



Advanced Simulation Technology inc.
441-A Carlisle Drive
Herndon, Virginia 20170 U.S.A.
Tel. (703)471-2104 • Fax. (703)471-2108
www.asti-usa.com

ASTi

Distributed Digital Interface

Technical Guide

Document: ASSY-01-DDI-MN-1

Table of Contents

Introduction	1
General Information	1
Available I/O	1
General Dimensions	2
Power Supply	2
Reset Switch	2
Status LEDs	2
Connector Information	3
Connecting the DDI to the RIU	4
DDI Cable	4
DDI Addressing	4
Connecting Multiple DDIs to a Single RIU Serial Port	5
Special Instructions for Using Multi-Dropped DDIs	5
Digital Inputs	6
Passive DIs	6
Voltage-Sensing DIs	6
Digital Outputs	7
Providing Surge Protection for the DO Circuitry	7
Analog Inputs	8
Wiring for Connector P2 Analog Input	8
Accessing the DDI objects in Model Builder	9
Initial Conditions	9
Controls List	9
Identifying DDI versions	10
Rackmounting DDIs	10
Ordering information	10
Temperature and Humidity Requirements	10
RMA Instructions	11

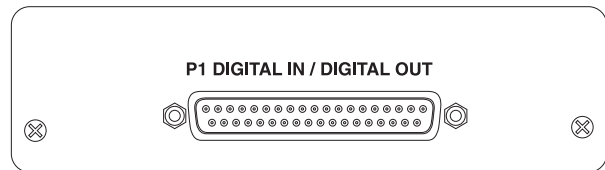
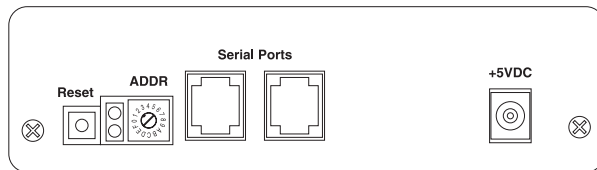
Introduction

The ASTi DDI module is a convenient “block” of I/O that can be simply and easily integrated into an ASTi system utilizing the TDM/RIU architecture. Depending on the version purchased, the DDI provides Digital Input, Digital Output and Analog Input capability. Up to 14 DDI modules may be added to each RIU (7 per RIU serial interface, of which there are 2). Predefined “objects” within Model Builder provide easy access to the I/O for use within the software model.

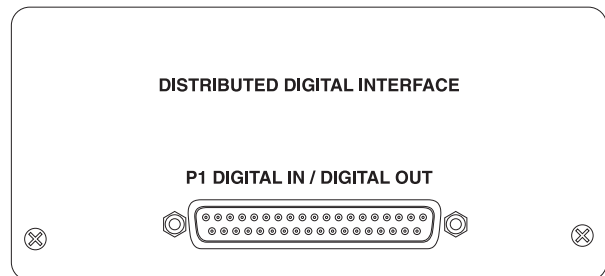
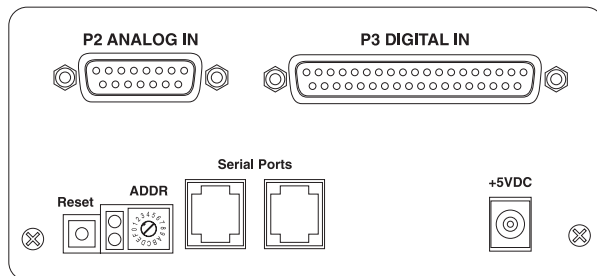
A typical application of the DDI is to provide software sensing of communication system control panel switch and volume controls, and to provide drive to indicator lamps or relays.

