ENGINE POSITION

Return to Home Page

A Motorola Low-Level Driver Component

Overview

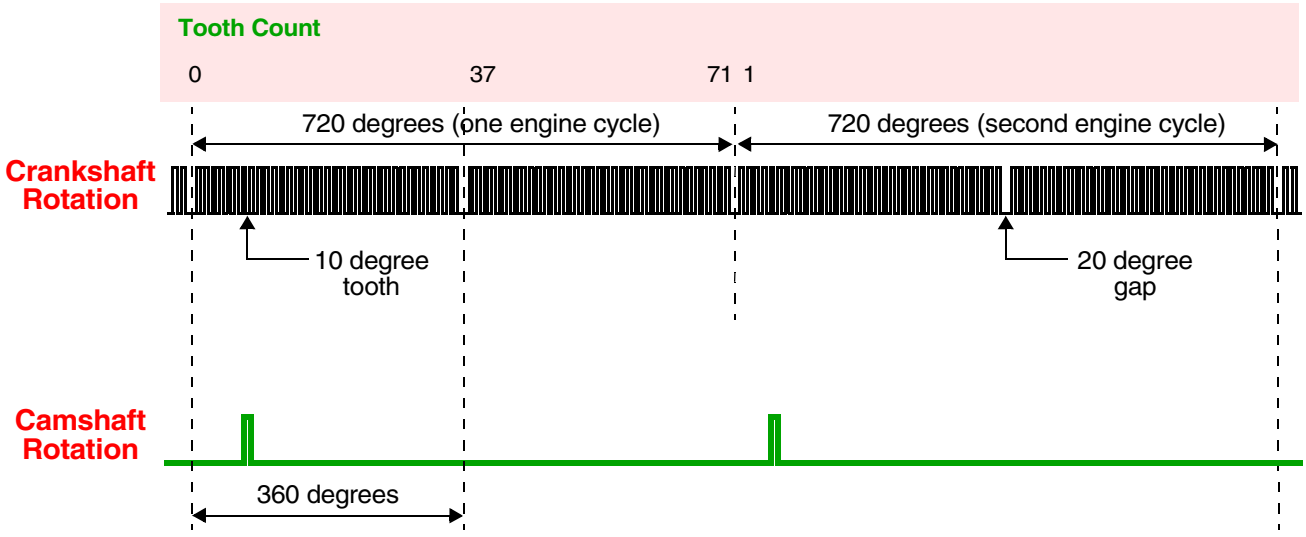
The Engine Position driver, one of the Motorola low-level driver components, is designed to process the inputs from a crankshaft and camshaft sensor from an automobile engine. It provides the application software with the angular position and speed of the crankshaft. The Engine Position driver also provides engine position and angular velocity information for Fuel, Spark, and other peripheral output drivers.

The Engine Position driver comprises C code as well as two TPU microcoded functions—a Crank function and a Cam function—which interfaces to engine position sensors and their associated hardware.

The Engine Position driver processes the input signal from two sensors attached to an automobile engine. The first sensor detects a pattern of teeth on a wheel rotating with the engine crankshaft. The teeth are distributed around the circumference of the wheel and typically consist of a series of evenly spaced teeth, followed by a gap of one missing tooth or multiple missing teeth. The second sensor detects one or more teeth on the camshaft.

This driver supports different toothed wheel configurations. Currently, it supports a 60-2 or a 36-1 toothed wheel crankshaft. This driver also supports multiple teeth on the camshaft.

Each rotation of the crankshaft produces a pattern of input pulses corresponding to the repeated pattern of teeth and gap or gaps. One engine cycle comprises two rotations of the crankshaft and one rotation of the camshaft. The diagram below illustrates a typical relationship of the crankshaft and the camshaft using a 36-1 toothed wheel.



The camshaft may provide information such as whether the current revolution of the crankshaft corresponds to the first or second half of the engine cycle. The camshaft may provide other information also, depending on its design by the manufacturer.

The Engine Position driver senses the crankshaft's rotational pattern and stores the crankshaft's current angular position. The driver also stores the angular position of two most recent teeth on the camshaft.

Operating Modes

The Engine Position driver is always in one of two modes:

- Count
  The driver counts and records the time of all transitions detected. This is useful in helping the application software determine when the input from the crank signal is stable enough to allow the driver to begin searching for the gap.
- Search
  The driver searches for and synchronizes to a missing tooth (or teeth) on the crankshaft signal. The application should ensure that the input signal is stable before initializing the driver into `Search` mode.

These modes determine how the crankshaft input is treated. The application software can change from Count mode to Search mode at any time by re-initializing the channel.

Period Averaging

The driver has an option to average the measured periods for use in detecting the gap and in filtering noise; this averaged period is not available for use by the output drivers; they use the instantaneous tooth period for their calculations.

Noise Blanking

The driver has an option to filter some noise from the input crankshaft signal. On both rising and falling edges, the driver sets an internal time match. The driver then ignores all subsequent input transitions until the expiration of this match.

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