



ALLEN-BRADLEY BULLETIN 1336 IMPACT MULTIPLY/DIVIDE FUNCTION BLOCK

APPLICATION NOTE # 1336E - 11

August 27, 1997

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 Multiply/Divide 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 Multiply/Divide function block is used to configure the drive to perform math functions, either standard or drive per unit scales, on the "function" inputs. To configure the drive with the Multiply/Divide circuit the [Function Sel] parameter (212) must be programmed appropriately. Refer to figure 1.

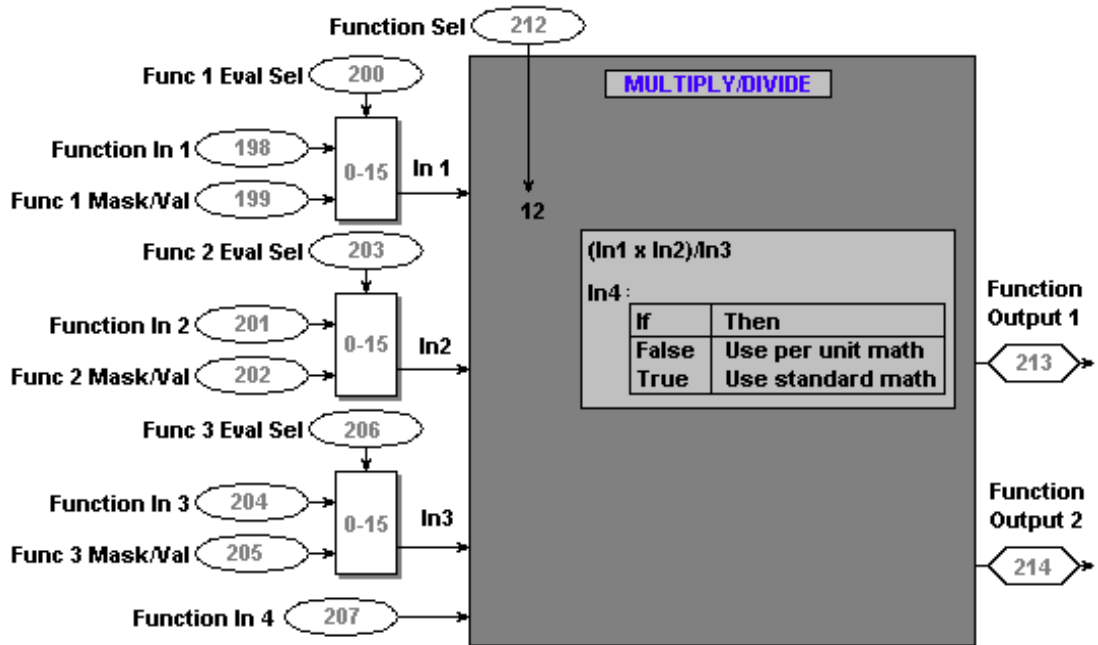


Figure 1

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 all bits that are set in the mask are on in the input value |
| 3 | Send a true value when all bits that are set in the mask are off in the input value |
| 4 | Send a true value when any bits that are set in the mask are on in the input value |
| 5 | Send a true value when any bits that are set in the mask are off 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 |

Multiply/Divide

When [Function Sel] is set to twelve, the Multiply/Divide function is used to multiply In1 and In2, then divide the result by In3. The output is a double word scaled in either standard math or drive per unit (In5 - In8 are not used). Output 1 is the whole number, Output 2 is the fractional number of the double word output. Refer to figure 2.

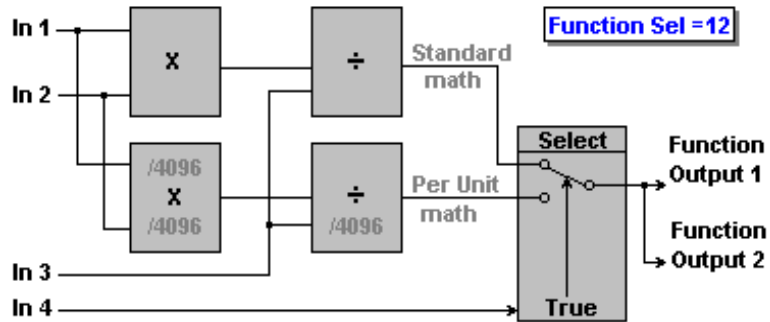


Figure 2

Per Unit math scales numbers to drive units. Drive units are 4096 = 1 (or 100%).

$$\left(\frac{4096 \cdot 4096}{4096} \right) = 4096 \text{ 0000}$$

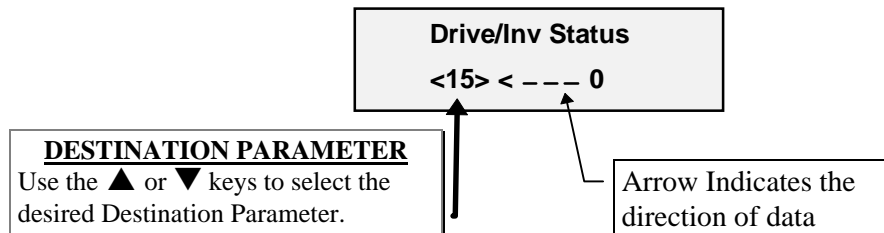
Output 1 Output 2

APPLICATION CONSIDERATION

The Function Input parameters for the multiply/divide 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.

