Film-Tech

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EPRAD INCORPORATED / 123 W. Woodruff / P.O. Box 4712 / Toledo, Ohio 43620 / (419) 243-8106 / Cable Address: EPRAD

SIMPLIFIED OPERATING INSTRUCTIONS FOR

EPRAD CO-OPERATOR UNITS

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EPRAD Co-Operator
Installation Instructions

The EPRAD Co-Operator is a basic unit of projection booth automation furnishing projector start, lamphouse ignition, and changeover capabilities. An interlock system shuts down the projection equipment in the event of a film break, and contacts are included to perform an auditorium function, such as house lights or intermission music.

If more functions are required, EPRAD manufactures a variety of auxiliary units:

The Auditorium Programmer - furnishes automated switching for house lights, curtain, masking, sound source (i.e. optical, magnetic, non-sync), and intermission music source. 35610

The Mini-Auditorium Programmer - provides automated switching for house lights and curtains, only. 35680

The Lens Changer & Masking Module contains dry contacts for actuating motorized lens/aperture changers and masking controls. 35583

Like the Co-Operator, all the above items feature manual override controls.

For additional details, contact your EPRAD Dealer.

PRE-INSTALLATION:

- Carefully inspect the shipment. Report any damage to the freight carrier IMMEDIATELY.
- Sound changeover must be effected through exciter lamp switching.
- If using a lamphouse other than an EPRAD Universal, check the manufacturer's "Automation" instructions. The Co-Operator provides "dry" contacts for lamphouse ignition.
- The Co-Operator unit furnishes 115 volts AC for the projector motor. If the motor being automated is anything other than 115 Volts AC, single phase, an additional control relay must be provided. Contact the factory for details.
- The pickoff used in the installation must be specified at the time of ordering the unit. EPRAD furnishes the following pickoffs:

35114	35mm Norelco
35245	35/70 mm Norelco
35134	Cinemaccanica V8, V18, V88, V4E, V4ES
35525	All American Manufacturers

Instructions for installing the pickoff are in a following insert. The Co-Operator is also compatible with Xetron and TECO pickoff/ safety switch assemblies. Contact the factory for information regarding other makes.

Check local electrical codes for wiring located outside the Co-Operator cabinet.

NOTE: The unit furnished is labeled "SINGLE" (one projector) or "DUAL - LEFT or RIGHT" (two projectors). If the incorrect unit is furnished, or to be used in a manner other than that stated on the label, please contact the factory.

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INSTALLATION

1. Mount Co-Operator cabinet to front booth wall in front of the machine or to the pedestal of the machine.

2. Connect 115 Volt AC to terminals 1, 2 and 3. Note HI, LO, GRND phasing.

3. Wire projector motor to terminals 4 and 5. Use no wire lighter than 16 gauge.

4. Connect xenon lamphouse (or rectifier) relay leads to terminals 6 and 7. NOTE: these are "dry" contacts; no voltage is furnished.

5. Terminals 8, 9, 10 and 11 are picture changeover contacts.
   SINGLE Cooperator: Connect "Zipper" (or other 115 Volt AC changeover douser unit) as labeled on the Co-Operator Chassis.
   Brown - CLOSE White - COMMON Black - OPEN

   NOTE: These contacts furnish 115 Volt AC to actuate the picture changeover. * SEE NEXT PAGE

   DUAL Co-Operator: Refer to wiring diagram 35559 following.

   NOTE:

Right Co-Operator terminal		Left Co-Operator terminal
8	to	10
9	to	9
10	to	8
11	to	11

Make sure that the jumpers are installed only in the LEFT unit.

6. Connect sound changeover relay (exciter lamp switching) to terminals 12 and 13.

7. Terminals 14 - 18 control raising and lowering house lights.

   NOTE: 15 - DOWN, 16 - UP, 14 and 18 - COMMON, depending on whether latched or pulsed contact is used. Cam number 8 on the timer may be adjusted to set the correct timing to raise or lower the lights. PULSED HOUSELIGHTS: JUMPER 14 TO 17 AND USE 18 FOR COMMON

NOTE ⟶ DO NOT RESET ANY OF THE OTHER CAMS!!

8. Terminals 19 -- 22 are utilized when auxiliary automation is added. Consult prints furnished with auxiliaries.

9. Terminals 23 and 24 (when furnished) are "dry" contacts used with the optional Remote Start (40400).

10. (DUAL systems only) Run the interconnect cable between the LEFT and RIGHT Co-Operators. Connect to sockets labeled P-1.

11. Mount the pickoff assemblies and align them according to the pickoff insert following. Plug the pickoffs to P-2 socket(s) on the Co-Operator chassis.

12. Mount the run-out switch assemblies according to the instructions in the pickoff insert. Plug the run-out switches to P-3 socket in the Co-Operator.

* If a changeover system using "dry" contacts, or voltage other than 115 Volt AC, please contact either EPRAD or a representative of the projector manufacturer. This applies to both SINGLE and DUAL systems.

TESTING

When power is applied to the Co-Operator, the Red FAULT light will be on. When the FAULT light is on, the Co-Operator will not function in AUTO mode.

Switched to INTERMISSION (OFF) mode, the Co-Operator is shut down. When placed in MANUAL mode, both the projector and lamphouse will start; changeover is effected by pressing the MANUAL C/O button. MANUAL mode is furnished as a bypass in the event of an automation failure.

In order to "clear" the FAULT when in AUTO mode, the run-out switch must be open (film properly threaded, so the paddle of the switch is outside the outer edge of the film). FAULT is reset by pressing the red button.

To start the system in AUTO, depress the green button. A momentary pulse is adequate; DO NOT hold the green button in. After a brief interval, the projector motor will start, the xenon lamphouse will ignite, and sound/picture changeover will occur in 7 - 8 seconds. The delay in changeover enables the incoming machine to gain proper operating speed before going on screen, and in a dual Co-Operator installation, correctly times the changeover.

When the changeover cueing foil at the end of the reel is sensed, the Co-Operator begins its shutdown sequence:

DUAL System: 35559

Outgoing Co-Operator pulses incoming Co-Operator to begin changeover. After changeover, the outgoing projector and lamphouse shut down. If enough tail leader is supplied, the outgoing Co-Operator will be in READY mode; if the film has run out, it will be in FAULT.

At this point, the film should be rewound, rethreaded, and the FAULT cleared. The machine is now ready for its changeover pulse from the other Co-Operator.

If an intermission is desired after the second machine's run, place the first Co-Operator in INTERMISSION.

SINGLE System: 35576

The Co-Operator will remove sound and picture from the screen, and shut down the projector and lamphouse. As before, if enough tail leader is provided, the Co-Operator will be in READY.

The changeover foil will initiate Intermission (i.e., house lights on).

REMOTE START

The Co-Operator can be started from a location other than the projection booth (i.e. lobby, office) by adding a Remote Start Switchbox. If ordered direct from the factory, the Co-Operator(s) will have two additional terminals (23 & 24) to connect directly to the remote box; if remote start is added to an existing installation, contact the factory for wiring instructions.

OPERATION

In the event of a film break, or film run-out, the run-out switch will open and the Co-Operator will shut down all projection functions (FAULT). To restart, correct the problem, check threading (switch paddle outboard of film path), and reset the FAULT by pressing the red button. When in RUN phase, the lamphouse, projector, and sound will restart immediately; if in READY, clearing the FAULT will allow normal start-up by pressing the green button.

NOTE: If the Co-Operator is equipped with a "Changeback" switch (a toggle switch for MANUAL C/O), starting "wow" can be avoided. "Changeback" to close the picture changeover douser and extinguish the exciter lamp; then press the red button to clear the FAULT. When the machine is at operating speed, operate the MANUAL C/O to put picture and sound on screen.

If the "Changeback" is not furnished, the show can be re-started without starting "wow" by first pressing the amber button and holding until the round POWER light on the front of the cabinet extinguishes. This indicates that the timer is cycling. Wait for the POWER light to relight; at this time, the amber READY indicator will also be on. At this point, press the red button to clear the FAULT, and then press the green button to initiate the starting sequence.

When making up a print, inspect the footage carefully. Many potential breaks can be eliminated on the rewind bench. Also, gently scrape the metal side of the cueing tape with a razor blade before applying. Many types of cueing tapes are coated with wax to prevent oxidation.

A humming noise noticed during RUN phase indicates dust or dirt on the motor relay (KM) contacts. This dust can be removed by passing a small piece of clean typing paper between the relay contacts.

For this operation, the Co-Operator must be off. Gently press on the contacts while passing the paper between them.

Keeping the front cover mounted to the Co-Operator cabinet will prevent dust from contaminating the relay contacts.

DO NOT overfuse! Replace fuses with replacement fuses of the indicated value.

NOTE: False pickoffs, missed changeovers and shutdown indicate misadjustment of the pickoff. Recheck according to the Pickoff Manual. Special care must be taken if the pickoff is used with wide-tooth sprockets, such as LaVezzi Positrol or VKF.

EPRAD PICK-OFF FOR 16, 24, or 32 tooth 35MM sprockets in Simplex, Century, etc.

PART NO. 35525

PATENT APPLIED FOR

TO BE INSTALLED PREFERABLY IN **SOUNDHEAD**

NOTE: In some installations, the leads may be liable to touch film where they leave the Pick-off. It may easily be reversed so that leads leave the Pick-off from the other side. Loosen setscrews A & B. Loosen setscrew C until shaft falls out. Replace shaft from other end and re-tighten setscrew C onto the shaft, letting the point engage the same depression in the shaft as before.

The installation is done in **THREE ESSENTIAL STAGES:**

FIRST—SET PICK-OFF INTO PAD ROLLER ARM with *inner shoe only* in contact with sprocket.

