

5908-W02 Radio Transceiver Module

Installation, Operation and Maintenance
Setup Manual

5/19/2011



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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed. Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate.

CAUTION

CAUTION used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage..

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

 **CAUTION****EQUIPMENT OPERATION HAZARD**

Verify that all installation and set up procedures have been completed.

Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.

Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in injury or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About The Book

At a Glance

Document Scope

This manual describes the operation and maintenance of the 5908-W02 (MDS) Radio Data Transceiver module.

Validity Notes

This document is valid for All versions of the 5908-W02 (MDS) Radio Data Transceiver module.

Product Related Information

 WARNING
UNINTENDED EQUIPMENT OPERATION
The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter and apply this product.
Follow all local and national safety codes and standards.
Failure to follow these instructions can result in death, serious injury or equipment damage.

User Comments

We welcome your comments about this document. You can reach us by e-mail at technicalsupport@controlmicrosystems.com.

Overview

The 5908-W02 Radio Transceiver is based on Microwave Data Systems (MDS) TransNET OEM 900MHz Spread Spectrum technology. These Wireless Data Transceivers are available as standalone units or can be integrated with any type of SCADAPack controller thus providing a single wireless controller package.

The MDS TransNET OEM Spread Spectrum Data Transceiver is connected to a 5911 TransNET Integration Module, which provides input power and communication interface to the transceiver. The Radio Module is mounted under the top cover of the Wireless SCADAPack controller and provides terminal connections for DC power input and two RJ-45 connections. One RJ-45 connection, labeled DIAG, is for the configuration and diagnostics of the Radio Module. The second RJ-45 connection is the serial communication port for the Radio Module.

If purchased as a wireless controller package, the MDS Wireless Data Transceiver is mounted in an embedded Radio Module. The Radio Module is located under the cover of the Wireless SCADAPack controllers. The Wireless SCADAPack controllers come complete with an integrated power supply, analog and digital I/O, counter inputs and serial communication ports depending on the SCADAPack selected. Application programs can be written in Relay Ladder Logic, IEC 61131-3 and the C language.

The Wireless SCADAPack W02 include:

Wireless SCADAPack 100, Wireless SCADAPack LP, Wireless SCADAPack, Wireless SCADAPack 32, Wireless SCADAPack 32P, Wireless SCADAPack LP and the Micro16 controller.

This user manual is not a complete reference for the SCADAPack controller or the MDS TransNET OEM Spread Spectrum Data Transceiver. The user manuals, in pdf format, for each product are included on the "Hardware Documentation Configuration Applications" CD that is included with shipments from our factory.

In addition to the user manuals the MDS TransNET Radio Configuration software is included on the CD. The configuration software is used to configure the transceiver for your specific application.

Getting Started

The Wireless SCADAPack W02 controllers are shipped from the factory with default configurations for the SCADAPack controller board and the Radio Module. These settings may need to be modified for optimum operation for individual systems.

- Install the Hardware Manual and the MDS TransNET Radio Configuration software on your PC using the “Hardware Documentation Configuration Applications” CD.
- Power the Wireless SCADAPack controller as explained in section ***Power Supply Connection***.
- Make serial port connections as explained in the ***Serial Port Connections***.
- Make antenna connection to the Radio Module as explained in section ***Antenna Connections***.
- Configure the Radio Module as explained in section ***Radio Module Configuration***.
- Configure and program the SCADAPack controller as required by your system configuration. Refer to the appropriate SCADAPack controller hardware manual and the Telepace or IEC 61131-1 programming reference.

Installation

The installation of SCADAPack controllers requires mounting the controller on the 7.5mm by 35mm DIN rail and connecting the SCADAPack controller to the system I/O Bus. Refer to the **System Configuration Guide**, at the beginning of the Hardware Manual, for complete information on system layout, I/O Bus cable routing and SCADAPack controller installation.

Complete information on field wiring and configuration of the 5908-W02 transceiver is covered in this manual. Any additional information regarding the operability of the radio can be found in the *FreeWave Spread Spectrum Wireless Data Transceiver User Manual*.

Radio Module Layout

The following diagram shows the power supply, serial port and RF connections and the diagnostic LEDs for the Radio Module. This diagram is referred to in the following sections of the manual.

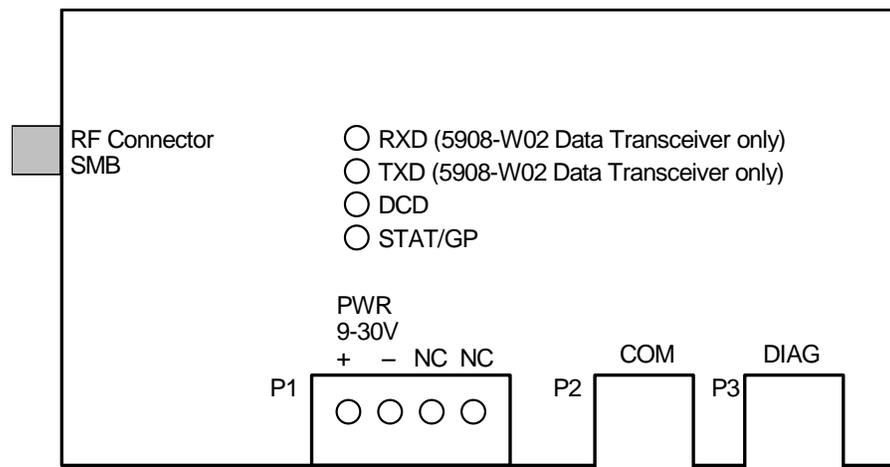


Figure 1: Radio Module Layout

Power Supply Connection

The Radio Module is powered from a 9VDC to 30VDC input power source. This power source is typically the same source the SCADAPack controllers are powered from. The voltage range is 9VDC minimum to 30VDC maximum.

