

Embedded Systems

Rotary Pulse Generators & Lab 3



F-35 Lightning II Electro-optical Targeting System (EOTS)

What Is An RPG?



Rotary Encoders



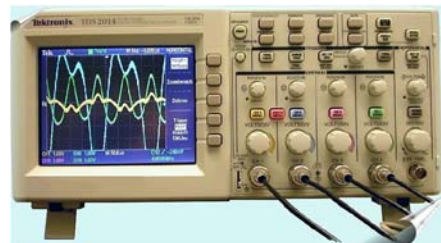
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Rotary Encoder Applications



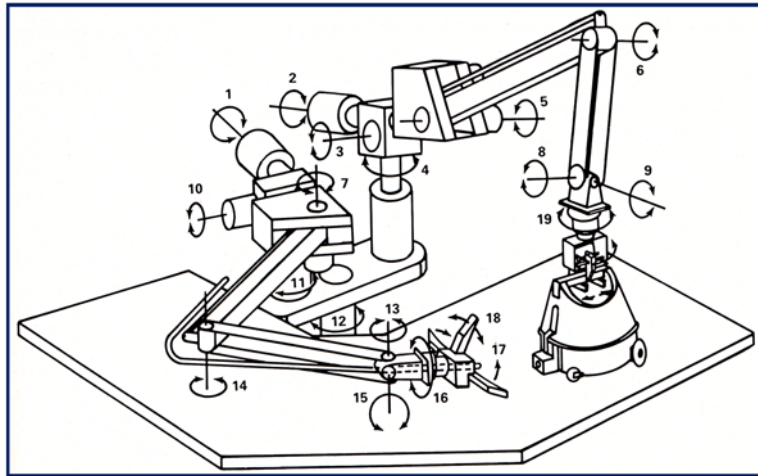
Consumer Electronics User Interfaces



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Rotary Encoder Applications



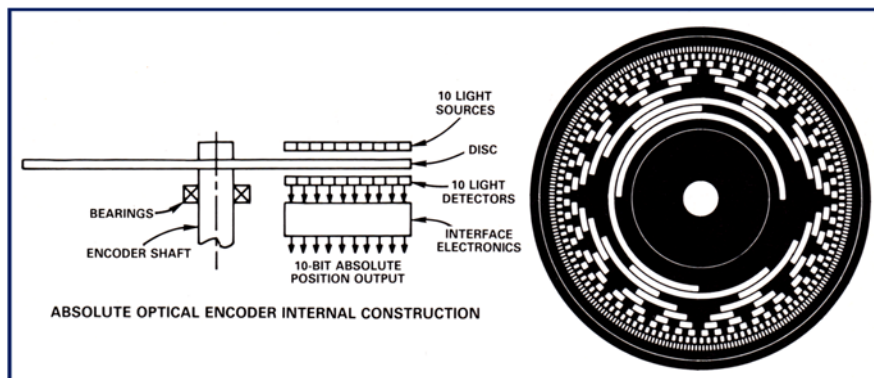
Multi-axis Robot Arms

From *Analog-Digital Conversion Handbook*, Analog Devices, 3rd Edition. Prentice Hall, 1986.

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Rotary Encoders



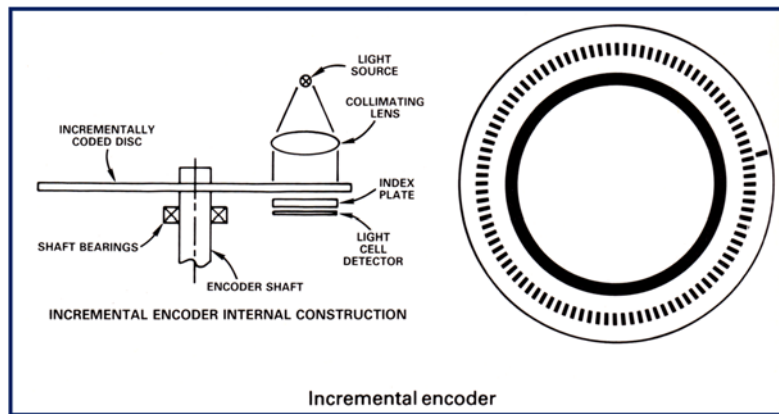
Optical Encoders

From *Analog-Digital Conversion Handbook*, Analog Devices, 3rd Edition. Prentice Hall, 1986.

