

AirStream™

Wireless Modem

Operation Manual



Chapter 1: Overview	1
Why Wireless?	1
AirStream Technology	2
Frequency Hopping	3
Speed and Bandwidth	3
Sessions and Links	4
Error Detection and Correction	4
Transmit Power Control	5
Data Transfer Sessions	5
Security	6
Transceiver Features	6
Using This Manual	7
Assumptions	8
Getting Help	8
Chapter 2: Installation and Specifications	9
Hardware Installation	9
Installing Stand-alone Transceivers	9
Interface Requirements	11
Stand-alone Transceiver Pin Out	12
Serial Communications	13
Hardware Specifications	15
Software Requirements	16
Software Installation	16
Configuration Manager	16
Network Software Utilities	17
Antennas	17
Chapter 3: Point to Point and Network Topologies	19
Point to Point Pair	19
Networks	19
Multi-Point Network	20
Repeater Network	20
Broadcast Network	22
Network Software Utilities	23

ComPort Intercept	23
TCP/IP Intercept	24
ActiveX Library	24
DOS Library	24

Chapter 4: Configuring Your Transceiver 25

Getting Status	26
The Toolbar	27
Exiting the program	27
Quick Configuration	27
Modifying Settings	31
Applying and Storing Changes	31
Generating Reports	32
Power Management.....	34
Passwords and Access.....	36
Levels Of Access	36
Passwords	36
Using Hop Tables.....	37
Entering Hop Table Numbers	37
Validating the Hop Table	38
Specifying Hopping Parameters	38
Assigning IDs.....	39
Signal Analysis	41
Serial Settings	41
Data Threshold	43

Chapter 5: Setting up a Network with ComPort 45

ComPort Configurator	46
Advanced View	48
Entering and Changing Information	48
Adding Virtual Ports	48
Setting Control Line Parameters	51
Tx Purge	51
Remove Unit ID Number	52
Remove Virtual Communications Port	53
Renaming Virtual Ports	53
Using ComPort Activator.....	53
ComPort Activator	54

Chapter 6: Setting up a Network with TCP/IP	55
TCP/IP Configurator	56
Advanced View	57
Entering and Changing Information	58
Adding TCP/IP Ports	58
Editing Ports	60
Setting Control Line Parameters.....	61
Remove Unit ID Number	61
Remove TCP/IP COM Port	62
Renaming TCP/IP Ports	62
Monitoring Activity	62
Using TCP/IP Activator	64
TCP/IP Activator	64
Chapter 7: ActiveX Network Applications	67
wCi_OPEN	67
wCi_Close	68
wCi_WriteDataEx	68
wCi_GetDestinationID	69
wCi_CheckRxQue	69
wCi_SetOutputDeviceID	69
wCi_StartStopPrinting	70
wCi_GetSourceID	70
wCi_SetGpioOutput	71
wCi_GetGpioOutput	71
wCi_GetGpioInput	72
wCi_GetGpioMode	72
wCi_Ping	73
AboutBox	73
NewMessage.....	73
ActiveX Design Time Properties Page:.....	74
Chapter 8: Testing Your Units	75
Terminal Mode Test	75
What You Need	75
Performing the Test.....	76
Loopback Test	76
What You Need.....	77
Performing the Test	77
Viewing Data In The Rx And Tx Panes	79

Using Hyperterminal	80
Chapter 9: Troubleshooting.....	81
Chapter 10: Learning Exercises.....	83
Point to Point	83
Materials Needed	83
Procedure	83
Multi-Point ComPort Intercept.....	86
Materials Needed	86
Procedure	86
Multi-Point TCP/IP Intercept	91
Materials Needed	91
Procedure	91
Repeater TCP/IP Intercept	95
Materials Needed	95
Procedure	95
Broadcast Remote-To-All	100
Materials Needed	100
Procedure	100
Broadcast Remote-To-Host	104
Materials Needed	104
Procedure	104
Glossary	109
Warranty	110

Chapter 1: Overview



Welcome to the AirStream™ family of wireless Transceivers. These frequency hopping transceivers are supplied as a Stand-alone Transceiver that plugs into the RS232 port of an existing product and can be used to create wireless data networks in the license-free band at 2.4 GHz. AirStream Transceivers can function in a wide array of network topologies. This manual provides the information you need to install, configure, and test this transceiver in a variety of these networks.

WHY WIRELESS?

AirStream Transceivers provide the first practical and affordable alternative to wire for industrial and commercial applications where data must be transmitted reliably and securely in a wide range of indoor and outdoor environments. These applications are solutions for OEMs and Systems Integrators in need of reliable, secure, long-range, and low-cost alternatives to wire for commercial and industrial applications. There are hundreds of factory, office, industrial, transportation, medical, financial, and retail applications for which AirStream solutions are ideally suited.

Wireless data connectivity offers many advantages over wire:

- Wireless systems are easier to install
- Wireless system installation and maintenance costs are lower
- Wireless links are feasible in many locations where wire is not
- Wireless installations can be reconfigured or relocated easily
- Wireless products are mobile

In this Chapter

- Why Wireless
- AirStream Technology
- Frequency Hopping
- Security
- Transceiver Features
- Assumptions
- Using this Manual
- Getting Help

Reliability, security, range, and cost have been the traditional obstacles to widespread adoption of wireless data networks. But today frequency hopping technology provides reliability comparable to and security greater than wire. AirStream Transceivers have been designed specifically for long range and low cost. Moreover, the license-free band at 2.4GHz allows wireless data connectivity solutions to be implemented without site licenses or carrier fees. These developments make wireless data networks more practical and affordable than wire for many applications.

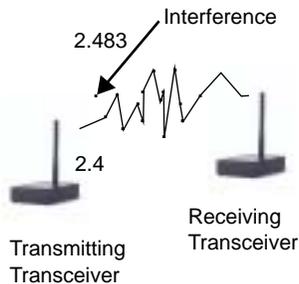
AirStream wireless data connectivity solutions are more reliable, more secure, longer range, and lower cost than wire:

- **More Reliable**
AirStream Transceivers evaluated with industry standard test equipment have exceeded a bit error rate (BER) standard 100 times more rigorous than for 10 BaseT Ethernet and 1,000 times more reliably than cellular devices.
- **More Secure**
AirStream Transceivers utilize frequency hopping technology developed by the military and refined by intelligence agencies to avoid interception and interference. It is more difficult to intercept communications between AirStream wireless devices than to tap a wire.
- **Longer Range**
AirStream Transceivers operate through walls and floors up to 1,500 feet in most buildings, and line-of-sight to the horizon outdoors. For longer distances, networks of AirStream Transceivers can relay data packets to and from out-of-range devices to significantly extend the range of a wireless data network.
- **Lower Cost**
Wireless devices are installed at prices that can be a fraction of the cost of wires. AirStream devices can be moved or reconfigured at no additional cost.

AIRSTREAM TECHNOLOGY

AirStream uses Frequency Hopping Spread Spectrum (FHSS) technology to ensure secure, reliable long-range data transmissions. AirStream utilizes this proven technology to provide OEMs and Systems Integrators with a superior wireless data connectivity solution for many industrial and commercial applications.

Frequency Hopping



Frequency Hopping Spread Spectrum technology was developed by the U.S. military to prevent interference or interception of radio transmissions on the battlefield. Frequency hopping devices concentrate their full power into a very narrow signal and randomly hop from one frequency to another within that spectrum up to 200 times per second. If they encounter interference on a particular frequency, the devices retain the affected data, randomly hop to another point on the spectrum, and continue transmission. There are always spaces without interference somewhere in the allotted radio spectrum. A frequency hopping device will find those spaces and complete a transmission where other wireless technologies fail.

AirStream Transceivers operate in the license-free Industrial, Scientific, and Medical (ISM) band at 2.4GHz. No one owns or licenses these frequency bands. Consequently, anyone may operate a wireless network in a license-free band without licenses or carrier fees (unlike cellular technology), subject only to restrictions on how much power can be used (1 watt or less in the U.S.) and the type of radio signals transmitted (spread spectrum). The U.S. FCC and telecommunications regulators in many countries have designated this band for low-power license-free use.

Speed and Bandwidth

There is a common misconception regarding speed and data connectivity; specifically, that faster is better. In computer and telecommunications networks, higher speeds are unquestionably superior. However, this is not the case with wireless data connectivity. There are many circumstances where range, in-building penetration, and reliability are more important than speed.

Paying for more speed than what is necessary to implement a data connectivity application is not efficient. The broader radio frequency (RF) bandwidth needed to transmit higher data rates dramatically reduces range. In contrast, the lower data rates used by AirStream allow narrow bandwidths to be used. This is ideal for intermittent, repetitive data transfer, where the premium is on accuracy and long-range transmission. AirStream products have been designed specifically to meet the requirements of such applications. A lower data rate enables AirStream Transceivers to operate within a narrow RF band over significantly longer ranges than other 2.4 GHz Frequency Hopping or Direct Sequence Spread Spectrum (DSSS) products.

Sessions and Links

AirStream Transceivers use demand-based frequency hopping where RF is only transmitted when there is data available to transmit. The initiating transceiver is termed the master and the receiving transceiver is called the slave. Any device (host or remote transceiver) can be a master or a slave depending on who initiates the data transfer. AirStream Transceivers transmit data using sessions and links. A session represents a complete data transfer cycle between two devices. The session lasts as long as it takes to transfer all of the data being sent. A session can be comprised of a number of links which represent the actual transfer of data between two devices. Radio interference can break a link but not end a session. It may take several links to complete a session. If a link is broken, it is the job of the master to reinitiate the link in order to complete the session. This strategy reduces the collision rate of packets and RF interference from adjacent devices.

Data going in and out of the transceiver via the serial port is (or can be) a continuous stream of information; whereas, data transmitted over the air is broken into frames. Links consist of these frames. The frame represents the physical data packet transmitted per hop between units.

The transceiver's channel access (communications link) is based on the Carrier Sense Multiple Access (CSMA) protocol. This protocol has the advantage of requiring no special coordination between remotes and works best with a large or variable number of remotes transmitting infrequent bursts of data. Channel latency is exponentially distributed, meaning there is a wait cycle during interference. During interference, data is hopped to another frequency. Although there is a slight delay during each hop, data is not lost.

Error Detection and Correction

AirStream Transceivers provide CRC error correction, forward error correction, and transmission retry to ensure complete transmissions, even in the most demanding circumstances.

The transceiver uses the ITU cyclical redundancy code 16 (CRC-16) for error detection. Two separate CRC-16 checks are used within each packet frame:

- Header Section
- Data Section

Most wireless systems experience single bit errors as the most common type of reception error. Forward Error Correction (FEC) can be used to correct for a specific number of bit errors within x -number of bits transmitted. AirStream uses a 'Half Rate Coding' algorithm which achieves a correction rate of 1 bit-error in 4 bits transmitted.

The transceiver maintains data integrity over the air by means of an internal automatic-repeat-request (ARQ) protocol, which will resend erroneous data until it is received correctly. The transceiver takes user data and breaks it into packets which are then transmitted at a much higher channel data rate. If the received packet has errors and is not correctable via the forward-error-correction (FEC) algorithm, the packet is rejected and resent until a valid packet is received. The transceiver maintains two 4kB buffers (transmit and receive) which helps to support continuous uninterrupted transfers even in noisy situations. See Broadcast Network on page 22 for details on how Broadcast Network behavior differs.

Transmit Power Control

Wireless devices in close proximity often experience desensing or overloading. AirStream Transceivers minimize this problem by providing adjustments in the Power Level Feed-Back Control Loop based on the time-averaged Received Signal Strength Indicator (RSSI) values and the Actual Power Level Setting as shared between both devices during a communication session.

Data Transfer Sessions

All units are in one of six possible sequential modes or phases of operation which cover the complete cycle of data transfer.

1. Idle
Unit listens and scans in each of the 75 channels in the hop table. No activity.
2. Link Acquisition
Data is present locally, unit begins to ping (search) each frequency in hop table to find the remote unit.
3. Synchronization
Units on both ends of data transfer synchronize their hopping patterns.

4. Data Transfer

In-sync units each alternate transmitting and receiving data in 32msec intervals (32msec Tx, 32msec Rx). Each 64 msec they hop to the next frequency.

5. Exit Phase

Data transfer is complete based upon the setting for number of frames of No Data specified in the transceiver's configuration.

6. End Connection

Data transfer is complete, units return to Idle mode.

SECURITY

Frequency hopping is inherently more secure than other RF technologies. In addition, each AirStream Transceiver has a Vendor ID set in the firmware shipped straight from the factory. As you configure each transceiver you may provide additional network ID numbers and assign varying hop tables for independent networks. The combination of firmware, software IDs, and frequency hopping technology ensures safe and secure data transmissions. AirStream Transceivers also support your data encryption software.

TRANSCEIVER FEATURES

AirStream Transceivers enable OEMs and Systems Integrators to integrate license-free 2.4GHz frequency hopping technology into their own products. Each transceiver includes a proprietary RF module with a frequency hopping transmitter and receiver, a Digital Control Module for RF Module and Application Interface management, and an interface (TTL or RS232) designed to communicate with a variety of products. The AirStream Transceivers employ a wireless interface designed to function as a virtual wire replacement. This offers some distinct advantages over wire. AirStream Transceivers:

- Enable mobility that may not have been possible before. And using either the RS232 or RS485 serial connection, the transceivers can connect devices at long range—up to 1500 feet indoors, and line of sight to the horizon.
- Compensate for baud rate differences between devices, eliminating the need for converters between older, slower devices and newer, somewhat faster ones.

- Provide a GPIO (General Purpose Input/Output) mode for enabling communication of status and control information in addition to data. This ensures timely notification of state changes such as an “out of paper” indication, eliminating the need for time-consuming manual checking for such conditions.
- Provide both Software and Hardware Flow Control to enable pacing of data transmission between devices.
- Enable efficient timed or batched transmission of data through data thresholding capabilities.
- Provide power control modes for power conservation.
- Provide asymmetrical data rates to accommodate large directional data transfers.
- Provide the configurability to support a variety of network topologies.
- Can be upgraded in the field.

USING THIS MANUAL

All AirStream software applications are Windows® based and adhere to Windows software conventions.

The conventions used for instructions in this manual are as follows:

Convention	Definition
bold	Bold is used to indicate something that should be typed exactly or an exact duplication of a window name or button.
click	Click with the button on the mouse and release. Left button always implied on Windows.
Control-e	Hold down the Control key and press the E key.
double-click	Click two times quickly on the mouse button and release.
right-click	Click with the right button on the mouse and release.
select	This can mean to highlight (which is the action of changing a screen object’s attribute to have an inverted look on the screen) icons or list items by clicking or by clicking a menu item and dragging the cursor over its options to choose that option or sub-item.
Shift-click	Hold down the Shift key and click.

ASSUMPTIONS

It is assumed that you are familiar with your Windows operating system. It is also assumed that your Windows operating system is operating in default mode (e.g., double-click to open). All instructions in this manual assume default mode (as delivered) operation.

GETTING HELP



Each software program has on-line help accessible through the help menu within the program. For Technical Support call 1-800-472-6703.

Chapter 2: Installation and Specifications

This chapter discusses the physical installation of the transceiver and the installation of the software needed to configure each transceiver. All AirStream Transceivers need to be configured for a specific network topology. This process involves understanding how the equipment is physically installed and how the software is installed. Sequentially, all transceivers are configured on a Host PC prior to being physically attached to their designated device. Configuration of the transceivers is discussed in Chapter 4, Configuring your Transceiver on page 25.

In this Chapter

- Hardware Installation
- Interface Requirements
- Pin Outs
- Serial Communication
- Hardware Specifications
- Software Requirements
- Software Installation
- Antennas

HARDWARE INSTALLATION

Prior to installing your transceiver(s), please count all of the delivered equipment. Use your packing slip or purchase order for verification. Each transceiver needs power and an antenna. It will be attached either internally or externally to a single device(e.g., PC, laptop, or printer).

Installing Stand-alone Transceivers

To Install Stand-alone Transceivers

1. Insert the power supply male connector into the corresponding female connector slot on transceiver chassis.



2. Insert Power supply plug into power (i.e., power outlet)

Verify LEDs 1 and 2 on front panel blink three times. LED 1 remains lit.

3. Attach the Antenna to the transceiver.

Note that the antenna connection is a reverse thread SMA connection. You must turn it counter-clockwise to attach.

4. Attach the male connector on the RS232 cable to the matching serial port on the rear panel of the transceiver.
5. Connect the other end of this cable to the matching serial port on the device.

Note: Prior to installation on the desired device, all transceivers must first be connected to and configured with a PC. In the case of some network installations, it must be the Host PC.

INTERFACE REQUIREMENTS

	Design-in	Stand-alone
Input Power Requirements		
Voltage	+5.0 Volts, +/- 5%	Greater than 6.5 Volts and Less than 9.0 Volts (6.5 -32 Volts if Wide Input model)
Ripple	Less then 10mV(RMS) from DC to 1MHz	Less then 250mV(RMS) from DC to 1MHz
Current in Idle mode	~200mA	~200mA
Instantaneous Current in Tx mode	550mA	550mA
Time averaged (over 100mSec.) Current in Tx/Rx mode	~360mA	~360mA
Physical Interface Requirements		
	PCB connector: 1x12 right angle connector; 0.025 square pin @ 0.1 spacing Matching connector: AMP Part Number 2-87499-1 or equivalent	PCB connector: Standard DB-9(Female)
Electrical Interface Voltage Levels		
Input levels	Low <1.5 Volts; High > 3.5 Volts @ 20uA	Low -3.0 to -30 Volts; High +3.0 to +30
Output levels	Low < 0.4 Volts; High > 3.7 Volts @ 6 mA	Low < -5.0 Volts; High > +5.0 Volts @ 3mA
Open Collector Output	Low < 0.7 Volts @12mA	N/A

Stand-alone Transceiver Pin Out

Pin	name	I/O	Function
1	DCD – Data Carrier Detect	Output	Session Status (True)
2	TxD – Transmit Data	Output	Data from transceiver to the attached device
3	RxD – Receive Data	Input	Data into transceiver from the attached device
4	DTR – Data Terminal Ready	Input	Data/Command Mode
5	Gnd	--	Signal Ground
6	DSR – Data Set Ready	Output	Always Asserted (High)
7	RTS – Request to Send	Input	HW Flow Control (internally pulled up)
8	CTS – Clear to Send	Output	HW Flow Control (default: asserted/High)
9	RI – Ring Indicate	Output	Status Change (default: de-asserted/Low)

SERIAL COMMUNICATIONS



In order to configure any transceiver, you must use a 9 pin RS232 cable. This is necessary because pin 4 is used to transmit the configuration data into EEPROM and other pins are used during the configuration process as well. AirStream provides a 9 pin RS232 cable with all Stand-alone Transceivers. A TTL to RS232 pin adapter is purchasable for Design-in Transceivers.

You must use the 9 wire cable in the following cases:

- When using the Configuration Manager to initialize/setup a transceiver.
- When the Host PC is using network utilities.
- When field upgrading the transceiver.

Once configuration is complete, you may opt to use a 3 or 5 wire cable during field communication with Stand-alone transceivers. These cables are not provided by AirStream. They can be purchased from a number of sources.

To determine which cable you need in the field

1. Evaluate which connections you need

Wire Type	What's Connected
3 Wire Connection	Data (TxD/RxD) and Ground. Does NOT support Hardware Flow Control; will work with no Flow Control or Software Flow Control
5 Wire Connection	Data and Ground; with Hardware Flow Control (RTS/CTS) (receive, transmit, ground, hardware flow control). Required for Hardware Flow Control, will also work with no Flow Control or Software Flow Control.
9 Wire Connection	All 9 pins are connected.

