

31 Circuit 48VDC Input Genius Block

March 2010

GFK-2041A

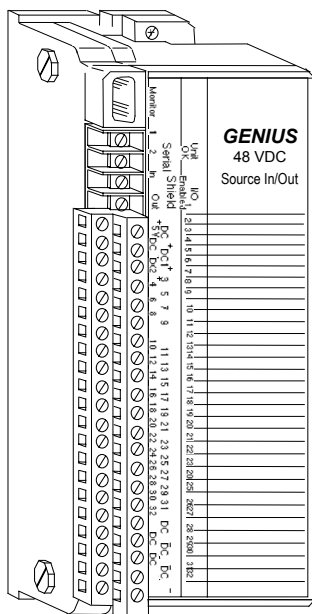
Description

A 48VDC Input Genius Block (IC660BBD040) interfaces the controller to input signals from 48V devices. The 48V system supply provides input power. The block logic supply is 24V.

The block accepts inputs from up to 31 input devices. It does not provide input diagnostics.

This block is suitable for use in Genius Modular Redundancy systems that utilize the GMR Discrete Input Autotest feature. Operation and configuration of this feature are described in the *GMR User's Manual* (GFK-1277). The block's 31 points accept 48V inputs. One additional logic point is used as a driver for GMR Autotest.

Note: Point 16 is dedicated to the GMR Autotest feature. Point 16 must not be connected to any field device.



Block features include:

- Thirty-one configurable input circuits (Points 1-15 and 17-32)
- Software configuration of block features

LEDs

Block LEDs verify proper block operation and CPU communications. Individual circuit LEDs on the logic side indicate voltage present on inputs.

Configurable Features

- Selectable Input Filter Time from 1ms to 100ms
- Internal test of input states for GMR Autotest
- CPU Redundancy type

Block Configuration Notes

- Points 1-15 and 17-32 must not be used as output points to drive loads, these points are for 48V input signals only.
- Point 16 must be configured as an output and set ON for non-GMR operation. Refer to the "Configuration" section later in this document.

Specifications

Catalog Numbers

Block	IC660BBD040
Electronics Assembly	IC660EBD040
Terminal Assembly	IC660TBD040

Block Specifications

Size (height x width x depth)	8.83" (22.44cm) x 3.58" (9.1cm) x 4.7" (11.94cm)
Weight	4 lbs. (1.8 kg)
LEDs (I/O Block)	Unit OK, I/O Enabled
LEDs (each circuit)	Individual logic side indicators
Isolation	Point to point Power, I/O to chassis ground Genius Serial Bus to Ground none ±500VDC (hipot test) 250VAC to ground; (1500V hipot test); note: bus rating also depends on cable type.
Heat Dissipation	11W minimum with 8 inputs 15W maximum with 31 inputs on
Operating voltage	Block Field devices 18 to 30 VDC (24V nominal supply) 36 to 60 VDC (48V nominal supply)
Supply Ripple (maximum)	10%
DC power supply current, block	150 ma. typical, 300 ma. maximum
Power supply dropout times	4ms at 12 volts, 20ms at 24 volts

Input Specifications

Input ON voltage relative to (DC-)	18VDC Block Supply: 22-60 volts
Field Device Supply: 36-60V	24VDC Block Supply: 30-60 volts 30VDC Block Supply: 39-60 volts
Input OFF voltage	18VDC Block Supply: 0-14 volts 24VDC Block Supply: 0-20 volts 30VDC Block Supply: 0-27 volts
Field Device Supply: 36-60V	
Input impedance (typical)	with point 16 ON: 16K Ohms with point 16 OFF: 6K Ohms
Input processing time (typical)	1.4ms (plus selectable filter delay)
Selectable input filter times	1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, or 100ms

Environmental Specifications

Operating temperature	0° C to +60° C (+32° to +140° F)
Storage temperature	-40° to +100° C (-40° to +212° F)

Refer to GFK-0867 for product standards and general specifications.

Using this Datasheet

This datasheet summarizes information about block installation, configuration, and diagnostics. Your primary reference should be the *Discrete and Analog Blocks User's Manual*. It includes detailed instructions for block installation and configuration.

For additional information about systems and communications, including bus specifications, refer to the *I/O System and Communications Manual*.

For details about GMR, please refer to the *GMR User's Manual*.

