

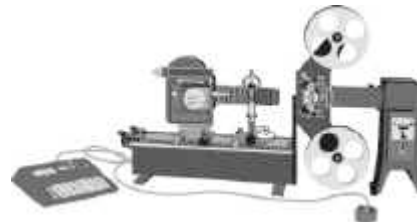
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## **OPTICAL PRINTER K106 & K106r**

### **INITIAL SETUP, OPERATION AND MAINTENANCE**



Optical Printer K106r



Optical Printer K106

JK Optical printers are mostly used with Bolex H Series Rex 4 and Rex 5 motion picture cameras. Any other camera can be used provided that camera have 1-to-1 ratio drive outlet and the motor is supplied for that camera.

#### **INITIAL SETUP OF K106 PRINTER**

The optical printer K106 is shipped in semi-assembled condition, only projector is removed from the base and the lens holder with bellows and X-axis assembly is also removed as a safety precaution. To re-install the lens holder assembly, carefully slide the dovetail of the base-block, which is part of Y-axis movement into mating part of a lens carriage (do not use force), push it in till lead screw will engage with the threaded insert which is located in the end of the slide.

Install projector mounting plate (projector still attached to) into end of the square base, use 4 screws to secure it in place. Note that four screw holes are elongated allowing height adjustment and alignment with the camera aperture.

#### **Electrical hook-up**

All power supplies and motor drives are assembled inside a long 4-inch-square printer base. You don't need to open that unless there is a serious problem in printer operation.

There are two 9-pin AMP connectors in the end of the square base. Plug the camera motor control cable to the socket which have 9 contact pins, usually the top socket. Rotate the plug till it inserts freely into the socket then twist the locking ring till it's tight. Do the same for projector motor control cable. To make sure that right socket is used, count the contact pins in the plug and match with equal number in the socket. (Camera socket have 9 pins and Projector socket have 7 pins)

Plug the cable with 14-pin connector to the control box socket (this plug has the remote-switch cable attached). Plug the power cord to 120 Volt AC outlet (make sure that the AC outlet is grounded; this will reduce electrical noise to low voltage controls).

Turn the power switch ON, LED display indicates "0", if not, press the preset button in the back of control box, the display should indicate zero.

#### **To prepare Bolex H16 Rex4 for printer**

Remove film and lenses and lock turret with provided plug or clamp. Allow spring motor to wind down then disengage by simultaneously swinging clutch lever from MOT to O and locking drive release back at M (down position). Set film speed to 64fps (to minimize stress on governor). Next step is to remove the camera mounting block from camera carriage; with hex-key loosen two screws holding the brass wedge then slide the block off from the carriage. Secure the mounting block to camera base by 3/8" NC cap screw provided, make sure that the mounting block is in 90 degree to lens axes. Slide the mounting block with camera back to carriage, locate with lens axes and tighten the screws on the wedge. Install provided C-mount adapter and secure bellows to camera.

#### **INSTALL CAMERA MOTOR**

Note the position of 1 to 1 drive shaft, engraved red dot should be towards lens, advance to this position using camera rewind crank. The camera motor in your hand, advance motor one turn by pressing the camera remote button, the motor will advance and stop to HOME position, in that position when motor is attached to camera the shutter is in closed position. engage the motor coupling so that the wider slot in the end of the coupling aligns with red dot. Install and screw in all 3 mounting screws with spacer bushings, do not tighten screws yet.

Advance motor few times, if OK go to control keyboard and program following sequence: Camera (PRESET COUNT) (50) (ENTER) (RUN). As camera runs continuously observe the movement of motor coupling and the

sound of motor. You can move the motor so that motor running sound is even and the coupling is in center of the camera shaft, when OK lock the motor into final position.

There is one more important operation left: Printer completely assembled, set a light source in place so that there is ½" gap in between the projector's forward edge and condenser tube. With 16mm module in projector, crank the lens carriage to 1 to 1 image magnification ( set pointer to 4" from projector mounting plate) and camera carriage so that pointer is 8" from the projector mounting plate. Remove the camera lid and the film pressure plate, now you can see the gate.

