User Manual for the
HE300GEN150

Option Card for GE Adjustable Frequency Drives (AF-300 G11 / P11 Series Drives)

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PREFACE

This manual explains how to use the Horner APG HE300GEN150 option card.

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ABOUT PROGRAMMING EXAMPLES

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Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

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CHAPTER 1: INTRODUCTION

1.1 Product Description

The Horner APG option card (HE300GEN150) enables GE Adjustable Frequency Drives (models AF-300 G11 or P11) to reside directly on a Genius network. The option card is installed within the AF-300 G11 or P11 (AF-300) and provides drive control and data access capabilities to a PLC.

Note: For clarification purposes, the *combination* of the HE300GEN150 Option Card *and* the GE Drive (AF-300 G11 or P11) is referred to as "AF-300" throughout the manual.

1.2 Genius Network Overview

Genius is a high-speed, token passing network, which is used in many industrial applications. The network supports up to 32 devices with baud rates of up to 153.6Kbaud. A wide variety of Genius devices exist, which can reside on the network ranging from intelligent I/O blocks to more sophisticated communications devices such as personal computers. In recent years a number of third party devices have emerged including operator interface units, valve manifolds, and RF tag readers.

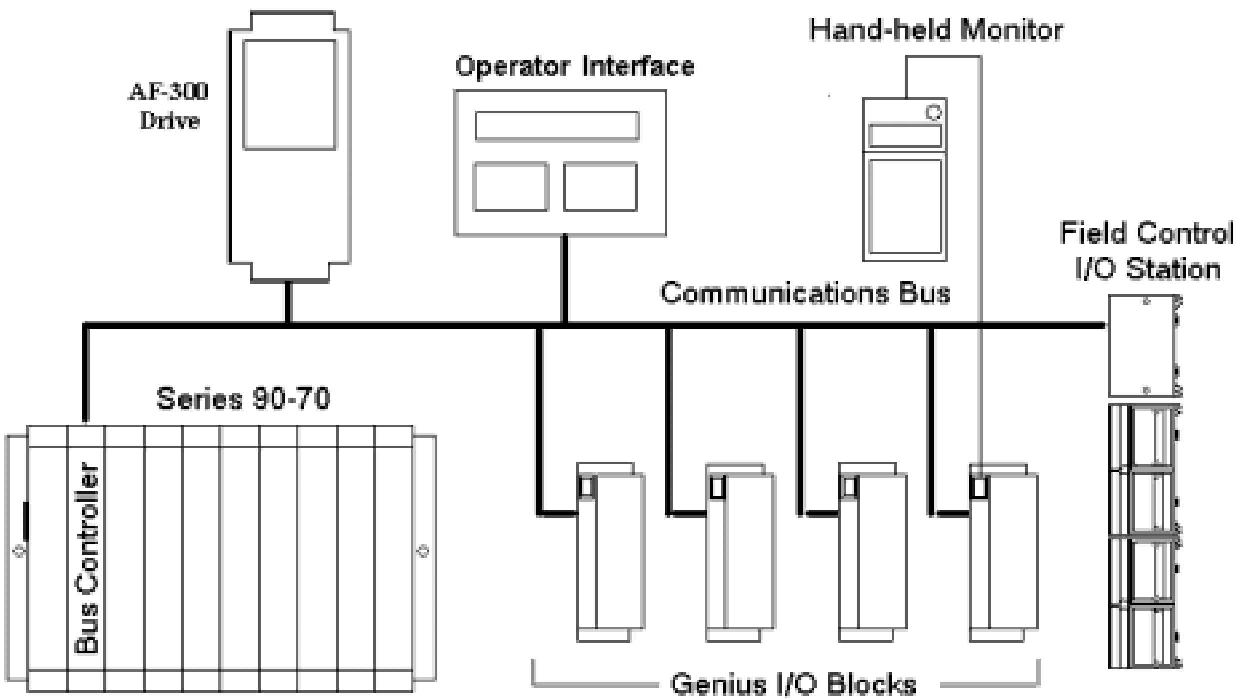

Figure 1.1 – Typical Genius Network

In a typical industrial application (Figure 1.1), Genius devices are distributed throughout a fairly wide area, wired in a daisy chained fashion with a single shielded, twisted pair. The option card (GEN150) allows the AF-300G11/P11 drives to be distributed on the factory floor on the same twisted pair as the I/O blocks and other Genius devices. The option card provides a new level of PLC integration for the drives.

The physical nature of the Genius network can allow for great savings in wiring, as many discrete wires can be replaced with a single communications cable. This allows tasks such as starting, stopping, reversing, and changing speeds to be accomplished over the LAN. In addition, drive parameters and diagnostic data previously not available to the PLC are easily accessible.

1.3 Genius Network Architecture

The Genius network architecture is depicted in Figure 1.1. Normally, a GE Fanuc programmable controller runs the network through a PLC module called a Genius Bus Controller (GBC). Up to 32 devices are wired in a daisy chained fashion. Network devices support four communications terminals, Serial 1, Serial 2, Shield In and Shield Out. The network is terminated at each end with an appropriate terminating resistor.

Each device on the network (up to 32 devices) is assigned a Genius Bus Address ranging from 0 to 31. Bus Controllers are typically assigned a Genius Bus Address of 31. In applications with redundant bus controllers, the backup bus controller is address 30. Bus address 0 is normally reserved for the Genius Hand Held Monitor.

Among other tasks, the bus controller allows Genius I/O (including the drives) on the network to be mapped into PLC memory, monitoring inputs and controlling outputs. Intelligent, data intensive Genius devices also share their data with the PLC through communications with the bus controller.

1.4 Genius Communications Services

The option card allows the drive to reside directly on the Genius LAN providing drive control and data access capabilities to the PLC. There are three types of communications that can occur on the Genius LAN. These are I/O Services, Global Data, and Datagrams. The option card supports all three of these communications types.

1.4.1 I/O Service

I/O Service is the manner in which data is transferred to and from Genius I/O Blocks. Outputs are selectively written to each I/O block from the CPU bus controller during each scan. The outputs written by the CPU bus controller to the AF-300 drives include start/stop, fwd/rev, frequency (speed), fault reset, and other outputs. Many I/O blocks also broadcast inputs to the bus every bus scan. The AF-300 does not support this means of communication as it broadcasts its inputs (feedback) as *Global Data*.

1.4.2 Global Data

Global data is data broadcast over the network at large, with no particular destination. Each Genius device has the capacity to broadcast up to 128 bytes of global data. Intelligent devices, which reside on the LAN (bus controllers, OIUs, etc.), can read this data off the network. These devices are intelligent and are able to interpret the data, which differs from Genius device to Genius device. The option card utilizes global data to broadcast drive feedback data over Genius. Drive feedback data consists of parameters such as speed reference, torque, current, faults, and function settings.

The option card allows the system designer to select which data is broadcast by the drive as global data. This is important for two reasons. First, the data, which is desired to be monitored on a regular basis varies from application to application. Second, the amount of global data broadcast by the drive is directly proportional to response time. The ability to control the amount and content of global data output is a vital feature of the option card.

In general, the procedure for configuring the drive's Global output data is a process of mapping the global output data words to drive parameters. There are two different means in which this mapping of global data output words to drive parameters can be accomplished. These include mapping from the keypad and from the drive configuration utility. The keypad configuration method is described in Chapter 2.

1.4.3 Datagrams

Datagrams are messages sent over the Genius LAN from one device to another. Datagrams are typically performed in PLC applications through a communications request or COMREQ. Typically, COMREQs are used for occasional data access. For instance, COMREQs are not typically used to monitor speed reference on a continuous basis, but it might be used to change a drive parameter once per shift or once per week. Datagrams (through COMREQs) could also be used to upload or download all drive parameters over the network. In PLC applications, a bus controller is required to perform datagrams or COMREQs.

1.5 Required References and Resources

This manual is to be used in conjunction with the GE FUJI Electric instruction manuals for the AF-300 G11 and P11 series drives. The manual numbers for the drives are as follows:

AF-300G11: Manual # GEI-100363
AF-300P11: Manual # GEI-100364

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CHAPTER 2: INSTALLATION

2.1 Installation Procedures for the Option Card (GEN150)

The option card is designed to be mounted to the AF-300 drive in the same location as the keypad. The same mounting instructions found in the *GE FUJI AF-300 Drive Instruction Manual(s)* for mounting the keypad to the drive are also used for mounting the option card to the drive. The keypad is, then, mounted to the option card. (Reference numbers for the drive instruction manuals are found in Section 1.5 in this manual.)

The following are the necessary steps for installing the option card:

1. Power down the drive.
2. Remove the keypad from the top cover.
3. Mount the option card in the same location where the keypad was removed. (Securing the two screws, one in the upper left and the other in the lower right).
4. Mount the keypad to the option card. (Securing the two screws, one in the upper left and the other in the lower right).
5. Connect the removable terminal strip with the Genius field wiring to the option card.
6. Power up the drive as needed.

Figure 2.1 shows an example of how the option card is installed in an under 40 Horsepower drive.

