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Wireless Technology, Inc.

**D-MAX
UCL900DM
WIRELESS DATA MODEM**

*Installation and
Operation Manual*

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INFORMATION

FCC NOTICE

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- 1.) This device may not cause harmful interference.
- 2.) This device must accept any interference that may be received, including interference that may cause undesired operation.

READ THIS MANUAL

Every effort has been made to insure that this WTI system is of the highest quality. This product has been carefully inspected to comply with rigid quality standards before shipment to you. In consideration of your investment and the desire to obtain full performance capability engineered into your new WTI product, we recommend that you read this manual before attempting to operate your system.

FOR MORE ASSISTANCE OR MORE INFORMATION:

Wireless Technology, Inc. (WTI)
2064 Eastman Avenue, Suite 113
Ventura, CA 93003-7787

TEL 805/339-9696

FAX 805/339-0932

EMAIL: sales@wirelesstech.com

INTERNET: <http://www.gotowti.com>

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PRODUCT WARRANTY AND REPAIR

PRODUCT WARRANTY

We appreciate your purchase of *Wireless Technology, Inc.* (WTI) security products. We take pride in the quality of our products and have manufactured each new WTI product to exacting quality standards. In normal use, it will provide you with years of satisfactory performance. However, should you experience difficulty; you are protected under the provisions of this warranty.

WTI warrants to the original user a product that is free of defects in materials and workmanship in normal use. WTI warrants to the original user that WTI's wireless RF transmission system products will be free of defects in materials and workmanship in normal use for a period of 12 months from the date of sale. WTI's obligation under this warranty shall be limited to the repair, including all necessary parts and the cost of labor connected therewith, or at our option, the replacement of any product that shows evidence of a manufacturing defect within the warranty period.

This warranty is extended to all WTI products purchased and used within the United States of America and is valid only when service is rendered by the authorized *Wireless Technology, Inc.* (WTI) Warranty Station.

This warranty shall not apply to appearance or accessory items including, but not limited to, knobs, connectors, cabinets and connecting cables. This warranty shall not, in addition, apply to repairs or replacements necessitated by any cause beyond the control of WTI including, but not limited to, acts of nature, improper installation, misuse, lack of proper maintenance, accident, voltage fluctuations, unauthorized repairs or modifications.

This warranty becomes void in the event serial numbers are altered, defaced or removed, or an attempt is made to field service or alter performance of any RF transmission component.

WTI reserves the right to make changes in design, or to make additions to, or improvements upon, products without incurring any obligation to install the same on products previously manufactured.

The foregoing is in lieu of all other warranties expressed or implied and WTI neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the sale of our products. In no event shall WTI or its Authorized Dealers be liable for special or consequential damage arising from the use of this product, or any delay in the performance of this warranty due to causes beyond its control.

PRODUCT WARRANTY AND REPAIR

REPAIR AUTHORIZATION

Please contact *Wireless Technology, Inc.* (WTI), to obtain a repair authorization number (RA) and provide the following information:

1.) Product Model & Serial Numbers

2.) Date of shipment, purchase order number, sales order number or WTI invoice number.

3.) Details of the defect or malfunction. If there is a dispute regarding the warranty or product, which does not fall under the warranty conditions stated within the description of the written warranty, please include a written explanation with the product when returned.

SHIP FREIGHT PRE-PAID TO:
Wireless Technology, Inc. (WTI)
2064 Eastman Avenue, Suite 113
Ventura, CA 93003-7787
TEL 805/339-9696
FAX 805/339-0932

RETURNS

No unauthorized returns will be accepted. All returns must have an authorized (RA) number issued by the factory (CA number if returned for credit and RA number if returned for repair). Products returned for repair or credit will be rejected if no authorization number has been issued or freight has not been pre-paid. All merchandise returned for credit will be subject to a 20% restocking and refurbishing charge.

SAFEGUARDS AND TOOLS

IMPORTANT SAFEGUARDS

1.) Read Instructions. It is important to read all safety and operating instructions before installing or using this equipment.

2.) Retain Instructions. Retain this manual and any supplements for future reference.

3.) Follow Instructions. Follow all instructions herein for use of this equipment.

Do not attempt to open the sealed Transmitter and Receiver Assembly. There are no user-serviceable parts inside. Refer servicing to the *Wireless Technology, Inc. (WTI)* factory service center only.

