



# TTL Input Module

## Cat. No. 1771-IGD

### Installation Instructions

#### To The Installer

This document provides information on:

- important pre-installation considerations
- power supply requirements
- initial handling
- installing the module
- using the indicators for troubleshooting
- replacing the fuse
- module specifications

#### Pre-installation Considerations

You can use this module in a Series A or B 1771-A1B, -A2B, -A3B, -A3B1, and -A4B chassis. The module is also compatible in a 1771-AM1 or -AM2 I/O chassis.

You can use any TTL device that meets the output logic level specification of -0.2V dc to +0.8V dc (low), and 2.0V dc to 5.25V dc (high).

This module contains input filtering to limit the effects of voltage transients caused by contact bounce and/or radiated electrical noise. The delay due to filtering is less than 1ms.

For maximum noise immunity, the output of the TTL device should have a pull-up resistor of 1k ohm (typical). Add an external pull-up resistor to the output terminals of the device, if necessary. If you add a pull-up resistor, be sure the TTL device maintains the low state requirement of -0.2V dc to +0.8V dc with the increased load.

#### Power Requirements

The TTL module requires power from two sources: the I/O chassis backplane, and a +5V dc power supply that you provide for transmission of TTL signals.

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### Backplane

The TTL module receives its power through the 1771 I/O chassis backplane from the chassis power supply. The module requires 130mA from the output of this supply. Add this to the requirements of all other modules in the I/O chassis to prevent overloading the chassis backplane and/or backplane power supply.

### Customer Supply

You must provide a separate  $+5(\pm 0.25)V$  dc power supply for the TTL inputs of the module and for your TTL output devices. Your module requires 380mA from the output of your supply. Ripple should not exceed 50mV peak to peak.

## Initial Handling

The TTL input module is shipped in a static-shielded bag to guard against electrostatic discharge damage. Observe the following precautions when handling the module.

### Electrostatic Discharge Damage



**ATTENTION:** Under some conditions, electrostatic discharge can degrade performance or damage the module. Observe the following precautions to guard against electrostatic damage.

- Wear an approved wrist strap grounding device, or touch a grounded object to discharge yourself before handling the module.
- Do not touch the backplane connector or connector pins.
- If you configure or replace internal components, do not touch other circuit components inside the module. If available, use a static-free work station.
- When not in use, keep the module in its static-shielded bag.

## Installing Your Module

In this section, we tell you how to set the logic level jumper, key your I/O chassis, install your module and make your wiring connections.

### Selecting the Logic Level

Your module is preset to the positive-logic level. Use the following table to choose between the two logic levels:

If you choose:	Then:	Jumper Position
HIGH = TRUE logic (positive)	2.0 to 5.25V dc corresponds to logic "1" (on)	Toward rear of module
LOW = TRUE logic (negative)	-0.2 to 0.8V dc corresponds to logic "1" (on)	Toward front of module

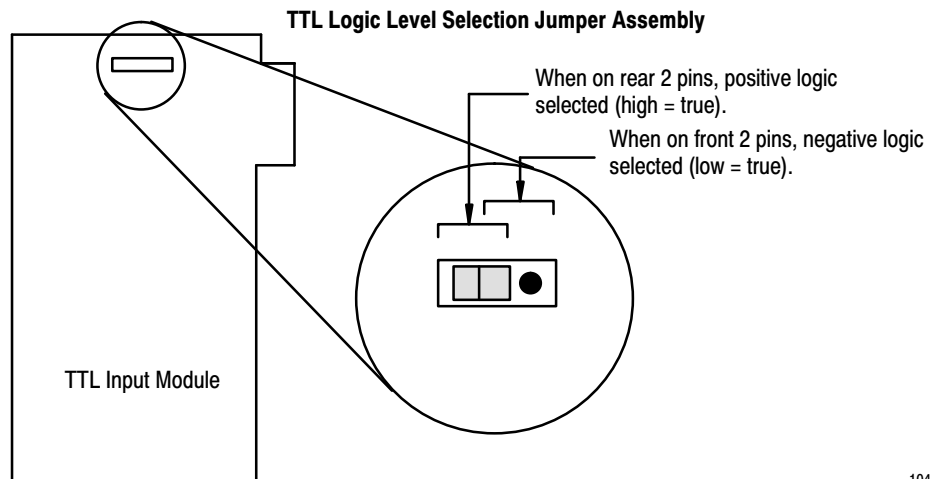
Note: Selecting positive logic automatically enables the HIGH (positive logic) indicator.

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You select high-true or low-true using the jumper accessible through a slot at the top of the module.

1. Locate the jumper in the slot at the top edge of the module.
2. Use tweezers to position the jumper as required for your application.



### Keying Your I/O Chassis

Use the plastic keying bands, shipped with each I/O chassis, to key the I/O slots to accept only this type of module.

