

Installing and Using the TCS TXM-21C Crystal Motor for Eclair Cameflex CM3

1. Installation. Engage the bayonet drive coupling with the motor mounting and drive hole. Push the motor into place. Rotate the motor to the left until the locking screw lines up with the threaded hole in the camera. Tighten the locking screw.

Turn the Manual Advance knob counter-clockwise until the drive coupling pops into place and the camera movement begins to advance.

2. Powering. The TXM-21C requires one or two sources of **12 volts DC**. The 4-pin male XLR receptacles uses standard 12 volt wiring, that is with pin 1 negative (—) and pin 4 positive (+). A single 12 volt battery is used for speeds up to 30 FPS (frames per second.) A second 12 volt battery is added for the 40 and 50 FPS speeds. Do not apply more voltage than required as this will cause greatly increased internal heating.

If the second battery receptacle is not used, we recommend keeping the small plastic cap (supplied) inserted in it. This is because the pins are “live” when the camera is running, and shorting them to the case will blow the fuse and could cause additional damage.

The basic 12 volt circuit is protected by a single 5 amp GMA (5x20mm) fuse. The second battery receptacle is not separately fuse protected. Be sure to not apply reversed DC polarity to this receptacle as this will cause circuit damage. Normal current draw is about 2 amps at most speeds and 3 amps at 50 FPS.

3. Maximum & Minimum speeds. The highest speed included is 50 FPS (frames per second.) We suggest not filming at speeds below 24 FPS for critical use as you may see some exposure non-uniformity. Run tests to determine your acceptable range. Do not run the camera higher than its rated maximum speed.

4. Basic Operation. The camera is started and stopped with the “**RUN - STOP**” rocker switch. No current is drawn in STOP, except that a Milliframe Controller, if connected, will draw a small standby power and other accessories can draw their normal current. Flip the switch **quickly** to the desired position; this is a double pole switch, and changing slowly can upset the circuit balance if one side makes or breaks contact much before the other. (This can cause a delay in reaching crystal speed when starting or next starting.)

a. The speed of the TXM-21C is selected with the six-position rotary switch. The available speeds are 12, 24, 25, 30, 40 and 50 FPS. If you change speed, remember to also change the lens aperture.

60 Hz HMI speeds are 12, 24, 30 and 40 FPS.

50 Hz HMI speeds are 25 and 50 FPS.

b. When illumination is daylight or high-amperage tungsten lights, you can film at any speeds you like. Also, there is no harm in changing speed while running.

c. If the camera stops running with the viewfinder dark, use the Manual Advance knob on the top of the motor. Turn it **counter-clockwise** to restore the viewing position. **Do not turn clockwise** as the camera gate claw does not drive in reverse, and this will cause loss of the loops and a film jam.

d. The “**Sync Alarm**” light will come on any time the motor is not running at the selected speed. It is normal for it to come on briefly at the beginning of a shot, and to flicker slightly when running below 24 FPS. An occasional slight flicker means the circuit is working hard to maintain sync, but has not actually lost sync; only about 1/60 of a frame phase (timing) error can light the Sync Alarm.

5. External Speed Control. Connecting a TCS “**Milliframe Controller**” will automatically make it the reference for controlling the speed. Connection is by the RJ-12/RJ-45 socket on the rear of the motor. The speed switch on the motor is totally inactive with an external reference, and can be left in any position. The “Sync Alarm” light on the motor will show whether the externally selected speed is being maintained. External speeds should be kept within the range of about 10 to preferably 50 FPS. Inputting a speed much in excess of 50 FPS may result in an incorrect running speed, although the Sync Alarm may remain dark.

The TCS Milliframe Controller should receive power for a few seconds before the motor is started in order to stabilize its output. No standby switch is provided because of the small current drain of the Milliframe Controller, about 25-50 mA (.025-.050 Amp.)

The Run-Stop switch on the TMC or TMC² Milliframe Controller should preferably not be used for remote control of the camera. The camera may creep forward slowly when the Milliframe is in the Stop position, drawing a fair amount of current and causing internal heating, making this function unusable.

The TXM-21C has a digitally synthesized frame pulse output so it will actuate the footage counter in the TMC². However, the counter will not advance when the camera is creeping forward when the Milliframe is in the Stop position, giving an incorrect count.

