



## ALLEN-BRADLEY BULLETIN 1336 IMPACT TIMER/DELAY FUNCTION BLOCK

APPLICATION NOTE # 1336E - 6

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 Timer/Delay 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 timer/delay function emulates the action of a mechanical on/off delay timer. The function inputs are routed to circuits that perform logical functions (AND,NAND,OR, and NOR). Additional noise immunity can be achieved by using a time value in both the on and off delay circuits. To configure the drive with the Timer/Delay circuit the [Function Sel] parameter (212) must be programmed appropriately. Refer to figure 1.

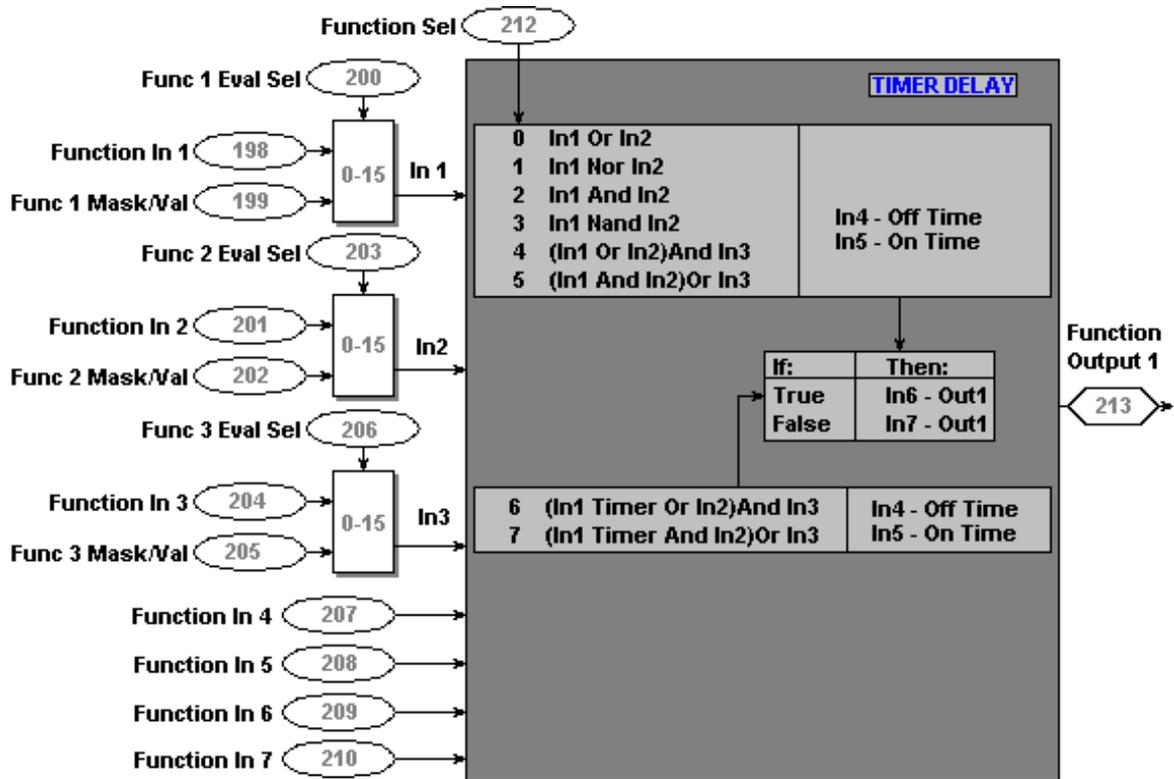


Figure 1

**EVALUATING THE FUNCTION INPUTS**

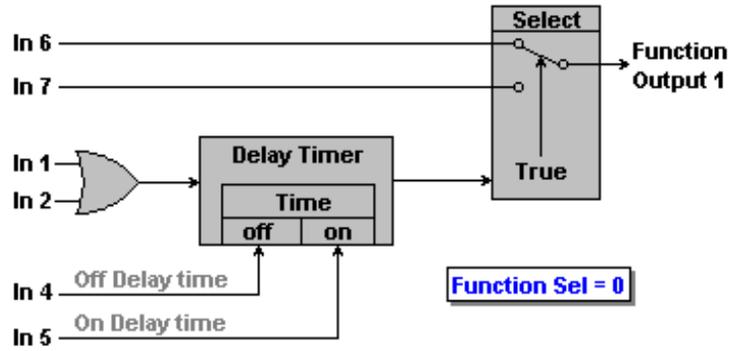
The “Function Evaluation Select” parameters (200,203,206) are used to precondition the inputs. The numbers 0-15 correspond to the 16 different evaluations available. Refer to table 1 for the descriptions.