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Rotary Encoders



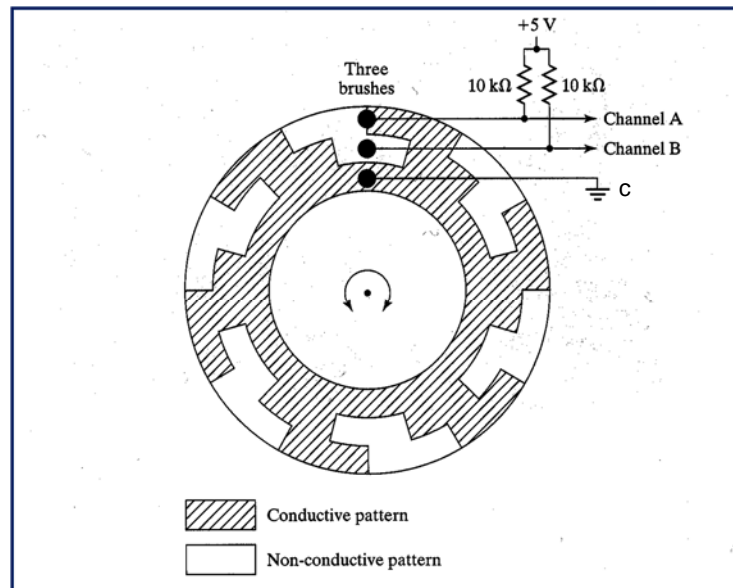
Optical Encoders

From *Analog-Digital Conversion Handbook*, Analog Devices, 3rd Edition. Prentice Hall, 1986.

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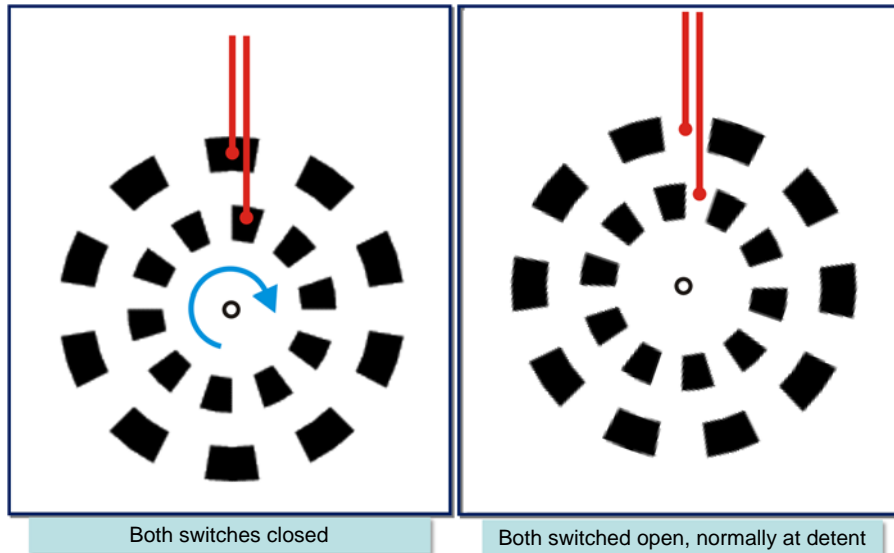
Simple Rotary Encoder Internals



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Simple Rotary Encoder Internals

