TTL Output Module
Cat. No. 1771-OG

Installation Instructions

To The Installer

This document provides information on:

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

Pre-installation Considerations

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

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.

Backplane
The TTL module receives its power through the 1771 I/O chassis backplane from the chassis power supply. The module requires 168mA 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 TTL outputs from the module and for your TTL input devices. Your module requires 250mA from the output of your supply. Ripple should not exceed 50mV peak to peak.

Initial Handling

The TTL output 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

This section explains how to:
- select the logic level
- key the I/O chassis
- install the module
- make the wiring connections

Selecting the Logic Level

You can select one of two logic conditions:

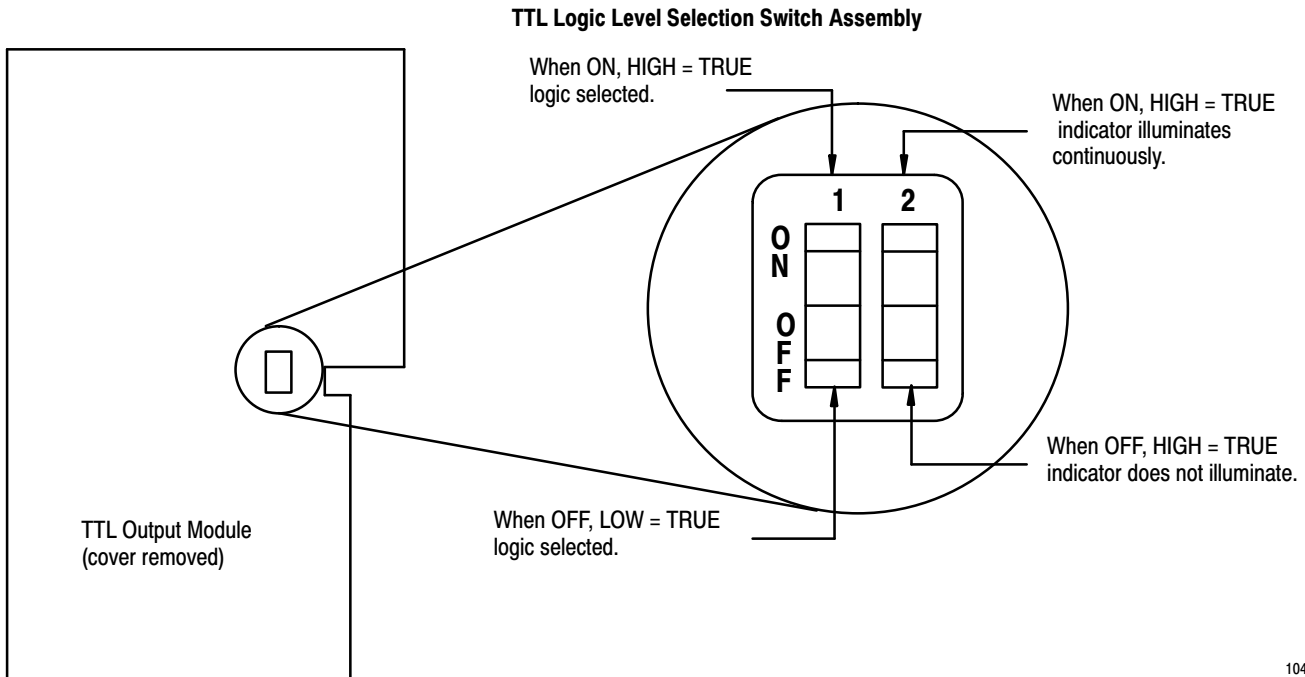| If you choose:	Then:	Set Switch SW:
HIGH = TRUE logic	2.0 to 5.25V dc corresponds to logic "1" (on)	SW1 – on, SW2* – on
LOW = TRUE logic	–0.2 to 0.8V dc corresponds to logic "1" (on)	SW1 – off, SW2* – on
* SW2 setting is optional for HIGH–TRUE indicator.		

Select high-true or low-true using the switch assembly inside the module.

