



## ALLEN-BRADLEY BULLETIN 1336 PLUS MOTOR STOP-ELECTRICAL

### APPLICATION NOTE #1336S - 5

May 19, 1997

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#### PURPOSE

The purpose of this document is to provide guidelines for wiring and control schemes for the Bulletin 1336S 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 1336S User Manual should be used as a reference to ensure that proper wire selection, routing and fusing guidelines are followed.

The Bulletin 1336S can be configured for various stopping modes. The User will need to determine which mode best suits the application.

#### WHAT THIS NOTE CONTAINS

The electrical machine stop is utilized to rapidly decelerate the motor and connected load. This mode of stopping requires that the drive has line power applied at all times and remains "logically enabled". The drive will not be able to control the stopping of the motor and load if power is removed or the logic is disabled.

#### 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.

## DESCRIPTION

The 1336S drive is configured by digital programming. For a controlled stop, the choices are as follows.

**DC INJECTION BRAKING** is selected by setting [Stop Select 1] (parameter 10) to a value of 1. The User can also select the amount of time the braking will be applied and the magnitude of the current used for braking with [DC Hold Time] (parameter 12) and [DC Hold Level] (parameter 13). This mode of braking will generate up to 40% of rated motor torque for braking and is typically used for low inertia loads. Refer to Table for parameter settings.

**RAMP TO STOP** is selected by setting [Stop Select 1] (parameter 10) to a value of 2. The 1336S will ramp the frequency to zero based on the deceleration time programmed into [Decel Time 1] (parameter 8) or [Decel Time 2] (parameter 31). The "normal" mode of machine operation can utilize [Decel Time 1]. If the "Machine Stop" mode requires a faster deceleration than desired for normal mode, the "Machine Stop" can activate [Decel Time 2] with a faster rate selected. [Decel Time 2] can only be selected with input modes 4, 11 and 14. Refer to Table for parameter settings.

**RAMP TO HOLD** is selected by setting [Stop Select 1] (parameter 10) to a value of 4. The 1336S will ramp the frequency to zero based on the deceleration time programmed into [Decel Time 1] (parameter 8) or [Decel Time 2] (parameter 31). [Decel Time 2] can only be selected with input modes 4, 11 and 14. Once the drive reaches zero hertz, a DC Injection holding current is applied to the motor. The level of current is set in parameter 13 [DC Hold Level]. The DC hold is removed only by removing the "enable" input or by a valid start input. Refer to Table for parameter settings.

**DYNAMIC BRAKING** is utilized to dissipate the regenerated energy from the motor during a rapid deceleration. When a STOP command is initiated and a short decel time is programmed, the motor operating mode changes from motoring to generating. The frequency of the rotor will be greater than the frequency of the stator. This will cause energy to flow from the rotor to the stator and back into the drive in the form of increased dc-bus voltage. To prevent an over voltage on the dc-bus capacitor bank, the dynamic brake will "turn on" and dissipate the excess power across a resistor bank. This mode of braking will generate 100% motor torque for a 20% duty cycle and allows a faster decel time. To determine if a Dynamic Brake is required, the User must refer to the Bulletin 1336S Dynamic Brake Manual or to Proposal Builder software for specific details and calculations for correct brake selection. Refer to Figure 1 for a diagram. If greater duty cycle is required, a chopper brake module with separate resistors is also available allowing the chopper module to be mounted separate from the resistors.

**BRAKE CHOPPER** The brake chopper can be used in place of the dynamic brake for increased braking power and duty cycle applications. The brake chopper contains the control and power switch circuitry for control, while a separate load resistor is used to dissipate the regenerated power from the motor during a deceleration. The resistor is selected for the given application requirements. The selections are for 100% or 150% braking torque with a duty cycle of 20%, 50%, or 100%.

## APPLICATION CONSIDERATIONS

**DC INJECTION BRAKING** - This mode of stopping can cause excessive motor heating when used in rapid cyclic applications or with overhauling loads that require high brake voltage levels. It is recommended to use the ramp-to-stop for applications with these characteristics.

**RAMP TO HOLD** - The [DC Hold Level] is limited to 70% of the drive rated amps. For extended periods of “holding” action, this type of control can cause excessive motor heating. A mechanical form of braking may be used for the “hold” function.

**DYNAMIC BRAKING** - The rating of the dynamic brake cannot exceed 200% of the rating of the drive. Refer to the dynamic brake instruction manual for application sizing assistance.

**BRAKE CHOPPER** - The rating of the brake chopper cannot exceed 200% of the rating of the drive. Refer to the brake chopper instruction manual for application sizing assistance.