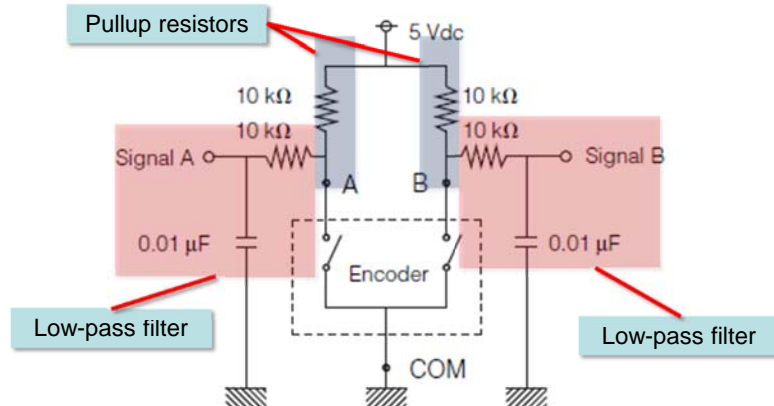


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Electrical Connections

Test circuit, from the data sheet

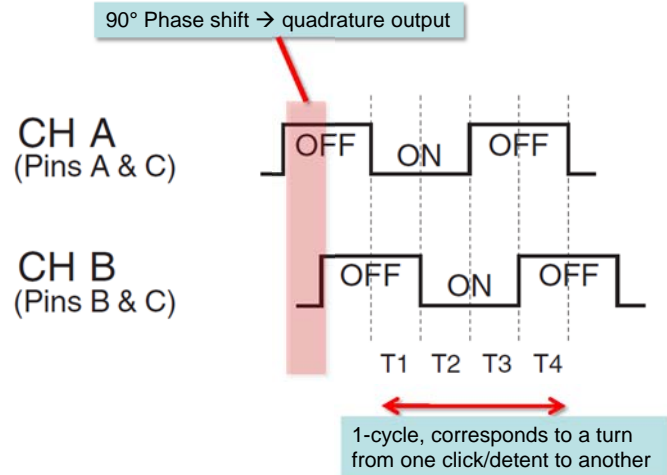


Remember contact bounce?

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Terminology



Number of pulses per revolution depends on particular device. Common numbers are 4, 6, and 12, but some have as many as 6,000 (\$\$\$)

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Panasonic EVE-GA1F2012B Encoder



Cost: ~ \$0.70

12 detents (positions)

What is a detent?

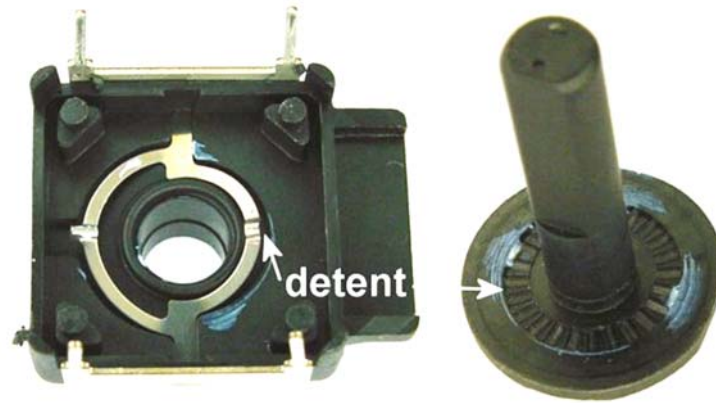
Data sheet does not explicitly specify maximum rpm, but implies that it is 60

Quadrature output

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Opening Up An Encoder



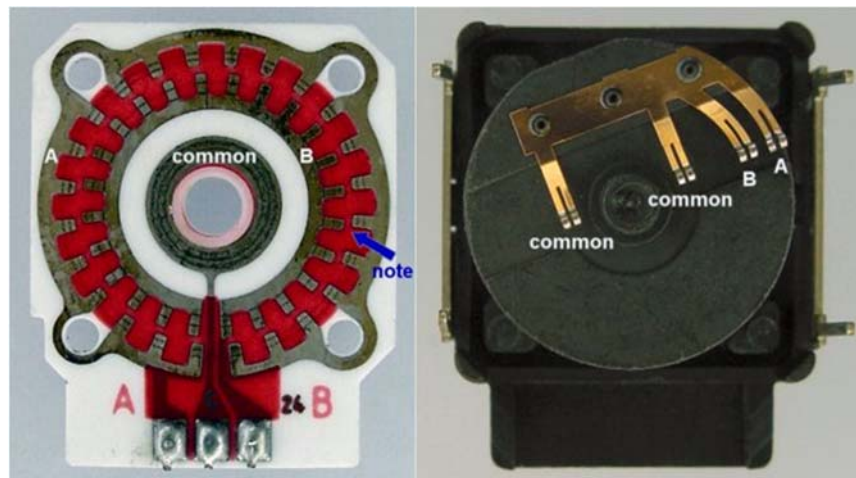
Inside the top of the rotary encoder case is a metal disc spring (also called a spring washer) with small raised areas. The disc of the encoder shaft is impressed with ridges that rub against the bumps in the spring to make clicking sounds as the shaft is turned.