SECOND—ADJUST OUTER SHOE DOWNWARDS until *both shoes are in contact* with sprocket.

THIRD—ADJUST ARM UPWARDS until *both* shoes are very slightly *clear of sprocket.*

FIRST STAGE

1. Check Pick-off as received . . . it should look like Fig. 1, with knob lower than the other end of shaft. If not, loosen setscrew "A", and tighten "B".

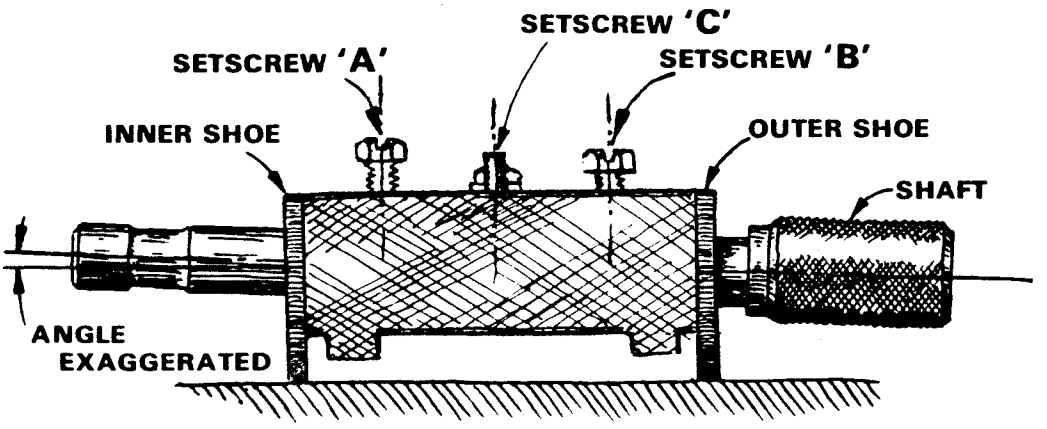


FIG. 1

2. Adjust pad roller to *raise* it, about one turn of its adjusting screw "E", Fig. 2 (this drawing shows the arrangement in Century equipment—others have slightly different means for adjustment). Loosen setscrew "D", remove old shaft and roller, and discard them.

If the sprocket has more than five thousandths of an inch of *endplay,* adjust to reduce it to a minimum (not less than two thousandths).

3. Oil arm pivot and be sure it snaps up and down easily.

4. Insert EPRAD Pick-Off shaft and lower the arm until inner shoe touches sprocket.

Twist shaft and move in or out until position of outer shoe complies with instructions in Fig. 2 (IMPORTANT). Lock the shaft in place with setscrew "D" *as tightly as you can.*

5. Loosen levelling setscrew "B" one full turn. Tighten levelling setscrew "A" until outer shoe just touches sprocket.

Now tighten setscrew "B" until outer shoe is *just visibly raised* off sprocket.

Finally, tighten setscrew "A" again, until outer shoe just touches sprocket.

NOW *BOTH* SHOES SHOULD JUST TOUCH SPROCKET.

6. To check that you have equal contact on both sides—First—raise arm and snap it down again. Then . . . Use ohmmeter, with one probe on sprocket and the other applied to each shoe in succession. If one shoe fails to show good electrical contact, re-adjust setscrew "A" or "B" slightly. (DO NOT APPLY EXTRA PRESSURE on the arm while checking with the meter.)

(Continued below)

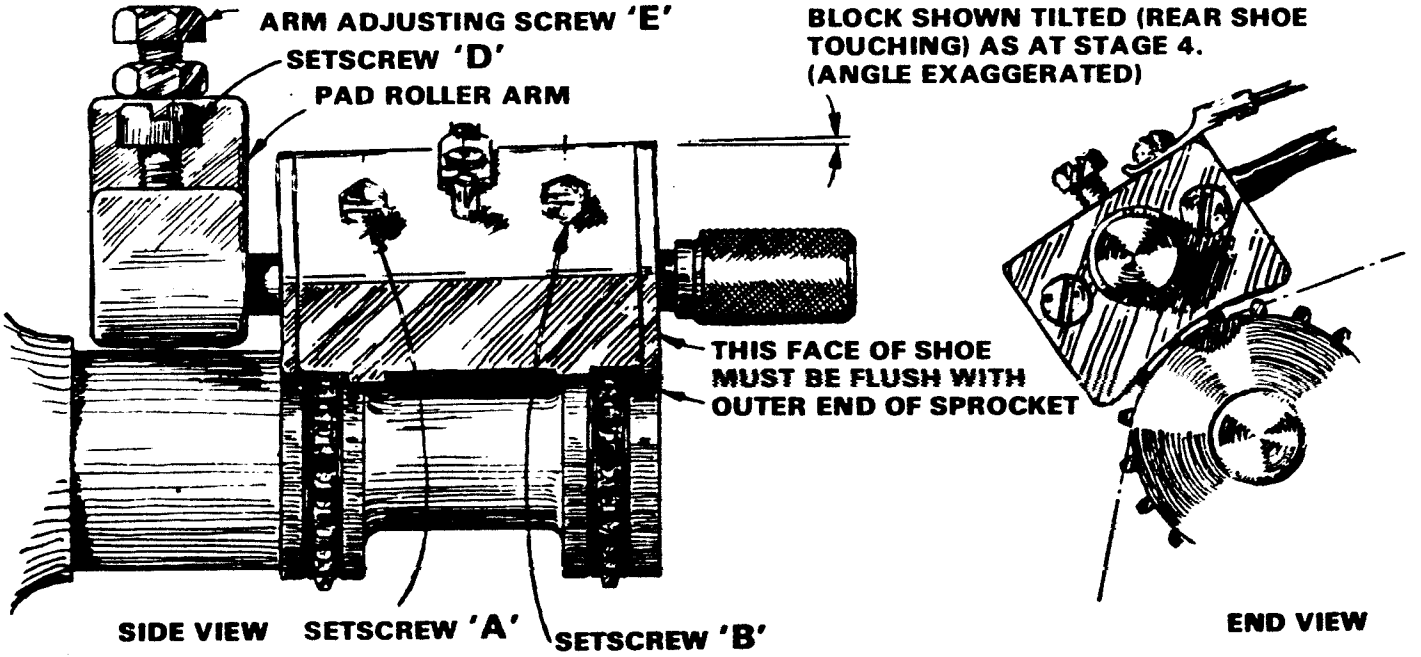


FIG. 2

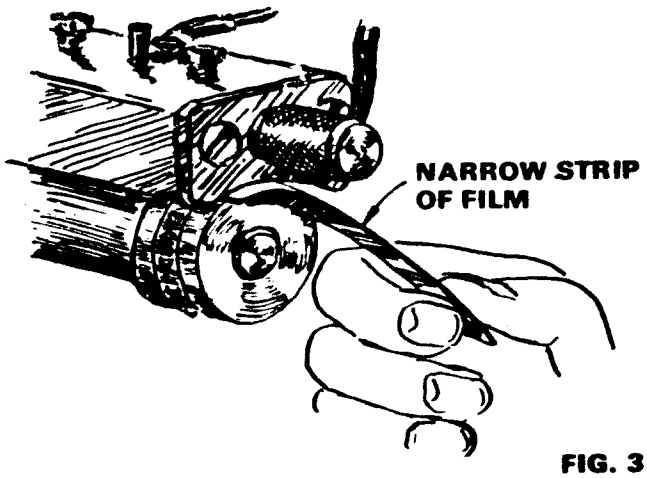


FIG. 3

THIRD STAGE

7. Turn pad roller arm adjusting screw "E" until shoes lift very slightly off sprocket.

Cut a *narrow* strip of film (not wider than 3/16 inch). Push it between shoe and sprocket as shown in Fig. 3. When gap is correctly adjusted the film should feel *very lightly gripped* by the pressure of the shoe.

When satisfactorily adjusted, TIGHTEN LOCKNUT (or whatever locking means is provided) on arm adjusting screw "E", FIRMLY.

8. Use ohmmeter again, as in paragraph 6 but, at this time, both shoes must be clear and you should NOT get a reading on EITHER.

If you do, repeat paragraph 7.

9. Repeat ohmmeter test 8, with projector running (*without* film). Again, you should NOT get a reading on either shoe.

10. Fig. 4 shows a signal foil applied to the leader or tail of a film reel. Preferably use 3/16 inch wide Metallic Sensing Tape, Allied Radio Stock No. 44-1155 (intended for cueing tape recorders), or equivalent, such as 3M manufacture.

Failing this, most self-adhesive aluminum foil tapes will be satisfactory and, if wider than 3/16 inch, can be cut to required width with a razor blade.

Clean the film carefully with solvent where you intend to place the foil.

