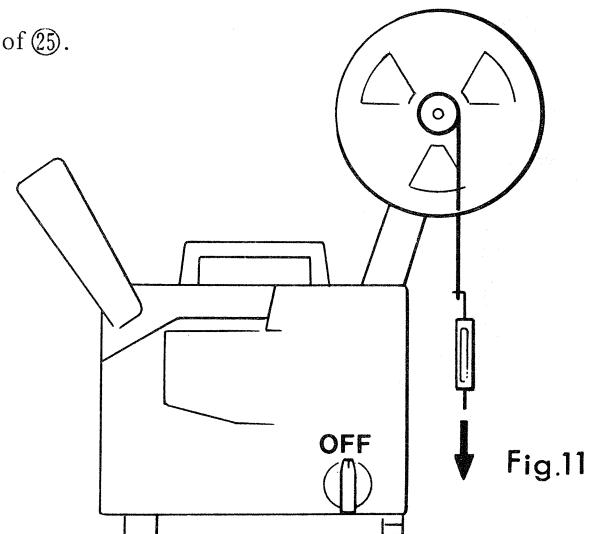
Reassembly:

1. Apply thinly and evenly the mixed grease (with Albania grease: Silicon grease = 9 : 1) to the cork surface of ⑥ and ⑧.
2. Adjust the tensin of ⑬ at the fixing position of ⑮, so that the film may not dangle before the projection lens during projection or when the projector is stopped half-way through projection.

\* Measurement of rewind brake: Wind 5 ~ 6 turns of film to the reel, with the main knob set to OFF, then pull the film in the direction of arrow mark, and measure the tension by means of the bar spring scale. (See Fig. 11.)

Standard value: 100 g ± 10 g

Adjustment: Adjust the tension of ⑬ at the fixing position of ⑮.



Magnet Clutch, First Sprocket

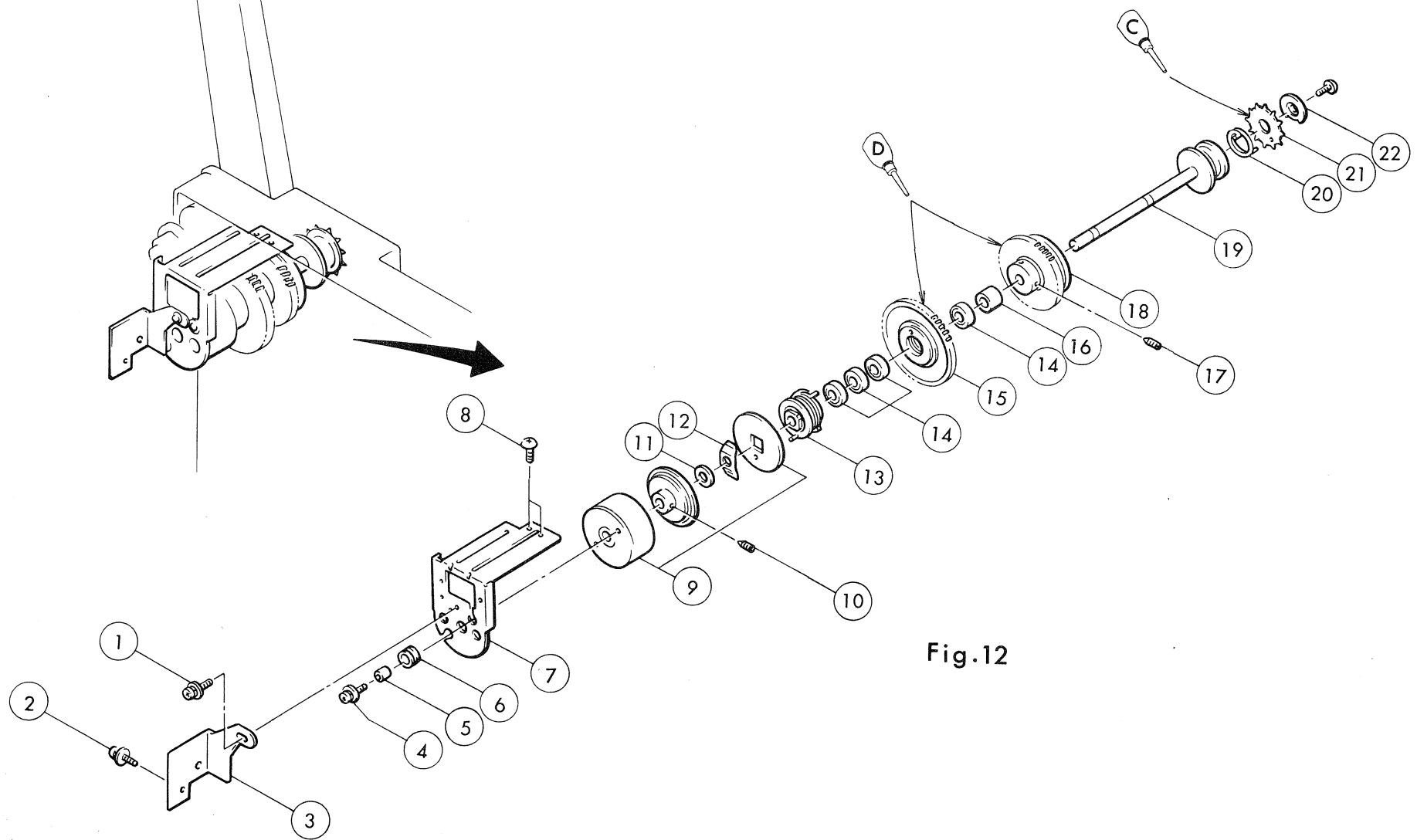


Fig.12

### Magnet Clutch and First Sprocket

Troubleshooting hints:

Symptom	Cause
Loop restorer fails to activate	Wear of rubber section of ⑯ or/and adhesion of oil
Fails to rewind.	Defective ⑨ and defective fixing position
Film gets scratched	Scratch (Flaw) and deformation of ⑯ and ㉑

Disassembly:

1. Unscrew ① and ② to remove ③.
2. Unscrew ④, ⑤, ⑥ and ⑧ to remove ⑦.
3. Pull out the coil side of ⑨, remove the cord and loosen ⑩ before pulling out ⑩ ~ ⑯.
4. Refer to Fig. 12 for further disassembly

Reassembly:

1. Replace ⑯ and ㉑ should they be found to have scratch or/and deformation.
2. If the rubber section of ⑯ is worn out or has oil adhered to it, wipe off the oil or replace the rubber section.
3. Carry out fine adjustment the space between ⑨ Ⓐ and ⑨ Ⓑ in Fig. 13 is 0.2 ~ 0.3 mm (approximately equivalent to 2 pieces of film).

\* Measurement of film rewinding power: Apply 800 ft reel to the rewind shaft assy (1), set to rewinding state by winding film to approximately 20 cm dia., and measure by using bar spring scale. (See Fig. 14)

Standard value: First 3 ~ 4 seconds: 150 ~ 250 g

After magnet clutch activates: 600 ~ 800 g

Adjustment: Adjust the spring tension of ⑤ in Fig. 11 with ③, and fix with ②.

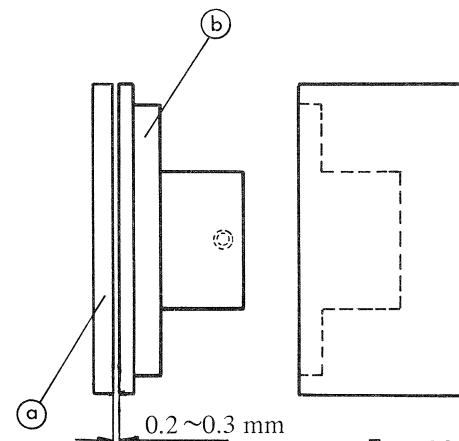


Fig.13

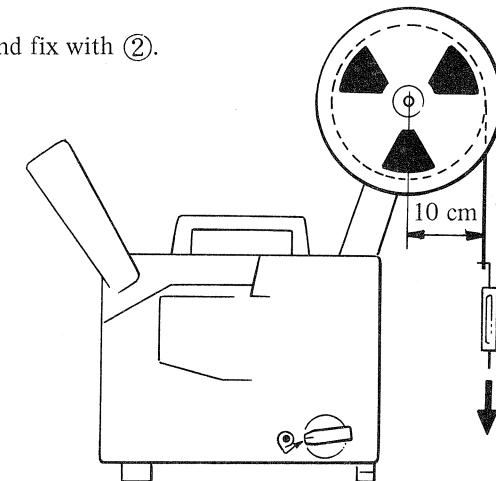


Fig.14

Take-up Arm Assy, V-Belt Take-up, Worm Gear (2) Assy, Second Sprocket

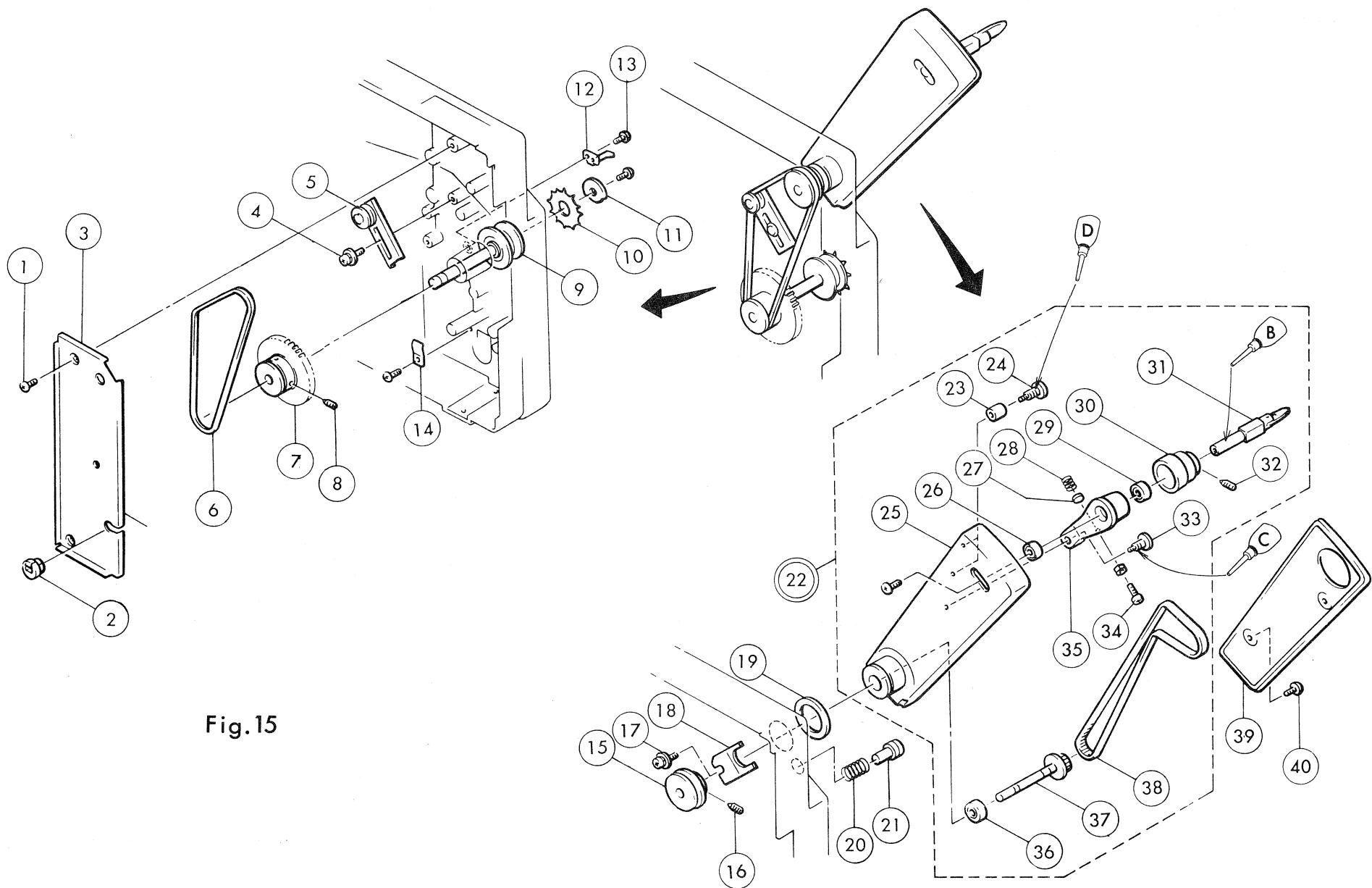


Fig.15

Take-up Arm Assy, V-belt take-up, Worm Gear (2) Assy Parts and Second Sprocket

Troubleshooting hints:	Symptom	Cause
	Fails to rewind or when rewinding is stopped in the middle, the film dangles on the rewind arm side.	Inadequate spring tension of ㉙ or/and adhesion of oil to ㉚ and ㉛
	Fails to rewind.	Excessively high spring tension of ㉙
	Excessively large wow/flutter	Deterioration of ㉖ and ㉗, or/and scratch and deformation of ㉙ and ㉚
	Film gets scratched.	Scratch and deformation of ㉙ and ㉚

Disassembly:

1. Unscrew ① to remove ③.
2. Unscrew ④ to remove ⑤ and ⑥.
3. Loosen ⑧ to pull out ⑦, then remove ⑫ and ⑬ before pulling out the assy parts of ⑨.
4. Unscrew ⑯ and ⑰ and remove ⑮ and ⑯ to take out ㉒, taking due care since ㉐ and ㉑ also come off simultaneously.

Reassembly:

1. Thoroughly wipe off or replace if oil is adhered to ㉚ and ㉛.
2. Replace if wear, scratch, deformation, etc. are found in ㉖, ㉗, ㉙, ㉚, ㉛ and ㉜.
3. Adjust the fixing position of ⑤, so that ⑥ can be fully stretched and does not interfere with ⑦ or other parts.

\* Measurement of film rewinding power: Apply 800 ft reel to the square shaft assy (2), set to projecting state by winding 5 ~ 10 turns of film, and pull in the direction of arrow mark to measure with the bar spring scale (C067). (See Fig. 16.)

Standard value:  $150 \pm 50$  g

Adjustment: Adjust the spring tension of ㉙ with ㉔.

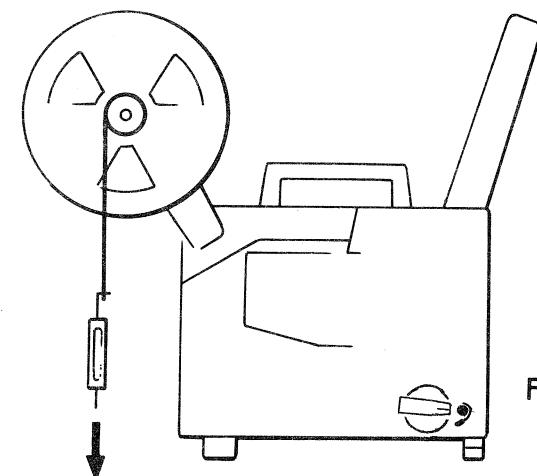


Fig.16

IV – 4 Motor Section

Synchronous Motor

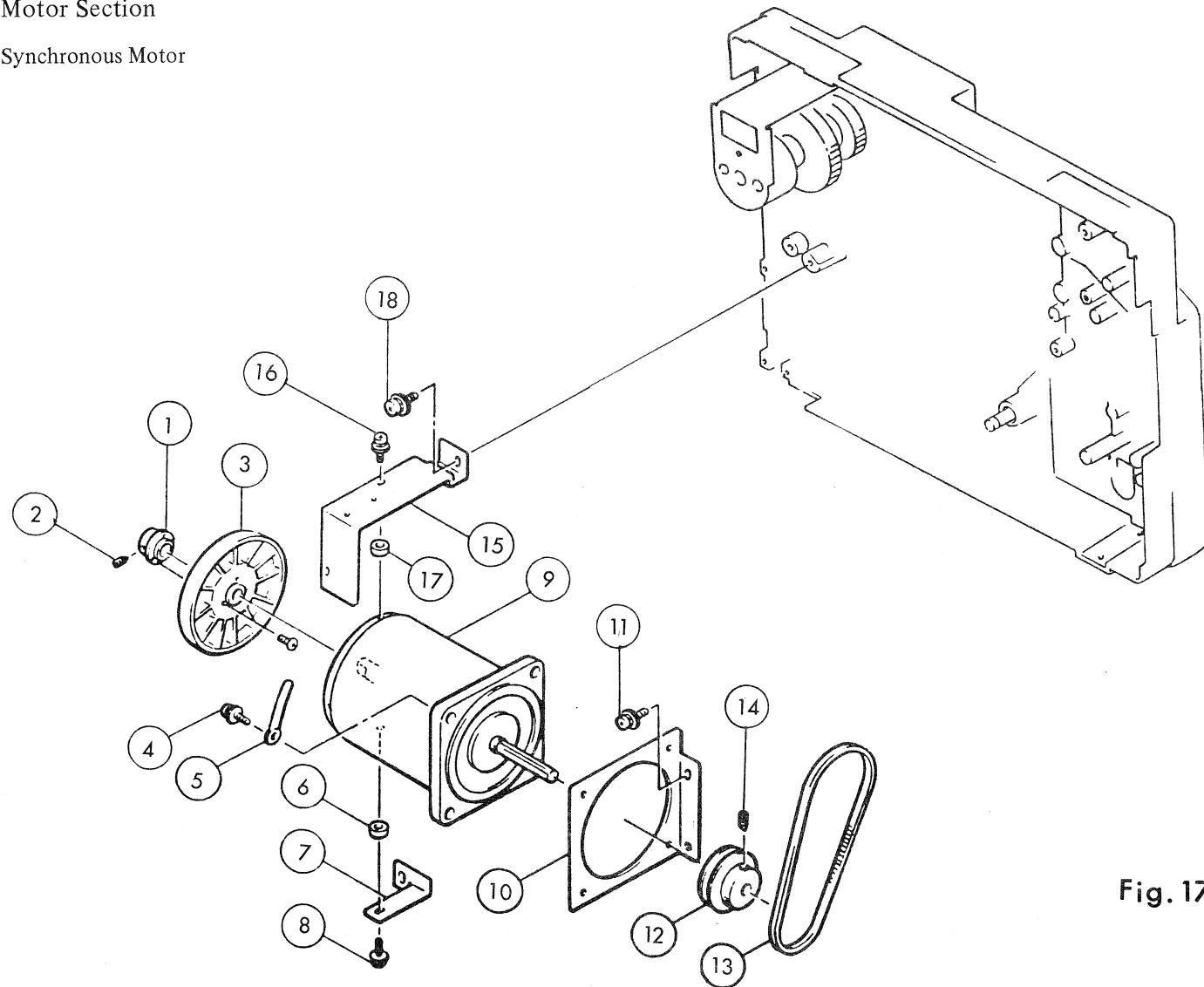


Fig. 17

AC Fan and Synchronous Motor

Troubleshooting hints:

Symptom	Cause
Failure in film take-up and rewind	Deterioration of ⑫ and ⑬, or/and defective installation of ⑫
Abnormal noise and vibration	Defective installation of ⑦, ⑩ and ⑯, or/and defective fixing position of ①
Oscillation of screen at replay	Excessively tensioned ⑬

Disassembly:

1. Unscrew ⑪ and ⑯ to remove the assy parts of ⑨ from the base main body. Here, keep ⑦, ⑩ and ⑯ attached to ⑨. In the meantime remove ⑬ from ⑫.
2. Loosen ⑭ to remove ⑫.
3. Unscrew ④, ⑧ and ⑯ to remove ⑦, ⑩ and ⑯.

Reassembly:

1. Install ⑫ to ⑨ with ⑭ before installing ⑦, ⑩ and ⑯.
2. Apply ⑬ to ⑫, and fix temporarily to the base main body by means of ⑪ and ⑯.
3. Adjust the tension of ⑬ at the position of ⑫, so that ⑬ may not interfere with other parts or be tilted (inclined). After adjustment, tighten ⑦, ⑩ and ⑯ firmly.
4. Thoroughly wipe or replace if stain scratch, wear, etc. are found in ⑫ and ⑬.
5. After reassembly, set to projecting state, and read out the number of frames by means of frequency counter (C005). No. of frames: 24 ± 0 frames/sec.

IV – 5 Amplifier and Transformer Section

Amplifier Assy

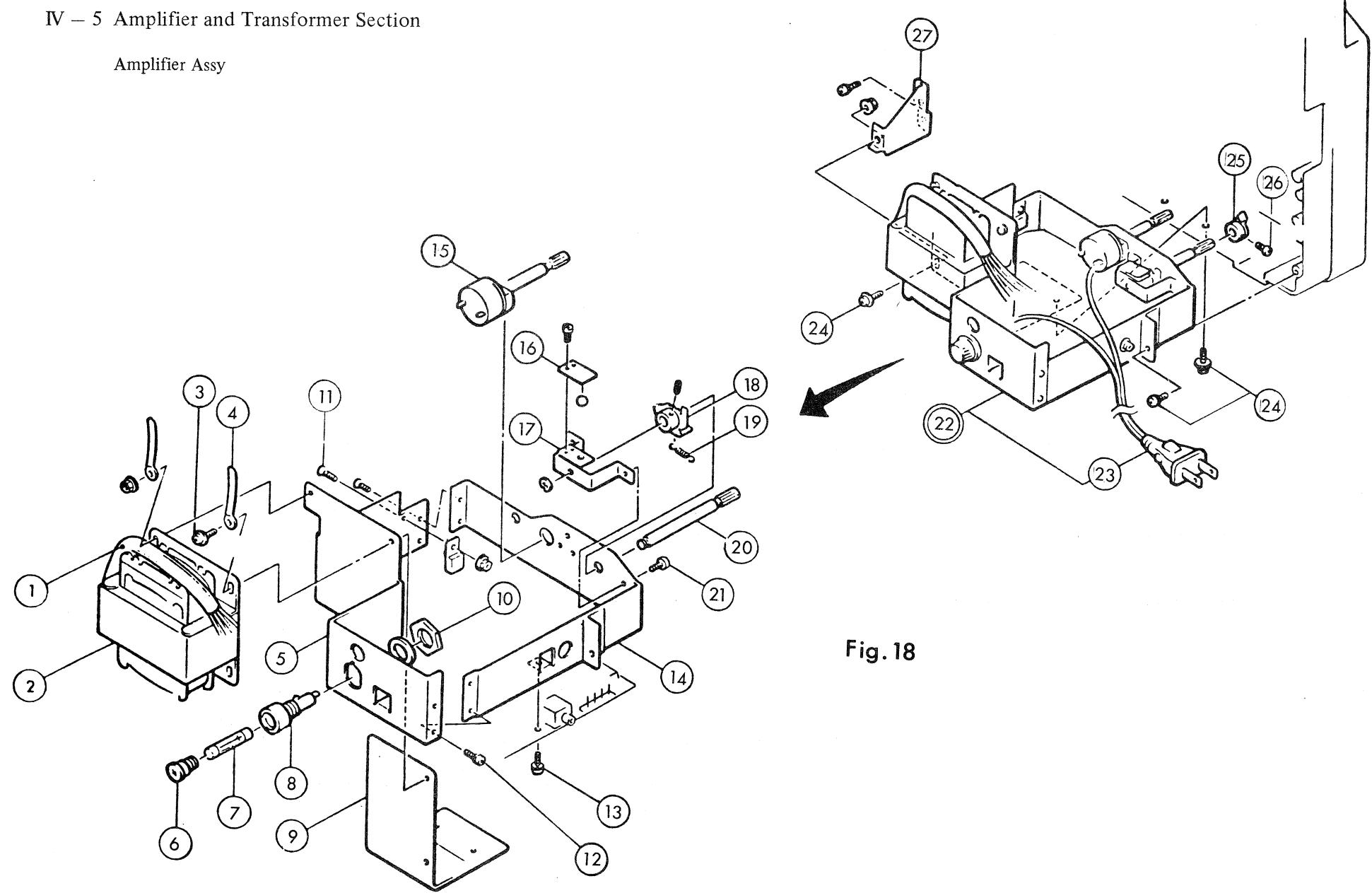


Fig. 18

## Amplifier Assy

### Disassembly:

1. Unscrew ④ to remove ② from the base main body; disconnect the connectors as well.
2. Unscrew ③ to remove ② from ⑤, taking due care since ⑨ also comes off simultaneously.
3. Unscrew ⑬ to remove the PC board.
4. Unscrew ⑪ and ⑫ to separate ⑤ from ⑯. Refer to Fig. 18 for disassembly of ⑤.
5. Unscrew ⑯ to pull out ⑮.
6. Unscrew ⑭ to remove the assy parts of ⑯.
7. Refer to Fig. 18 for further disassembly.

### Reassembly:

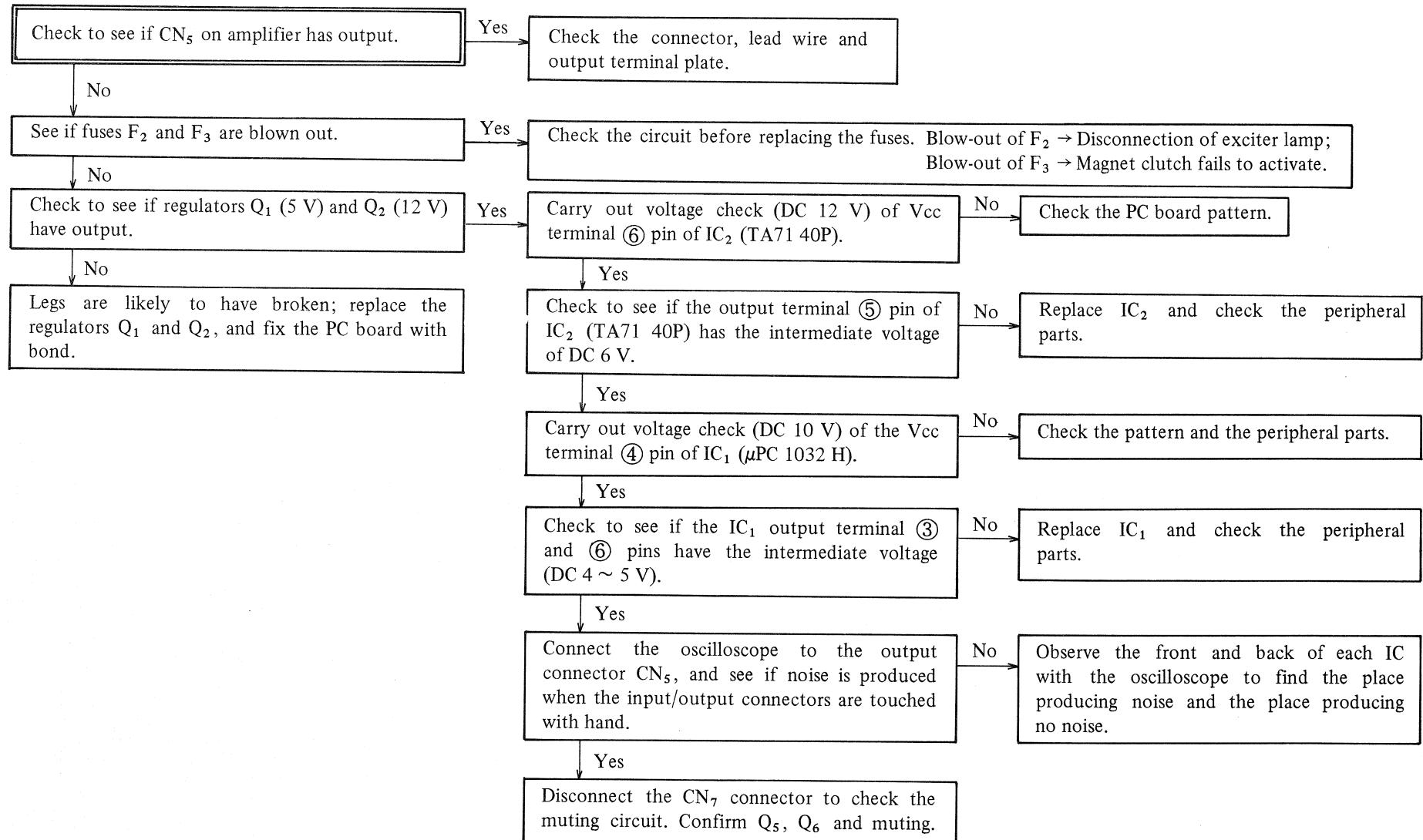
1. Carry out reassembly in the reverse order of disassembly.
2. Do not touch the printed surface of PC board, and take utmost care so that the mounted parts may not fall out or the solder may not get peeled off.
3. Put the lead wires together in a bunch, so that they may not touch the flywheel, etc.
4. After adjustment and reassembly, check to see that the audio output level is  $800 \text{ mV} \pm 6 \text{ dB}$  by using the AC voltage meter and oscilloscope.

