Allen-Bradley

Compact Combination 24V dc Sink Input/Source Output BOOLEAN Control Module

1769-BOOLEAN

Reference Manual

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence
SHOCK HAZARD 	Labels may be located on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be located on or inside the equipment, for example, a drive or motor, to alert people that surfaces may be dangerous temperatures.

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Notes:

Read this preface to familiarize yourself with the rest of the manual. This preface covers the following topics:

- Who should use this manual
- How to use this manual
- Related publications
- Conventions used in this manual

Who Should Use This Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use the Allen-Bradley Compact I/O system.

How to Use This Manual

As much as possible, we organized this manual to explain, in a task-by-task manner, how to install, configure, program, operate, and troubleshoot a control system using the 1769 BOOLEAN module.

Related Documentation

The table below provides a listing of publications that contain important information about using Compact I/O modules.

For	Read this document	Document number
A user manual containing information on how to install, use and program your MicroLogix 1500 controller.	MicroLogix 1500 User Manual	1764-UM001
A user manual containing information on how to install, and use your 1769-ADN DeviceNet adapter.	DeviceNet Adapter User Manual	1769-UM001
A user manual containing information on how to install, use and program your 1769-L20 and 1769-L30 CompactLogix controllers.	CompactLogix User Manual	1769-UM007
A user manual containing information on how to install, use and program your 1769-L31, 1769-L32C, 1769-L32E, 1769-L35CR and 1769-L35E CompactLogix controllers.	CompactLogix System User Manual	1769-UM011
An overview of 1769 Compact I/O modules.	Compact I/O System Selection Guide	1769-SG002
In-depth information on grounding and wiring Allen-Bradley programmable controllers.	Allen-Bradley Programmable Controller Grounding and Wiring Guidelines	1770-4.1

If you would like a manual, you can:

- download a free electronic version from the Internet at http://literature.rockwellautomation.com
- purchase a printed manual by contacting your local distributor or Rockwell Automation representative.

Conventions Used in This Manual

We use the following conventions throughout this manual.

- Bulleted lists (like this one) provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- **Bold** type is used for emphasis.

Module Operation

Overview

This chapter contains information about the following.

- Module description
- Module block diagram
- Input and output circuit diagrams
- Controlling outputs using Boolean expressions
  - Format of Boolean expression
  - Allowed variations of Boolean expressions
  - Operands
  - Operators
  - Output delay control
  - Output duration control
  - Delay/Duration control rules and examples

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About the 1769-BOOLEAN Module

The 1769-BOOLEAN module is a 24V dc combination input/output module. The module outputs can be either directly controlled from your program or independently controlled by the module using configured Boolean expressions. These Boolean expressions are simple, logical combinations of the module hardware input states and soft inputs controlled by your program. When controlled by Boolean expression, the 1769-BOOLEAN module output states can be conditioned using configured delay and duration settings. The 1769-BOOLEAN module supports interrupts to the system controller on both input and output change of states[1].

The Compact I/O system is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2[2]) and to circuits not exceeding Over Voltage Category II[3] (IEC 60664-1)[4].

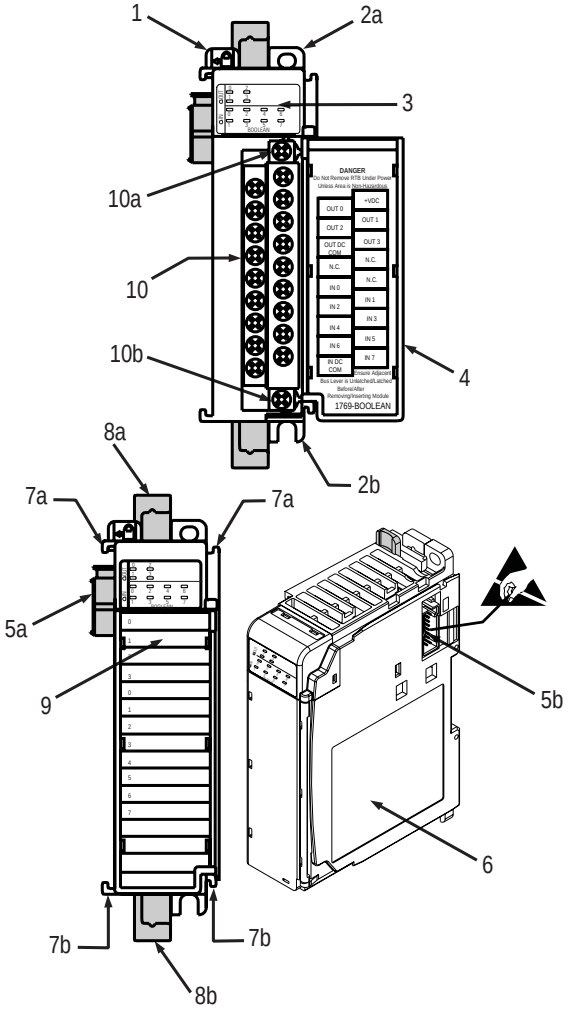
(1) Interrupts from the module to the controller may not be supported by all controllers. Refer to your controller's user manual for more information.

(2) Pollution Degree 2 is an environment where, normally, only nonconductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

(3) Over Voltage Category II is the load-level section of the electrical distribution system. At this level, transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(4) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Module Description



Item	Description
1	Bus lever (with locking function)
2a	Upper panel mounting tab
2b	Lower panel mounting tab
3	Module status LED
4	Module door with terminal identification label
5a	Movable bus connector with female pins
5b	Stationary bus connector with male pins
6	Nameplate label
7a	Upper tongue-and-groove slots
7b	Lower tongue-and-groove slots
8a	Upper DIN rail latch
8b	Lower DIN rail latch
9	Write-on label (user ID tag)
10	Removable terminal block (RTB) with finger-safe cover
10a	RTB upper retaining screw
10b	RTB lower retaining screw

Hardware Features

The 1769-BOOLEAN module contains a removable terminal block. The module input circuits are isolated from the output circuits. Single-ground applications can be supported by wiring the IN DC COM and the OUT DC COM terminals together; however, this eliminates the isolation between the input and output circuits provided by the module.

Module configuration is normally done via the controller programming software. In addition, some controllers support configuration via the user program. In either case, the controller memory stores the module configuration. Refer to your controller's user manual for more information.

Boolean Expressions

An expression is any legal combination of symbols that represents a value. An expression that results in a value of either TRUE or FALSE is called a Boolean expression. Every Boolean expression (except a null expression) consists of at least one operand and can have one or more operators. Operands are values, whereas operators are symbols that represent particular logical actions. For example, in the expression

OUT = A **AND** B,

the value of OUT is either TRUE or FALSE and is determined by the value of the expression "A **AND** B". A and B are operands that also have a value of TRUE or FALSE. The operator in the expression is the logical operator **AND**. Other examples of logical operators are **OR** and **XOR** (exclusive-OR).

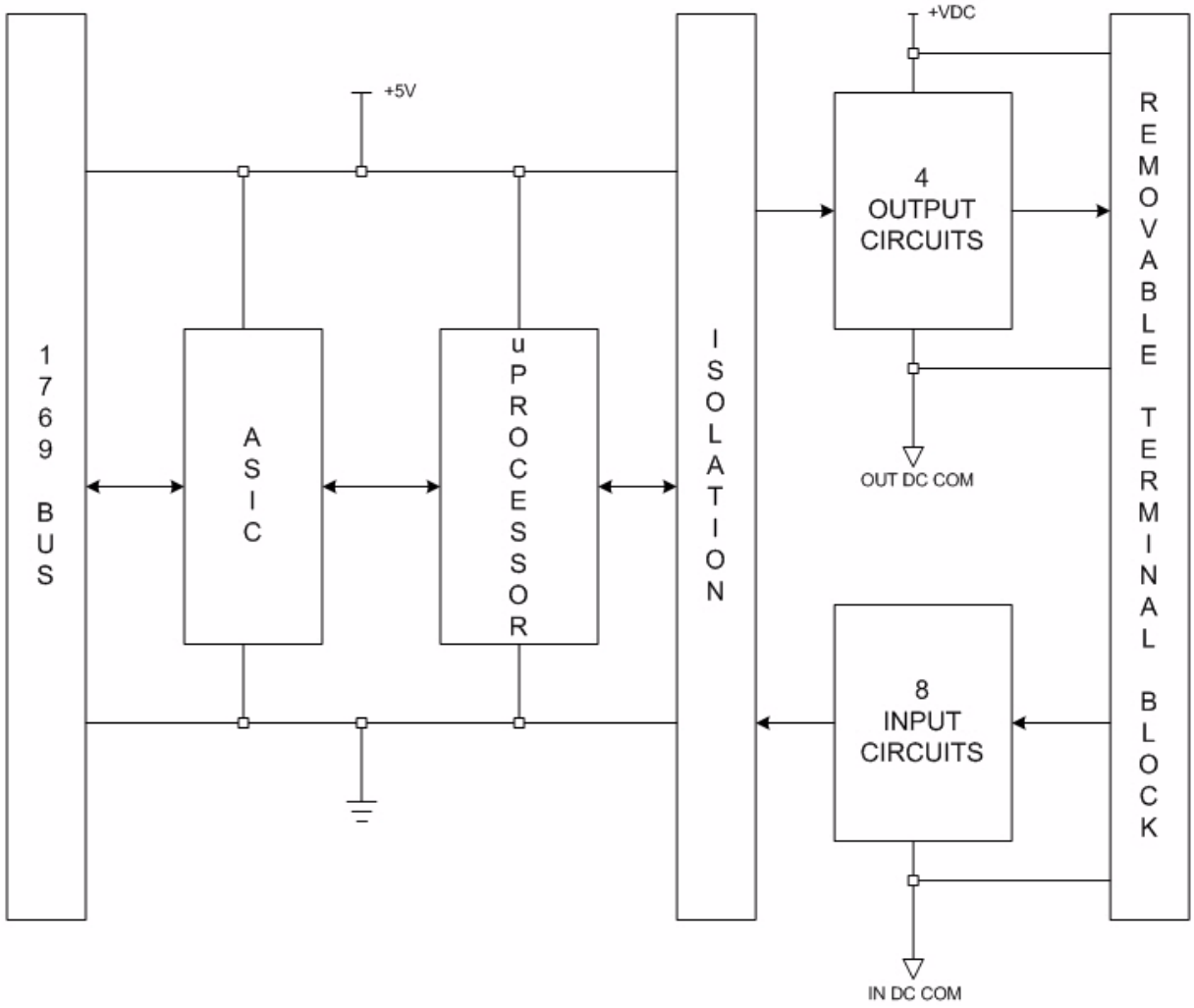
The 1769-BOOLEAN module outputs can be controlled based upon the value of Boolean expressions configured by the program. An output state (when in Boolean control mode) is determined by the state of that output's configured Boolean expression, with a value of TRUE corresponding to the ON state and a value of FALSE corresponding to the OFF state.

Refer to Chapter 3, Module Data, Status, and Configuration on page 41, for information on configuring control of the 1769-BOOLEAN module outputs using Boolean expressions.

1769-BOOLEAN Module Block Diagram

The following figure is the block diagram for the 1769-BOOLEAN module.

1769-BOOLEAN Module Block Diagram



Wire the 1769-BOOLEAN Module

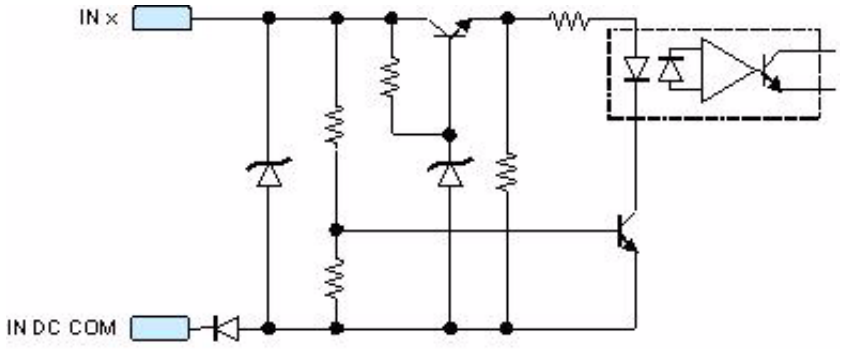
Each terminal accepts as many as two wires with these restrictions.

Wire Type		Wire Size	Terminal Screw Torque	Retaining Screw Torque
Solid	Cu-90 °C (194 °F)	2.08…0.34 mm² (14…22 AWG)	0.68 Nm (6 lb-in)	0.46 Nm (4.1 lb-in)
Stranded	Cu-90 °C (194 °F)	1.31…0.34 mm² (16…22 AWG)	0.68 Nm (6 lb-in)	0.46 Nm (4.1 lb-in)

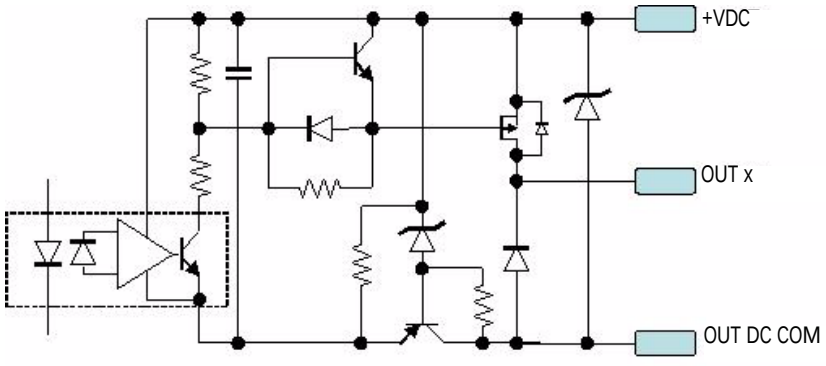
Input and Output Circuit Diagrams

The following figures illustrate the simplified input and output circuits.

Simplified Input Circuit Diagram



Simplified Output Circuit Diagram



Control Outputs Using Boolean Expressions

You can configure the 1769-BOOLEAN module outputs to be controlled by Boolean expression (Boolean control mode).

Format of Boolean Expression

Each output is controlled with a separate expression. The fixed format of each Boolean expression is assumed to be of the form:

Output State = (A **x** B) **y** C

where A, B, and C are operands and **x** and **y** are logical operators you select. The location of the parentheses in the fixed format indicates that the logical operation represented by **x** is performed on operands A and B first, with the result of that operation then used as the first operand for the logical operation represented by **y** (with C being the second operand).

The parameter names assigned in the 1769-BOOLEAN module configuration file that correspond to the operands and operators of the fixed format Boolean expression above are:

A: Operand_A_#

B: Operand_B_#

C: Operand_C_#

x: Operator_1_#

y: Operator_2_#

where the # symbol indicates the module output (OUT0 through OUT3).

Boolean Expression Configuration Restrictions

The Boolean expressions controlling the output states have default values assigned to each operand and operator. These default values assign "None" to each operand and operator resulting in a "Null" expression. A "Null" expression will be accepted by the module but will result in an output that will always be in the OFF state.

The module will only accept the following variations of Boolean expressions as valid (based on the fixed format expression (A x B) y C).

Variations of Boolean Expressions

Variation	Description
Null	All operands and operators assigned a value of “None”.
A	Only the first operand assigned a non-default value, all other operands and all operators assigned a value of “None”.
A **x** B	Only the first two operands and the first operator assigned a non-default value, final operand and final operator assigned a value of “None”
(A x B) y C	All operands and operators assigned non-default values)

Operands

The operands in each output's Boolean expression can be configured to be one of the following.

- None (default)
- Current state of one of the module's eight, real inputs
- Inverted, current state of one of the module's eight, real inputs
- Current state of one of the module's eight, virtual inputs (controlled by the user program via the module's output data file)
- Inverted, current state of one of the module's eight, virtual inputs

Refer to Chapter 3, Module Data, Status, and Configuration on page 41, for details on configuring the Boolean expression operands.

Operators

The operators in each output Boolean expression can be configured to be one of the following (the operator's effect on a pair of operands is described).

Boolean Expression and the Related Operator Effect

Expression	Operator Effect
None	Default, no logical operation performed.
OR	If either operand in TRUE, the result is TRUE.
AND	Both operands must be TRUE for the result to be TRUE.
XOR	Exclusive - OR, one operand must be TRUE and the other FALSE for the result to be TRUE.

Refer to Chapter 3, Module Data, Status, and Configuration on page 41, for details on configuring the Boolean expression operators.

Output Delay

When configured for Boolean control, the module's outputs are directed ON when the Boolean expression for each output channel is TRUE. The module can be configured to add a delay between an output's Boolean expression becoming TRUE and the output being placed into the ON state. The length of this delay time for an output operating in Boolean control mode can be configured to be between 0 (default) and 1 second in 1 ms increments.

Refer to Chapter 3, Module Data, Status, and Configuration on page 41, for details on configuring the Boolean expression output delay.

Output Duration

When configured for Boolean control, if an output is directed ON as the result of the output's Boolean expression becoming TRUE, and the Output Delay time for that output has been satisfied, then the length of time an output stays ON can be controlled by designating an Output Duration. The length of this duration time for an output operating in Boolean control mode can be configured to be either a fixed amount of time between 1 ms and 1 second (in 1 ms increments), or, the output can be configured to remain ON only as long as its Boolean expression remains TRUE (duration time set to 0, this is the default setting).

Refer to Chapter 3, Module Data, Status, and Configuration on page 41, for details on configuring the Boolean expression output duration.

Output Delay and Duration Operation

Since an output's Boolean expression can change in real time, configuring a delay and/or duration time when an output is in Boolean control mode could cause confusion.

The module shall operate in the following manner when output delay and/or duration times are configured to non-default values (while an output is configured for Boolean control).

When the Boolean expression controlling an output transitions from FALSE to TRUE, the output will be directed ON after the delay time has expired only if:

Case 1

- The output's duration time is not equal to 0. In this case the output should be directed ON for the length of the duration time regardless of the state of the output's Boolean expression and then should be directed OFF regardless of the state of the Boolean expression.

