



## ALLEN-BRADLEY BULLETIN 1336 IMPACT MAXIMUM/MINIMUM FUNCTION BLOCK

APPLICATION NOTE # 1336E - 9

August 27, 1997

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### PURPOSE

The purpose of this document is to provide guidelines for wiring and control schemes for the Bulletin 1336 IMPACT AC Drive. This document is to be used as a suggestion only. Users must ensure that installations meet applicable codes and are suitable for the existing conditions.

The Bulletin 1336E User Manual should be used as a reference to ensure that proper wire selection, routing and fusing guidelines are followed. Refer to application note #1336E - 4 for an overview of Function Block concepts.

### WHAT THIS NOTE CONTAINS

This note contains descriptions and possible uses for the Maximum/Minimum function block incorporated into the 1336E drive

### INTENDED AUDIENCE

This application note is intended to be used by personnel familiar with the hardware components and programming procedure necessary to operate the Bulletin 1336S.


### WHERE IT IS USED

The diagrams, parameter settings and auxiliary hardware used in this application note are designed to address specific issues in many different applications. Some changes by the User may be necessary to apply the concepts of this document to a specific application.

### TERMS AND DEFINITIONS

[ ] - Indicates a parameter name

Link - A link is a software connection between two parameters that lets one parameter receive information from another.

 - This represents a **source** which is a link parameter that provides the information.

 - This represents a **destination** which is a link parameter receiving the information.

### DESCRIPTION

The Maximum/Minimum function block is used to configure the drive with a selector circuit that makes logical decisions based upon the programmed "function" inputs. To configure the drive with the Maximum/Minimum circuit the [Function Sel] parameter (212) must be programmed appropriately. See figure 1.

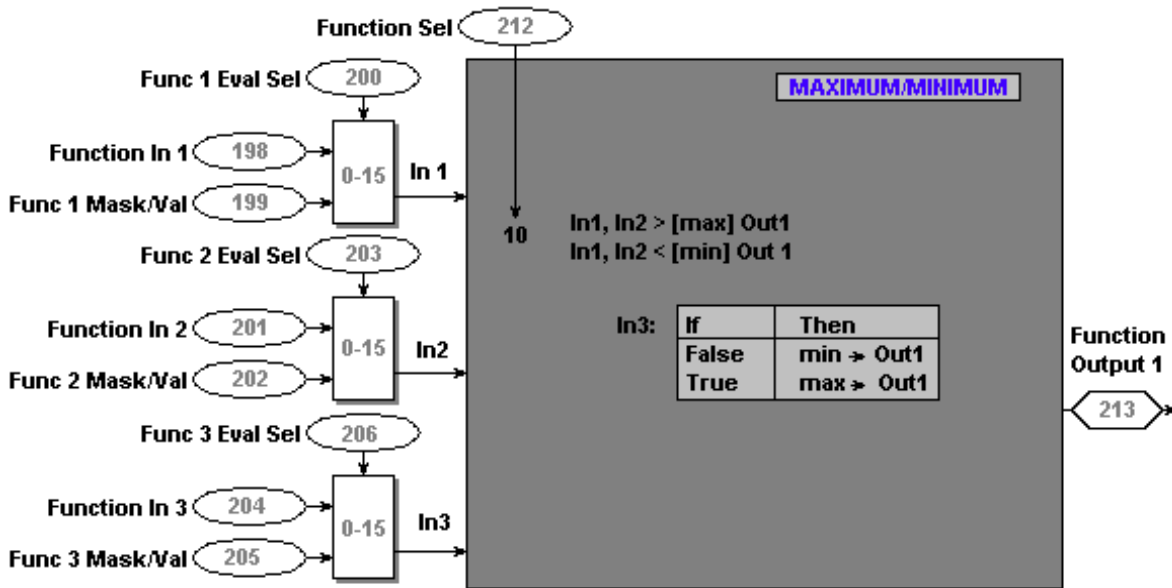


Figure 1

### EVALUATING THE FUNCTION INPUTS

The “Function Evaluation Select” parameters (200,203,206) are used to precondition the inputs. The numbers 0-15 correspond to the 16 different evaluations available. Refer to table 1 for the descriptions.

