

# Installing & Using the TCS TXM-26Ce Crystal Motor on your Bolex H-16 Spring-Wind Camera

## 1. Installation

**1A. VERY IMPORTANT:** First prepare the camera for motor attachment:

1. Turn the camera's **MOT** lever down to **O** to disengage the clockwork spring motor, and prevent it from stripping the gears in the crystal motor.
2. Remove the spring winding handle by folding it up as if to wind the spring, but turn it *clockwise* instead of counter-clockwise. It has a left-hand thread and will unscrew. If it is excessively tight, use penetrating oil on the coupling point.
3. Set the camera speed dial to **64** or higher, fully clockwise. This is required to prevent the camera's mechanical governor, which is still connected, from fighting the crystal motor and causing overload and overheating.
4. Lock the release slide in the left **M** (lock-run) position to permit the mechanism to operate and not stall the crystal motor.
5. On H-16 Rex models with a variable shutter, remove the Rexofader if present, and lock the variable shutter in the **top** (fully open) **0** position. The setting can be varied during filming to do in-camera fades, which is generally not done these days, but we recommend always locking it in the **top** (fully open) **0** position for the most pleasing picture quality. Whatever the setting, be sure it is locked in place to prevent random changes of the exposure while running, or especially when you start and stop.



**Warning:** Failure to follow these steps *before attaching the motor* will result in motor or camera damage that is not covered by your warranty, or in inferior quality film.

**1B.** Attach the motor to the camera by following these steps:

1. Lay the camera down on a cushion or other soft surface, with the lid side down.
2. If the camera bottom has an add-on flat base adapter, or quick-release tripod adapter, this must be removed with a screwdriver.
3. Line up the motor drive shaft with the camera's 8-frame shaft. If the camera has two shafts, it is the one above and to the rear of the other. Place the spring-loaded motor drive shaft on the camera's shaft.
4. Attach the one or two 3/8" x 1/2" screws through the motor bottom plate up into the camera's one or two tripod threads. NOTE: If you have a 3/8" to 1/4" screw-in tripod adapter installed, ideally this should be removed so you can use the 3/8 inch attaching screw. If you are careful to attach the camera to the motor nice and straight, you can instead leave the tripod adapter in place. You would then use the 1/4" screw and shoulder washer set in this location instead of the larger screw. Make sure the camera and the inside face of the camera are parallel to each other, as if there is too much misalignment the drive shaft may not engage easily or this could introduce binding and thus uneven running and uneven exposure. (Newer cameras will have two 3/8" tripod threads. Older cameras will have just one rear thread.) Tighten gently with a screwdriver or coin. If there is resistance, put oil or grease on the threads.
5. Some cameras have a winding shaft that does not protrude very far. If you notice a gap between the motor standoff and the winding shaft, first place one or two #10 plastic washers on the screw threads to prevent pulling the motor out of alignment when it is tightened. Gently tighten the winding shaft screw by turning it *counter-clockwise* with your fingers, as it is a left-hand thread. It does not need to be tightened with a tool. If there is resistance, put oil on the threads.
6. Turn the inching knob on the bottom of the motor slowly until the spring-loaded shaft coupling pops into place on the camera shaft drive pin. After this, turning the knob counter-clockwise will advance the camera mechanism and the film.

## 2. Operation

**Power** is supplied to the TXM-26Ce crystal motor by the 4-pin XLR connector on the front. 12.6 volts DC is required. Pin 1 is negative (—) and pin 4 is positive (+). Reversed DC polarity will cause the motor to run at high speed in reverse, spoiling film you have already exposed and possibly causing a film jam or damage. If you are not sure your battery and all cables are correctly wired, do not use them until proper polarity is verified with a voltmeter. Do not apply more than 16.8 V as this may cause circuit overheating and damage.