- In Case 1 a “One-shot” type of function has been configured. The output will be turned ON with a single pulse of configured delay time and duration time when the output's Boolean expression becomes TRUE. The length of time the Boolean expression remains TRUE does not determine whether the “One-shot” pulse occurs. As long as the duration time of the output has been configured to a value greater than 0, then a “One-shot” ON pulse will occur and the output will remain ON for the length of the duration time. The output will then turn OFF regardless of the state of the output's Boolean expression.

- Retriggering of the output is not supported. Any additional transitions of the output's Boolean expression from FALSE to TRUE after the initial transition to TRUE are ignored for a length of time equal to the configured delay time added to the configured duration time. Once the output's “One-shot” pulse duration is complete, and the output is turned OFF, a FALSE to TRUE transition of the Boolean expression will cause another “One-shot” ON pulse to occur.

Case 2

- The output's duration is equal to 0 and the output's Boolean expression has maintained a state of TRUE for the entire delay time. The output should then be directed OFF when the output's Boolean expression becomes FALSE.

- In Case 2 the output will follow the state of the Boolean expression as long as the configured delay time has expired and the Boolean expression has maintained a TRUE state. When an output's Boolean expression transitions from FALSE to TRUE, the output will be turned ON only if the Boolean expression has maintained a state of TRUE for the entire length of the delay time. If the output's Boolean expression transitions to FALSE before the configured delay time expires, then the delay time should be terminated and the output should not be turned ON. If the output's Boolean expression has maintained a TRUE state for the full length of the delay time, the output will be turned ON and will remain ON until the Boolean expression becomes FALSE.

- If an output's Boolean expression is configured with both the delay and duration times set to 0, then the output simply follows the state of the Boolean expression, ON when the expression is TRUE and OFF when it is FALSE.

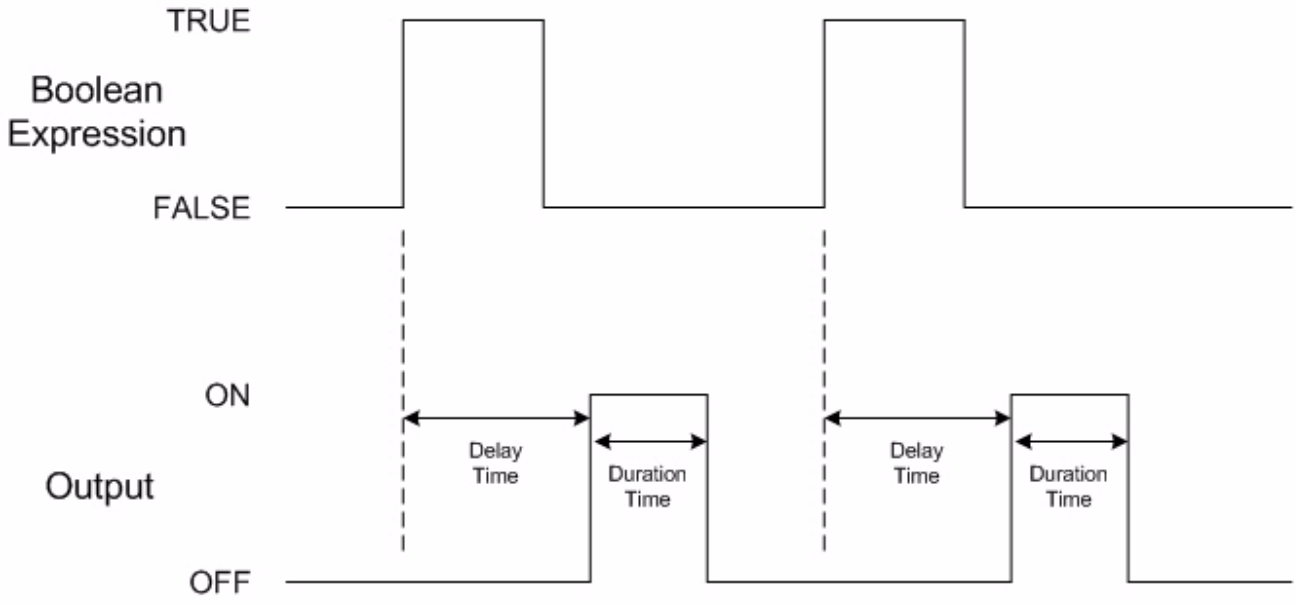
Boolean Control Mode Examples

The following examples illustrate the module's operation when an output is configured in Boolean control mode. Examples 1…5 show module output operation for Case 1 where the configured duration time is greater than 0. Examples 6 and 7 show module operation for Case 2 where the configured duration time is equal to 0.

Example 1: Duration > 0, Delay > TRUE Time

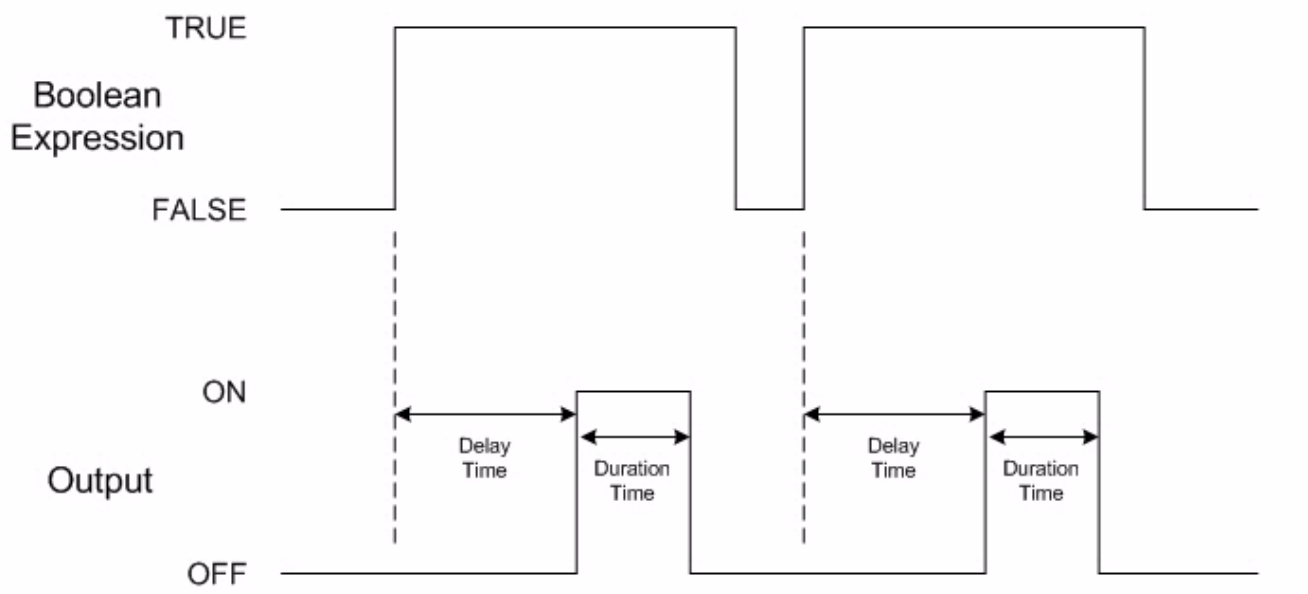
In this example, the output is configured with a duration time greater than 0, a delay time greater than 0, and the configured delay time is longer than the time that the Boolean expression remains TRUE.

Since the configured duration time is greater than 0, a “One-shot” pulse occurs on the output. The pulse starts an amount of time after the FALSE to TRUE transition of the Boolean expression equal to the configured delay time. The “One-shot” pulse lasts as long as the configured duration time even though the Boolean expression transitions to FALSE. The second “One-shot” pulse occurs on the output since there was a FALSE to TRUE transition in the Boolean expression after the first “One-shot” pulse is completed.


TRUE
Boolean Expression
FALSE
ON
Output
OFF
Delay Time
Duration Time
Delay Time
Duration Time

Example 2: Duration > 0, Delay < TRUE Time

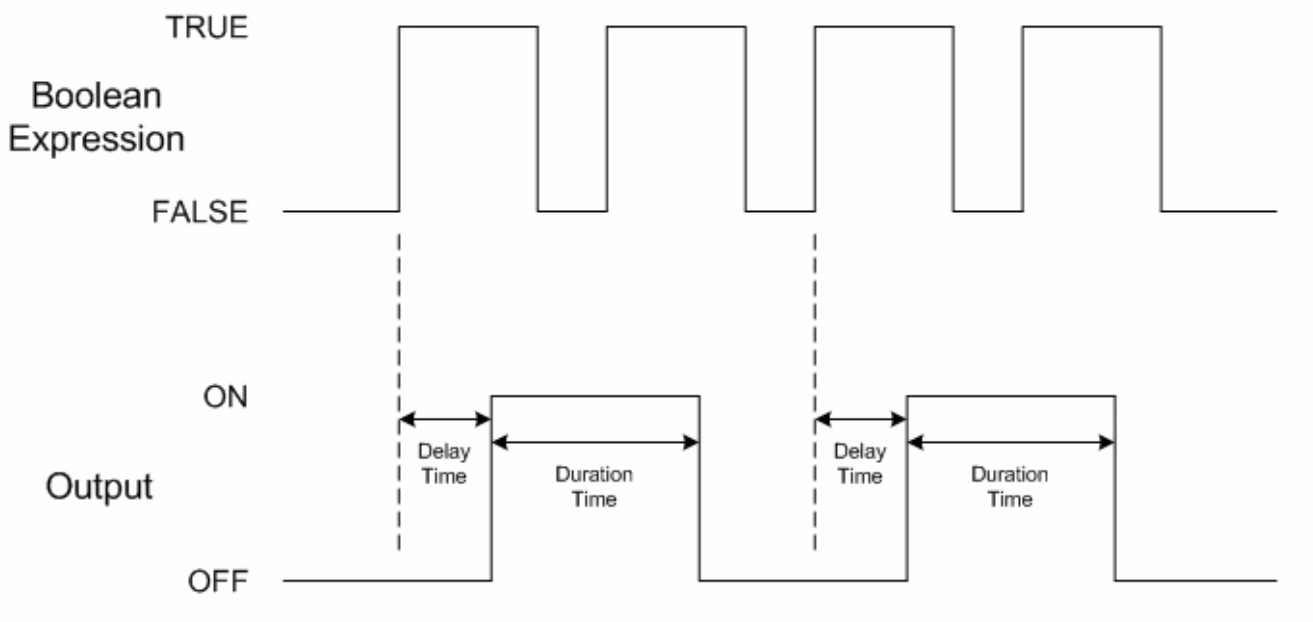
In this example, the output is configured with a duration time greater than 0, a delay time greater than 0, and the configured delay time is shorter than the time that the Boolean expression remains TRUE.



Again, since the configured duration time is greater than 0, a "One-shot" pulse occurs on the output. The pulse starts an amount of time after the FALSE to TRUE transition of the Boolean expression equal to the configured delay time. The "One-shot" pulse again lasts only as long as the configured duration time even though the Boolean expression remains TRUE. The second "One-shot" pulse occurs on the output since there was a FALSE to TRUE transition in the Boolean expression after the first "One-shot" pulse is completed.

Example 3: Duration > 0, Delay < TRUE Time, Retriggering Ignored

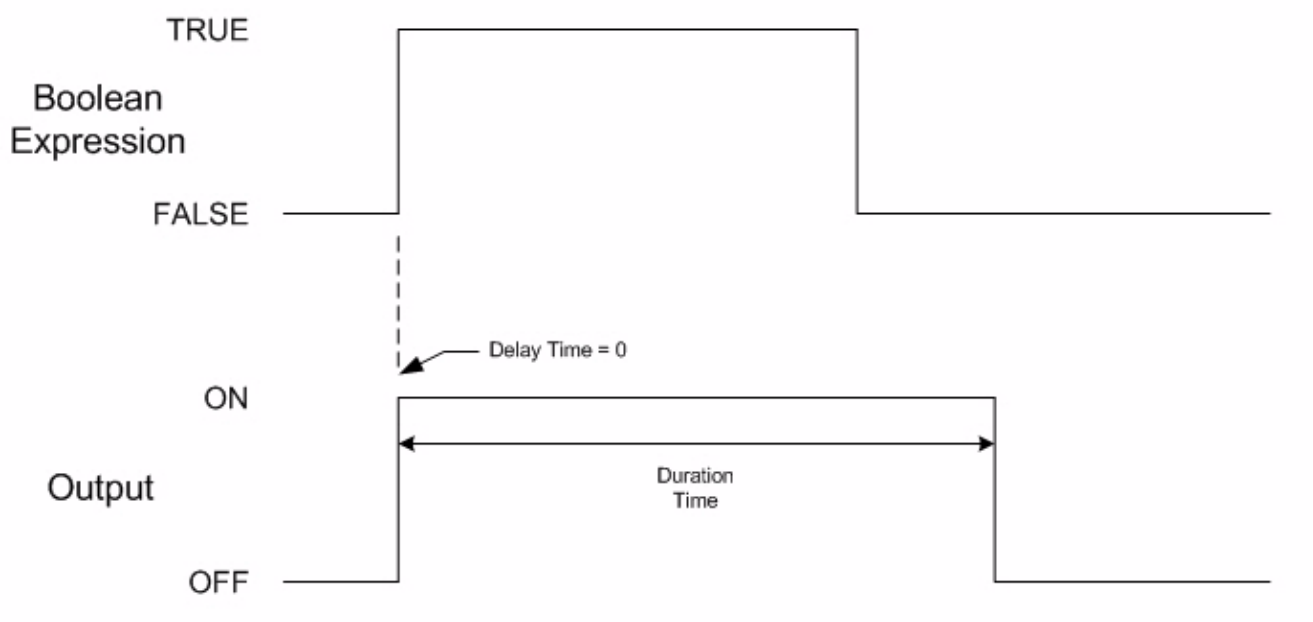
In this example, the output is configured with a duration time greater than 0, a delay time greater than 0, and multiple transitions of the Boolean expression occur before the initial "One-shot" pulse duration is completed.



The first FALSE to TRUE transition of the Boolean expression causes a "One-shot" pulse to occur. The pulse starts an amount of time after the FALSE to TRUE transition of the Boolean expression equal to the configured delay time. The "One-shot" pulse lasts as long as the configured duration time. Since the second FALSE to TRUE transition of the Boolean expression occurs before the initial "One-shot" pulse is completed, that transition of the Boolean expression is ignored by the module. The third FALSE to TRUE transition of the Boolean expression again causes a "One-shot" pulse, with the fourth FALSE to TRUE transition of the Boolean expression again ignored by the module since it occurs before the second "One-shot" pulse is complete.

Example 4: Duration > 0, Delay = 0, Duration > TRUE Time

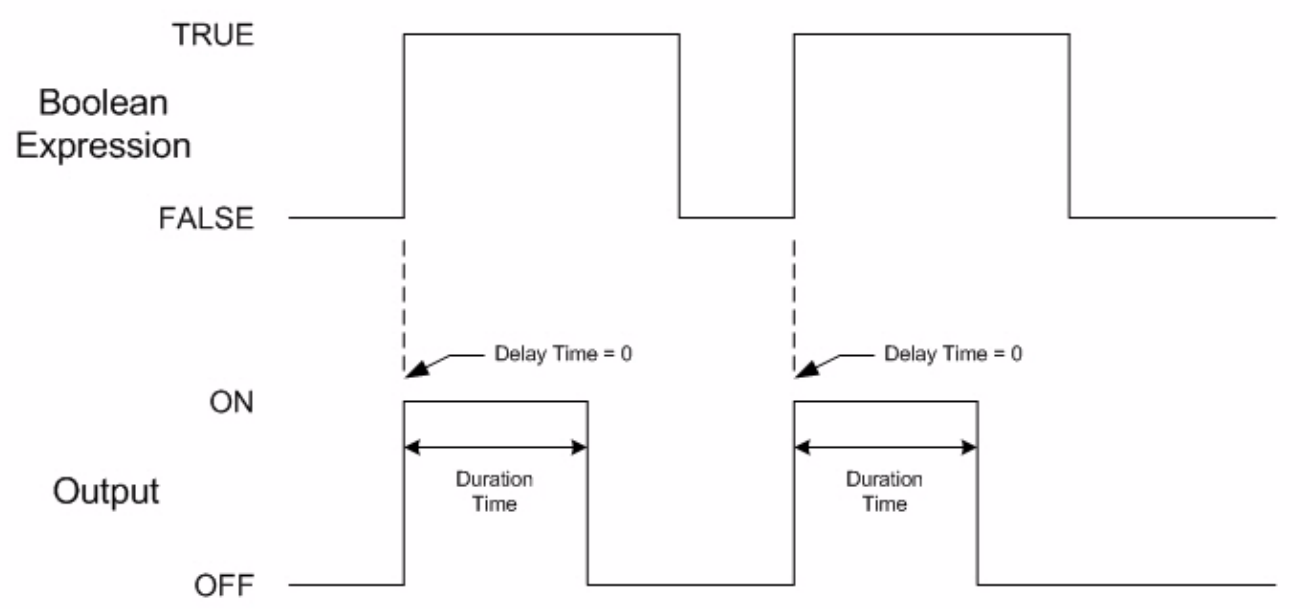
In this example, the output is configured with a duration time greater than 0, a delay time equal to 0, and the configured duration time is longer than the time that the Boolean expression remains TRUE.



Since the configured duration time is greater than 0, a "One-shot" pulse occurs on the output. The pulse starts at the same time as the FALSE to TRUE transition of the Boolean expression because the configured delay time is equal to 0. The "One-shot" pulse lasts as long as the configured duration time even though the Boolean expression transitions to FALSE.