4.) Heed warnings. Adhere to all warnings on the equipment, and in this manual.

5.) To reduce the risk of electric shock or equipment damage, work on the unit only when the power is shut off and is unplugged from its power source to prevent accidental activation. Also take precautions to avoid contact between the equipment and other electrical wires or power sources that may be present at the installation site.

RECOMMENDED TOOLS AND ACCESSORIES FOR PROPER INSTALLATION:

- 1.) Tie-wraps to secure cable runs
- 2.) Phillips screwdriver
- 3.) Slot screwdriver
- 4.) Cordless power drill
- 5.) Set of open end or SAE wrenches
- 6.) Silicone caulking compound for antenna connector
- 7.) Self-sealing connector tape - Used to weatherproof all outdoor cable connections
- 8.) 3/4" PVC flex conduit if boxes are mounted outdoors
- 9.) Hand held radios

INTRODUCTION

THE UCL900DM SERIES

The UCL900DM transceiver is a Frequency-Hopping Spread Spectrum (FHSS) radio designed for license-free operation in the 900MHz ISM band. The radio facilitates a standard asynchronous serial data stream between two or more radios. Housed in a compact and rugged die-cast enclosure, the radio is equipped to replace thousands of meters of serial cable with its wireless link. The radio features an RS-232 interface for integration into legacy data systems.

FEATURES

- Durable NEMA-4X non-metallic enclosure.
- Transparent operation, supports any legacy system.
- Transmits around corners, through walls.
- Reliable communication up to 115.2Kbps.

OVERVIEW

The UCL900DM uses Frequency Hopping Spread Spectrum modulation, where the units “hop” from frequency to frequency many times per second using a specific hop pattern applied to all the transceivers in the same network. A distinct hopping pattern is provided for each Channel Number, thereby allowing multiple networks to co-exist in the same area without interference.

The UCL900DM transceivers operate in a Point-to-Point or Point-to-Multipoint, Client-Server or Peer-to-Peer architecture. One transceiver is configured as a Server and there can be one or many Clients. To establish synchronization between transceivers, the Server emits a beacon. Upon detecting a beacon, a Client transceiver informs its Host and a RF link is established.

The UCL900DM series implement a proprietary communication protocol to provide secure data transmissions. As it uses FHSS technology, the data remains reliable over long distances. The use of license free frequency bands ensure that the units are ready to use with no further certification requirements.

Each unit is small and easily portable for use in mobile and temporary settings as well as for fixed installations. The UCL900DM configuration software enables custom configurations based on unique application requirements.

INSTALLATION

MOUNTING

For best performance, both UCL900DM antennas should be located in an open area with a direct line-of-sight path between them. Mount antennas with elements vertical and pointed directly at each other.

Antennas should be installed a minimum of twenty (20) feet above the ground and a minimum of 9 feet above the rooftop. They should be a minimum of nine (9) feet away from any other antenna.

Mount boxes at least five (5) feet away from the antenna, and preferably in a position that can be reached without special equipment. Attach the antenna cable to the box (bottom connector) and seal the connection with sealing tape. Call WTI if longer cable is required. Seal the connections against moisture using plenty of sealing tape.

When mounting boxes to a mast, insert stainless steel clamp straps through the slots in the pole mount brackets and tighten.

GROUNDING

Make sure that the antenna system is grounded to protect against voltage surges, static charges, and lightning strikes. Use a minimum of No. 10 AWG copper or No. 8 AWG aluminum wire as a direct ground wire.

If the box is not mounted on the antenna mast, mount an antenna cable discharge unit as close as possible to where the antenna cable enters the building.

Comply with all industry standards for safety and grounding.

POWER WIRING

If desired, plumb weather tight conduit from inside the building to the UCL900DM box. Wire power to the top three screws of power supply using 16-gauge (for up to 150 feet) to 14-gauge (for up to 300 feet) wire. Be sure to fuse the power source appropriately for the size of wire used. For example, with the 16-gauge wire you must have an upstream fuse of 10 amps maximum to meet NEC requirements.

TIP

Separating power supply wiring from data wiring will reduce noise pickup. Use of shielded twisted cable for power will even further reduce noise pickup.

INSTALLATION

DATA WIRING

Connect data cable to the Phoenix connector terminals. See Figure 1 for location (Labeled "TS1" on the circuit board) and Figure 2 for typical wiring example. The example shown uses a Pelco KBD300 keyboard and a camera configured for P-Code at 4800 Baud. Follow the instructions included with your equipment for wiring and configuration.

