MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GENERAL ELECTRIC

IC660BBD101

8-CIRCUIT 115 V AC I/O BLOCK

Used with the applicable Genius I/O configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

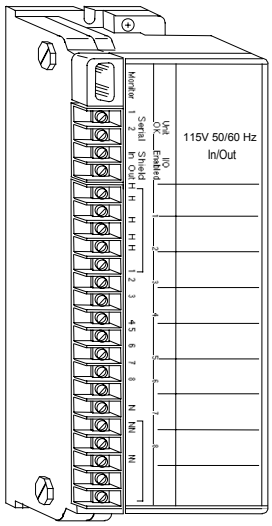
Source: Genius I/O 8-circuit 115 V AC I/O Block; applicable manufacturer document pages 2, 3, 4, 5

115VAC 8-Circuit Discrete I/O Block

June 2002 GFK-0035D

Description

The 115VAC Low-leakage I/O Block (IC66*BBD101) is an intelligent, configurable module that interfaces discrete sensors and actuators to a communications bus. The block has eight identical 115VAC circuits. Each circuit can be used as either an input or an output.



Features

Block features include:

- Selectable input Filter Time from 10ms to 100ms.
- Output feedback for monitoring.
- Output powerup defaults.
- Outputs hold last state or default.
- Pulse Testing for outputs.
- Bus Switching Module control.

Control power for the block is tapped off the input/output device voltages wired to the terminals. No separate block power supply is needed.

Each circuit has electronic fusing that shuts down the circuit in 5ms if output current exceeds 30 Amps with the output turned on, or 20 Amps after 2 cycles. The circuit is easily restored by command from a Hand-held Monitor or the CPU.

Block diagnostics include:

- Overtemperature
- Failed Switch
- Open Wire for tristate inputs
- Overload Detection and Shutdown
- No-load Detection

Fault reporting can be enabled or disabled circuit by circuit.

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*.

Specifications

Catalog Numbers		
Block	IC66*BBD101	
Electronics Assembly	IC66*EBD101	
Terminal Assembly	IC66*TSD100	
Block Specifications		
Size (height x width x depth)	8.83" (22.44cm) x 3.34" (8.48cm) x 3.91" (9.93cm)	
Weight	4 lbs. (1.8 kg)	
LEDs (I/O Block)	Unit OK, I/O Enabled	
LEDs (each circuit)	On logic side of switch	
Block to Block Isolation	1500V	
Heat Dissipation	16W maximum with 8 inputs, 43.5W maximum with 8 outputs on at 2 Amps.	
Standby power (all inputs and outputs off)	8.5 Watts	
Operating voltage (single source)	93-132VAC	
Frequency	47-63 Hz	
Power supply dropout time	1 cycle (16.7ms at 60Hz, 20ms at 50Hz)	
Input Specifications		
Non-tristate input		
OFF state min. voltage across input device (IN to H)		60V RMS
OFF state, max. leakage through input device		1.5mA
ON state, max. voltage across input device (IN to H)		20V RMS
ON state, max. switch current threshold		6mA RMS
Tristate input		
OFF state, acceptable voltage across input device (IN to H)		16V RMS-40V RMS,
ON state, max. voltage across input device (IN to H)		4V RMS
Input load network		
Resistor to N:	13K Ohms	
Capacitor to H:	0.10 µf	
Input processing time (typical)	2ms + filter	
Selectable input filter times	10 to 100ms in 10ms increments	
Input diagnostics	Open Wire, Overtemperature, Failed Switch	
Output Specifications		
Circuit output current (steady state)	2 Amps RMS	
Max. inrush current up to 2 cycles	25 Amps peak	
Maximum inrush current 2-6 cycles	14 Amps peak	
Maximum block output current	15 Amps at 35°C, 7.5 Amps at 60°C	
Output Leakage @ 115 VAC	Current at 0 volt output (OUT to N): < 7mA	
	Voltage at open output (OUT to N): 65 volts	
Output switch (OFF to ON/ON to OFF)	Zero crossing	
Maximum switching frequency	once per second (high inrush currents)	
Turn-on delay	0.5 Hz + 1ms, maximum	
Voltage drop	2.5V at 2 Amps, 10V at 30 Amps inrush	
Recommended min. load (No Load disabled)	25mA resistive, 40mA inductive	
No Load enabled threshold	50mA	
Fusing	Internal electronic short circuit trip. 100ms long time trip	
Output diagnostics	Short Circuit, Overload, No Load, Failed Switch, Overtemperature	
Environmental Specifications		
Operating temperature	0° C to +60° C (+32° to +140° F)	
Storage temperature	-40° to +100° C (-40° to +212° F)	
Humidity	5% to 95% (non-condensing)	
Vibration	5-10 Hz 0.2" (5.08mm) displacement, 10-200 Hz at 1G	