Running **speed** is selected by the rotary switch on the rear. The speeds are 7.8125, 12.5, 15.625, 25, 31.25 and 50 FPS (frames per second) and are extremely accurate owing to being referenced to a quartz crystal. Normal

speed is 25 FPS. The speeds 12.5, 25 and 50 are HMI safe for 50 Hz powering of the lights. This means that if you are filming under HMI or fluorescent lights, or discharge type street lights, you will get flickerless results when you film at any of these speeds. None of the speeds are HMI safe for 60 Hz powered lights, except possibly for square-wave ballasts. If you are filming under daylight or high-amperage incandescent light, any speed can be used at will. No harm should be done by changing speeds while running. Remember that a speed change calls for a corresponding lens aperture change. Crystal speed will be reached rapidly at 25 FPS and will take longer at 50 FPS, which is helped by a higher battery voltage not to exceed 16.8 volts.

Speaking of exposure, at 25 FPS your effective exposure time is about 1/80 second with a Bolex Reflex, 1/60 second with a non-reflex camera above serial number 100401, or 1/45 second if below serial 100400.

**Running** is controlled with the front rocker switch. In case the camera has a film jam, be ready to stop the camera immediately. A red stripe shows on the switch when it is in the Run position.

A **sync alarm** light is provided. It will light up whenever the chosen speed is not being maintained. An internal auto-reset **circuit breaker** will trip in case of overload and will reset minutes later when it cools.

Three threaded holes are provided for mounting on a tripod; two have the heavy camera / European 3/8"-16 thread and one has the 1/4"-20 U.S. / small-camera thread. A 3mm slot is present for anti-turn provision for certain handgrips or tripod accessories. The three holes are the same distance from the front of the camera as the original three holes in the Bolex flat base, but are of necessity displaced sideways.

If you are using a Rex-5, M-5, or SBM with a 400' (120m) film **magazine**, plug the magazine takeup motor into the socket on top of the TXM-26Ce. Note that if using the **MM** takeup, you need to set the torque motor slide switch to the left-hand MM position. If you are using the **WM** takeup motor, set the switch to the right-hand WM position. With the **MM** motor, the TXM-26Ce will vary the power going to the MM according to the running speed set on the TXM-26Ce speed dial. Note that the **MM** torque motor might not be able to turn fast enough, at the beginning of the roll, to safely run at 50 FPS using a standard 2" (50mm) core. The solution is to use a 3" (75mm) core for takeup, or else do not film at high speed for about the first 50 or 100 feet (15 or 30m) of the roll. With the **WM**, you must set the approximate speed also on the speed dial on the takeup motor.

Your Bolex is not a self-blinded (quiet) studio camera. For sound filming, you must either use a blimp or barney indoors, or else film outdoors at a distance, or through a closed window.

For double-system **sound**, you should use a film sound recorder such as a crystal Nagra, or else newer media such as DAT (digital audio tape), MiniDisc, Hi-Fi video tape, etc. Subsequent transfer, editing and mixing steps are beyond the scope of these instructions and we refer you to the books and courses on the subject.

### 3. Filming from video or computers

Your eye is not fast enough to see it, but the image on a video monitor or TV with a picture tube is actually composed of a spot of light that scans across the face of the picture tube from left to right, and from top to bottom, to paint the rectangular "raster" area that your eye sees as a picture. This causes shutter bar or flicker in the resulting film, as the camera's shutter is not open continuously. You can prevent this problem by filming from an LCD or Plasma monitor, which is not scanned.

### 4. For Technicians

The Torque Motor socket is for either an original Bolex 5.95mm x 2.1mm locking inverted power plug, or a standard 5.5mm x 2.1mm locking inverted power plug, preferably a Mouser 1710-2120. Center is positive, outside is negative. The power level supplied to the torque motor depends on the setting of the MM - WM slide switch, and the speed setting on the dial. For the WM, power is a solid +12V and the torque is adjusted using the knob on the torque motor. For the MM, power is +12V at 31 and 50 FPS, and +12V through 18Ω 2W for 25 FPS and below.

If it is necessary to adjust the crystal frequency, use a counter of known accuracy and attach it to the TP test point and case. Adjust trimmer capacitor for 6.400000 MHz ± 20 Hz.



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