

FILM-TECH

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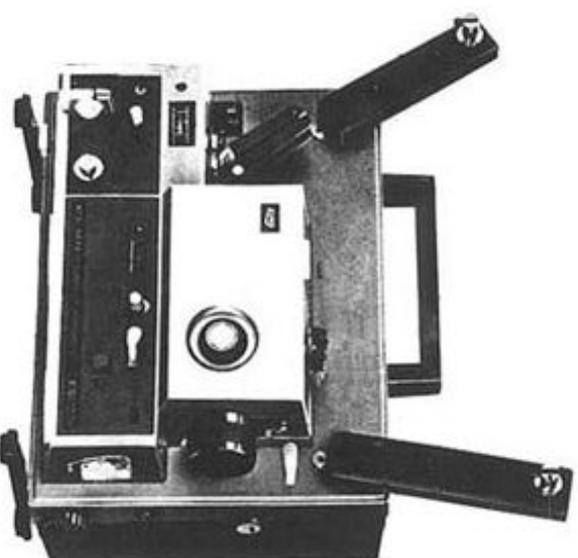
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ELMO
ST-1200 HD

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

Thank you for selecting the Elmo ST-1200HD Sound Projector.

The Elmo ST-1200HD is a high performance sound projector specially designed to meet your needs in creative sound recording and to expand your playback possibilities.

Features:

- Dual Track System. The utilization of both the balance stripe and the main stripe on conventional magnetic sound film as a dual track system for recording and playback.
 - Unlimited sound recording potentials including: sound-on-sound recording, dubbing capabilities, sound transfer from main stripe to balance stripe and back to main stripe. These recording features can be employed individually or can be combined and integrated to meet the most demanding recording situations.
 - Convenient sync-sound editing capabilities enabling the buildup of the most sophisticated sound tracks in the most effortless manner.
 - Versatile dual track playback facilities utilizing both the balance and main stripe available on conventional sound film. Optical track in addition to magnetic tracks, can also be played back with model "M.O."
- All these features are made possible because of the dual track system incorporated in your Elmo ST-1200HD sound projector. Be sure to carefully read through this instruction manual to make the most of these fascinating, breakthrough features and to ensure against improper handling that may result in damage.

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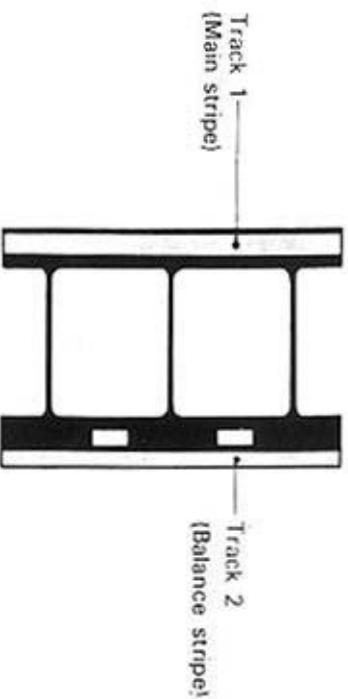
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INTRODUCTION

The dual track system



As shown in the illustration, 8mm sound film is coated with a magnetic material also known as "magnetic stripe". Stripe is applied to both the right and left edges of the film. The wide or "main" stripe is used to carry the sound track when used in conventional projectors. The narrow or "balance" stripe, that runs just outside the film perforations, is used for balance to ensure smooth film travel through the projector.

The Elmo ST-1200HD utilizes both the main stripe and the balance stripe for recording and playback. After receiving your sound film from the processing laboratory, there will most likely be sound on the sound stripe (track 1). Music can be easily matched and added to the balance stripe (track 2) to accompany your original sound on track 1. Sound can easily be recorded over any number of times until you achieve the desired sound composition.

Because of the advantage of using the dual track system, sound can be transferred from track to track without loosing synchronization with the picture. If a mistake is made, say in volume levels, simply

change the volume and transfer again from track 1 to track 2. Suppose you want to build a sound track of three types of sound, dialogue, music and sound effects. Your dialogue has already been recorded in sync, on track 1 with your sound movie camera. Therefore, record your music on track 2. After playing back both tracks to test the volume, transfer the dialogue on track 1 to track 2 that contains the music utilizing the sound-on-sound capabilities of this projector. Track 2 now contains both music and dialogue. Sound effects, such as doors slamming, sounds of crickets, the wind or the sea can now be dubbed in on track 1. A final transfer of track 2 (music and dialogue) to track 1 (sound effects) will result in all three sounds on track 1. This process can be repeated to add more sounds and to build even more complex tracks. Simply concentrate on one sound at a time and then transfer.

Building your sound track with the dual track system

When using sound film:

Super 8 or Single 8 sound film comes coated with both the main stripe and the balance stripe and is ready to use with your Elmo ST-1200HD sound projector.

When using silent film:

Although there is some pre-stripped film available for use with silent cameras, most film, for silent cameras, does not come striped with a magnetic coating. Therefore, it is necessary to ask your nearest photo dealer to have your film "striped" when sending it in for processing.

Dual track recording and playback techniques

The following five methods can be used to record and playback with the dual track system.

- 1 Both sound tracks can be recorded or played back independently.
- 2 Playback levels of both tracks can be properly mixed by simply adjusting the balance control.
- 3 Sound can be monitored through an earphone or headset on one track while recording on the other track.
- 4 Sound-on-sound recording and mixing can be performed at any point on either track.
- 5 Sound can be transferred from one track to the other without erasing the original track.

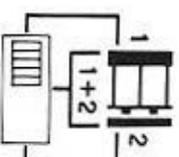
Dual track recording and playback operation

Set the track selector in the correct position to perform the following :

■ Track selection

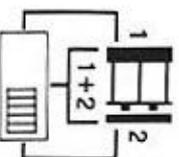
● Position 1

Select position 1 to record or playback track 1.



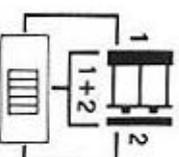
● Position 2

Select position 2 to record or playback track 2.



● Position 1 + 2

Select position 1 + 2 to play both tracks simultaneously.

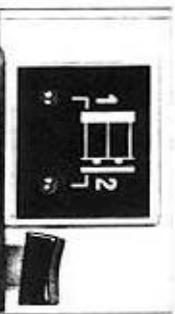


Note : 1. Prior to recording, be sure the track selector is in the correct position so as not to mistakenly erase or spoil your desired sound track.

2. If only one track is carrying sound, set the track selector to that track only for playback. Setting the track selector to 1+2 may result in undesirable noise coming from the other track.

3. Both tracks can not be recorded simultaneously therefore, either track 1 or track 2 must be selected for recording.

◆ Track indicator lamps



After selecting the desired track, turn the volume control clockwise. The corresponding track indicator lamp should come on to confirm track selection. (Please refer to the following illustration.)

	1st track recording/playback	2nd track recording/playback	1st and 2nd track playback
Track selector			
Track indicator lamp			

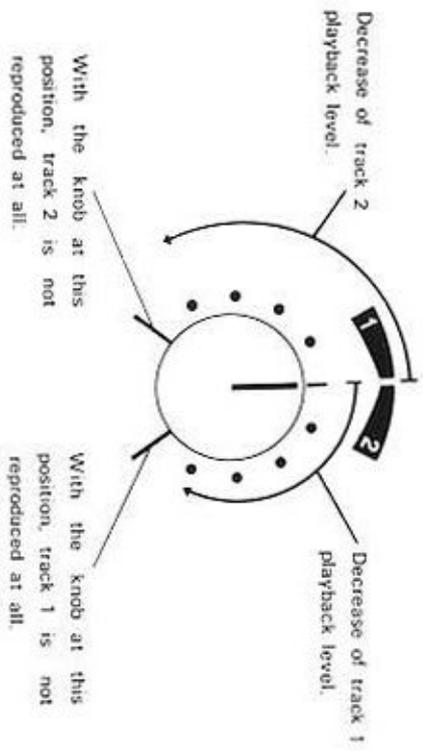
■ Balance control



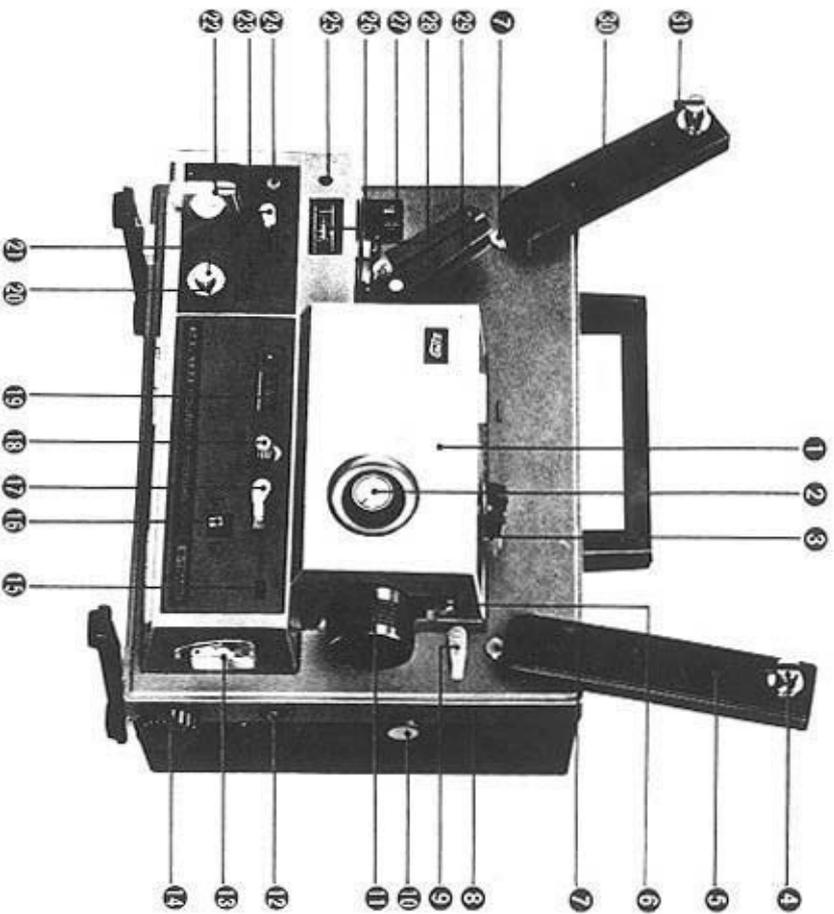
The balance control knob is used to balance the playback levels of both tracks (1 and 2) by adjusting as follows: The balance control is normally set in the middle position. If track 1 is higher than track 2, turn the knob clockwise until both tracks are balanced.

