Title: High-Speed Strobe/Camera Triggering with MultiFlex Motion Controllers
Products(s): All MultiFlex motion controllers
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Summary

PMC's MultFlex family of motion controllers feature versatile high-speed position capture and compare circuits that allow users to precisely synchronize motion with external events.

More Information

The position capture circuits capture (or "latch") the current encoder position when a TTL logic **input** is activated, while the position compare circuits assert a TTL logic **output** when one or more pre-defined encoder positions are reached. A significant new feature of the encoder compare output circuit is a high-frequency programmable **strobe** (or multiple trigger) mode. In this mode, a user can define the start and end position of a "strobe zone" for an axis. Inside of this zone, the controller will fire a series of equidistant output pulses at frequencies up to 20 MHz. This feature can be useful, for example, in optical inspection line-scan systems where image acquisitions need to be triggered at regularly spaced intervals and at very high rates.
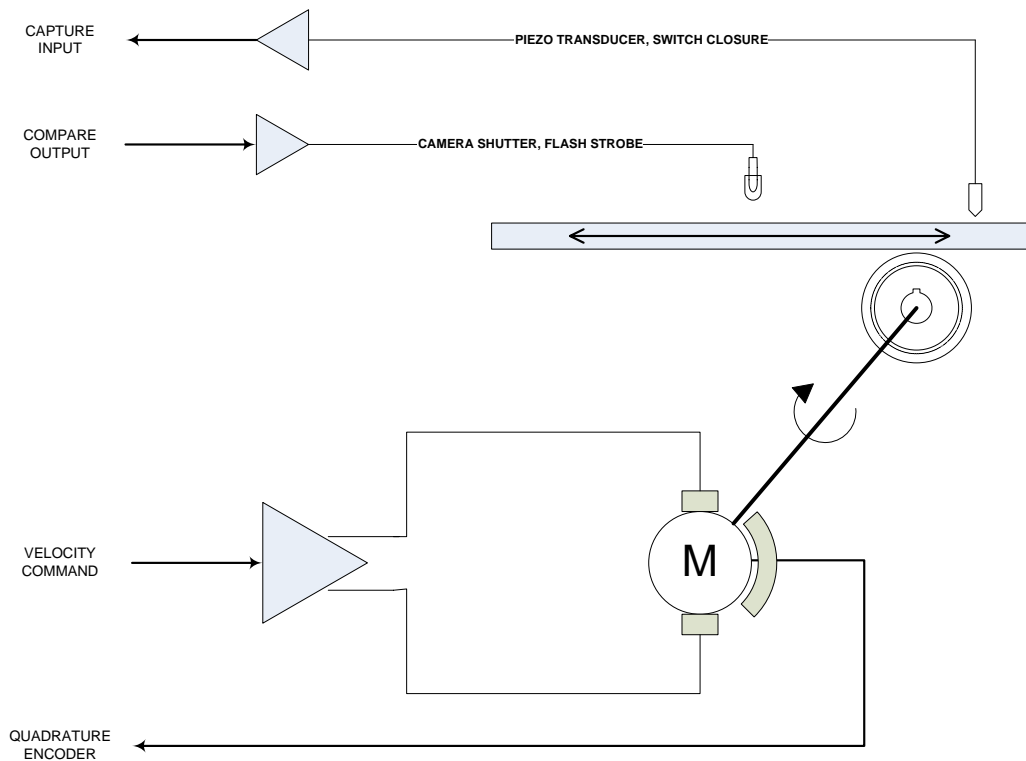

Figure 1. Encoder Position Compare Example

As shown in Figure 2 below, the hardware strobe function is fully programmable, allowing the user to define the following parameters:

strobe parameter	range	units
start point	$0 - 2^{31}$	encoder counts
count	$0 - (2^{32} - 1)$ (32-bits)	pulses
period	0 - 65535 (16 bits)	encoder counts
pulse width	0 - 65535 (16 bits)	system clock periods (25 nS)