Example 5: Duration > 0, Delay = 0, Duration < TRUE Time

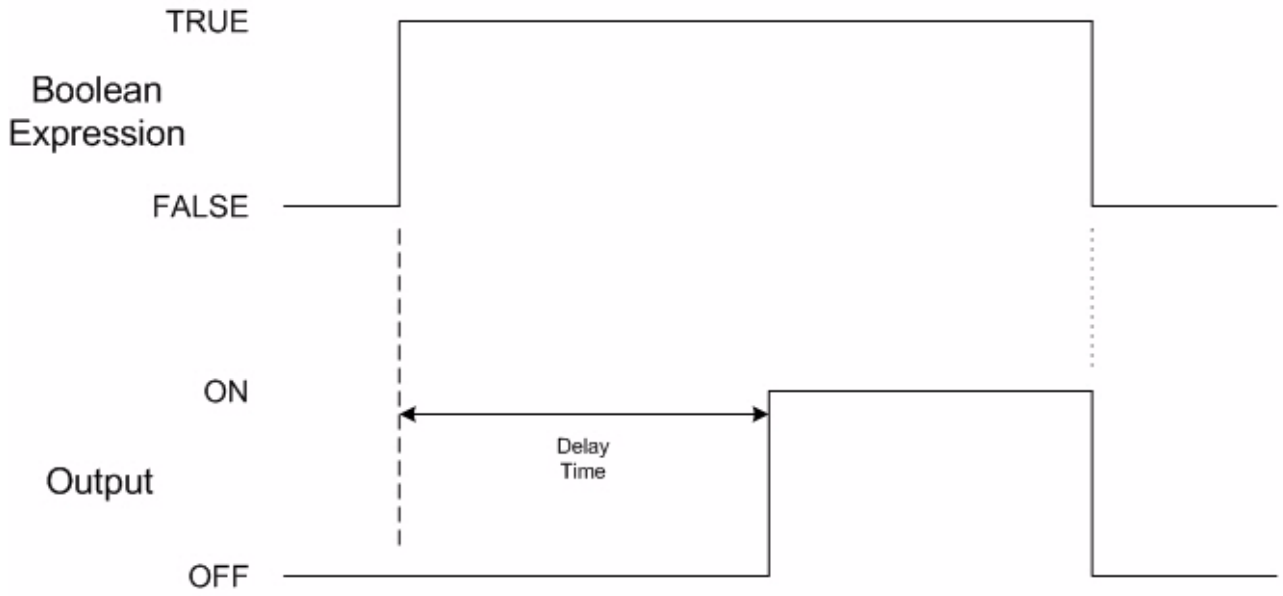
In this example, the output is configured with a duration time greater than 0, a delay time equal to 0, and the configured duration time is shorter than the time that the Boolean expression remains TRUE.



Again, since the configured duration time is greater than 0, a "One-shot" pulse occurs on the output. The pulse starts at the same time as the FALSE to TRUE transition of the Boolean expression because the configured delay time is equal to 0. The "One-shot" pulse again lasts only as long as the configured duration time even though the Boolean expression remains TRUE. The second "One-shot" pulse occurs on the output since there was a FALSE to TRUE transition in the Boolean expression after the first "One-shot" pulse is completed.

Example 6: Duration = 0, Delay < TRUE Time

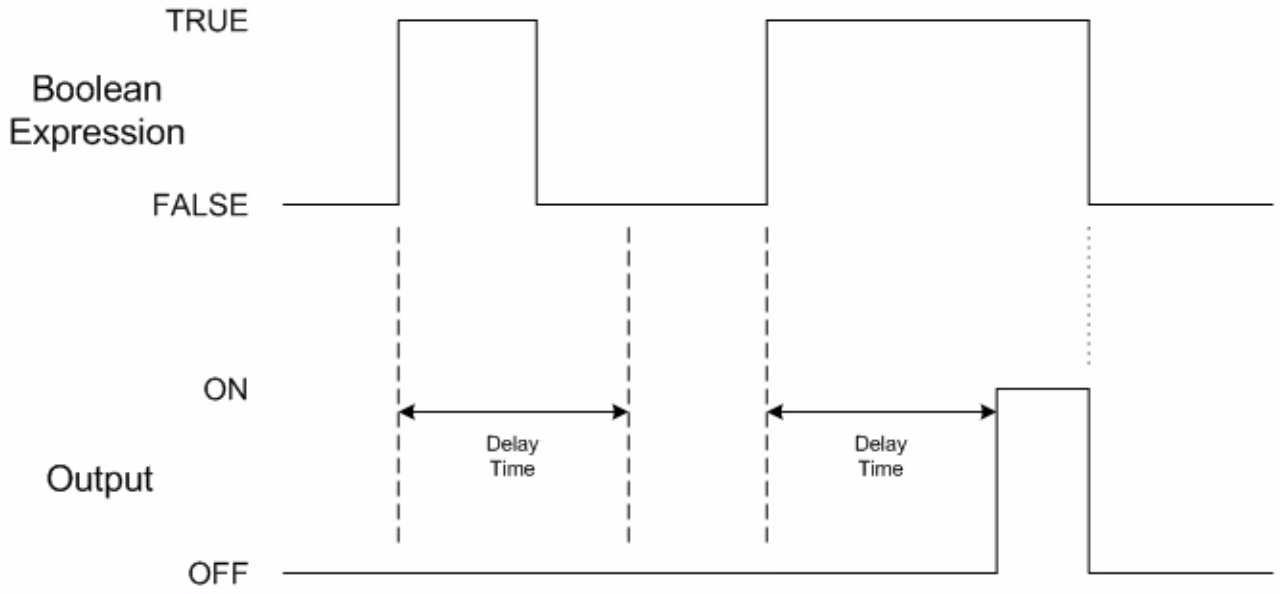
In this example, the output is configured with a duration time equal to 0 (the output will remain ON only if the Boolean expression remains TRUE), a delay time greater than 0, and the Boolean expression continuously remains TRUE for a length of time greater than the configured delay time.



Since the delay time is greater than 0, the output does not turn ON until the Boolean expression has maintained a TRUE condition for a period of time equal to the configured delay time. The output remains ON until the Boolean expression becomes FALSE. The output immediately turns OFF since the configured duration time is 0.

Example 7: Duration = 0, Delay > TRUE Time

In this example, the output is configured with a duration time equal to 0 (the output will remain ON only if the Boolean expression remains TRUE) and a delay time greater than 0. Conditions where the Boolean expression remains TRUE both for less than and longer than the configured delay time are illustrated.



The first instance that the Boolean expression goes to the TRUE state, but does not remain continuously TRUE for a period of time exceeding the configured delay time, it does not cause the output to turn ON. When this first TRUE condition ends, the corresponding delay time event also ends. The next time the Boolean expression becomes TRUE, a new delay time event begins. This second TRUE event does continuously remain TRUE for longer than the configured delay time and the output turns ON. The output remains ON until the Boolean expression becomes FALSE, at which point it immediately turns OFF since the configured duration time is 0.

Installation and Wiring

Overview

This chapter tells you how to:

- determine the power requirements for the module.
- avoid electrostatic damage.
- install the module.
- wire the module's terminal block.
- wire input devices.
- wire output devices.

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Compliance to European Union Directives

This product is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

The analog modules are tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 61000-6-4:2001
  Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standards - Emission Standard for Industrial Environments

- EN 61000-6-2:2001
  Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standards - Immunity for Industrial Environments

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 – Equipment Requirements and Tests.

For specific information required by EN61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines for Noise Immunity, publication 1770-4.1
- Automation Systems Catalog, publication B113

Power Requirements

The module receives power through the bus interface from the +5V dc/+24V dc system power supply. The maximum current draw for the 1769-BOOLEAN module is:

- 5V dc: 220 mA.
- 24V dc: 0 mA.

General Considerations

The Compact I/O system is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2[(1)]) and to circuits not exceeding Over Voltage Category II[(2)] (IEC 60664-1).[(3)]

(1) Pollution Degree 2 is an environment where, normally, only nonconductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.

(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or nonhazardous locations only. The following attention statement applies to use in hazardous locations.

ATTENTION

Explosion Hazard

- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components or disconnect equipment unless power has been switched off or the area is known to be nonhazardous.
- Do not connect or disconnect components unless power has been switched off or the area is known to be nonhazardous.
- This product must be installed in an enclosure.
- All wiring must comply with N.E.C. article 501-4(b).

Prevent Electrostatic Discharge

ATTENTION

Electrostatic discharge can damage integrated circuits or semiconductors if you touch the bus connector pins or the terminal block on the module. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
- Wear an approved wrist-strap grounding device.
- Do not touch the bus connector or connector pins.
- Do not touch circuit components inside the module.
- Use a static-safe work station, if available.
- Keep the module in its static-shield box when it is not in use.

Remove Power

ATTENTION

Remove power before removing or inserting this module. When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion.
- causing an explosion in a hazardous environment.

Electrical arcing causes excessive wear to contacts on both the module and its mating connector and may lead to premature failure.

Reduce Noise

Most applications require installation in an industrial enclosure to reduce the effects of electrical interference. Group your modules to minimize adverse effects from radiated electrical noise and heat. Consider the following conditions when selecting a location for the module. Position the module:

- away from sources of electrical noise such as hard-contact switches, relays, and ac motor drives.
- away from modules that generate significant radiated heat, such as the 1769-IA16 module. Refer to the module's heat dissipation specification.

Protect the Circuit Board from Contamination

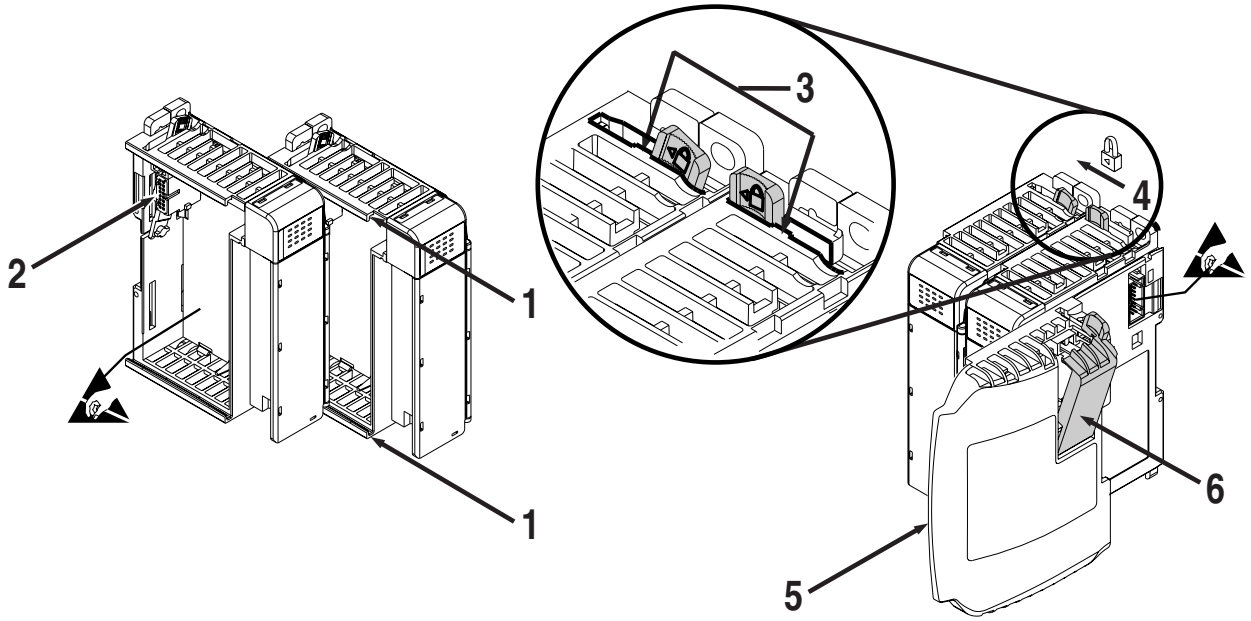
The printed circuit board of the module must be protected from dirt, oil, moisture, and other airborne contaminants. To protect the printed circuit board, the system must be installed in an enclosure suitable for the environment. The interior of the enclosure should be kept clean and the enclosure door should be kept closed whenever possible.

System Assembly

The module can be attached to the controller or an adjacent I/O module **before** or **after** mounting.

Refer to Panel Mounting Using the Dimensional Template on page 33, for mounting instructions, or to DIN Rail Mount on page 34.

Refer to Replace a Single Module Within a System on page 34, for information on working with a system that is already mounted.



1. Disconnect power.
2. Check that the bus lever of the module to be installed is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots (1) to secure the modules together (or to a controller).
4. Move the module back along the tongue-and-groove slots until the bus connectors (2) line up with each other.
5. Push the bus lever back slightly to clear the positioning tab (3), using your fingers or a small screwdriver.

6. Move the bus lever fully to the left (4) until it clicks, making sure it is locked firmly in place, to allow communication between the controller and module.

ATTENTION

When attaching I/O modules, it is very important that the bus connectors are securely locked together to be sure of proper electrical connection.

7. Attach an end cap terminator (5) to the last module in the system by using the tongue-and-groove slots as before.

8. Lock the end cap bus terminator (6).

IMPORTANT

A 1769-ECR or 1769-ECL right or left end cap must be used to terminate the end of the bus.

Mount the Module

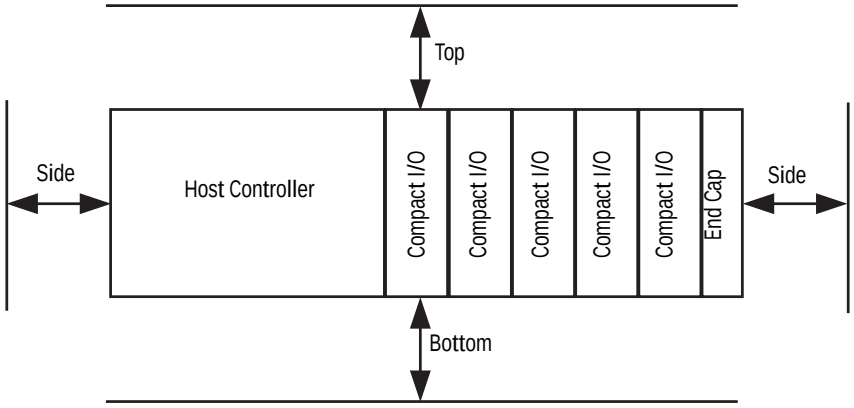
ATTENTION

During panel or DIN rail mounting of all devices, be sure that all debris (that is, metal chips or wire strands) is kept from falling into the module. Debris that falls into the module could cause damage when you cycle power.

Minimum Spacing

Maintain spacing from enclosure walls, wireways, or adjacent equipment. Allow 50 mm (2 in.) of space on all sides for adequate ventilation.

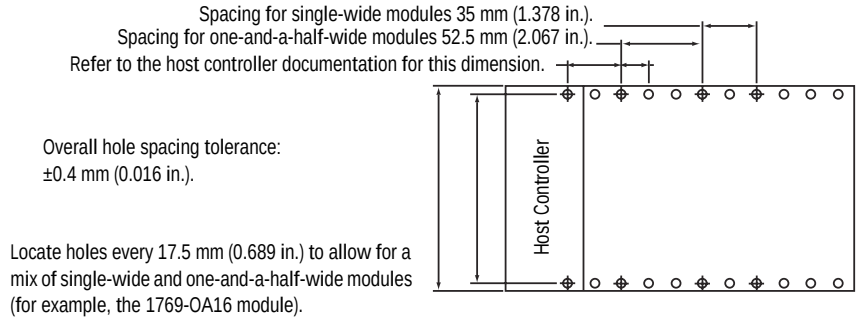
Space Requirements



Panel Mount

Mount the module to a panel using two screws per module. Use M4 or #8 panhead screws. Mounting screws are required on every module.

Panel Mounting Using the Dimensional Template



Panel Mounting Procedure Using Modules as a Template

This procedure lets you use the assembled modules as a template for drilling holes in the panel. If you have sophisticated panel-mounting equipment, you can use the dimensional template provided. Due to module mounting hole tolerance, it is important to follow these procedures.

1. Assemble no more than three modules on a clean work surface.
2. Using the assembled modules as a template, carefully mark the center of all module-mounting holes on the panel.
3. Return the assembled modules to the clean work surface, including any previously mounted modules.
4. Drill and tap the mounting holes for the recommended M4 or #8 screw.
5. Place the modules back on the panel, and check for proper hole alignment.
6. Attach the modules to the panel using the mounting screws.

TIP If mounting more modules, mount only the last one of this group and put the others aside. This reduces remounting time during drilling and tapping of the next group.

7. Repeat steps 1…6 for any remaining modules.

DIN Rail Mount

The module can be mounted using the following DIN rails:
35 x 7.5 mm (EN 50 022 - 35 x 7.5) or 35 x 15 mm (EN 50 022 - 35 x 15).

Before mounting the module on a DIN rail, close the DIN rail latches. Press the DIN rail mounting area of the module against the DIN rail. The latches will momentarily open and lock into place.

Replace a Single Module Within a System

The module can be replaced while the system is mounted to a panel (or DIN rail). Follow these steps in order.

1. Remove power.

ATTENTION

Remove power before removing or inserting this module. When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion.
- causing an explosion in a hazardous environment.

Electrical arcing causes excessive wear to contacts on both the module and its mating connector and may lead to premature failure.

2. Remove the upper and lower mounting screws from the module to be removed (or open the DIN latches using a flat-blade or Phillips screwdriver).
3. Move the bus lever to the right to disconnect (unlock) the bus.
4. Move the right-side adjacent module's bus lever to the right (unlock) to disconnect it from the module to be removed.
5. Gently slide the disconnected module forward.

   If you feel excessive resistance, check that the module has been disconnected from the bus, and that both mounting screws have been removed (or DIN latches opened).

TIP

It may be necessary to rock the module slightly from front to back to remove it, or, in a panel-mounted system, to loosen the screws of adjacent modules.

6. Make sure that the bus lever, on the module to be installed and the right-side adjacent module, are in the unlocked (fully right position) before installing the replacement module.

7. Slide the replacement module into the open slot.

8. Connect the modules together by locking (fully left) the bus levers on the replacement module and the right-side adjacent module.

9. Replace the mounting screws (or snap the module onto the DIN rail).

Field Wiring Connections

Use the following information to properly make field wiring connections.

Ground

Mount this product to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the module's mounting tabs or DIN rail (if used) are not required unless the mounting surface cannot be grounded. Refer to the Allen-Bradley Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for additional information.

System Wiring Guidelines

Consider the following when wiring your system.

