### Terminal Block TB2

TB2 is located at the bottom of the Main Control Board. A Frame drives have 18 positions. Remaining frame sizes have 22 positions. The maximum and minimum wire size accepted by TB2 is 2.1 and 0.30 $mm^2$ (14 and 22 AWG). Maximum torque for all terminals is 1.36 N-m (12 lb.-in.). Use Copper wire only. See Figure 2.1.

### Terminal Block TB3

The Control Interface Option provides a means of interfacing various signals and commands to the 1336 PLUS II by using contact closures. Several different versions of the option are available:

- L4 Contact Closure Interface[1].
- L4E Contact Closure Interface[1] with Encoder Feedback Inputs.
- L7E Contact Closure Interface[1] with Encoder Feedback Inputs for use with encoder loss detection.
- L5 +24VAC/DC Interface.
- L5E +24VAC/DC Interface with Encoder Feedback Inputs.
- L8E +24VAC/DC Interface with Encoder Feedback Inputs for use with encoder loss detection.
- L6 115VAC Interface.
- L6E 115VAC Interface with Encoder Feedback Inputs.
- L9E 115VAC Interface with Encoder Feedback Inputs for use with encoder loss detection.

[1] Uses internal +5V DC supply.

The user inputs are connected to the option board through TB3 (see Figure 2.1 for location). The L4, L5 and L6 options each have nine control inputs. The function of each input must be selected through programming as explained later in this section. The L4E through L9E options are similar to L4, L5 and L6 with the addition of encoder feedback inputs. In addition, the L7E, L8E and L9E options allow encoder loss detection. Refer to Appendix A for further information.

The maximum and minimum wire size accepted by TB3 is 2.1 and 0.30 $mm^2$ (14 and 22 AWG). Recommended torque for all terminals is 0.90-1.13 N-m (8-10 lb.-in.). Use Copper wire only.