Turn the light ON, remove the lens cap if applicable, set lens aperture to F:4 and make following observation from the camera gate: If you do not see the light, the motor is properly installed, if the gate is illuminated, that means that the motor engagement is 180 degrees off. To verify, advance camera several times, when motor stops the shutter must be closed and the shutter open indicator light is off. You can also toggle the shutter movement by pressing the shutter open/closed key. Redo the motor installation if gate is open when camera stops.

### **ALIGNMENT OF CAMERA AND PROJECTOR APERTURES ON COMMON AXIS**

It may be useful to observe that the critical alignment of the common axis is important only, when printing the scene which includes zoom movement, where the image must stay in the center of the aperture.

### **VERTICAL ALIGNMENT:**

Establish exact 1:1 image via prism in camera gate using suitable calibrated film. Mark positions of camera and lens carriages and of camera and lens carriage hand-wheel cranks. Track lens toward projector about 1 1/8" or more and the away from projector until image is in focus on prism. Mark these positions 2:1 ratio (approx.).

Loosen 3 of 4 screws holding the projector mounting plate. Then observing the image position carefully loosen the last screw and correct the vertical image center by about half by lifting or lowering the projector.

Track camera and carriage back to original 1:1 positions. Reframe image to exact 1:1 using lens vertical adjustment hand-wheel. Track camera and lens to 2:1 positions. Repeat steps 3, 4 and 5 until image remains vertically centered throughout 1:1 to 2:1 range. Tighten projector mounting screws

### **HORIZONTAL ALIGNMENT:**

Proceed as in steps 1 and 2 above and then loosen the brass wedge which locks the camera mounting slide.

Do the horizontal alignment following the same procedure as in Vertical axis steps 3, 4, 5 and 6. EXCEPT, correcting the horizontal error by relocating the camera instead.

When done lock the camera in place.

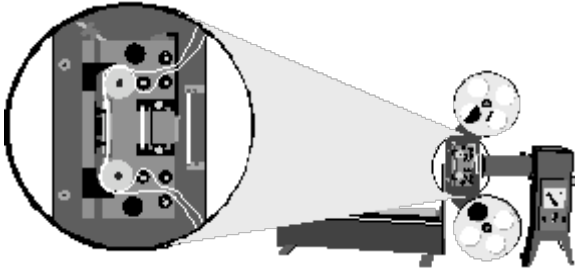
### **PROJECTOR FILM TRANSFER AND REGISTRATION MODULE**

#### **CLEANING:**

Frequently remove dirt and loose particles from module by swabbing entire film path with film cleaner/lubricant. Check more often if many splices pass through the film gate.

#### **PERIODIC LUBRICATION:**

Approximately every 200 printing hours. Remove a projector module from the projector. Place 2 drops of sewing machine oil on each side of activator slide where it contacts two brass slide bearings. Slide should retract freely by applying tension by finger. And return smoothly under its own spring tension. Also lubricate the spindle bearings of model K103 film module. Inside the gear assembly, apply a drop of oil on the switch rollers and on the activator arm bearing. Using medium weight grease, lubricate the outer flange surface of synchronizing cam and top and bottom drive gear teeth.



## FILM LOADING

Except for reverse action printing and aerial image projector, projector feeds from the bottom supply film reel (image reads correctly and appears right side up in camera viewfinder). See the film threading diagram for correct film path.

### Threading a single film:

Thread film around sprockets and between film lifter plates, around the idle wheel as shown above. Make sure that film perforation engages with sprocket teeth before sliding a film gate in. For Bipacking. Tread film separately as shown in image above. For best results outside film should be of printstock pitch (.3000"). Inside film may be either print or camera (.2994") pitch. Place the feed and take-up reels of outside film adjacent to those of inside film, coaxial.