2. Determine whether you need a straight through or null cable.

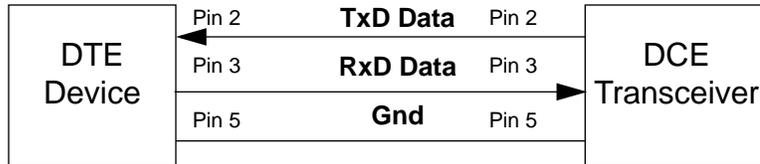
The interface between the transceiver and the attached device is a Data Communications Equipment (DCE) or Data Terminal Equipment (DTE) connection requiring either a straight through or Null cable. The Null cable (or Null adapter) simply crosses the required pins to allow similar devices to communicate properly (e.g., DCE to DCE). In general:

- The AirStream Transceiver is always a DCE device.
- A PC is typically a DTE device.
- Remote devices (customer equipment) can be DCE or DTE depending on the device.
- DCE to DTE communications require a straight through cable.

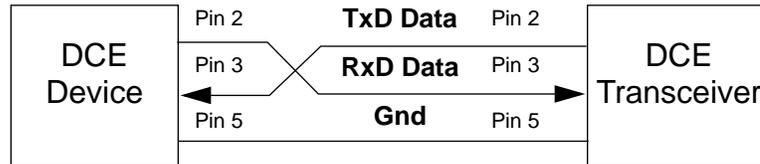
- DCE to DCE communications require a null cable or adapter.

Note: The following diagrams assume that the DCE transceiver is sending data to the DCE or DTE device.

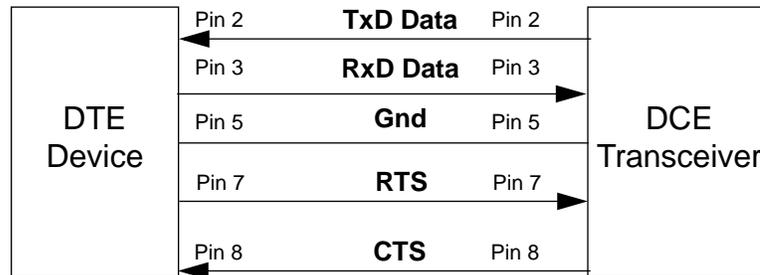
3 Wire Straight Through Cable



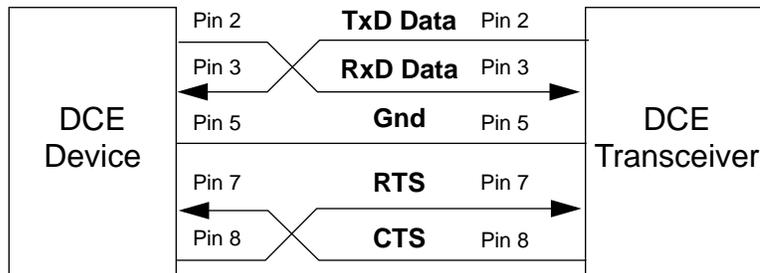
3 Wire Null Cable



5 Wire Straight Through Cable (flow control in use)



5 Wire Null Cable



HARDWARE SPECIFICATIONS

	Design-in	Stand-alone
Transceiver		
Frequency	2.400 - 2.4835 GHz license-free ISM band in U.S. (varies in other countries where AirStream Transceivers have been certified)	same
Radio Type	Frequency Hopping Spread Spectrum	same
Number of Channels	417 independent, non-interfering frequencies	same
Data Rate	600bps to 9.6 kbps full duplex, up to 19.2kbps asymmetrical	same
Transmit Power Output	10mW to 500mW nominal, self-adjusting (lower maximum power output where required)	same
Indoor Range	Up to 1,500 feet (457 m) in normal construction	same
Outdoor Range	Up to 2 miles (3.2 km) with omni-directional antenna Up to 12 miles (19.3 km) with optional directional antenna (line of sight to the horizon) Up to 75 miles (120 km) theoretical range (line of sight to the horizon from towers above the curvature of the earth)	same
Protocol	CSMA (Carrier Sense Multiple Access)	same
Flow control	Supports Hardware, Software or None	same
Warranty	1 year parts and labor	same
Error Detection & Correction	CRC 16 error detection; forward error correction can correct errors in 1 out of every 4 bits transmitted	same
Certification	FCC Part 15 Certified, Industry Canada, Japan, Europe, Brazil Other International certifications pending	same
Electrical		
Electrical Interface	Serial TTL Voltage Levels	RS-232C Voltage Levels
Physical Interface	1x12 right angle connector (header)	Standard RS-232C DB-9 (female) connector
Input Power	Voltage: +5.0 V, +/- 5% Ripple: Less than 10mV (RMS) from DC to 1MHz	Shipped with a 115VAC power adapter providing: Voltage: > 6.5 V and < 9.0 V Ripple: Less than 250mV (RMS) from DC to 1MHz

Software Requirements

Installation and Specifications

	Design-in	Stand-alone
Input Current Draw	Idle: 200mA Transmit: 550mA instantaneous current Transmit/Receive (time averaged over 100msec): 360mA	same
Environmental		
Temperature Range	-4°F to +140°F, -20°C to +60°C	same
Humidity	0% to 95% (non-condensing)	same
Physical		
Dimensions	0.75 inches height (19mm) x 2.35 inches width (60mm) x 4.25 inches length (108mm)	1.2 inches height (30mm) x 3.8 inches width (97mm) x 5.2 inches length (132mm)
Weight	2.3 ounces (65grams)	6 ounces (170 grams)

SOFTWARE REQUIREMENTS

- Windows® 95/98 or above (depending on software used)
- Pentium processor >233 MHz or higher
- 1 available RS-232 serial port
- Minimum 32 MB DRAM
- Maximum 20 MB hard disk space for Configuration Manager Plus necessary Network Software Utilities
- 1 parallel port (for hardware key used in certain networks only for Developer Kits)

SOFTWARE INSTALLATION

Configuration Manager

This program is used to configure all transceivers.

To install the Configuration Manager

1. Make sure all Windows applications are closed.
2. Insert the Installation CD-ROM or diskette 1 into the appropriate drive.
3. Open the contents of the drive in your usual manner.
You can use Windows Explorer or My Computer on the desktop, for example.
4. Double-click **Setup.exe**.
5. Follow the on-screen instructions.

Network Software Utilities



Intercept and Library Utilities

This installation process is required if you are configuring transceivers in networks using ComPort or TCP/IP Intercept, ActiveX, or DOS Utilities.

To install Network Software Utilities

1. Insert the Installation CD-ROM or diskette 1 into the appropriate drive.
2. Open the contents of the drive in your usual manner.
You can use Windows Explorer or My Computer on the desktop, for example.
3. Double-click **Setup.exe**.
4. Follow the on-screen instructions

If installing ActiveX, make sure to install the sample files as these will provide the examples you need to create your own applications.

ANTENNAS



Antennas must be connected to each transceiver for proper operation. Without an antenna, two units will not communicate. The higher the gain of the antenna, the longer the range of the transceiver signal.

AirStream Transceivers are designed to be used only with certain antenna products. AirStream offers the omni-directional antennas listed below as compliant with FCC Certification for the transceiver. The AirStream Transceiver uses a unique mechanical connection (reverse thread SMA connector) for all external mount antennas to ensure that only compliant antennas are used with the transceiver. AirStream does not endorse the use of omni-directional antennas other than those listed below.

<u>AirStream Part Number</u>	<u>Description</u>
Call	1dBi Omni-Directional Antenna (2")
Call	2dBi Omni-Directional Antenna (6")
52375	3dBi Omni-Directional Antenna (5")
Call	5dBi Omni-Directional Antenna (9")



Other higher gain directional antennas may be purchased through an approved Rice Lake Weighing Systems supplier. Contact Rice Lake Weighing Systems for additional information.

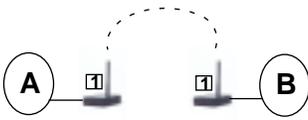
Chapter 3: Point to Point and Network Topologies

AirStream Transceivers support Point to Point Pairs and several Network topologies. Each AirStream Transceiver can be configured via its Configuration Manager to work in any of these topologies. The transceiver's Configuration Manager controls how the transceiver transmits and receives data as connected to the device. The operation of the transceiver in the network topology is determined by its Network Software Utility.

In this Chapter

- Point to Point Pairs
- Networks
- Network Utilities

POINT TO POINT PAIR



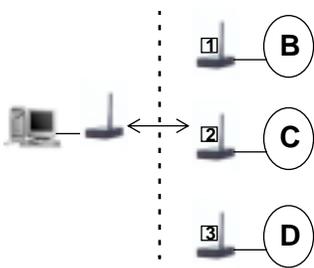
In a Point to Point topology, AirStream Transceivers are used to connect two devices (e.g., a bar code reader and a printer), or a PC with a single remote device. The Point to Point topology can be considered a virtual wire replacement (e.g., data in on one side equals data out on the other side). This is useful for machine to machine communications. All of the transceiver features listed in Transceiver Features on page 6 apply in Point to Point topologies.

NETWORKS

Wireless data connectivity applications require a wide range of networking options. The AirStream Network topologies consist of more than two transceivers and may have a PC to host a network of devices. The host and network devices are each physically attached to a AirStream Transceiver.

The following Network topologies may require Network Software Utilities. The required utilities are listed within each topology description and explained in detail in “Network Software Utilities” on page 23. Depending on the topology and network utility combination you select, some of the Transceiver Features on page 6 may not apply. This is explained for each topology.

Multi-Point Network



The Multi-Point Network enables data to be transmitted between as many as 238 remote devices and a PC host. The transceiver connected to the Host PC transmits and receives data from any other transceiver one at a time. Sessions may be initiated by any device on the network. Devices can be dumb (accept data directly without recognition) or intelligent (recognize data transmission on a network and grab what applies). In a Multi-Point Network there is no direct remote to remote communication, everything must go through the host.

As opposed to a Point to Point topology, where you have a machine to machine interface, Multi-Point networks are communicating at the application level. Depending on the utility chosen, these networks can communicate with one or more applications at a time. Multi-Point Networks can be created with the following Network Software Utilities.

- ComPort Intercept
- TCP/IP Intercept
- ActiveX Library
- DOS Library

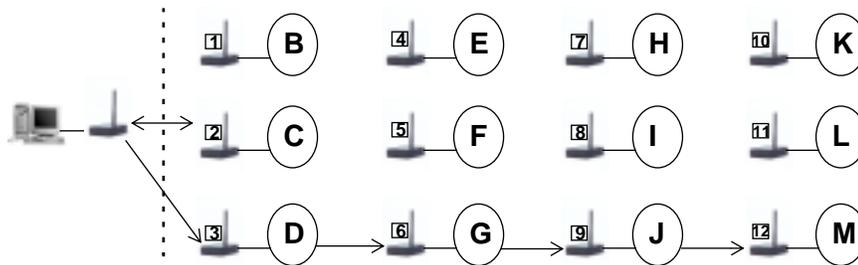
Note: Depending on the network utility used, GPIO may be available. If you assign GPIO mode to any remote on the network, the host must also be assigned GPIO mode. The Host has a GPIO register so it can detect which remotes are using GPIO.

Repeater Network

AirStream Transceivers in a Repeater Network function similarly to a Multi-Point Network. They expand the range of the Multi-Point Network by relaying data packets between otherwise out-of-range remote devices and a Host PC. The effective transmission rate for data packets for devices beyond direct connection with the host is reduced by one third. Data can be transmitted between as many as 238 remote devices and a Host PC. The transceiver connected to the Host PC transmits and receives data from any transceiver one at a time. Sessions may be initiated by any device on the network. Devices can be dumb (accept data directly without recognition) or intelligent (recognize data transmission on a network and grab what applies).

The most significant advantage of a Repeater Network is the ability to extend range. This is advantageous when you have some remote devices that are not within direct range of the host. This network extends range in

layers. These layers may overlap but you cannot go beyond 4 layers of range. Data travels through a single path to the receiving transceiver. This network works well in environments where you do not need to communicate large amounts of data but need to communicate over long range. In the diagram below there are four layers. Data is sent from the host through a path consisting of D, G, J, and M. This is the single path used to get the data from the host to M as M is out-of-range of the host.

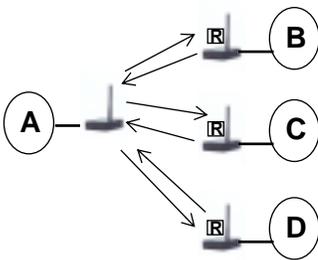


Repeater Networks can be created with the following Network Software Utilities:

- ComPort Intercept
- TCP/IP Intercept
- ActiveX Library
- DOS Library

Note: GPIO, power management modes, and asymmetrical data flow rates are not applicable to Repeater Networks. Even though you can use GPIO with ComPort Intercept, you cannot implement this function on a Repeater Network.

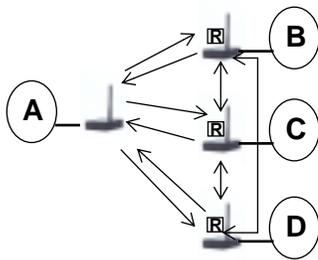
Broadcast Network



Remote to Host (4 wire)

In a Broadcast Network, data is sent out by one transceiver (sending transceiver) and received by an unlimited number of remote devices simultaneously. These devices must be intelligent enough to recognize relevant messages and recover lost or corrupted data. Broadcast Networks operate solely as configured by the Configuration Manager.

The AirStream Broadcast Network has two modes of operation; Remote To All and Remote To Host. In both modes all transmissions sent by the sending transceiver can be received by every remote unit in its associated network. The difference is in the way that transmissions by remote units are handled:



Remote to All (2 wire)

- In Remote To Host, transmissions by remote units can only be received by the host.
- In Remote To All, transmissions by remote units can be received by every other unit in the network that is within range.

Unlike other AirStream Network topologies, in Broadcast there is no session established between the units engaged in communication. This means that transmitted data is not acknowledged by the receiving side. If, for example, there is a momentary signal blockage at the receiving unit location, the affected receiving unit will miss any data transmitted during the signal blockage. Although signal impairments could cause data “drop-outs” any data received over the wireless link is still checked and corrected (if possible) by the AirStream error detection/correction process. This ensures that data is error free.

Broadcast mode is especially useful to applications where you must transfer the same information to all units at once or where a polling protocol is employed to collect data from remote units. In polling applications, the sending transceiver sends a query message to each remote unit in turn, asking for any data that the remote unit has available. The remote unit then has a chance to send its data to the polling transceiver. In a typical polling arrangement, each remote must wait until it is queried by the sending transceiver before transmitting. In this way collisions between transmissions of more than one remote unit are avoided. If, when polling a number of remotes, a reply is not received within a predetermined time interval the sending transceiver can retransmit its query or simply move on to the next query on its list.

Broadcast mode is intended primarily to be a RS485 network wire replacement. It is especially useful in adding new equipment to older (legacy) systems where there is a 2 wire or 4 wire RS485 connection. The

4 wire connection is replaced with the Remote to Host mode and the 2 Wire connection is replaced with Remote to all mode. The AirStream RS232 to RS485 converter is needed to configure AirStream Transceivers for RS485 devices.

Note: The Broadcast Network does not support GPIO, data thresholding, or power management and asymmetrical data rates are lower. Flow control was not intended for use in this topology.

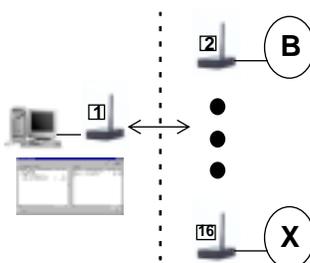
Note: The sending transceiver's link light will only turn on if a remote is sending data. The remote transceiver's link light will always be lit when synchronized on the network. The sending transceiver is always transmitting; however, other AirStream Networks will work when collocated with a Broadcast Network as long as their hop table assignment is different.

NETWORK SOFTWARE UTILITIES

Each network topology is supported by a combination of a Configuration Manager which allows you to configure each individual transceiver for your network topology and a variety of available Network Software Utilities which allow you to arrange data transmission in your network. Although summarized here, usage of each of these utilities is described in detail throughout this manual.

Note that the network software utilities are optional; contact Rice Lake Weighing Systems for details.

ComPort Intercept

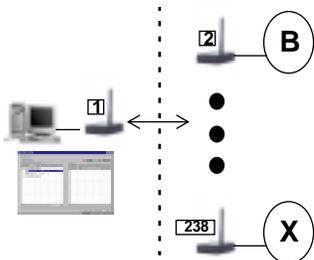


ComPort Intercept is a software program which provides all the functionality you need to assign virtual ports (enabling transparent communication) in your Windows System Registry for a small network configuration of up to 16 devices (including the host PC). See Setting up a Network with ComPort on page 45 for information on using this software.

You can use this utility for the following network topologies:

- Multi-Point
- Repeater

TCP/IP Intercept



TCP/IP Intercept is a software program which provides all the functionality you need to route wireless data through a Host PC to and from as many as 238 devices on a TCP/IP based network. See *Setting up a Network with TCP/IP* on page 55 for information on using this software.

You can use this utility for the following network topologies:

- Multi-Point
- Repeater

ActiveX Library

The ActiveX Library provides the standard ActiveX system calls you need to create applications which can link as many as 238 devices. See *ActiveX Network Applications* on page 67 for information on using this software.

You can use this utility for the following network topologies:

- Multi-Point
- Repeater

DOS Library

The DOS Library provides the standard DOS system calls you need to create applications which can link as many as 238 devices. This feature is currently being tested and will not be documented further in this version of the manual. You can use this utility for the following network topologies:

- Multi-Point
- Repeater

Chapter 4: Configuring Your Transceiver



The Configuration Manager is used to configure all transceivers being used in all network topologies. The procedures in this chapter describe how to configure the transceiver to meet your specific needs. These instructions assume that your transceiver is in default OEM mode (as shipped) and correctly connected to a PC with the Configuration Manager installed.

Note: All transceivers are delivered from the factory in default mode with OEM privileges. If you have user privileges, some features may not be available.

Note: You cannot open Configuration Manager if ComPort or TCP/IP Activators are running.

To open your Configuration Management Application

1. From the Start menu in Windows, select Programs and then **Configuration Manager**.

A splash screen appears with a Login dialog on top requesting username and password.

2. Enter the username: **oem**
3. Enter the password: **oem**

Note: oem is lower case.

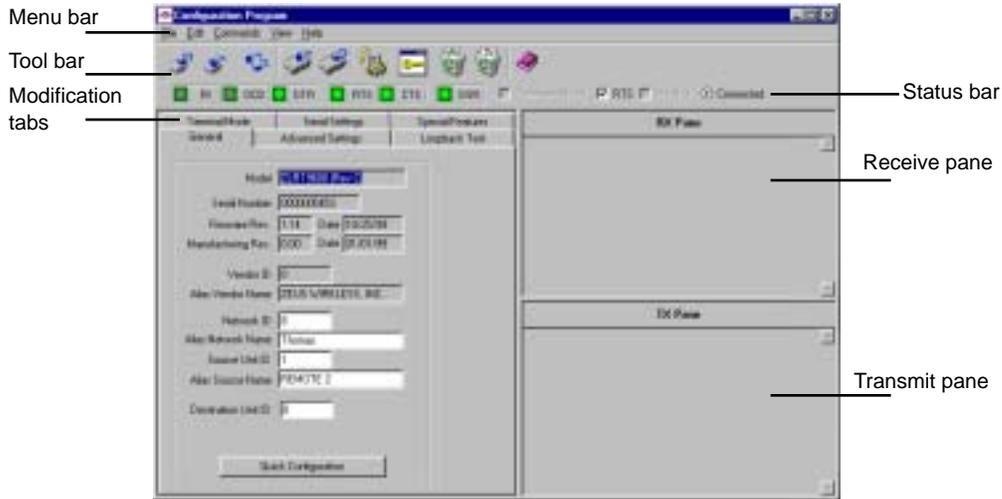
4. Click **OK**.

