TELETRONICS
INTERNATIONAL, INC.

WINC 2400C Wireless Modem

Owner's Manual

TELETRONICS INTERNATIONAL, INC.
1803 Research Blvd. Suite 404,Rockville, Maryland, USA, 20850-3155
Tel: (301) 309-8500, Fax: (301) 309-8851, E-mail: tiusa@teletronics.com

Serial Number:_____

Remote Units

Serial Number	Remarks

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by

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LIMITED WARRANTY

The WINC 2400C is warranted to the original purchaser to be free from defects in materials and workmanship under normal installation, use, and service for a period of one (1) year from the date of purchase.

Under this warranty, Teletronics International, Inc. shall repair or replace (at its option), during the warranty period, any part that proves to be defective in material of workmanship under normal installation, use and service, provided the product is returned to Teletronics International, Inc., or to one of its distributors with transportation charges prepaid. Returned products must include a copy of the purchase receipt. In the absence of a purchase receipt, the warranty period shall be one (1) year from the date of manufacture.

This warranty shall be voided if the product is damaged as a result of disassemble, defacement, misuse, abuse, neglect, accident, destruction or alteration of the serial number, improper electrical voltages or currents, repair, alteration or maintenance by any person or party other than a Teletronics International, Inc. employee or authorized service facility, or any use in violation of instructions furnished by Teletronics International, Inc.

This warranty is also rendered invalid if this product is removed from the country in which it was purchased, if it is used in a country in which it is not registered for use, or if it is used in a country in which it was not authorized to use. Due to variations in communications laws, this product may be illegal for use in some countries. Teletronics International, Inc. assumes no responsibility for damages or penalties incurred resulting from the use of this product in a manner or location other than that for which it is intended.

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Some states do not allow the exclusion or limitation of special, incidental or consequential damages, so the above exclusion or limitation may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

TABLE OF CONTENTS

1.0 Overview

Teletronics' advanced WINC 2400C[1] modem is a versatile wireless synchronous modem that compatibly interfaces with a variety of external synchronous data devices, including multiplexers, routers, bridges, PBXs, frame relays, etc. Acting as "wireless airports", the WINC 2400C's transmit and receive data information for the synchronous data devices located in separated locations without cables and expensive network operating system. The modem operates at very low power in the FCC designated ISM (Instrument, Scientific and Medical) frequency band between 2400 and 2483 MHz and user requires no license to operate. Using state-of-the-art spread spectrum technology, the WINC 2400C offers point-to-point linkage and point-to-multipoint broadcasting data communications function. Typical applications include multichannels of voice, facsimile, and data up to 128 Kbps.

2.0 Technical Information

The WINC 2400C transfers data between synchronous devices at selectable data rate, from 1.2, 2.4, 4.8, 9.6, 56.0, 64.0, to 128.0 Kbps.

WINC 2400C provides all comparable features as WINC 900C, the existing 900 MHz version, operating within the 2404 - 2483 MHz frequency band.   The channel bandwidth of transmission is 4 Mhz and there are twenty (20) independent 4 MHz channels available for choice when operation. Due to different environmental application requirement, at least 3 different radiation power levels are offered, either 50mW, 100mW, or 500mW. Please check the product sheet that comes with the WINC 2400C you purchased. Depending on the material of walls and ceilings, indoor operation as much as 30 to 50 meters. For outdoor unobstructed environment, the operating range of the modem is approximately 1 kilometer using the standard rubber omni-directional antenna.   Using a high-gain Yagi antenna, operating ranges can increase to up to 30 km.

The WINC 2400C uses direct-sequence spread spectrum technology with a fixed PN spreading code for access. Differentially QPSK modulation is employed. The air-link operates in a Time Division Duplex (TDD) mode which performs the full-duplex function to the user. Sensitivity is better than -85 dBm (not including spreading gain). See Appendix C for a detailed technical specification of the modem.

In general, the WINC 2400C operates automatically with little need for user intervention. Both channel selection and power control are automatic and transparent to the user guarantying that communications occur at the lowest power sufficient to maintain the link on a channel that is least noisy.

