March 17, 2010

GFK-2275A

IMPORTANT PRODUCT INFORMATION

READ THIS INFORMATION FIRST

Product: **Bus Controller**
for IC697BEM731B and later
Firmware version 5.9 Upgrade Kit, 44A751619-G02

Compatibility

.

Firmware version 5.9 for the Series 90-70 GENIUS Bus Controller (GBC) corrects a safety issue in all previous versions. See "Error Rate Safety Issue" in section 3 of this document, *Problems Resolved By This Upgrade*, for a complete description of the issue.

Depending on the application, the safety issue that is corrected in this firmware version can potentially cause bodily injury, property damage, or both. All users are advised to address this issue for every GBC either by upgrading to version 5.9 firmware or by setting the Error Rate configuration item to zero, as described in section 3 of this document. Version 5.9 upgrade kits are available at no charge upon request.

This version is compatible with both Series 90-70 and PACSystems RX7i PLCs.

Version 5.9 is not yet qualified for use in systems that require TUV approval. Version 5.6 must be used in these systems until version 5.9 receives TUV approval. Version 5.9 is not available in production IC697BEM731 modules at this time.

Bus Controller Modules: Bus Controllers IC697GBI731B and later are compatible with this upgrade.

PACSystems RX7i PLC: Firmware version 5.8 or later is required for operation slots 10 through 17 in a PACSystems RX7i PLC. Prior versions are restricted to slots 3 through 9.

This firmware version supports PACSystems RX7i user bulk memory (%W) for GBC COMMREQ status and read-data locations. The specified starting address must be in the range of %W00001 to %W65535, inclusive.

VersaMax Genius NIU: GBC firmware versions 5.4 and later are compatible with the VersaMax Genius NIU.

Problems Resolved by this Upgrade

- **Rarely, a Bus Controller in an RX7i PLC Was Lost When Rack was Powered On:** With previous GBC firmware versions, there was a very small chance that a GBC in a PACSystems RX7i PLC would be lost when the rack where it is installed is powered on.

- **Bus Controller Could Remain Off Bus During Periods of Excessive Errors:** In previous versions of GBC firmware, if the Error Rate item in the GBC hardware configuration was assigned a non-zero value, and the bus error rate exceeded half the configured value during any 5-second period (the configured error rate is the maximum number of errors acceptable in any 10-second period.), the GBC temporarily dropped off the bus. Depending on the nature of the bus disruption that causedthe errors, the GBC could potentially remain off the bus indefinitely.

  During the entire time the GBC was off the bus:

  1. The BUS LED was off.
  2. Devices with outputs did not receive output data from the GBC because it had stopped sending output data. Output devices that were configured to default their outputs did so.
  3. The GBC did not receive input data from bus devices.
  4. The GBC did not send or receive global data.
  5. Loss of device, Addition of device, and Extra device faults were suppressed.
  6. All bus devices were marked INACTIVE in the 4-byte (32-bit) bit field structure at offset 7E8 Hex. in VME memory.

There were two unexpected consequences from this mode of operation:

1. Input data retained the last state received from the corresponding bus device during the entire time when the GBC was off the bus. Inputs from devices that were configured to default inputs were NOT defaulted.
2. When the GBC returned to the bus, any devices that were active before the GBC went off the bus but were lost while the GBC was off the bus were NOT reported as lost. Inputs from lost devices configured to default inputs were NOT defaulted.

   Similarly, any devices that were NOT active before the GBC went off the bus but were added while the GBC was off the bus were NOT reported as added or extra. The loss/addition of device condition for these devices remained undetected until either a hardware configuration was stored to the PLC, or the GBC was restarted by cycling power on either the main PLC rack or (if so configured) the expansion rack where the GBC was installed.

Warning

These consequences can potentially cause bodily injury, property damage, or both, depending on the application. Users of GBC firmware version 5.8 and earlier versions are advised to avoid this safety issue either by upgrading to version 5.9 or by setting the Error Rate item in the GBC hardware configuration to 0 (zero).

GBC firmware version 5.9 changes the way the GBC operates during excessive bus faults conditions. In version 5.9:

1. The GBC does not drop off the bus. It continues to receive messages, including input data, from devices on the bus. Note that input data received during excessive bus faults conditions may be corrupted by undetected bus errors.
2. Outputs are disabled on all bus devices that have outputs for the duration of the excessive bus faults condition. Output devices that are configured to default their outputs do so.
3. The GBC keeps track of loss and addition of bus devices. However, Loss/Addition/Extra device faults are NOT reported as long as the excessive bus faults condition continues. Note that devices may be lost because of the communications disruption that caused the excessive bus faults condition. Whenever a device that is configured for inputs defaulted OFF is lost, the inputs for that device are defaulted. If the device is subsequently added to the bus, input data from the device replaces the defaults. During an extended excessive bus faults condition, input data may periodically toggle between the actual and default states.
4. The byte at offset 7FA hexadecimal in VME memory contains the value 1 during excessive bus faults conditions and the value 0 (zero) at all other times. PLC applications can monitor the status of excessive bus faults conditions by using a VME_READ/BUS_READ function block to read this byte.

