INSTRUCTION MANUAL

FP-350

Cue Detector & Failsafe Switch

Types 51-98217 & 51-98243

Rev. July 2004

PRODUCT DESCRIPTION

THE STRONG 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 contacts, commonly associated with conventional units.

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 and normal 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.

THE CUES are short lengths of aluminum tape placed on the edges of the film during the print make-up procedure. The exact locations of the cues is determined by the type of automation controller used, and the format of the desired presentation. The proximity detector, positioned at both 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 (Type 51-98217) will sense only an inboard *or* outboard cue, as determined by the setup of the cue detector board. These units do not have the capability of sensing a crossframe cue. The single Cue Detector board is illustrated on Figures 1a & 1b. The dual Cue Detector FP-350 (Type 51-98243) is illustrated on Figures 2c & 2d.

SETTING CUE DETECTOR BOARD

For units with only one proximity detector (Type 51-98217), it may be necessary to set the cue detector board for either *inboard* or *outboard* cues, as required by the automation controller. Before installing the FP-350, check the underside of the unit 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" through "d" sequence illustrated. After rotating the board, make certain it is reinserted into the same plug. Reverse the sequence for reassembly.
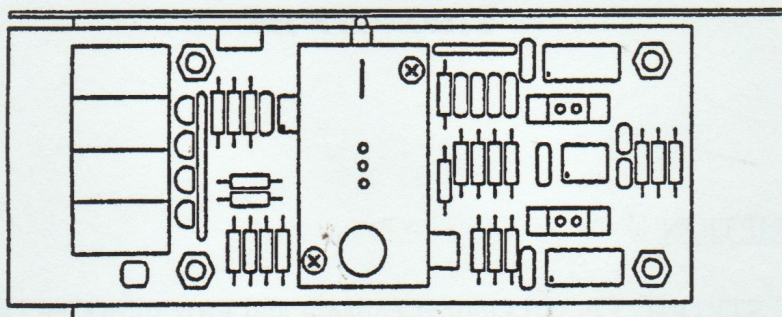
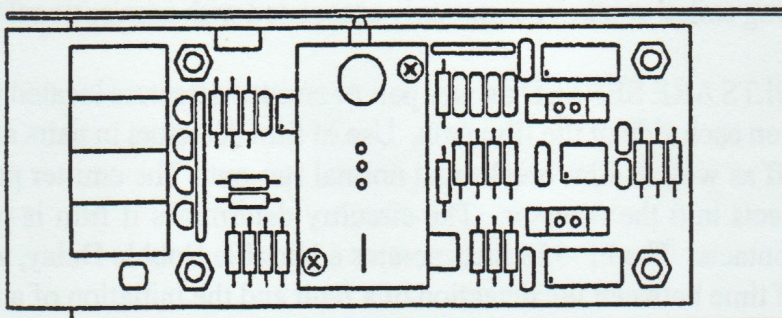Figure 1a: single Cue Detector set for INBOARD Cue

Figure 1b: single Cue Detector set for OUTBOARD Cue
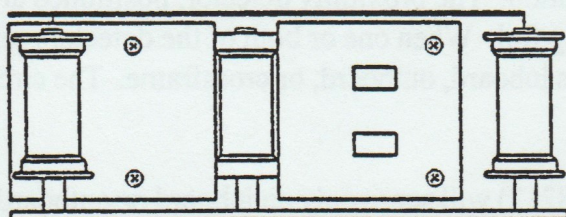

Figure 2a: Bottom of Cue Detector/Failsafe

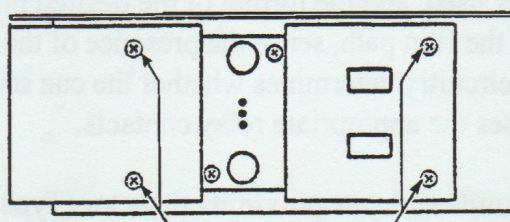Figure 2c: Remove these (4) screws to access Cue Detectors

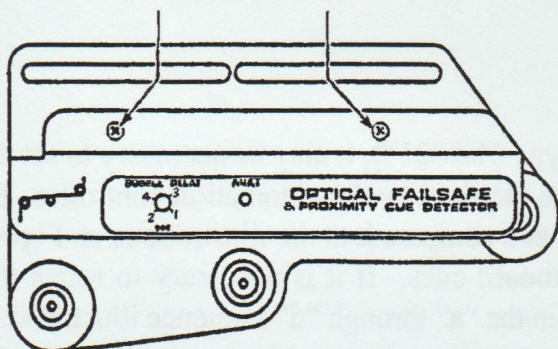Remove these (2) screws to access Failsafe printed circuit board

