

YASKAWA

GA800 Drive

Custom Software Supplement

Traverse Application

Software Number:

VSAA10060

Applicable Models:

Three-Phase 200 V: GA80U2004xxx to GA80U2415xxx

Three-Phase 400 V: GA80U4002xxx to GA80U4720xxx

6-phase/12-Pulse 400 V: GA80UT103xxx to GA80UT720xxx

Three-Phase 600 V: GA80U5382xxx to GA80U5472xxx

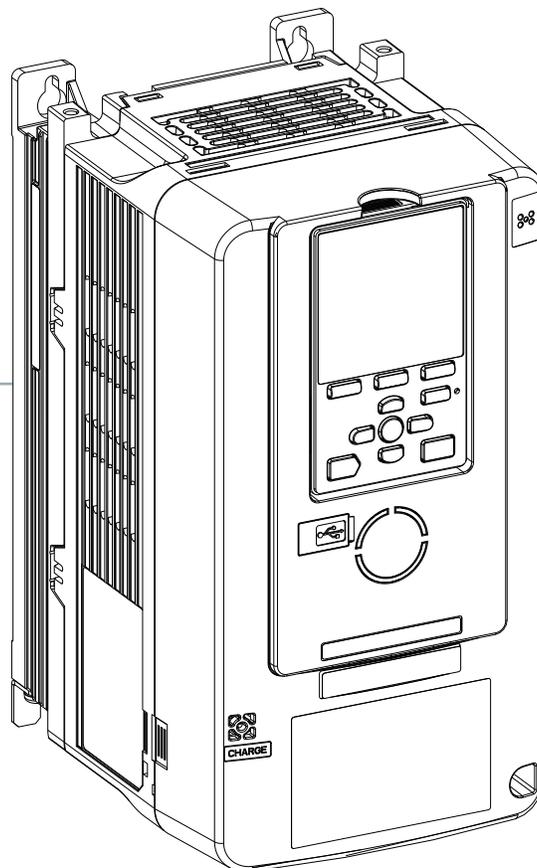


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Refer to the GA800 Technical Reference for content not described in this document.

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1 Preface and Safety

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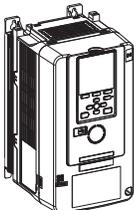
◆ Applicable Documentation

The following manuals are available for the GA800 Drive:

Custom Software Supplement

	<p>Yaskawa AC Drive - Traverse Application GA800 Custom Software Supplement Manual No: TM.GA800SW.029</p> <p>Read this manual first. This supplement is an addendum to the GA800 Installation & Primary Operation Manual and Technical Reference. It lists the effects of this custom software on the parameters in the drive and function descriptions in the manual. To obtain the supplement access this site: U.S: http://www.yaskawa.com</p>
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Yaskawa Drive

	<p>Yaskawa AC Drive - GA800 Installation & Primary Operation</p>	<p>To obtain instruction manuals for the GA800 AC Drive access this site: U.S.: http://www.yaskawa.com/ga800manuals Other areas: contact a Yaskawa representative. For questions, contact the local Yaskawa sales office or the nearest Yaskawa representative.</p>
	<p>Yaskawa AC Drive - GA800 Technical Reference</p>	

◆ Supplemental Safety Information

Read and understand this manual and the GA800 Installation & Primary Operation Manual before installing, operating, or servicing this option unit. Install the drive according to the GA800 Installation & Primary Operation Manual and local codes. Observe all cautions and warnings in this document and the standard drive technical manuals.

Refer to the GA800 Installation & Primary Operation Manual and Technical Reference for safety information and to install and start-up the drive.

This document is a supplement to the standard drive Technical Reference. It describes the effects on the drive parameters and functions with the software installed.

- Custom software is provided to add functionality to a standard drive to enhance or enable use in a specific application.
- The software is loaded to the flash ROM area of the control board, and replaces the standard drive software.