TX/RX SELECTOR

Install the jumper over the two pins that correspond to the use of the of the unit:

Transmit (TX) - Center pin and Left pin

Receive (RX) - Center pin and Right pin

NOTE: See Figure 2 for example.

ANTENNA CONNECTIONS

Each UCL900DM link consists of two identical antennas and two identical electronic boxes (Shown in figure 1). The antennas are 900 MHz vertical element (rod) yagi construction with a type "N" connector. Note that some *Wireless Technology* video systems also have a type "N" connector antenna. However the video system usually uses a high frequency fan type antenna. Do not connect the wrong antenna! Call WTI if you are not sure which antenna to use.

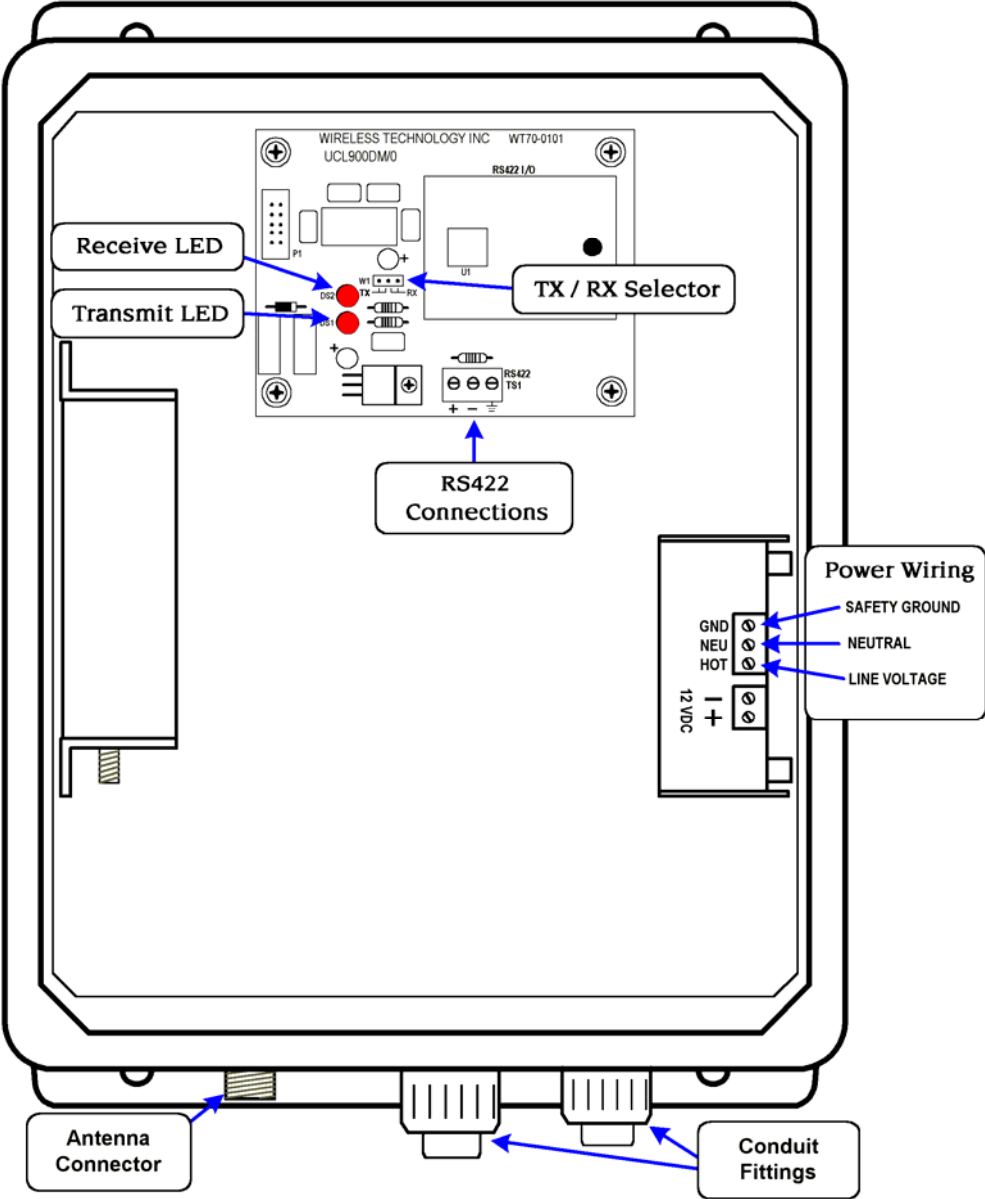


Figure 1 – UCL900DM