The module circuit board is slotted in two places on the rear edge. The position of the keying bands on the backplane connector must correspond to these slots to allow insertion of the module. You can key any connector in an I/O chassis to receive this module except for the left-most connector reserved for adapter or processor modules. Place keying bands between the following numbers labeled on the upper backplane connector:

- Between 16 and 18
- Between 24 and 26

You can change the position of these keys if system redesign and rewiring makes insertion of a different module necessary.

### Installing the Input Module

To install the TTL input module in your 1771 I/O chassis, follow the steps listed below.



**ATTENTION:** Remove power from the 1771 I/O chassis backplane and wiring arm before removing or installing an I/O module.

- Failure to remove power from the backplane or field wiring arm could cause module damage, degradation of performance, or injury.
- Failure to remove power from the backplane could cause injury or equipment damage due to possible unexpected operation.

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1. Turn off power to the I/O chassis.
  2. Place the module in the plastic tracks on the top and bottom of the slot that guides the module into position.
  3. Do not force the module into its backplane connector. Apply firm, even pressure on the module to seat it properly.
  4. Secure the module's position by doing the following:
    - with a Series A chassis, snap the chassis latch over the top of the module
    - with a Series B chassis, pull down the locking bar
  5. Connect the field wiring arm to the input module.

### **Connecting Wiring to the Input Module**

Connect wiring to the input module using the field wiring arm (cat. no. 1771-WH) shipped with the module (shown in the connection diagram below). Make your connections as follows:

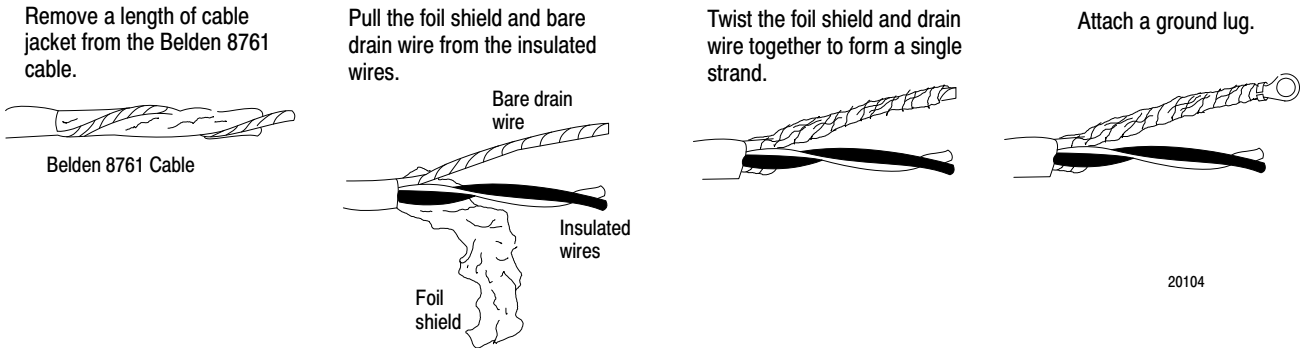
1. Attach the field wiring arm to the pivot bar on the bottom of the I/O chassis.
2. Pivot the wiring arm upward and push it into the module until the wiring arm clicks into position. The field wiring arm is designed to let you install and remove the module without disconnecting the wires.



**ATTENTION:** Do not apply ac or reverse dc voltage to module terminals. Circuitry at the input of module may be damaged.

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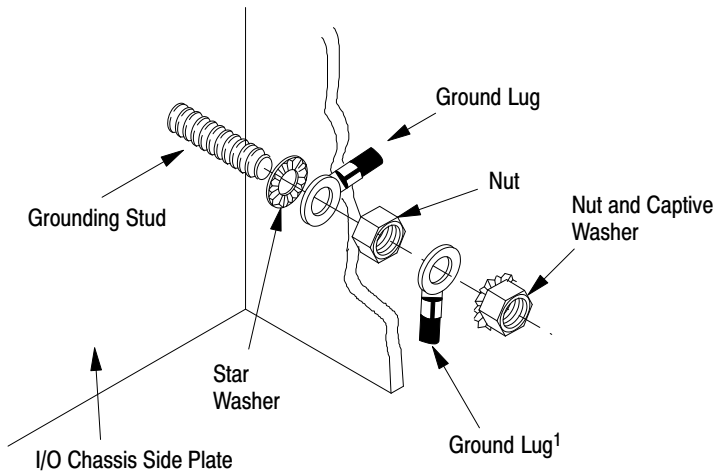
3. Separate the shielded cables from wiring that radiates electrical noise. Refer to category 2, low power dc I/O lines, in publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines".
4. Prepare the cable for grounding by doing the following:



5. Ground the single strand (at the ground lug end) to the grounding stud on the I/O chassis or by using single-point grounding.