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Compatibility

This block is compatible with Hand-held Monitor model IC660HHM501 only. Note that Hand-held Monitor IC660HHM501 version A will only display all references for a 32-circuit block if it is made the "Active Block".

For an Series Six PLC, the Bus Controller may be model IC660CBB902 or CBB903, any version; or model IC66*CBB900 or CBB901 version 1.3 or later.

Installation Instructions

Carefully inspect all shipping containers for damage. If any equipment is damaged, notify the delivery service immediately. Save the damaged shipping container for inspection by the delivery service. After unpacking the equipment, record all serial numbers. Save the shipping containers and packing material in case it is necessary to transport or ship any part of the system.

Block Installation

Genius I/O blocks are considered "open equipment" and therefore must be installed within a protective enclosure. They should be located in an area that is clean and free of airborne contaminants. There should be adequate cooling airflow.

The block can be mounted right side up, or upside down. Leave at least 2 inches of space between blocks. Mount the block by drilling two screw or bolt holes for 8-32 hardware. Position the block so that the notches in the upper and lower flanges line up with the mounting holes. Mount the block using 8-32 screws. Use star washers to provide ground integrity.

Grounding

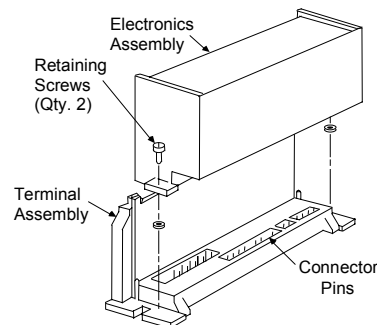
The block's mounting screws must not be used as the only means of grounding the block. Connect the green ground screw on the block to a reliable ground system using a short wire lead, minimum size AWG #12 (avg 3.3mm² in cross-section).

Warning

If mounting screws do not make good ground connection and the ground screw is not connected to a reliable ground, the block is not grounded. Electrical shock hazard exists. Death or personal injury may result.

Removing an Electronics Assembly

The block's Electronics Assembly can be replaced without removing field wiring or reconfiguring the block.



1. Unscrew the retaining screws at the top and bottom of the block.
2. Using a Block Puller (IC660BLM507), engage the tabs in the first vent slots. Move the tool to the center of the block and squeeze the handle.
3. Pull the Electronics Assembly upward.

Warning

If power is applied to the field terminals, power is also exposed on the connector pins at the base of the Terminal Assembly, and electrical shock hazard exists. Do not touch the connector pins! Death or injury may result.

Inserting an Electronics Assembly

1. Align the Electronics Assembly in the guides and push down firmly.

Caution

Do not exert excessive force; it may damage the block.

2. If unusual resistance is met, remove the Electronics Assembly. If power is applied to the block, DO NOT TOUCH THE CONNECTOR PINS! Inspect the Terminal Assembly, connector receptacle, and connector edge board (on the Electronics Assembly). Be sure the keying matches. Remove any obstacles and reinsert the Electronics Assembly. Pay close attention to the alignment of the guide pins.
3. Secure the Electronics Assembly with the screws on the top and bottom of the Terminal Assembly.

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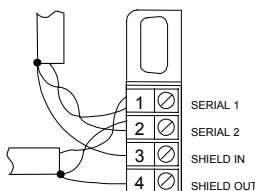
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Serial Bus Wiring

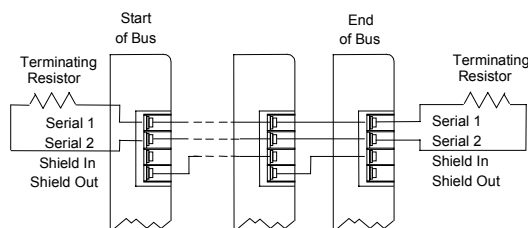
Terminals 1 to 4 are for the serial bus. They accept one AWG #12 wire (avg. 3.3mm^2 in cross-section) or two AWG #14 wires (each avg 2.1mm^2). The minimum recommended wire size is AWG #22 (avg $.36\text{mm}^2$). Terminals 1 to 4 can also accommodate spade or ring lugs up to 0.27 inch (6.85 mm) in width with a minimum opening for a #6 screw, and up to 0.20 inch (5.1 mm) depth from the screw center to the back barrier. Be sure unshielded wire ends are not longer than 2 inches (5cm).