## HOW TO CHANGE THE FILM MODULE

The inter-changeable film module consists of film advance sprockets, aperture, registration pins, film lifting mechanism and film guide brackets and reels. The film lifting mechanism is activated by the oscillating arm from the projector power head. The two film advance sprockets are synchronized by corresponding spindles in the power head. All film modules for different film formats operates by the same mechanical principle and the removal and installation requires the same procedure.

### TO REMOVE THE FILM MODULE

First unscrew two thump-screws and gently pull the module out, away from projector. The installation requires more attention. Use thump-screws to locate the module in place, do not tighten screws yet, module still loose engage the lifter arm with the corresponding hole in the slide then rotate the sprockets so that the spindles will engage with projector drive spindles, the module should slide in against the projector face plate without using force then tighten the screws.

### 300 watt QUARTZ LIGHT

The light source is a self standing unit which consist of a cooling fan, ELH lamp holder, light intensity control, AC volt meter, light condenser tube and plug-in power cord for 120 AC power outlet. Set this light unit so that the light tube is in center of the linear line of image bath, in X and Z axis. Leave 1/2" cap in between the light tube and projector face plate. Use spacers for alignment if necessary and tape or screw mount in place. The main switch turns power On/Off to a cooling fan and to dimmer switch which is push activated, therefore the lamp cannot be ON without having cooling fan ON. Use replacement lamp # ELH 300.

## CONTROL SWITCHES AND KEYBOARD OPERATION

### Switches located in the back of the control box have following functions:

Projector FWD/REV. Camera FWD/REV (lever up is FWD). Reset (push button) cancels all programmed functions. Projector count reversing switch, this is installed and used to change frame count direction in conjunction of 35mm gate. A 14 pin AMP connector is to plug-in a power and control gable from the printer base. A key pad on this unit has four modes of operation, following is a description of the modes and then a description of each key function within that mode.

NOTE 1: Keys pressed will activate only when pressure is released.

### MODE 1: MAIN MODE

This is the mode the unit is in after power is turned on or after the reset key has been pressed or when no other mode has been entered.

### FUNCTIONS OF INDIVIDUAL KEYS IN THE 'MAIN MODE':

#### MODE SELECTION KEYS:

(PGM) - PROGRAM - Key used to enter the PROGRAM MODE.

(VERIFY) - VERIFY - Key used to enter the VERIFY MODE.

(RUN) - RUN - Key used to enter the RUN MODE.

#### COUNTER KEYS:

(PROJ TOTAL) - PROJECTOR TOTAL - Press to display the projectors total count.

(CAM TOTAL) - CAMERA TOTAL - Press to display the camera total count.

#### FUNCTION KEYS:

(CAP SHTR) - CAPPING SHUTTER - Press once to enable and again to disable.

(PROJ INDIV) - PROJECTOR INDIVIDUAL - Advances the projector one frame.

(CAM INDIV) - CAMERA INDIVIDUAL - Advances the camera one frame.

**NOTE 2:** Any key not explained above has no function when in the MAIN MODE.

**NOTE 3:** If the individual button on the motor or the projector is pressed the counter will be updated and then display the count for that device. Also the external input trigger may be activated from the connector on the rear panel of the unit. This will have the same function as the run key.

## MODE 2: PROGRAM MODE

This mode can be entered using the PROGRAM KEY as described above. When in this mode keys are used to enter data required to run a specified sequence.

**NOTE 4:** The PROGRAM LED, on the left side of the key pad, indicating the PROGRAM MODE.

### FUNCTIONS OF INDIVIDUAL KEYS IN THE 'PROGRAM MODE':

(PGM) - PROGRAM

This key may now be used to exit the PROGRAM MODE. After using this key the PROGRAM LED will no longer be lit indicating that the unit is no longer in this mode.

(NUMBER KEYS 0 THRU 9)

Use to enter data when the data parameter has been defined. (Pressing a function key then the number values desired for that function.)

(.) - DECIMAL - (The decimal point doesn't show in the LED display but is functional when key is pressed) Should be used only with exposure time and delay time specs.

