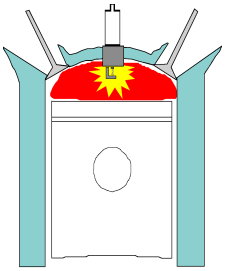


KNOCK WINDOW

Return to Home Page

A Motorola Low-Level Driver Component

The Knock Window driver executes in conjunction with the Engine Position driver to produce a pulse referenced to two angles on the crankshaft. The pulse is continually repeated, with a constant number of teeth between each pulse, to produce a pattern of pulses matched to the position of the engine regardless of engine speed.

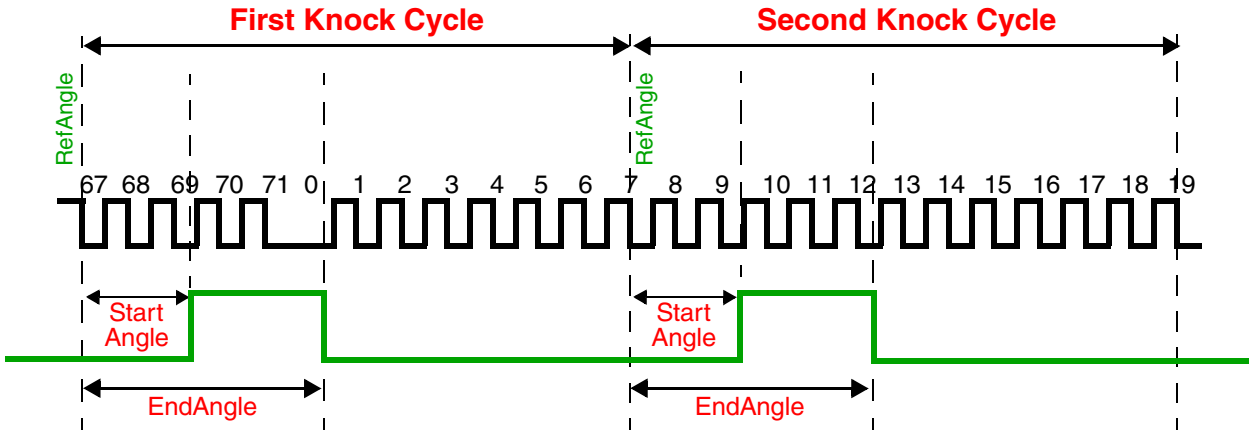
An example application of the driver is to create a window for use in detecting noise in the engine. The output pulses may be used to gate the signal from an acoustic sensor to a detection circuit, which is tuned to detect signature frequencies of pre-ignition (knock) in an internal combustion engine.

The Knock Window driver divides the engine cycle into a series of knock cycles – each cycle consists of the same number of degrees, and the driver produces one pulse in each cycle. As an example, if one engine cycle has 72 teeth, and the number of knock pulses desired is 6, the driver would produce one pulse every 12 teeth.

The pulse placement within the knock cycle is defined by specifying the start and end angles of the pulse relative to a reference tooth that defines the beginning of the knock cycle. At the end of each knock cycle, the driver automatically begins the next knock cycle and schedules the next window pulse.

The diagram below illustrates an example of normal operation of the Knock Window driver.

System Parameters	
Pulse start angle	24 degrees
Pulse end angle	53 degrees
Tooth that begins first knock cycle	7 degrees
Knock cycles per engine cycle	6



The example is a snapshot at some point well after initialization. Using the example parameters, the first knock window after initialization would begin at tooth 7, assuming that knock was initialized immediately after the Engine Position driver detected the first gap.

At initialization, the Knock driver searches for the next upcoming knock cycle so that it can begin scheduling pulses as soon as possible. In the preceding example, if the Engine Position driver had already been running for awhile and had determined that the current crankshaft position was 600 degrees at the time of Knock driver initialization, the Knock driver would have automatically determined that the first pulse should begin at 694 degrees.

Knock Window Control Options

The Knock Window driver includes a set of C function calls that may be used to update and manipulate the knock pulses. The driver allows for:

- Updating the start and end angles for a pulse
- Enabling and disabling the output of knock pulses on one or more knock channels

The driver buffers all angle updates and enable/disable requests until the beginning of the next knock cycle. This guarantees that a pulse in progress will not be affected by an update.

The Low Level Driver System

The Low Level Driver system includes a set of drivers with an API that interfaces to and controls the hardware for a microcontroller unit (such as the Motorola MPC555)

Engine Position

Tracks the angular position in the engine cycle based on input from an automobile's crankshaft and camshaft sensors

Spark & DTS

Generates pulses defined by duration and end angle; can be used to time the firing of spark plugs

Fuel

Generates pulses immediately upon request or defined by duration and end angle; can be used to control fuel injection duration and frequency

Speed Measurement

Determines the speed of a rotating shaft

Synchronous PWM

Synchronizes an output pulse width modulation (PWM) signal to an input PWM signal

Synchronous Output

Transmits a clock signal and serial data, following a specific protocol

Angle Toggle

Toggles an output pin and generates interrupts on selected crank angles

QADC Trigger

Generates pulses defined by a start angle and duration

Knock Window

Generates pulses defined by a start and end angle

Discrete Input/Output (DIO)

Operates as a general-purpose digital input or output pin

Return to Home Page

For more information, contact your local Motorola sales representative or:

Motorola, Inc.
Advanced Vehicle Systems Division
Attention Software Operations
6501 William Cannon Drive West, Mail Drop OE-39
Austin, TX 78735-8589