◆ Obtaining Support

When seeking support for a drive with custom software, it is imperative to provide the unique part number shown on the drive nameplate. The software is flashed to the control board memory and the operation of parameters, functions, and monitors are different than the standard drive software, as described herein.

Refer to Yaskawa office locations listed on the back cover of this manual.

2 Product Overview

◆ About This Product

This custom software is designed specifically for use in Traverse applications.

◆ Applicable Models

This custom Traverse application software is available for the GA800 drive models listed in [Table 1](#).

Table 1 Applicable Models

Voltage Class	Models	Software Version ^{<1>}
200 V Three-Phase	GA80U2004□□□ to GA80U2415□□□	VSAA10060
400 V Three-Phase	GA80U4002□□□ to GA80U4720□□□	VSAA10060
400 V 6-Phase/12-Pulse	GA80UT103□□□ to GA80UT720□□□	VSAA10060
600 V Three-Phase	GA80U5382□□□ to GA80U5472□□□	VSAA10060

<1> See “PRG” on the drive nameplate for the software version number.

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◆ Traverse Anti-Phase

■ Overview

The Traverse Anti-Phase function controls the traverse arm of a winder in textile industry applications. This function generates a dithered disturbed waveform that is used as frequency reference for the traverse arm drive and also provides an anti-phase signal for output to a spindle slave drive for better winding.

■ Basic Concept

When the drive reaches the set frequency reference, the output frequency waveform is modulated in a triangle type pattern. This randomizes fiber overlap on the spindle, producing a tighter wrap and a higher quality wound package.

P1 parameters are used to set the attributes of a disturbed waveform, which is essentially a triangle wave with instantaneous jumps at the peak and trough. This triangle wave rides on top of the base frequency reference for the traverse drive.

The signal(s) output to control the slave spindle drive can be set to one of three new monitors:

- U7-02 - Absolute Slave Frequency
- U7-03 - Ripple Slave Frequency
- U7-04 - Slave Base Frequency

The Absolute and Ripple Slave Frequency monitors have an anti-phase component to them, outputting a disturbed waveform that is the inverse (anti-phase) of the master disturbed waveform. The anti-phase waveform ignores the jump portion of the master traverse disturbed waveform.

■ Limitations

- Although the GA800 supports multiple languages on the digital operator, the special parameters in this drive software will always be displayed in English language on the drive display. All other parameters in the GA800 are available in multiple languages as set by the Language Selection parameter A1-00.
- Parameter L4-02, Speed Agree Detection Width, should be set to a small, nonzero value to avoid unintended jumps in the disturbed waveforms.
- When P1-04 and P1-05 are set to short slope times, set L4-02 to a value greater than 0.5 Hz to prevent inconsistent traverse operation.
- Step changes in frequency reference will result in unintended jumps in the disturbed waveforms. Disable the Traverse function using the 80h (Disturbed WF Off) digital input to prevent damage to the motor or connected equipment.
- The Traverse waveform can be configured to be smaller than the input resolution of the GA800 slave drive's frequency reference. Ensure that Master Frequency Reference \times P1-02 is significantly larger than (Slave Max Output Freq/2048) for proper control of the slave drive.

3 Application Selection

◆ Control Modes, Symbols, and Terms

The table below lists terms and symbols used in this section to indicate which parameters are available in which control modes.

	Description
All Modes	Parameter is available in all control modes.
V/f	Parameter is available when operating the drive with V/f Control.
OLV	Parameter is available when operating the drive with Open Loop Vector.
OLV/PM	Parameter is available when operating the drive with Open Loop Vector for PM monitors.

◆ Related Parameters and Functions

The following parameters are used to set up the drive for operation with the software. Available parameter settings are listed based upon which drive control modes are active, as listed in the Control Mode Access Level column in the following tables.

Confirm proper setting of the parameters beginning with [Table 2](#).

