Film-Tech

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INSTRUCTION MANUAL

FP-350

Cue Detector & Failsafe Switch

Issue 3-92

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STRONG FP-350
Optical Failsafe & Proximity Cue Detector
Installation and Operation

PRODUCT DESCRIPTION

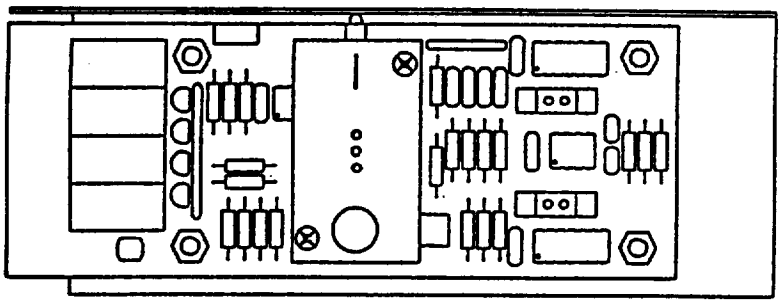
The STRONG model FP-350 optical failsafe and proximity cue detector is a solid state device. The design eliminates clumsy gravity-actuated failsafe arms as well as the routine maintenance tasks, such as cleaning soiled rollers, commonly associated with conventional units.

The cues are short lengths of aluminum tape placed on the edges of the film during the print make-up procedure. The exact location of the cues is determined by the type of automation controller used, and the format of the desired presentation. The proximity detector, positioned at the edges of the film path, sense the presence of the cueing foil. When one or both of the detectors sense a cue, the circuitry determines whether the cue sensed is inboard, outboard, or crossframe. The circuitry then closes the appropriate relay contacts. NOTE: Units with one proximity detector will sense **only** an inboard or outboard cue, as determined by the setup of the cue detector board. These units will **not** have the ability to sense a crossframe cue.

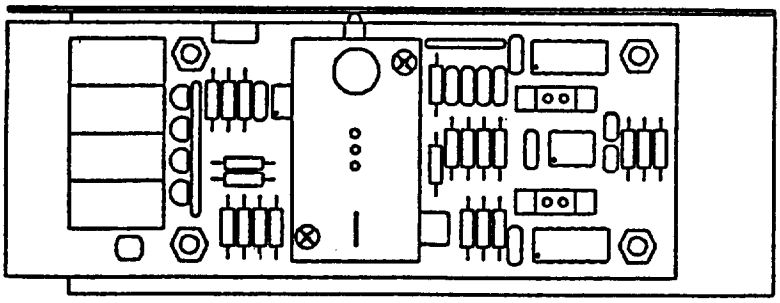
Faults are sensed using a pair of emitter/detectors located immediately inside the sprocket hole track on each side of the film path. Use of film detectors in pairs allows the unit to detect film splits or run-off as well as film breaks or run-out. The emitter projects a beam of light which the film reflects into the detector. The circuitry determines if film is present and closes the appropriate relay contacts. The FP-350 incorporates a Variable Bobble Delay, which gives the unit an adjustable period of time between the detection of a fault and the initiation of a fault condition output.

SETTING CUE DETECTOR BOARD

For units with only one proximity detector, it may be necessary to set the cue detector board for either inboard or outboard cues, as required by the automation controller. Before installation, check the underside of the FP-350 and compare it to the illustrations on Figure 1 to determine whether the unit is set for inboard or outboard cues. If it is necessary to rotate the cue detector board, see Figure 2 and disassemble the unit in the a - d sequence illustrated. After rotating the board, make certain it is reinserted into the same plug. Reverse the sequence for reassembly.

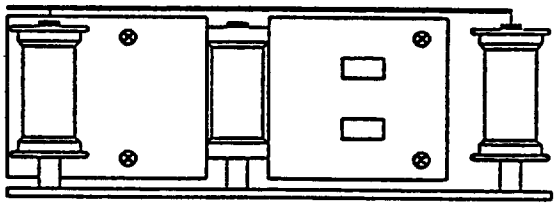


Cue detector board set for inboard cues



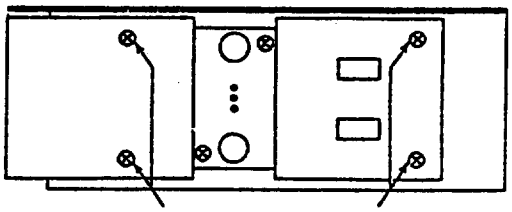
Cue detector board set for outboard cues