Table 1

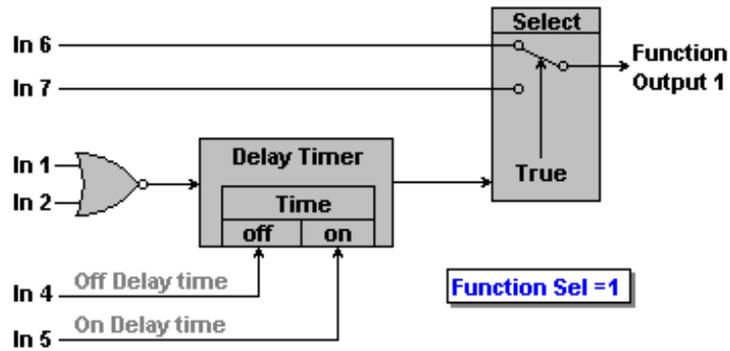
VALUE	EVALUATION (1 = on = true = set = closed) (0 = off = false = reset = open)
0	Pass the value directly through the function block
1	Mask the value (logical AND the input value with a value)
2	Send a true value when <b>all</b> bits that are set in the mask are <b>on</b> in the input value
3	Send a 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

**Timer/Delay**

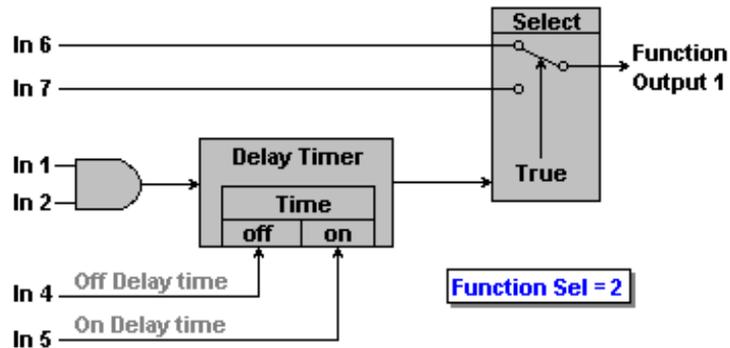
When [Function Sel] is set to zero, the Timer/Delay function is selected to **OR** the true/false states of In1 and In2. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In3 and In8 are not used for this function).



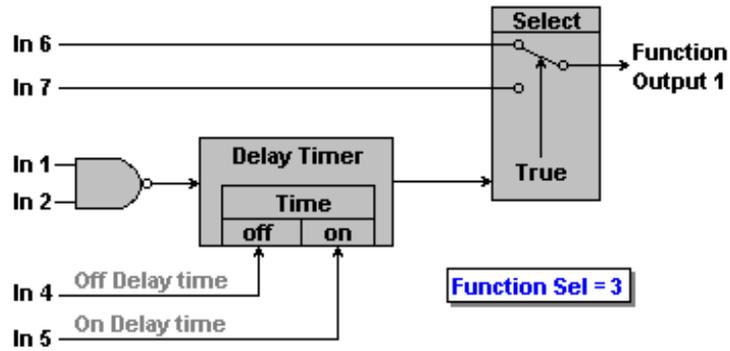
When [Function Sel] is set to one, the Timer/Delay function is selected to **NOR** the true/false states of In1 and In2. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In3 and In8 are not used for this function).



