Installing and Using the TCS TM-23
Variable Speed Motor for Arri 16-S, 16-M

1. **Installation.** First remove the existing motor by loosening the clamp, then pulling out the motor. **Clean** the front electrical contact and the front coupling ball on the TM-23, the camera’s electrical motor contact spring, and the inside of the camera’s mating rubber coupling, with a cotton swab stick moistened with rubbing alcohol. Do not touch these components with your fingers since skin oils can cause loss of electrical contact and mechanical slippage. **Install** the TXM-23 by lining up the index pin with the slot in the camera, then push the motor fully in until the trim ring is flush against the body. **WARNING:** If the motor coupling ball is a tight fit in the rubber coupling inside the camera, push it in place by pressing the manual advance knob and **not** the motor housing. Tighten the clamp.

2. **Powering.** The TM-23 requires *12 volts DC* for the full range of speeds, 0 to 50 frames per second (FPS). Using 8 volts limits the maximum speed to around 35 FPS. If you want to try to film at 60+ FPS (frames per second) a 14-16 volt battery can be used intermittently, but don’t routinely use this higher voltage as it may cause overheating and damage. Make sure the correct DC polarity is applied. Normally the Left pin on the Arri-S original 2-pin socket is + and Right is —; the Arri-M 3-pin socket has pin 1 + and pin 3 ——; and pin 4 is + and pin 1 is — on cameras that have been converted to have the standard XLR 4-pin socket. If the polarity is reversed, the motor may not be harmed but it will turn in the wrong direction at high speed, or not run at all. **NOTE:** Except on newly manufactured motors, if the polarity could be wrong, make sure the speed knob is set in the middle. We will not be responsible for film, motor or camera damage from misuse.

3. **Magazines.** There should be no problem using the *16-M 400’* magazines as they are driven mechanically by the camera body. The *16-S 400’* magazine torque motors, however, are mostly designed for 8 volt operation. They must be converted for use on 12 volts to prevent overheating and burnout, and also to reduce electrical interference.

4. **Basic Operation.** The camera is started and stopped as before with the camera’s usual switch. The **speed** is controlled with the knob on the right. Turning clockwise increases the speed and turning counter-clockwise reduces the speed, even down to zero speed. Read the speed from the camera’s tachometer while running forward (it will not register in reverse.) Excessively low speeds may result in film with uneven exposure, that is flicker.

   The **direction** is controlled by the switch on the left. Down is forward, and up is reverse. Using the Arri 16-S equipped with the 400’ magazine, also change the direction lever on the torque motor.

   **Do not change direction while running!**

   If the camera stops with the viewfinder dark, use the Manual Advance knob on the back of the motor. Turn it clockwise to restore the viewing position.

   As a variable speed motor, the TM-23 is not designed for critical speed control as required for double-system sound filming, or for flickerless results under HMI or fluorescent light. A TCS crystal motor is recommended instead for these applications. The TM-23 also will not accept any accessories.

5. **In Case of Difficulty.**

   **Running Backwards or Not Running.** If the motor turns at high speed the wrong way, your DC polarity is reversed and must be corrected. The fact that your original Arri variable speed motor runs the right way means nothing as it is a wound-field type that will turn the same way with either polarity, or even on AC.

   Recently manufactured motors have a power mosfet transistor instead of a bipolar type, to prevent speed dial burnout in case of reverse polarity or stalling the motor. They have a lithium bias battery inside and draw no current from it, so this battery should last for an estimated 10 or 20 years.

Tobin Cinema Systems, Inc.
http://www.tobincinemasystems.com