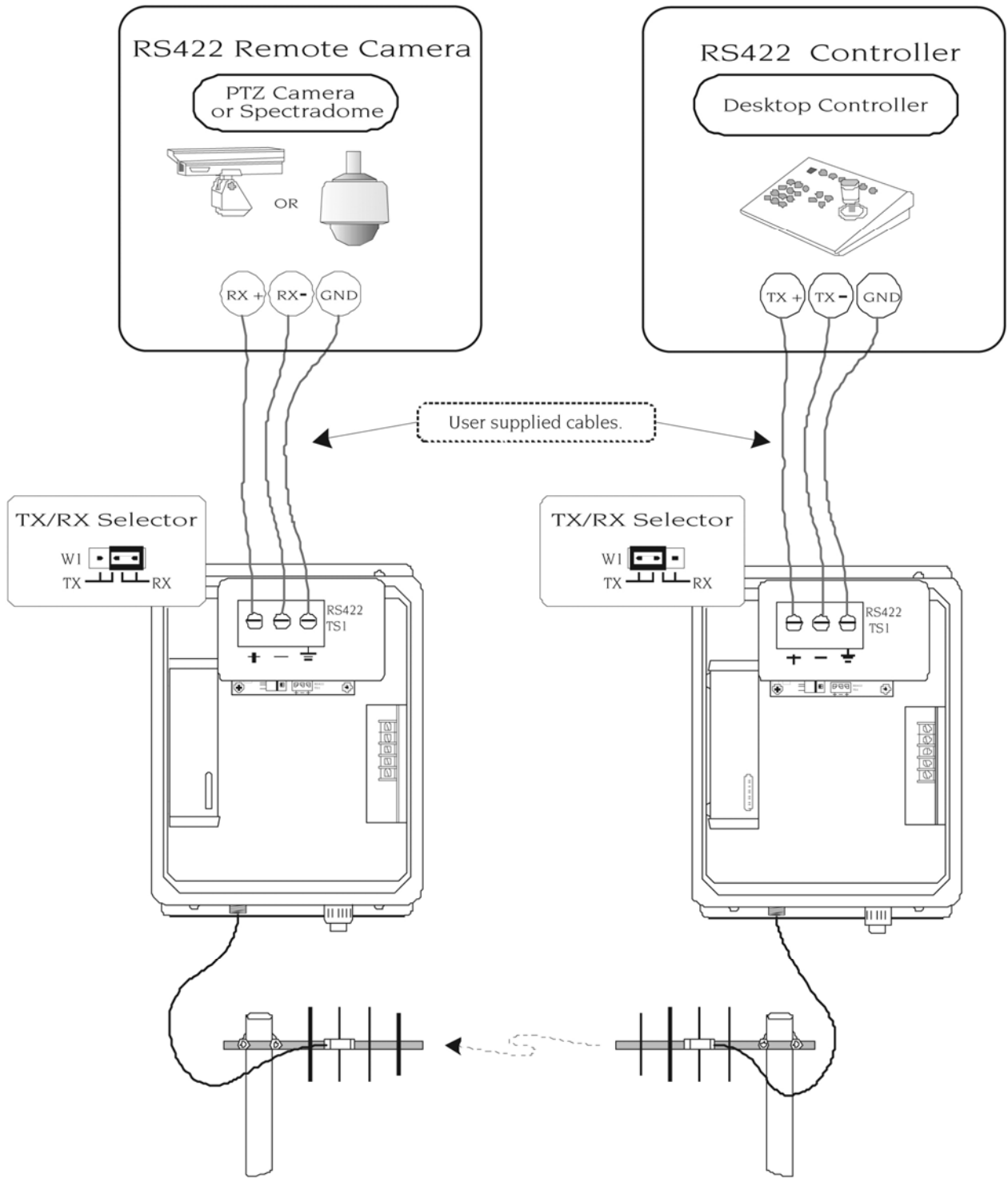


Figure 2 - Typical RS422 P/T/Z Control Wiring

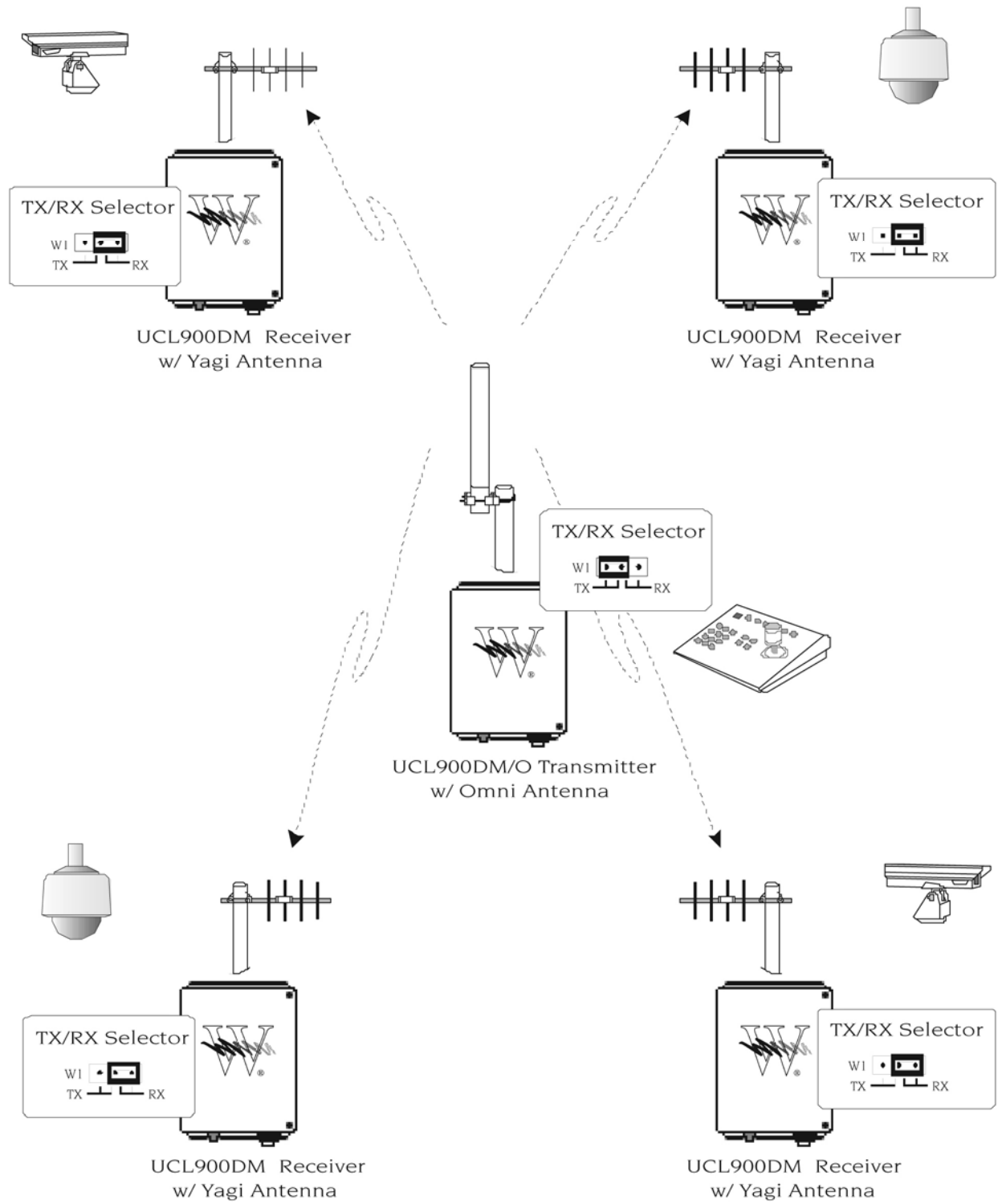


Figure 3 – Example Multiple Camera / Receiver System

The UCL900DM configuration utility software is available for download on WTI's company web site at www.wirelesstech.com/Software/

Note: the 'S' in the word Software must be capitalized!

