SERVICE MANUAL

16-A

ELMO CO., LTD.
NAGOYA, JAPAN

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C O N T E N T S

I. SPECIAL TOOLS AND INSTRUMENTS

A. SPECIAL TOOLS

1. P012 Special Spanner
   (Refer to Par. III-B-1-c)

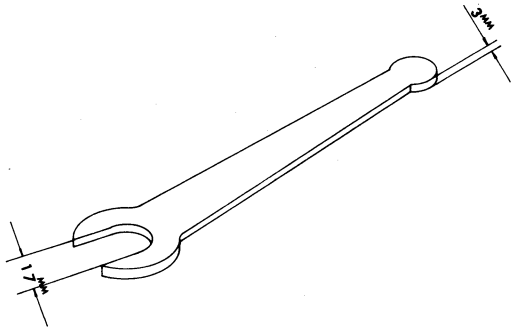


Fig. 1

2. P014 Special Spanner
   (Refer to Par. III-D-1-i)

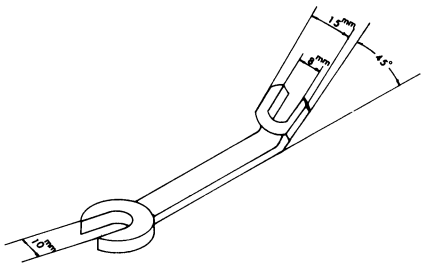


Fig. 2

3. P028 Special Driver
   (Refer to Par. IV-A-8)

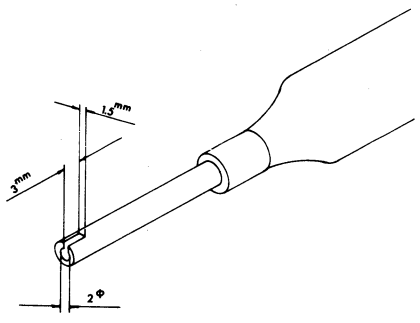


Fig. 3

B. INSTRUMENTS FOR AMPLIFIER AND CONNECTION

1. P029 Amplifier Checker

Input: (1) - Magnetic 64.8dB
(2) - Optical 59.9dB

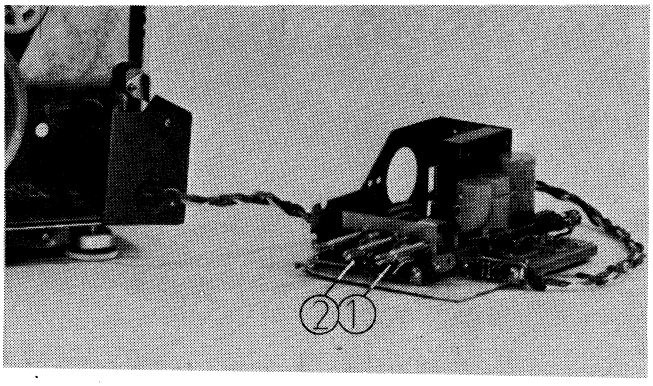


Fig. 4

2. RC Oscillator

Sine Curve: 400Hz - 0dBm

3. Resistance Attenuator

600 ohms Unbalance Type

4. Dummy Box

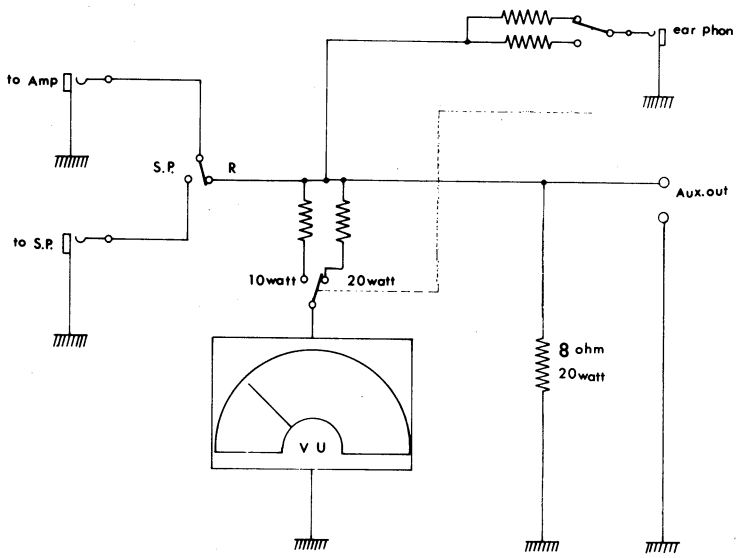
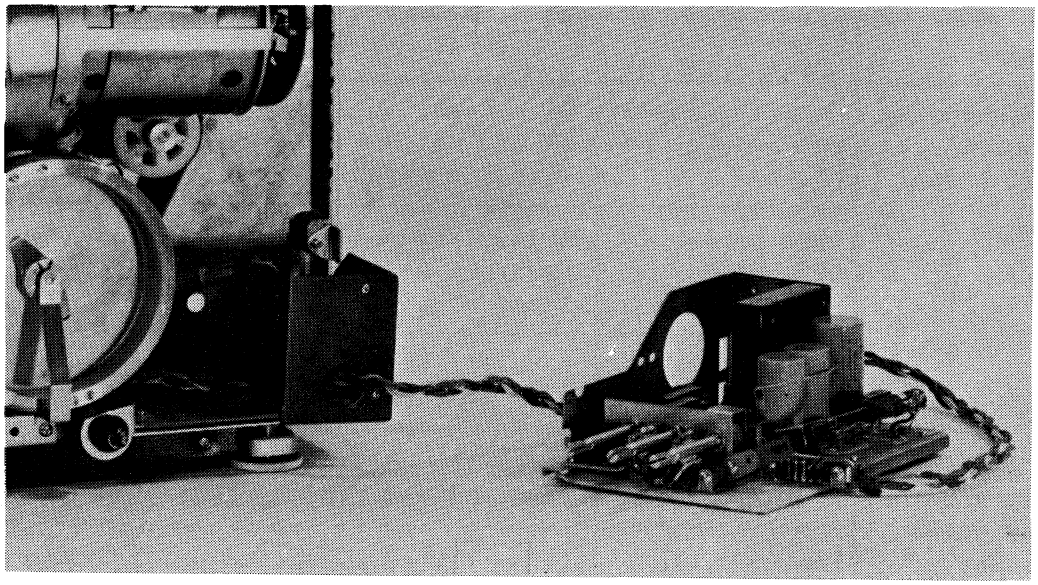


Fig. 5

5. Connecting Diagram



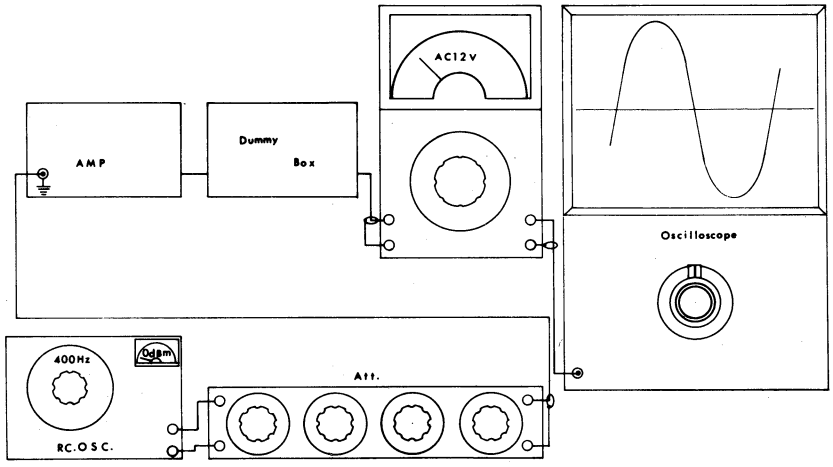


Fig. 6

II. TROUBLE SHOOTING

A. FILM TRANSPORTATION

Case	Check Point (Parts List)	Repairing	
Auto-threading mechanism cannot be set	Thread stopper guide (P5-78)	When Motor switch is "OFF", the guide should not interrupt the movement of Thread stopper.	
	Film guide (P5-61)	Adjust its position not to touch Pressure roller 1, Threading guide 1 and 2.	
	Thread lock lever (P3-18)	Adjust its position.	
Film passing is not smooth during auto-threading	Loop former (P4-40, 42)	Check the clearance between Loop former 1 and 2.	P-26
	Pressure plate (P6-23)	It must keep 1.5-2.0mm off Aperture plate in parallel during auto-threading.	P-26
	Aperture plate (P6-5)	Check the escape of Film Guide pressure.	P-26
	Threading guide (P5-53, 64, 65)	Check the respective position of them. Check the defacement of their surfaces. Check the respective position of Pressure roller, Pad roller and Middle tension roller.	P-29
Motor does not run during auto-threading	Thread contact presser (P3-24)		P-26
Film jumping	Claw (P8-43)	If the tip of Claw could not protrude far enough above Aperture plate or is not in perforation during feeding, adjust the position of Claw by moving Film guide.	
	Aperture plate (P6-5)	Check the pressure of Film side pressure 40-50g, and check the its movement.	
	Pressure plate (P6-23)	Adjust the pressure of Pressure plate spring at 100-120g. Pressure plate must press Aperture plate with the whole surface of it. If not, adjust the position of Pressure plate.	
	Loop setter (P3	Check the action of it.	P-28

A. FILM TRANSPORTATION (Cont'd)

Case	Check Point (Parts List)	Repairing	
Picture flow	Loop setter (P3)	Check and adjust the action of it. Check the abrasion of Rubber roller.	P-28
	Loop former 2 (P4-40)	Check the damage of it. Adjust the active timing.	P-28
	Feeding unit assy (P8-j)	Check the damage of Claw and adjust the active timing of Claw.	
Unabling to switch 24 - 18 f/s	Loop former 2 (P4-40)	Check the active timing of it.	P-28
	Feeding unit assy (P8-j)	Adjust the timing of the frame number switching.	
Film winding is insuf-ficient	Friction wheel (P2-11, 14)	Clean the stain of it. Check the alignment of Friction wheel 2 and Take-up friction wheel.	P-16
	V shaped belt 6 (P2-18)	Adjust the tension of it.	
	Take-up gear 3 (P2-27)	If the roller clutch inferior, replace Take-up gear 3.	
	Timing pulley 1 (P4-37)	Check the damage of it. Check the looseness of its attaching screw.	
Take-up reel cannot wind at all	Belt (P2-18, 3-5)	If Synchronous belt 270 and/or V shaped belt 6 is broken, replace it.	
	Take-up gear 3 (P2-27)	If the roller clutch is bad, replace Take-up gear 3.	
	Timing pulley 1 (P4-37)		
	Screws	Check the looseness of the each fixing screw of Timing pulley 1, Rear arm lower pulley, Friction wheel 2 and so on.	
Film winding is excessive	Friction wheel (P2-11, 14)	Remove the stain outside.	
Front reel cannot rewind at all during high speed rewinding	Rewind arm V belt (P2-52)	If the belt is broken, replace it.	
	Rewind gear 1 (P2-54)	If the caulking is loose or the roller clutch is damaged, replace Rewind gear 1.	
	Rewind gear (P3-47)	Check the damage of Rewind gear, Rewind friction wheel 2 and Timing pulley 1.	