3.0 Equipment Check List

The WINC 2400C package contains the following items:

1. One (1) WINC 2400C wireless modem.

2. One (1) rubber omni antenna.

3. One (1) power cord.

4. One (1) pair of stands for vertical placement (Optional).

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[1] WINC is a trademark of Teletronics International, Inc. All other trademarks or references to other commonly used software or hardware are the property of their respective companies.

5.   One (1) WINC 2400C Operation Manual..

6.   One (1) warranty card

Each WINC 2400C is uniquely identified by a digital address code.   The address enables two intended modem units to establish a communications link. The seven (7) digit address can be found on the label affixed to the left side of the unit and is defined by the right-most seven (7) digits of the serial number. The device address can also be found by using the ATI0 command to be further discussed in Appendix A. A DB-25 female connector is used for synchronous operation.   (There is also a port, the DB-9 male connector. It is used for configuring the unit prier to first operation by a PC notebook. Once it is configured, the port is no longer needed for operation).

If anything is missing or damaged, please contact your supplier immediately.

4.0 Hardware Installation (Cabling)

Installing a WINC 2400C involves a simple cable connection between it and a synchronous data device. However, beffore you can make it operational for wireless data transmission among various units of WINC 2400Cs, each unit has to be properly configurated.   The configuratiion of each unit requires the connection with a PC or a termainal. (After the configuration task is completed, the PC or terminal can either stay connected for monitoring purpose or be disconnected). The following instructions are provided to assist you in wiring peier to the configuration.

1. Turn your computer off before starting.

2. Connect the asynchronous configuration port of the WINC 2400C to your computer's
serial port using an RS-232, DB-9 connector and associated cable.

DB-25 or V.35 connector to
external device

Cable with DB-9 connectors at each end
connect Async. port of WINC 2400C and PC.

DB-25 male connector connects to WINC
2400C DB-25 female Sync. Port
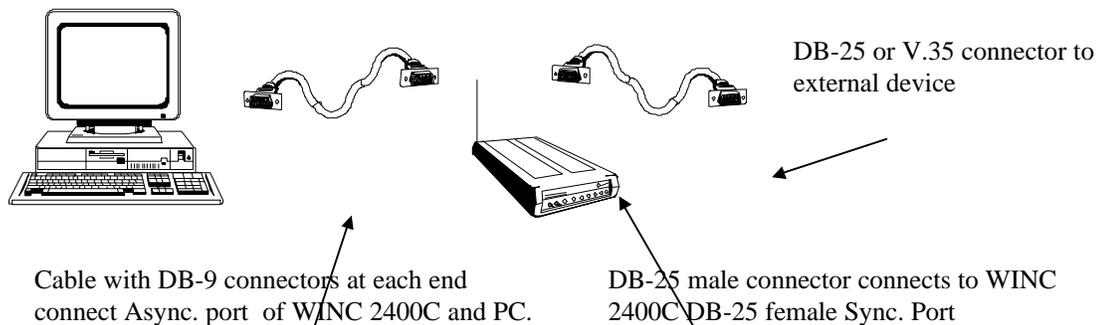
Fig. 4.0 Wiring Interface

3. The DB-25 connector of WINC 2400C is used to connect to a synchronous device like a digital multiplexer or LAN bridge.   This DB-25 port can be configured as RS-23, V.35, or RS-422 by configuration software. Please refer to Appendix C for detailed pin definition for different interfaces.

4. Attach the rubber omni antenna to the matching connector on the rear of the WINC 2400C.

5. With the WINC 2400C power switch in the *off* position, connect the power cord to the rear of the unit and plug it into the electrical jack nearest your equipment. The WINC 2400C is equipped with a universal power supply for 110-220 volts and will internally adjust itself for either voltage.

6. Turn on the computer and the synchronous device, if applicable.

7. Turn on the WINC 2400C modem. The WINC 2400C performs a brief self-test. LED indicator lights will be displayed on the front panel.   Each LED displays single or dual colors. Green indicates an active state or signal presence, whereas red indicates otherwise.   See Appendix C, WINC 2400C Synchronous Interface Status, for LED indicator definitions.

After the self-test, you are now ready to do the configuration.   This will be presented in the next section..

5.0 System Configuration

Before we proceed from here, let us back off a little bit. Although the WINC 2400C is a modem with a wireless transceiver, it has been designed to be compatible with off-the-shelf commercially available communications software typically used with conventional land-line modems. Consequently, we take for grated that you already have the software to operate a land line modem in place, such as the PC communications software Pcplus. Otherwise, you have to install the appropriate data communications software into your computer before proceeding the configuration.