- DC input power is applied to the positive (+) and negative (-) terminals on **PWR IN** connector P1.

The connector is removable allowing replacement of the Radio Module without disturbing the field wiring. Leave enough slack in the field wiring for the connector to be removed.

To remove the termination connector:

- Pull the connector upward from the board. Apply even pressure to both ends of the connector.

To install the termination connector:

- Line up the pins on the module with the holes in the connector.
- Push the connector onto the pins. Apply even pressure to both ends on the connector

System Grounding

It is desirable to ground the system by connecting the system power supply common, to the chassis or panel ground. The negative (–) side of the PWR IN terminal is connected to chassis ground.

Serial Port Connections

The two RS-232 communication ports, **COM** and **DIAG**, connect to 8 pin modular RJ-45 jacks. Refer to section **Serial Communication Ports** for pinout details and wiring diagrams for these modular jacks.

The **COM** serial port is used to connect the Radio Module to a serial port on the SCADAPack controller board. This port is configured at the factory for 9600 baud, 8 data bits, no parity and 1 stop bit. This port is fully configurable using the Setup Program. See section **Set Baud Rate** for information on configuring the COM port.

The **DIAG** serial port is used for configuration of the Radio Module. This port has the following parameters fixed: 8 data bits, no parity and 1 stop bit. It automatically configures itself to function at 1200, 2400, 9600, 19200, 38400, 57600 or 115200, as required.

See the section **Radio Module Setup Program** for information on configuration of the Radio Module using the MDS TransNET Radio Configuration software.

Antenna Connections

The antenna connection for the Radio Module is a male type SMB connector on the left side of the controller chassis.

Refer to the **MDS TransNET OEM Spread Spectrum Data Transceiver Manual** for antenna installation information

Antennas and feed lines need to be professionally installed as directed in the **MDS TransNET OEM Spread Spectrum Data Transceiver Manual**.

Control Microsystems has antenna, feed line and surge protector package available. Please contact Control Microsystems Sales for information on this package.

LED Indicators

The LED indicators are located on the cover of the Radio Module. The RXD and TXD LEDs are included in the 5908-W02 version of the Radio Module only.

The following table describes the LEDs on the Radio Module.

LED Label	Description
RXD Receive Data	Indicates serial receive data activity on the COM serial port. This LED is included with the 5908-W02 version of the Radio Module only. The RX led on the Wireless SCADAPack W02 serial port provides indication of receive data activity.
TXD Transmit Data	Indicates serial transmit data activity on the COM serial port. This LED is included with the 5908-W02 version of the Radio Module only. The TX led on the Wireless SCADAPack W02 serial port provides indication of transmit data activity.
DCD Data Carrier Detect	This LED is ON continuously when the Radio Module is sending and receiving synchronization frames with another transceiver. This LED will turn ON within 10 seconds of power-up under normal conditions.
STAT/GP Status General Purpose	When this LED is ON continuously power is applied to the Radio Module working correctly. When this LED is flashing (5 times per second) a the Radio Module is not working correctly. Refer to section <i>Troubleshooting</i> .

Radio Module Configuration

The typical installation for Wireless SCADAPack W02 controllers is in a point to multipoint configuration. In this configuration a single master Wireless SCADAPack W02 controller communicates with a number of Wireless SCADAPack W02 remote stations. The user is encouraged to thoroughly read the *Typical Applications* section of the **MDS TransNET OEM Spread Spectrum Data Transceiver Manual** for complete information on using Multipoint systems.

It is recommended that the following steps be used to configure the Radio Modules in your network.

- Open the MDS TransNET Radio Configuration software.
- Set the Operation Mode for the master and remote Radio Modules.
- Set the serial port parameters for the Radio Module **COM** port.
- Set the Radio Module **COM** port type.
- Set the Radio Module transmit power level.
- Set the Network Address for every Radio Modules.

Radio Module Setup Program

The Radio Module radios are shipped from the factory with default configuration settings. These setting will typically need to be adjusted for an individual network. Radio Module configuration is done using the **MDS TransNET Radio Configuration** program.

The PC that is running the **MDS TransNET Radio Configuration** program is connected to the Radio Module **DIAG** serial port. See section **RS-232 Cables** for information on the cable needed for this connection.

