

8mm SOUND PROJECTOR

FILMO
ST-180EM
2-TRACK

INSTRUCTION MANUAL

IMPORTANT SAFEGUARDS

When using your photographic equipment, basic safety precautions should always be followed, including the following:

1. Read and understand all instructions.
2. Close supervision is necessary when any appliance is used by or near children. Do not leave appliance unattended while in use.
3. Care must be taken as burns can occur from touching hot parts.
4. Do not operate appliance with a damaged cord or if the appliance has been dropped or damaged — until it has been examined by a qualified serviceman.
5. Do not let cord hang over edge of table or counter or touch hot surfaces.
6. If an extension cord is necessary, a cord with a suitable current rating should be used. Cords rated for less amperage than the appliance may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.
7. Always unplug appliance from electrical outlet when not in use. Never yank cord to pull plug from outlet. Grasp plug and pull to disconnect.
8. Let appliance cool completely before putting away. Loop cord loosely around appliance when storing.
9. To protect against electrical shock hazards, do not immerse this appliance in water or other liquids.
10. To avoid electric shock hazard, do not disassemble this appliance, but take it to a qualified serviceman when some service or repair work is required. Incorrect reassembly can cause electric shock hazard when the appliance is used subsequently.

SAVE THESE INSTRUCTIONS

SPECIFICATIONS

(Projector)

Power Source	:	AC 60 Hz
Power Consumption	:	200W
Projection Speed	:	24 and 18 fps.
Motor	:	Frequency generator servo DC magnet motor
Film	:	Super 8 sound and silent film
Film Loading	:	Automatic
Reverse Projection	:	Possible
Reel Capacity	:	Max. 180 m (600 ft)

(Light Source)

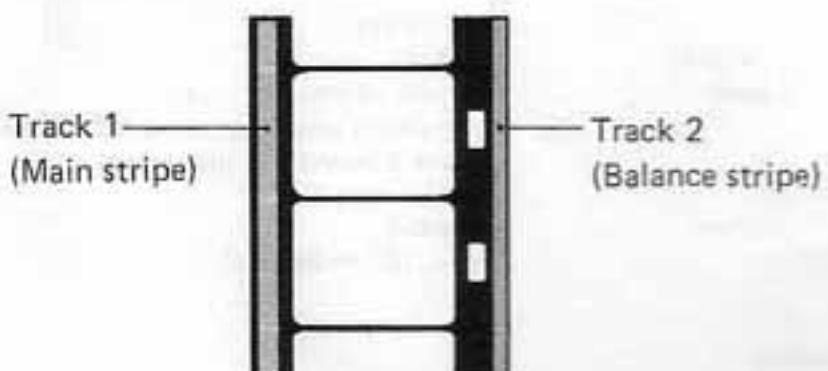
Projection Lamp	:	12V, 100W Halogen lamp with cold mirror
Projection Lens	:	F1.3, f=15 - 25 mm zoom lens

(Sound Recording & Playback)

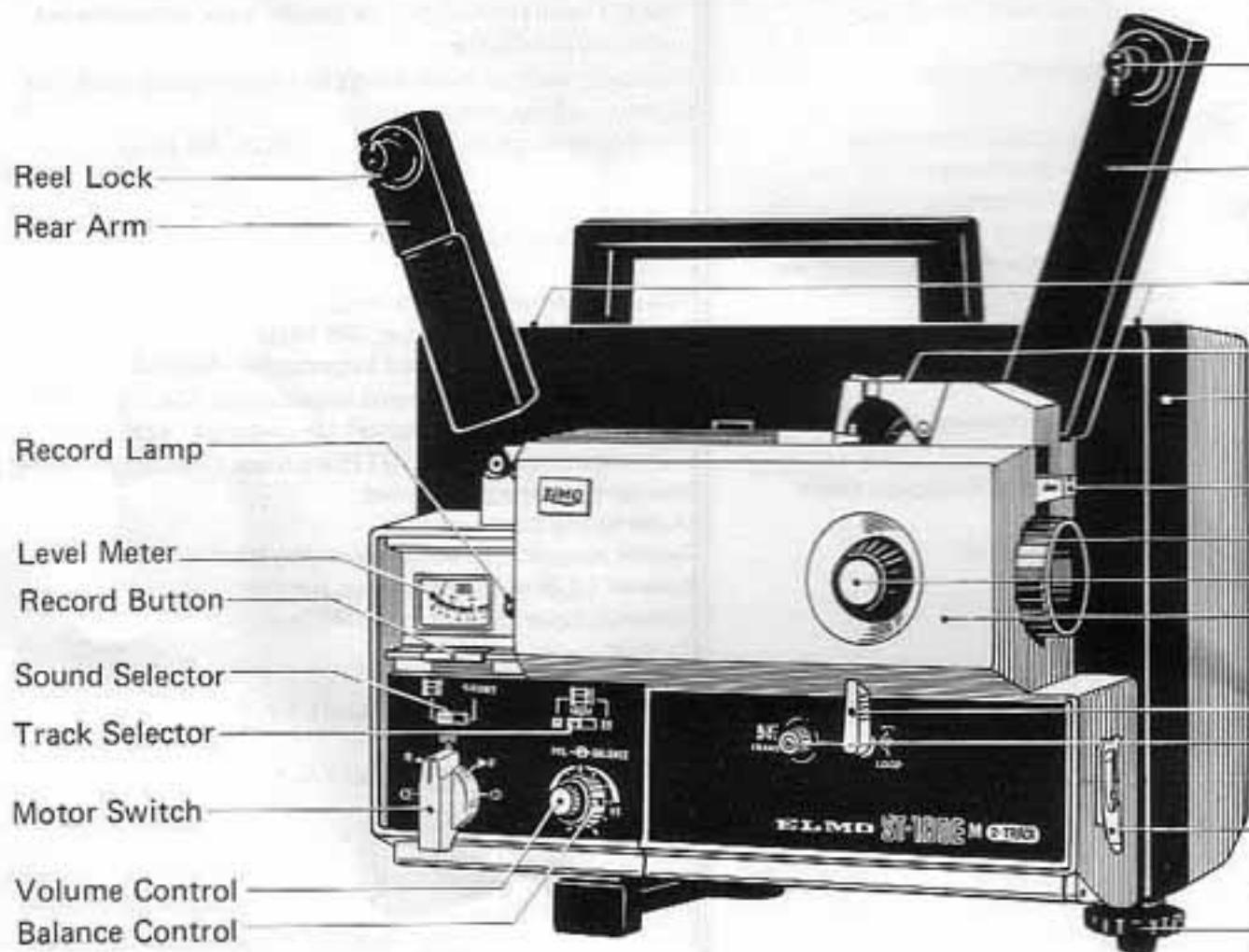
Sound System	:	Magnetic playback and recording
Dual-track Recording	:	Magnetic recording on track 1 and track 2
Dual-track Playback	:	Track 1 and track 2 can be played back simultaneously or independently.
Balance Control	:	Playback level of both tracks can be balanced with the balance control knob.
Automatic Recording (Limiter System)	:	Possible through use of MIC and AUX IN jacks
Spot Recording	:	Possible
Amplifier	:	2 IC's, 3 transistors, 10 diodes
Amplifier Protective Circuit	:	Built-in
Output	:	Music power output; 5W (4Ω) Continuous power output; 3W (4Ω)
Input Terminals	:	MIC (Microphone) (Input impedance: 10KΩ) AUX IN (Auxiliary) (Input impedance: 50KΩ)
Output Terminals	:	EXT SP (Extension speaker) (Impedance: 4Ω) MONI(Monitor)/AUX OUT(Earphone Impedance: 8-16Ω)
Recording/Playback Head	:	Special alloy magnetic head (Alternating bias system)
Erasing Head	:	Ferrite magnetic head (Alternating erase system)
Speaker	:	Built-in 12.5cm (5") dynamic speaker
Microphone	:	Dynamic type (Impedance: 400Ω)
Level Meter	:	Built-in
Recording Indicator Lamp	:	Light Emitting Diode
Dimensions	:	315 x 230 x 172mm (12.4 x 9.1 x 6.8 in)
Weight	:	8.5 Kg (18.7 lbs)
Attachment	:	Auto reel 180m (600ft) and Microphone.