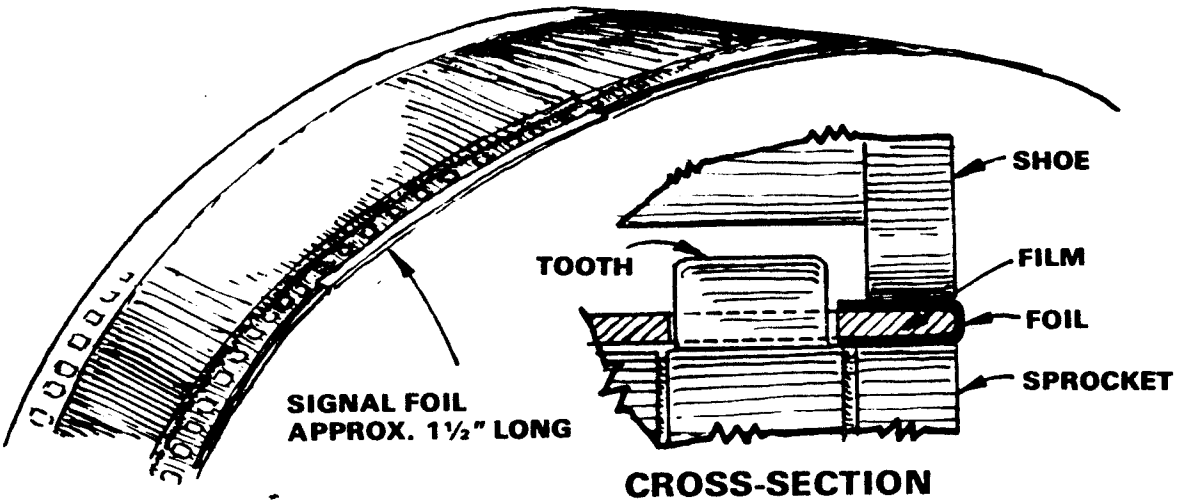
(Continued below)

11. Make a test loop of film, as shown in Fig. 5.

12. Run the loop through projector for several minutes, testing for contacts with the ohmmeter. Hold one probe against the end of the Pick-off shaft knob and the other against each shoe in succession. Do not push down on the Pick-off while doing this.

Each time the foil passes on that side, the ohmmeter should flick off its stop momentarily.

NOTE: *Always* raise the Pick-offs before starting any trouble shooting of the control system.



CROSS-SECTION THRU FOIL & FILM AT EITHER END OF SPROCKET

FIG. 4

Note that the tape is applied to one side of the film with the tape edge alongside the outer edges of the sprocket holes. The remainder of the tape is then folded under and should appear similar on both sides of the film.

Rub the foil with the flat of your fingernail, to ensure good adhesion to the film. **Then scrape both sides with a razor blade to remove any oxide deposits from the aluminum surface.**

When the film is running under the Pick-off, the shoes touch very lightly. They cannot damage film.

When the foil reaches the Pick-off, an electrical pulse flows from the sprocket into the foil, around the folded edge, and into the appropriate shoe.

A foil is sometimes required on the soundtrack side and sometimes on the other side. For this reason, each shoe has a separate lead. A foil on the soundtrack side initiates changeover (or stopping, on second projector). A foil on the other side initiates an auditorium function (or steps the EPRAD Super Programatic unit if included in the control system).

(Continued above, right)

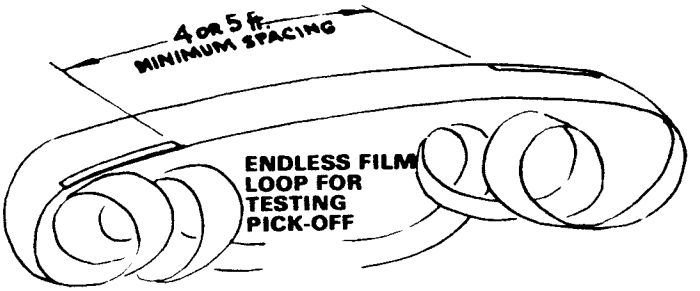
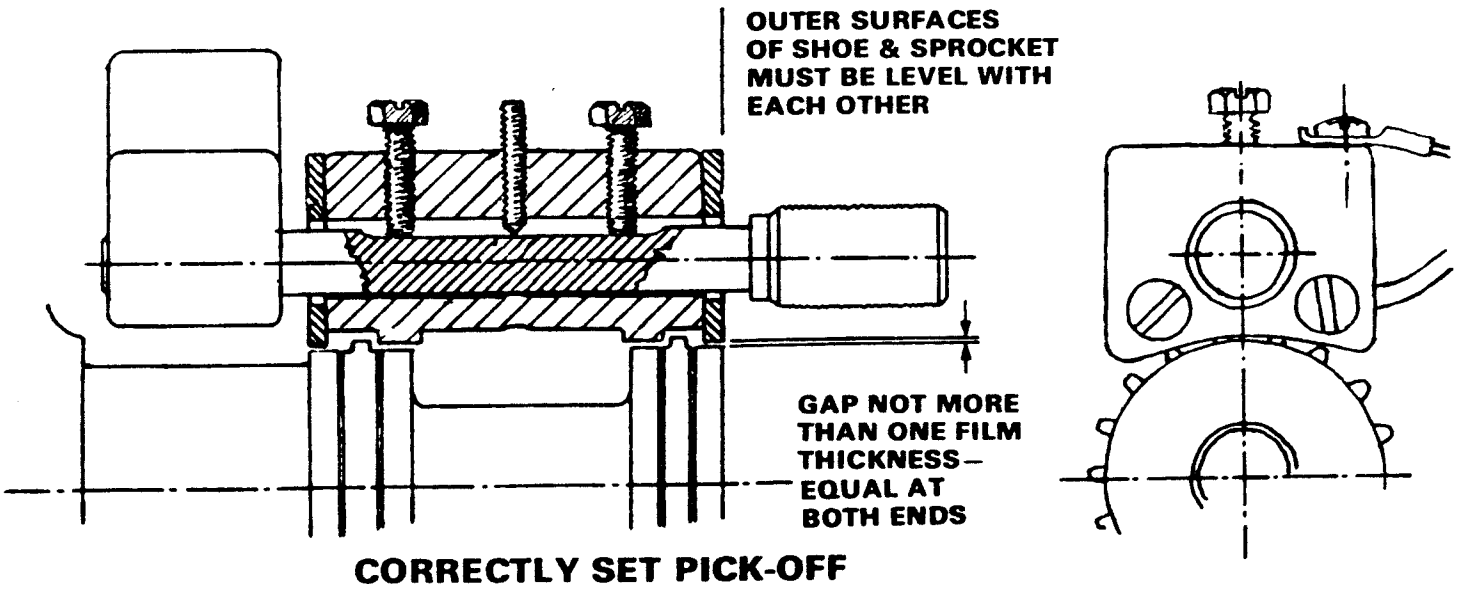


FIG. 5

13. Connect the two pick-off leads to the appropriate terminals. (Soundtrack side lead to SOUND TRACK terminal, other side to (bottom) unmarked terminal, and black lead to GROUND (middle) terminal.)

NOTE: Figure 6 shows a cross-section and end view of a correctly set Pick-off.



CORRECTLY SET PICK-OFF

FIG. 6

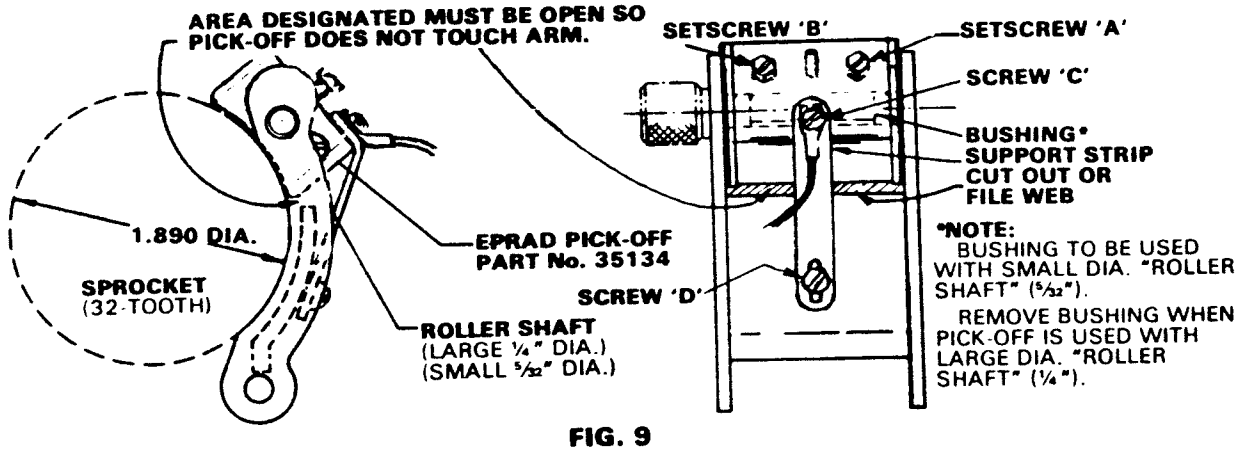


FIG. 9

SPLICING

Good splices are essential if you are to enjoy reliable performance with your automation.

Every reel must be carefully inspected during the make-up procedure. Cracked edges, torn sprocket holes, and poor splices must be corrected.

Good, fresh cement is a "must". We have found Kodak "Professional" cement to be consistently reliable.

We recommend using a splicer of the highest quality. Under automated conditions, a film break is embarrassing and only one such occurrence could cost you more than a new splicer.

We suggest the MARGUET PRO 35 half-width splicer, available from EPRAD INCORPORATED. For added security, apply one piece of mylar splicing tape on the non-emulsion side of each splice, using a Norelco tape splicer to pierce the sprocket holes through the tape and trim the edges. (We do not recommend tape splicing *in place of* cement splicing.)

FOIL REMOVAL

Foil tapes applied to the film during make-up (as in paragraph 10, page 3 of these instructions) must be removed before returning to distributor. Peel off carefully and wipe the film with a solvent such as "spot remover". Be sure you clean off all traces of the adhesive.

EPRAD RUN-OUT SWITCH

Part No. 35239

NOTE: Preferably install these switches *in pairs* (see Fig. 11H, page 8) to detect film *splitting* as well as run-out. Connect all switches in series.

This switch is designed to detect film breaks, and to signal run-out at the end of a reel.

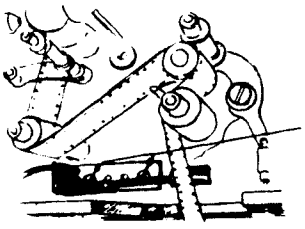
Also, when adjusted as described here, it will detect film splits (or edge breaks of substantial length) on the non-soundtrack side. If this protection is desired for the soundtrack side as well, a second switch may be mounted so that its blade presses on the other edge of the film. This is then wired in series with the first switch.