Using one of the cable types recommended in the System and Communications User's Manual, connect the serial bus to terminals 1-4.



Do not over-torque the terminal screws. Recommended torque for all terminals on the block is 6in/lb (.678N/M).

If the block is at either end of the bus, connect a terminating resistor of the appropriate type (see the System and Communications User's Manual for details) across its Serial 1 and Serial 2 terminals.



Field Wiring

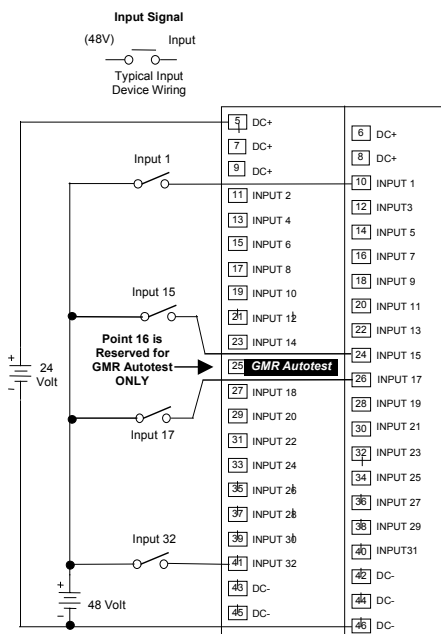
Terminals 5 - 46 accept one AWG #14 wire (avg. 2.1mm^2 cross section), two AWG #14 (2.1mm^2 cross section) solid wires, or two AWG #16 (each avg. 1.3mm^2 in cross section) stranded wires.

Terminals 5-9 are for the positive 24V block supply. Terminals 42-46 are common for both the block supply and the 48V input device supply.

This block is an inputs-only block. Connect one terminal of a field device to the positive side of the 48V power supply and the other to the block (terminals 10-41). All I/O devices must return to the same power circuit.

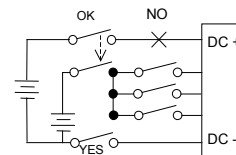
Depending on layout and current loads, positive and negative connections can be bussed and made by single wires to the block or power source.

Point 16 is for GMR Input Autotest applications only. For all applications, pt. 16 MUST NOT BE connected. However, this point must be ON in the user's application logic in order to enable the input points.



Power Disconnects

It is important to wire power disconnects so that block power and input power will be removed at the same time. Either switch both supplies at the same time, or switch the DC-.



Caution

If I/O circuit power is not removed at the same time as block power, the block may power up when multiple inputs are activated, even though one leg of power has been removed from the block.

If you want to disable the block without removing power from input devices, use a Block Puller to unplug the Electronics Assembly. Do not disconnect H or N to remove power.

LEDs

The block's Unit OK and I/O Enabled LED's show its operating status:

Unit OK	I/O Enabled	Meaning
ON	ON	Block functioning, CPU communicating
ON	OFF	Block functioning No CPU communications for 3 bus scans
ON	Blinking	Block functioning, Circuit forced
Blinking	ON	Circuit fault, CPU communicating
Blinking	OFF	Circuit fault, No CPU communications for 3 bus scans
Alternate Blinking		Circuit fault, Circuit forced
Synchronous Blinking		No CPU communications - block number conflict
OFF	Don't Care	No block power, or block faulty

For each input circuit, the circuit LED indicates the presence of threshold voltage at the input terminal.

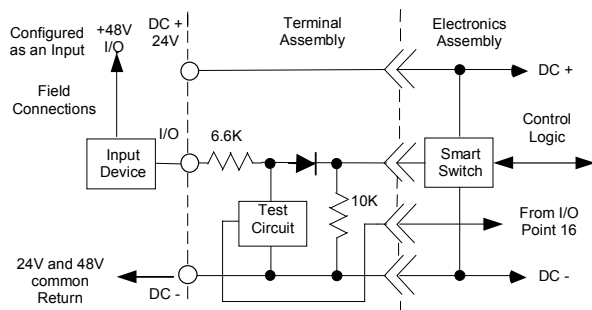
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Block Operation

The block has 31 identical input circuits. All inputs connect to the positive (+) side of the 48V I/O power supply. The 24V positive connects to DC+. The negative side of both supplies connects to DC-.