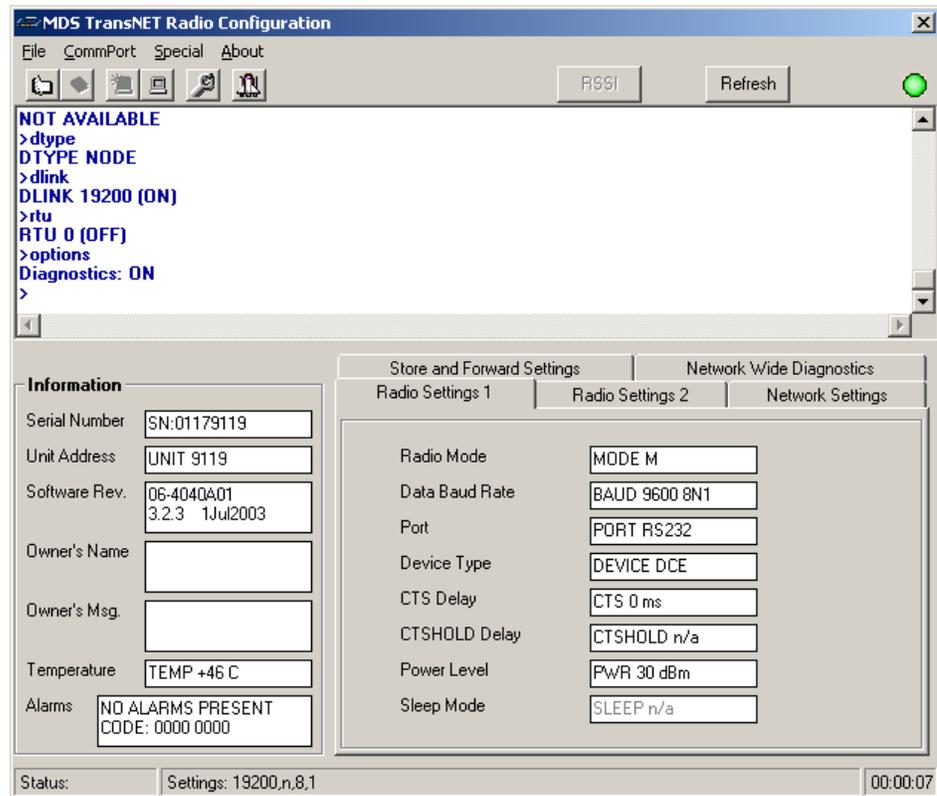
The **DIAG** serial port on the Radio Module is set for 8 data bits, no parity and 1 stop bit. The port automatically configures itself to function at 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 baud.

Setting up the Configuration Software

The **MDS TransNET Radio Configuration** software is installed from the "Hardware Documentation Configuration Applications" CD that is included with shipments from our factory. This CD will autorun when inserted into your CD drive. Click the **Install MDS TransNET Configuration** button to install the software.

- Start the MDS TransNET Radio Configuration program by selecting **MDS TransNET Configuration** from the Microwave Data Systems selection in the Windows Programs list.

The MDS TransNET Configuration setup screen is shown below.



Connecting to Radio Module

A serial port on the PC running the **MDS TransNET Radio Configuration** program needs to be connected to the Radio Module **DIAG** serial port. See section **RS-232 Cables** for information on the cable needed for this connection.

- Click **CommPort** command on the menu bar and then select **Setup**. The setup dialog is opened as shown below.



- In the **Port** window select the desired PC serial communication port to use and then click the **OK** button.
- COM port to use. Click "OK".

- Click **CommPort** command on the menu bar and then select **Port Open**. The software will now connect to the radio and retrieve the current radio settings.

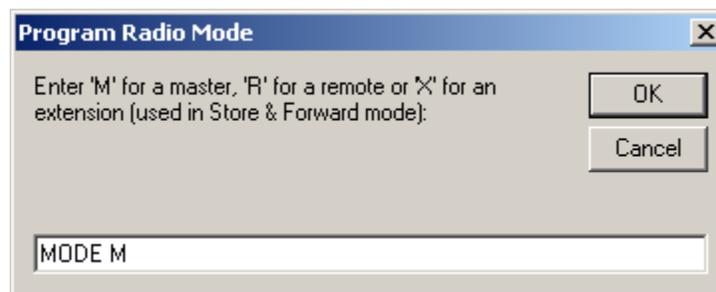
The basic configuration changes required are discussed in the following paragraphs. The user is encouraged to read the detailed description for each parameter in the ***MDS TransNET OEM Spread Spectrum Data Transceiver Manual***.

Set Operation Mode

Wireless SCADAPack W02 controllers are shipped with the Radio Modules configured for Remote (slave) operation. In a typical network there will be one master Wireless SCADAPack W02 controller and multiple slave Wireless SCADAPack W02 controllers. The Radio Mode for the master Wireless SCADAPack controller needs to be set to "**MODE M**" (Master) operation.

To configure a Radio Module for Master operation:

- Click on the tab labeled **Radio Settings 1**.
- Click anywhere in the **Radio Mode** window to open the **Program Radio Mode** dialog.



- Enter "**MODE M**" in the Radio Mode box to enable the Radio Module as a master.