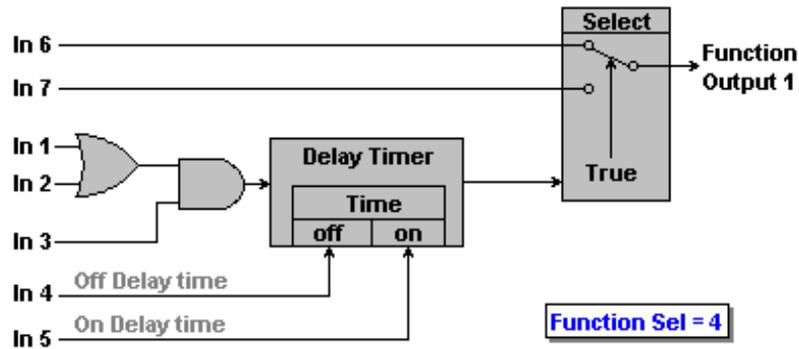
When [Function Sel] is set to two, the Timer/Delay function is selected to **AND** the true/false states of In1 and In2. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In3 and In8 are not used for this function).



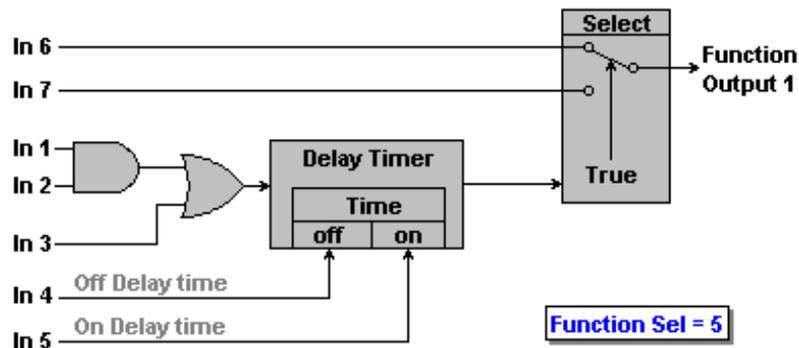
When [Function Sel] is set to three, the Timer/Delay function is selected to **NAND** the true/false states of In1 and In2. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In3 and In8 are not used for this function).



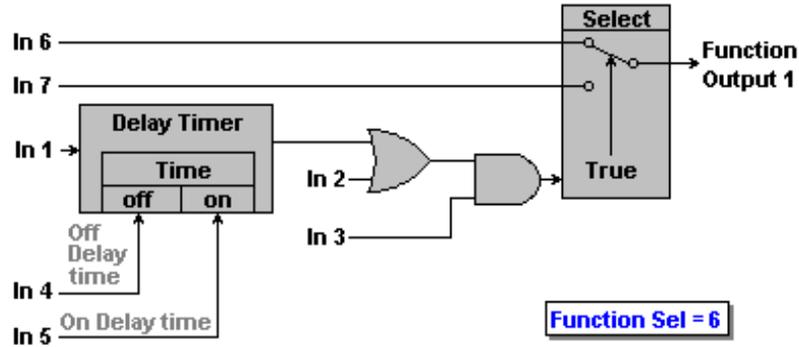
When [Function Sel] is set to four, the Timer/Delay function is selected to **OR** the true/false states of In1 and In2, then **AND** the result with In3. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In8 is not used for this function).



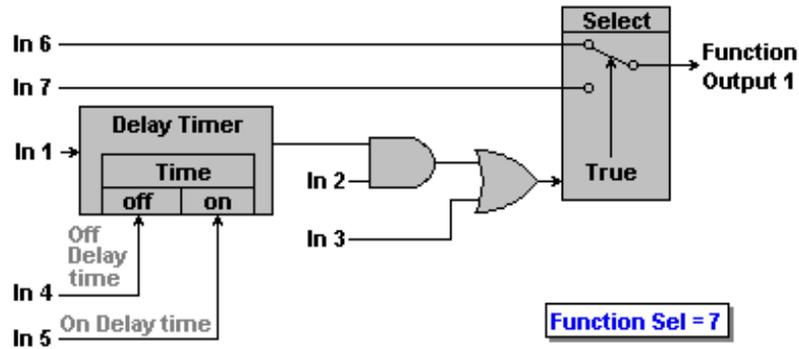
When [Function Sel] is set to five, the Timer/Delay function is selected to **AND** the true/false states of In1 and In2, then **OR** the result with In3. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In8 is not used for this function).



