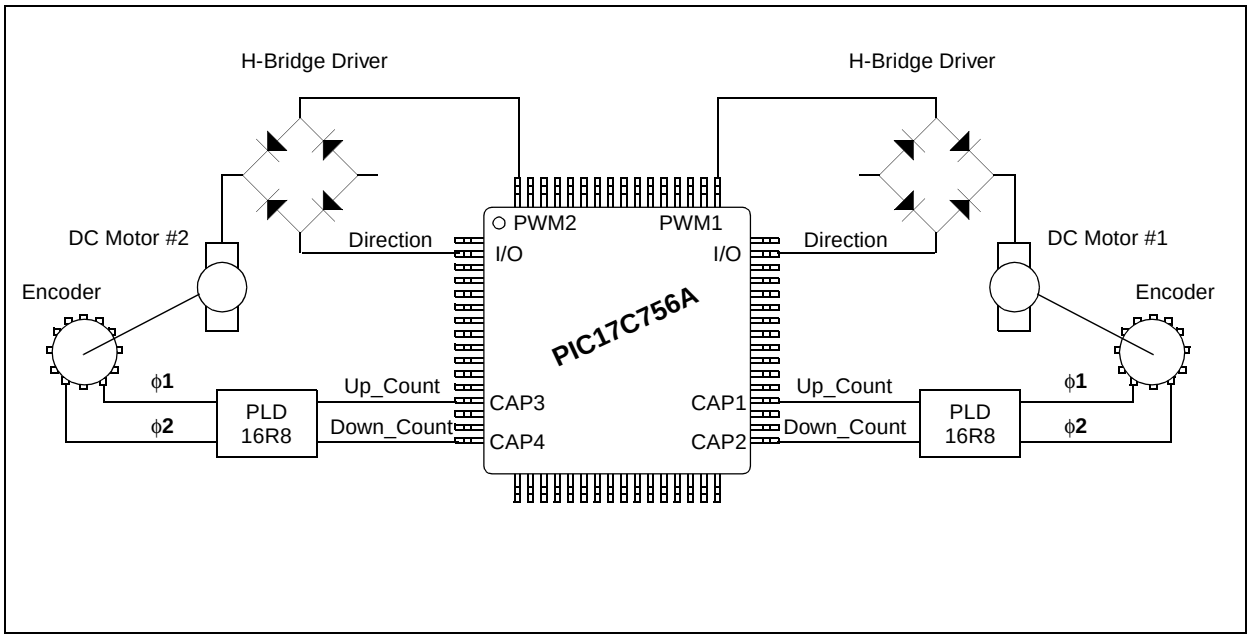
DC Servo Motor Control Application Brief



APPLICATION DESCRIPTION

The PIC17C756A microcontroller is an excellent choice for cost-effective servo control in embedded applications. With two PWMs and four Captures, position and velocity servo control for two motors can be accomplished. (Velocity-only control can be done for three motors.)

The D/A for control of each DC motor is accomplished by one PWM. An H-Bridge is used to translate the PWM into usable voltages and currents to drive the motor. Feedback (quadrature data) on the motor goes from the encoder to a programmable logic device (PLD), which is translated into Up_Count and Down_Count pulses. This information is captured by the PIC17C756A and used in its calculations to control the motor.

The PID (Proportional, Integral, Differential) algorithm is widely used and, although not the optimum controller for all applications, it is easy to understand and use. The PIC17C756A can perform the PID control calculation in less than 100µs (@33 MHz), allowing fast control loop sample times.

For more details on how to implement motor control, refer to *AN532 Servo Control of a DC Brush Motor*.

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System Requirements

System Requirements	PICmicro™ MCU Applicability
Motor drive	• High speed PWM reduces noise
Motor drive feedback control	• 4 Captures
Motor direction control	• 50 I/O lines

Related Applications

- Industrial Valve Control
- Remote Controlled Toys
- Pick and Place Machines
- Remote Controlled Motors
- Robot Arm (Manufacturing)

PIC17C756A Features

Performance	Peripherals	Power	Package
✔ DC - 33 MHz	✔ 4 Captures (16 bit)	BOR	DIE
✔ Program Memory: 16K internal, 64K external	✔ 3 PWM (10 bit)	< 1 μA Standby Current	✔ 64/68 pin
✔ Data Memory: 902 bytes	✔ 4 Timers	✔ Low Voltage Capability - see the PIC17C75X Data Sheet for details (DS30264A)	
✔ Single Cycle Instructions	2 USARTs		
✔ 8 x 8 Single Cycle Multiply in 121 ns	10-bit A/D (12 channel), < ± 1LSb error		
	SPI™		
	I^2C™ Master		
	✔ Watchdog Timer		
✔ Key features utilized in this application.			

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