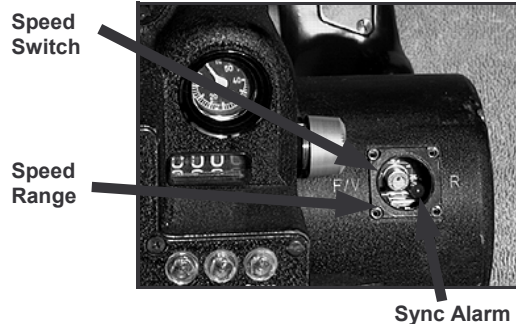


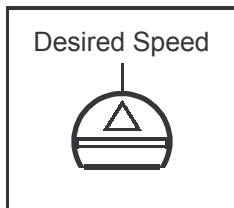
Installing and Using the Tobin TXM-25 Crystal Motor in your Arri 16-BL

Simplified Instructions:

1. **Set the Speed Range** on the three-position slide switch, inside and down behind the removable window on the motor shroud. The window will unscrew by turning its knurled periphery counter-clockwise with your fingers. The **middle** position gives normal running speeds. Use this position unless you are looking for a special speed effect. The **left** position gives speeds one half of normal. The **right** position gives speeds that are twice normal. Use something like a small screwdriver to move the actuator as desired.



2. **Set the Speed** with the small rotary switch directly behind the



removable window. Be sure to use the arrow or color dot on the knob to indicate the desired speed; do not look at which direction the screwdriver slot is pointing as this will be incorrect and ambiguous. To change the setting, use only a small flat-blade screwdriver that will fit the slot. Do not use a sharp, pointed or oversize object as this will damage the plastic shaft, and replacing the switch is not covered by warranty.

Straight up (12:00) gives the normal USA and theatrical speed of 24 FPS (frames per second.) **Left 45°** (10:30) gives 18.75 FPS for speeding up motion. **Right 45°** (1:30) gives 25 FPS for European television. **Straight right** (3:00) gives the 30 FPS speed that is sometimes used for smoother movement in film that will only be transferred to USA video, and not projected.

These speeds will be divided by two, or multiplied by two, if the slide switch is not in the middle.

3. **Replace the window** to prevent camera noise from leaking out and spoiling your sound filming.

4. **Double system sound filming** requires that the live sound be recorded separately from the picture. Use a suitable recorder. At the beginning of each shot, with the camera and recorder running, use a clapper board to enable synchronizing the start points of the picture and sound in editing.

5. **Out of sync running** is indicated by the red light on the right inside the window. It is normal for it to light momentarily at the beginning of each shot. If it lights while filming, this means that crystal speed is not being maintained, and the sound will get out of sync and the picture may flicker. Depending on the camera's gear ratio and the battery strength, the camera may not be able to reach crystal speed if you select a speed above 37.5 FPS (18.75 on the x2 range.)

Installation Instructions:

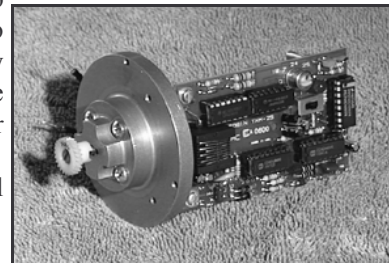
1. **Before you begin.** Do you have the correct version of TXM-25 motor to suit your camera's gear set? This motor is made in three versions to correspond with the gear set that is available. The gear set is best identified by actually counting the teeth on the motor gear and the camera gear, which are visible behind the plastic window inside the film compartment. The motor gear has 24 or 25 teeth, and the camera gear has 50 or 60 teeth.

TXM-25/24 is used if your camera has the 24:50 USA universal motor gear set.

TXM-25/25 is used if your camera has the 25:50 European gear set.

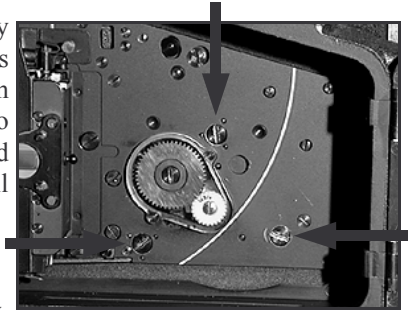
TXM-25/20 is used if your camera has the 24:60 USA synchronous or reversing motor gear set.