Specifications are subject to change without prior notice.

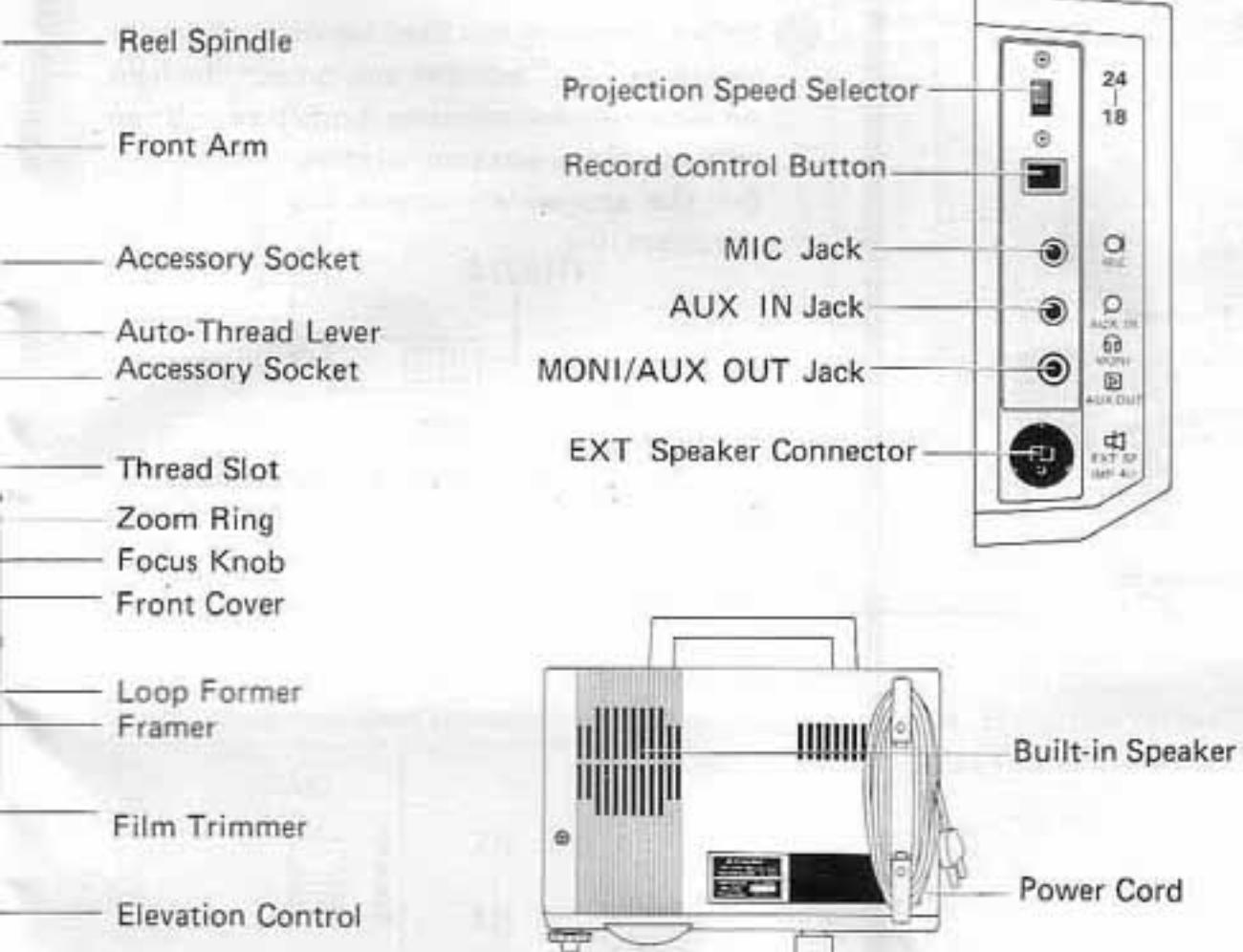
Two Track System



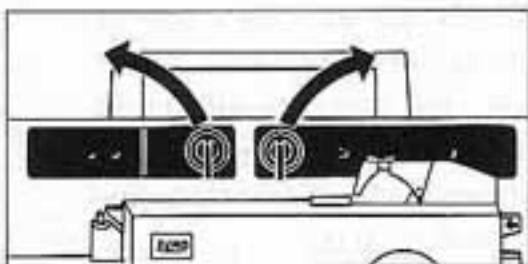
NOMENCLATURE



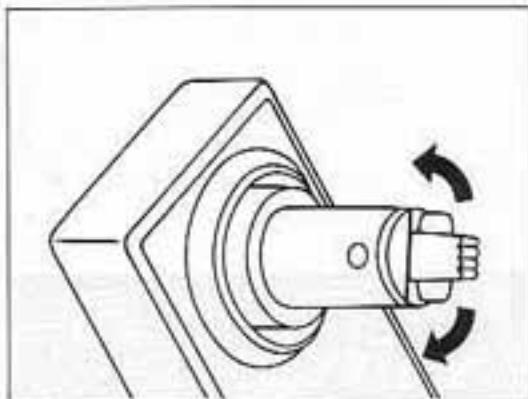
As shown in the left illustration, 8mm sound film is coated with magnetic stripes. Track 1 (Main stripe) is used to carry the sound track when used in conventional sound projectors. Track 2 (Balance stripe), that runs just outside the film perforations, is used to ensure smooth film travel through the projector. The Elmo ST-180EM is a high performance sound projector capable of recording and playback on two sound tracks.



Preparation

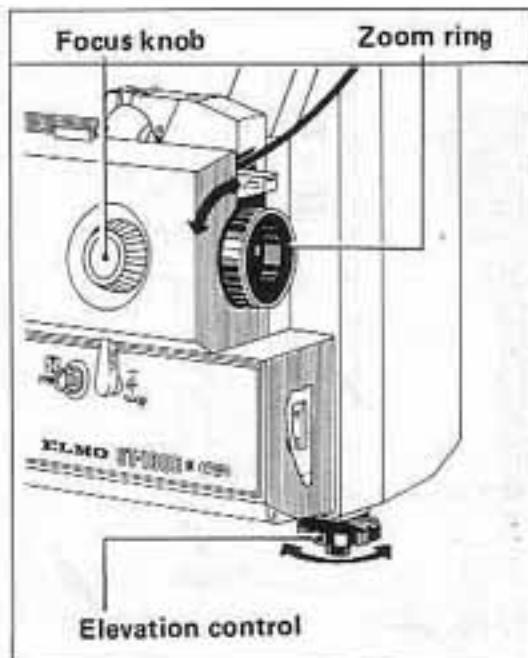


- 1 Pull both reel arms up into position.