General Information

Single-height DDI Panel Faces



Double-height DDI Panel Faces

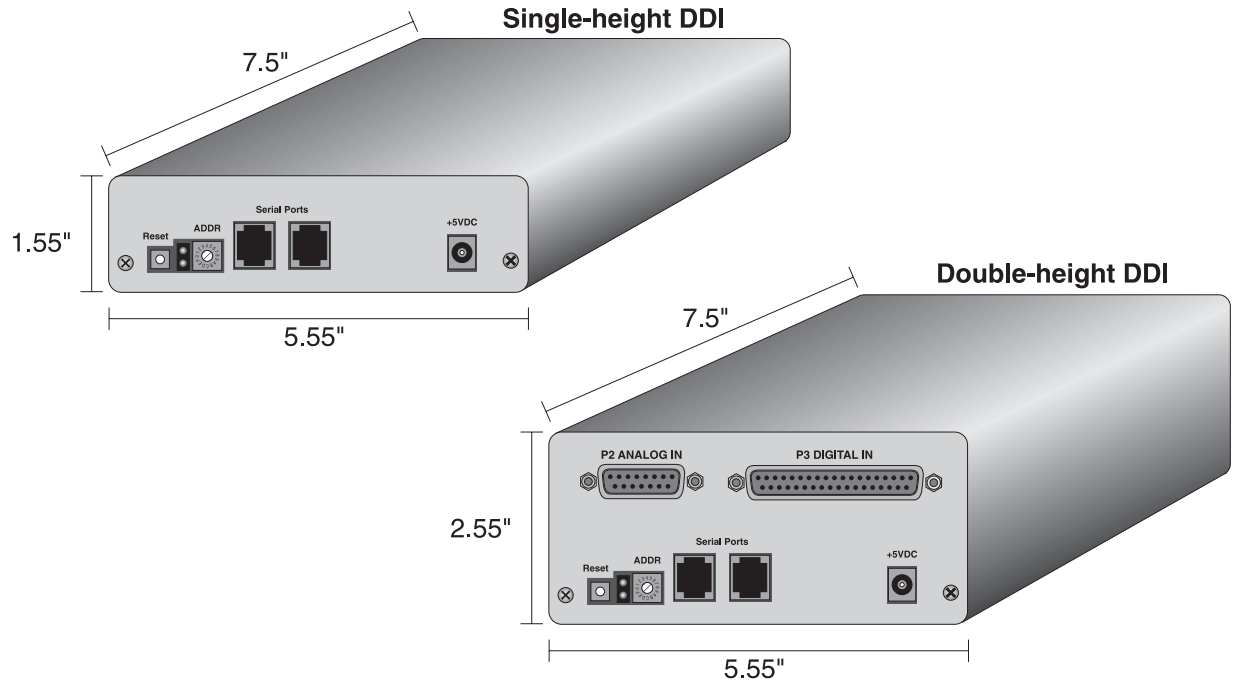


Available I/O

- 32 Digital Inputs
 - Digital Inputs 1-24 are contact sensing*
 - Digital Inputs 25-32 are voltage sensing
- 8 Digital Outputs
- 4 Analog Inputs*

* These I/O elements are only available when you have purchased the unpackaged DDI or the double height package.

General Dimensions



A packaged single height DDI weighs approximately 1.5 pounds.

A packaged double height DDI weighs approximately 1.75 pounds.

Power Supply

Each DDI is supplied with an external +5 VDC regulated power supply which is rated for 50/60 Hz, 100-240 VAC and will supply a maximum of 2.5 amps.

The DDI includes an automatically re-settable over current protection device that has a 1.1 A trip point.

Reset Switch

The reset switch located on the rear panel is a momentary contact device. Pressing the switch will reset the DDI, clear all settings and cause the address/mode to be re-read.

Status LEDs

There are two LEDs on the rear panel situated between the reset and address switches.

The bottom LED indicates that the DDI is powered on and that the firmware is operational. This LED flashes at approximately 1 Hz under normal operation.

The top LED indicates communication activity with the Remote Interface Unit (RIU). Each time a command is received or data is transmitted the LED will flash.

