MODEL SS & SSA
Slide/Strip/Animation Camera with Copy Stand

STANDARD FEATURES

- Interchangeable film movements for 46, 35, 16mm and 110 films, as well as microfilm and microfiche applications.
- Fixed-pin film registration—within ±0.0002".
- Automatic focus from 32X to 2½X reduction with variable speed motor control for rapid copy sizing.
- High resolution 55mm f2.8 Micro-Nikkor lens with automatic diaphragm, interchangeable with wide angle lenses and bellows extension.
- Remote controlled reticle projection indicating full aperture and various mount cutoffs and direct reading high/low power viewer with 4X and 10X magnification.
- Independent or interlocked rotary shutter and film advance with timed exposure control, totalizing and preset frame counters.
- Light trapped 400' magazines with automatic take-ups, film notcher and film cutter.
- Rotating camera head for filmstrips and slides so artwork always remains right side up.
- Tungsten halogen lamps for top and bottom light illumination with strobe outlet.

OPTIONAL FEATURES

- Animation components—rotary dissolve shutter, compound table with N-S, E-W and rotation movements, two peg tracks, platen and pantograph. These components are included as standard features of Model SSA.
- Optional dialable dichroic filter systems simplifies transparency colorcorrection.

CAPABILITIES

- Duplicate and create 46, 35 & 110mm color slides, 35 & 16mm filmstrips from opaque copy to 48 inches and over, transparencies to 11 x 14".
- Produce internegatives for color prints.
- Make slides from filmstrips or filmstrip masters from slides.
- Title, re-frame, color correct, crop, compose, change contrast and density, multiple expose.
- Create 35 & 16mm masters for filmstrips or animation.
- Microfilm documents and produce color microfiche.
- Components can be added to increase capabilities as needed.

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CAMERA

The Forox camera contains all exposure, film advance and take-up mechanisms in a rugged precision aluminum housing. Exposures are controlled by a synchronous ¼ second rotary motion picture type shutter. A variable automatic timer extends the range to 99.99 seconds. For multiple exposures on the same frame, the shutter can be operated without advancing the film. The film is transported at a rate of 44 frames/min. for slides, 62 frames/min. for filmstrip or animation. An optional high-speed drive increases the film rate to 97 and 137 frames/min. respectively. In either case, the advance rate doubles when the shutter is turned off for rewind. An out-of-film switch deactivates the camera when the film supply is exhausted. A remote frame counter which operates in forward or reverse accurately indicates the number of the frame in the aperture. A preset counter permits continuous operation for a predetermined number of frames to facilitate automatic slide duplication.

400 FOOT MAGAZINES

The 400 ft. magazines, identical for supply and take-up, handle all film sizes on core or daylight load spools. The magazines have velvet light trap rollers and are driven by electric motor take-up with beltless tendency drives to allow rapid removal. An externally operated film cutter enables take-up magazine to be removed without rethreading the film. It is located near the aperture to minimize film waste. A film notcher scallops the edge of the film outside the sprocket holes to provide easy darkroom location of start or end of run.

90° ROTATION

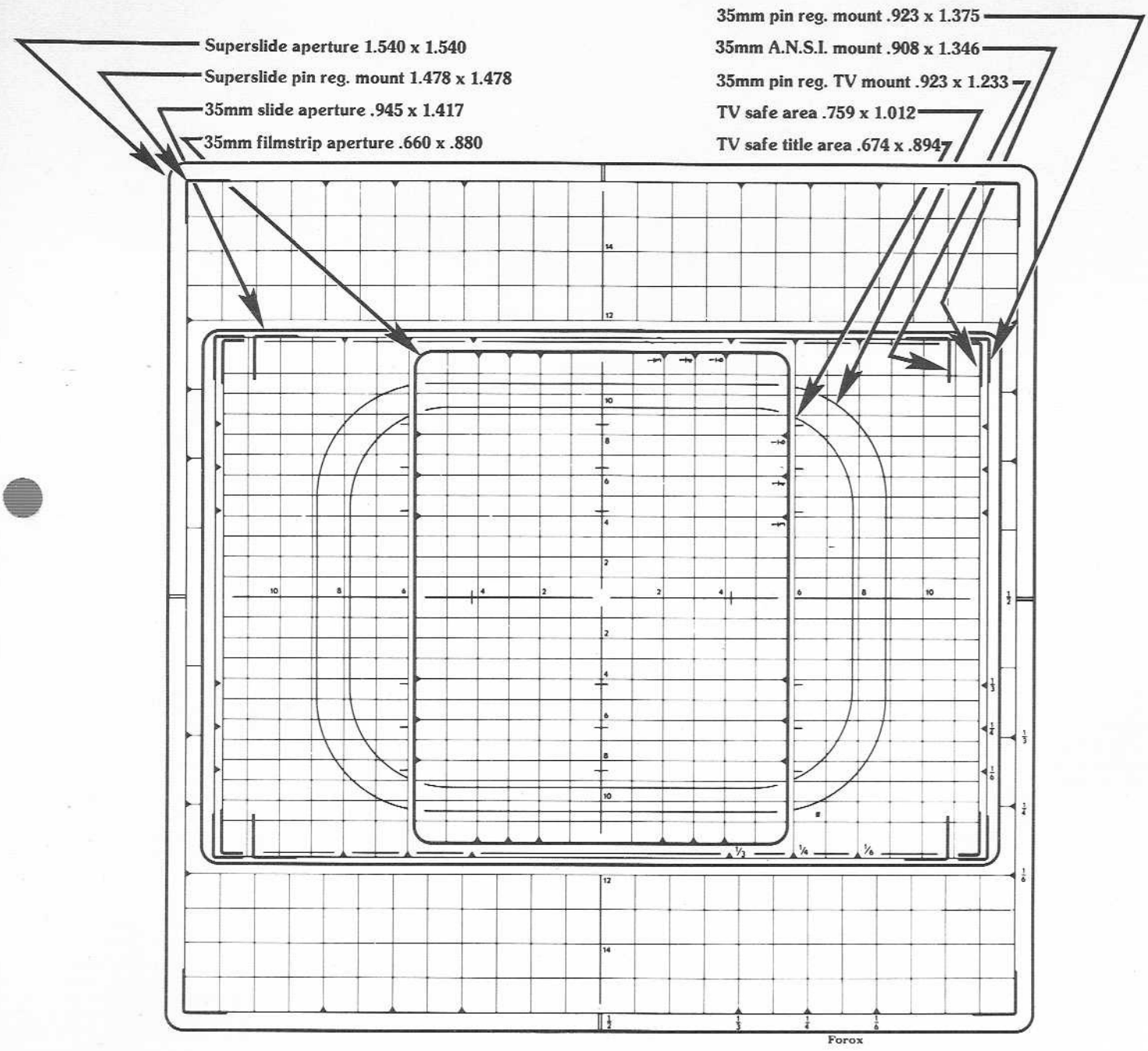
The camera rotates 90° when changing from filmstrip to slide operation so that the art works can always be placed on the table top right side up facing the operator.

FILM MOVEMENTS

Interchangeable fixed-pin registration film movements with sprocket drives accurately position to film for exposure to within plus or minus two ten-thousandths of an inch, forward or reverse. The registration pins never move. The film is positioned on the pins by a vibrationless cam activated pressure and stripper plate. For greatest accuracy and durability, the cam is tapered to ease the movement of the film onto the pins. The cam movement is automatically deactivated when the film is transported without exposure to minimize film wear and eliminate scratching. Film movements are available in 16mm, 35mm KS or BH perf, 46mm, and 110 perforated versions for slides and filmstrips. The apertures for all perforated film sizes contain fixed registration pins, and automatically set the camera for the proper single or double frame film advance.

VIEWFINDER

A precision rack-over mechanism automatically positions the reticle over the film center for projection or viewing. Interchangeable ground glass reticles accurately match the aperature center and film focus plane. A high intensity tungsten halogen lamp projects the reticle markings through the lens onto the table top for convenient composing of copy and for correcting focus above the table top when thick material is used. The projection lamp is automatically switched off during exposure or when the viewing eyepiece is used. The direct reading monocular eyepiece with 4X and 10X magnification is used for composing transparencies. It swings to face the operator when the camera is rotated for slide or filmstrip formats. The standard 46/35 reticle has markings for slide aperture, various mount cutoffs, filmstrip aperture, TV safe area and composing grid. The animation reticle has markings for 35mm and 16mm film sizes.


Superslide aperture 1.540 x 1.540
Superslide pin reg. mount 1.478 x 1.478
35mm slide aperture .945 x 1.417
35mm filmstrip aperture .660 x .880
35mm pin reg. mount .923 x 1.375
35mm A.N.S.I. mount .908 x 1.346
35mm pin reg. TV mount .923 x 1.233
TV safe area .759 x 1.012
TV safe title area .674 x .894
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LENS AND AUTOMATIC FOCUS MECHANISM

The camera and lens are automatically maintained in critical focus throughout the entire reduction range from 32X to 2½X. The automatic focus system utilizes a positive anti-backlash, non-rotating lens movement connected by a ball bearing activator to hyperbolic focusing cam. The cam is microscopically matched at the factory to each specific lens over the complete photographic range. This feature insures sharper focus and saves considerable setup time over conventional manual focus systems. Similar autofocus systems have been used extensively on precision photographic equipment for more than 30 years without appreciable signs of wear. A 55mm f/2.8 Micro-Nikkor lens, specifically designed for high resolution flat copy reproduction is provided. It has an uninterrupted focusing range throughout its entire travel from 32X reductions through 1:1. It has a preset diaphragm which automatically opens to its maximum aperture for composing and resets to its pre-selected f/stop before exposure. The lens is mounted in a standard Nikon F bayonet mount allowing it to be interchanged with other focal length lenses similarly mounted. Additional focus cams, which can be provided for other lenses. A bellows extension attachment is available to increase the enlargement range, e.g. enabling 16mm frames to be enlarged to slide format.

FOCAL PLANE ADJUSTING MECHANISM

This mechanism provides for continuous automatic focus on both the animation table and main table surfaces. It can be easily adjusted to focus on other levels up to 8" to permit product photography on the table top.

COPY STAND

The rigid self-supporting welded steel base with its 6" circular heavy wall steel column has an overall maximum height of 10 ft. The height of the column may be shortened at no additional charge. The column is accurately keyed for large ball bearing rollers and the carriage is perfectly counterbalanced to insure steady tracking and smooth movement over the entire range of travel. The carriage movement is controlled by a variable speed electric motor with limit switch cutoffs. Its position is accurately indicated for repeatability by a reference counter. A pointer on a four-sided unmarked scale also shows the carriage height. A manual elevation knob is located on the front of the stand next to the electric speed and directional controls.

LAMINATED TABLE

The 48" x 42" laminated table is at a convenient working height. It has a 14½" x 14½" cutout with an opal glass insert for transparency photography. The cutout has provisions for mounting color correction filters from the front of the stand or installing an accessory dialable dichroic color head. Adequate cooling for the filters is provided by a blower mounted under the table and ducted between glass inserts. A pair of 500 watt top lights and a single 1000 watt bottom light have an automatic dimmer circuit to reduce their intensity after exposures. All lights are 3200°K tungsten halogen and are adjustable in height. The top lights are mounted from the rear on rigid brackets supported by the main frame, providing a clear unobstructed working surface at table top height on both sides of the stand. A shadowboard and barn doors are supplied to minimize reflections from the camera undercarriage.

CONTROL CONSOLE

Operating controls for the camera and lights are conveniently located on a single control console. When the "Expose" button is activated, all functions that are switched on are automatically sequenced. Maximum flexibility is achieved by enabling any function to be individually turned off, omitting it from the sequence. A simple printed circuit board with plug-in relays contains the entire uncomplicated camera circuitry. It is removable in minutes for rapid serviceability. A switch for optional accessories and a strobe outlet are provided.

DISSOLVE SHUTTER

A variable 180° rotary motion picture type dissolve shutter is provided with the Model SSA animation package. It has a large legible dial calibrated with overlap dissolve and logarithmic fade scales for 24 and 32 frames which can be readily divided for shorter or longer lengths. A linear scale shows percent of shutter opening. The dissolve shutter is driven by the main rotary shutter through a unique no-play planetary gear mechanism which allows it to be adjusted while the camera is running.

INSTALLATION

All Model SS and SSA equipment includes installation by a Forox technician as well as a mechanical demonstration of all camera functions. An optional training session is available which encompasses the latest in special effects, multi-image and slide animation techniques.