- 2 Place your film on the front arm and the take-up reel on the rear arm. Press the reel locks until the reels are snugged against the spindles.

Note: Be sure to snap down the reel locks.



- 3 Before threading the film, advance the motor switch to " $\odot\ddot{\circ}$ " position and project the light on the screen for adjusting the picture position with use of the elevation control. Set the appropriate screen size by turning the zoom ring.

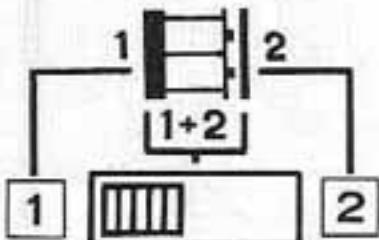
- ④ Set the sound selector to "M" or "SILENT" according to the type of film to be projected.

■ Magnetic Sound Film



SILENT

Set the sound selector to "M"



- ◊ Track selector.
- Select position "1" to playback Track 1.
- Select position "2" to playback Track 2.
- Select position "1 + 2" to playback both tracks simultaneously.

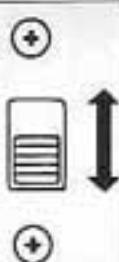


SILENT

Set the sound selector to "SILENT"

Note: Track selector is for magnetic film only.

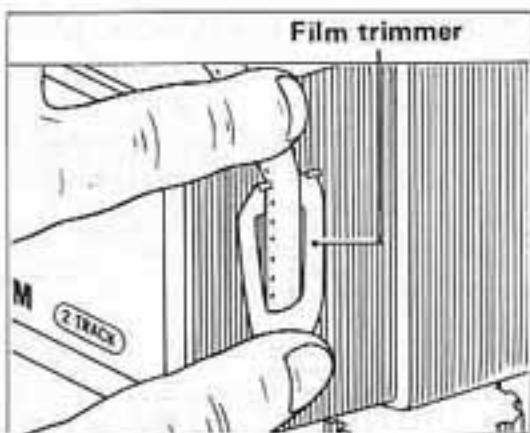
Projection speed selector



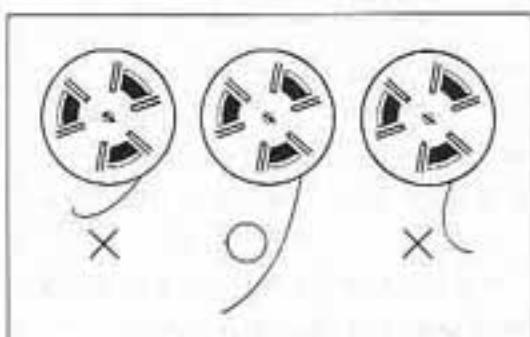
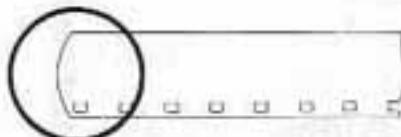
24
18

- ⑥ Select the proper projection speed, either 24 fps (UP) or 18 fps (DOWN).

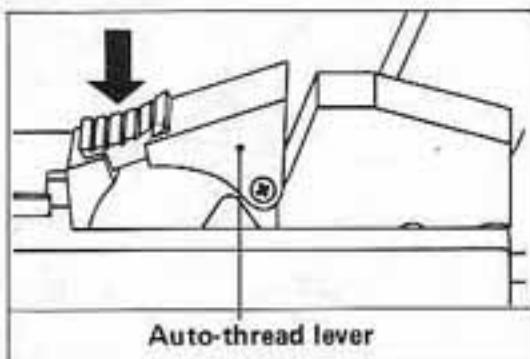
Projection



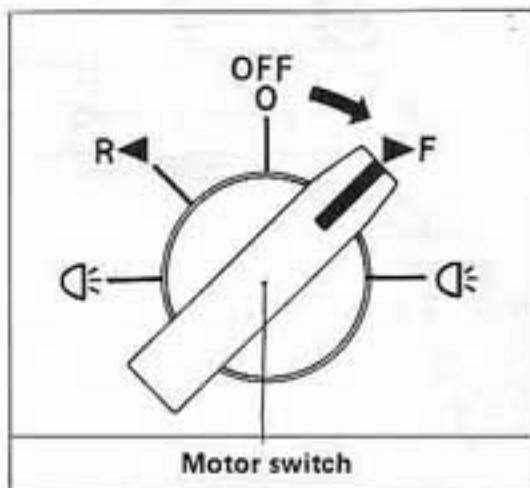
- 1 To insure smooth automatic threading, trim the end of the film leader with the film trimmer. Locate a film perforation over the pin and trim off the end of the film.



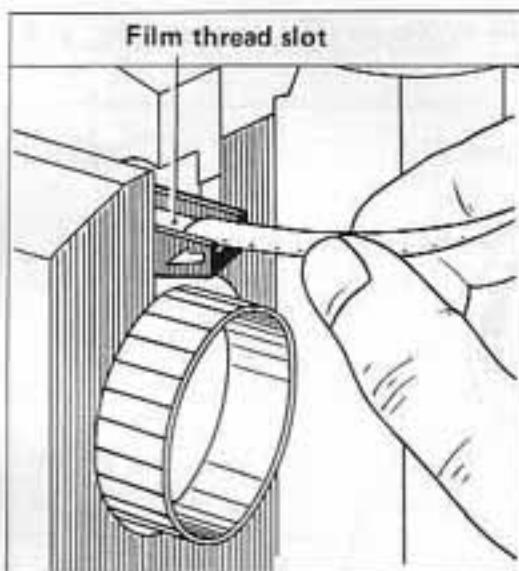
Note: When the tip of the leader is bent or snapped, trim off. Be sure to prepare a straight leader without any bend or snap as illustrated.



- 2 Depress the green auto thread lever until it locks.

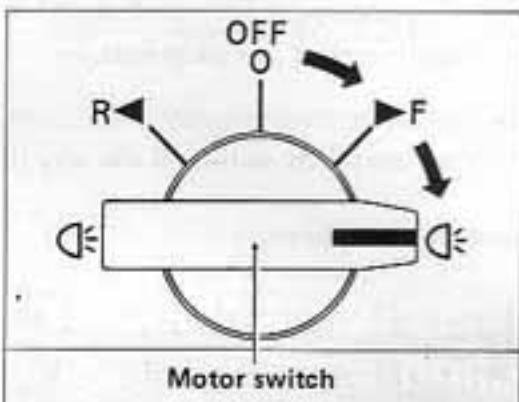


- 3 Advance the motor switch to "► F" position, and the motor runs.