Note:

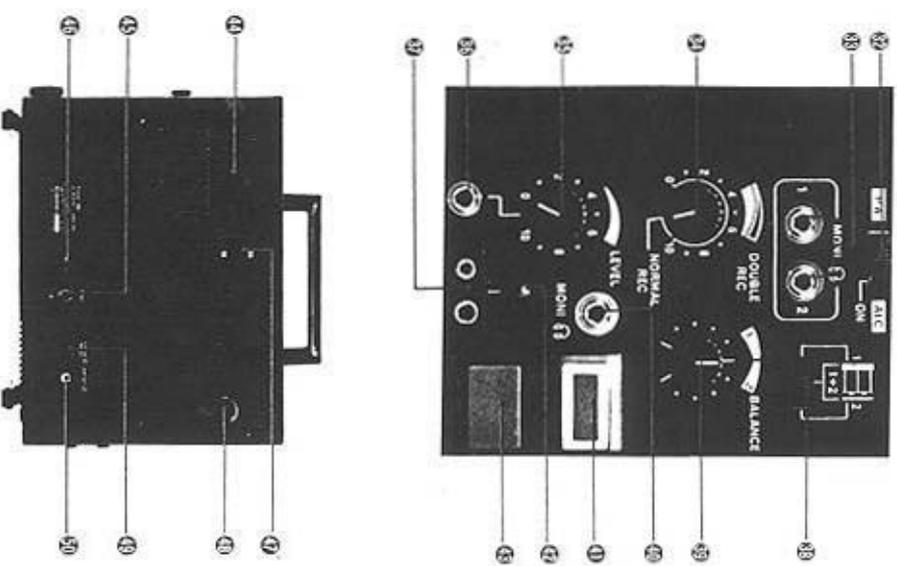
1. Whether playing both tracks or either track 1 or 2, begin with the balance control in the middle. (Only one track will play if the balance control is turned all the way in one direction.)
2. Balance control can not be used to set recording level.



NOMENCLATURE



- 1 Cover
- 2 Focus
- 3 Auto thread lever
- 4 Reel spindle
- 5 Forward arm
- 6 Auto thread slot
- 7 Arm lock
- 8 Accessory socket
- 9 Rewind lever
- 10 Single frame adjustment
- 11 Zoom lens
- 12 R-1 sync jack
- 13 Film trimmer
- 14 Elevation control
- 15 Exciter lamp window (Model M-O only)
- 16 M-O selector (Model M-O only)
- 17 Loop former
- 18 Framer
- 19 Film counter
- 20 Tone control
- 21 Volume control (with amp. switch)
- 22 Motor switch
- 23 Lamp switch
- 24 Pilot lamp

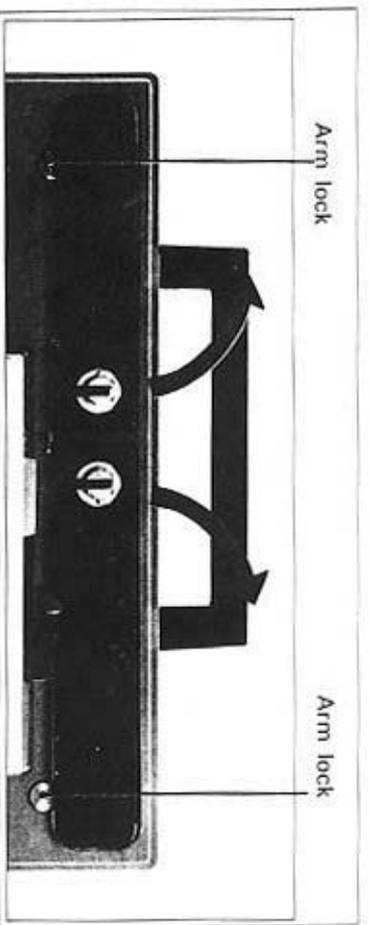


- 25 Record indicator lamp
- 26 Level meter
- 27 Track indicator lamp
- 28 Auto thread release
- 29 Rear film guide
- 30 Rear arm
- 31 Rear lock
- 32 PA-ALC selector
- 33 Green monitor jacks
- 34 Double record control
- 35 AUX volume control
- 36 AUX IN jack
- 37 Microphone jack
- 38 Track selector
- 39 Balance control
- 40 Yellow monitor jack
- 41 Record control button
- 42 Microphone-ON lamp
- 43 Record button
- 44 Speaker
- 45 Power fuse
- 46 Power cord socket
- 47 Projection speed selector
- 48 Voltage reference window
- 49 EXT speaker connector
- 50 AUX OUT jack

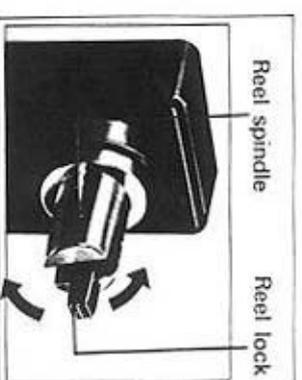
PROJECTION

Preparing for projection

- 1 Plug in the power cord and the pilot lamp will light.



- 2 Pull both arms up into position until they lock. (Depress arm locks to fold back.)



- 3 Place your film on the forward arm and the take-up reel on the rear arm. Press the reel locks until the reels are snug against the spindles.

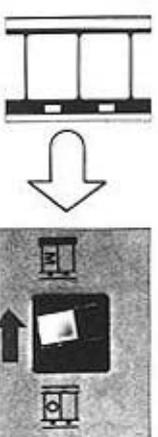
Note:
If a take-up reel with a capacity less than 240 m (800 ft.) is used, sound playback may be affected. Be sure to use the take up reel supplied with the projector.

- 4 Set the M-O selector to M for magnetic sound film and to O for optical sound film. At O position, exciter lamp window glows blue. (Model M-O only)

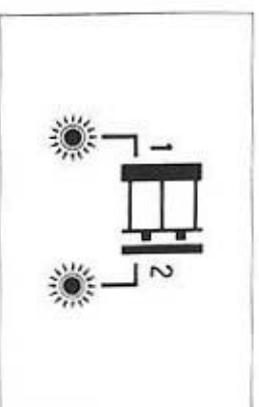
Note:

1. Turn volume control knob clockwise. With the M-O selector at the M position, the track indicator lamp will indicate track selection: lamp 1 is ON with track selector at 1, lamp 2 is ON with the selector at 2, and both lamps are ON with the selector at 1 + 2.
2. When projecting silent film, set the selector to O and the volume control knob to OFF.

For magnetic sound film

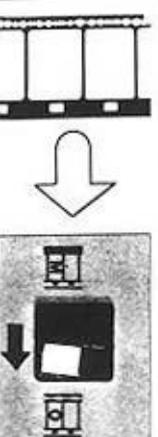


M-O selector

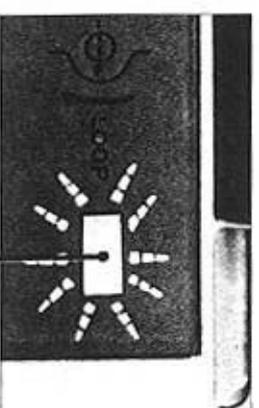


Track indicator lamps

For optical sound film

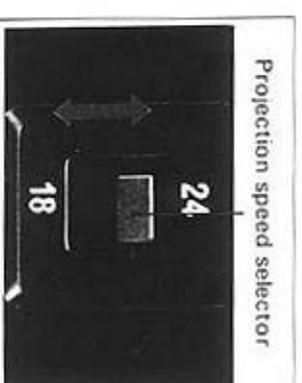


M-O selector



Exciter lamp window

- 5 Select proper projection speed, either 24 fps (up) or 18 fps (down).
Important:
Be sure the motor is OFF when changing projection speed.



Sound projection

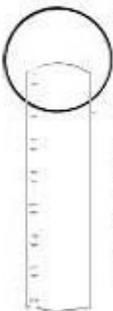


Film trimmer

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

Note:

When the tip of leader is bent or snapped, trim off as illustrated.



- 2** Depress green auto thread lever until it locks. This lever will release when film reaches the take-up reel. To manually release, press auto thread release lever.



Auto thread lever



Auto thread release lever

- 3** Advance motor switch clockwise to ● position, then to F after motor starts.