Install as low down in the film path as possible, preferably below the soundhead sprocket, as shown in Fig. 10.

Notice that the Bracket is designed to be fairly universal. For instance, the smaller part may be mounted in many different attitudes on the larger part of the bracket, simply by removing the two screws and replacing, after rotating the smaller part. (See Fig. 11, page 8.) Also, there is no objection to bending the brackets to suit an unusual situation.

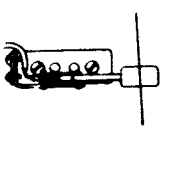
In every case, the film should run "edge-on" across the middle of the paddle blade, as shown in the true side view in Fig. 10.

The switch should be adjusted by moving the screws in their slots, or by bending the blade arm. the switch must be closed with the blade resting on the film edge, and open when the blade is moved more than 1/8" and less than 1/4" from the film edge towards the center of the film. Hold the film just clear of the end of the blade with one finger, while checking these measurements.



MARK OFF POSITIONS OF 2 OF THE BRACKET HOLES & DRILL THRU SOUNDHEAD BACKPLATE. HOLES TO BE .169" DIA. (No. 18 DRILL) TO SUIT No. 10 SELF-TAP SCREWS.

TYPICAL INSTALLATION



BEND BLADE ARM AS NEEDED TO ENSURE SWITCH IS CLOSED WHEN BLADE IS ON EDGE OF FILM, AND OPEN WHEN 1/4" NEARER TO CENTER OF FILM.

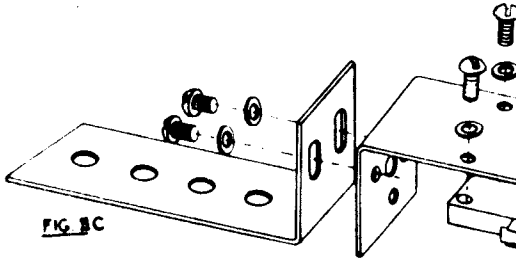


FIG 11C

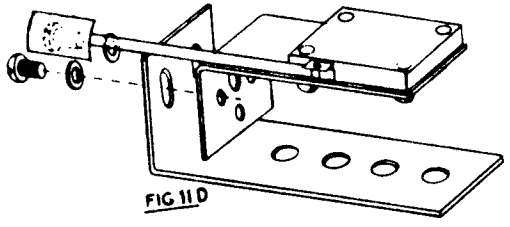


FIG 11D

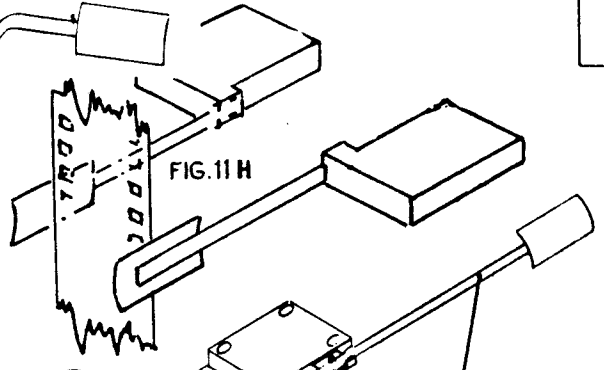


FIG. 11 H

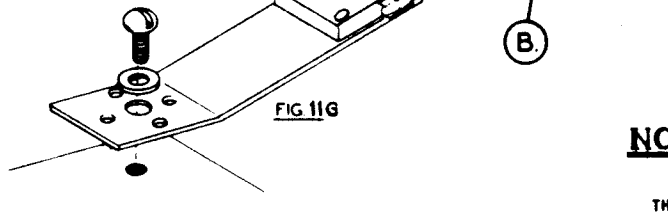


FIG 11G

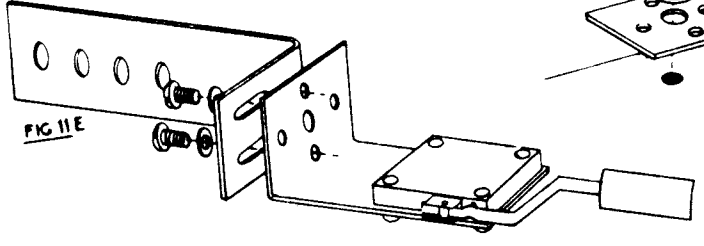


FIG 11E

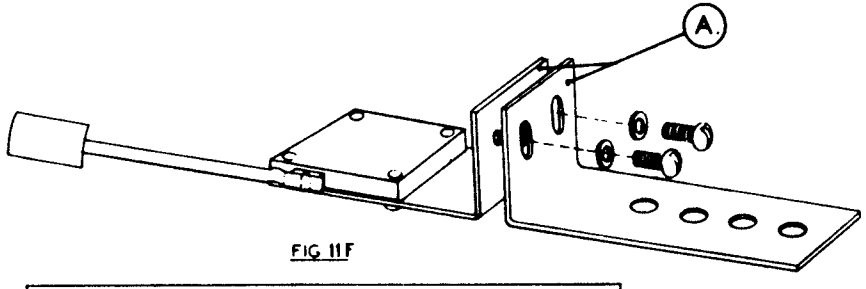


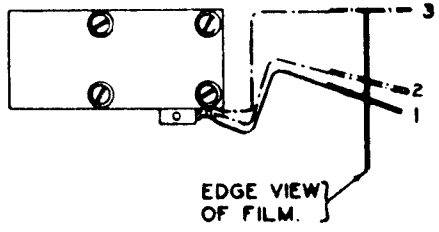
FIG 11F

WARNING: With certain types of automation, run-out circuit must be opened and re-closed at least once between shows, to re-set controls

POSITION 1. OF LEVER WHEN OUT OF FILM OR FILM BREAK.

POSITION 2. OF LEVER WHEN CONTACTS ARE CLOSED.

POSITION 3. OF LEVER WHEN THREADED WITH FILM.



NOTE:

NONE OF THE ABOVE DRAWINGS ARE DRAWN TO SCALE.

NOTE:

THE RUN-OUT SWITCH LEVER HAS A LARGE OVERTRAVEL AFTER THE CONTACTS CLOSE. THE LEVER SHOULD BE ADJUSTED SO THE FILM PUSHES THE LEVER AT LEAST 1/4 INCH PAST THE OPERATING POINT OF THE SWITCH CONTACTS. THIS PREVENTS FALSE SHUTDOWNS.

MICROSWITCH CAN BE MOUNTED ON EITHER SIDE OF THE BRACKET AS SHOWN IN FIG. 11C & D

SWITCH LEVER CAN BE BENT OR TWISTED TO ACHIEVE PROPER FILM ALIGNMENT.

A. THIS IS A UNIVERSAL BRACKET. CUT, BEND OR FIT TO SUIT YOUR REQUIREMENTS.

B. RUN-OUT SWITCH ARM MAY BE BENT OR FORMED TO FIT YOUR SOUNDHEAD.

THE BRACKET MAY BE ATTACHED BY SCREWS, NUTS AND BOLTS, OR CONTACT CEMENT.

FIG. 11

EPRAD CO-OPERATOR
Description of Circuit Operation

The purpose of the CO-OPERATOR is to provide basic control of the projector and auditorium functions. Start the projector and Xenon lamp, changeover, start alternate projector, shutdown, and operate auditorium lights up and down at appropriate times.

When the CO-OPERATOR is in the correct cycle to start and SW-1 mode switch set at AUTO, the amber READY light will be on. The orange neon power light will also be on.

Pressing the START push-light will start the cycle. If the red FAULT light is on, the cycle will not start. Threading of the projector should be checked. After Fault is corrected, push fault reset button.

When the green START push-light is pressed, relay KS is pulled in, the zipper and sound changeover are made to the alternate machine. Timer Motor B starts and is locked in through TMS-1.

As the timer rotates, TMS-7 operates, turning the READY light off and the RUN light on. The POWER light is deactivated during the timer cycle, indicating timer motor running.

As the timer rotates, TMS-3 operates, starting the Xenon lamp circuit and TMS-2 operates, starting the projector motor.

Seven seconds after the motor starts, TMS-4 operates, momentarily operating the changeover relay KCO. Zipper and sound changeover are made to the running machine.

The timer comes to a stop as TMS-1 drops into the dwell in the RUN position.

The auditorium function is controlled by TMS-8. The houselights are turned down at the start of the run cycle.

The running projector will continue to run until the changeover foil at the tail of the film is sensed. KS is pulled in and self-holding through KS (8-5) contact and TMS-4 and TMS-5. The timer starts its cycle to the ready position. TMS-6 operates as soon as the cycle starts, sending a start signal to the alternate machine.

The alternate machine starts as above. The first machine runs until TMS-1 drops into its dwell and then shuts down. KS drops out as TMS-4 operates.

Changeover from machine to machine will be made alternately as long as there is film in each machine and the mode switch remains in AUTO and the red FAULT light is not on.

To go into intermission, the mode switch on the idle machine is changed to OFF (INTERMISSION). In this position, the start signal from the running machine will not start the idle machine.

As long as the mode switch remains in the OFF (INTERMISSION) position, the red FAULT light will be lit.

At any time the mode switch can be changed to the MANUAL position. The projector motor and lamp will then run regardless of the cycle position and any foil on film will not be detected.

To stop a machine at any time, move the mode switch to the OFF position; the motor and lamp will shut down, and FAULT light will come on.

As long as the timer is in the run cycle, the projector motor and lamp will run as soon as the mode switch is changed to the AUTO position and the red FAULT button is pressed.