(CLR) - CLEAR - Clears the currently entered data, in the event of a correction.

(ENTER) - ENTER - Enters the currently programmed data into the programs memory.

(EXP TIME) - EXPOSURE TIME

Selects the desired exposure time in increments of 0.1 seconds. The minimum open-shutter exposure time of 0.175 (for Bolex H 16 Rex. 120 rpm motor = 1/6 of the second exposure time ) is automatically accounted for. "0" exposure time = this value.

**NOTE 5:** The K104 Sequencer does not take advantage of this feature. Using this key will enter the value but it will have no effect on the operation of the unit.

(CAP SHTR) - CAPPING SHUTTER

In this mode this key no longer selects the capping shutter. Instead it can be selected to enter a value pertaining to a delay time after the sync switch has been activated by the camera or the projector. Entering a value of 1 will then delay any further action by the camera or projector for about 1 second. This value is default at 0, which is the fastest speed at which the camera and projector can sync back and forth. NOTE: this may be useful for instance when very fragile film is being used through the projector, to carefully observe the alignment before any further action.

(PROJ TOTAL) - PROJECTOR TOTAL

Loads the projector total counter with any value selected by the number keys.

(CAMTOTAL)- CAMERATOTAL

Loads the camera total counter with any value selected by the number keys.

(RUN) - SCENE

In this mode the RUN key is used to start the programmed scene.

### **PROJECTOR AND CAMERA SEQUENCING KEYS:**

The following keys are all in the two left hand columns (next to the LED's).The farthest left keys all relate to projector functions. The next column of keys all relate to camera functions. There are three types of executable runs modes that can be selected using these keys.

### **(PRESET COUNT) - PRESET COUNT**

Presets the desired number of frames to be exposed or advanced. Preset count must be entered in order to run programmed scene. If the CAMERA PRESET COUNT is used then the run will stop after the camera has exposed that many frames. If the PROJECTOR PRESET COUNT is selected then the run will stop after the projector has advanced that many frames. If both are selected the camera will override.

**SCENE** is the term used for each continued event to be printed.

**CYCLE** is the repeating sequence during printing one scene (one combined camera and projector cycle). In **step mode** enter the cycle number which indicate the total number of projector frames. In **skip mode** enter the cycle number of total camera frames.

1 - **ALTERNATE** (whole number ratios) where camera exposes number of frames then projector advance number of frames completing one cycle, this cycle will repeat till preset count is full.

The programmed camera frame number indicates how many times the frame number programmed to projector is to be printed.

2 - **STEP** Fractional ratios where the camera can expose some projector frames more than one time. Camera prints each projector frame ones EXCEPT: Programmed camera frame number indicates, how many times frame number that is programmed to projector is to be printed.

3 - **SKIP** Fractional ratios where the camera can miss exposing some projector frames. Camera prints each projector frame ones EXCEPT: After number of frames programmed to camera is printed, projector advances to frame programmed to projector skip count.

### **MORE ABOUT MODES:**

#### **MODE 1 (ALT COUNT) - ALTERNATE COUNT**

This is for whole number ratios (1:1, 5:2, 3:7 etc.). Loading the CAMERA ALTERNATE COUNT will set the camera to expose that many frames per cycle. And loading the PROJECTOR ALTERNATE COUNT will set the projector to advance that many frames per cycle. (After power on, both the projector and camera ALTERNATE COUNTS are default to one.) Note the LED next to these keys. This is to indicate this type of run.

#### **MODE 2 (CYCLE COUNT) - STEP or CYCLE COUNT**

Used to enter the step count that the camera will expose for before each alternating PROJECTOR and CAMERA CYCLE COUNT.

#### **MODE 3 (SKIP) - SKIP CAMERA**

Used to enter the number of frames the projector will skip before each alternating CAMERA CYCLE. Note the LED next to the SKIP key. This is used to indicate this type of run.