Table 1

VALUE	EVALUATION (1 = on = true = set = closed) (0 = off = false = reset = open)
0	Pass the value directly through the function block
1	Mask the value (logical AND the input value with a value)
2	Send a true value when <b>all</b> bits that are set in the mask are <b>on</b> in the input value
3	Send a true value when <b>all</b> bits that are set in the mask are <b>off</b> in the input value
4	Send a true value when <b>any</b> bits that are set in the mask are <b>on</b> in the input value
5	Send a true value when <b>any</b> bits that are set in the mask are <b>off</b> in the input value
6	Send a true value when the input value is equal to the value of the mask
7	Send a true value when the input value is not equal to the value of the mask
8	Send a true value when the signed input value is < the value of the mask
9	Send a true value when the signed input value is < or = to the value of the mask
10	Send a true value when the signed input value is > the value of the mask
11	Send a true value when the signed input value is > or = to the value of the mask
12	Send a true value when the unsigned input value is < the value of the mask
13	Send a true value when the unsigned input value is < or = to the value of the mask
14	Send a true value when the unsigned input value is > the value of the mask
15	Send a true value when the unsigned input value is > or = to the value of the mask

### Maximum/Minimum

When [Function Sel] is set to ten, the Maximum/Minimum function is used to select the minimum or maximum value of In1 or In2. The logical state of In3 is used to determine which value is sent to the output. (In4 - In8 are not used) Refer to figure 2.

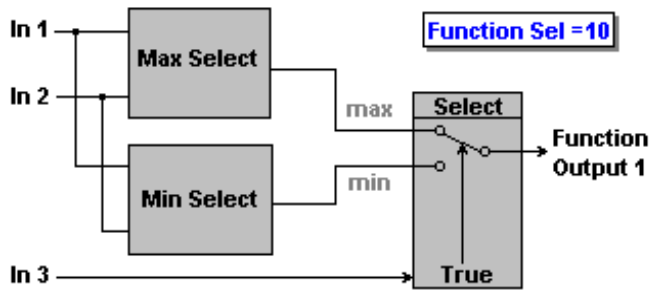


Figure 2

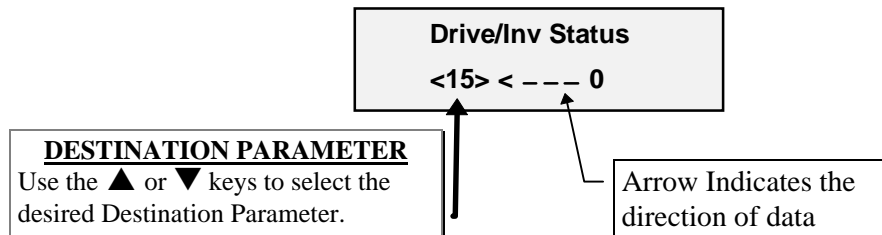
In3	Output
False	Minimum Value
True	Maximum Value

**APPLICATION CONSIDERATION**

The Function Input parameters for the state machine block are *linkable destination* type parameters. This means that other parameter values may be directly sent to, or linked, to these locations. All function inputs that are used by the function block must be programmed with a constant value or have a link.

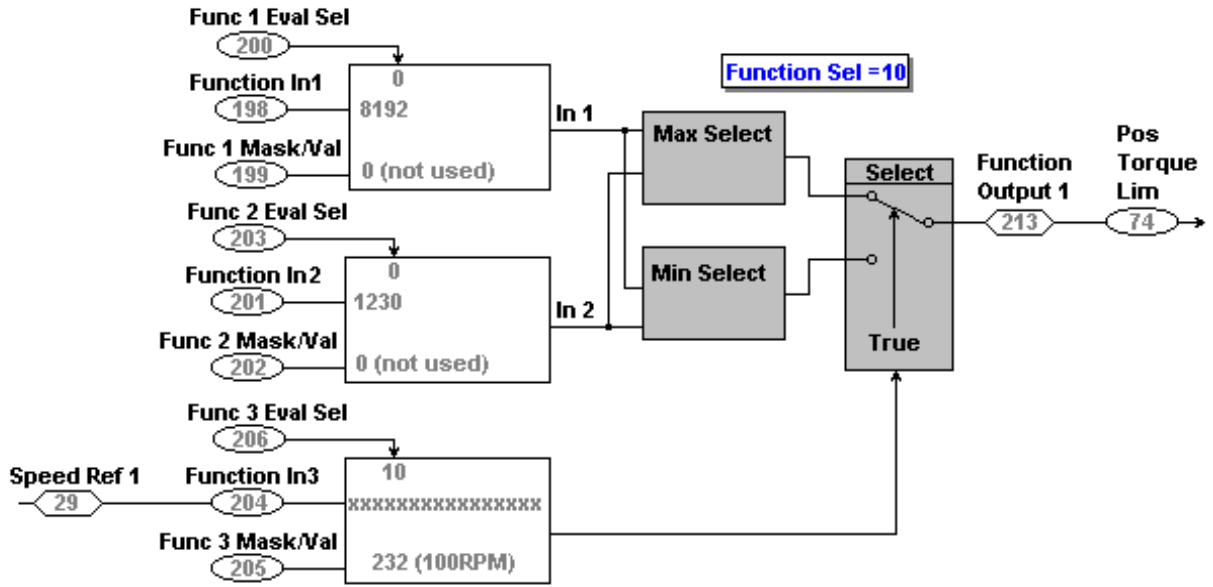
The Function Output parameter is a *source* parameter. This parameter must be linked to a destination parameter.