We now proceed to the configuration. There are two parts. The first part involves the enabling of PC or terminal to communicate with the WINC 2400C. This can be achieved in 4 steps to be described below. The next part is the concept of synchronous software configuration to be presented in section 5.1.

Please note, due to the popularity of MS-Windows, the Terminal in the Accessories of MS Window 3.1 will be used in the following process as guidance.

Step 1: Activate your communication software
       a. Running MS-Windows, and then activate the Terminal in Accessories.
       b. Click the "Settings" ,and then activate the "Communications" dialog box.

Step 2: Configure your communication software to meet default value of configuration port on the WINC 2400C
       a. Click on the available serial port from the "Connector" list,
       b. Click on the 9600 from the "Baud Rate" list,
       c. Click on "OK" return to the Terminal.

       All selectable items in the communication dialog box will turn into active (high-lighted), if the selected serial port is available on your computer. Otherwise, stop here and consult with a computer set up specialist about setting up serial port for you.

Step 3: Communicate with WINC 2400C via AT command
       a. Press the "Enter" key.
         You should get an "ERROR" whenever you press the Enter key without AT commands.
       b. Try type in "ATI0"
         You should get response similar to the followings:

        MODEM address: 2500155
        Peer address :   3467777
        Current channel: 0

       (The MODEM address should match the right-most seven (7) digits of the serial number digit found on the label affixed to the left side of the unit.)

       After the configuration setup process above, the communications software will go into the local-terminal or direct-connection mode. All AT commands for WINC 2400C will be sent to the serial port directly, accepted and executed by WINC 2400C.

       There is a possibility that you will get some funny characters or no response resulting from the different baud rate settings on the communications software and the WINC 2400C. If this happens, please reset the WINC 2400C back to the manufacturer's default setting -- 9600 bps as instructed below.

Whenever you need to clear the settings, you can issue AT command AT&F to reset the WINC 2400C to the original factory default conditions. An alternative method for accomplishing this is to hold the reset button on the front panel and turn on the power of WINC 2400C. (please refer to Fig. 5 -1) A pencil, pen or other sharply pointed object is required to access the button through the hole on the front panel.

Fig 5-1. WINC 2400C Front Panel
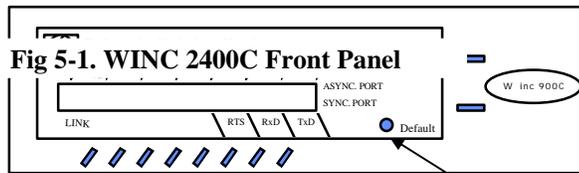
Step 4: Save the configuration settings of your communications of software

If you already completed the steps above without problems, you may select the "Save" from the "File" option in the MS-Windows Terminal and save the configuration settings for the future before you leave Terminal.

If you still have problems communicating with the WINC 2400C from your computer, please check the followings steps, and then start all over again from the beginning of this chapter.

1. Contact your computer hardware engineer, verify the availability of the serial port (com port) on your computer, and working on this until the serial port is available to you.

2. Connect your serial port with an external land line modem and work on the communication software setting until you get the dial tone, dialing out successfully.

3. Replace the external modem with WINC 2400C. At this point, go through the factory default setting process above to make sure that 9600 is the default baud rate on WINC 2400C.

4. Please work from the beginning of chapter 4.0 again.

5. If you still have problems communicating with the WINC 2400C, Please visit our **Web Customer Support page at www.teletronics.com** or fill out the technical support request form at the last page with all details and fax it to our "Technical Support Team" located in our US headquarters.

5.1 The Concept of Synchronous Configuration

After we have achieved the part I of the system configuration, we now move part II.   Let us start with a point-to-point link where two WINC 2400C are involved.   Major technical
details are :
1. The Baud Rate setting of the external device.
2. Make sure that all external devices are configured as DTE and does take Tx and Rx clock from external device -- WINC 2400C   for better performance.
3. The interface configuration on the external device -- RS-232, RS-422, or V.35.
4. The frequency interference, LOS (line of sight) at both locations.
5. The address of both WINC 2400Cs.
(The seven (7) digit address is on the label affixed to the left side of the unit and is defined by the right-most seven (7) digits of the serial number).