ELECTRICAL REQUIREMENTS

Camera and stand operate on 115 VAC, 60 Hz. Power required is 20 amps and is supplied through a standard 3 pin grounded power cord. Other voltages are available on request for foreign installations.

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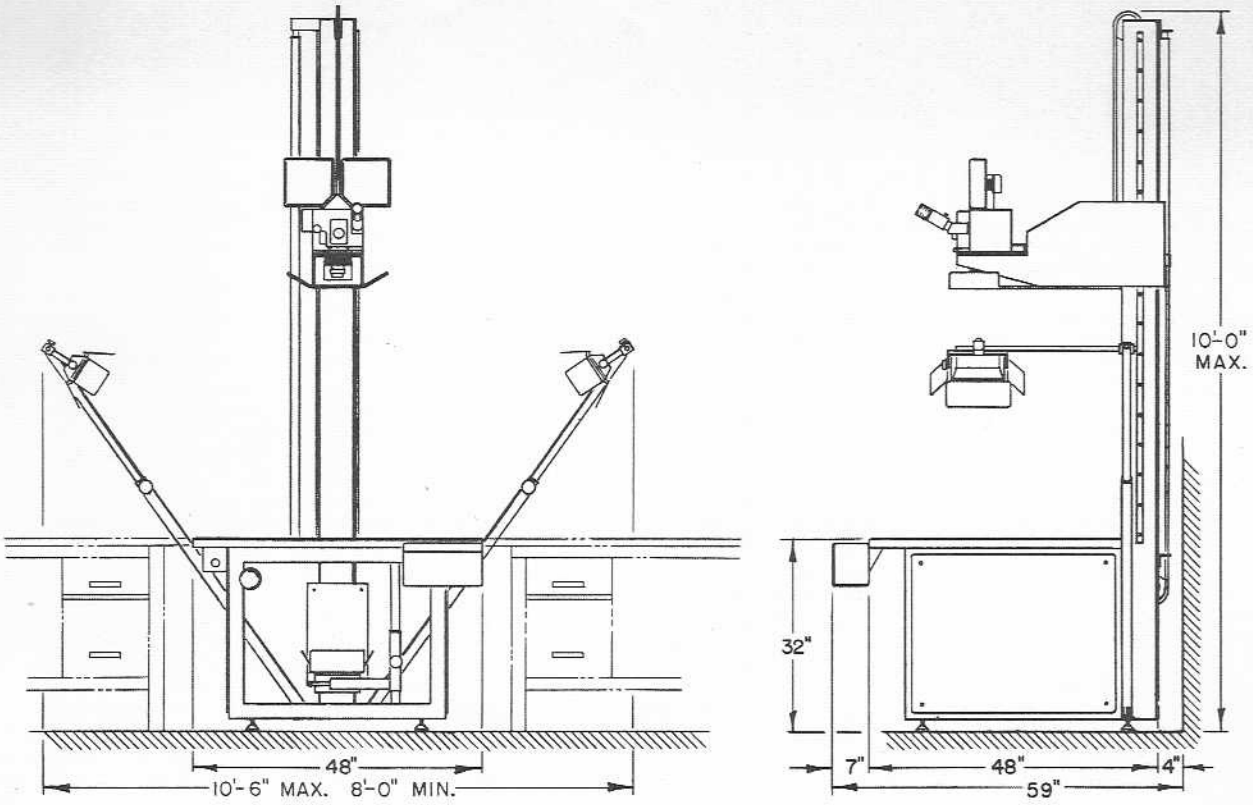

MODEL SS & SSA

Forox Model SS Slide/Strip and SSA Slide/Strip/Animation Camera and Copy Stands are designed for the rapid professional productions of slides, filmstrips and animation. Many automatic features and a wide variety of optional accessories are available to simplify operation, speed production, and provide the versatility necessary to meet your specific requirements for multi-image. Forox equipment is manufactured to the most exacting professional standards and incorporates the latest engineering concepts to facilitate the production of slide and film animation.

The Model SS Slide/Strip equipment includes 35mm fixed-pin registration film movements interchangeable for 46mm, 16mm or 110 films. The camera features automatic rack-over viewing with reticle projection, direct reading monocular viewer, interchangeable 400 ft. magazine, external film cutter and film notcher, rotary shutter and film advance mechanisms which can be operated independently or interlocked, preset and totalizing frame counters. The stand provides completely automatic focus for the 55mm Micro-Nikkor lens from 32X to 2½X reduction with motorized variable speed size control. The tungsten halogen top and bottom lights are equipped with an automatic dimmer control.

The Model SSA Slide/Strip/Animation equipment package includes all the features listed above as well as an animation compound table and a 180° variable rotary shutter for dissolves and fades. 16mm components can be substituted for 35mm.

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OWNER'S MANUAL

Forox Model SS Slide/Strip Camera and Copy Stand

Forox Model SSA Slide/Strip & Animation Camera and Copy Stand

Forox Corporation
393 West Avenue
Stamford, Connecticut 06902
Phone (203) 324-7400

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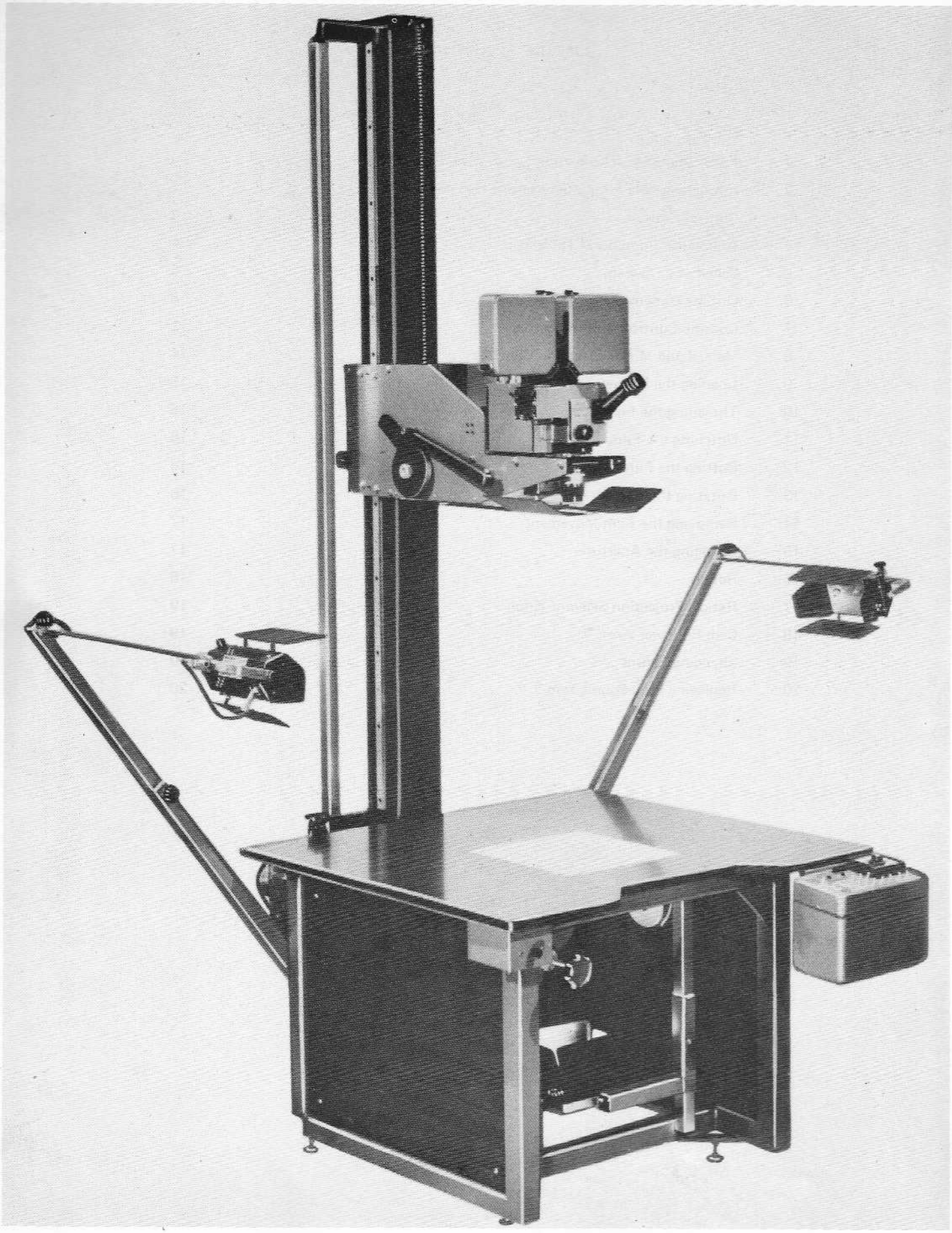

Figure 1. Forox Slide/Strip/Animation Camera and Copy Stand

1.0 INTRODUCTION

1.1 The Forox Models SS Slide/Strip and SSA Slide/Strip/Animation Cameras and Copy Stands are designed for the rapid professional production of slides, filmstrips and animation. Many automatic features and a wide variety of optional accessories are offered to simplify operation, speed production and provide the versatility necessary to meet specific requirements and future growth. Forox equipment is manufactured to the most exacting professional standards and incorporates the latest engineering concepts by designers knowledgeable in the requirements of the slide, filmstrip and animation industries.

The Model SS Slide/Strip equipment includes 35mm fixed pin registration film movement. Film movements for 46mm, 16mm, 110 and other film formats are also available. The camera features automatic rack-over viewing with reticle projection, direct reading monocular viewer, interchangeable 400 foot magazines, external film cutter and film notcher, rotary shutter and film advance mechanisms which can be operated independently or interlocked, preset and totalizing frame counters. The stand provides completely automatic focus for the 55mm Micro-Nikkor lens from 32X to 2½X reduction with motorized variable speed size control. Top and bottom lights are equipped with an automatic dimmer control.

The Model SSA Slide/Strip/Animation equipment includes all the features listed above as well as an animation compound table with platen and a 180° variable rotary shutter for dissolves and fades. 16mm components are substituted for 35mm and a 28mm Auto Nikkor lens for the 55mm Micro-Nikkor lens.

2.0 DESCRIPTION

2.1 The Forox camera (see Figure 1) contains all exposure, film advance and take-up mechanisms in a rugged aluminum housing. Exposures are controlled by a synchronous ¼-second rotary motion picture type shutter. A variable automatic timer extends the range to 15 seconds. For multiple exposures on the same frame, the shutter can be operated without advancing the film. The film is transported at a rate of 40 frames/minute for slides, 60 frames/minute for filmstrip or animation. The advance rate doubles when the shutter is turned off for rewind. An end-of-film switch deactivates and audibly signals the camera when the film supply is exhausted. A remote frame counter which operates in forward or reverse accurately indicates the number of the frame in the aperture. To facilitate automatic slide duplication, a preset counter permits continuous or single frame operation for a predetermined number of frames.

Identical magazines for feed and take-up handle all film sizes up to 400 feet on core and/or daylight load spools. Adapters for magazines are available for use with 16mm and 110 film sizes. The magazines have velvet light trap rollers and are driven without belts to permit rapid removal.

An externally operated film cutter enables the take-up magazine to be removed without rethreading the film. It is located near the magazine to minimize film waste. A film notcher scallops the edge of the film outside the sprocket holes to provide easy darkroom location of start or end of run.

The camera rotates 90° when changing from slide to filmstrip/animation operation so that the art work can always be placed on the table top right side up facing the operator.

2.2 **FILM MOVEMENTS.** Interchangeable film movements with sprocket drives (see Figure 2) accurately position the film for exposure to within plus or minus two ten-thousandths of an inch, forward or reverse. The registration pins on the aperture never move. The film is positioned on the pins by a vibrationless cam actuated pressure and stripper plate. For greatest accuracy and durability, the cam is tapered to ease the movement of the film onto the pins. The cam movement is automatically deactivated when the film is transported without exposure to minimize film wear and eliminate scratching.

Film movements are available in 16mm, 35mm KS or BH perf, 46mm and 110 perforated versions for slides or filmstrips. The apertures for all perforated film sizes contain the fixed registration pins, and automatically set the camera for the proper full or half frame film advance.