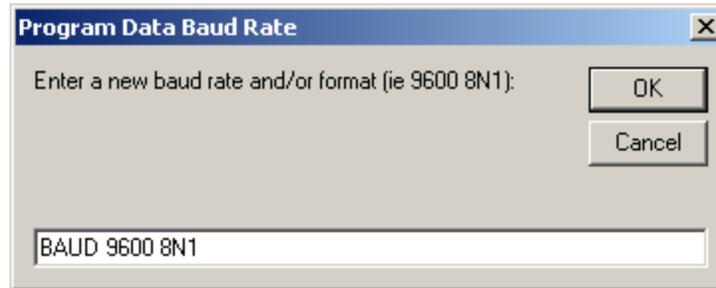
Set Baud Rate

The **Data Baud Rate** window is used to set the baud rate and communication parameters for the COM port on the Radio Module. The settings for the COM port of the Radio Module and the serial port of the SCADAPack controller it is connected to needs to be set to the same.

The Radio Module COM port is set to 9600 baud, 8 data bits, no parity and 1 stop bit at the factory. Depending on your system configuration you may wish to change the Radio Module COM port settings.

To configure the Radio Module COM port parameters:

- Click on the tab labeled **Radio Settings 1**.
- Click anywhere in the **Data Baud Rate** window to open the **Program Data Baud Rate** dialog.



- Enter “**BAUD XXXX abc**” in the Data Baud Rate box, where **XXXX** is the desired baud rate, **a** is the number of data bits (7 or 8), **b** is the parity (N for None, O for Odd, E for Even) and **c** is the number of stop bits (1 or 2). Example: BAUD 38400 8N1.

Set Port Type

The Radio Module COM port can be configured for either RS-232 or RS-485 operation. To change the port type:

- Click on the tab labeled **Radio Settings 1**.
- Click anywhere in the **Port** window to open the **Program Payload Port** dialog.



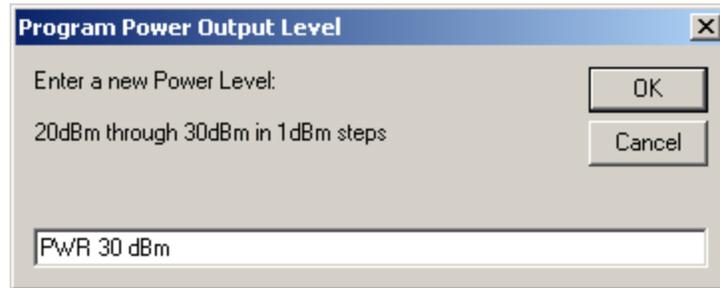
- Enter either “**PORT RS232**” or “**PORT RS485**” in the Port box.

For the Radio Module COM connector pinout see section **COM – RS-232/485 Communications Port**.

Set Power Level

To change the radio output power level, follow these steps:

- Click on the tab labeled **Radio Settings 1**.
- Click anywhere in the **Power Level** window to open the **Program Power Output Level** dialog.



- Enter **PWR XXdBm** in the Power Level box, where **XX** represents the level in dBm (max. +30dBm).

For dBm to Watt conversion see the MDS TransNET OEM Spread Spectrum Data Transceiver Manual.

Set the Network Settings

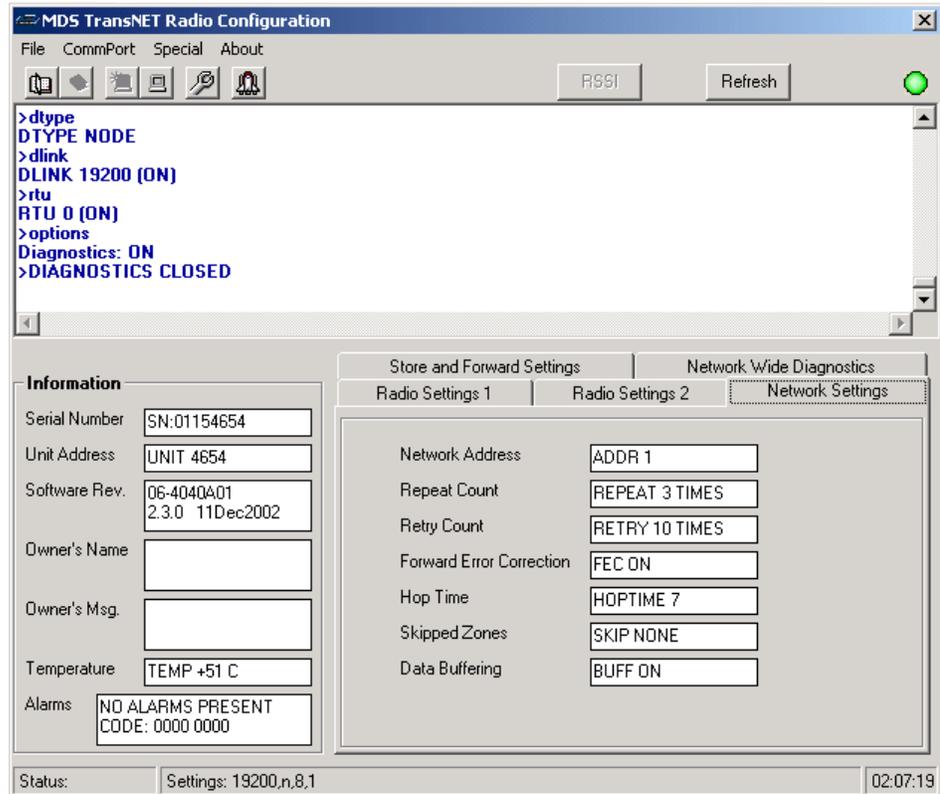
The Network Settings are set to identical values for all Radio Modules at the factory.