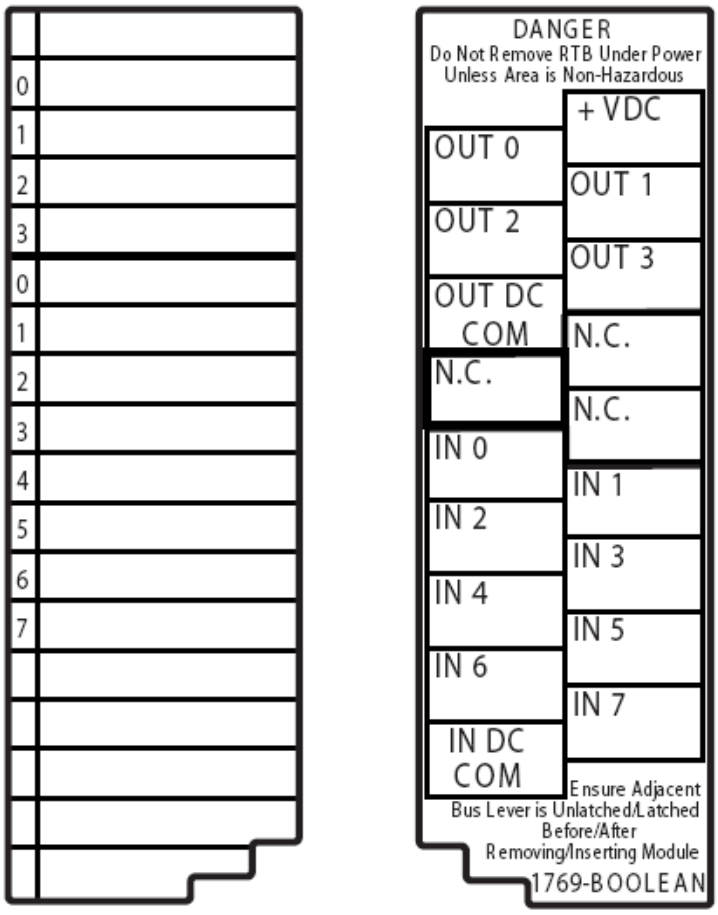
General Guidelines

- Input and output channels are isolated from each other.
- Do not use the module's NC terminals as connection points.

Label the Terminals

A removable, write-on label is provided with the module. Remove the label from the door, mark the identification of each terminal with permanent ink, and slide the label back into the door. Your markings (ID tag) will be visible when the module door is closed.

Terminal Labels



Remove the Finger-safe Terminal Block

When wiring field devices to the module, it is not necessary to remove the terminal block. If you remove the terminal block, use the write-on label on the side of the terminal block to identify the module slot location and type. RTB position can be indicated by circling either the R for right side or L for left side.

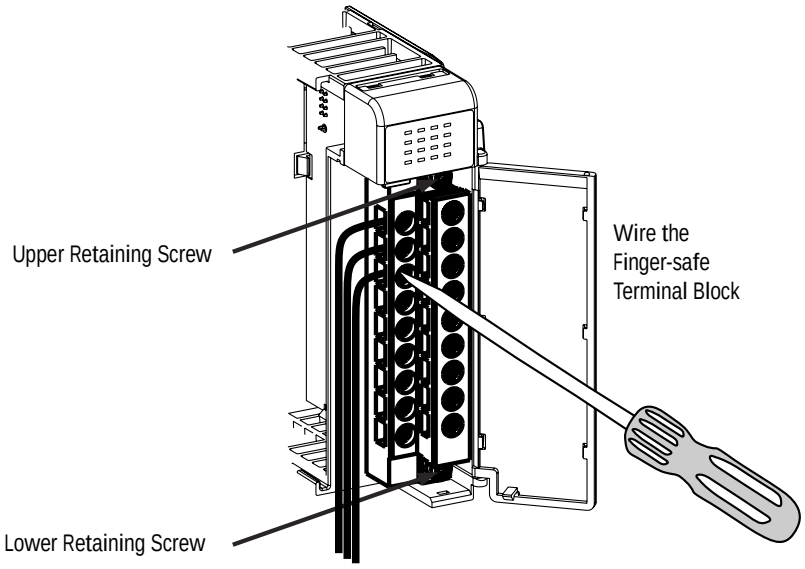
Finger-safe Terminal Block

To remove the terminal block, loosen the upper and lower retaining screws. The terminal block will back away from the module as you remove the screws. When replacing the terminal block, torque the retaining screws to 0.46 Nm (4.1 lb-in).

Wire the Finger-safe Terminal Block

When wiring the terminal block, keep the finger-safe cover in place.

1. Loosen the terminal screws to be wired.
2. Begin wiring at the bottom of the terminal block and move up.



3. Route the wire under the terminal pressure plate.

   You can use the bare wire or a spade lug.
   The terminals accept a 6.35 mm (0.25 in.) spade lug.

TIP The terminal screws are non-captive. Therefore, it is possible to use a ring lug (maximum 1/4 in. o.d. with a 0.139 in. minimum i.d. (M3.5)) with the module.

4. Tighten the terminal screw making sure the pressure plate secures the wire.

   Recommended torque when tightening terminal screws is 0.68 Nm (6 lb-in).

TIP If you need to remove the finger-safe cover, insert a screwdriver into one of the square, wiring holes and gently pry the cover off. If you wire the terminal block with the finger-safe cover removed, you will not be able to put it back on the terminal block because the wires will be in the way.

Wire the Module

ATTENTION

To prevent shock hazard, care should be taken when wiring the module to signal sources. Before wiring any module, disconnect power from the system power supply and from any other source to the module.

After the module is properly installed, follow the wiring procedure below.

1. String about 5 mm (3/16 in.) of insulation away to expose the end of the wire at each end of a signal wire.
2. Connect one end of the signal wire to the terminal block.

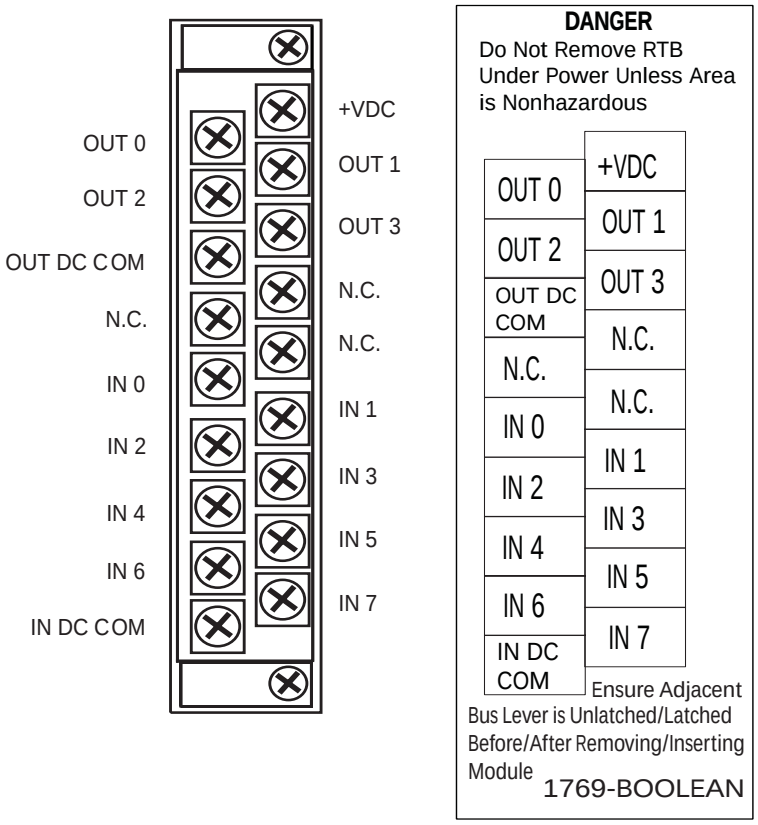
   Refer to Input and Output Wiring on page 39.

3. Connect the other end of the signal wire to the input or output device.
4. Repeat steps 1…3 for each signal wire.

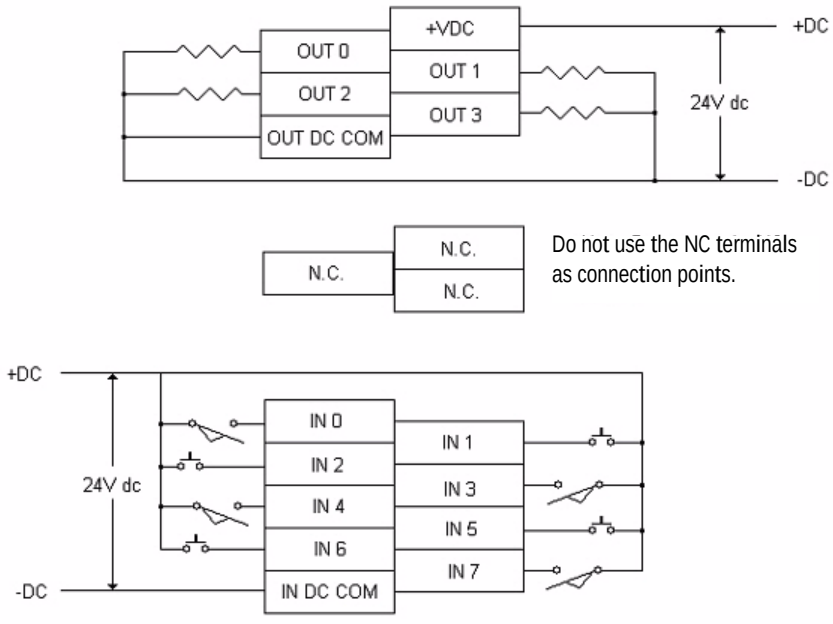
Input and Output Wiring

This illustration describes the 1769-BOOLEAN module terminal layout.

1769-BOOLEAN Module Terminal Layout



Input/Output Wiring



Notes:

Module Data, Status, and Configuration

Overview

This chapter examines the module's data tables and channel configuration words.

Topic	Page
1769-BOOLEAN Module Addressing	42
1769-BOOLEAN Module Input Data File	44
1769-BOOLEAN Module Output Data File	44
1769-BOOLEAN Module Configuration Data File	46

Module Inputs

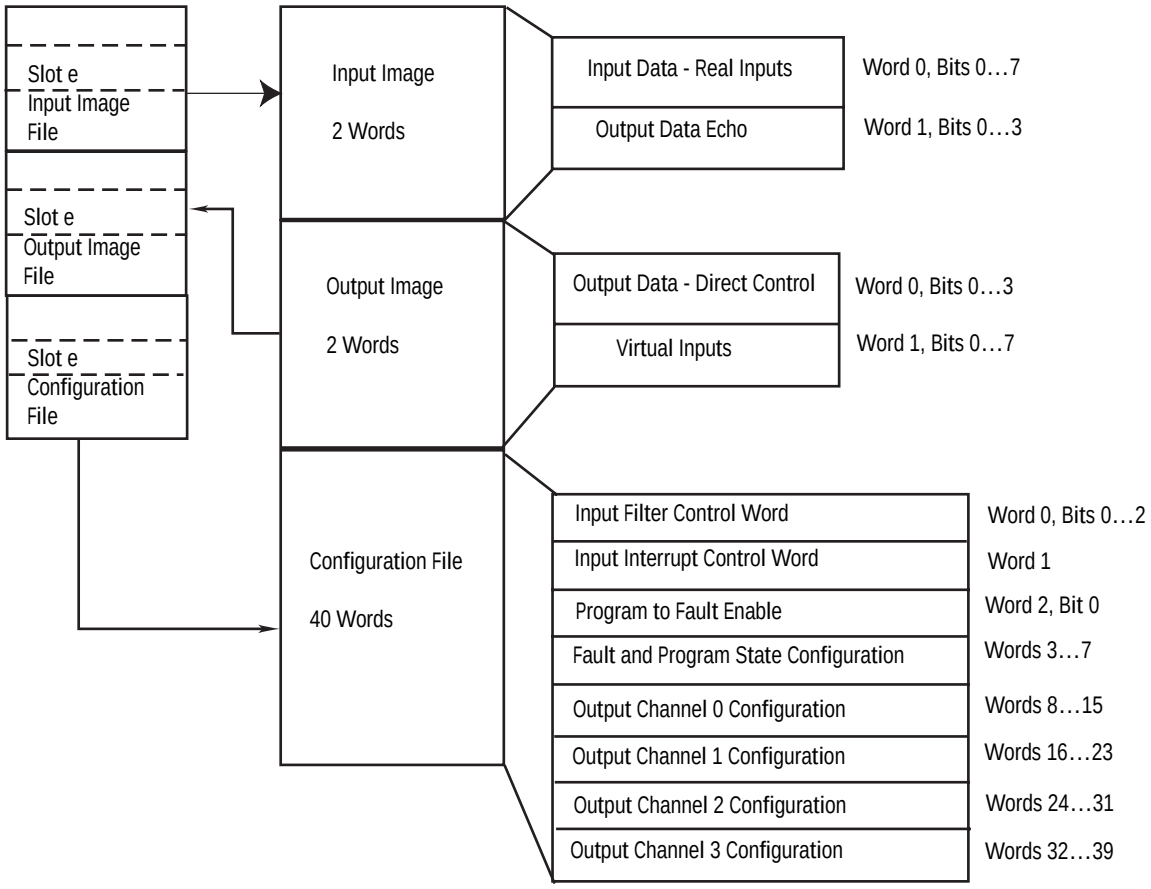
The 1769-BOOLEAN module has eight, single-ended, 24V dc sinking inputs. Sinking describes the current flow between the I/O module and the field device. Sinking input circuits are driven by a current sourcing field device. Field devices supplying the positive (+V) field supply voltage when ON will source current to the 1769-BOOLEAN module inputs.

Module Outputs

The 1769-BOOLEAN module has four, single-ended, 24V dc sourcing outputs. Sourcing describes the current flow between the I/O module and the field device. Sourcing output circuits supply current to sinking field devices when ON. Field devices connected to the dc common of the field supply voltage are sinking field devices.

1769-BOOLEAN Module Addressing

The 1769-BOOLEAN module memory map shows the input, output, and configuration files for the module.



1769-BOOLEAN Module Input Image

The 1769-BOOLEAN module input image file represents real input data states and output state data echo. Input word 0 contains the state of the module's real inputs IN 0 through IN 7 in bits 0...7. Input word 1 contains the directed state of the module's outputs OUT0 through OUT3 in bits 0...3. These output data echo bits indicate the state of the module's output control circuits and do not represent the actual state of the outputs.

TIP You can access information in the input image file using the programming software configuration screen.

1769-BOOLEAN Module Output Image

The 1769-BOOLEAN module output image file represents directed output states in Direct Control mode and virtual input data states. Output word 0 contains the states to which the module's outputs will be set when the outputs are configured for Direct Control mode.

Module outputs OUT0 through OUT3 are set in Direct Control mode using output file word 0 bits 0...3. Output word 1 contains the values of the virtual inputs V0 through V7 in bits 0...7. These virtual inputs can be controlled in the customer's user program and can be used in a module output's Boolean expression when the output is configured for Boolean Control.

TIP You can access information in the output image file using the programming software configuration screen.

1769-BOOLEAN Module Configuration File

The 1769-BOOLEAN module configuration file contains information that you use to define the module's operation.

The configuration file is explained in more detail in 1769-BOOLEAN Module Configuration Data File on page 46.

TIP Not all controllers support program access to the configuration file. Refer to your controller's user manual.

1769-BOOLEAN Module Input Data File

The input data file lets you access module input read data for use in the control program, via word or bit access. The data file structure is shown in the table below. For each module, word 0, bits 0...7 in the input data file contain the values of the real inputs. For each module, word 1, bits 0...3 in the input data file contain the state of the module's output control circuits.

1769-BOOLEAN Module Input Data File

WORD	Bit Position															
	15	14	13	12	1	10	9	8	7	6	5	4	3	2	1	0
0									IN7	IN6	IN5	IN4	IN3	IN2	IN1	IN0
1													03	02	01	00

TIP Shaded bits always must be set to 0.

1769-BOOLEAN Module Output Data File

The output data file lets you access module write data for use in the control program, via word or bit access. The data file structure is shown in the table below.

1769-BOOLEAN Output Data File

		Bit Position															
		15	14	13	12	1	10	9	8	7	6	5	4	3	2	1	0
WORD	0													OUT3	OUT2	OUT1	OUT0
	1									V7	V6	V5	V4	V3	V2	V1	V0

TIP Shaded bits must be set to 0.

Direct Control of Module Outputs

The module's outputs can be directly determined by the control program when the outputs are configured to have Boolean Control disabled.

Refer to Output Control (DB) on page 51, for information on configuring the module's outputs for direct control mode.

When a module output has Boolean Control disabled, the directed state of that output is controlled by the corresponding bit (OUT0 through OUT3) in the output data file. Setting the bit (1) turns the output ON, clearing the bit (0) turns the output OFF.

Virtual Inputs

The control program determines eight virtual inputs. The module's outputs can be controlled by the module itself when the outputs are configured to use Boolean Control mode.

Refer to Output Control (DB) on page 51, for information on configuring the module's outputs for Boolean Control mode.

When a module output is configured for Boolean Control mode, the Boolean expression controlling the output state can be configured to use any of the virtual inputs (V0 through V7) as operands.

Refer to Operands on page 52, for information on configuring Boolean expression operands.

The values of the virtual inputs can be updated by the control program at any time. The most recent values will be used by the module in the Boolean expressions that are controlling the module's outputs. Word 1, bits 0…7 of the output data file are used to control the values of the virtual inputs. Setting a bit (1) assigns a logical value of TRUE, clearing a bit (0) assigns a logical value of FALSE.

1769-BOOLEAN Module Configuration Data File

The configuration file determines how the module will operate. Parameters such as input filtering, output control mode, and Boolean expressions are set up using this file. This data file is readable and writable. The default value of the configuration file is all 0's.