If it is desired to change the timer to the READY position with the mode switch is in the OFF position, this can be done by pressing the READY push-light. This must be held in long enough to allow TMS-1 to come out of the dwell, or approximately three (3) seconds. The AC power light goes out during the timer cycle and comes back on when the cycle is complete.

TERMINAL BLOCK CONNECTIONS

Drawing D-35565 shows the circuit schematic and external connections for a CO-OPERATOR System.

All external connections are made to the 22 terminals on terminal block TB1.

AC power is connected TB1-1 and TB1-2. Earth ground should be connected to TB1-3.

The projector motor is connected to TB1-4 and 5. This circuit will handle a ¼ hp motor reliably. No external motor switch is required. However, if one is already installed, it should be left permanently in the ON position or be by-passed.

The lamp circuit is connected to terminals TB1-6 and 7. These contacts are intended to operate the starting relay of a Xenon lamp. They are not intended to switch the high primary current of the lamp.

The projector zipper coil is connected to terminals TB1-8, 9 and 10. Observe the proper color coding of the coil.

It is important that AC power for the zipper be connected only as shown, on one terminal block, otherwise out of phase line voltage will result in blowing fuses and burning out zipper coils.

Terminal TB1-9 is jumpered to TB1-2 and TB1-11 is jumpered to TB1-1 on left controller.

The changeover contact is between TB1-10 and TB1-11. Pressing the changeover push-light energizes the open coil of that machine and the closed coil of the alternate machine.

The zipper interconnection between respective CO-OPERATOR terminal blocks can be made with a 4-wire 18 or 16 gauge cable. Note that TB1-9 on one terminal block must be connected to TB1-9. This cross-connects the respective "open" and "closed" coils of the alternate zippers.

The sound changeover contact is intended to operate a latching relay in the exciter lamp supply so that the exciter lamp in the running machine only is on. If no relay is furnished with the exciter supply, a suitable one must be installed. A magnetic latching relay is preferred.

Control of the auditorium lights is obtained by connecting terminals TB1-14 to 17 as shown. With four additional 8 or 16 gauge wire connections from controller to controller 15 to 15, left 16 to right 14, 17 to 17, and 18 to 18. A pulsed contact or a maintained contact is provided as needed. Up to 750 watts could be switched off and on directly with these contacts, but it is not recommended because the high in-rush current of the lamps can be as much as ten times the running current.

When neither machine is running (both in READY position), TMS-8 of both CO-OPERATORS are in the dwell and the "houselights up" line is made. If either CO-OPERATOR is running, TMS-8 of that CO-OPERATOR is up and the "houselights down" line is made.

CO-OPERATOR PARTS LIST

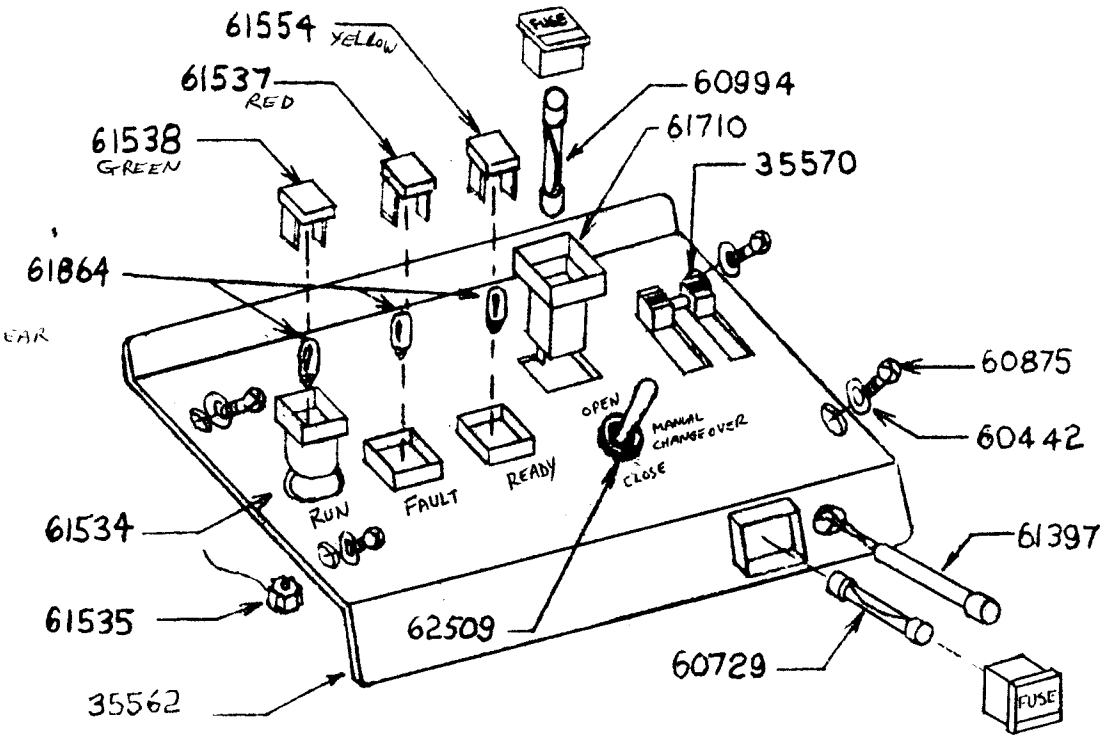
SYMBOL	PARTS NUMBER		DESCRIPTION
B	62035		Timer Motor 2 rpm
F1	60729		Fuse 10 amp Slo-Blo (MAIN POWER)
F2	60994		Fuse 2 amp Slo-Blo (ZIPPER COIL)
F3	10127		Fuse ¼ amp Standard (24 VOLT RELAYS)
	61710		10 amp Fuse Holder
	60525		Fuse Block
KCO	61707	RLY 1853	Relay 3PDT 24 vac Coil P+B KUP14A15
KFS	61707		Relay 3PDT 24 vac Coil
KM	61730	MAGNECRAFT W88KADX-2	Relay SPST 115vac Coil RLY 8415
KS	61707		Relay 3PDT 24 vac Coil
PB-1	61534		Actuator Square
	61535		Contactor
(Start) I-1	61864		28v lamp (Pilot light)
	61538		Lens Square Green
PB-2	61534		Actuator Square
	61535		Contactor
(Ready) I-3	61864		28v lamp (Pilot light)
	61554		Lens Square **Amber**
PB-3	61534		Actuator Square
	61535		Contactor
(Fault) I-2	61864		28v lamp (Pilot light)
	61537		Lens Square Red
I-5	61397		Neon Power Light
SW-2	62509		Toggle Switch
SW-1	35569		Slide Switch Mod.
T-1	61706		Transformer, 24V, 400MA
TMSI 1-8	60947		Timer Switch
SW-3	61519		Slide Switch
No Symbol	35598		Complete Timer Assembly
No Symbol	35239		Film Split Switch
No Symbol	35525		Pick-Off Assembly
No Symbol	30106		Metal Foil Tape
No Symbol	35571		Interconnect Cable Assembly
P-3	61251		Plug, 3-pin
P-2	61253		Plug, 4-pin
P-1	61255		Plug, 9-pin
No Symbol	61159		Male Insert Pins

ON CO-OPERATORS WITH GENERAL TIME TIMERS -

B1	61370	Timer Motor 2 rpm
TMSI 1-8	61166	Timer Switch
No Symbol	61371	Complete Switch Assembly

NO SYMBOL 35555 CO-OPERATOR UNIT ONLY

	35562	Top Panel
	35570	Slide Switch Ass'y
	60442	Fiber Washer
	60729	10 amp (Slo-Blo) Fuse
	60875	#6-32 Screw
	60994	2 amp (Slo-Blo) Fuse
*	61397	Neon Lamp, LINROSE B2110A2 CLEAR
	61534	Actuator, Sq.
	61535	Contactor
	61537	Lens "Red", Sq.
	61538	Lens "Green", Sq.
	61554	Lens "Amber", Sq.
	61710	Fuse Holder, Sq.
	61864	Lamp 28v Midget #388
	62509	Toggle Switch



* CAN ALSO USE SELECT-A-SWITCH # SL32114-6-BG PILOT LIGHT

No.	E.C.N.	DATE	CHANGE	BY
8				
7				
6				
5				
4				
3				
2				
1				

MATERIAL

FINISH

EPRAD ®
INCORPORATED 123 W. WOODRUFF TOLEDO, OHIO

TITLE: CO-OPERATOR TOP PANEL

TOLERANCE (EXCEPT AS NOTED)

SCALE: NONE

DEC.± FRACT.± ANGLE±

DRAWN: DCC | CHECKED | APPR'D | DATE: 9/14/82

ASSEMBLY No.