2.3 **VIEWFINDER.** A precision rack-over mechanism automatically positions the reticle over the optical center for projection or viewing. Interchangeable ground glass reticles (see Figure 2) accurately match the aperture center and film focal plane. A high intensity tungsten halogen lamp projects the reticle markings through the lens onto the table top for convenient composing of copy and for correcting focus above the table top (e.g., when using compound, etc.). The projection lamp and blower are automatically switched off during exposure or when the viewing eye-piece is used. The direct reading monocular eye-piece with 4X and 10X magnification is used for composing transparencies. It swings to face the operator when the camera is rotated for slide or filmstrip formats.The standard 35/46mm reticle has precise markings for slides to fit pin registered mounts, for cardboard and plastic mounts, filmstrips, TV safe area and composing grid. The animation reticle supplied with the Model SSA has markings for 16mm and 35mm Academy formats.

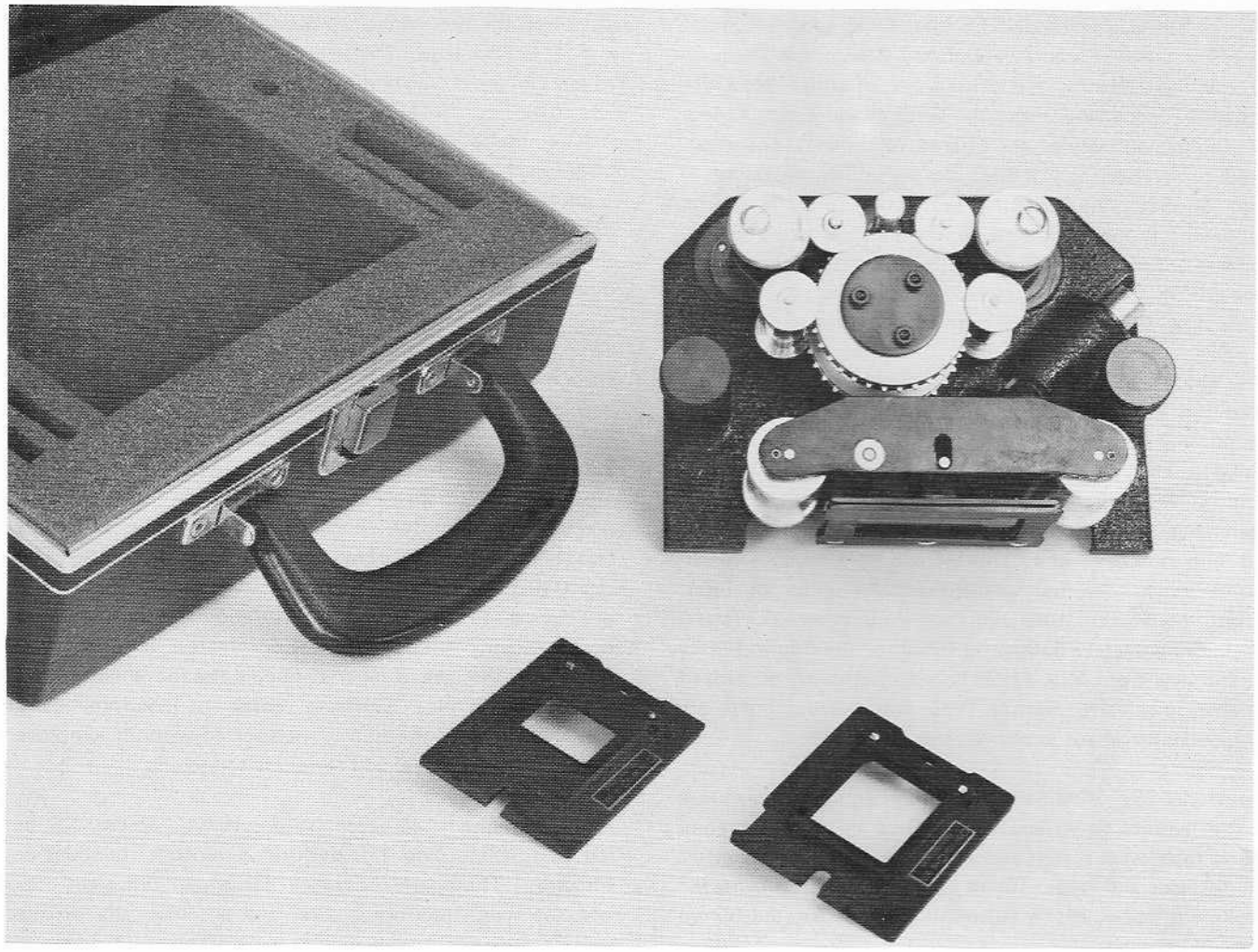

Figure 2. Interchangeable Film Movements

2.4 LENS AND AUTOMATIC FOCUS MECHANISM. The camera and lens are automatically maintained in critical focus throughout the entire reduction range from 32X to 2½X. The automatic focus system utilizes a positive anti-backlash, non-rotating lens movement connected by a ball bearing actuator to a hyperbolic focusing cam. The cam is microscopically matched at the factory to each specific lens over the complete photographic range. This feature ensures sharper focus and saves considerable set-up time over conventional manual focus systems.

Similar auto focus systems have been used extensively on precision photographic equipment for more than 20 years without appreciable signs of wear. A 55mm f/3.5 Micro-Nikkor lens, specifically designed for high resolution flat copy reproduction, is provided. It has an uninterrupted focusing range through its entire travel from 32X reduction through 1:1. Focusing is manual beyond 2½X reduction. It has a preset diaphragm which automatically opens to its maximum aperture for composing via reticle projection or monocular viewing, and resets to its preselected f/stop before exposure. The lens is mounted in a standard Nikon E-2 bayonet mount allowing it to be interchanged with other similarly mounted lenses. Additional focus cams, easily changed by the operator, can be provided for other lenses. A bellows extention attachment is available to increase the enlargement range to approximately 4:1 ratio; e.g., enabling 16mm frames to be blown up to slide format.

2.5 **FOCAL PLANE ADJUSTING MECHANISM.** The focal plane adjusting mechanism provides for continuous automatic focus on both the main table and animation table surfaces. It can easily be adjusted to focus on other levels up to 8" to permit product photography on the table top.

2.6 **COPY STAND.** The rigid, self-supporting, welded steel base with its 6-inch diameter heavy wall steel column has an overall maximum height of 10 feet. The height of the column may be shortened at the factory at no additional charge. The column is accurately keyed for large ball bearing rollers and the carriage is counterbalanced to ensure smooth and precise tracking. The carriage movement is controlled by a variable speed electric motor with upper and lower limit switch cut-offs. Its position is accurately indicated for repetition by the reference counter and a pointer on a four-sided unmarked scale also shows the carriage height. A manual elevation knob is located on the front of the stand (see Figure 8).

The 48" x 42" laminated table is at a convenient working height. It has a 14½" x 14½" cutout with opal and clear glass inserts for transparency photography and provisions for mounting color correction filters from the front of the stand. Adequate cooling for the filters is provided by a blower mounted under the table and ducted between the glass inserts. A pair of 500 watt top lights and a single 1000 watt bottom light have an automatic dimmer circuit to reduce their intensity after exposures. All lights are 3200°K tungsten halogen and are adjustable in height. The top lights are mounted from the rear of the table on rigid brackets supported by the main frame, providing an unobstructed area at table top height on both sides of the stand. A shadowboard is supplied to minimize reflections from the camera undercarriage.

2.7 **CONTROL CONSOLE.** Operating controls for the camera and lights are conveniently located on a single control console (see Figure 3). When the EXPOSE button is depressed, all functions switched on are automatically

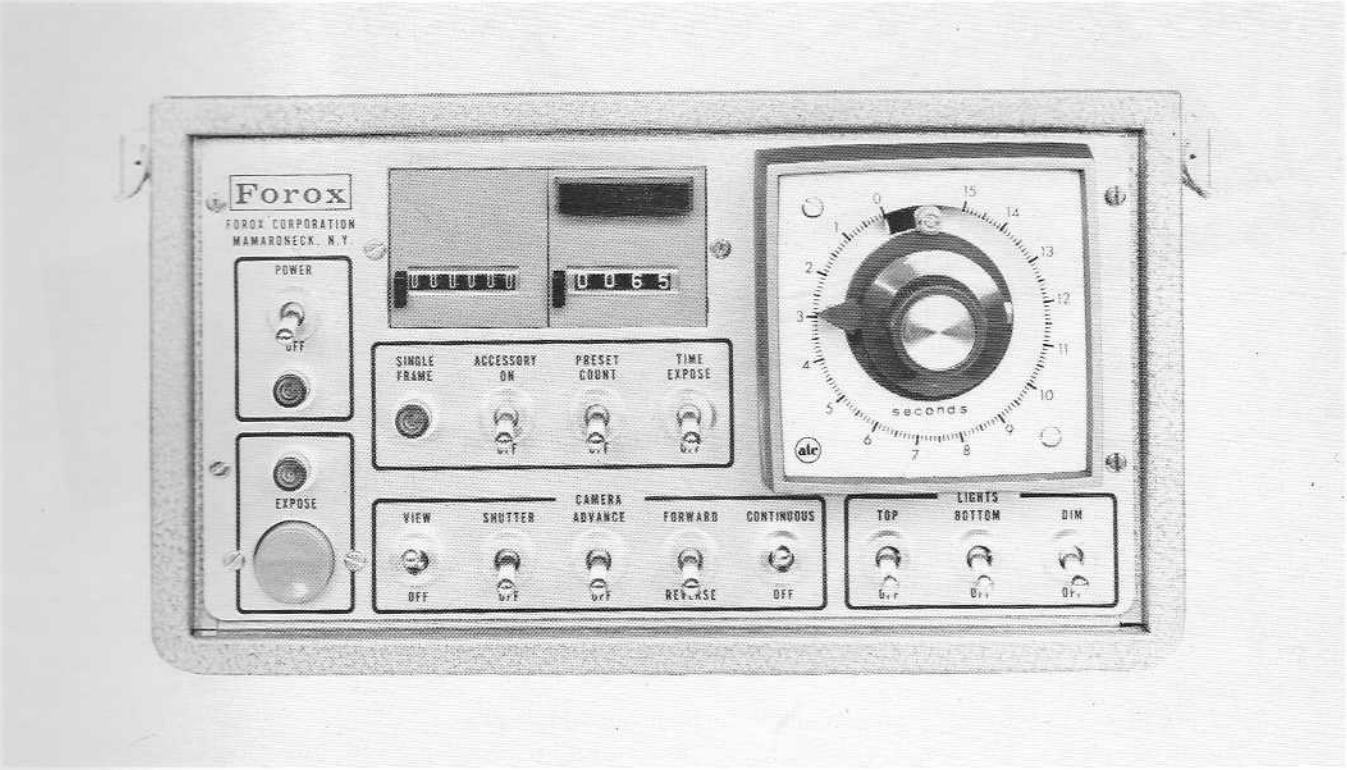

Figure 3. Control Console

sequenced. Maximum flexibility is achieved by enabling any function to be individually turned off, thereby omitting it from sequence. A simple printed circuit board with plug-in relays contains the entire camera circuitry and can be removed in minutes. A switch for optional accessories and a strobe outlet are standard.

2.8 ANIMATION COMPONENTS.

2.8.1 LENS. 28mm Auto Nikkor.

2.8.2 DISSOLVING SHUTTER. A variable 180° rotary motion picture type dissolving shutter is provided with the Model SSA animation package. It has a large, legible dial calibrated with overlap dissolve and logarithmic fade scales for 24 and 32 frames which can be readily divided for shorter or longer lengths. A linear scale shows percent of shutter opening. The dissolving shutter is driven by the main rotary shutter through a unique no-play planetary gear mechanism.