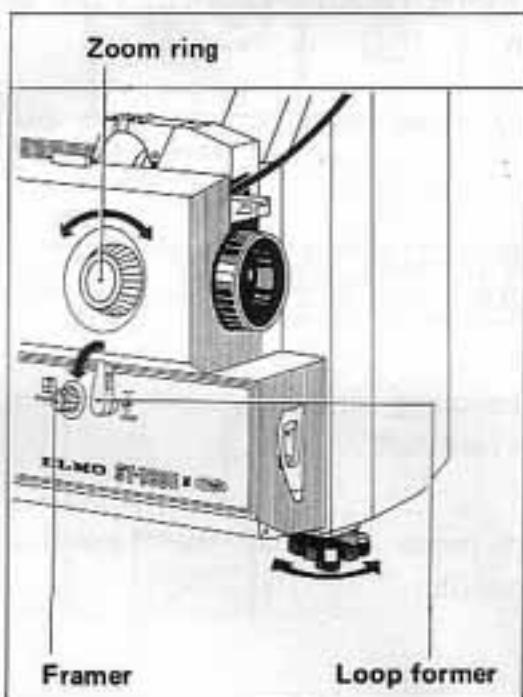


- 4** Insert the film leader into the thread slot as indicated by the red arrow. The film will automatically thread to the take-up reel through the film guide.

Note: If the film fails to attach itself to the take-up reel, reverse the motor switch to "OFF" position and then attach the leader to the take-up reel manually.



- 5** Set the motor switch to "" position to turn the lamp ON. With this operation, the auto thread lever will release automatically.

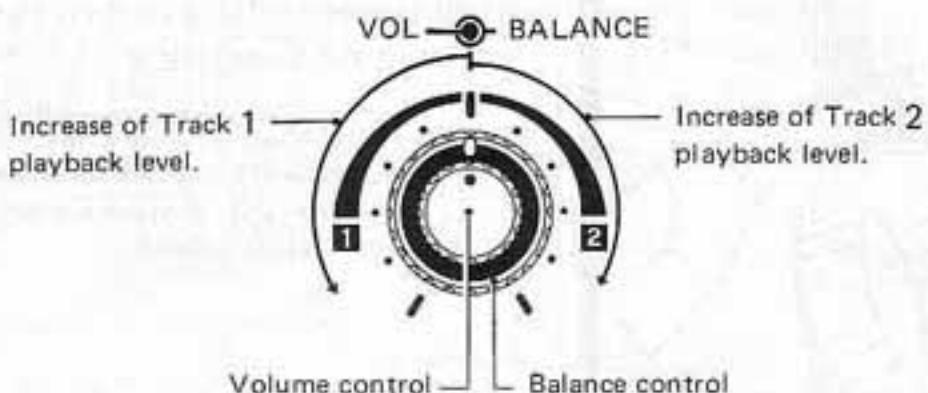


6 Image Adjustment

- A** Adjust sharpness with focus knob.
- B** Adjust the framer to eliminate frame line.
- C** Press the loop former to restore the film loop if lost during projection.

Note: When the film loop is lost during projection, check the film's perforations and splices after projection is over.

- 7 Adjust the volume by turning the volume control knob.

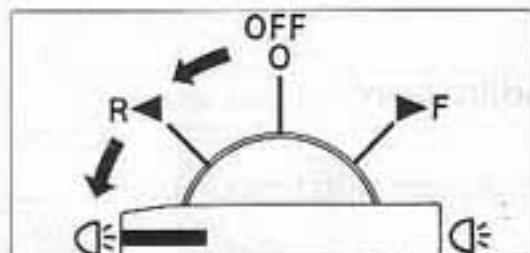


- 8 The balance control knob is used to balance the playback levels of Track 1 and Track 2. The balance control is normally set in the middle position. If Track 1 is higher than Track 2, turn the knob clockwise until both tracks are balanced.

Note:

1. Be sure to set the track selector at "1 + 2" position.
2. Only one track will be played back if the balance control is turned all the way in one direction.
3. When recording sound the balance control knob will not function.

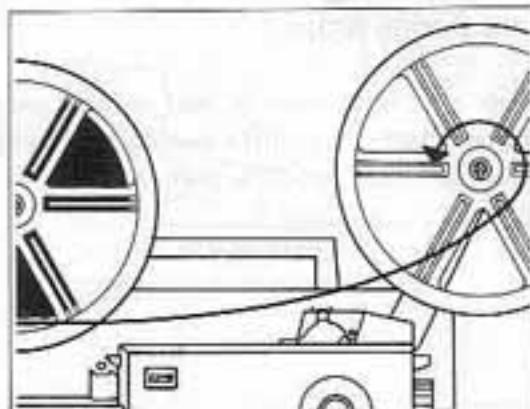
Reverse Projection



Advance the motor switch counterclockwise to "R" position.

Note: The sound is not played back in reverse projection.

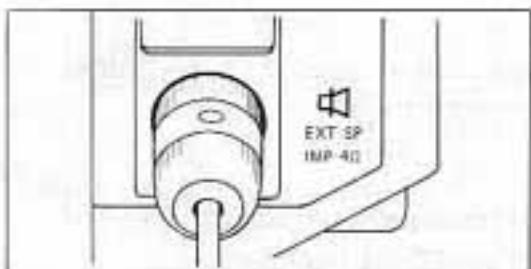
Rewinding the Film



- 1 After projection is finished, wind the film back on the feed reel.
- 2 Advance the motor switch to "R" position to rewind the film.

Sound Options

■ Extension Speaker



- When using Elmo extension speakers (ES-1000 or ES-650), connect the speaker line to EXT SP connector.



- When using your own extension speaker with 6φ phone plug, the optional SC-002 adaptor cord is available for connecting the speaker line with EXT SP connector.

Note: The projector accepts the extension speaker with an impedance of 4 – 8Ω.

■ Reproducing Sound Through a Stereo Amplifier



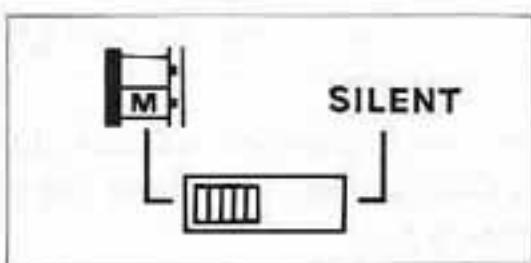
Plug the accessory cord into the projector AUX OUT jack and connect the other end to either AUX IN or LINE IN receptacle on your own stereo amplifier.
(Monaural sound reproduction)
Refer to Page 19 for accessory cords.

■ Using an Earphone or Headset



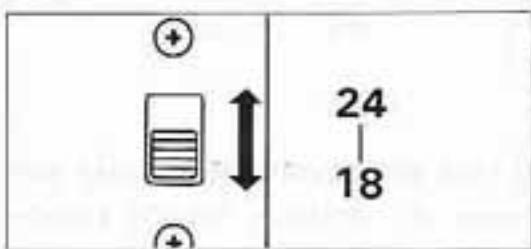
Connect the earphone or headset to the MONI jack. In this case, sound will not play back through the built-in or extension speaker.

Recording

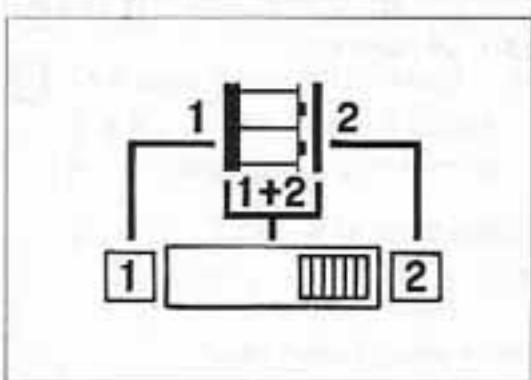


- ① Set the sound selector to "M".