To Download:

- ~Click on UCL900DM.zip
- ~Click "save" (note the location where you save this file)

To Install:

- ~Double click the UCL900DM.zip file on your computer
- ~Double click setup.exe
- ~Click "run" if you receive a security warning due to an unknown publisher
- ~ Accept all defaults

PROGRAMMING THE UCL900DM UNITS

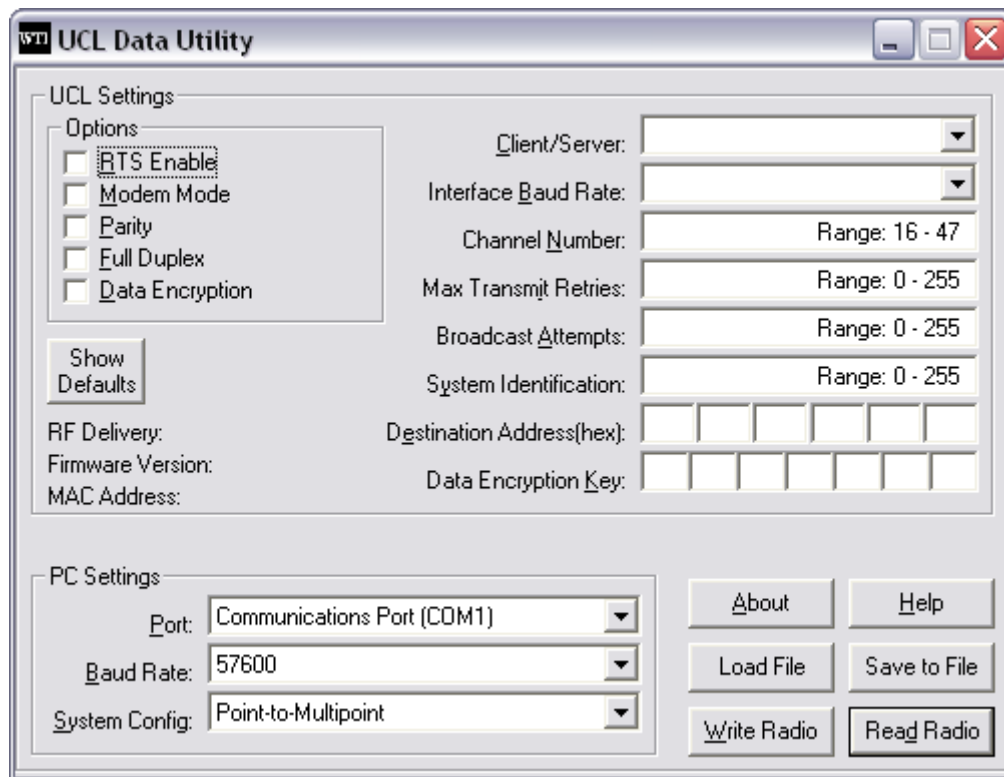
1. Connect a UCL900DM unit to the serial communications port on the PC.
2. Connect the power supply to the UCL900DM unit. Make sure the Power LED is on.
3. Start the UCL900DM Configuration Utility.
4. Select the COM Port that is connected to the UCL900DM unit on the PC Settings section.
5. Select the Interface Baud Rate of the UCL900DM unit. All UCL900DM units are shipped with a default rate of 57600 (unless units have been pre-configured to match specific serial settings). If the Interface Baud Rate of the UCL900DM unit is changed as described in Section 4.2 Changing UCL900DM Settings, then PC Setting Baud Rate must be set to the same Baud Rate to allow proper programming of the units.
6. Select the System Configuration for the UCL900DM network, Point-to-Point (one Server and one Client) or Point-to-Multipoint (one Server and multiple Clients).
7. Select Read Radio to display the current settings of the UCL900DM unit.
8. Change desired settings.
9. After all changes have been made, select Write Radio to save the changes.
10. Cycle Power to the unit after all changes has been saved. This will set the UCL900DM unit to its normal mode of operation.

Note: The Show Defaults button can be used to display the default Radio settings.

CONFIGURATION

UCL900DM SETTINGS

The UCL900DM settings page is shown below, as it will appear the first time the program is run.



PC SETTINGS

Port: Serial communications port of the PC connected to the UCL900DM unit.

Baud Rate: Must equal the Interface Baud Rate setting of the UCL900DM unit that is about to be programmed.

System Configuration: Type of UCL900DM network to be configured. Valid choices are Point-to-Point (one Server and one Client) or Point-to-Multipoint (one Server and multiple Clients).