The configuration process is mainly a process of setting up parameters so that link can be maintained at both WINC 2400Cs.   Consistency includes the following.

1. Baud Rate
2. Your choice of interface type on both WINC 2400Cs must match to the interface type of external device.
3. Regarding the setting of Tx and Tx clock source, we prefer to choose INTERNAL on both selections.
4. Peer address on both units must cross indexed each other.
5. The choice of channel must be the same.
6. Our recommendation on SYNC protocol is "TRANSPARENT".
7. The unit closes to the control center should be designated as "MASTER" unit. And, the remote unit should be "SLAVE" unit.
8. Your choice on Air Preamble pattern must be the same on both units.
9. Your choice on Air Spreading Code pattern of both units must be the same.

Please note, the configuration process should be performed with one WINC 2400C at a time. Otherwise, you might not be able to complete the configuration process before the connection process between these two units. (Please refer to Appendix A for details)

After the configuration process, a wireless linkage between the local and remote WINC 2400C can be established on the designated channel. However, if this channel is not performing properly, or if for some other reason you wish to switch to another channel, you must make the changes on both WINC 2400Cs. The change again has to be made from the PC or the termainal.

The actual procedure of configuration is performed by selecting alternatives from a series of menus via the DB-9 configuration port. In this section the menu selection procedure is detailed.

The *Main Menu* is selected by issuing the AT command <AT&#2> from the terminal connected to the asynchronous port. On issuing this command, the main menu appears on the screen and contains seven (7) alternative selections as follows:

(1) Change Active Operating Mode,
(2) Configure Synchronous Interface
(3) Configure Asynchronous Interface
(4) Configure Broadcast Interface
(5) Air Link Status,
(6) System Reset
(7) Exit.

(Please Note, option 3, Configure Asynchronous Interface, is not active in WINC 2400C, so just ignore the option.)

Selections 1, 2, and 4 are crucial when you wish to change or modify either the synchronous, or broadcast operation of the system. The Menu Selection Procedure in the following outlines the recommended approach for configuring the system. As indicated, you must first determine which mode the system is in before re-configuring. Once that is determined, it is a simple matter to follow the procedure as outlined.

Main Menu Selections

(1) Change Active Operating Mode:
    This option is designed to change the operating mode from asynchronous to synchronous or vice versa. Since the current WINC 2400C operates always at the synchronous mode, you should choose option 1 to change to synchronous operation, if it is not already set that way. Then choose (7) Exit to get back to the Main Menu. When in the Main Menu choose (6) to reset the system to the operating mode chosen.

(2) Configure Synchronous Interface:

    Select this option from the Main Menu to configure the synchronous interface.

(3) Configure Asynchronous Interface:

    Select this option from the Main Menu to configure the asynchronous interface. (Please note : The choices under this menu selection will be removed from WINC 2400C model, if not yet on the screen).

(4) Configure Broadcast Interface:

    Select this option from the Main Menu to change the parameters for broadcast mode.   The choices under this menu selection are described in Section 5.4.

(5) Air-Link Status:

    Select this option to determine the air-link performance statistics.

(6) System Reset:

    Select this option when it is required to reset the system to effect the change selected previously. The changes that require this step are specified in the menu associated with that change. Please note that the Main Menu is exited upon choosing this option. To get back to the Main Menu you must issue the <AT&#2> command from the terminal mode.

(7) Exit:

    Select this option to exit from the Main Menu.

5.2 Synchronous Configuration

After choosing Configure SYNCHRONOUS interface, you will see the following screen :   (please refer to fig. 5-3 for the layout of configuration manual)

<div align="center">

Synchronous Configuration

</div>

Current speed	**: 64000**	**Interface type**	**: RS-232**
Tx clock source	**: INTERNAL**	**Rx clock source**	**: INTERNAL**
Peer Address	**: XXXXXXX**	**Active Channel**	**: 0**
Self Address	**: XXXXXXX**	**SYNC Protocol**	**: TRANSPARENT**
FEC Er Drop Pkt	**: OFF**	**Master-Slave**	**: SLAVE**
Air Time-Out	**: 15**	**Air Preamble IX**	**: 8**
Air Spreading IX	**: 0**	**Power Level**	**: 4**