When [Function Sel] is set to six, the Timer/Delay function is selected to **delay** the state of In1 by the time value set by In5 & In4, and **OR** this with In2. Then **AND** the result with In3. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In8 is not used for this function).



When [Function Sel] is set to seven, the Timer/Delay function is selected to **delay** the state of In1 by the time value set by In5 & In4, and **AND** this with In2. Then **OR** the result with In3. The value of In6 becomes the output in a “true” condition, In7 for a “false” condition. (In8 is not used for this function).

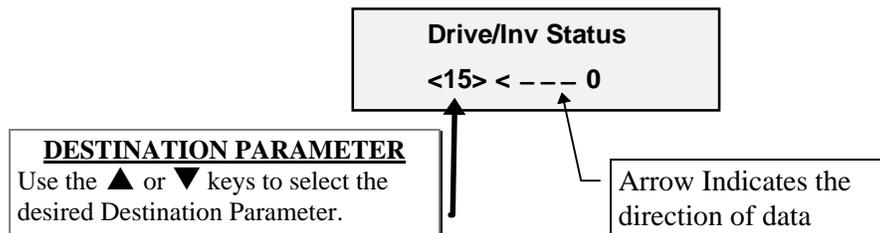


**APPLICATION  
CONSIDERATION**

The Function Input parameters for the timer delay 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.

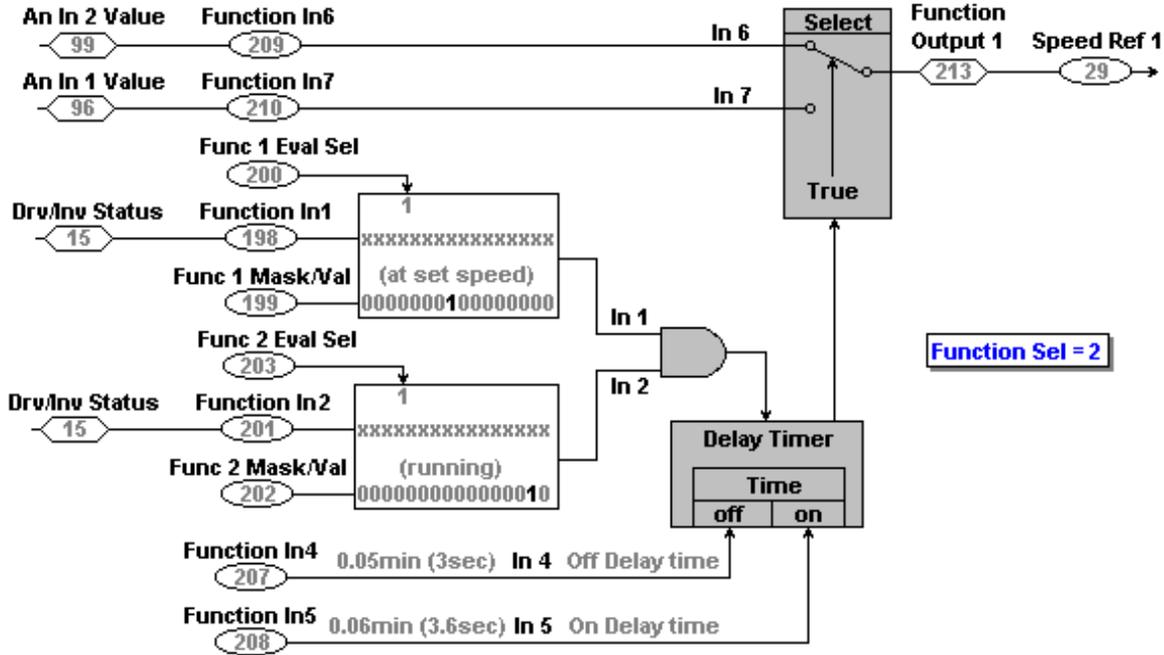
The Function Output parameter is a *source* parameter. This parameter must be linked to a destination parameter.