Credits: www.robotroom.com

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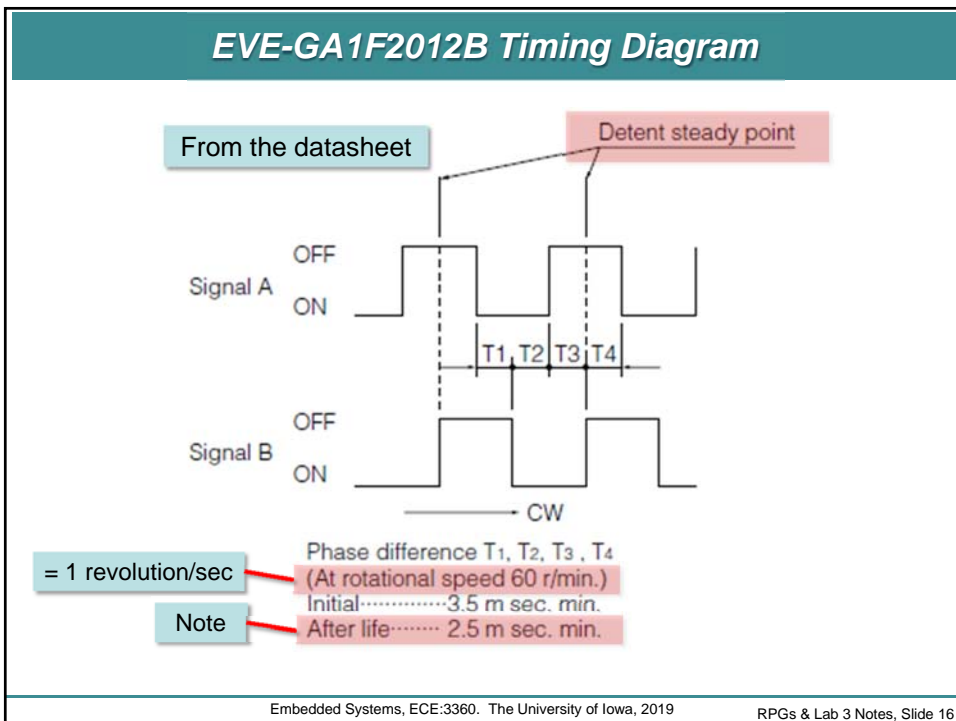
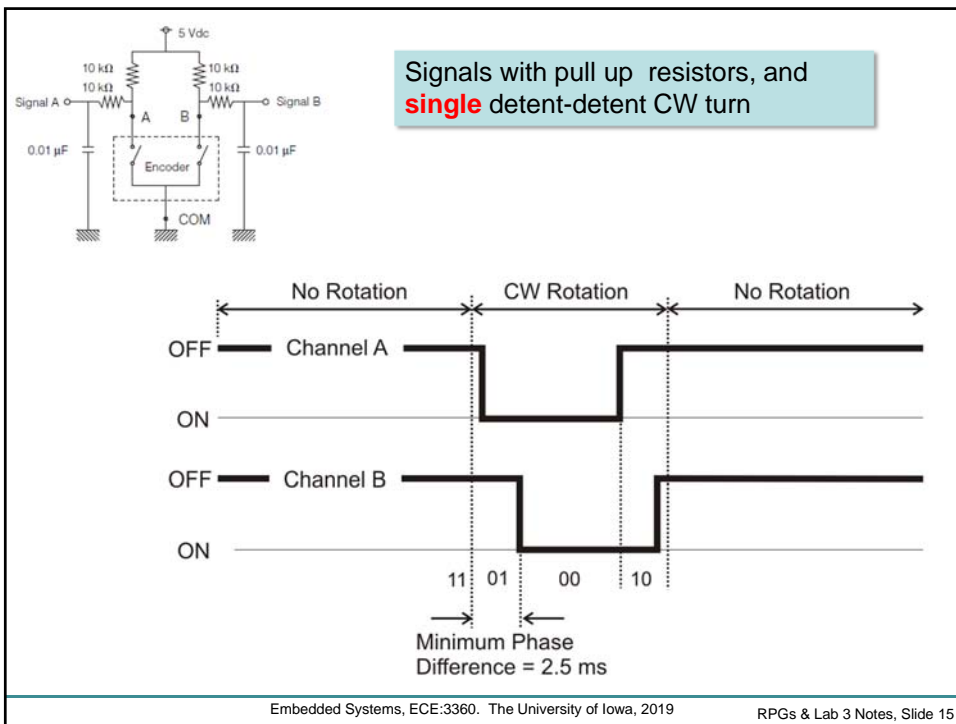
Opening Up An Encoder