Table 2 Additional Parameters

No. (Addr. Hex)	Parameter Name	Description	Values	Change during Run	Control Mode Access Level
P1-01 (600h)	Disturbed Waveform Selection	Enables and disables the traverse disturbed waveform function. 0: Disabled 1: Enabled	Default: 0 Range: 0 to 1	Yes	V/f OLV OLV/PM
P1-02 (601h)	Disturbed Waveform Amplitude	Sets the amplitude of the disturbed waveform as a percentage of the commanded frequency reference. Note: Setting this parameter to 0.0 disables the Traverse function.	Default: 0.0 Range: 0.0 to 20.0 %	Yes	V/f OLV OLV/PM
P1-03 (602h)	Disturbed Waveform Jump	Adds a notch or jump below the peak amplitude of the disturbed waveform when set to a non-zero value. Set as a percentage of the Disturbed Waveform Amplitude (P1-02).	Default: 0.0 Range: 0 to 50.0 %	Yes	V/f OLV OLV/PM
P1-04 (603h)	Negative Slope Time	Sets the time for the disturbed waveform to decelerate from the maximum value (reference + P1-02) to the minimum value (reference - P1-02). Note: Setting this parameter to 0.0 seconds disables the Traverse function.	Default: 0.0 Range: 0.0 to 120.0 s	Yes	V/f OLV OLV/PM
P1-05 (604h)	Positive Slope Time	Sets the time for the disturbed waveform to accelerate from the minimum value (reference - P1-02) to the maximum value (reference + P1-02). Note: Setting this parameter to 0.0 seconds disables the Traverse function.	Default: 0.0 Range: 0.0 to 120.0 s	Yes	V/f OLV OLV/PM
P1-06 (605h)	Slave Scan Offset	Monitor shift (U7-02, U7-03, and U7-04) in ms to compensate for systematic delays.	Default: 0 ms Range: -24 to 24 ms	Yes	V/f OLV OLV/PM

Table 3 Group Text

Function Group	Group Name Digital Operator Display
P	Traverse Group Traverse

Table 4 Function Text

Function Group	Function Name Digital Operator Display
P1	Disturbed Waveform Adjustment Disturb Waveform Adj

Table 5 Monitor Function Text

Function Group	Monitor Name Digital Operator Display
U7	Traverse Monitors Traverse

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Table 6 Monitors

No. (Addr. Hex)	Monitor Name Digital Operator Display	Description	Analog Output Scaling	Unit	Control Mode Access Level
U7-02 (661h)	Absolute Slave Frequency Absolute Slave Freq	Base frequency reference summed with the anti-phase dither.	10V: Maximum Frequency (E1-04)	0.01 Hz	V/f OLV OLV/PM
U7-03 (662h)	Ripple Slave Frequency Ripple Slave Freq	Anti-phase dither alone.	10V: Maximum Frequency (E1-04)	0.01 Hz	V/f OLV OLV/PM
U7-04 (663h)	Base Slave Frequency Base Slave Freq	Base frequency reference (before disturbed waveform is applied).	10V: Maximum Frequency (E1-04)	0.01 Hz	V/f OLV OLV/PM

Table 7 Multi-function Input Settings (H1-□□)

Setting	Description	Control Mode Access Level
80h	Disturbed Waveform Disable Open: Disturbed waveform enabled Closed: Disturbed waveform disabled	V/f OLV OLV/PM
180h	Disturbed Waveform Disable Open: Disturbed waveform disabled Closed: Disturbed waveform enabled	V/f OLV OLV/PM

Table 8 Multi-function Output Settings (H2-□□)

Setting	Description	Control Mode Access Level
40h	Disturbed Waveform Increasing Open: The disturbed waveform frequency is decreasing Closed: The disturbed waveform frequency is increasing	V/f OLV OLV/PM
41h	During Disturb Waveform Open: Disturbed waveform disabled Closed: Disturbed waveform being generated	V/f OLV OLV/PM
140h	!Disturbed Waveform Increasing Closed: The disturbed waveform frequency is decreasing Open: The disturbed waveform frequency is increasing	V/f OLV OLV/PM
141h	!During Disturb Waveform Closed: Disturbed waveform disabled Open: Disturbed waveform being generated	V/f OLV OLV/PM

■ Function Description

Machine Parameter Selection

The disturbed waveform begins once the drive reaches Speed Agree. The disturbed waveform rides on top of the base frequency reference for the traverse drive. The output will be the frequency reference waveform summed with the disturbed waveform if the frequency reference of the master drive is adjusted while the disturbed waveform is active.

