

Using the CTI 2573-MOD Serial Interface Adapter with Microwave Data Systems Master/Remote Radios

This document reflects the results of tests performed with the CTI 2573-MOD Serial Interface Adapter with a MDS 2101 Master Station and a MDS 2310A Remote Data Transceiver equipped with 9600 Baud modems and using Modbus RTU as the communication protocol. A 2573-MOD configured as MODBUS RTU Master was connected to the modem port of the MDS 2101 Master Station. A 2573-MOD configured as a MODBUS RTU Slave was connected to the modem port of the MDS 2310A Remote Transceiver.

The MODBUS protocol describes an industrial communications and distributed control system developed by Gould-Modicon to integrate PLCs, computers, terminals and other monitoring, sensing and control devices. MODBUS is a Master/Slave communications protocol, whereby one device (the Master), controls all serial activity by selectively polling one or more slave devices. The protocol provides for one master device and up to 247 slave devices on a common line. Each device is assigned an address to distinguish it from all other connected devices.

The CTI 2573-MOD Serial Interface Adapter acts as a MODBUS interface to the CTI 2500 Series or Simatic® 505 family of programmable controllers. The 2573-MOD can act as a MODBUS Master to control a MODBUS network or exist on a MODBUS network as a slave. Two of the four serial ports may be configured as MODBUS RTU Master or Slave and will operate independently of each other. Any of the four ports may be configured as MODBUS ASCII Master or Slave and operate independently of each other.

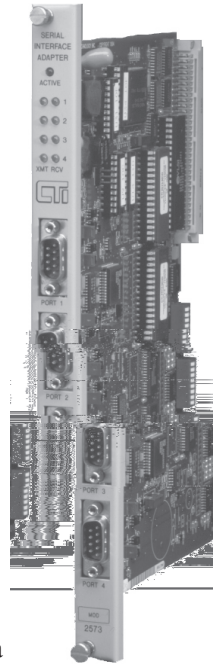
MODBUS RTU is a robust protocol which works well in applications which require communication over radio modems from a Master Station to multiple Remote slaves. Many CTI 2573-MOD customers have chosen Microwave Data Systems as the transmission system in this type of application.

The combination of the CTI 2573-MOD acting as a MODBUS RTU Master connected to a MDS Master Station has been done successfully in several applications, although there have been some initial problems in establishing consistent communication. The purpose of this document is to provide the user with information to make the integration easier.

The combination of the 2573-MOD acting as a MODBUS RTU Slave and connected to the MDS 2310A Remote Transceiver has been a problem due to the fact that the remote radios require RTS/CTS handshaking. RTS is required by the radio to key the transmitter. After a time delay, the radio returns CTS which signals the host to transmit data. The CTI 2573-MOD with firmware versions less than V6.2 **do not** support RTS/CTS handshaking in MODBUS RTU mode.

If you plan to use the CTI 2573-MOD as a MODBUS Master or Slave connected to an MDS Remote Transceiver, you must upgrade your firmware to V6.2 or higher. The RTS/CTS control feature is enabled by setting Offset 9 (Handshake options) of the Create Connection Command block, either RTU Master or RTU Slave, to a value of 6.

Typically the MDS 2101 Master Station, when configured as Master, does not require the RTS/CTS control and will work properly with the 2573-MOD without RTS/CTS control enabled.



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MDS 2101 Master Station Modem Jumper Configuration

The Master Station used for test was configured as follows:

<u>Jumper</u>	<u>Controls</u>	<u>Jumper Position</u>	
J3	Annunciator LEDs	Internal	1-2
J5	Receiver Audio	Invert	2-3
J6	CTS Inhibit	Master	1-2
J7	RXD Inhibit	Full-Duplex Master	5-6
J8	RXD Delay	Master	2-3
J9	Receive Descramble	ON	2-3
J10	Transmit Scramble	ON	2-3
J11	TX Pre-Coder	ON	1-2
J16	TX Clock	Normal	1-2
J17	RS-422/232	RS-232	Empty
J18	RTS	Continuous	2-3
J19	Loopback Testing	Normal	2-3
J20	TX Synchronization Mode	Async	2-3
J21	CTS Delay	10 msec	1-2
J22	Soft Carrier Dekey	OFF	2-3
J23	Keyline Control	On RTS	1-2
J24	Async Character Length	10 bit	2-3
J25	Async Character Length	10 bit	1-2
J27	TTL Invert	RS-232	Empty
J28	Dual Time Constant	Master	Installed
J29	Test Pattern <i>Rev D Boards Only</i>	Normal	Empty
J31	Data Loopback <i>Rev D Boards Only</i> <i>Replaces TP4 in Rev C Bd.</i>	Normal	Empty

2573-MOD Configuration

Port 1 Configured as MODBUS Master

Communication Parameters: 9600 baud, 8 data bits (by default), No parity, 1 stop bit

Handshaking: RTS/CTS control

Communication Cable Connections

MDS 2101 Modem Port Connector
(25 Pin Female)

2573-MOD Master Port
(9 Pin Male)

	Pin 2-----	Pin 3 TXD (Output)
Transmit Data In		
Received Data Out	Pin 3-----	Pin 2 RXD (Input)
RTS (Input)	Pin 4-----	Pin 7 RTS (Output)
CTS (Output)	Pin 5-----	Pin 8 CTS (Input)
Signal Ground	Pin 7-----	Pin 5 Signal Ground

MDS 2310A Remote Transceiver Configuration

For MODBUS RTU operation at 9600 baud, the remote radio should be configured for a Soft Carrier Dekey (SCD) value of at least 8 msec. This prevents the “squelch tail” from getting involved in the transmitted query response message. “Squelch tail” is caused by the dekey of the transmitter. MODBUS RTU is a time delimited protocol, that is, MODBUS messages are delimited by a “quiet” time of 3.5 character times for the communication baud rate. At 9600 baud, this is about 4 msec. If the transmitter is dekeyed too quickly, the “squelch tail” causes noise on the end of the response message and if it occurs within 3.5 character times, this noise is processed as part of the query response by the Master. The result

of this is that checksum errors are generated on the 2573-MOD master side and the whole message is lost. At lower baud rates, the Soft Carrier Dekey would have to be set to a larger value since 3.5 character times at lower baud rates is also longer.

2573-MOD Configuration

Port 3 Configured as MODBUS Slave

Communication Parameters: 9600 baud, 8 data bits, No parity, 1 stop bit

Handshaking: RTS/CTS control

Communication Cable Connections

MDS 2301A Modem Port Connector
(25 Pin Female)

2573-MOD Slave Port
(9 Pin Male)

Transmit Data In	Pin 2-----	Pin 3 TXD (Output)
Received Data Out	Pin 3-----	Pin 2 RXD (Input)
RTS (Input)	Pin 4-----	Pin 7 RTS (Output)
CTS (Output)	Pin 5-----	Pin 8 CTS (Input)
Signal Ground	Pin 7-----	Pin 5 Signal Ground

Typical Multiple Address System