Hints for troubleshooting are given below (on the following pages).

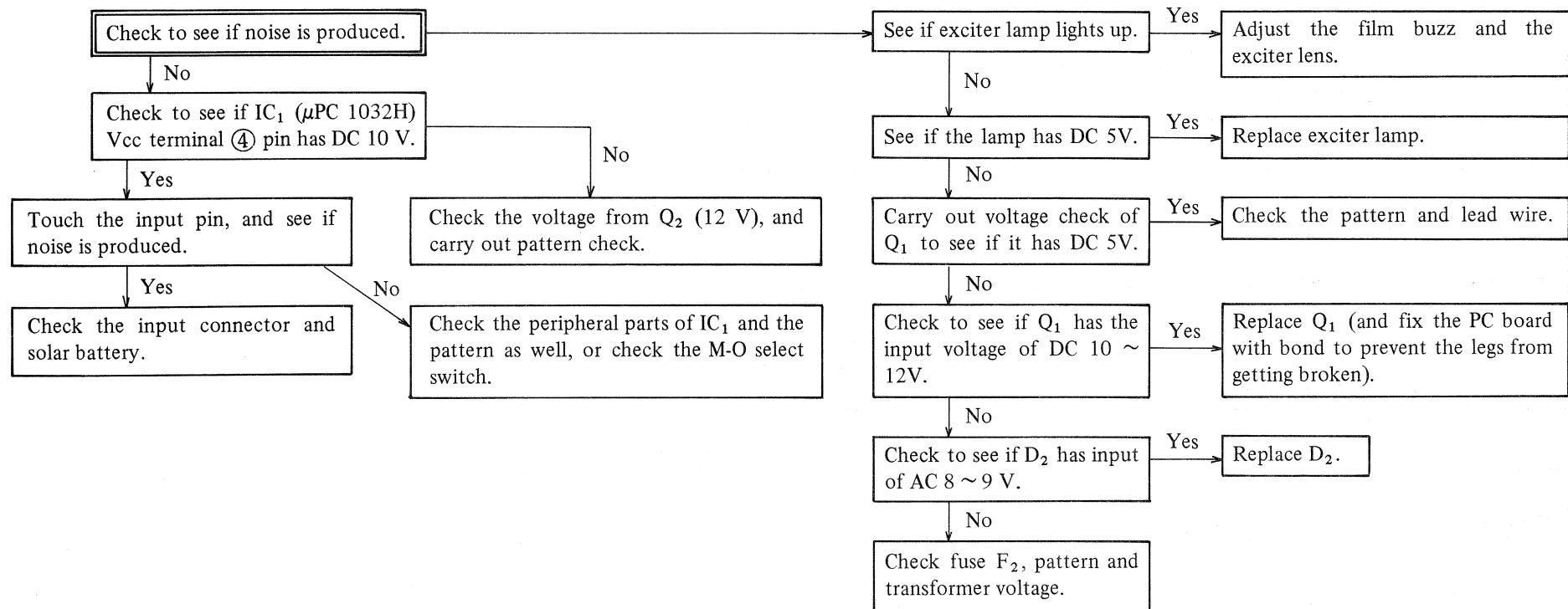
For repair, refer to the Amplifier Connection Diagram, E44122, on P. 88, and release the muting by shortcircuiting the check connector CN7 before the repair work.

## Troubleshooting hints

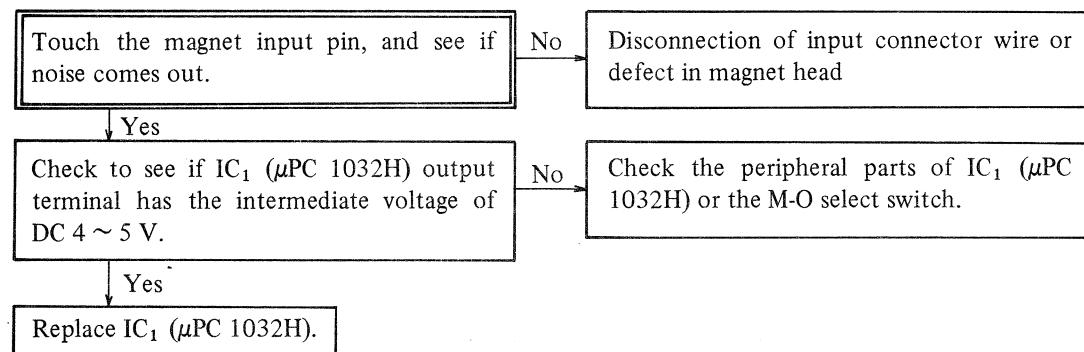
- \* Failure in reproduction of magnetic/optical sounds:



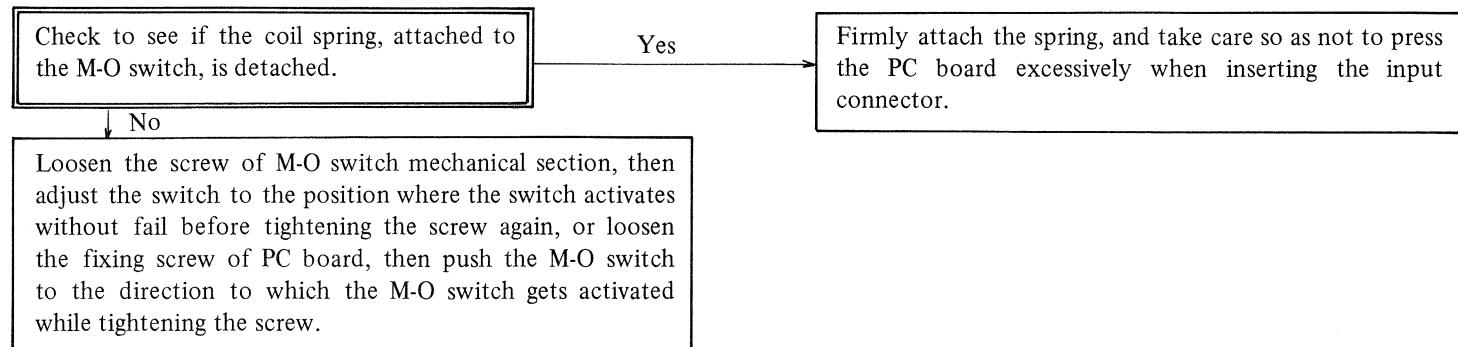
\* Failure in reproduction of optical sound (magnetic sound being normal):



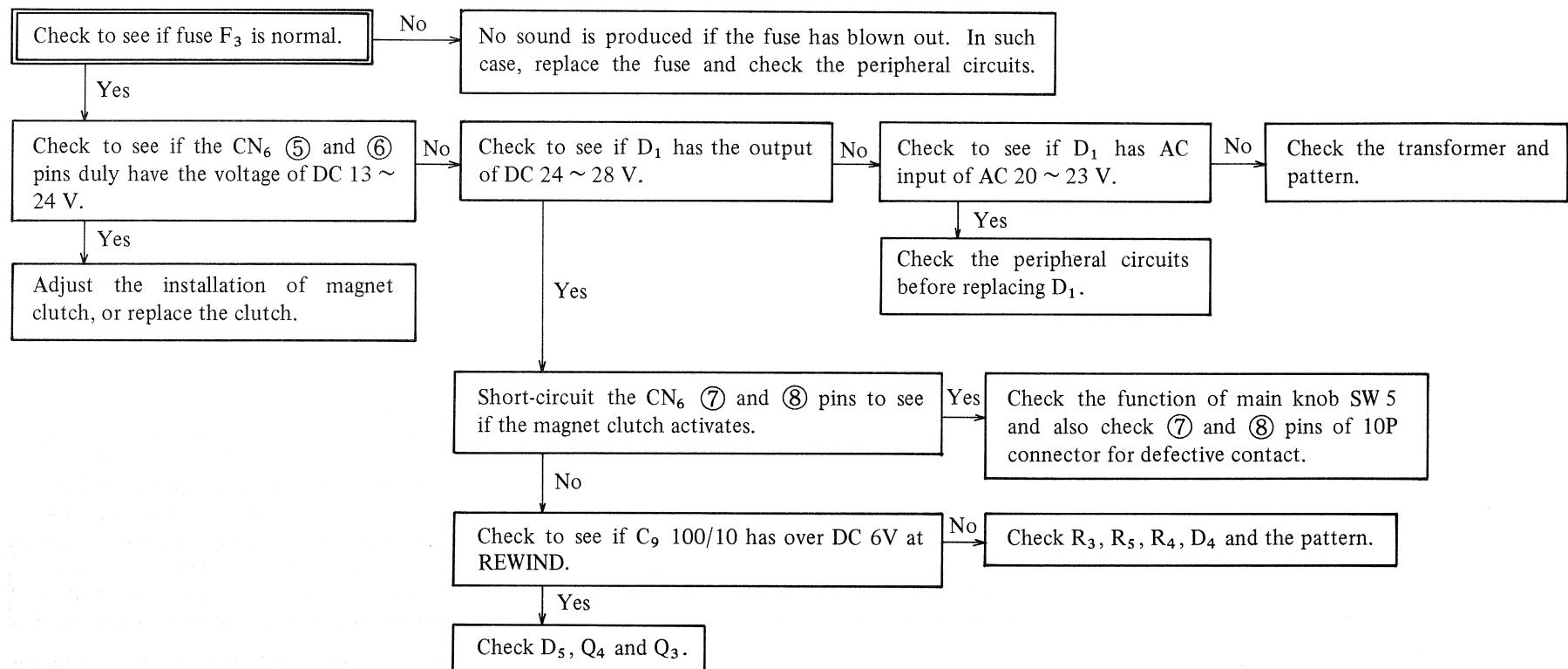
\* Failure in reproduction of magnetic sound (optical sound being normal):



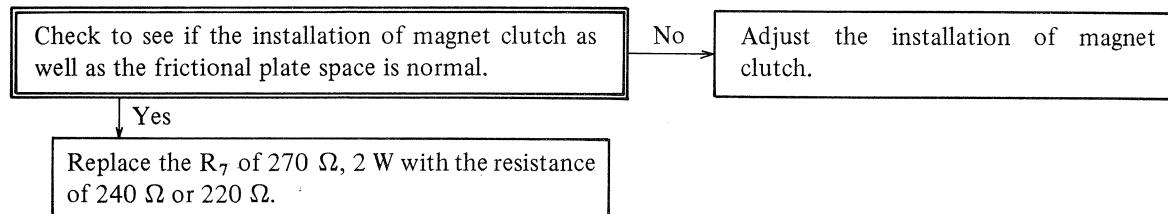
\* Failure M-O change-over



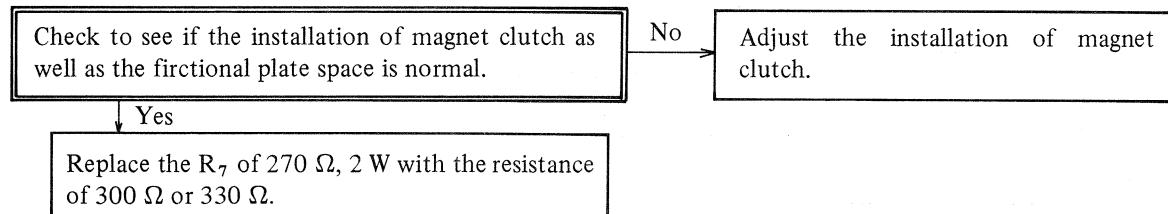
\* Magnet clutch fails to activate.:



\* Magnet clutch has excessively small initial power for activation:



\* Magnet clutch has excessively large initial power for activation.:



IV – 6 Link Section

Shoe First Sprocket, Lever Sprocket Shoe

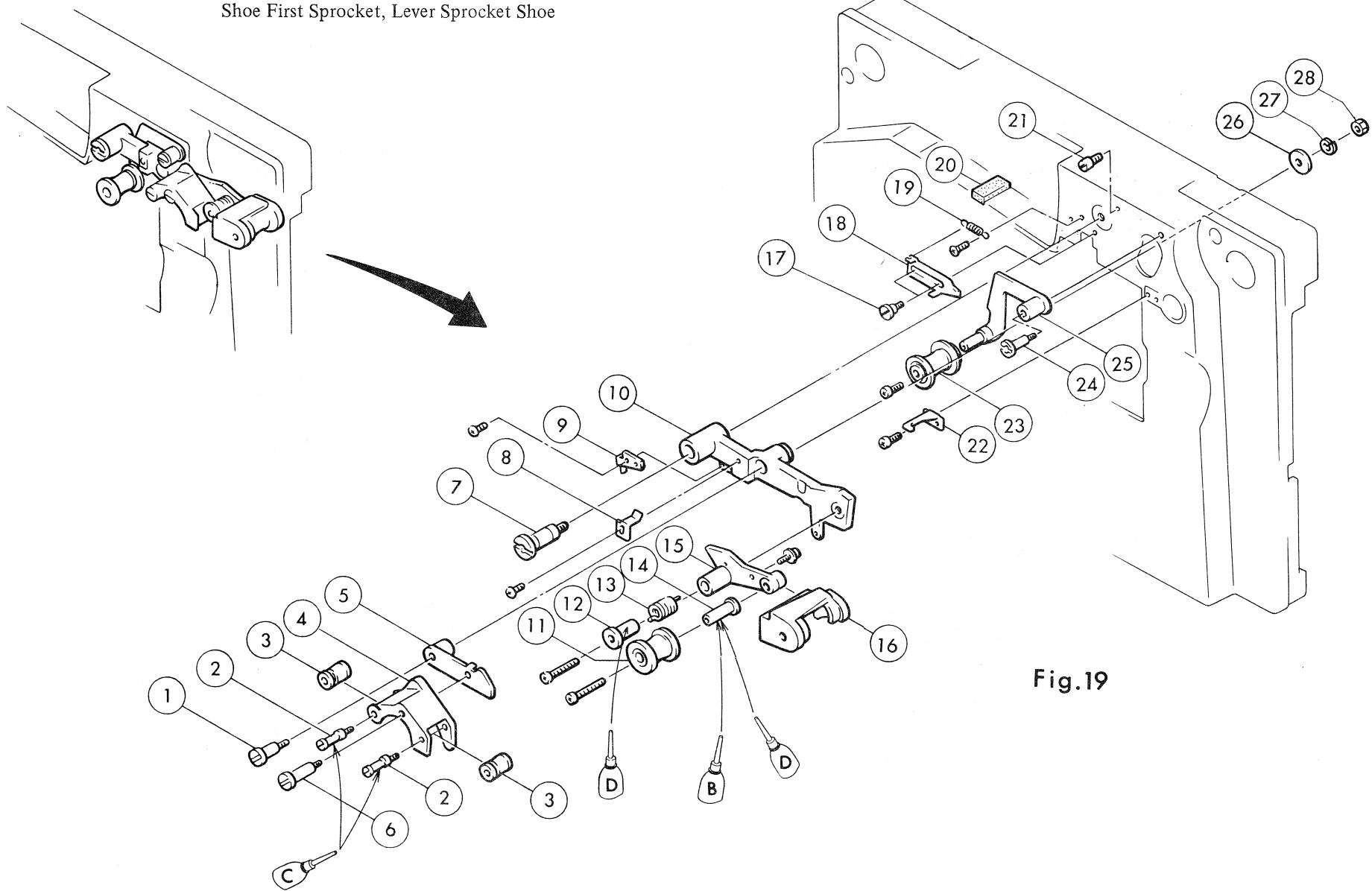


Fig.19

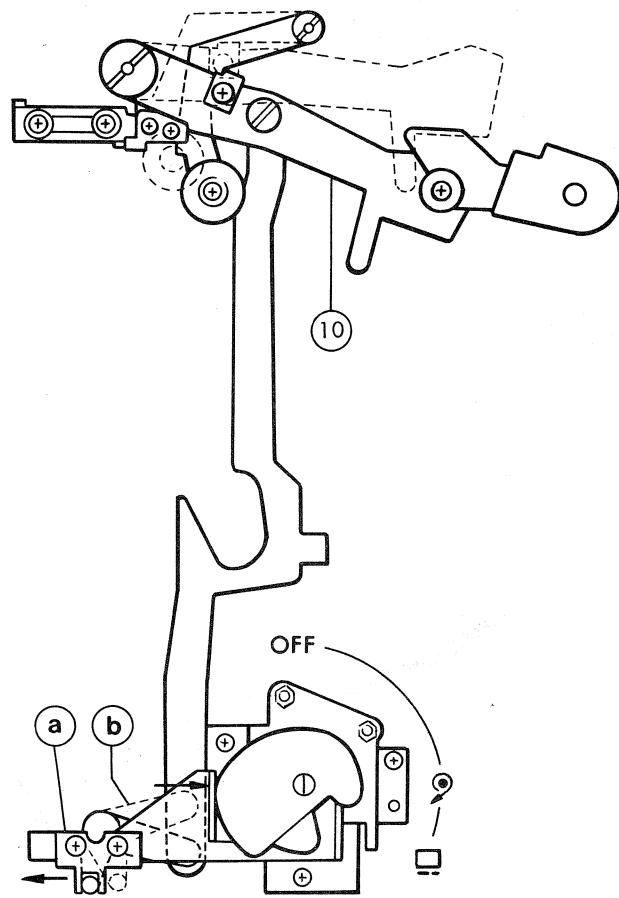


Fig. 20

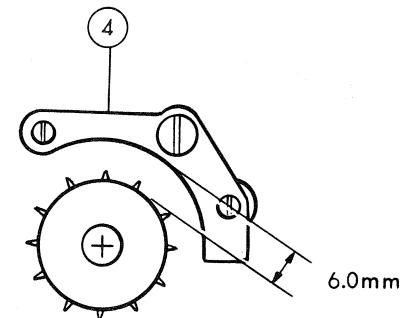


Fig. 21

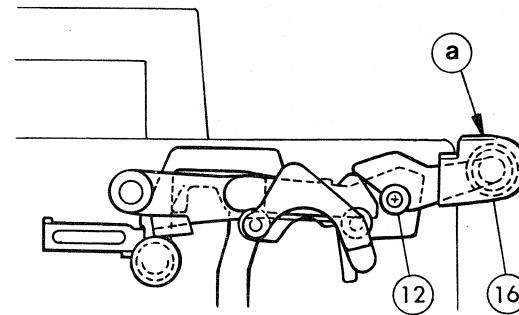


Fig. 22

## Shoe First Sprocket and Lever Sprocket Shoe

Troubleshooting hints:

Symptom	Cause
Upper loop runs out.	Defective fixing position of ⑧ and ⑨ or/and inadequate spring tension of ⑬
Film gets scratched.	Scratch and deformation of ③, ⑪ and ⑬, excessively high spring tension of ⑬, and defective installation of ⑨

Disassembly:

1. Remove the magnet clutch. (See Fig. 12.)
2. Unscrew ⑦, ⑯ ~ ⑰ to remove the assy parts of ① ~ ⑯.
3. Refer to Fig. 20 for disassembly of ① ~ ⑯.
4. Unscrew ⑭ to remove ⑮.
5. Remove ⑯ from ⑯, and unscrew ⑯ to remove ⑯.

Reassembly:

1. Replace if scratch and deformation are found in ③, ⑪ and ⑬.
2. Make sure that the rollers and connecting levers move smoothly.
3. Since the upper loop quantity is determined by the stroke of ⑮, install ⑧, so that ⑮ lightly touches ⑯.
4. Turn the knob main to OFF, and in case ⑩ has play at the top and bottom, press ④ and ⑤ in Fig. 20 in the direction of arrow mark, and adjust their fixing positions, so that there is no play in ⑩.
5. Turn the main knob slowly to “”, and adjust by sliding ⑨ left and right, so that the space between ④ and first sprocket is approximately 6 mm when ⑨ touches ⑯. (See Fig. 21)

\* Measurement of spring tension of ⑬: Turn the main knob to OFF, and take measurement at ④ point in Fig. 22 by using a bar spring scale (C043).

Standard value: 50 ~ 80 g

Adjustment: Adjust by turning ⑫.

Lever Guide Roller (4), Lever Middle Tension

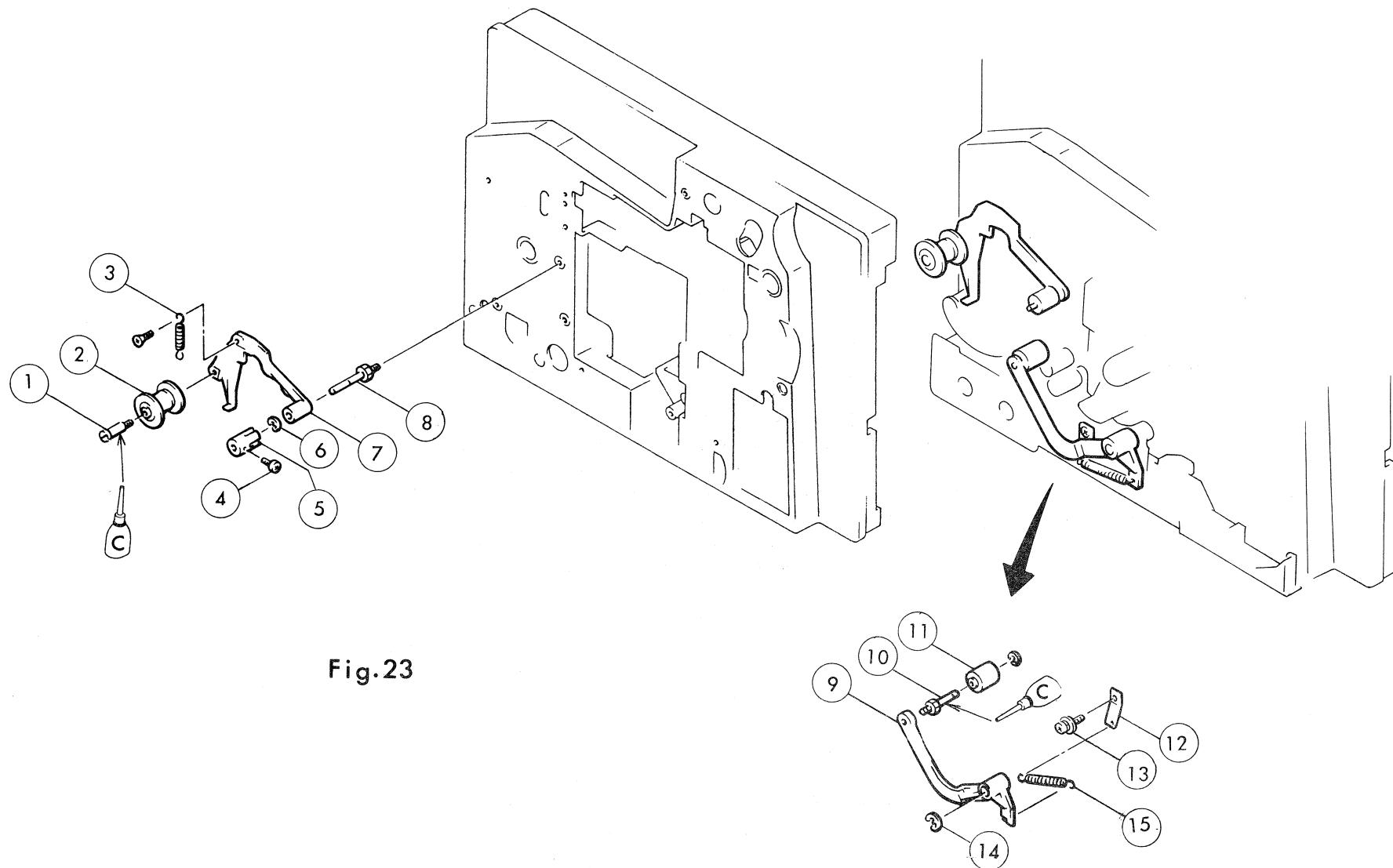


Fig.23

## Lever Guide Roller (4) and Lever Middle Tension

Troubleshooting hints:

Symptom	Cause
Film gets scratched.	Scratch and deformation of ②, improper spring tension of ③ and defective fixing position of ⑤.
Wow/flutter appears.	Improper spring tension of ⑯ scratch and irregular rotation of ⑪
Loop restorer fails to activate.	Improper spring tension of ⑮

Disassembly:

1. Unscrew ④ to remove ⑤.
2. Remove ③ from the base main body side, and remove ⑥ before removing ⑦.
3. Remove ⑯ from ⑬, and then remove ⑭.
4. Refer to Fig. 23 for further disassembly.

Reassembly:

1. Replace if scratch, etc. are found in ② and ⑪, and after installation see to it that ② and ⑪ have smooth rotation.  
\*Measurement of spring tension of ③: Take measurement at ⑧ point in Fig. 24 by using bar spring scale (C067).  
Standard value: 150 ~ 250 g
2. After adjustment, attach the 2000 ft metal reel to the take-up arm, pass the film, turn the knob main to " □ " position and adjust the fixing position of ⑤ for correct position so that hunting of ⑦ are not exceed 10 times.  
\*Measurement of spring tension of ⑮: Take measurement at ⑨ point in Fig. 24 by using bar spring scale (C043).  
Standard value: 30 ~ 70 g
3. After adjustment, transfer the film and make sure that the magnetic and optical loop restorers activate.