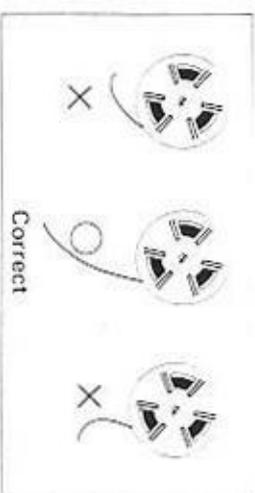


Motor switch

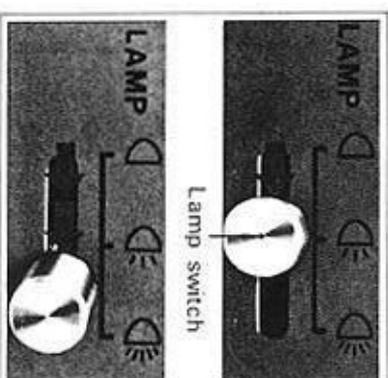


Film thread slot

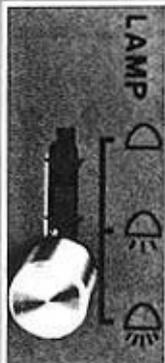
- 4** Insert film leader into the auto thread slot as indicated by the red arrow. When film reaches the take-up reel, the auto thread lever will release automatically.



- 5** Set the lamp switch to D position. If higher brilliance is required, advance lamp switch further to D . The D position will increase lamp life.



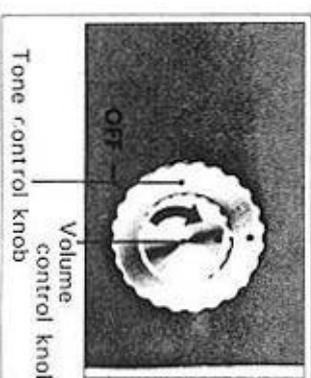
Lamp switch



LAMP

- 6** Volume and tone can be adjusted by turning the volume and tone control knobs.

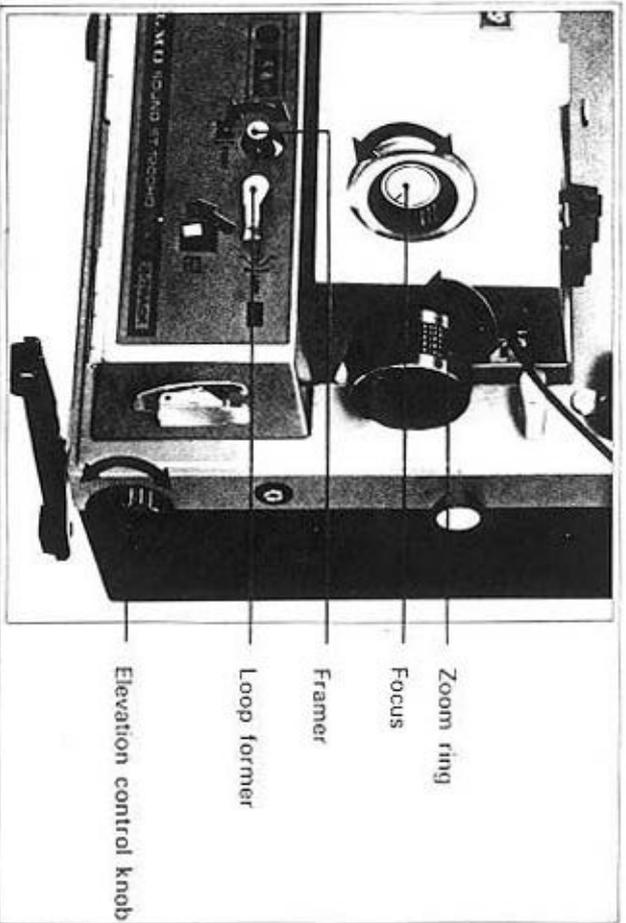
Note:
If there is no sound after turning the volume control, try adjusting balance control.



Volume control knob

Tone control knob

Image adjustment



- A DOES YOUR PICTURE FIT THE SCREEN?**
Adjust picture size with the zoom ring.

- B IS THE FOCUS SHARP?**
Adjust sharpness with the focus knob.

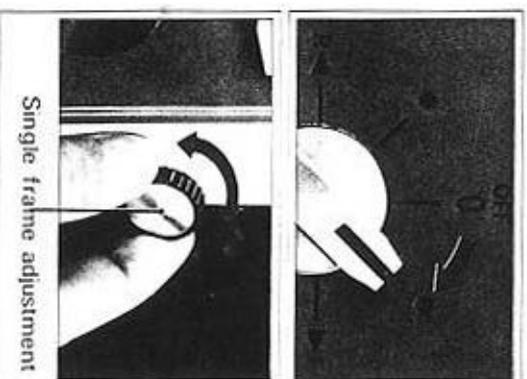
- C DOES A FRAME LINE APPEAR ON THE SCREEN?**
Adjust framer to eliminate frame line in the picture.

- D DOES YOUR PICTURE MATCH THE HEIGHT OF YOUR SCREEN?**
Adjust the height of your picture with the elevation control knob.

Note:

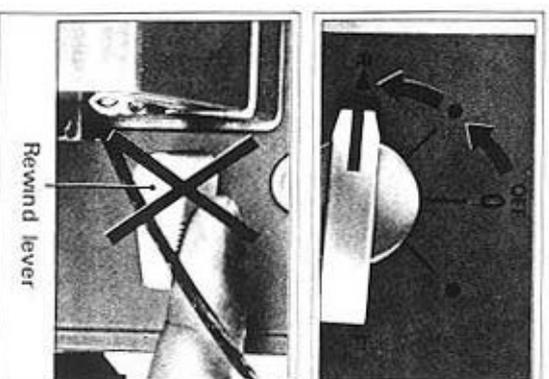
If film loop is lost during projection, press down on the loop former.

Single frame projection



During projection, you may wish to stop the film to show a particular frame. This can be done by turning the motor switch to ● (still) position. If the film stops in the middle of a frame, or the aperture is closed, pull out the single frame adjustment and turn it until a full frame is projected.

Reverse projection

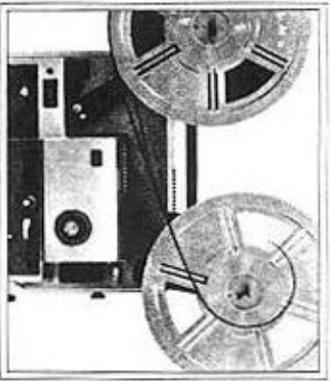


Advance motor switch counterclockwise to ● position, after motor starts, advance to R(Reverse).

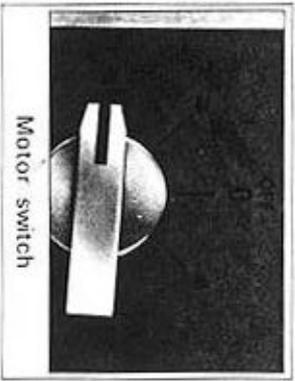
Note:

Be careful not to touch the rewind lever during reverse projection

■ Rewinding the film

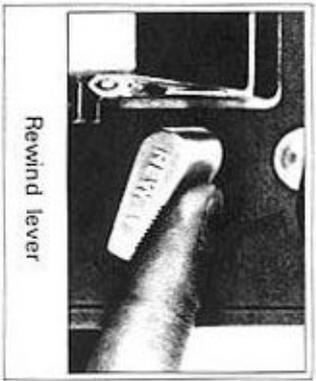


- 1 After the film has been wound completely on the take-up reel, turn off the lamp and motor.
 - Insert the end of the film into the slot of the feed reel hub.



Motor switch

- 2 Advance the motor switch counterclockwise to ● position, then to R position after motor starts.



Rewind lever

- 3 Lock the rewind lever by pushing down in the direction of the arrow as illustrated.
 - The rewind lever is released automatically when the projector is operated in the forward direction. Therefore, rewind lever can remain locked until next projection.



■ Removing the film from the film path

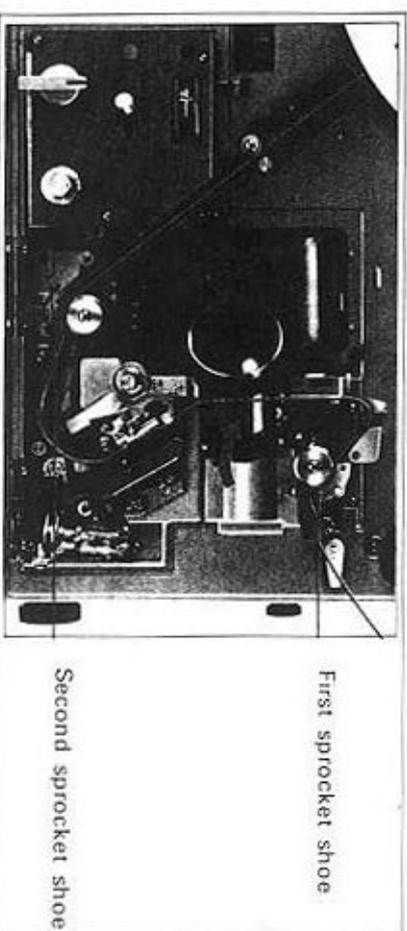


- 1 Turn motor off.



Cover

- 2 Open cover by pulling top down.



First sprocket shoe

Second sprocket shoe

- 3 Take hold of the lens barrel, swing the lens away from the projector. Press the first sprocket shoe forward and the second sprocket shoe downward. Remove the film.

Caution:

When rewinding film, turn take-up reel once in the clockwise direction to take up the slack in the film. Then turn motor switch to R.

RECORDING

Before recording

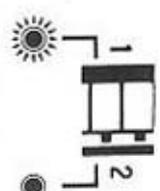
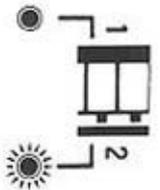
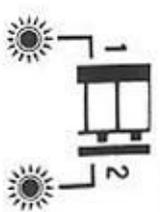
- 1 Be sure both edges of your film are magnetically coated. If just one edge is coated, only half of the projector's capabilities can be utilized.
- 2 Set the M-O selector at M for both recording and playback.
- 3 Set the projection speed selector either to 18 fps or to 24 fps in accordance with the film you are using.