Parameters need to be identical for every radio in a network. With the exception of the Network Address these values will not usually require changes. The Network Address, for Radio Modules, needs to be changed from the factory default (NONE).

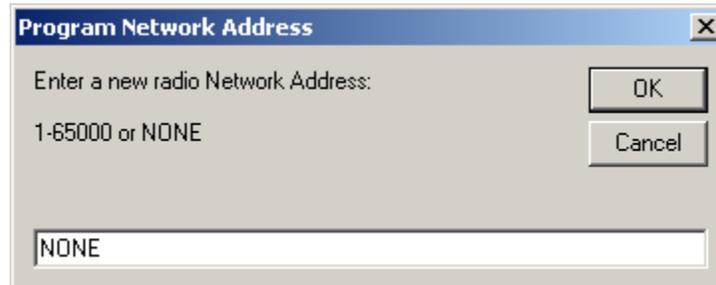
If the network address is invalid the STAT/GP LED flashes rapidly (5 times/ sec).

To configure the Radio Module Network Address:

- Click on the **Network Settings** tab. The MDS TransNET Configuration setup screen changes as shown below.



- Click anywhere in the **Network Address** window to open the **Program Network Address** dialog.



- Enter **ADDR XXX** in the Network Address box, where **XXX** is a number between 1 and 65,000.

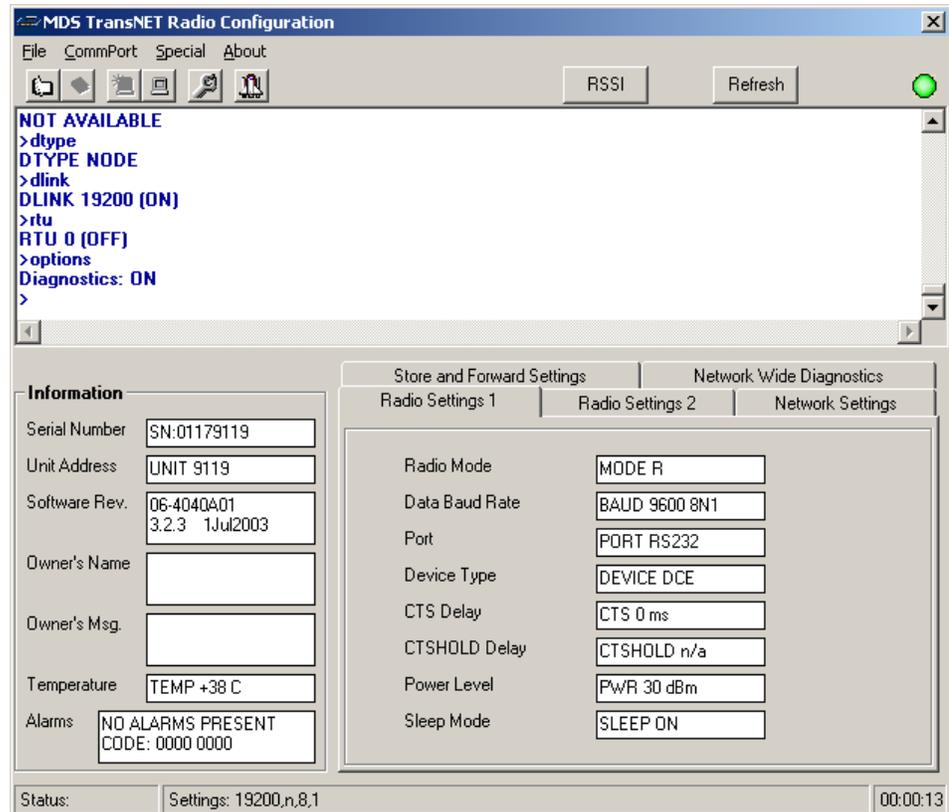
For MODBUS operation the Data Buffering setting is “**BUFF ON**”.

Sleep Mode

In some installations, such as at solar-powered sites, it may be necessary to keep the transceiver’s power consumption to an absolute minimum. This can be accomplished using the Radio Module’s Sleep Mode feature. In this mode, power consumption is reduced to about 8 mA.

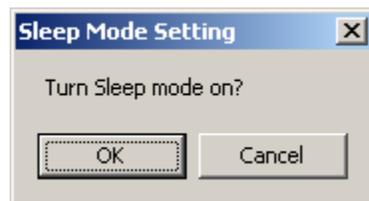
The Radio Module will wake up once per minute to synchronize with the master radio. The time to synchronize will typically be less than 0.5 seconds if a master is present. If a master radio is not present the Radio Module will go back to Sleep mode in 10 to 15 seconds.

To use the Sleep feature the Sleep Mode parameter is set to SLEEP ON. The Radio Mode is set to Remote (MODE R), Sleep Mode is not available on Master radios.