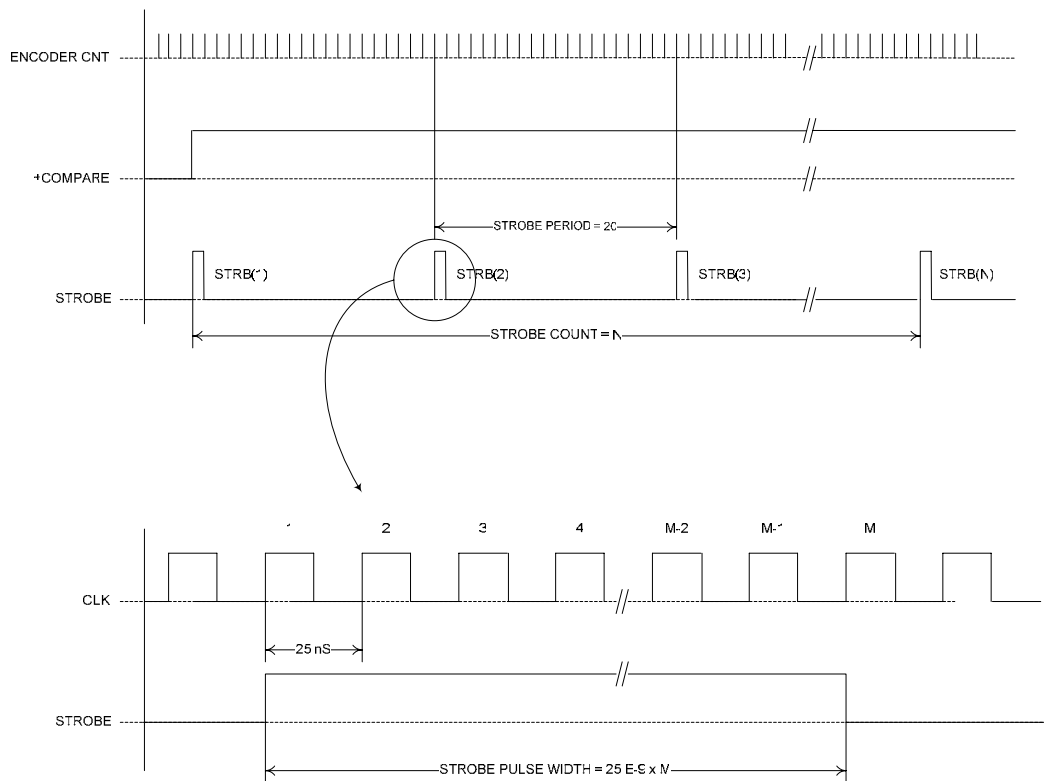The range of allowable pulse widths is 25 nS – 1.64 mS.

Figure 2. High Speed Hardware Strobe Timing

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Motion Control API Programming

For users who choose to program their MultiFlex motion controller from a high-level language, like C/C++ or C#, the following Motion Control API functions are used to configure and enable the hardware strobe mode of the position compare circuit:

- MCConfigureCompare()
- MCEnableCompare()

An example of the use of these functions is shown below:

```
WORD axis = 1;
double start = 1000;
double* values = &start;
double inc = 400;
int mode = 5;
double period = 10;
int count = 100;

MCConfigureCompare( hCtlr, axis, values, 1, inc, mode, period);
MCEnableCompare(hCtlr, axis, count);
```

Motion Control Command Language Programming

For those users who choose to program their MultiFlex motion controller from the native Motion Control Command Language (MCCL), the following example illustrates a typical sequence of instructions required to configure and enable the hardware strobe on the axis 1 compare output:

```
1BC-1        // reset compare logic
1OC5         // set output compare mode to 5 for hardware strobe function
1 LC1000     // set compare start position to 1000 counts
1NC400       // set PW = 10 uS (25E-9 * 400)
1OP10        // set strobe period to 10 encoder counts
1BC100       // start compare and issue 100 strobe pulses
```

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