CTW Paging Transmitter VHF/UHF

User's Manual

CommtechWireless

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1 Introduction

1.1 Purpose of Manual

This manual is supplied with the purchase of a VHF/UHF Transmitter product. It provides an overview, installation and operation instructions as well as technical specifications. The manual is the first port of call for all information for operation and installation. Additional information or technical resources may be obtained from:

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www.commtechwireless.com

1.2 Document Overview

This document is structured along the following guidelines:

➢ Chapter One describes the purpose of the document and the layout.
➢ Chapter Two provides an overview of the VHF/UHF Transmitter, its components and operation.
➢ Chapter Three provides quick Install instructions on the VHF/UHF Transmitter system.
➢ Chapter Four provides a detailed overview on the Menu System and navigation.
➢ Chapter Five gives block diagrams, mechanical references and cable installation drawings.
➢ Chapter Six the source for the technical specifications of the VHF/UHF Transmitter.
➢ Chapter Seven helps the user in trouble shooting the system.
➢ Chapter Eight gives a glossary of all the technical terms used.

1.3 Warnings

The VHF/UHF paging transmitter must contain an external 2.5 Amp fuse in the wiring to the input connector in order to provide the correct protection of the internal electronics. If the power is connected the wrong way around or over voltage the product may fail, this will void the warranty.

Note: Warning Statements: User must keep 65cm distance from the RF radio device

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2 Overview
2.1 Basic System Overview

The *VHF/UHF Paging Transmitter* is a highly integrated communications radio system that includes Audio and Data paging capability. This product will open up new lines of unparalleled high speed reliable data communications in hostile environments while ensuring quick easy field installation and operation.

The VHF/UHF is essentially a transmitter capable of emulating a voice and Pocsag systems. The units can be configured for several types of standard link formats and speeds. The transmitter comes from the factory pre-configured.

The Transmitter unit maybe connected a PC, laptop or any RS-232 terminal, to display the menus and control the operation of the Device. In operation the Transmitter maybe connected to any RS-232 device. An external simple computer headset can be wired directly to the input connector for complete voice functionality.

The VHF/UHF provides a menu system through the RS232 port of the Device. The menu configuration utility is enabled by connecting to the device with a terminal program and typing the command "*MENU<cr>*", or the Hayes control command "*AT?<cr>*".

The operational baud rate is configured using the menu system, the baud rate is only valid for the RS232 menu commands and system control commands. Once the option is chosen from the menu, it will not take effect until the command **Submit** is used to change and save the current configuration. The menu configuration utility will operate at the units pre-configured baud rate.

2.2 Display Modes

The Paging transmitter display contains a dual colour LED display indicator. This indicator provides a complete picture of the operation and status of the Paging transmitter system, at a glance a technician can use this to find problems in the field.

In standard standby mode the LED will blink green at one second intervals.
When the transmitter is activated the LED will remain on in a green steady state condition.
When digital data is presented into the data interface the LED will blink fast from red to green, this will indicated changing data on the interface port.

When a PC is connected the and RS232 data is moving in and out of the unit then the LED will also fast blink from one colour to another.

If the LED remains on constant RED then the system has developed a fault or recognised a fault condition, the status display in the menu will indicated the type of fault, unless the fault is a intermittent one. Faults of this nature are typically like low power supply voltage that dips when the transmitter is under full operation and the voltage cannot be sustained.

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3 Quick Install Guide

3.1 VHF/UHF Transmitter Unit

The Transmitter is set at the factory to standard configurations.
The transmitters are shipped from the factory with the second lowest power setting, so that the units may operate in close proximity to each other and with simple whip antenna for testing purposes.

3.2 Step by Step Testing

- First read the Introduction and Quick Install Guide section.
- Ensure the correct wiring connection as per the *DIAGRAM* section of the manual
- Connect the antenna to the BNC socket on the Radio Modem
- Power the units and check that the display LED's indicate power and standby modes *DISPLAY MODES* section of the manual
- Connect the test transmitter a RS232 terminal device at 19200,8,N,1 communications settings
- Type the command AT<cr> and check the Radio Modem responds with "**OK"**.
- Use the command AT?<cr> or MENU<cr> to connect into the menu system.
- Use a test pager with a cap code of 8 and set the transmitter to match the channel and frequency of this device.
- Use the Diagnostic menu section to send a test page to the test pager.
- If the test page is received a full RF and data test transmission has now been performed.

The unit may now be configured to suit the required application this may include possible modification of the following settings.