The Main Window appears.

A Tip of The Day window also appears. A new tip of the day will appear each time you open the configuration program. You can turn this off by unchecking the box. Click OK to dismiss the window.

In this Chapter

- Quick Configuration
- Modifying Settings
- Generating Reports
- Power Management
- Passwords and Access
- Using Hop Tables
- Assigning IDs
- Signal Analysis
- Serial Settings
- Data Threshold



Getting Status

Status lights on the Status bar indicate the status of the control lines on the RS232 link between the PC and the transceiver being configured.

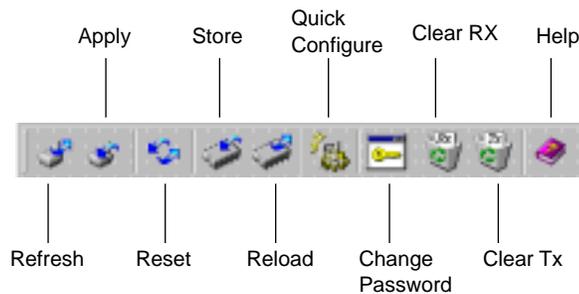


Abbreviation	Name	Definition
RI	Ring Indicator	A signal is coming into the host unit from the transceiver at the remote unit.
DCD	Data Carrier Detect	A connection has been established with another unit. This lets the PC know that communication between two units can take place.
DTR	Data Terminal Ready	Indicates that the unit is in Command Mode. This mode is utilized by the network software.
RTS	Ready To Send	This is a hardware flow control indicator
CTS	Clear To Send	A hardware control indicator
DSR	Data Set Ready	Reserved for future use

In addition to the status lights in the Configuration Manager, the LED's on the Stand-alone transceiver also display status.



The Toolbar



Exiting the program

To Exit the Configuration Manager

1. From the File menu, select **Exit**.

Note: It is important to note that any changes in any tab not Stored in EEPROM will be lost. See “Applying and Storing Changes” on page 31.

QUICK CONFIGURATION

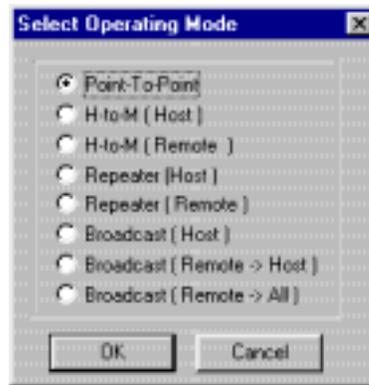


This is the fastest and easiest way to configure a unit. Activation of Quick Configuration loads settings directly into EEPROM. These settings will remain in effect until a unit is reconfigured.

To use Quick Configure

1. Click **Quick Configuration** on the General tab, click it on the toolbar, or select it from the Commands menu.

The Quick Configuration wizard appears with the Operating Mode window displayed.



2. Select the desired Operating Mode.

Select Point-to-Point to configure two units for a direct one-to-one communication link.

Select H-to-M (Host) for a network configuration of 3 or more transceivers. If host is configured first, the wizard will provide options for configuring remotes. This feature is used for Multi-Point Networks. The H-to-M (Remote) will follow after the host is configured.

Select Repeater (Host) for a network configuration of 3 or more transceivers on a Repeater Network. If host is configured first, the wizard will provide options for configuring remotes. The Repeater (Remote) will follow after the host is configured.

Select Broadcast (Host) for a network configuration of 3 or more transceivers on a Broadcast network. The Broadcast (Remote to Host) allows the remote to talk directly (only) to the host. You can also configure a remote to talk to all remotes on the network. If host is configured first, the wizard will provide options for configuring remotes. See Broadcast Network on page 22 for a more detailed explanation of Broadcast modes.

Note: To operate transceivers in Multi-Point or Repeater modes you will need to install a Network Software Utility.

3. Click **OK**.

The Unit Settings screen appears.



4. Enter the desired criteria.

Enter the desired identification numbers. See “Assigning IDs” on page 39 for acceptable parameters. Select a Hop Table (0-100). The Hop Table selected must be the same for all transceivers in a Point To Point Pair or a Network. This number specifies a table of predefined frequencies, which the transceiver will use for transmitting and receiving. If multiple separate networks exist in the same area, each network should have a unique Hop Table number to avoid RF collisions.

Note: Depending on which network you selected in the previous screen, certain ID fields may be grayed and inaccessible.

5. Click **Change** in the Serial settings group

The Serial Settings dialog appears. This allows you to set the various serial port parameters.



6. Enter the desired settings

These should match the requirements for the device that the transceiver will be attached to once the configuration is complete, not those of the computer you are using to configure the transceiver. See the equipment manufactures specifications for details. To use GPIO mode see “GPIO Mode” on page 42.

Note: Depending on which network topology you selected, some parameters may be grayed and inaccessible. Some network topologies have required serial settings.

7. Click **OK**.

8. Click **Submit**.

A Configuration Sequence dialogue box appears while the unit is being configured. This shows the sequence of configuration steps as they are being executed. Upon completion, a Configuration Status box appears with a checkbox option for report generation. All fields should read “OK” if the configuration was successful. If you do not wish an ASCII report to be generated automatically, click Report generation to deactivate the selection.



9. Click **Close**.

A few more status dialogs appear. All entries are stored in EEPROM permanently.

10. Click **OK** to configure another unit or **Cancel** to discontinue.

11. Continue to configure as many transceivers as required.

Disconnect the transceiver attached to the computer. Connect a new one. Wait until this transceiver’s information is displayed. Follow the on-screen instructions.

Note: Transceivers can be reconfigured as needed.

12. Select File and then **Exit** to exit the Configuration Manager.

If Report Generation was checked, Quick Configuration will automatically create and store a configuration data profile for each unit configured in the location specified in the Report Settings. See “Generating Reports” on page 32.

MODIFYING SETTINGS

You can run the Quick Configuration wizard to modify settings or you can change entries manually in the fields in the modification tabs provided. When manually changing entries, you must click apply and/or store for the changes to take effect. See “Applying and Storing Changes” on page 31.

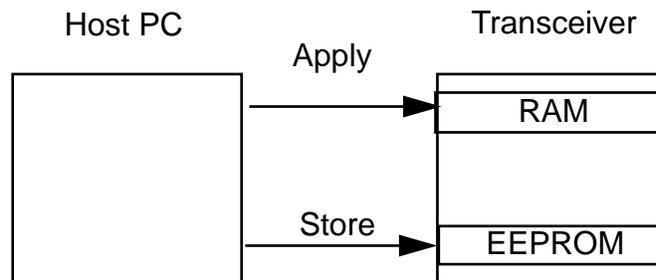
To manually change data in fields

1. Click the desired tab.
2. Click in and highlight the data to be changed.
3. Change the data.
4. Click **Apply** and/or **Store**.



Applying and Storing Changes

The following features can be selected from the Commands menu or you can click the appropriate button on the toolbar. These features write the information entered into temporary or permanent storage.



Note: Settings must be Applied before they can be Stored.

Apply



This applies (transfers) changes from the all tabs into the attached transceiver's RAM (temporary memory). This is useful when changing and testing settings you are not sure you really want.

Note: When you exit the configuration program these changes will not remain in effect. You must click Store for them to become permanent.



Store Applied Settings

Stores all Applied changes into the transceiver's EEPROM. These settings will remain in effect upon exiting the program. Stored changes are overwritten when new stored entries are made or when you load the default factory settings. You must Apply settings prior to storing them.

Reset Unit



Performs a soft reset of the attached unit returning the settings stored in EEPROM. Any configuration settings Applied but not Stored to EEPROM will be lost.

Load Default Settings



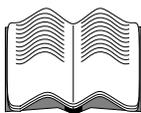
Reloads Factory Default settings into unit. All changes made previously will be lost.

Refresh



This queries a transceiver about its current settings. These settings will be displayed on the screen. It lets you go back to the last Stored settings before Apply was selected. Settings will not be refreshed if Store has been selected.

GENERATING REPORTS



Reports can be generated during the Quick Configure (if the box was checked) or can be generated at any time using menu commands. Two types of reports can be generated. Information in each report can be cleared separately. Both reports generate text (.txt) files. The default

location for reports is C:\Program Files\Configuration Program. The RReport.txt file produces a formatted text file which can be viewed using any text reader or word processing program. For example, Microsoft Word ®. The DReport.txt produces a comma delimited ASCII report which can be viewed with any spreadsheet program, for example Microsoft Excel®. It can also be imported into a database program like Microsoft Access®.

To Add to an existing Report

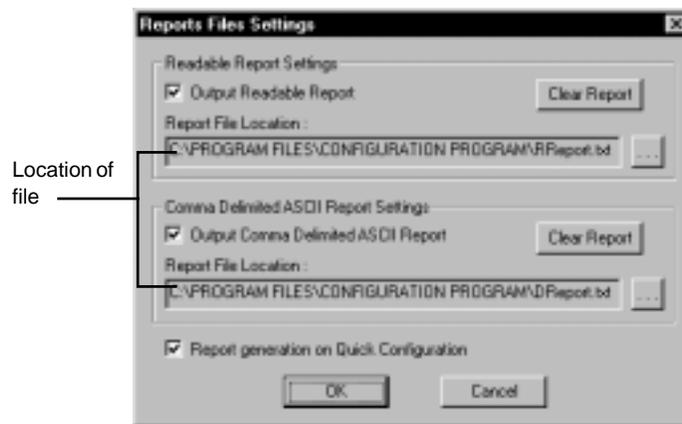
1. From the File menu, select **Add To Report**.

The configuration data profile for the attached transceiver is added to the report in the location specified under the Report Settings command.

To change Report Settings

1. From the File menu select **Report Settings**.

A dialog appears showing the settings and location for storage of configuration data profiles.



2. Select the type of report desired or both.

Both files generated are ASCII files readable by any text reader. A readable report is formatted in ASCII with spaces and tabs to make it readable when opened in programs such as NotePad.

Comma delimited formatting is useful when you want to import the text into spreadsheet or database programs.

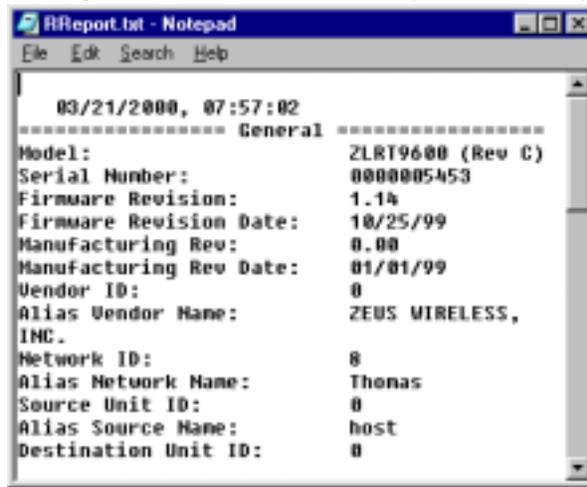
You can clear the contents of a report by clicking Clear Report.

If you wish reports to be generated when you run Quick Configuration, the Report generation box must be checked.

3. Click **OK**.

To View reports in ASCII form

1. From the File Menu, select **Report Settings**.
2. Locate the path to the desired report.
You can close this window and the Configuration Manager if desired.
3. Using a text reader such as Notepad or a word processor, open the file.



```

DRReport.txt - Notepad
File Edit Search Help

03/21/2000, 07:57:02
----- General -----
Model:                ZLRT9600 (Rev C)
Serial Number:        0000005453
Firmware Revision:    1.14
Firmware Revision Date: 10/25/99
Manufacturing Rev:    0.00
Manufacturing Rev Date: 01/01/99
Vendor ID:            0
Alias Vendor Name:    ZEUS WIRELESS,
INC.
Network ID:          8
Alias Network Name:   Thomas
Source Unit ID:      0
Alias Source Name:    host
Destination Unit ID: 0

```

To import reports into Microsoft Excel (for example)

1. From the File menu, select **Report Settings**.
2. Check **Tab Delimited**.
3. Open Microsoft Excel.
4. From the File menu, select **Import**.
The Text Import wizard appears.
5. Import the DReport.txt file.
6. Click **Comma** and **Tab** in the Delimiters box.
7. Click **Next** and fill out the rest of the wizard as desired.

Each comma in the delimited file will be transformed into a column in the Excel spreadsheet.

POWER MANAGEMENT

There are three modes which can be used to manage the power in your transceiver. Each serves a specific purpose and has an advantage in certain circumstances. For example, if you have a PC acting as a host to a bar code reader and printer, you can have all three transceivers in different power modes. The Host will be normal as it is always sending and receiving data. The transceiver attached to the printer can doze as it will

only be receiving data and will wake up when it is needed to deliver incoming data to the printer. The transceiver attached to the bar code reader will only be sending so it can sleep until awakened by the reader when it needs to send data to the printer. It is possible to conserve power usage in this manner without sacrificing efficiency of data transfer.

To change power modes

1. Click the **Special Features** tab.



2. Click the desired Power mode.

Mode	Explanation
Normal	Unit operates at full power. LED is a constant light.
Sleep	Unit will enter a Sleep mode with minimal power requirements. The unit will not wake-up until data appears locally on the unit's serial port for transmission. During Sleep mode reception of data from another unit is not possible. This is practical for battery applications and other low power requirements. LED on unit will slowly blink on and off when unit is in Sleep mode.
Doze	Unit will cycle the receiver on and off (at a 50% duty cycle). Data can be received from another unit or transmitted from the local unit during the Doze mode. Response time in receiving data from another unit may be slightly longer than under Normal power. LED on unit will blink very rapidly when the unit is in Doze mode.

3. Click **Apply** and/or **Store**.

PASSWORDS AND ACCESS

Levels Of Access

There are two levels of access: OEM and USER. Each level has access to different sets of fields in the Configuration Manager. A User has the lowest level of access and is only able to change parameters in some of the fields available to OEMs. OEMs have access to all functions.

All transceivers are shipped with OEM access. It is up to the administrator to assign user privileges from that point on.

Passwords

You can change your password as frequently as you desire. A password consists of any combination of numbers or letters up to 29 characters. If you forget your password, contact AirStream for a new password file. All units are shipped with **oem** as the password. It is recommended for security reasons to change your password from the factory setting.

Depending on access level, you have User or OEM privileges. The dialogs that appear and the options available vary by privilege.

Note: All units are delivered with OEM privileges.

User Functions

To change your password as a user

1. From the File menu, select **Change Password**.
Change password dialog appears.
2. Enter the desired criteria.
Enter your user name and new password. Retype the new password in Confirm Password.
3. Click **OK**.

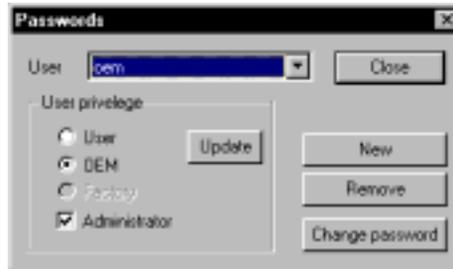
OEM Functions

All units are delivered with default OEM privileges. The system administrator must set units to User access.

To access OEM privileges

1. From the File menu, select **Change Password**.

Change password dialog appears.



2. Select the desired **User** name from the list.
3. Change user permissions as desired.

Privilege	Options
User privileges	Assign privileges as OEM or User. They can also be assigned Administrator privilege which provides the ability to change user privileges. If you are assigned as a User, you can not add other users or change the passwords of other users. Click update for these changes to take effect.
New	Add a new user by typing in their name and password. You must retype the password to confirm it.
Change password	Change the password of an existing user by typing in their name and password. You must retype the password to confirm it.
Remove users	Removes the currently selected user.

USING HOP TABLES

A Hop Table is a listing of frequencies in a given spectrum that are used for communication. Data is sent to each frequency in the table in a hopping pattern. Hop Tables provide improved security and the ability to avoid localized noise sources. There are 100 possible Hop Tables in your transceiver (this number may vary for international transceiver models). These are subdivided into five completely independent, non-overlapping Hop Table sets, each with no more than three consecutive frequencies. Each individual network can only utilize one Hop Table.

Entering Hop Table Numbers

Hop Table numbers can only be entered or changed by using the Quick Configuration wizard.

Validating the Hop Table

This command verifies the integrity of the Hop Table stored within the transceiver. The Hop Table in the transceiver is compared to the Hop Table with the same number in the Configuration Manager database. The Advanced Settings tab provides the selected Hop Table number and whether the Hop Table has passed validation and the first and last indices used for the Hop Table. Index values are set to meet the requirements of the country in which the transceiver is deployed for a minimum number of hop frequencies. These values can not be changed to avoid violating country regulations. To validate the Hop Table, from the Commands menu, select Validate Hop Table.

Specifying Hopping Parameters

You can customize Hop Table parameters by setting some features available from the Advanced Settings tab.

Max No Data

Max No Data is the number of hop cycles that must pass during which no data was received and no data was available for transmission before a session can be declared down. It is used as the trigger to end a session. After a certain number of Frames No Data between both units, the master will terminate the current session/link.

Max Bad Hop

Max Bad Hop is the number of data frames with errors received before a link is considered bad. This is the trigger to stop the current link and wait for a random standoff period (~0.5 to 3 seconds). This is due to the assumption that after 4 (system default but can be changed) consecutive bad hops, the link has been lost — either due to interference or lost synchronization. By waiting a small amount of time before attempting to reestablish the link, the obstruction (i.e., noise source) may have moved somewhere else.

Session Holdoff

This will only be enabled for a host transceiver and is required to manage the communication from multiple remotes. It prevents a host unit from

starting a new session until it completes its current session. It keeps other devices from establishing a session with the host until the host has completed its current session with a particular device.

Permanent Link

This is only used in a Point to Point configuration to keep a link between the two units active at all times.

ASSIGNING IDS

Using a combination of firmware and software assigned IDs, the security of your data is ensured. Some IDs can be modified and others cannot depending on your privileges. IDs are all accessed either via Quick Configuration or the General Tab.

ID Type	Explanation
Vendor ID	Assigned at the factory and burned into the firmware. This number is not modifiable. This ensures that no other AirStream customer can intercept data assigned to your ID. There are 64,000 unique Vendor IDs.
Network ID	A number that identifies the network and makes it unique from other networks in the area. All units in a network must have the same Network ID. The Network ID allows you to have multiple networks within the same transceiver space. There are up to 64,000 unique numbers. Units with different IDs cannot communicate with each other.