Controls

The following will acquaint you with the controls for recording and playback. A thorough understanding of their functions will assure you of crisp, clear, high-fidelity sound reproduction.

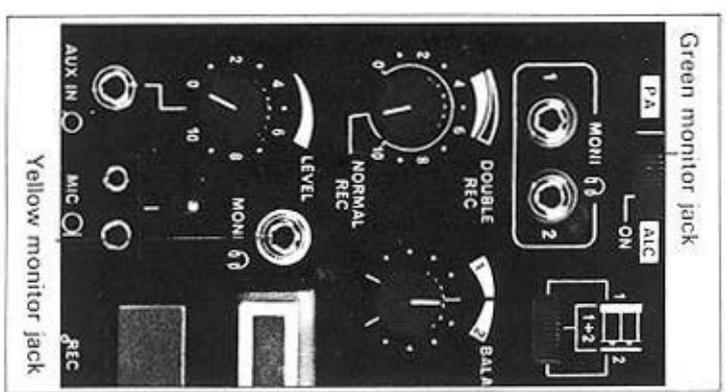
Track selector and track indicator lamps

Set track selector in the correct position (Refer to page 7).
The corresponding lamp should come on.

Track selector	Track 1 record/playback	Track 2 record/playback	Track 1 and 2 playback
			

Monitor jacks

Yellow and Green jacks are provided on the rear panel for monitoring sound through an earphone or headset.



Yellow monitor jack

Sounds being recorded or played back can be monitored by connecting an earphone or a headset to this jack. (Impedance: 16 ohms)

Sound will not play back through built-in or extension speaker.

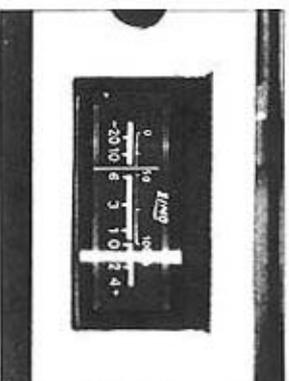
Green monitor jacks

Track 1 is monitored from jack 1.
Track 2 is monitored from jack 2.
These jacks can also be used to transfer sound from one track to the other. (see page 32.)

1. Monitoring playback only is possible. Monitoring during recording is not possible with green jacks.
2. Monitoring level is preset when using the green jacks therefore, volume can not be adjusted.
3. Monitoring from the green jacks will not cut out built-in or extension speaker.

Sound options

Using the level meter during playback



Level meter

The AUX OUT jack can be used to reproduce sound through an external amplifier or to transfer sound to a tape recorder. When using an extra amplifier, adjust the volume control so the needle of the level meter stays on the red dot near the digit-6 as shown. This indicates the standard level (600Ω about -10db)

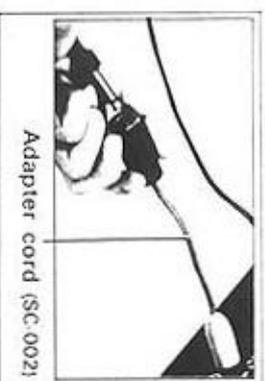
The level meter can also be used to observe the volume level of the extension speakers.

Connecting the extension speakers



EXT SP connector

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



Adapter cord (SC-002)

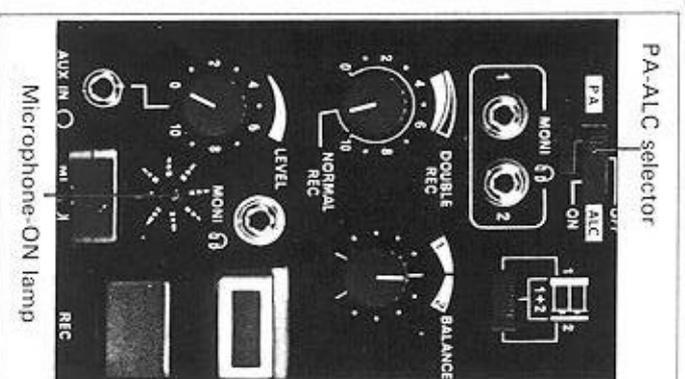
When using an extension speaker with a 6.5 plug, use the accessory cord adaptor SC-002 for connecting the speaker line to the EXT SP connector. Be sure to use speakers with an impedance rating of 8 ohms.

Reproducing sound through a stereo set



Connect the green monitor jacks with input jacks on a stereo set by the accessory cord MC-006. (Connect the green monitor jack 1 with left channel, and the green monitor jack 2 with right channel.)

Using the public address system (PA)



Set the PA-ALC selector to the PA position. Plug the microphone into the MIC jack, then turn on the volume control and the microphone lamp will come on. Now you can use the projector as a public address system.

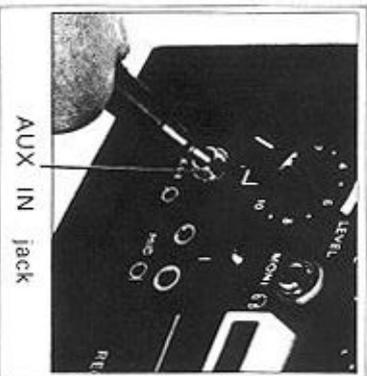
The public address system can also be used to speak over the sound track during projection.

Note:

When using your projector as a public address system, it is recommended to attach the extension speakers. However, be careful not to place the microphone too close to the speakers or adjust the volume too high which may result in an undesirable loud noise or howling.

Input jacks

- ◆ This projector is provided with two input jacks: MIC and AUX IN



AUX IN

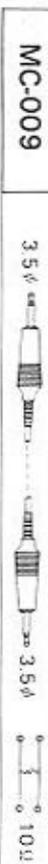
This jack is used to connect a tape recorder, record player, radio, etc. to the projector for recording and mixing various types of sound.

It is also used as an input jack when transferring sound from one track to the other. (Refer to page 32.)

The recording level must be set manually using the AUX volume control since the automatic level control (ALC) will not function when recording through AUX IN.

Note:

When recording from a recorder or player without an AUX OUT or LINE OUT jack, connect the accessory cord MC-009 to earphone or speaker jack.



Microphone jack (MIC)

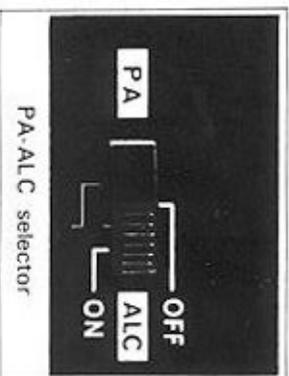
This jack is used to connect the microphone for recording live narration.

Recording through the microphone jack can be done by manually adjusting volume level or by using the automatic level control.

Set switch to ALC-ON for automatic level control recording. For manual recording level adjustment, set switch to ALC-OFF and adjust the volume control knob.

Note:

To achieve the best possible quality recording with the least background and inherent projector noises, record at the lowest level and with the microphone as far away from the projector as possible.

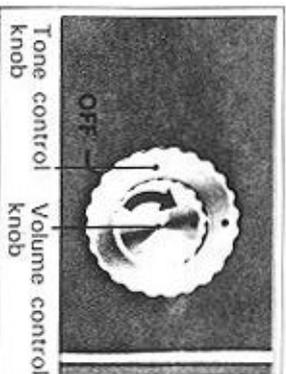


Automatic level control (ALC) recording

When the selector is set to ALC-ON, recording level is automatically controlled to maintain optimum distortion-free recording. For ALC recording, turn the volume control knob clockwise so that the indication dot just passes midway. In ALC recording, it is unnecessary to check the level meter.

Limiter:

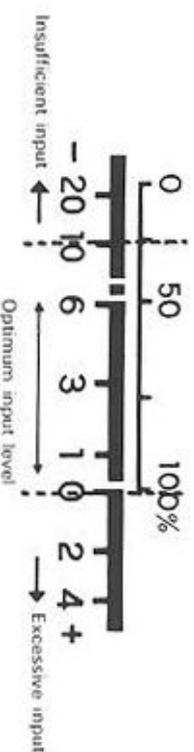
If the knob is not set past the midway point, the circuit will act as a limiter and will reduce only high level input which may result in distortion. In this case, adjust the volume while observing the level meter.



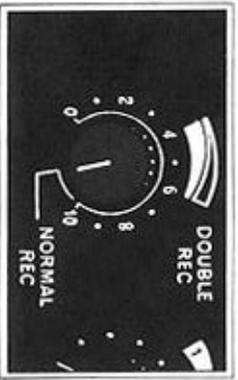
Level meter



To ensure good quality recordings, adjust the volume so the level meter needle stays in the optimum level zone as shown in the illustration. When the needle swings to the extreme right, the recorded sound will be distorted. The level meter is activated by advancing the motor switch clockwise to ● position and is used to adjust the sound input level manually by turning the volume control. Playback levels can also be checked with the level meter.



Double recording



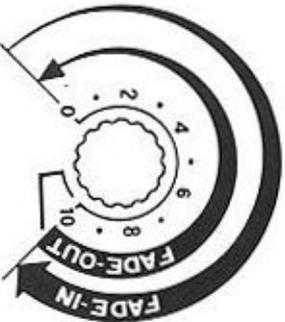
With the double record control knob, sound can be added over a recorded track without erasing the original sound. For normal recording, set the knob at the NORMAL REC position.

Note:

When utilizing double recording, prerecorded sound is erased by the addition of the new sound. High frequencies are more apt to be erased than low frequencies.

Operating double record control

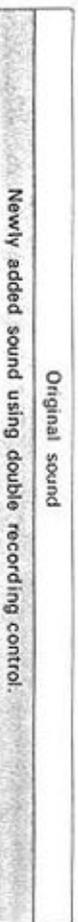
During double recording, the volume will not be indicated on the level meter nor can it be checked through the monitor jacks. Use the numerals indicated around the knob to set the proper recording level.