- RS232 Interface settings
- RF power levels
- Data and POCSAG control Inversions
- Frequency and channel selection and control
- Audio/Data mode control phase on hardware connector

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4 Menu System

The VHF/UHF Transmitter contains its own internal menu system accessed with any general terminal package. The Transmitter allows you to change several parameters to optimise its performance for your particular application. All adjustments are made through a menu system, which is the user interface programmed into each transmitter. A standard terminal program can be used to access the menu system, which eliminates the need for set-up diskettes, DIP-switch settings, or custom software. Laptop computers or Palm top systems are best suited for this operation in the field.

The set-up program is invoked by connecting the transmitter to any terminal program, setting the baud rate for that terminal to 19200, 8, N, 1.. While any terminal which can be set to 19200 baud will work, all examples for this manual were generated using the Hyper-terminal terminal program available from the Website (www.hilgraeve.com) and comes standard with most windows installations.

When the set-up Menu program is invoked from the main menu screen for the set-up program will come up on the Terminal screen as shown below. The user can select various options from the menu, such as changing the transmitter power. The changes made to the operation of the transmitter are stored in non-volatile memory to maintain the latest configuration even with loss of power.

NOTE: Users not familiar with this type of system should gain additional help.

```
      ###  CTW VHF Paging Transmitter MAIN MENU (V1.0)  ###

         Unit Name : Commtech W
      Serial Number : 2308050001

      (R)    Radio Configuration Menu
      (S)    Serial Port Configuration Menu
      (P)    Radio Personality Menu
      (D)    Diagnostics Menu
      (Esc)  To Exit Menu

      Enter Choice :
```

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4.1 Menu Navigation

The menu system contains a level indicator, which shows the depth that the current menu is away from the master level. The indicator is on the first line on the top left most point as the example below. The Indicator will be activated once the menu system is away from the MAIN MENU screen. The example below is shown after the 'P' for Radio Personality is selected.

```
(1)---   Radio Personality Menu    ---

Unit Name : Commtech W
Menu Time Out is 05 Minutes

(U)    Set Unit Name
(T)    Set Current Time
(M)    Set Menu Time out
(Esc)  Previous Menu

Enter Choice :
```

Commands are terminated by either entering the correct data with the correct amount of characters or by hitting the ENTER KEY. Sub menu selection only requires a single key press to enter the sub menu sections. The ESC key can be used at any time to terminate functions. Menus are reversed, or backed out by using the ESC key, until the main menu area is reached then the question will be asked:

Are You Sure (Y/N)

If the answer is Y, then the system will return to the command prompt stage and if NO, the Main Menu will appear again. The Menu system also contains and automatic timer that will reverse the user out of the menu system after the programmed time. The time is measured from the last active menu display, and the time is programmed from the Personality Menu area. The factory back out default time is 5 minutes. With this automatic back out the menu system can be left in any state without any concerns of the system operating correctly once the menu has exited, this prevents field technicians leaving site just to find out that the transmitter has been left in the wrong mode.

4.2 Main Menu

To activate the main menu system issue the command AT?<cr> or MENU<cr>, and the menu below will
be activated.

```
            ###  CTW VHF Paging Transmitter MAIN MENU (V1.0)  ###

                Unit Name : Commtech W
            Serial Number : 2308050001

            (R)     Radio Configuration Menu
            (S)     Serial Port Configuration Menu
            (P)     Radio Personality Menu
            (D)     Diagnostics Menu
            (Esc)   To Exit Menu

            Enter Choice :
```

The letters indicated in the brackets are the only letters that the terminal system will respond too.
Note: Inputs require upper or lower case character entry.

Now we will look at each section of the menu and explain the operation of all the controls.

4.3 [R] Radio Configuration Menu

The Radio Configuration menu controls all aspects to do with the radio operation, these include
frequencies, protocols, and RF characteristics.

```
            (1)---   Radio Configuration Menu     ---

                    POCSAG Data PHASE Normal is ON
            Data/Audio Input Select Inversion is ON

            (C)     Radio Characteristics Menu
            (P)     Toggle POCSAG Data Inversion
            (D)     Toggle Data/Audio Inversion
            (F)     Restore Factory Defaults
            (Esc)   Previous Menu

            Enter Choice :
```

POCSAG data phase is used to invert the data to RF Data relationship, for normal operation this should
be ON.
Data/Audio Input inversion reverses the control of the hardware pin for this function.