The dithering is a triangle waveform with amplitude and slope set by P1-02, P1-04, and P1-05 parameters. The traverse drive also has a jump in the dithering wave form which is set by parameter P1-03.

The anti-phase output signal is the disturbed portion of the traverse frequency reference signal inverted. Only the triangle portion of the disturbed waveform is used for the anti-phase. The jump is ignored.

The Traverse application software has three monitors:

- Base Slave Frequency (U7-04)
U7-04, Base Slave Frequency, outputs the frequency reference of the master (traverse) before the disturbed waveform is applied.
- Ripple Slave Frequency (U7-03)
U7-03, Ripple Slave Frequency, outputs the anti-phase of the disturbed portion of the waveform.
- Absolute Slave Frequency (U7-02)
U7-02, Absolute Slave Frequency, outputs the anti-phase of the disturbed portion of the waveform summed with U7-04.

All three monitors can be set to analog outputs. U7-02 or U7-03 would generally be used as an analog output going to the slave (spindle) for its frequency reference. U7-02 provides the slave a complete reference signal. U7-03 is used as a dither reference if the slave is to use its own base frequency reference as shown in *Figure 1*.

To compensate for system delays, U7-02, U7-03, and U7-04 monitors can be set to lead or lag the traverse control output by up to 24 scans (24 ms), set by P1-06.

3 Application Selection

■ Application Example

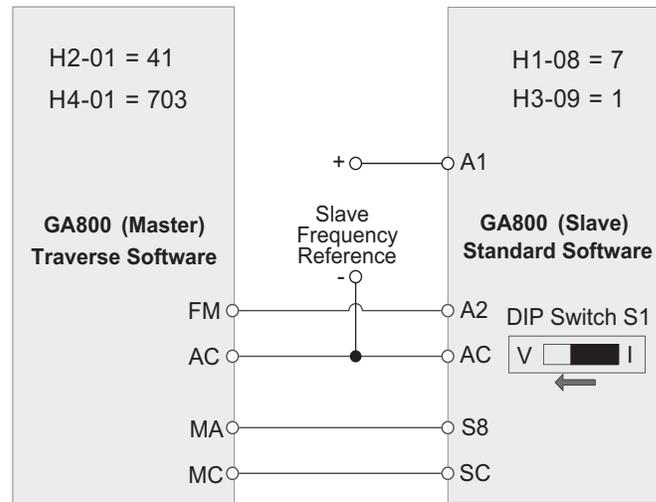


Figure 1 Software and Hardware Configuration for GA800 Traverse

Master Parameter Changes

- H2-01 = 41h (**During Disturbed Waveform**) Provide during disturb status output to slave.
- H4-01 = 703 (**Ripple Slave Freq**) Provide disturbed frequency ripple to slave.
- H4-07 = 1: Provide a bipolar analog output signal.
- P1-01 = 1 (**Disturbed Waveform Selection**) Enable Traverse functionality.
- P1-02 ~ P1-05 = Application requirement: Define the characteristics of the disturbed frequency.
- P1-06 = Application requirement: Define scan offset to account for system delays.

Slave Parameter Changes

- C1-03 = 0.0 sec: Set acceleration time 2 to 0.0 seconds.
- C1-04 = 0.0 sec: Set deceleration time 2 to 0.0 seconds.
- H1-08 = 7: Switch between accel/decel time 1/2 based on During Disturb output.
- P1-01 = 1: Enable Traverse functionality.
- DIP Switch S1 = V: Enable voltage input to A2.
- H3-09 = 1: Set A2 to a -10V to +10V bipolar input.