DWG. No: 35563

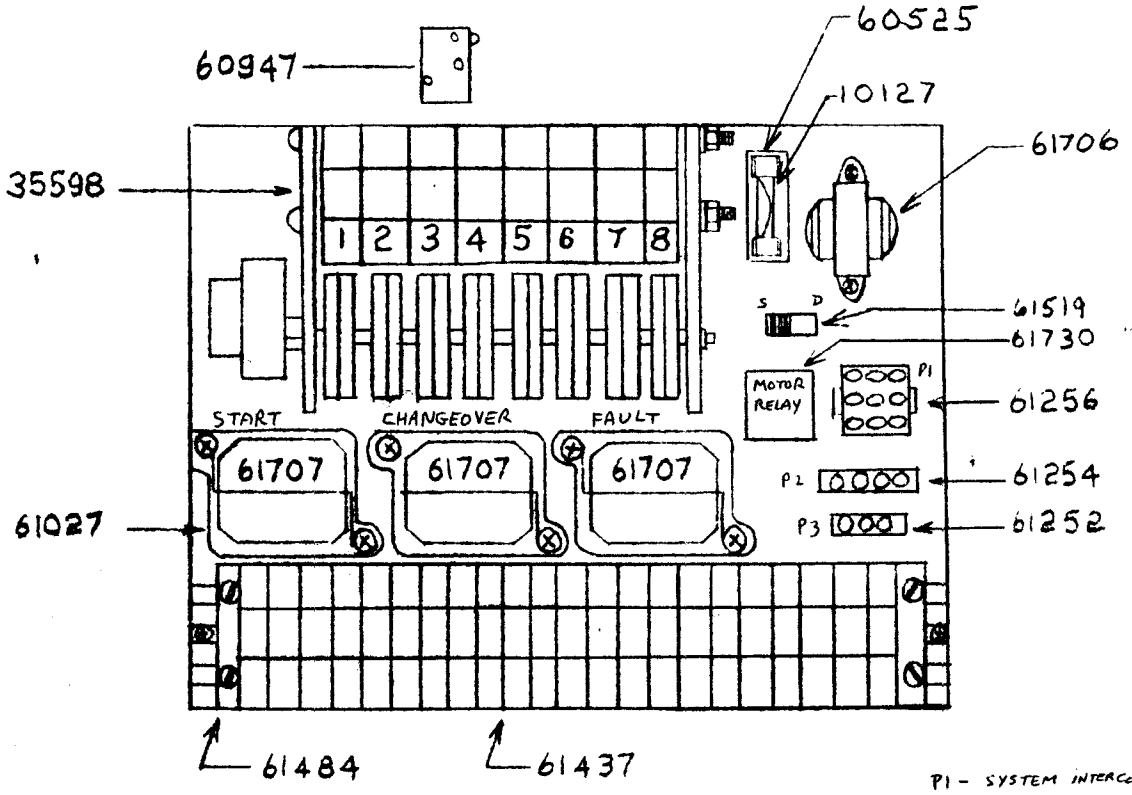
TIMER MICROSWITCHES

1 - COMMON

2 - NORMALLY CLOSED

3 - NORMALLY OPEN

10127	¼ amp St'd Fuse
35598	Timer Mod.
60525	Fuse Holder
60947	Micro Switch
61027	Relay Socket
61252	3-Pin Socket
61254	4-Pin Socket
61256	9-Pin Socket
61437	Terminal Block
61484	Terminal Block Kit
61519	Slide Switch
61706	Transformer
61707	24vac Relay
61730	115vac Relay



P1 - SYSTEM INTERCONNECT

P2 - PICK OFF

P3 - SPLIT FILM

No.	E.C.N.	DATE	CHANGE	BY
8				
7				
6				
5				
4				
3				
2				
1				

MATERIAL

FINISH

EPRAD INCORPORATED 123 W WOODRUFF TOLEDO, OHIO

TITLE: Co-OPERATOR CHASSIS ASS'Y

TOLERANCE (EXCEPT AS NOTED) DEC ± FRACT ± ANGLE±

SCALE NONE

DRAWN DCC | CHECKED | APPR'D | DATE 9/19/82

ASSEMBLY No

DWG. No 35564

KEN LAYTON
1941½ E. State #8
Olympia, WA 98506
FILMS-ELECTRONICS-SPECIAL EFFECTS

EPRAD CO-OPERATOR WIRING

1	Hot	120 VAC Power Input
2	Neutral	
3	Ground	
4	AC Neutral	120 VAC Power Output to Projector Motor
5	AC Hot	
6	Lamp Start	Dry Contacts to Xenon Power supply relay
7	Lamp Start	
8	Close (Brown)	To Picture Changeover (ZIPPER) coils
9	Common (White)	
10	Open (Black)	
11	AC Hot Terminal	(SPARE)
12	Sound "ON" Pulse	To Exciter Supply Latching Relay
13	Sound Common	
P1-6	Sound "OFF" Pulse	
14	Common	Maintained dry contacts for houselights, see the notes below also.
15	Down (N.O.)	
16	Up (N.C.)	
17	Audit. Pulse 1	Dry Contact Momentary pulse at each cycle
18	Audit. Pulse 1	
19	Audit. Pulse 2	Dry Contact Momentary pulse at changeover
20	Audit. Pulse 2	
21	Ground	Inboard Cue Pulse for Auditorium function
22	Signal	

NOTES:
For Houselight dimmers that require a pulsed contact instaed of a maintained contact, please jumper terminal 14 to terminal 17 and use terminal 18 for common, 15 for lights down, and 16 for lights up.

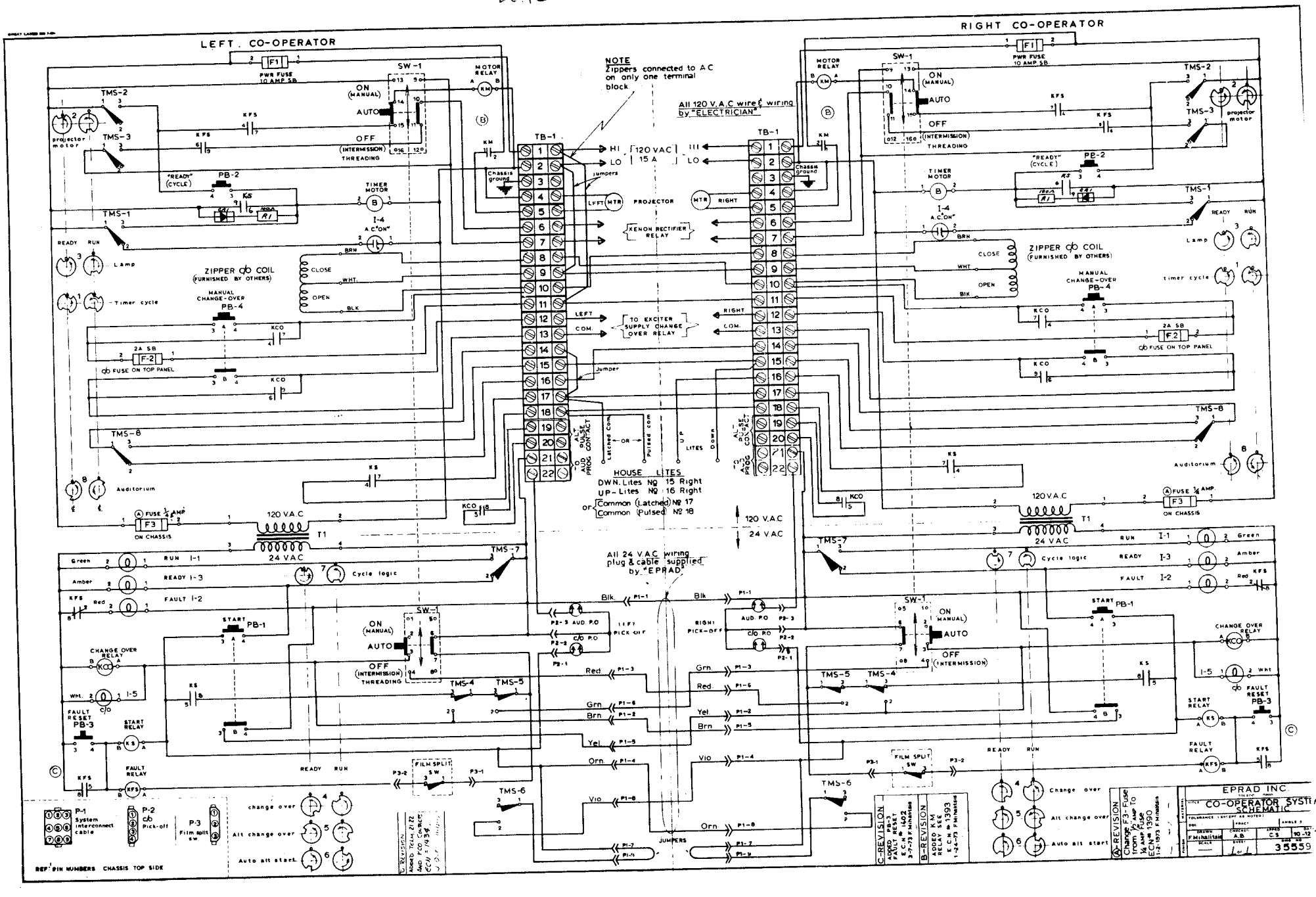
P1: System Interconnect
6 Exciter "off" pulse
8 Switched 120 vac to picture changeover CLOSE coil
9 Hot 120vac to TMS-6 microswitch