4.3.1 [C] Radio Characteristics Menu

```
(2)---   Radio Characteristics Menu    ---

Current Tx RF Channel  = 00
  Channel Raster 20KHz = OFF
 Narrow Band Deviation = OFF
      Tx Power Setting = 01
    Tx Time OUT Setting = 30 Sec

(C)    Channel Selection Menu
(T)    Set Tx Time Out Timer
(1)    Set Tx Power 100mW
(2)    Set Tx Power 1W
(3)    Set Tx Power 5W
(D)    Toggle Narrow/Wide Deviation
(Esc)  Previous Menu

Enter Choice :
```

4.3.1.1 [C] Channel Selection Menu

```
(3)---   Channel Control Menu    ---

   Current Tx RF Channel = 00
External Channel Control = ON

 Base Frequency Transmit = 148.00000 MHz
      Transmit Bandwidth = 026.00000 MHz

00 148.00000 MHz  01 152.00000 MHz  02 160.00000 MHz  03 166.00000 MHz
04 173.50000 MHz  05 148.00000 MHz  06 148.00000 MHz  07 148.33750 MHz
08 148.33750 MHz  09 148.00000 MHz  10 148.00000 MHz  11 148.00000 MHz
12 148.00000 MHz  13 148.00000 MHz  14 148.00000 MHz  15 148.00000 MHz

(E)    Toggle External Channel Control
(T)    Set Current Tx Channel
(2)    Change Tx Frequency
(Esc)  Previous Menu

Enter Choice :
```

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4.4 [S] Serial Port Configuration

The serial port controls the flow of information in and out of the VHF/UHF Transmitter. The standard setting is 19200, 8, N, 1. If the baud rate needs to be altered for any reason use this menu and the Submit option to change the settings. The serial port and command structure is directly suited to interface into either simple 3 wire control connections or more advanced systems with both software and hardware flow control options.

```
(1)---  Serial Port Configuration Menu   ---

  Baud Rate  = 19200 bps
   Data Bits = 08
Flow Control = OFF
      Parity = OFF
  ODD Parity = OFF

(B)    Baud Rate Menu
(N)    Toggle Parity
(O)    Toggle ODD Parity
(D)    Set to Defaults
(S)    Submit
(Esc)  Previous Menu

Enter Choice :
```

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4.4.1 [B] Baud Rate Menu

```
(2)---   Baud Rate Menu    ---

Baud Rate = 19200 bps

(2)     38400
(3)     19200
(4)     9600
(5)     4800
(6)     2400
(7)     1200
(S)     Submit
(Esc)   Previous Menu

Enter Choice :
```

4

4.5 [P] Radio Personality Menu

This allows a user to program 10 characters into memory for their own use. It could serve to identify components of the same system or apply a name to the programmed device. The menu is accessed from the main menu system by pressing the "P" character and then the "U" character, a prompt will then appear to enter the required data.

```
(1)---   Radio Personality Menu    ---

Unit Name : Commtech W
Menu Time Out is 05 Minutes

(U)     Set Unit Name
(T)     Set Current Time
(M)     Set Menu Time out
(Esc)   Previous Menu

Enter Choice :
```

4.5.1   [T] Set Current Time

The Real Time Clock is a software feature that can track the operational time of the unit from the last power on reset. It is volatile and will reset each time the power is applied. The time can be set in normal 24 hour format for solar applications or long term system diagnosis.

When in this menu system a real time output with a second by second update is also displayed at the bottom of the menu system.

```
(2)---   Psuedo Real Time Clock Menu   ---

(H)     Set Hours
(M)     Set Minutes
(S)     Set Seconds
(Esc)   Previous Menu

Enter Choice :
00:07:36
```

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4.6 [D] Diagnostics Menu

The diagnostic menu system is used to monitor or help debug the installed system.

```
(1)---   Diagnostics Menu    ---

Current Mic Level Setting = 127
      Test Pager Cap Code = 08
     Test Pager Data Rate = 512 bps
           Test Page Data = Testing 123

(S)    Display Status
(A)    Adjust Mic Level
(T)    Set Test Page
(1)    Set Data Rate 512 bps
(2)    Set Data Rate 1200 bps
(3)    Set Data Rate 2400 bps
(R)    Reset UNIT
(Esc)  Previous Menu

Enter Choice :
```

When the "S" option is selected the following data is output to the terminal screen, it is a snapshot of the current real data on the transmitter.

```
Commtech Wireless VHF V1.0 08/09/2005

Unit Time              = 00:14:14
Current Temperature    = 029
Supply Voltage         = 12.6
Switch Mode Voltage    = 36


....Hit any Key to Continue
```

Production testing………………………

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5 Diagrams
5.1 Block Diagram VHF/UHF Transmitter

Too be completed……………when product is final.

5

5.2 Hardware Installation VHF/UHF

The VHF/UHF Transmitter unit is designed to simply bolt into position inside a cabinet or other similar location. Please refer to the mechanical dimensions to aid in drilling mounting holes for the equipment.