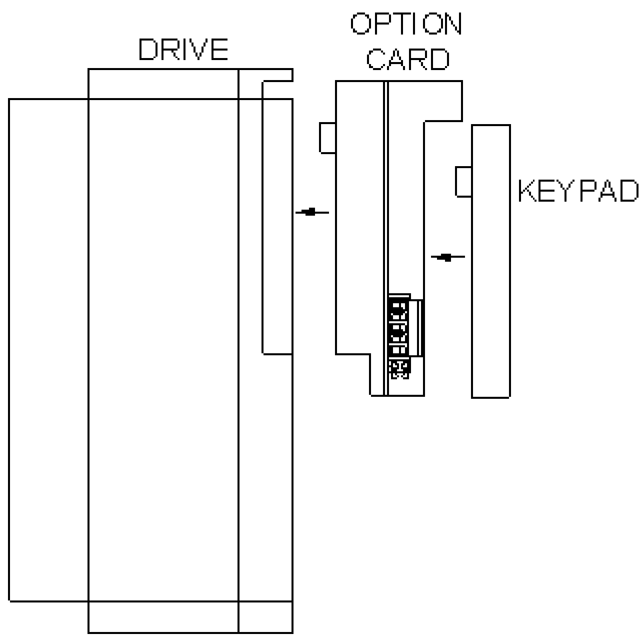

Figure 2.1 - Example Installation in an Under 40 Horsepower Drive

2.2 Genius Wiring

Up to 32 devices are wired in a daisy-chained fashion in a Genius network. (See Figure 1.1 for an overview of Genius network.) The network is terminated at each end with an appropriate terminating resistor (Figure 2.2). The value of the resistor is chosen to match the characteristic impedance of the cable. Refer to GE *Genius I/O and System Communications User Manual* (GE-90486) for help in selecting an appropriate cable type for the application.

Note: If the characteristic impedance of the cable is unknown, 120-ohm terminating resistors need to be used

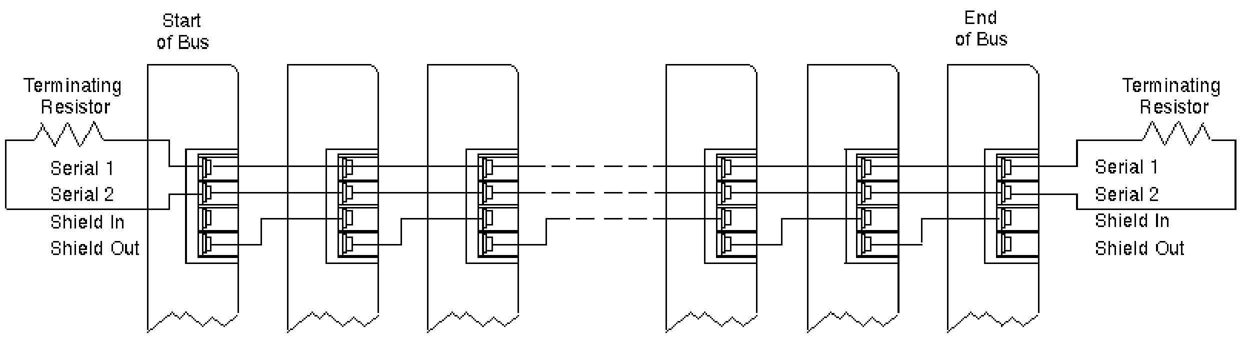

Figure 2.2 – Typical Genius Wiring Techniques

Network devices support four communications terminals, Serial 1, Serial 2, Shield In and Shield Out. (Figure 2.3.)

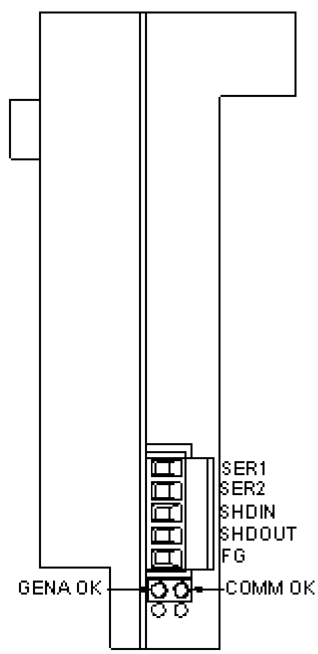

Figure 2.3 – Genius Connector

The LED designators and connector pin out are shown in Figure 2.3. In addition to the normal Genius connections showing in Figure 2.2, Frame Ground must be attached to the “FG” terminal, Terminal 5.

Table 2.1 -– Genius LEDs	
LED	**Description**
GENA OK	Illuminated unless there is a fault with the GENA board.
COMM OK	The “COMM OK” indicator illuminates when the GENA board is communicating with the Genuis Bus Controller (GBC) properly. If the “COMM OK” LED is not illuminated after configuration, check the following: Make sure the cable is wired correctly between the GBC and the option card. Check the GBC configuration (LM90 Configuration package). The Global data length, and the Directed control data length must match the input length and the output length respectively.

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CHAPTER 3: OPTION CARD CONFIGURATION (USING AF-300 KEYPAD)

3.1 Keypad Functionality

The keypad functions and operations are covered in the drive manufacturer documentation. This document is concerned only with describing the keypad functions that are used to configure the option card and effect the option card operation.

3.2 Option Card Configuration Parameters

The following table lists and describes the parameter settings used to configure the Option Card parameters. As described previously, Genius devices have the capacity to broadcast 128 bytes (64 words) of global data and receive 128 bytes (64 words) of directed data. The Option Card is limited to 24 bytes (12 words) of global data and 20 bytes (10 words) of directed data. The parameter values can be changed using the instructions found in the drive manufacturer's documentation.

Table 3.1 – Parameter Settings

Option Card Parameter	Description	Valid Input Values	Default Value (o31 = 255)
o30	Bus Address	0-31 (1-30 typical)	1
o31	Baud Rate • 0 = 153.6K EXT • 1 = 153.6K STD • 2 = 76.8K • 3 = 38.4K • 255 = Reset parameters to default	0-3 255	1 = 153.6K standard
o32	Global Data Length	0 - 12	7
o33	Directed Data Length	0 - 10	4
o34	User Defined Broadcast Data 1	1-254 0;255*	M14 Operating State
o35	User Defined Broadcast Data 2	1-254 0;255*	M06 Actual Frequency
o36	User Defined Broadcast Data 3	1-254 0;255*	M11 Output Current
o37	User Defined Broadcast Data 4	1-254 0;255*	M10 Motor Output
o38	User Defined Broadcast Data 5	1-254 0;255*	M16 Fault Memory 0
o39	User Defined Broadcast Data 6	1-254 0;255*	M07 Actual Torque
o40	User Defined Broadcast Data 7	1-254 0;255*	M01 Frequency Command
o41	User Defined Broadcast Data 8	1-254 0;255*	255
o42	User Defined Broadcast Data 9	1-254 0;255*	255
o43	User Defined Broadcast Data 10	1-254 0;255*	255

Table 3.1 – Parameter Settings			
Option Card Parameter	**Description**	**Valid Input Values**	**Default Value (o31 = 255)**
o44	User Defined Broadcast Data 11	1-254 0;255*	255
o45	User Defined Broadcast Data 12	1-254 0;255*	255
o46	User Defined Control Data 1	1-254 0;255*	S06 Operation Command
o47	User Defined Control Data 2	1-254 0;255*	S01 Frequency Cmd
o48	User Defined Control Data 3	1-254 0;255*	S07 Universal Do
o49	User Defined Control Data 4	1-254 0;255*	S12 Universal Ao
o50	User Defined Control Data 5	1-254 0;255*	255
o51	User Defined Control Data 6	1-254 0;255*	255
o52	User Defined Control Data 7	1-254 0;255*	255
o53	User Defined Control Data 8	1-254 0;255*	255
o54	User Defined Control Data 9	1-254 0;255*	255
o55	User Defined Control Data 10	1-254 0;255*	255
Note: If the Option Card detects and invalid parameter value then the parameter number containing the invalid value appears at o31 (Bus address). It is recommended that parameter o31 be checked after the configuration is completed to make sure that all parameter values are valid. * 0 and 255 are used to notate unused configuration parameter.			

3.2.1 User Defined Parameters

The object of the user defined configuration parameters is to create a selectable data map for the Genius data. There are 254 available parameters and only 12 broadcast and 10 control data words available on the Genius network. The selectable map allows the user to configure what parameters and how many are to be used.

The following table shows how the user defined map translates to GBC global and control data words.

Table 3.2 – Translation of Global and Data Words

Global Data (Option Card to GBC)			Control Data (GBC to Option Card)		
Broadcast Data Parameter Number	**Parameter Value Appears in GBC Word #**		**Control Data Parameter Number**	**GBC Word written to Parameter**	
	Word	**PLC**		**Word**	**PLC**
1	1	AI1	1	1	AQ1
2	2	AI2	2	2	AQ2
3	3	AI3	3	3	AQ3
4	4	AI4	4	4	AQ4
5	5	AI5	5	5	AQ5
6	6	AI6	6	6	AQ6
7	7	AI7	7	7	AQ7
8	8	AI8	8	8.	AQ8
9	9	AI9	9	9	AQ9
10	10	AI10	10	10	AQ10
11	11	AI11			
12	12	AI12			

3.3 Operation Configuration Parameters

The previous section described parameters that are used to directly configure the Option Card. There are other configurable parameters in the drive that effect the operation of the Option Card, (GEN150), such as drive control and error handling. The following table lists and describes the parameter settings that affect the Option Card operation.