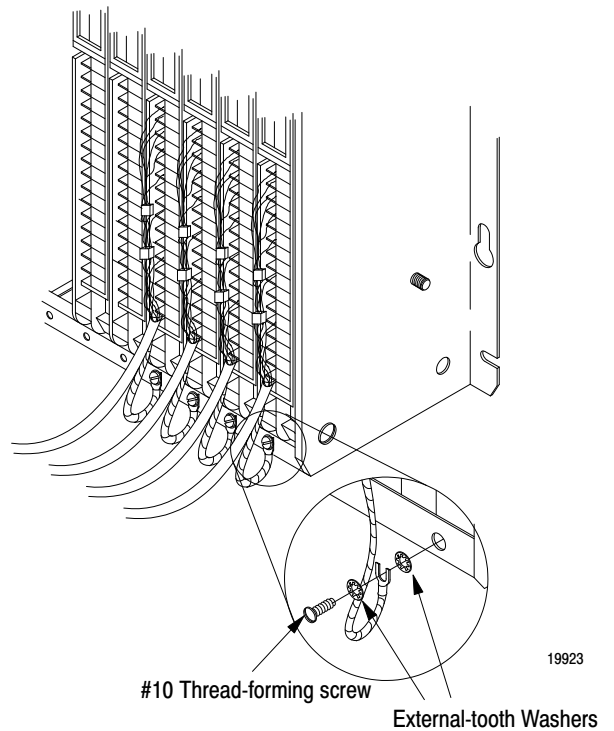
**Chassis Ground**

When you connect grounding conductors to the I/O chassis grounding stud, place a star washer under the first lug, then place a nut with captive lock washer on top of each ground lug.



<sup>1</sup>Use the cup washer if crimp-on lugs are not used.

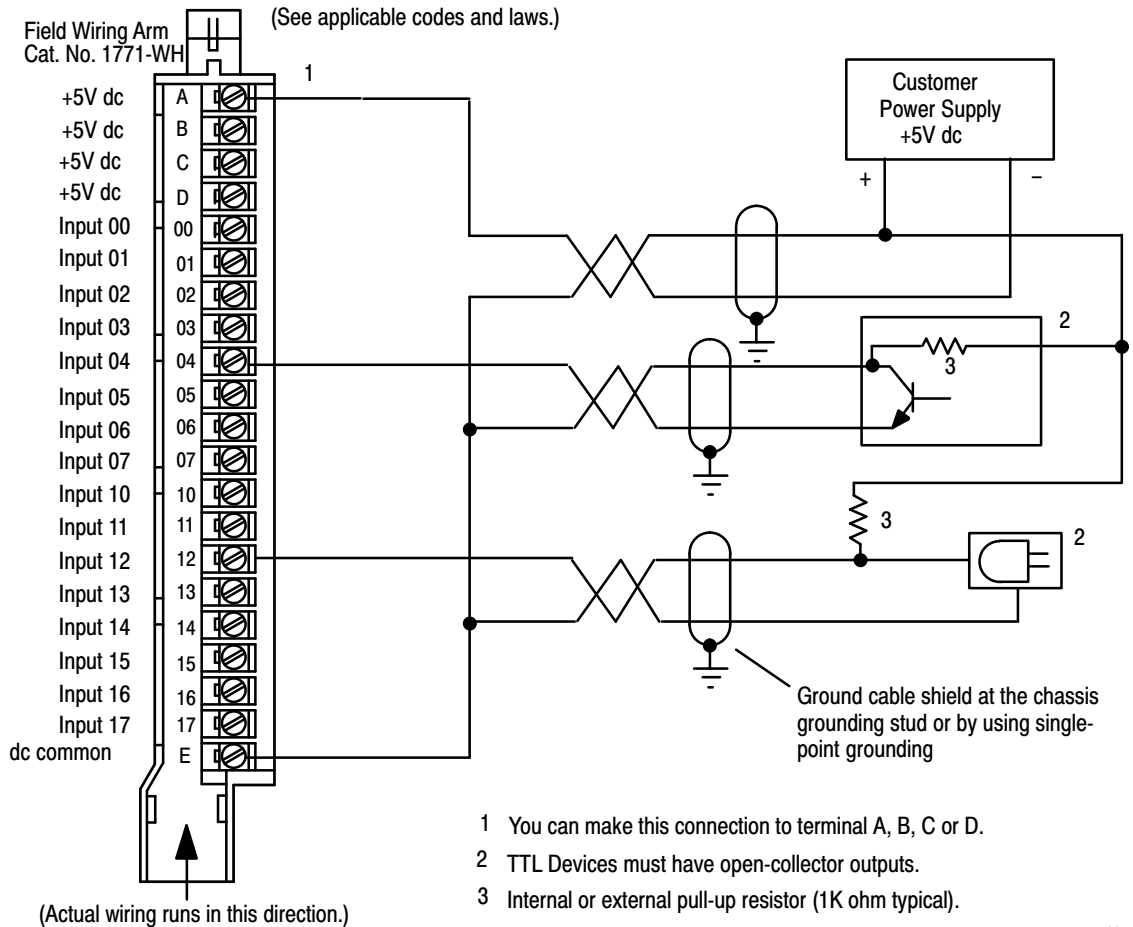
**Single-point Grounding**



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- You must connect both ends of the insulated signal return wire in each transmission cable as follows:
  - connect one end to the dc common terminal of your +5V dc power supply
  - connect the other end to the dc common terminal of the field wiring arm