Mechanical dimensions to be placed here………

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5.3 Electrical Connections VHF/UHF

The cable harness is installed as per the user requirements.

Detailed electrical interface here……………

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6 Technical Specifications

6.1 VHF/UHF Transmitter General

Minimum performance to exceed the
Following, for 148MHz to 174MHz*:
          440 MHz to 470MHz*:

                  AS4295-1995,
                  ETS 300 086 Jan 1991, ETS 300 113,
                  ETS 300 279,
                  CEPT T/R 24-01 E Sept 1988,
                  RFS25, RFS26, RFS32,
                  TIA/EIA-603,
                  BAPT 225 ZV 1/2098 (German soft keying),
                  FCC Part 22, 74, 90, 90.210, 80.475,
                  MIL-STD-810E (Parts thereof),
                  EC Marking, EC EMC Directive 89/336/EEC.

∗Conforms but not all approved.

Synthesis Method:	Non mixing PLL
	Fractional N synthesizer
Modulation:	Direct FM, two point method.
Channel Spacing:	12.5kHz/20kHz option
Synthesizer Step Size:	12.5kHz or 20kHz.
Channels:	16Tx, PC Software selectable or Internal Dip switch
Supply Voltage:	13.8 +/- 20%
DC Power Consumption:	<65 mA standby, typically 60mA.
	<1.5A for 5W TX RF, typ 1.2A.
Operating Temperature:	-30 to +60C.
Physical Size:	62mm Width x 28mm High x 118mm Long.
Standard LED indicators:	Power, Alarm, RS232 Data Rx/Tx, paging Data
Standard Switches:	Internal DIP switch for channel selection.
Standard Controls:	External Voice/Data select, PTT and RS232 I/O.

6.2 VHF/UHF Transmitter

MEASURED IN ACCORDANCE WITH TIA/EIA-603 STANDARDS

RF Power Output:	100mW to 5W.
Frequency Stability:	1.0PPM for –30 to 60C.
Spurii:	Better than -70dBc.
RF Switching Bandwidth:	Full Sub band.
RF Switching Bandwidth PA:	Full Sub band.
Duty Cycle:	50% for 5W RF output with microprocessor thermally controlled fallback system and lockouts.
RF Rise Time:	<50mS with continuous VCO selected (Controlled RF envelope transmission)

6.3   ANCILLARIES and FEATURES

Data Interface RS232 1200 to 38400 bits/second
RF Data speed up to 2400 bits/second with wave shaping
Fully Programmable / Configurable via Internal Software
Flash Firmware Upgrade Capable
VF Audio Radio compatibility
Built In Test Equipment (B.I.T.E.) and remote diagnostics
Broad Band High Efficiency LDMOS PA module
Serial Data Interface
Digital alignment and calibration
Low RFI and EMI emission design
Low current consumption
Latest technology, full SMD
High performance 8 bit processor
Based on proven technology
Simple disassembly for service
Minimal technician adjusts for future maintenance
Design spec –40 to 70C
Low aging oscillators
Minimal interconnections

*** Due to ongoing development we reserve the right to alter specifications without notice.*

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7 Trouble Shooting

"I have the paging transmitter ready for Menu Configuration but I get no menu on my terminal program"

The largest cause of programming and set up problems with the VHF/UHF Transmitter is caused by incorrect terminal settings or the wrong hardware set up for the applications. Always ensure that the terminal is at the correct baud rate and the flow control is set correctly. When using the Configuration Menu option ensure the terminal is connected to port on the transmitter. The transmitter contains a LED indicator that can be used as a line break out box, use this to diagnose cable problems such as RxD / TxD or flow control issues.

8

8 Glossary

A

Alphanumeric
Roman Letters (alphabetic) and Arabic numbers (numeric).

ARQ
Automatic Request Repeat. A form of error correction protocol. That uses retries to correct bad packets of data.

ARQ Retries
The number of times the radio modem will try to send a packet of lost information before it gives up.

ASCII
American Standard Code for Information Interchange. Pronounced as-kee. A code by which alphanumeric, punctuation and control characters, commonly found on computer keyboards, are each assigned a unique value between 0-127 (decimal).

Asynchronous
A data transmission in which the time between characters may vary. Characters are delimited by start and stop bits.

Attention Commands (AT Commands)
A group of commands created by HayesTM that are recognised by the modem and that begin with AT (or at).

Attenuation
The loss of power through transmission equipment, lines or other communication devices.

Auto answer
A modem capability that allows it to automatically pick-up.

B

Bandwidth
The range of signal frequencies that are accepted or passed by a circuit or network.