2.8.3 COMPOUND TABLE. The professional animation table (see Figure 4) features split-nut devices allowing extremely smooth free-float action and fully supported ground and hard chrome plated guide rails with heavy duty linear ball bearings. North-South travel is 15½", East-West is 25½" and the table rotates 360°. The pantograph pointer enables complex movements to be accurately plotted. The table top with a 12 field illuminating area is for cel photography and has 2 peg tracks with your choice

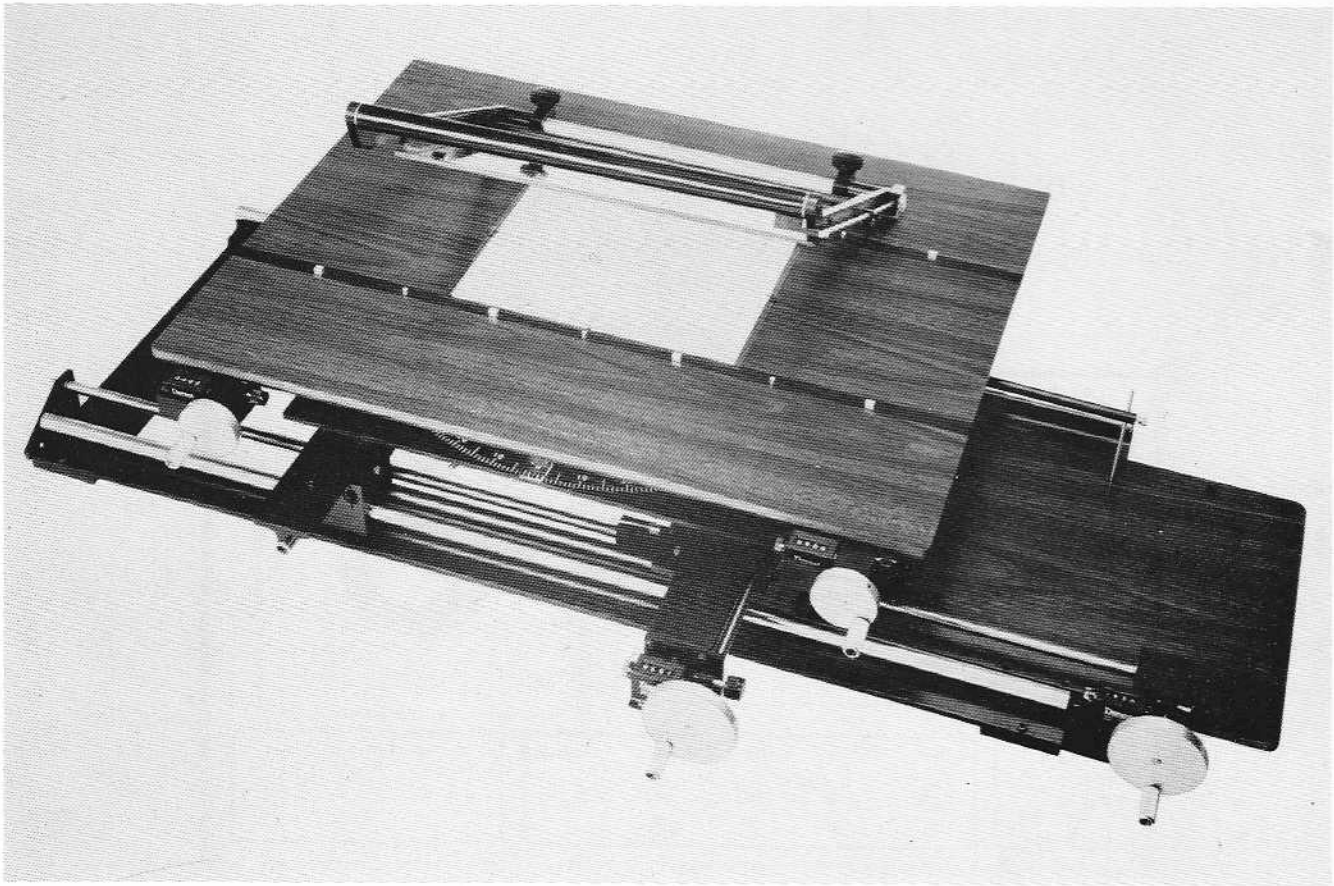

Figure 4. Animation Compound Table Top

of either Oxberry or Acme tracks. North-South, East-West and peg track movements have dial hand cranks and lead screws and movements are displayed by hundredth reading, resettable counters. The compound table is engineered to receive motorized or computerized controls. A platen, holding 12 field cels in firm contact, pivots to lock in the open position and has a quick wrist-action release.

2.8.4 **CEL PUNCH.** Oxberry or Acme three-hole cel punches are available as accessories.

2.8.5 **OFF-CENTER ZOOMS.** Off-center zooms can be accomplished with the use of an optional 35mm f/2.8 P.C. Nikkor lens.

3.0 THEORY

3.1 **POWER.** The camera is automatically sequenced in the proper mode for operation by choosing the appropriate switch positions on the control panel. The camera can be operated in the following modes:

- Exposing and advancing film
- Advancing film without exposing
- Exposing without film advance
- Continuous operation with or without preset count
- Reverse operation
- Timed exposure operation

For each of these modes of operation, one of the three drive motors (shutter, film advance or rack-over viewer) is activated. Each motor is controlled by a set of switches actuated by a cam or limit stop and by relays located on the main printed circuit board (see Figure 5).

3.2 **NORMAL OPERATION.** For normal operation (exposure and advance) the electrical control sequence is as follows: Depressing the EXPOSE button energizes the coil of relay K1. This coil is held energized through its own contacts 11-7. Contacts 10-6 supply 115v AC to the rack-over motor which turns it in a clockwise direction until the "shoot limit" switch is activated. A second set of contacts on the "shoot limit" (rack-over in) switch energizes relay K2 through the SHUTTER Switch. Contacts 10-6 of relay K2 supply 115v AC to the shutter motor, causing it to make one rotation. The shutter index cam turns with the motor, actuating the index switch. When the index switch closes, relay K3 is energized. Then contacts 12-4 of relay K3 open, disconnecting voltage to the coil of relay K2 except through the index switch. Contacts 11-7 of relay K3 hold relay K3 energized. When the shutter motor index cam turns 360°, the index switch is de-energized, dropping out relay K2. Relays K4 and K4B are then energized through contacts 11-3 of relay K2. Contacts 5-9 and 6-10 of relay K4 and 5-9 of relay K4B supply 115v AC to the advance motor, causing it to turn in a clockwise direction. Contacts 2-10 of relay K4 disconnect voltage to the rack-over motor. The advance index cam turns with the motor, actuating the advance index switch. The closing of the advance index switch energizes relay K5. Contacts 11-3 of K5 disconnect power to relays K4, K4B and K3, except through the index switch. Contacts 12-4 of relay K5 de-energize relay K1. When the cam advances 90°, one of the counter switches is actuated, causing the frame counter to advance one number.

When the cam rotates 180° (for filmstrip) or 360° (for slide), the index switch is opened, de-energizing relays K4 and K5. Closing of contacts 2-10 of relay K4 supplies voltage to the rack-over motor through contacts 10-2 of K1, causing it to rotate in a counterclockwise direction. When the rack-over reaches the end of its travel, it actuates the "view limit" switch, which stops the motor and turns on the projection lamp and blower, ending the cycle.

3.3 **ADVANCING FILM ONLY.** To advance film without exposing, the SHUTTER Switch is in the OFF position; actuation of the "rack-over in" switch energizes relay K4 directly, starting the advance cycle. Relays K2 and K3 are not sequenced in this mode of operation.

3.4 **EXPOSING WITHOUT FILM ADVANCE.** To expose without advancing for double exposures, the ADVANCE Switch is turned to the OFF position, which de-energizes relay K8. After the camera has racked over, the shutter motor index cam is connected through contacts 4-12 of relay K8 to relay K5 instead of relay K3. Relays K3 and K4 are not sequenced in this mode of operation.

3.5 **CONTINUOUS OPERATION WITH PRESET COUNT.** When the PRESET COUNT and CONTINUOUS Switches are turned to the "on" position, a normally closed contact of the preset switch is connected in series with the EXPOSE button and relay K1 is held energized after the EXPOSE button is depressed. After the completion of the advance cycle, contacts 9-1 of relay K5 re-energize relay K2 and the expose/advance sequence is repeated automatically. When the PRESET COUNTER reaches zero, its contact is opened, enabling relay K1 to de-energize. The cycle ends after relay K5 de-energizes.

3.6 **REVERSE OPERATION.** When the FORWARD/REVERSE Switch is placed in the REVERSE position, relay K7 is energized. Contacts 11-7, 11-3, 9-1, 9-5, 10-2, 10-6 transfer the connections from relay K2 to relay K4 and from relay K5 to relay K3. When these connections are transferred, closing of the "rack-over in"

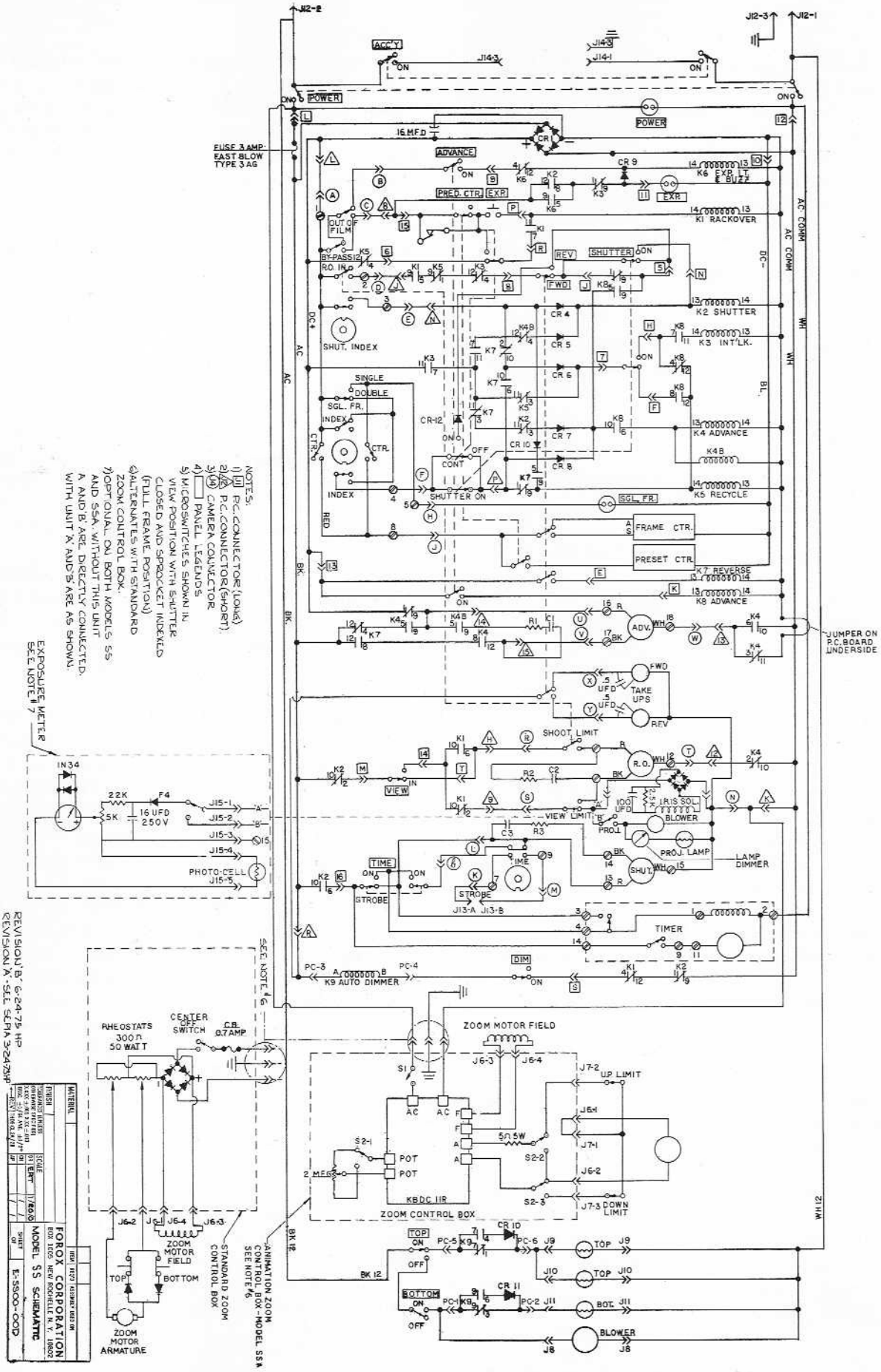

Figure 5. Schematic Diagram

switch energizes relay K4 instead of relay K2. Contacts 12-8 of relay K7 cause the advance motor to turn counterclockwise. The contacts of the advance motor cam switch are connected to relay K3. After relay K4 de-energizes, relay K2 is energized, causing the shutter motor to turn, energizing relay K5 through the contacts of the shutter motor index cam switch. When the shutter motor turns 360°, the cam switch is opened, de-energizing relay K5. The closing of contacts 10-2 of relay K2 then enables the rack-over motor to turn counterclockwise until the "view limit" switch is activated and the cycle is ended.

