Application Note

PM 6680 Timer/Counter

Characterizing Frequency Bursts

Reciprocal counters are excellent at making measurements of frequency bursts. The PM 6680's advanced capabilities make it a truly exceptional product for use in these applications.

In this application, the customer needed to profile a two-tone burst used in sonar applications. (See Figure 1). The burst consisted of 4 ms at 10 kHz followed immediately by 6 ms at 20 kHz. The PM 6680 can be used to characterize any part of the burst.

The following examples describe measuring single-shot bursts. Other techniques are available for measuring repetivive bursts, also providing additional information such as pulse repetition factor and burst length.

Simple Burst Measurements

For measuring simple (single frequency) bursts, the measurement technique is simple. By merely programming a measuring time that is shorter than the length of the burst, the PM 6680 can measure the burst carrier. Since a reciprocal counter does not begin measuring until an input signal trigger is received, the counter simply waits for the start of the burst before beginning its measurement. (See Figure 1).

With the PM 6680's very high resolution, even short bursts can be measured with a high degree of precision. For example, a 10 µs burst can be measured with five digits of resolution.

Measuring a Selected Part of the Burst

The PM 6680 features **delayed arming** which allows the counter to wait for a specified period of time after the burst begins before starting the measurement. This delay may be programmed with a resolution of 100 ns. (See Figure 2).

By setting this delay to 5 ms, and a measuring time of 1 ms, the customer can measure the frequency of the second part of the burst. Here's how it is programmed:

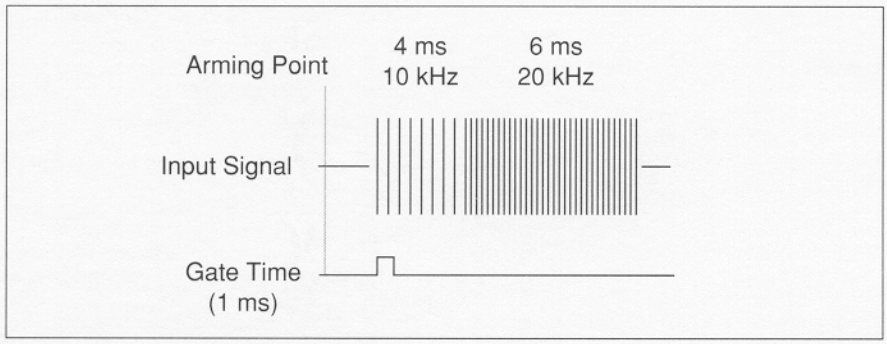

Figure 1. Reciprocal counters automatically synchronize with the first cycle of a burst.

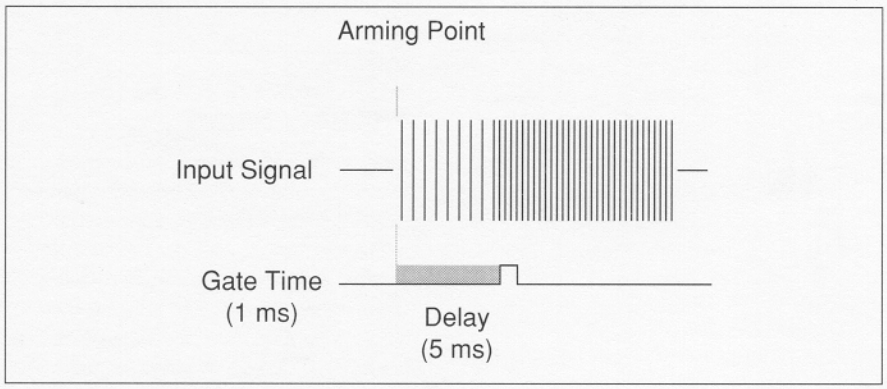

Figure 2. With arming delayed by time, the counter waits for the specified period of time after the first cycle before beginning the measurement.