Figure 1



Bottom of cue detector/failsafe

Figure 2a



To gain access to cue detectors, remove these four screws

Figure 2c

Remove these two screws to gain access to failsafe PCB

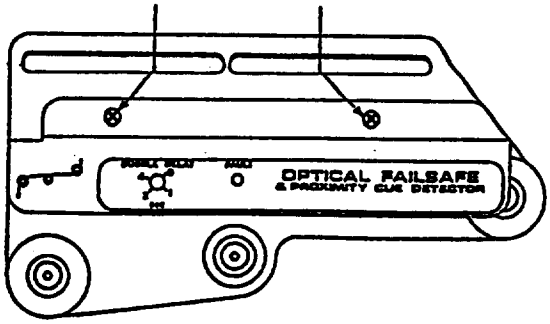
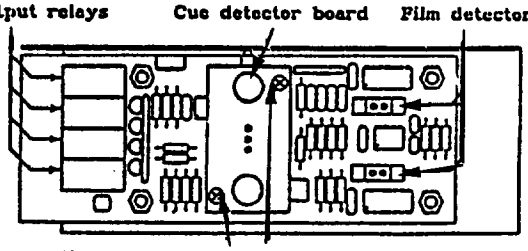


Figure 2b

Output relays Cue detector board Film detectors



Remove these two screws to remove cue detector board

Figure 2d

WIRING THE FP-350

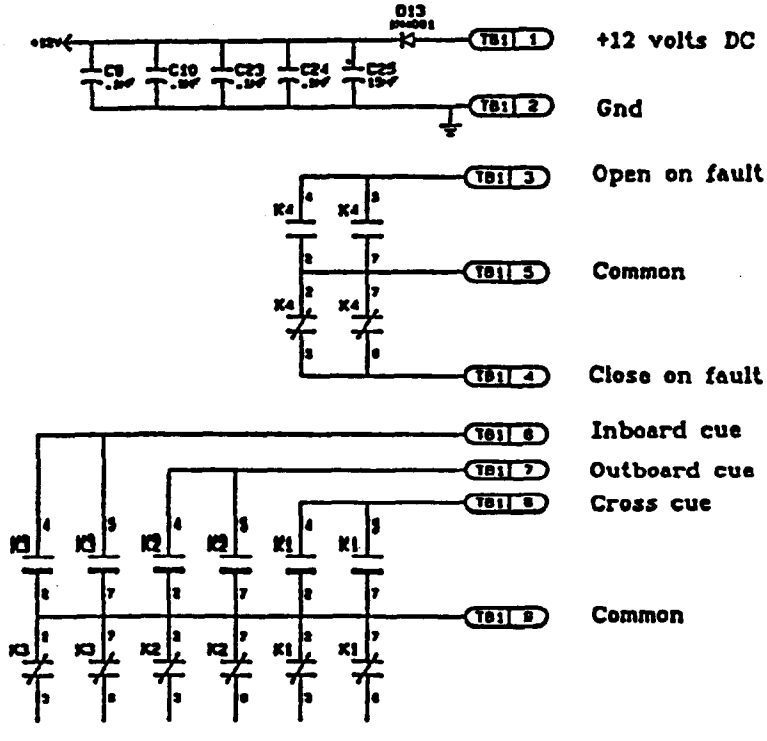
The FP-350 requires a 12 V.DC supply of at least 150 mA. This may be supplied by the automation controller (i.e. STRONG CPA-10 or SPA-7), or it may be supplied by a plug-in wall module. Wiring is easier to perform prior to installation.

Connect the +12 V.DC from the power supply to the terminal marked **+12VDC** on the FP-350, and the power supply ground to the FP-350 terminal marked **GROUND.** The unit is protected against damage by reverse wiring of the **+12VDC** and the **GROUND** terminals. The outputs are dry relay contacts with a current rating of 2 A. at 28 V.DC.

Connect the appropriate OPEN or CLOSED failsafe terminals to the automation controller (see AUTOMATION Manual).

All three cue outputs are common to the terminal marked **COMMON.** This should be connected to the automation's supply or ground as required by the automation. The inboard, outboard, and cross cues are wired to the automation as described in the AUTOMATION manual.