Attention: When setting up a Point-to-Point network the Server's Destination address must be set to the Client's MAC Address.

CONFIGURATION

Client/Server: Designates UCL900DM type. In each network, there must be only one Server. All other UCL900DM units must be programmed as Clients. The number of Clients in the network is not limited; however, if performance diminishes, consider additional RF Networks.

Interface Baud Rate: This defines the baud rate used for communicating with the UCL900DM over the serial interface. The RF baud rate is fixed at 76.8 Kbps and is independent of the Interface Baud Rate. The default baud rate setting is 57600 bps unless the units have been pre-configured by Wireless Technology, Inc. (WTI). The Interface Baud Rate setting of the UCL900DM must match the Baud Rate setting of its host device.

Channel Number: A number that designates an independent network of UCL900DM units. Up to 32 independent networks can be created. The valid range of values for this field is 16 to 47.

Max Transmit Retries (For Clients and Servers in Point-to-Point networks only): This value represents the maximum number of times a particular data packet will be transmitted unsuccessfully, or without an acknowledgement, before the UCL900DM discards the packet. The default value is 16 attempts. If communication is lost and the Client's Link LED is on, try increasing this value in small increments until communication is reestablished.

Note: *This value is always associated with Client radios and Server radios in Point to Point Mode. The valid range of values for this field is 2 to 255.*

Broadcast Attempts (For Servers in Point-to-Multipoint networks only): This value represents the number of times a data packet will be transmitted by the Server UCL900DM. The default value is 4 attempts. If communication is lost and the Clients' Link LED is on, try increasing this value in small increments until communication is reestablished. The valid range of values for this field is 2 to 255

System Identification: A number from 0 to 256 that provides added security to each independent network of UCL900DM units. The System ID is used in conjunction with the Channel Number and serves as an RF password to maintain secure transfers of data. The combination of the Channel Number and System ID must be unique to each network of UCL900DMs to establish communication. Multiple Servers in the same coverage area must be programmed with different Channel Numbers to prevent inoperability of the networks. The System ID will not prevent inoperability that occurs from locating multiple Servers with the same Channel Number in the same coverage area.

Important Note: *Separate Collocated UCL900DM networks must operate on different Channel Numbers. All units in a given UCL900DM network must have identical Channel Numbers and System IDs.*

Data Encryption Key: Encryption is the process of encoding an information bit stream to secure the data content. The DES algorithm is a common, simple and well-established encryption routine. An encryption key of 56 bits is used to encrypt the packet. The receiver must use the exact same key to decrypt the packet; otherwise garbled data will be produced.

CONFIGURATION

Destination Address: The MAC Address of the remote UCL900DM in a Point-to-Point network. Used to optimize Point-to-Point communications by utilizing RF Acknowledgement.

Firmware Version: Displays the UCL900DM firmware version.

MAC Address: A unique 6 Byte, IEEE 802.3 Ethernet address assigned by Wireless Technology, Inc. (WTI) to each UCL900DM.

OPTIONAL SETTINGS

Data Encryption: Enables the Data Encryption Key. All UCL900DMs in the same network must have the same encryption setting.

RTS Enable: Enables the Request to Send control line. When enabled, enables Hardware Flow Control. Refer to Section 2.3 Hardware Flow Control.

Parity: Needs to be enabled if host requires even or odd parity and 8 data bits. This is considered as 9-bit mode. Note: Enabling Parity cuts the overall throughput into half.

Full Duplex: This mode restricts Client radios to transmitting on odd numbered frequency hop bins and the Server to even numbered frequency hop bins. Though the RF hardware is still technically half duplex, it makes the transceiver seem full duplex. This can cause overall throughputs to be cut in half. Note: All transceivers on the same network must have the same setting for Full Duplex.