Assigning IDs

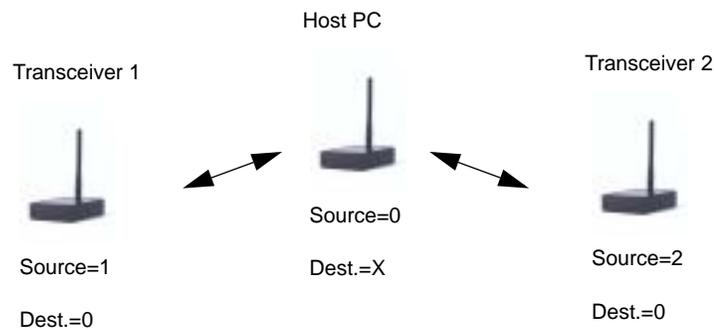
Configuring Your Transceiver

ID Type	Explanation
Alias Network Name	A descriptive name for the network.
Source Unit ID	For Point to Point communication the source and destination IDs must be the same number for both transceivers. For most network communication, the source ID = 0 for the host and the source IDs for the remotes are unique numbers from 1- 238.
Alias Source Name	A descriptive name for the unit.
Destination Unit ID	The numeric ID of the unit that the transceiver being configured will communicate with. For Point to Point communication, the destination ID will match the source ID. For a Multi-Point network, the host will have a destination ID = X. The remotes will each have a destination ID = 0 (the host source ID number).

The way source and destination IDs are assigned differs between Point to Point and Network configurations. In Point to Point the source and destination IDs between the two units must match. Any unit with a different ID will not be able to communicate.



In a Multi-Point Network the Source for the Host PC is always zero and destination corresponds to the transceiver it is trying to communicate with in each session. It is a dynamic number. The remote units have the matching destination of zero but source numbers are unique.



SIGNAL ANALYSIS

There are a number of features which can help you analyze the strength and consistency of your data signal. They are available via the Advanced Settings tab.

Feature	Explanation
Tx Power	The transmit power of the unit relative to the possible power levels.
Power Ctrl Upper Value	The upper RSSI (Received Signal Strength Indicator) threshold which when surpassed causes the unit to reduce its transmit power.
Power Ctrl Lower Value	The lower RSSI threshold which when surpassed causes the unit to increase its transmit power.
Temperature	The operational temperature of the unit as reported by the thermistor in fractional volts.
Local time-averaged RSSI	The RSSI averaged over the last 16 transmissions. Used in analyzing the strength and quality of the transmit signal.
Local instantaneous RSSI	The value of RSSI for the last transmission. Used in analyzing the strength and quality of the transmit signal.
D/A / A/D Loopback	Factory Diagnostic.

SERIAL SETTINGS



The Serial Settings tab allows you to select the serial port, baud rate, flow control, data bit size, parity, and stop bits settings. Each side of the communication link need not have the same serial settings. Serial Settings can also be entered via Quick Configuration. These settings are how the transceiver communicates with the device attached to it.

Setting	Explanation
Port	The particular serial port number to be used. The default setting is COM1.
Baud Rate	Speed of the serial connection for the device to which the transceiver will be connected. Available options: 300, 600, 1200, 2400, 4800, and 9600 full duplex and 14,400 and 19,200 for asymmetrical data transfer. The asymmetrical rates will automatically default back to 9600 full duplex during periods of peak bi-directional data exchange. The default setting is 9600. For a Host transceiver the setting must be 9600. Supported values are: 600, 1200, 2400, 4800, and 9600.

Setting	Explanation
Flow Control	A method of temporarily suspending the flow of data between two devices. Available options: None, Hardware (RTS/CTS) or Software (Xon/Xoff). The default setting is None. Software flow control is not available for a Host transceiver. Flow control is a means of temporarily suspending the flow of data between two devices. The most popular methods are called hardware and software flow control. Hardware flow control uses the RTS/CTS lines. Software flow control uses special characters, often called tokens (Xon/Xoff) to achieve the same result. Hardware flow control is typically the more common of the two methods. When using asymmetrical data rates, hardware control should be used to ensure data buffers are not overfilled which can result in a loss of data. Supported values for Flow Control are: None, Hardware, or Software.
Data Bits	Represents the number of bits within each piece of data. Available options: 7 or 8. The default setting is 8. A host transceiver must be set to 8.
Parity	Traditionally used as a method of detecting data errors. Available options: None, Odd, Even, Mark, or Space. The default setting is None. A host transceiver must be set to N.
GPIO Mode	When enabled this allows for a General Purpose Input and Output pin to be assigned on the RS232 connector (e.g. RTS & CTS). This provides additional benefit for contact closure applications such as opening/closing, turning on/off, notifying when specific events have occurred. When this function is enabled, Hardware Flow Control will be automatically disabled. NOTE: You must assign control lines in your network utility software for GPIO mode to take affect.
Stop Bits	Available options: 1 or 2. The default setting is 1. A Host transceiver must be set to 1.

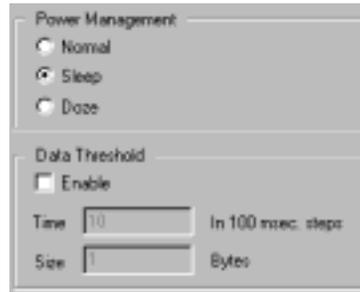
Supported combinations for Data Bits, Parity, and Stop Bits are:

---	7, None, 2	8, None, 1
7, Odd, 1	7, Odd, 2	8, Odd, 1
7, Even, 1	7, Even, 2	8, Even, 1
7, Mark, 1	7, Mark, 2	8, Mark, 1
7, Space, 1	7, Space, 2	8, Space, 1

Note: When setting up a Host device within a Network setting, the configuration program will automatically preset the serial parameters to: 9600, 8, N, 1. These settings are required for the Network Software Utility to ensure the best possible data transfer speeds.

DATA THRESHOLD

This feature allows a predetermined time to elapse or amount of data to accumulate before a data transfer session is initiated. It is accessed through the Special Features tab.

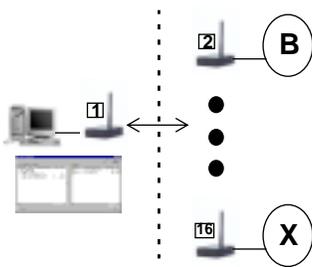


To set data threshold

1. Click the **Special Features** tab.
2. Click **Enabled**.
3. Enter Time and Size criteria.

Setting	Explanation
Time	A number (from 1 to 65,535) will specify the number of 100msec increments that must elapse between the initial receipt of data (locally) before a data transfer with another transceiver is initiated. This will provide up to 109 minutes of time that data can accumulate before a transfer. The time must be set to ensure that no more than 4K (the size of the data transfer storage buffer) of data collects before a transfer occurs. If the buffer were to fill up before a transfer, all additional data would be lost.
Size	Up to 4096 bytes of data can be collected before a data transfer is initiated.

Chapter 5: Setting up a Network with ComPort



Note that network software utilities are optional; contact Rice Lake Weighing Systems for details.

ComPort Intercept™ is a Windows communication driver (software application) that intercepts all RS232 traffic and automatically reroutes it to/from the host transceiver. It allows up to 16 transceivers to be configured in a network topology. One transceiver is designated as the host and is connected to a local personal computer with up to 15 remote units in the network. The remote units can be dumb or intelligent. The Host PC must be running a Microsoft Windows 95 or 98 operating system. ComPort Intercept allows the host transceiver to be configured to provide the network management functions. It can have multiple applications on the host communicating through the virtual ports at the same time. It can be used for Multi-Point or Repeater Network topologies.

This chapter discusses the configuration of the small network. It assumes that the ComPort Intercept software has been correctly installed.

ComPort Intercept consists of two components which are designed to hook into Windows serial communication traffic and transparently reroute the data through a Multi-Point or Repeater Network. The Configurator component is used to configure the Windows System Registry, by creating virtual communications devices. The Activator component is the actual loader/driver that will run in the background of the operating system and capture any configured serial data traffic and reroute it to the assigned remote transceiver and application program.

The host transceiver needs to be assigned to a physical communication port (typically COM1 or COM2). Virtual ports are created and assigned a remote Unit ID which corresponds to a particular remote transceiver's Source ID Number thereby creating a logical association between each virtual COM port number and a remote transceiver within the network.

In this Chapter

- ComPort Intercept
- ComPort Configurator
- ComPort Activator
- Virtual Ports
- Physical Ports

Note: The ComPort Intercept program will work with various client programs that communicate via COM ports (e.g., HyperTerminal) with serial rates of greater than 115K baud. While "over the air" data rates are effectively 9600 full duplex, the ComPort Intercept process will buffer data to each application according to its particular requirements. Internal buffer space for each virtual port is 8K Bytes.

Note: You can not activate ComPort Activator if any other application is currently using the Physical COM port that has been configured for the host transceiver on the network (e.g., Configuration Manager).

COMPORT CONFIGURATOR

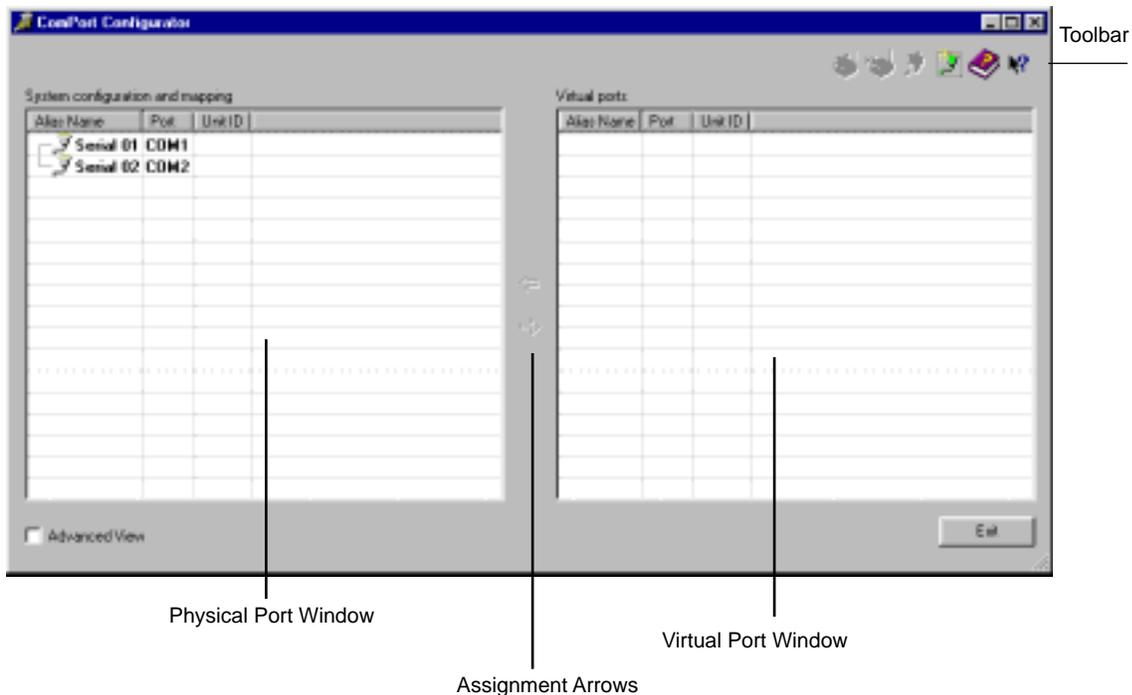
Microsoft Windows requires that all physical and virtual ports be registered within the System Registry for proper operation. ComPort Configurator is used to create and configure virtual ports and assign them to the host.

You can make changes to ComPort Configurator options either by clicking the appropriate icon or clicking the right mouse button and selecting the desired topic. All instructions given are based on clicking an icon.

To run ComPort Configurator

1. In Windows, select Start then ComPort Intercept Program and then **ComPort Configurator**.

The ComPort Intercept main window appears.



Note: For Developer Kits only, the hardware key must be connected to the parallel port of the computer for the ComPort Configurator to run.

The Physical Port window shows:

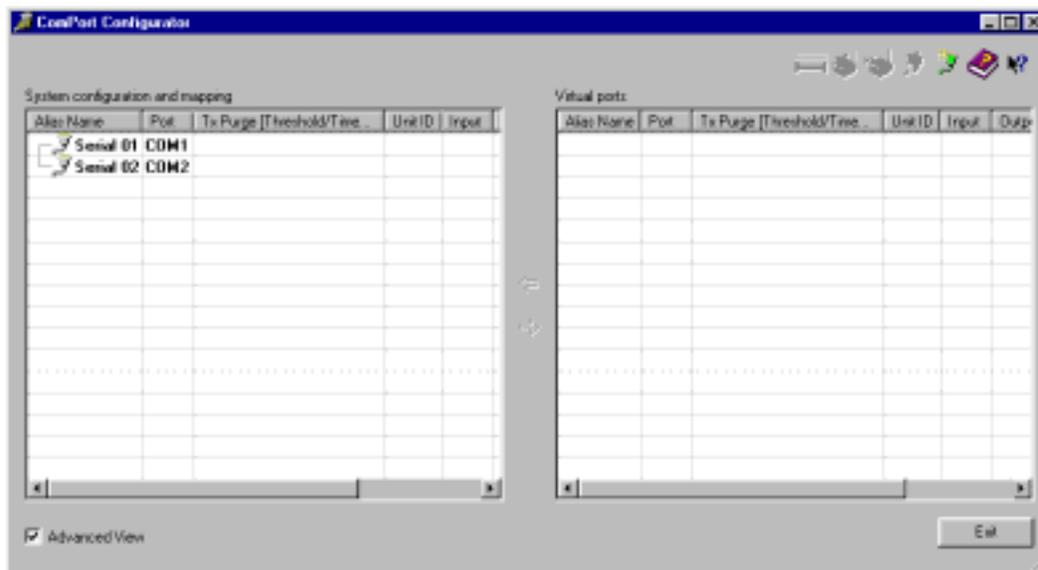
- all physical COM ports as contained within the Host PC (this will include any modems or other assigned ports)
- the one serial port assigned to the host transceiver
- any assigned virtual ports (if this is the first time you are running the ComPort Configurator program, no virtual ports will be shown)

The Virtual Port window lists all available virtual ports that have not been assigned to a particular physical port (e.g., a temporary storage/maintenance area). If this is the first time that you have used the Port Configurator program, this area should be blank.

When the program is opened, only the Add Virtual Port icon and Help icons on the Toolbar are active. Other icons are deactivated.

Advanced View

This check box allows you to change the fields displayed in the main window. Advance view provides more detailed information and options by adding new columns. These include Input, Output, and Tx Purge which are all described in this chapter.



Entering and Changing Information

You can use the left and right assignment arrows to move items between the Physical Port and Virtual Port windows or you can drag and drop items. There are also items available on the right-click pop-up menu.

Adding Virtual Ports



You will need to add a virtual port for each device in your small network. New port numbers are created in numerical order. Up to 15 virtual ports can be created; however, the actual number will be limited by the number of physical COM ports that are assigned. If the Physical Port window shows more than the host transceiver as a physical COM port, the available virtual ports will be decreased from 15 accordingly.

The number of virtual ports can vary depending on network size (15 remotes maximum) and the number of physical ports in use (if 4 Physical Ports are in use, the maximum number of virtual ports will be 12).

To Add Virtual Ports:

1. Click **Add Virtual Ports** on the toolbar.

You can also right-click and select Add Virtual Port from the menu. This applies to many features in this application.

The Add Virtual Ports dialog appears.



2. Enter the number of ports you wish to add.

This number should equal the amount of devices on your network (not including the host machine)

3. Click **OK**.

A message appears asking you to restart the computer.

4. Click **NO**.

5. Select a virtual port.

6. Click **Assign Unit ID Number**.

The Assign Device ID dialog appears which allows you to enter a Remote Unit ID number for the selected virtual port. The Remote Unit ID Number is equal to a remote transceiver's Source ID number. You can select a number between 1 and 238.

7. Enter the desired number.

8. Repeat steps 6-8 for each port added.

Note: Using standard Windows methods, you may also change the name of each port while it is selected.

9. Select the virtual port(s) in the Virtual Port window.

Note: You can shift-click the first and last port to select all virtual ports or control-click to select a varying group of ports, or you may do each port individually.

10. Select the appropriate physical COM port in the Physical Port window.

This will be the COM port to which the host transceiver is connected.

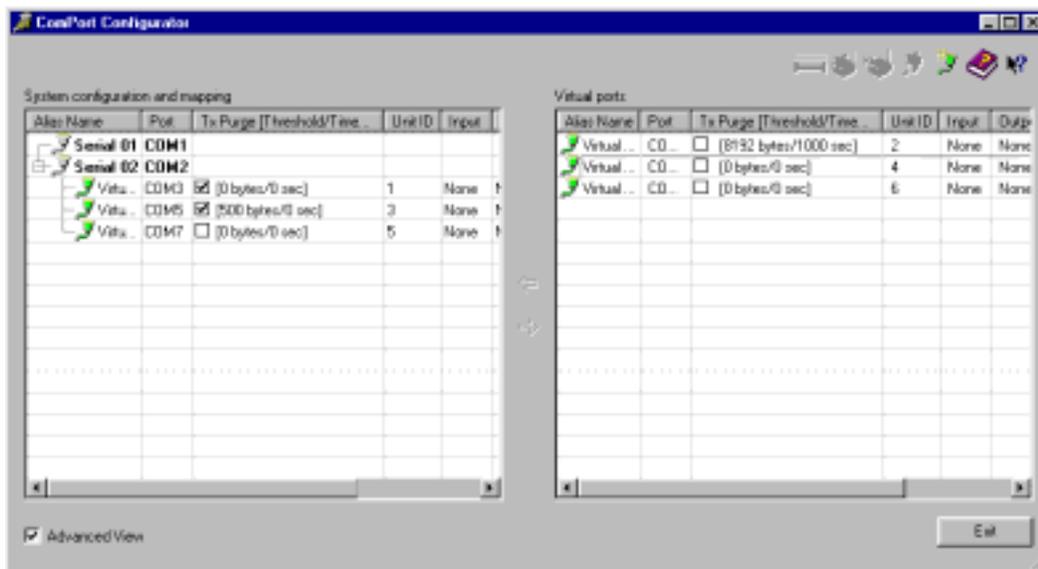
The left assignment arrow is enabled.

You can now associate each virtual port with a physical host port as displayed in the Physical Port window.

11. Click the **Left Assignment** arrow.

This will transfer the virtual ports to the host transceiver and establish the virtual communication link between the host transceiver and remote devices.





If your PC has more than one physical port, make sure you assign the virtual ports to the correct physical port number.

Attach to Host is available on the right-click pop-up menu in the Virtual Port window. When invoked, the currently selected port is moved to the Physical Port window under the last selected host. Detach from Host is available on the right-click pop-up menu in the Physical Port window. When invoked the currently selected port is moved to the Virtual Port window. These can be used instead of the drag and drop or the assignment arrow features.

Note: If you have selected multiple ports, it is more efficient to use the drag and drop method to assign them.

Note: Virtual ports can not be associated with a physical port until the Remote Unit ID number has been assigned.

12. Click **Exit**.

13. Restart Windows.

Each time a virtual port is Added or Deleted, a message asking if you want to restart windows will be displayed. Windows must be restarted when virtual ports are added or deleted (this is a Microsoft Windows requirement).

Setting Control Line Parameters

Available in Advanced View, this feature allows you to assign Input and Output lines. You must have GPIO mode turned on for the host and at least one remote on the network. This is assigned in the Configuration Manager as shown in “GPIO Mode” on page 47. Any remote device using GPIO mode can not use hardware flow control. GPIO mode will only work in Point to Point and some Network topologies.

1. In Advanced View, click the **Set Control Line** icon.

A dialog appears.



You can also select Control Lines from the right-click menu.