Knob set at this position will not record over or erase original sound.

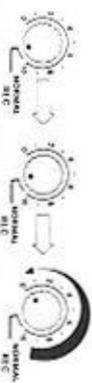
For normal recording set the knob at this position.

- 1 With the knob in the middle, recording level is nearly equal to original sound.



Original sound

Newly added sound



Newly added sound

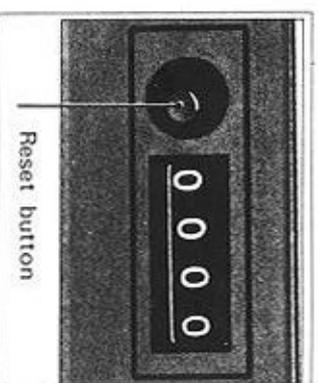
Original sound

- 2 By turning the double record control knob slowly to NORMAL REC the added sound will gradually dominate the original sound. To the listener, it will seem like the original sound has dissolved into the newly added sound. This effect is known as "lap dissolve" or "overlap."

- 3 Turning the knob from NORMAL REC back to 0 reduces the added sound to zero with the original sound again dominating the track. This time it seems like the added sound has dissolved back into the original sound.

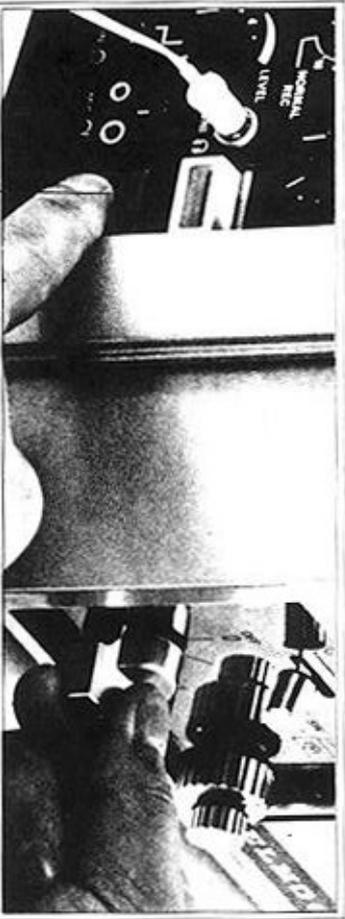
The illustrations show how the newly added sound is recorded over the original sound and is again dominated by the original sound.

Film counter



Any spot on the sound track of the film can be located simply by using the four digits displayed on the film counter as a guide. Pressing the button will reset the counter to zero. (One digit corresponds to 18 frames.)

Record button



Record button

The record button is used for normal recording, mixing, double-recording, dubbing, etc.

To lock, depress red record button and advance motor switch clockwise to ●

Advancing motor switch further to F begins the recording operation. After level meter comes ON and the needle is activated by the motor switch at ●, adjust the recording level. Check to see if the red record indicator lamp is ON. (The lamp will not come on unless the M-O selector is at M)

Note: Record button is released when motor switch is turned to OFF. The snap or click heard when record button is locked or unlocked, will not be recorded.

Record control button



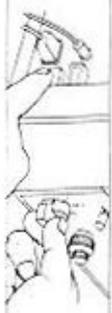
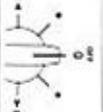
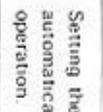
Record control button

The record control button allows you to make spot recording without stopping the projector. Depress the record control button together with the red record button at the desired film position for spot recording. (Release your finger from the record control button, and the red record button is locked.)

To release the red record button, depress the record control button again.)

Normal recording

When recording on either track, all controls must be set as shown in the following table.

Playback	Recording					Track selector
	Track selector	Track indicator lamp	Input jack	Volume control	Double record	
	Track 1 recording/playback  position 1		Connect the microphone to the MIC jack and the tape recorder, or other external sound source, to the AUX IN jack.	Use the volume control to adjust MIC input and the AUX volume control for the AUX IN jack. 	Set the knob at NORMAL REC position. 	Track 2 recording/playback  position 2
	Connect the earphone or headset to the yellow monitor jack. 			Depress to record.		
Releasing recording operation				Setting the motor switch to OFF automatically releases record operation.		
Track selector	 position 1				 position 2	

Note:

When you finish recording without monitoring the sound source thru a headset or earphone, turn the volume control fully off, before turning the motor switch off. This will prevent excess volume when you play back the recording.

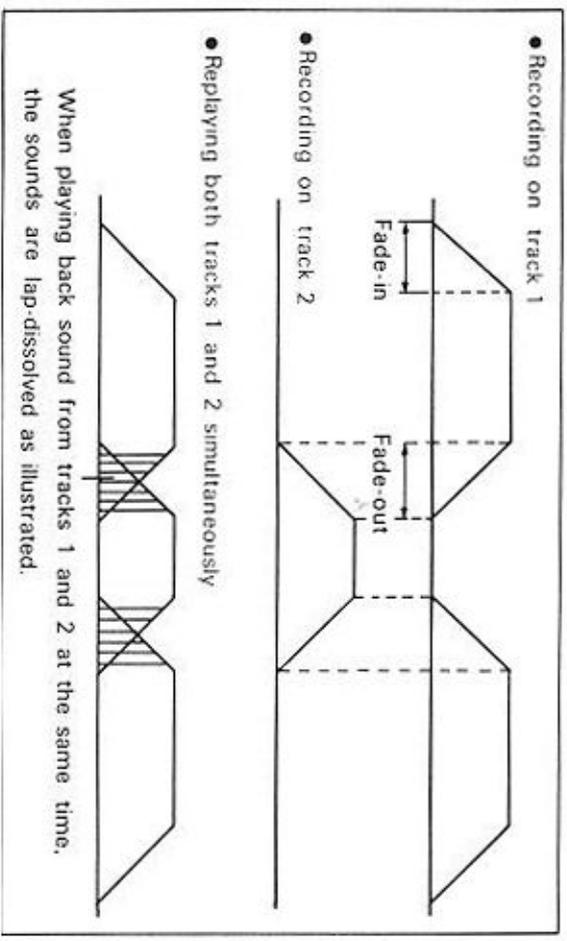
Recording and playback advantages of the dual track system

Because sound can be recorded separately on each track and then played back together in sync, planning, editing and building sound tracks is made easier.

● After sound has been recorded on track 1, complementary sound effects, music or narration can be easily added on track 2. By monitoring track 1 through the green monitor jack, track 2 can be easily built up and synchronized with track 1. Track 2 playback can be monitored through the yellow monitor jack.

Prior to the recording, be sure that the track selector is properly set.

By using fade in/out on both tracks 1 and 2, sound recording (as illustrated) is possible. (When making fade ins and fade outs, adjust the input level, from the microphone, with the volume control knob and the input level, from other sound sources through the AUX IN jack, with the AUX volume control knob.)



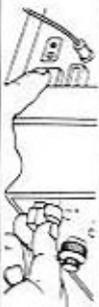
Playback		Recording							
Balance control	Track selector	Releasing recording operation	Monitoring	Record button	Double record control	Volume control	Input jack	Track indicator lamp	Track selector
			<p>Connect the earphone to the green monitor jack 1. Monitor track 2 through the yellow monitor jack.</p>		Be sure the double record control knob is set at the NORMAL REC position.	Adjust the recording level with the volume control knob.	Connect the microphone to the MIC jack and a tape recorder or other sound source to the AUX IN jack.		
This knob is normally set in the middle. Adjust, to balance playback levels of both tracks.	Set track selector to 1 : 2.	Setting the motor switch to OFF automatically releases recording operation.	<p>Monitor track 2 through the green monitor jack 2. Monitor track 1 through the yellow monitor jack.</p>	Set the record button to recording position.					Recording track 1 while monitoring track 2
									Recording track 2 while monitoring track 1

Track to track sound transfer

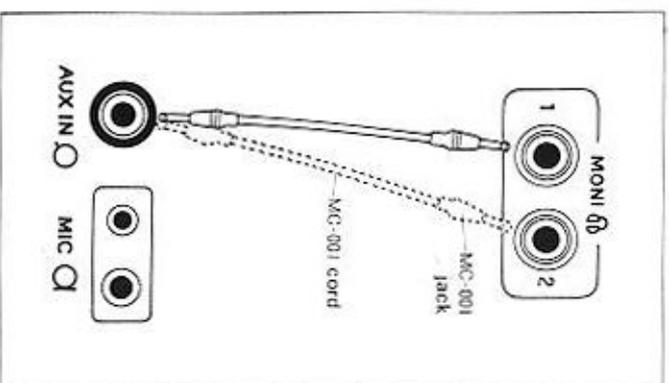
This method is used to transfer sound from one track to the other. In addition it is possible to add and mix sound to the original track during transfer.

Note:

During transfer, original track is not erased.

Recording	
Track selector	<p>Sound transfer from track 1 to track 2</p>  <p>Position 2</p>
Track indicator lamp	
Input jack	 <p>Connect the green monitor jack 1 to AUX IN with connection cord (MC-001)</p>
Double record control	<p>Be sure the double record control knob is set at NORMAL REC position.</p>
AUX volume control	<p>Adjust the input level after starting the projector.</p>
Monitoring	<p>Sound transfer can be monitored through the MC-017 cord.</p>
Record button	

Connecting cord



- To transfer sound from track 1 to track 2, connect the green monitor jack 1, to AUX IN jack with the MC-001 accessory cord. (To transfer from track 2 to track 1, use green monitor jack 2.)

Mixing can also be accomplished when a microphone or other sound sources are connected to the MX-4 four channel mixer. The mixer is connected to the MIC jack on the projector and the MIC jack input level can be adjusted with the volume control.