■ Implementation

Situation 1: Standard Operation

When programmed with the settings as shown in [Table 9](#), the Traverse software produces output waveforms similar to the ones in [Figure 2](#). Using these settings and a reference frequency of 45 Hz, the master drive operates based on the triangle waveform with 9 Hz (peak-peak) amplitude. Because the waveform is centered on the 45 Hz reference frequency, the master waveform oscillates between 36 and 54 Hz while in Traverse mode.

Table 9 Sample Operating Parameters

Parameter	Name	Setting
P1-01	Disturbed Waveform Selection	1
P1-02	Disturbed Waveform Amplitude	20.0 %
P1-03	Disturbed Waveform Jump	50.0 %
P1-04	Negative Slope Time	5.0 s
P1-05	Positive Slope Time	4.0 s
P1-06	Slave Scan Offset	0 ms

The Slave Absolute Frequency parameter U7-02 is available as an output to the slave by setting parameter H4-01 to 702. U7-02 has the same amplitude of 9 Hz that is calculated by $(P1-02 \times \text{Reference Frequency})$. U7-02 is anti-phase to the master waveform and is centered around the Slave Base Frequency U7-04. Because the Slave Base Frequency is 45 Hz, U7-02 varies from 36 to 54 Hz while in Traverse mode. The Slave Absolute Frequency will rest at 48 Hz before entering Traverse mode as represented by the equation in *Figure 2*.

The Slave Ripple Frequency parameter U7-03 is the same as the U7-02 waveform without the Slave Base Frequency component. It is a bipolar waveform centered at 0 Hz. The output varies from 21 to 39 Hz during operation. The Slave Ripple Frequency will rest at 3 Hz before entering Traverse mode as represented by the equation in *Figure 2*.