3.7 **TIMED EXPOSURES.** When the TIME EXPOSE Switch is turned on, the shutter will remain open until the preset time on the timer has elapsed. Placing the TIME EXPOSE Switch in the "on " position connects the timer cam switch in series with the shutter motor. When relay K2 is energized, contacts 10-6 actuate the timer, at the same time feeding 115v AC to the shutter motor through the timer cam switch. When the cam rotates 180°, the cam switch is actuated, causing the shutter motor to stop with the shutter in the open position. When the preset time has elapsed, contacts 3-4 on the timer switch are closed, by-passing the shutter time cam switch, enabling the shutter motor to complete its cycle.

3.8 **POWER INDICATOR.** The POWER Indicator lights when the main power switch is turned to the "on" position.

3.9 **SINGLE FRAME INDICATOR.** When a single frame (filmstrip) aperture is placed in the camera, it actuates the "single frame" switch which supplies voltage to the SINGLE FRAME light (see Figure 3). At the same time, it removes a by-pass connection from one index switch on the advance cam so that the advance cam automatically turns 180° per advance.

3.10 **EXPOSE INDICATOR.** Whenever relay K2 is activated to cause the shutter motor to turn, relay K6 is energized and held in by its own contacts 4-12. Contacts 12-8 of relay K2 apply voltage to the EXPOSE Indicator. When relay K3 is energized, contacts 1-9 extinguish the Indicator and de-energize relay K6. (When the camera is in the REVERSE mode, the Indicator stays lighted.)

3.11 **END-OF-FILM SWITCH.** The "end-of-film" switch is activated when the camera is threaded with film. This switch enables relay K1 to be energized to start the camera operating. When the film in the feed magazine is exhausted, the switch will be de-activated, feeding voltage to relay K6 through normally closed contacts 4-12 of relay K6. This action causes the relay to buzz. Pressing the "by-pass" switch on the camera and holding it in or opening the camera door by-passes the "end-of-film" switch, enabling the camera to be operated.

3.12 **DIMMER CIRCUIT.** When the DIM switch is placed in the "on" position, the lights will be operated automatically at half power except during an exposure. Placing the DIM switch in the "on" position energizes relay K1. Contacts 7-4 and 9-6 of relay K9 supply voltage to the top and bottom lights through two diodes providing half-wave rectified voltage, thereby reducing the power to the lights. When relay K1 or K2 energizes, relay K9 is de-activated. Contacts 7-1 and 9-3 apply full voltage to the lights.

3.13 **FILM MOVEMENT.** The film is advanced by a sprocket which is driven by the advance motor. The sprocket advances the film one frame. After the advance, a vertical lobe on the cam lowers the pressure plate and places the film perforation onto fixed pins on the aperture to ensure precise registration.

3.14 **LENS.** The lens is equipped with a preset diaphragm. When the camera is racked-over to view position, the diaphragm control is actuated, opening the lens to its largest aperture to aid in focusing and viewing. When the camera is returned to shoot position, the control is de-activated, automatically returning the lens to its preset diaphragm.

3.15 **VIEWING.** The camera utilizes the rack-over principle for viewing. A reticle is located in the viewer assembly. When the camera is racked-over, the reticle moves to the precise position of the camera aperture, i.e., the film plane. The ground glass of the reticle is at the same optical plane of focus as the film on the aperture. An optical viewing system with both a 4X and 10X magnification provides an erect right reading image of the reticle. A knob on the viewer controls the operation of the projection lamp for projection of the reticle through the lens onto the table top.

4.0 INSTALLATION

4.1 **ELECTRICAL REQUIREMENTS.** Camera and stand operate on 115v AC/60 Hz. Power required: 20 amps, standard 3-pin-grounded power cord. Other voltages for foreign installations are available upon request.

4.2 **FLOOR SPACE.** Camera and stand require a minimum floor area of 9 feet x 7 feet to allow sufficient room for cameraman's chair. Ceiling height of 10 feet is necessary (see Figure 6) unless factory has been instructed to shorten the column. In the case of dropped ceilings, an area of 2 feet wide by 4 feet out from the wall may be

opened to provide unobstructed elevation of the camera head with magazines.

NOTE: In most instances, cameras in the U.S. and Canada are installed by Forox-trained technicians. The following section applies to the purchaser who chooses to have his own personnel install the camera.

4.3 UNPACKING THE EQUIPMENT. The equipment is shipped disassembled. Before installing the equipment, all containers should be opened and all components removed. The sub-assemblies and components should be checked against the packing lists and arranged in the area where the equipment is to be installed. Refer to the hardware list contained in the box of hardware and inspect packing materials carefully before discarding to be sure no parts are overlooked.

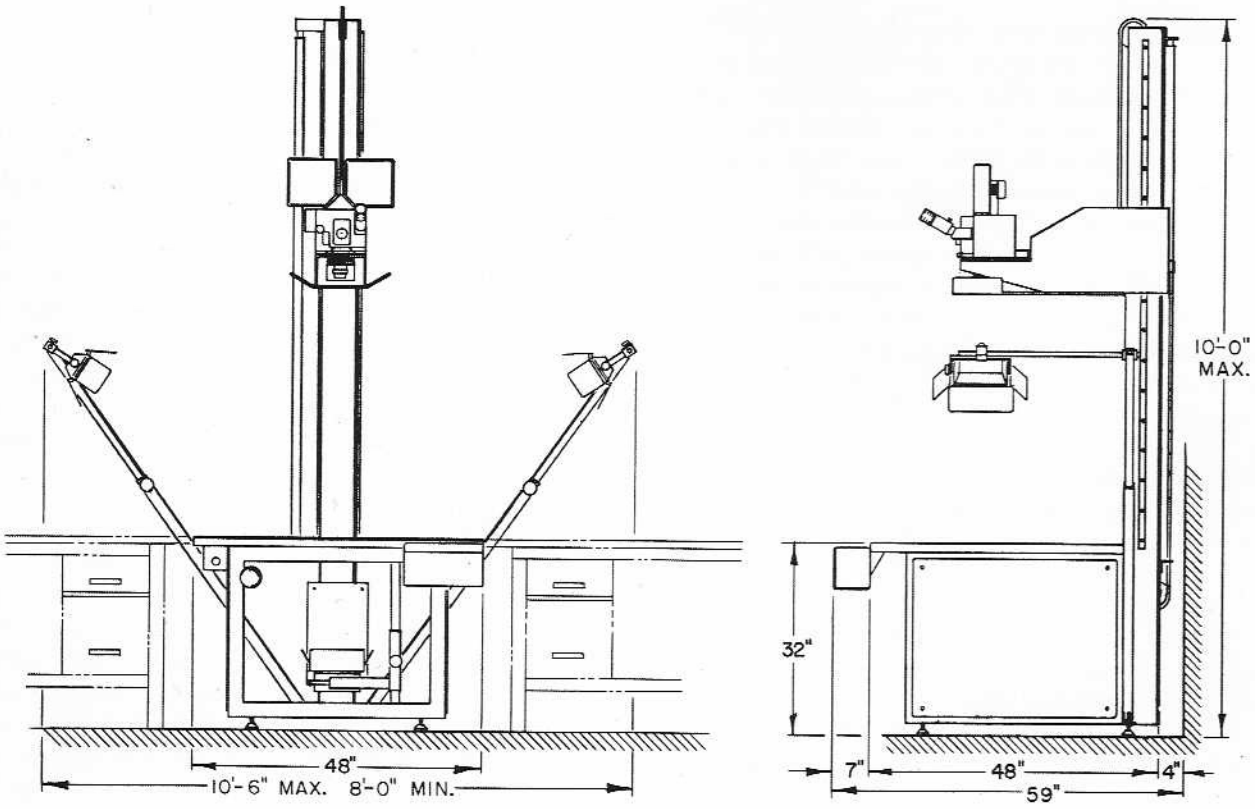

Figure 6. Outline Dimensions

4.4 ASSEMBLIES SUPPLIED. The Model SS Slide/Strip Camera and Copy Stand consists of the following assemblies:

1 Camera
1 Carriage and Shadowboard
2 Film Magazine Chambers
1 Film Movement, 35mm Full Frame Aperture and Reticle
1 Control Console
1 Camera Stand (Base and Column)
1 Lens, 55mm f/3.5 Micro-Nikkor with Focus Cam
1 Zoom Control
1 Four-sided Elevation Scale
1 Transmission, Motor and Bracket Top and Bottom Light Assemblies

The Model SSA Slide/Strip/Animation Camera and Copy Stand consists of the following assemblies:

1 Camera
1 Carriage and Shadowboard
2 Film Magazine Chambers (with 16mm adapter plates)
1 Film Movement, 16mm Animation Filmstrip Aperture and Reticle
1 Control Console
1 Camera Stand (Base and Column)
1 Compound Table and Platen
1 Lens, 28mm f/3.5 Auto-Nikkor with Focus Cam
1 Zoom Control
1 Four-sided Elevation Scale
1 Transmission, Motor and Bracket
Top and Bottom Light Assemblies

4.5 **PREPARATION FOR INSTALLATION.** It is recommended that this entire section and the hardware list be read *before* installation is started. The following tools are necessary to install the equipment:

Assorted Allen wrenches
Assorted open end wrenches or adjustable "Crescent" wrench
Assorted screwdrivers, small and medium sizes
One Small ball peen hammer
One 3/16" drift pin punch

4.6 **ASSEMBLY OF COLUMN AND CARRIAGE.** Place the column flat on the floor (bracket for base facing up) on two pieces of 2" x 4" x 10" wood (one piece under the slot for the bottom chain sprocket). Attach bottom zoom scale bracket (it has a zoom scale stop) to the column with two 10-32 x ½" socket head cap screws. Slide the carriage on the column all the way down until it touches the bottom zoom scale bracket and then secure the carriage to the bracket with a strong rope. Slide the bottom carriage chain through the column using wire or cable (the side with the long bolt should go in first). Attach the other end to the counterweight. Slide the counterweight in and attach the top chain (the one with the shorter bolt) to the counterweight. Both ends of the chain are provided with mending links for this purpose. Slide the counterweight farther in so that it clears the holes for the top chain sprocket bracket. Attach top chain sprocket to the column with two 5/16-18 x 1" hex head bolts. Feed the chain over the sprocket and attach it to the top of the carriage. Make sure the chain is not twisted. Attach zoom scale to bottom zoom scale bracket and attach top zoom scale bracket to column.

4.7 **ASSEMBLY OF BASE TO COLUMN.** Check the hardware box for column-to-base shim (spacer), marked top or bottom shim. If you have one, place the shim on its appropriate bracket on the column. Locate two 3/16" x ¾" roll pins. Install these pins in the bracket weldment holes. Then attach the base to the column, making sure that pins are aligned with the holes in the base. Using four ½-13 x 1½" hex head and four ½" 13 nuts and ½" lockwashers, securely fasten base to column. Screw in about half-way four Fabcel feet (adjustable leveling bolts) to the bottom of the base. If you have ordered the bottom light assembly, attach it to the base using two ¼-20 x 3" and ¼-20 x ¾" pan head screws, two ¼-20 nuts and two ¼" lockwashers. With three people (two holding the column, one counter-balancing the base) raise the column to a verticle position. If you have the bottom light set-up, install the clear glass first and then the opal glass; if not, install the dichroic color head.

4.8 **INSTALLATION OF TRANSMISSION AND HAND CRANK ASSEMBLY.** Find the package marked "bottom chain sprocket." At the rear of the stand, install the bracket with two 5/16-18 x 1" hex head and 5/16" plain washer. Hand tighten only. Locate the plate with the transmission and zoom motor and slide the transmission onto the bottom sprocket shaft. Attach the transmission plate to the base using two 5/16-18 x 1" socket caps, 5/16" lockwasher, two 5/16" flat washers and two 3/16 x ¾" roll pins. Locate a taper pin in the hardware box. Match two center punch marks on the transmission and shaft. Drive the taper pin all the way in. From the left front, push the manual zoom control shaft through the bushing. Slide the zoom counter pulley belt on the shaft before attaching the shaft to the transmission with one 1/8" x ½" roll pin. Attach the limit switch assembly just above the bottom chain bracket with two 10-32 x 1" socket head cap screws. Feed the chain over the bottom sprocket and attach it to the carriage.