Connector Information

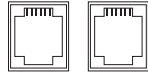
Power Supply

2.1mm socket
center positive



Serial Connectors

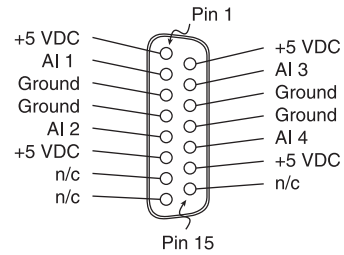
RJ-12 Jacks



1 = TX+ 4 = RX-
2 = TX- 5 = +5 VDC
3 = RX+ 6 = Ground

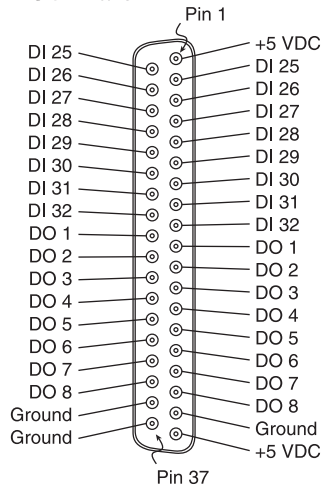
P2 - Analog In

DB-15 female



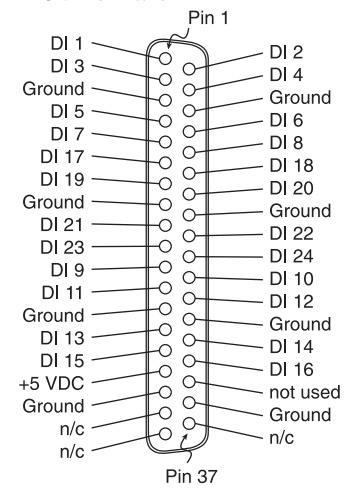
P1 - Digital In/Out

DB-37 male



P3 - Digital In

DB-37 female



Connecting the DDI to the RIU

DDI Cable

Use ASTi's cable CA-RJ12-RJ12-L-A or B to connect the DDI to a serial port of an RIU or to daisy chain DDIs together. The -L in the part number is the cable length in feet. The -A is used when ordering coiled cable while -B is used when ordering flat cable.

The total length of the cabling between an RIU serial port and the attached DDI(s) should not exceed 100 feet. Environmental conditions and cable quality may either shorten or lengthen this distance.

DDI Addressing

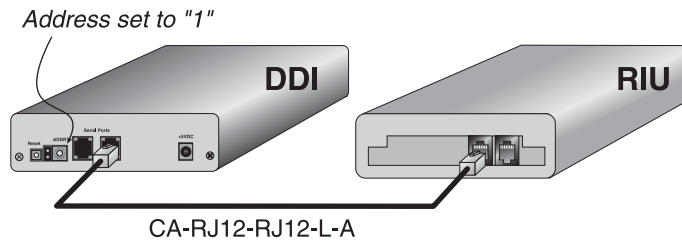
There is a rotary switch on the back of the DDI labeled "ADDR". This switch is used to control the single- or multi-drop modes of operation.

The modes and addresses are as follows:

- Position 0: Single-drop mode. The DDI will drive the communication lines at all times, and will respond to all commands. This mode is present for backwards compatibility with previous generations of this product.
- Positions 1–7: Multi-drop mode. The DDI will drive the communication lines only when polled at the address set by the switch. Only commands sent to the corresponding address will be executed. See section titled "Accessing Multi-Dropped DDI I/O" for further configuration details.
- Positions 8–15: Reserved for future use.

Connecting Multiple DDIs to a Single RIU Serial Port

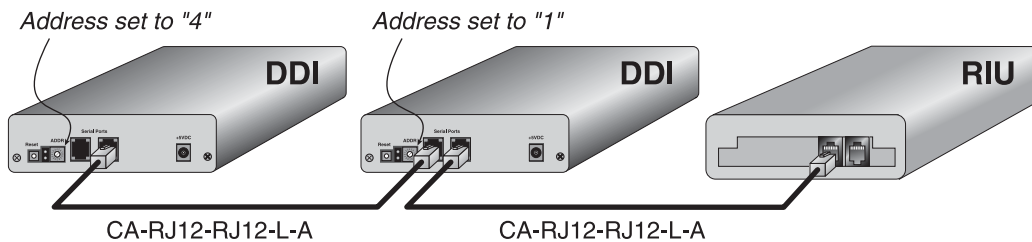
Single-drop Mode



Each DDI connected to an RIU serial port must have a unique address, however the addresses do not need to be sequential.

Connect multiple DDIs to an RIU serial port as shown in the diagram below.

Multi-drop Mode



Special Instructions for Using Multi-Dropped DDIs

The following applies to all DDIs set to address 2 through 7. Please note that DDI addresses 0 and 1 are handled slightly differently and the following does not apply. No special configuration is required for DDIs using address 0 or 1.

In order to read I/O generated from multi-dropped DDIs, the software model must include at least one (1) Digital Output (DO) object pointing to each DDI. This will force the RIU to poll the DDI(s). It is not necessary to connect the DO to an output device, unless required by the design of your application.