FILM TRANSPORTATION (Cont'd)

Case	Check Point (Parts List)	Repairing	
Film rewinding is insuf-ficient	Rewind arm V belt (P2-52)	Adjust the tension of it.	
	Rewind gear (P3-47)	Adjust the position of it.	P-12
	Timing pulley 1 (P-37)	Check the damage of it.	
	Rewind arm shaft pulley (P2-51)	Check the looseness of the fixing screw for it.	
Film hangs down during forward projection	Front arm brake spring (P2-38)	Adjust the pressure of it.	
	Rewind gear 1 (P2-54)	Adjust the clearance between Rewind gear 1 and Take-up wheel collar at 0.2-0.4mm. Check the damage of Rewind gear 1.	P-12
Arm cannot be locked in position	Arm lock pin (P2-29)	Clean it. If it wears, replace it. Replace Rewind arm 1.	
Noisy projection	Oil tank assy (P9-k)	Check the oil level. The oil level should be kept between the two lines on the oil level gauge. Check the action of Oil tank; If oil does not flow from Ejection oil pipe faucet, refer to 6 in Fig.13, remove Oil pump lever 2 and pump with hand. When oil is not bailed out, replace Oil tank assy with new one.	P-23
	Feeding unit assy (P8-j)	If Claw wears or Bearing wears, replace it or Feeding unit assy.	
	Gears	Check abrasions of gears. Check the backlash of gears.	
	Rewind gear 1 (P2-54)	Apply a drop of lubrication oil to Rewind arm pulley shaft. In this case, check the function of high speed rewinding mechanism. If the function is irregular, replace Rewind gear 1.	
	Loop former 2 (P4-40)	Adjust the position of it.	P-28
	Loop setter (P3)	Check the function of it.	P-28
	Sprocket (P4-20)	If the film perforation is flipped by sprocket teeth, replace Sprocket shoe assy and/or Sprocket. If a flip sound is created by the second sprocket, adjust the take-up tension.	P-16

B. MOTOR

Case	Check Point (Parts List)	Repairing	
Motor does not run: * but runs at auto-threading	Remote switch (P11-40)	Replace it. Refer to S7 in Fig. 44.	P-23
	Motor switch (P5-112)	Replace it. Refer to S1 in Fig. 44.	P-23
* at all	See Repairing (P11-37,44,47)	Check the soldering work of lead wire which connects Starting capacitors C1 & C2 to 8-P flat connector (CN2B).	P-20
	Reverse switch (P5-113)	Replace S3 and/or S4 in Fig. 44.	P-23
	Motor (P10-24)	Check Motor itself.	P-24
* at Reverse projection	Reverse switch (P5-113)	Replace S3 and/or S4 in Fig. 44.	P-23
* at forward projection	-"-	-"-	P-23
Motor starting is slow	Relay PA109B (P11-32)	Check it up.	
	Starting capacitors (P11-37, 44)	Replace C1(12MF/220V), C2(8MF/125V), and/or Resistor 5 ohm/1W.	P-20
	Motor (P10-24)	Replace Motor, Main belt or Feeding unit assy. Check the looseness of the fixing screw for Motor pulley.	

C. LIGHT

Lamp does not light	Lamp socket assy (P9-5)	Check it.	
	Lamp switch (P5-112)	Check S2 in Fig. 38.	P-23
Dark image	Lamp (P9-6)	If Lamp is defective, replace it.	
	Ellipse mirror (P9-9)	If Ellipse mirror is dirty, clean it with a neutral cleanser. If the stains do not come out easily, replace it. To obtain the sufficient brightness, adjust the respective position of Lamp and Ellipse mirror.	
	Safety shutter lever (P10-4)	Adjust the function and the position of Safety shutter lever.	P-24
Lamp breaks often	Input voltage	Check the voltage selection terminal of Transformer according to the line. 110V, 117V, 127V, 220V, 230V, 240V.	

D. SOUND

Case	Check Point (Parts List)	Repairing	
Optical sound film cannot be reproduced	Exciter lamp (P5-89)	Check the breakage of it and S7 in Fig. 38. And check the breakage of Amplifier.	
	Sound lens (P5-6)	Check whether it is dirty excessively, and if so, clean it up.	P-32
	Buzz track	Check whether Pressure roller is misplaced.	P-29
	Speaker (P1-6)	Check the breakage of Speaker itself. If so, replace.	
	Speaker cord (P1-16)	Check the breakage of it.	
	Amplifier assy (P11-L)	Check Amplifier assy.	P-37
	Silicon photo diode (P5-3)	Check the breakage of it.	
Output sound is low during optical sound film reproduction	Sound lens (P5-6)	Clean Sound lens. And adjust the position of it.	P-32
	Buzz track	Adjust the position of Pressure roller.	P-29
	Amplifier assy (P11-L)	Check Amplifier assy.	P-37
	Speaker (P1-6)	Check Speaker by replacing with good speaker.	
	Silicon photo diode (P5-3)	If the sensibility is not sufficient, replace it.	
Tone color is inferior during optical sound film reproduction	Exciter lamp (P5-89)	If Exciter lamp is defective, replace. Adjust the position of it.	P-37
	Sound lens (P5-6)	Clean Sound lens. And adjust the position.	P-37
	Buzz track	Adjust the position of Pressure roller.	P-29
	Wow and flutter		P-33
	Speaker (P1-6)	Check Speaker by replacing with good speaker.	
	Amplifier assy (P11-L)	Check Amplifier assy.	

SOUND (Cont'd)

Case	Check Point (Parts List)	Repairing	
Magnetic sound film cannot be reproduced	Sound head (P5-27)	Check the movement of Sound head. If Sound head is defective, replace.	P-31
	Amplifier assy (P11-L)	Check Amplifier	
	Actuator (P11-6)	M-O switch lever must press. M-O actuator securely.	
		If the lead wire interrupts the movement of Actuator, correct it.	
	Film	Check the recording condition of film.	
Output sound is low at magnetic sound film reproduction	Sound head (P5-27)	If Sound head would not be in touch with the sound track exactly, adjust the position of Sound head. If Sound head has been exhausted, replace it.	P-31
	Pad roller (P5-71)	The gap of Sound head should be pressed by the center of Pad roller.	P-30
	Amplifier assy (P11-L)	Check Amplifier	P-37
	Film	Check the recording condition of film.	
Tone color is inferior at magnetic sound film reproduction	Sound head (P5-27)	If Sound head would not be in touch with the Sound track exactly, adjust the position of Sound head. Check the movement of Head lever, and the pressure of Sound head against the film. If Sound head has been exhausted or broken, replace Sound head.	P-31
	Wow and Flutter	Check the respective pressure of Sound head and Pad roller against the film.	P-33
	S/N Ratio	Adjust the position of Cancel coil. Check the position of Pad roller cover. If Amplifier assy is out of order, fix it up.	P-32
	Speaker (P1-6)	If Speaker is inferior, replace it.	

III. DISASSEMBLY & ASSEMBLY

A. FRONT ARM

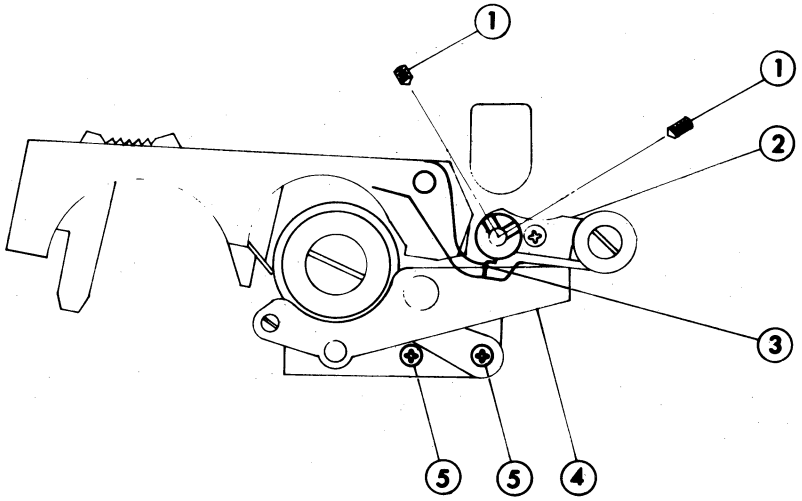


Fig. 7

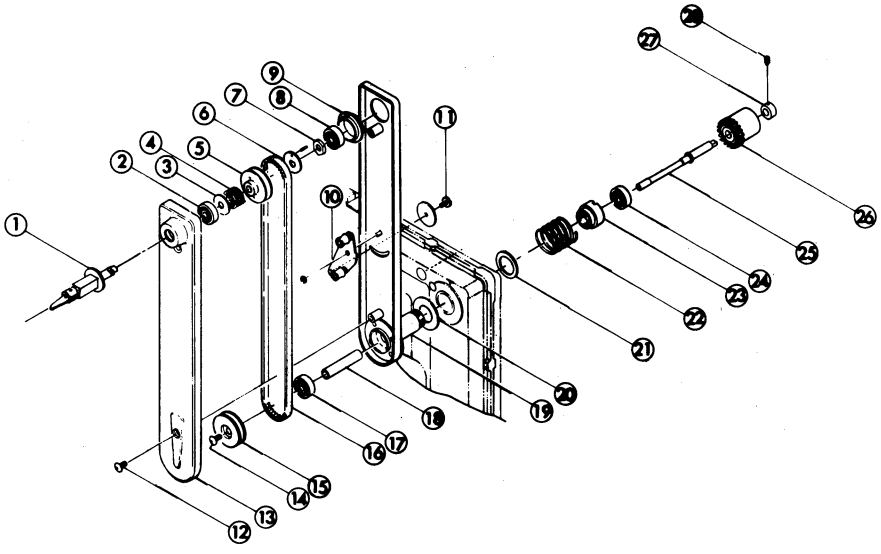


Fig. 8

A. FRONT ARM (Cont'd)

1. Disassembly:

   a. Unscrew Fig.7-1x2, 5x2, and remove Fig.7-2,4.

   b. Unscrew Fig.8-12x2 and remove Fig.8-13.

   c. Unscrew Fig.8-14 and remove Fig.8-15.
      Then pull out Fig.8-25,26,27 simultaneously.

   d. Unscrew Fig.8-23 in turn and remove Fig.8-19.

   e. Unscrew Fig.8-7 in turn and remove Fig.8-1.

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. When assembling Fig.8-13 on Fig.8-19, make sure the Fig.8-16 is inside of both rollers on Fig.8-10.

   b. Adjust the tension of Fig.8-16 by changing the attaching angle of Fig.8-10.

   c. Keep 0.2mm clearance between Fig.8-26 and 27 with 0.2mm thickness gauge.