4.9 **INSTALLATION OF CONTROL CONSOLE AND ZOOM CONTROL BOX.** Mount the control console assembly to the right front edge of the table top with three # 14 self-tapping screws and two 5/16-18 x ½" socket head cap screws, attaching the green ground wire to one of the 5/16-18 x ½" screws. Blow the main circuit board with compressed air and mount nine relays on it. Mount one dimmer relay on the dimmer circuit board. Close the console. Bring the control cable and power cord under the table and attach them to the clamp, bringing the cable out on the back side. Unwind the control cable. Locate two ½" diameter steel clamps, one 5/8" diameter clamp, three

¼-20 x ½" button head screws, three ¼-20 nuts, two ¼" lockwashers, one star washer. Measure approximately 24" from the cable connector and attach the cable to the carriage using ¼-20 x ¼" button head screw, nut and star washer. Slide the spring on the cable and line it up with the top right rear of the carriage. Using a 5/8" diameter steel clamp, attach it to the carriage and attach the remaining clip in the middle. Mount the zoom control box on the left under the table top with two # 10 self-tapping screws. Slide the cover back on the door. Bring the cable from the zoom motor under the base and out through the cut-out on the top left side panel and attach it to the box. Pull power cord through the cut-out. Attach the two clamps and plug the power cord into the outlet on the rear of the control console.

4.10 ASSEMBLY OF TOP LIGHT BRACKETS. Fasten the two top light brackets to the rear of the base with four 5/16 x 3" socket screws and nuts and washers provided. The inner tube with a hole should go in the right-hand side. Feed the cord through the brackets and mount the lamps on their brackets with the front filter slots facing up. Attach the control cable with the help of ½" clamps and # 14 self-tapping screws to the right side bracket. Plug the light wires on the right rear of the control console. The top two outlets are for the top lights and the bottom outlet is for the bottom light. Attach the elevation counter on the rear left of the base, using two 10-32 x 3/8" socket caps and # 10 flat washers. Zero the counter when the carriage is at the bottom stop.

4.11 INSTALLATION OF CAMERA. Using a lint-free cloth, wipe the rack-over gibs to remove any grit or dust that may have accumulated. Oil the edges of the gibs with a few drops of light machine oil. Before sliding the camera over the gibs, note that there is Teflon tape on the base of the camera. Clean this area. Now, very carefully slide the camera over the rack-over plate without damaging the tape. Connect the rack-over link with a shoulder screw and fasten the set screw. Connect the control and solenoid power supply connector on the rear top left of the camera. Untie the rope from the carriage. Turn the power switch on and check that the zoom and rack-over functions do not bind or chatter.

4.12 AUTO FOCUS. The remaining small chain is the auto focus chain. Note that the chain has a long and a short bolt. The long bolt has three nuts on it. Remove the loose one and attach this side of the chain to the top zoom scale bracket and fasten the nut. Bring the bottom of the carriage 6" from the top of the table. Line up all the scribe marks as marked on the gears. Remove two nuts off the small chain bolt. Feed the chain over the top small sprocket. Line up the mark on the chain with the mark on the large gear. Feed the chain over the gear, onto the bottom sprocket and the bottom zoom scale bracket. Install the focus cam. Mount the lens and turn the view switch on, projecting the reticle image on white paper. Elevate the camera and check the sharpness of the reticle line (for auto focus, always keep the lens set to infinity). Install auto focus chain cover using three stand-offs and three 10-32 x 7/8" pan head screws.

4.13 ZOOM CONTROL AND LIMIT SWITCH STOP. The zoom control is located on the left-hand side and is of variable speed. As a precaution, always slow down when you are reaching the top or bottom of the column height. Install the limit switch stops by tightening the Allen screw and bringing the camera all the way down until it touches the rubber bumper on the bottom zoom scale bracket. Raise the camera about ½" and install the stop block from the front.

4.14 TOP LIMIT SWITCH. Bring the carriage all the way up until it reaches the top of the bracket and touches the rubber bumper. Lower it about ½" and install the top limit switch stop on the chain.

4.15 FINAL ASSEMBLY. Place the stand in the location where it will be used and, using a bubble level, raise or lower Fabcel feet until the table top surface is level. Slide the shadowboard under the carriage and install a 10-32 x 3/8" button head screws to keep it from sliding out. Install side panels on the base using 10-32 x ¾" Phillips head screws and nuts.

5.0 OPERATION

5.1 CONSOLE CONTROLS AND INDICATORS. Figure 7 illustrates the console controls and indicators. Table I describes their function.

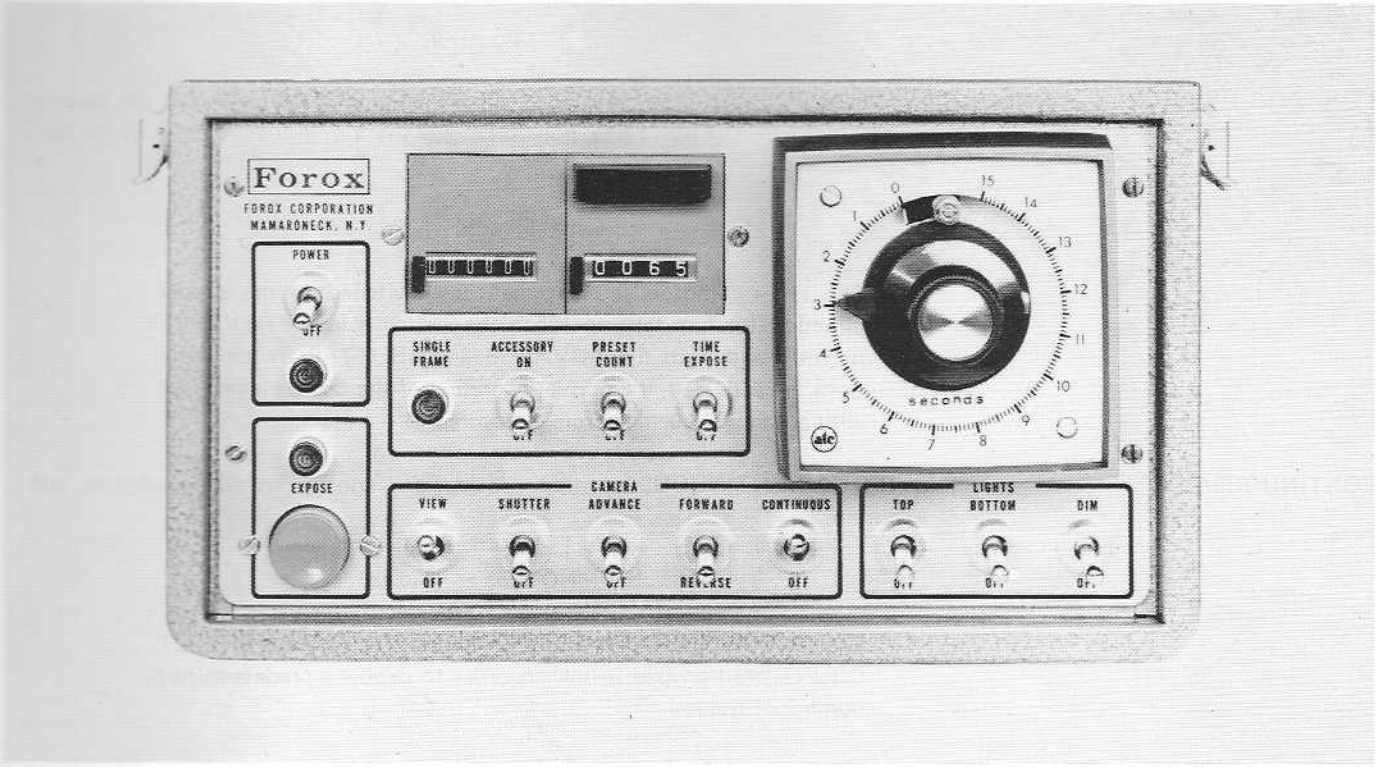

Figure 7. Console Controls and Indicators

Table I. Control/Indicator Functions

Control/Indicator	Function
POWER/OFF Switch	Switch in POWER position supplies AC to camera and elevation motor operation.
POWER Indicator Light	Indicates AC power is on.
VIEW/OFF Switch	Switch in VIEW position allows the operator to view the material. Switch in OFF position keeps the camera in shoot position.
SHUTTER/OFF Switch	Switch in SHUTTER position permits film exposure.
ADVANCE/OFF Switch	Switch in ADVANCE position permits film advance.

NOTE

When both ADVANCE and SHUTTER Switch positions are activated and EXPOSE button is depressed, the camera automatically exposes and advances.

Table I. Control/Indicator Functions (Cont.)

Control/Indicator	Function
FORWARD/REVERSE	Switch in FORWARD position advances the film in the direction of the take-up magazine. Switch in REVERSE position moves the film in the direction of the feed magazine. NOTE The take-up motors are automatically switched to the proper direction for film take-up. When the Switch is in the REVERSE position and both the ADVANCE and SHUTTER Switch positions are activated, the normal operation of the camera is reversed with advance occuring before exposure.
CONTINUOUS/OFF	Switch in CONTINUOUS position provides for continuous frame advance and exposure. NOTE Use the CONTINUOUS position in conjunction with the PRESET COUNT position (see below) in order to expose a predetermined number of frames.
PRESET COUNT/OFF	Switch in PRESET COUNT position activates the preset counter.
PRESET COUNTER	The PRESET COUNTER can be set to operate the camera for a predetermined number of frames. To preset the counter, the hinged cover plate above the numerals is raised and as the Counter Reset Tab is pressed, one or more of the four master counter digit buttons is pushed until the desired number appears. The counter will subtract one digit for each film advance in either forward or reverse direction. To reset the counter, depress the tab to the left of the numerals. NOTE When the PRESET COUNTER reaches 0000, the camera will stop and be inoperable until the PRESET COUNT Switch is moved to the OFF position or the counter is reset.
FRAME COUNTER	The FRAME COUNTER indicates the number of frames that have been advanced. It can be reset to 000000 by depressing the tab to the left of the numerals. The counter will automatically add one digit for each frame advanced when the camera is being operated in the forward direction and subtract one digit in the reverse direction. It will automatically compensate for full or half frames (slides or filmstrips).
TIME EXPOSE/OFF	Switch in the OFF position opens the shutter for ¼ second. Switch in TIME EXPOSE position will activate the timer and keep the shutter open for the duration of the time selected.
Timer	Turn knob on timer to desired time exposure.

Table I. Control/Indicator Functions (Cont.)

Control/Indicator	Function
Lights:	
TOP/OFF	Switch in TOP position will turn on the top lights for photographing opaque copy.
BOTTOM/OFF	Switch in BOTTOM position will turn on the bottom lights for photographing transparencies.
	NOTE Top and bottom lights cannot be turned on simultaneously. Should both Switches be activated, only the top lights will operate.
DIM/OFF	Switch in DIM position will automatically reduce either top or bottom light intensity by approximately 50%. This reduces heat and facilitates focusing or sizing. When the EXPOSE button is pressed to make exposures, the lights automatically return to full intensity until the exposures are completed. The Switch in OFF position keeps the lights on continuously at full intensity.
EXPOSE Button	Pressing the EXPOSE button will start the camera operating sequence selected by the position of the above Switches.
EXPOSE Indicator Lamp	If the sequence selected leaves an exposed frame in the aperture, the Indicator Lamp will remain lighted.

5.2 OPERATION OF CAMERA CONSOLE CONTROLS. To use the camera in the normal mode of operation, the controls should be set as shown in Table II. Operation is started by pressing the EXPOSE button.

Table II. Normal Camera Operation Settings

Operation	Switch	Position
Single exposure with film advance in forward direction	POWER/OFF	POWER
	VIEW/OFF	VIEW
	SHUTTER/OFF	SHUTTER
	ADVANCE/OFF	ADVANCE
	FORWARD/REVERSE	FORWARD
	CONTINUOUS/OFF	OFF
	PRESET COUNT/OFF	OFF
	TIME EXPOSE/OFF	Either position

5.3 ALTERNATE MODES OF OPERATION. To operate the camera in other modes, only those switches listed in Table III should be set.

5.4 MANUAL ELEVATION CONTROL KNOB. The control knob (see Figure 8) for manually positioning the camera carriage is located under the left side of the table.