PHILIPS

PHILIPS

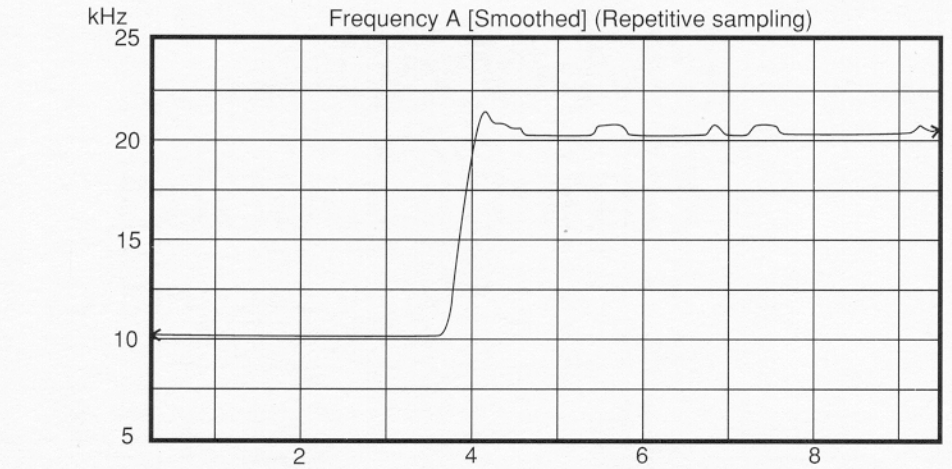

Figure 3. Plot of frequency versus time for sonar burst.

Use the DEFAULT key to reset the counter to its default settings. Connect the signal to be measured to input A. Proper input settings are required for dealing with these low-frequency signals.

- Press the COUPL button to set the counter for DC coupling.
- Press the SET A button and set the trigger level to a non-zero value (to prevent false triggering as a result of noise) less than the amplitude of the burst.
- Press COM via A to send the input signal to the B input for arming.

Next, the counter must be set up to make a frequency measurement. Since frequency A is the default function, no change to the function is necessary. To make sure the measurement will fit within the burst, a short enough measurement time must be programmed:

- Press the SET MEAS TIME button and enter a measuring time of .001.

Then, we must set up the arming so that the counter will wait 5 ms after the start of the burst before beginning measurements.

- Press the AUX MENU button to access the auxiliary functions.
- Press the SELECT key until **Ar.Start** is displayed. Press ENTER.
- Use the SELECT key to set the arming source as **Chan b.** Press ENTER.
- Use the SELECT key to choose arming delay by time **(delay ti.)** Press ENTER.
- Use the keyboard to enter the number delay time .005. Press ENTER.

Finally, start arming must be enabled.

- Press the START button under the heading ARM.
- Use the SELECT key to choose a POSitive edge. Press ENTER.

Press RESTART to set the counter up to make the measurement. At this point the signal may be input to the counter.

Using TimeView™ to Profile Frequency Bursts

TimeView™ software allows you to analyze changing frequencies as never before. Using an external signal to trigger the burst, and then using that signal to arm the counter, TimeView™ can provide an accurate plot of frequency versus time. Measurements in Figure 3 are taken at intervals of 100 µs. Cursors may be used to make precise measurements on the plot, for example, the length of the 10 kHz and 20 kHz parts of the burst.

Literature

Request literature #G0285A for a PM 6680 Timer/Counter brochure.

For information on additional PM 6680 Timer/Counter applications, request:

Lit.# G0293A TimeView™ brochure
Lit.# B0225A Advanced Arming Delay by Event Counts
Lit.# B0227A Characterizing Rapidly Changing Frequencies
Lit.# B0230A Sources of Error in Time Interval Measurements
Lit.# B0231A Exploring the Modulation Domain

John Fluke Mfg. Co., Inc.
PO Box 9090, Everett, WA 98206
Tel. (206) 347-6100

For more information call:
(800) 443-5853 (toll-free) in the U.S.A.
(416) 890-7600 in Canada.
(206) 356-5500 from other countries.

Philips International B.V.
T&M Dept., Building TQIII-4
5600 MD Eindhoven, The Netherlands
Telex: 35000 PHTC NL/NLFEVSI

Printed in U.S.A. B0226A-04U9203/SE EN

Printed on recycled paper

FLUKE®