The slash and number refers to the number of slots in the optical encoder disc that is mounted on the outside end of the drive motor. That is, /24 has 24 slots, and so on. Field disc replacement is possible if you ordered the wrong motor version. The motors are electrically identical.



2. Removal of motor and gear. Remove the outside motor shroud by loosening the four screws. Remove the motor by loosening the three screws that are about equally spaced around the motor gear, and 1-3/8" (35mm) from it, inside the film compartment. Pull out the motor, supporting its weight to avoid damage to the gear. Remove the gear from the motor as it will be used with the TXM-25 motor also; loosen the screw in the middle of the gear, pull off the gear, and replace the screw so it is not lost.

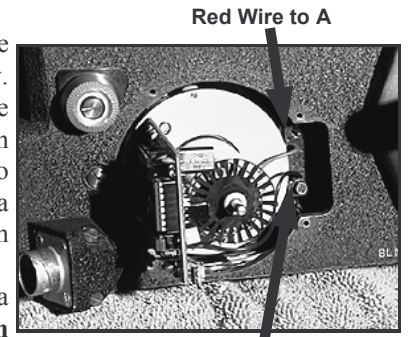
2A. No gear set? We make a 24:60 gear set.



3. Attach the gear to the TXM-25 motor by removing the gear screw, pushing the gear on so the slots surround the drive pin, and replacing the gear screw. In handling the new motor be careful not to damage the encoder disc at the other end of the motor.

4. Install the motor by slipping the end with the gear into the recess in the camera. The correct orientation is with the motor forward, and with the circuit board upright at the rear. Do not force the gears into mesh, but rather turn the motor slightly until the gear teeth line up. Rotate the entire motor gently back and forth, while you try engaging and then tightening one of the three motor mounting screws inside the film compartment. Tighten the remaining two screws.

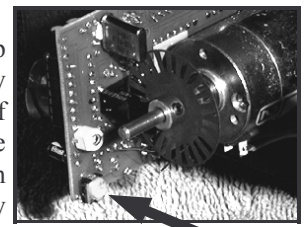
5. Connect the motor electrically by plugging in the two leads into the female socket that the original motor connected to, inside the camera body. The **Red** positive wire plugs into the top hole marked **A**. The **Black** negative wire plugs into the bottom hole marked **H**. The other holes are not used with the TXM-25 motor. If the pins are a loose fit, they should be tightened to prevent erratic operation. This can be done by gently bending the pin into a kinked shape, flattening it slightly to make it oval, or else by applying a thin tinning of solder to one side of the pin, before final insertion.



5A. If you don't object to modifying the camera body, and have a qualified technician available, then the following **Deluxe Installation Modification** can be done. The only operational improvement is that, if you are using an **Black Wire to H** external speed reference such as the Milliframe Controller, the camera will start up more smoothly if the Milliframe is provided DC power for at least a few seconds to stabilize it, before the camera is started. This requires connecting a continuous source of +14.4 volts DC to the pin marked **+12A** (+12 always) on the TXM-25 circuit board. A continuous 14.4 volts is available inside the camera body between pin A of the Amphenol/Bendix 9-pin 165-15 power cable socket and the always-hot side of the camera's Run switch. A piece of wire with a connector to suit the +12A pin is available on request. This should be protected with a fuse or PTC device.

6. Run the camera to verify that the motor works. (If the camera runs backwards at high speed, this means the connections to the battery are reversed and must be corrected.)

7. Optional Start Power Adjustment. If at 24 and 25 FPS the camera starts up running too fast and comes back down to speed, or conversely if it only gradually comes up to speed, this can be corrected by adjusting the circuit. On the bottom rear of the board is an adjustment marked "S" and "103." Turn it clockwise slightly to reduce the start power. Turn it counter-clockwise to increase the start power. A technician with a high input resistance DVM or VTVM can make this adjustment accurately by doing the following: With normal 14.4 volt supply and with magazine and film loaded, run the camera at 24 FPS. After the Sync Alarm goes out, measure the DC voltage from pin 8 (top pin) of the Milliframe socket to ground or case. Adjust pot "S" for this same or a slightly higher voltage on the center pin, or metal frame, of pot "S." **NOTE:** Do not touch adjustment "Y" above this pot, which is for trimming the crystal frequency and speed of the motor. A frequency counter is required for this adjustment.