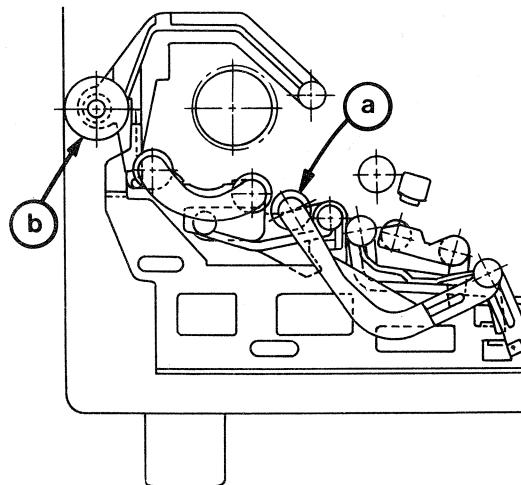


Fig.24

Link (1), Pad Roller Assy, Guide Roller (3) and Lever (2) Second Sprocket

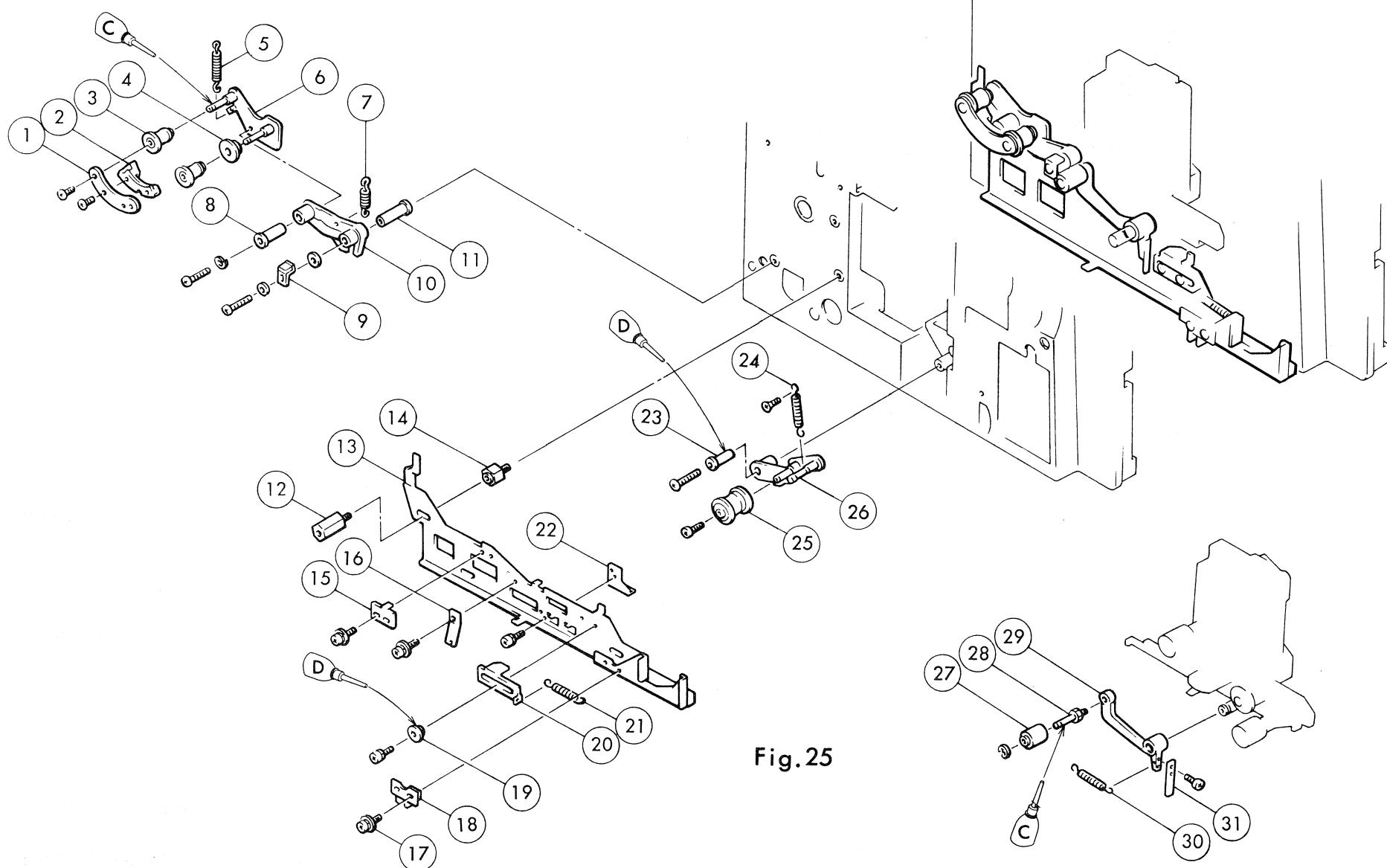


Fig. 25

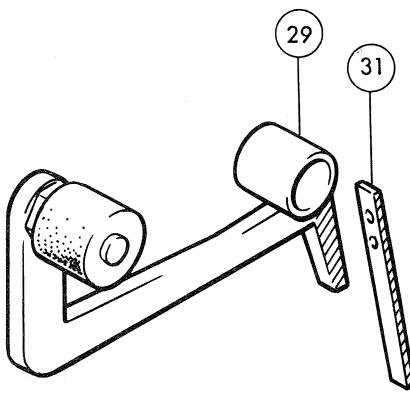


Fig.26

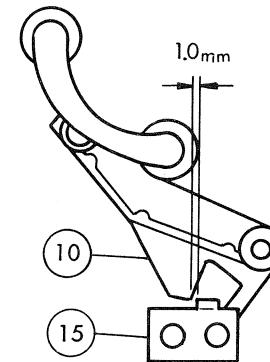


Fig.27

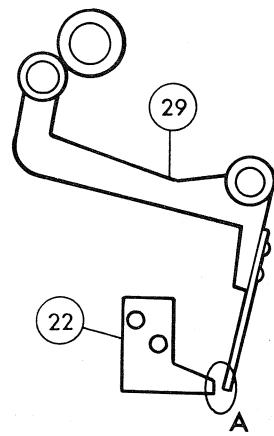


Fig.28

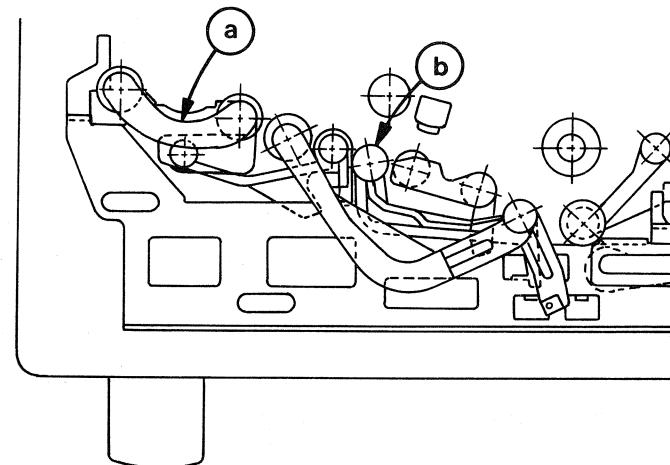


Fig.29

Link (1), Pad Roller Assy, Guide Roller (3) and Lever (2) Second Sprocket

Troubleshooting hints:

Symptom	Cause
Small lower loop	Defective installation of ②, ⑯, ⑰ or ⑲, inadequate spring tension of ⑦
Small upper loop	Defective fixing position of ⑯
Large wow/flutter	Scratch and stain of ⑦, defective fixing position of ⑲ and inadequate spring tension of ⑳
Film gets scratched.	Scratch and deformation of ③ and ⑮
Defective optical sound at replay	Defective fixing position of ⑨ and defective rotation of ⑦

Disassembly:

1. Remove the lever middle tension. (See Fig. 23.)
2. Take out ⑫ before removing the ⑬ assy parts and then the ⑯ assy parts.
3. Refer to Fig. 25 for disassembly of ⑬ and ⑯.
4. Unscrew ⑭ to remove the ⑮ assy parts.
5. Remove ⑤ and ⑦ from the base main body before removing the ⑩ assy parts.
6. Refer to Fig. 25 for further disassembly.

Reassembly:

1. Thoroughly wipe off or replace if scratch, stain, deformation, etc. are found in ③, ⑮ and ⑦; after installation make sure that they have smooth rotation.
2. Install ⑯ and ⑪, so that the oblique sections lie on the same plane. (See Fig. 26.)
3. Install ① and ② assy parts by pushing them downward.
4. After installing ⑩, ⑮ and ⑯, install ⑬ by pushing it rightward.
5. Install ⑮ to a position, with the knob main set to “  ” so that the gap between ⑮ and ⑩ is approximately 1 mm. (See Fig. 27.)
6. After brake roller (3) assy (Fig. 33-12) contacts with brake roller (2) assy (Fig. 33-14), install ⑲ so that shaft flywheel assy (Fig. 33-1) comes in contact with ⑯. After adjustment, make sure that there is a gap as shown in Fig. 28A.
7. Install ⑳ by turning ⑯, so that ⑮ comes at the lowest position when the knob main is set to OFF.
8. See to it that ⑳ activates smoothly due to the spring tension of ⑪.

9. After carrying out the above adjustments, measure the spring tension of ⑦ and ⑩. (See Fig. 31.)

\* Measurement of ⑦ spring tension: Set the knob main to “  ”, and measure the tension at ⑨ point with a bar spring scale.

Standard value: 300 ~ 400 g

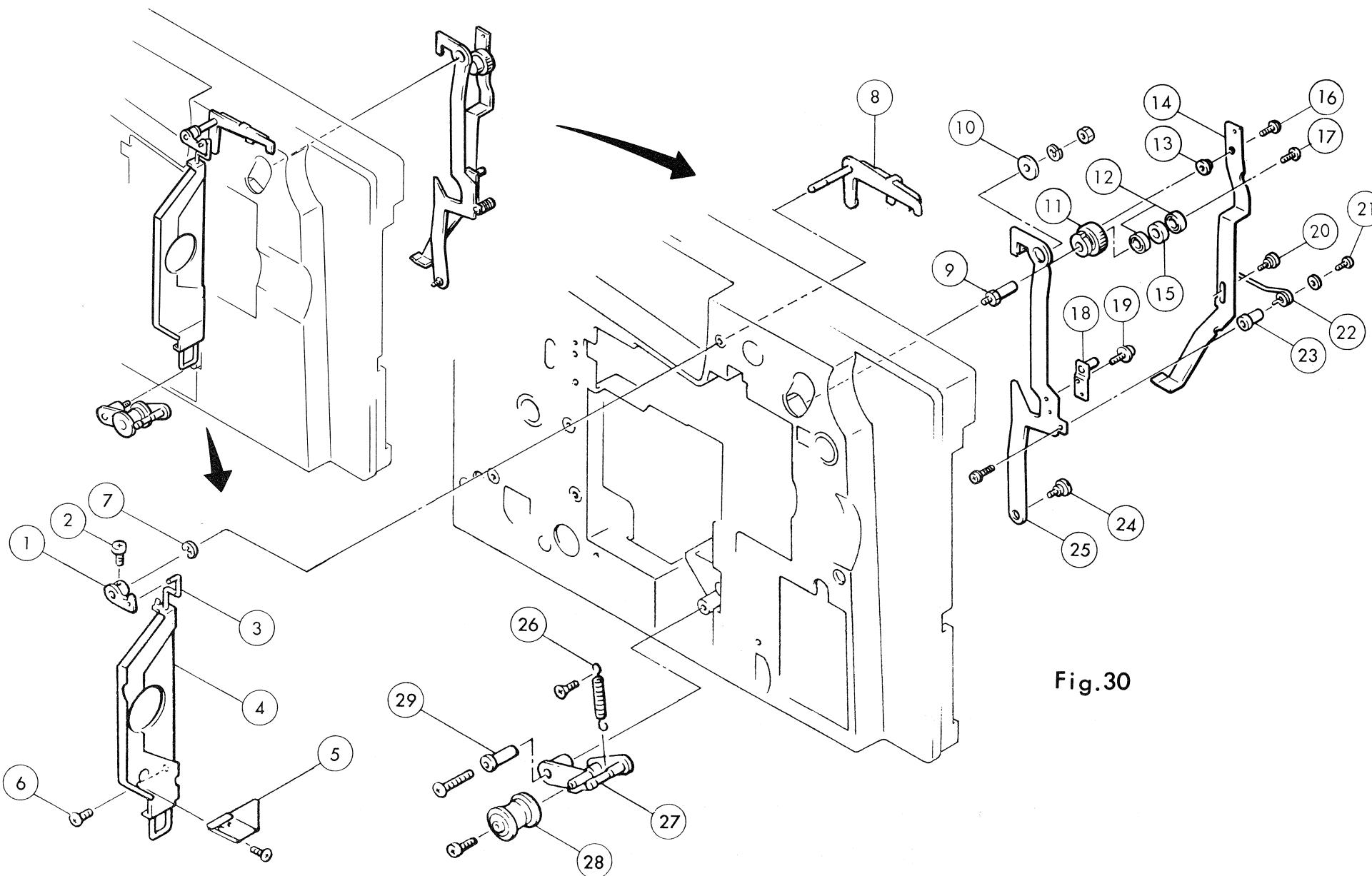
Measurement of ⑩ spring tension: Set the knob main to “  ”, and measure the tension at ⑩ point with a bar spring scale.

Standard value: 200 ~ 300 g

10. Pass the film, set the knob main to “  ”, and adjust the fixing position of ⑨, so that the film may not touch the cover photodiode and the film guide sound lens.

IV - 7 Loop Setter Section

Friction Wheel (2) and Link (2) Loop Setter



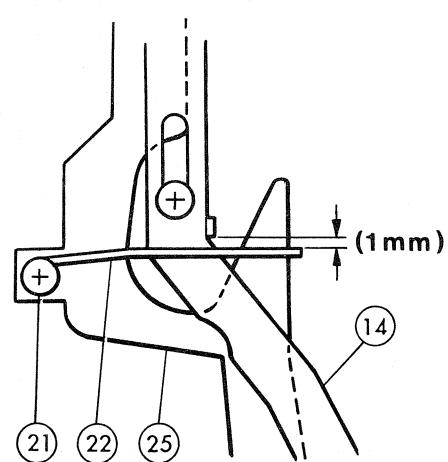


Fig.31

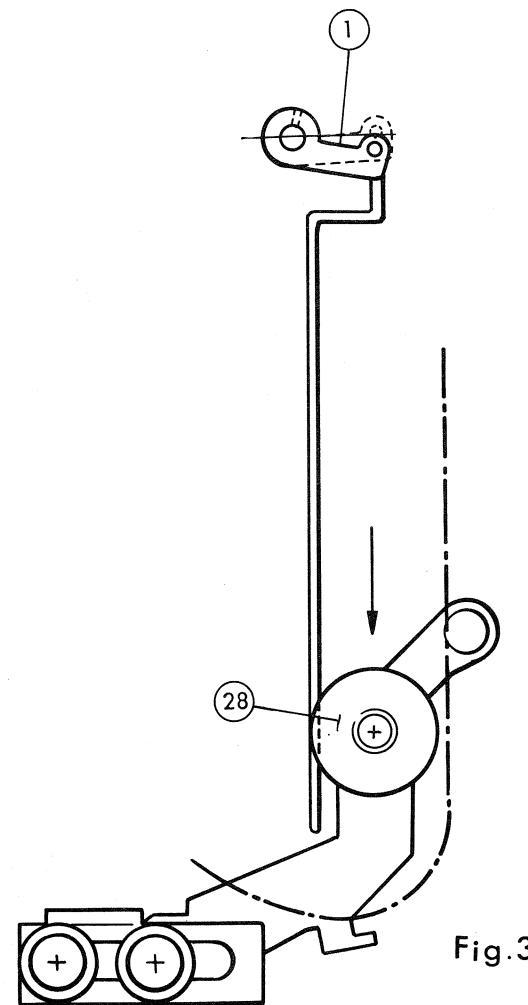


Fig.32

Friction Wheel (2) and Link (2) Loop Setter

Troubleshooting hints:

Symptom	Cause
Loop restorer fails to activate	Misadjustment of ①, excessively high spring tension of ② and defective fixing position of ⑦
Loop restorer keeps on functioning.	Misadjustment of ① and malfunction of ⑧
Lower loop is too small.	Inadequate spring tension of ②
Film flows and can not be set.	Misadjustment of ⑬

Disassembly:

1. Remove the film feed section. (See Fig. 5.)
2. Remove the motor assy parts. (See Fig. 17.)
3. Unscrew ⑪ to remove ⑫ and ⑬.
4. Remove ⑯ and ⑰ to remove ⑭.
5. Unscrew ⑩, ⑪ and ⑫ to remove ⑪ and ⑫.
6. Remove ⑮.
7. Loosen ⑨ and remove ① from ⑧.
8. Unscrew ⑥ to remove ④ from the base main body.
9. Unscrew ⑦ to pull out ⑧.
10. Refer to Fig. 31 for further disassembly.

Reassembly:

1. Thoroughly wipe off the oil from ⑪ before installing.
2. Install ⑮, so that it has a little "play" with the lever (2) claw escape (Fig. 6) when the projector is set to ON, but keeps the lever claw release thoroughly pressed when the projector is set to OFF or REWIND.
3. Adjust ⑫ by turning ⑬ so as to allow a gap of 1 mm as shown in Fig. 31. Furthermore, turn on the loop restorer several times to make sure that the position of ⑫ does not have a big change.
4. Pass the film, making the lower loop shorter frame by frame, and install ①, so that the film touches the roller in Fig. 32, then touches the bottom of ③ before the roller rotates, causing the loop restorer to activate. Furthermore, in case the loop restorer fails to activate, with the film touching ⑧ and producing the vibrating sound, make gear alignment by rotating the second sprocket (Fig. 15).

\* Measurement of spring tension of ②: Refer to Fig. 31, and measure the tension by using the bar spring scale (C043).  
Standard value: 20 ~ 60 g

5. After adjustment, make sure that the following conditions are duly met with.
  - 1) No change shall be observed in the loop when sled → FORWARD, rewind in path → FORWARD, OFF → FORWARD operations are carried out by using reels of different sizes.
  - 2) Loop shall not get reduced even when feeding the film with 2 perforations missing.
  - 3) Loop shall not get reduced at the film joint.
  - 4) Loop shall get restored by less than 2-time activation of the loop restorer when the film, with one or two perforations missing, is forwarded.

IV - 8 Flywheel Section

Shaft Flywheel Assy, Flywheel and Brake Roller

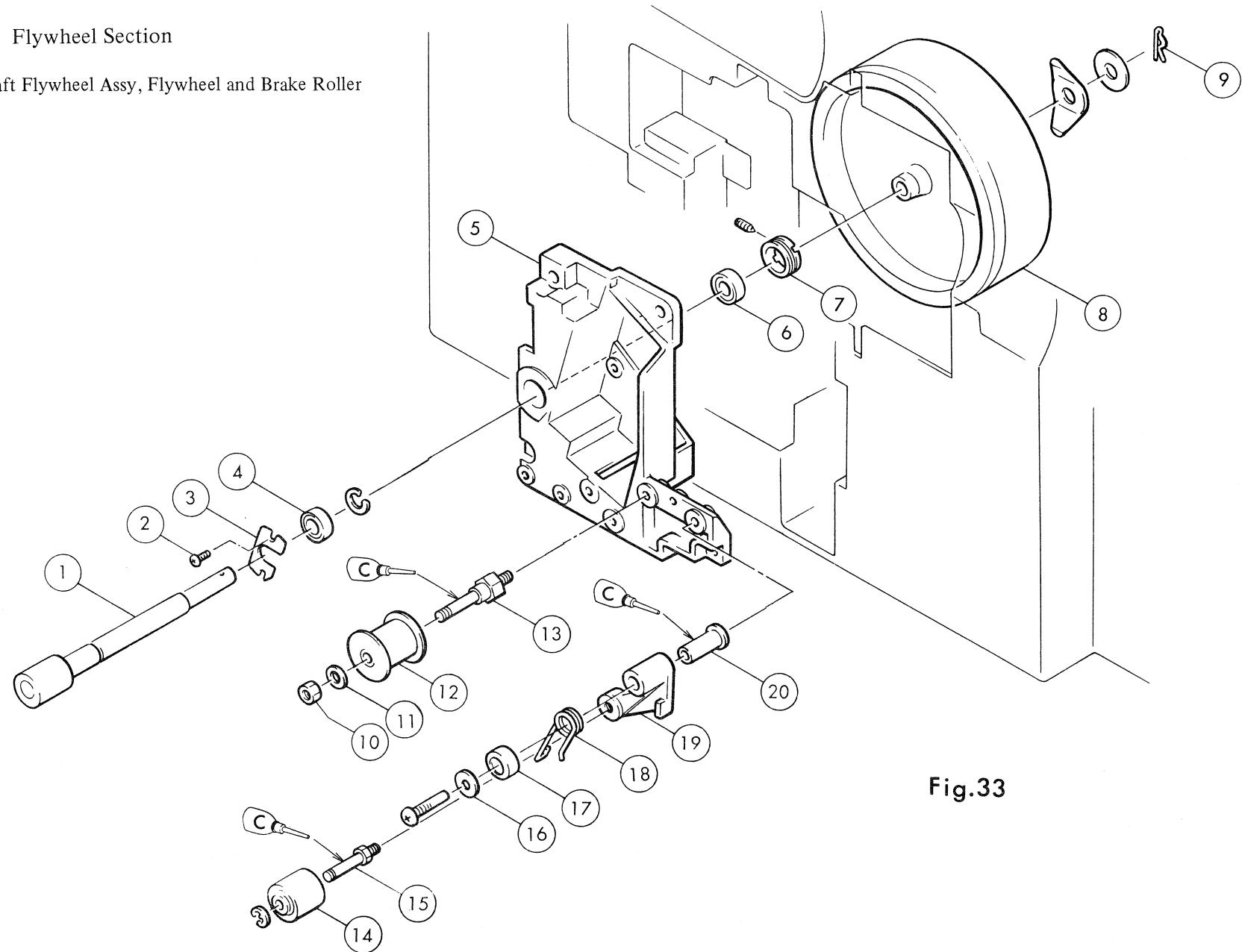


Fig.33

## Shaft Flywheel Assy, Flywheel and Brake Roller

Troubleshooting hints:

Symptom	Cause
Excessively large wow/flutter	Rotation of ①, ④, ⑥ and ⑫ not smooth, deflection of ①
Film gets scratched.	Scratch in ①, ⑫ and ⑭

Disassembly:

1. Refer to Fig. 33 for disassembly of ⑫ and ⑭.
2. Take out ⑨ to pull out ⑧.
3. Unscrew ② and remove ③ before pulling out ①.

Reassembly:

1. Make sure that ①, ⑫ and ⑭ have no scratches and that ④ and ⑥ have normal rotation before carrying out reassembly in the reverse order of disassembly.
2. Install ① to a position with minimum thrust, and tighten with ⑦ before fixing with the stop screw of ⑦.
3. The ⑫ not only retains the film traveling position in the sound PC board, but also works as the impedance roller. Hence, take utmost care when adjusting the fixing position of ⑫, keeping in mind that improper setting leads to unstable traveling of the film and directly causes deterioration in wow/flutter and other characteristics.
  - Make adjustment, so that the space between the base frame surface (t) in Fig. 34 and the film perforation side surface is 27 mm. (See Fig. 34)
  - Replay the SMPTE P16-BT, then loosen ⑧ and ⑩ in Fig. 37, and move ⑨ back and forth to find a position where both the low-sound zone and high-sound zone sounds are inaudible, before fixing the ⑨ at that position.
  - The film to be used is recorded as shown in Fig. 35.
4. After reassembly, make sure that ① has no left-right or back-forth play and has smooth rotation.

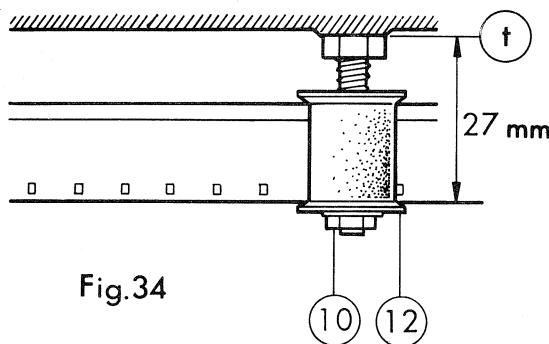


Fig.34

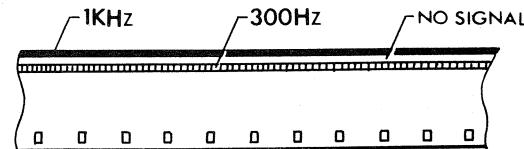


Fig.35

Pad Roller Assy, Sound Head and Sound Lens Assy

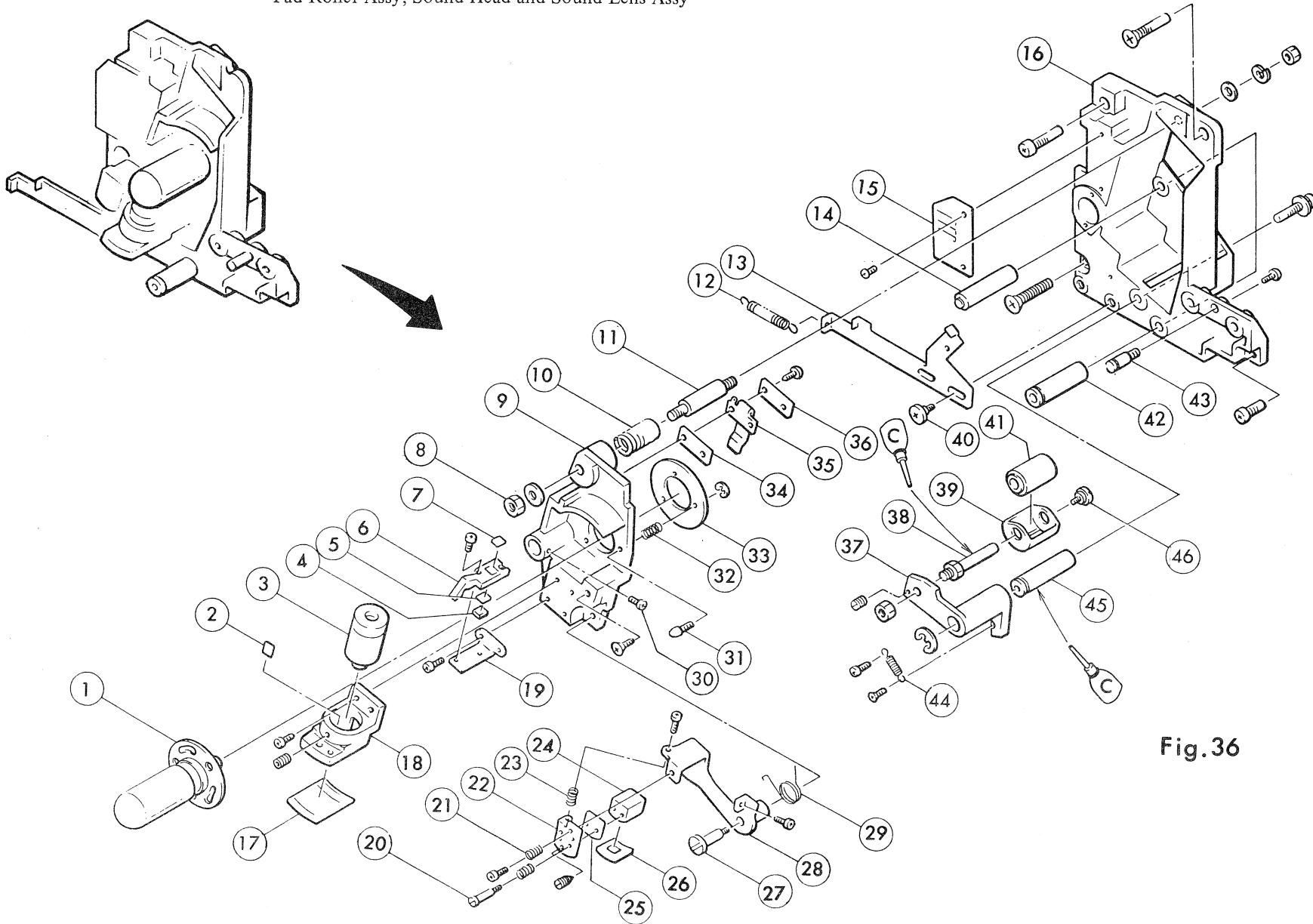


Fig.36

Pad Roller Assy, Sound Head and Sound Lens Assy

Troubleshooting hints:

Symptom	Cause
Excessively large wow/flutter	Defective rotation of ④①
Optical sound is not reproduced or is inadequate.	Disconnection of ① and ⑤, misadjusted position and stain of ③, and dust (stain) of ⑦
Exciter lamp fails to light up.	Defective contact of ③⑤
Magnetic sound is not reproduced or is defective.	Disconnection of ⑯ and ⑭, misadjustment of ⑭ position and defective rotation of ④①
Bad S/N ratio	Defective fixing position of ⑯ and ⑩⑧

Disassembly:

1. Pad roller assy ④①
  - 1) Remove the lever middle tension. (See Fig. 26.)
  - 2) Remove the link ①. (See Fig. 28.)
  - 3) Remove the lever pressure roller.
  - 4) Refer to Fig. 36 for further disassembly.
2. Sound head ⑭
  - 1) Remove the 2 pieces of lead wires extending out of ⑯.
  - 2) Remove the ⑬ assy part and ⑰ to remove ⑱. In this case both optical and magnetic adjustments are necessary after reassembly.
3. Silicon photodiode ⑤
  - 1) Take out ⑲ and remove the 2 pieces of lead wires extending out of ⑯.
  - 2) Refer to Fig. 37 for further disassembly.
4. Exciter lamp
  - 1) Remove the rear cover to remove the flywheel. (See Fig. 33.)
  - 2) Refer to Fig. 36 for further disassembly.