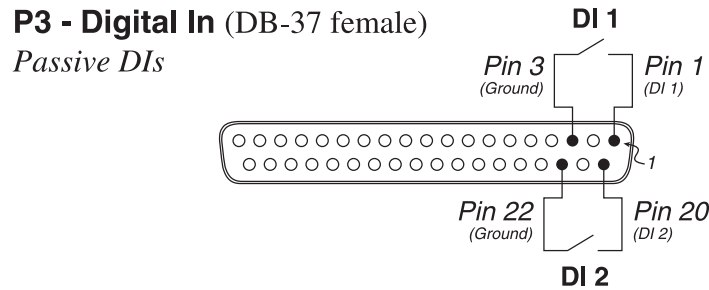
If your application requires the use of DO objects as part of its inherent design, the requirement is already met within the model, and no additional configuration is required. If, however, you are only using input type objects (Digital INs and/or Analog INs), the addition of a DO object for each multi-dropped DDI is required in the model.

Digital Inputs

There are two types of Digital Inputs (DI) available on the DDI, Passive and Voltage-Sensing.

Passive DIs

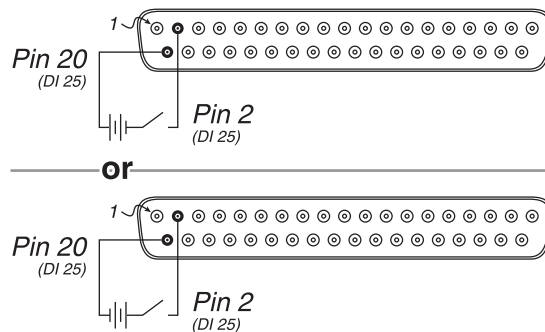
The Passive DIs, 1-24, are activated by contact closure with ground.



Voltage-Sensing DIs

The Voltage-Sensing DIs, 25-32, use an optoisolator and require +5 VDC for activation. These DIs are not polarity sensitive, simply apply +5 VDC between the two DI pins.

P1 - Digital In/Out (DB-37 male)
Powered DIs



Digital Outputs

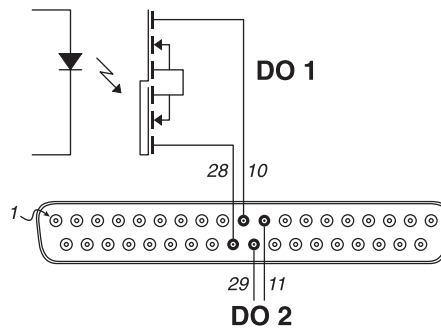
The Digital Output (DO) circuitry consists of an optoisolated, solid-state relay for switching power to external loads.

Each DO circuit has a continuous load current rating of 150 mA and a maximum power dissipation rating of 375 mW.

While providing 1 mA of load current, the MOSFET on state resistance is typically 30 ohms.

P1 - Digital In/Out (DB-37 male)

DOs

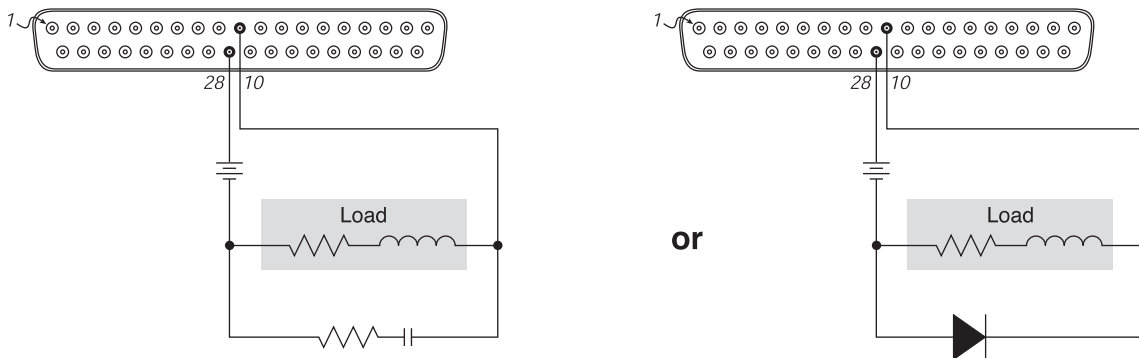


Providing Surge Protection for the DO Circuitry

When driving an inductive load, such as a relay coil, always use a C/R snubber or clamping diode in parallel with the load to suppress large spikes.