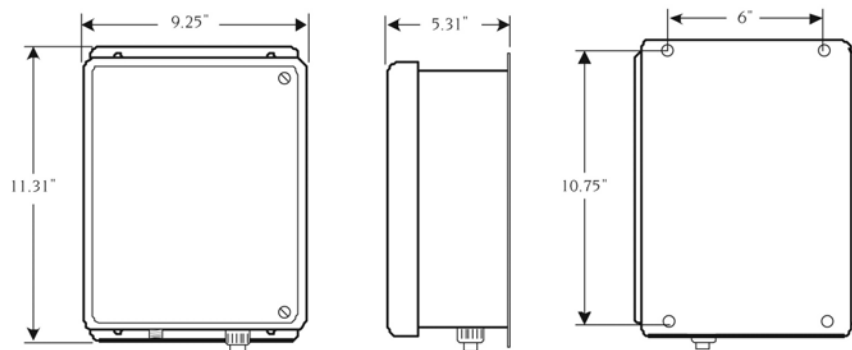
Modem Mode: Full modem handshaking is supported by the transceivers when Modem Mode is enabled. Modem Mode is incompatible with RS232 Interface. Enables DCD, DTR, DSR and Ring Indicator control lines.

SPECIFICATIONS

UCL900DM Wireless Control Link

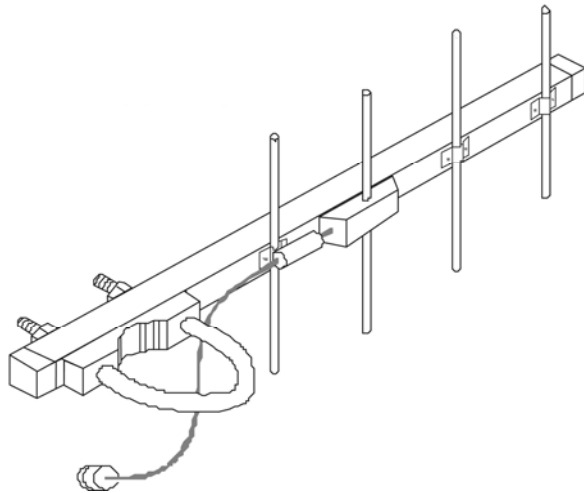
Frequency Band	902-928 MHz
Frequency Selection (Switches)	Up to 32 channels
RF Power	1 Watt
Range	3 Miles (3.4 Km) standard (contact WTI) 10 miles (16.1 Km) extended
Mount	Wall (close to rooftop or mast) Pole mount / antenna mast clamps provided
Antenna	Pole mount 7 dB Yagi standard
Antenna Cable	10 feet, type 'N' connector Optional: Antenna extension cable – call factory
Temperature	-40°F (-40°C) to 140°F (+80°C)
Prime Power	85-230 V 0.1A, 50/60 Hz
Size	9.25" (23.6 cm) W x 11.31" (28.7 cm) H x 5.31" (13.5 cm) D
Weight	6 lbs. (2.7 Kg)

Weatherproof NEMA-4X non-metallic enclosure provided with a mast mount bracket for a 1.5"(6.35mm) minimum diameter mast.



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SPECIFICATIONS



MODEL 918-4 Spread Spectrum Yagi Antenna

A durable spread spectrum Yagi with maximum gain-to-boom length ratio designed for FCC Part 15 and other 902-928MHz applications.

These antennas provide excellent electrical performance mated with a rugged mechanical design to deliver a high value solution to your antenna requirements.

FEATURES

- “Ever Sealed” feed system which ensures against system failures due to moisture.
- Fully balanced design which delivers peak performance and requires no tuning in the field.
- Rugged, square boom construction and stainless steel hardware for a robust installation.

ELECTRICAL SPECIFICATIONS		MECHANICAL SPECIFICATIONS	
Frequency Range	902-928 MHz		
Gain	7 dBd minimum	Number of Elements	4
Front to Back Ratio	14 dB minimum	Boom Length	1.25' (0.38 m)
VSWR (50Ω)	1.2:1 typical	Boom Material	0.750" by 0.750" square tube 6061-T6 aluminum
1.5:1 bandwidth	26 MHz minimum	Element Material	0.188" diameter 2011-T3 aluminum rod
3dB Beamwidth, E/H Planes	57° /78°	Mast Diameter	1.25" – 2.00" (3.2 cm – 5.1 cm)
Stacking Distance, E/H	11.5"/8.5"	Mounting	Rear
Maximum Power*	50 Watts	Wind Surface Area	0.12 ft ² (0.011 m ²)
Termination, Coax	'N' female, 1' (0.3 m), RG58 type	Wind Survival	150 mph (240 kph)
Polarization	Horizontal or vertical	Weight	1.0 lbs. (0.45 kg)

* Limited by feedline. Higher power ratings are available upon request.

MADE IN THE USA • 2 Year Warranty

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