

# Component Engineering

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## FM-35/37

### Film Monitoring System

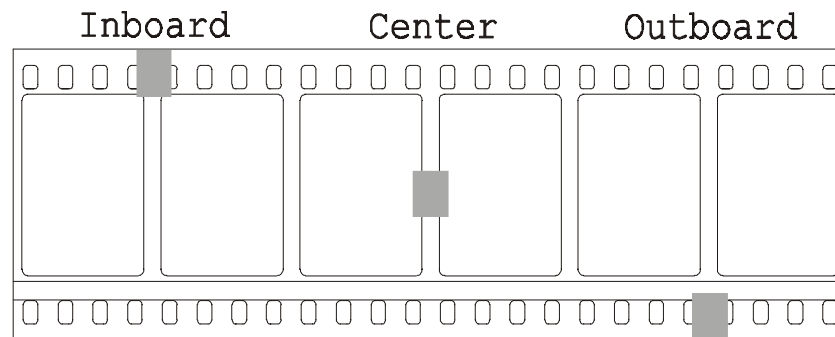
This is a self-contained unit (except for power supply) which consists of a three position proximity sensor type cue detector, film presence (i.e., film break) sensor and a film motion sensor. The unit is furnished with a multiconductor cable with a connector of the detector assembly end. Also furnished is a mounting bracket which sandwiches in between the take-up arm and the bottom of the sound head. (Special mounting arrangements may have to be devised for projectors not made in the U.S.)

The unit requires from 12 to 30 Volts D.C. either from the host automation system or other power supply. If the host system is A.C. operated it takes only a bridge rectifier and a single filter capacitor to get the necessary D.C. If the input is 12 Volts, use a 25 Volt capacitor in the range of 470 to 1000 mFd. From a 24 Volt source, use a 50 Volt capacitor in the 33 to 100 mFd range. Maximum momentary current drain is 400 mA. Ready made power assemblies are available for some automation systems, and there are wall-transformer type power supplies which can do the job.

The cue detectors are for inboard, center, and/or outboard cues. For purposes of standardization and customer convenience, all units are equipped with all three detectors. These are of the "ECKO" (Eddy Current Killed Oscillation) proximity type and will respond to small foil cue patches on the film. The recommended size of the patch is approximately 3/16" to 1/4" square. Please see the attached illustration for placement. Note that the center cue is placed in the center of the film, not the center of the picture area. Should you have any trouble with these small cues rubbing off, they may be sealed in by overlaying them with a piece of clear splicing tape, or in some cases be installed on a splice line under the tape.

The film presence (film break) detector is actually two detectors scanning the two edges of the film. This is done with infrared light and is therefore not visible to the eye. If there is film properly seated over the black roller a green L.E.D. will light and the relay will close. The film motion detector is similar except that it is watching the two rows of perforations. When the film gets up to about half normal speed its motion will be sensed.

All outputs are relay contacts rated at 500 mA. The three cue detector outputs are "Make" (Form "A") contacts, while the Film Presence and Film Motion detector outputs are "Break/Make" (Form "C") contacts. The contact identification on the cable color chart/block diagram sheet shows the unthreaded condition, i.e., no film in the projector. The cue detector output pulses are stretched to about 1/3 second (350 to 400 milliseconds). Should a longer pulse be required, successive cues can be placed on the film at 6 frame intervals. Each cue will re-start the 1/3 second interval.



Little or no maintenance is required other than Keeping the optical assemblies clean. The Film Presence and Film Motion detectors operated by shining infra-red light onto the film and then detecting the light when it is reflected back. If the L.E.D.s from which the light comes, or the phototransistors which receive it, get too dirty, the detectors can't work. In a normal cleanly maintained projector it is usually sufficient to merely wipe the optical area with a clean dry cloth.

If you find an excessive amount of dust, lint, or film wax accumulating, it would be a good idea to check the alignment of the film path through the unit. If the alignment is not correct the film will scrape on the roller flanges and create debris which can be deposited on the optical sensors. Also, watch for too much oil. If this is combined with the dust problem, a sort of "mud" is produced which may require stronger cleaning measures. Stay away from the more exotic solvents such as acetone, MEK, or those thing which have "chloro" or "fluoro" in their names. These (and others) have the potential of attacking the plastics in the sensor assemblies, which could ruin them and require their replacement.

If it is time for a real bath, remove the large black roller and then remove the two small Phillips head screws which hold in the optical assembly. With the screws out the whole assembly can be unplugged by pulling it straight out. Spray the sensor area thoroughly with one of the stronger household cleaners such as "Formula 409", "Texize" or the like. Allow the detergent to work a minute or two and then scrub it with a toothbrush. Then rinse it off with a strong stream of hot water. If it doesn't look clean, do it all again. Dry it all off and put it back together.

# FM-35/37 Block Diagram with Wire Colors and Pin Numbers