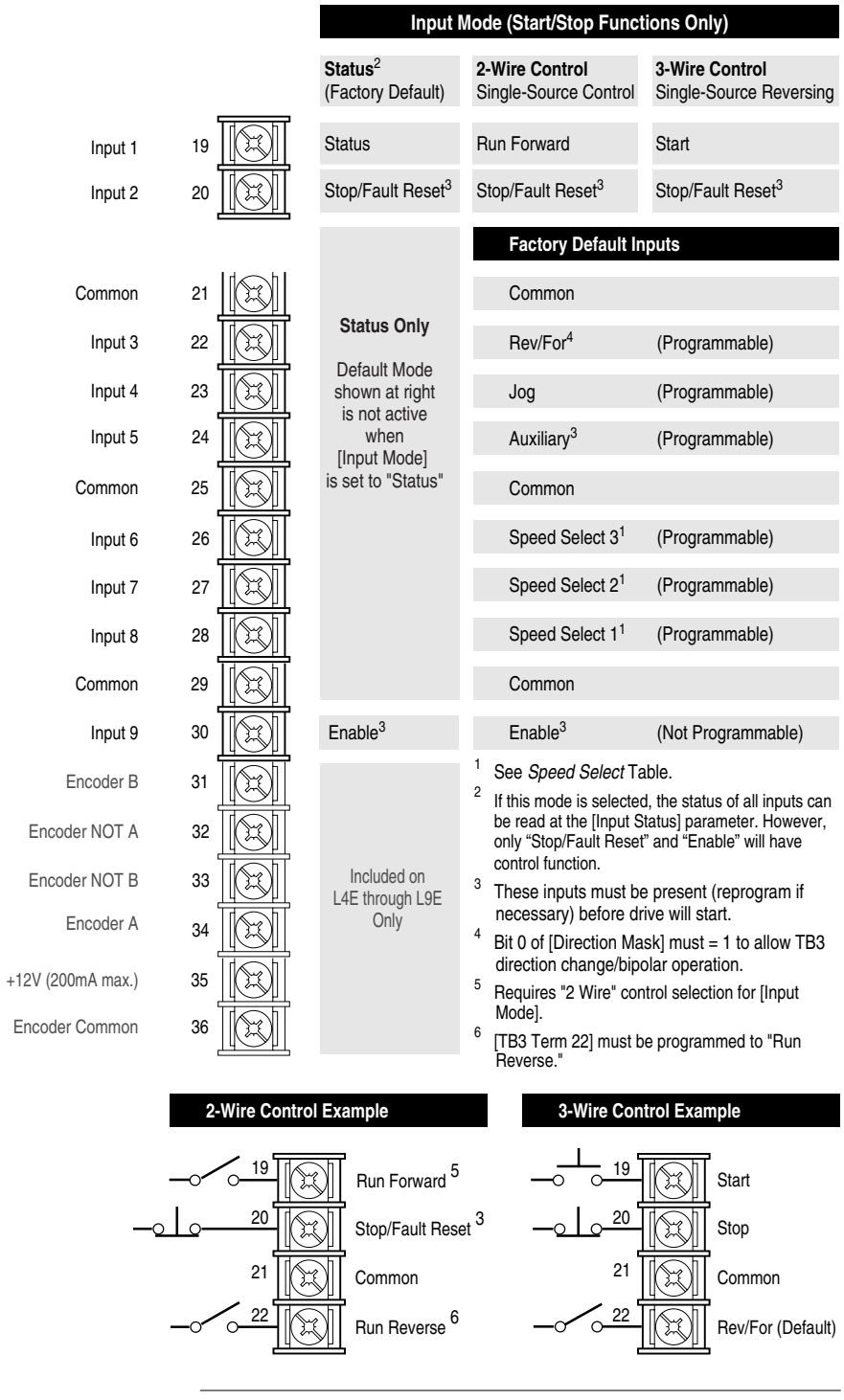
## Digital Inputs

Digital inputs are connected at TB3.

### Input Mode Select

A number of combinations are available by first programming [Input Mode] to the desired control scheme (i.e. 2 wire, 3 wire or Status). The remaining inputs can then be configured by programming [TB3 Term 22 Sel] through [TB3 Term 28 Sel]. Refer to the *Digital I/O* parameter group in Chapter 6 for programming information.

**Figure 2.3**
**Digital I/O Default Settings – TB3**




A hazard of personal injury from automatic restart exists with 2-wire control. 2-wire control uses maintained Run contacts that act as both Run (closed) and Stop (open) devices. Opening the Stop contact (terminal 20) will stop the drive. If this contact is reclosed, any fault will be reset. If a valid Start command is still present, the drive will restart. Only use 2-wire control for applications outlined in NFPA79, "Under Voltage Protection."

If a 3-wire device (i.e. HIM) is also used, pressing the HIM Stop key will also stop the drive. Releasing the Stop key will clear any faults that are present, but the drive will not restart without cycling the Start contact.

### Available Functions for Inputs 3 through 8

A variety of combinations made up of the following inputs are available.

| Input | Description |
|---|---|
| 1st and 2nd Accel<br>1st and 2nd Decel | Closing these inputs will command the corresponding accel or decel rate. If both inputs are open or both are closed, the current rate is maintained.<br>Input 1st 2nd<br>No Command 0 0<br>Accel/Decel 1 0 1<br>Accel/Decel 2 1 0 |
| 1st/2nd Accel/Decel | Allows selection of the accel or decel time used by the drive. 1=2nd, 0=1st |
| Auxiliary | Faults the drive via external devices (i.e. motor thermoswitch, O.L. relays, etc.). Opening this contact will fault (F02 - Aux Fault) the drive and shut the output off, ignoring the programmed stop mode. |
| Clear Fault | If drive has faulted, closing this input will clear the fault. |
| Digital Pot (MOP) Up/ Down | These inputs increase (up) or decrease (down) the drive commanded frequency when MOP (Motor Operated Potentiometer) is chosen as the frequency command source. The rate of increase/decrease is programmable. |
| Forward | Closing these inputs (Forward or Reverse) commands the corresponding direction. If both inputs are open or both are closed, the current direction is maintained. |
| Jog | Closing this input starts the drive and causes it to run at programmed jog frequency. Opening this input stops the drive using the programmed stop mode. |
| Local Control | Closing this input gives exclusive control of drive logic to the inputs at terminal block TB3. No other devices may issue logic commands (excluding Stop) to the drive. |
| Rev/For | Available only with three-wire control - Closing this input commands reverse direction and opening this input commands forward direction. |
| Reverse | See “Forward” above. |
| PI Enable | Enables the output of the process PI loop. |
| PI Reset | Opening this input clamps the process PI *integrator* value at zero. Closing this input allows the integrator to continue to operate. |
| Run Reverse | Available Only with two-wire control - Closing this input issues both a start command and a reverse command to the drive. Opening the input issues a stop command to the drive. |
| Speed Select 1, 2, 3 | These inputs choose the frequency command source for the drive. See following pages for details. |
| Stop Type | Closing this input selects the stop mode in [Stop Select 2] as the method of stopping when a stop command is issued. Opening this input selects the stop mode in [Stop Select 1] as the method of stopping. |
| Sync | Normally wired to multiple drives – When the Sync input is low, the drive operates normally. When the input is high, the speed of the drive will be held constant and the speed command will have no effect. During this period the speed input of the drive will normally be changed to a different source and/or value. Allows synchronized change of frequency command to multiple drives. |
| Traverse | Setting this input low disables the traverse function. When the input is high, the traverse function will be active. [Speed Control] must also be set to “P Jump” for the function to be active. |