OPTICAL FAILSAFE & PROXIMITY CUE DETECTOR

Figure 2b

Output Relays

dual Cue Detector board
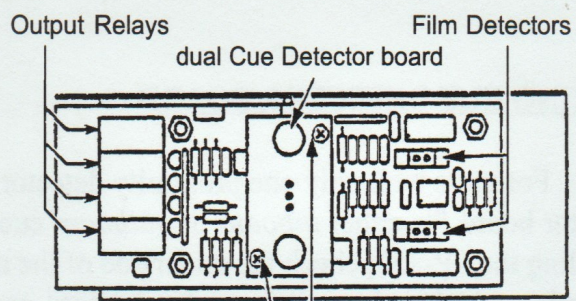
Film Detectors

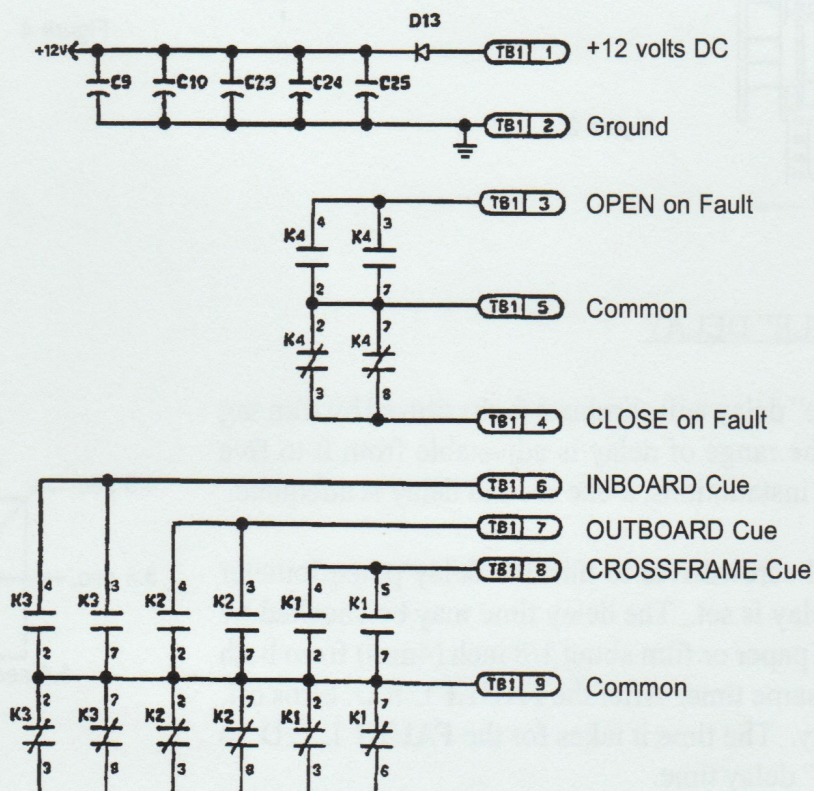Figure 2d

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, SPA-7, CineNet™), or it may be supplied by a plug-in wall module. It is generally easier to perform the wiring prior to installing the FP-350 to the soundhead or projector.

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

Connect the appropriate OPEN or CLOSED failsafe terminals to the automation controller, as instructed in the automation installation 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 manufacturer of the automation controller. The inboard, outboard, and crossframe cues are wired to the automation as described in the automation installation 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.
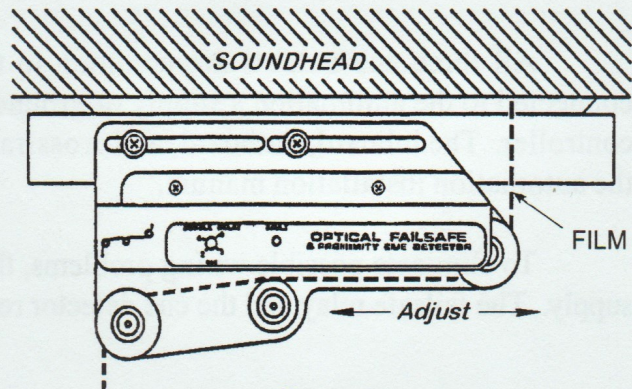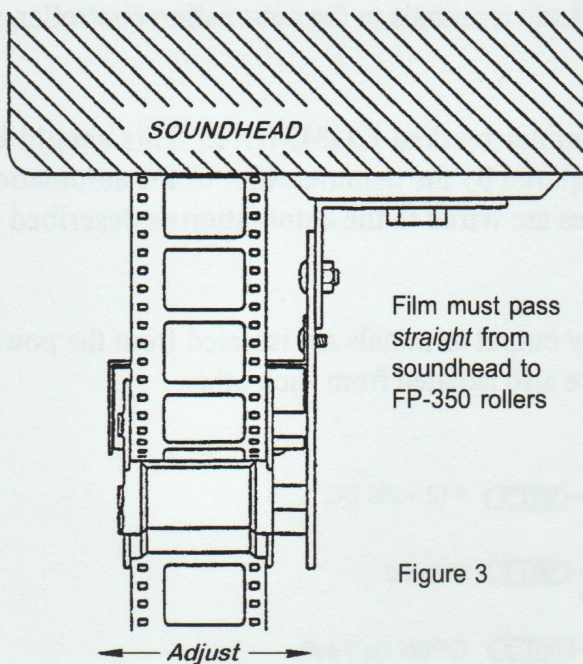

