

# Application Note #55:

## Program Interrupt with On Input

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### Functional Description

Skeleton Code Name: Program Interrupt with On Input

Software: Q Programmer

Hardware: ST10-Q Stepper Drive

Hardware Compatibility: Q Program Capable Drives Only

References: [Host Command Reference Manual](#)

- Commands:
  - o OI – On Input
  - o MT – Multi-Tasking
  - o QX – Queue Load & Execute

Disclaimers:

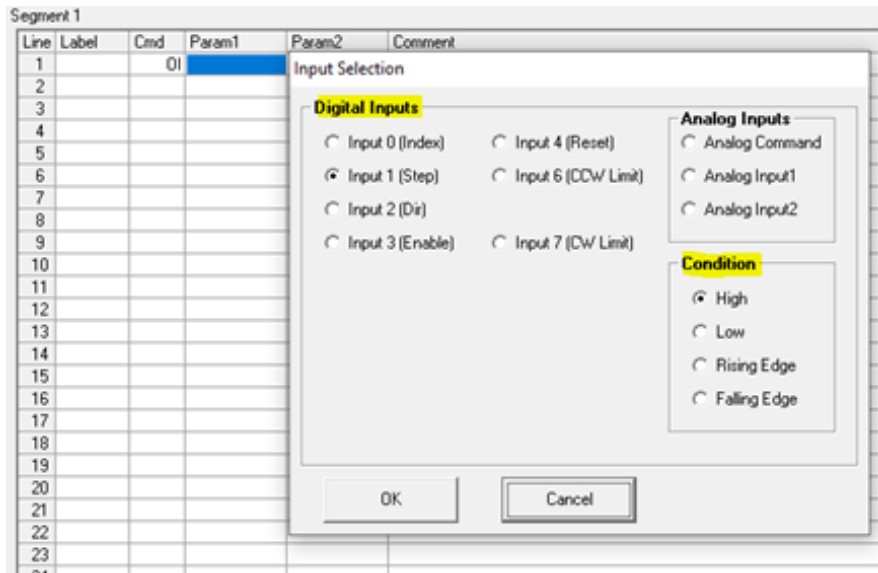
- The demo code provided in this Application Note executes motion at a motor shaft.
- Please ensure that the motor is not attached to a load or near personnel.
- Untested motion of shaft can damage equipment.
- Motion of a freely rotating shaft can also cause bodily harm to personnel.
- This Application Note does NOT explain the purpose of the MT Command. Please read our Host Command Reference for further details.

### Goals

#### Goal 1: To familiarize oneself with the On Input (OI) Command

- a. On Input (OI) behaves like a program flow interrupt and if configured correctly, it can act as a program flow interrupt AND as a move interrupt/stop. OI is declared once at the start of our program but is active throughout the entire program until triggered by an input. In a sense, OI is not so much a command, but a function that we declare in our program.
  - As its Param1, OI takes the desired input to interrupt the program and the condition of said input we want the OI function to monitor (HIGH or LOW).
  - NOTE: Only one active declaration of the OI command is allowed at any one time.

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- Once the desired input condition is met throughout our program segment, OI function will stop further execution or the current program segment and load up/execute Segment 10. Within Segment 10, we will program our interrupt handler.
- After our interrupt handler is done executing in Segment 10, we must load another segment to jump back to our regular program (via the QX Command). We must also, re-activate the OI function as we wish for it to capture another program interrupt input. If not, it will remain inactive after having been triggered.
- To configure OI as simply a program flow interrupt, but still complete any move going on at the motor, we must turn ON the Multi-tasking via our MT Command.
- To configure OI as simply a program flow interrupt AND a move interrupt/stop, we must turn OFF Multi-tasking via the MT Command.