To select the Sleep Mode:

- Click on the tab labeled **Radio Settings 1**.
- Click anywhere in the **Sleep Mode** window to open the Sleep Mode dialog.



- Click **OK** to turn on Sleep mode.

When Sleep mode is enabled the Radio Module can be put to sleep and awakened by controlling pin 2, Sleep Mode Input, on the COM serial port. See section **COM – RS-232/485 Communications Port** section for information on the COM serial port.

The Sleep Mode Input can be controlled from the DTR signal on SCADAPack controller. The DTR signal from the SCADAPack controller will need to be connected to the Sleep Mode Input on the Radio Module COM serial port.

- For Telepace applications the CNFG DTR Off register assignment module can be used to control the DTR signal for a SCADAPack serial port.
- For IEC 61131-1 applications the dtroff function can be used to control the DTR signal for a SCADAPack serial port.

Serial Communication Ports

The Radio Module is equipped with two serial communication ports labeled **COM** and **DIAG**. These serial communication ports use RJ-45 type connectors. The **COM** port can be configured for RS-232 or RS-485 operation.

The **COM** serial port is the communication interface to the Radio Module. The **DIAG** port is used to configure the Radio Module communication and network parameters.

DIAG - Diagnostics Port

The following table shows the serial communication parameters used by the DIAG port. These parameters are fixed at the factory and cannot be modified.

Parameter	Supported Values
Baud Rate	Auto configurable between 1200 and 115200 bps
Duplex	Fixed at Full
Parity	Fixed at None
Data Bits	Fixed 8 Bits
Stop Bits	Fixed at 1 Bit

Connections to the **DIAG** port are made through a RJ-45 modular connector. The **DIAG** port supports Tx, Rx and ground signals. The following diagram shows the pin connections for the RS-232 (RJ-45) port connector for the **DIAG** port.

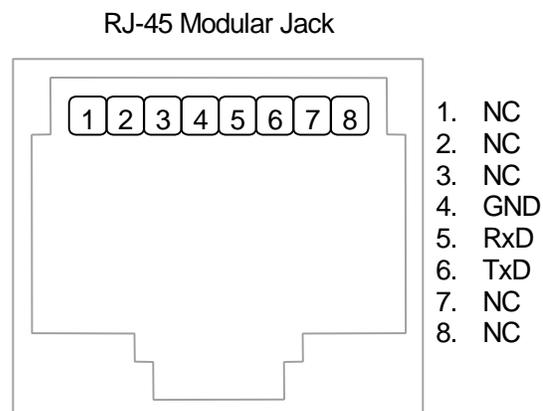


Figure 2: DIAG Port Modular Jack

The following table provides a description of the function of each pin of the RJ-45 connector. In this table a MARK level is a voltage of +3V or greater and a SPACE level is a voltage of 0V.

Pin	Function	Description
1	NC	No connection.
2	NC	No connection.
3	NC	No connection.
4	GND	This pin is connected to the system ground.
5	RxD (Input)	The level is SPACE on standby and MARK for received data.
6	TxD (Output)	The level is SPACE on standby and MARK for transmitted data.
7	NC	No connection.
8	NC	No connection.

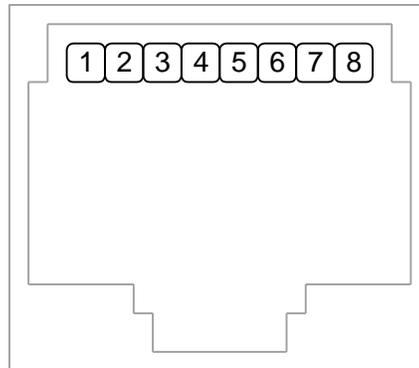
COM – RS-232/485 Communications Port

Serial port **COM** on the Radio Module may be configured as an RS-232 or RS-485 serial communication port. The following table shows the serial communication parameters supported by the **COM** port. These parameters are set using Radio Module Setup Program. Default values are set at the factory.

Parameter	Supported Values
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200. Default: 9600
Parity	Odd, None or Even Default: None
Data Bits	7 or 8 Bits Default: 8 Bits
Stop Bits	1 or 2 Bits Default: 1 Bit

Connections to the **COM** port are made through a RJ-45 modular connector. The **COM** port supports RxD and TxD plus Ground. The following diagram shows the pin connections for the RJ-45 port connector for the **COM** port.

RJ-45 Modular Jack



1. N/C
2. Sleep Mode Input
3. N/C
4. GND
5. RxD (RS-232) / Rx+ (RS-485)
6. TxD (RS-232) / Tx+ (RS-485)
7. CTS (RS-232) / Rx- (RS-485)
8. RTS (RS-232) / Tx- (RS-485)

Figure 3: COM Port Modular Jack

The following table provides a description of the function of each pin of the RJ-45 connector. In this table a MARK level is a voltage of +3V or greater and a SPACE level is a voltage of 0V.