<table>
<tr><th colspan="6">Table 3.3 - Parameter Effect on Option Card Operation</th></tr>
<tr><th>Operation Parameter</th><th colspan="3">Description</th><th>Valid Input Values</th><th>Default Value</th></tr>
<tr><td rowspan="6">H30</td><td colspan="3">Link Function</td><td rowspan="6">0-3</td><td rowspan="6">0</td></tr>
<tr><th>Value</th><th>Freq. from Option Card</th><th>Commands from Option Card</th></tr>
<tr><td>0</td><td>Disabled</td><td>Disabled</td></tr>
<tr><td>1</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>2</td><td>Disabled</td><td>Enabled</td></tr>
<tr><td>3</td><td>Enabled</td><td>Enabled</td></tr>
<tr><td>o27</td><td colspan="3">Loss of Network Behavior
• 0 = Immediate trip – Code ERR5
• 1 = ERR5 trip after timer setting o28
• 2 = Re-check after the timer setting o28
• 3 = Ignore communication error</td><td>0-3</td><td>0</td></tr>
<tr><td>o28</td><td colspan="3">ERR5 timer setting (used with o27)</td><td>0.0 – 60.0 S</td><td>0.0 Seconds</td></tr>
</table>

3.3.1 Description of Parameter H30

Parameter H30 is used to split the Frequency and Command control between the drive and the Option Card. The frequency and/or the stop/start commands can be controlled completely by the drive, completely by the option card or split so one of the commands is controlled by the drive and the other is controlled by the option card.

3.3.2 Description of Parameters o27 and o28

Parameters o27 configures how the drive reacts to a loss of network. Out of the four settings, the first (0) setting allows for an immediate trip when a network problem occurs. The last setting (3) configures the drive to ignore the error. The middle two settings (1 and 2) use a timer setting (o28) in conjunction with the error setting. Parameter o28 contains the timer setting that is used when o27 is configured for a value of 1 or 2.

3.3.3 Network Loss

Network loss (ERR5) occurs when the COMM OK led is not on. There are a few reasons that cause this condition. The following table lists the most common reasons for a network loss (ERR5) condition:

Table 3.4 – Network Loss Conditions	
1	Genius cable broken or not connected
2	The Global and Directed data lengths do NOT match the settings in the GBC.
3	The PLC is not in RUN mode.

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CHAPTER 4: GENIUS BUS CONTROLLER CONFIGURATION

4.1 PLC Configuration

This chapter discusses the configuration of the PLC in Genius applications using the AF-300 drive with GEN100 Genius option board. As mentioned in a previous chapter, Genius LANs performing control require a Genius Bus Controller. Most GE Fanuc PLCs offer a module which acts as the bus controller. This document discusses configuration of the Series 90 PLCs -- Series 90-30 and Series 90-70.

4.2 Series 90-70 Configuration

For successful integration of the Series 90-70 GBC, the document GFK-0398, *Series 90-70 Genius Bus Controller User's Manual* is required.

Configuration of Series 90-70 PLC system requires the use of Logicmaster 90-70, the personal computer software package used for ladder logic programming and system setup. Configuration of the Genius devices residing on the LAN with Logicmaster 90-70 cannot be accomplished until the Genius Bus Controller (GBC) is configured. For instructions on that process, consult GFK-0398 from GE Fanuc.

After configuration of the GBC has been completed, the Genius devices residing on the LAN may be configured by zooming into the slot containing the GBC. A Logicmaster screen similar to that below will appear:

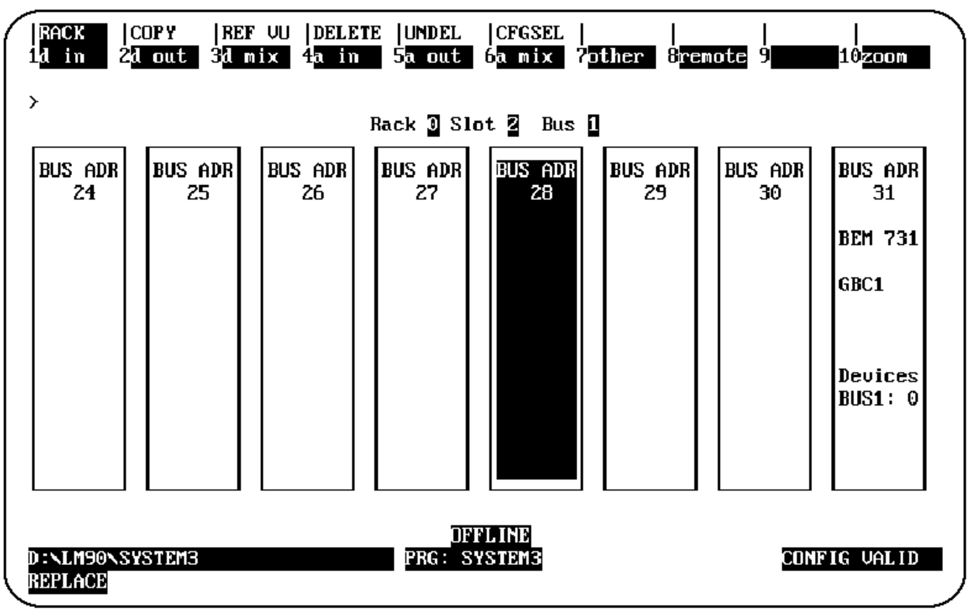

Figure 4.1 - Logicmaster 90-70 Configuration Screen

This is a representation of the Genius LAN, with each device shown as a "block". Because only eight devices can be shown on the screen at once, the screen "wraps around" from left to right. The left and right cursor keys are used to select the device to be configured. When the desired block is highlighted, the type of Genius device can be selected using the function keys. The AF-300 is configured as a "Generic Genius I/O Device". This device is selected by pressing the "Other" (F7) function key, and selecting the "Generic I/O" device from the devices listed.

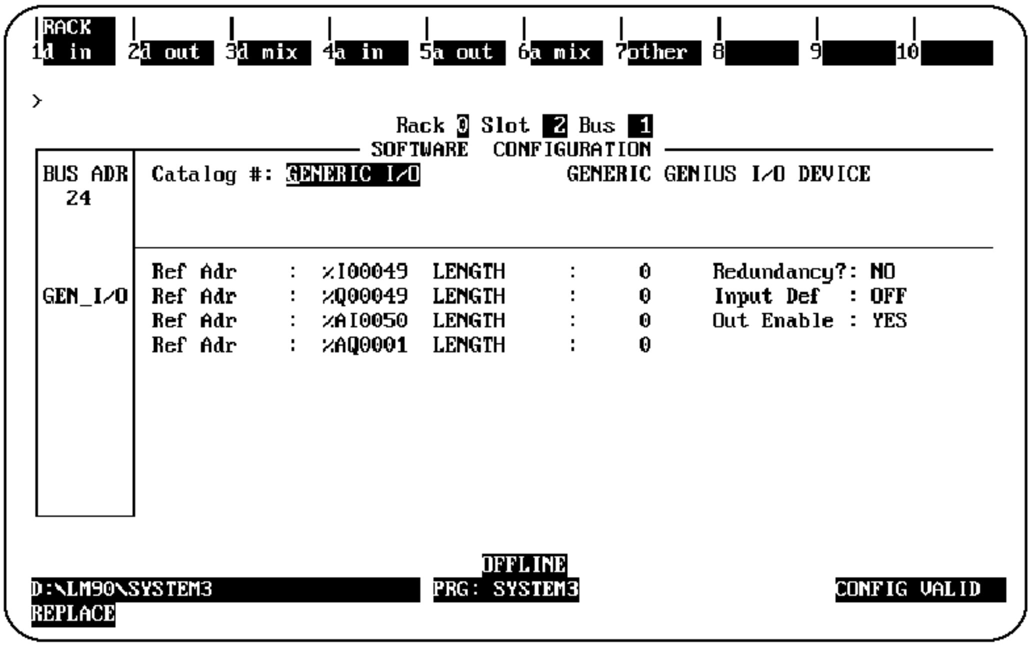

Figure 4.2 – Generic I/O Device Configuration Screen

Below, each configuration parameter is described. The proper setting for a drive with a default data configuration is also listed. **Figure 4.3** lists the default drive data configuration.

%AI Length (Default = 6)
The number of %AIs assigned to the AF-300 drive should be equal to the number of global data words broadcast by the drive.

%AQ Length (Default = 1)
The number of %AQs assigned to the AF-300 drive should be equal to the number of directed control words.

Reference Addresses
In addition to the length of each of the four I/O references (%I, %Q, %AI, %AQ), the starting reference address for each I/O type must be set for each of the I/O references with a non-zero length. This reference address should not conflict with any other I/O module or Genius device.