P1 - Digital In/Out (DB-37 male)

Surge protection for the DO circuitry

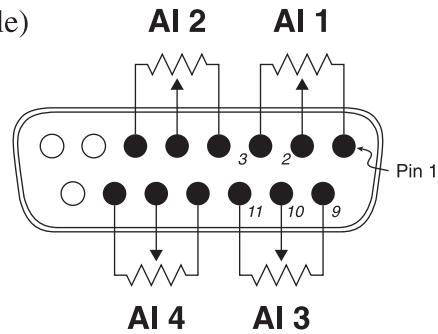


Analog Inputs

The four independent Analog Inputs (AI) accept an input range from 0 to +5 volts referenced to the ground connections.

Use a 10 Kohm linear potentiometer for the AI sensing.

P2 - Analog In (DB-15 female)
Analog Inputs



Wiring for Connector P2 Analog Input

Analog Input	Fixed Leg (+5 VDC)	Wiper Arm (Sense)	Fixed Leg (Ground)
A1	1	2	3
A2	6	5	4
A3	9	10	11
A4	14	13	12

Accessing the DDI objects in Model Builder

Initial Conditions

- DACS is powered on and Model Builder v4.04e or higher is running
- The TDM ring is intact with a known working RIU on the ring
- The RIU(s) has/have been addressed in the model
- The DDI has been addressed and connected to the serial port of an RIU

Controls List

- Within the model choose the “Controls List”
- Access the pull down menu of available objects and choose “Piu i/o”
- From the “Piu i/o” menu choose “digital_In”, “digital_Out” or “Analog_in”
- The chosen object will appear
- You must set the following fields:
 - 1.The RIU that the DDI is attached to
 - 2.The serial port and device number on that RIU
 - 3.The I/O bit you wish to use

Example: PIU Digital Input #26 for a DDI addressed #2 on RIU #3, serial port A

For the “digital_In” object, you would set:

- The "RIU Number" to "3"
- The "Port" to "A2"
- The "DI Channel" to "26"

Identifying DDI versions

Part Number: DDI-V_{xx}-yy-z

In the part number, **xx** is a number combination denoting the hardware version. For example, "30" denotes DDI board version 3.0.

In the part number, **yy** is used to identify firmware version or special configurations of the boards. For example "AA" denotes firmware version 4.0.0.

In the part number, **z** is used to identify the packaging option.

- U = unpackaged DDI
- 1 = single height box
- 2 = double height box

When ordering spares, be sure to specify the complete part number.

Rackmounting DDIs

The single height DDIs may be rackmounted in a 1U high, 19" wide bracket; this bracket will accept any combination of up to three (3) DDIs, RIUs or Audio Interface Units (AIUs). Double-height DDIs may be rackmounted in a 2U high, 19" wide bracket; this bracket will accept up to two (2) double-height DDIs. The brackets can be supplied unassembled, or ASTi can mount the components for a small fee.

NOTE: When the DDI is rackmounted, the plastic front bezel of the DDI case is not used. Keep the bezel in the event that the DDI is removed from the bracket and used as a stand-alone unit. Without the bezel, the endplate of the unmounted DDI will not fit on the case correctly.

Ordering information

- For the unassembled single height bracket only, use ASTi Part Number: RMK-RAD-3-U.
- For the unassembled double height bracket only, use ASTi Part Number: RMK-DDI-3-U.

Temperature and Humidity Requirements

The DDI is to operate in an environment of 50 to 90 degrees F, with a relative humidity of 10% to 90 % non-condensing and an altitude range of 0 to 8000 feet.

Storage requirements should be limited to a 32 to 135 degree F (0 to 55 C) range.

RMA Instructions

If it becomes necessary to return equipment to ASTi for repair, please observe the following instructions:

- Obtain an RMA number either by calling ASTi or through the instructions on our website.
- Always DOUBLE BOX the equipment in question. Failure to properly package equipment could void the warranty.
- Do not include accessory pieces such as power cords, software and mounting brackets. Only send back items that do not work.
- The shipping label must include the RMA number.
- Include a description of the problem including the serial number and a point of contact. Failure to include this information could delay return of the equipment.
- If the equipment is not under warranty, a Purchase Order will be required to cover any repairs. ASTi will provide a quote for all non-warranty items.
- Equipment will be shipped back via UPS ground unless otherwise directed. If it is a non-warranty repair, shipping charges will be billed.

Printed in US. Copyright © 2001-2002 Advanced Simulation Technology inc.

ASTi reserves the right to change any specifications herein without prior notice.

Document No. ASSY-01-DDI-MN-1 (Rev. B, August 2002)