1769-BOOLEAN Module Configuration Data File

	BIT															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0														Input Filter		
1	IT_I7	EI_I7	IT_16	EI_I6	IT_I5	EI_I5	IT_I4	EI_I4	IT_I3	EI_I3	IT_I2	EI_I2	IT_I1	EI_I1	IT_I0	EI_I0
2																PFE
3																
4													Program State			
5													Program Value			
6													Fault State			
7													Fault Value			
8											IT_O0			EI_O0		DB_0
9											Operand A 0					
10											Operand B 0					
11											Operand C 0					
12											Operator_2_0				Operator_1_0	
13							Output Delay 0									
14							Output Duration 0									
15																
16											IT_O1			EI_O1		DB_1
17											Operand A 1					
18											Operand B 1					
19											Operand C 1					
20											Operator_2_1				Operator_1_1	
21							Output Delay 1									
22							Output Duration 1									
23																
24											IT_O2			EI_O2		DB_2
25											Operand A 2					
26											Operand B 2					
27											Operand C 2					
28											Operator_2_1				Operator_2_0	
29							Output Delay 2									
30							Output Duration 2									
31																
32											IT_O3			EI_O3		DB_3
33											Operand A 3					
34											Operand B 3					
35											Operand C 3					
36											Operator_3_1				Operator_3_0	
37							Output Delay 3									
38							Output Duration 3									
39																

IMPORTANT Shaded bits must be set to 0. Default is all data file bits = 0.

The configuration file is typically modified using the programming software configuration screen.

For information on how to configure the module using.

Hardware and Software	See
MicroLogix 1500 and RSLogix 500 software	Appendix B
CompactLogix and RSLogix 5000 software	Appendix C
1769-ADN DeviceNet adapter and RSNetWorx software	Appendix D

The configuration file can also be modified through the control program, if supported by the controller.

Input Filtering

The 8 real inputs on the module are filtered using a common filter setting. Word 0, bits 0…2 are used to select the input filtering level. A 3-bit pattern for the filter time controls the filter setting for the input channels.

Word 0			Filter Time
Bit 2	Bit 1	Bit 0	
0	0	0	8000 µs
0	0	1	0 µs
0	1	0	100 µs
0	1	1	200 µs
1	0	0	500 µs
1	0	1	1000 µs
1	1	0	2000 µs
1	1	1	4000 µs

The default filter setting is 000 binary, selecting 8000 µs.

Input Interrupts

The module will support 8 input interrupts - one each for the 8 real inputs (IN 0 to IN 7). Interrupts are not supported by all controllers. Refer to your controller's user manual to determine if interrupts from expansion I/O modules are supported.

Each real input can have one of 2 types of interrupts selected by the user. An interrupt can be triggered on the following conditions (the interrupt will occur after input filtering delay):

- The input changes state from OFF (0) to ON (1).
- The input changes state from ON (1) to OFF (0).

The type of interrupt is selected for each channel by control of the IT_I bits in word 1 of the configuration data file as follows.

IT_I	Interrupt Event
0	Input change of state OFF (0) → ON (1)
1	Input change of state ON (1) → OFF (0)

The default interrupt event setting is 0:
Input change of state OFF (0) → ON (1).

Each real input's interrupt must be enabled before it will become active. Each real input's interrupt is enabled or disabled using the EI_I bit for each input in word 1 of the configuration data file. Set (1) the EI_I bit for an input to enable the interrupt for that input, clear (0) the EI_I bit to disable the interrupt for that input. The default state for each EI_I bit is 0 (interrupt disabled).

Program to Fault Enable (PFE)

If a system operating in program mode faults, this setting determines whether the program or fault value is applied to the output. Word 2, bit 0 is used to select the program to fault state control mode for the module's outputs. When the bit is cleared (0), the module applies the program value determined by the configuration data file's Program State and Program Value words. When the bit is set (1), the module applies the fault value determined by the configuration data file's Fault State and Fault Value words. The default setting is 0, meaning the module applies the program value to the outputs when the control system transitions from program mode to fault mode.

TIP The MicroLogix 1500 and CompactLogix controllers do not yet support alternate output states. This functionality is currently only supported when the module is used on the DeviceNet network via the 1769-ADN adapter.

Program State

This configuration selection provides the individual selection for the control of the module outputs when the system enters the program mode. Word 3, bits 0…3 are used to select the program state control mode for module outputs OUT0 through OUT3. When any of these bits are cleared (0) and the system enters the program mode, the module holds that output's last state, meaning that the output remains at the last value prior to the condition that caused the control system to enter the program mode.

IMPORTANT Hold last state is the default setting for the 1769-BOOLEAN program state control bits.

When any of these bits are set (1) and the system enters the program mode, it instructs the module to set the outputs to the corresponding user-specified values from the configuration data file's Program Value word.

TIP The MicroLogix 1500 and CompactLogix controllers do not yet support program state control. This functionality is currently only supported when the module is used on the DeviceNet network via the 1769-ADN adapter.

Program Value

Use the Program Value word to set the values for the outputs to assume when the system enters the program mode and the Program State bit for any outputs are set (1). Word 4, bits 0…3 indicate the values to apply to the corresponding module outputs OUT0 through OUT3. A value of 0 in any bit will set the corresponding output to the OFF state when the system enters program mode. A value of 1 in any bit will set the corresponding output to the ON state when the system enters the program mode. The default setting for the Program Value word is 0 for all bits indicating that when applicable, all module outputs should be set to the OFF state.

TIP The MicroLogix 1500 and CompactLogix controllers do not yet support program state control. This functionality is currently only supported when the module is used on the DeviceNet network via the 1769-ADN adapter.

Fault State

This configuration selection provides the individual selection for the control of the module outputs when the system enters the fault mode. Word 5, bits 0…3 are used to select the program state control mode for module outputs OUT0 through OUT3. When any of these bits are cleared (0) and the system enters the fault mode, the module holds that output's last state, meaning that the output remains at the last value prior to the condition that caused the control system to enter the fault mode.

IMPORTANT Hold last state is the default setting for the 1769-BOOLEAN fault state control bits.

When any of these bits are set (1) and the system enters the fault mode, it instructs the module to set the outputs to the corresponding user-specified values from the configuration data file's Fault Value word.

TIP The MicroLogix 1500 and CompactLogix controllers do not yet support fault state control. This functionality is currently only supported when the module is used on the DeviceNet network via the 1769-ADN adapter.

Fault Value

Use the Fault Value word to set the values for the outputs to assume when the system enters the fault mode and the Fault State bits for any outputs are set (1). Word 6, bits 0…3 indicate the values to apply to the corresponding module outputs OUT0 through OUT3. A value of 0 in any bit will set the corresponding output to the OFF state when the system enters fault mode. A value of 1 in any bit will set the corresponding output to the ON state when the system enters the fault mode. The default setting for the Fault Value word is 0 for all bits indicating that when applicable, all module outputs should be set to the OFF state.

TIP The MicroLogix 1500 and CompactLogix controllers do not yet support fault state control. This functionality is currently only supported when the module is used on the DeviceNet network via the 1769-ADN adapter.

Output Control (DB)

The outputs on the 1769-BOOLEAN module can be configured for two modes of control: direct control mode or Boolean Control mode. Each output is independently configured by use of the Disable Boolean (DB) control bits. Word 8, bit 0 determines the output control mode for OUT0. The output control modes for OUT1, OUT2, and OUT3 are determined similarly by bit 0 of words 16, 24, and 32. When an output's DB bit is cleared (0), the output is configured for Boolean Control mode. When an output's DB bit is set (1), the output is configured for direct control mode. The default setting for all DB bits is 0 (Boolean Control mode).

Refer to Control Outputs Using Boolean Expressions on page 15, for details on forming Boolean expressions to control the module's outputs.

Refer to Direct Control of Module Outputs on page 44, for details on controlling the module's outputs directly from the control program.

Output Interrupts

The module will support four output interrupts - one each for the 4 outputs (OUT0 through OUT3). Interrupts are not supported by all controllers. Refer to your controller's user manual to determine if interrupts from expansion I/O modules are supported.

Each output can have one of four types of interrupts selected by the user. An interrupt can be triggered on the following conditions:

- The Boolean expression for the output transitions from FALSE to TRUE.
- The output directed state transitions from OFF to ON.
- The Boolean expression for the output transitions from True to False.
- The output directed state transitions from ON to OFF.

The type of interrupt is selected for OUT0 by configuring the IT_O bits (bits 4 and 5) of word 8. The output interrupt types for OUT1, OUT2, and OUT3 are similarly configured using the IT_O bits of words 16, 24, and 32. The type of interrupt is selected for each output by configuring the IT_O bits as follows.

IT_O		Interrupt Event
Bit 5	Bit 4	
0	0	Boolean expression False → True
0	1	Output directed state OFF → ON
1	0	Boolean expression True → False
1	1	Output directed state ON → OFF

The default value for output interrupt type is 00:
Boolean expression FALSE → TRUE.

Each output's interrupt must be enabled before it will become active. The output interrupt enable for OUT0 is selected by configuring the EI_O bit (bit 2) of word 8. The output interrupt enables for OUT 1, OUT 2, and OUT 3 are similarly configured using the EI_O bits of words 16, 24, and 32. Set (1) the EI_O bit for an output to enable the interrupt for that output, clear (0) the EI_O bit to disable the interrupt for that output. The default state for each EI_O bit is 0 (interrupt disabled).

Operands

The operands that are used in each output's Boolean expression are selected from one of 33 possibilities. Each operand can be configured as: one of the eight real inputs' current state, one of the eight real inputs' current state inverted, one of the eight virtual inputs' (from the output data file) current state, one of the eight virtual inputs' current state inverted, or none (the operand is not used in the Boolean expression).

Each output's Boolean expression operands are configured using three words in the configuration data file. For OUT0, Operand_A, Operand_B, and Operand_C are configured using bits 0-5 of words 9, 10, and 11.

Configure the operands for OUT1 with words 17, 18, and 19; for OUT2 use words 25, 26, and 27; and, for OUT3 use words 33, 34, and 35.

The following table shows the bits patterns to use to configure the operands.

Bits Patterns Used to Configure the Operands

Words 9,10,11, 17,18,19, 25,26,27, 33,34,35						Operand
Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
0	0	0	0	0	0	None
0	0	0	0	0	1	Real Input 0
0	0	0	0	1	0	Inverted Real Input 0
0	0	0	0	1	1	Real Input 1
0	0	0	1	0	0	Inverted Real Input 1
0	0	0	1	0	1	Real Input 2
0	0	0	1	1	0	Inverted Real Input 2
0	0	0	1	1	1	Real Input 3
0	0	1	0	0	0	Inverted Real Input 3
0	0	1	0	0	1	Real Input 4
0	0	1	0	1	0	Inverted Real Input 4
0	0	1	0	1	1	Real Input 5
0	0	1	1	0	0	Inverted Real Input 5
0	0	1	1	0	1	Real Input 6
0	0	1	1	1	0	Inverted Real Input 6
0	0	1	1	1	1	Real Input 7
0	1	0	0	0	0	Inverted Real Input 7
0	1	0	0	0	1	Virtual Input 0
0	1	0	0	1	0	Inverted Virtual Input 0
0	1	0	0	1	1	Virtual Input 1
0	1	0	1	0	0	Inverted Virtual Input 1
0	1	0	1	0	1	Virtual Input 2
0	1	0	1	1	0	Inverted Virtual Input 2
0	1	0	1	1	1	Virtual Input 3
0	1	1	0	0	0	Inverted Virtual Input 3
0	1	1	0	0	1	Virtual Input 4
0	1	1	0	1	0	Inverted Virtual Input 4
0	1	1	0	1	1	Virtual Input 5
0	1	1	1	0	0	Inverted Virtual Input 5
0	1	1	1	0	1	Virtual Input 6
0	1	1	1	1	0	Inverted Virtual Input 6
0	1	1	1	1	1	Virtual Input 7
1	0	0	0	0	0	Inverted Virtual Input 7

The default value for each operand is all 0's which corresponds to an operand selection of None.

Operators

The operators that are used in each output's Boolean expression are selected from one of four possibilities. Each operator can be configured as one of the supported logic functions (AND, OR, or XOR) or can be configured as none (the operator is not used in the Boolean expression).

Each output's Boolean expression operators are configured using one word in the configuration data file. For OUT0, Operator_1 is configured using bits 0 and 1 of word 12 while Operator_2 is configured using bits 4 and 5 of word 12. Configure the operators for OUT1 with word 20; for OUT2 use word 28; and, for OUT3 use word 36. The following tables show the bit patterns to use to configure the operators.

Operator_1 Bit Patterns

Operator_1 Words 12,20,28,36		Operator
Bit 1	Bit 0	
0	0	None
0	1	OR
1	0	AND
1	1	XOR

Operator_2 Bit Patterns

Operator_2 Words 12,20,28,36		Operator
Bit 5	Bit 4	
0	0	None
0	1	OR
1	0	AND
1	1	XOR

The default value for each operator is all 0's, which corresponds to an operator selection of None.

Each operator will perform the corresponding logical operation on the two operands it is between as illustrated in the following truth tables.

OUT = A OR B

A	B	OUT
0	0	0
0	1	1
1	0	1
1	1	1

OUT = A AND B

A	B	OUT
0	0	0
0	1	0
1	0	0
1	1	1

OUT = A XOR B

A	B	OUT
0	0	0
0	1	1
1	0	1
1	1	0

Output Delay

When operating in Boolean Control mode, the module's outputs are directed ON when the Boolean expression for each output is TRUE. The user determines how much time delay the module inserts between the Boolean equation transition from FALSE to TRUE and the time the output is directed ON by the module. An output's delay time can be set in 1 millisecond increments between 0 milliseconds and 1000 milliseconds (1 second).

Each output's delay time is configured using one word in the configuration data file. For OUT0, output delay is configured using bits 0-9 of word 13. Configure the output delay for OUT1 with word 21; for OUT2 use word 29; and, for OUT3 use word 37. The following table shows the bits patterns to use to configure output delay time.

Output Delay Time Bit Patterns

Words 13, 21, 29, 37										Delay Time (ms)
Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	1	0	2
0	0	0	0	0	0	0	0	1	1	3
0	0	0	0	0	0	0	1	0	0	4
•										
•										
•										
1	1	1	1	1	0	0	0	1	1	995
1	1	1	1	1	0	0	1	0	0	996
1	1	1	1	1	0	0	1	0	1	997
1	1	1	1	1	0	0	1	1	0	998
1	1	1	1	1	0	0	1	1	1	999
1	1	1	1	1	0	1	0	0	0	1000

The default delay time is 0 milliseconds.

Refer to Output Delay and Duration Operation on page 18, for additional information on the module's delay time operation.

Output Duration

When operating in Boolean Control mode, the module's outputs are directed ON when the Boolean expression for each output is TRUE. The duration (length of time) the output remains ON can be controlled regardless of how long the Boolean expression remains TRUE. The ON duration time for an output starts when that output's delay time has expired. An output's duration time can be set in 1 millisecond increments between 1 millisecond and 1000 milliseconds (1 second), or, a duration value of 0 can be used to indicate that the output's ON state should match the duration of the Boolean equation's TRUE state.

Each output's duration time is configured using one word in the configuration data file. For OUT0, output duration is configured using bits 0…9 of word 14. Configure the output duration for OUT1 with word 22; for OUT2 use word 30 and, for OUT3 use word 38. The following table shows the bits patterns to use to configure output duration time.

Output Duration Time Bit Patterns

Words 14, 22, 30, 38										Duration Time (ms)
Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
0	0	0	0	0	0	0	0	0	0	(1)**
0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	1	0	2
0	0	0	0	0	0	0	0	1	1	3
0	0	0	0	0	0	0	1	0	0	4

(1) The output remains ON only if the Boolean expression remains TRUE.

•
•
•

1	1	1	1	1	0	0	0	1	1	995
1	1	1	1	1	0	0	1	0	0	996
1	1	1	1	1	0	0	1	0	1	997
1	1	1	1	1	0	0	1	1	0	998
1	1	1	1	1	0	0	1	1	1	999
1	1	1	1	1	0	1	0	0	0	1000

The default duration time setting is 0, no set duration time. The output remains ON only if the Boolean expression remains TRUE.

Refer to Output Delay and Duration Operation on page 18, for additional information on the module's duration time operation.

Notes:

Module Diagnostics and Troubleshooting

Overview

This chapter describes troubleshooting the 1769-BOOLEAN module. This chapter contains information on:

- safety considerations when troubleshooting.
- the module's diagnostic features.
- and module error condition data.

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Safety Considerations

Safety considerations are an important element of proper troubleshooting procedures. Actively thinking about the safety of yourself and others, as well as the condition of your equipment, is of primary importance.

The following sections describe several safety concerns you should be aware of when troubleshooting your control system.

ATTENTION

Never reach into a machine to actuate a switch because unexpected motion can occur and cause injury.

Remove all electrical power at the main power disconnect switches before checking electrical connections or inputs/outputs causing machine motion.

Stand Clear of the Machine

When troubleshooting any system problem, have all personnel remain clear of the machine. The problem could be intermittent, and sudden unexpected machine motion could occur. Have someone ready to operate an emergency stop switch in case it becomes necessary to shut off power to the machine.

Program Alteration

There are several possible causes of alteration to the user program, including extreme environmental conditions, Electromagnetic Interference (EMI), improper grounding, improper wiring connections, and unauthorized tampering. If you suspect a program has been altered, check it against a previously saved program on an EEPROM or UVPROM memory module.

Safety Circuits

Circuits installed on the machine for safety reasons, like over-travel limit switches, stop pushbuttons, and interlocks, should always be hard-wired to the master control relay. These devices must be wired in series so that when any one device opens, the master control relay is de-energized, thereby removing power to the machine. Never alter these circuits to defeat their function. Serious injury or machine damage could result.

Power Cycle Diagnostics

When you cycle power to the module, a series of internal diagnostic tests are performed. These diagnostic tests must be successfully completed or a module error results and is reported to the controller.

Module Error Definition Table

Module errors are expressed in two fields as four-digit Hex format with the most significant digit as don't care and irrelevant. The two fields are Module Error and Extended Error Information.

Module Error Table

Don't Care Bits				Module Error			Extended Error Information								
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	0	0	0	0	0
Hex Digit 4				**Hex Digit 3**			**Hex Digit 2**					**Hex Digit 1**			

Module Error Field

The purpose of the module error field is to classify module errors into three distinct groups, as described in the table below. The type of error determines what kind of information exists in the extended error information field. These types of module errors are typically reported in the controller's I/O status file. Refer to your controller manual for details.