Base Frequency
The frequency band occupied by a signal in its original or unmodulated form. The base frequency for the transmitter is 140MHz or 440MHz.

Baud
This term represents the number of signal elements per second. In asynchronous communication, 1 block has data bits, start bit(s), stop bit(s) and parity bit(s). This is greater than 1 byte and so the time taken to send this package will be different then the time taken to send a byte. This term is not equivalent to BPS (bits per second), although it is often used in this way. Compare with bit rate.

Baud Rate
Number of discrete signalling events per second; not necessarily the same as bits per second.

Binary
A number system with a base of two, using the digits 0 and 1. Commonly used in computers since the values 0 and 1 can easily be represented as OFF and ON in electrical circuits.

Bit
The smallest piece of information in a binary number system. The word stands for Binary digIT.

Bit rate
The speed at which bits are transmitted, usually expressed as bits per second (BPS).

Block
Group of characters treated as a unit for the purpose of data transmission.

GLOSSARY

BPS
An acronym for Bits Per Second. Transmission rate of binary numbers (bits).

Bridge
Joins dissimilar networks and converts protocols such that data can passed between them. For example, a bridge may allow data to be passed from a TCP/IP network to a ISDN network.

Buffer
Temporary storage area used to compensate for a difference in the rate of data flow into and out of a device.

Byte
A grouping of bits to specify a single character usually consisting of eight consecutive bits. See also Bit.

C

Carrier signal
The base frequency which is modulated by another signal containing information to be transmitted.

Carriage Return
The enter key on a keyboard. Causes the curser to move to the beginning of the next line.

Carrier Detect (CD)
An RS-232 interface signal from the modem to a terminal or personal computer indicating that the modem is receiving a signal from a remote modem. See also DCD.

Character
A letter, number or other symbol contained in a message or used in a control function. See Byte and ASCII.

Clear to Send (CTS)
Control signal sent by the DCE to indicate that the DTE may begin a transmission.

Competing System
A Leased Line. For example X25, QPSX, ISPN.

Connection Commands
Commands that enable information to be passed between two modems, after a communications link has been established.

Connector
A physical devices, such as a plug, socket or jack, used to connect one hardware component of a system to another. A connector may also be called a port.

Console
Part of a computer system, usually a video display terminal, used by the operator to communicate with the computer. See terminal.

Contention
Condition arising when two or more devices try to transmit at the same time using the same channel.

Control Character
Any character assigned as ASCII numeric code less than the SPACE character. These characters are used to initiate a control function on the receiving device. Also a symbol you can create by pressing one of your computer's keys while holding down the Control key. These symbols are not usually printed, and are generally used to control screen formatting and cursor positioning.

Clear to Sent (CTS)
This signal is generated by a modem in response to RTS to indicate that a communications channel has been established and that data can be sent.

Cyclic Redundancy Check (CRC)

An error-detection technique in which a data validation value is mathematically derived from a block of data and transmitted at the end of the block. The receiving end recomputes the value and if it matches the value sent, the data is assumed to be valid (error-free). If not, the receiver notifies the transmitter that an error has occurred and the block is retransmitted.

D

Data

Any type of information, such as numbers, letters and symbols, that can be processed by a computer.

Data Bits

The actual characters being transmitted between two computers when asynchronous communications is being used. Usually 7 or 8 data bits are used. A normal byte has 8 bits. 7 data bits are used for ASCII/alphanumeric data.

Data Communications Equipment (DCE)

Equipment that is used to access a communications network. The DCE provides all the functions required to establish, maintain and terminate a connection, and provides the signal conversion required for communications between the Data Terminal Equipment (DTE) and the telephone network. With RS-232 connections, the modem is generally the DCE device while the computer or terminal connected to a modem is generally the DTE device. See also Data Terminal Equipment.

Data Compression

An encoding technique which provides for the transmission of fewer data bits without the loss of information. The receiving end expands the data received to its original form. For example, a ZIP file/drive, ARJ file formats, MPEG/JPEG and Gif formats.

Data Latency

Time delay between input stream and output data.

Data Set Ready (DSR)

An RS-232 control signal used to indicate the readiness of the DCE (Usually a modem) to accept data from the DTE (usually a terminal or computer).

Data Terminal Equipment (DTE)

The equipment which provides the data source and/or receiving end of a data transmission link. The DTE may be a personal computer, a printer, a front-end processor to a large mainframe computer or any other device which can transmit or receive data. With RS-232 connections the designation of DTE or DCE determines which device is responsible for generating certain control signals. See also Data Communications Equipment.