2. Click the desired radio buttons.

Select the desired input and output lines.

3. Click **OK**.

The assigned input and output lines are displayed in the Input and Output columns in the main window.

Tx Purge

Available in Advanced View, this feature allows you to create a buffer within the ComPort intercept program for outgoing data. If the host is sending but the remote is not ready to receive, this can be a useful tool. You can set the buffer size and the amount of seconds before time-out. By default, Purge Control is enabled with a maximum threshold (8192 bytes) and a timeout setting (1000 seconds).

1. Select the desired port.
2. Right-click.

3. Select the **Set Purge Control** from the pop-up menu.



4. Select the desired criteria.
You can select the buffer size (Threshold) between 1 and 8192 and amount of seconds between 1 and 1000 before time-out. Clicking the checkbox will turn this criteria on. The check will also be displayed in the main window view.
5. Click **OK**.
This information is added to the TX Purge column for that port.
6. Toggle the purge feature on and off by checking/unchecking the box for that port.

Remove Unit ID Number



This button will remove the Remote Unit ID number associated with a selected virtual port. Remember that the Remote Unit ID Number is equal to a remote transceiver's Source ID number.

To remove ID numbers

1. Highlight desired port.
2. Click **Remove Unit ID**.

The ID is removed. If an ID is removed and you are letting the program increment IDs, the ID removed will be skipped and not reassigned. You will have to reassign it manually, if desired.

Remove Virtual Communications Port



This button will remove the selected virtual port from the system registry.

To remove a virtual port

1. Select the desired port.
2. Click **Remove Port**.

The port is removed from the display and from the system registry.

3. Remove all desired ports.
4. Restart Windows.

The port will not actually be removed until Windows is restarted.

Renaming Virtual Ports

The system will automatically name each virtual port sequentially. You can rename the virtual ports to a more conventional notation.

To rename a virtual port

1. Select the virtual port.
2. Right-click and select **Rename**.

The name field is now editable.

3. Edit the name of the port.

You may use up to 20 characters for the name. A descriptive name such as “Printer”, may help you remember what equipment each port represents.

USING COMPORT ACTIVATOR



To complete the setup of the Small Network, the ComPort Activator program must be activated. This program resides in the lower right hand of the computer task bar as represented by its icon. ComPort Activator runs in the background, captures virtual port traffic, and reroutes it as specified by ComPort Configurator.

Note: The Configuration Manager will not work if the ComPort Activator program is running in the background. Suspend or unload ComPort Activator when using the Configuration Manager to make changes.

Note: For Developer Kits only, the white hardware key must be connected to the parallel port of the computer for the ComPort Activator to run.

ComPort Activator

To run ComPort Activator



1. Double click the **ComPort Activator** icon in the right hand corner of your desktop or click **Load Driver** in the Configurator Main window.

You may also select Start> Programs> ComPort Intercept Program> ComPort Activator.



The icon now appears active and ComPort Activator is running in the background. All serial communication traffic is redirected between the host transceiver and remote transceivers according to the network of virtual ports created with the ComPort Configurator program.

Note: If you right click the icon, a list of several options will be displayed (Load & Unload ComPort Activator, Load with Windows [at start-up] and Exit). You can also open your ComPort Configurator from this menu.

Note: Once ComPort Activator is running, restrict all application programs from using the physical serial port which has been assigned to the host transceiver.

To stop ComPort Activator

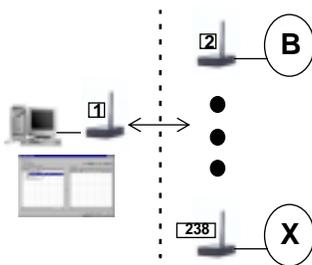
1. Double click the **ComPort Activator** icon.
2. A red symbol indicates that ComPort Activator is now inactive.

To start ComPort Activator when you start windows

1. Right-click the **ComPort Activator** icon.
2. Select **Load With Windows**.

ComPort Activator will automatically start each time you restart Windows.

Chapter 6: Setting up a Network with TCP/IP



Note that network software utilities are optional; contact Rice Lake Weighing Systems for details.

TCP/IP Intercept™ is a software package that provides all the functionality you need to route wireless data packets through a Host PC to and from as many as 238 devices. The remote units can be dumb or intelligent. The Host PC must be running a Microsoft Windows 95 or 98 operating system. TCP/IP Intercept allows the host transceiver to be configured to support the network management functions. This chapter discusses the configuration of the TCP/IP network. It assumes that the TCP/IP software has been installed. TCP/IP enables multiple applications in various locations on the network to communicate. Remote units can send data to the host transceiver one at a time while the host can send to many applications on the PC all at once depending on the network topology. TCP/IP Intercept can be used with Multi-Point and Repeater Network topologies.

TCP/IP Intercept consists of two components which are designed to hook into TCP/IP communication traffic and transparently reroute the data through a Multi-Point or Repeater Network. The Configurator component is used to assign TCP/IP port addresses to multiple devices on a network. The Activator component is the actual loader/driver that will run in the background of the operating system and capture any configured TCP/IP traffic and reroute it to the assigned remote transceiver and application program.

The host transceiver needs to be assigned to one physical communication port (typically COM1 or COM2). TCP/IP ports are created and assigned a remote Unit ID Number that corresponds to a particular remote transceiver's Source ID Number thereby creating a logical association between each TCP/IP port and a remote transceiver within the network. The entire network consisting of a host and multiple remotes must reside on one physical COM port.

In this Chapter

- TCP/IP Intercept
- TCP/IP Configurator
- TCP/IP Activator
- TCP/IP ports

- Note:** The TCP/IP Intercept program will work with various client programs that communicate via TCP/IP assignable ports (e.g., HyperTerminal or Telnet) serial rates of greater than 115K baud. While 'over the air' data rates are effectively 9600 full duplex, the TCP/IP Intercept process will buffer data to each application according to its particular requirements. Internal buffer space for each TCP/IP port is 8K Bytes.
- Note:** You cannot load TCP/IP Intercept any other applications are currently using the physical COM port you have configured for your network (e.g., Configuration Manager)
- Note:** All functions will be disabled in the Configurator if the Activator is currently loaded.
- Note:** You cannot implement GPIO mode on TCP/IP networks.
- Note:** The base IP address used by the TCP/IP Intercept Program is that of the Host computer. See your local system administrator if you are unsure of the number.

TCP/IP CONFIGURATOR

This program is used to create and configure TCP/IP ports and assign them to the host.

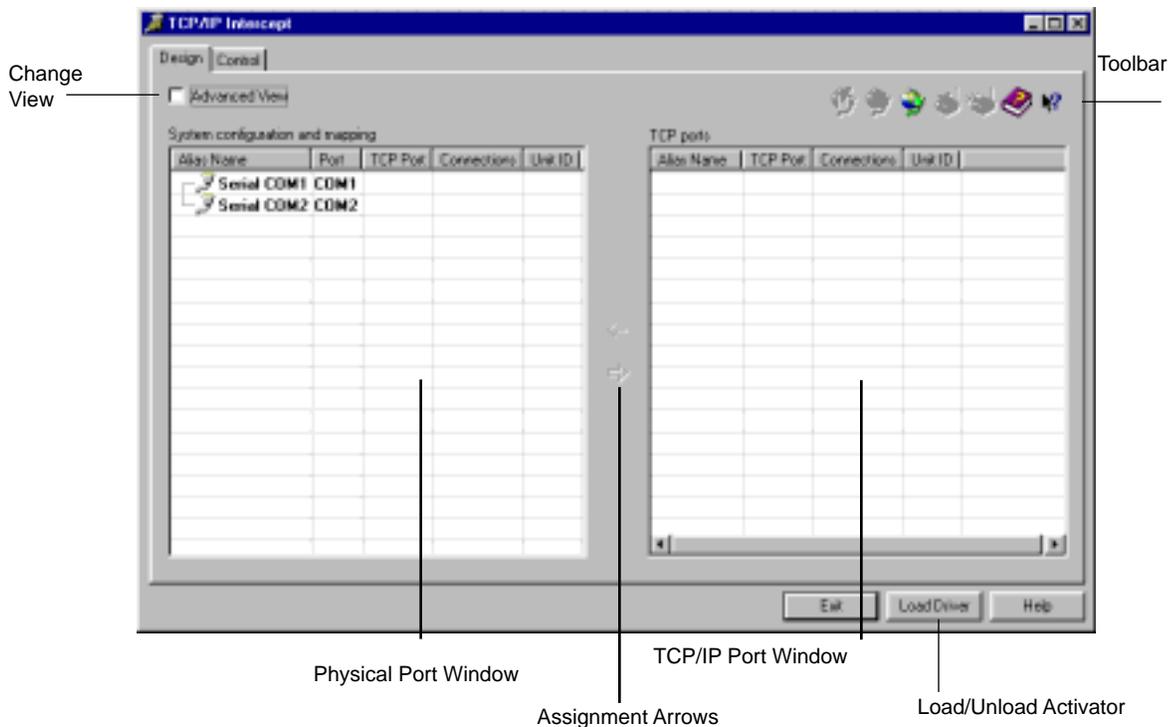
You can make changes to TCP/IP Configurator options either by clicking the appropriate icon or clicking the right mouse button and selecting the desired topic. All instructions given are based on clicking an icon.

To run TCP/IP Configurator

1. In Windows, select Start then Programs then TCP/IP Intercept Program and then **TCP/IP Configurator**.

If you already have TCP/IP ports configured, you can also open this program by right clicking the TCP/IP icon at the bottom right of your desktop and selecting Show Configurator.

The TCP/IP Intercept main window appears with the Design tab open.



The Physical Port window shows:

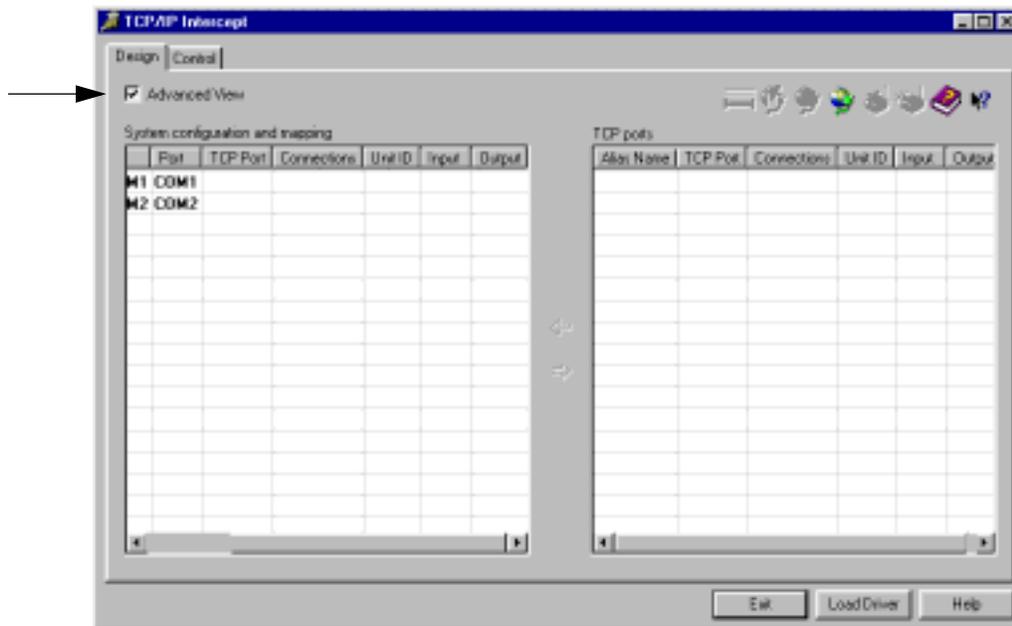
- all physical COM ports as contained within the Host PC (this will include any modems or other assigned ports)
- one serial port assigned to the host transceiver

The TCP/IP Port window lists all available TCP/IP ports that have not been assigned to a particular physical port (e.g., a temporary storage/maintenance area). If this is the first time that you have used the TCP/IP Configurator program, this area should be blank.

When the program is opened, only the Add TCP/IP Port icon and Help icons on the Toolbar are active. Other icons are deactivated.

Advanced View

This check box allows you to change the fields displayed in the main window. Advance view provides more detailed information and options by adding new columns. These include Input and Output which are described in this chapter.



Entering and Changing Information

You can use the left and right assignment arrows to move items between the Physical Port and TCP/IP Port windows or you can drag and drop items.

Adding TCP/IP Ports



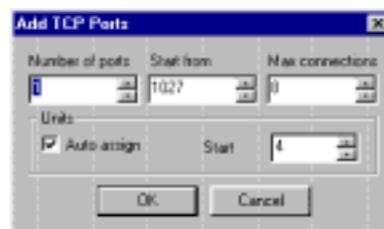
You will need to add a TCP/IP port for each device in your small network. New port numbers are created in numerical order.

To Add TCP/IP Ports:

1. Click **Add TCP/IP Port** on the toolbar.

You can also right-click and select Add TCP/IP Port from the menu. This applies to many features in this application.

The Add TCP/IP Port dialog appears.



2. Enter the desired criteria.

Enter the number of ports you would like to add. The total number of ports should equal the amount of remote transceivers on your network (not including the host machine). The maximum number of ports allowed with the TCP/IP Configurator is no more than 238.

Enter the starting port number (these will be incremented by 1). The TCP/IP port numbers available are between 1024 and 10,000. Enter the maximum number of connections you would like to allow for each port. The maximum number of connections cannot be greater than 8. These connections should be the number of concurrent applications that will be logged into the TCP/IP Intercept.

The Auto Assign feature allows you to automatically increment the Remote Unit ID number as you are creating multiple TCP/IP ports. The start window will allow you to choose the Remote Unit ID number you wish to start with. This feature will be of particular use when configuring a large network from the beginning. Remember the Remote Unit ID number must match the Source ID number of the remote transceiver.

You can also use the two buttons in the toolbar to Assign Unit ID Number or Remove Unit ID Number.



Note: Using standard Windows methods, you may change the name of each port while it is selected.

3. Click **OK**.

4. Select the port(s) in the TCP/IP Port window.

Note: You can shift-click the first and last port to select all TCP/IP ports or control-click to select a varying group of ports, or you may do each port individually.

5. Select the appropriate physical COM port in the Physical Port window.

This will be the COM port to which the host transceiver is connected.

The left assignment arrow is enabled.

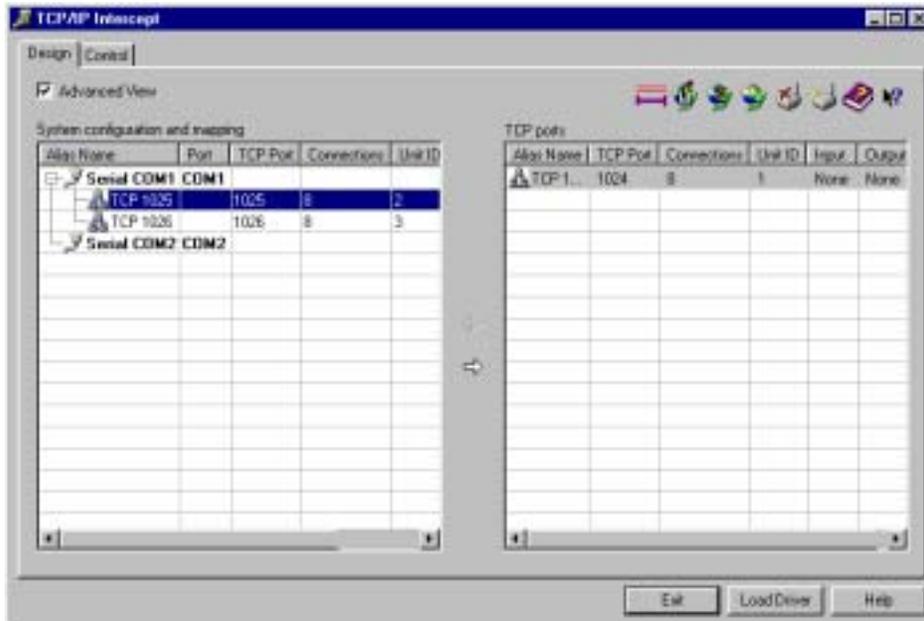
You can now associate each TCP/IP port with a physical communications port.

Note: All devices in the network must reside on one physical port.

6. Click the **Left Assignment** arrow.

This will transfer the TCP/IP ports to the host transceiver and establish the TCP/IP communication link between the host transceiver and remote devices.

If your Host PC has more than one physical port, make sure you assign the TCP/IP ports to the correct physical port number.



Attach to Host is available on the right-click pop-up menu in the TCP/IP Port window. When invoked, the currently selected port is moved to the Physical Port window under the last selected host. Detach from Host is available on the right-click pop-up menu in the Physical Port window. When invoked, the currently selected port is moved to the TCP/IP Port window. These can be used instead of the drag and drop or assignment arrow features.

- Note:** If you have selected multiple ports, it is more efficient to use the drag and drop method to assign them.
- Note:** TCP/IP ports can not be associated with a physical port until the Remote Unit ID number has been assigned.

7. Click **Exit**.

Editing Ports



You can change the assigned TCP/IP port number and the maximum amount of connections at any time.

1. Select the desired port.
2. Right-click.
3. Select the **Edit TCP Port** from the pop-up menu.
4. Select the desired criteria.
5. Click **OK**.

Setting Control Line Parameters



Available in Advanced View, this feature allows you to assign Input and Output lines. You must have GPIO mode turned on for the host and at least one remote on the network. This is assigned in the Configuration Manager as shown in “GPIO Mode” on page 47. You can not use this feature in conjunction with Hardware Flow Control.

1. In Advanced View, click the **Set Control Line** icon.
A dialog appears.



You can also select Control Lines from the right-click menu.

2. Click the desired radio buttons.
Select the desired input and output lines.
3. Click **OK**.
The assigned input and output lines are displayed in the Input and Output columns in the main window.

Remove Unit ID Number



This button will remove the Remote Unit ID number associated with a selected TCP/IP port. Remember that the Remote Unit ID Number is equal to a Remote transceivers Source ID number.

To remove ID numbers

1. Highlight desired port.
2. Click **Remove Unit ID**.

The ID is removed. If an ID is removed and you are letting the program increment IDs, the ID removed will be skipped and not reassigned. You will have to reassign it manually, if desired.

Remove TCP/IP COM Port



This button will remove the selected TCP/IP port.

To remove a TCP/IP port

1. Highlight desired port(s).
2. Click **Remove TCP Port**.

The port is removed.

Note: The port can only be removed while it resides in the TCP/IP port window.

Renaming TCP/IP Ports

The system will automatically name each TCP/IP port sequentially. You can rename the TCP/IP ports to a more conventional notation.

To rename a TCP/IP port

1. Select the TCP/IP port.
2. Right-click and select **Rename**.

The name field is now editable.

3. Edit the name of the port.

You may use up to 20 characters for the name. A descriptive name such as “Printer”, may help you remember what equipment each port represents.