Redundancy
If the AF-300 is used in a redundant application, this parameter should be set to YES.

Input Default
The input defaults can be set to OFF or HOLD, as desired.

Outputs Enabled
If outputs from the PLC are to be enabled (most cases), this parameter should be set to YES.

Note that the reference types available for mapping into Series 90-30 memory are more numerous than those available for the Series 90-70. This is due to the fact that the Series 90-70 performs more data type checking than the Series 90-30. This extra checking requires that the number and type of memory references to match exactly in the Series 90-70. The Series 90-30 requires only that the amount of data match exactly.

4.3 Series 90-30 Configuration

For full information on the configuration of Genius LANs with the Series 90-30 PLC, consult the GE Fanuc document GFK-1034, *Series 90-30 Genius Bus Controller User's Manual*.

The Series 90-30 PLC is configured using Logicmaster 90-30. In the configuration package, the Genius Bus Controller (GBC) configuration screen appears as follows:

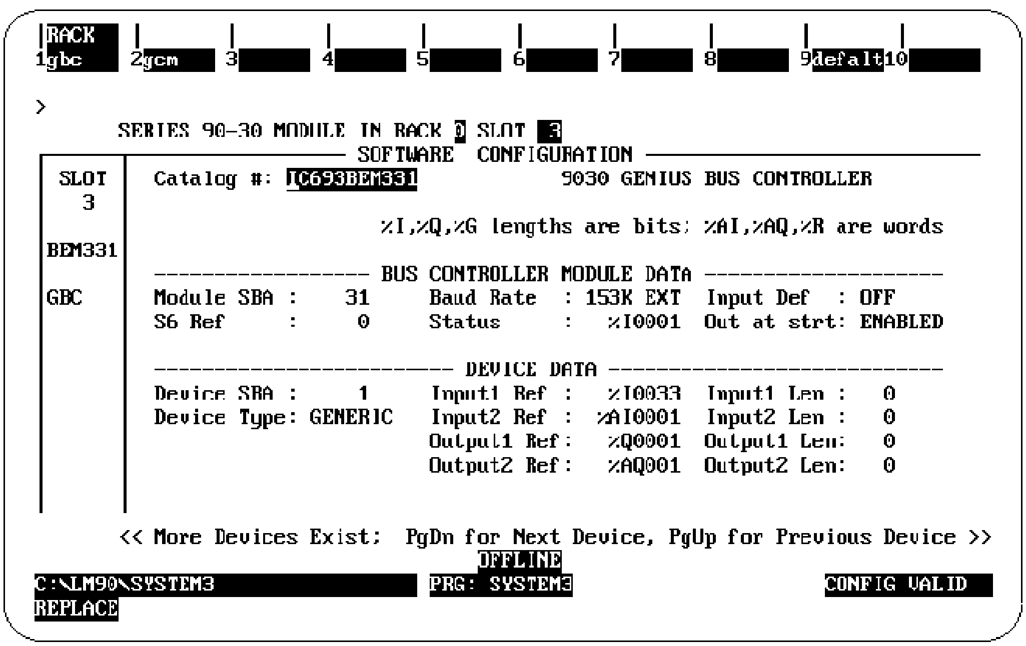

Figure 4.3 – Series 90-30 GBC Configuration Screen

The devices residing on the Genius LAN are configured in the lower "Device Data" section of the screen. The cursor keys are used to navigate around the screen. When the cursor is on the "Device Data" section of the screen, the PageUp and PageDown keys are used to select the Device number. Once the proper device number is displayed for the AF-300, the following parameters can be set.

Device Type
The AF-300 is configured as a GENERIC device type, which is the default.

Input References (Input 1 Ref, Input 2 Ref)
These parameters specify where the AF-300's global data is mapped in Series 90-30 memory. Legal reference types for these parameters are %I, %G, %AI, and %R. The global data broadcast by the AF-300 can be divided into two different areas of PLC memory. For instance, part of the global data can be mapped into %I and the remainder into %AI. Two non-consecutive areas of the same reference type can also be mapped. For instance, part of the global data can be mapped to %R1 and the remainder to %R500.

Input Length (Input 1 Len, Input 2 Len)

These parameters specify how much global data is broadcast by the AF-300. If the Input Reference specified is bit-type (%I, %G), the length parameter is in bits. If the Input Reference specified is word type (%AI, %R), the length parameter is in words. The total amount of data mapped into the Series 90-30 must exactly match the total amount of global data broadcast by the AF-300.

If bit-type parameters are used then they must be defined in the first global words of the drive. They must also be configured as bit-type data in the bus controller

Output References (Output 1 Ref, Output 2 Ref)
These parameters specify where the AF-300's directed control data is mapped in Series 90-30 memory. Legal reference types for these parameters are %Q, %G, %AQ, and %R. As you can see, the directed data input by the AF-300 can be divided into two different areas of PLC memory. For instance, part of the global data could be mapped into %Q, and the remainder into %AQ. Two non-consecutive areas of the same reference type could also be mapped. For instance, part of the directed data could be mapped to %R1, and the remainder to %R500.

Output Length (Output 1 Len, Output 2 Len) Output

These parameters specify how much directed data is received by the AF-300. If the Output Reference specified is bit-type (%Q, %G), the length parameter is in bits. If the Output Reference specified is word type (%AQ, %R), the length parameter is in words. The total amount of data mapped from the Series 90-30 must exactly match the total amount of global data received by the AF-300.

If bit-type parameters are used then they must be defined in the first global words of the drive. They must also be configured as bit-type data in the bus controller.

CHAPTER 5: AF-300 DRIVE PARAMETERS

5.1 Drive Parameter Descriptions

The following table contains the communication index number used for mapping the drive parameters into Genius I/O. Each communication index number is associated with a specific parameter. The details about the specific parameters can be found in the manual supplied with the drive.

Table 5.1 – Communication Parameter Index

Comm Index	G11 data	E11 data	Hex	Description	Keypad	Data Format
0	-	-	0			
1	S01	S01	1	Frequency command		2
2	-	-	2			
3	-	-	3			
4	-	-	4			
5	S05	S05	5	Frequency command		5
6	S06	S06	6	Operation command		14
7	S07	S07	7	Universal Do		15
8	S08	S08	8	Accel Time		3
9	S09	S09	9	Deccel Time		3
10	S10	S10	A	Driving Torque Limit		5
11	S11	S11	B	Braking Torque Limit		5
12	S12	S12	C	Universal Ao		2
13	-	-	D			
14	-	-	E			
15	M01	M01	F	Frequency (Motor speed) setting (final)		2
16	-	-	10	Torque command (final)		
17	-	-	11	Torque current command (final)		
18	-	-	12	Magnetic flux command (final)		
19	M05	M05	13	Frequency setting (final)		5
20	M06	M06	14	Actual frequency		2
21	M07	M07	15	Actual value of torque		6
22	M08	M08	16	Torque current		6
23	M09	M09	17	Output frequency		5
24	M10	M10	18	Motor output		5
25	M11	M11	19	Output current (rms)		5
26	M12	M12	1A	Output voltage (rms)		3
27	M13	M13	1B	RUN command, Di, RESET input (final)		14
28	M14	M14	1C	Operation state		16

Table 5.1 – Communication Parameter Index

29	M15	M15	1D	General-purpose output terminal		15
30	M16	M16	1E	Alarm content latest		10
31	M17	M17	1F	Alarm content 1st previous		10
32	M18	M18	20	Alarm content 2nd previous		10
33	M19	M19	21	Alarm content 3rd previous		10
34	M20	M20	22	Total operation time		1
35	M21	M21	23	DC link voltage		1
36	-	-	24	Motor temperature		
37	M23	M23	25	Model code		17
38	M24	M24	26	Capacity code		11
39	M25	M25	27	ROM version		1
40	M26	M26	28	Processing code in abnormal transmission		20
41	M27	M27	29	Frequency (Motor speed) setting at alarm final		2
42	-	-	2A	Torque command at alarm (final)		
43	-	-	2B	Torque current command at alarm (final)		
44	-	-	2C	Magnetic flux command at alarm(final)		
45	M31	M31	2D	Frequency setting at alarm final		5
46	M32	M32	2E	Actual frequency at alarm		2
47	M33	M33	2F	Actual value of torque at alarm		6
48	M34	M34	30	Torque current at alarm		6
49	M35	M35	31	Output frequency at alarm		5
50	M36	M36	32	Motor output at alarm		5
51	M37	M37	33	Output current (rms) at alarm		5
52	M38	M38	34	Output voltage (rms) at alarm		3
53	M39	M39	35	RUN command, Di, RESET input at alarm		14
54	M40	M40	36	Operation state at alarm		16
55	M41	M41	37	General-purpose output terminal at alarm		15
56	M42	M42	38	Total operation time at alarm		1
57	M43	M43	39	DC link voltage at alarm		1
58	M44	M44	3A	Internal temperature of inverter at alarm		1
59	M45	M45	3B	Temperature of cooling fin at alarm		1
60	M46	M46	3C	Lifetime of main circuit capacitor		3
61	M47	M47	3D	Lifetime of capacitor on PCB		1
62	M48	M48	3E	Lifetime of cooling fan		1
63	-		3F			
64	-		40			
65	-		41			
66	-		42			
67	-		43			