The block's Terminal Assembly includes an active test circuit for GMR Autotest applications.

Diagnostics

In a GMR system, this block can provide input diagnostics when set up for the GMR Input Autotest function, as part of its GMR configuration. A complete explanation of installation requirements and GMR Input Autotest diagnostics are included in the *GMR User's Manual* (GFK-1277).

If this block is used in a non-GMR system, it provides basic block diagnostics features.

Inputs and Outputs

The block always sends 4 bytes of data each bus scan, and accepts 4 bytes of data each bus scan.

Since the block is configured as a combination block the block will use 32 input references and 32 output references.

Input Data Format

The block broadcasts 4 bytes of input data each bus scan.

Byte #	Description
0	Inputs 1 - 8 (input 1 in bit 0)
1	Inputs 9 - 16 (input 9 in bit 0)
2	Inputs 17 - 24 (input 17 in bit 0)
3	Inputs 25 - 32 (input 25 in bit 0)

Output Data

The block receives 4 bytes of output data from the bus controller each bus scan. However, because this block is only compatible with input devices, the output data is not used by the block, except to set point 16 ON.

Hand-held Monitor I/O Display

The Hand-held Monitor displays the current states of 16 circuits at a time on line 4 of the Monitor Block screen. Press a function key to see the next 16 circuits.

```
REF    17-32IO
1234567890123456
IIIIIIIIIIIIIIII
1011010101101101
```

Configuration

Block IC660BBD040 has the same Electronics Assembly and firmware as the 24VDC 32-circuit Genius Source Block, IC660BBD024. Because it has the same configuration parameters, it will identify itself as a BBD024 to the Genius Hand Held Monitor and must be configured as a BBD024 at the 90-70 GBC. Since the IC660BBD040 block is an inputs-only block, it must be configured as described below. First, the block must be configured with a Hand-held Monitor to:

- Enter its Device Number (serial bus address).
- Enter its Reference Number (required only for Series Six and Series Five PLCs only).
- Specify its Block I/O Type on the Program Block ID screen. For this block, the Block I/O Type **must** be set to "Combination".

Note: If a block is configured offline, it must be properly grounded and have a 75 Ohm resistor installed across its Serial 1 and Serial 2 terminals. See the Discrete and Analog Blocks User's Manual for instructions. The rest of the features can be configured either using a Hand-held Monitor, or by sending a Write Configuration datagram to the block from the host.

Feature	Circuit or Block	Factory Setting	Selections	Non-GMR Application Settings
Device Number*	Block	null	0 to 31 (a number must be selected)	0 to 31 (a number must be selected)
Reference Address*	Block	none	Depends on host CPU type	Depends on host CPU type
Block I/O Type*	Block	input	input, output, combination	combination
Baud Rate*	Block	153.6 std	153.6 std, 153.6 ext, 76.8, 38.4 Kbd	153.6 std, 153.6 ext, 76.8, 38.4 Kbd
Pulse Test for Outputs	Block	enabled	enabled, disabled	disabled
Input Filter Time	Block	20ms	1, 2, 3, 4, 5, 10 to 100ms in 10ms steps	1, 2, 3, 4, 5, 10 to 100ms in 10ms steps
Block I/O Type	Block	input	input, output, combination	combination
Circuit I/O Type	Circuit	input	input, output	input (1-15, 17-32) output (16)
Report Faults	Circuit	yes	yes, no	no
Hold Last State	Circuit	no	yes, no	no
Output Default State	Circuit	off	on, off	point 16: ON all other points: N/A
BSM Present	Block	no	yes, no	yes, no
BSM Controller**	Block	no	yes, no	no
Output Default Time	Block	3 bus scans	(for bus redundancy) 2.5 or 10 seconds	N/A
CPU Redundancy	Block	none	none, hot standby, duplex, GMR	none, hot standby, duplex, GMR
Duplex Default	Block	off	on, off	off
Configuration Protection	Block	disabled	enabled, disabled	enabled, disabled

* Configured using HHM, from Program Block ID screen.