The LINK menu of the Human Interface Module is used to create parameter links. An example of the link display is shown below.



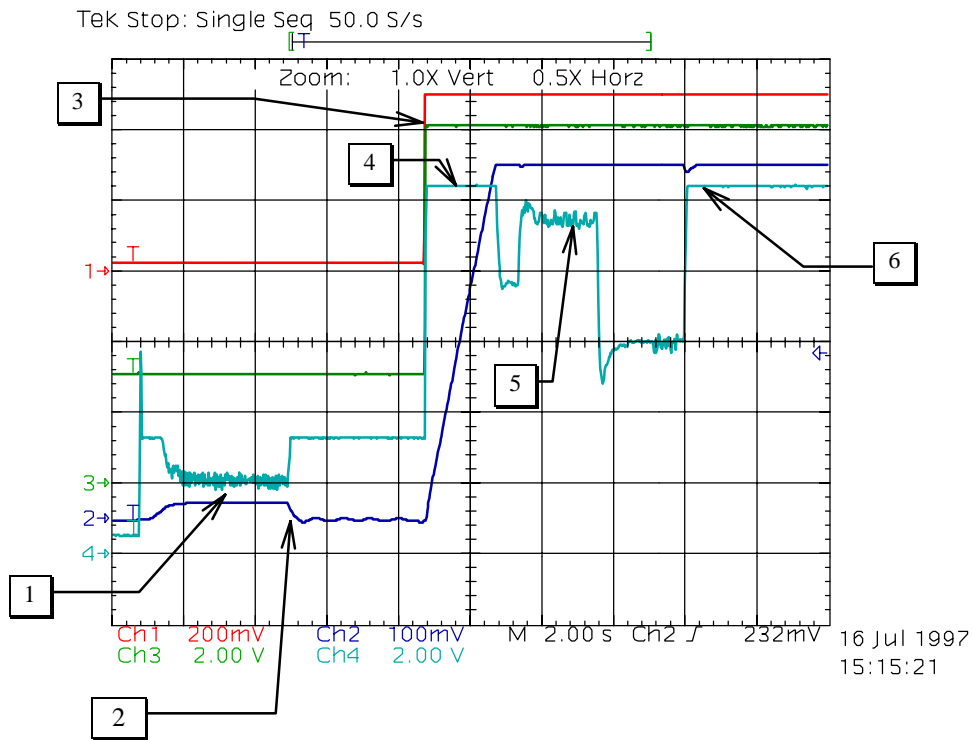
**APPLICATION EXAMPLE**

The following example shows how the maximum/minimum block can be used to change the torque limit of the drive. An application that has a “thread speed”, such as a blast drill, may need to limit the torque during the thread operation. Once the “thread” portion is complete, it is required to supply more torque to perform the drilling operation. A digital input can be used as the “switch” to change from minimum to maximum.



In this example we simulated a blast drill. There is a thread speed for attaching drill extensions and to ensure that the threads are not damaged when the piece is getting tight we set the current limit down when the thread speed push-button is depressed. So when the motor stalls this indicates that the extension piece is tight and the tread speed push-button is released. Now the speed is increased as well as the torque limit to give us “full power” when drilling. Ch1 is speed command. Ch2 is actual speed. Ch3 is torque limit. Ch4 is actual torque.

- 1.) At thread speed with “normal” load for threading.
- 2.) Extension completely threaded by indication of actual torque hitting the torque limit and the motor stalls.
- 3.) Speed command and torque limit jump up as soon as the thread push-button is released.
- 4.) Actual torque is at torque limit during acceleration then falls off when at speed.
- 5.) Load increase indicates “normal” drilling load.
- 6.) The drill hits some rock and drive hits torque limit.



In this example we simulate a “dipper/trip” shovel. This is a huge shovel that could dig a basement for a house with a single pass. The Impact will control the pin that holds the bottom of the shovel in place while digging. After a dig is made the Impact pulls the pin and the shovel full of dirt is dumped. While the shovel is digging and retracting after a dump the Impact must maintain tension on the cable that pulls the pin.  
 Ch1 is internal torque. Ch2 is actual speed. Ch3 is pull-pin push-button. Ch4 is DC Bus.

1.) The shovel is digging. As it extends, the pin cable is being pulled shown as an increased level on the DC Bus. The bus level is being maintain with a brake chopper wired into the drive. 2.) The push-button that controls the dump pin is depressed. The drive switches from straight torque mode to torque/min mode and reverses the motor with full torque which pulls the pin to allow the shovel to dump. When the push-button is released the drive returns to straight torque mode. 3.) Here the arm is retracting to make another pass and to close the shovel. Then the process is repeated.