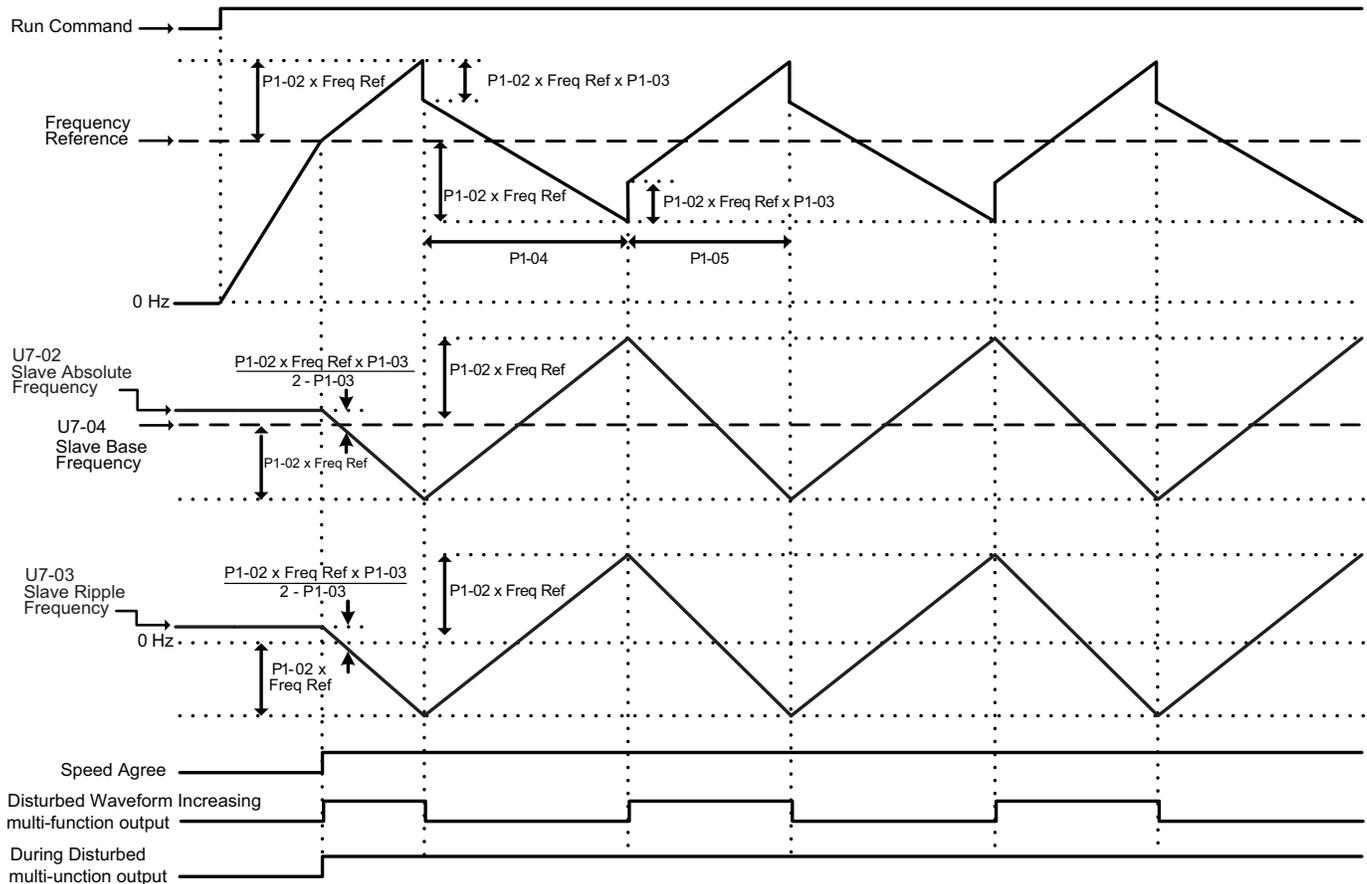


Figure 2 Master and Slave Output Diagram: Standard Operation

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Situation 2: Traverse Operation Exceeds Maximum Output Frequency

Using the same parameter settings in [Table 9](#) and a reference frequency of 52 Hz, the Traverse software will produce output waveforms similar to the ones in [Figure 3](#). The Traverse software produces a triangle output that varies from 41.6 to 62.4 Hz, with an amplitude of 10.4 Hz. Setting the drive parameter E1-04 to 60.0 Hz caps the triangle waveform when the traverse frequency exceeds the Maximum Output Frequency of 60 Hz.