8. Replace the motor shroud and tighten the four attaching screws. Please give this instruction manual to the user.

Advanced Operating Instructions:

The marked settings and speed range are shown in bold face. The actual resulting speeds are shown in normal face. Speeds with () may not be available depending on battery voltage and gear ratio. Speed with (()) is not available with acceptable battery voltages and is excessive for the camera anyway.

Speed
Range

Marked Setting

	0	18.75	24	25	30
2	0	37.5	(48)	(50)	((60))
1	0	18.75	24	25	30
0.5	0	9.375	12	12.5	15

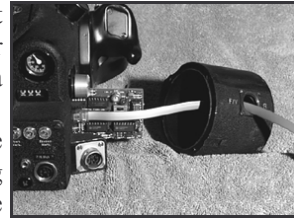
HMI Speeds. For filming under 60 Hz HMI or fluorescent lights, the following speeds should give flickerless results: 12, 15, 24, 30. For filming under 50 Hz HMI or fluorescent lights, the following speeds should give flickerless results: 12.5, 25, 50. If the Sync Alarm is lit, speed is not being maintained and it is not HMI safe.

Milliframe Controller. The Tobin TMC2 and TMC Milliframe Controllers can be used for precision control of speed in .001 FPS increments. This will give additional HMI speeds, or permit filming from a video or computer monitor with control of the shutter bar. It will also permit double system sound filming for transfer to video, with the use of audio recorders that are not capable of speed correction on playback, such as DAT, CD, MiniDisc, or HiFi video recorders, by filming at 23.976 FPS for NTSC video. The TXM-25 has a synthesized frame pulse output to activate the electronic footage counter in the TMC2. This will give an accurate count unless running at such a high speed that the Sync Alarm light is lit, in which case the counter will register more than the actual footage used.

The Milliframe, when connected, overrides all the TXM-25 speed settings so they can be in any positions. In rare cases where a very long cable is used to the Milliframe Controller, erratic operation may result, and this might be cured by setting "0" speed on the TXM-25 speed switch.

Connect the Milliframe by removing the motor shroud, passing the connector through the viewing window and into the socket at the left end of the TXM-25 circuit board. The motor shroud can then be replaced, and sync-sound filming begun after inserting a cork or rubber stopper into the viewing window hole to prevent camera noise from coming out.

The best performance of the Milliframe, in respect to smooth starting of the camera, will result if power is furnished to it for at least a few seconds, prior to starting the camera. This requires a camera modification as described above in step 5A of the installation instructions. Alternatively, leave the camera turned on and start and stop with the switch on the TMC2 or TMC; this will give a smooth but slightly slow startup.



For Technicians:

Power Input is 14.4 volts DC with plus (+) on red wire to BL internal socket A, minus (—) on black wire to BL internal socket H. Maximum rated input is 16.7 volts. Reversed polarity will cause high speed reverse run but should not damage the circuit. Overload protection is through a 1.50 amp PTC "circuit breaker" device which resets after cooling. +12A (+12 always) input is not protected and should have an external fuse or PTC, if used.

Milliframe Controller connections. An RJ-12 6-conductor cable is used to connect to the Milliframe Controller. Pin 1 is +14.4 volts, pin 2 is open for internal crystal or grounded to select external reference, pin 3 is 100 pulse per frame 5 volt input, pin 4 is ground, pin 5 is 5 volt frame pulse output, and pin 6 is ground.

Other accessories might use all 8 positions in the socket using an RJ-45 8-conductor cable. In this case, pin 1 is +14.4 volts source for variable speed, 2 is +14.4 volts, 3 is open for crystal or grounded for external, 4 is 100 PPF input, 5 is ground, 6 is frame pulse, 7 is ground, 8 is direct 0~14 volt input with reversed sense, to the power control follower for special uses. Ideally do not use an 8 conductor cable unless pin 8 needs to be connected.

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