This Datasheet for the

# IC693BEM331

## Genius Bus Controller (Supports I/O and Datagrams)

Provides the wiring diagrams and installation guidelines for this GE Series 90-30 module.

# IC693BEM331 Genius Bus Controller (GBC)

The Series 90-30 Genius Bus Controller (GBC), catalog number IC693BEM331, provides the interface between a Series 90-30 PLC and a Genius I/O serial bus. The GBC receives and transmits control data of up to 128 bytes for up to 31 devices on the Genius I/O bus. A Genius Bus Controller can serve:

■ **Genius blocks**, which provide an interface to a wide range of discrete, analog, and special-purpose field devices. **Note that the GCM and GCM+ modules, described earlier, cannot control Genius blocks.**

■ **Remote Drops**, which consist of Series 90-70 I/O racks interfaced to the bus through Remote I/O Scanner modules. Each of these drops can have any mix of Series 90-70 discrete and analog I/O modules, providing up to 128 bytes of input data and 128 bytes of output data.

■ **Field Control I/O Station,** which consists of a Bus Interface Unit (BIU) and up to eight additional Field Control modules. The BIU provides intelligent processing, I/O scanning, and feature configuration for the I/O station.

■ **Genius Hand-Held Monitor** (HHM)**,** which is a portable device that can also be permanently mounted. The HHM provides a convenient operator interface for block setup, data monitoring, and diagnostics.

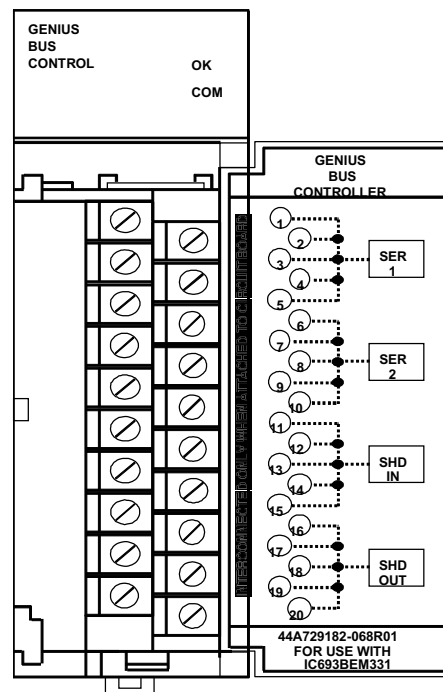■ **Multiple hosts**, for communications using datagrams and Global Data.



**Figure 8-5. Genius Bus Controller Module**

A bus may feature I/O control, enhanced by communications commands in the program. Or, a bus can be used entirely for I/O control, with many I/O devices and no additional communications. A bus can also be dedicated to CPU communications, with multiple CPUs and no I/O devices. More

complex systems can also be developed, with dual CPUs and one or more additional CPUs for data monitoring.

## Number of Genius Bus Controllers

Up to eight Genius Bus Controllers or Enhanced Genius Communications Modules can be included in a Series 90-30 PLC system that has release 5.0 or later CPU firmware. A GBC *cannot* be installed in a system with a GCM.

The I/O devices on a bus may be Genius I/O blocks, or standard Series 90-70 I/O modules in one or more remote drops. The total number of I/O circuits that can be served by one Genius bus depends on the types of I/O devices that are used and the memory available in the CPU.

Many Genius I/O blocks have both inputs and outputs on the same block. Blocks configured in the programming software as having both inputs and outputs occupy the identical number of references in both %I and %Q memory, regardless of the block's software configuration. Unused references cannot be assigned to other inputs or outputs, *and should not be used in the application program*.

## Status LEDs

The LEDs on the front of the GBC indicate its operating status and should be on during normal operation.

**OK**    Shows the status of the GBC module. This LED turns on after power up diagnostics are completed.

**COM**   Shows the status of the Genius communications bus. This LED is on steadily when the bus is operating properly. It blinks for intermittent bus errors and is off for a failed bus. It is also off when no configuration has been received from the PLC CPU.

## Compatibility

Specific equipment or software versions required for compatibility with the GBC module are listed below.

### Series 90-30 PLC

**CPU**: The GBC module can be used with CPU models: IC693CPU311K, 321K, 331L or later, or any version of the IC693CPU313, 323, 340, 341, 350, 351, 352, 360, 363, and 364. The CPU firmware must be release 5.0 or later.

Logicmaster 90-30 version 5.0 (IC641SWP301L, 304J, 306F, 307F), VersaPro, or Logic Developer-PLC software is required.