To eliminate possible wiring problems, the relay output terminals are isolated from the power supply. The failsafe relay and the cue detector relays are also isolated from each other.



INSTALLATION

Install the FP-350 as shown in Figure 3. The mounting bracket is bolted to the base of the soundhead casting through the two slots. When positioning the FP-350, make certain the film exits the soundhead and passes over the FP-350 rollers in a straight path. The slots in the mounting bracket permit aligning the FP-350 in the center of the film path.

The roller bracket and assembly is attached to the mounting bracket through two slotted holes to permit the unit to be adjusted forward and backward under the soundhead. Position the roller bracket to set a nearly vertical film path out of the soundhead, as illustrated on Figure 4.

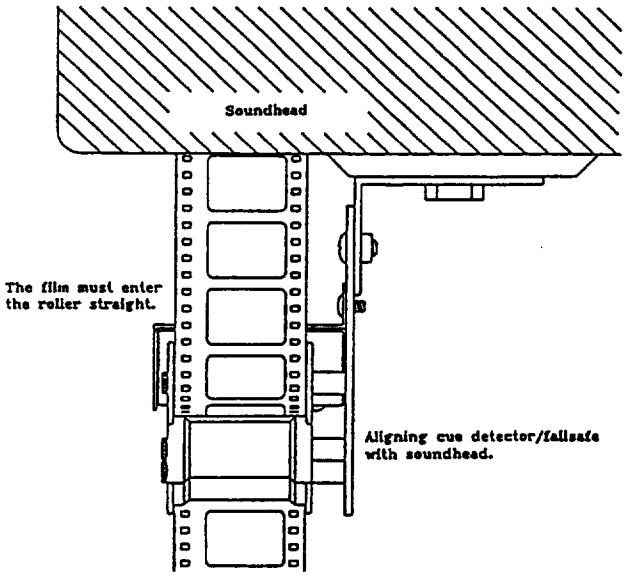
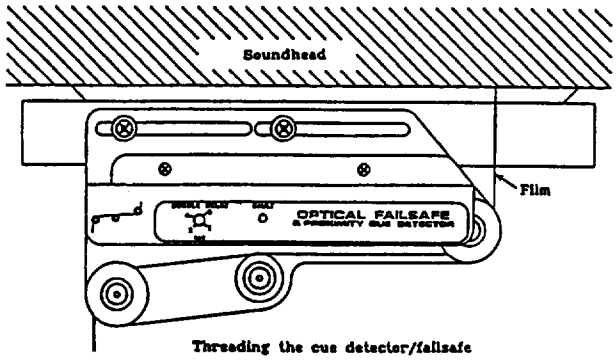


Figure 3



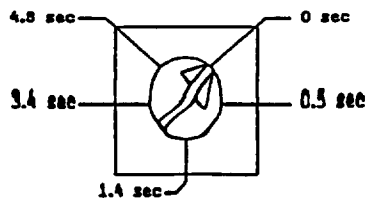
Threading the cue detector/failsafe

Figure 4

SETTING "BOBBLE" DELAY

The "bobble" delay will eliminate faults caused by film sag during start-up. The range of the delay is adjustable from 0 - 5 seconds. For most installations, a one second delay is sufficient.

Use a small screwdriver to turn the delay potentiometer until the desired delay is set. The delay time may be checked by inserting a piece of paper or film about 4mm from both film sensors at the same time. After the FAULT L.E.D. turns off, pull the object away. The time it takes for the FAULT L.E.D. to light is the "bobble" delay time.



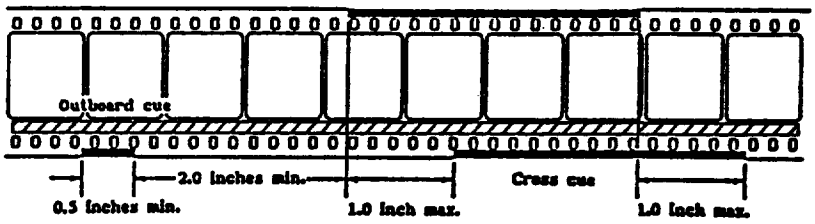
Bobble delay time

CUE PLACEMENT

Remove ALL traces of foreign cues which may have been left on the film by prior exhibitors. Use film cleaner as required to remove residue of the foil tape.