1. Change SYNC speed   **2. Change interface type**
3. Change Tx clock source   **4. Change Rx clock source**
5. Change Peer Address   **6. Change Channel Number**
7. Change operation protocol   **8. Change power level**
9. Change FEC Check Operation
A. Change Master-Slave mode
B. Change air Time-Out value
C. Change air Preamble pattern
D. Change air Spreading Code pattern
E. Back to previous menu

Enter :
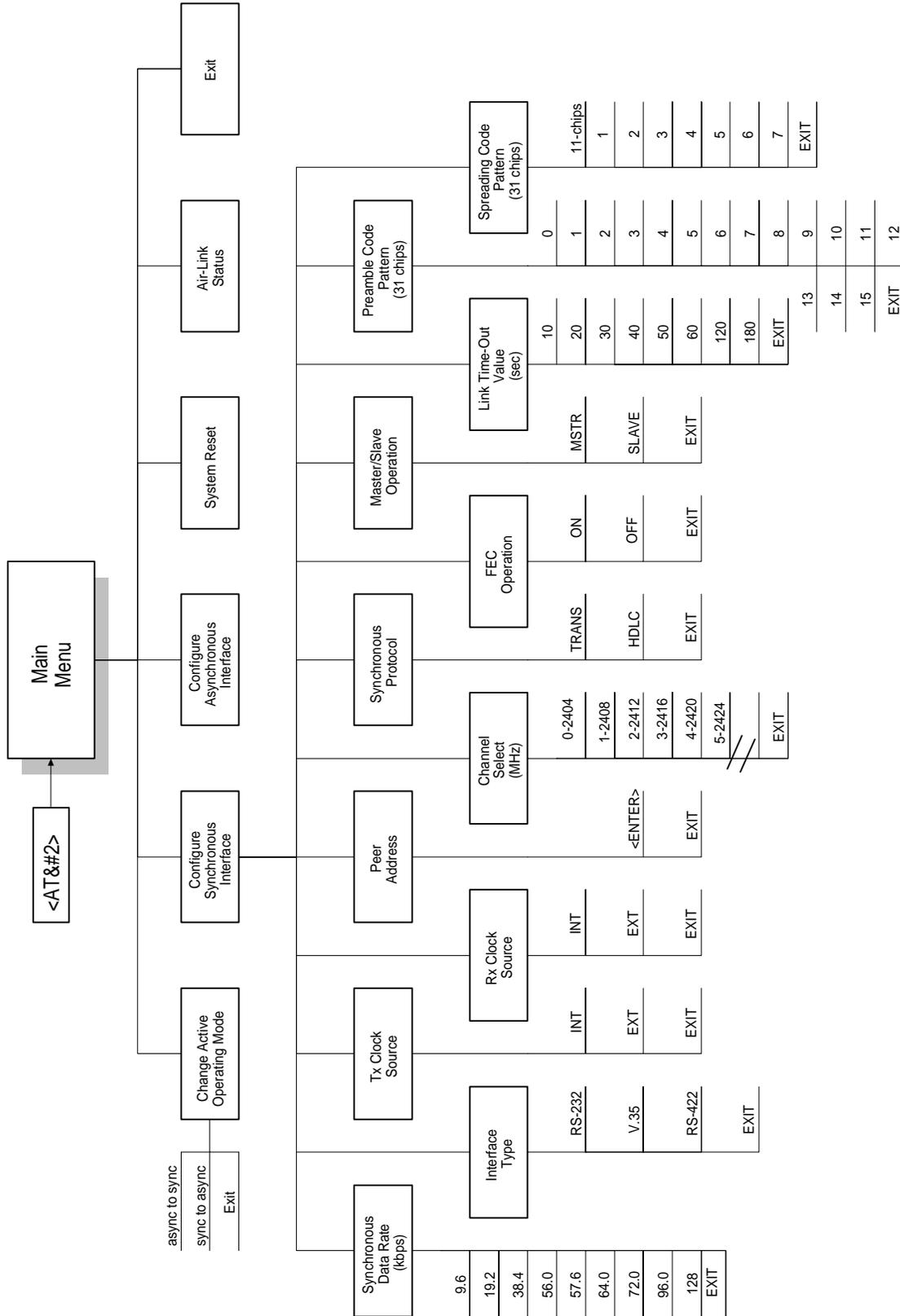
Fig. 5.3 Layout of Synchronous Configuration Manual

(1) Change SYNC speed:

This selection determines the data rate in Kbps of data entering and leaving the WINC 2400C over the synchronous port. The data rate ranges from 9600 bps to 128 Kbps. Please note that once the selection is made, it takes effect instantly. In addition, this selection is only valid when the WINC 2400C provides the clock, i.e., items 3 and 4 setting are at internal.