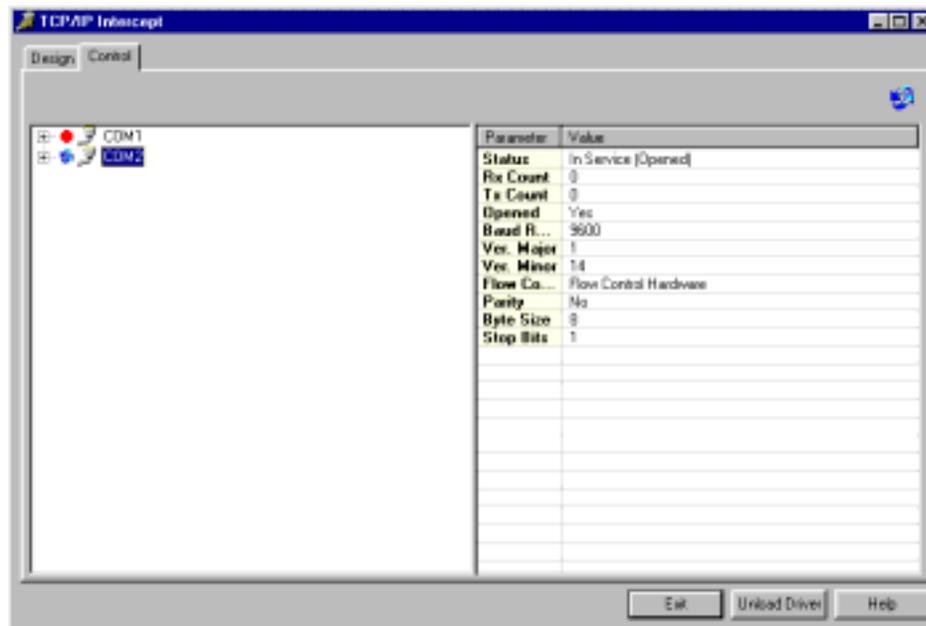
MONITORING ACTIVITY

You can monitor communication port, TCP/IP port, and connection activity on your network.

To Monitor activity

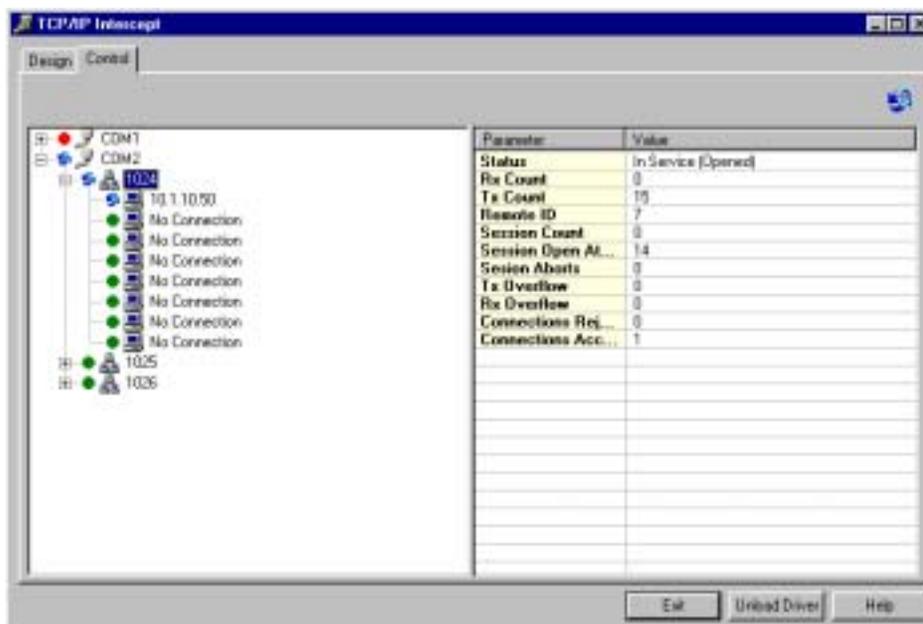
1. Open **TCP/IP Configurator**.
2. Click **Load Driver** (if the Activator is not already loaded).

- Click the **Control** Tab.



- Double-click the Communication port.

Information about the port is displayed on the right side of the window.
The TCP/IP ports are displayed.



- Double-click the desired TCP/IP port.

Information about the port is displayed on the right side of the window. The connections (IP addresses) are displayed.

6. Double-click the desired connection.



Information about the connection is displayed on the right side of the window.

USING TCP/IP ACTIVATOR



To complete the setup of the network, the TCP/IP Activator program must be activated. This program resides in the lower right hand of the computer task bar as represented by its icon. TCP/IP Activator runs in the background, captures traffic from TCP/IP port as assigned by TCP/IP Configurator.

Note: You cannot load the TCP/IP Activator if any other application is currently using the physical COM port you have configured for the network. Suspend or unload TCP/IP Activator when using the Configuration Manager to make changes.

Note: For Developer Kits only, the green hardware key must be connected to the parallel port of the computer for the TCP/IP Activator to run.

TCP/IP Activator



To run TCP/IP Activator

1. Double click the **TCP/IP Activator** icon in the right hand corner of your desktop or click **Load Driver** in the Configurator Main window.



The icon now appears active and TCP/IP Activator is running in the background. All serial communication traffic is redirected between the Host transceiver and remotes according to the network of TCP/IP ports created with the TCP/IP Configurator program.

Note: If you right click the icon, a list of several options will be displayed (Load & Unload TCP/IP Activator, Load with Windows [at start-up] and Exit). You can also open your TCP/IP Configurator from this menu.

Note: Once TCP/IP Activator is running, restrict all application programs from using the physical serial port which has been assigned to the Host transceiver.

To stop TCP/IP Activator

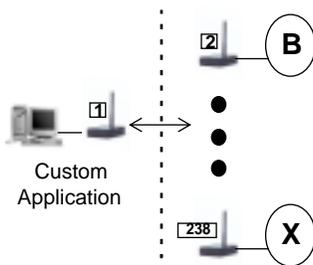
1. Double click the **TCP/IP Activator** icon.
2. A red symbol indicates that TCP/IP Activator is now inactive.

To start TCP/IP Activator when you start windows

1. Right-click the **TCP/IP Activator** icon.
2. Select **Load With Windows**.

TCP/IP Activator will automatically start each time you restart Windows

Chapter 7: ActiveX Network Applications



Note that network software utilities are optional; contact Rice Lake Weighing Systems for details.

The ActiveX Library provides a number of API system calls which can be used to create custom network applications which can link as many as 238 devices in Multi-Point and Repeater Network topologies. One application controls the entire network. The ActiveX driver may be used for Windows NT as well as Windows 95/98 and above.

You can use any Windows compliant compiler, however, the examples provided in the following functions are specific to Visual C++, Visual Basic, and Visual J++. The sample code placed on your system during installation is also based on these three compilers. These files have been modularized to emphasize the unique properties of each of these compilers and the various system calls. Please use these examples as your instructional material for creating an application template. They are located in C:\Program Files\Zeuswireless\Samples. These samples include a simple Host to Multi-point application, a ping application, a background printing function, and complex example that incorporates all of these. This chapter provides the entire ActiveX API.

Note: GPIO transactions are performed on a per device basis.

WCI_OPEN

This function is used to open a communications port (handle) and establish a connection with the host transceiver. The specific Serial Port number is assigned within the properties screen of the ActiveX device, this is a design time variable assignment.

Syntax

```
lHandle = wCi_Open() as long;
```

Return Value

> 0 handle of the communication,
< 0 Failure to connect the port.

In this Chapter

- Location of sample files
- ActiveX API

WCI_CLOSE

This function is used to close the communications port, which was previously opened with the wCi_Open function.

Syntax

```
void wCi_Close(long lHandle)
```

Parameters

lHandle	The handle of the communication returned from wCi_Open.
---------	---

WCI_WRITEDATAEX

This function is used to write the data buffer to a specific destination ID.

Syntax

```
Result = wCi_WriteDataEx(VARIANT WriteBuf, long WriteLen, long lDestID, long lHandle) as long;
```

Parameters

WriteBuf	The data to be transmitted.
WriteLen	Number of bytes contained in the string.
lDestID	The identity of the destination unit that data will be transmitted to.
lHandle	The handle of the communications port being used.

Return Value

Result	> 0 The length of transmitted data. = 0 No data was transferred. < 0 No transceiver is available to transfer.
--------	---

WCI_GETDESTINATIONID

This function is used to get the current identity of the destination unit as contained in the host unit.

Syntax

```
Result = wCi_GetDestinationID(long lHandle) as long;
```

Parameters

lHandle The handle of the communications port being used.

Return Value

Result The ID of the destination unit.

WCI_CHECKRXQUE

This function is used to check the number of incoming messages contained within the receive queue.

Syntax

```
Result = wCi_CheckRxQue(long lHandle) as long;
```

Parameters

lHandle The handle of the communications port being used.

Return Value

Result Returns the number of the incoming messages currently in the receive queue.

WCI_SETOUTPUTDEVICEID

This function is used to set the output device to log all incoming data. All data received from any remote device will be passed up to the application program as well as forwarded to the listed devices.

Syntax

```
void wCi_SetOutputDeviceID(short iPrintID, long lHandle);
```

Parameters

iPrintID	The ID of the output device.
lHandle	The handle of the communications port being used.

WCI_STARTSTOPPRINTING

This function is used to start and stop the logging of the output device.

Syntax

```
void wCi_StartStopPrinting(short iStatus, long  
lHandle);
```

Parameters

iStatus	The status of output device. 'True' starts logging. 'False' stops logging.
lHandle	The handle of the communications port being used.

WCI_GETSOURCEID

This function is used to get the host transceiver's ID.

Syntax

```
Result = wCi_GetSourceID(long lHandle) as long;
```

Parameters

lHandle	The handle of the communications port being used.
---------	---

Return Value

Result	Returns the host transceiver's ID.
--------	------------------------------------

WCI_SETGPIOOUTPUT

This function is used to set the GPIO output line on the specific device.

Note: GPIO must be enabled on the host transceiver as well as the listed device contained in this function call. GPIO is enabled via the Configuration Manager as described in Quick Configuration on page 27.

Syntax

```
wCi_SetGpioOutput(short iStatus, long lDestID, long lHandle);
```

Parameters

iStatus	Output status which can be 0 or 1.
lDestID	The destination ID.
lHandle	The handle of the communications port being used.

WCI_GETGPIOOUTPUT

This function is used to read the current GPIO output status line on the selected devices.

Note: GPIO must be enabled on the host transceiver as well as the listed device contained in this function call. GPIO is enabled via the Configuration Manager as described in Quick Configuration on page 27.

Syntax

```
Result = wCi_GetGpioOutput(long lDestID, long lHandle)  
as short;
```

Parameters

lDestID	The destination ID.
lHandle	The handle of the communications port being used.

Return Value

Result	Returns the status. 0 is OFF, 1 is ON.
--------	--

WCI_GETGPIOINPUT

This function is used to read the GPIO input status line on the selected device.

Note: GPIO must be enabled on the host transceiver as well as the listed device contained in this function call. GPIO is enabled via the Configuration Manager as described in Quick Configuration on page 27.

Syntax

```
Result = wCi_GetGpioInput(long lDestID, long lHandle)  
as short;
```

Parameters

lDestID	The destination ID.
lHandle	The handle of the communications port being used.

Return Value

Result	Returns an integer which denotes the status. 0 is OFF 1 is ON.
--------	---

WCI_GETGPIOMODE

This function is used to verify that GPIO has been enabled.

Note: GPIO must be enabled on the Host transceiver as well as the listed device contained in this function call. GPIO is enabled via the Configuration Manager as described in Quick Configuration on page 27.

Syntax

```
Result = wCi_GetGpioMode(long lDestID, long lHandle)  
as short;
```

Parameters

lDestID	The destination ID.
lHandle	The handle of the communications port being used.

Return Value

Result	Returns a 1 if GPIO is enabled.
--------	---------------------------------

WCI_PING

This function is used to check if a particular remote device is available.

Syntax

```
Result = wCi_Ping(long lDestID, long lHandle) as  
short;
```

Parameters

lDestID	The destination ID.
lHandle	The handle of the communications port being used.

Return Value

Result	Returns the following possible status results. 0 - Not available 1 - Available 2 - The host device is currently too busy to perform this check
--------	--

ABOUTBOX

This function is used to display the About message box (i.e., version number).

Syntax

```
void AboutBox();
```

NEWMESSAGE

This is an event/callback function that occurs whenever a new message has been received from the driver.

Syntax

```
void NewMessage(short iStatus, long lDestID, VARIANT  
DataInfo, long Datalen);
```

Parameters

iStatus	Predefined message types: 0 – Data received 1 – Time-out or error condition 4 – GPIO event, remote input when low 5 – GPIO event, remote input when high
IDestID	The destination ID.
DataInfo	The string that has been received.
Datalen	Number of bytes contained in the DataInfo string.

ACTIVEX DESIGN TIME PROPERTIES PAGE:

CommPort	The specific Serial Port connected to the host transceiver. Range: 1, 2, 3 and 4.
Timeout	A global timeout value (in seconds) used when attempting to communicate with a remote device.

Chapter 8: Testing Your Units

You can test the operation of transceivers in a variety of ways using the Configuration Manager. The instructions in these chapter assume that the Configuration Manager is correctly installed and the transceiver is properly connected to your PC. These tests include:

- Terminal mode
- Loopback test (Stand-alone model only)

TERMINAL MODE TEST

The Terminal Mode tab provides a simple terminal interface from which data can be sent between two units configured as a Point to Point Pair. Anything typed in the input field of transceiver 1 will immediately be transferred to transceiver 2. The data is displayed in the transmit pane for transceiver 1 and the receive pane for transceiver 2. (Note you will only see received data if the destination transceiver is connected to a PC with Configuration loaded and open or if the destination PC's transceiver has a loopback connector.)

What You Need

- Two transceivers (A and B) configured as a Point to Point Pair
The Source Unit ID of unit A equals the Destination Unit ID of unit B and vice-versa. In addition, both units must have matching Vendor ID numbers, Network ID numbers and Hop Table numbers.
- One of these units is connected to a PC with the Configuration Manager loaded.

In this Chapter

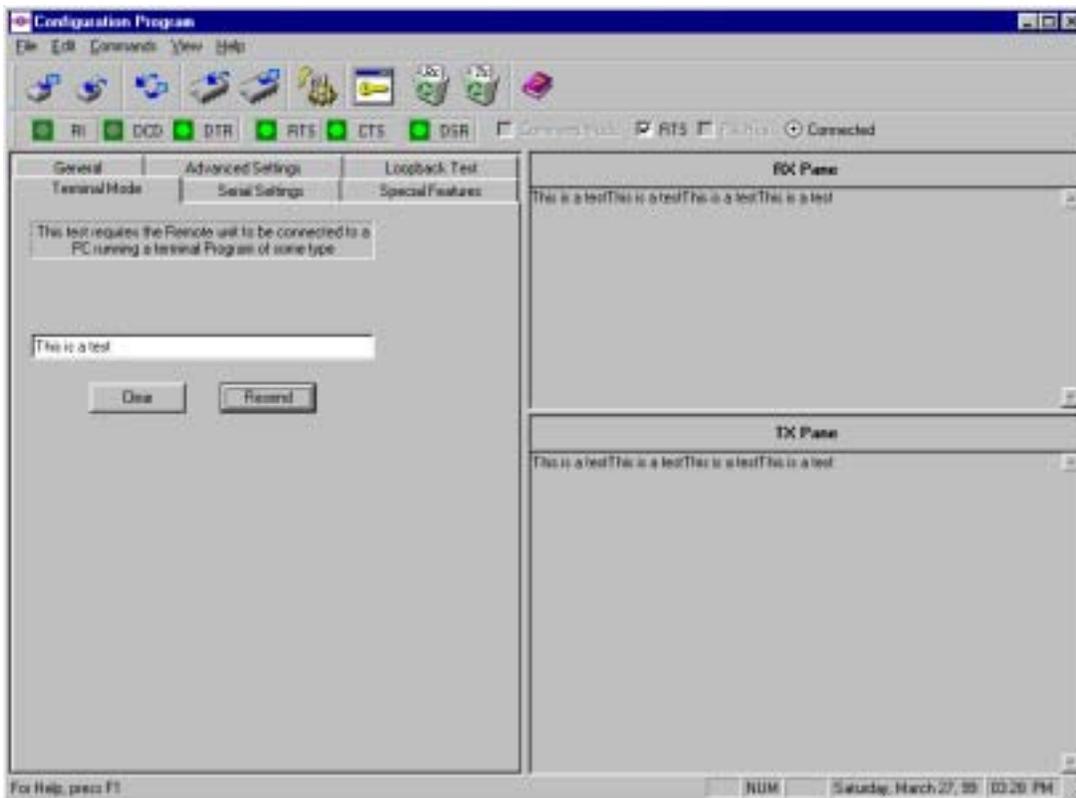
- Terminal Mode
- Loopback
- Rx and Tx Panes
- Using HyperTerminal

Performing the Test

To test communications between units:

1. Open the Configuration Manager.
See Configuring your Transceiver on page 25.
2. Click the **Terminal Mode** tab.
3. In Test String, enter some text.
4. Click **Resent**.

The test string is transmitted to the Destination Unit



LOOPBACK TEST

The Loopback Test screen allows you to perform two functions; to test that two units can communicate and to determine the best placement of one unit relative to another based on received signal strength. This test is only used for stand-alone models.

What You Need

- Two transceivers (A and B) configured as a Point to Point Pair
The Source Unit ID of unit A equals the Destination Unit ID of unit B and vice-versa. In addition, both units must have matching Vendor ID numbers, Network ID numbers and Hop Table numbers. Transceiver A is connected to a PC loaded with the Configuration Manager,
- Loopback connector
Transceiver B (the one not connected to the PC running this program) must have a loopback connector (pins 2 and 3 of the serial port tied together) on the serial port of the remote unit.



Performing the Test

To test communications between units

1. Open the Configuration Program.
See Configuring your Transceiver on page 25.
2. Click the **Loopback Test** tab.
3. In Test String, enter some text.
4. Enter the desired criteria in other fields in this group.
The default values are recommended for this type of testing. 100 msec is minimum for Repeat Every.
5. Click **Start**.

The test string is transmitted to the Destination Unit and looped back to the Source Unit.

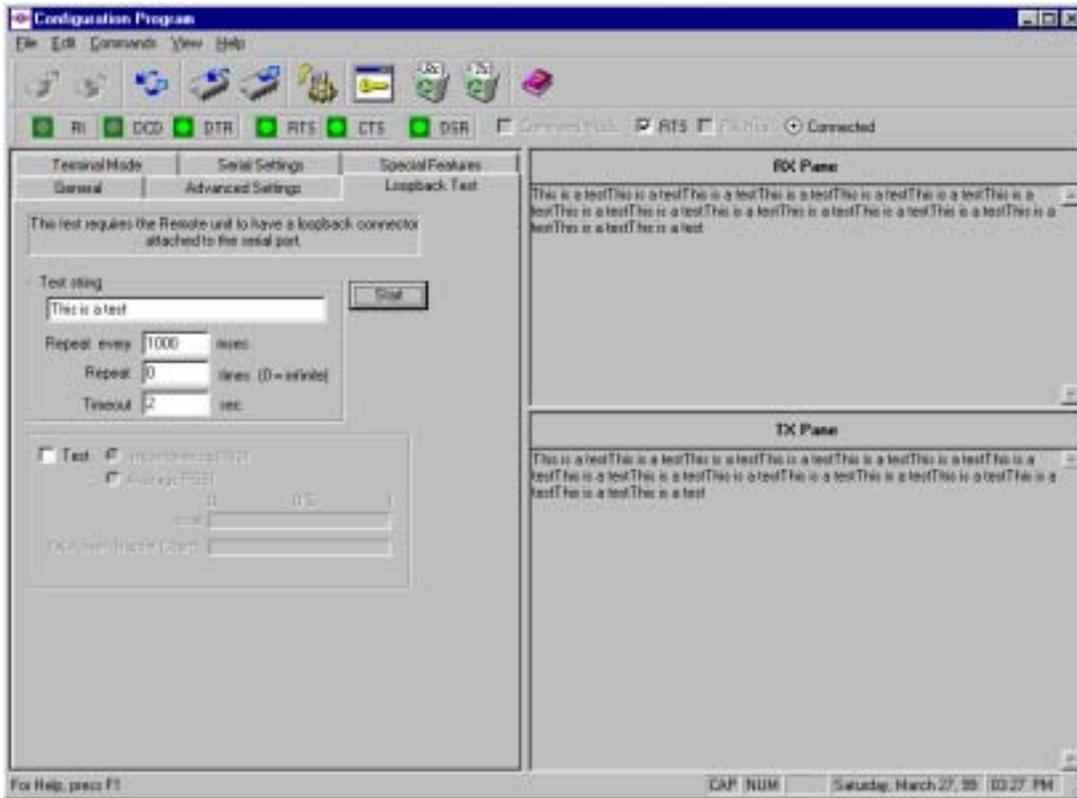
The RX Pane shows the test string as received by the transceiver connected to the computer after being loopbacked from the remote transceiver. If no data is received within the timeout period the message !Timeout! is printed in the RX Pane. The TX Pane shows the test string as typed in the dialogue box.