The 32-bit (4-byte) bit field structure at offset 7E8 hexadecimal in VME memory changes dynamically to indicate whether bus devices are active or not. These bits are updated during excessive bus faults conditions and at all other times. For example, the most significant bit in the byte at offset 7E8 (corresponding to Serial Bus Address = 7) is set to 1 when the device at that address is active and to 0 (zero) when the device at that address is not active. PLC applications can monitor the status of individual bus devices during excessive bus faults conditions by using a VME_READ/BUS_READ function block to read these bytes.

New Feature for this Version

GBC operation during a communications disruption with a non-zero Error Rate configuration is incompatible with all redundancy modes. When the hardware configuration for a GBC contains both a bus device configured for **Redundancy: Yes**, and a non-zero **Error Rate**, GBC firmware version 5.9 does the following:

1. Replaces the error rate value in the stored configuration with zero; and

2. Reports a System configuration mismatch fault to the PLC fault table. The fault error code is 77 (4D hexadecimal). The fault action is Informational to assure that the fault cannot cause the CPU to enter Stop/Fault mode.

Operating Notes

Communications Window Time for Internally-Redundant Bus Controllers: Operation of internally-redundant Bus Controllers in the same PLC relies on backplane communications between the Bus Controllers. When a PLC hardware configuration includes one or more pairs of internally redundant Bus Controllers, the Backplane (or System) Communications Window Mode for the CPU should be set to Complete. If the CPU is configured for Constant Sweep mode, the specified sweep time must be long enough to assure that communications between the Bus Controllers will occur without delay. Depending on the CPU model, communication times from one to six milliseconds are recommended.

Checking COMREQ Status for Send Datagrams: When using the Send Datagrams command (COMREQ 14) to send a Write Device datagram, permissive logic should be used to test the COMREQ status before sending the request. Otherwise, the Bus Controller may reset. COMREQ 12 (Write Device) can also be used instead of COMREQ 14.

BSMs and Bus Error Rate Configuration: If the bus includes any Bus Switching Module(s), the Bus Error Rate must be set to zero. This keeps the Bus Controller from dropping off the bus while the BSMs are switching.

Input Defaults: If the Bus Controller loses communications with a device on the bus, the Bus Controller continues supplying "input" data for that device to the PLC. The content of that data depends on the device type:

A. *Discrete block, PowerTRAC block or Remote I/O Scanner:* Inputs may either default or hold last state, as configured.
B. *Analog block or High-speed Counter:* Inputs automatically hold last state.
C. *Global data*: Automatically defaults to off.

Queuing Fault Information: If a large number of faults (45 or more) occurs simultaneously, some faults may be lost. This is most likely to be caused by the sudden loss of numerous blocks at each bus controller in the system. The resulting PLC diagnostics and diagnostic contacts may be incorrect.

Impact on PLC Sweep Time when Adding or Losing Bus Devices: If a number of bus devices are lost or added at the same time, it can cause a PLC's watchdog timer to expire, shutting down the PLC. For example, I/O blocks that do not use the same power source as the PLC might all lose power during the same CPU sweep, while the PLC kept operating. When power was restored, the blocks might all return to the system during the same CPU sweep. When calculating CPU sweep time, include the following steps:

1. Determine the maximum number of devices on all busses in the system that might be lost or added in the same PLC sweep period.
2. Find the "Asynchronous Events Fault Message" time listed for the type of CPU in the system. Multiply this number by the number of devices that might be added or lost together.
3. Add the total to the worst case PLC sweep time. Set the PLC sweep timeout period above this value.

Downloading a Configuration When the Bus is Damaged: If you download a configuration to the Bus Controller while the bus is broken, shorted, or otherwise damaged, it may be necessary to cycle power to the Bus Controller for it to function. If the bus is known to be corrupted, do not download a configuration.

Repeated Power Cycles to Main Rack May Cause Loss of Bus Controller in Expansion Rack. Also, if a GBC is installed in an expansion rack and the main rack is powered off, the GBC in the expansion rack can be lost when the CPU is next powered on. Using the same power source for the main rack and expansion rack switching them on and off together will minimize this.

Read/Write Device Rejection: This Bus Controller will ignore any incoming Read or Write Device datagrams sent using the routing parameter FE (hex) in byte 0. This byte is designated as "reserved" in the datagram descriptions in the I/O System User's Manual. For a Bus Controller to use this capability, datagrams must be sent with the Send Datagram command. Please refer to the Bus Controller User's Manual for instructions.