B. HIGH SPEED REWINDING MECHANISM

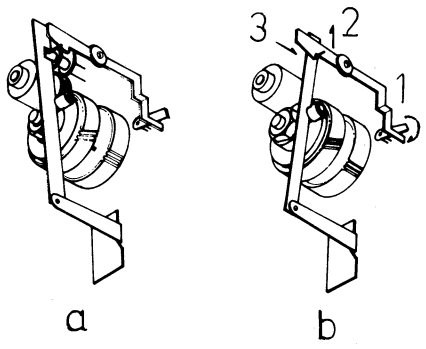


Fig. 9

Rewinding Mechanism:

Fig.9-a shows the state of reverse projection.
Fig.9-b shows the state of high speed rewinding.

The high speed rewinding state is released with the steps from 1 to 3 in Fig.9-b.

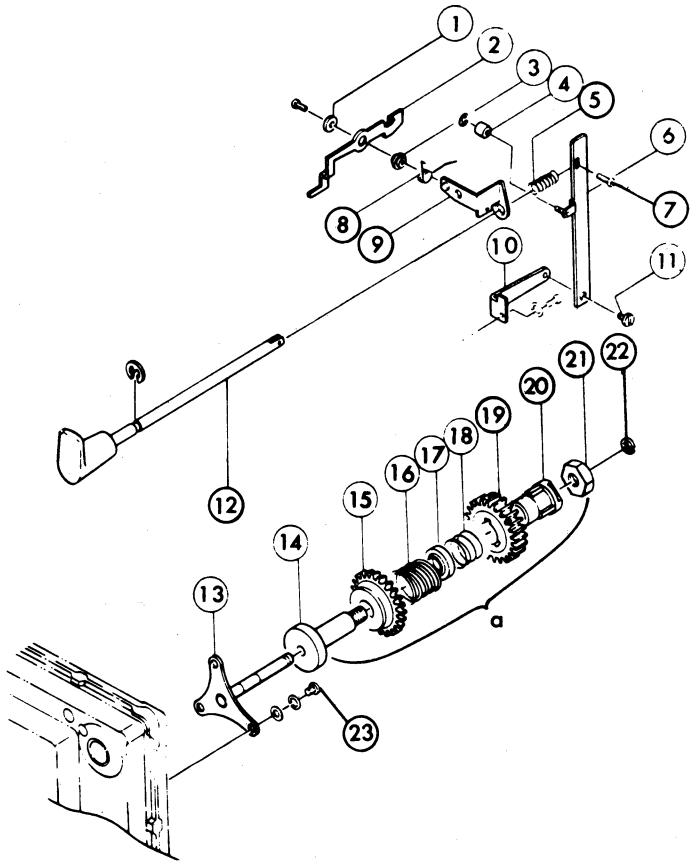


Fig. 10

B. HIGH SPEED REWINDING MECHANISM (Cont'd)

1. Disassembly:

   a. Unscrew Fig.10-11.

   b. Remove Fig.10-22 and Pull out (a) in Fig.10 as assembled parts.

   c. Then disassemble (a) in pieces with Special spanner P012 of Fig.1.

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. Adjust the clamping amount of Fig.10-20 so that the rewind-up tension may be kept at 150-200 gr. during the reverse projection.
   Then fix Fig.10-21.

   b. If you remove Fig.10-13 from the base frame, adjust eht position of Fig.10-13 so that the respective backlash of 0.1-0.2mm may be achieved between Fig.10-15 and the meshing gear against it, and between Fig.10-19 and the meshing gear against it.

   c. If film hangs down in front of Projection lens:

      (1) Increase the pressure of Fig.8-4 and/or
      Increase the belt tension of Fig.8-16.

      (2) Fig.8-26 should turn freely during the forward projection.
      If not, adjust the clearance between Fig.8-26 and 27 at 0.2-0.4mm.
      In case that the clearance is adequate, replace Fig.8-26.

C. REAR ARM

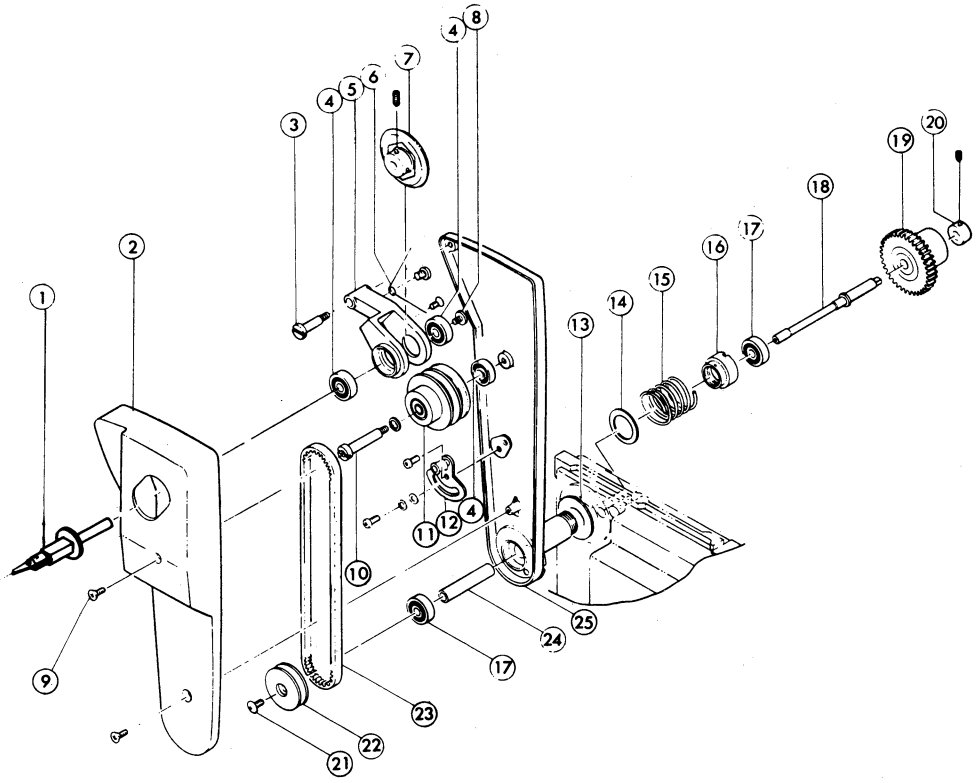


Fig. 11

C. REAR ARM (Cont'd)

1. Disassembly:

   a. Unscrew Fig.11-9x2 and remove Fig.11-2.

   b. Unscrew Fig.11-21 and remove Fig.11-22.

   c. Pull out Fig.11-18,19,20 simultaneously.

   d. Remove Fig.11-14,15,16 and 25 in order.

   e. Unscrew Fig.11-3 and remove Fig.11-5 as assembly

   f. Unscrew Fig.11-8 and two screws for Fig.11-7, and remove Fig.11-1.

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. When attaching Fig.11-5, adjust Fig.11-7 so that both centers of Fig.11-11 and 7 may coincide.

   b. Take-up tension:

      (1) The friction surfaces of Fig.11-7,11 should be kept clean.

      (2) The tension can be adjusted by moving Fig.11-6 and 23.

   c. The defacement of Fig.11-19 will cause the malfunction of film taking-up.

   d. Attach Fig.11-19 to Fig.11-20 while inserting the thickness gauge of 0.2mm.

NOTE: 1. If a creaking noise is heared during reverse projection, apply a drop of oil to Fig.11-19, and yet the noise is recognized, replace Fig.11-19 then.

2. If a slip occurs between Fig.11-18 and 19 replace Fig.11-18 and/or 19.

D. FILM FEEDING MECHANISM

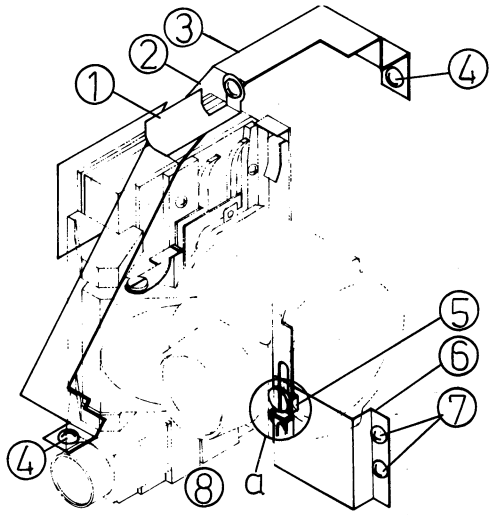


Fig. 12

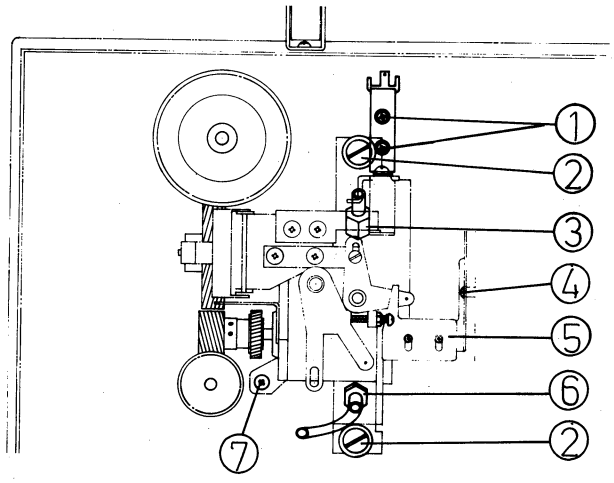


Fig. 13

D. FILM FEEDING MECHANISM (Cont'd)

1. Disassembly:

   a. Remove projection lens.

   b. Remove synchro-belt (270XL025G).

   c. Remove fly-wheel.

   d. Unscrew Fig.12-2,4x2 and remove Fig.12-1,3.

   e. Unscrew Fig.12-7x2 and remove Fig.12-6.

   f. Unscrew Fig.13-1x2.

   g. Remove Fig.14-1.

   h. Unscrew Fig.13-2x2,7.

   i. Pull the film feeding mechanism toward yourself and remove Fig.13-3,6.
   Tool .... P013, P014.

   j. Open the lens holder and pull out the component.

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. Install the lens holder to the base frame and attach Fig.13-3,6.

   b. Hang the main belt.

   c. Tighten securely Fig.13-2x2,7 while observing the engagement of Fig.12-5,8 in the part (a) of Fig.12.

   d. Make Fig.12-1 and the end of the feeding unit frame come closely contact.

   e. Tighten Fig.13-1x2 while observing the position of 4P49204 and 4N01841.

   f. Attach Fig.14-1 while observing the engagement of Fig.14-a.

   g. Attach Fig.13-5 while observing the position of the safety shutter.

   h. Hang the synchro belt.