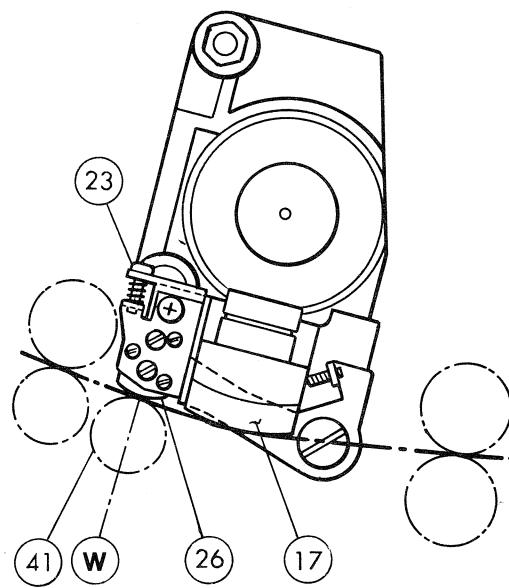


Fig.37

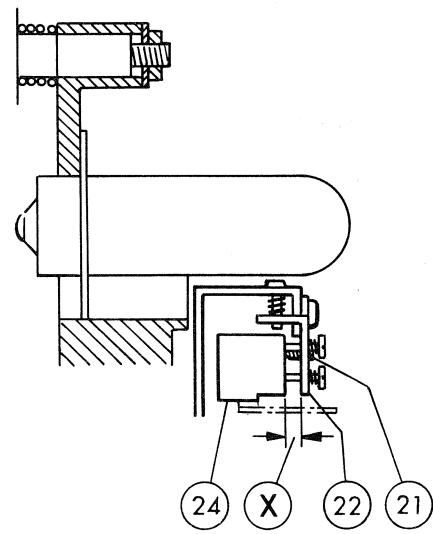


Fig.38

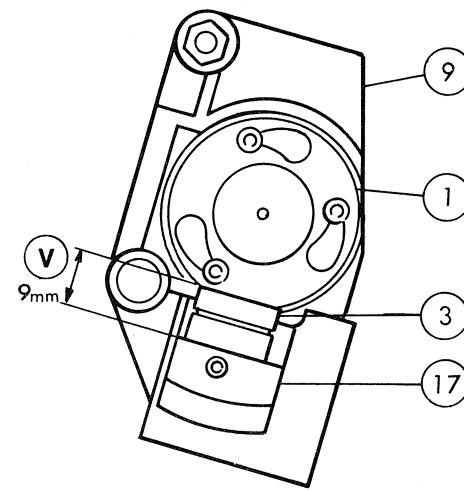
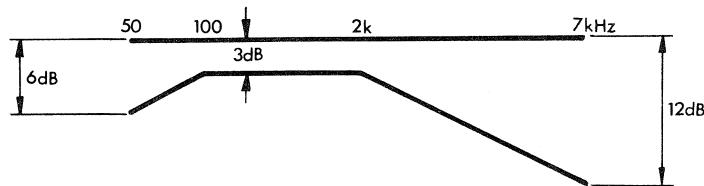


Fig.39

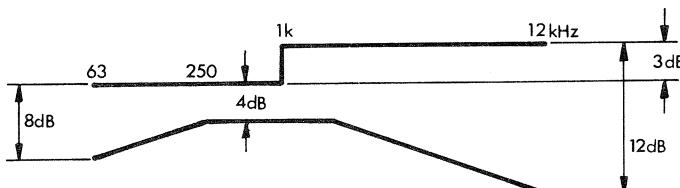
- Reassembly:
1. Pad roller assy ⑪
    - 1) Refer to Fig. 37, and carry out reassembly in the reverse order of disassembly.
    - 2) Make sure that ⑪ has no scratch, irregularity, etc., and rotates smoothly.
    - 3) Turn ⑩ slightly, and fix where the S/N ratio is minimum.
    - 4) Adjust the spring tension of ⑫ to 20 g (by using 30 g dial tension gauge, CO62.)
  2. Sound head ⑭
    - 1) Carry out reassembly in the reverse order of disassembly.
    - 2) Adjust the extension allowance of ⑬ in Fig. 37, so that the ⑬ extends approximately 2.5 mm towards ⑩ from the imaginary film traveling line obtained by connecting ⑯ to guide roller with a straight line.
    - 3) Adjust ⑮, so that its center lies on the center line of ⑪.
    - 4) Make adjustment, so that the gap between ⑪ and ⑭ is approximately 2.5 mm. (See Fig. 38.)
    - 5) After adjustments in items 2) ~ 4), use the standard films, SMPTE P16-SL and DIN 16/EBU, to find a position where the audio output level is  $800 \text{ mV} \pm 6 \text{ dB}$ , and then fix.
  3. Silicon photodiode ⑤ and sound lens ③
    - 1) Make sure that ③ and ⑦ are not stained with oil, etc. before carrying out reassembly in the reverse order of disassembly.
    - 2) Extend ③ approximately 9 mm from ⑧, and fix temporarily. (See Fig. 39.)
    - 3) After temporary fixing, use the standard films, SMPTE P16-SL and DIN 16/EBU to find a position where the audio output level is  $800 \text{ mV} \pm 6 \text{ dB}$ , and then fix.
  4. Exciter lamp  
See to it that the noise due to vibration of exciter lamp is not so high as to give harm in practical use.

Measurement of sound characteristics

1. Picture-sound spacing: Shall comply with JIS B7164; optical (with scanned light preceding):  $26^{+0.5}_{-1.0}$   
magnetic (with head cap preceding):  $28^{+0.5}_{-1.0}$
2. Buzz tracking: The signal sound levels of low-sound zone and high-sound zone shall be equal, with the level difference with SMPTE P16-SL being 40 dB.  
Film to be used: SMPTE P16-BT or P16-SL  
Measuring instrument: AC voltage meter and oscilloscope
3. Optical replay frequency characteristic: The output signal, with the film membrane facing towards light receiving element for replay, shall lie within the range shown in the Fig. below.  
Film to be used: SMPTE P16-MF  
Measuring instrument: Distortion factor meter



4. Magnetic replay frequency characteristic: The output signal when DIN calibration film 16/EBU (made by BASF) is used for replay shall be within the range shown in the Fig. below.  
Measuring instrument: Distortion factor meter (Film used in ELMO: SMPTE signal level test film)



5. High-frequency distortion factor

Optical replay: The signal output of SMPTE P16-SL test film shall have the high-frequency distortion factor below 4.5%.

Measuring instrument: Distortion factor meter

Magnetic replay: The high-frequency distortion factor when standard level signal of DIN calibration film 16/EBU is replayed is below 3.5%.

Measuring instrument: Distortion factor meter

6. S/N ratio (both optical and magnetic): The level against the replayed level and the noise output signal of 400 Hz (when the projector is set to FORWARD) shall be over 45 dB. (The measurement shall be made through A.W.N. circuit)

Film to be used: (Optical) .... SMPTE P16-SL

(Magnetic) ... DIN 16/EBU

Measuring instrument: Distortion factor meter

7. Wow/flutter: It shall be below 0.25% at JIS WEIGHTED.

Film to be used: P16-FL

Measuring instrument: Wow/flutter meter

8. Audio output level: It shall be  $800 \text{ mV} \pm 6 \text{ dB}$ .

Film to be used: Standard films, SMPTE P16-SL and DIN 16/EBU

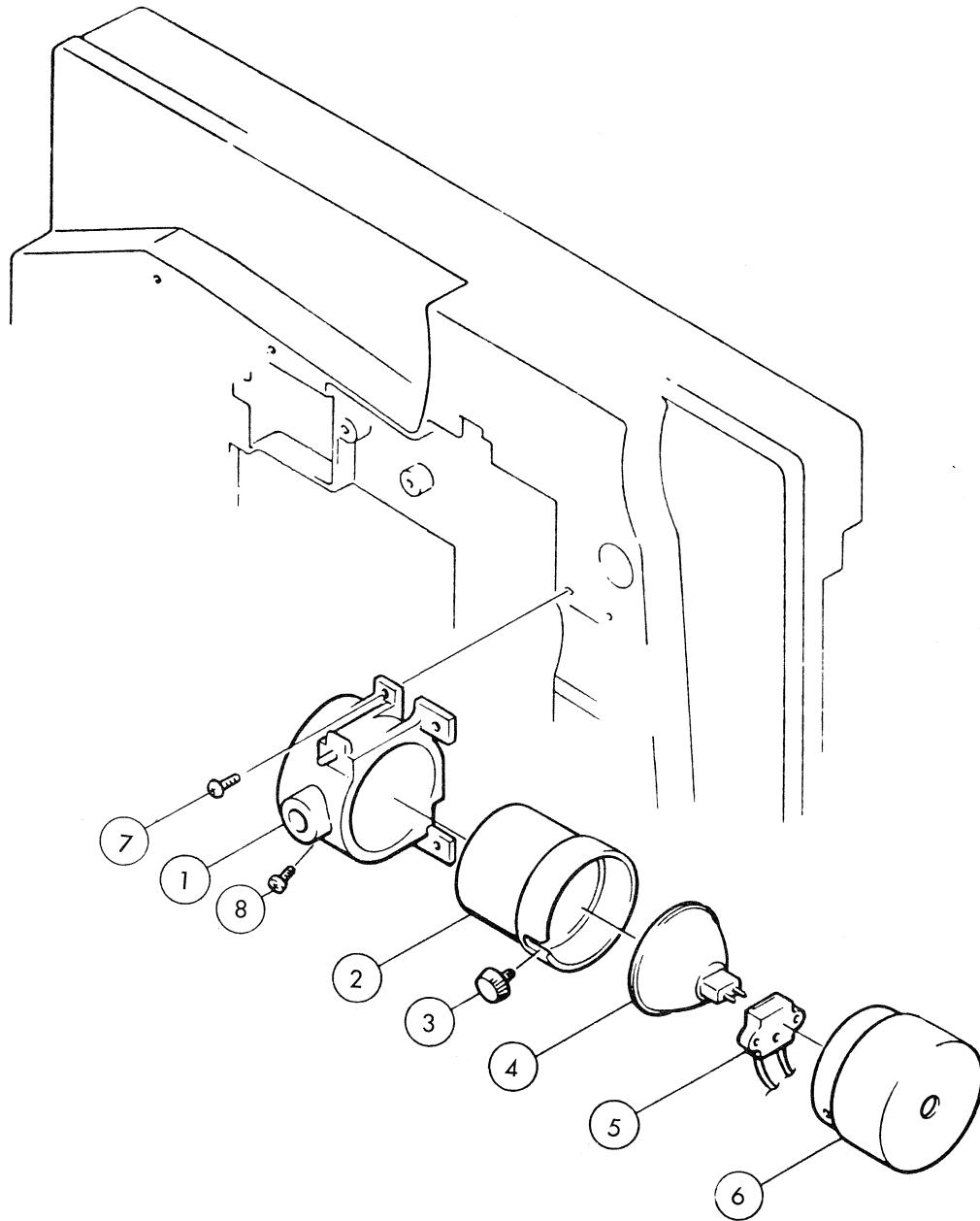
Measuring instrument: AC Voltage meter and oscilloscope

9. Hearing sense (acuity) test: Carry out test by replaying SMPTE P16-PP to make sure that the acuity is satisfactory, taking due care of distortion, sound tone, hum and noise.

IV - 9 Lamp Section

Lamp and Holder (1) Lamp

Fig.40



## Lamp and Holder (1) Lamp

Troubleshooting hints:

Symptom	Cause
Lamp fails to light up.	Defective ④ and ⑤
Lamp brightness is low.	Stained ④, defective fixing position of ②, ④ and ①

Disassembly:

1. Loosen ③, pull out ⑥ and remove ④ and ⑤.
2. Unscrew ⑧ to pull out ②, and loosen ⑦ to remove ① from base main body.

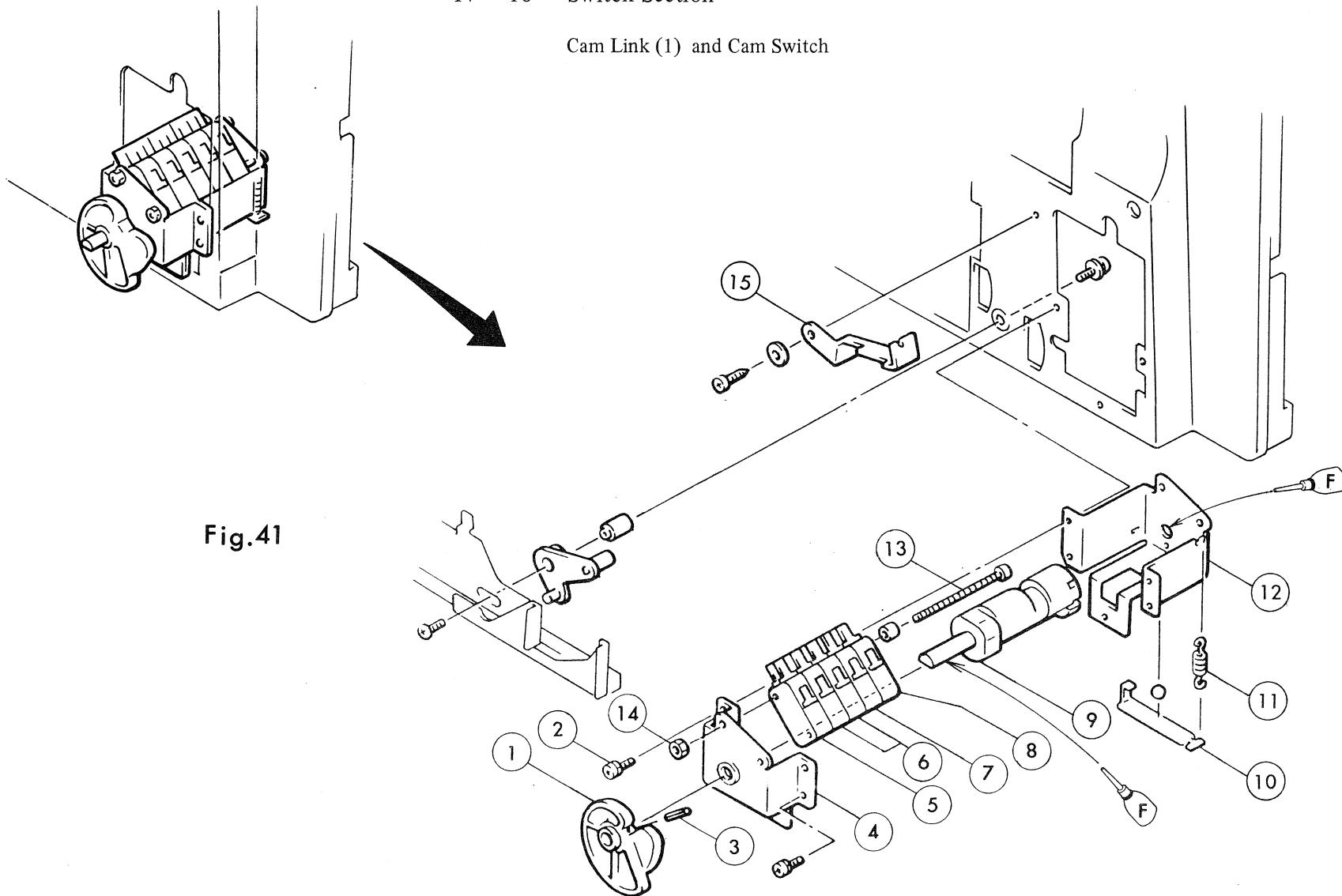
Reassembly:

1. Reassembly by passing the cord of ⑤ through notch of ⑥.
2. Make sure that reflecting surface of ④ and the bulb have no stain, etc., and preferably refrain from touching the lamp during reassembly.
3. Pass ③ through the notch of ②, and tighten with stop screw ⑥.

\* In order to replace the lamp, loosen ③ to pull out ⑥, then take out ④ and ⑤, and remove ④. Insert the new ④ into ⑤, and carry out reassembly in the reverse order of disassembly.

IV – 10 Switch Section

Cam Link (1) and Cam Switch



Cam Link (1) and Cam Switch

Troubleshooting hints:

Symptom	Cause
Motor fails to turn or stop.	Defective connection of ⑦ or/and defective ⑦
Failure in change-over for FORWARD -REWIND	Defective fixing angle of ① and ⑨
Projection lamp fails to light up.	Defective connection of ⑧ or/and defective ⑧, defective fixing angle of ① and ⑨
Amplifier and magnet clutch fail to activate.	Defective ⑦ or defective connection of ⑦, and defective fixing angle of ① and ⑨

Disassembly:

1. Unscrew ⑯, and remove the lead wires connected to ⑤ ~ ⑧.
2. Remove ① assy parts from base main body.
3. Pull out ③ and remove ①.
4. Refer to Fig. 41 for further disassembly.

Reassembly:

1. Apply molybdenum grease to the sliding sections of ④, ⑨ and ②, and to the contact surfaces of ⑤ ~ ⑧ and ⑨.
2. Make adjustment, so that when ⑨ is set to FORWARD, the ⑤, ⑥ and ⑦ switches get pressed, and when ⑨ is set to REWIND, the switches other than ⑦ get pressed.
3. Carry out further reassembly in the reverse order of disassembly.
4. Make connections to the switches firmly, referring to the "Connecting Diagram for Machine."

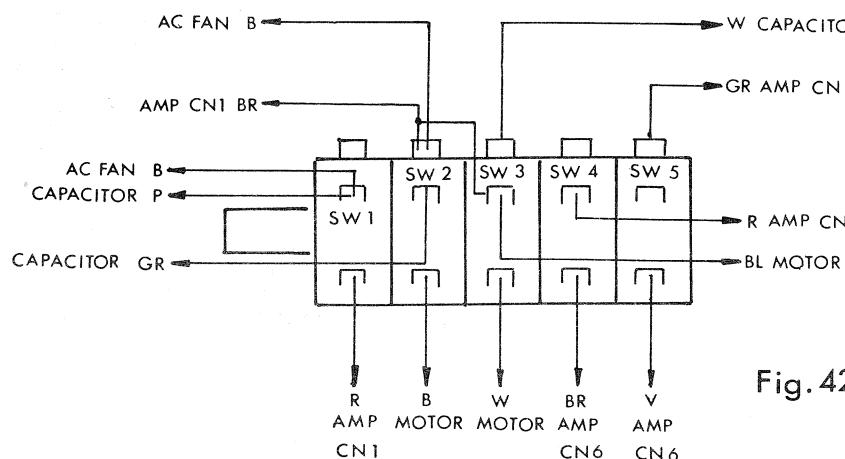
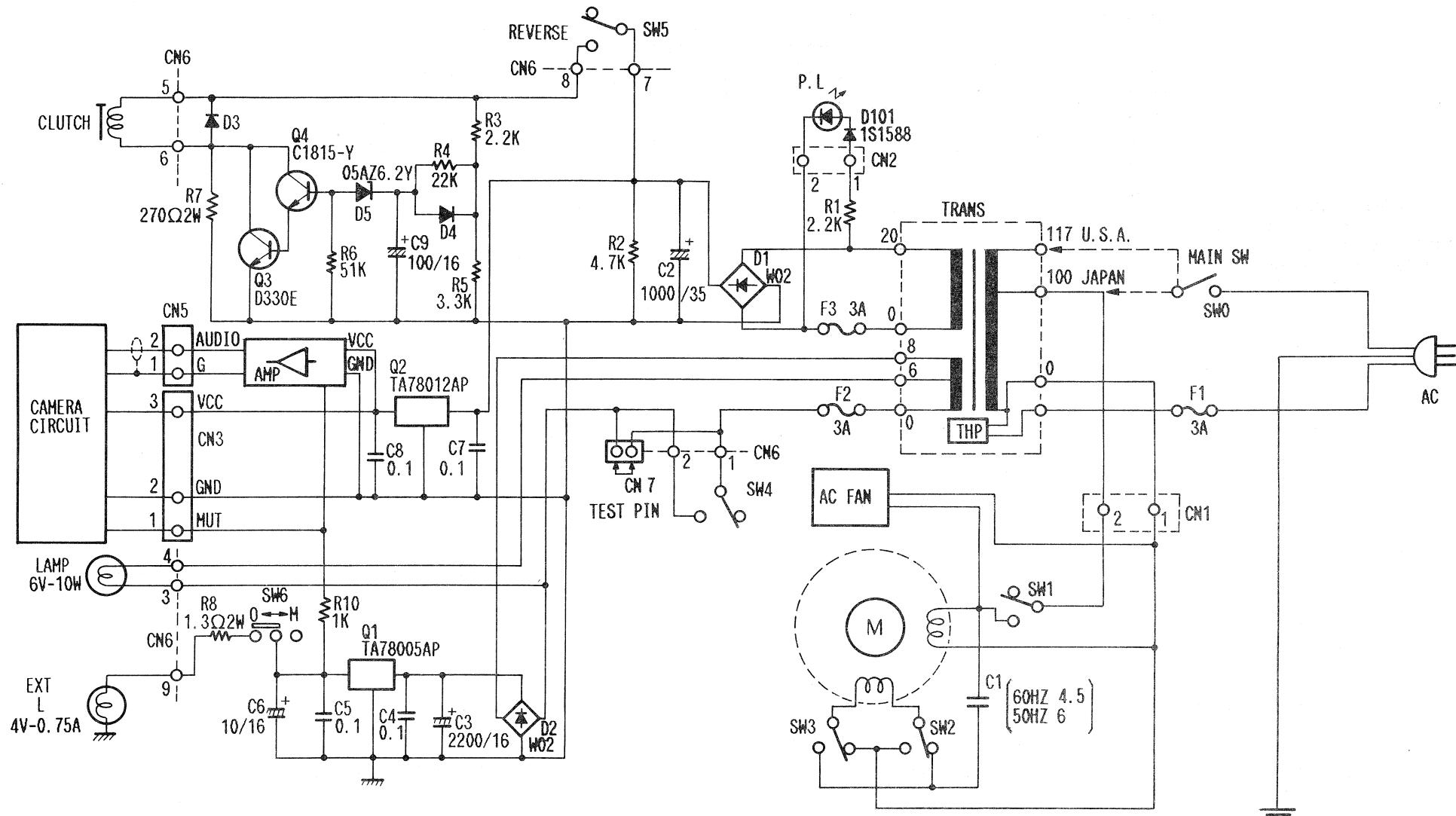


Fig. 42

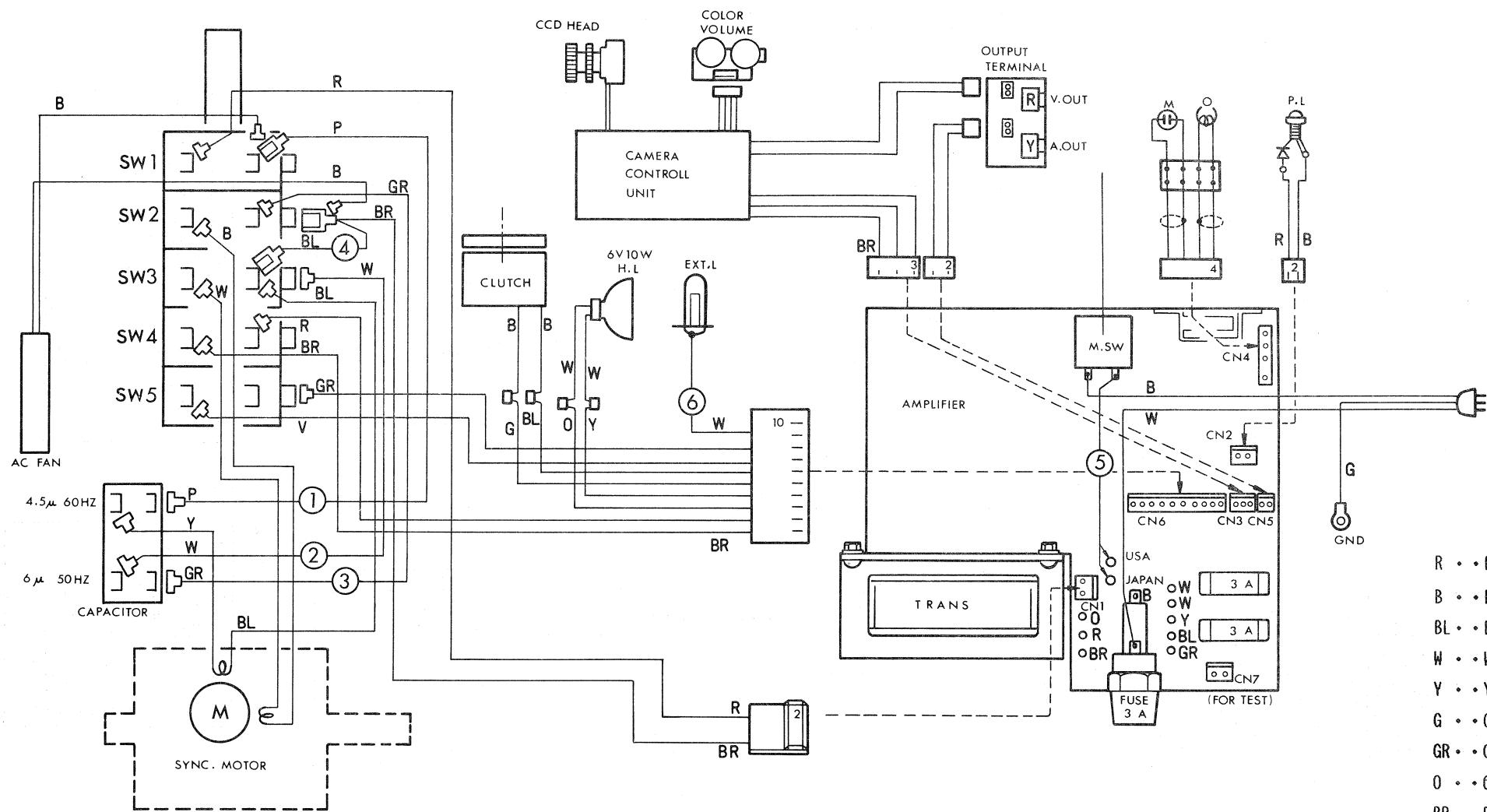
SW1 : MOTOR ON  
 SW2 : MOTOR FORWARD/REWIND  
 SW3 : MOTOR FORWARD/REWIND  
 SW4 : IMAGE ON  
 SW5 : REWIND CLUTCH

R .. RED  
 B .. BLACK  
 BI .. BLUE  
 W .. WHITE  
 Y .. YELLOW  
 G .. GREEN  
 GR .. GRAY  
 O .. ORANGE  
 BR .. BROWN  
 V .. VIOLET  
 P .. PINK

