



## **MODEL 3170 TIME CODE GENERATOR**

The Model 3170 Time Code Generator accumulates time from either an internal oscillator or an external frequency standard. When equipped with its synchronized generator option, the unit has two modes of operation; Generator and Synchronized Generator. In the Generator mode, time is presettable from the front panel and controls are provided to synchronize the unit to an external time standard such as WWV. Internal batteries maintain time accumulation for in excess of eight hours in the event of primary power failure.

In the Synchronized Generator mode, the unit automatically synchronizes to a serial time code input such as IRIG B.

The standard output of the unit is the IRIG B serial time code.

Optional outputs include:

Parallel BCD outputs (tenths of milliseconds through days)  
Parallel Binary Outputs (several ranges and resolutions available)  
IEEE488 In/Out  
RS232C In/Out  
Pulse Rate Outputs  
Sine Wave Outputs  
Modem Rate Outputs  
Other Time Code Outputs: IRIG A, E, G, H  
NASA 36 and 28  
AMR B1 and D5  
XR3/2137

Multiple Rate Slow Code Output for strip chart recording.

# SPECIFICATIONS

## Frequency Standard

The unit accumulates time from an internal temperature compensated crystal oscillator (TCXO) or external 1MHz frequency standard as selected by internal jumpering.

Specifications for the TCXO are:

Frequency: 1MHz  
Stability:  $\pm 1 \times 10^{-6}$  from 0 to +50°C  
Aging Rate:  $3 \times 10^{-9}$  per day ( $5 \times 10^{-7}$  per year)

Specifications for the 1MHz input are:

Waveform: Sine or square wave  
Amplitude: 0.5 to 9 volts, peak to peak  
Input Impedance: 10K ohms

## Time Preset

Nine thumbwheel switches plus a load switch provide for the presetting of real or elapsed time into the generator when operating in the Generator mode.

## Synchronization

### Generator Mode (Manual)

When equipped with the Synchronized Generator option, a front panel toggle switch permits selection of the Generator mode (manual synchronization) or Synchronized Generator mode (automatic synchronization).

The Model 3170 can be manually synchronized to an external time standard. The controls involved include a switch for selection of the advance or retard rate and switches to activate the synchronization logic. Selectable advance/retard rates are .001, .01, .1, 1, 10 and 100 milliseconds per second. Activation of the appropriate switch causes speed up or slow down of the accumulator at the selected rate. Other controls permit automatic start of the generator from an external pulse. Energization of a pushbutton switch arms the unit to start on the next input pulse. A lamp indicates when the generator is armed. Switches are included to manually start and stop the generator.

### Synchronized Generator Mode (Automatic)

If equipped with this option, in this mode the Model 3170 accepts a synchronizing time code. If the digital contents of the incoming code differ from those of the Model 3170's time accumulators, the unit refers to the operator setting of its error bypass logic. If this logic has been programmed to zero frames, the Model 3170's time accumulators are immediately synchronized to the contents of the incoming code. If the error bypass logic has been set to a level other than zero, synchronization occurs after N + 1 discrepancies, where N is the number of frames of error bypass programmed into the unit.

Once digital synchronization is attained, fine-tuning is performed to achieve phase correlation between the 1PPS rate derived from the input code and the Model 3170's 1PPS output. Two windows are established, one with boundaries at  $\pm 1$  millisecond from the on time point and the second at  $\pm 100$  microseconds from the on time point. If the phase comparison indicates that the two signals are greater than one millisecond apart, synchronization results in the reset of the Model 3170's minor time counter at the incoming time code's reference mark. If the phase comparison indicates that the two units are out of phase by less than one millisecond but more than 100 microseconds, the Model 3170 is sped up or slowed down at a rate of 10 microseconds per second. The decision to speed up or slow down the Model 3170 depends upon whether the Model 3170 lags or leads, respectively, the on time point of the 1PPS reference. Once the Model 3170 is synchronized to the 1PPS reference to within  $\pm 100$  microseconds, a one microsecond per second advance/retard (speed up/slow down) rate is used.

Front panel LED's indicate loss of the synchronizing input and synchronization of the Model 3170 to the time code input to within  $\pm 100$  microseconds.

## Synchronizing input

The Model 3170 automatically synchronizes to a time code input when in the Synchronized Generator mode.

Format: IRIG B in the modulated carrier form (other codes are optional)  
Amplitude: 0.1 to 10 volts, peak to peak  
Modulation Ratio: 2:1 to 6:1  
Input Impedance: Greater than 10K ohms

An input threshold detector can be adjusted within the range of +0.1 to +3.0 volts. If the peak value of the input falls below that level, the front panel INPUT LOSS LED is energized.

## Outputs

### IRIG B Serial Time Code Output

An IRIG B modulated carrier serial time code output is furnished at a rear panel BNC connector:

Amplitude: Adjustable from 0 to 8 volts, peak to peak  
Modulation Ratio: Adjustable from 2:1 to 6:1  
Maximum External Load: 600 ohms

Other available outputs and control inputs are listed on the front page.

Detailed specifications for these options are available upon request.

## Display

Generated time is displayed by nine front panel mounted LED's with 0.5-inch character height.

## Power Requirements

The Model 3170 operates from a primary power source of 115 volts AC  $\pm 10\%$ , 50-70 Hz and consumes less than 20 watts of power. In the event of primary power failure, internal Nickel Cadmium batteries maintain time accumulation for in excess of eight hours. No display or outputs are provided during power failure. The batteries are continuously trickle charged when AC power is present.

## Physical Characteristics

The Model 3170 is designed for rack mounting.

Height: 1.75 inches (4.4 cm)  
Width: 19 inches (48.3 cm)  
Depth: 19.5 inches (49.5 cm)  
Weight: Less than 10 pounds

## Environmental Characteristics

Operating Temperature: 0°C to +50°C  
Storage Temperature: -40°C to +100°C  
Humidity: 0 to 95% relative, non-condensing

## Manual

One copy of an operation and maintenance manual is furnished with each unit.