Table III. Alternate Operation Settings

Operation	Switch Position
Single timed exposure and advance in forward direction	Switch in TIME EXPOSE position and timer set for desired interval.
Continuous exposures and advance for a preset number of frames	Switches in PRESET COUNT and CONTINUOUS positions. Set PRESET COUNTER to the desired number of frames.
Advancing without exposure	SHUTTER/OFF Switch to the OFF position.
Rewinding without exposure	SHUTTER/OFF Switch to the OFF position and FORWARD/REVERSE Switch to REVERSE.
Exposing without advance	ADVANCE/OFF Switch in OFF position. CONTINUOUS/OFF Switch in OFF position.
Multiple exposures on one frame	EXPOSE light will remain lighted indicating exposed frame is still in the aperture. Before making last exposure place Switch in ADVANCE position. The exposure can be made and the film will be advanced to clear the aperture.
Exposures without viewing	VIEW/OFF Switch to the OFF position.
Automatic dimming of light intensity after exposing	Switch in DIM position.

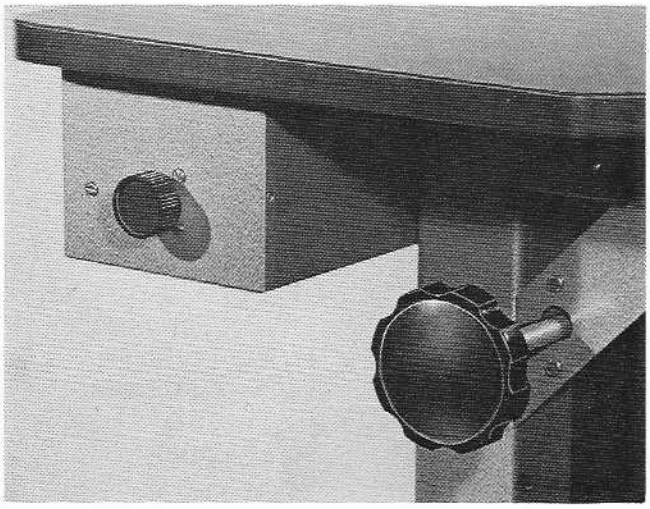

Figure 8. Manual and Motor Elevation Controls

5.5 ELEVATION MOTOR CONTROL. Turning the small knob on the elevation control box at the left of the table (see Figure 8) will activate the elevation motor, raising or lowering the camera carriage. Turning the knob counterclockwise will lower the carriage; turning the knob clockwise will raise the carriage. The speed of the carriage is controlled by the distance the knob is turned away from center. When the knob is moved back to center or when the carriage has reached the end of its travel, the carriage will stop.

Caution: Sudden starts and stops or abrupt speed changes should be avoided. As the desired elevation is neared or if the carriage approaches its limit of travel, the knob should be gradually returned to its center position. The elevation motor should not be reversed until the carriage has first come to a complete stop.

5.6 **LOADING THE MAGAZINE.** Two identical 35/46mm magazine chambers are provided with the camera: one to use for holding raw stock and the other to accept the exposed film. The magazines accept up to 400 foot rolls of film wound on either plastic cores or metal flange daylight load spools. Magazines should be loaded in the darkroom. To load the magazine (see Figure 9), remove the cover by opening the latches and use the 1" diameter adapter if required. Position the film to unwind clockwise. Thread the end of the film through the light trap rollers so that the base is toward the guide rollers, replace the cover tightly and close the latches. The loaded magazine is now light-tight and ready for insertion on the camera.

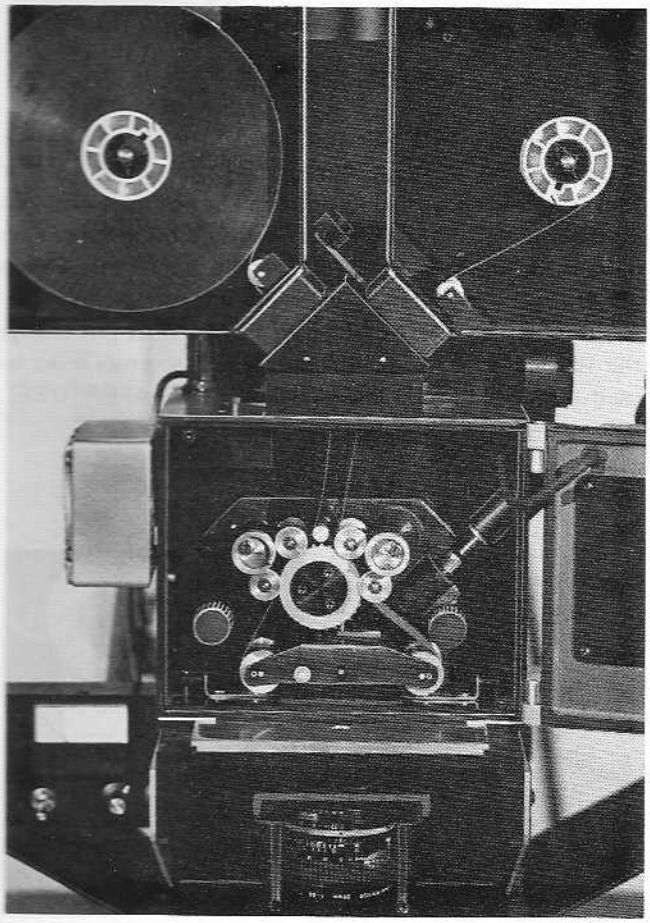

Figure 9. Loading the Magazine

5.7 **THREADING THE FILM.** Open the camera door and insert the loaded magazine on the left side of the camera by sliding the stud located on the back of the magazine into the shoe mounted on the take-up motor bracket. Feed the end of the film into the slot on top of the camera while sliding the magazine in toward the camera until it fits into the black triangular block forming the light seal. Open the film rollers on the left and right sides of the film feed sprocket on the film movement. Thread the film end down on the left side between the rollers and the sprocket, around the idler roller, between the pressure and stripper plates, over the aperture and up on the right side between the sprocket and the rollers (see Figure 10). While holding the film on the sprocket, turn the film roller knob on the left side until it snaps into position. Take the film end with the left hand and apply tension to the film, while positioning the film properly around the two lower idler rollers and through the notcher slot. While still keeping slight tension on the film, turn the film roller knob on the right side to secure the film on the sprocket. Place the control switches on the console in the following positions: VIEW, CONTINUOUS and PRESET COUNT Switches to OFF; SHUTTER and ADVANCE to "on"; FORWARD/REVERSE to FORWARD. Press the EXPOSE button to advance the film end approximately 3" - 4" out of the camera. While the film is advancing, be sure the pressure plate is coming down all the way and is flat on the aperture. Before closing the camera door, check that the inside edge of the film is in contact with the end-of-film switch actuator; close the camera door and latch it. If door will not latch, check to see that the left and right rollers are closed. Remove the cover from the take-up magazine by unlatching it and insert the take-up magazine on the right side of the camera in the same manner as the feed magazine was inserted, feeding the film end in through the light trap rollers. When the magazine is secure, the camera is light-tight. Advance the film in the magazine, tape to 2" core, then advance the film approximately 10 frames (20 frames if using filmstrip) to clear the camera of exposed stock. Replace the magazine cover securely and latch it. Reset the frame counter to zero and notch if desired. The camera is ready for use.

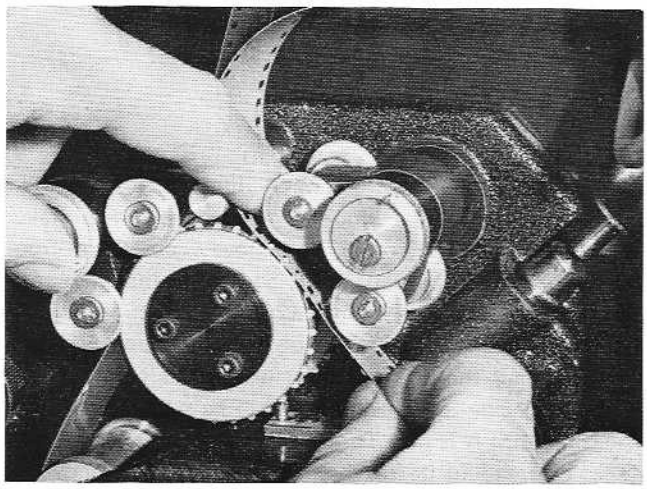

Figure 10. Threading the Film

5.8 NOTCHING THE FILM. A plunger located on the right side of the camera notches the edge of the film to locate the start and end of a run (see Figure 11). The notch will be located approximately 2½ slide frames ahead of the frame in the aperture. For locating multiple 36 exposure lengths (slide format), advance five frames after the last exposed frame before operating the film notcher. The notch will be located in the center of the five frames, leaving 2½ frames of leader on each side of the notch. Film chips from the notcher will accumulate in a receptacle in the film movement and should be removed periodically.

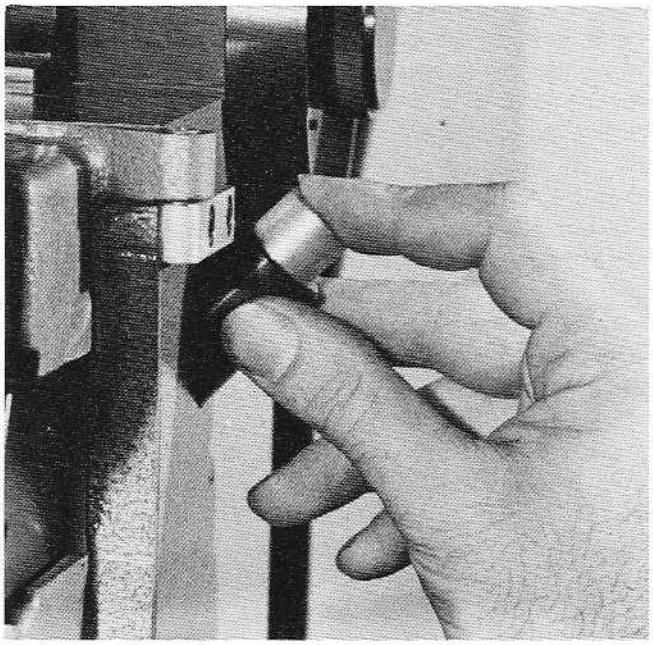

Figure 11. Notching the Film

5.9 CUTTING THE FILM. A film cutter, mounted on the black triangular block, is located behind the take-up magazine (see Figure 12). To remove exposed film from the camera, turn the SHUTTER Switch to the OFF position and advance ten frames (20 for filmstrip). Slowly slide the take-up magazine out of its holder approximately 1" and swing the cutter blade forward to cut the film. As the magazine is removed, film will be pulled out of the magazine until it is cut. To avoid fogging the exposed film stock, care should be taken that the magazine is moved a minimal amount until the film is cut. Move blade back to original position.

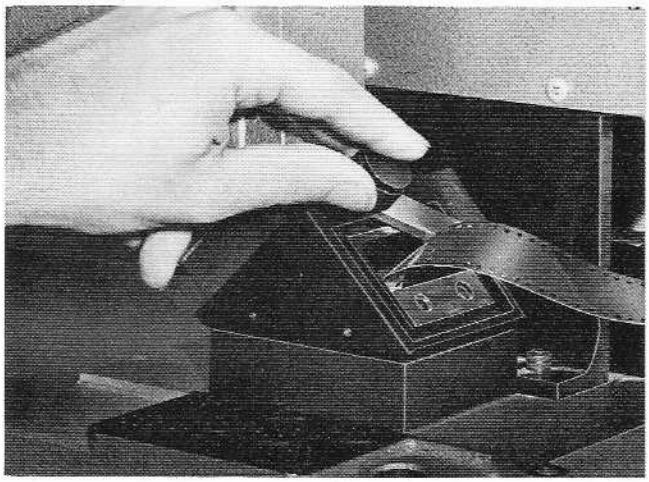

Figure 12. Cutting the Film

5.10 ROTATING THE CAMERA. The camera can be rotated 90° to align the film properly for either slide or filmstrip formats so that material can be positioned upright on the copy table. Rotate the camera by turning the camera head clockwise to align it for filmstrip format (see Figure 13). When the camera is square with the carriage, an indexing stop can be felt. Rotating the camera does not change the film advance; to do this, the proper aperture must be used (see Section 5.12 CHANGING THE APERTURE).