**Important:** If a Control Interface Option is not installed, the [Input Mode] parameter must be set to “Status” (default) and jumpers must be installed as shown in Figure 2.7. If the drive was shipped from the factory without the option, these jumpers will have been installed.

**Important:** The [Input Mode] parameter can be changed at any time, but the change will not affect drive operation until power to the drive has been removed and bus voltage has decayed completely. When changing this parameter, it is important to note that the functions of the Start and Stop inputs will change when power is reapplied to the drive.

The programming options of the Control Interface Option allow the user to select an input combination to meet the needs of a specific installation. The firmware will verify programming, to assure an appropriate combination has been selected.

### Speed Select/Frequency Reference

The drive speed command can be obtained from a number of different sources. The source is determined by drive programming and the condition of the Speed Select Inputs on TB3 (or reference select bits of command word if PLC controlled - see Appendix A).

The default source for a command reference (all speed select inputs open) is the selection programmed in [Freq Select 1]. If any of the speed select inputs are closed, the drive will use other parameters as the speed command source. See Table 2.H and the examples that follow.

**Table 2.H**
**Speed Select Input State vs. Frequency Source**

| Speed Select 3 | Speed Select 2 | Speed Select 1 | Frequency Source |
|---|---|---|---|
| Open | Open | Open | [Freq Select 1] |
| Open | Open | Closed | [Freq Select 2] |
| Accessed through [Freq Select 2] parameter | | | [Preset Freq 1] |
| Open | Closed | Open | [Preset Freq 2] |
| Open | Closed | Closed | [Preset Freq 3] |
| Closed | Open | Open | [Preset Freq 4] |
| Closed | Open | Closed | [Preset Freq 5] |
| Closed | Closed | Open | [Preset Freq 6] |
| Closed | Closed | Closed | [Preset Freq 7] |

**Important:** The final speed command may be affected by the type of modulation selected with [Speed Control], parameter 77. See [Speed Control] in Chapter 6 for further information.

**Important:** If a bi-polar input option (LA6 or LA7) is installed, the signal is designated “Analog Input 0.” Note the following:

3 Wire Control – If [Input Mode] is set to “3 Wire” and the bi-polar input is selected as the active frequency reference [Freq Select 1 or 2], it is assumed that direction control is desired via analog polarity. If another source has control of direction, a “Bipolar Direction” fault (F16) will occur. If direction control via polarity is not required, bit 7 of [Direction Mask] should be set to “0.” This causes the input to be treated as a 0-10V frequency reference only. Negative analog signals are treated as zero and direction control must come from another source.

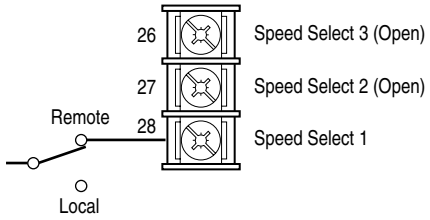
2 Wire Control – If [Input Mode] is set to “2 Wire,” it is assumed that direction control is provided via the 2 wire inputs (Run Forward and Run Reverse). Bit 7 of [Direction Mask] must be set to “0.” This causes the input to be treated as a 0-10V frequency reference only. Negative analog signals are treated as zero. Failure to set the Mask will generate a “Bipolar Direction” (F16) fault.

Example 1

3 Wire Control - Application calls for a local Human Interface Module (HIM) speed command or remote 4-20mA from a PLC. The drive is programmed as follows:

- [Freq Select 1] = Adapter 1
- [Freq Select 2] = Analog Input 0

With Speed Select inputs 2 & 3 open and the selector switch set to "Remote" (Speed Select 1 closed), the drive will follow [Freq Select 2] (Analog Input 0). With the switch set to "Local" (Speed Select 1 open) all speed select inputs are open and the drive will follow the local HIM (Adapter 1) as selected with [Freq Select 1].