1. Remove the side cover from the module by removing the screw at each of the four corners.

2. Set the switches as needed for your application.

TTL Logic Level Selection Switch Assembly

When ON, HIGH = TRUE logic selected.

When ON, HIGH = TRUE indicator illuminates continuously.

When OFF, HIGH = TRUE indicator does not illuminate.

When OFF, LOW = TRUE logic selected.

TTL Output Module (cover removed)

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3. Reinstall the cover and secure with the four screws.

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 the keying bands between the following numbers labeled on the upper backplane connector:

- Between 6 and 8
- Between 10 and 12

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

Installing the Output Module

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

> ⚠️ **ATTENTION:** You must first turn off power to the 1771 I/O chassis backplane and field wiring arm before removing or installing an I/O module.
> - Failure to turn off power to the backplane or field wiring arm could cause personal injury, module damage, or degradation of performance.
>
> - Failure to turn off power to the backplane could cause personal injury or equipment damage due to possible unexpected operation.

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 output module.
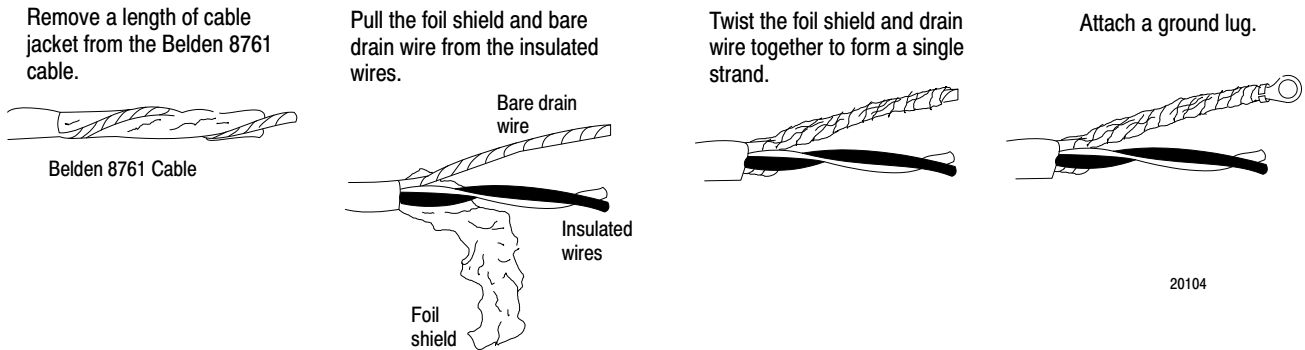
Connecting Wiring to the Output Module

Connect wiring to the input module using the field wiring arm (cat. no. 1771-WC) shipped with the module (shown in the following figure). 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 field wiring arm upward and push it into the module until the field 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.

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:

Remove a length of cable jacket from the Belden 8761 cable.

Belden 8761 Cable

Pull the foil shield and bare drain wire from the insulated wires.

Bare drain wire

Insulated wires

Foil shield

Twist the foil shield and drain wire together to form a single strand.

Attach a ground lug.

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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.

Ground Lug

Nut

Nut and Captive Washer

Grounding Stud

Star Washer

I/O Chassis Side Plate

Ground Lug[1]
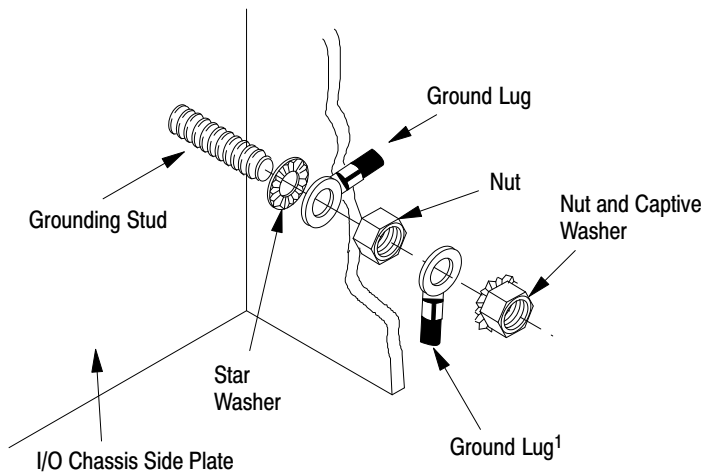
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[1]Use the cup washer if crimp-on lugs are not used.