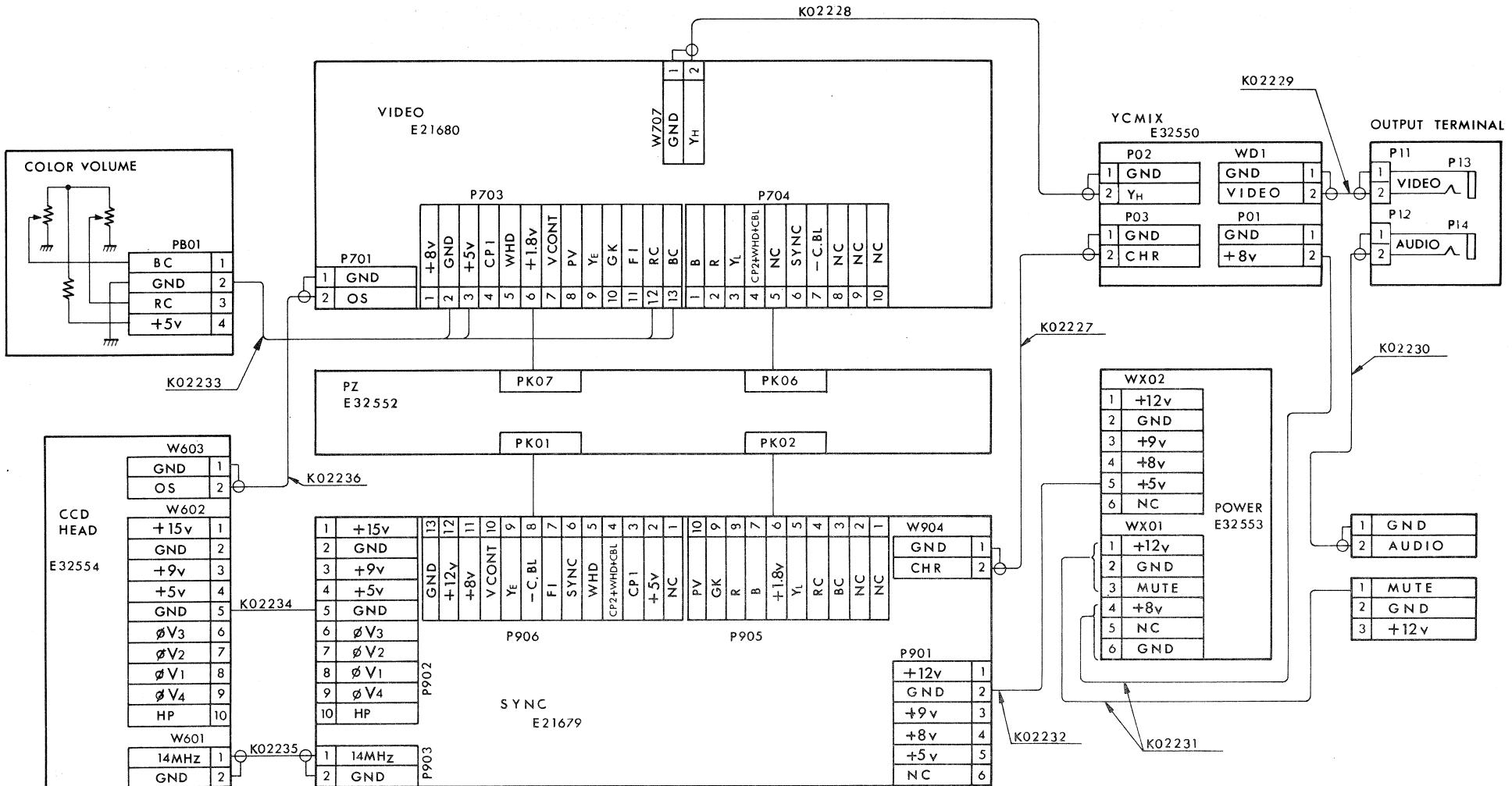
## V. DIAGRAMS



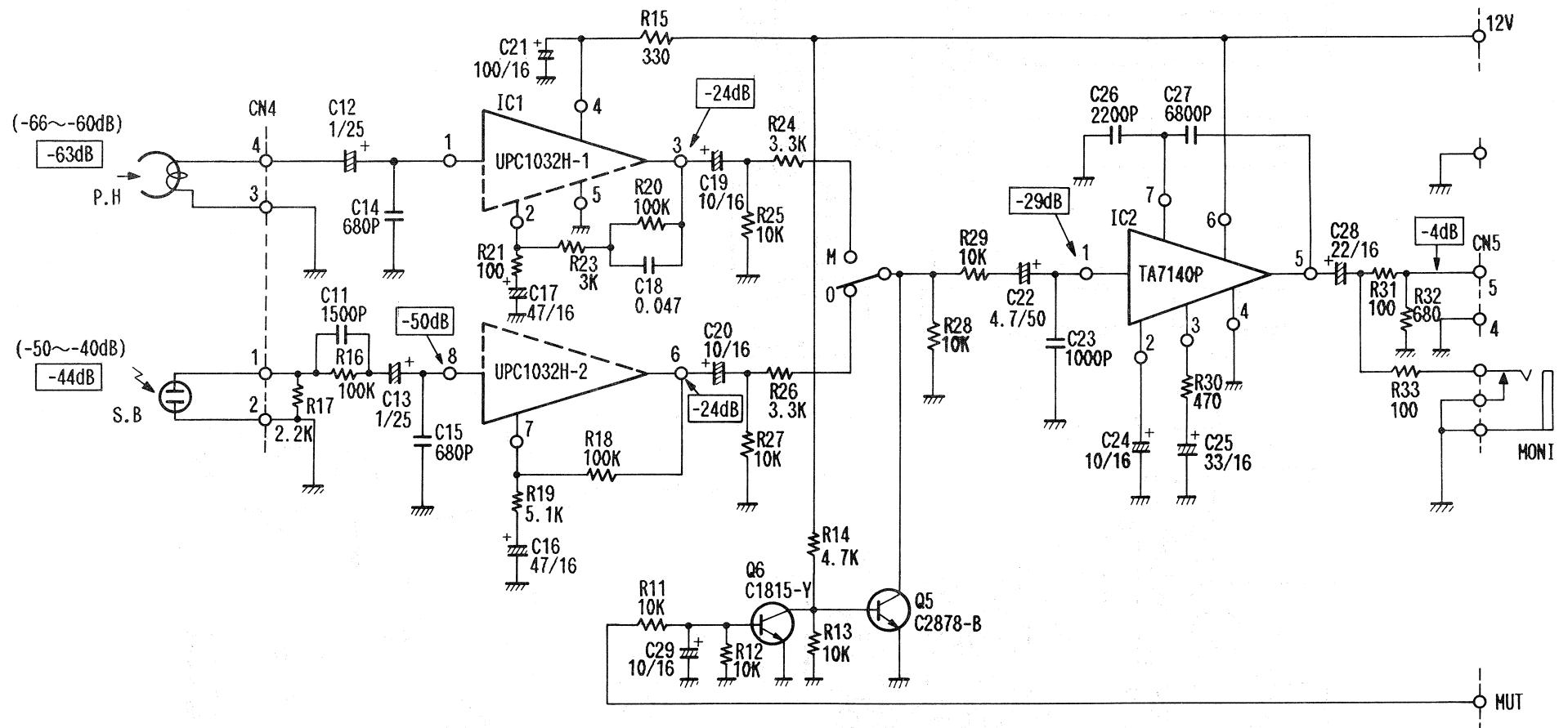
V- 1 SCHEMATIC DIAGRAM FOR MACHINE



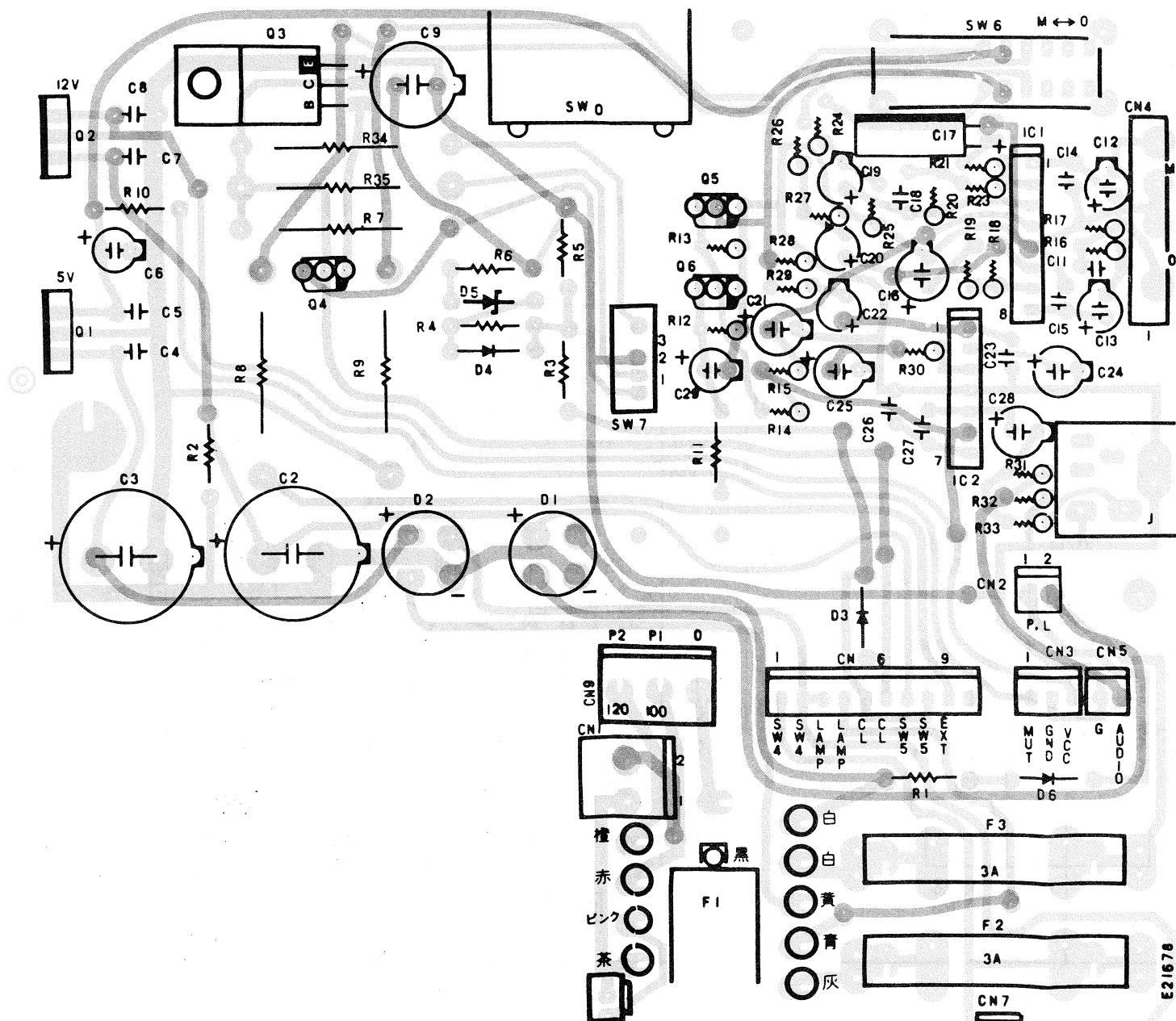
V-2 CONNECTING DIAGRAM FOR MACHINE (E44114)



V- 3 CONNECTING DIAGRAM FOR CCD CAMERE (E32551)



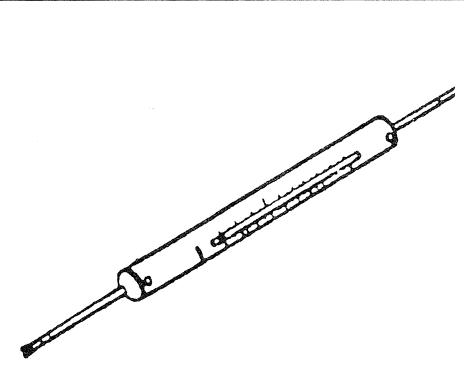
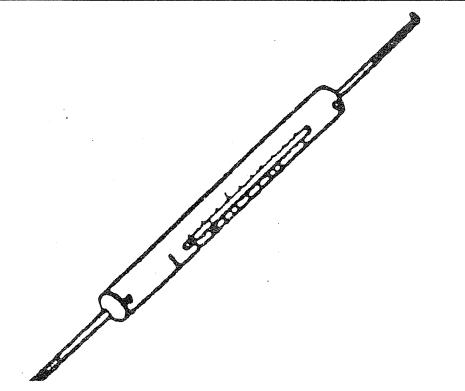
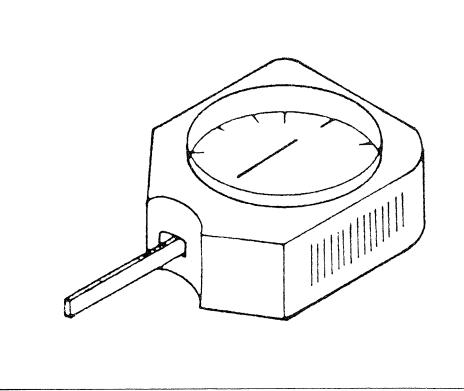
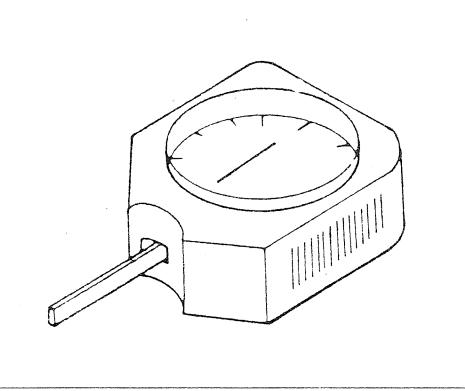
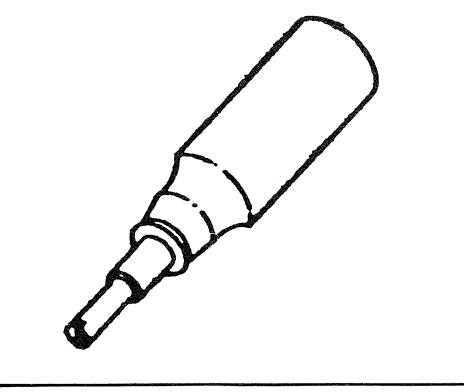
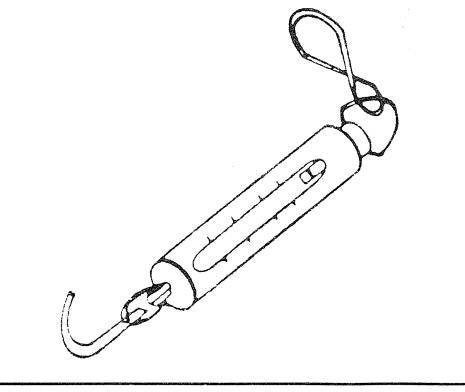
V- 4 SCHEMATIC DIAGRAM FOR AMPLIFIER (E44112)

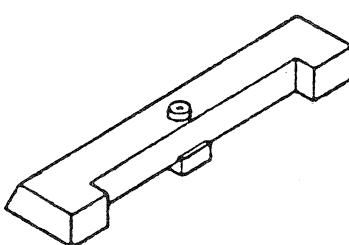
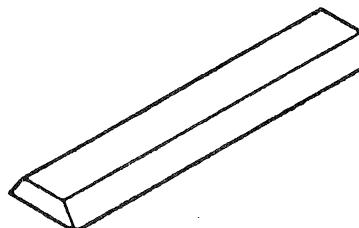
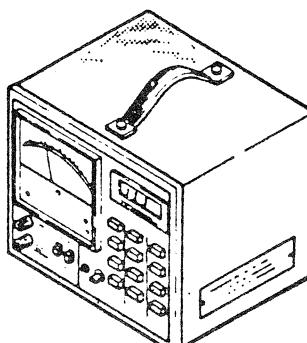
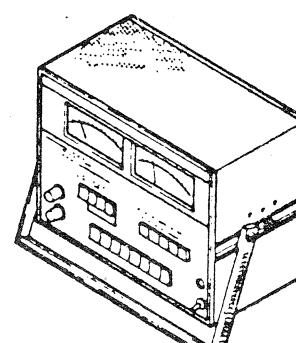
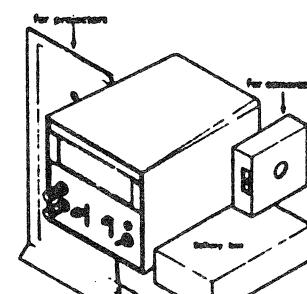
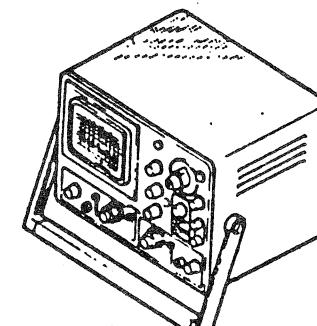


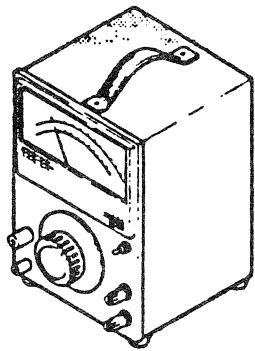
V- 5 LAYOUT DIAGRAM FOR AMPLIFIER

## VI. TESTING INSTRUMENTS AND TOOLS

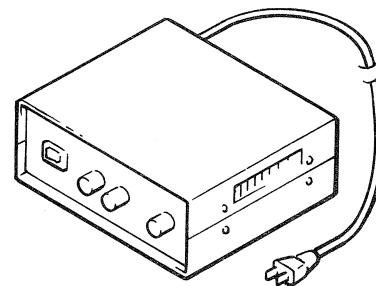
### VI – 1 Testing Instrument and Tools

	<p>Code No. : C043          Name : Bar Spring Scale          110 g          Use : to measure the          spring pressure          Page : 64, 66, 75          Weight : 40 g          Dimensions : 10 dia. x 280 mm</p>		<p>Code No. : C067          Name : Bar Spring Scale          500 g          Use : to measure the          spring pressure          Page : 68, 72          Weight : 40 g          Dimensions : 10 dia. x 280 mm</p>
	<p>Code No. : C062          Name : Dial Tension Gauge          30 g          Use : to measure the          spring pressure          Page : 74          Weight : 60 g          Dimensions : 20 x 48 x 90 mm</p>		<p>Code No. : C063          Name : Dial Tension Gauge          100 g          Use : to measure the          spring pressure          Page : 52, 70          Weight : 60 g          Dimensions : 20 x 48 x 90 mm</p>
	<p>Code No. : P028          Name : Screw driver for          film side presser          Use : to adjust film side          presser          Page : 43          Weight : 50 g          Dimensions : 24 dia x 130 mm</p>		<p>Code No. : P048          Name : Bar Spring Scale          1 Kg          Use : to measure the          spring pressure          Page : 40, 44          Weight : 110 g          Dimensions : 37 dia. x 180 mm</p>

	<p>Code No. : P087 Name : Lateral Guide Attach Gauge Use : to attach the film guide (1) Page : 51 Weight : 35 g Dimensions : 65 x 15.5 x 6.5 mm</p> 	<p>Code No. : P088 Name : Fixed Guide Attach Gauge Use : to attach the fixed guide Page : 51 Weight : 60 g Dimensions : 71 x 16 x 4.5 mm</p>
	<p>Code No. : P083 Name : Wow/Flutter Meter Use : to measure wow and flutter Page : 77 Weight : 5.5 kg Dimensions : 200 x 160 x 140 mm</p> 	<p>Code No. : P084 Name : Distortion Meter Use : to measure the distortion factor Page : 77 Weight : 6 Kg Dimensions : 270 x 200 x 250 mm</p>
	<p>Code No. : C005 Name : Frequency Counter Use : to check the projection speed Page : 51 Weight : 1.7 kg Dimensions : 130 x 135 x 180 mm</p> 	<p>Code No. : P801 Name : Oscilloscope Use : to check the waveform Page : 36, 54~59, 78, 79 Weight : 4 kg Dimensions : 150 x 300 x 400 mm</p>



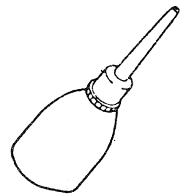
Code No. : P080  
Name : AC Voltage Meter  
Use : to measure signal level  
Page : 36, 54~59, 78, 79  
Weight : 3.2 kg  
Dimensions : 180 x 205 x 240 mm



Code No. : P110  
Name : Cross-line Generator  
Use : to check inclination of playback image  
Page : 34  
Weight : 2 kg  
Dimensions : 80 x 200 x 180 mm

### VI – 3 Oil and 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 VG6080

### VI – 2 Test Film

Code No.	Film Name	Page
P086	Registration film	40, 79
P032	Optical buzz track film	79
P039	Magnetic multi-frequency film	79
P037	Magnetic signal level film, 400Hz	78
P033	Optical signal level film, 400Hz	78, 80
P034	Optical flutter film	80
P108	Projector performance test film	80

## VII TOLERANCE

Item		Tolerance	Remarks	
Pressure of side presser spring		40 – 50 g	Refer to page 43.	
Unsteady picture in forwarding	upward/downward	less than 1.5 mm	Refer to page 40.	
	rightward/leftward	less than 1.0 mm		
Projector speed		24 fps	Refer to page 51.	
Tension at take-up side		100 ± 10 g	Refer to page 45.	
Tension at rewinding side		200 ± 50 g 700 ± 100 g	Refer to page 47.	
Pressure of cover guide roller spring		50 – 80 g	Refer to page 62.	
Pressure of lever pressure roller spring		200 – 300 g	Refer to page 64.	
Pressure of lever guide roller assy spring		20 – 60 g	Refer to page 64.	
Pressure of pad roller spring		15 – 25 g	Refer to page 67.	
Film scratch		After projecting film 10 times, there shouldn't be scratch affecting the picture or deflection in connecting part.		
Distortion factor	Optical	4.5%	Refer to page 80.	
	Magnetic	3.5%		
S/N ratio	Sound	Optical	Refer to page 80.	
		Magnetic		
Brilliance		over 45 dB		
Wow/Flutter		less than 0.25%	Refer to page 80.	
Frequency response		within the range shown in the diagram in page 79.		
Unevenness of illumination		less than 15%	to measure illumination without film	

### VIII. TABLE FOR TROUBLES

○ Film feeding section:	Page	○ Sound section:	Page
Screen oscillation	40, 42, 51	Appearance of wow/flutter	49, 64, 67, 74, 76
Film flow	40, 71	Optical/magnetic sounds are not produced at replay.	54
Shutter flow	40	Optical sound is not produced.	55, 76
Excessively large sound at feeding	40	Magnetic sound is not produced.	56
Film scratch	42, 47, 49, 62, 64, 67, 74	Fails to change over to M or O.	57, 76
Loop restorer fails to activate.	47, 64, 71	Exciter lamp fails to light up.	76
Loop restorer continues operating.	71	Bad S/N ratio	
Small upper loop	62, 67	○ Lamp section:	Page
Small lower loop	67, 71	Lamp fails to light up.	82
Film cannot be set.	42, 71	Lamp has low brightness.	82
Film curls.	42		
○ Take-up and rewind sections:	Page		
Failure in take-up	49, 51		
Failure in rewinding	45, 49, 51		
Film hangs down.	45, 47, 49		
Magnet clutch fails to activate.			
○ Motor:	Page		
Motor fails to rotate or stop.	38, 84		
Fails to set to FORWARD or REWIND.	84		
Abnormal or vibration is produced.	51		

# PARTS LIST

## TRANSVIDEO TRV-16

NO. 278

SEPTEMBER 1986

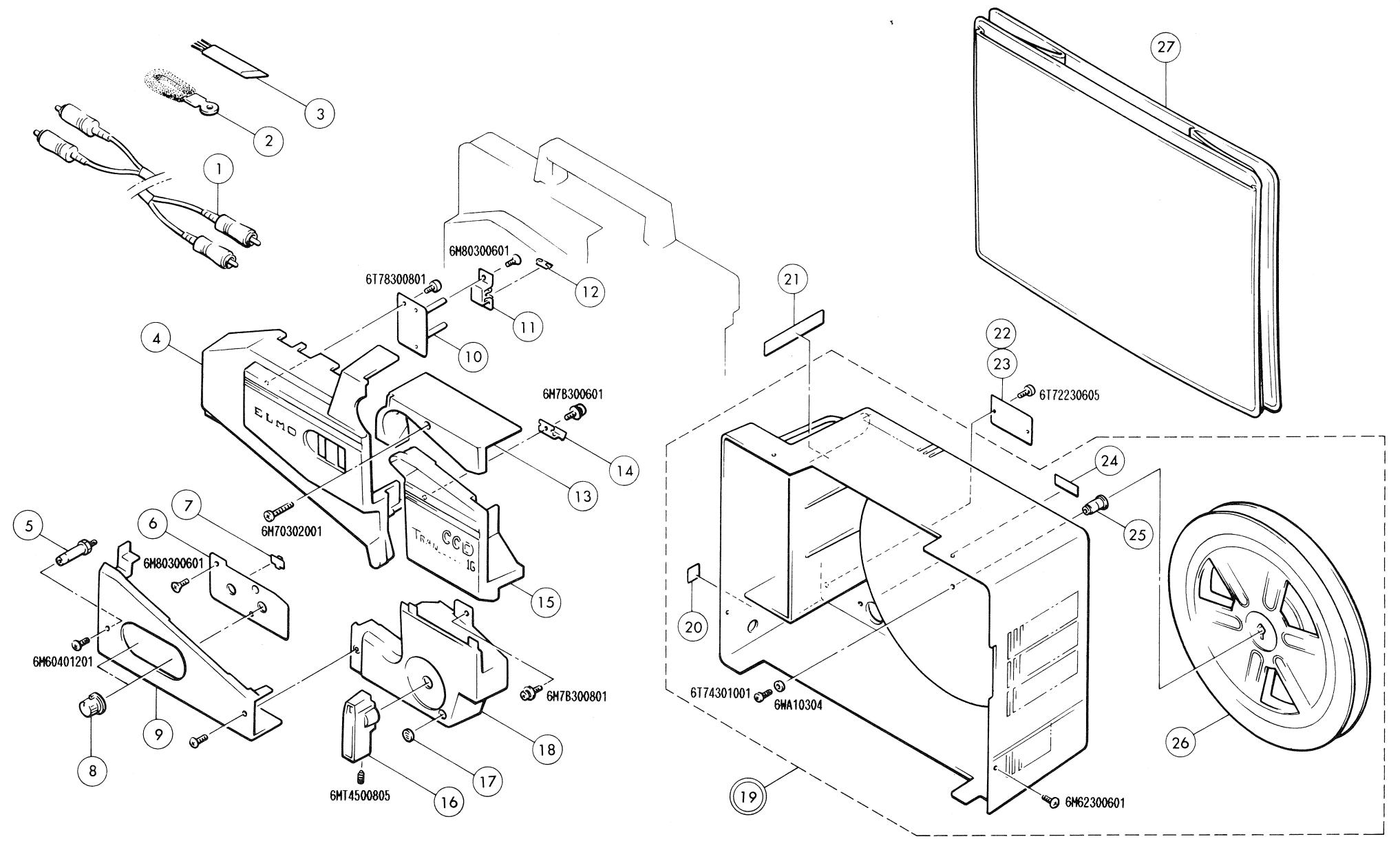
### INTRODUCTION

1. The part marked with double-encircled illustration number can be supplied as the assembly shape.
2. Parts numbers for the readily-available parts such as screws, nuts, washers and E-rings are indicated in the illustration directly.
3. The part number encircled with a circlet in the column Illustration No. is for Japanese market only. For your market use, please refer to Page 11.
4. The model name marked with  $\ast$  in the column Common use model indicates an improved model.
5. The spare parts index is listed on page 12 and the schematic diagrams and electric parts are listed on page 13 and 14.