Note:

MIC jack can be used as an input jack for low level sound sources. In this case, connect the line to the larger jack (3.5mm). The smaller jack (2.5mm) is for supplying power to the microphone. When connecting the output of tape recorder directly to this 3.5mm MIC jack, use the accessory cord MC-010.

- You can monitor the sound being transferred if you use the MC-017 accessory cord.



Adjusting the input level

Turn the motor switch to F while depressing the record button.

Adjust the input level with the AUX volume control knob while observing the level meter.

Note:

When transferring sound from one track to the other, a loud feed back may occur when the volume control is turned too far. (In this case, level meter swings extremely to the RH end of meter range.) Adjust the AUX volume control to eliminate the feed back.

MAINTENANCE

Mixing

Mixing is a method used to combine and blend sounds from two or more sources onto one sound track. (For cord connections, see page 24.)

Mixing can be done in combination with double recording on either track or can also be done during transfer from one track to the other. This technique will enable you to build a sophisticated sound track with very interesting sound effects. Become familiar with the fundamentals of mixing to make full use of its applications.

● Music/Narration level adjustment

Due to the characteristics of the human ear, music is heard at a louder level than narration. Therefore, be sure to adjust music to 50% of the narration recording level.



When recording narration over music, reduce the music recording level to 30-15% of the narration level.

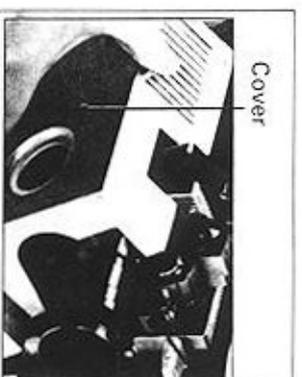


● Setting AUX IN and MIC recording levels

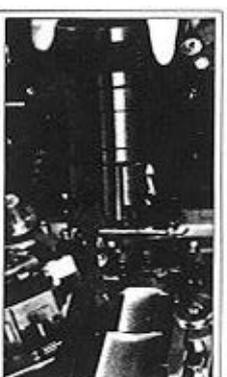
To set AUX IN volume level, first set the volume control to 0, then set the AUX volume control at the proper level.

To set MIC volume level, first set the AUX volume control at 0, then set the volume control at the proper level.

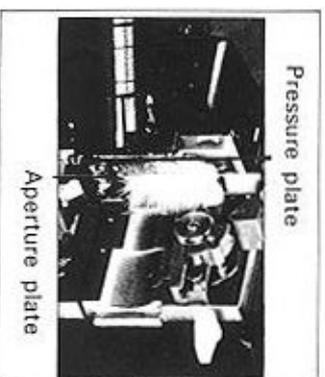
Cleaning



- 1 Pull cover down to open.



- 2 Swing the lens away from the projector.



- 3 Gently clean the aperture and pressure plate with the brushes provided or use a soft lint free cloth.

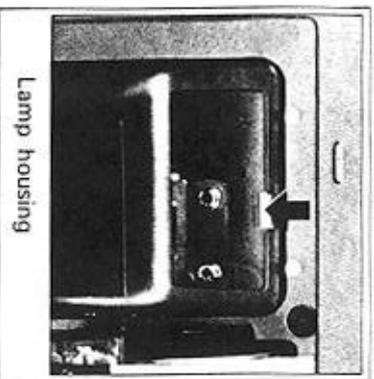
Dust, which adheres to the magnetic head surface, may affect recording/playback performance. So clean the head surface gently with a cleaning stick or soft cloth. When cleaning the head, be sure to disconnect the power cord and to set the motor switch to OFF.

- Be careful not to touch the film claw or scratch the film path during cleaning. The film gate and path, which are in continuous contact with the film, have been precisely machined to prevent damage to the film.

Replacing lamps

Projection lamp

- The projection lamp is a 15V-150W halogen lamp with a cold mirror. (ANSI code EFR or equivalent)
- Disconnect the power cord and be sure the lamp has cooled sufficiently before handling.



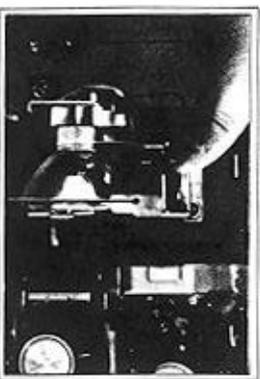
- 1 Press down on the spring lock and swing the lamp housing open as shown.



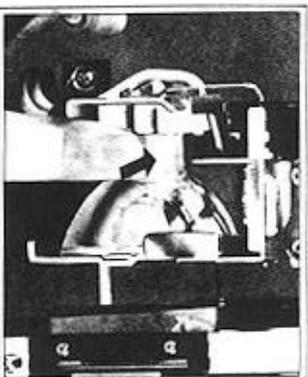
Note:

Heat proof glass is not broken but, purposely split in two pieces to allow for expansion and contraction caused by heat.

- 2 To remove, push up on the top of the lamp frame to eject the lamp.



- 3 To install new lamp, align the protrusion on the rim of the lamp with the niche in the lamp holder.



- 4 Insert the lamp all the way into the socket and push down on the top of the lamp frame to secure in place.

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 a cloth when installing a new lamp.

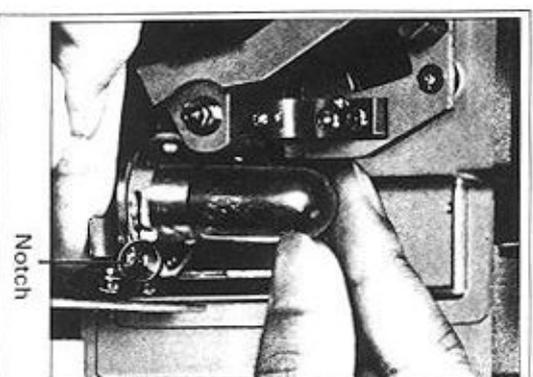
Exciter lamp

- (The following instructions are applicable for Model M-O only.)
- Exciter lamp-ANSI code BRS or equivalent.

- 1 Disconnect the power cord.

- 2 Press up and hold the pin-release lever below the lamp base at the same time, turning the lamp counterclockwise to remove.

- 3 To install new lamp, align the holes on the lamp base with the three guide pins of the socket. The notch in the lamp base should be facing forward. While pressing up on the pin-release lever, press lamp down and turn clockwise until the holes are snug against the pins. Let go of the pin-release lever to lock lamp in place.



Replacing fuses

■ Amplifier and exciter lamp fuse

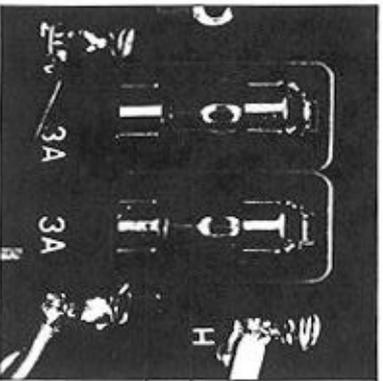
- If the volume control, exciter lamp or M-O lever does not respond when adjusted, check to see if the amplifier[†] or exciter lamp fuse has blown out.
- If the fuse has blown, take the following steps to replace.



1 Disconnect the power cord.

2 Remove both screws to take off rear cover as shown.

3 There are two fuses below the transformer. The left one is for the amplifier and the right one is for the exciter lamp. Both fuses are rated at 3A (3.15A).

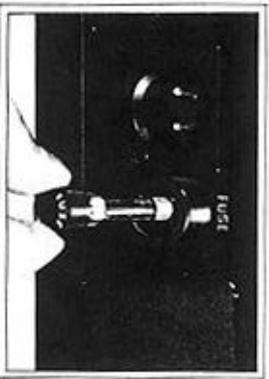


4 Replace the blown fuse with a new one.

Amplifier fuse

Exciter lamp fuse

■ Main power fuse



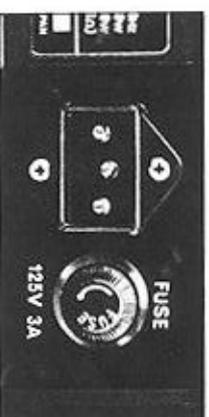
- If the pilot lamp does not light and the motor does not start, check the main power fuse.

Important:

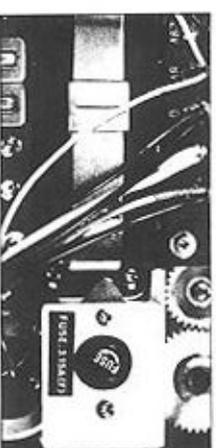
- Disconnect power cord.
- Do not use fuses other than those rated at the specified value.



100-240V type 230-260V type



For U.S.A. and Canada



For Scandinavia countries

1 Disconnect power cord.

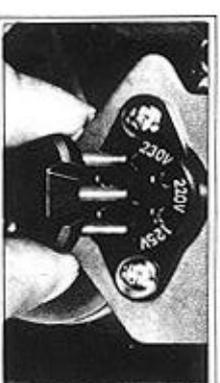
2 Loosen screws and remove cover. Main power fuse is located to the right of the transformer.

Voltage selection

- Voltage can be adjusted to comply with electrical requirements of each country. (There is a single voltage model that complies with the electrical regulations or conditions of each country.)*

1 Disconnect power cord.

2 Loosen screws and remove rear cover.



3 Pull out the voltage selection plug. Align the notch to the required voltage and then insert the plug back into the socket so the voltage can be read through the notch.

* Caution

Projectors sold in the USA are not designed for voltage alteration.