INSTALLATION

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

The roller bracket and assembly is attached to the mounting bracket through two slotted holes to permit the FP-350 to be adjusted forward and backward below the sound reader. Position the roller bracket to set a nearly vertical film path out of the sound reader, as illustrated on Figure 4.

SOUNDHEAD

Film must pass *straight* from soundhead to FP-350 rollers

Figure 3

Adjust

SOUNDHEAD

OPTICAL FAILSAFE
& PROXIMITY CUE DETECTOR

FILM

Adjust

Figure 4

SETTING "BOBBLE" DELAY

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

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 1/8 inch (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.

4.5 sec. — — 0 sec.
3.4 sec. — — 0.5 sec.
1.4 sec. —
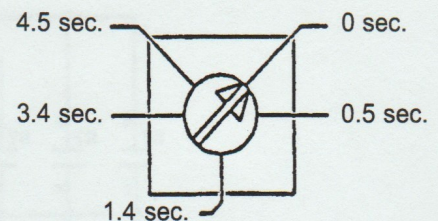
CUE PLACEMENT

Remove ALL traces of foreign cues which may have been left on the print by prior exhibitors. Use film cleaner as required to remove the glue 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 edge-mounted cueing foils is one-half inch (12mm). The recommended maximum foil length is two inches (50mm), although longer foils may be used if required.

When placing cueing foil on the film, it is *not necessary* to wrap the foil around the edge of the film. 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 special requirements for crossframe cues, inboard and outboard cues must be spaced *at least* two inches (50mm) from one another. If the two foils are closer than two inches apart, a false crossframe cue may be detected.
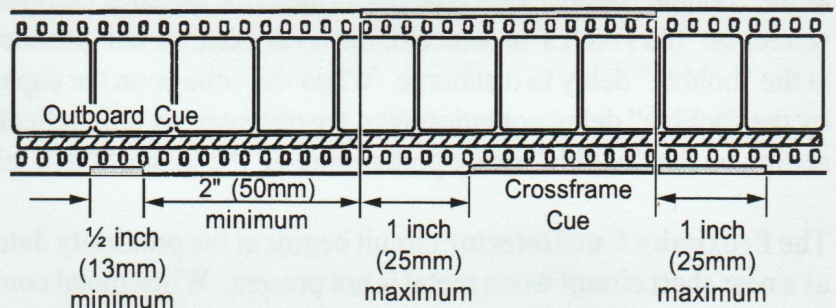
CineNet™ automation (CNA-100, CNA-150, CNA-200) requires only an outboard cue, and the metal foil tape may be applied as shown on the right. Cueing foil is normally supplied in a .225 inch (5.7mm) width, and a ¼ inch (6.35mm) length applied at the frame line minimizes visibility on the screen. A piece of clear splicing tape over the foil prolongs its useful life, and perforation of the (2) sprocket holes covered by the foil can be restored using the cutter of the tape splicer.
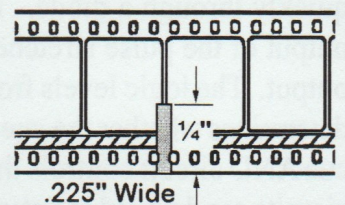
GENERAL MAINTENANCE

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.
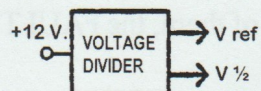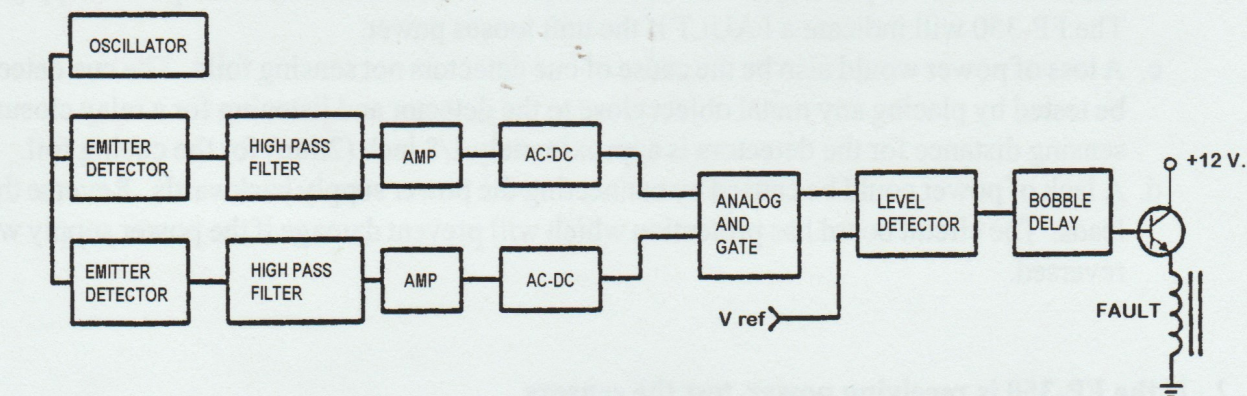
DESCRIPTION OF CIRCUIT OPERATION