E. AMPLIFIER

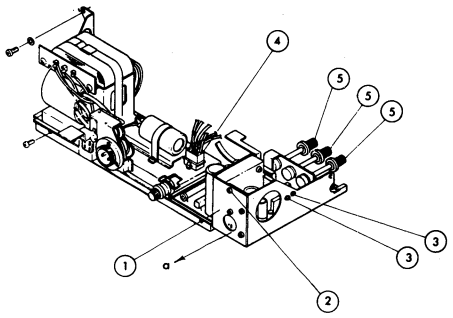


Fig. 14

1. Disassembly:

   a. Pull out Fig.14-5x3.

   b. Unscrew Fig.14-2,3x2.

   c. Pull out the component towards the "a" direction from the body, making certain that the amplifier actuator may not be caught by the amplifier switch cord.
   If you pull out the component, having Fig.14-1, IC may be damaged because the lead wire of IC is pulled with a strong presser.

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. Observing the circuit plate may come under the amplifier rail, insert the amplifier.

   b. Attach the amplifier switch by Fig.14-3x2 while observing the amplifier switch cord.

   c. Paying attention to the each position of the mark of three knobs, insert them.

   d. Tighten Fig.14-2.

F. POWER SOURCE

1. Disassembly:

   a. Unscrew Fig.15-4 and remove Fig.15-3.

   b. Disconnect Fig.16-1,5.

   c. Unsolder Fig.17-1.

   d. Unscrew Fig.15-1,2x2,6x2.

   e. Pull out Fig.15-5 and unsolder the exciter cord from 12P amplifier connector (2).

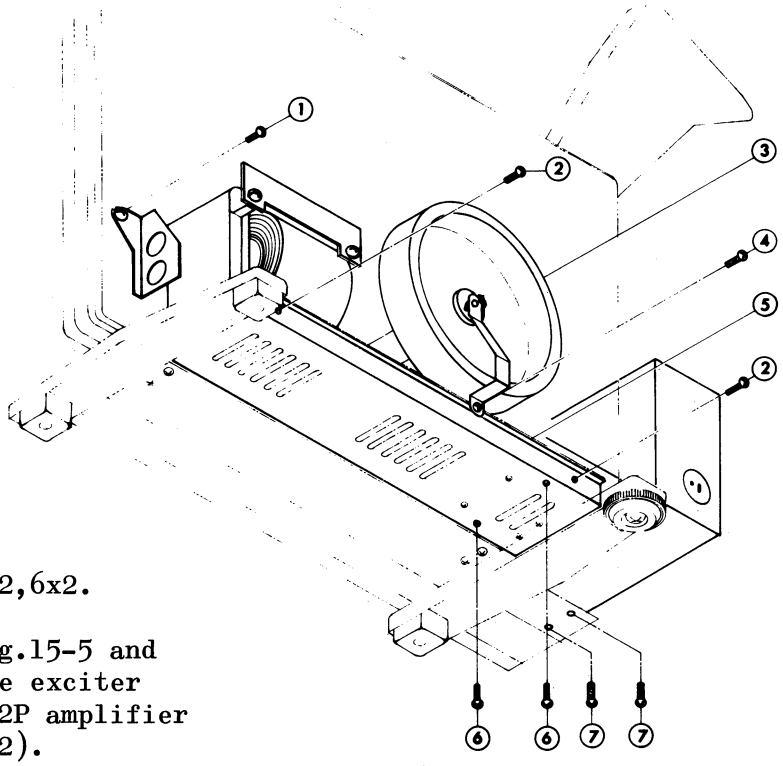


Fig. 15

2. Assembly:

   Assemble in the reverse order of disassembly.

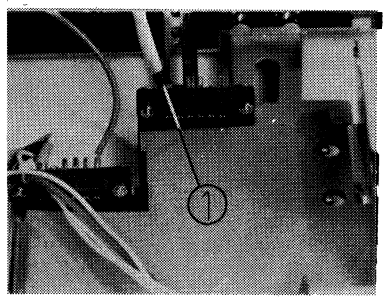


Fig. 17

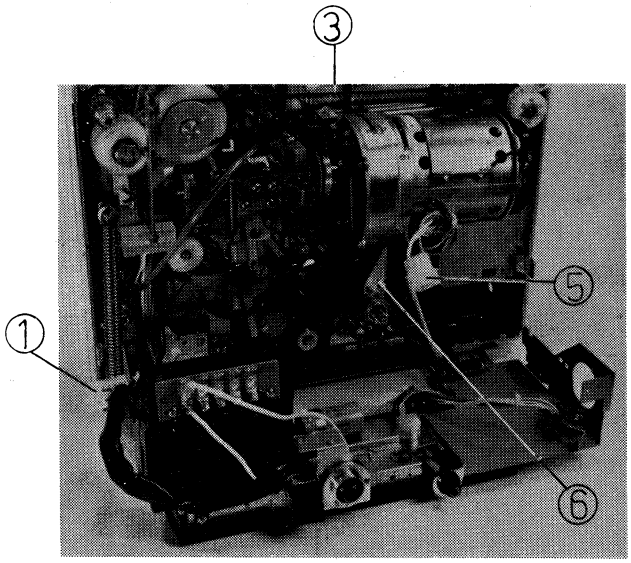


Fig. 16

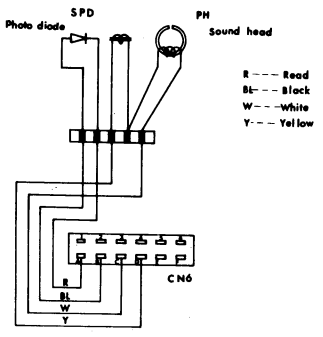


Fig. 18

G. BELT

Regarding the arm belt and the main belt, refer to the previous steps of FRONT ARM, REAR ARM and FILM FEEDING MECHANISM.

Synchro-belt

1. Disassembly:

   a. Loosen the tension of Fig.19-3,5 by changing the position of Fig.19-2,4 and remove Fig.19-1.

   b. Remove Fig.19-7, Fig.16-3, and Fig.19-6 in order.

   c. After pulling the power source unit a bit, remove Fig.16-5,6 and Fig.19-7 in order.

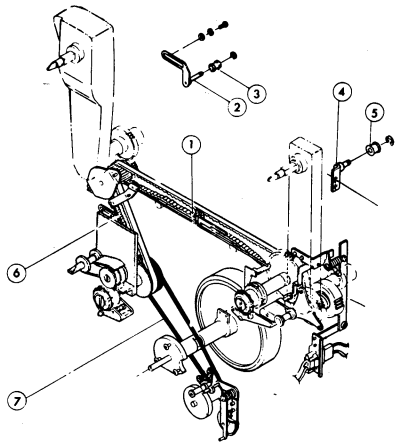


Fig. 19

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. The belt tension:

      Fig.19-1 .... 8 $\pm$1.5mm
      Fig.19-6 .... 3 $\pm$1 mm

      Pushing the belt at the middle position between two pulleys.

   b. Adjust the position of Fig.19-2,4 & Fig.16-3 to carry out tension of Fig.19-1 & Fig.19-6 respectively.

NOTE: 1. W/F is influenced considerably by the tension of these belts. Adjustment should be made most carefully.
2. The defacement of Fig.26-7,8 have direct effects upon W/F.

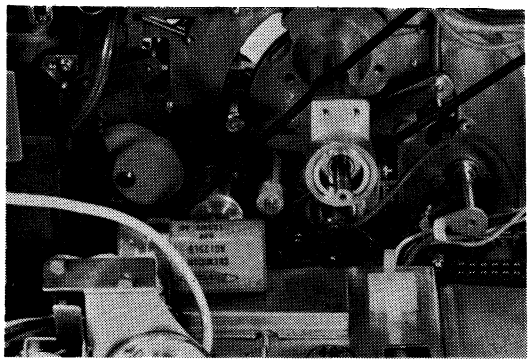


Fig. 20

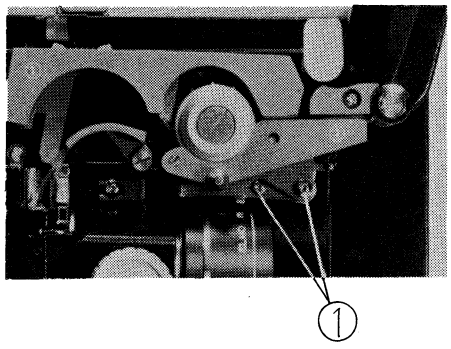


Fig. 21

H. SPROCKET

First Sprocket

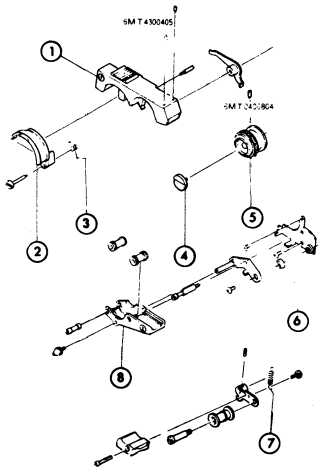


Fig. 22

1. Disassembly:

   a. Remove Fig.22-1.

   b. Remove Fig.22-7 from Fig.22-8 and unscrew Fig.21-1x2, and remove Fig.19-6 then.

   c. Unscrew Fig.19-4 and two set-screws, and pull out Fig.19-5.

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. Fig.19-8,4 should be arranged as a pair of concentric circles.

   b. To adjust the timing of sprocket (Fig.19-5), refer to IV-B.

Second Sprocket

1. Disassembly:

   a. Remove the threading guide (3). (Fig.23)

   b. Remove Fig.23-1.

   c. Detach the spring from Fig.23-3.

   d. Unscrew Fig.23-4x2 and remove the sprocket shoe.

   e. Unscrew Fig.23-2 and two setscrews, and pull out the sprocket.

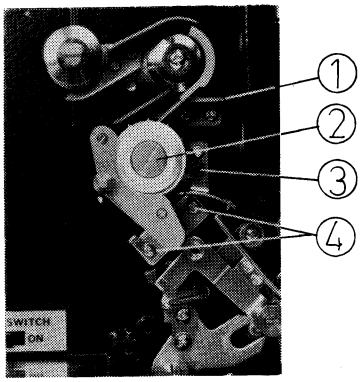


Fig. 23

2. Assembly:

   Assemble in the reverse order of disassembly.

   a. Before attaching the sprocket shoe, hook the wpring to Fig.23-3.

   b. Attach the sprocket shoe so that the sprocket and sprocket shoe may be arranged as concentric circles.

I. OIL PUMP

1. Disassembly:

   a. Remove the switch panel. (Fig.24)

   b. Remove Fig.24-1,2,4 in order.

   c. Remove the power source component.

   d. Disconnect the oil pipe from the film feeding device.

   e. Unscrew Fig.24-3x3 and remove the oil pump.

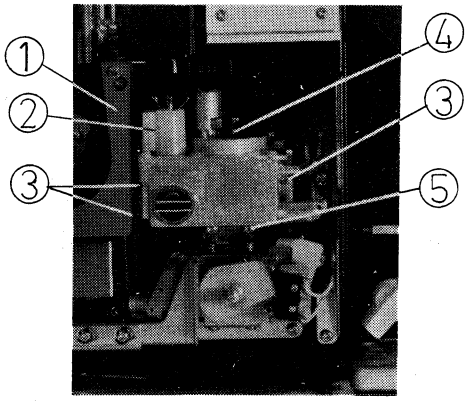


Fig. 24

2. Assembly:

   Assemble in the reverse order of disassembly.