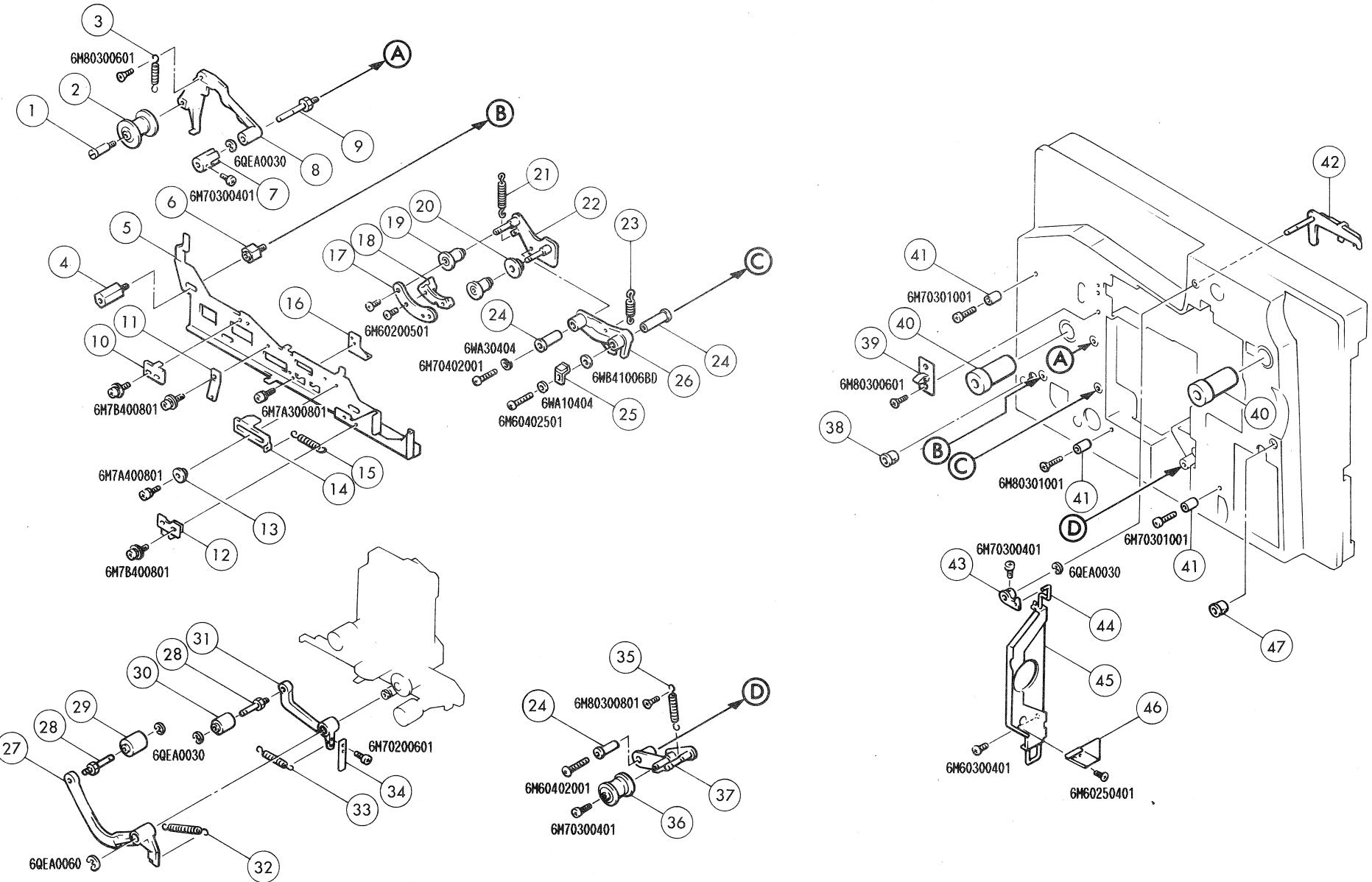
### は じ め に

1. 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。
2. 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。
3. イラスト番号欄に○印が付記されている部品は、国内用とは異なる国外用部品があり11ページに記載してあります。
4. 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。
5. 部品番号索引は、12ページにあります。
6. 結線図と電気部品表は、13~14ページにあります。

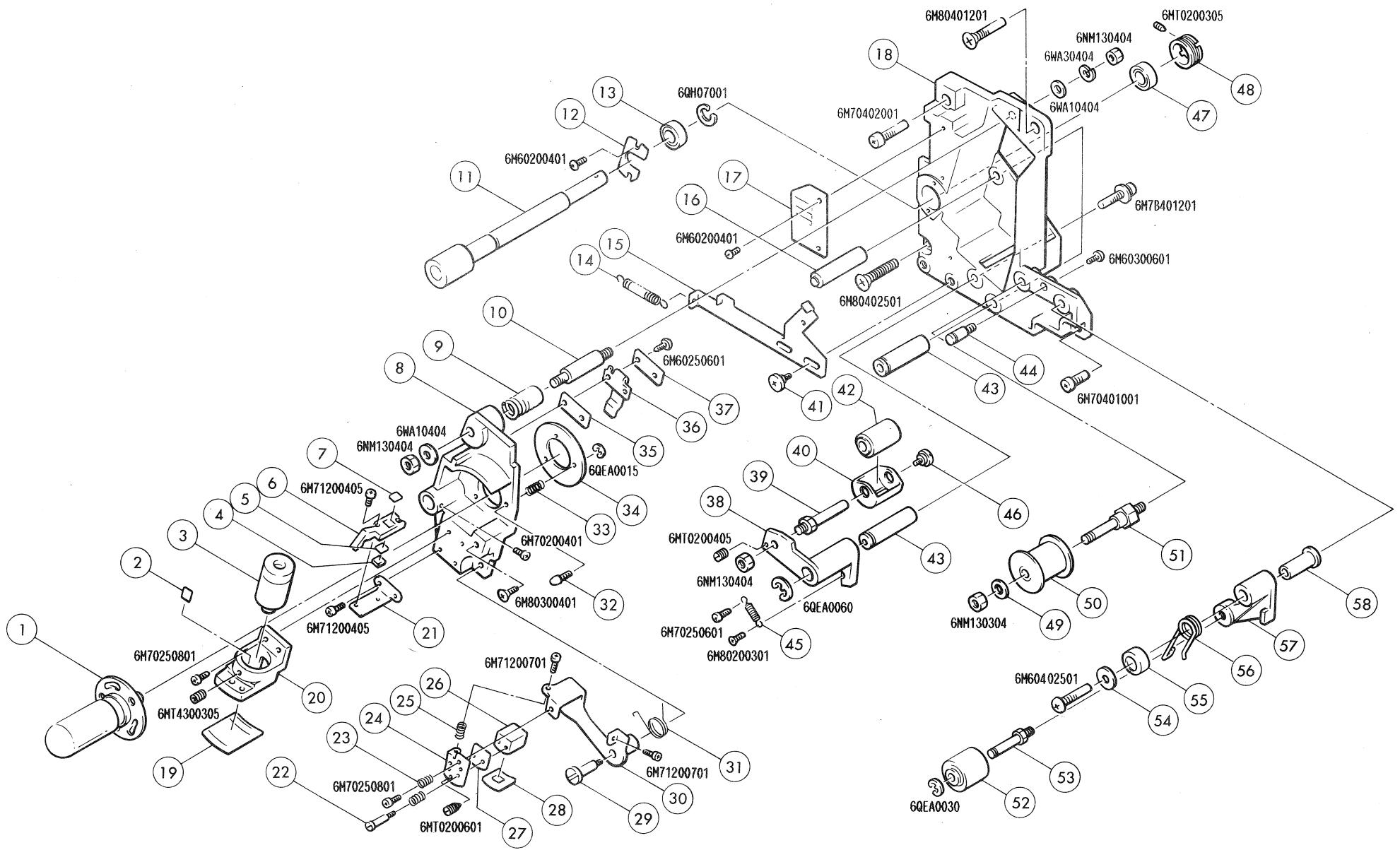
ELMO CO., LTD.



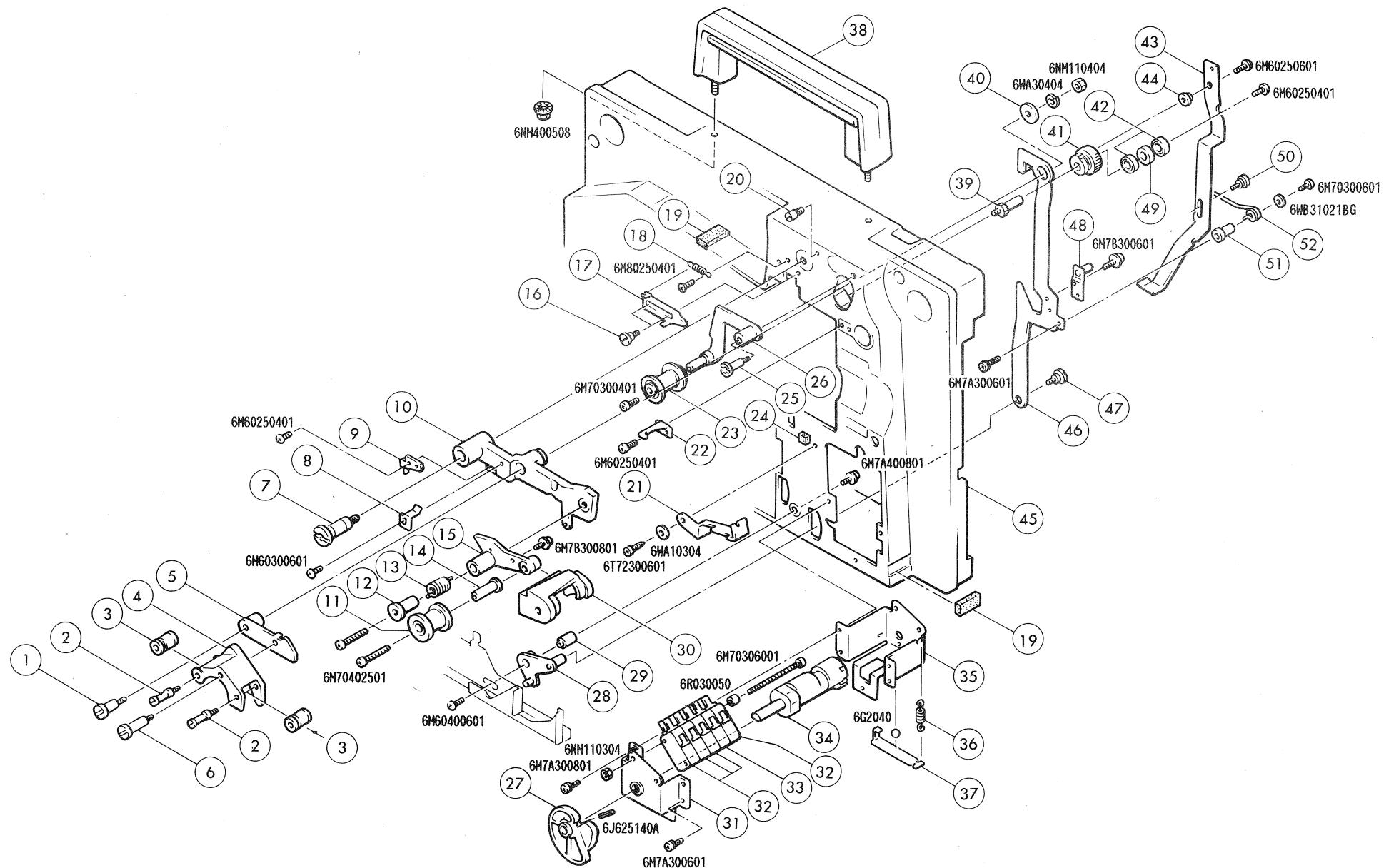
ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL
1	5Z0064	ビデオ オーディオケーブル	VIDEO AUDIO CABLE						
2	4K00502	アバーチュアブラシ	APERTURE BRUSH	16-CL					
3	P413991	角ブラシ	CLEANING BRUSH	16-CL					
4	4M10132B	前カバー(3)	FRONT COVER 3						
5	P414769	スタッド 前カバー(12)	STUD FRONT COVER 12	16-CL					
6	4N40750	銘板 パワースイッチ	PLATE POWER SWITCH						
7	5G6010	ステッカ T-18	STICKER (T-18)	16-AL					
8	P413670003	ツマミ ボリューム	KNOB VOLUME						
9	4P20732002	前カバー(12)	FRONT COVER 12						
10	4M45413	組立金具 前カバー(3)	METAL FRONT COVER 3						
11	6Z00502	ジュラコンキャッチ C131メス	CATCH (C-131-2)	16-CL					
12	P412419	補助板 キャッチ	PLATE CATCH	16-CL					
13	4P20571B02	前カバー(4)	FRONT COVER 4						
14	4M45341	止メバネ 前カバー(2)	FIX SPRING FRONT COVER 2						
15	4M20740	前カバー(2)	FRONT COVER 2						
16	P412227002	ツマミ メイン	KNOB MAIN						
17	4N40751	銘板 前カバー(11)	PLATE FRONT COVER 11						
18	4M20739	前カバー(11)	FRONT COVER 11						
19	4P8TRV023	裏カバー(8) 組立品	REAR COVER(8) ASSY						
20	4N40778	銘板 モニタ	PLATE MONITOR						
21	4N40753	銘板 出力端子	PLATE VIDEO AUDIO OUT						
(22)	4N40752001	定格銘板 100V-60HZ	RATING PLATE (100V-60HZ)						
23	4N40752002	定格銘板 100V-50HZ	RATING PLATE (100V-50HZ)						
24	4N02424	ヒューズ銘板(7)	FUSE PLATE 7	ST-180					
25	P412245003	リール止メ軸 裏カバー	REEL SHAFT REAR COVER						
26	4P20584	組立800フィートリール	REEL 240m	16-CL					
27	4K00842	ビニールカバー(2)	DUST COVER (2000FT)	16-CL					



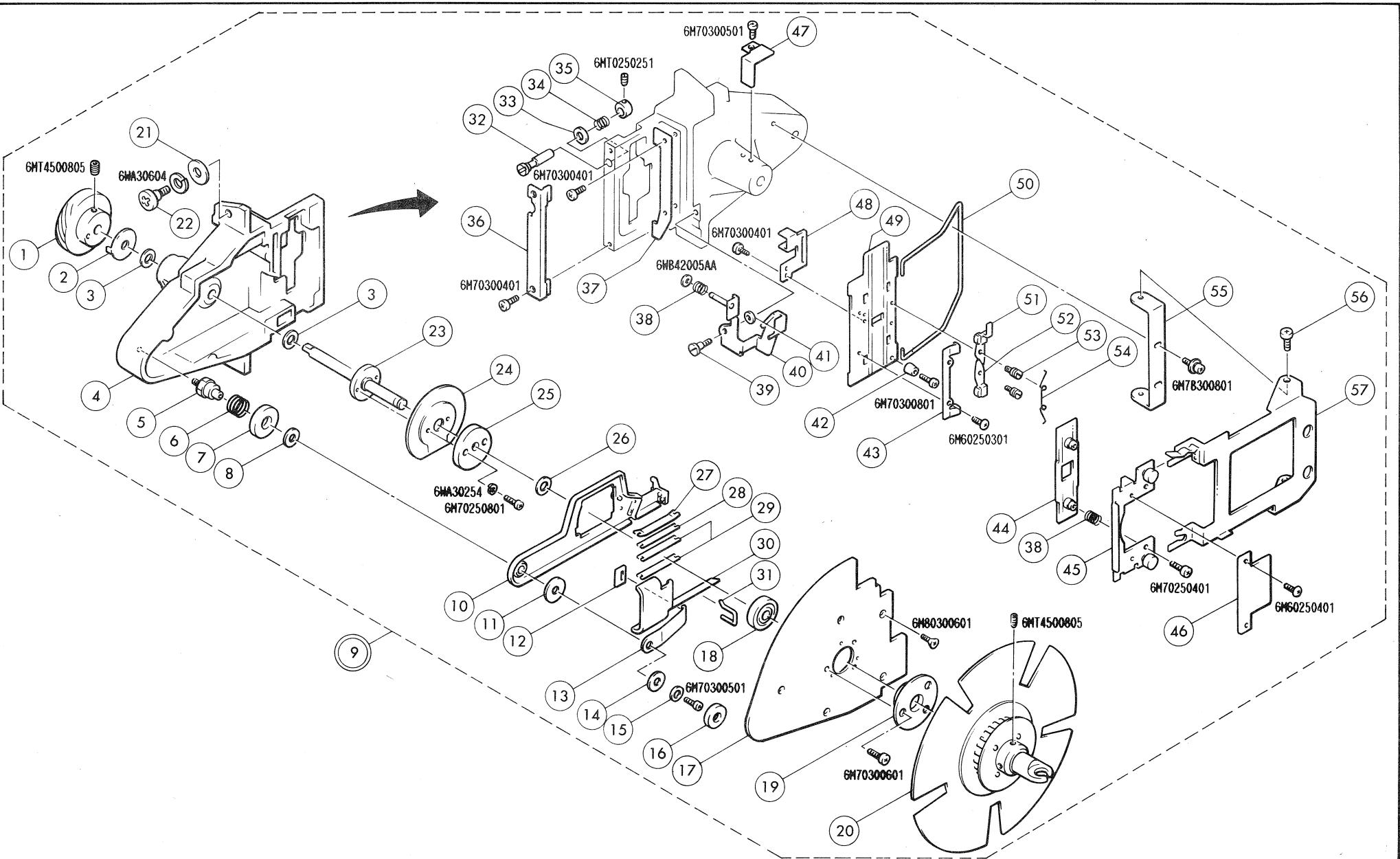
ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	
1	4P55595	段付ネジ ガイドローラ(4)	SCREW GUIDE ROLLER 4	16-CL	31	P412057C	レバー ブレッシャローラ	LEVER PRESSURE ROLLER
2	P412339	ガイドローラ(4)	GUIDE ROLLER 4	16-CL	32	4P55608B	バネ 中間テンションローラ	SPRING TENSION ROLLER
3	4P55661	バネ レバーガイドローラ(4)	SPRING GUIDE ROLLER 4	16-CL	33	4P55551	バネ ブレッシャローラ	SPRING PRESSURE ROLLER
4	P414742	スタッダ 銘板	STUD PLATE	16-CL	34	P412930	ストッパー(1) レバーブレッシャローラ	STOPPER(1) LEVER
5	4P31836C	連= (1)	LINK 1	16-CL	35	4P55597	バネ ガイドローラ(3)	SPRING GUIDE ROLLER 3
6	4P55574B	座 連= (1)	MOUNT LINK 1	16-CL	36	P412209	ガイドローラ(3)	GUIDE ROLLER 3
7	P412935	スタビライザ レバーガイドローラ(4)	STABILIZER LEVER G.R.4	16-CL	37	P412179	組立レバー ガイドローラ(3)	LEVER GUIDE ROLLER 3
8	P412051D	レバー ガイドローラ(4)	LEVER GUIDE ROLLER 4	16-CL	38	5G5042	スナップアッショウ SB-375-4	CORD BUSH (SB-375-4)
9	P412469B	軸 ガイドローラ(4)	SHAFT LEVER GUIDE ROLLER	16-CL	39	6Z00501	ジュラコンキャッチ C131オス	CATCH (C-131-1)
10	P412928B	ストッパー レバー第2スプロケット押エ	STOPPER LEVER SPROCKET	16-CL	40	4P55586	メタル スプロケット	METAL SPROCKET
11	P413094B	固定板 バネ中間テンション	PLATE SPRING MID.TENSION	16-CL	41	4P56118	スペーサ ベースフレーム	SPACER BASE FRAME
12	P412166B	ホルダ リンク(3)	HOLDER LINK 3	16-CL	42	P412352	組立レバー ループセッタ	LEVER LOOP SETTER ASSY
13	4P55575B	簡座 押エ板ガイドローラ(3)	WASHER GUIDE ROLLER 3	※16-CL	43	P412129	組立ホルダ リンク(2)	HOLDER LINK(2) ASSY
14	P412206B	押エ板 レバーガイドローラ(3)	PLATE GUIDE ROLLER 3	16-CL	44	P412202	リンク(2) ループセッタ	LINK(2) LOOP SETTER
15	4P55627	バネ 連= (1)	SPRING LINK 1	16-CL	45	4P31831B	シャッタカバー	SHUTTER COVER
16	P412971	ストッパー(2) レバーブレッシャローラ	STOPPER(2) LEVER	16-CL	46	P412386B	シャッタカバー(2)	SHUTTER COVER 2
17	P412368B	取付板 シュー第2スプロケット	HOLDER SHOE SECOND SPRO.	16-CL	47	5G5058	スナップアッショウ SB-312-3	CORD BUSH (SB-312-3)
18	P412367B	シュー 第2スプロケット	SHOE SECOND SPROCKET	16-CL				HP-L290DX
19	P412221	ローラ 第2スプロケット押エ	ROLLER SECOND SPROCKET	16-CL				
20	4P55620	簡座 押エローラ第2スプロケット	WASHER SECOND SPROCKET	16-CL				
21	4P55596	バネ(1) ガイドローラ(4)	SPRING(1) GUIDE ROLLER 4	16-CL				
22	P412225B	組立レバー(2) 第2スプロケット押エ	LEVER(2) SECOND SPROCKET	16-CL				
23	4P55573	バネ レバー(1) 第2スプロケット押エ	SPRING SECOND SPROCKET	16-CL				
24	4P55545	簡座 6mm×15mm	METAL 6mm×15mm	16-CL				
25	P413593	組立フィルムガイド	FILM GUIDE ASSY	16-CL				
26	P412059C	レバー(1) 第2スプロケット押エ	LEVER(1) SECOND SPROCKET	16-CL				
27	P412058	レバー 中間テンション	LEVER MIDDLE TENSION	16-CL				
28	P412106	軸 ブレッシャローラ	SHAFT PRESSURE ROLLER	16-CL				
29	P412112	組立制動ローラ(2)	BRAKE ROLLER(2) ASSY	16-CL				
30	P412114	組立バッドローラ	PAD ROLLER ASSY	16-CL				



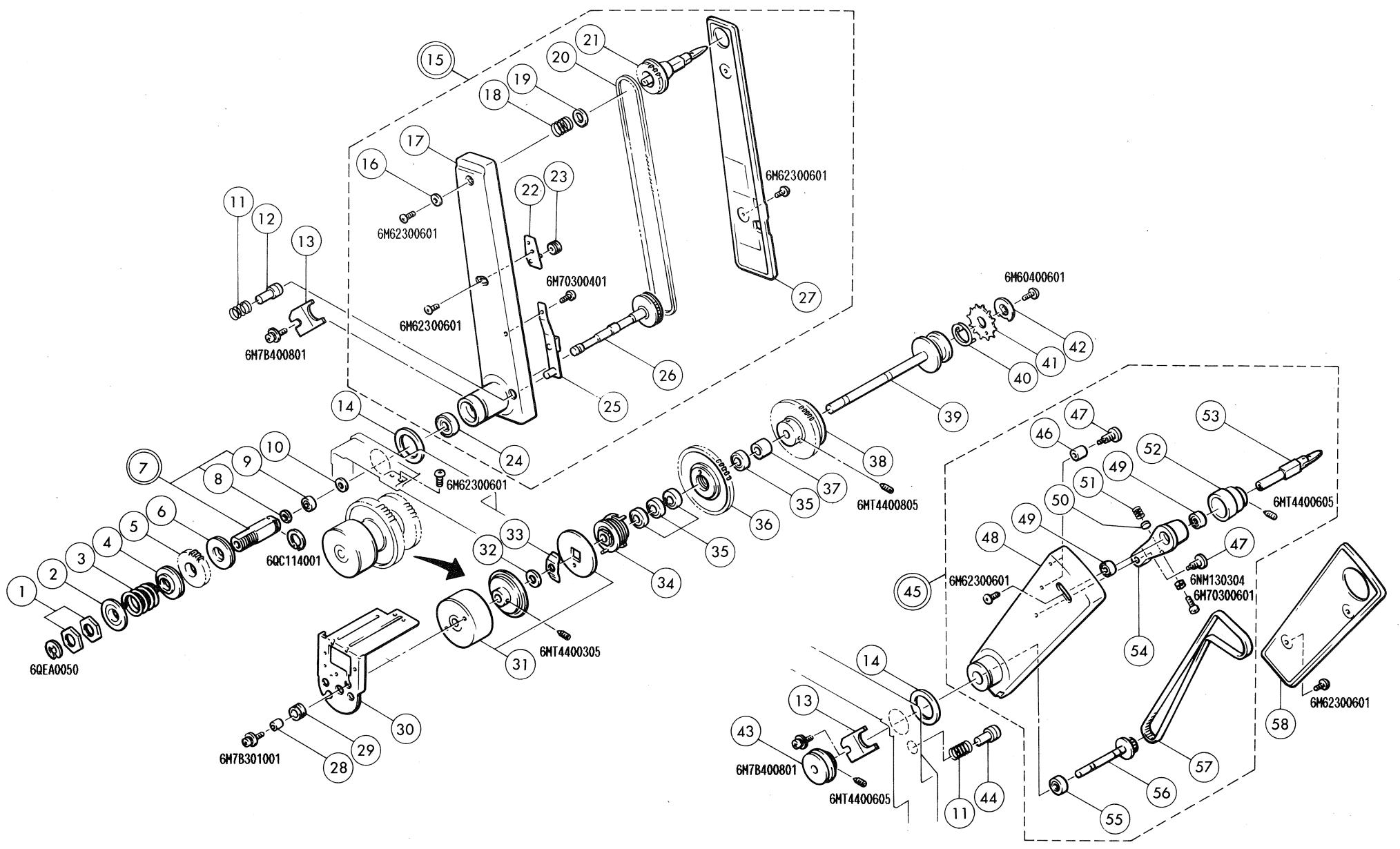
ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	
1	4E41580	エキサイタランプ KE-04 4V-0.75A	EXCITER LAMP (KE-04)	16-CL	31	4P55540	バネ ヘッドレバー	SPRING HEAD LEVER
2	4M41176	固定板 サウンドレンズ	PLATE SOUND LENS	16-AL	32	4P55539	ピン エキサイタランプ	PIN EXCITER LAMP
3	4P32388	組立サウンドレンズ(2)	SOUND LENS ASSY	16-AL	33	4P53365	エキサイタランプソケットスリーブピンバネ	SPRING SLEEVE PIN
4	P412421	バッド 光電池	PHOTO CELL PAD	16-CL	34	4P53364	エキサイタランプソケットスリーブ座板	MOUNT EXCITER LAMP
5	5S4PD520UA	光電素子 PD-520UA	PHOTO DIODE (PD-520UA)	16-CL	35	P412090	絶縁紙(1) エキサイタランプ	ISOLATOR(1) EXCITER LAMP
6	P412098	ホルダ(2) フォトダイオード	HOLDER(2) PHOTO DIODE	16-CL	36	P412092B	端子押エ エキサイタランプ	TERMINAL EXCITER LAMP
7	P412099	カバー フォトダイオード	COVER PHOTO DIODE	16-CL	37	P412091	絶縁紙(2) エキサイタランプ	ISOLATOR(2) EXCITER LAMP
8	P412050C	ホルダ エキサイタランプ	HOLDER EXCITER LAMP	※16-CL	38	P412056C	レバー バッドローラ	LEVER PAD ROLLER
9	4P55541	バネ ホルダエキサイタランプ	SPRING HOLDER EXC.LAMP	16-CL	39	4E43078	軸 バッドローラ	SHAFT PAD ROLLER
10	P412100	軸(1) ホルダエキサイタランプ	SHAFT(1) EXCITER LAMP	16-CL	40	4E43077	カバー バッドローラ	COVER PAD ROLLER
11	P412107	組立軸 フライホイル	SHAFT FLYWHEEL ASSY	16-CL	41	4P55230	ネジ(1) ループフォーマ	LOOP FORMER SCREW 1
12	P412103	押エ板 ポールベアリング	PRESSING PLATE BEARING	16-CL	42	P412114	組立バッドローラ	PAD ROLLER ASSY
13	6B20801201	ラジアル玉軸受 SSL-1280ZZH	B-BEARING (SSL-1280ZZH)	16-CL	43	4P55548	軸 バッドローラレバー	SHAFT PAD ROLLER LEVER
14	4P55978	バネ レバー(1) M-O切換	SPRING LEVER(1) M-O CHA.	16-CL	44	P415245	スタッド バネ制動ローラ(2)	STUD SPRING BRAKE ROLLER
15	P412104B	レバー(1) M-O切換	LEVER(1) M-O SWITCH	16-CL	45	4P55549	バネ(1) バッドローラ	SPRING(1) PAD ROLLER
16	P412101	軸(2) ホルダエキサイタランプ	SHAFT(2) EXCITER LAMP	16-CL	46	4E50872	段付ネジ バッドローラ	SCREW PAD ROLLER
17	4E44121	端子板 トランビジョン	TERMINAL TRV		47	6B20601201	ラジアル玉軸受 SSL-1260ZZ	B-BEARING (SSL-1260ZZ)
18	4P20566C	ホルダ フライホイル	HOLDER FLYWHEEL	16-CL	48	P412722	リングナット サウンドドラム	RING NUT SOUND DRUM
19	P412251	フィルムガイド ホルダサウンドレンズ	FILM GUIDE SOUND LENS	16-CL	49	4P55642	ワッシャ 角棒巻返	WASHER SQUARE SHAFT
20	P412233	ホルダ サウンドレンズ	HOLDER SOUND LENS	16-CL	50	P414947	組立制動ローラ(3)	BRAKE ROLLER(3) ASSY
21	P412097B	ホルダ(1) フォトダイオード	HOLDER(1) PHOTO DIODE	※16-CL	51	P414950	軸 制動ローラ(3)	SHAFT BRAKE ROLLER 3
22	P412095B	ネジ ヘッド	SCREW HEAD	16-CL	52	P412112	組立制動ローラ(2)	BRAKE ROLLER(2) ASSY
23	4P49658	バネ(4) ヘッド	HEAD SPRING 4	16-CL	53	P412106	軸 プレッシャローラ	SHAFT PRESSURE ROLLER
24	P412543	取付板 ヘッド MH-16	HOLDER HEAD	16-CL	54	4P55658	間座 レバー制動ローラ(2)	WASHER BRAKE ROLLER 2
25	4P52431	サウンドヘッド取付板押エバネ	HEAD PLATE PRESS SPRING	16-CL	55	4P55632	間座 バネ制動ローラ(2) レバー	WASHER SPRING B ROLLER 2
26	4E42473	組立(1) 磁気ヘッド MH-16	SOUND HEAD (MH-16)	16-CL	56	4P55547	バネ 制動ローラ(2) レバー	SPRING BRAKE ROLLER 2
27	P412439	座板 ヘッド MH-16	MOUNT HEAD	16-CL	57	P412049C	レバー 制動ローラ(2)	LEVER BRAKE ROLLER 2
28	4E42767	カバー(2) 磁気ヘッド MH-16	COVER(2) SOUND HEAD	16-CL	58	4P55545	間座 6mm×15mm	METAL 6mm×15mm
29	4P54451	セレクターレバー軸	SELECTOR LEVER SHAFT	16-CL				
30	P412093B	組立レバー ヘッド	LEVER HEAD ASSY	16-CL				