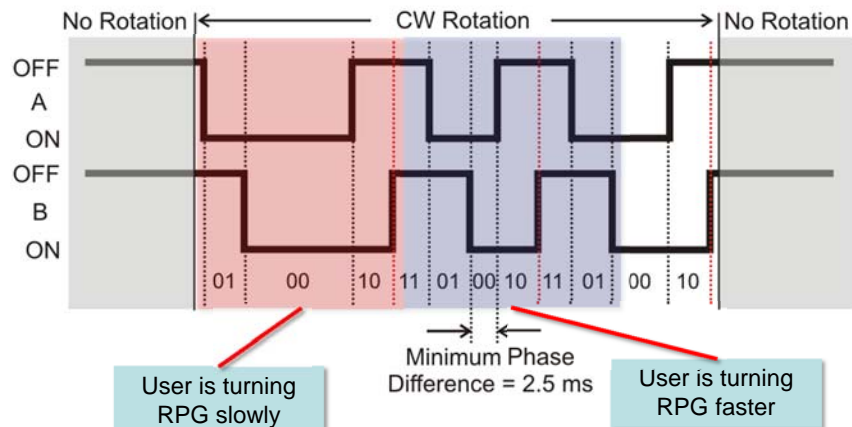
Credits: www.robotroom.com

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EVE-GA1F2012B Timing Diagram

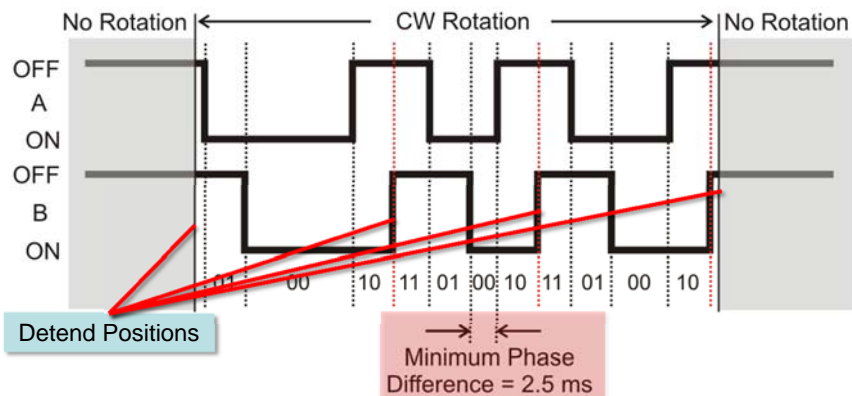


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EVE-GA1F2012B Timing Diagram

Note at **detent steady point**, both switches are open (and output pulled high), and the pulse width depends on how fast the RPG is turned.



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