J. SWITCH BOX

1. Disassembly:

   a. Remove the switch panel.

   b. Remove the link (1). (Fig.24)

   c. Remove the Power source component.

   d. Remove Fig.25-1.

   e. Remove Fig.25-2 from the connector attaching plate.

   f. Unscrew Fig.24-5x4 and remove the switch box.

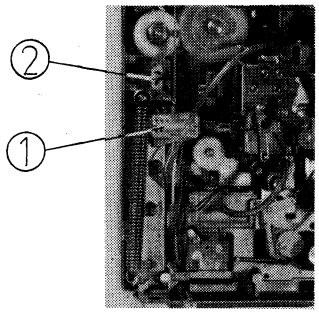


Fig. 25

2. Assembly:

   Assemble in the reverse order of disassembly.

   Check the operation of high speed rewinding mechanism.

K. MOTOR

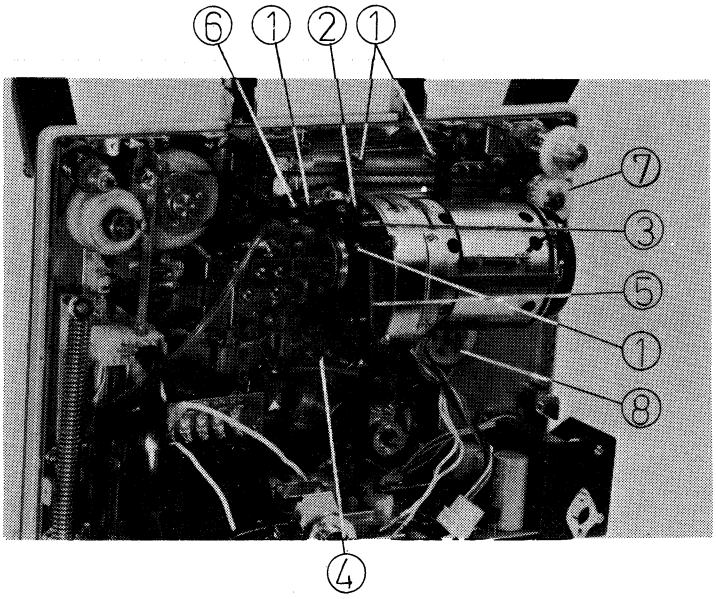


Fig. 26

1. Disassembly:

   a. Remove the fly wheel.

   b. Disconnect the lamp cord from the 6P housing, pressing the (a) part in Fig.26 with the pincette.

   c. Remove Fig.27-2.

   d. Unhook Fig.26-5 from Fig.26-6.

   e. Unscrew Fig.26-1x4 and remove the motor.

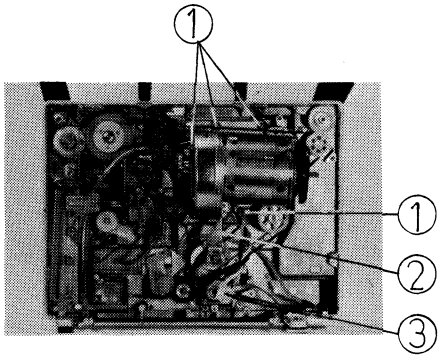


Fig. 27

2. Assembly:

   a. Loosen belt roller attaching plate (1),(2).

   b. Hang the main belt.

   c. Then assemble in the reverse order of disassembly.

   d. Adjust the belt tension, referring to Par. G-2-a, Page

   e. Adjust the position of Fig.26-2,4 so that the center of Fig.26-6 may coincide with the center of optical axis during "STILL" projection, and may not disturb the screen image during "NORMAL" and "SLOW-MOTION" projection.

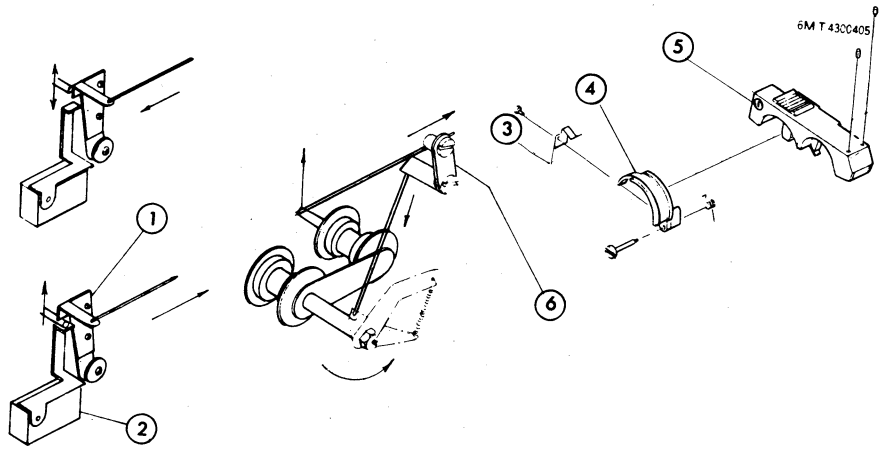


Fig. 28

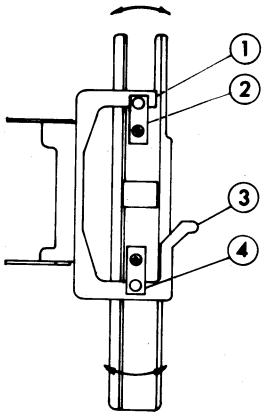


Fig. 29

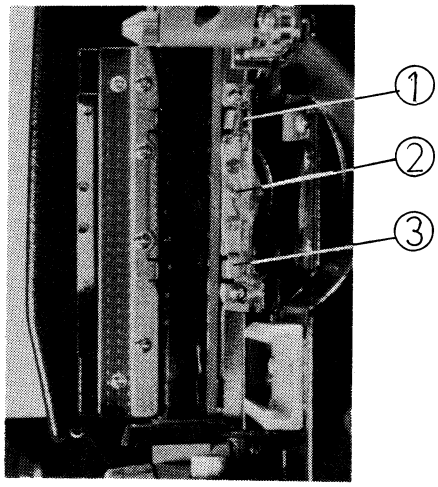


Fig. 30

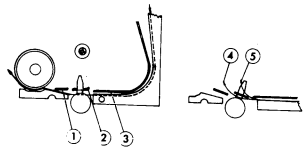


Fig. 31

IV. ADJUSTMENT

A. AUTO-THREADING

1. Adjust the position of Fig.28-1 so that Fig.28-5 may touch to the film feeding device when the threading mechanism is set at "AUTO-THREAD".
   In this case, the micro switch attaching plate should press Fig.28-2.

2. The clearance between Fig.28-4 and 5 should be at 0.3-0.45mm.
   To adjust this, bend Fig.28-3.

3. The clearance between the pressure plate and the aperture plate should be at 1.5-2.0mm.
   To adjust this, bend Fig.29-3.
   In this case, the pressure plate must not exceed the film side rail (1).

4. Even turning the framing knob, the clearance between the pressur plate and the aperture plate should not change.
   To adjust this, bend Fig.29-3 either "c" or "d" direction.

5. The pressure plate should parallel to the aperture plate when taking a view from the side.
   To adjust this, bend Fig.29-1.

6. The pressure plate should parallel to the aperture plate when taking a view from the upside.
   To adjust this, bend Fig.29-2,3 either "a" or "b" direction.

7. Check the position of the pad roller.

8. Fig.30-2 and 3 should be at same position vertically, Fig.29 and the clearance between they and the film should be at 1-2mm.
   To adjust this, bend Fig.30-1 and 2 respectively. (use P028)

9. Adjust the position of Fig.31-2 so that the film may not run off the film pass as shown in Fig.25-4,5.
   To correct running is shown in Fig.31-1,2,3.

B. LOOP FORMER (2)

Note:

Never fail to adjust this when replacing the film feeding device.

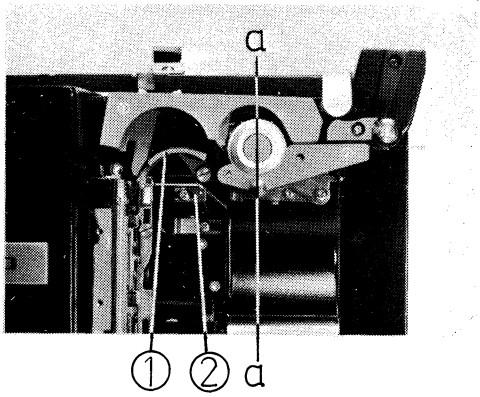


Fig. 32

1. Set the projector for the normal projection.

2. Set the projection speed at 24 fps.

3. Turn the motor pulley by the hand, and put the film feeding claw at the position just before starting to transport the film.

4. Attach the first sprocket so that the optional sprocket teeth may be in the vertical line of "a-a" in Fig.32.

5. Adjust the position of Fig.32-2 so that the sprocket tooth may come off just halfway between the film perforations when the film is removed from the sprocket and touch Fig.32-1 closely.

C. LOOP SETTER

1. Remove the switch panel.

2. Remove the thread stopper guide.

3. Adjust the position of Fig.33-4 so that the engagement of Fig.33-3 and 4 may be at 1-2mm.

4. Adjust the position of Fig.33-1 so that the film may be about to touch Fig.33-2 when decreasing in the two frames from the normal numbers.

5. If the surface of Fig.33-2 hardens and/or stains with oil, the loop setter comes malfunctional. If so, replace it.

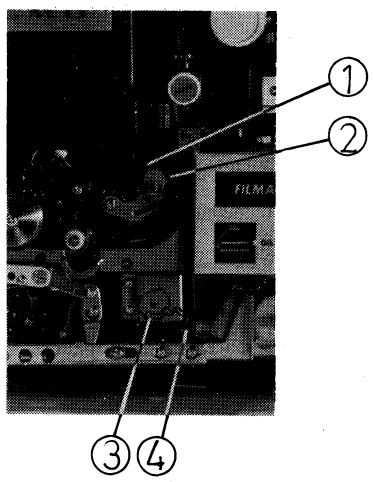


Fig. 33

D. SOUND MECHANISM

1. Pressure Roller

Test film: SMPTE PH22.57

a. Adjust the position of Fig.34-6 by Fig.34-5x2 so that Fig.34-3 may come in touch with the sound drum slightly.

b. Adjust the buzz track 40dB min., removing the position of Fig.34-3.