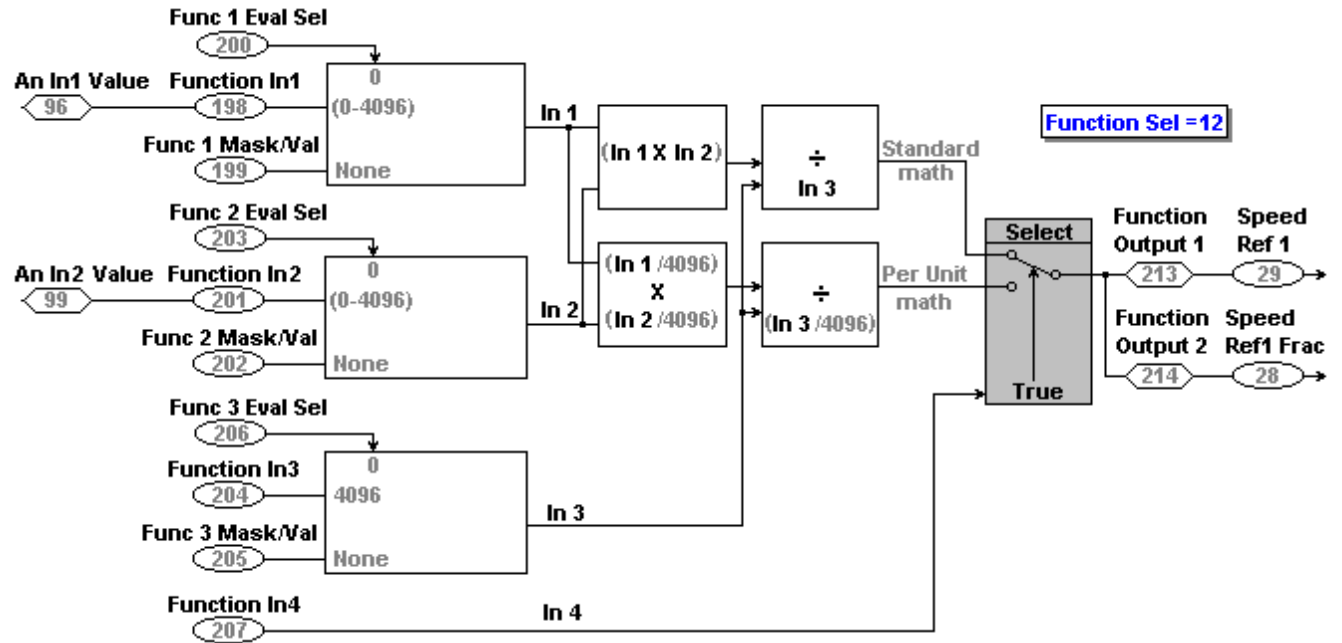
The Function Output parameter is a *source* parameter. This parameter must be linked to a destination parameter.

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**

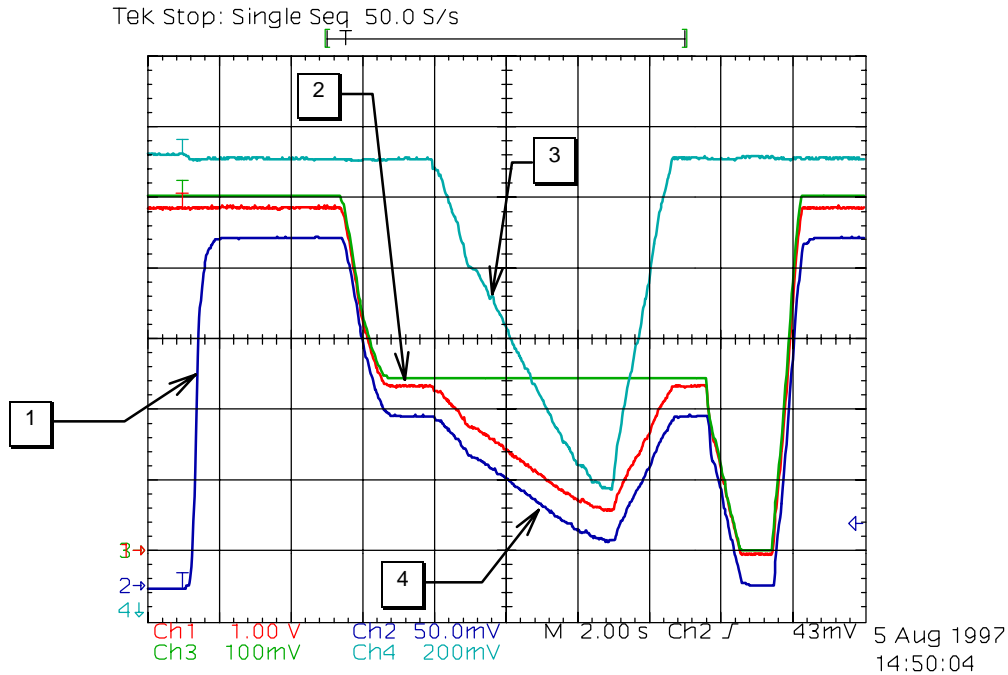
The following example uses the multiply/divide block to



Ch1 is function output 1. Ch2 is speed. Ch3 is Analog In 1. Ch4 is Analog In 2.

The following plots simulate the use of the function block on a winder application. Channel 3 could be the speed command generated from the line speed. Channel 4 is simulating the diameter of the roll increasing. The first plot was done manually.

1.) The drive is started and ramps to the commanded speed. 2.) The line speed is adjusted to the desired speed. 3.) This is the signal that is simulating the roll diameter increasing. As the value decreases, 4.) the speed drops off even though the line speed has not changed.



This plot shows basically the same thing only we put a signal generator in for the roll diameter changing. This would be channel 4. Notice the speed of the motor follows this signal regardless of the line speed.

1.) When the line speed signal is changed the overall speed of the winder is also changed.