Pin	Function	Description
1	NC	No connection.
2	Sleep Mode	Digital Input compatible with RS-232 and TTL. Connect to the controller DTR if Sleep Mode required. De-asserting DTR will put the Data Transceiver in Sleep Mode. For Sleep Mode information see the MDS TransNET OEM Spread Spectrum Data Transceiver Manual.
3	NC	No connection.
4	GND	This pin is connected to the system ground.
5	RxD / Rx+ (Input)	The level is SPACE on standby and MARK for received data. (Also used as Rx+ in RS-485 operation.)
6	TxD / Tx+ (Output)	The level is SPACE on standby and MARK for transmitted data. (Also used as Tx+ in RS-485 operation.)
7	CTS / Rx- (Input)	A MARK level is required for the communication port to transmit data. When the attached device does not provide this signal, the controller keeps the line at a MARK. When the attached device does provide this signal, it sets CTS to MARK to allow the controller to transmit data. (Also used as Rx- in RS-485 operation.)
8	RTS / Tx-	This pin is a MARK if full-duplex operation is selected for

Pin	Function	Description
	(Output)	the port. This pin is set to a MARK just before and during transmission of data if half-duplex operation is selected. This pin is set to a SPACE when no data is being transmitted. (Also used as Tx- in RS-485 operation.)

RS-232 Cables

RJ-45 to DE-9S DTE

This cable is used to connect from the RJ-45 based RS-232 COM or DIAG port to a SCADAPack controller DE-9P connector. A 6 in. long cable is available from Control Microsystems as part number TBUM307242.

This cable does not support the Sleep Mode on the Radio Module.

RJ-45 8 Pins	RJ-45 DTE Function	DE9S DTE Function	DE9S 9 Pins
			Shield optional, connects to shell if used.
6	TxD	RxD	2
5	RxD	TxD	3
4	GND	GND	5
7	CTS	RTS	7
8	RTS	CTS	8
1	5V	5V	9
2 and 3 No wires connected at this end.			Wires not connected at this end; 1, 4 and 6.

RJ-45 to RJ-45 DTE

This cable is used to connect from the RJ-45 based RS-232 COM or DIAG port to a SCADAPack RJ-45 based serial port. A 7 in. long cable is available from Control Microsystems as part number TBUM307224.

This cable does not support the Sleep Mode on the Radio Module.

RJ-45 8 Pins	RJ-45 DTE Function	RJ-45 DTE Function	RJ-45 8 Pins
			Shield optional, connects to shell if used.

RJ-45 8 Pins	RJ-45 DTE Function	RJ-45 DTE Function	RJ-45 8 Pins
6	TxD	RxD	5
5	RxD	TxD	6
4	GND	GND	4
7	CTS	RTS	8
8	RTS	CTS	7
1	5V	5V	1
2 and 3 No wires connected at this end.			Wires not connected at this end; 2 and 3.

RS-485 Wiring

The COM serial port can be configured for RS-485 4-wire full duplex or 2-wire half duplex.

RS-485 4-wire Full Duplex

COM pin	RS-485 function
5	Rx+
6	Tx+
7	Rx-
8	Tx-

RS-485 2-wire Half Duplex

COM pin	RS-485 function
5 connected to 6	+ or A
7 connected to 8	- or B

Maintenance

The Radio Module requires no maintenance. If the Radio Module is not functioning correctly, contact Control Microsystems Technical Support for information on returning the Wireless SCADAPack W02 for repair.

Troubleshooting

Condition	Action
Cannot connect to DIAG configuration port.	<p>Confirm that the correct serial cable is being used and is connected to the DIAG port and your PC.</p> <p>Confirm the correct PC port is selected in the configuration software and the PC port is not being used by another application.</p>
SCADAPack controller will not communicate with Radio Module.	<p>Ensure the serial port settings for the SCADAPack controller serial port and the COM settings for the Radio Module are the same.</p>
Leds on Radio Module are off.	<p>Check that correct power is connected to the PWR IN terminals on the Radio Module.</p>
Leds on Radio Module and SCADAPack controller are off.	<p>Check that the SCADAPack controller is properly powered as described in the controller user manual.</p> <p>Check that correct power is connected to the PWR IN terminals on the Radio Module.</p>
Interference is suspected.	<p>Verify that the system has a unique network address. Nearby systems with the same address will cause interference.</p> <p>If omni directional antennas are used on remote stations, consider changing to directional antennas. This will often limit interference to and from other stations.</p>
No synchronization with master, or poor overall performance.	<p>Check interface connections at the radio and the connected device.</p> <p>Check the antenna, feed line and connectors. Reflected power should be less than 10% of the forward power reading.</p> <p>If the remote radio is in synchronization, but performance is poor, check the received signal strength using the RSSI command. If RSSI is low, it may be misalignment of directional antenna headings.</p> <p>Verify proper programming of system parameters: mode, network address, data interface baud rate, transmitter power, CTS delay, etc. For store-and-forward applications, also verify the following: SAF is ON and extended address is properly programmed at</p>

Condition	Action
	each extension.
BER is too high. Data throughput is spotty.	<p>The RETRY and REPEAT commands may be increased to deal with interference, or decreased to increase throughput and reduce latency.</p> <p>Try turning on FEC. FEC on gives some coding gain, but comes at the cost of reduced throughput.</p>
Latency is too high.	<p>Reduce the REPEAT count.</p> <p>Check that HOPTIME is set to 7.</p>

Specifications

Disclaimer: Control Microsystems reserves the right to change product specifications. For more information visit www.controlmicrosystems.com.