(2) Change interface type:

Three types of physical interfaces, RS-232, V.35 or RS-422, are available for synchronous operation. This selection allows the user to choose from the list.

(3) Change Tx (Transmit) clock source:

This selection determines whether the WINC 2400C (considered the DCE) provides the transmit clock (internal) to the DTE or receives the transmit clock (external) from the DTE . The choice of internal is recommended.

(4) Change Rx (Receive) clock source:

This selection determines whether the WINC 2400C (considered the DCE) provides the receive clock (internal) to the DTE or receives the receive clock (external) from the DTE. Again, the choice of internal is recommended

(5) Change Peer Address:

This 7-digit number represents the address of the modem in remote to which a link is established. The address is on the sticker attached to the side of the remote unit.

(6) Change Channel Number:

Operating in the synchronous mode, twenty (20) 4-MHz channels are available for communications. After you make your selection, you must coordinate that choice with the distant end and use this menu to select the idential channel.

(7) Change operation protocol:

This selection determines whether the synchronous interface between the DTE and the WINC 2400C (DCE) is *transparent* (i.e. no meaning is associated with any bit or bit sequence) or *HDLC* (i.e. a "bit-oriented" protocol in which data bits are "framed" by standardized bit sequences). For proper operation the DTE and the DCE should be configured identically. Note that the system must be reset for this change to take effect. We recommend transparent.

(8) Change power level:

Using this selection you can choose any one of four transmission power levels, if available. Otherwise, the selection is not operative.

(9) Change FEC Check Operation:

When operating synchronously, forward error correction (FEC) is used to improve the link performance. This selection determines whether only error-free packets are passed to the DTE (FEC ON) or whether all packets are passed (FEC OFF), i.e. even those packets with known errors are passed to the DTE.

(A) Change Master - Slave mode:

For proper operation of the system, one unit must be designated as the master unit and the other as the slave. This selection is used to make such a designation. Note that the system must be reset before this instruction takes effect.

(B) Change air Time-Out value:

This value determines how long the link remains established without receiving the handshake control packet.

(C) Change air Preamble pattern:

The WINC 2400C uses separate spreading code sequences for synchronization and communications. The preamble is used for synchronization and consists of 16-code patterns, each 63 chips in length. This selection allows one of those patterns to be chosen. Note that the system must be reset before a new pattern takes effect and both the local and distant terminals must use the same code pattern.

(D) Change air Spreading Code pattern:

The spreading code used for communications can be either 11 chips or 31 chips in length. This selection allows either one 11-chip code or one of nine 31-chip codes to be chosen. As above, the system must be reset before this selection takes effect and the same code must be selected by both the local and distant end.   Please consult Teletronics before you intend to make the change.

5.3 Broadcast Configuration

Most of the configuration setting under the broadcast mode are similar to the synchronous mode.   The address configuration is the only difference comparing to the synchronous configuration.

In the broadcast mode, only one station can function as the master station.   This master station will perform the broadcast function sending messages it received from the synchronous device to the air. The receivers are configured to be at slave mode and their master address in the configuration setting has to be set to the master station's address.   Otherwise the slave station can not filter the transmitted message from master station.   This master address and broadcast address can be changed as shown under item 5 below.

(1) Change SYNC speed:

This selection determines the data rate in Kbps of data entering and leaving the WINC 2400C over the synchronous port. The data rate ranges from 9600 bps to 128 Kbps. Please note that once the selection is made, it takes effect instantly. In addition, this selection is only valid when the WINC 2400C provides the clock, i.e., items 3 and 4 settings are at internal.