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

The **Optical Failsafe** circuit 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 produced by 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 DC. The lower 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.
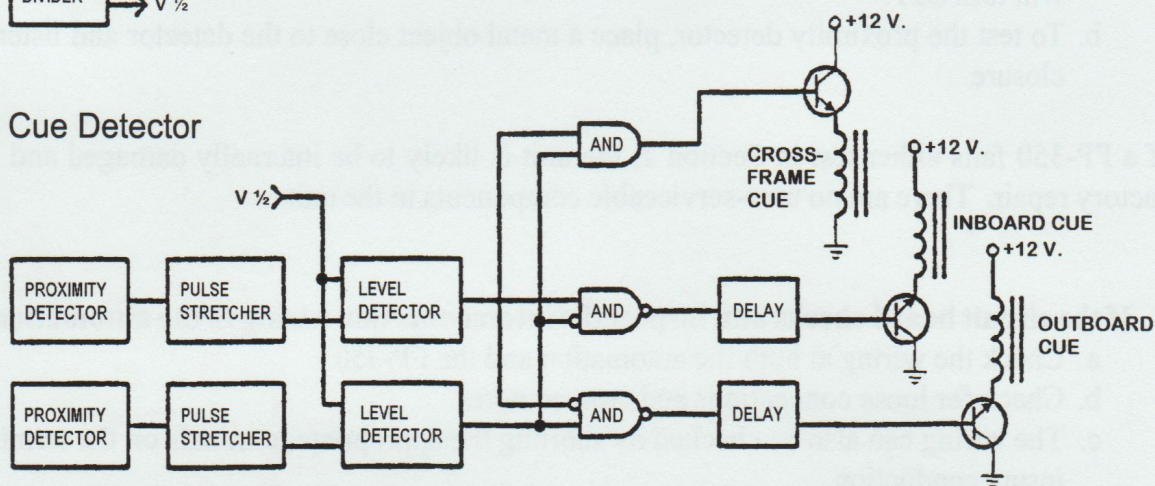
The **Proximity Cue Detector** circuit begins at the proximity detectors. The proximity detectors appear as a near short circuit when metal is not present. When metal comes in close proximity, the detector acts like an open, which will force the output of the detector high. This signal charges a capacitor very quickly through a diode. The diode creates a pulse stretcher by slowing the rate of discharge. If the output of the pulse stretcher is higher than the reference voltage, a high logic level is produced 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 crossframe cue AND circuit controls the crossframe cue output relay. The output of the inboard and outboard AND circuits are delayed to prevent an 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

OSCILLATOR

EMITTER DETECTOR → HIGH PASS FILTER → AMP → AC-DC

EMITTER DETECTOR → HIGH PASS FILTER → AMP → AC-DC

ANALOG AND GATE → LEVEL DETECTOR → BOBBLE DELAY

+12 V.

V ref

FAULT

+12 V. → VOLTAGE DIVIDER → V ref
→ V ½

Proximity Cue Detector

V ½

PROXIMITY DETECTOR → PULSE STRETCHER → LEVEL DETECTOR → AND

PROXIMITY DETECTOR → PULSE STRETCHER → LEVEL DETECTOR

AND → DELAY

AND → DELAY

+12 V.

CROSS-FRAME CUE

+12 V.

INBOARD CUE

+12 V.

OUTBOARD CUE

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TROUBLESHOOTING

1. Make certain the unit is receiving power
   a. The automation controller, if used to supply power to the FP-350 unit, 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 1/8 inch (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 3/16 inch (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 a FP-350 fails either test in Section 2, 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, inspect the interconnection wiring to the automation controller
   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 insure conduction.

Factory-rebuilt FP-350 units are available under a Repair/Exchange program. Contact an authorized Strong International Equipment Dealer for detailed information and a Return Authorization. Strong International assumes *no liability* for goods returned to the factory without prior authorization.