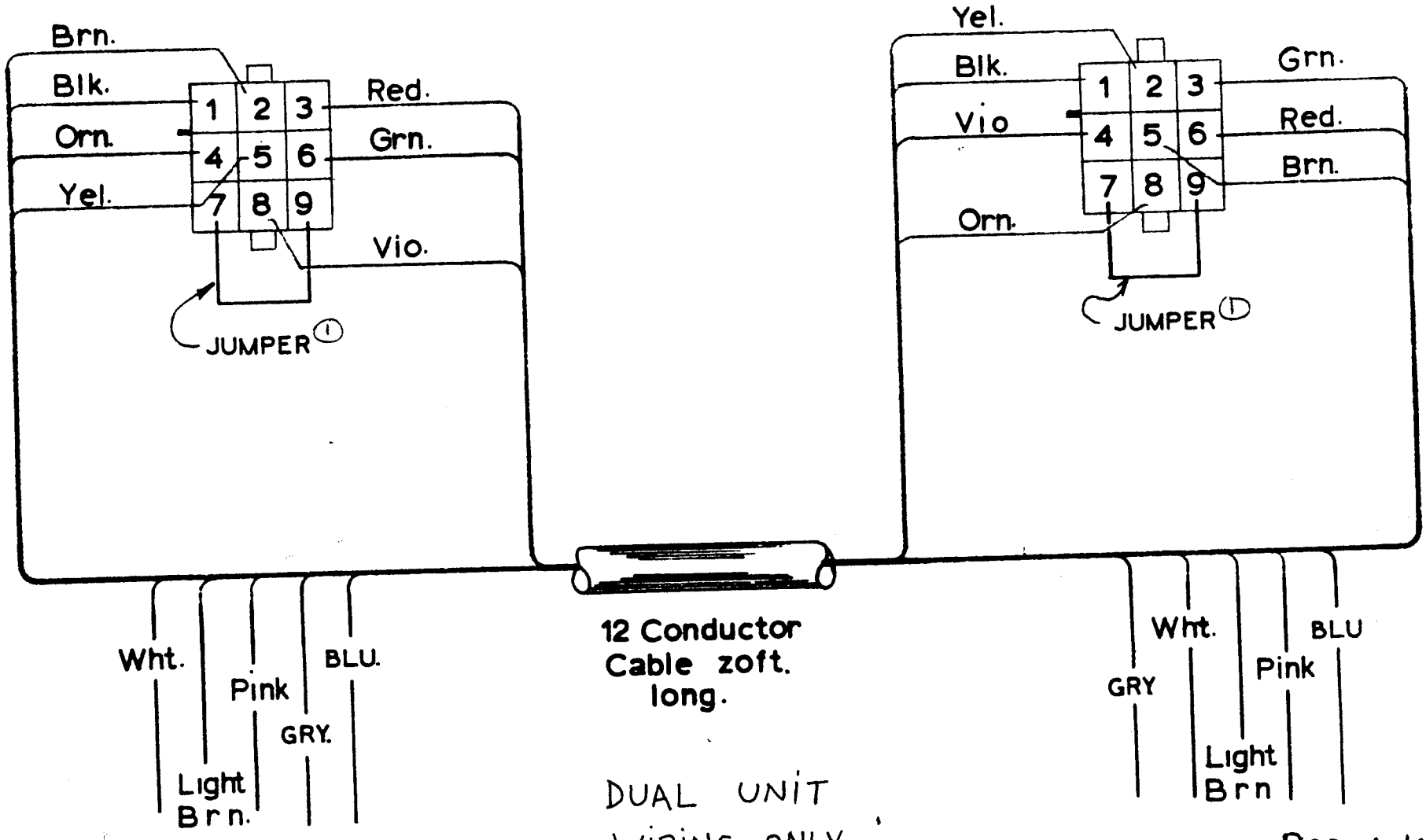
P2: Cue Detector
1 Outboard cue (end-of-show)
2 Common Ground
3 Inboard Cue (for Auditorium Programmer accessory)

P3: Failsafe
1 Film split switch
2 Film split switch

OLD STYLE CO-OPERATOR

DUAL





DUAL UNIT
WIRING ONLY

REDRAWN & REVISED

No.	E.C.N.	DATE	CHANGE	BY
8				
7				
6				
5				
4				
3		5-7-77	WIRE COLOR REVISED ON	
2			35571-2 12 CON CABLE	
1	1447	5-28-74	ADDED JUMPERS 7 TO 9	J.O.

MATERIAL

FINISH

EPRAD®
INCORPORATED 123 W. WOODRUFF TOLEDO, OHIO

TITLE: INTERCONNECTING CABLE WIRING DIA. CO-OPERATOR SYST.

TOLERANCE (EXCEPT AS NOTED)

SCALE —

DEC.± FRACT ± ANGLE±

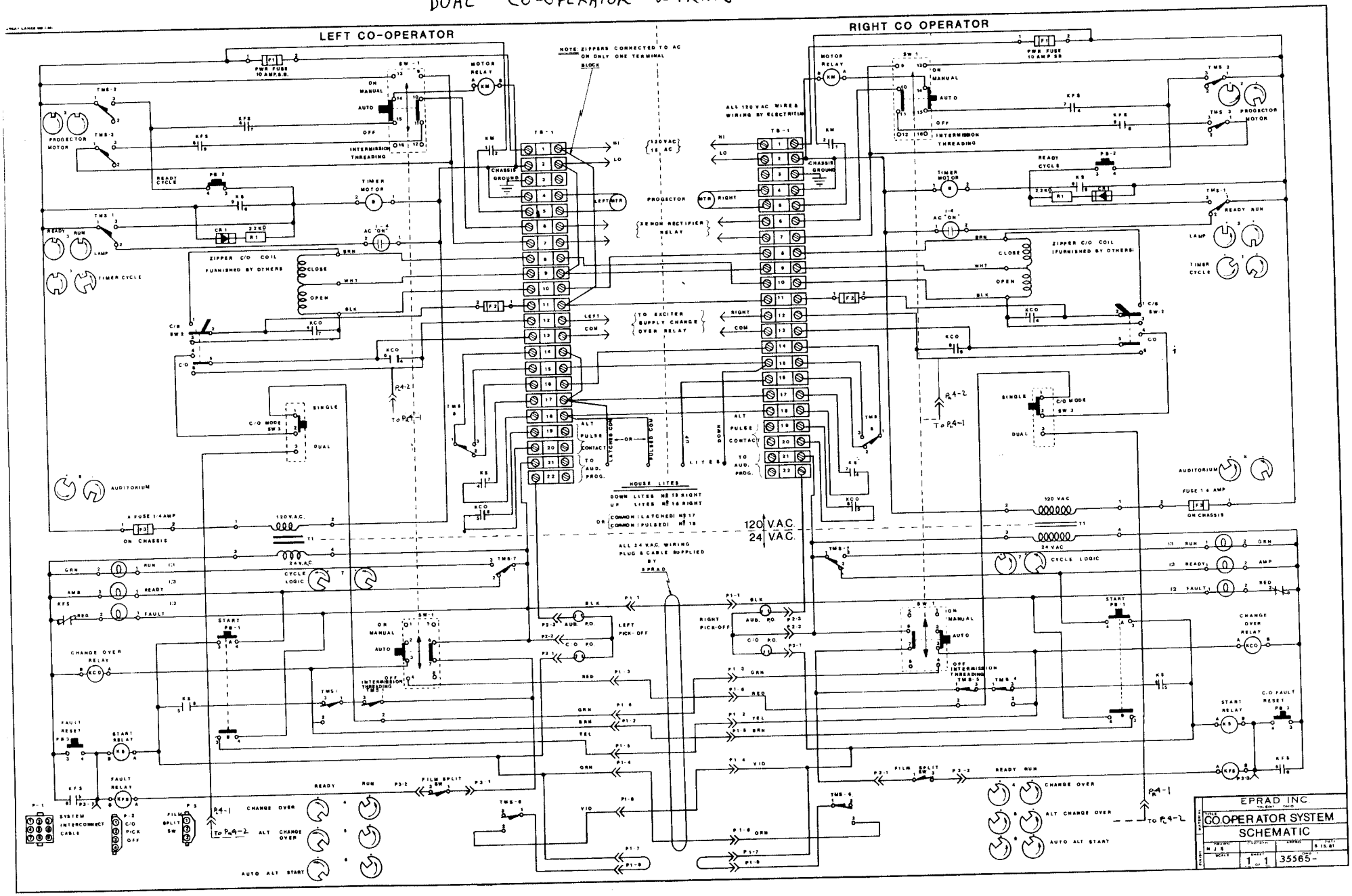
DRAWN F. Mihaltsis | CHECKED | APPR'D | DATE 11-6-72

