

Quasi-Absolute Encoding

Application Brief M-022

What is Quasi-Absolute Encoding?

It is a method using Incremental encoders to determine absolute position after a small change in position.

Applications:

- Throttle Valve Positioning
- Steering Angle Sensor

Used in:

- Power steering control
- Suspension control
- 4-wheel steering
- Traction control

A.) First, let us look at a typical 3-Channel Incremental Encoder and Codewheel.

There are two channels which produce digital signals that are 90 degrees out of phase with each other, which provides direction information and allows discrimination into quadrature counts. See A and B in Figure 1. The third channel occurs once per revolution and is used as a reference to establish an absolute position. The index channel coincides with channels A and B both low. See I in Figure 1.

Why use incremental encoding instead of absolute encoding?

Encoder Type	Advantages	Disadvantages
Optical Absolute	Position known on power up Easy interface to controller Various output codes available High resolution	Large size Expensive 2^N counts requires N channels
Optical Incremental	Low cost Small size High resolution Index pulse for absolute reference	Position unknown on power up* May require interface circuitry

* Quasi-Absolute addresses the issue of unknown position on power up for optical incremental encoders.

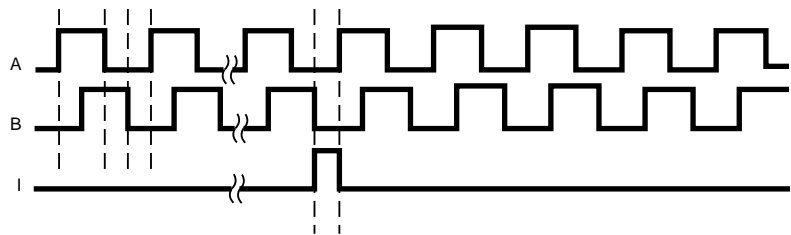


Figure 1.

B.) Now, let us look at the same 3-Channel Incremental Encoder used with a Special Codewheel to achieve Quasi-Absolute encoding:

A coding scheme can be used with multiple index channels in order to determine the absolute position without a large movement of the

codewheel. A very simple scheme might use 1 index at 0 degree, 2 indexes at 90 degrees, 3 indexes at 180 degrees, and 4 indexes at 270 degrees. This would provide absolute position information within 1/4 turn. See I_1 in Figure 2.

Another method might use indexes spaced such that a specific number of counts on channels A and B happen between adjacent indexes. See I_2 in Figure 2.

More complex coding schemes can be used to provide absolute position detection in just a few mechanical degrees of movement.

Codewheels:

Quasi-Absolute codewheels may be developed in cooperation with Agilent Technologies.

Encoders:

Special encoders may be required depending on desired resolution. For resolutions of 73 LPI or below, a standard 3-channel encoder may be used to provide up to 1 index pulse per electrical cycle. Higher resolutions using 1 index pulse per 10 or more cycles may also use a standard 3-channel encoder. High resolutions using 1 index pulse per 9 or less cycles requires a special encoder design and may be developed in cooperation with Agilent Technologies.

For more information concerning your particular application, you may contact Agilent Technologies.

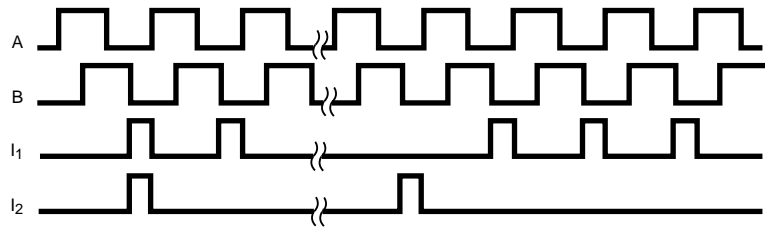


Figure 2.