Data Terminal Ready (DTR)

An RS-232 control signal used to indicate the readiness of the DTE for data transmission.

DCD

An acronym for Data Carrier Detect. See also Carrier Detect.

Dedicated Line

A communications line which is not dialed. Also known as a leased or private line.

Decibel (dB/dBm)

Unit of measure indicating the logarithmic ratio of output signal power to input signal power. dB is relative to Watts while dBm is scaled so that is relative to milli-Watts.

Default

A value, action or setting that is automatically used by a computer system when no other explicit information has been given.

Demodulate

To recover the information being transmitted by a modulated signal. For example, a conventional radio receiver demodulates an incoming broadcast signal top convert it into sound emitted by a speaker. See also Modulate and Modem.

Dial Tone

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A call progress signal returned by a telephone switching machine to indicate that it is ready to accept a telephone number. ATDT (HayesTM compands) supported for compatibility.

Dial-up

Establishing a temporary connection to a remote system or computer.

Digital Signal

A signal composed of discrete signal levels as opposed to the continuous signal levels of an analogue signal.

DIP Switch

Acronym for Dual In-line Package. Options chosen by pushing a switch to one of two positions.

Distortion

Undesired change in a signal's original waveform resulting from the characteristics of the transmission circuits or other external influences.

Downloading

Refers to the transferring of software from a remote system to your computer.

DTE

An acronym of Data Terminal Equipment. See Data Terminal Equipment.

Dumb Terminal

Terminals that do not contain an intelligent microprocessor and usually send data one character at a time.

Duplex Transmission

Independent, simultaneous, two-way transmission.

E

Echo

The re-transmission of characters received by either the modem or remote system back to the DTE.

End Point Radio

Radios at the end communication path. The radios that are actually requesting and/or supplying information. As opposed to a repeater.

Escape Guard Time

The amount of time for which no activity is allowed on the data line before and after the sequence is entered. Otherwise the escape sequence will be ignored.

Even Parity

Even parity refers to the addition of a 0 value or 1 value bit to the data bits which form a character to cause an even number of 1 value data bits to be sent. See also Parity.

Extension Numbers

The numbers that must be placed after the destination radio's number, to access the required port (internal or external). Only available in Point to Multipoint mode.

F

Fault Log

Contains a list of modem faults since the log was last cleared.

Firmware

Computer program stored permanently in Flash Memory.

Flash Memory

Non-volatile memory for storing programs and configuration data.

Flow Control

Controls the flow according to the readiness of the associated terminals to receive and transmit data. May be controlled with hardware or software.

Frame

See Block.

Frame Time

Specifies the maximum length of each packet frame (larger the time, the more information that can be contained within the frame).

Forward Error Correction (FEC)

Technique of transmitting additional information with the original data so that if small errors are detected the correct information can be recreated by the receiving end without requiring a retransmission.

Full Duplex

Data transmission which allows data to flow in two directions at the same time.

G

Gateway

An electronic connection that joins similar networks together, for example IP to IP. Generally transparent to the user.

H

Half Duplex

Data transmission in which data may flow in either direction at one time, but not both directions simultaneously. Transmission direction is alternatively switched to allow two way flow of data.

Handshake

A predetermined interchange of signals between two devices to establish conditions for a transfer of data.

Hang-up

Termination of the Communications Link. As with a normal phone call, the phone must be hung-up so that you can call and receive other calls.

Hang-up on DTR

Only available with the Main Port. If activated, will terminate the Communication Link when the Data Terminal Ready pin is low.

Hardware

The electronic or electro-mechanical devices in a computer system as opposed to the programs or software.

Hardware Handshaking

The use of special RS-232 signals to halt or commence the flow of data between two computers or terminals, between computers and modems or between facsimile machines. See also Software Handshaking, RTS and CTS.

HayesTM

Company that designed the AT commands.

Hertz (Hz)

Unit of frequency, one cycle per second.

Hopping Pattern

Pattern to which the modem jumps through the frequency spectrum as it transmits and receives information. There are 32 hopping patterns available.

Host Computer

A computer that manages information for many terminals. A host computer may be mainframe, minicomputer or a microcomputer.

I

Input

Information transferred into a computer from some external source, such as the keyboard, a disk drive, a modem or a scanner. Also, the act or process of transferring such information.

Input/Output Device

A device that transfers information into or out of a computer.

GLOSSARY

Interface

A physical point of interconnection between two devices where electrical signal levels, timing, handshaking and pin numbers are defined. The devices, rules or convention by which one component of a system communicates with another.

Interference

Undesirable disturbances or distortions in a data transmission signal.

I/O

Input/Output. The transfer of information into and out of a computer.