Single-point Grounding
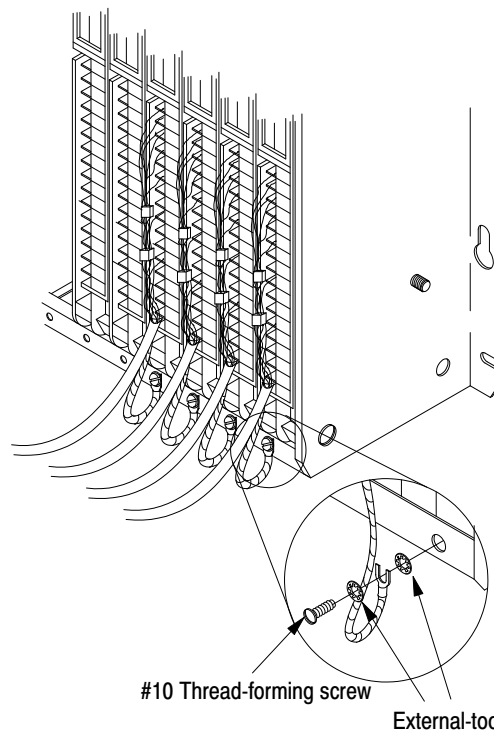
#10 Thread-forming screw

External-tooth Washers
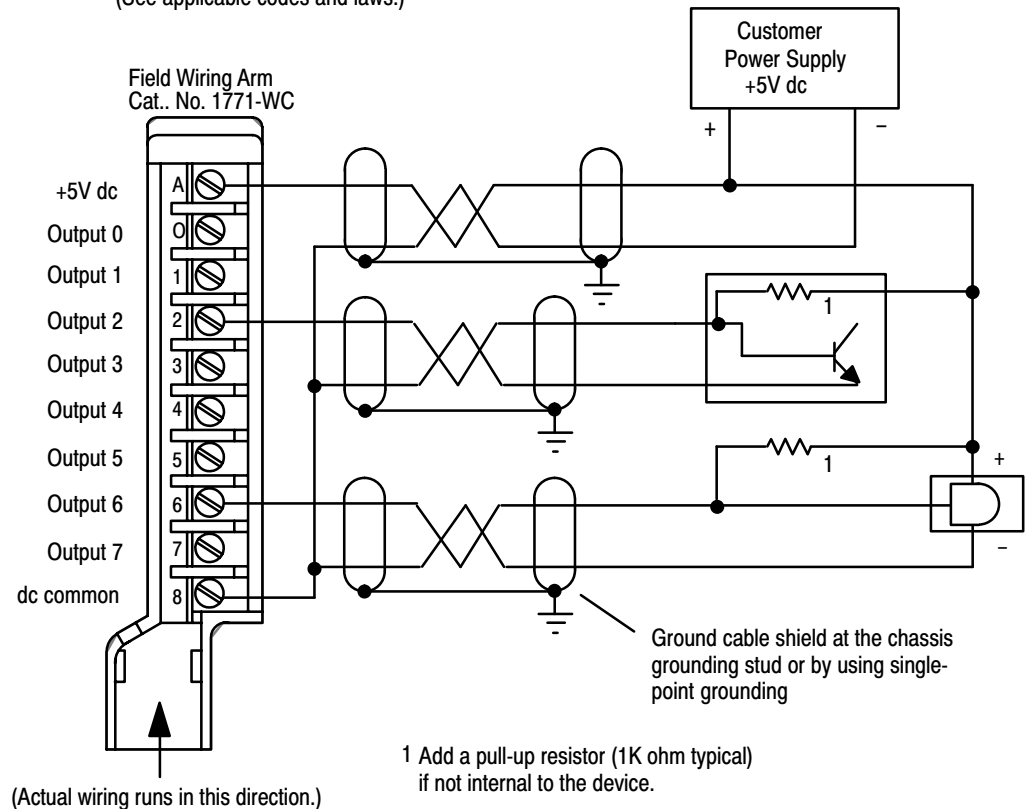
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6. You must connect both ends of the insulated signal return wire in each transmission cable as follows:

- 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

(See applicable codes and laws.)