When using the FP-350 Proximity Cue Detector, there are some requirements for the placement of cues on the film. Minimum length of ALL cueing foils is one half (.5) inch. The recommended maximum foil length is two (2) inches, although longer foils may be used if required.

When placing cue foil on the film, **it is necessary to wrap the foil around the edge of the film.** The proximity detectors do not require electrical conduction; they detect the **presence** of aluminum. For this reason, worn or cracked foil tape is reliably detected.



Because of the special requirements for crossframe cues, inboard and outboard cues **must be spaced at least two (2) inches from one another.** If the two foils are closer than two inches apart, a false crossframe cue may be detected.

A crossframe cue consists of two (2) foils opposite one another on both edges of the film. The beginnings and ends of the foils must be within one (1) inch of each other. When the circuitry determines that both inboard and outboard foils are present simultaneously, the CROSS CUE relay will close, while the INBOARD and OUTBOARD relays will remain open.

GENERAL MAINTENANCE

Because the film sensors are light sensing devices, it is important that the emitter and detector are kept clean.

Make certain to keep the circuit board free of moisture or oil. Water and oil may conduct electricity and cause the board to malfunction. If the circuit board should become dirty or oily, wash the board with soap and water if required. Rinse the board thoroughly and permit to air dry completely before again applying power.

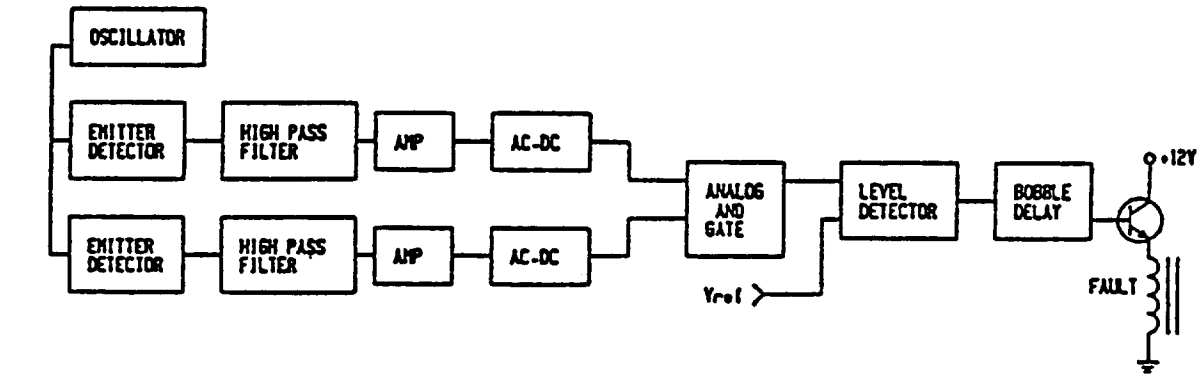
THEORY OF OPERATION

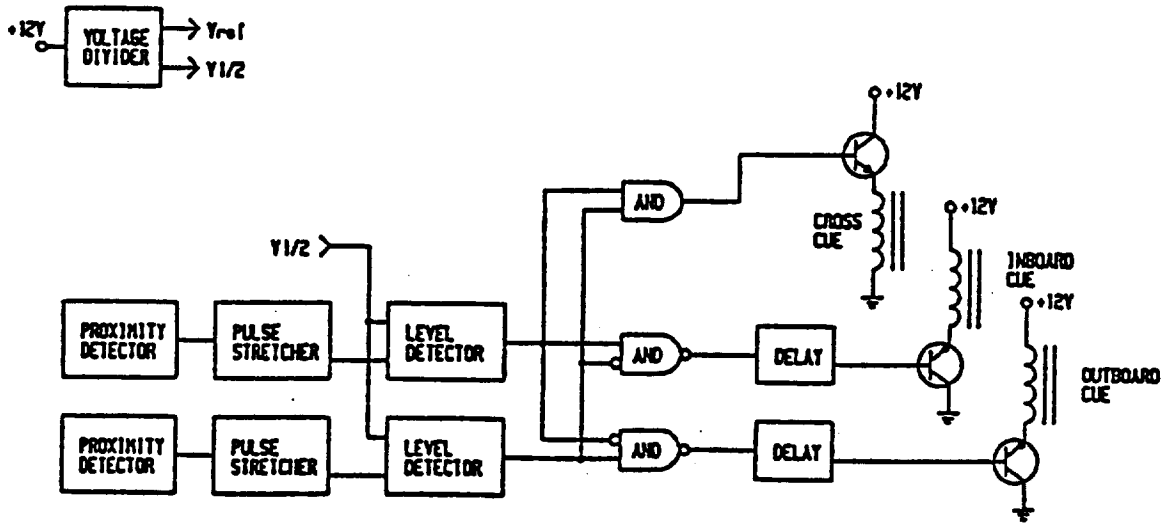
The FP-350 consists of two separate circuits: The Optical Failsafe and the Cue Detector circuits.