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

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Compatibility

This block is fully compatible with Hand-held Monitor model IC66*HHM501. It may be used with IC66*HHM500; however, HHM501 is required to change the baud rate or to configure the block for redundancy.

If the block will be used on a bus controlled by an IC550 series PLC, or a host computer equipped with a bus interface module, and the block will be configured as an inputs-only block, it may be necessary to upgrade the IC550 bus controller or computer bus interface module as detailed in the Discrete and Analog Blocks User's Manual.

Block IC66*BBD101 is designed to control small loads without the addition of parallel load resistance. It is also suitable for installations where a Class 1 Division 2 rating is required for Factory Mutual.

This block is backward compatible with blocks IC66*CBD100 and BBD100, and may be used to replace them. Electronics Assembly IC66*EBD101 replaces IC66*ELD100 and EBD100. Terminal Assemblies IC66*TSD100E and later are not compatible with earlier versions of the Electronics Assembly. If the Terminal Assembly will be used to replace Terminal Assembly IC66*TSD100D or earlier, the Electronics Assembly must be either replaced with version IC66*EBD101F or later, or upgraded.

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.

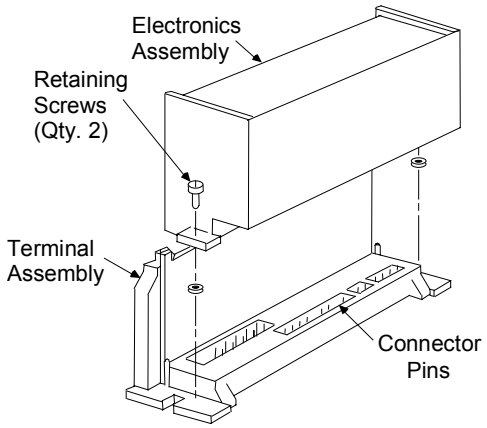
Block Mounting

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.

Removing an Electronics Assembly

The block's Electronics Assembly can be replaced with a compatible model 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.

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 3.3mm^2 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.

Block Wiring

All terminals accept one AWG #12 wire (avg 3.3mm^2 cross-section) or two AWG #14 wires (each avg 2.1mm^2 in cross-section). The minimum recommended wire size is AWG #22 (avg .36mm^2 in cross-section).

Block terminals can also accommodate spade or ring terminals up to 0.27 inch (6.85mm) wide with a minimum opening for a #6 screw, and up to 0.20 inch (5.1mm) depth from the screw center to the back barrier. Be sure unshielded wire ends are not longer than 2 inches (5 cm).

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

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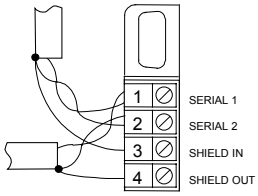
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Serial Bus Wiring

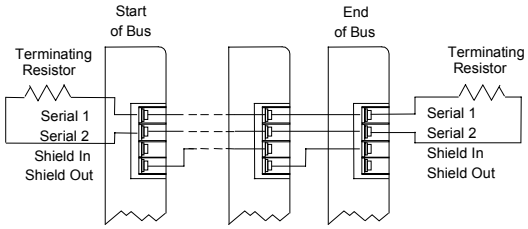
Terminals 1 to 4 are for the serial bus.