**Goal 2: To execute a simple program using OI that showcases both its Program Flow interrupt and the Program Flow/Current Move interrupt capabilities.**

- Written at the start of Segment 1 are motion configuration commands. These commands include velocity, acceleration, deceleration, and electronic gearing setting. They are application dependent:

Line	Label	Cmd	Param1	Param2	Comment
1		VE	0.25		Velocity set to 0.25 RPS = 15 RPM
2		AC	50		Accel set to 50 rps <sup>2</sup>
3		DE	50		Decel set to 50 rps <sup>2</sup>
4		EG	10000		Step/Rev set to 10000 Step/Rev

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- b. We then declare our On Input function and set it to monitor Input X3 for a LOW state:

7		OI 3L	On Input set to monitor input 3 for a LOW state
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- c. After declaring our On Input, we will program our two different interrupt styles. First up is the simple Program Flow interrupt, which is done by turning on Multitasking (MT=1). This means the current move at the motor will reach completion if input X3 goes LOW during the move:

8	LABEL1	MT 1	Multitasking turned on, Program Flow interrupt only. check segment 10 for interrupt handler
9		DI 150000	Travel distance set to 15 revolutions (1 minute of travel)
10		FL	Move Execute

- d. We will wait three seconds after the motion is executed. Then, we will switch our interrupt mode to include program flow interrupt, but to also stop any move at the motor. We have changed our direction of motion to CCW, while MT is set to 0, so we know what portion of the program we are on.

11		WT 3.00	Wait Time of 3 seconds
12		MT 0	Multitasking turned off, Program Flow and Move interrupts/stop active. check segment 10 for interrupt handler
13		DI -150000	Travel distance set to 15 revolutions in opposite direction (1 minute of travel)
14		FL	Move Execute

- e. The following is our complete Segment 1. Velocity has been set sufficiently low to allow enough time to turn input 3 LOW during a displacement of +/- 150,000 counts:

Line	Label	Cmd	Param1	Param2	Comment
1		VE	0.25		Velocity set to 0.25 RPS = 15 RPM
2		AC	50		Accel set to 50 rps <sup>2</sup>
3		DE	50		Decel set to 50 rps <sup>2</sup>
4		EG	10000		Step/Rev set to 10000 Step/Rev
5		NO			
6		NO			
7		OI	3L		On Input set to monitor input 3 for a LOW state
8	LABEL1	MT	1		Multitasking turned on, Program Flow interrupt only. check segment 10 for interrupt handler
9		DI	150000		Travel distance set to 15 revolutions (1 minute of travel)
10		FL			Move Execute
11		WT	3.00		Wait Time of 3 seconds
12		MT	0		Multitasking turned off, Program Flow and Move interrupts/stop active. check segment 10 for interrupt handler
13		DI	-150000		Travel distance set to 15 revolutions in opposite direction (1 minute of travel)
14		FL			Move Execute
15		WT	3.00		Wait Time of 3 seconds
16		QG	#LABEL1		if input 3 never set to LOW, jump back to program at label 1
17					
18					

- f. Our interrupt handler will simply spin the motor a rev in both directions, four times. It will wait three seconds in between each half rev index. Then, it will reload Segment 1 of our program. Segment 1 will execute starting at line 1 (see QX in Host Command Reference) and will therefore re-activate our OI function.

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Segment 10

Line	Label	Cmd	Param1	Param2	Comment
1		WT	3.00		Wait Time 3 seconds
2		VE	1		Velocity set to 1 rps = 60 rpm
3		NO			Our interrupt handler for now will have two back and forth movements for simplicities sake
4		DI	10000		
5		FL			
6		DI	-10000		
7		FL			
8		DI	10000		
9		FL			
10		DI	-10000		
11		FL			
12		WT	3.00		Wait Time 3 seconds
13		QX	1		Load and Execute Segment 1 again. Segment 1 will re-declare DI for us within its Line 7

[Click here for the Sample Code.](#)

### Try it out today!

If you have questions about this or any other application, please reach out to our Apps Engineering Group for any assistance at 1-800-525-1609 or [support@applied-motion.com](mailto:support@applied-motion.com).