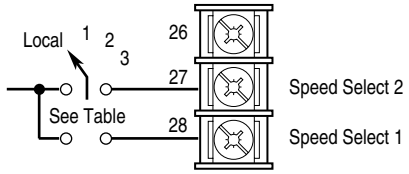



Example 2

Application is to follow a local HIM unless a preset speed is selected. The drive is programmed as follows:

- [Freq Select 1] = Adapter 1
- [Freq Select 2] = Preset Freq 1
- [Preset Freq 1] = 10 Hz.
- [Preset Freq 2] = 20 Hz.
- [Preset Freq 3] = 30 Hz.

Contact operation for the speed select switch is described in the table below. If the user does not select an input as Speed Select 3, [Preset Freq 4-7] would not be available.



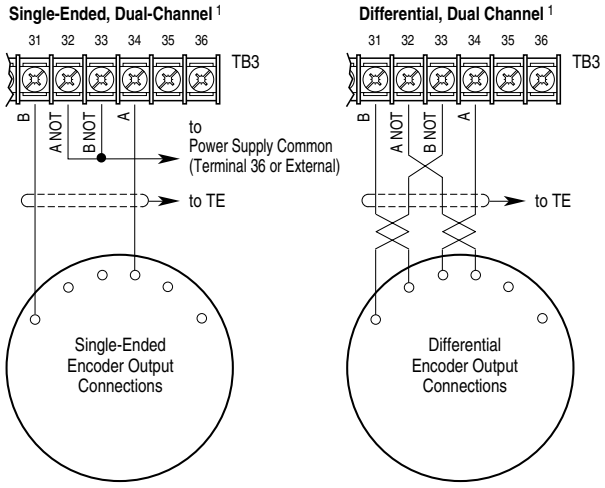

| Switch Position | Speed Select Input | | Parameter Used for Speed Ref. | Programmed Setting |
|---|---|---|---|---|
| | 1 (#28) | 2 (#27) | | |
| Local | Open | Open | [Freq Select 1] | Adapter 1 |
| 1 | Closed | Open | [Freq Select 2] | Preset Freq 1 |
| 2 | Open | Closed | [Preset Freq 2] | 20 Hz. |
| 3 | Closed | Closed | [Preset Freq 3] | 30 Hz. |

## Encoder Inputs

Encoders must be line driver type, quadrature (dual channel) or pulse (single channel), 5V DC or 8-15V DC output, single-ended or differential and capable of supplying a minimum of 10mA per channel. Maximum input frequency is 250 kHz.

Encoder inputs are available at TB3. The interface board is jumper selectable to accept a 5V TTL or 12V DC square-wave with a minimum high state voltage of 3.0V DC (TTL) or 7.0V DC (12 volt encoder). Maximum high state voltage is 18.5V DC (board damage could result if voltage is exceeded). Maximum low state voltage is 0.4V DC. See *Encoder & Communications Cabling* on page 2–11.

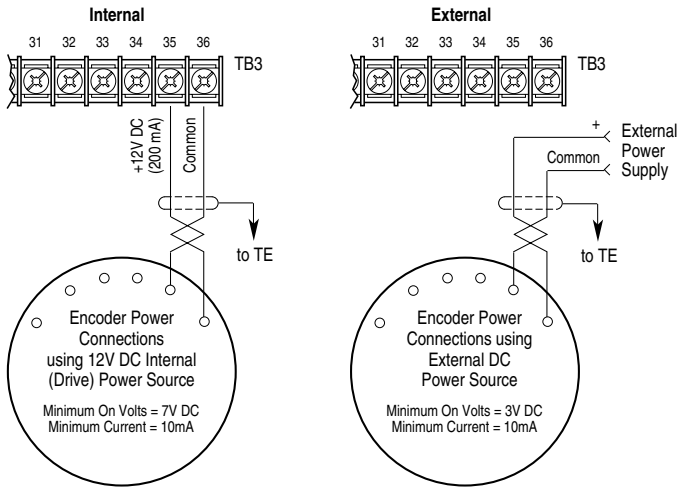
**Figure 2.4a**
**Encoder Signal Wiring**




1 For Single-Channel applications, eliminate the B and B (NOT) connections. Some encoders may label the "A" connection as "Signal." Single-channel provides speed indication Only, Not direction.

**Important:** Correct direction of motor rotation as determined during start-up (see Chapter 5) may require that the A ***or*** B channel wiring be reversed.

**Figure 2.4b**
**Encoder Power Wiring**




**Important:** Control Interface Board jumpers JP3 & JP4 must be set for the voltage level of the encoder output.