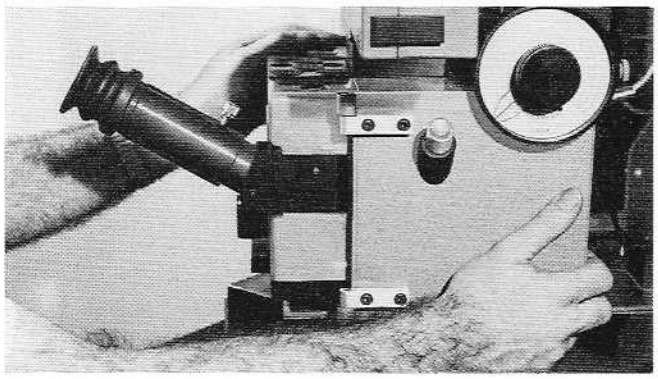

Figure 13. Rotating the Camera

5.11 REMOVING THE FILM MOVEMENT. To remove the film movement, loosen the two knurled knobs on either side of the film movement (see Figure 14). Lift the film movement out while holding the pressure plate up. The pressure plate must be held up with the thumb while removing or inserting the film movement so that it clears the registration pins and prevents damage.

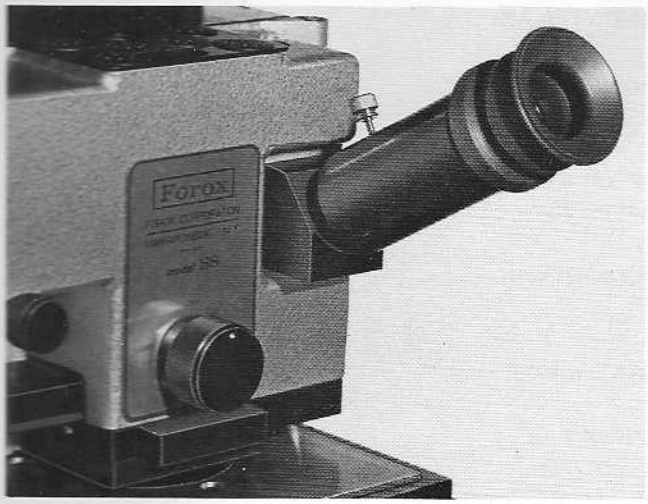

Figure 17. Reticle Projection Selector Knob

5.19 **FOCAL PLANE ADJUSTING MECHANISM.** The Focal Plane Adjusting Mechanism is used to relocate the plane of focus above the table top when using the compound, etc. When refocusing the lens, the elevation of the camera should be such that the projected slide reticle image measures approximately 4" across. The lens focus ring should be set at infinity. Loosen the auto-focus cam locking knob and rotate the cam clockwise slowly until critical focus is achieved. Lock the knob securely. Run the camera part way up the column while observing the projected reticle image to assure that it stays in sharp focus. The accuracy of the setting is dependent on the operator's ability to set precise focus. To reset the focus on the main table surface, loosen the locking knob and rotate the cam counterclockwise to the end of its travel and tighten the locking knob.

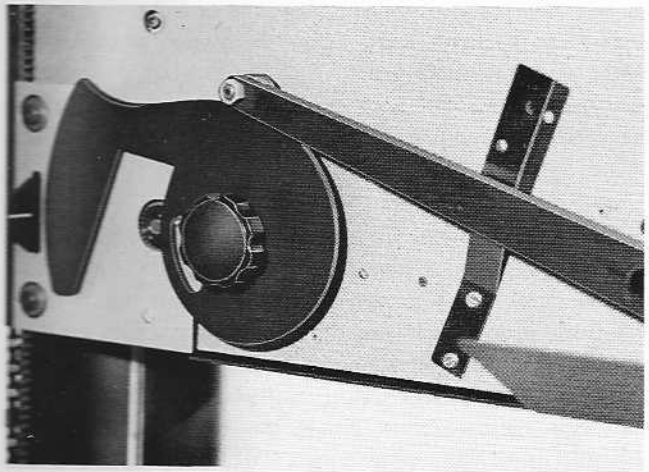

Figure 18. Cam Follower Arm

5.20 **FILTERS FOR TRANSPARENCY PHOTOGRAPHY.** Filters may be placed below the opal glass on top of the clear glass plate by raising the opal glass from the front of the table top. A blower is provided to circulate air and cool the filters, glass and transparencies.

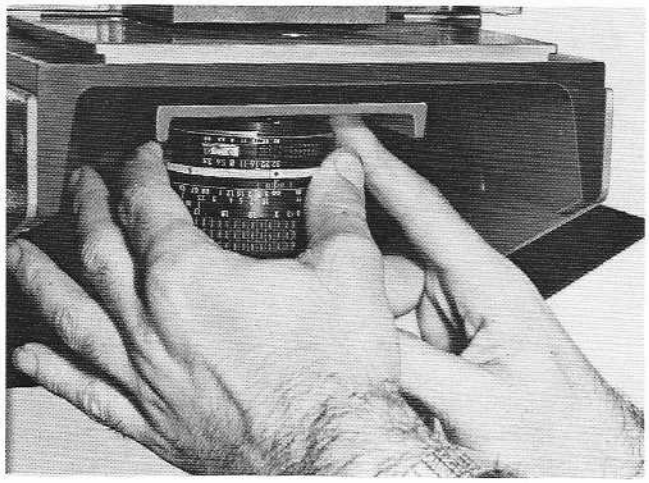

Figure 19. Changing Lenses

5.21 **SHADOWBOARD.** A shadowboard is used by sliding it towards the operator to prevent reflections from being picked up by the lens when copying reflective material.

6.0 MAINTENANCE.

6.1 **PREVENTIVE MAINTENANCE.** It is desirable to have the camera located in a clean, dust-free environment. The area around the camera should be vacuumed regularly. When the camera is not being used for extended periods of time, the lens should be removed and placed in a storage box, and the camera should be covered with a plastic sheet.

6.2 **PREVENTIVE MAINTENANCE SCHEDULE.** The components of the camera should be maintained according to the schedule below:

COMPONENT	PREVENTIVE MAINTENANCE	FREQUENCY
Camera	Brush out thoroughly with a camel's hair brush.	Weekly
Film Movement	Remove and brush off any excess film particles from the film notcher.	Weekly
Camera Aperture	Remove and brush edges with camel's hair brush.	Weekly
Lens	Clean with lint-free lens cloth.	Weekly
Glass Insert	Clean with glass cleaner.	As required
Rack-over Gibs	Clean and oil gibs by placing no more than a few drops of light machine oil on each edge only. Do not overlubricate the rack-over gibs.	Bi-weekly

6.3 REPLACING PROJECTION LAMP. Make sure POWER Switch is in OFF position. To change the projection lamp, the ventilator plate must first be removed from the top of the viewer. The projection lamp can be removed by pulling it out of its spring-loaded socket (see Figure 20).

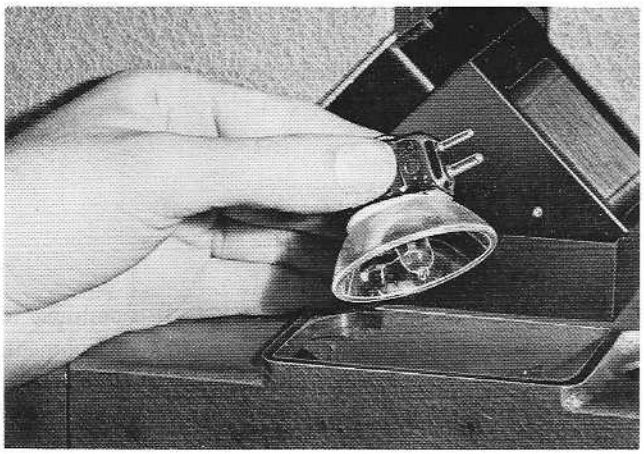

Figure 20. Replacement of Projection Lamp

7.0 ACCESSORIES.

7.1 EXPOSURE METER/COMPARATOR. The Exposure Meter/Comparator functions as a "nulling" meter operating from a photocell located over the viewing reticle in the camera door. The sensor is about midway between an averaging type and a spot type. It covers 10-15% of 35mm slide format, 25-35% of 35mm filmstrip, 100% of 16mm and Super 8, 60-70% of 110 and 6-8% of 46mm (Superslide). The sensitivity of the system is one division per ¼ stop or better.

To use the meter, the photocell carrier located below the camera door latch knob must be pushed in to the right where it will be held by a detent. When in this position, neither the optical viewer nor the reticle projection system can be used. Next, throw the toggle switch on the meter assembly mounted to the left side of the camera carriage to the "on" (up) position. This switch disables the projection lamp and the automatic diaphragm system of the lens.

To calibrate the meter for a given film emulsion, a step test must be run from a standard slide (such as Kodak's test transparency) or your own normal accepted standard to determine proper exposure time and f/stop. Once the optimum f/stop has been determined, calibrate the meter by setting the lens to this f/stop, and while reading through the same standard slide, adjust the knob on the meter assembly until the meter reads "0" (center of scale). Since the system is electronically regulated, the calibration will be maintained as long as the knob is not moved.

If material to be copied reads above or below "0" due to density or required filtration, compensation can be made by adjusting the lens f/stop ring until a "0" reading is obtained. Be sure to turn the system off when not in use.

These instructions apply as well to reflective copy if an 18% gray card or equivalent is used to calibrate the meter.

NOTE

The photocell carrier must always be moved back to the left detent position before using the viewer reticle projection system.

7.2 DICHROIC FILTER HEAD. The Dichroic Filter Head is used for color correction of slides, transparencies, or for special effects. It consists of a diffuser box, dialable dichroic filter; 0-170CC dichroic cyan, magenta and yellow filters; high and low intensities for filters and white light. Replace the opal and clear glass on the table top with the Dichroic Filter Head and plug it into the accessory outlet on the Copy Stand. To operate, turn accessory switch located on control box to ON.

7.3 LIGHT BOX. The Light Box will increase the Dichroic Filter Head coverage from 5" x 7" to 8" x 10". Remove the glass from the Dichroic Filter Head and place the Light Box on top of it. The bottom of the box registers to the area that was occupied by the glass.

7.4 SLIDE STAGE. The Slide Stage holds any thickness 2" x 2" mounted slides for slide duplication. It has a 3" x 3" filter drawer, 1"-N/S, 2"-E/W travel and 360° rotation. It is placed on top of the standard opal glass or the Dichroic Filter Head.

7.5 LEKTRO-PLAQUE COPY BOARD AND FILM HOLDER. The Lektro-Plaque holds copy flat without glass or vacuum by creating a static charge on a copy area 24" x 30". Since it has its own power source, it may be plugged into a wall outlet or into the accessory outlet on the Copy Stand. It is used directly on the camera table top. No physical connection is required.

TROUBLE SHOOTING

SYMPTOM	MOST LIKELY CAUSE	SOLUTION
Camera will not operate; but Power Indicator stays lighted	a) Blown fuse on printed circuit board	Replace fuse
	b) ADVANCE and SHUTTER Switch OFF	Put switches to "on" position
	c) PRESET COUNT Switch on with zero count	Turn PRESET OFF or reset
	d) Defective printed circuit board	Replace circuit board
Camera will not operate, expose indicator stays on and relay buzzes	Out of film	Use by-pass button or reload magazine with film
Registration off Soft slides (out of focus)	a) Improper loading of film movement	See instruction # 5.11 for proper loading
	b) Pressure plate does not come down flat or all the way on the aperture *with* film in the camera	Check threading of film (see instruction # 5.7), check advance microswitch

	c) Pressure plate does not come down flat or all the way on aperture *without* film in the camera	Pressure plate must be realigned on the aperture. Contact FOROX.
	d) Registration off by very small amount	Check aperture for correct pins (BH or KS) for film used
Neither counter operates properly	Counter microswitches	Adjust counter microswitches
One counter does not operate	Defective counter	Replace counter
Noisy rack-over	Dust on rack-over plate	Clean the rack-over plates and gibs and use a few drops of light machine oil
Auto-focus does not function properly	a) Auto-focus Cam not in its proper place	See instruction # 5.19
	b) Lens not at infinity	Set the lens on infinity
Over-exposed film	a) Incorrect f/stop setting	Check f/stop setting and correct
	b) Iris solenoid malfunction	With VIEW Switch in VIEW position, lens set to smallest opening, turn POWER Switch on and off several times, checking that with POWER OFF, lens is closed and with POWER "on", open wide. If this does not happen, contact FOROX
Just the blower operates when camera is in view position and projection lamp is in "on" position	a) Projection lamp burned out	See instruction # 6.3
	b) Faulty circuit	Contact FOROX
Neither lamp nor blower functions when camera is in the View position and lamp is in the "on" position	a) Exposure/Meter Comparator is on	Turn it off
	b) Microswitch on selector knob faulty	Contact FOROX
Top or bottom light does not dim	a) Dimmer relay	Check dimmer relay for proper fit on the socket
	b) Faulty dimmer rectifier	Replace