## PARAMETER SETTINGS

Number	Group	Name	Value
7	Setup	Accel Time 1	0-600 Sec
8	Setup	Decel Time 1	0-600 Sec
10	Setup	Stop Select	0=Coast to Stop 1=DC Injection 2=Ramp to Stop 3=S-Curve Stop 4=Ramp to Hold
12		DC Hold Time	0-90 Sec
13		DC Hold Level	0-150%
30	Advanced Setup	Accel Time 2	0-600 Sec
31	Advanced Setup	Decel Time 2	0-600 Sec

Ramp to Hold - is only available on firmware revision 4.01 and later.

FIGURE 1 MACHINE STOP WITH DYNAMIC BRAKING

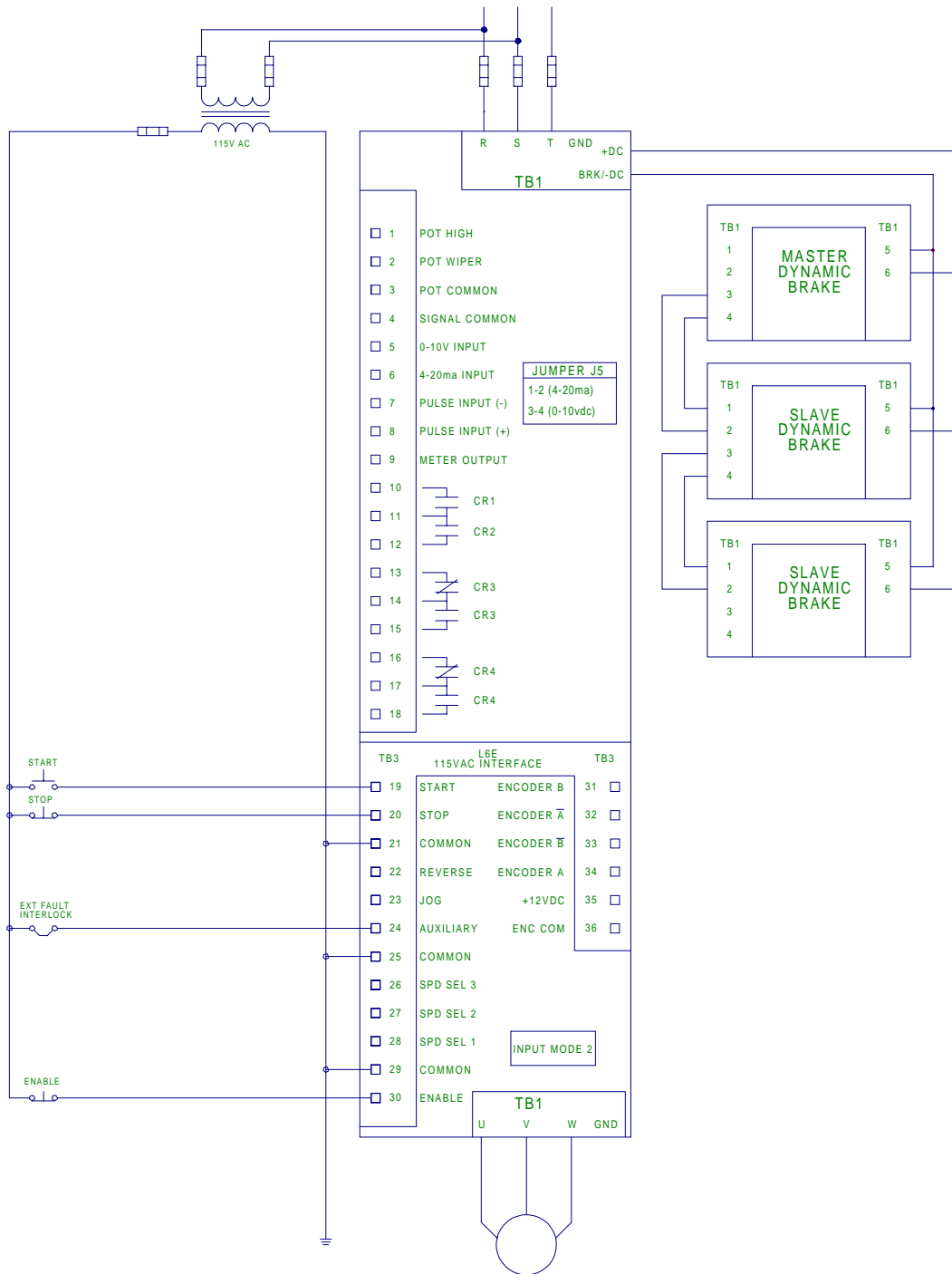


FIGURE 2 MACHINE STOP WITH BRAKING CHOPPER