If the block will be used as a BSM Controller, first install the Bus Switching Module at the block's serial bus terminals. Then connect the serial bus cables to the BSM terminals, as described in the Bus Switching Module datasheet. Wire either of the BSM's pigtail wires to terminal 10. Connect the second BSM wire to an N terminal.

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



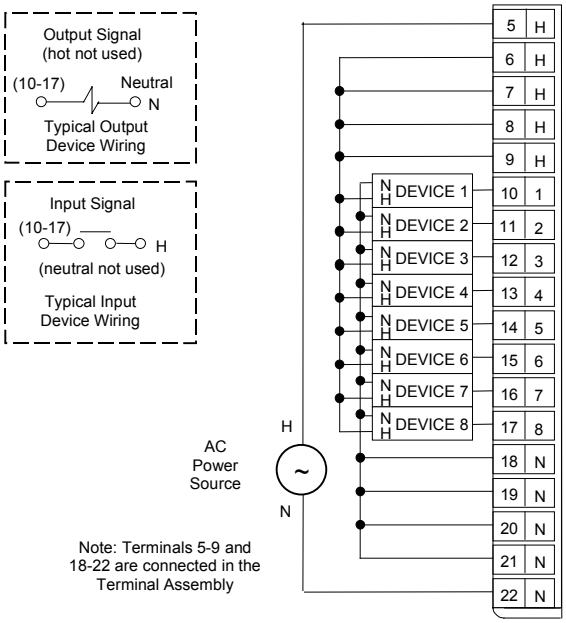
If the block is at either end of the bus, connect a terminating resistor of the appropriate type (see the System and Communications User's Manual for details) across its Serial 1 and Serial 2 terminals.



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.

Field Wiring

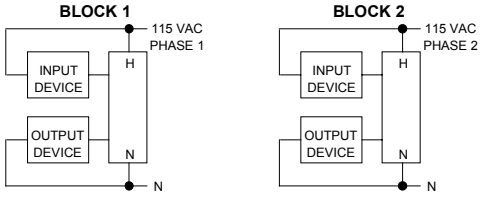
Connect wiring for I/O devices to terminals 10 - 17. Connect two-wire output devices to N, and two-wire input devices to H, as shown below left. Connect three-wire devices as shown below right.



Note: Terminals 5-9 and 18-22 are connected in the Terminal Assembly

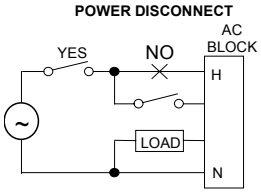
Connect a 115 volt AC source to one of the H terminals on the terminal strip. Connect neutral to an N terminal. All H terminals are internally bussed, as are all N terminals. Extra power terminals are for convenience. Depending on the physical layout and current loads, hot connections can be bussed together and made by one wire to the block or power source. Neutral connections can also be bussed together and made by one wire.

Any circuit can be an input or output. Connect the power source through the input device (such as a switch) to a discrete input circuit on the block. For outputs, power is routed through the block electronics to a discrete circuit and applied to a load. Connect the load return to the N terminal. Make all power connections on the block to the same 120 VAC phase. Different blocks can have different phases between them.



Power Disconnects

Since block power is the same as circuit power, it is important to wire block power disconnects so that block power and input power will be removed *at the same time*.

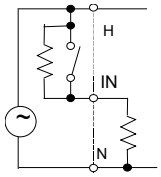


Caution

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.

Wiring for Tristate Inputs

If an input circuit should report open wire conditions, install a 5.1K ohm, 1/2 Watt or larger non-inductive resistor across the dry contacts of the input device. The circuit must be configured as a Tristate Input.



External Suppression

If a contact is wired between the block and a load, install suppression across the load. Resistor capacitor suppressors are preferred for low current, high inductance loads. For a high-power load, instead use a voltage-clamping device such as a MOV. RC suppressors are also recommended to reduce electromagnetic interference.