Trouble-shooting hints

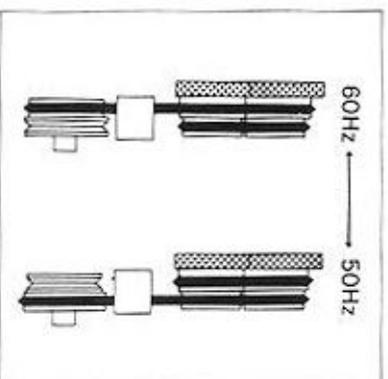
- Motor doesn't start.
 - Is the power cord properly plugged in?
 - Does the main power fuse need replacement?
 - Is the lamp correctly plugged into the socket?
- Projection lamp does not come on.
 - Is film leader correctly trimmed?
 - Are the first film perforations on the leader damaged?
 - Is the film leader spliced correctly?
- Film doesn't thread automatically to the take-up reel.
 - Is the lens fitted correctly into the sleeve?
- Screen image is out of focus.
 - Is the lens fitted correctly into the sleeve?
- Either sound track does not playback.
 - Is volume control turned up enough?
 - Is track selector at the correct position?
 - Is the balance control set near the middle?

Cycle selection

- The projector is previously set to conform to the power supply requirements of each country. If it becomes necessary to change the cycle, it is best to consult with your nearest Elmo dealer. To change the cycle yourself, proceed as follows:



- 1 Disconnect power cord.
- 2 Loosen screws and remove cover.



- 3 Change belt as illustrated to conform with required cycle.

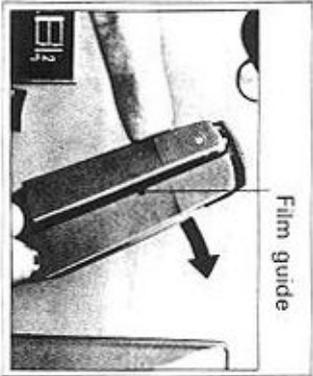
Changing the projection lens



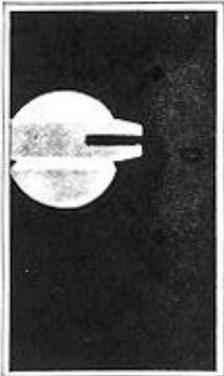
Focus knob

- **Removal:**
Turn the focus knob fully clockwise, gently pull out the lens.
- **Installation:**
With the focus knob fully clockwise, insert the lens barrel into the sleeve. Turn focus knob counterclockwise until lens is all the way in.

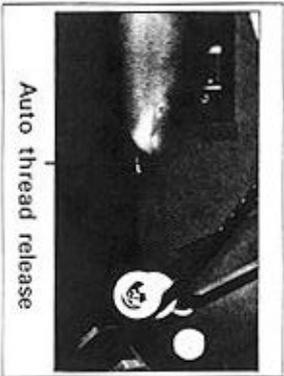
When using the 1200 ft (360m) reel (Optional accessory)



- 1 Push rear film guide in and then forward to lock. Place the 1200 ft (360m) reel on the take-up spindle and push to lock into place.



- 2 Load the film. When about 12" (32cm) of film leader extends from the rear film guide return the motor switch to OFF.

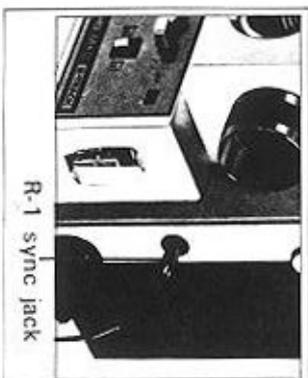


- 3 After inserting the end of the film leader into the reel hub, press the auto thread release.



- 4 When finished using the 1200 ft reel, return the rear film guide to its original position by pushing back.

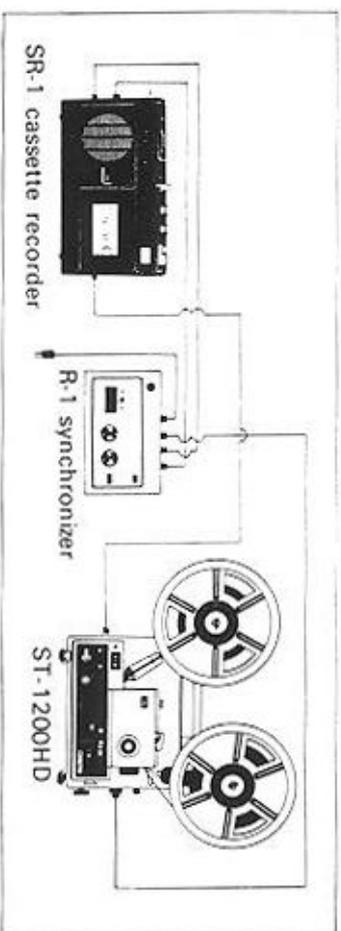
Jack for the R-1 synchronizer



- Plug the R-1 synchronizer into this sync-pulse jack.



- The R-1 synchronizer is used to synchronize the Elmo SR-1 Cassette Recorder with the ST-1200HD projector for transferring sync-sound to magnetically striped film. The SR-1 Cassette Recorder, when attached to Elmo cameras; 110R, 612R or 1018R, utilizes a pulse-sync system for recording sound in post-sync for later sound transfer to the film during projection.



● Sound transfer

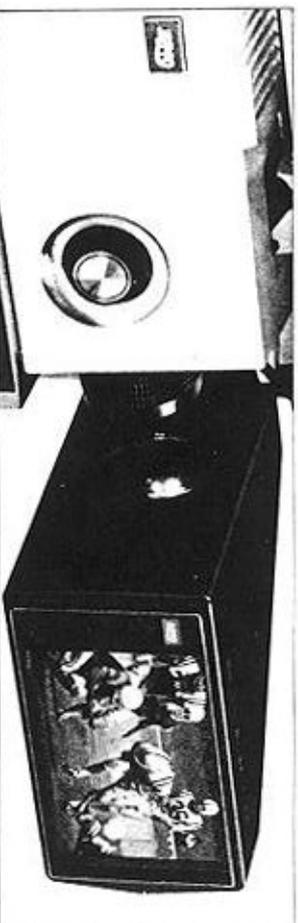
Sound transfer connections are illustrated above. (For a more detailed description, refer to the R-1 synchronizer instruction manual.)

Optional accessories



● Elmo viewer type 100

With this viewer, you can show your films under daylight conditions. Use the ST-1200HD adapter to attach the viewer to your projector.



● Long-focus zoom lens

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



● Fast zoom lens

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



● Extension speakers ES-650

High fidelity speakers mounted in a wooden cabinet.

Rated input : 10W (max. 20W)



● Twin 2-way speakers

High performance extension speakers with a 10" (25cm) woofer and a horn type tweeter. Especially suitable for projection in a large auditorium. Store conveniently in one portable case.



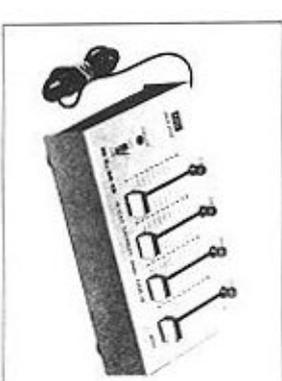
● Headset type EH-75

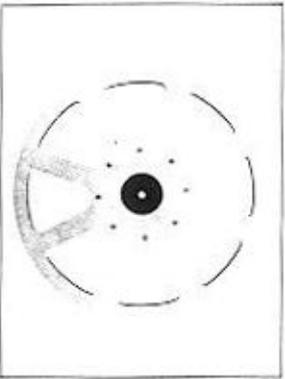
Includes switch to select impedance either 16 or 600 ohms.



● 4-channel mixer

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





● **1200ft (360m) reel**

The largest reel capacity in the 8mm world. Enables continuous projection extended over one hour.



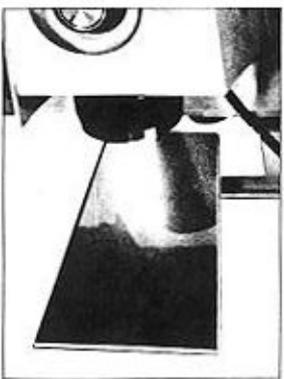
● **Elmo rewinders**

Large reel capacity-1200ft. Fast winding. One rotation of crank turns reel three times.



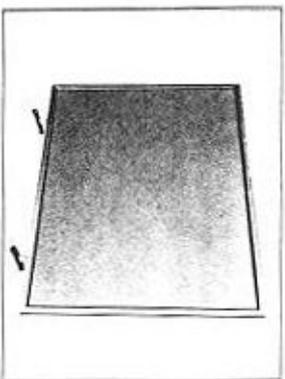
● **Editor 912**

Accepts both Super 8 and Regular 8 film. Includes sound monitor, film counter and film cleaner as optional attachments. An easy-to-handle, quality editor with a large, bright screen for producing fine sound or silent film.



● **Daylight projection mirror**

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

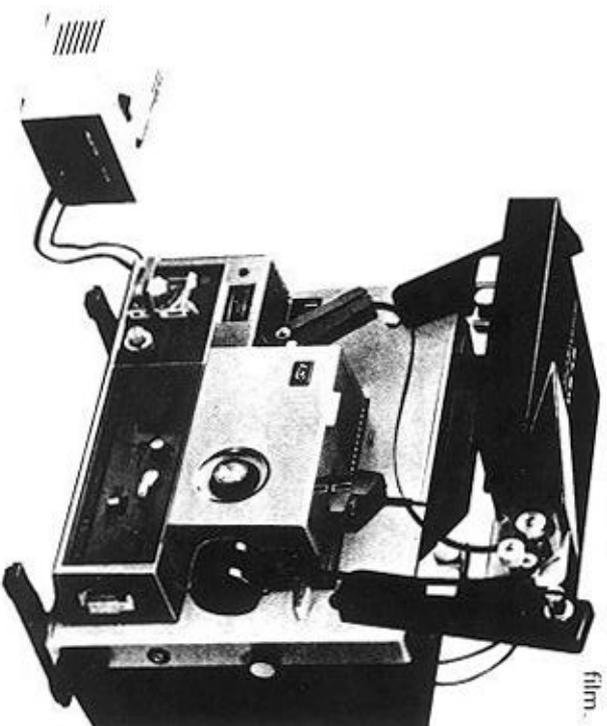


● **Translucent screens**

60 cm X 80 cm (23.6" X 31.5")
39 cm X 52 cm (15.4" X 20.5")
Special quality screens for rear projection under daylight condition.