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



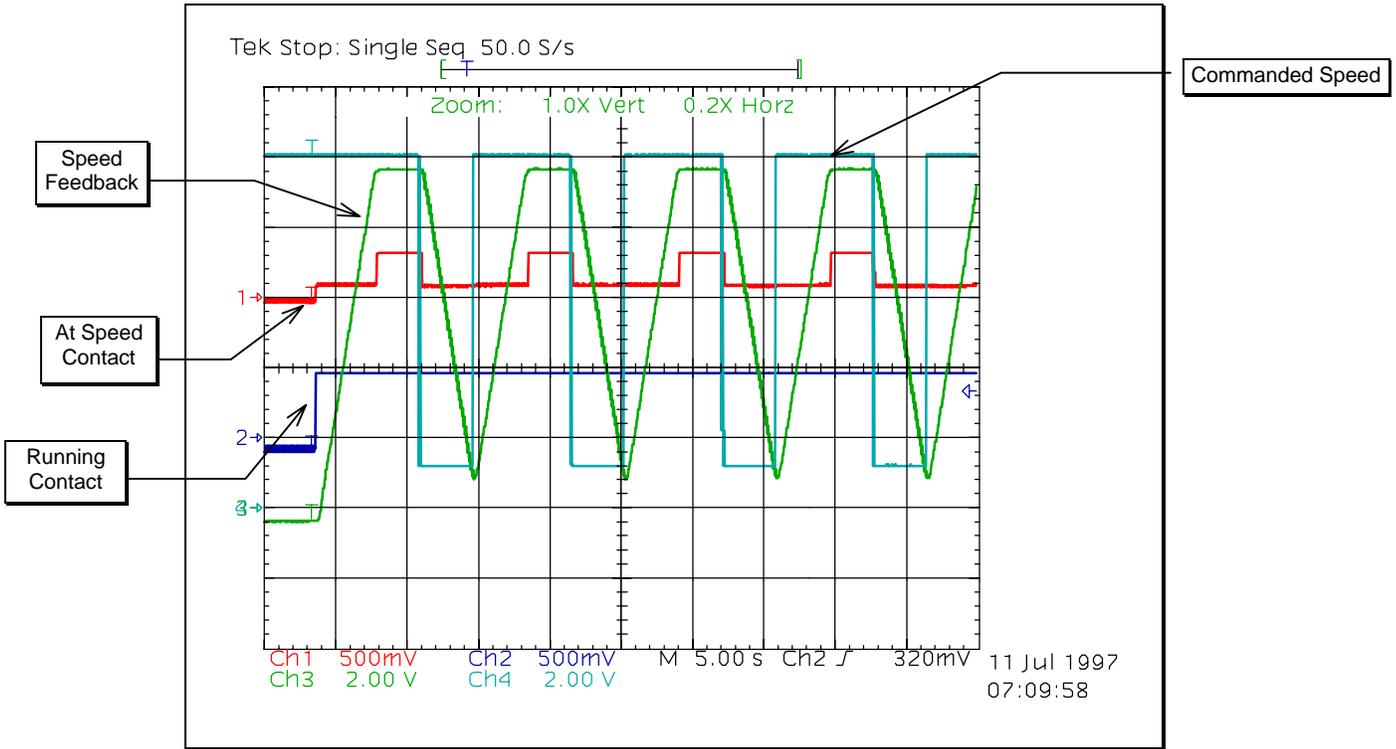
**APPLICATION  
EXAMPLE**

The following example shows how the Timer/Delay block can be used to change the speed reference. The drive status word is used to “trigger” the timer. The **At Set Speed** and **Running** bits must be true to start the off delay timer. Once the off delay time is completed, the reference is switched from In7 to In6. Refer to the diagram below.