Power supply-side switches may require line to line suppression if power is to be switched with devices energized.

See the *Discrete and Analog Blocks User's Manual* for more information about using suppression.

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Block Operation

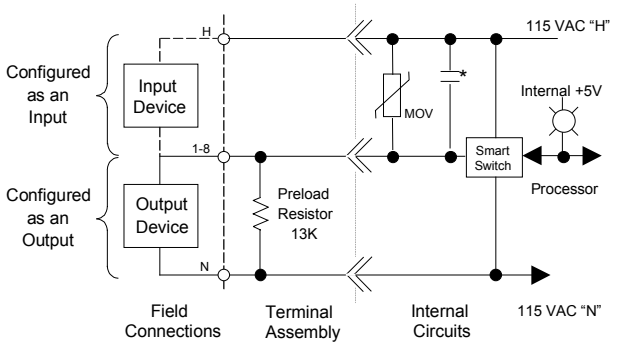
The 115VAC Low-leakage I/O block has eight identical circuits rated to operate at a nominal 115 volts AC. It can be used as combination input/output, inputs-only or outputs-only block.

If the block is configured as a combination block, circuits can be any mix of inputs and/or outputs. The actual state of each output circuit will be returned to the CPU in the corresponding input reference location. The CPU can monitor the feedback state to verify (after an appropriate delay) that the output switching device has operated properly and that the load has the proper voltage and current applied.

If the block is configured as an inputs-only block, all circuits must be regular inputs or tristate inputs.

If the block is configured as an outputs-only block, all circuits must be outputs; no feedback analysis will be performed.

Each circuit has its own LED. If the circuit is used as an input, the LED indicates the presence of threshold voltage at the input terminal. If the circuit is used as an output, the LED indicates the state commanded by the CPU.



* .2µF for Block IC66*BBD100
.1µF for Block IC66*BBD101

LEDS

The block's Unit OK and I/O Enabled LEDs 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. Output circuit LEDs show the state commanded by the CPU.

Diagnostics

Block diagnostics are listed below. Overload and No Load reporting are optional features that can be disabled during block configuration.

Open Wire: Voltage, but no current on tristate input.

Overtemperature: Block's internal temperature is above 100° C.

Short Circuit: Instantaneous current on an output exceeds 30A during first two line cycles or 20A thereafter. Output is turned off automatically.

Overload: A load exceeds 2.8A (2.0A RMS) continuously for 100ms. Output is turned off automatically.

No Load: Load does not continuously draw 50mA from the output circuit.

Failed Switch: May mean output's internal feedback state does not match its commanded state. False Failed Switch diagnostics may be reported if an external device like a manual switch is wired in parallel with an output. Several other Failed Switch faults may be reported on inputs and outputs, indicating a need to replace the Electronics Assembly.

Configuration

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 IC600 and IC550 series PLCs only).
- In addition, unless all circuits on the block will be inputs, the Block I/O Type must be set to either Outputs or Combination on the Program Block ID screen.

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.

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*.

Feature	Circuit / Block	Factory Setting	Selections
Device Number	Block	null	0 to 31 (a number must be selected)
Reference Address	Block	none	Depends on host CPU type
Block I/O Type	Block	input	input, output, combination
Baud Rate	Block	153.6 std	153.6 std, 153.6 ext, 76.8, 38.4 Kbd
Pulse Test	Block	enabled	enabled, disabled
Input Filter Time	Block	20ms	10 to 100ms
Overload Shutdown	Circuit	yes	yes, no
Circuit I/O Type	Circuit	input	input, output, tristate input
Report Faults	Circuit	yes	yes, no
Hold Last State	Circuit	no	yes, no
Output Default State	Circuit	off	on, off
BSM Present	Block	no	yes, no
BSM Controller	Block	no	yes, no
Output Default Time	Block	2.5 sec	2.5 or 10 seconds
CPU Redundancy	Block	none	none, hot standby, duplex
Duplex Default	Block	off	on, off
Configuration Protection	Block	disabled	enabled, disabled