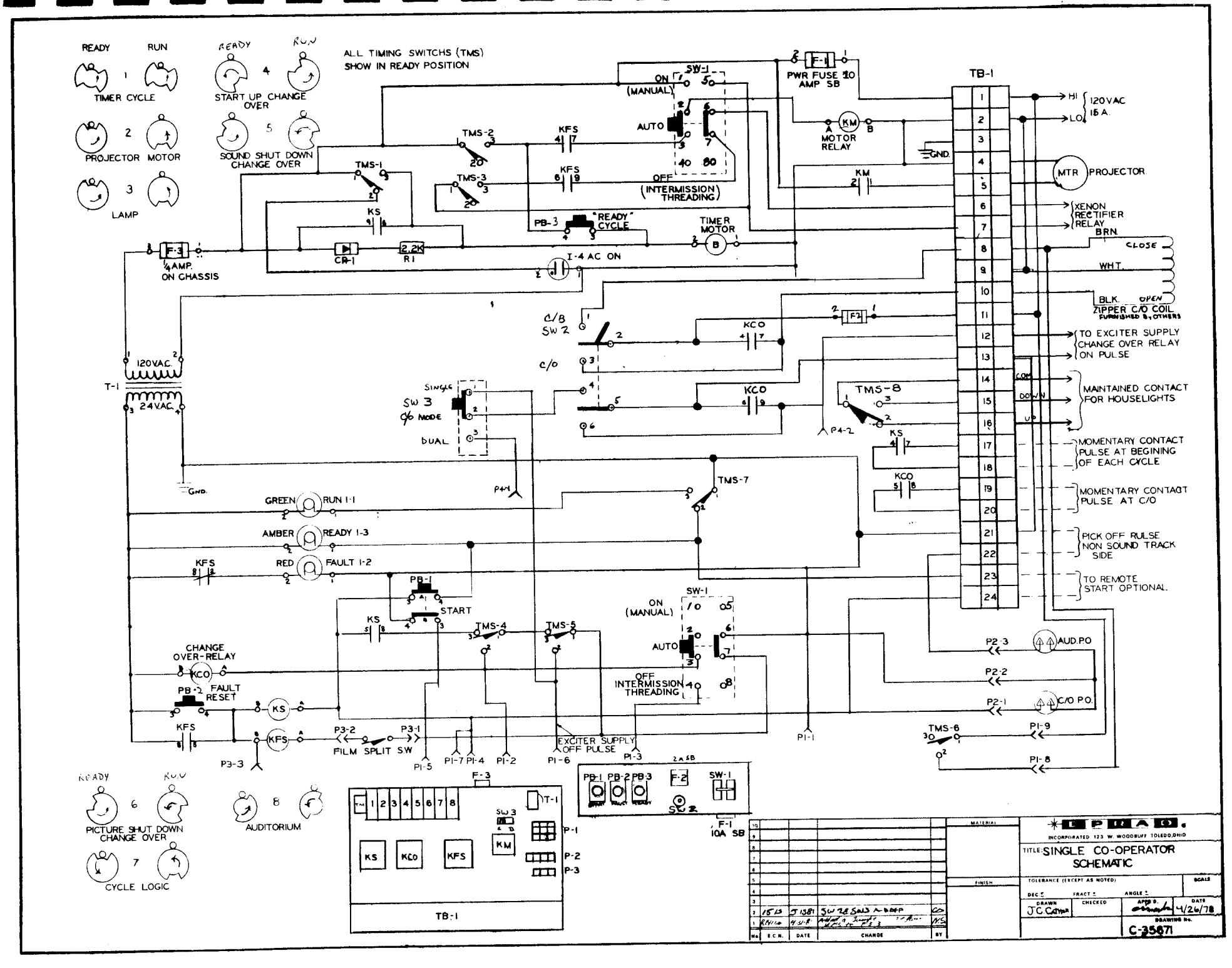
ASSEMBLY No

DWG No 35571-1

NEWER STYLE

DUAL CO-OPERATOR WIRING




READY
RUN
1
TIMER CYCLE
2
PROJECTOR MOTOR
3
LAMP
READY
RUN
4
START UP CHANGE OVER
5
SOUND SHUT DOWN CHANGE OVER
ALL TIMING SWITCHS (TMS) SHOW IN READY POSITION
SW-1
ON (MANUAL)
AUTO
OFF (INTERMISSION) THREADING
PWR FUSE 10 AMP SB
F-1
KM
MOTOR RELAY
GND.
TB-1
HI
LO
120 VAC 15 A.
MTR
PROJECTOR
XENON RECTIFIER RELAY
BRN.
CLOSE
WHT.
BLK. OPEN
ZIPPER C/O COIL FURNISHED BY OTHERS
TMS-1
TMS-2
TMS-3
KFS
KS
PB-3
"READY" CYCLE
TIMER MOTOR
F-3
1/4 AMP. ON CHASSIS
CR-1
2.2K R1
I-4 AC ON
T-1
120 VAC.
24 VAC.
C/B SW 2
C/O
KCO
F-2
TO EXCITER SUPPLY CHANGE OVER RELAY ON PULSE
SW 3
% MODE
SINGLE
DUAL
TMS-8
P4-2
COM
DOWN
UP
MAINTAINED CONTACT FOR HOUSELIGHTS
P4-1
TMS-7
MOMENTARY CONTACT PULSE AT BEGINING OF EACH CYCLE
MOMENTARY CONTACT PULSE AT C/O
GREEN
RUN 1-1
AMBER
READY 1-3
RED
FAULT 1-2
PB-1
START
PICK OFF PULSE NON SOUND TRACK SIDE
TO REMOTE START OPTIONAL
TMS-4
TMS-5
CHANGE OVER-RELAY
PB-2 FAULT RESET
P3-2
P3-1
FILM SPLIT SW
EXCITER SUPPLY OFF PULSE
P3-3
P1-5
P1-7
P1-4
P1-2
P1-6
P1-3
P1-1
P2-3
AUD.PO
P2-2
P2-1
C/O P.O.
TMS-6
P1-9
P1-8
PB-1 PB-2 PB-3
F-2
2A SB
SW-2
F-1
10A SB
READY
RUN
6
PICTURE SHUT DOWN CHANGE OVER
7
CYCLE LOGIC
8
AUDITORIUM
F-3
T-1
SW 3
P-1
P-2
P-3
KS
KCO
KFS
KM
TB-1
MATERIAL
FINISH
EPRAD.
INCORPORATED 123 W. WOODRUFF TOLEDO, OHIO
TITLE: SINGLE CO-OPERATOR SCHEMATIC
TOLERANCE (EXCEPT AS NOTED)
SCALE
DEC ±
FRACT ±
ANGLE ±
DRAWN
J.C. Cather
CHECKED
APP'D.
DATE
4/26/78
DRAWING No.
C-35871
No.
E.C.N.
DATE
CHANGE
BY
2 1813 J 1381 SW 2B SAME A DEEP CO
1 R1414 4-21-8 MC

TO CONVERT A DUAL CO-OPERATOR SYSTEM TO A SINGLE CO-OPERATOR

P1 Plug will connect:

Pin 8 of Plug to Terminal 8 of TB-1.
Pin 9 of Plug to Terminal 11 of TB-1.
This will close dowser from cue foil.

Also:

Reset Cam #6 to match Cam #5 of Timer.

Double check that there are jumpers from TB1-1 to TB1-11. Also jumper from TB1-4 (or 2) to TB1-9. Right Co-Operators did not have these present.

Remove jumper from TB1-14 to TB1-17 if there is one installed for applications requiring latched houselight functions. This jumper must remain for applications requiring pulsed houselights.

23 W. Woodruff P.O. Box 4712 Phone (419) 243-8106
Toledo, Ohio 43620 Cable Address: EPRAD

EPRAD®
INCORPORATED
ELECTRICAL PRODUCTS RESEARCH & DEVELOPMENT

INSTRUCTIONS FOR CONVERSION OF EPRAD CO-OPERATOR AUTOMATION TO CYCLE TO INTERMISSION UPON FAULT.

REFERENCE - SCHEMATIC DRAWING NUMBER 35671

1. On relay socket KFS (right relay) are the following wires:
   a. on pin 4 - 2 light blue wires
   b. on pin 7 - 1 black wire

* reverse the position of these wires.

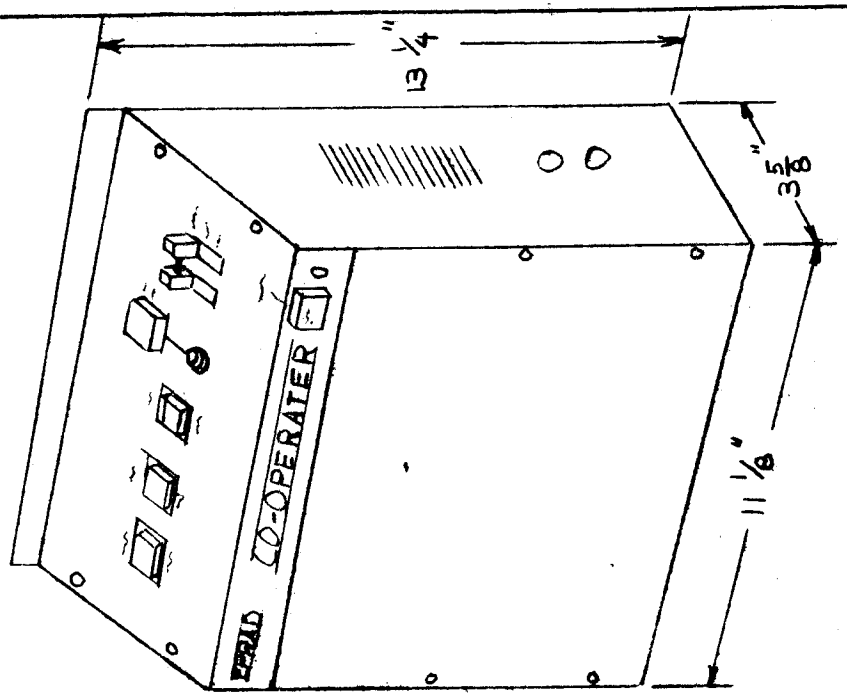
2. Run an additional wire from pin 6 on the KS (left relay) socket to pin 1 on relay socket KFS. Pin 1 should currently be empty.

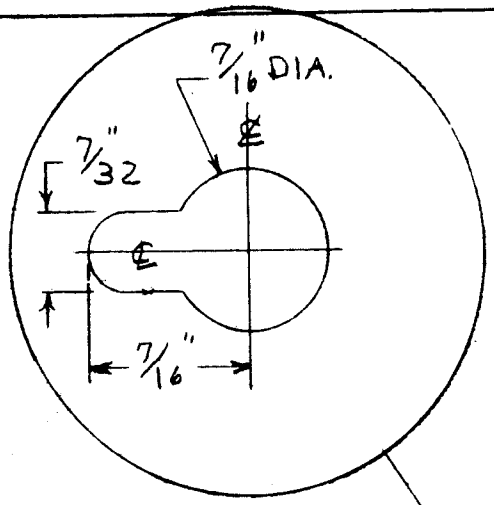
NOTE 1: The automation will cycle back to intermission if the "manual/auto/intermission" switch is put in the "manual" position while the automation is in "run" mode.

NOTE 2: The "Fault" light will be on constantly in the "manual" mode.

This modification will bring the houselights UP in the event of a film break.

GREAT LAKES 1000 8-70





3 3/4"

7 1/2"

3 1/2" To Top of cabinet from Hole center Line

3 1/2"

9 1/32"

NO.	E.C.N.	DATE	CHANGE	BY
		4-13-79	REDRAWN	GLB

MATERIAL

FINISH

EPRAD
TOLEDO OHIO

TITLE: SPOTTING TEMPLATE FOR MOUNTING CO-OPERATOR CABINET

TOLERANCE (EXCEPT AS NOTED)
DEC. ±
FRACT. ±

SCALE: FULL

DRAWN | CHECKED | APPRD. | DATE: 12-18-72

ASSEMBLY NO.

DWG NO. 35697