Note: Record button does not work unless the selector is set to "M".



- ② Select the appropriate projection speed, either 24 fps (UP) or 18 fps (DOWN), in conformity with the speed at which the picture has been taken.



- ③ Set the track selector either to "1" (Track 1) or "2" (Track 2).
(The sync-film carries sync-sound on Track 1. So, set the track selector to "2" to build new music or narration on Track 2 without affecting the sound on Track 1.)

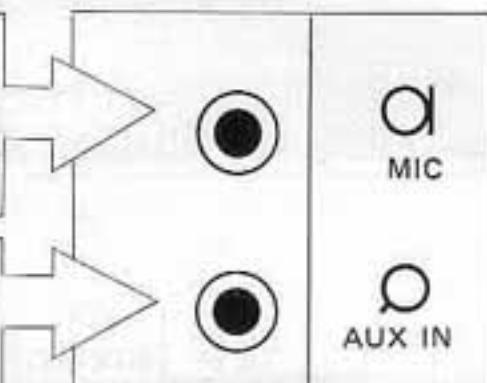
Note: 1. Sound cannot be recorded if the track selector is at "1 + 2" position.
2. If a new sound is recorded on a previously recorded track, the previous sound is erased.

- ④ Load the projector with film.

- ⑤ Connect record input lines.

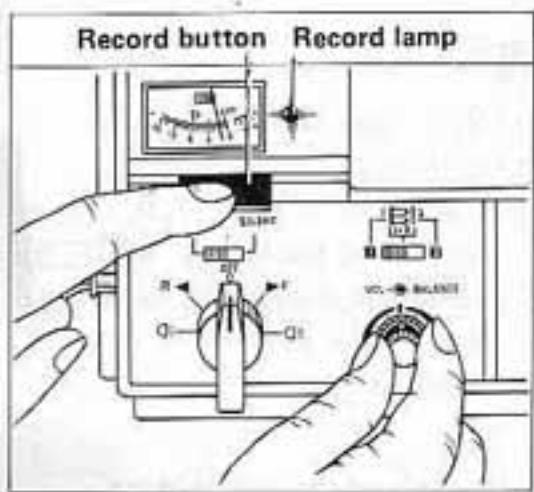
Connect the microphone plug to MIC jack.

Note: When using the microphone, hold it as close to sound source as possible.



Connect LINE OUT or AUX OUT jack of the tape recorder, tuner or stereo set to AUX IN jack of the projector.

- If MIC and AUX IN jacks are plugged in simultaneously, sounds from MIC and AUX IN are blended.
- Refer to page 19 for accessory cords.



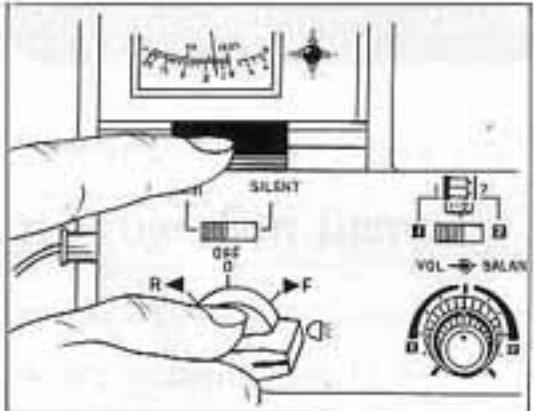
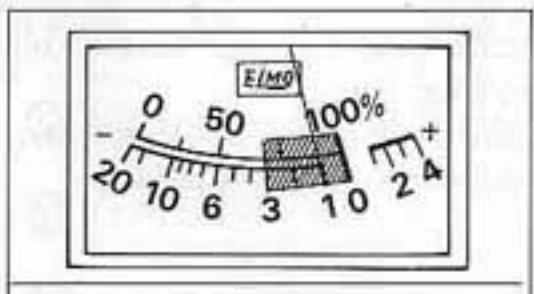
- 6** Depress the record button and the record lamp comes on.

Adjust the sound input level by turning the volume control while checking the recording level on the level meter.

Set the level so that the needle of the level meter stays within the shaded zone (from -3 to 0) as illustrated.

- The built-in limiter circuit works at a maximum input level to eliminate distortion, achieving optimum recording.

The limiter circuit works for both MIC and AUX IN.

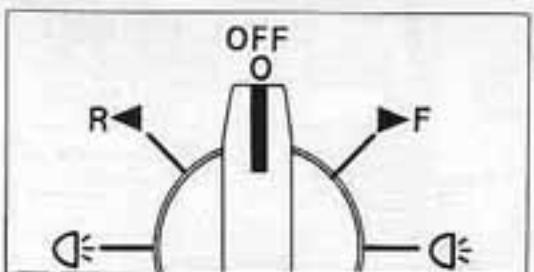
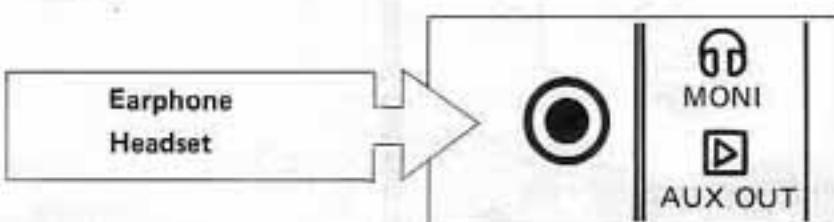


7 Start Recording

Advance the motor switch clockwise to "REC" position while depressing the record button.

• Monitoring

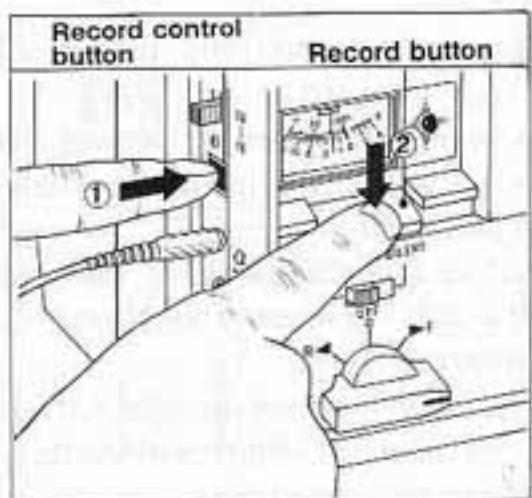
Connect an earphone or headset to MONI jack to monitor the sound being recorded.



8 Stop Recording

Turn the motor switch to "OFF" position.

■ Spot Recording



① Record Control Button

This button allows you to make spot recording without stopping the projector.

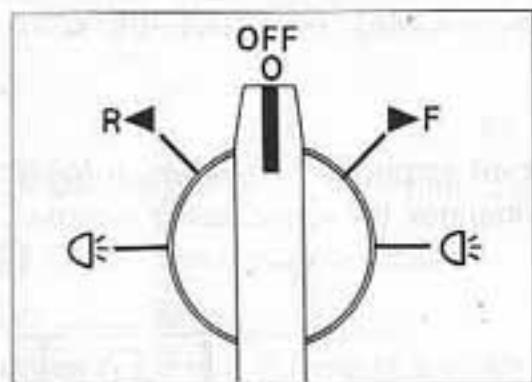
Depress the record control button ① together with the record button ② when the desired film position is reached. Release your finger from the record control button ① and the record button ② is locked.