Table 5.1 – Communication Parameter Index

68	-		44			
69	-		45			
70	F00		46	Data protection	DATA PRTC	1
71	F01		47	Frequency command 1	FREQ CMD 1	1
72	F02		48	Operation method	OPR METHOD	1
73	F03		49	Maximum frequency 1	MAX Hz-1	1
74	F04		4A	Base frequency 1	BASE Hz-1	1
75	F05		4B	Rated voltage 1	RATED V-1	1
76	F06		4C	Maximum voltage 1	MAX V-1	1
77	F07		4D	Acceleration time 1	ACC TIME1	12
78	F08		4E	Deceleration time 1	DEC TIME1	12
79	F09		4F	Torque boost 1	TRQ BOOST1	12
80	F10		50	Electronic Thermal 1 (Select)	ELCTRN OL1	3
81	F11		51	Electronic Thermal 1 (Level)	OL LEVEL1	1
82	F12		52	Electronic Thermal 1 (Time constant)	TIME CNST1	19
83	F13		53	Electronic thermal overload relay (for DB resistor)	DBR OL	3
84	F14		54	Restart mode after momentary power failure	RESTART	1
85	F15		55	Frequency limiter (High)	H LIMITER	1
86	F16		56	Frequency limiter (Low)	L LIMITER	1
87	F17		57	Gain (for freq set signal)	FREQ GAIN	1
88	F18		58	Bias frequency	FREQ BIAS	1
89	F20		59	DC brake (Starting freq.)	DC BRK Hz	3
90	F21		5A	DC brake (Braking level)	DC BRK LVL	1
91	F22		5B	DC brake (Braking time)	DC BRK t	3
92	F23		5C	Starting frequency (Freq.)	START Hz	3
93	F24		5D	Starting frequency (Holding time)	HOLDING t	3
94	F25		5E	Stop frequency	STOP Hz	1
95	F26		5F	Motor sound (Carrier freq.)	MTR SOUND	1
96	F27		60	Motor sound (Sound tone)	SOUND TONE	1
97	F30		61	FMA (Voltage adjust)	FMA V-ADJ	1
98	F31		62	FMA (Function)	FMA FUNC	1
99	F33		63	FMP (Pulse rate)	FMP PULSES	1
100	F34		64	FMP (Voltage adjust)	FMP V-ADJ	1
101	F35		65	FMP (Function)	FMP FUNC	1
102	F36		66	30RY operation mode	30RY MODE	1
103	F40		67	Torque limiter 1 (Driving)	DRV TRQ 1	1
104	F41		68	Torque limiter 1 (braking)	BRK TRQ 1	1
105	F42		69	Torque vector control 1	TRQVECTOR1	1
106	E01		6A	X1 terminal function	X1 FUNC	1

Table 5.1 – Communication Parameter Index

107	E02		6B	X2 terminal function	X2 FUNC	1
108	E03		6C	X3 terminal function	X3 FUNC	1
109	E04		6D	X4 terminal function	X4 FUNC	1
110	E05		6E	X5 terminal function	X5 FUNC	1
111	E06		6F	X6 terminal function	X6 FUNC	1
112	E07		70	X7 terminal function	X7 FUNC	1
113	E08		71	X8 terminal function	X8 FUNC	1
114	E09		72	X9 terminal function	X9 FUNC	1
115	E10		73	Acceleration time 2	ACC TIME2	12
116	E11		74	Deceleration time 2	DEC TIME2	12
117	E12		75	Acceleration time 3	ACC TIME3	12
118	E13		76	Deceleration time 3	DEC TIME3	12
119	E14		77	Acceleration time 4	ACC TIME4	12
120	E15		78	Deceleration time 4	DEC TIME4	12
121	E16		79	Torque limiter 2 (Driving)	DRV TRQ 2	1
122	E17		7A	Torque limiter 2 (braking)	BRK TRQ 2	1
123	E20		7B	Y1 terminal function	Y1 FUNC	1
124	E21		7C	Y2 terminal function	Y2 FUNC	1
125	E22		7D	Y3 terminal function	Y3 FUNC	1
126	E23		7E	Y4 terminal function	Y4 FUNC	1
127	E24		7F	Y5A, Y5C terminal func.	Y5 FUNC	1
128	E30		80	FAR function (Hysteresis)	FAR HYSTR	3
129	E31		81	FDT function (Level)	FDT1 LEVEL	1
130	E32		82	FDT signal (Hysteresis)	FDT1 HYSTR	3
131	E33		83	OL function (Mode select)	OL1 WARNING	1
132	E34		84	OL function signal (Level)	OL1 LEVEL	19
133	E35		85	OL function signal (Timer)	OL1 TIMER	3
134	E36		86	FDT2 function (Level)	FDT2 LEVEL	1
135	E37		87	OL2 function (Level)	OL2 LEVEL	19
136	E40		88	Display coefficient A	COEF A	12
137	E41		89	Display coefficient B	COEF B	12
138	E43		8A	LED Monitor (Function)	LED MNTR	1
139	E44		8B	LED Monitor (Display @ STOP mode)	LED MNTR2	1
140	E45		8C	LCD Monitor (Function)	LCD MNTR	1
141	C01		8D	Jump frequency (Jump freq 1)	JUMP Hz 1	1
142	C02		8E	Jump frequency (Jump freq 2)	JUMP Hz 2	1
143	C03		8F	Jump frequency (Jump freq 3)	JUMP Hz 3	1
144	C04		90	Jump frequency (Hysteresis)	JUMP HYSTR	1
145	C05		91	Multistep frequency setting (Freq. 1)	MULTI Hz-1	5

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146	C06		92	Multistep frequency setting (Freq. 2)	MULTI Hz-2	5
147	C07		93	Multistep frequency setting (Freq. 3)	MULTI Hz-3	5
148	C08		94	Multistep frequency setting (Freq. 4)	MULTI Hz-4	5
149	C09		95	Multistep frequency setting (Freq. 5)	MULTI Hz-5	5
150	C10		96	Multistep frequency setting (Freq. 6)	MULTI Hz-6	5
151	C11		97	Multistep frequency setting (Freq. 7)	MULTI Hz-7	5
152	C20		98	JOG frequency	JOG Hz	5
153	C30		99	Frequency command 2	FREQ CMD 2	1
154	C31		9A	Offset adjust (terminal [12])	BIAS 12	4
155	C32		9B	Offset adjust (terminal [C1])	GAIN 12	3
156	C33		9C	Analog setting signal filter	REF FILTER	5
157	P01		9D	Number of motor 1 poles	M1 POLES	1
158	P02		9E	Motor 1 (Capacity)	M1 -CAP	5
159	P03		9F	Motor 1 (Rated current)	M1-Ir	19
160	P04		A0	Motor 1 (Tuning)	M1 TUN1	21
161	P05		A1	Motor 1 (On-line Tuning)	M1 TUN2	1
162	P06		A2	Motor 1 (No-load current)	M1-Io	19
163	P07		A3	Motor 1 (%R1 setting)	M1-%R1	5
164	P08		A4	Motor 1 (%X setting)	M1-%X	5
165	P09		A5	Slip compensation control	SLIP COMP1	5
166	H03		A6	Data initializing	DATA INIT	1
167	H04		A7			1
168	H05		A8			1
169	H06		A9	Fan stop operation	FAN STOP	1
170	H07		AA			1
171	H08		AB	Rev. phase sequence lock	REV LOCK	1
172	H09		AC	Start mode	START MODE	1
173	H10		AD	Energy-saving operation	ENERGY SAV	1
174	H11		AE	DEC mode	DEC MODE	1
175	H12		AF	Instantaneous OC limiting	INST CL	1
176	H13		B0			
177	H14		B1			
178	H15		B2			
179	H16		B3			
180	H18		B4	Torque control	TRQ CTRL	1
181	H19		B5			
182	H20		B6	PID control (Mode select)	PID MODE	1
183	H21		B7	PID control (Feedback signal)	FB SIGNAL	1
184	H22		B8	PID control (P-gain)	P-GAIN	5