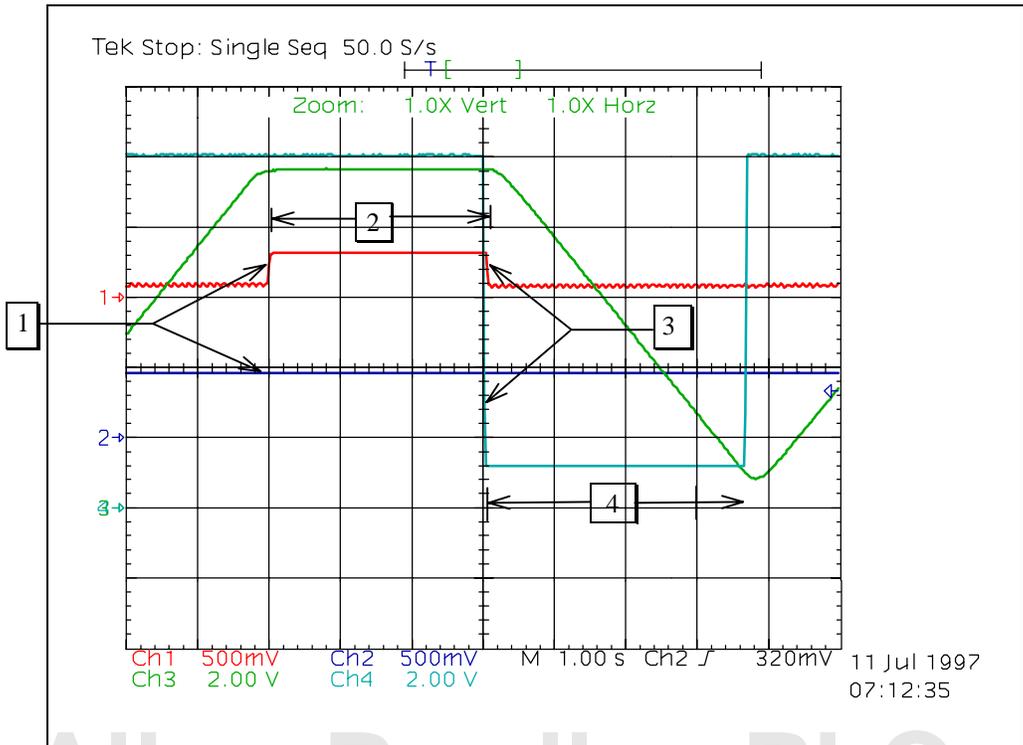


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Looking at the speed feedback trace you can see the profile generated from the parameter settings outlined in the example. Note the waveform names below. CH1 is the At Speed contact, CH2 is the running contact, CH3 is the motor speed and CH4 is the commanded speed.