For filming from a video or computer monitor, the speed of the external controller is set so as to get a stationary shutter bar. When you start filming the scene, push the controller’s “Phase” button until the shutter bar is where you want it, such as at the bottom of the monitor’s picture. Then the director can call “Action!”

6. Application Notes for sound filming:

a. Your Eclair CM3 is not a self-blimped quiet camera, so for successful sync sound filming you may need: a directional microphone and sound-absorbing walls; to use a blimp or barney indoors; to film outdoors at a distance; or to film through a window. Of course, to shoot a music video etc. where the performers are miming to playback and no audio is being recorded, camera noise is not a problem.

b. Choice of filming speeds:

Traditional sound speeds are **24 FPS** used in North America, and **25 FPS** in Europe and much of the world for television. The **30 FPS** rate is sometimes used for film that is to be only transferred to U.S. video, as it eliminates “judder,” an irritating 12 Hz irregularity in the strobing of moving objects arising from the so-called “2-3 pulldown” for digitally converting 24 FPS film to 30 FPS video. The audio recorder such as a Nagra must be equipped with a crystal sync generator to record a pilot signal (a timing or speed reference) on the recorder’s pilot or spare audio track. (Suitable crystal sync generators are also manufactured by TCS.) This tape is then resolved (i.e., transferred in sync) to 35mm perforated magnetic film, at the same speed as the picture, for editing.

It is also possible to have the sound on DAT (digital audio tape,) CD (compact disk,) or on Hi-Fi video tape such as 8mm, Hi-8, VHS, etc. Since these formats automatically record a control track that is locked to the same crystal on playback, acceptable sync can usually be maintained by simply re-recording to magnetic film without any special equipment. The magnetic film recorder is run at the same speed as the filming rate (24, 25 or 30) preferably locked to a crystal rather than the power line (mains) frequency, which can vary somewhat. Since general purpose audio equipment is not adjusted as accurately as equipment intended for double system sound, the best sync will be obtained by playing the digital or Hi-Fi tape back on the **same piece** of equipment (not just the same model) as was used in the field. The picture and sound rolls can then be edited to make film prints, or interlocked together for transfer to video.

7. Maintenance. The TXM-21C has engineering plastic gears that should be lubricated once in a while to minimize wear and noise. The moving parts can be reached by detaching the motor from the camera and removing the 6 screws that hold the lid in place. You can lubricate the drive train without further

disassembly. Keep the motor's open side uppermost to prevent the camera coupling and the two springs from falling out and becoming lost or dirty.

The **gear teeth** should have a thin layer of grease painted on them with an "acid brush" or similar stiff brush. Turn the Manual Advance by hand so you can reach all of the teeth.

The **sintered bronze bearing** should have about one drop of SAE 30 oil added to the exposed stationary shaft in the center of the large gear.

The internal **motor** has sealed ball bearings which should not need lubrication.

Use a rag to mop up any excess oil and grease inside the TXM-21C case. Replace the lid while guiding the camera coupling and the locking screw into position. Replace the six screws.

8. In Case of Difficulty.

Fuse. The TXM-21C has a 5 Amp GMA (5 x 20 mm) 32 Volt or higher standard fuse. It should blow in case of a film jam or other gross fault. The operator should, however, be alert and ready to turn off the power instantly in case of a film jam. The fuse may not act rapidly enough in every conceivable situation to prevent all possible damage to the motor and camera.

Rough Running Without a Camera. The TXM-21C is designed to be run only with the camera attached. Without a camera, the motor will overshoot and take a while to reach crystal speed, and the flexible camera drive coupling will rub against the inside of the lid and rattle, perhaps causing the out of sync light to flicker.

9. (for technicians) Milliframe Controller connections. An RJ-12 6-conductor cable is used to connect to the Milliframe Controller. Pin 1 is +12 volts, pin 2 is open for internal crystal or ground for 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 +5 volts low current, 2 is +12 volts, 3 is open for crystal or ground for external, 4 is 100 PPF input, 5 is ground, 6 is frame pulse, 7 is ground, 8 is direct 0~5 volt input 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.