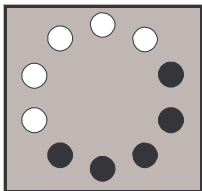


# Using the TCS “TSC t” Speed Checker

**Introduction.** You can quickly verify that your camera is running at the correct crystal speeds. This is particularly important with cameras having a friction drive coupling from the motor, such as the Eclair NPR or Arri 16-S or M. With these cameras, slippage can arise without warning, and be either continuous or jerky. This can cause sound that is out of sync, and flicker in the picture. The “t” suffix means the unit is in a transparent plastic case.



**How It Works.** The light rotates at a crystal speed, for example 24 times per second. Your camera's shutter is open and closed, each about half the time. When the shutter is opening and closing at the same speed as the light is rotating, you get the following result: When viewed through your camera's mirror reflex finder about half of the ten LED's (light emitting diodes) in the rotating circular array can be seen.



A stationary light/dark **pattern** indicates that the speed is correct. A moving **pattern** indicates the camera is drifting out of sync. (The actual orientation of the pattern does not matter, and it will change every time you start and stop the TSC t or the camera.)

Drifting clockwise means the camera is slow; counterclockwise means the camera is fast. One LED's worth of movement indicates a sync error of 1/10 of a frame. A drift of 5/10 frame (five LED's) in the time period of your longest possible shot length could cause a noticeable loss of sound sync. (Some fluctuation in brightness of the first and last lights is normal, from camera phase jitter.)

For cameras without a mirror shutter, the lens and pressure plate can be removed so you can look through the lens opening and running shutter towards the Speed Checker. Alternatively, nine of the LED's can be covered up with black paper and the remaining one shined on to sprocket teeth or the pulldown claw. Although the flashes are not as short as with a strobe, giving some motion blur, any significant drift can be clearly seen.

**WARNING: Flashing lights have been known to cause epileptic fits in susceptible people.**

**On & Off Switch** is inside to prevent damage or accidental actuation. Down is off, up is on.

**Speed Selection.** The 8-position rotary switch is inside, to prevent damage or accidental actuation, in the middle of the array of LED's. (Only 7 positions are used.) Turn it with your fingertips or a small flat-blade screwdriver.



**Note that the molded-in arrow or pointer, or white dot, must be aimed towards the desired speed;** do not go by the screwdriver slot or the speed will be incorrect and ambiguous. All of the speeds are 60 Hz HMI compatible ones as used with modern cameras and techniques. The speeds include 12, 15, 20, 24, 30, 40 and 60 FPS. 24 FPS is with the pointer straight up and the flat, if any, down.

**Slipping Sync.** If your Eclair NPR, or Arri 16-S or M, is slipping from correct sync with a crystal motor, a likely cause is a rubber coupling that has stretched out of tight fit by age and use. An expedient remedy is to cut a short piece of heat-shrinkable tubing, 3/8" diameter for the Arri and 1" for the NPR, slip it over the motor's drive coupling, and heat it to a tight fit.

If this does not work, or for other camera models, refer to a factory authorized servicer for speed calibration. This normally entails attaching a frequency counter to the appropriate point in the crystal oscillator circuit, and adjusting a trimmer capacitor for the correct reading.

Some early equipment may not have an adjustment, and correction must be done by changing component values. The counter itself should be ovenized and recently calibrated, and the probe must go to the right place to avoid de-tuning the circuit and getting a false reading.

(If your camera has a constant-speed, or variable speed, motor the TSC e can be used to adjust the speed. Do not expect the same sort of accuracy and stability as when using a crystal motor, however.)

**Battery Installation.** The TSC t is sold without a battery installed. A battery can be used until the LED's become noticeably dimmer than when new. Do not leave a dead battery in place as it may leak corrosive fluid. Pull out the battery. Remove the battery snap from the old battery only by pulling on the snap assembly itself, never by pulling on the thin wires, which will break.

With the power switch turned off, install the battery snap on the fresh battery, which should be a 9 volt alkaline type, and slip it into the bottom recess provided below the circuit board. A foam strip prevents the battery from rattling.

Estimated battery life is 2 hours for zinc-carbon, 12 hours for alkaline, and 34 hours for lithium type batteries if they are used within their shelf life. Do not reverse the battery connections as this will cause component damage that is not covered by your warranty.

**External Power.** The TSC t has an inverted power socket for connecting a source of 9 to 12 volts DC. The plug **must** be wired so the inside is negative —, and the outer sleeve is positive +. Do not apply reversed DC polarity, AC, or excessive (over 16 volts) voltage to the circuit as this will cause component damage that is not covered by your warranty.

**Calibration.** The TSC t itself has a calibration adjustment which must not be disturbed except by properly equipped and informed technicians. The crystal trim adjustment is on the left and below the center of the board. Connect the frequency counter to pin 9 of the 74HC4060 IC and negative ground, and adjust the trimmer for  $4915.200 \text{ kHz} \pm 15 \text{ Hz}$ .

# Tobin Cinema Systems, Inc.

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# Addendum for 50 Hz TSC te

**Speeds** are 10, 12.5, 16-2/3, 20, 25, 33-1/3 and 50 FPS.

**Sticker** is revised as follows:



Because of space limitations, the full speed is not marked on some settings. A dot “.” after the number indicates that this setting has a fractional speed, as listed above.

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