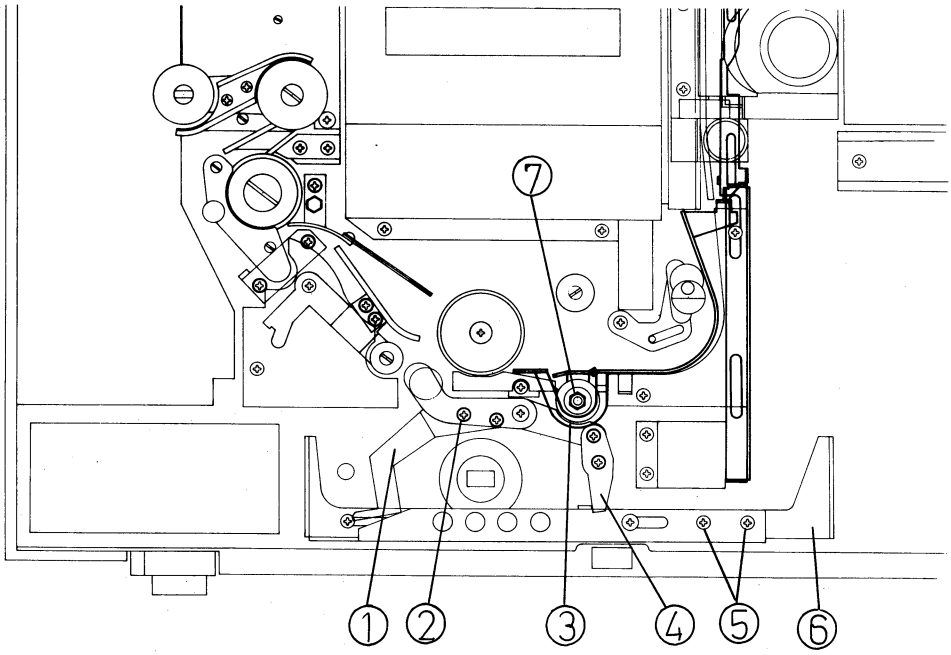


Fig. 34

D. SOUND MECHANISM (Cont'd)

2. Pad Roller

a. The pad roller should be in contact with the sound drum closely at magnetic reproduction.

b. 2-4mm clearance between the sound drum and the pad roller should be kept at optical reproduction.
Adjust the position of Fig.35-4 so that the conditions of the above 'a' and 'b' may be satisfied.

c. The pressure of the pad roller should be 40-50gr.
This adjustment is done by cutting Fig.36-6 little by little.

d. Adjust the position of Fig.36-3 so that the film may pass smoothly without any interruption at auto-threading.

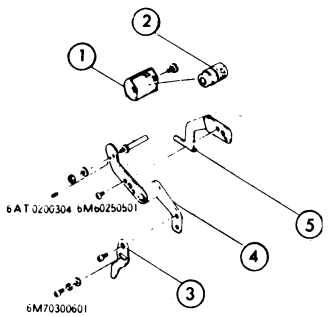


Fig. 35

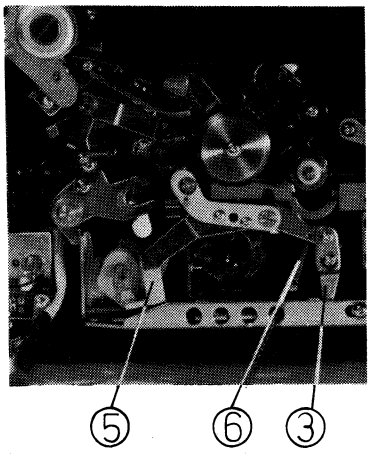


Fig. 36

D. SOUND MECHANISM (Cont'd)

3. Middle Tension Roller

a. The middle tension roller should be put in the threading guide 4 at auto-threading. This adjustment is done by the position of Fig.37-5.

b. Balance the tension of Fig.37-1 & 4 so that the center of the middle tension roller may be aligned in a line of the center of the second sprocket and the sound drum at normal projection. Adjust the position of Fig.37-2 so that the middle tension roller may stop after moving 3-5mm downward.

4. Recording & Reproduction Head

a. Adjust the position of Fig.38-1 so that the head may be put in the sound drum completely at optical reproduction.

b. Adjust the pressure of the head at 25-30gr. by the position of Fig.37-3.

c. The core of the head should appear 0.5mm above the edge of the sound drum when the pad roller is kept at the rest position.

d. Adjust Fig.38-4x2 so that the gap of the sound head may come out initially when the sound head moves from the sound drum. In this case, the center of the pad roller should coincide with the gap of the head on the sound drum.

e. Load 7,000Hz azimuth film (SMPTE PH22.114), and adjust Fig. 38-3x3 so that the maximum output power may be carried out.

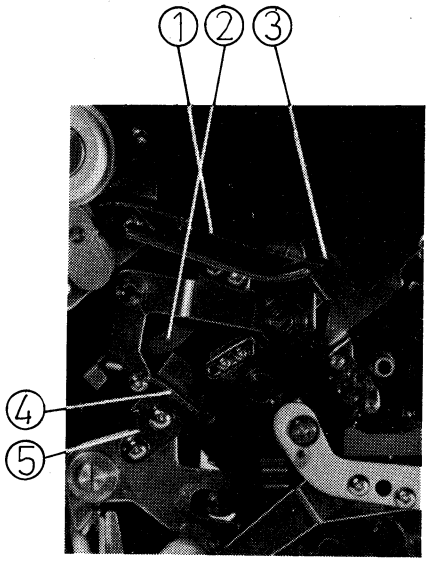


Fig. 37

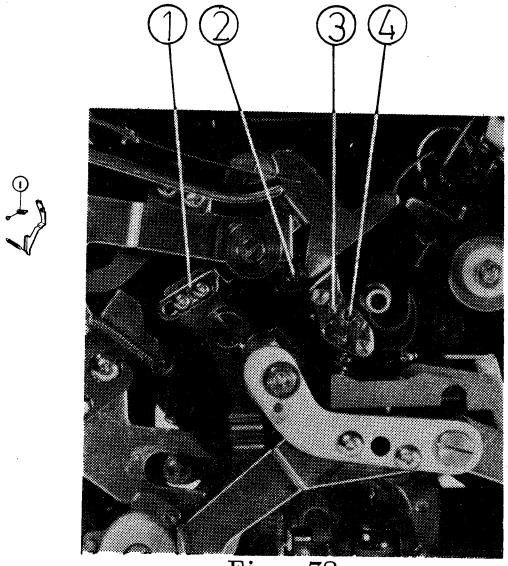


Fig. 38

D. SOUND MECHANISM (Cont'd)

5. Sound Lens

a. Load 7,000Hz sound focusing film (SMPTE PH22.42), and get the laximum output power, in the following manner:

Adjust the position of the exciter lamp in the directions of right and left by Fig.39-1x2.

Adjust the position of the exciter lamp in the directions of back and forth by Fig.39-2.

b. Loosen Fig.39-3, and adjust the azimuth of the sound lens.

c. When setting the treble control at the highest and the volume control at the maximum, the output power at 7,000Hz should be over the rated output power.

d. To clean the upper side of the sound lens, remove Fig.39-4.

e. The defective exciter lamp may cause the worse frequency response in high zone, and a howling.

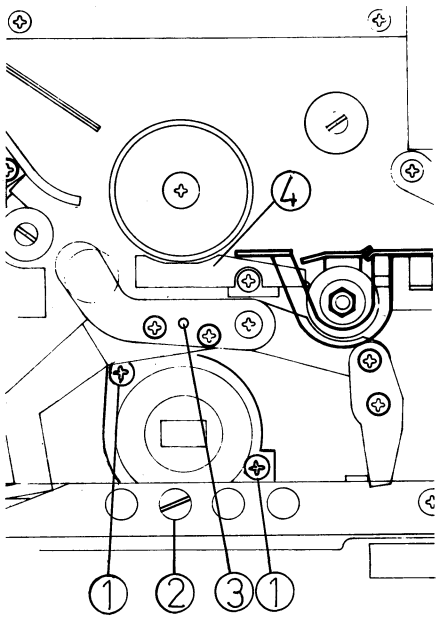


Fig. 39

6. S/N

a. Load 400Hz film, and set the tone control at the neutral position and the volume control -2dB lower than the rated out put power of 10V for 16-A/16-AR or 7V for 16AL. Then unload the film and check Signal (the rated output power) to Noise Ration over 40dB.

b. The adjustment of magnetic recording/reproduction is done by the position of the pad roller cover and the cancel coil with the test film (SMPTE PH22.132). In this case, the adjustment of the sound head should have been complete.

c. The adjustment of optical reproduction should be achieved with the test film (SMPTE PH22.45), after confirming that the adjustments of the 7,000Hz azimuth and buzz are complete. Also replace the exciter lamp with a new one before adjusting optical reproduction.

D. SOUND MECHANISM (Cont'd)

7. Wow & Flutter

a. Load 3,000Hz test film (SMPTE PH22.43).

b. To carry out accurate measurement, W/F testing instruments should have been effected a weighting.
The tolerance is 0.5% max.

c. Adjustment:

(1) The sound drum should rotate smoothly.

(2) Check the position of the pressure roller.

(3) Check the balance of the pad roller and the sound head pressures.

(4) Check the pressure and movement of the middle tension roller.

d. Defective parts:

(1) Synchro belt

(2) Synchro pulley

(3) Second sprocket

(4) Take-up mechanism

8. Tension Roller

Adjust the position of Fig.40-2 so that the clearance between Fig.40-1 & 2 may be 4mm.

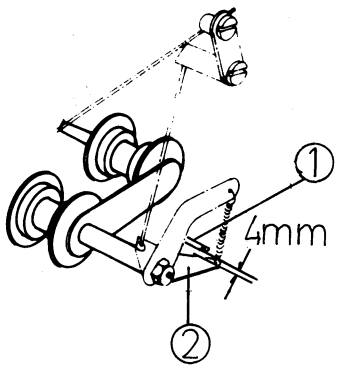


Fig. 40

E. SCREEN IMAGE

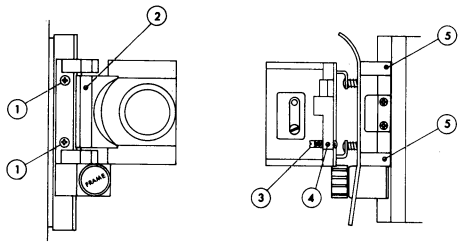


Fig. 41

1. Focusing

a. Unevenness in vertical directions across the screen: Loosen Fig.51-1x2 and screw down or up Fig.41-5 & 5', then tighten Fig.41-1x2.

b. Unevenness in horizontal directions across the screen: Loosen Fig.41-4 and screw down or up Fig.41-3, then tighten Fig.41-4.

2. Framing Line

Load a registration test film, and adjust Fig.41-2 so that adequate momentum of a picture in the both directions may be achieved.