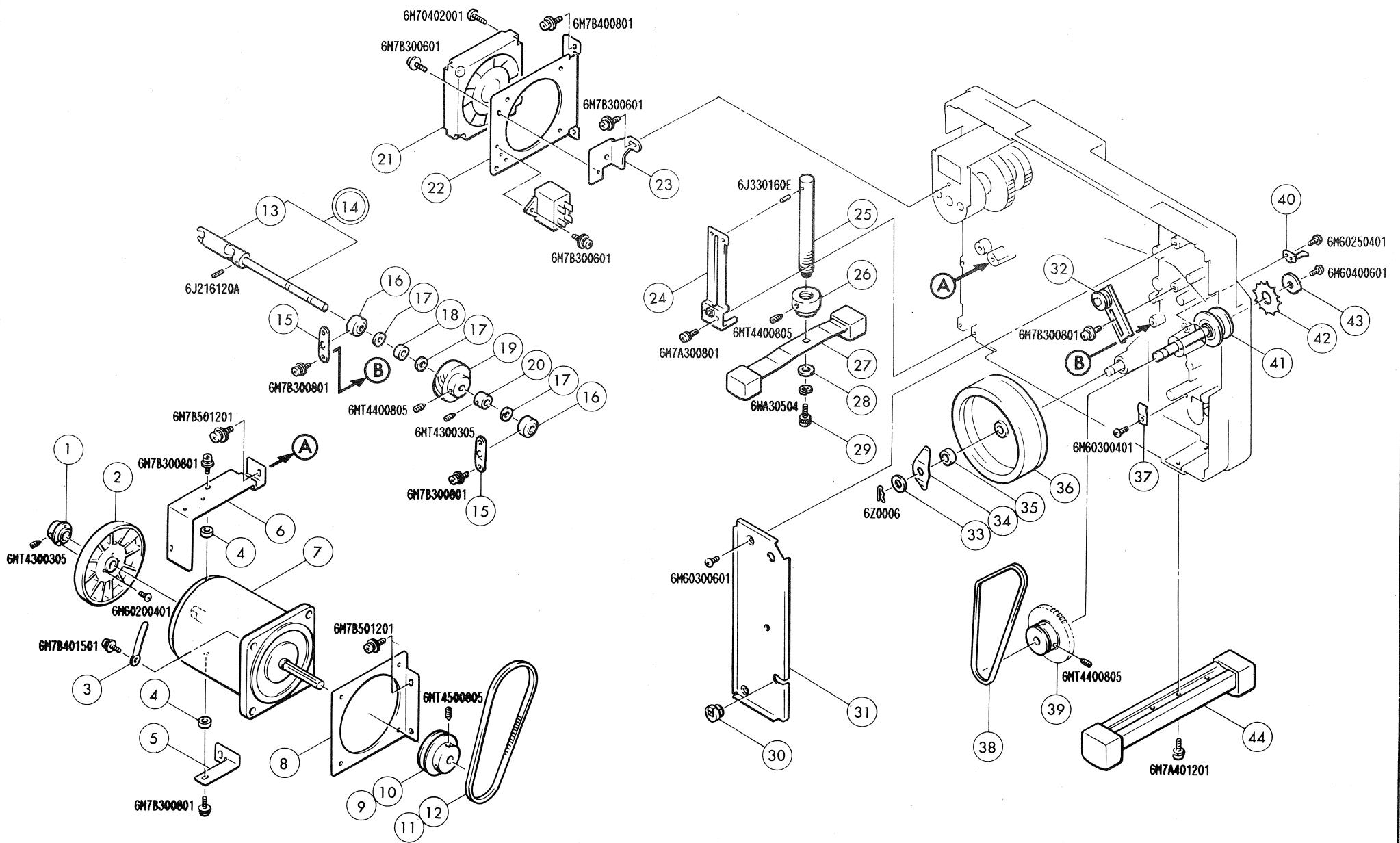
ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL
1	4P55581	段付ネジ 取付板シュー	SCREW HOLDER SHOE	16-CL	31	P412123	ホルダ(1) スイッチカム
2	P412527	軸 スプロケット押エローラ	SCREW ROLLER SPROCKET	16-CL	32	5E1072	マイクロスイッチ AH715089
3	P412201	スプロケット押エローラ	ROLLER SPROCKET	16-CL	33	5E1041	マイクロスイッチ V3C2
4	4P31838	シュー 第1スプロケット	SHOE FIRST SPROCKET	16-CL	34	P412187	カム スイッチ
5	P412213	組立取付板 スプロケットシュー	HOLDER SPROCKET SHOE	16-CL	35	P413120	組立ホルダ(2) スイッチカム
6	4P55580	段付ネジ 第1スプロケットシュー	SCREW SPROCKET SHOE	16-CL	36	4P55593	クリックバネ スイッチカム
7	4P55579	段付ネジ レバーシュー	SCREW LEVER SHOE	16-CL	37	P412142	レバー クリックバネ
8	P412344	押工板 レバーガイドローラ(2)	PLATE GUIDE ROLLER 2	16-CL	38	P412074	吊手
9	P412216B	ストッパ ガイドローラ(2)	STOPPER GUIDE ROLLER 2	16-CL	39	P412236	軸(1) ループセッタ
10	4P31827B	レバー スプロケットシュー	LEVER SPROCKET SHOE	16-CL	40	4P55055B	間座 アオリバネ
11	P412200	ガイドローラ(1)	GUIDE ROLLER 1	16-CL	41	P412237	摩擦車(2) ループセッタ
12	4P55571	間座 取付板ガイドローラ(1)	WASHER HOLDER ROLLER 1	16-CL	42	6B00400702	ラジアル玉軸受 4×7×2
13	4P55583	バネ 取付板ガイドローラ(1)	SPRING HOLDER ROLLER 1	16-CL	43	4P31849	リンク(1) ループセッタ
14	4P55625	間座 ガイドローラ(1)	WASHER GUIDE ROLLER 1	16-CL	44	4P55616	間座 摩擦車
15	P412174	取付板 ガイドローラ(1)	HOLDER GUIDE ROLLER 1	16-CL	45	4M20741	ベースフレーム
16	4P55648	段付ネジ スッパレバー	SCREW STOPPER LEVER	16-CL	46	4P31850B	リンク(1) スプロケットシュー
17	P412204B	ストッパ レバーガイドローラ(2)	STOPPER LEVER ROLLER 2	16-CL	47	4P55598	段付ネジ リンク(1) スプロケットシュー
18	4P55637	バネ スッパレバー	SPRING STOPPER LEVER	16-CL	48	P412929B	組立ガイドレバー 爪逃シ
19	P412382	アーム バッド	ARM PAD	16-CL	49	4P55657	間座(1) 摩擦車
20	4P55791	取付ネジ カバー機構部	SCREW COVER MACHINE	16-CL	50	4M50231	取付ネジ ロック板
21	P412340	コード押エ	CORD SUPPORTER	16-CL	51	4P55629	間座 バネリンク(1)
22	P412181	巻込ヨケ スプロケット	FILM GUIDE SPROCKET	16-CL	52	4P55592	バネ リンク(1) スプロケットシュー
23	P412215	ガイドローラ(2)	GUIDE ROLLER 2	16-CL			
24	P413143	ストッパ ガイドローラ(3)	STOPPER GUIDE ROLLER 3	16-CL			
25	4P55584	段付ネジ レバーガイドローラ(2)	SCREW GUIDE ROLLER 2	16-CL			
26	P412157B	組立レバー ガイドローラ(2)	LEVER GUIDE ROLLER 2	16-CL			
27	P412173	カム 連= (1)	CAM LINK 1	16-CL			
28	P415214	組立リンク(2) スプロケットシュー(2)	LINK(2) SPROCKET SHOE 2	16-CL			
29	4P55570	間座 リンク(2)	WASHER LINK 2	16-CL			
30	4P31886002	カバー ガイドローラ(1)	COVER GUIDE ROLLER 1				



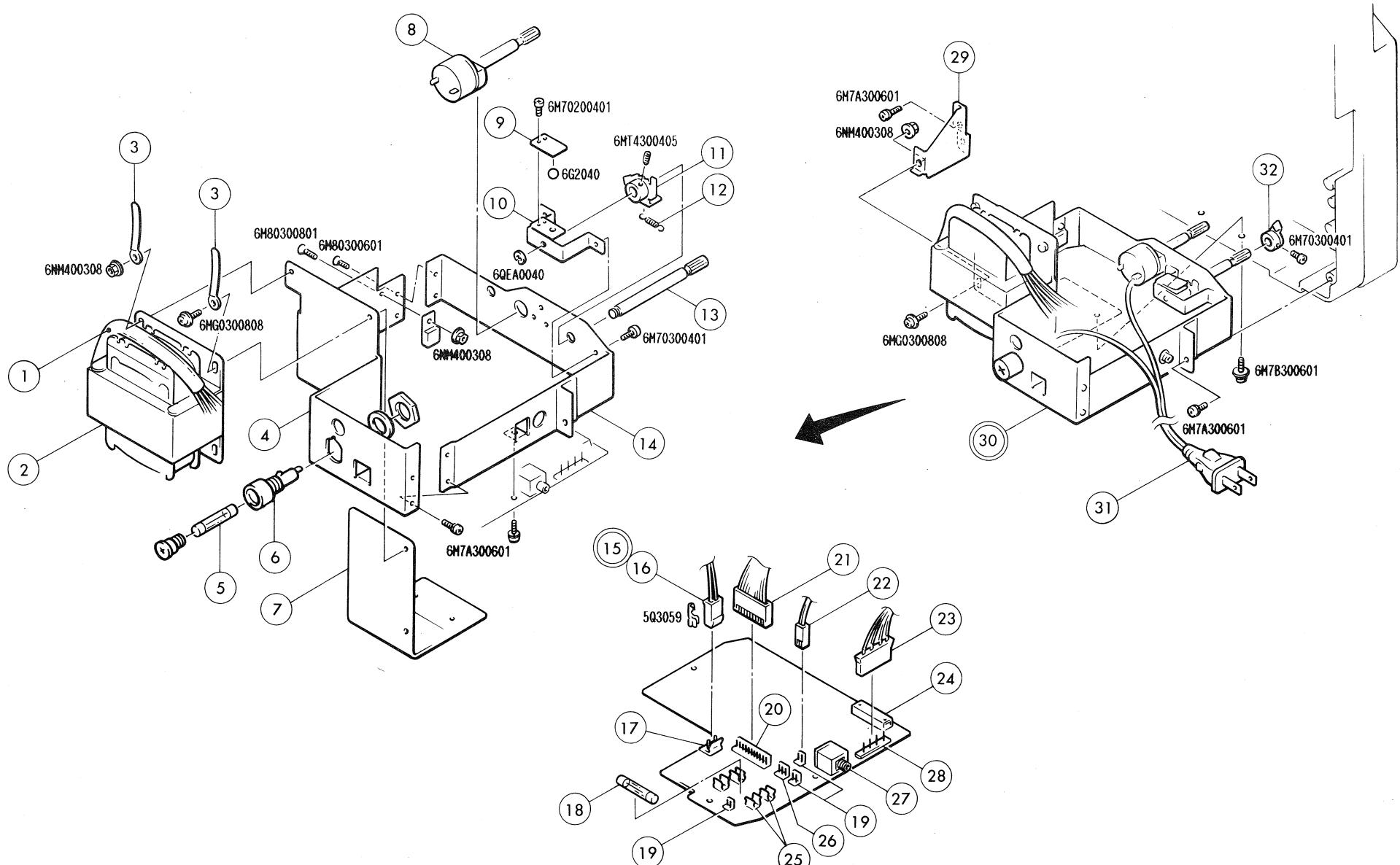
ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL
1	P 412284	ウォーム(1)		WORM 1	16-CL	31	P 411507	固定バネ 油含ミ	FIX SPRING OIL CLOTH
2	4P55452	座金 ウォーム		SPROCKET WORM WASHER	16-CL	32	4M45212	軸 マスキング	SHAFT MASKING
3	4P54650	円筒カム輪ワッシャ(2)		CAM SHAFT WASHER 2	16-CL	33	4P52856	マスキング座金	MASKING WASHER
4	P 414075B	組立間欠給送装置フレーム		FRAME CLAW UNIT	16-AL	34	4P52855	マスキングバネ	MASKING SPRING
5	P 411319B	軸 送り爪(1) 支点		FULCRUM SHAFT CLAW	16-CL	35	4P41729D	マスキングカム	MASKING CAM
6	P 410661	制動バネ 中間ギヤ		MIDDLE GEAR BRAKE SPRING	16-CL	36	4P41731	アバーチュアプレート取付板	APERTURE PLATE HOLDER
7	P 412043	フェルト 支点送り爪		FELT FULCRUM CLAW	16-CL	37	P 412199	押工板 アバーチュアプレート	A.P. PRESSING PLATE
8	P 411322	ワッシャ 送り爪軸		WASHER CLAW SHAFT	16-CL	38	4P55653	プレッシャプレートバネ	PRESSURE PLATE SPRING
9	4P8TRV010	間欠給送装置組立品		CLAW SECTION FRAME ASSY		39	4P55775	段付ネジ レバー爪逃シ	SCREW LEVER CLAW ESCAPE
10	4M45080	組立(2) 送り爪(1)		CLAW(1) ASSY		40	P 412938B	組立(2) レバー爪逃シ	LEVER(2) CLAW ESCAPE
11	4P55055B	間座 アオリバネ		TILTING SPRING WASHER	16-CL	41	4P55795	間座 レバー爪逃シ	WASHER LEVER CLAW ESCAPE
12	4P55650	間座 バネ送り爪		WASHER CLAW SPRING	16-CL	42	P 412500B	固定ガイド アバーチュアプレート	SETTLE GUIDE
13	4M45551	バネ 送り爪		SPRING CLAW		43	P 412347	組立フィルムガイド(1)	FILM GUIDE(1) ASSY
14	4P55945	ワッシャ(2) 送り爪軸		WASHER(2) CLAW SHAFT	16-CL	44	P 412350C	組立プレッシャプレート	PRESSURE PLATE ASSY
15	4P56099	ワッシャ(3) 送り爪軸		WASHER(3) CLAW SHAFT	16-AL	45	4M45402	組立ホルダ(2) PP TRV	HOLDER(2) ASSY PP TRV
16	P 412558	上側フェルト 支点送り爪		FELT FULCRUM CLAW	16-CL	46	4M45211	拡散板	DIFFUSE PLATE
17	P 412297	蓋 給送部		LID CLAW SECTION	XP-550SM	47	P 413915	油ヨケ 給送部	OIL GUARD CLAW FRAME
18	6B20601903	ラジアル玉輪受 (626-2NK)		B-BEARING (626-2NK)	16-AL	48	4P41884C	マスキングカム ガイド	MASKING GUIDE
19	4M40304	ホルダ ベアリング		HOLDER BEARING		49	4M31686	アバーチュアプレート TRV	APERTURE PLATE TRV
20	4M31647	組立(2) シャッタ 60		SHUTTER(2) ASSY 60		50	P 412260	バネ プレッシャプレートホルダ	SPRING P.P. HOLDER
21	4P52527	モータ取付ネジワッシャ		MOTOR FIX SCREW WASHER	16-CL	51	P 412345	組立フィルム横押工(1)	FILM SIDE PRESSER 1
22	4P55081B	ネジ フレーム給送部		FRAME SCREW	16-CL	52	P 412346	組立フィルム横押工(2)	FILM SIDE PRESSER 2
23	P 411335C	組立三角カム軸		TRIANGLE CAM SHAFT ASSY	16-CL	53	4P55603	段付ネジ フィルム横押工	SCREW FILM SIDE PRESSER
24	P 411317B	面カム		FACE CAM	16-CL	54	4P55611	バネ フィルム横押工	SPRING FILM SIDE PRESSER
25	4M45078	三角カム 58		TRIANGLE CAM 58		55	P 412143	取付板 プレッシャプレート	HOLDER PRESSURE PLATE
26	4P54523	スプロケットギヤ間座(1)		WASHER(1) SPROCKET GEAR	16-CL	56	4P55804	段付ネジ 連ニ	SCREW LINK
27	P 411326	バネ 送り爪棒		SPRING SLIDE PLATE CLAW	16-CL	57	P 412348	組立ホルダ(1) プレッシャプレート	HOLDER(1) PRESSURE PLATE
28	P 412193	間座 送り爪棒		WASHER SLIDE PLATE CLAW	16-CL				
29	P 411325	送り爪棒		SLIDE PLATE CLAW	16-CL				
30	P 411298	フェルト		OIL CLOTH 1	16-CL				



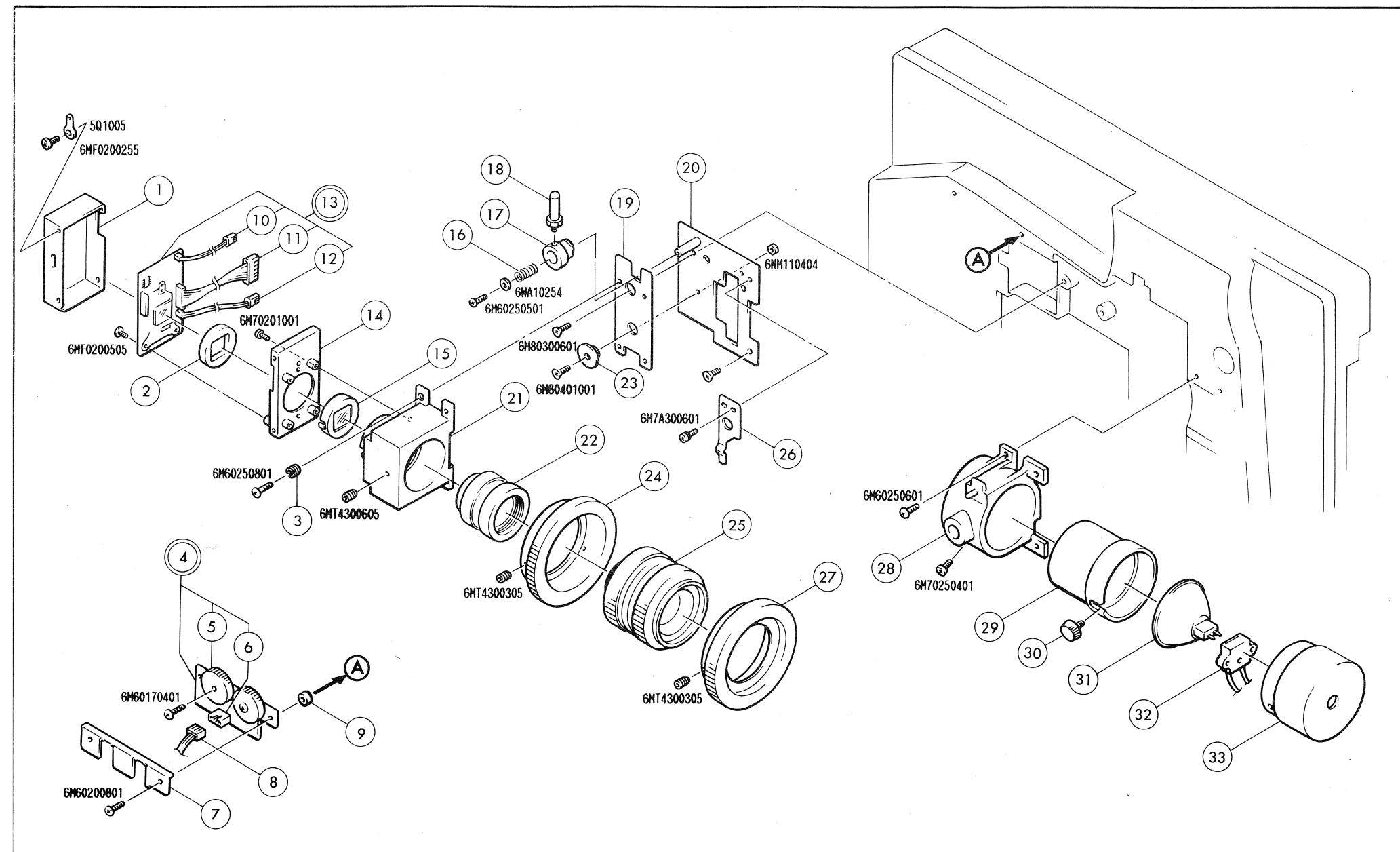
ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	
1	4P55599	ナット 摩擦板	NUT FRICTION PLATE	16-CL	31	6Y49491007	電磁クラッチ ZCF-10D24V	MAGNET CLUTCH (ZCF-10D)
2	P412328	摩擦板(4)	FRICITION PLATE 4	16-CL	32	4P55651	テフロンワッシャ 8.1×14×0.3	WASHER (8.1X14X0.3) PTFE 16-CL
3	4P55600	バネ 摩擦板	SPRING FRICTION PLATE	16-CL	33	P412523B	バネ(2) 電磁クラッチ	SPRING(2) MAGNET CLUTCH 16-CL
4	P412261	組立摩擦板	FRICITION PLATE ASSY	16-CL	34	4M41027	組立側板 電磁クラッチ	PLATE ASSY MAGNET CLUTCH CX-350 XENON
5	P412232	ギヤ(2) 卷返	GEAR(2) REWIND	16-CL	35	6B10801601	ラジアル玉軸受 8×16×5PO	B-BEARING (688ZZ) 16-AL
6	P412316	組立摩擦板(3)	FRICITION PLATE(3) ASSY	16-CL	36	4M41030	ギヤ(1) 卷返	GEAR(1) REWIND CX-350 XENON
7	4M45383	組立ボス 摩擦板	BOSS ASSY FRICTION PLATE	※16-CL	37	4P55602	間座 第1スプロケット	WASHER FIRST SPROCKET 16-CL
8	4M50327	ワッシャ 7.6×10×0.4	WASHER (7.6X10X0.4)	16-AL	38	P412270	組立ウォームギヤ(1)	WORM GEAR(1) ASSY 16-CL
9	6B20601001	ラジアル玉軸受 (MR106ZZ)	B-BEARING (MR106ZZ)	16-AL	39	P412159	第1スプロケット	FIRST SPROCKET 16-CL
10	4M50321	ワッシャ 6.1×8.5×0.3	WASHER (6.1X8.5X0.3)	16-AL	40	4P55577	バネ 第1スプロケット	SPRING FIRST SPROCKET 16-CL
11	4P55555	バネ アームボタン	SPRING ARM BUTTON	16-CL	41	P412338	歯 第1スプロケット	COG FIRST SPROCKET 16-CL
12	P412257	ボタン アーム(1)卷返	BUTTON ARM(1) REWIND	16-CL	42	P412141	キャップ スプロケット	CAP SPROCKET 16-CL
13	P412156	ロックバネ ボスマーム	LOCK SPRING BOSS ARM	16-CL	43	P412170B	Vブーリ(2) 卷取	V PULLEY(2) TAKE-UP CX-350 XENON
14	P412133	間座 外軸アーム	WASHER OUTER SHAFT ARM	16-CL	44	P412134	ボタン アーム巻取	BUTTON ARM TAKE-UP 16-CL
15	4P8TRV014	巻取アーム組立品	REWIND ARM ASSY		45	4P8TRV013	巻取アーム組立品	TAKE-UP ARM ASSY
16	4P55642	ワッシャ 角棒巻返	WASHER SQUARE SHAFT	16-CL	46	4M50244	ベルト案内ローラ	BELT GUIDE ROLLER 16-AL
17	4P31853003	組立アーム(1) 卷返	ARM(1) REWIND ASSY		47	4P55605	段付ネジ レバーアーム	SCREW LEVER ARM 16-CL
18	4P55623	制動バネ 卷返	BRAKE SPRING REWIND	16-CL	48	P412283003	組立アーム(1) 卷取	ARM(1) TAKE-UP ASSY
19	4P55635	間座 ブーリ軸巻返	WASHER PULLEY SHAFT	16-CL	49	6B20601201	ラジアル玉軸受 SSL-1260ZZ	B-BEARING (SSL-1260ZZ) 16-CL
20	P412321	シンクロベルト	SYNCHRO BELT (206XL016G)	16-CL	50	P414086	座板 制動バネ巻取	WASHER BRAKE SPRING 16-CL
21	4P8CL0039	巻返角棒シャフト組立品	REWIND SQUARE SHAFT ASSY	16-CL	51	4M50105	制動バネ(2) 卷取	BRAKE SPRING(2) TAKE-UP CX-350 XENON
22	P412384	組立アームガイド ローラ巻返	GUIDE ROLLER REWIND ASSY	16-CL	52	4M43602	ブーリ(2) 上巻取	PULLEY(2) UPPER TAKE-UP 16-AL
23	P412212	ベルトローラ 卷返	ROLLER BELT REWIND	16-CL	53	P415262	組立角棒シャフト(2)	SQUARE SHAFT ASSY 16-CL
24	6B10802201	ラジアル玉軸受 (608Z)	B-BEARING (608Z)	16-CL	54	P414261	組立レバー アーム巻取	LEVER ASSY TAKE-UP ARM XP-550
25	P412265	組立ボタン アーム(1) 卷返	BUTTON ARM REWIND ASSY	16-CL	55	6B10601601	ラジアル玉軸受 (DG0616ZC)	B-BEARING (DG0616ZC) 16-CL
26	P412171B	ブーリ軸 卷返	PULLEY SHAFT REWIND	※16-CL	56	4M41097	ブーリ軸 卷取	PULLEY SHAFT TAKE-UP CX-350 XENON
27	4P20575002	アーム(2) 卷返	ARM(2) REWIND		57	6VS215MXL	歯形ベルト 215MXL	BELT (215MXL) CX-350 XENON
28	4P55607	間座 防振ゴム	WASHER VIB. PROOF RUBBER	16-CL	58	4P20576003	アーム(2) 卷取	ARM(2) TAKE-UP
29	4E42016	防振ゴム モータ	VIBRATION PROOF RUBBER	16-CL				
30	P412290B	取付板 電磁クラッチ	HOLDER MAGNET CLUTCH	16-CL				