Table 5.1 – Communication Parameter Index

185	H23		B9	PID control (I-gain)	I-GAIN	3
186	H24		BA	PID control (D-gain)	D-GAIN	1
187	H25		BB	PID control (Feedback filter)	FB FILTER	5
188	H26		BC	PTC thermistor (Mode select)	PTC MODE	1
189	H27		BD	PTC thermistor (Level)	PTC LEVEL	5
190	H28		BE	Droop operation	DROOP	4
191	H30		BF	Serial link (Function select)	LINK FUNC	1
192	H31		C0	Modbus-RTU (Address)	ADDRESS	1
193	H32		C1	Modbus-RTU (Mode select on no response error)	MODE ON ER	1
194	H33		C2	Modbus-RTU (Timer)	TIMER	3
195	H34		C3	Modbus-RTU (Baud rate)	BAUD RATE	1
196	H35		C4	Modbus-RTU (Data length)	LENGTH	1
197	H36		C5	Modbus-RTU (Parity check)	PARITY	1
198	H37		C6	Modbus-RTU (Stop bits)	STOP BITS	1
199	H38		C7	Modbus-RTU (No resp. error detection time)	NO RES t	1
200	H39		C8	Modbus-RTU (Response interval)	INTERVAL	5
201	A01		C9	Maximum frequency 2	MAX Hz-2	1
202	A02		CA	Base frequency 2	BASE Hz-2	1
203	A03		CB	Rated voltage 2 (at Base frequency 2)	RATED V-2	1
204	A04		CC	Maximum voltage 2	MAX V-2	1
205	A05		CD	Torque boost 2	TRQ BOOST2	1
206	A06		CE	Electronic thermal 2 (Select)	ELCTRN OL2	1
207	A07		CF	Electronic thermal 2 (Level)	OL LEVEL2	19
208	A08		D0	Electronic thermal 2 (Thermal time constant)	TIME CNST2	3
209	A09		D1	Torque vector control 2	TRQVECTOR2	1
210	A10		D2	Number of motor 2 poles	M2 POLES	1
211	A11		D3	Motor 2 (Capacity)	M2-CAP	5
212	A12		D4	Motor 2 (Rated current)	M2-Ir	19
213	A13		D5	Motor 2 (Tuning)	M2 TUN1	21
214	A14		D6	Motor 2 (On-line Tuning)	M2 TUN2	1
215	A15		D7	Motor 2 (No-load current)	M2-Io	19
216	A16		D8	Motor 2 (%R1 setting)	M2-%R1	5
217	A17		D9	Motor 2 (%X setting)	M2-%X	5
218	A18		DA	Motor 2 (Slip compensation control 2)	SLIP COMP2	5
219	o01		DB	Control method selection		1
220	o02		DC	Speed filter time constant		1
221	o03		DD	Number of feedback pulses		1
222	o04		DE	P-gain of feedback		1

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223	o05		DF	I-gain of feedback		1
224	o06		E0	Feedback speed detection filter		1
225	o07		E1	Feedback pulse correction coeff 1		1
226	o08		E2	Feedback pulse correction coeff 2		1
227	o27		E3	Bus loss behavior		1
228	o28		E4	Bus loss timer		1
229	o30		E5	Bus address		1
230	o31		E6	Baud rate		1
231	o32		E7	Global Data Length		1
232	o33		E8	Directed Data Length		1
233	o34		E9	User Defined Broadcast Data 1		1
234	o35		EA	User Defined Broadcast Data 2		1
235	o36		EB	User Defined Broadcast Data 3		1
236	o37		EC	User Defined Broadcast Data 4		1
237	o38		ED	User Defined Broadcast Data 5		1
238	o39		EE	User Defined Broadcast Data 6		1
239	o40		EF	User Defined Broadcast Data 7		1
240	o41		F0	User Defined Broadcast Data 8		1
241	o42		F1	User Defined Broadcast Data 9		1
242	o43		F2	User Defined Broadcast Data 10		1
243	o44		F3	User Defined Broadcast Data 11		1
244	o45		F4	User Defined Broadcast Data 12		1
245	o46		F5	User Defined Control Data 1		1
246	o47		F6	User Defined Control Data 2		1
247	o48		F7	User Defined Control Data 3		1
248	o49		F8	User Defined Control Data 4		1
249	o50		F9	User Defined Control Data 5		1
250	o51		FA	User Defined Control Data 6		1
251	o52		FB	User Defined Control Data 7		1
252	o53		FC	User Defined Control Data 8		1
253	o54		FD	User Defined Control Data 9		1
254	o55		FE	User Defined Control Data 10		1
255	-		FF			

5.2 Data Format Specification

Data format [1]: Integer data (Positive): Min. unit 1

Example) If F15 (Frequency limiter, upper limit)= 60Hz

Since 60 = $003C_H$

Data format [2]: Integer data (Positive, negative): Min. unit 1

Example) -20

Since -20 = $FFEC_H$

Data format [3]: Decimal data (Positive): Min. unit 0.1

Example) If F17 (gain frequency setting signal) = 100.0%

Since $100.0 \times 10 = 1000 = 03E8_H$

Data format [4]: Decimal data (Positive, negative): Min. unit 0.1

Example) If C31 (Analog input offset adjust, terminal12) = - 5.0%

Since $- 5.0 \times 10 = - 50 = FFCE_H$

Data format [5]: Decimal data (Positive): Min. unit 0.01

Example) If C05 (multi-step frequency 1) = 50.25Hz

Since $50.25 \times 100 = 5025 = 13A1_H$

Data format [6]: Decimal data (Positive, negative): Min. unit 0.01

Example) If M07 (actual torque value)= - 85.38%

Since $- 85.38 \times 100 = - 8538 = DEA6_H$

Data format [7]: Decimal data (Positive): Min. unit 0.001

Example) If o05 (follow - up side ASR 1 constant) = 0.105s

Since $0.105 \times 1000 = 105 = 0069_H$

Data format [8]: Decimal data (Positive, negative): Min. unit 0.001

Example) If being -1.234

Since $- 1.234 \times 1000 = - 1234 = FB2E_H$

Data format [9]: Integral data (Positive): Min. unit 2

Example) If P01 (Motor 1 number of poles) =2pole

Since 2 = 0002_H

Data format [10]: Alarm code

Code	Description		Code	Description	
0	No alarm	---	28	PG wire breaking	Pg
1	Overcurrent, during acceleration (INV output)	OC1	31	Memory error	Er1
2	Overcurrent, during deceleration (INV output)	OC2	32	Keypad panel transmission error	Er2
3	Overcurrent, during steady state operation (INV output)	OC3	33	CPU error	Er3
5	Ground fault	EF	34	Option communication error	Er4
6	Overvoltage, during acceleration	OU1	35	Option error	Er5
7	Over voltage, during deceleration	OU2	36	PL error	Er6
8	Overvoltage, during steady state operation	OU3	37	Output wiring error	Er7
10	DC undervoltage	LU	38	RS485 communication error	Er8
11	Power supply open phase	Lin			
14	Blown DC fuse	FUS			
16	Output wiring error	Er7			
17	Overheat, heat sink, inverter	OH1			
18	Overheat, outside thermal	OH2			
19	Overheat, unit inside temp.	OH3			
22	Overheat, DB resistor	dbH			
23	Overload, motor 1	OL1			
24	Overload, motor 2	OL2			
25	Overload, inverter	OLU			
27	Overspeed	OS			

Example) If over - voltage, during acceleration (OU1).

Since 6 = 0006_H

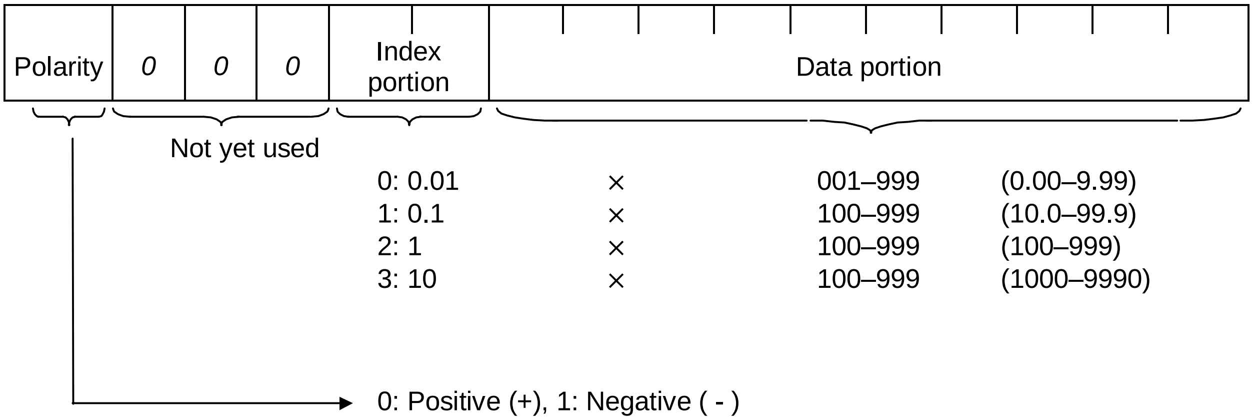
Data format [11]: Capacity code

Code	Capacity (HP)	Code	Capacity (HP)	Code	Capacity (HP)
7	0.07 (spare)	1500	15	15000	150
15	0.15 (spare)	2000	20	17500	175
25	0.25	2500	25	20000	200
50	0.5	3000	30	25000	250
100	1	4000	40	30000	300
200	2	5000	50	35000	350
300	3	6000	60	40000	400
500	5	7500	75	45000	450
750	7.5	10000	100	50000	500
1000	10	12500	125		