3. Screen Brightness

a. Screen:
Center .. 700 Lx. min.
Corner .. 60% of the center brightness

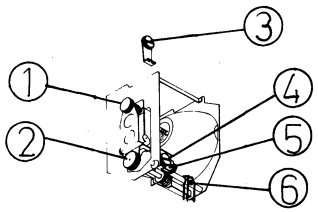


Fig. 42

b. To adjust it in horizontal directions, loosen Fig.42-4 and adjust Fig.42-5.

c. To adjust it in vertical directions, adjust Fig.42-1.

d. If the center or corner of screen is extremely dark (unevenness), adjust Fig.42-2.

e. If the center of screen is dark, loosen Fig.42-3,6 and adjust by moving the whole mirror holder.
This adjustment means namely positioning of the aperture mask and the reflector. Therefore, it is not required when just replacing the lamp with a new one.

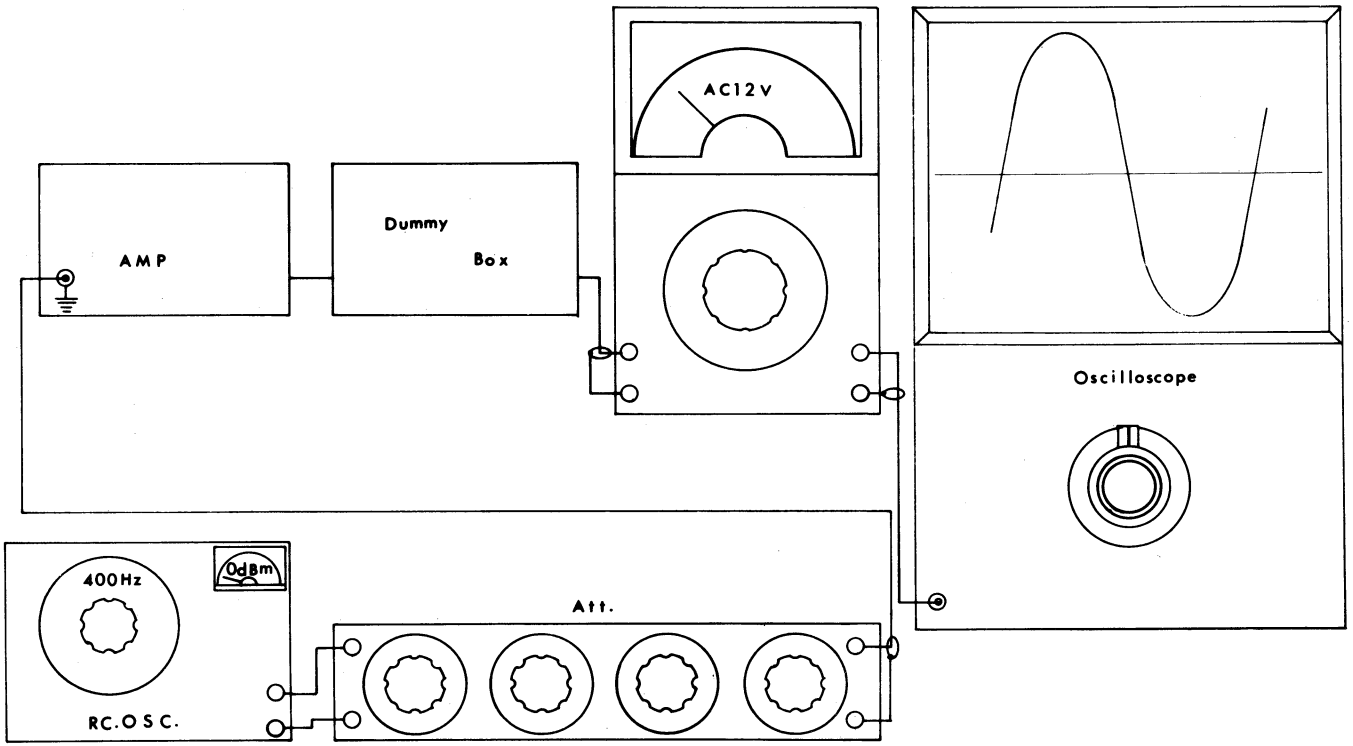


Fig. 43

F. AMPLIFIER

1. Preparation

a. Instruments and tool:

(1) R.C. Oscillator
(2) Milli-volt meter
(3) Attenuator
(4) Oxcilloscope
(5) Vacuum tube voltage meter or Digital multimeter which is desired to have a high input impedance.
(6) P029

b. Connection:

(1) The amplifier is connected to the projector through the tool P029.
(2) The instruments should be connected as shown in Fig.43.

c. Setting of the instruments and the amplifier:

(1) R.C. Oscillator 400Hz, 0dB
(2) Output power meter ... the range to measure A.C. 12V
(3) Oscilloscope ..... the range to measure 400Hz, 12V
(4) Amplifier ..... Volume at max., Tone at neut.

2. Measurement

a. Optical:

(1) Connect the cord from Attenuator to the jack marked "0" of P029.
(2) Adjust Attenuator at the rated output power (12V RMS). And the indicated value of Attenuator should be 59.9dB.
(3) The optimum signal levels of the each junction are mentioned on P029. Therefore, check the points by oscilloscope as compared with the above table.
(4) To check the D.C. voltages, use a voltage meter with input impedance of 10 Mohms while referring to the table on P029.
(5) The exciter lamp will light when pushing the switch "S1" on the circuit plate.

b. Magnetic:

(1) The switch "S2" on the circuit plate should be "ON".
(2) Connect the cord from Attenuator to the jack marked "M" of P029.
(3) Adjust Attenuator at the rated output power (12V). And the indicated value of Attenuator should be -64.8dB.
(4) Check the each signal level in the same manner as optical.
(5) Check the D.C. voltages with input impedance of 10 Mohms in the same manner as optical.

F. AMPLIFIER (Cont'd)

3. Repairing

a. Fuse F1 is gone: (Refer to the circuit diagram)

(1) Short circuit in speaker circuit.
If so, CN2, Connector, Cord or IC3 are defective.
(2) IC3 (D2242) breakage.
(3) C15 (1000 MF/35V) breakage.
In this case, also IC3 may be defective.
(4) REC1 (SIRB20) breakage.

b. Fuse F2 is gone: (The Exciter lamp does not light)

(1) REC2 (SIRB20) breakage.
(2) Short circuit in exciter lamp circuit.
(3) C22, C23 (3300 MF/16V) breakage.

c. No sound at optical reproduction:

(1) Exciter lamp breakage.
(2) S9 at motor switch breakage.
(3) The adjustment of the sound lens is not enough.
(4) Amplifier breakage: Refer to the "Fuse F1/F2 is gone". Check the D.C. voltage of IC. If the rated voltage, mentioned on P029, are not gained, replace the IC.

d. No sound at magnetic reproduction:

(1) Malfunction of "S2", which is for Power, on circuit plat
(2) Maladjustment of the sound head.
(3) IC breakage when the rated voltage are not gained.
(4) Sound head breakage.

e. Small sound at optical reproduction:

(1) Generate a signal of 0dB by Oscillator and put the attenuated signal of 1.4mV to the jack marked "0" of P029 through attenuator at 59.9dB.
(2) Check the points (IC1 #11&3 pin, IC2 #11&3 pin, IC3 #6&3 pin). If the output voltage is lower in comparison with the input, replace IC or Capacitor with a new one.

f. Small sound at magnetic reproduction:

Put the signal of -64.8dB to the jack marked "M" of P029. The output power of 28mV should be gained at IC4 #3 pin.

g. Noise:

(1) Use the tool P029 and the input is not connected (1 K ohm shunt circuit by P029).
(2) Tolerance (Volume max.):
Tone control at min. ..... 20mmV max.
Tone control at max. ..... 100mmV max.