Module Error Types

Error Type	Module Error Field Value Bits 11…09 (Bin)	Description
No Errors	000	No error is present. The extended error field holds no additional information.
Hardware Errors	001	General and specific hardware error codes are specified in the extended error information field.
Configuration Errors	010	Module-specific error codes are indicated in the extended error field. These error codes correspond to options that you can change directly. For example, the input filter selection.

Extended Error Information Field

Check the extended error information field when a non-zero value is present in the module error field. Depending upon the value in the module error field, the extended error information field can contain error codes that are module-specific or common to all 1769 modules.

TIP If no errors are present in the module error field, the extended error information field will be set to zero.

Hardware Errors

General or module specific hardware errors are indicated by module error code 001 (binary).

Configuration Errors

In general, if you set the fields in the configuration file to invalid or unsupported values, the module will generate an error. If this occurs while in RUN mode, the module ignores the invalid configuration, generates an error, and keeps operating with the previous configuration. If you set the field in the configuration file to invalid or unsupported values before entering RUN mode, the module will generate an error and the system will not enter RUN mode until the problem is corrected. Configuration errors are indicated by module error code 010 (binary).

Error Codes

Error codes can help troubleshoot your module.

1769-BOOLEAN Module Extended Error Codes

Error Type	Hex Equivalent (1)	Module Error Code	Extended Error Information Code	Error Description
		Binary	Binary	
No Error	X000	000	0 0000 0000	No Error
General Common Hardware Error	X200	001	0 0000 0000	General hardware error; no additional information
	X201	001	0 0000 0001	Power-up reset state
Hardware Specific Error	X300	001	0 1000 0000	General hardware error
	X301	001	0 1000 0001	Microprocessor hardware error
	X302	001	1 0000 0010	ASIC hardware error
Configuration Error	X400	010	0 0000 0000	General configuration error; no additional information
	X401	010	0 0000 0001	Invalid output interrupt enable, OUT0(3)
	X402	010	0 0000 0010	Invalid output interrupt enable, OUT1(3)
	X403	010	0 0000 0011	Invalid output interrupt enable, OUT2(3)
	X404	010	0 0000 0100	Invalid output interrupt enable, OUT3(3)
	X405	010	0 0000 0101	Invalid Operand_A, OUT0(4)
	X406	010	0 0000 0110	Invalid Operand_A, OUT1(4)
	X407	010	0 0000 0111	Invalid Operand_A, OUT2(4)
	X408	010	0 0000 1000	Invalid Operand_A, OUT3(4)

Error Type	Hex Equivalent (2)	Module Error Code	Extended Error Information Code	Error Description
		Binary	Binary	
	X409	010	0 0000 1001	Invalid Operand_B, OUT 0(4)
	X40A	010	0 0000 1010	Invalid Operand_B, OUT 1(4)
	X40B	010	0 0000 1011	Invalid Operand_B, OUT 2(4)
	X40C	010	0 0000 1100	Invalid Operand_B, OUT 3(4)
	X40D	010	0 0000 1101	Invalid Operand_C OUT 0(4)
	X40E	010	0 0000 1110	Invalid Operand_C, OUT 1(4)
	X40F	010	0 0000 1111	Invalid Operand_C, OUT 2(4)
	X410	010	0 0001 0000	Invalid Operand_C, OUT 3(4)
	X411	010	0 0001 0001	Invalid Boolean expression, OUT 0(5)
	X412	010	0 0001 0010	Invalid Boolean expression, OUT 1(5)
	X413	010	0 0001 0011	Invalid Boolean expression, OUT 2(5)
	X414	010	0 0001 0100	Invalid Boolean expression, OUT 3(5)
	X415	010	0 0001 0101	Invalid Output Delay value, OUT 0(6)
	X416	010	0 0001 0110	Invalid Output Delay value, OUT 1(6)
	X417	010	0 0001 0111	Invalid Output Delay value, OUT 2(6)
	X418	010	0 0001 1000	Invalid Output Delay value, OUT 3(6)
	X419	010	0 0001 1001	Invalid Output Duration value, OUT 0(7)
	X41A	010	0 0001 1010	Invalid Output Duration value, OUT 1(7)
	X41B	010	0 0001 1011	Invalid Output Duration value, OUT 2(7)
	X41C	010	0 0001 1100	Invalid Output Duration value, OUT 3(7)

(1) X represents the Don't Care digit.

(2) X represents the Don't Care digit.

(3) EI_O bit set (1) while DB bit set (1).

(4) Operand value not between 0 and 32 decimal.

(5) Invalid Boolean expression configuration. Refer to Boolean Expression Configuration Restrictions on page 15, for valid Boolean expression configurations.

(6) Output Delay value less than 0 or greater than 1000 decimal.

(7) Output Duration value less than 0 or greater than 1000 decimal.

Module Inhibit Function

CompactLogix controllers support the module inhibit function. See your controller manual for details.

Whenever the 1769-BOOLEAN module is inhibited, the module's output state enters either the program state or the off state and the module's outputs are changed accordingly. The output state entered by the module depends on whether the CompactLogix controller supports alternate output states (refer to your controller manual to determine if alternate output states are supported). CompactLogix controllers that support alternate output states cause the module's outputs to the program state; controllers that do not support alternate output states cause the module's outputs to the off state.

When the 1769-BOOLEAN module is inhibited, the module continues to provide information about changes at its inputs to the CompactLogix controller.

Contacting Rockwell Automation

If you need to contact Rockwell Automation for assistance, please have a clear statement of the problem, including a description of what the system is actually doing, available when you call. Create a list of the following:

- LED states
- Input and output image words for the module
- Remedies you have already tried
- Controller type and firmware number (see the label on the controller)
- Hardware types in the system, including all I/O modules
- Fault code, if the controller is faulted

1769-BOOLEAN Module Specifications

Compact Combination 24V dc Sink Input/Source Output BOOLEAN Control Module - 1769-BOOLEAN General Specifications

Attribute	Value
Closed Loop Time (Digital Filter = 0)	Output on-state current ≥ 5 mA: 100 µs max Output on-state current < 5 mA: 150 µs max
Bus Current Draw, Max	220 mA at 5V dc
Heat Dissipation	3.55 Total Watts (The Watts per point, plus the minimum Watts, with all points energized.)
Power Supply Distance Rating	8 (The module may not be more than 8 modules away from the power supply or controller.)
Isolated Groups	Group 1: inputs 0…7 Group 2: outputs 0…3
Input Point to Output Point Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 s or 1697V dc for 1 s 75V dc working voltage (IEC Class 2 reinforced insulation)
Vendor I.D. Code	1
Product Type Code	109
Product Code	37
Dimensions, HxDxW, Approx.	118 mm x 87 mm x 35 mm (4.65 in. x 3.43 in. x 1.38 in.) Height including mounting tabs is 138 mm (5.43 in.)
Approximate Shipping Weight (with Carton)	282 g (0.625 lb)

Input Specifications

Attribute	Value
Voltage Category	24V dc (sink[1])
Operating Voltage Range	10…30V dc @ 30 °C (86 °F) 10…26.4V dc @ 60 °C (140 °F)
Number of Inputs	8 real 8 virtual
Digital Filter	OFF to ON: 0 s, 100 µs, 200 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms ON to OFF: 0 s, 100 µs, 200 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms
Hardware Delay, Max	OFF to ON: 10 µs ON to OFF: 10 µs
Off-state Voltage, Max	5V dc
Off-state Current, Max	1.5 mA
On-state Voltage, Min	10V dc
On-state Current, Min	2.0 mA
Inrush Current, Max	250 mA

Attribute	Value
Nominal Impedance	2.0 kohm @ 24V dc 2.3 kohm @ 30V dc
IEC Input Compatibility	Type 3
Input Point to Bus (CompactBus) Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 s or 1697V dc for 1 s 75V dc working voltage (IEC Class 2 reinforced insulation)

(1) Sinking Input - Sink describes the current flow between the I/O module and the field device. Sinking I/O circuits are driven by a current sourcing field device. Field devices connected to the positive side (+V) of the field supply are sourcing field devices. **Europe:** DC sinking input and sourcing output module circuits are the commonly used options.

Output Specifications

Attribute	Value
Voltage Category	24V dc
Operating Voltage Range	20.4…26.4V dc (source[3])
Number of Outputs	4
Signal Delay, Max (resistive load)	Turn-on: 10 µs, output on-state current ≥ 5 mA Turn-off: 10 µs, output on-state current ≥ 5 mA
Off-state Leakage, Max[1]	1.0 mA @ 26.4V dc
On-state Current, Min	1.0 mA
On-state Voltage Drop, Max	1.0V dc @ 1.0 A
Continuous Current per Point, Max	0.5 A @ 60 °C (140 °F) 1.0 A @ 30 °C (86 °F) Refer to Temperature Derating.
Surge Current, Max[2]	2.0 A (Repeatability is once every 2 s for a duration of 10 ms.)
Output Point to Bus (CompactBus) Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 s or 1697V dc for 1 s 75V dc working voltage (IEC Class 2 reinforced insulation)

(1) Typical Loading Resistor - To limit the effects of leakage current through solid state outputs, a loading resistor can be connected in parallel with your load. Use a 5.6 kohm, 1/2 W resistor for transistor outputs, 24V dc operation.

(2) Recommended Surge Suppression - Use a 1N4004 diode reverse-wired across the load for transistor outputs switching 24V dc inductive loads. For additional details, Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1.

(3) Sourcing Output - Source describes the current flow between the I/O module and the field device. Sourcing output circuits supply source current to sinking field devices. Field devices connected to the negative side (dc common) of the field power supply are sinking field devices. **Europe:** DC sinking input and sourcing output module circuits are the commonly used options.

Environmental Specifications

Attribute	Value
Storage Temperature	-40…85 °C (-40…185°F)
Operating Temperature	0…60 °C (32…140 °F)
Operating Humidity	5…95% noncondensing
Operating Altitude	2000 m (6561 ft)
Vibration, Operating	10…500 Hz, 5 g, 0.030 in. max peak-to-peak
Shock, Operating	30 g panel mounted (20 g DIN-rail mounted)
Shock, Nonoperating	40 g panel mounted (30 g DIN-rail mounted)
Radiated and Conducted Emissions	EN50081-2 Class A
Electrical /EMC	The module has passed testing at the following levels.
ESD Immunity (IEC1000-4-2)	4 kV contact, 8 kV air, 4 kV indirect
Radiated Immunity (IEC1000-4-3)	10V/m, 80…1000 MHz, 80% amplitude
Fast Transient Burst (IEC1000-4-4)	2 kV, 5 kHz
Surge Immunity (IEC1000-4-5)	2 kV common mode, 1 kV differential mode
Conducted Immunity (IEC1000-4-6)	10V, 0.15…80 MHz[1]

(1) Conducted Immunity frequency range may be 150 kHz…30 MHz if the radiated immunity frequency range is 30…1000 MHz.

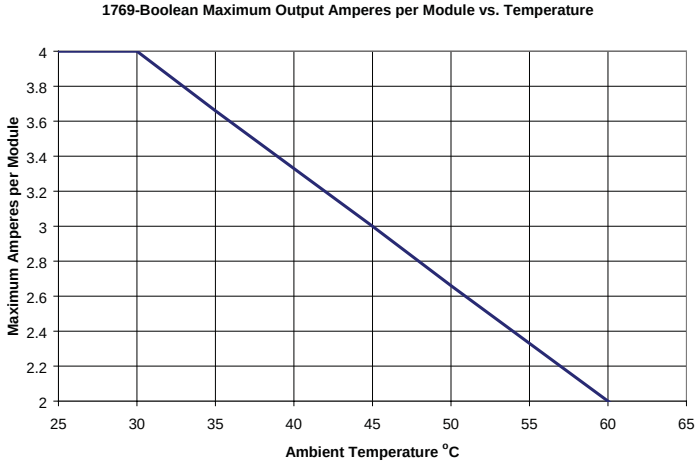
Certifications

Certification	Value
Agency Certification C-UL UL CE	 Under CSA C22.2 No. 142 508 listed Compliant for all applicable directives
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)

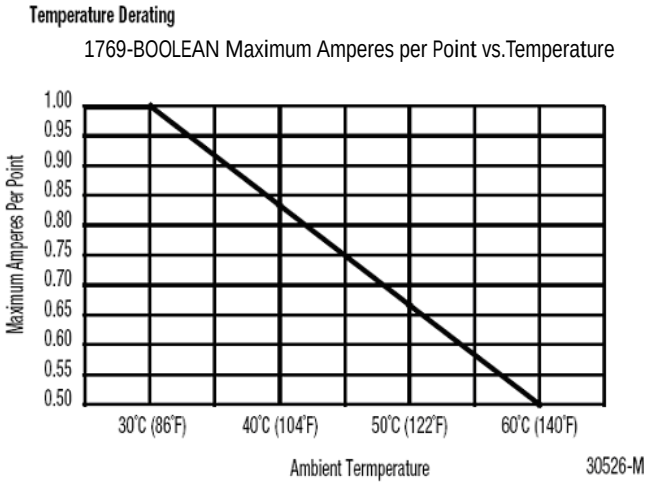
Temperature Derating

The area within the curve represents the safe operating range for the module under various conditions of user-supplied voltages and ambient temperatures.

1769-BOOLEAN Module Maximum Output Amperes per Module vs. Temperature



1769-BOOLEAN Module Maximum Output Amperes per Point vs. Temperature



Transistor Output Transient Pulses

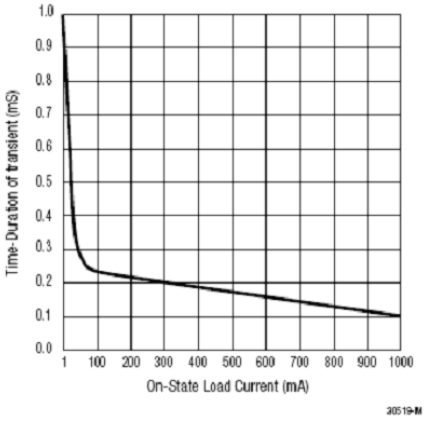
The maximum duration of the transient pulse occurs when minimum load is connected to the output. However, for most applications, the energy of the transient pulse is not sufficient to energize the load.

ATTENTION

A transient pulse occurs in transistor outputs when the external dc supply voltage is applied to the output common terminals, for example, via the master control relay. The sudden application of voltage creates this transient pulse. This condition is inherent in transistor outputs and is common to solid-state devices. A transient pulse can occur regardless of the controller having power. Refer to your controller's user manual to reduce inadvertent operation.

The figure below illustrates that the duration of the transient is inversely proportional to the load current. Therefore, as the on-state load current increases, the transient pulse duration decreases. Transients when you cycle power do not exceed the time duration shown for the amount of loading indicated at 60 °C (140 °F).

Transient Pulse Duration as a Function of Load Current



Notes:

Module Addressing and Configuration with MicroLogix 1500

Overview

This appendix examines the 1769-BOOLEAN module's addressing scheme and describes module configuration using MicroLogix 1500 and RSLogix 500 software.

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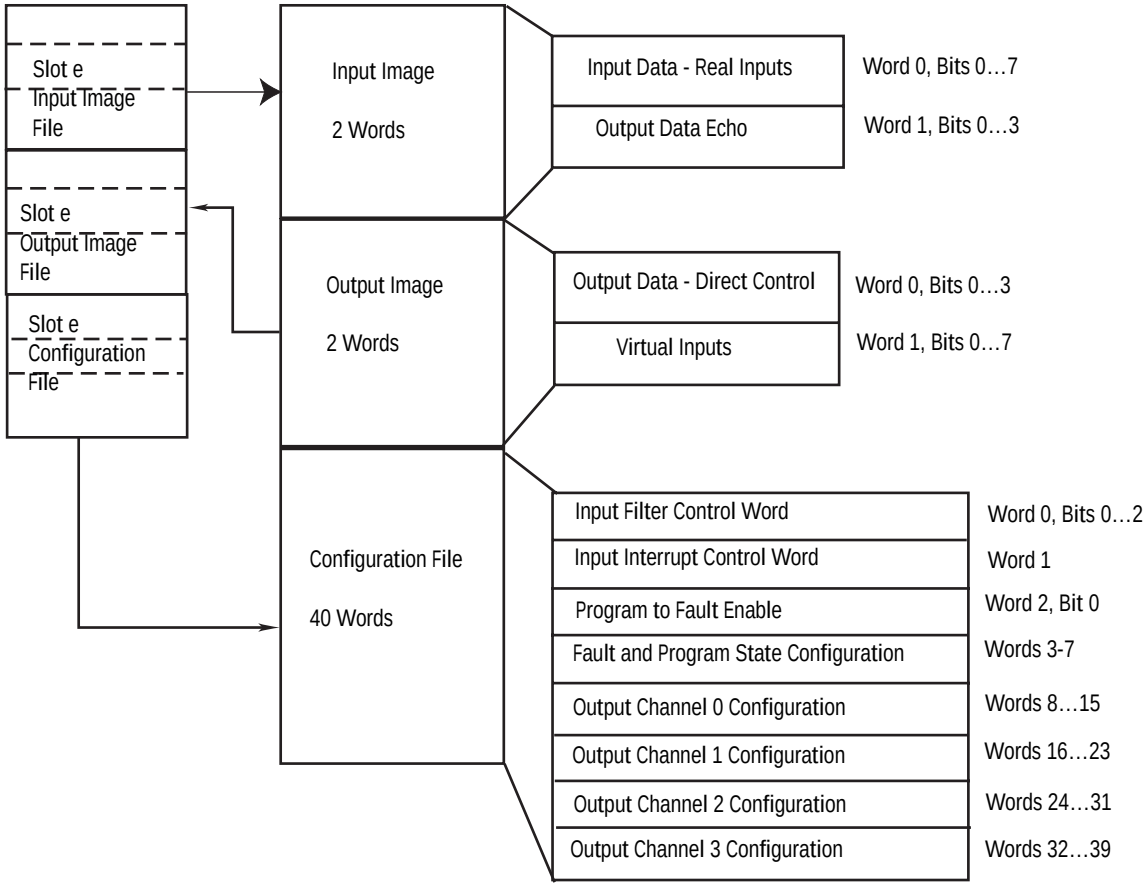
Configure the 1769-BOOLEAN Module in a MicroLogix 1500 System	76

Module Addressing

This example shows the 1769-BOOLEAN module memory map.