Example) 30HP

Since $30 \times 100 = 3000 = 0BB8_H$

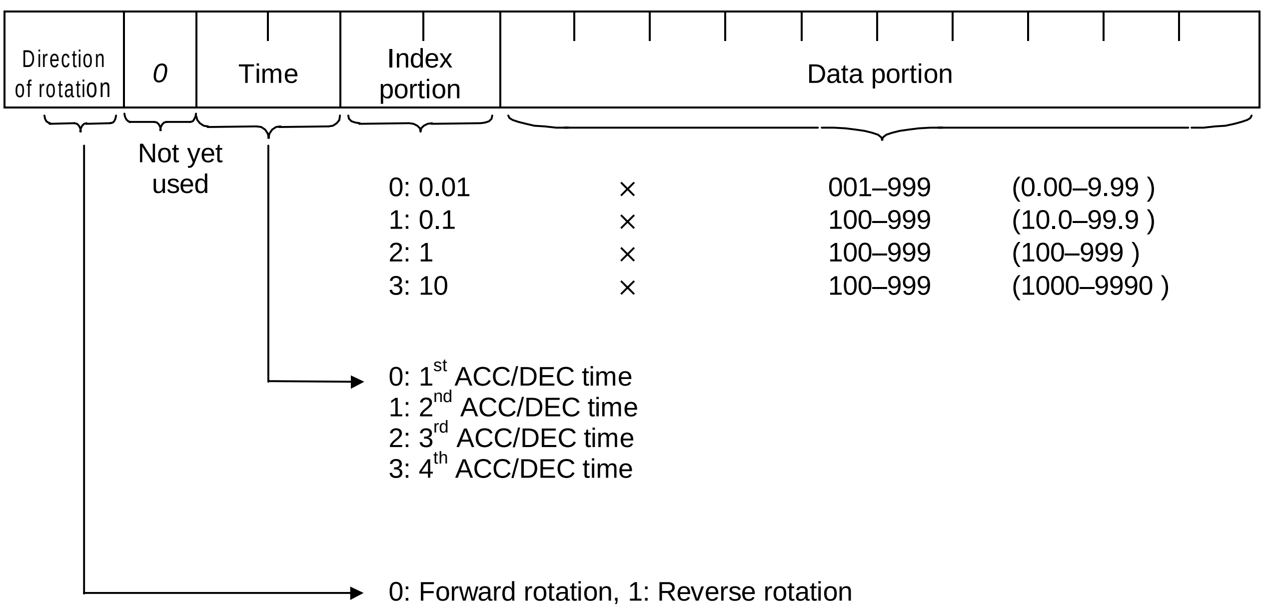
Data format [12]: Index data (ACC/DEC time, display coefficient)



Example) If F07 (acceleration time 1) = 20.0 s

Since $20.0 = 0.1 \times 200 \Rightarrow 0400_H + 00C8_H = 04C8_H$

Data format [13]: Pattern operation



Example) If C22 (Stage1) = 10.0s R2 (10s, reverse rotation, acceleration time 2/deceleration time 2)

Since $10.0 = 0.1 \times 100 \Rightarrow 9000_H + 0400_H + 0064_H = 9464_H$

Data format [14]: Operation command

RST	*0*	*0*	*0*	*0*	X9	X8	X7	X6	X5	X4	X3	X2	X1	REV	FWD
Alarm reset	Not yet used				Multi-function command									FWD: Forward rotation Command REV: Reverse rotation Command	

(All bit are ON by 1)
Example) If S06 (operation command) = FWD, X1 and X5 = ON

Since 0000 0000 0100 0101_b = 0045_H

Data format [15]: Universal output terminal

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	Y5	Y4	Y3	Y2	Y1
Not yet used											Universal output				

(All bit are ON by 1)
Example) If M15 (Universal output terminal)=Y1 and Y5 = ON

Since 0000 0000 0001 0001_b = 0011_H

Data format [16]: Operating state

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
BUSY	WR		RL	ALM	DEC	ACC	IL	VL	TL	NUV	BRK	INT	EXT	REV	FWD

(All bit are ON or active by 1)

FWD:	Under forward operation	IL:	Under current limiting
REV:	Under reverse operation	ACC:	Under acceleration
EXT:	Under DC braking (or under pre-excitation)	DEC:	Under deceleration
		ALM:	Lump alarm
INT:	Inverter trip	RL:	Transmission valid
BRK:	Under braking	WR:	Function writing right 0: Keypad panel 1: RS485 2: Link (option)
NUV:	DC link voltage is established (undervoltage at 0)		
TL:	Under torque limiting		
VL:	Under voltage limiting	BUSY:	Under data writing (processing)

Data format [17]: Type code

Type	Generation	Series	Voltage series

Code	Type	Generation	Series	Voltage series
1	VG	G11/P11	For domestic	100V single phase
2	G	-	For Asia	200V single phase
3	P	-	For China	200V three phase
4	E	-	For Europe	400V three phase
5	C	-	For USA	575V three phase
6	S	-	-	-

Data format [18]: Code setting

Data 4	Data 3	Data 2	Data 1

Example) If o22 (Ai function selection)=123

Since 123=0123_H

Data format [19]: Amperage value Decimal data (positive):
Min. unit 0.01 for inverter capacity is not more than 30HP
Min. unit 0.01 for not less than 40HP respectively

Example) If F11 (electronics thermal overload relay 1 level)107.0A (40HP)

Since 107.0×10=1070=$042E_H$

If F11 (electronics thermal overload relay 1 level)=3.60A (1HP)

Since 3.60×100=360=0168_H

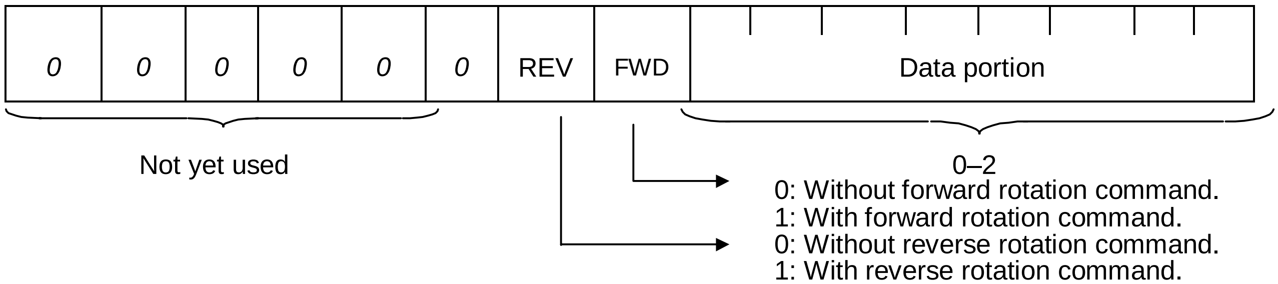
Data format [20] Transmission error code

Code	Description	Code	Description
1	FC (function code) error	71	CRC error (no response)
2	Illegal address	72	Parity error (no response)
3	Illegal data (Data range error)	73	Other errors (no response) - Framing error - Overrun error - Bufferfull error
7	NAK - Priority for link - No right for writing error - Forbidden writing error		

Example) If illegal address

Since 2=0002_H

Data format [21] Auto tuning



Example: If P04 (motor 1 auto - tuning)=1: Forward rotation
Since 0000 0001 0000 0001_b=0101_H

NOTES

CHAPTER 6: DATAGRAM ACCESS

6.1 General

Global and directed data are the standard methods used to send and receiving drive parameter data. Datagrams can also be used to send and receive drive parameter data. Sending and receiving data using datagrams is done using a communications request (COMM_REQ) in the PLC logic. There two communications requests that are support by the drive card, Write Device (20H) and Read Device (1EH). The specifics on using communications requests are found in the Series 90-30 Genius Bus Controller User's Manual (GFK-1034) or refer to Appendix A for the Write and Read datagram COMM_REQ values. The following sections describe specific portions of the datagrams that are specific to communicating with the option card.

6.2 Write to Drive using Datagram

The Send Datagram COMM_REQ (14) is used to send a Write Device datagram. The Write Device datagram is used to write from the PLC to parameters in the drive. The COMM_REQ allows multiple sequential parameters to be written. A starting parameter number is supplied, the number of parameters and the values of the parameters. The following is an example of a Write Device datagram to set the drive speed to 30.00Hz (Figure 6.1).

```
|%I0001                                                                    %M0001
+--] [-----------------------------------------------------------------------(^)--
|
|%M0001  +-----+                 +-----+                 +-----+
+--] [---+BLKMV+-----------------+BLKMV+-----------------+BLKMV+-
|        | INT |                 | INT |                 | INT |
|        |     |                 |     |                 |     |
| CONST -+IN1 Q+-%R0100   CONST -+IN1 Q+-%R0107   CONST -+IN1 Q+-%R0114
| +00010[1] |     |         +00001[2] |     |        +00512[5] |     |
|        |     |                 |     |                 |     |
| CONST -+IN2  |          CONST -+IN2  |          CONST -+IN2  |
| +00000 |     |          +00032 |     |          +10000[6] |     |
|        |     |                 |     |                 |     |
| CONST -+IN3  |          CONST -+IN3  |          CONST -+IN3  |
| +00008 |     |          +00032 |     |          +00000 |     |
|        |     |                 |     |                 |     |
| CONST -+IN4  |          CONST -+IN4  |          CONST -+IN4  |
| +00050 |     |          +00000 |     |          +00000 |     |
|        |     |                 |     |                 |     |
| CONST -+IN5  |          CONST -+IN5  |          CONST -+IN5  |
| +00000 |     |          +00008[3] |     |        +00000 |     |
|        |     |                 |     |                 |     |
| CONST -+IN6  |          CONST -+IN6  |          CONST -+IN6  |
| +00000 |     |          +00256[4] |     |        +00000 |     |
|        |     |                 |     |                 |     |
| CONST -+IN7  |          CONST -+IN7  |          CONST -+IN7  |
| +00014 +-----+          +00000 +-----+          +00000 +-----+
|
|%M0001         +-----+                                                    %M0002
+--] [----------+COMM_|+---------------------------------------------------( )--
|               | REQ ||
|               |     ||
|       %R0100 -+IN FT++
|               |     |
|        CONST -+SYSID|
|          0005 |     |
|               |     |
|        CONST -+TASK |
|      00000001 +-----+
|
```