Radio Module

Power Supply

Input Voltage Range	9 to 30VDC UL508 rated 13.75-28VDC. Class 2.
Power requirements (Typical)	Transmit: 510mA @ 13.8VDC. Receive: 115mA @ 13.8VDC. Sleep Mode: 8mA @ 13.8VDC.
Power Requirements	7.5W maximum

Connectors

Power Input Connector PWR IN	4 pole, removable terminal block 12 to 22 AWG 15A contacts
Communication Port COM	RS-232 serial port Data Terminal Equipment (DTE) 8 pin modular jack Implemented TxD, RxD, CTS, RTS, DTR RS-485: Rx+, Tx+, Rx-, Tx-
Diagnostics Port DIAG	RS-232 serial port Data Terminal Equipment (DTE) 8 pin modular jack Implemented TxD, RxD
RF	SMB

Data Communications

Baud Rates	1200, 2400, 4800, 9600, 192000, 38400, 57600, 115200
Word Length	10 or 11 bits
Maximum Data Rate	Continuous up to 115200 bps
Data Latency	7 ms (typical)

Features

Store and Forward	Yes
Sleep mode	DTR controlled

RF Characteristics

Frequency Range	Up to 128 frequencies within 902-928 MHz., configurable in 3.2 MHz. zones
Hop Pattern	Based on network address
Frequency stability	±1.5 ppm
Half-Duplex Operation	±1.6 MHz. TX/RX split
Network Addresses	65,000
Transmitter Power Output	1.0 Watt (+30 dBm) maximum (at antenna connector)
Duty Cycle	Continuous
Modulation type	CPFSK
Output Impedance	50 ohms
Transmitter Spurious	-60 dBc
Transmitter Harmonics	-55 dBc
Receiver Type	Double conversion superheterodyne
Receiver sensitivity	-108 dBm @ 1 X 10 ⁻⁶ BER
Intermodulation	54 dB minimum (EIA)
Desensitization	75 dB
Receiver Spurious	70 dB minimum
Interference Ratio	Co-channel: -10 dB (SINAD degraded by 3dB) Adjacent channel: +30 dB Two Channels away: +40 dB Three Channels away: +48 dB
Synchronization Time	0.5 Seconds (typical) required to synchronize with Master Radio

Wireless Controller

General

I/O Terminations	<p>4 pole, removable terminal block 12 to 22 AWG 15A contacts Screw termination - 6 lb.-in. (0.68 Nm) torque 8 pole modular jacks</p>
Packaging	<p>The MDS transceiver is mounted inside the top cover of the following SCADAPack controllers: SCADAPack SCADAPack LP SCADAPack 100 SCADAPack 32 SCADAPack 32P Micro16</p>
Dimensions	<p>SCADAPack, SCADAPack 32 8.40 inch (213mm) wide 6.13 inch (155mm) high 3.50 inch (89mm) deep SCADAPack LP 8.40 inch (213mm) wide 5.00 inch (127mm) high 2.40 inch (61mm) deep SCADAPack 32P, Micro16 8.40 inch (213mm) wide 4.63 inch (118mm) high 2.40 inch (61mm) deep SCADAPack 100 5.65 inch (144mm) wide 5.00 inch (127mm) high 2.40 inch (61mm) deep Data Transceiver Model 5911 5.65 inch (144mm) wide 5.00 inch (127mm) high 2.40 inch (61mm) deep</p>
Environment	<p>5% RH to 95% RH, non-condensing -40°C to 70°C -40°F to 158°F</p>
Isolation	<p>Common ground return connected to Chassis Ground</p>

Visual Indicators

Status/GP	Red LED, Status/General Purpose
DCD	Red LED, Data Carrier Detect
TXD	Red LED, Transmit data (Model 5208 Data Transceiver only)
RXD	Red LED, Receive data (Model 5208 Data Transceiver only)

Approvals and Certifications

Hazardous Locations - North America	cULus Class 1, Div. 2 Groups A, B, C and D Hazardous Locations. Temp Code T4A at 70C UL Listed and CSA certified to the requirements of: <ul style="list-style-type: none"> • CSA Std. C22.2 No. 213-M1987 - Hazardous Locations. • UL Std. No. 1604 - Hazardous (Classified) Locations.
Safety	CSA (cCSAus) certified to the requirements of: CSA C22.2 No. 142-M1987 and UL508. (Process Control Equipment, Industrial Control Equipment) UL (cULus) listed: UL508 (Industrial Control Equipment)
Digital Emissions	FCC Part 15, Subpart B, Class A Verification EN50081-2: 1993 Electromagnetic Compatibility Generic Emission Standard Part2: Industrial Environment
Immunity	EN61000-6-2:1999 Electromagnetic Compatibility Generic Standards Immunity for Industrial Environments.
FCC	Part 15.247 (E5MDS-EL806)
Industry Canada	RSS-210 and RSS-139 (CAN 3738A-MDSEL806)