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- Connect TTL output devices using Belden 8761 shielded cable as shown in the connection diagram. Do not exceed 50 cable feet for any output device. Connect the insulated wires to their respective terminals on the field wiring arm.

## Driving Inputs with Outputs

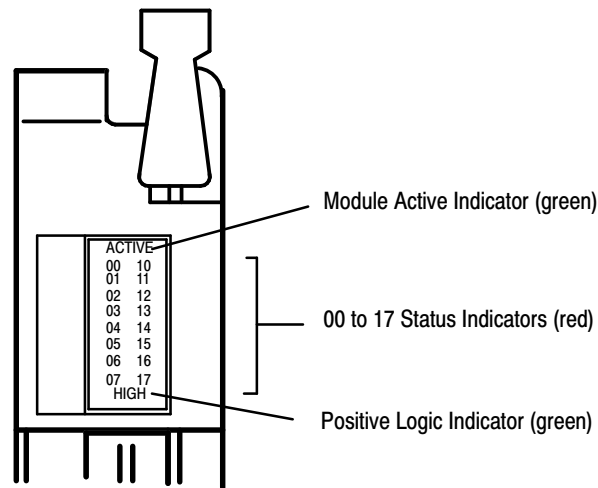
Input terminals of the TTL input module (cat. no. 1771-IGD) may be directly driven by the outputs of a TTL output module (cat. no. 1771-OGD). Connect the cable shield between modules at one end only.

## Interpreting the Status Indicators

The front panel of your module contains 18 status indicators (Figure 1). The green top indicator is labeled “ACTIVE.” This indicator is on when the fuse is good. The green bottom indicator, when on, indicates you selected high-true logic. When off, it indicates you selected low-true logic.

Each of the 16 red status indicators light when their corresponding input terminal senses TTL voltages in the true state.

**Figure 1**  
**Status Indicators**



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## Replacing the Fuse

To replace a blown fuse, proceed as follows:



**ATTENTION:** Remove power from the 1771 I/O chassis backplane and field wiring arm before removing or installing an I/O module.

- Failure to remove power from the backplane or field wiring arm could cause module damage, degradation of performance, or injury.
- Failure to remove power from the backplane could cause injury or equipment damage due to possible unexpected operation.

1. Turn off power to the chassis.
2. Remove the module from the I/O chassis.
3. Remove the blown fuse from the fuse holder (accessible through the slot in the side cover), and replace with a 0.5A, 250V normal blow fuse.
4. Reinsert module into the I/O chassis.
5. Turn on power to the chassis.

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## Specifications

Inputs per Module	16
Module Location	Series A or B 1771-A1B, -A2B, -A3B, -A3B1, or -A4B I/O chassis. Other locations include 1771-AM1, and -AM2 I/O chassis.
Input Voltage Rating HIGH = TRUE  LOW = TRUE	ON: 2.0 to 5.25V dc OFF: -0.2 to +0.8V dc ON: -0.2 to +0.8V dc OFF: 2.0 to 5.25V dc
Customer Supply Voltage	5.0V dc ( $\pm 0.25V$ ) 50mV peak-to-peak ripple max.
Customer Current Sink Requirements	7mA maximum (source per input) 0.8mA maximum (sink per input)
Customer Supply Current per Module	380mA max.
Input Signal Delay	Less than 1ms
Power Dissipation	2.7 Watts (max.); 0.4 Watts (min.)
Thermal Dissipation	9.2 BTU/hr (max.); 1.4 BTU/hr (min.)
Backplane Current	130mA max.
Isolation Voltage	Tested at 1500V ac (rms) for 1 second
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity	0° to 60°C (32° to 140°F) -40° to 85°C (-40° to 185°F) 5 to 95% (without condensation)
Fuse	0.5A 250V normal blow
Conductors Wire Size  Cable Category	14 gauge stranded maximum 3/64 inch insulation maximum Shielded (Belden 8761) 2 <sup>1</sup>
Keying	Between 16 and 18 Between 24 and 26
Field Wiring Arm	Catalog Number 1771-WH
Wiring Arm Screw Torque	7-9 inch-pounds

<sup>1</sup> Refer to publication 1770-4.1, Programmable Controller Wiring and Grounding Guidelines.



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