② How to Release Record Control Button

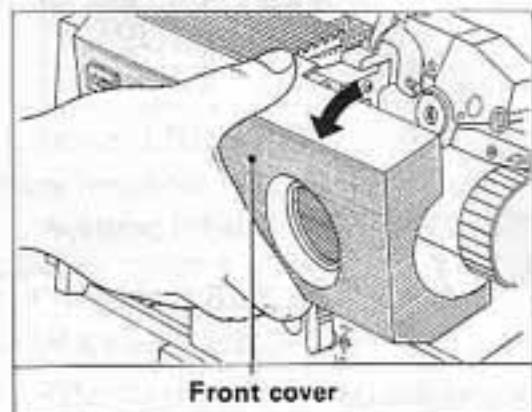
Just depress the record control button, and the recording setup is released.

This procedure permits you to resume playback mode without stopping the projector.

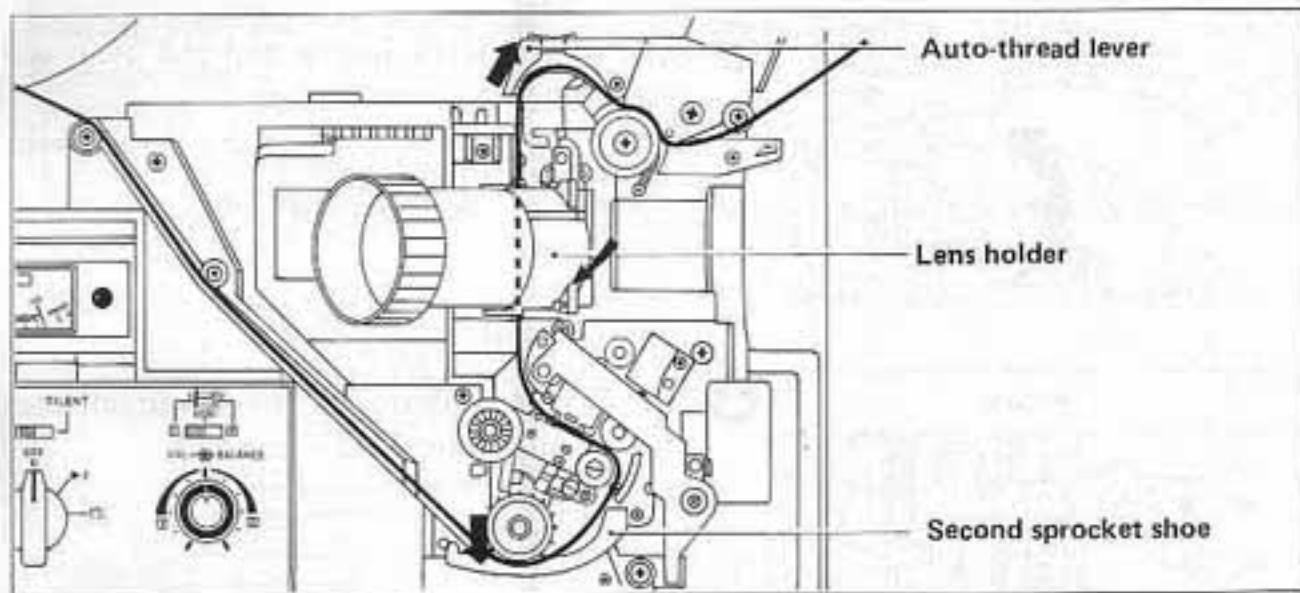
Removing the Film During Midway Projection



① Turn the motor switch to "OFF" position.



② Open the front cover by pulling the top toward yourself.



- 3** Swing the lens holder to the arrow direction.
- 4** Open the auto thread lever upward and remove film..
- 5** Press the second sprocket shoe downward and remove film.

Replacing Lamp

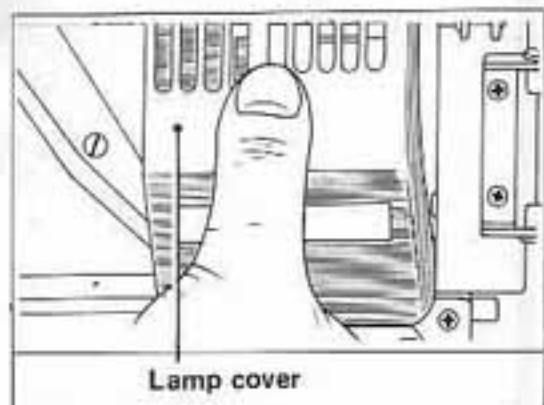
◆ When replacing the lamp, be sure to unplug the power cord.

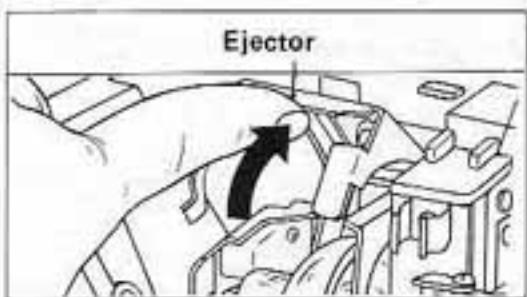
■ Projection Lamp

- Use a 12V-100W halogen lamp with cold mirror. (ANSI Code EFP or equivalent)
- It's recommended to keep a spare lamp on hand in case of unexpected breakage.

- 1** Pull the front cover down to open.

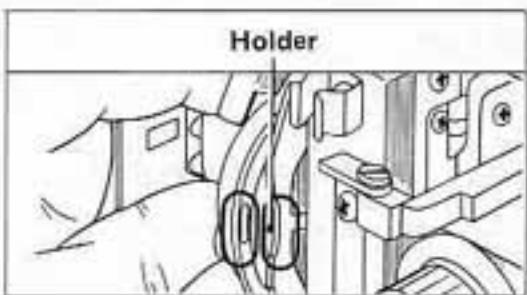
- 2** Take hold of the upper part of the lamp cover and turn toward yourself to remove.





- ③ Push up the lamp ejector and the lamp will detach from the lamp socket.

Note: Be sure the lamp has cooled sufficiently before handling.



- ④ Place the protrusion of the lamp reflector edge facing towards you.



- ⑤ Insert the lamp all the way into the socket and swing down the lamp ejector.

Important:

Avoid touching glass bulb area with your bare fingers. Oil from your fingers will affect the heat conductivity of the glass and will shorten the life of the bulb. Touch only the base or use cotton gloves or cloth when installing a new lamp.

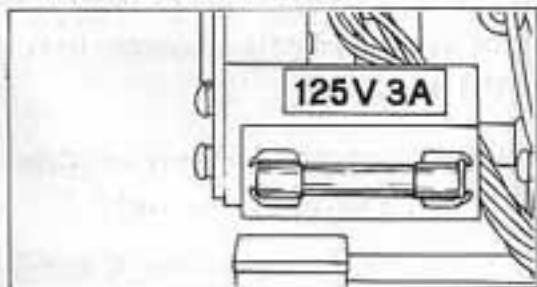
Replacing Fuses

When replacing the fuse, please refer to qualified personnel for servicing.