K

Kermit

Kermit is a file transfer protocol developed for operating systems which could not support the XModem protocol. Kermit was developed at Columbia University in 1981.

L

Light Emitting Diode (LED)

A diode which glows when a current flows through it. Often used as an indicator light.

Link

A circuit or transmission path, including all equipment, between a sender and a receiver.

Local Echo

A method of communication in which your modem or software displays data locally on your screen, without relying on the host computer to echo the characters back.

Local Command State

Also called Terminal Command State. When a computer is communicating with a local modem. The local mode, assumes all commands are for it and acts on the AT commands. As opposed to being connected to a remote modem (see On-Line State).

Local Rx Address

4 digit phone number/address of the modem that you are dialing. Each modem, within a network, must have a unique Rx address. Used when dialing a remote modem.

Log

List of information concerning the modem. See Fault Log, Physical Layer Log, Serial Layer Log.

Loopback

Directing signals back toward the source at some point in the communications path. Used in testing all types of modems and data systems.

M

Master

Active Modem that synchronises the slave modems to enable the transmission of information. Can communicate with all slaves.

Modbus Timer

Sends the packet of information when no information has been received for the specified length of time.

Modem

Modulator/Demodulator. A device to convert data from a computer or terminal into a form suitable for transmission across a telephone system.

Modem Returns Response Codes

Suppresses (when activated) the Response Codes, so that they are not displayed on the terminal.

Modem Eliminator

A usually passive device which takes the place of a modem between a local terminal which requires a modem and a computer. Also called Null Modem.

8

Modulate
To modify or alter a signal so as to transmit information. For example, conventional broadcast radio transmits sound by modulating the amplitude or the frequency of a carrier signal. See also Demodulate and Modem.

Multiplex
To interleave or simultaneously transmit two or more messages on a single channel.

N

NAK
Negative Acknowledgement. This control character indicates that the last block transmitted was in error and that the receiver is expecting a re-transmission.

Network Address
If the modem is a master, then this is the network identification number. Slaves are synchronised by the master that has the same network address. A radio will ignore messages originating from radios with differing addresses. Must be the same for all radios within a network.

Network Fail Timeout
The length of time that the system will wait after a signal is lost before trying to re-synchronise.

Node
A point of interconnection on a circuit.

Noise
Random electrical signals introduced by components of the circuit or natural disturbances which can produce errors in transmission.

Non-Volatile Memory
Stores data/programs/configurations without the need for a battery backup. Will not be erased if there is a power failure. Nearly permanent.

Null Modem
See Modem Eliminator.

O

Odd Parity
Odd parity refers to the appending of a 0 or 1 value bit to the data bits of a character to ensure that an odd number of 1 value bits are sent. See also Even Parity and Parity.

Off-line
Describes to state of a connection as not in session or not currently connected. There is no communications link between the modems, system has not dialled.

On-line Requests Timer
Controls the time between slave integrity checks by the master.

On-line State
When a Communications Link is established and dialogue is between your computer and a remote system. The local modem assumes that all information from your computer is to be sent on to the remote modem. All AT commands are ignored by the local modem but are acted upon by the remote modem. See also Local Command State.

On-line Time
The amount of time spent on-line with an information service.

P

PABX
Private Automatic Branch Exchange. An automatic switchboard for handling large concentrations of telephones (extensions).

Packet

Group of bits including data and control elements that are transmitted as a whole.

Packet Switched Network

System where messages are transmitted in packets, each individually addressed and routed through the network.

Parity

A simple method of error checking by which the number of data bits received are added together to ensure that the correct number have been received.

Password

Password protection for the menu to prohibit unauthorised menu access and the ability to alter the radio's settings. 12 to 18 Alpha-numeric characters.

Peripheral (Peripheral Device)

A device, such as a video monitor, disk drive, printer or modem, used in conjunction with a computer. Often (but not necessarily) physically separate from the computer and connected to it by wires, cables or some other form of interface.

Physical Layer Logging

Shows the modem statistics relating to the quantity of data throughput.

Point-to-Multipoint Communication

One radio (the master) communicates with more that one slave, while each slave can only talk to the master. As opposed to Point to Point Communication.

Port

The point of connection, usually a physical connector, between a computer and a peripheral device, another computer or a network.

Propagation Delay

The time required for a signal to travel from one end of a circuit to another.

Protocol

A set of conventions controlling the timing and format of data communications between two pieces of communications equipment.

Public Switched Telephone Network (PSTN)

Telephone system providing circuit switching to many customers.

Pulse

An abrupt and relatively short change in voltage, either positive or negative, resulting in the conveyance of data in a circuit.