● **Continuous loop projection device EF-400**

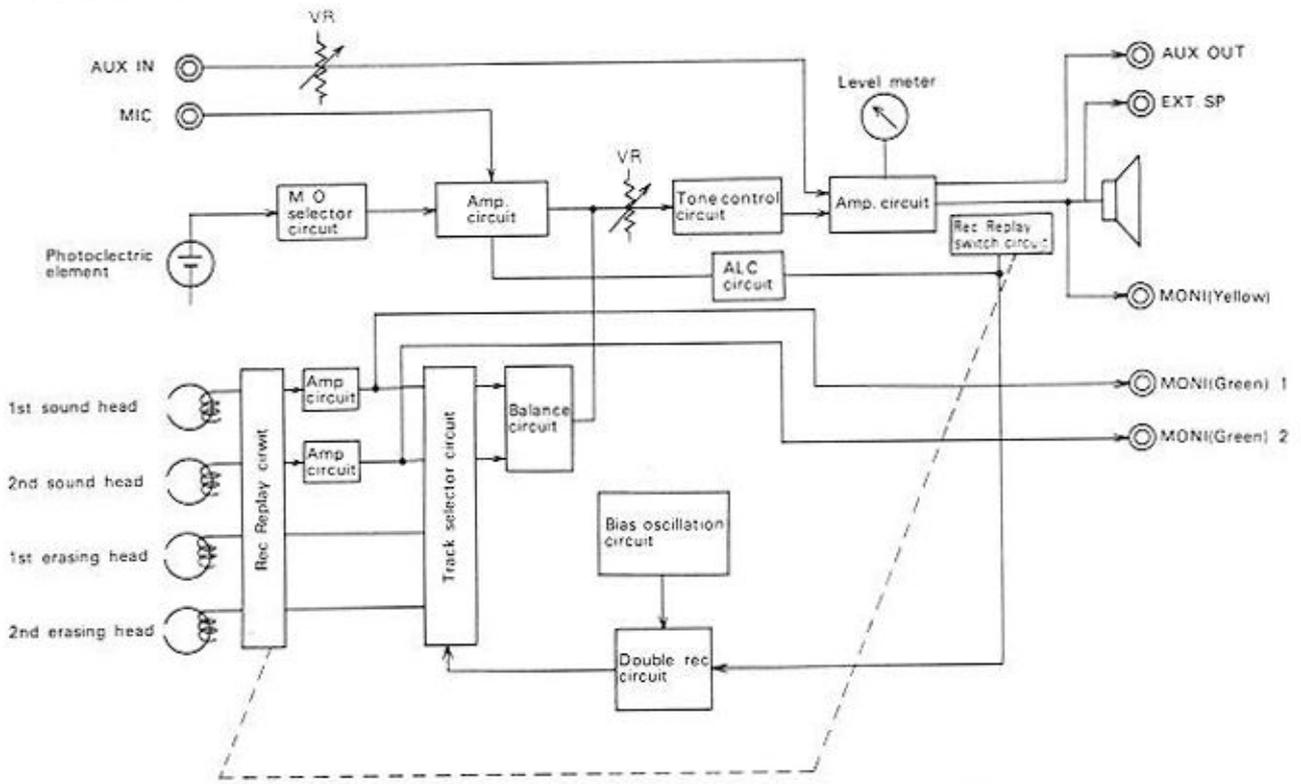
No rewinding necessary. When attached to your ST-1200HD projector, EF-400 provides fully automatic and continuous projection. Equipped with loop-sensor and auto-stopper to automatically stop projection if the film breaks. Accepts up to 120m (400ft) of film.



● Accessory cords

Code No.	Specifications	Remarks
MC-001	3.5φ (Female) 1.5m 3.5φ	1.5m
MC-002	6φ (Female) 1.5m 6φ	1.5m
MC-003	1.5m 3.5φ	1.5m
MC-004	clip 1.5m 3.5φ	1.5m
MC-006	1.5m 3.5φ	1.5m
MC-009	1.0m 3.5φ	1.0m From earphone or monitor jack to AUX IN input
MC-010	3.5φ (Female) 3.5φ	From earphone or monitor jack to MIC input
MC-017	3.5φ (Female) 3.5φ	Connection of green monitor jack and AUX IN jack
MP-001	3.5φ (Female) 6φ	
MP-002	6φ (Female) 3.5φ	
SC-002	10cm 6φ (Female)	10cm For ST-800, ST-1200D, ST-1200HD

Block diagram



Projection distance and image size

Focal length	12.5mm (Optional accessories)	Width 15mm
Distance	Image size (cm)	Image size (cm)
1 m	3 1 × 4 2	2 6 × 3 5
1.5 m	4 7 × 6 3	3 9 × 5 2
2 m	6 3 × 8 5	5 2 × 7 0
2.5 m	7 9 × 1 0 6	6 6 × 8 8
3 m	9 5 × 1 2 8	7 9 × 1 0 6
5 m	1 6 0 × 2 1 3	1 3 3 × 1 7 8
1 0 m	3 2 0 × 4 2 8	2 6 6 × 3 5 6

Focal length	Tele 25mm	50mm (Optional accessories)
Distance	Image size (cm)	Image size (cm)
1 m	1 5 × 2 0	7 × 1 0
1.5 m	2 3 × 3 1	1 1 × 1 5
2 m	3 1 × 4 2	1 5 × 2 0
2.5 m	3 9 × 5 2	1 9 × 2 6
3 m	4 7 × 6 3	2 3 × 3 1
5 m	7 9 × 1 0 6	3 9 × 5 3
1 0 m	1 6 0 × 2 1 3	7 9 × 1 0 6
1 5 m	2 4 0 × 3 2 0	1 1 9 × 1 6 0
2 0 m	3 2 0 × 4 2 8	1 6 0 × 2 1 3
3 0 m		2 4 0 × 3 2 0
4 0 m		3 2 0 × 4 2 8

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	21	128.0	420	96.0	315
2	12.2	40	9.1	30	22	134.1	440	100.6	330
3	18.3	60	13.7	45	23	140.2	460	105.2	345
4	24.4	80	18.3	60	24	146.3	480	109.7	360
5	30.5	100	22.9	75	25	152.4	500	114.3	375
6	36.6	120	27.4	90	26	158.5	520	118.9	390
7	42.7	140	32.0	105	27	164.6	540	123.4	405
8	48.8	160	36.6	120	28	170.7	560	128.0	420
9	54.9	180	41.1	135	29	176.8	580	132.6	435
10	61.0	200	45.7	150	30	182.9	600	137.2	450
11	67.1	220	50.3	165	31	189.0	620	141.7	465
12	73.2	240	54.9	180	32	195.1	640	146.3	480
13	79.2	260	59.4	195	33	201.2	660	150.9	495
14	85.4	280	64.0	210	34	207.3	680	155.4	510
15	91.4	300	68.6	225	35	213.4	700	160.0	525
16	97.5	320	73.2	240	40	243.9	800	182.9	600
17	103.6	340	77.7	255	50	304.8	1000	228.6	750
18	109.7	360	82.3	270	60	365.8	1200	274.4	900
19	115.8	380	86.9	285	70	426.8	1400	320.0	1050
20	121.9	400	91.4	300	80	487.8	1600	365.8	1200

Specifications

<Projector>

Power source : Single phase AC, 50/60 Hz

Projection speed : 18 & 24 fps

Motor : Induction motor

Film : Super 8/Single 8 sound and silent film

Film loading : Automatic

Reel capacity : Max. 1200ft (360m)

Still picture projection : Possible

Reverse projection : Possible

Film rewinding : High speed rewinding

Film counter : One digit equals 18 frames

<Light source>

Projection lamp : 15V-150W halogen lamp with cold mirror, Choice of hi-low brightness.

Projection lens : F 1.3 $f=15$ - 25mm zoom lens.

<Sound recording & playback>

Sound system : Model M-O; Magnetic/optical playback and magnetic recording.

Model M : Magnetic playback and recording.

Amplifier : IC circuit is built in.

Music power output: 15W

Continuous power output: (5%) 12W

Dual-track recording : Magnetic recording on both main and balance stripe

Dual-track playback : Both tracks can be played back together or independently. Tracks

can be mixed and transferred from one to the other.

Both track levels can be balanced with the balance control knob.

Treble control type

Automatic/Manual level control

Possible at any point on film during projection

Mixing is possible using AUX and MIC terminal.

EXT SP (Impedance 8 Ω)

AUX OUT (Impedance 600 Ω)

MONI (Yellow) (Impedance 16 Ω)

MONI (Green) \times 2 (Impedance 16 Ω)

Special alloy magnetic head

(Alternating bias system)

Special alloy magnetic head

(Alternating erase head)

Photo electric element : Solar battery

Exciter lamp : 4V-0.75A direct-current lighting system (Model M-O)

Speaker : Built-in 5" (12.5cm) dynamic speaker

Microphone : Electret condenser type

(Impedance 600 Ω)

Built-in

Level meter :

Indicator Lamps : Track lamps, Recording lamp, Pilot lamp

Attachments : 800ft (240m) Auto reel, Power cord, Carrying case, Microphone, Monitor receiver and Aperture cleaning brushes