### **VERIFY MODE**

This mode is used to verify any data that has been entered in the PROGRAM MODE. Using the VERIFY key to enter this mode and then any key, explained in the PROGRAM MODE, will then display its data. Then a delay for a few seconds before returning to the MAIN MODE again.

**Note 5:** the PAUSE key is a toggle. If this function is off the verified number will be zero. If it is on the number will be 255.

## RUN MODE

When this mode is entered the computer will run the programmed scene. **Note:** The Camera or Projector PRESET COUNT must be entered which equals the total number of frames of programmed scene. Only two keys are active during a run. The pause and the stop keys. Pressing the pause key will halt any further operation until the pause, stop or run key have been pressed. If the **PAUSE** or run key are pressed the computer will continue with the programmed scene. If the **STOP** key is pressed the running scene will be aborted. The VERIFY MODE can be used while a run is being paused. Any of the programmed data can be verified before continuing or aborting the run. If the stop key is pressed during a run the scene running will be aborted.

## PROGRAMMING EXAMPLES

The following are some simple examples of various different types of runs.

### EXAMPLE 1:

Run one scene of 1:1 ratio for total of 50 camera exposures.

Power on - (PGM) CAMERA (PRESET COUNT) (5) (0) (ENTER) (PGM) (RUN)

In this scene the CAMERA will advance first and expose the first frame in the projector, projector will advance one frame and then camera will expose the second projector frame. This alternating cycle will continue till the camera frame count is 50. NOTE: When pressing the RUN key, the CAMERA will expose the current PROJECTOR frame at the beginning of each cycle.

### EXAMPLE 2:

Run one scene of **ALTERNATE COUNT** for total of 100 camera exposures, using 25 projector frames.

Power on - (PGM) CAMERA (PRESET COUNT) (100) (ENTER) PROJECTOR (ALT COUNT) (1) (ENTER) CAMERA (ALT COUNT) (4) (ENTER) (PGM) (RUN)

### EXAMPLE 3:

Run one scene of **ALTERNATE COUNT** for total of 100 camera exposures, using 200 projector frames.

Power on - (PGM) CAMERA (PRESET COUNT) (100) (ENTER) PROJECTOR (ALT COUNT) (2) (ENTER) CAMERA (ALT COUNT) (1) (ENTER) (PGM) (RUN)

### EXAMPLE 4:

Run one scene of **CYCLE COUNT** (this mode is the same as a **STEP MODE**) for exposing the projector frames 1 and 2 and adding one extra camera frame for every third projector frame.

Power on - (PGM) CAMERA (PRESET COUNT) (50) (ENTER) CAMERA (CYCLE COUNT) (2) (ENTER) PROJECTOR (CYCLE COUNT) (3) (ENTER) (PGM) (RUN)

This mode is useful when changing the silent film speed (16fps.) to sound speed (24 fps.)

### EXAMPLE 5:

Run one scene of **SKIP COUNT** In this mode the camera will expose projector frames 1 and 2 and skip frame 3. Each sequence will skip every third projector frame.

Power on - (PGM) CAMERA (PRESET COUNT) (40) (ENTER) CAMERA (SKIPCOUNT) (2) (ENTER) PROJECTOR (SKIP COUNT) (2) (ENTER) (PGM) (RUN)

### EXAMPLE 6:

Run one scene of **SKIP COUNT** for total of 50 camera frames using 100 projector frames. Each sequence will skip every third and fourth projector frame.

Power on - (PGM) CAMERA (PRESET COUNT) (50) (ENTER) CAMERA (SKIP COUNT) (2) (ENTER) PROJECTOR (SKIP COUNT) (3) (ENTER) (PGM) (RUN)

### EXAMPLE 7:

Rewind 300 camera frames using preset count.

Set camera switch to REV. and press camera (PRESET COUNT) (300) (ENTER) (RUN)

### EXAMPLE 8:

Rewind 300 projector frames using preset count.

Set projector switch to REV. and press projector (PRESET COUNT) (300) (ENTER) (RUN)

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