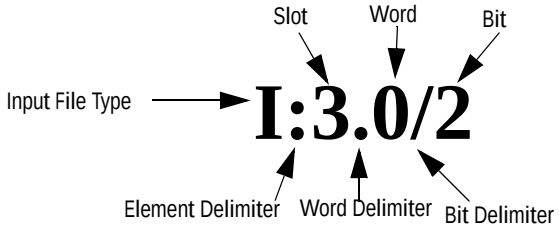
1769-BOOLEAN Module Memory Map

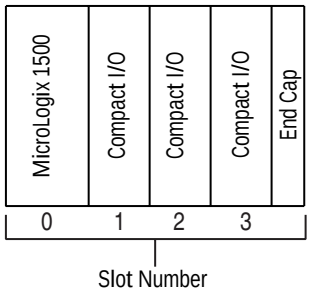


Input Image

The module's input image file represents input states and output data echo states. Input word 0 holds the input data that represents the value of inputs IN0 to IN7. Input word 1 represents the directed state of the module's outputs OUT0 through OUT3.

For example, to obtain the state of input IN2 of the module when it is in slot 3, use address I:3.0/2.



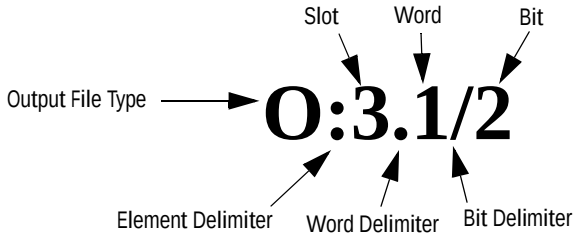


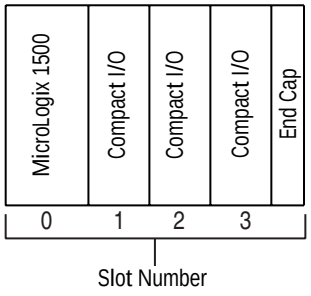
TIP The end cap does not use a slot address.

Output Image

The module's output image file represents directed output states and virtual input states. Output word 0 holds the directed states for the module's outputs (OUT0 through OUT3) when any of the outputs are configured for direct control mode. Output word 1 holds the states of the module's virtual inputs (V0 through V7) can be used as Boolean operands when any of the module's outputs are configured for Boolean Control mode.

For example, to set the state of virtual input V2 of a module when it is in slot 3, use address O:3.1/2.





TIP The end cap does not use a slot address.

Configuration File

The configuration file contains information that you use to define how the module operates.

Refer to Module Data, Status, and Configuration on page 41, for more configuration information.

The configuration file is modified using the programming software configuration screen.

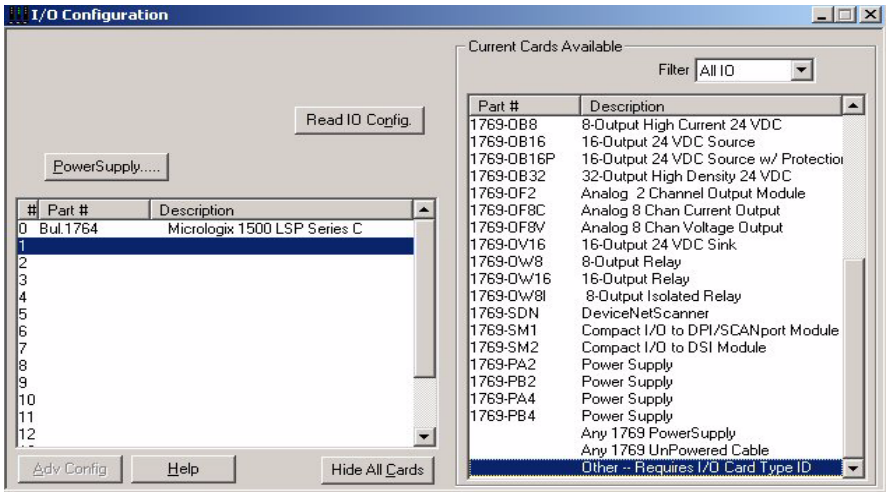
Refer to Configure the 1769-BOOLEAN Module in a MicroLogix 1500 System on page 76 for an example of module configuration using RSLogix 500 software.

Configure the 1769-BOOLEAN Module in a MicroLogix 1500 System

This example takes you through configuring your 1769-BOOLEAN module with RSLogix 500 programming software. This application example assumes your module is installed as expansion I/O in a MicroLogix 1500 system that RSLinx software is properly configured, and a communications link has been established between the MicroLogix controller and RSLogix 500 software.

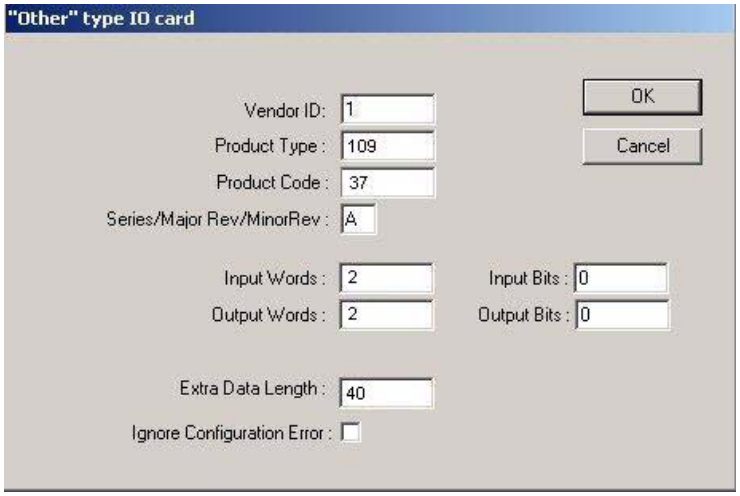
If you have RSLogix 500, follow this procedure to configure your module.

1. From the list, choose Other:Requires I/O Card Type ID.



2. Enter the appropriate values as listed below and click OK.

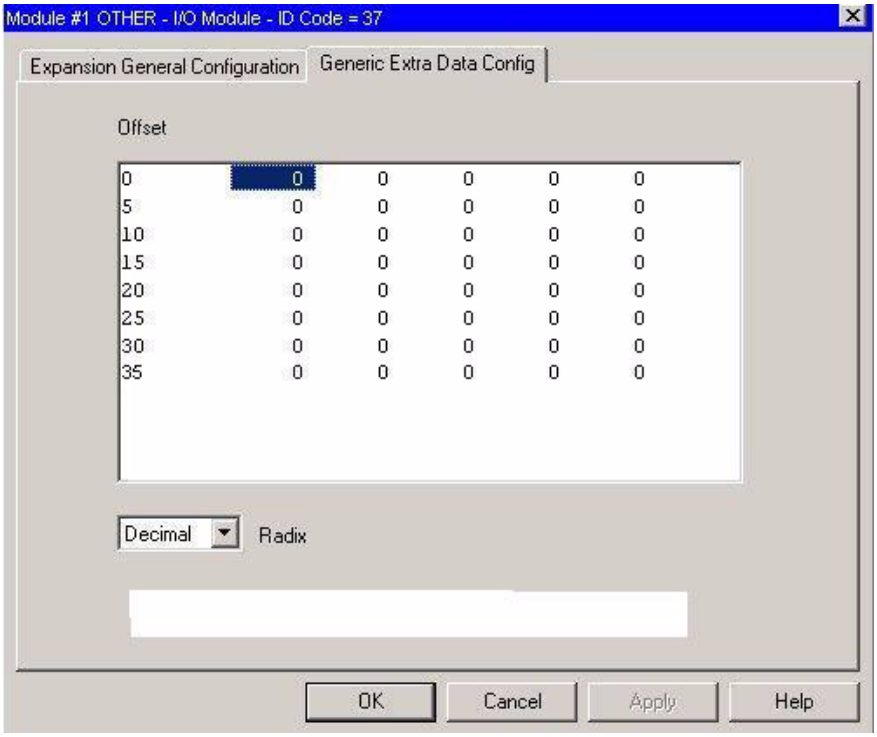
Vendor ID = 1
Product Type = 109
Product Code = 37
Series/Major Rev/Minor Rev = A
Input Words = 2
Input Bits = 0
Output Words = 2
Output Bits = 0
Extra Data Length = 40



3. Click the Generic Extra Data Config tab.

4. Enter your configuration data.

   Refer to 1769-BOOLEAN Module Configuration Data File on page 46 for more information on configuration data word and bit assignments.



5. Click OK.

Notes:

Configuration Using the RSLogix 5000 Generic Profile for CompactLogix Controllers

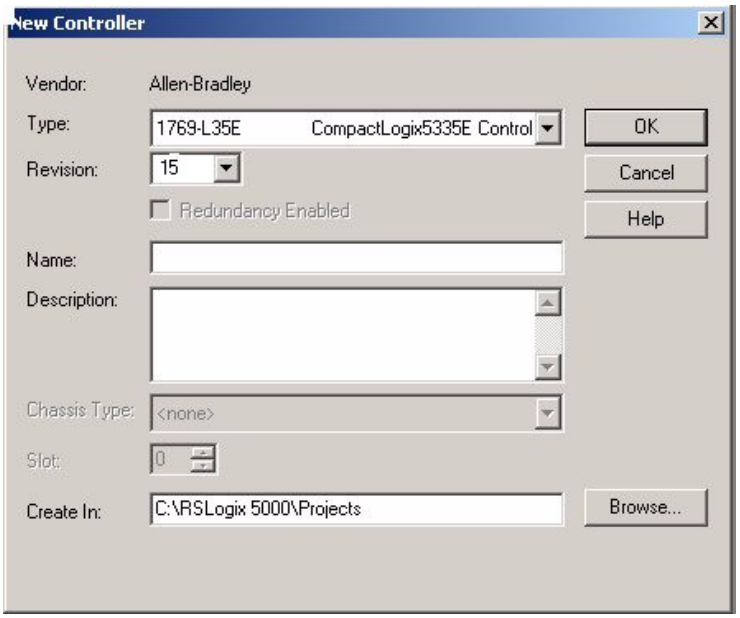
Overview

This appendix describes how to configure the 1769-BOOLEAN module for a CompactLogix controller.

Configure the Module

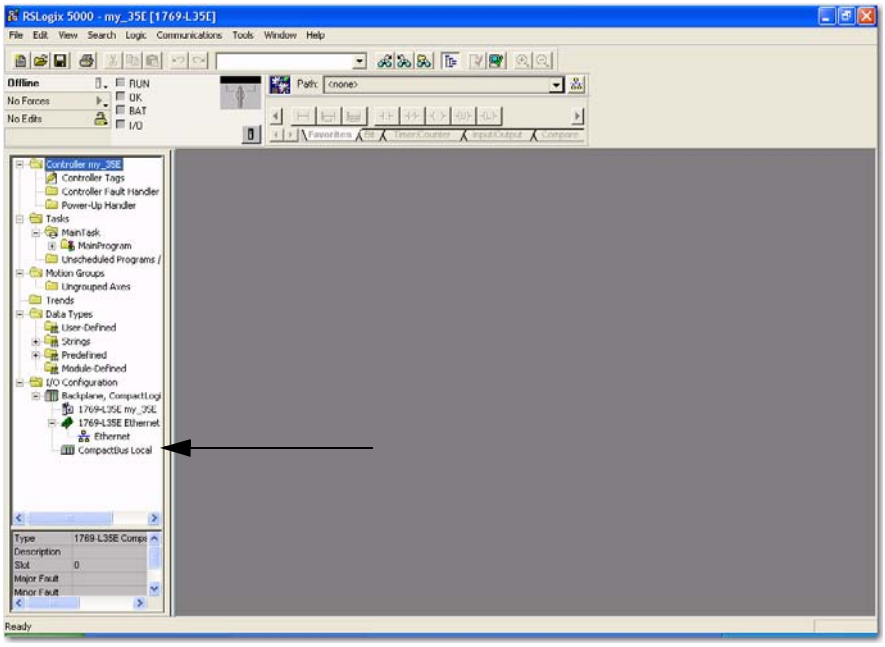
To configure a 1769-BOOLEAN module for a CompactLogix controller in RSLogix 5000 software using the Generic Profile, you must first begin a new project in RSLogix 5000 software.

1. Click the new project icon or on the FILE pull-down menu and select New.



2. Choose your controller type.
3. Enter a name for your project.
4. Click OK.

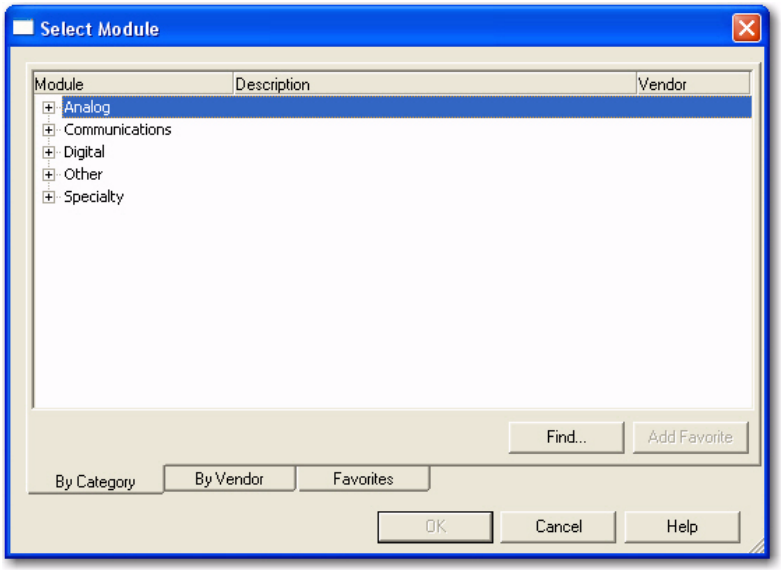
The main RSLogix 5000 screen appears.



The last entry in the controller organizer on the left of the screen is a line labeled [0] CompactBus Local.

5. Right-click this line and select New Module.

The Select Module screen appears.

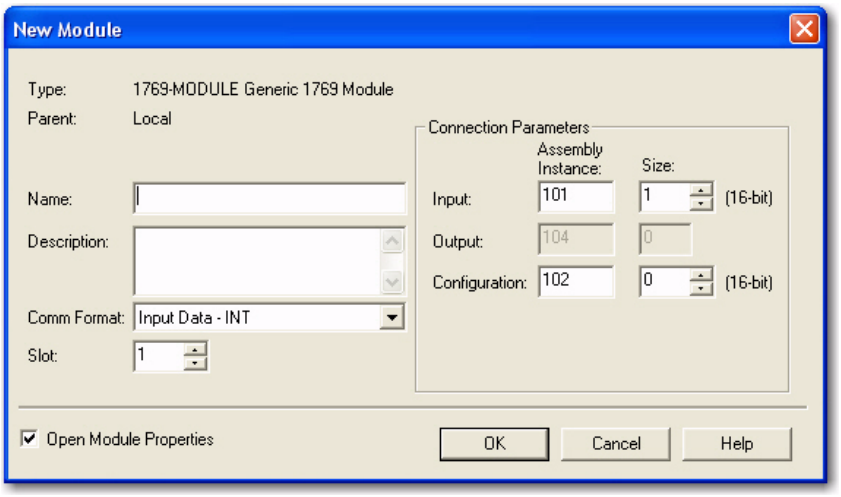


This screen narrows your search for I/O modules to configure into your system.

6. Expand the + next to Other to use the 1769 generic selection for the 1769-BOOLEAN module.

7. Click OK.

   The New Module default Generic Profile screen appears.



   This is the default Generic Profile screen.

8. (optional) Fill in the Generic Profile screen name.

   This helps to easily identify the module type configured on your local Compact Bus. The Description field is optional and may be used to provide more details concerning this I/O module in your application.

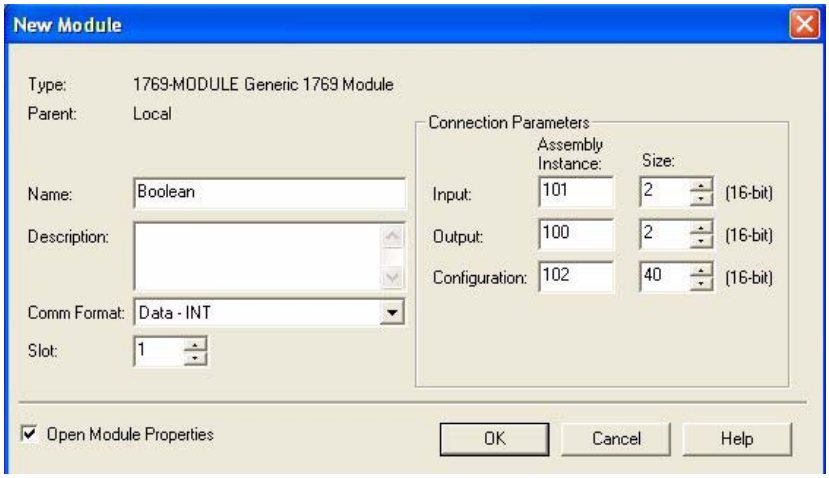
   The next parameter to configure is the Comm Format.

9. Click the down arrow for the Comm Format parameter menu list and select Data - INT.

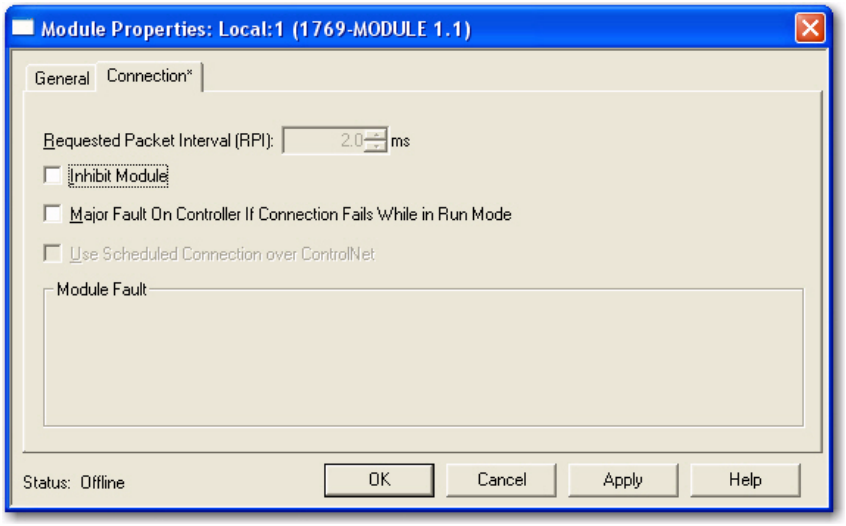
10. Select the slot number.