Field Wiring Arm
Cat.. No. 1771-WC

Customer Power Supply +5V dc

+5V dc — A
Output 0 — 0
Output 1 — 1
Output 2 — 2
Output 3 — 3
Output 4 — 4
Output 5 — 5
Output 6 — 6
Output 7 — 7
dc common — 8

(Actual wiring runs in this direction.)

Ground cable shield at the chassis grounding stud or by using single-point grounding

1 Add a pull-up resistor (1K ohm typical) if not internal to the device.

The outputs of the 1771-OG are open-collector with internal 1K pull-up (up to 5V) resistors.

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7. 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

Output terminals of the TTL output module (cat. no. 1771-OG) may directly drive inputs of a TTL input module (cat. no. 1771-IG). Connect the cable shield between modules at one end only.
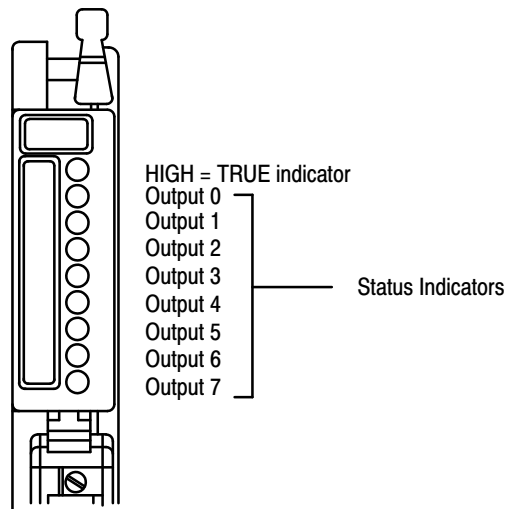
Interpreting the Status Indicators

The front panel of your module contains nine status indicators (Figure 1). The red top indicator is labeled ''HIGH = TRUE.'' When on, it indicates you selected high-true logic (SW1 on and SW2 on). When off, it indicates you selected low-true logic (SW1 off and SW2 on).

Each of the lower eight red indicators light when their corresponding output terminal delivers TTL voltages in the true state.

Indicators may appear dim during rapid pulsing of output signals.

Figure 1
Status Indicators

HIGH = TRUE indicator
Output 0
Output 1
Output 2
Output 3
Output 4
Output 5
Output 6
Output 7

Status Indicators

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Specifications

|	
Outputs per Module	8
Module Location	1771 I/O chassis

Output Voltage Range
      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

Maximum Output Current	Source: 1mA; Sink: 20mA
Customer Supply Voltage	5V dc ($\pm$0.25V) 50mV peak-to-peak ripple max.
Customer Supply Current per Module	250mA max.
Output Signal Delay	Less than 1ms
Power Dissipation	2.2 Watts (max.); 0.8 Watts (min.)
Thermal Dissipation	7.5 BTU/hr (max.); 2.7 BTU/hr (min.)
Backplane Current	168mA max.
Isolation Voltage	Tested at 1500V ac (rms) for 1 second

Environmental Conditions
    Operational Temperature
    Storage Temperature
    Relative Humidity
	0º to 60ºC (32º to 140ºF)
	−40º to 85ºC (−40º to 185ºF)
	5 to 95% (without condensation)

Conductors   Wire Size
 	
                  Cable
                  Category
	14 gauge stranded maximum
	3/64 inch insulation maximum
	Shielded, (Belden 8761)
	2[1]

Keying	Between 6 and 8 Between 10 and 12
Field Wiring Arm	Catalog Number 1771-WC
Wiring Arm Screw Torque	7-9 inch-pounds

[1] Refer to publication 1770-4.1 "Programmable Controller Wiring and Grounding Practices."

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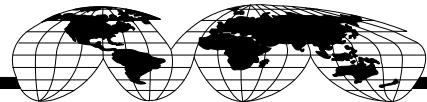
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