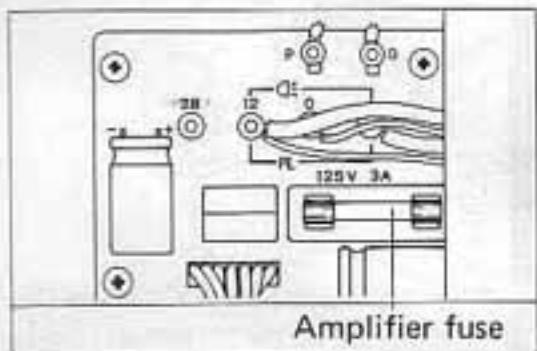
To service man:

- 1.) Disconnect power cord.
- 2.) Loosen screws and remove rear cover.
- 3.) Replace the fuse with new one of specified rating, referring to the below illustrations.

- **Main Power Fuse**

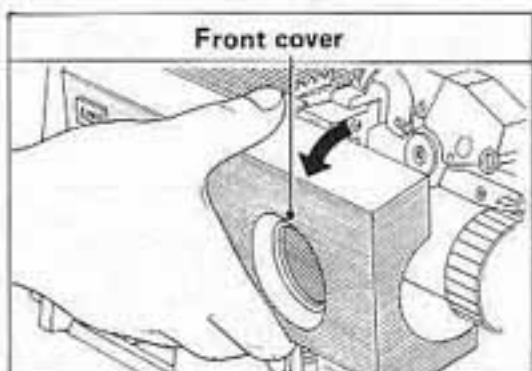


- **Amplifier Fuse**

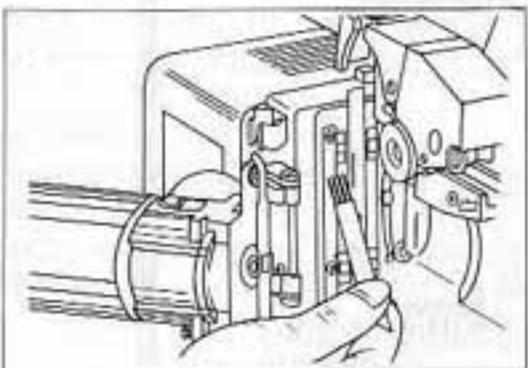
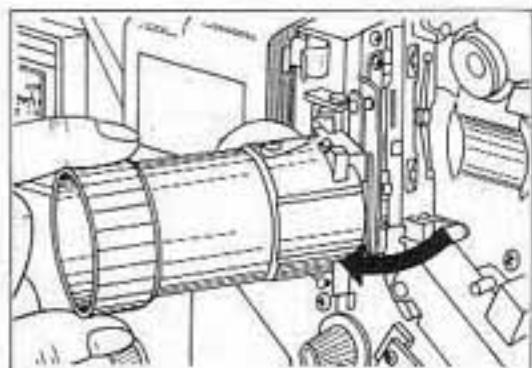


Cleaning

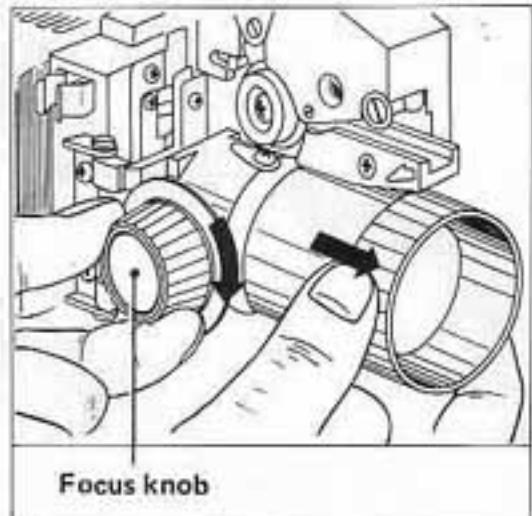
Periodic cleaning of the projector is important for keeping it (and your films) in top condition.



- 1 Pull the front cover down to open.
- 2 Swing the lens away from the projector in the direction of the arrow.
- 3 Gently clean the aperture and pressure plates with the brushes or a soft lintfree cloth.



- 4 Dirt or dust deposits on the sound heads will degrade the sound playback quality. Clean the sound heads with a cotton swab or soft cloth. In this case, be sure to disconnect the power cord and set the motor switch at "OFF" position.



■ How To Remove the Lens

Turn the focus knob clockwise as far as possible and pull the lens forward.

Wipe the lens surface gently with a clean soft cloth or lens cleaning tissue.

When putting the lens back in position, match the lens pin with the lens barrel slot with the focus knob turned fully clockwise.

Trouble-shooting Hints

Motor fails to start.

- Is the power cord properly plugged in?
- Isn't the main power fuse blown? (See page 15)

Projection lamp fails to come on.

- Is the lamp correctly plugged into the socket? (See page 13)
- Isn't the lamp defective?

Film does not thread automatically to the take-up reel.

- Is film leader correctly trimmed? (See page 6)
- Aren't the perforations on the leader damaged?
- Is the film leader spliced correctly?

Screen image is out of focus.

- Is the lens fitted correctly into the sleeve? (See page 16)

Either sound track fails to record or playback.

- Is the volume control turned up enough? (clockwise)
- Is the track selector at the correct position? (See page 5)
- Is the sound selector set correctly? (See page 5)
- Isn't a fuse for the amplifier blown? (See page 15)

After checking the above items, if your trouble still persists, consult your nearest photo dealer or an authorized Elmo Service Centre.

Optional Accessories

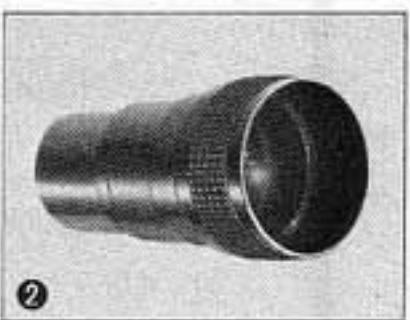


Viewer type 100

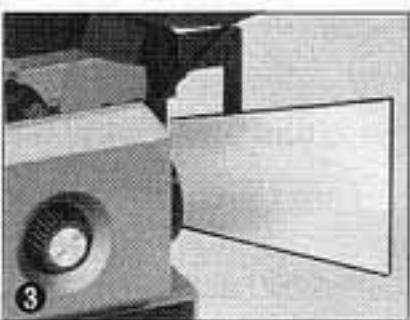
With the viewer type 100, you can show your films under daylight conditions. Use the ST-180EM adapter to attach viewer to your projector.



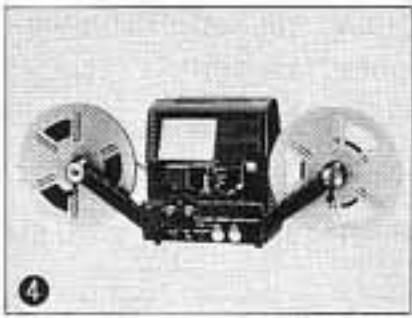
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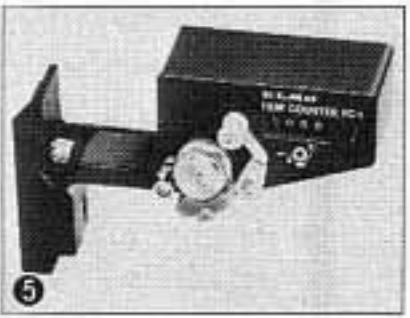
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③



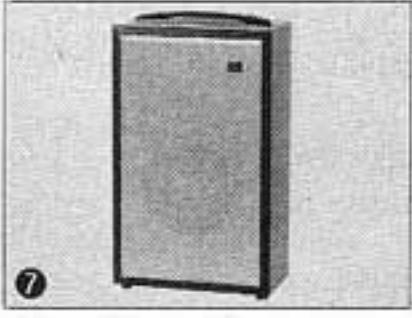
④



⑤



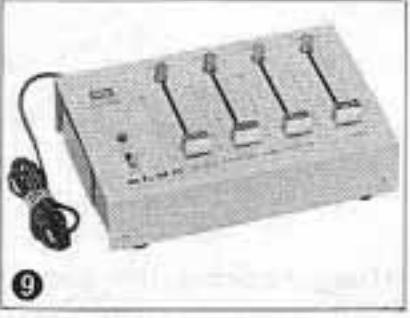
⑥



⑦



⑧



⑨

① Long-focus zoom lens

Sharp F1.4, 25 - 50mm long-focus zoom lens for projection in a large auditorium.