### Series Six PLC

To exchange global data with a Genius Bus Controller, the Series Six Bus Controller must be catalog number IC660CBB902F/903F (firmware version 1.5), or later.

## Genius Hand-Held Monitor

The Genius Hand-Held Monitor can be used to display the GBC bus address, its software version, and the Series Six register address configured for global data. HHM version IC660HHM501H (revision 4.5) or later is required. There is no Hand-Held Monitor connector on the GBC module, but a Hand-Held Monitor can communicate with the GBC while connected to any other device on the bus. Optionally, an additional HHM mating connector can be installed on the bus near the GBC.

## Hand-Held Programmer

The GBC can be configured using a Series 90-30 Hand-Held Programmer (IC693PRG300).
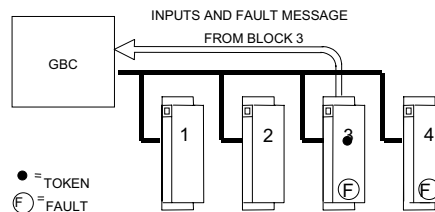
## Genius I/O Blocks

Genius I/O blocks can be present on the same bus as the GBC. However, because the Bus Controller is *not* compatible with older *phase A* blocks, they should not be installed on the same bus.

## Genius Bus

The Genius bus is a shielded twisted-pair wire, daisy-chained between devices, and terminated at both ends. Proper cable selection is critical to successful operation of the system. Suitable cable types are listed in GEK-90486-1, the *Genius I/O System and Communications User's Manual*.

# Diagnostics

Genius blocks and other devices on the bus automatically report faults, alarms and certain other predefined conditions to the PLC.



Only one diagnostic message can be sent during any bus scan. If a fault message has already been sent (by another device) during that scan, a device saves its own diagnostic message until the next available bus scan. For example, if the communications token is currently at device 3, and faults occur at devices 3 and 4 at the same time, device 3 can send its diagnostic message if another message has not already been sent. Device 4 must wait at least one more bus scan to send its diagnostic message.

The GBC stores any diagnostic messages it receives. They are read automatically by the Series 90-30 CPU. Faults can then be displayed in the fault table using the programming software. A Genius Hand-held Monitor must be used to clear the faults from the fault table.

## Datagrams

The Series 90-30 GBC supports all Genius datagrams.  Refer to chapter 3 of the *Genius I/O System and Communications User's Manual,* GEK-90486-1, for details on using datagrams.

## Global Data

Global Data is data that is automatically and repeatedly broadcast by a GBC. The Series 90-30 GBC can send up to 128 bytes of Global Data each bus scan. It can receive up to 128 bytes of Global Data each bus scan from each GBC on its bus.

### Sending Global Data

Once set up by configuration, Global Data is broadcast automatically. Other devices that receive the Global Data sent by a Series 90-30 PLC place it in these memory locations:

| Series 90-30 PLC Sends Global Data To: | Other CPU Places Global Data in these Memory Location: |
|---|---|
| Series 90-30 PLC | %I, %Q, %G, %R, %AI, %AQ. Memory type and beginning address are chosen during configuration of the *receiving* GBC. |
| Series 90-30 GCM+ | %I, %Q, %G, %R, %AI, %AQ |
| Series 90-30 PLC/GCM | %G memory location corresponding to Device Number (16-23) of the Series 90-30 GBC that sent the data. |
| Series Six PLC | Register memory. Beginning Series Six address selected during configuration of the Series 90-30 GBC that sent the data. |
| Series Five PLC | Register memory. Beginning Series Five address selected during configuration of the Series 90-30 GBC that sent the data. |
| Computer | PCIM or QBIM Input Table Segment corresponding to Device Number of the Series 90-30 GBC that sent the data. |

### Receiving Global Data

The GBC can be configured to receive or ignore Global Data from any other GBC. The memory type and length for incoming Global Data are also selected during configuration.  The Series 90-30 CPU can place incoming Global Data in %I, %Q, %G, %R, %AI, or %AQ memory.

### Genius Bus Controller Documentation

See the following manuals for detailed information on the Series 90-30 Genius Bus Controller and the Genius I/O system:

■ GFK-1034, *Series 90-30 Genius Bus Controller User's Manual*

■ GEK-90486-1, *Genius I/O System and Communications User's Manual*

■ GEK-90486-2, *Genius I/O Discrete and Analog Blocks User's Manual*

■ GFK-0825, *Field Control Distributed I/O and Control System - Genius Bus Interface Unit User's Manual*

■ GFK-0826, *Field Control Distributed I/O and Control System - I/O Modules User's Manual*