To test the placement of a unit:

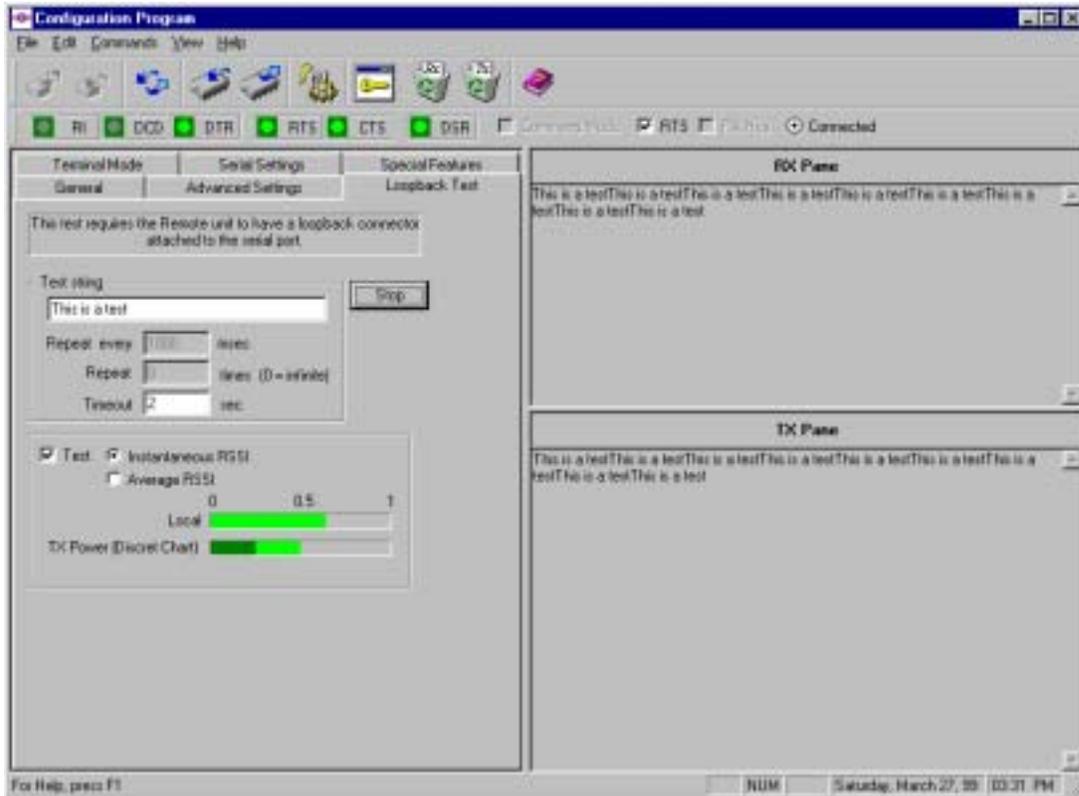
1. Click the **Loopback Test** tab.
1. Click **Test**.
2. Click **Instantaneous RSSI**.
3. In Test String, enter some text.
4. Enter the desired criteria in other fields in this group.
The default values are recommended for this type of testing.
5. Click **Start**.

Loopback Test

Testing Your Units



6. Move one or both units until the greatest RSSI values for local and remote are achieved. The optimization of the unit placement does not have to be too exact. An RSSI value above the half mark is acceptable.



VIEWING DATA IN THE RX AND TX PANES



These display areas show the data being transmitted and received during tests. The RX panes shows data being received into the transceiver. The TX pane shows data being transmitted from the transceiver. All data sent will be displayed and at times the pane may become cluttered. You can use the Clear buttons on the toolbar or the commands in the Edit menu to clear the panes of data. To clear data in the panes, select Clear RX Pane or Clear TX Pane.

USING HYPERTERMINAL

On every Windows system there is a terminal program called HyperTerminal. The following instructions show how to use HyperTerminal to test data communication for Point to Point or Multi-point networks.

To use Hyperterminal

1. Select Start> Program Files> Accessories> Communications> HyperTerminal.
2. Double-click **HyperTerminal.exe**.

The main window appears with a session window active.

3. Enter a name for this session and click the first icon (red and yellow telephones).
4. Click **OK**.

The Connect To window appears.

5. Select a connection option.
6. For Point to Point and ComPort Intercept select the direct Com port. (This is the COM Port used to connect the transceiver in the Configuration Manager). Fill out the serial settings to match what you have set in the Configuration Manager.

For TCP/IP select TCP/IP(winsoc).

7. Enter the Begin Typing and watch for the results.

Note: If you type but do not see the characters on screen and wish to see them, select File> Properties> Settings> ASCII setup> Echo Typed Characters Locally.

Note: If you are testing Multi-Point or Repeater with ComPort Intercept or TCP/IP Intercept their Activators must be running.

Chapter 9: Troubleshooting

Problem	Possible Cause	Possible Solution
“(?) Timeout” messages are displayed in the Configuration Manager general tab fields.	The equipment is not connected properly. Wrong serial port is selected.	Check that all connections are secure. Make sure transceiver has power (LED 1 is lit). Select the correct serial port in the Serial tab of the Configuration Manager.
Antenna cannot be threaded onto the antenna connector.	Antenna and antenna connector have “left-handed” threads.	Turn antenna connector counter-clockwise to attach to transceiver.
In Network mode a link gets stuck on—that is, LEDs 1 & 2 stay lit.	The application program running on the host PC is writing to the physical COM port which is attached to the host transceiver, instead of writing to a virtual COM port.	Power off the host transceiver and ensure that the mapping of virtual COM ports to a physical COM port is correct. Make sure that the ComPort Activator is running. Make sure that the application program is not writing data to the PC’s physical COM port which is attached to the transceiver.
LED 1 not lit	Power is not being supplied to unit.	Check power supply connection into unit and outlet. Make sure supply of power is active.
LED 1 and LED 2 flashes 3 times	Normal operation.	No need to troubleshoot.
Open the Configuration Manager and get an error message	Outdated DLL.	Run 401COMUPD.exe included in program disk to install COMCTL32.DLL in your C:\Windows\System directory.
Point to Point or remote transceiver in a network is malfunctioning with a 9 wire cable	The device to which the transceiver is connected is activating the pin utilized by the Zeus Network Software Utility.	Try replacing the 9 wire cable with a 5 wire cable. If this corrects the problem, utilize the 5 wire cable.
The Configuration Program will not start	ComPort or TCP/IP Activator program is running in the background.	Suspend or unload Activators when using the Configuration Program to make changes.

In this Chapter

- Problem
- Possible Cause
- Solution

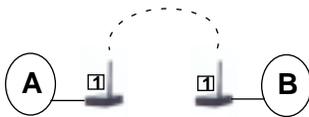
Problem	Possible Cause	Possible Solution
Unit is being sent data but is not receiving	Power mode settings (sleep) can prevent the transfer of data.	Use Configuration Manager to place unit in normal power mode.
User applications report a "timeout" while waiting for a response from another user-supplied device (e.g. printer or computer) connected to the remote transceiver.	Longer data propagation delay compared with cable.	Increase the period that the user application waits before declaring a "timeout." (Suggest 1500 to 2000 msec.)

Chapter 10: Learning Exercises

The following exercises guide you through the steps of the setup, configuration, and test for Point to Point and Network wireless operation. These procedures rely on the assumptions that you have adequate power, peripherals, and host devices.

Note: These procedures are written for Stand-alone Models.

POINT TO POINT



This exercise provides a demonstration of all the steps needed to have a direct wireless communication between two transceivers.

Materials Needed

- 1 PC
- 2 transceivers
- 2 Antennas
- 2 Power sources (outlet and/or surge strips) and 2 power supplies for transceivers
- 1 other peripheral (must have a RS232 connector)
- Configuration Manager software
- 2 RS-232 cables

Procedure

Install Software

1. Power up your PC.
2. Insert the Configuration Manager CD into the appropriate drive.
3. Using your usual method (Windows Explorer, My computer etc.) to view the contents of the drive.
4. Double-click Setup.exe.
5. Follow the on screen instructions to complete the installation.

In this Chapter

- Point to Point
- Multi-Point
- ComPort Intercept
- TCP/IP
- Repeater
- Broadcast

Connect the Transceiver

6. Attach the power supply to transceiver 1.
7. Plug the power supply into power source.
8. Verify that LED 1 on the front panel of the transceiver blinks 3 times and remains lit.
9. Attach an antenna to transceiver 1.
10. Insert the RS232 cable connector into the serial connector in the back of the transceiver.
11. Attach the other end of this cable into the serial port on the back of your computer.

Configure Transceiver 1

12. Select **Configuration Manager** from the Start menu in Windows.
The Main window appears.
13. Click **Quick Configuration**.
14. Click **Point-to-Point**.
15. Click **OK**.
16. Enter the information as shown in the dialog below.



17. Click **Submit**.

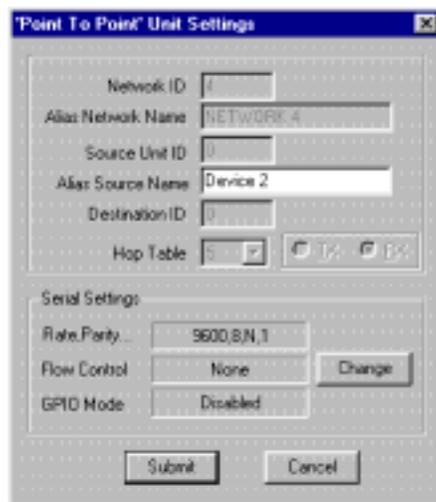
Generate a Report (if desired)

18. Click **Report Generation**.
19. Click **Close**.

Connect and Configure Transceiver 2

20. Click **OK**.
21. Click **OK** to configure another Unit.
22. Disconnect serial connector from transceiver 1. (You can leave it on the computer.)
23. Attach power supply to transceiver 2.
24. Plug power supply into power source.
25. Verify that LED 1 on the front panel of the transceiver blinks three times and remains lit.
26. Attach an antenna to transceiver 2.
27. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name.



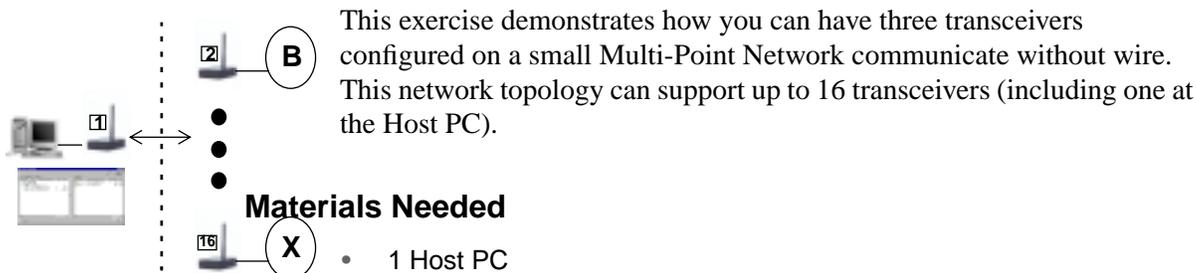
28. Click **Submit**.
29. Uncheck **Report Generation**.
30. Click **Close**.

View the Report

31. In your Windows Explorer, open **C:\Program Files\Configuration Manager\RRReport.txt**.

Test Operation

32. Connect transceiver 1 to a peripheral device. Note power supply, connector and antenna connections must all be made.
33. On the Host PC, Click the **Terminal Mode** tab in the Configuration Manager.
34. In Test String, enter some text.
The test string is transmitted to the Destination Unit as shown in the TX and RX panes.
35. Select **Exit** from the File menu.

MULTI-POINT COMPORT INTERCEPT**Materials Needed**

- 1 Host PC
- 3 Transceivers
- 3 Antennas
- 2-3 Power sources (outlet and/or surge strips) and 3 power supplies for transceivers
- 2 other peripherals (must have a RS232 connector)
- Configuration Manager software
- ComPort Intercept software
- 3 RS232 cables

Procedure**Install Software**

36. Power up your Host PC.
37. Insert the Configuration Manager software into the appropriate drive.
38. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
39. Double-click **Setup.exe**.
40. Follow the on screen instructions to complete the installation.
41. Insert the ComPort Intercept Software into the appropriate drive.

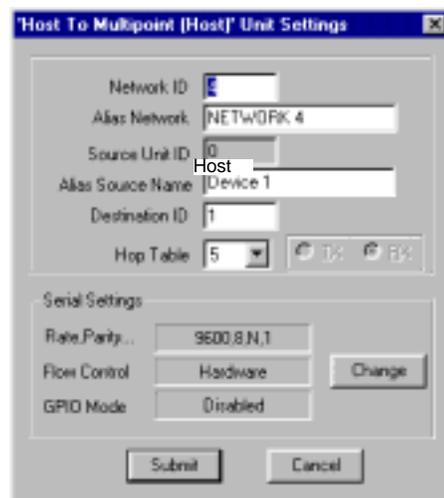
42. Using your usual method (Windows Explorer, My computer etc.) to view the contents of the drive.
43. Double-click **Setup.exe**.
44. Follow the on screen instructions to complete the installation.

Connect the Transceiver

45. Attach the power supply to transceiver 1.
46. Plug the power supply into power source.
47. Verify that LED 1 on the front panel of the transceiver blinks 3 times and remains lit.
48. Attach an antenna to transceiver 1.
49. Insert the RS232 cable connector into the serial connector in the back of the transceiver.
50. Attach the other end of this cable into the serial port on the back of your Host PC.

Configure Transceiver 1

51. Select Configuration Manager from the Start menu in Windows.
The Main window appears.
52. Click **Quick Configuration**.
53. Click **Host to Multi-Point (Host)**
54. Click **OK**.
55. Enter the information as shown in the dialog below.



56. Click **Submit**.

Generate a Report (if desired)

57. Click **Report Generation**.
58. Click **Close**.

Connect and Configure Transceiver 2

59. Click **Yes**.
60. Click **OK**.
61. Disconnect serial connector from transceiver 1. (You can leave it on the computer.)
62. Attach power supply to transceiver 2.
63. Plug power supply into power source.
64. Verify that LED 1 on the front panel of the transceiver blinks three times and remains lit.
65. Attach an antenna to transceiver 2.
66. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID.



Make sure that Auto increment is checked.

67. Click **Submit**.
68. Uncheck **Report Generation**.
69. Click **Close**.

Connect and Configure Transceiver 3

70. Click **OK**.
71. Disconnect serial connector from transceiver 2. (You can leave it on the computer.)
72. Attach power supply to transceiver 3.
73. Plug power supply into power source.
74. Verify that LED 1 on the front panel of the transceiver remains lit.
75. Attach an antenna to transceiver 3.
76. Insert the RS232 connector into the serial connector in the back of the transceiver.
Note that all of the fields are grayed out except Alias Source name and Source Unit ID. Make sure that Auto Increment is checked.
77. Click **Submit**.
78. Check **Report Generation**.
79. Click **Close**.
80. Click **Cancel**.
81. Select **Exit** from the File menu.

View the Report

82. In your Windows Explorer, open **C:\Program Files\Configuration Manager\RRReport.txt**.

Set up Virtual Ports

83. Select **ComPort Configurator** from the Start Menu under ComPort Intercept.
The Comport Configurator Main Window appears.
84. Click the **Add Virtual Ports** icon.
85. Enter **2** and click **OK**.
A message appears asking to restart your computer.
86. Click **No**.
87. In the Virtual ports window, right-click the first listed Virtual port.
88. Click **Assign Unit ID**.
89. Enter **1** and click **OK**.
This will be assigned to the remote called Device 1.
90. Right-click the second virtual port.
91. Click **Assign Unit ID**.
92. Enter **2** and click **OK**.
This will be assigned to the remote called Device 2.

Note: The host device is not assigned to a virtual port as it is physically connected to the Host PC.

93. Highlight both virtual ports.
94. Drag them to the physical Port window under Comm Port 1.
Note that this is most likely your comm port but others may be listed.
95. Click **Exit** to exit the ComPort Intercept program.
96. Restart your computer.
97. Select Start then Programs and then **Comport Activator**.

Test Operation

98. Connect transceivers 2 and 3 to peripheral devices. Note power supply, connector, and antenna connections must all be made.

Transceiver 1 must remain connected to the Host PC.

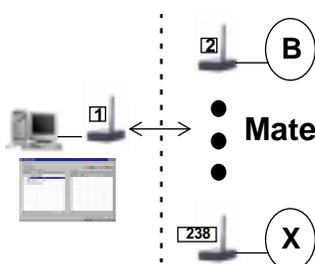
99. Send data from the Host PC to a peripheral device.

For example, if you had a printer (with a serial connection) that you have been using (i.e., drivers are already set up) you could write a short memo in a word processor on the Host PC and select File>print. The information would be printed out on the printer just as if it had been connected by wire. This would work for any existing wired connection on a local LAN.

Another example would be to use HyperTerminal. This requires that your peripherals are also PCs or that you use a loop back connector to see the data sent returned in your HyperTerminal Window.

Note: If you are using hyperterminal, remember to connect the Virtual Port number and not the physical port number (COM1). You will need to open two HyperTerminals to connect to both remote transceivers at the same time.

MULTI-POINT TCP/IP INTERCEPT



This exercise demonstrates how you can have 3 transceivers configured on a TCP/IP based Multi-Point network communicating without wire.

Materials Needed

- 1 Host PC
- 3 Transceivers
- 3 Antennas
- 2-3 Power sources (outlet and/or surge strips) and 3 power supplies for transceivers
- 2 other peripherals (must have a RS232 connector)
- Configuration Manager software
- TCP/IP Intercept software
- 3 RS232 cables

Procedure

Install Software

1. Power up your Host PC.
2. Insert the Configuration Manager software into the appropriate drive.
3. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
4. Double-click **Setup.exe**.
5. Follow the on screen instructions to complete the installation.
6. Insert the TCP/IP Intercept software into the appropriate drive.
7. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
8. Double-click **Setup.exe**.
9. Follow the on screen instructions to complete the installation.