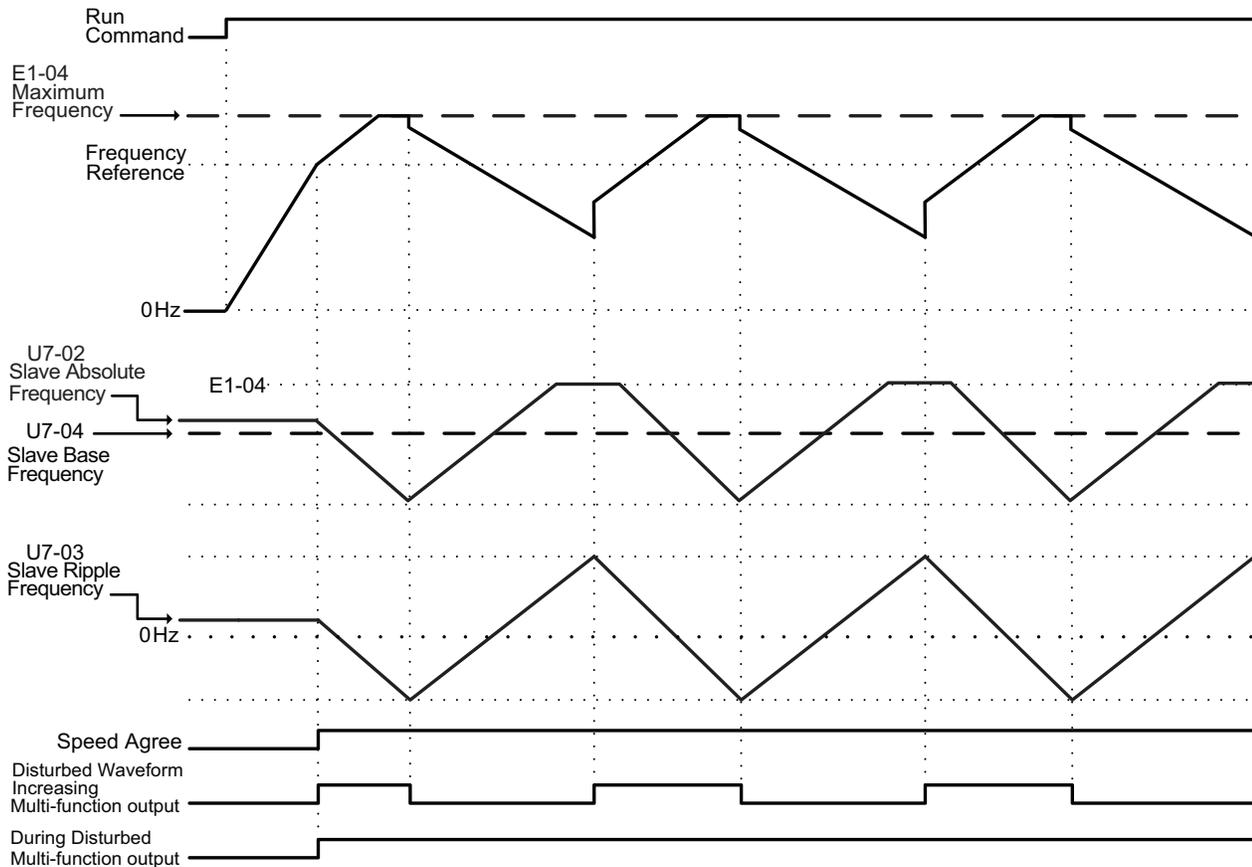


Figure 3 Traverse Mode Operation Outside of Max Output Frequency Parameter E1-04 / E3-04

Situation 3: Changing Reference Frequency

Using the parameter settings found in [Table 9](#) and a reference frequency that changes from 20 Hz to 30 Hz, the Traverse software will produce output waveforms similar to those in [Figure 4](#). Using the 20 Hz frequency reference, the master drive oscillates between 16 and 24 Hz. When the reference frequency increases to 30 Hz, the drive exits Traverse mode and accelerates using the default acceleration time set in parameter C1-01. When the drive reaches the new frequency reference, it re-enters Traverse mode and the master drive oscillates between 24 and 36 Hz.

The Slave Absolute Frequency parameter U7-02 initially rests at 21.33 Hz. When the drive enters Traverse mode, U7-02 oscillates between 16 and 24 Hz. When the reference frequency changes, the drive exits Traverse mode and the Slave Absolute Frequency rises to 32 Hz until the drive re-enters Traverse mode. After resuming traverse mode, the new waveform oscillates between 24 and 36 Hz.

Slave Ripple Frequency parameter U7-03 operates similar to U7-02 except that its waveform remains centered at 0 Hz.

Step changes in frequency reference results in unintended jumps in the disturbed waveforms. Disable the Traverse function using the 80h, (Disturbed WF Off), to prevent damage to the motor or connected equipment before making large changes in the frequency reference.