** This block cannot act as a BSM Controller.

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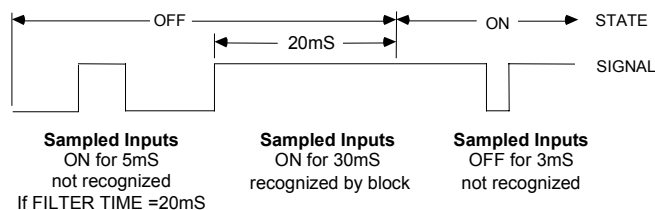
Description of Configurable Features

Pulse Test: If the block will be used in a GMR system and use the GMR Input Autotest feature, Pulse Testing should be *enabled* (the default).

If the block will NOT be used in a GMR system, Pulse Testing should be changed to *disabled*.

Input Filter Time: A filter time can be selected for inputs on the block. (The same filter will apply to all inputs). The default filter time is 20ms.

The block continuously samples an input for the length of the filter time period. If the input remains either on or off for the length of the Filter Time, the block recognizes its state. For example:



An input filter helps reject spurious noise spikes and multiple inputs generated by the bounce of mechanical devices. In controlled, noise-free environments, signals generated by clean, solid state electronics may be unnecessarily slowed by a filter, delaying system response. In such an environment, no additional filter time is needed.

In noisy environments, select a longer filter time to prevent noise from possibly causing erratic or unsafe system operations. The filter time can be 1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, or 100ms.

I/O Circuit Type: An earlier configuration step selected the Block I/O type (on the Program Block ID screen). This step selects the I/O circuit types. The default Block I/O Type and I/O Circuit Type are Input.

If the block is used in a GMR system and will use the GMR Autotest feature, the Block I/O Type must be set to Combination, and Point 16 must be configured as an output. See the *GMR User's Manual* for configuration instructions.

If the block is used in a non-GMR system, its Block I/O Type must be configured as "Combination". All circuits except 16 must be configured as inputs (the default). Point 16 must be an output, but cannot be used for a physical input device, as explained previously. Point 16 must be set ON in the user's application logic to enable input operation on the other points. It is recommended that the default state for point 16 be set to ON. This will reduce power and permit continued display of input states on point LEDs when I/O Enable is OFF.

Report Faults to CPU: Fault reports to the host can be disabled or enabled for any circuit on a block.

If Fault Reporting is enabled for a circuit, the block will send a message to the host if any fault occurs on that circuit.

If Fault reporting is disabled, the block will not send fault reports for that circuit.

Regardless of whether fault *reporting* is enabled, the block detects any faults on the circuit and takes appropriate actions if faults occur. The Unit OK LED blinks when a fault occurs, and a fault report is sent to a Hand-held Monitor. The fault condition must be corrected for proper operation of the block.

If the CPU requests diagnostic information from the block using Read Diagnostics datagrams, the block returns current diagnostics for all circuits, including any with CPU fault reporting disabled.

Hold Last State: Not used for inputs.

Output Default State: Not used for inputs. For all applications, the Output Default State for point 16 should be ON.

BSM Present: If the block is connected to a single bus or to just one trunk of a dual bus, BSM Present should be set to NO.

Select YES if the block is located in a cluster connected to dual busses via a Bus Switching Module.

BSM Controller: A BSM Controller is a block to which a Bus Switching Module is directly attached, which controls the BSM's switching action. Selecting a block to be a BSM Controller block has no effect on the block's I/O type - the block can still be configured as an inputs-only block, but circuit #1 cannot be physically used as an input. The first circuit will not be under CPU control.

To change this configuration with a Hand-held Monitor, the block must first be configured for BSM PRESENT. The BSM CONTROLLER menu will not appear if BSM PRESENT is set to NO.

Output Default Time: Not used for inputs.

CPU Redundancy: This feature determines how a block will utilize output data received from single or redundant CPUs.

If the block will be used in GMR system, refer to the configuration instructions in the *GMR User's Manual* to choose the appropriate CPU Redundancy option. Not all input blocks in a GMR system are configured for GMR Redundancy. **Do not try to configure a block for GMR mode** without referring to the detailed configuration instructions in the *GMR User's Manual*.

Duplex Default State: Not used for inputs.

Configuration Protection: This feature can be used to protect the block's configuration, preventing changes from the CPU or Hand-held Monitor. It can only be selected from the Hand-held Monitor. To make subsequent changes, protection must be removed again using the Hand-held Monitor. For a new block, configuration is unprotected. Before a block is used in the system, its configuration should be protected.