Connect the Transceiver

10. Attach the power supply to transceiver 1.
11. Plug the power supply into power source.
12. Verify that LED 1 on the front panel of the transceiver blinks 3 times and remains lit.
13. Attach an antenna to transceiver 1.

14. Insert the RS232 cable connector into the serial connector in the back of the transceiver.
15. Attach the other end of this cable into the serial port on the back of your Host PC.

Configure Transceiver 1

16. Select Configuration Manager from the Start menu in Windows. The Main window appears.
17. Click **Quick Configuration**.
18. Click **Host to Multi-Point (Host)**.
19. Click **OK**.
20. Enter the information as shown in the dialog below.



21. Click **Submit**.

Generate a Report (if desired)

22. Click **Report Generation**.
23. Click **Close**.
24. Click **Yes**.
25. Click **OK**.

Connect and Configure Transceiver 2

26. Disconnect serial connector from transceiver 1. (You can leave it on the computer.)
27. Attach power supply to transceiver 2.
28. Plug power supply into power source.

29. Verify that LED 1 on front panel of transceiver blinks three times and remains lit.
30. Attach an antenna to transceiver 2.
31. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID.



Make sure that Auto Increment is checked.

32. Click **Submit**.
33. Uncheck **Report Generation**.
34. Click **Close**.

Connect and Configure Transceiver 3

35. Click **OK**.
36. Disconnect serial connector from transceiver 2. (You can leave it on the computer.)
37. Attach power supply to transceiver 3.
38. Plug power supply into power source.
39. Verify that LED 1 on the front panel of the transceiver remains lit.
40. Attach an antenna to transceiver 3.
41. Insert the RS232 connector into the serial connector in back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID. Make sure that Auto increment is checked.

42. Click **Submit**.
43. Check Report Generation.
44. Click **Close**.

45. Click **Cancel**.
46. Select **Exit** from the File menu.

View the Report

47. In your Windows Explorer, open **C:\Program Files\Configuration Manager\RRReport.txt**.

Set up TCP/IP Ports

48. Select Start> Programs> **TCP/IP Intercept Program**.
- Note:** If you receive a message requesting you set up TCP/IP ports, click OK.
49. Right-click the TCP/IP Activator icon in the lower right corner of your Desktop.
 50. Select **Show Configurator**.
The TCP/IP Configurator Main Window appears.
 51. Click the **Add TCP/IP Ports** icon.
 52. Enter **2** and a *start from value*.
The value here refers to your machines TCP/IP port number. values range from 1024 to 10,000, make sure that the value in the units section is 1.
 53. Click **OK**.
Unit IDs are automatically assigned.
 54. Highlight both virtual ports.
 55. Drag them to the Physical Port window under COM Port 1.
Note that this is most likely your COM port but others may be listed.
 56. Click **Hide** to hide the TCP/IP Configurator and keep the Activator running.

Test Operation

57. Connect transceivers 2 and 3 to peripheral devices. Note power supply, connector, and antenna connections must all be made.
Transceiver 1 must remain connected to the Host PC.
58. Send data from the Host PC to a peripheral device.
For example, if you had a printer (with a serial connection) that you have been using (i.e., drivers are already set up) you could write a short memo in a word processor on the Host PC and select File>print. The information would be printed out on the printer just as if it had been connected by wire. This would work for any existing wired connection on a local LAN. Another example would be to use HyperTerminal. This requires that your peripherals are also PCs or that you use a loop back connector to see the data sent returned in your HyperTerminal Window.

REPEATER TCP/IP INTERCEPT

This exercise demonstrates how you can have 3 transceivers configured on a TCP/IP based Repeater network communicating without wire.

Materials Needed

- 1 Host PC
- 3 Transceivers
- 3 Power sources (outlet and/or surge strips) and 3 power supplies for transceivers
- 1 other peripherals (must have a RS232 connector)
- Configuration Manager software
- TCP/IP Intercept software
- 3 RS232 cables
- 1 loopback connector

Procedure

Install Software

1. Power up your Host PC.
2. Insert the Configuration Manager software into the appropriate drive.
3. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
4. Double-click **Setup.exe**.
5. Follow the on screen instructions to complete the installation.
6. Insert the TCP/IP Intercept software into the appropriate drive.
7. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
8. Double-click **Setup.exe**.
9. Follow the on screen instructions to complete the installation.

Connect the Transceiver

10. Attach the power supply to transceiver 1.
11. Plug the power supply into power source.
12. Verify that LED 1 on the front panel of the transceiver blinks 3 times and remains lit.
13. Insert the RS232 cable connector into the serial connector in the back of the transceiver.

14. Attach the other end of this cable into the serial port on the back of your Host PC.

Configure Transceiver 1

15. Select Configuration Manager form the Start menu in Windows.
The Main window appears.
16. Click **Quick Configuration**.
17. Click **Repeater (Host)**.
18. Click **OK**.
19. Enter the information as shown in the dialog below.



20. Click **Submit**.

Generate a Report (if desired)

21. Click **Report Generation**.
22. Click **Close**.
23. Click **Yes**.
24. Click **OK**.

Connect and Configure Transceiver 2

25. Disconnect serial connector from transceiver 1. (You can leave it on the computer.)
26. Attach power supply to transceiver 2.
27. Plug power supply into power source.
28. Verify that LED 1 on the front panel of the transceiver blinks three times and remains lit.

29. Insert the RS232 connector into the serial connector in the back of the transceiver.
Note that all of the fields are grayed out except Alias Source name and Source Unit ID.



Make sure that Auto Increment is checked.

30. Click **Submit**.
31. Uncheck **Report Generation**.
32. Click **Close**.

Connect and Configure Transceiver 3

33. Click **OK**.
34. Disconnect serial connector from transceiver 2. (You can leave it on the computer.)
35. Attach power supply to transceiver 3.
36. Plug power supply into power source.
37. Verify that LED 1 on the front panel of the transceiver remains lit.
38. Insert the RS232 connector into the serial connector in the back of the transceiver.
Note that all of the fields are grayed out except Alias Source name and Source Unit ID. Make sure that Auto increment is checked.
39. Click **Submit**.
40. Check Report Generation.
41. Click **Close**.
42. Click **Cancel**.
43. Select **Exit** from the File menu.

View the Report

44. In your Windows Explorer, open **C:\Program Files\Configuration Manager\RRReport.txt**.

Set up TCP/IP Ports

45. Select Start> Programs> **TCP/IP Intercept Program**.

Note: If you receive a message requesting you set up TCP/IP ports, click OK.

46. Right-click the TCP/IP Activator icon in the lower right corner of your Desktop.

47. Select **Show Configurator**.

The TCP/IP Configurator Main Window appears.

48. Click the **Add TCP/IP Ports** icon.

49. Enter **1** and a *start from value*.

The value here refers to your machines TCP/IP port number. Values range from 1024 to 10,000.

Make sure that the value in the units section is 1.

This is the configuration of the port that will be used to send data to Transceiver 3.

50. Click **OK**.

Unit IDs are automatically assigned.

51. Highlight the virtual port.

52. Drag them to the Physical Port window under COM Port 1.

Note that this is most likely your COM port but others may be listed.

53. Click **Hide** to hide the TCP/IP Configurator and keep the Activator running.

Test Operation

54. Connect transceiver 2 to power only.

Transceiver 1 must remain connected to the Host PC.

55. Place a loopback connector and power on transceiver 3.

56. Send data from the Host PC to transceiver 3.

For example, if you had a printer (with a serial connection) that you have been using (i.e., drivers are already set up) you could write a short memo in a word processor on the Host PC and select File>print. The information would be printed out on the printer just as if it had been connected by wire. This would work for any existing wired connection on a local LAN.

Another example would be to use HyperTerminal. This requires that your peripherals are also PCs or that you use a loop back connector to see the data sent returned in your HyperTerminal Window.

Note: You can not use the Loopback test in Configuration Manager, it will conflict with TCP/IP Activator.

57. Unplug transceiver 3 and move significantly away from transceiver 1. Plug-into power.
58. Resend data. If data is received, repeat moving away and resending until you receive a time out message.
59. Move transceiver 2 and resend data to transceiver 3 until data is again received.
60. Connect transceiver 3 to peripheral devices. (Note power supply and connector connections must be made.)
61. Resend data.

Instead of being looped back, data is received on the peripheral attached to transceiver 3.

BROADCAST REMOTE-TO-ALL

This exercise demonstrates how you can have 3 transceivers configured on a Broadcast Network communicating without wire.

Materials Needed

- 1 Host PC
- 3 Transceivers
- 3 Power sources (outlet and/or surge strips) and 3 power supplies for transceivers
- 3 antennas
- 2 smart peripherals (must have a RS232 connector and be able to produce output (i.e, laptop))
- Configuration Manager software
- 3 RS232 cables

Procedure

Install Software

1. Power up your Host PC.
2. Insert the Configuration Manager software into the appropriate drive.
3. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
4. Double-click **Setup.exe**.
5. Follow the on screen instructions to complete the installation.
6. Insert the TCP/IP Intercept software into the appropriate drive.
7. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
8. Double-click **Setup.exe**.
9. Follow the on screen instructions to complete the installation.

Connect the Transceiver

10. Attach the power supply to transceiver 1.
11. Plug the power supply into power source.
12. Verify that LED 1 on the front panel of the transceiver blinks 3 times and remains lit.
13. Insert the RS232 cable connector into the serial connector in the back of the transceiver.

14. Attach the other end of this cable into the serial port on the back of your Host PC.

Configure Transceiver 1

15. Select Configuration Manager from the Start menu in Windows.
The Main window appears.
16. Click **Quick Configuration**.
17. Click **Broadcast (Host)**.
18. Click **OK**.
19. Enter the information as shown in the dialog below.



20. Click **Submit**.

Generate a Report (if desired)

21. Click **Report Generation**.
22. Click **Close**.
23. Click **Yes**.
24. Click **OK**.
25. Click **Remote to All**.

Connect and Configure Transceiver 2

26. Disconnect serial connector from transceiver 1. (You can leave it on the computer.)
27. Attach power supply to transceiver 2.
28. Plug power supply into power source.

29. Verify that LED 1 on the front panel of the transceiver blinks three times and remains lit.
30. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID.



Make sure that Auto Increment is checked.

31. Click **Submit**.
32. Uncheck **Report Generation**.
33. Click **Close**.

Connect and Configure Transceiver 3

34. Click **OK**.
35. Disconnect serial connector from transceiver 2. (You can leave it on the computer.)
36. Attach power supply to transceiver 3.
37. Plug power supply into power source.
38. Verify that LED 1 on the front panel of the transceiver remains lit.
39. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID. Make sure that Auto increment is checked.

40. Click **Submit**.
41. Check Report Generation.
42. Click **Close**.
43. Click **Cancel**.

44. Select **Exit** from the File menu.

View the Report

45. In your Windows Explorer, open **C:\Program Files\Configuration Manager\RRReport.txt**.

Test Operation

46. Connect transceivers 2 and 3 to peripheral devices. (Note power supply, connector, and antenna connections must all be made.)
Transceiver 1 must remain connected to the Host PC.
47. Send data from the host pc to a peripheral device.
An example would be to use HyperTerminal. This requires that your peripherals are also PCs or that you use a loop back connector to see the data sent returned in your HyperTerminal Window.
The data appears on both peripheral at once.
48. Send data from the peripheral device to a the host.
The data appears on the Host and on the other peripheral device.

BROADCAST REMOTE-TO-HOST

This exercise demonstrates how you can have 3 transceivers configured on a broadcast network communicating without wire.

Materials Needed

- 1 Host PC
- 3 Transceivers
- 3 Power sources (outlet and/or surge strips) and 3 power supplies for transceivers
- 3 antennas
- 2 smart peripherals (must have a RS232 connector and be able to produce output (i.e, laptop))
- Configuration Manager software
- 3 RS232 cables

Procedure

Install Software

1. Power up your Host PC.
2. Insert the Configuration Manager software into the appropriate drive.
3. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
4. Double-click **Setup.exe**.
5. Follow the on screen instructions to complete the installation.
6. Insert the TCP/IP Intercept software into the appropriate drive.
7. Using your usual method (Windows Explorer, My computer etc.) view the contents of the drive.
8. Double-click **Setup.exe**.
9. Follow the on screen instructions to complete the installation.

Connect the Transceiver

10. Attach the power supply to transceiver 1.
11. Plug the power supply into power source.
12. Verify that LED 1 on the front panel of the transceiver blinks 3 times and remains lit.
13. Insert the RS232 cable connector into the serial connector in the back of the transceiver.

14. Attach the other end of this cable into the serial port on the back of your Host PC.

Configure Transceiver 1

15. Select Configuration Manager from the Start menu in Windows.
The Main window appears.
16. Click **Quick Configuration**.
17. Click **Broadcast (Host)**.
18. Click **OK**.
19. Enter the information as shown in the dialog below.



20. Click **Submit**.

Generate a Report (if desired)

21. Click **Report Generation**.
22. Click **Close**.
23. Click **Yes**.
24. Click **OK**.
25. Click **Remote to Host**.

Connect and Configure Transceiver 2

26. Disconnect serial connector from transceiver 1. (You can leave it on the computer.)
27. Attach power supply to transceiver 2.
28. Plug power supply into power source.

29. Verify that LED 1 on the front panel of the transceiver blinks three times and remains lit.
30. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID.



Make sure that Auto Increment is checked.

31. Click **Submit**.
32. Uncheck **Report Generation**.
33. Click **Close**.

Connect and Configure Transceiver 3

34. Click **OK**.
35. Disconnect serial connector from transceiver 2. (You can leave it on the computer.)
36. Attach power supply to transceiver 3.
37. Plug power supply into power source.
38. Verify that LED 1 on the front panel of the transceiver remains lit.
39. Insert the RS232 connector into the serial connector in the back of the transceiver.

Note that all of the fields are grayed out except Alias Source name and Source Unit ID. Make sure that Auto increment is checked.

40. Click **Submit**.
41. Check Report Generation.
42. Click **Close**.
43. Click **Cancel**.

44. Select **Exit** from the File menu.

View the Report

45. In your Windows Explorer, open **C:\Program Files\Configuration Manager\RRReport.txt**.

Test Operation

46. Connect transceivers 2 and 3 to peripheral devices. Note power supply, connector, and antenna connections must all be made.
Transceiver 1 must remain connected to the Host PC.
47. Send data from the host pc to a peripheral device.
An example would be to use HyperTerminal. This requires that your peripherals are also PCs or that you use a loop back connector to see the data sent returned in your HyperTerminal Window.
The data appears on both peripheral at once.
48. Send data from the peripheral device to a the host.
The data appears on the Host but not on the other peripheral device.

Glossary

ActiveX Library	A Network Software Utility used to develop custom applications.
Asymmetrical Data Rates	The ability to send data in different directions at varying data rates which accommodates large data transfers.
Automatic-repeat-request (ARQ)	A protocol which helps maintain data integrity.
Broadcast Network	A type of Host to Multi-Point Network. A network topology.
Buffer	A collection station for data.
Carrier Sense Multiple Access (CSMA)	A protocol used for communication between transceivers.
ComPort Activator	The driver part of ComPort Intercept.
ComPort Configurator	The application part of ComPort Intercept.
ComPort Intercept	A Network Software Utility used for networks with up to 16 devices.
Configuration Manager	Name of the program used to configure all Transceivers.
dBi	A ratio of decibels to an isotropic antenna that is commonly used to measure antenna gain. The greater the dBi value, the higher the gain and, as such, the more acute the angle of coverage.
Design-in Transceiver	A type of AirStream Transceiver. Integrated into OEM products.
Device	Refers to customer equipment, peripheral, nodes.
Direct Sequence Spread Spectrum (DSSS)	A type of spread spectrum radio transmission that spreads its signal continuously over a wide frequency band
Directional Antenna	An antenna with range extended in a particular direction.
DOS Library	A Network Software Utility to port AirStream software to controllers and embedded microprocessors that are not Windows PCs.
Ethernet	A type of data transmission technology that enables LAN/WANs, Internet, and Intranet connectivity.
Forward-error-correction (FEC)	An algorithm which corrects and retransmits erroneous data.
Frame	Term for the smallest unit of data being transmitted. The physical data packet.
Frequency Hopping Spread Spectrum (FHSS)	A type of spread spectrum radio transmission that hops, in a prearranged pattern, through a prescribed frequency band.
Gain	A method accomplished by an antenna of increasing signal strength by concentrating a signal in a single direction. The higher the gain the longer the distance of transmission.

GigaHertz (GHz)	A unit of measure for frequency. Billions of Cycles per second.
GPIO	A feature which enables General Purpose Input/Output control lines.
Hardware Key	Hardware used to prevent unauthorized duplication of proprietary software. Used in AirStream Developer Kits.
Hertz(Hz)	A unit of measure for frequency. Cycles per second.
Hop Table	A list of frequencies in a given spectrum that is used for Frequency Hopping.
Host	Any device or transceiver that acts as the controlling mechanism on a network.
Host PC	A PC that acts as a host in a network topology.
ITU cyclical redundancy code 16 CRC-16	Used to detect errors in data packets.
Line of Sight	An unobstructed straight line between two transceivers.
Link	A term which describes the period of time two transceivers are in sync and transmitting data. Links consist of frames.
Loopback Connector	A connector used to test Stand-alone transceivers.
Master	A transceiver that initiates a communications link.
MegaHertz (MHz)	A unit of measure for frequency. Millions of Cycles per second.
Multi-Point Network	A network topology consisting of three or more transceivers with one transceivers connected to a Host PC.
Network Software Utilities	All software used to create network topologies.
Network Topology	Used to describe the configurations of networks.
OEM	Original Equipment Manufacturer. Typically uses AirStream Design-in Transceivers. Also refers to a level of access in the Configuration Manager.
Omni-directional Antenna	An antenna with range extended in a 360 degree transmission pattern.
Peripheral	A device that is not a host.
Point to Point Pair	A network topology consisting of only 2 transceivers.
Quick Configuration	A wizard contained in the Configuration Manager application which allows you to configure all transceivers and load the settings into EEPROM.
Radio Frequency (RF)	A generic term for radio-based technology.
Range	A linear measure of the distance that a transmitter can send a signal.
Repeater Network	A network topology consisting of three or more transceivers with one transceivers connected to a Host PC. Extends the range of a Multi-Point Network

Remote	Any device or transceiver on a network that is not a host.
RS232	A COMM protocol and the 9 pin type of cable shipped with Stand-alone transceivers.
Session	A term which describes the complete process of transmission between two transceivers. Sessions consist of links.
Slave	The target of a communications link initiated by a master.
Spread Spectrum	A radio transmission that spreads the user information over a wide bandwidth.
Stand-alone Transceiver	A AirStream Transceiver in a case with an RS232 port and external power adaptor.
Systems Integrator	Designs or Integrates equipment systems using AirStream Stand-alone Transceivers or OEM products built with AirStream Design-in Transceivers.
TCP/IP Activator	A part of TCP/IP Intercept
TCP/IP Configurator	A part of TCP/IP Intercept
TCP/IP Intercept	A Network Software Utility used to connect three or more transceivers to a TCP/IP backbone.
Transceiver	A two-way (transmit and receive) radio.
TTL	A 12 pin connection (interface) provided on Design-in Transceiver boards.
User	A level of access in the Configuration Manager.
Virtual Ports	Ports that are created via software and used to route communications traffic.

AirStream Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

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- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
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- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

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FCC Warning

This equipment complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Operation of this device is subject to the condition that it does not cause harmful interference; this device must accept any interference received, including interference that may cause undesired operation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.