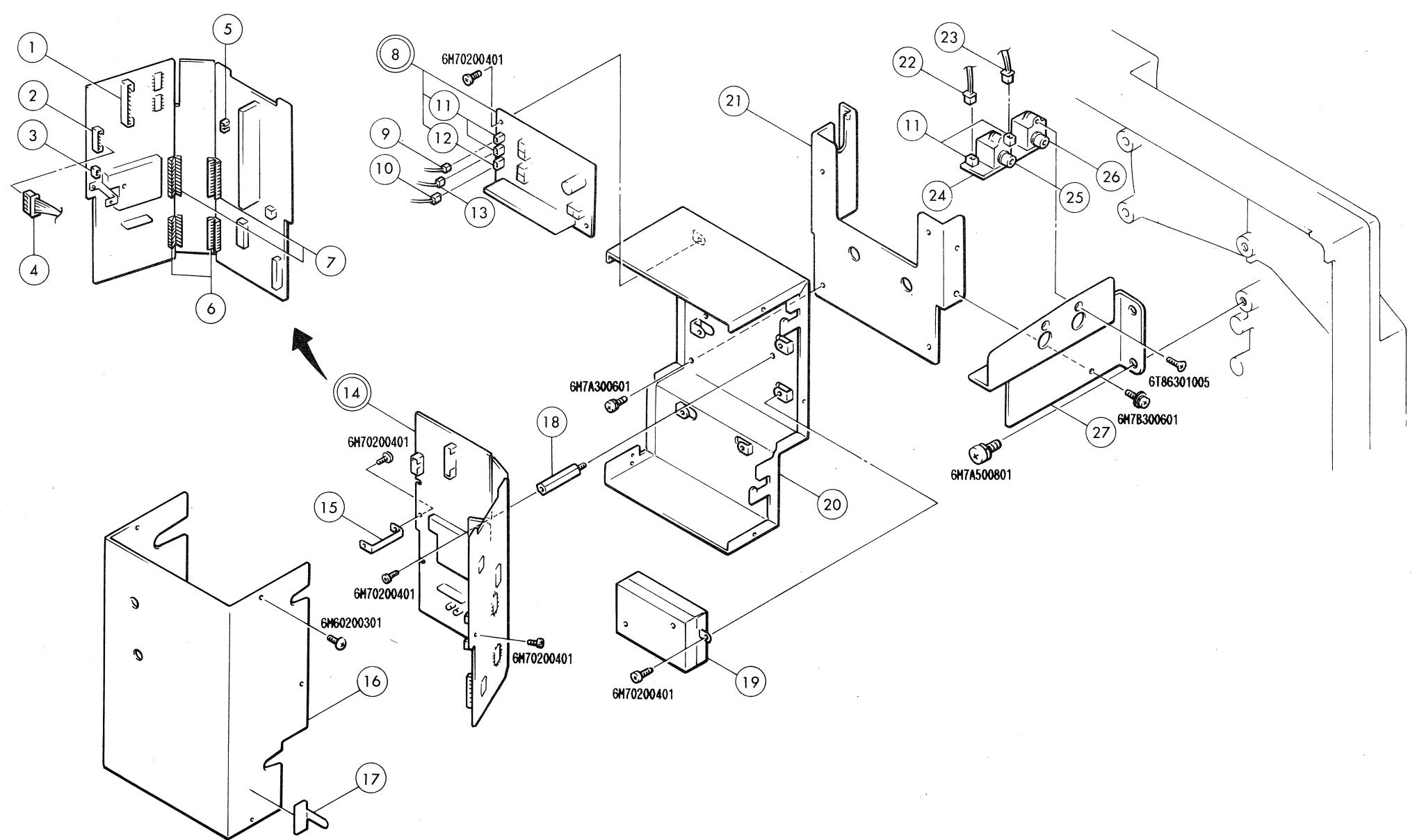
ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL
1	4M40213	ボス ファン	BOSS FAN		31	4M45213	板 コードホルダ	PLATE CORD HOLDER	
2	4M40214	ファン	FAN		32	P412127	組立Vベルトガイドローラ	V BELT GUIDE ROLLER ASSY	16-CL
3	6Z0046	リード押エ(A)	CORD SUPPORTER	16-AA	33	4P52527	モータ取付ネジワッシャ	MOTOR FIX SCREW WASHER	16-CL
4	4P55295	座金 アオリ装置バネ掛け	WASHER (1X3.2X6) BS	ST-1200	34	4P46467	バネ フライホイル	FLYWHEEL SPRING	16-CL
5	4M40152	ホルダ(3) シンクロナスマータ	HOLDER(3) MOTOR		35	4P55844	間座 ウォーム	WASHER WORM	16-CL
6	4M30077	ホルダ(2) シンクロナスマータ	HOLDER(2) MOTOR		36	4P48612	フライホイル	FLYWHEEL	16-CL
7	4M30085	シンクロナスマータ	SYNCHRONOUS MOTOR		37	4P43587B	コード押エ	CORD PRESSER	16-CL
8	4M30076	ホルダ(1) シンクロナスマータ	HOLDER(1) MOTOR		38	P412203	Vベルト 卷取	V BELT TAKE-UP	16-CL
9	P414595	ブーリ組立(2) 60HZ	PULLEY(2) ASSY (60HZ)	XP-550SM	39	P412161B	組立ウォームギヤ(2)	WORM GEAR(2) ASSY	16-AL
10	P414594	ブーリ組立(1) 50HZ	PULLEY(1) ASSY (50HZ)	XP-550SM	40	P412181	巻込ヨケ スプロケット	FILM GUIDE SPROCKET	16-CL
11	6VS136XL25	シンクロベルト 136XL025G 60HZ	SYNCHRO BELT (136XL025G) (60HZ)		41	P412183	第2スプロケット	SECOND SPROCKET	16-CL
12	6VS140XL25	シンクロベルト 140XL025G 50HZ	SYNCHRO BELT (140XL025G) (50HZ)		42	4P44463	16mmスプロケット	SPROCKET	16-CL
13	4M42663	ユニバーサルジョイント	UNIVERSAL JOINT	16-AL	43	P412141	キャップ スプロケット	CAP SPROCKET	16-CL
14	4M41239B	組立中間軸(2)	MIDDLE SHAFT(2) ASSY	※16-CL	44	P414946	後足(2)	REAR LEG	16-CL
15	P412191B	メタル押エ	METAL PRESSER	16-CL					
16	4P46460	メタル 中間軸	MIDDLE SHAFT METAL	16-CL					
17	4P54650	円筒カム軸ワッシャ(2)	CAM SHAFT WASHER 2	16-CL					
18	4P55929	間座 ウォーム(2)	WASHER WORM 2	16-CL					
19	P412285/	ウォーム(2)	WORM 2	16-CL					
20	4P49039	間座 主軸	MAIN SHAFT WASHER	16-CL					
21	5V2078	ACファン 3108PS-10W-B30	AC FAN						
22	4M31875	取付板 ファン	HOLDER FAN						
23	4M45466	補強板 ファン取付	REINFORCE PLATE FAN						
24	P412243	取付金具 アオリ棒	METAL TILTING LEG	16-CL					
25	P412178B	アオリ棒	TILTING LEG	16-CL					
26	4M45334	ボス 前足	BOSS FRONT LEG						
27	P412153B	前足	FRONT LEG	16-CL					
28	4P55664	ワッシャ アオリ棒	WASHER TILTING LEG	16-CL					
29	6FM3050125	六角穴付ボルト M5×12	HEXAGON HOLE BOLT M5X12	16-CL					
30	5G5005	ストレインリーフブッシング SR-5P-4	CORD BUSH (SR-5P-A)	16-CL					



ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME		COMMON USE MODEL
1	4M45399	チューブ トランス		TUBE TRANSFORMER	(3)	4K02267	電源コード組立品		POWER CORD ASSY
2	5V3038	トランス TRV		TRANSFORMER TRV	32	P412207	組立レバー(2) M-O切換		LEVER(2) M-O SWITCH ASSY
3	6Z0046	リード押エ(A)		CORD SUPPORTER	16-AA				16-CL
4	4M31721	シャーシ(4) トラビアンプ		CHASSIS(4) AMPLIFIER					
5	5H1030007	ミゼットヒューズ 3A		MIDGET FUSE (3A)	ST-180				
6	5H2015	ヒューズホルダ S-N2250		FUSE HOLDER (S-N2250)	16-CL				
7	4M45467	補強板 トランス		PLATE TRANSFORMER					
8	5E3022	ロータリスイッチ P241A11-5J1A1135		ROTARY SWITCH					
9	4M45215	ボール押エバネ		SPRING BALL SUPPORTER					
10	4M45214	ホルダ M-O切換		HOLDER M-O SELECT					
11	4M42701	組立レバー SW・M-O切換		LEVER ASSY M-O SELECT	16-AL				
12	4M50255	バネ M-O切換		SPRING M-O SELECT	16-AL				
13	4M45216	軸 M-O切換		SHAFT M-O SELECT					
14	4M31685	シャーシ(5) アンプ		CHASSIS(5) AMPLIFIER					
15	4K02170	2P コード組立品		2-P CORD ASSY					
16	5N202962	2P ハウジング 5197-02		2-P CONNECTOR (5197-02)					
17	5N202961	2P ウェハ 5281-02A		2-P CONNECTOR (5281-02A)					
18	5H1030004	ヒューズ 3A		FUSE (3A)	ST-180				
19	5N202361	2P ピンヘッダ IL-2P-S3EN2		2-P CONNECTOR 1	16-CL XENON				
20	5N210031	10P ピンヘッダ IL-10P-S3EN2		10-P CONNECTOR 1	ST-180				
21	4K02172	10P コード組立品		10-P CORD ASSY					
22	4K02169	PLコード組立品		PL CORD ASSY					
23	5N204122	4P PCボードコネクタ S-12502		4-P CONNECTOR (S-12502)	16-CL				
24	5E5084	スライドスイッチ SL106-1-2		SLIDE SW (SL106-1-2)					
25	5H2034	ヒューズホルダ S-N5051		FUSE HOLDER (S-N5051)					
26	5N203231	3P ピンヘッダ IL-3P-S3EN2		3-P CONNECTOR 1	16-CL XENON				
27	5N50392	3.5mmジャック X-G8017		JACK 3.5mm (X-G8017)	16-CL XENON				
28	5N204121	4P PCボードコネクタ 48-0009		4-P PIN CONNECTOR 1	16-CL				
29	4M45275	取付板 アンプ		HOLDER AMPLIFIER					
30	4P8TRV901	トランス・アンプ組立品		AMPLIFIER ASSY					



ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	
1	70851441	CCDシールドケース組立品	SHIELD CASE ASSY CCD		31	5L40600111	ハロゲンランプ JDR 6V-10W	LAMP (6V-10W)
2	70382010	遮光枠	SHADE FRAME		32	5N1045	ランプソケット HS-G4N2	LAMP SOCKET (HS-G4N2)
3	4M50093	調整ネジ ホルダ映写レンズ	SCREW HOLDER PROJ. LENS	16-AL	33	4M45339	ホルダ(2) ランプ	HOLDER(2) LAMP
4	4P8TRV032	プリント基板 ボリューム組立品	VOLUME PLATE ASSY					
5	4M45345	ツマミ 色調整	KNOB COLOR CONTROL					
6	5N204371	4P ピンヘッダ IL-S-4P-S2T2EF	4-P CONNECTOR 1					
7	4M45473	カバー プリント基板ボリューム	COVER VOLUME PLATE					
8	4K02233	4P コネクタ組立品	4-P CONNECTOR ASSY					
9	4M50523	間座 ボリューム基板	WASHER VOLUME PLATE					
10	4K02236	2P コネクタ組立品 (6)	2-P CONNECTOR ASSY 6					
11	4K02234	10P コネクタ組立品	10-P CONNECTOR ASSY					
12	4K02235	2P コネクタ組立品 (5)	2-P CONNECTOR ASSY 5					
13	4P8TRV025	CCDカメラヘッド組立品	CAMERA HEAD ASSY CCD					
14	70361247A	CCD取付ベース	BASE CCD					
15	70153161	組立光学水晶フィルタ	OPTICAL FILTER ASSY					
16	4M50552	バネ フレーミングカム	SPRING FRAMING CAM					
17	4M45619	カム フレーミング	CAM FRAMING					
18	4M45616	ツマミ フレーミング	KNOB FRAMING					
19	4M45618	取付板 ホルダ(2) レンズ	PLATE HOLDER(2) LENS					
20	4M45621	組立ベース カメラヘッド	BASE ASSY CAMERA HEAD					
21	4M31744B	ホルダ(2) レンズ	HOLDER(2) LENS					
22	4M45340	ホルダ(1) Cマウント	HOLDER(1) C MOUNT					
23	4M45617	間座 フレーミング支点	WASHER FRAMING					
24	4M45343	リング 紋り	RING IRIS					
25	6Z0109	TVカメラレンズ F1.4-25mm	LENS (F1.4-25mm)					
26	4M45440	バネ レンズ押エ	SPRING LENS SUPPORTER					
27	4M45344	リング スケール	RING SCALE					
28	4M45346	ホルダ 映写レンズ	HOLDER PROJECTION LENS					
29	4M45338	ホルダ(1) ランプ	HOLDER(1) LAMP					
30	6Y26519012	ユリア化粧ネジ M3×4	SCREW (M3X4)					



ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL	ILLUST NO.	PART NO.	PART NAME	COMMON USE MODEL
1	23164469	10P ブラグ	10-P PLUG				
2	23164473	6P ブラグ	6-P PLUG				
3	23164477	2P ブラグ	2-P PLUG				
4	4K02232	6P コネクタ組立品(2)	6-P CONNECTOR ASSY 2				
5	23164410	2P ブラグ GRN	2-P PLUG GREEN				
6	23364187	10P コネクタ B/B2.0mm	10-P CONNECTOR (B2.0mm)				
7	23364188	13P コネクタ B/B2.0mm	13-P CONNECTOR (B2.0mm)				
8	4P8TRV028	YCMIX基板組立品	YCMIX CIRCUIT ASSY				
9	4K02231	6P コネクタ組立品(1)	6-P CONNECTOR ASSY 1				
10	4K02227	2P コネクタ組立品(1)	2-P CONNECTOR ASSY 1				
11	5N202681	2P ピンヘッダ IL-S-2P-S2T2-EF	2-P CONNCETOR 1				
12	5N202911	2P ピンヘッダ 赤 IL-S-2P-S2T2-EFR	2-P CONNECTOR 1 RED				
13	4K02228	2P コネクタ組立品(2)	2-P CONNECTOR ASSY 2				
14	4P8TRV029	VIDEO PZ SYNC基板組立品	VIDEO PZ SYNC CIRCUIT				
15	70842416	ビデオ連結金具	CONNECT METAL VIDEO				
16	4M31749	カバー カメラコントロールユニット	COVER CONTROL UNIT				
17	5G6010	ステッカ T-18	STICKER (T-18)	16-AL			
18	4M50524	スタッダ シャーシ	STUD CHASSIS				
19	4P8TRV027	POWER基板組立品	POWER CIRCUIT ASSY				
20	4M31748	シャーシ カメラコントロールユニット	CHASSIS CONTROL UNIT				
21	4M31745	ホルダ カメラコントロールユニット	HOLDER CONTROL UNIT				
22	4K02229	2P コネクタ組立品(3)	2-P CONNECTOR ASSY 3				
23	4K02230	2P コネクタ組立品(4)	2-P CONNECTOR ASSY 4				
24	4E44123	プリント基板 出力端子	POWER TERMINAL PLATE				
25	5N50822	ビンジャック 黄 YKB11-0252	JACK (YKB11-0252 YELLOW)				
26	5N50812	ビンジャック 赤 YKB11-0306	JACK (YKB11-0306 RED)				
27	4M31747	ホルダ コネクタ	HOLDER CONNECTOR				

E X P O R T   T Y P E

ITEM NO.	PAGE AND ILLUST NO.	PART NO.	PART NAME	REMARKS	
1	1-22	4N40752003	RATING PLATE (120V-60HZ)	CANADA U. S. A	
2	8-31	4K02268	POWER CORD ASSY	CANADA U. S. A	

P A R T S N U M B E R I N D E X

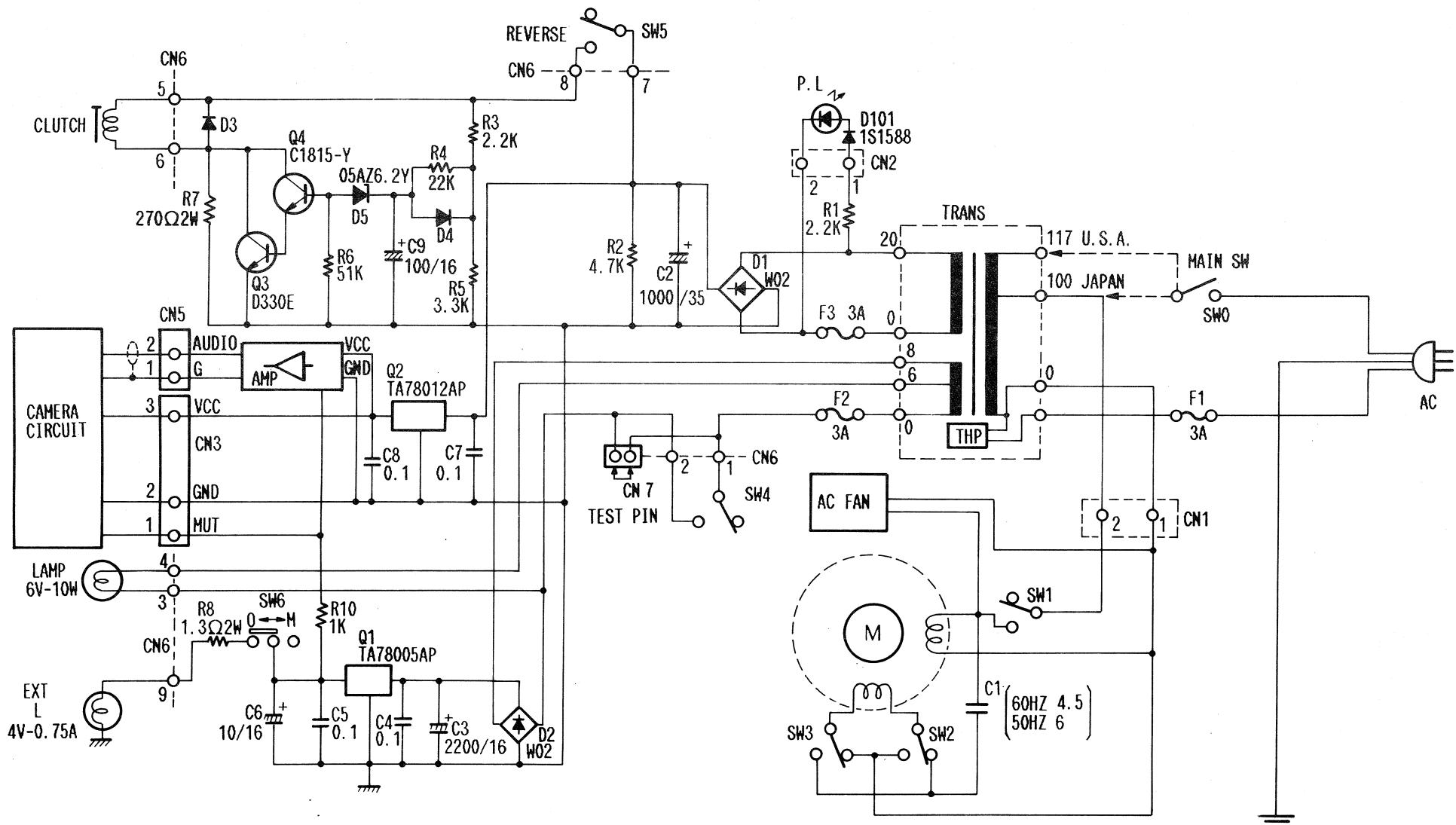
PART NO.	RAGE AND ILLUST NO.	PART NO.	PAGE AND ILLUST NO.	PART NO.	RAGE AND ILLUST NO.	PART NO.	PAGE AND ILLUST NO.	PART NO.	PAGE AND ILLUST NO.
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P411298	5-30	P412107	3-11	P412201	4-3	P412297	5-17	P412929B	4-48
P411317B	5-24	P412112	2-29 3-52	P412202	2-44	P412316	6-6	P412930	2-34
P411319B	5-5	P412114	2-30 3-42	P412203	7-38	P412321	6-20	P412935	2-7
P411322	5-8	P412123	4-31	P412204B	4-17	P412328	6-2	P412938B	5-40
P411325	5-29	P412127	7-32	P412206B	2-14	P412338	6-41	P412971	2-16
P411326	5-27	P412129	2-43	P412207	8-32	P412339	2-2	P413094B	2-11
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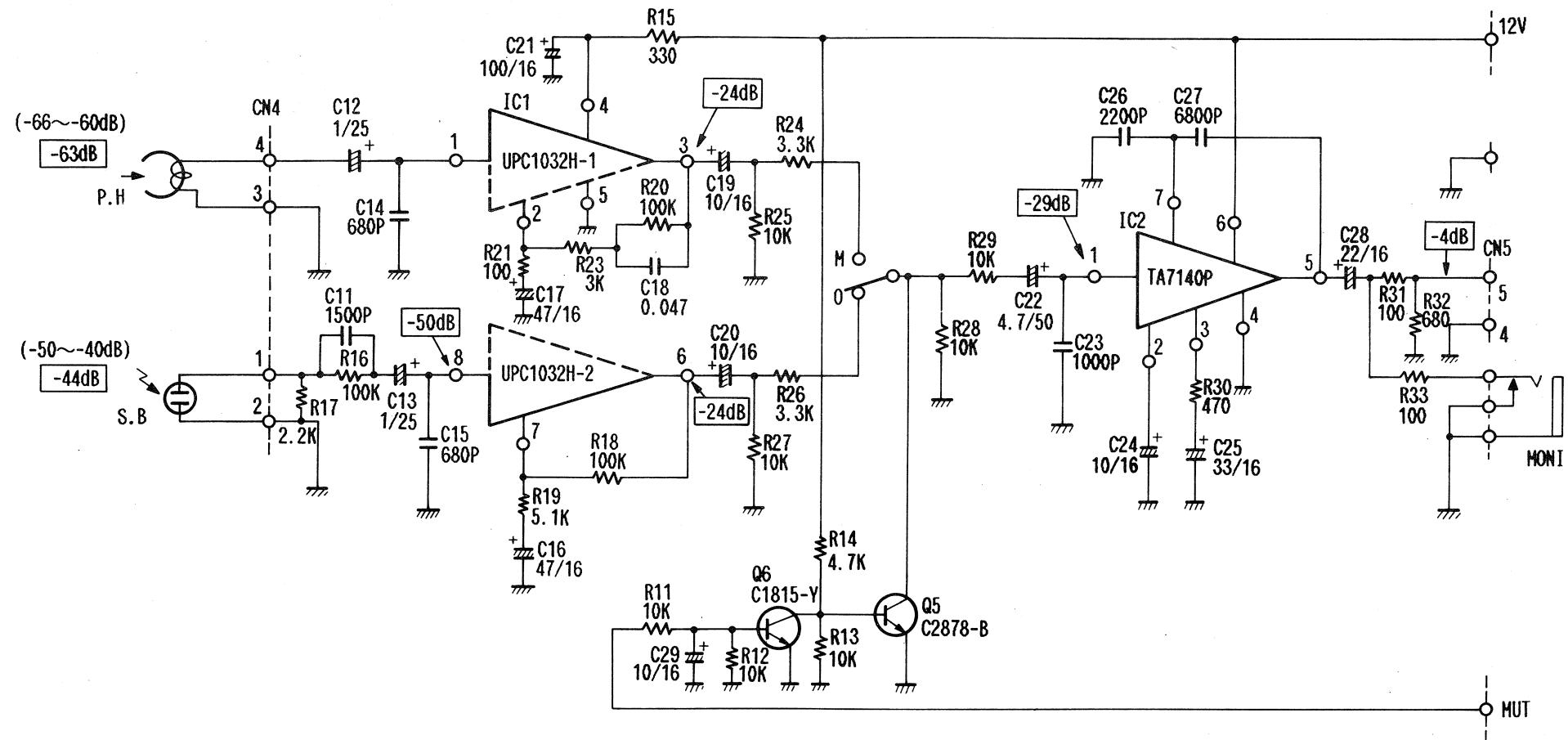
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Q	5ATA78005P	IC (TA78005AP)	Q 1
	5ATA78012P	(TA78012AP)	Q 2
	5S1D330E	TRANSISTOR (2SD330E)	Q 3
	5S1C1815Y	(2SC1815-Y)	Q 4
D	5S2W02F	RECTIFIER (W02)	D 1 D 2
	5S2S5277GL	DIODE (SS277G-LC-7-10)	D 3 D 4
	5S205AZ621	ZENER DIODE (05AZ6.2V-TP)	D 5
	5S21S1588	DIODE (1S1588)	D 10 1
PL	5S2MD31ARB	LED (GL-MD5-31AR-B)	PL
C	5DQ0150515	CERAMIC CON 0.1MF 50V	C4 C5 C7 C8
	5DK4552211	POLYEST FILM 4.5MF 220V	C1 (60HZ)
	5DK0662211	6MF 220V	C1 (50HZ)
	5DB0171601	AL ELECT CON 10MF 16V	C6
	5DB0181604	100MF 16V	C9
	5DB0193507	1000MF 35V	C2
	5DB2281605	2200MF 16V	C3
R	5R5B013J71	METAL FILM R 1.3Ω 2W	R8
	5R5B027171	270Ω 2W	R7
	5R1C001341	C FILM FIX R 1KΩ 1/4W	R10
	5R1C022241	2.2KΩ 1/4W	R1 R3
	5R1C033241	3.3KΩ 1/4W	R5
	5R1C047241	4.7KΩ 1/4W	R2
	5R1C022341	22KΩ 1/4W	R4
	5R1C051341	51KΩ 1/4W	R6



SCHEMATIC DIAGRAM FOR AMPLIFIER (E44112)

E L E C T R I C P A R T S L I S T

ITEM	PART NO.	PART NAME	CIRCUIT DIAGRAM NO.
IC	5AUPC1032H	IC (UPC1032H)	IC1
	5ATA7140P	(TA7140P)	IC2
Q	5S1C2878B1	TRANSISTOR (2SC2878-B)	Q5
	5S1C1815Y	(2SC1815-Y)	Q6
C	5DQ6810511	CERAMIC CON 680PF 50V	C14 C15
	5DJ0130511	POLYEST FILM 1000PF 50V	C23
	5DJ1520511	1500PF 50V	C11
	5DJ2220511	2200PF 50V	C26
	5DJ6820512	6800PF 50V	C27
	5DJ4730511	0.047MF 50V	C18
	5DB0162502	AL ELECT CON 1MF 25V	C12 C13
	5DB4750511	4.7MF 50V	C22
	5DB0171601	10MF 16V	C19 C20 C24 C29
	5DB2261604	22MF 16V	C28
	5DB3361601	33MF 16V	C25
	5DB4761602	47MF 16V	C16 C17
	5DB0181602	100MF 16V	C21
	5R1C0001241	C FILM FIX R 100Ω 1/4W	R21 R31 R33
R	5R1C033141	330Ω 1/4W	R15
	5R1C047141	470Ω 1/4W	R30
	5R1C068141	680Ω 1/4W	R32
	5R1C022241	2.2KΩ 1/4W	R17
	5R1C003341	3KΩ 1/4W	R23
	5R1C033241	3.3KΩ 1/4W	R24 R26
	5R1C047241	4.7KΩ 1/4W	R14
	5R1C051241	5.1KΩ 1/4W	R19
	5R1C001441	10KΩ 1/4W	R11 R12 R13 R25 R27 R28 R29
	5R1C001541	100KΩ 1/4W	R16 R18 R20

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