    The slot number begins with the first available slot number, 1, and increments automatically for each subsequent Generic Profile you configure.

11. Enter the Comm Format, Assembly Instance numbers and their associated sizes into the Generic Profile and click OK.



The Module Properties screen appears.



12. (optional) Check the Inhibit Module checkbox.

    The default for this parameter is not to inhibit the module.

13. (optional) Check the Major Fault on Controller checkbox.

    The default for this parameter is not to fault the controller should an I/O module connection fail.

TIP Refer to the Help screens in RSLogix 5000 software, under Connection Tab Overview for a complete explanation of these features.

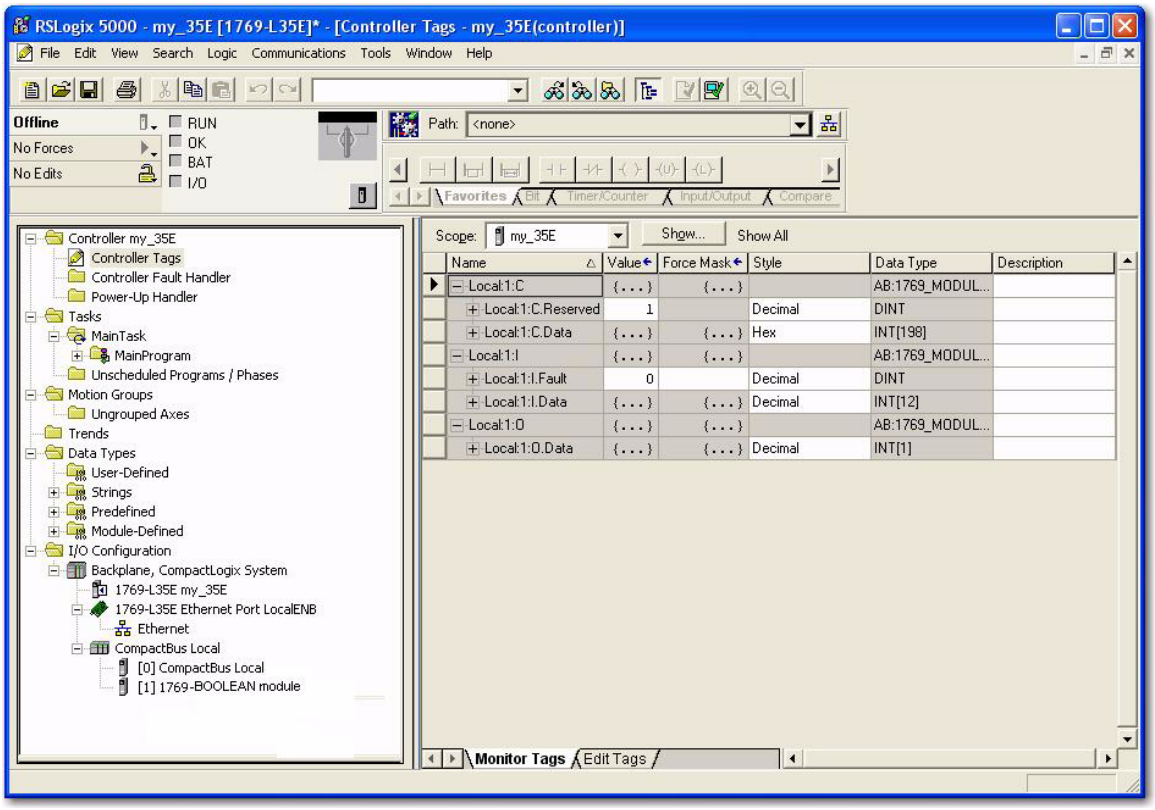
14. Click OK to complete the configuration of your 1769-BOOLEAN module.

Configure I/O Modules

Once you have created generic profiles for each 1769-BOOLEAN module in your system, you must then enter configuration information into the Tag database that has been automatically created from the generic profile information you entered for each of these modules. This configuration information is downloaded to each module at program download, going to run, and at power cycle.

This section shows you how and where to enter configuration data for each 1769-BOOLEAN module once you have created a generic profile. You must first enter the Controller Tag database, by double-clicking Controller Tags in the upper portion of the controller organizer. The following example demonstrates entering configuration data for the 1769-BOOLEAN module.

For demonstration purposes, generic profiles have been created for the modules. The Controller Tags screen looks like the following.



Tag addresses are automatically created for configured I/O modules. All local I/O addresses are preceded by the word Local. These addresses have the following format:

- Input Data: Local:s.I
- Output Data: Local:s.O
- Configuration Data: Local:s.C

  where **s** is the slot number assigned the I/O modules in the Generic Profiles.

To configure an I/O module, you must open up the configuration tag for that module by clicking on the plus sign to the left of its configuration tag in the tag database.

Configure the Module

Follow these instructions to configure the 1769-BOOLEAN module in slot 1.

1. Click on the plus sign left of Local:1.C.

   Configuration data is entered under the Local:1.C.Data tag.

2. Click the plus sign to the left of Local:1.C.Data to reveal the 40 integer data words where configuration data may be entered for the 1769-BOOLEAN module.

   Refer to The 1769-BOOLEAN Module Configuration Data File on page 46 for more information on configuration data word and bit assignments.

Configure Modules in a Remote DeviceNet System with a 1769-ADN DeviceNet Adapter

Overview

In this example, the 1769-BOOLEAN module is in a remote DeviceNet system controlled by a 1769-ADN DeviceNet adapter. RSNetWorx for DeviceNet software, version 2.23 or later, is used to configure the network and the I/O modules.

Topic	Page
Configuration Method	85
Add the DeviceNet Adapter to the Scanlist	86
Configure the 1769-BOOLEAN Module Example	88

Configuration Method

The configuration method described here must be done prior to configuring the DeviceNet adapter in the DeviceNet scanner's scanlist. This applies if you are configuring an I/O module offline, then downloading to the adapter, or if you do the configuration online. After the adapter is placed in the scanner's scanlist, you can only configure or re-configure the I/O module using explicit messages or by removing the adapter from the scanner's scanlist, modifying the configuration of the I/O module, and then adding the adapter back into the scanner's scanlist.

For additional information on configuring DeviceNet scanners and adapters, the documentation for those products. The DeviceNet Adapter User Manual, publication 1769-UM001, contains examples on modifying I/O module configurations with explicit messages while the system is running.

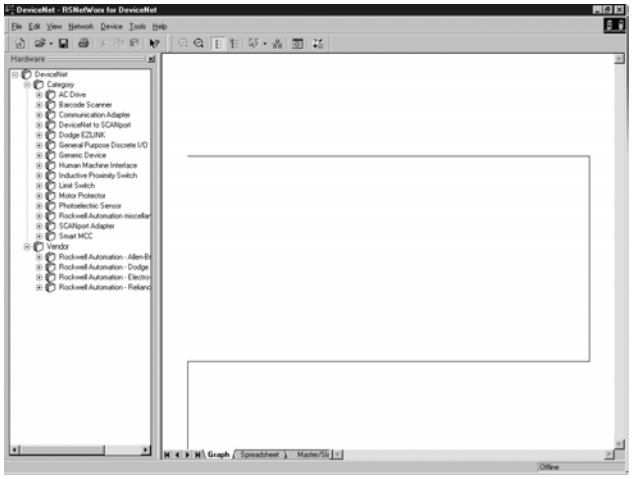
IMPORTANT You must use a Series B 1769-ADN adapter with the 1769-BOOLEAN module.

TIP After setting up each slot, be sure to choose Apply.

Add the DeviceNet Adapter to the Scanlist

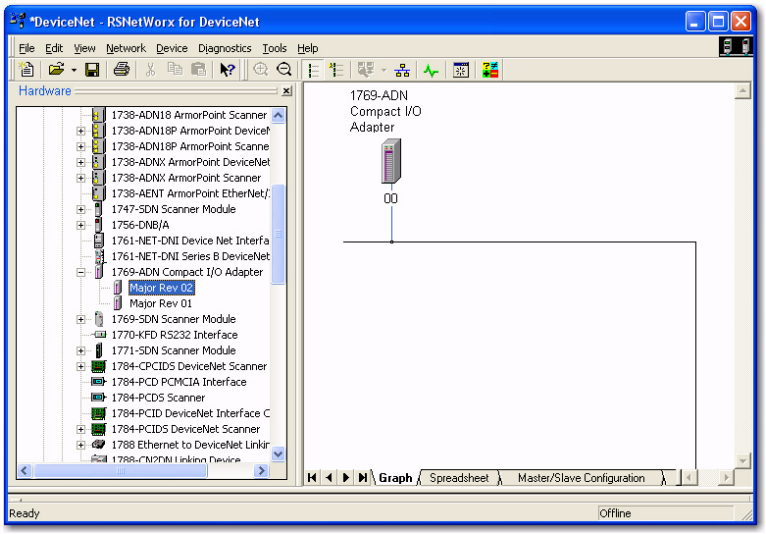
In this part of the example, the 1769-ADN adapter is added to the DeviceNet scanner's scanlist.

1. Start the RSNetWorx for DeviceNet software.



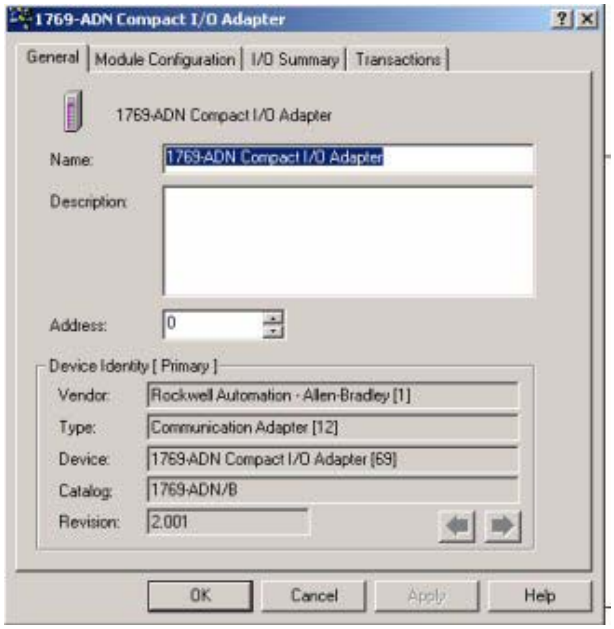
2. In the left column under Category, click the + sign next to Communication Adapters.

3. In the list of products, double-click the 1769-ADN to place it on the network.

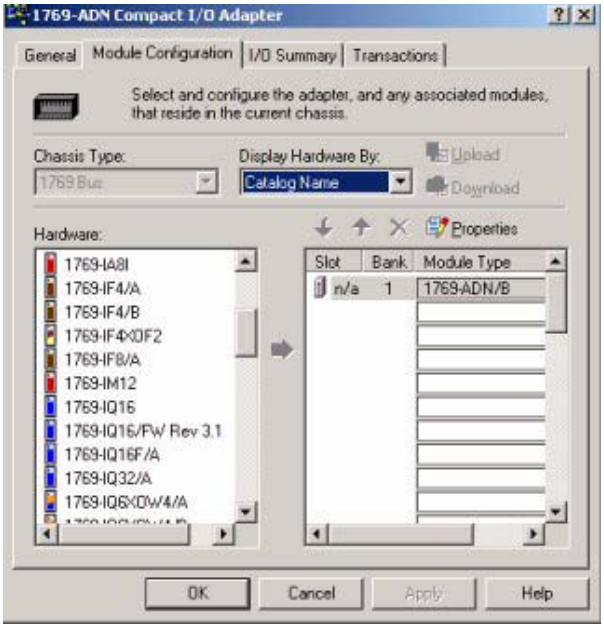


TIP If 1769-ADN is not an option, you have an earlier version of RSNetWorx for DeviceNet software.

4. To configure I/O for the adapter, double-click the adapter icon that appears on the network.



5. Click the Module Configuration tab.



TIP

The I/O Summary tab provides the configured size and format of the I/O data.

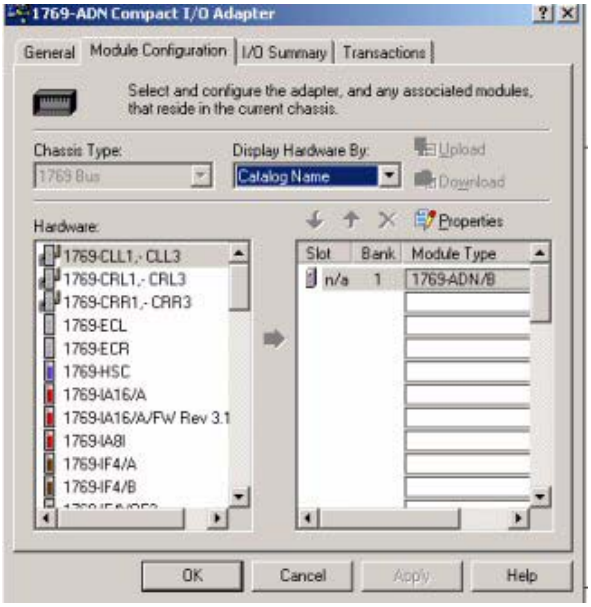
The Transaction tab lets you send services supported by the device. The Clear/Reset Memory transaction returns the module's configuration to the factory defaults, that is, empty. This operation cannot be undone.

Configure the 1769-BOOLEAN Module Example

The 1769-ADN adapter appears in slot 0. Your I/O modules, power supplies, end caps, and interconnect cables must be entered in the proper order, following the 1769 I/O rules contained in the DeviceNet Adapter User Manual, publication 1769-UM001. To simplify this example, we placed the module in slot 1 to show how it is configured.

1. To place the 1769-BOOLEAN module into slot 1, click Module Configuration.

   A list of all possible 1769 products appears.

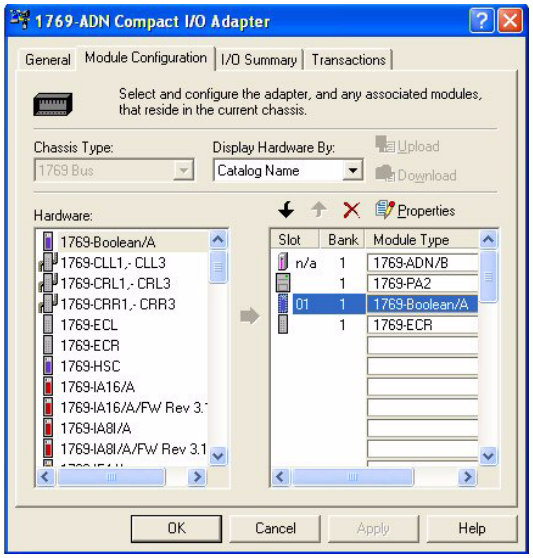


2. Select the 1769-BOOLEAN/A module from the Hardware tree on the left and click the arrow to move it to the right.

   Slot 1 appears to the right of the module.

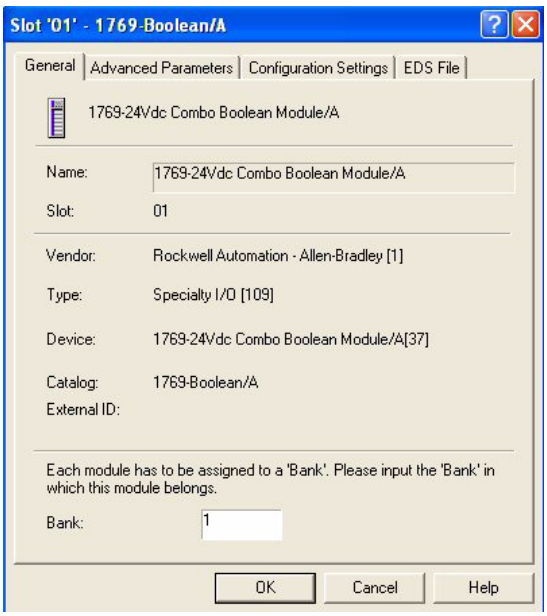
TIP If the 1769-BOOLEAN module does not appear in the hardware tree, use the EDS wizard for adding the EDS file.

3. Double-click on the module.

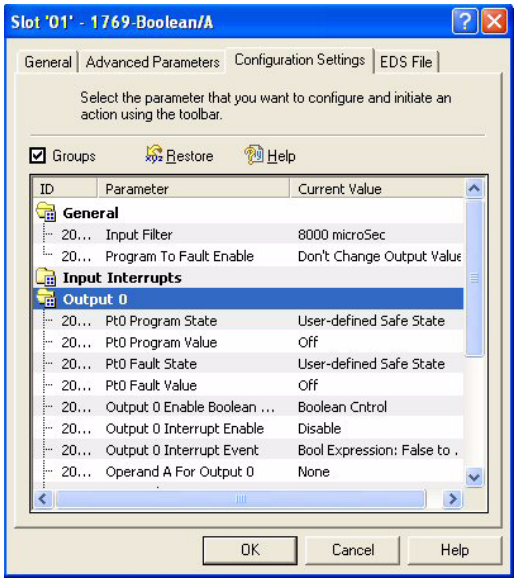


4. Under the General tab, select the appropriate bank.

   Bank 1 was selected in this example.



5. Under the Configuration Settings tab, you can select the parameter that you want to configure and initiate an action using the toolbar.



6. Set each parameter's current value to match the desired 1769-BOOLEAN module configuration settings.

7. Click OK or Cancel to exit this screen and return to the Configuration screen.

   The revision number for the 1769-BOOLEAN module is one. With this setting, you may leave the electronic keying to Exact Match. It is not recommended to disable keying, but if you are not sure of the exact revision of your module, selecting Compatible Module allows your system to operate, while still requiring a 1769-BOOLEAN module in slot 1.

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