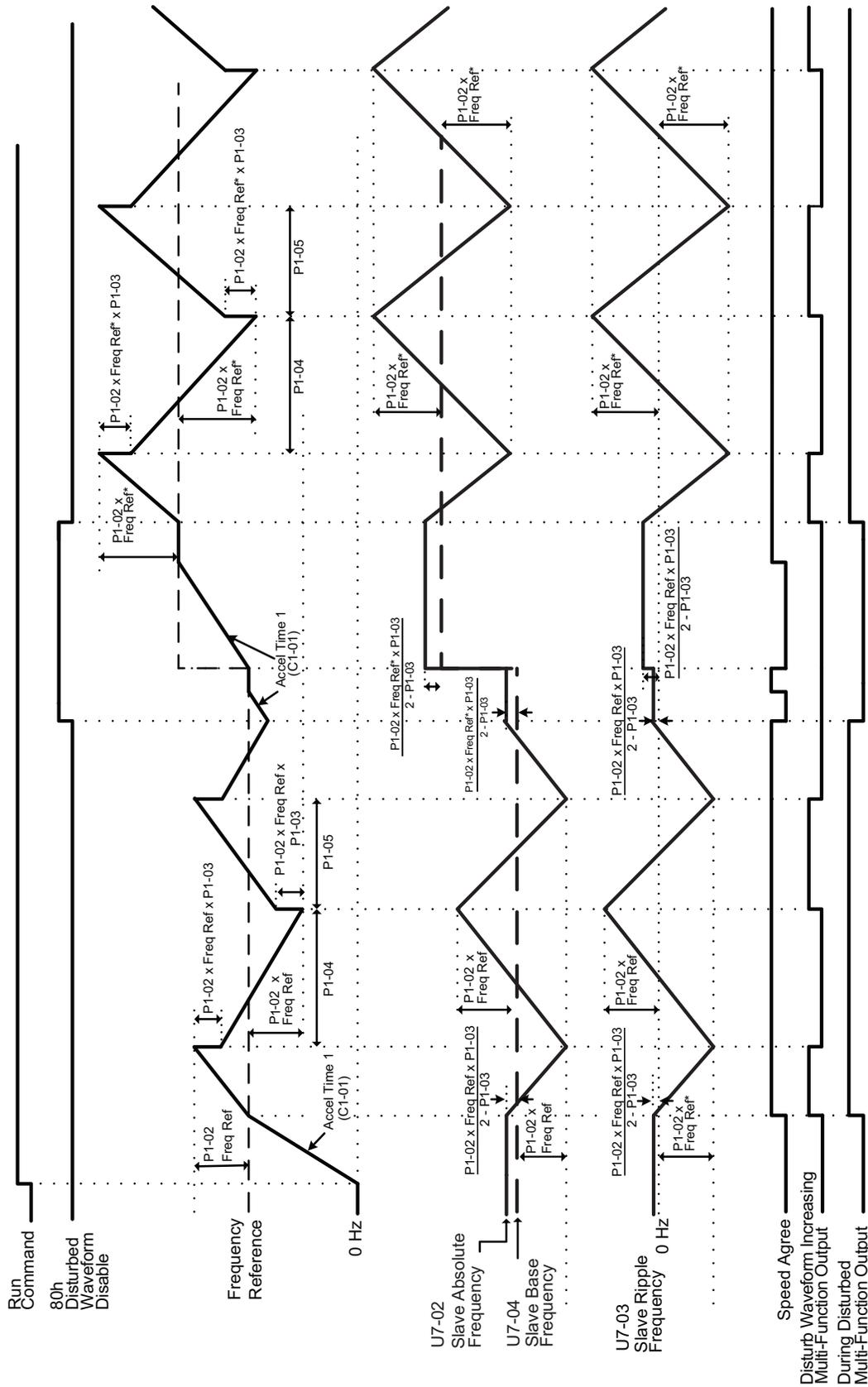


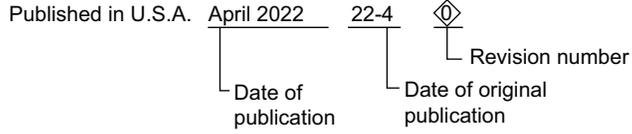
Figure 4 Traverse Mode Operation with Changing Frequency Reference

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◆ Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.

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Specifications are subject to change without notice for ongoing product modifications and improvements.

Original instructions.

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