R

RAM

Random Access Memory.

Received Line Signal Detector

See Carrier Detect.

Redundancy Check

Technique of error detection involving the transmission of additional data related to the message so that the receiving device can determine if the data transmitted is valid (error-free).

% Registers

Registers inside the modem that usually contain string values. Can be read and altered on a remote modem using a Communications Link. Examples include Unit Name, Security Code and Local Address.

Remote Configuration

The accessing of information from a remote radio and the ability to change the remote radio's attributes via a Communications Link.

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Remote System
A another PC or network that can be communicated with via modem.

Repeater
Radio that receives and repeats the signal in a communications path, to extend the range between the End Point Radios. They do not act on the information, only pass it on.

Request to Send (RTS)
Control signal by the DTE to inform the DCE that it is ready to transmit data. When used for flow control between the DTE and the modem, this signal indicates to the modem that the DTE is ready to accept data. Used mainly in half-duplex communications.

Response Codes
Also called Result Codes. Screen messages that indicate what the modem is doing. For example, OK will appear when a command has been executed successfully.

RF Channels
Steps or intervals of frequency divisions in the frequency spectrum.

Router
Guides data through a network by the address of the data.

RS-232C
Frequently shortened to RS-232. A standard which defines the physical and electrical interface between Data Communications Equipment and Data Terminal Equipment. The most commonly used interface between modems and computers. Also known as ITU-T V24.

RSSI Trigger Level
Signal threshold/trigger level in dBm.

RTS/CTS
Control characters for hardware handshaking.

Rx
Abbreviation for Receive.

S

Serial Data
Data transmission in which each bit of information is sent sequentially through a single data path.

Serial Logging
Shows information regarding the performance of both serial ports.

Serial Port
Port that receives/transmits serial data.

Simplex
Data communications in one direction only.

Slave
Passive modem. Requires a Master to synchronise timing to enable successful transmission. May initiate communication, but can only communicate with the Master.

Software
Computer program or set of computer programs held in storage, and loaded into RAM for execution.

Software Handshaking
A method of controlling the flow of data between two computers or terminals. Special control characters are sent from one terminal to the other in order to halt or recommence the flow of data. See also Hardware Handshaking.

Spread Spectrum Modem
Modem that operates within a frequency band (as opposed to operating at a single, fixed frequency), jumping through the frequencies according to the Hopping Pattern.

8

S Registers
Registers, inside the modem, that contain whole number values. These can be read and obtained from remote modems by using a communications link. Examples include Escape Sequence Guard Time, Number of Retries for ARQ.

Start Bit
When a character is transmitted asynchronously to another computer, a start bit always precedes the actual data. Seven or eight data bits, an optional parity bit and a stop bit will follow.

Stop Bit
The last bit or element transmitted in asynchronous transmission of a character to return the circuit to an idle state. One or two stop bits are sent at the end of each character of data.

Synchronous
A data transmission in which the time between characters is fixed by synchronising the transmitting and receiving communications equipment. The clock signal is typically derived from the data stream in order to maintain synchronisation.

T

Telecommunications
The transmission of information across long distances, such as over telephone lines.

Terminal
An input/output device consisting of a typewriter-like keyboard and a display device, used for communicating with a large computer. Any device capable of sending and/or receiving data over a communications channel.

Terminal Emulation
Refers to the type of ASCII terminal your software will imitate (the control characters used to perform certain screen and cursor movement tasks vary from one terminal to another).

Terminal Program
Also called Terminal Software, terminal package, emulator. Computer program that deciphers the information received from the modem and send information to the modem as required.

Test Link Margin
Displays the average signal and noise the modem is measuring.

Text
The message portion of a data block in synchronous data transmissions.

Transmit Power
Power of signal emanating from the antenna. This should be the minimum required to maintain a solid data link.

Turnaround Time
The time required to reverse the direction of transmission when operating in half duplex mode.

Tx
Abbreviation for Transmit.

U

Unit Name
User defined name for radio. May be used to indicate radio position or other identifying feature.

Upload
Refers to sending files or text from the user's computer to another user.

V

Virtual Hayes Connection
Interface for communication with and management of a remote radio.

W

Wait Time for Connect

Time the radio will wait for valid connection, before indicating communication unsuccessful.

X

XModem

A communications protocol developed in the late '70s by Ward Christensen to perform error checking on data being sent between two computers. See Kermit.

XON/XOFF

Special control characters used to control the flow of data between your computer and a remote system. See Software Handshaking.

Z

ZModem

Designed to rectify limitations of previous models as well as providing support for high speed, packet and network communications environments