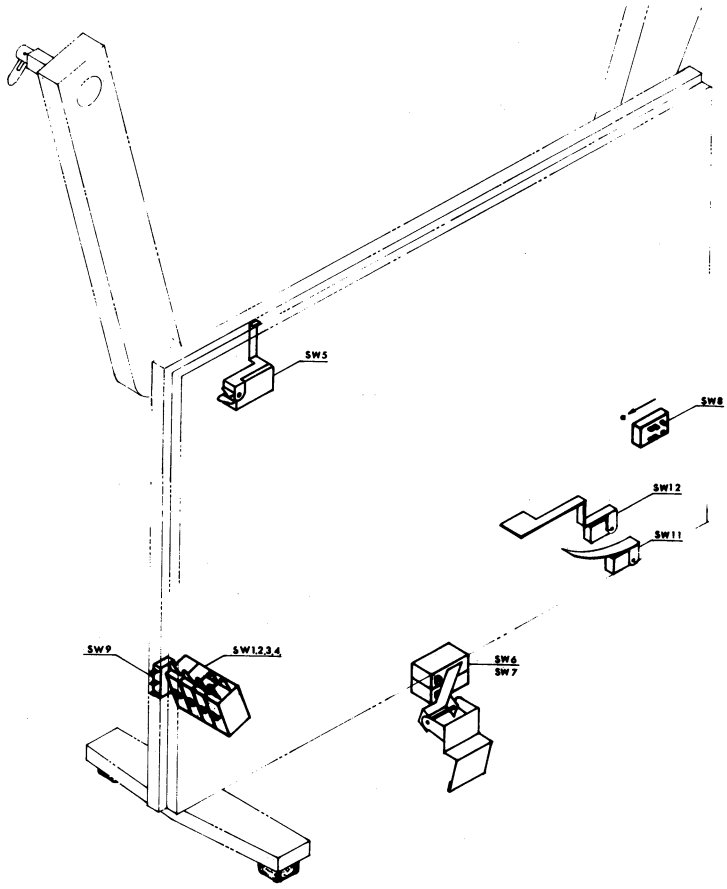
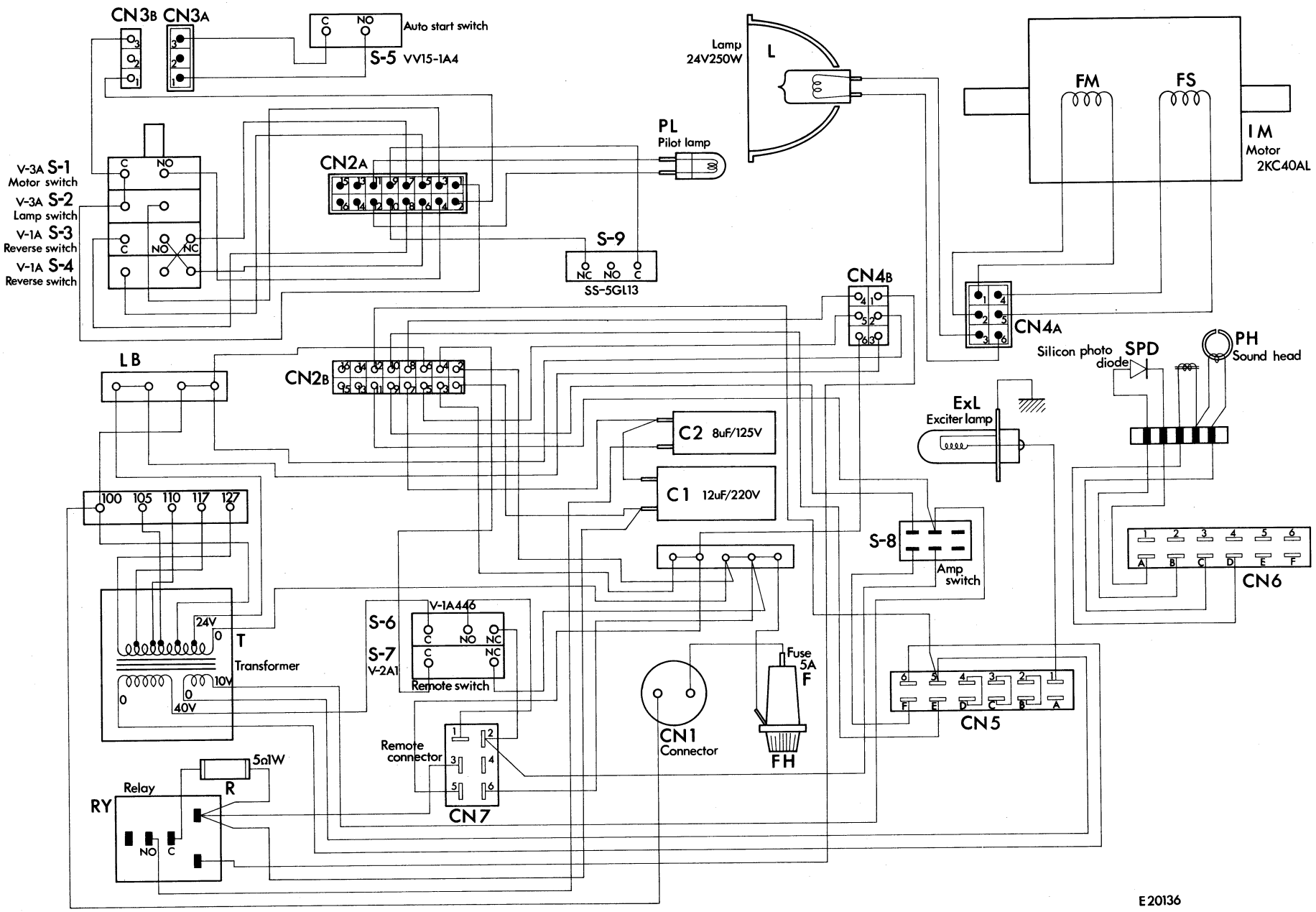
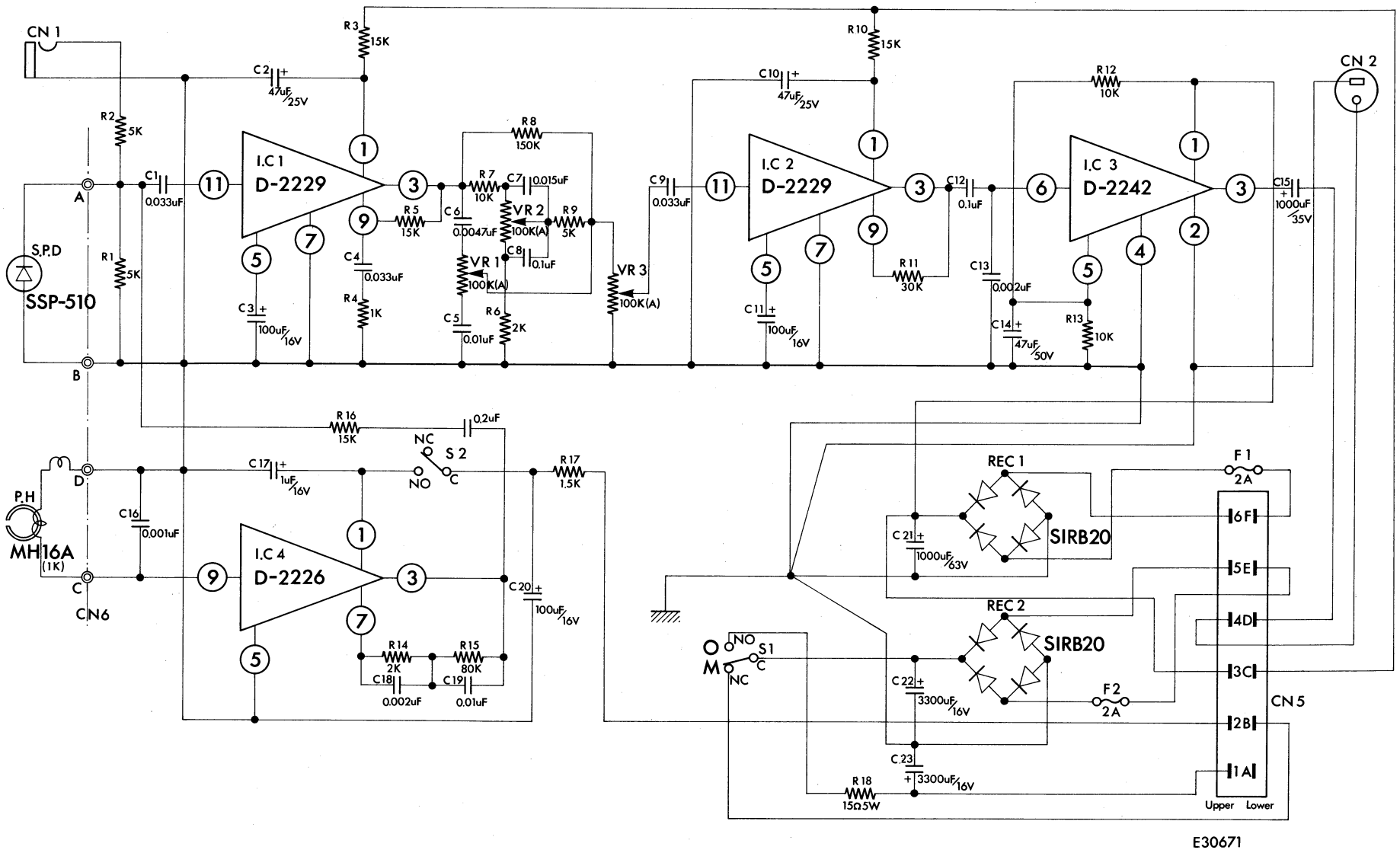


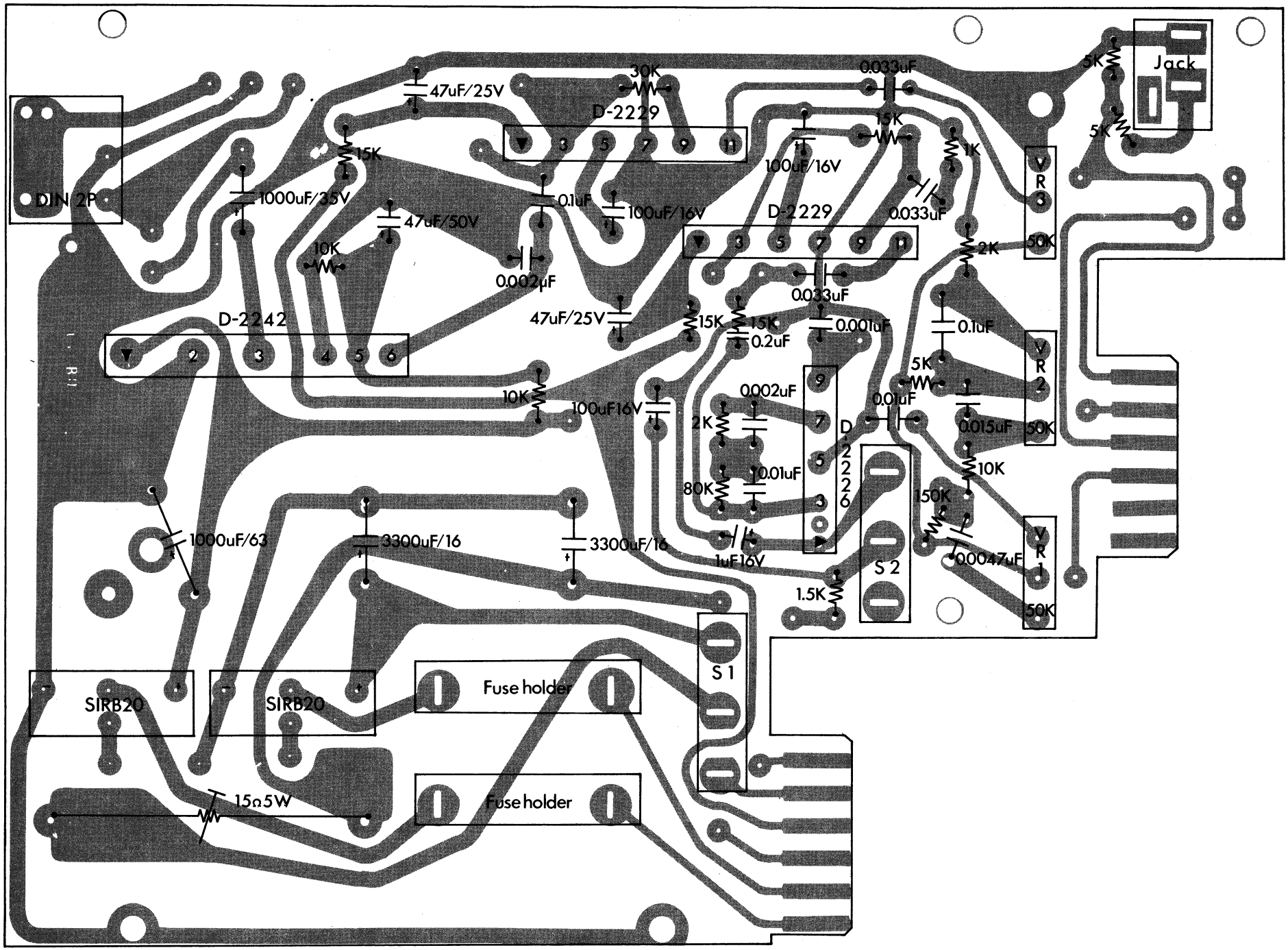
Fig. 44



Connecting diagram for machine for 16-A



Schematic diagram for amplifier for 16-A


DIN 2P
47uF/25V
15K
1000uF/35V
47uF/50V
10K
0.002μF
0.1uF
100uF/16V
30K
D-2229
3 5 7 9 11
0.033uF
1.5K
100uF/16V
1K
0.033uF
D-2229
3 5 7 9 11
2K
0.033uF
47uF/25V
15K
15K
0.2uF
0.001uF
0.1uF
D-2242
2 3 4 5 6
10K
100uF16V
0.002uF
2K
0.01uF
80K
1uF16V
9 7 5 3
D 2226
0.01uF
5K
0.015uF
10K
150K
0.0047uF
1.5K
5K
5K
Jack
VR 3 50K
VR 2 50K
VR 1 50K
S 2
S 1
1000uF/63
3300uF/16
3300uF/16
SIRB20
SIRB20
Fuse holder
Fuse holder
15Ω5W