Figure 6.1 – Ladder Example #1 (Write to Drive)

The starting address for the COMM_REQ is the first word in the first block move at %R100. Table 6.1 provides an explanation of the values in the example (Figure 6.1) that are either specific to the drive or change depending on the COMM_REQ values. The values in the example are bold and are noted by superscript numbers that correlate to the numbers in Table 6.1

Table 6.1 – Superscript Notes (Ladder #1 Example)

Superscript Number	COMM_REQ Location	Name	Description
1	Address	Command Length	Number of words from Address+6 to Address+n
2	Address+7	Device Number	Device to receive COMM_REQ; 0-31, or 255 to broadcast
3	Address+11	Datagram Length (Bytes)	Length of datagram content beginning at Address+12
4	Address+12	Starting Parameter Number (High byte)	High byte of word contains starting drive parameter.
5	Address+14	Number of Parameter Values to Write (High byte)	High byte of word contains number of parameter values, in bytes, to write to the drive.
6	Address+15 to Address+n	Parameter Value	Value(s) to be written sequentially to drive starting with the parameter number at Address+12 and ending with the parameter number + number of parameters.

6.3 Read from Drive using Datagram

The Request Datagram Reply COMM_REQ (15) is used to send a Read Device datagram. The Read Device datagram is used to read parameters from the drive to the PLC. The COMM_REQ allows multiple sequential parameters to be read. A starting parameter number is supplied and the number of parameters to read. The following is an example of using a Read Device datagram to read the drive speed setting (Parameter 1).

```
|%I0001                                                                   %M0001
+--] [-------------------------------------------------------------------(^)--
|
|%M0001  +-----+                 +-----+                 +-----+
+--] [---+BLKMV+-----------------+BLKMV+-----------------+BLKMV+-
|        | INT |                 | INT |                 | INT |
|        |     |                 |     |                 |     |
| CONST -+IN1 Q+-%R0100   CONST -+IN1 Q+-%R0107   CONST -+IN1 Q+-%R0114
| +00014[1] |     |        +00001[2] |     |        +00200 |     |
|        |     |                 |     |                 |     |
| CONST -+IN2  |          CONST -+IN2  |          CONST -+IN2  |
| +00000 |     |          +00032 |     |          +00064[4] |     |
|        |     |                 |     |                 |     |
| CONST -+IN3  |          CONST -+IN3  |          CONST -+IN3  |
| +00008 |     |          +00030 |     |          +00256[5] |     |
|        |     |                 |     |                 |     |
| CONST -+IN4  |          CONST -+IN4  |          CONST -+IN4  |
| +00050 |     |          +00000 |     |          +00000 |     |
|        |     |                 |     |                 |     |
| CONST -+IN5  |          CONST -+IN5  |          CONST -+IN5  |
| +00000 |     |          +00006[3] |     |        +00256[6] |     |
|        |     |                 |     |                 |     |
| CONST -+IN6  |          CONST -+IN6  |          CONST -+IN6  |
| +00000 |     |          +00031 |     |          +00000 |     |
|        |     |                 |     |                 |     |
| CONST -+IN7  |          CONST -+IN7  |          CONST -+IN7  |
| +00015 +-----+          +00008 +-----+          +00000 +-----+
|
|%M0001         +-----+                                                   %M0002
+--] [----------+COMM_|+-------------------------------------------------( )--
|               | REQ ||
|               |     ||
|        %R0100 -+IN FT++
|               |     |
|         CONST -+SYSID|
|           0005 |     |
|               |     |
|         CONST -+TASK |
|       00000001 +-----+
|
```

Figure 6.2 - Ladder Example #2 (Read From Drive)

The starting address for the COMM_REQ is the first word in the first block move at %R100. Table 6.2 provides an explanation of the values in the example that are either specific to the drive or change depending on the COMM_REQ values. The values in the example are bold and are noted by superscript numbers that correlate to the numbers in Table 6.2.

Table 6.2 – Superscript Notes for Ladder Example #2

Superscript Number	COMM_REQ Location	Name	Description
1	Address	Command Length	Number of words from Address+6 to Address+n
2	Address+7	Device Number	Device to receive COMM_REQ; 0-31
3	Address+11	Datagram Length (Bytes)	Length of datagram content beginning at Address+16
4	Address+15	Maximum Data Length	This number must be large enough to accommodate the reply message otherwise data will be lost
5	Address+16	Starting Parameter Number (High byte)	High byte of word contains starting drive parameter.
6	Address+18	Number of Parameter Values to Read (High byte)	High byte of word contains number of parameter values, in bytes, to read from the drive.

The description of the reply datagram from the drive is contained in Table 6.3. A general description can be found in the Series 90-30 Genius Bus Controller User's Manual (GFK-1034).

Table 6.3 – Reply Datagram Description

COMM_REQ Location	Name	Description
Address	Data Length in Bytes (High Byte) Device Number (Low byte)	The high byte of the word contains the total number of bytes in the reply and the low byte contains the device number where the reply originated.
Address+1	Subfunction Code (High Byte) Function Code (Low Byte)	The high byte of the word contains the Subfunction code and the low byte contains the Function code of the reply datagram.
Address+2	Starting Parameter # (High Byte) Always 0 (Low Byte)	The high byte of the word contains the starting parameter number and low byte is always 0.
Address+3	Always 0	The word is always 0.
Address+4	# of Data Bytes (High byte) Always 0 (Low Byte)	The high byte of the word contains the number of data bytes and the low byte is always 0.
Address+5 to Address+n	Drive Parameter Value(s)	The word contains the value for request drive parameter number.

6.4 PLC Ladder Code

In Examples 1 and 2, the COMM_REQ requires four inputs; Power, IN, SYSID and TASK. The Power input is assigned to a contact that is on for only one scan. Leaving this contact on causes the datagram to be sent multiple times and slows down the response time on the Genius LAN. The IN input is set to a %R reference that contains all of the registers determined in the examples. The SYSID input specifies which rack and slot has the Genius Bus Controller that receives this command. The upper byte is the rack number and the lower byte is the slot number. The value of 0005 in the examples represents rack 0 slot 5. The TASK input is always set to a 1.

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APPENDIX A: COMM_REQ COMMAND BLOCK DESCRIPTIONS

COMMAND BLOCK FOR WRITE DEVICE DATAGRAM (14):

Address	Command Length	Number of words from Address+6 to Address+n
Address +1:	No Wait	0
Address +2:	Status Block Memory Type	70(%I),72(%Q),8(%R),10(%AI), or 12(%AQ)
Address +3:	Status Block Offset	Beginning address for COMREQ status
Address +4:	Idle Timeout Value	0
Address +5:	Max. Communication Time	0
Address +6:	Command Number	14
Address +7:	Device Number for Receiving Device	0-31, or 255 to broadcast message
Address +8:	Function Code	20H (32)
Address +9:	Subfunction Code (hex)	20H (32)
Address +10:	Priority	0 for Normal, or 1 for High
Address +11:	Datagram Length (in bytes)	Number of bytes from Address+12 to Address+n
Address +12: To Address +n:	Datagram Content	Datagram Content

READ DEVICE DATAGRAM (15):

Address	Command Length	Number of words from Address+6 to Address+n
Address +1:	No Wait	0
Address +2:	Status Block Memory Type	70(%I), 72(%Q), 8(%R), 10(%AI), or 12(%AQ)
Address +3:	Status Block Offset	Beginning address for COMREQ status
Address +4:	Idle Timeout Value	0
Address +5:	Max. Communication Time	0
Address +6:	Command Number	15
Address +7:	Device Number for Receiving Device	0-31
Address +8:	Function Code	20H (32)
Address +9:	Subfunction Code (hex)	1EH (30)
Address +10:	Priority	0 for Normal, or 1 for High
Address +11:	Datagram Length (in bytes)	Number of bytes from Address+12 to Address+n
Address +12:	Subfunction Code of Reply (hex)	1FH (31)
Address +13:	Memory Type for Reply	8(%R), 10(%AI), or 12(%AQ)
Address +14:	Memory Offset	Starting address within this memory type
Address +15:	Maximum Data Memory	Number of words required by reply
Address +16: To Address +n:	Datagram Content	Datagram Content

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