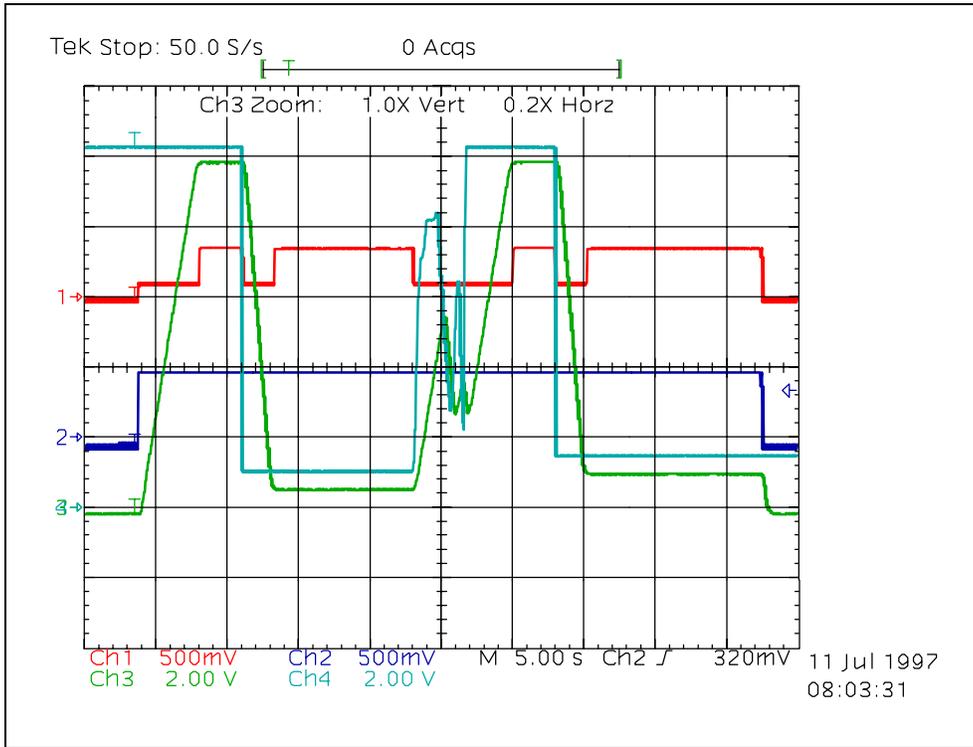


The plot below expands just a portion of the previous plot. This enables you to see the timing of the function block.  
1.) The motor reaches the command speed AND the drive is running, timing starts in the function block. 2.) Timer is set for 3 seconds. 3.) Off timer begins and the drive runs at a different set speed. 4.) Off timer is set for 3.6 seconds.

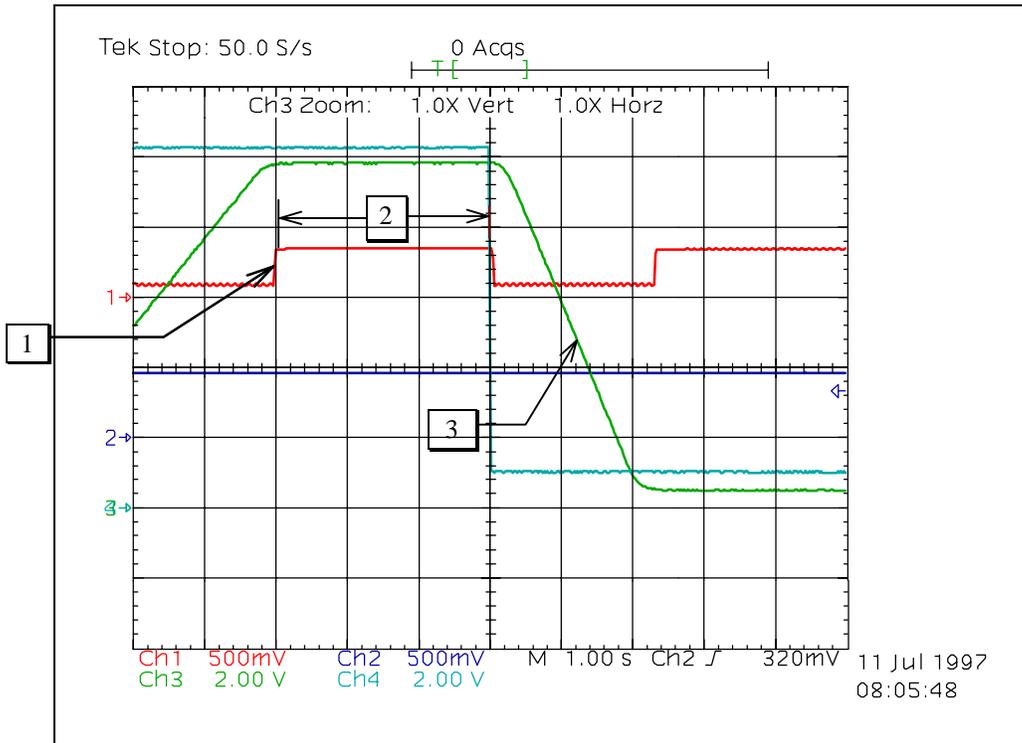


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The following plot show what happens when the drive changes state but does so before the On Delay timer times out After the drive reaches at speed and changes to the other set speed the decel rate is faster than the on delay timer. So when the timer times out the drive (according to the function block) has not made a transition. After a certain amount of time I changed the speed command manually to start the timer and continued varying the command speed until I out last the timer. The function block takes over again until once again the decel rate is faster than the Off timer.



This plot is a close-up of the previous plot. 1.) On delay timer starts. 2.) Time for 3 seconds. 3.) The Off timer is set for 3.6 seconds and the decel happens in 2.25 seconds. Therefore the rest of the function block never triggers.



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This plot just show that the At Speed contact stays false longer than the Off timer which allows the function block to continue. Note that the commanded speed shoots up after 3.6 seconds when the At Speed contact goes false.