The Optical Failsafe circuits starts with an oscillator which feeds the two optical sensor L.E.D.s. The pulsing light is then reflected off the film back to the detectors. The detectors produce a current which is proportional to the amount of infrared light received. The signal is amplified by a current-to-voltage converter. This is sent through a high pass filter to remove any DC component that may be present from ambient light. The high pass filter also removes any low frequency light such as that from a fluorescent light fixture. The remaining high frequency signal is amplified again to a usable level. The signal is then rectified to convert the AC signal to a DC signal. The lowest of the two DC levels from the detectors is compared against a reference. If the signal is greater than the reference, a high is produced at the "bobble" delay. This charges a capacitor which is compared against the "bobble" delay voltage reference. If a FAULT is detected, the level detector will produce a low. This low allows the capacitor at the "bobble" delay to discharge. When the voltage on the capacitor becomes less than DC voltage set by the "bobble" delay potentiometer, the output relay will indicate a FAULT. The lower the DC voltage setting on the "bobble" delay potentiometer, the longer it will take for the relay to indicate a FAULT.

The Cue Detector circuit starts at the proximity detectors. The proximity detectors appear as a near short circuit when metal is **not** present. When metal comes in close proximity, the detector acts like an open which will force the output of the detector high. This signal charges a capacitor very quickly through a diode. The diode creates a pulse stretcher by slowing the rate of discharge. The output of the pulse stretcher is compared against a reference DC level. If the output of the pulse stretcher is higher than the reference voltage, a high logic level is produced at the at the output. The logic levels from both detector circuits provide the input to the AND logic. The AND logic determines whether the cue detected was inboard, outboard, or crossframe. The output of the cross cue AND circuit controls the cross cue output relay. The output of the inboard and outboard AND circuits are delayed to prevent as inboard or outboard cue at the beginning and end of a crossframe cue. The delayed signal controls the inboard and outboard output relays. The combined stretched input pulse and the delayed output provides a cue pulse equal in duration but delayed approximately one-tenth (0.1) of a second.

Optical failsafe





Proximity cue detector

TROUBLESHOOTING

1. Make sure the unit is receiving power.

a. The automation controller, if used to supply power to the FP-350, must be energized and turned ON.
b. Check the FAULT L.E.D. When no film is present, it should be lit. If the FAULT light is OFF and the failsafe relay indicates a FAULT, the problem is most likely in the power supply wiring. The FP-350 will indicate a FAULT if the unit looses power.
c. A loss of power would also be the cause of cue detectors not sensing foils. The cue detector can be tested by placing any metal object close to the detector and listening for a relay closure. The sensing distance for the detectors is approximately 2mm for the cueing foil.
d. A lack of power could be caused by connecting the power supply backwards. Reverse the input leads. The circuit board has protection which will prevent damage if the power supply wiring is reversed.

2. If the FP-350 is receiving power, test the sensors.

a. To test the film sensors, put a piece of paper or film approximately 4mm from both sensors simultaneously. When both sensors detect an object in front of them, the FAULT L.E.D. will turn OFF.
b. To test the proximity detector, place a metal object close to the detector and listen for a relay closure.

If either test in Section 2 failed, the unit is likely to be internally damaged and will require factory repair. There are no user serviceable components in the unit.

3. If the circuit board checks out, the next possible cause is the Automation Controller interconnection wiring.

a. Check the wiring at both the automation and the FP-350.
b. Check for loose connections and crossed wires.
c. The wiring can also be checked by shorting the appropriate terminals on the terminal block to assure conduction.