② Fast zoom lens

Exceptionally bright wide-angle F1.1, 12.5 - 25mm zoom lens.

③ Daylight projection mirror

This accessory mirror provides a clear projection image under daylight conditions when used with the special Elmo translucent rear projection screens.

④ Editor 912/S

An easy-to-handle, quality flickerless sound editor with a large, bright screen for producing fine sound film.

⑤ Film counter FC-1

Elmo Film Counter, Type FC-1 is designed for counting advanced frames of film (one number per 18 frames). This Film Counter makes sound recording more convenient, and combined use of it and Elmo Viewer, Type 100 (Optional) makes film editing easier.

⑥ ES-1000 speaker

High performance twin extension speakers with 10" (25cm) woofers and tweeters. Especially suitable for projection in a large auditorium. Stores conveniently in one portable case.

⑦ Extension speaker ES-650

High-fidelity speaker mounted in wooden cabinet.
Rated input: 10W (max. 20W)
Impedance 8Ω

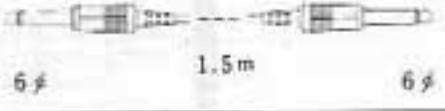
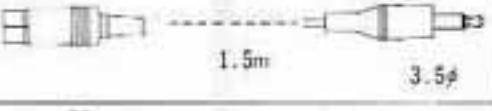
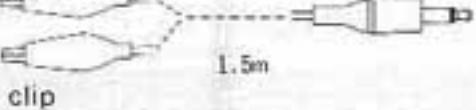
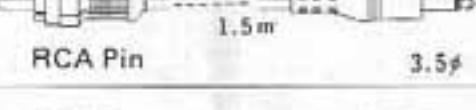
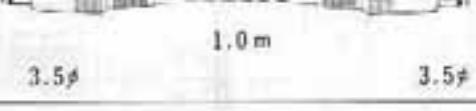
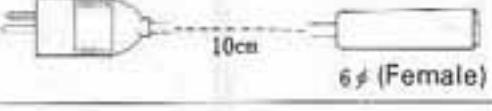
⑧ Headset type EH-75

Includes switch to select impedance, either 16 or 600 ohms.

⑨ 4-channel mixer type MX-4

For mixing sound from four separate sources onto one track.
With this mixer you can perform professional fade-in, fade-out and overlapping.
Easily connects to tape recorder, record player and microphone.

● Accessory cords

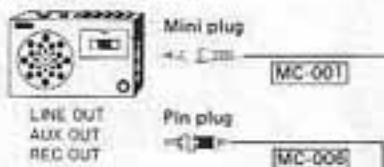
	Code No.	Specifications	Remarks
Connection cord	MC-001	 3.5φ 1.5m 3.5φ	1.5m
	MC-002	 6φ 1.5m 6φ	1.5m
	MC-003	 3.5φ 1.5m 3.5φ	1.5m
	MC-004	 clip 1.5m 3.5φ	1.5m
	MC-006	 RCA Pin 1.5m 3.5φ	1.5m
	MC-009	 3.5φ 1.0m 3.5φ	1.0m From earphone or monitor jack to AUX IN input
	MC-010	 3.5φ 1.0m 3.5φ (grey)	From earphone or monitor jack to MIC input
Adaptor	MP-001		
	MP-002		
	MP-004		
Speaker cord	SC-002	 6φ (Female) 10cm 6φ (Female)	10cm

● Connection Example

• Microphone



• Cassette tape recorder



• Television set
Radio etc.



Mini plug

MC-003

• Stereo set



Pin plug

MC-004

DIN plug

MC-005

• Cassette deck



Pin plug

MC-006

DIN plug

MC-007

• Mixer

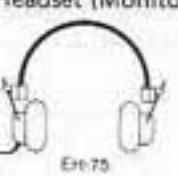


Mixer MX-4

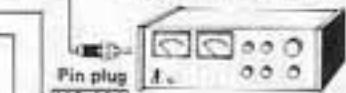
• Earphone (Mohitor)



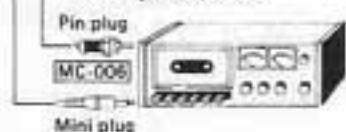
• Headset (Monitor)



• External amplifier



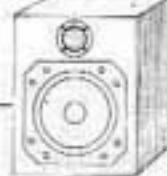
• Tape recorder



• External speaker



• External speaker



Projection Distance and Image Size

Focal length Distance	Wide 15mm Image size (cm)	Tele 25mm Image size (cm)	50mm (with optional lens) Image size (cm)
1 m	26 x 35	15 x 20	7 x 10
1.5 m	39 x 52	23 x 31	11 x 15
2 m	52 x 70	31 x 42	15 x 20
2.5 m	66 x 88	39 x 52	19 x 26
3 m	79 x 106	47 x 63	23 x 31
5 m	133 x 178	79 x 106	39 x 53
10 m	266 x 356	160 x 213	79 x 106
15 m		240 x 320	119 x 160
20 m		320 x 428	160 x 213
30 m			240 x 320
40 m			320 x 428

Projection Time and Film Length

Time (min.)	24 fps		18 fps		Time (min.)	24 fps		18 fps	
	m	ft	m	ft		m	ft	m	ft
1	6.1	20	4.6	15	19	115.8	380	86.9	285
2	12.2	40	9.1	30	20	121.9	400	91.4	300
3	18.3	60	13.7	45	21	128.0	420	96.0	315
4	24.4	80	18.3	60	22	134.1	440	100.6	330
5	30.5	100	22.9	75	23	140.2	460	105.2	345
6	36.6	120	27.4	90	24	146.3	480	109.7	360
7	42.7	140	32.0	105	25	152.4	500	114.3	375
8	48.8	160	36.6	120	26	158.5	520	118.9	390
9	54.9	180	41.1	135	27	164.4	540	123.5	405
10	61.0	200	45.7	150	28	170.7	560	128.0	420
11	67.1	220	50.3	165	29	176.8	580	132.6	435
12	73.2	240	54.9	180	30	182.9	600	137.2	450
13	79.2	260	59.4	195	31			141.8	465
14	85.4	280	64.0	210	32			146.3	480
15	91.4	300	68.6	225	33			150.9	495
16	97.6	320	73.2	240	34			155.5	510
17	103.6	340	77.7	255	35			160.0	525
18	109.7	360	82.3	270	40			182.9	600



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