(2) Change interface type:

Three types of physical interfaces, RS-232, V.35, or RS-422, are available for synchronous operation. This selection allows the user to choose from the list.

(3) Change Tx (Transmit) clock source:

This selection determines whether the WINC 2400C (considered the DCE) provides the transmit clock (internal) to the DTE or receives the transmit clock (external) from the DTE . The choice of internal is recommended.

(4) Change Rx (Receive) clock source:

This selection determines whether the WINC 2400C (considered the DCE) provides the receive clock (internal) to the DTE or receives the receive clock (external) from the DTE. The choice of internal is recommended.

(5) Broadcast Address / Change Master Address:

If this station is configured as master, this option will be marked as "Broadcast Address" and a default address -- "9999999" will be assigned automatically after you select this option.   Under the slave configuration setting, "Change Master Address" will be listed as option and the master station

address should be assigned to this configuration.   The address is on the sticker attached to the side of the MASTER unit.

(6) Change Channel Number:
Operating in the synchronous mode, twenty (20) 4-MHz channels are available for communications. If, however, you wish to select a specific channel you must coordinate that choice with the distant end and use this menu to select the desired channel.

(7) Change operation protocol:
This selection determines whether the synchronous interface between the DTE and the WINC 2400C (DCE) is *transparent* (i.e. no meaning is associated with any bit or bit sequence) or *HDLC* (i.e. a "bit-oriented" protocol in which data bits are "framed" by standardized bit sequences). For proper operation the DTE and the DCE should be configured identically. Note that the system must be reset for this change to take effect.   We recommend the choice of transparent.

(8) Change power level:
Using this selection you can choose any one of four transmission power levels, if available. Otherwise, this selection is not operative.

(9) Change FEC Check Operation:
When operating synchronously, forward error correction (FEC) is used to improve the link performance. This selection determines whether only error-free packets are passed to the DTE (FEC ON) or whether all packets are passed (FEC OFF), i.e. even those packets with known errors are passed to the DTE.

(A) Change Master - Slave mode:
For proper operation of the system, the broadcaster must be designated as the master. And, receivers must be configured as the slave. This selection is used to make such a designation. Note that the system must be reset before this instruction takes effect.

(B) Change air Time-Out value:
This value determines how long the link remains established without receiving the handshake control packet.

(C) Change air Preamble pattern:
The WINC 2400C uses separate spreading code sequences for synchronization and communications. The preamble is used for synchronization and consists of 16-code patterns, each 63 chips in length. This selection allows one of those patterns to be chosen. Note that the system must be reset before a new pattern takes effect and both the local and distant terminals must use the same code pattern.

(D) Change air Spreading Code pattern:
The spreading code used for communications can be either 11 chips or 31 chips in length. This selection allows either one 11-chip code or one of nine 31-chip codes to be chosen. As above, the system must be reset before this selection takes effect and the same code must be selected by both the local and distant end.   Please consult Teletronics before making the intended change.

APPENDIX A : AT Command Set

At any given time the WINC 2400C configuration port is in the *command* mode. The configuration port accepts AT commands from the host computer connected to that port. These commands are sent to the WINC 2400C as character strings composed of printable ASCII characters. Using the same character set, the WINC 2400C responds to the host computer's command by sending back a result code string indicating whether the WINC 2400C was able to accomplish the requested command.

The command language is simulated to the Hayes compatible and *de facto* industry standard AT command set. In addition to the basic AT commands, certain command extensions accommodate specific WINC 2400C configuration requirements.

AT Command Syntax

A command line is a string of characters sent from the host computer or peripheral - Data Terminal Equipment (DTE), to the WINC 2400C - Data Communications Equipment (DCE). (The command line is interpreted by the DCE only when in the command state.) All command lines have a prefix, a body, and a terminator. The prefix consists of the characters "**AT**" and the body is a command string restricted to the printable ASCII characters. The default terminator is the <CR> character and is required for all commands.

Commonly used AT Commands with the WINC 2400C

Viewing the Current Connection Status

The current connection status of the WINC 2400C can be viewed at any time by using the AT&& command. In response to this command, the connection status of WINC 2400C will be displayed as following.

Global counters:

Air_rx_pkt =	0	Air_tx_pkt = 0	
Air_rx_data =	0	Air_tx_data = 0	
Async_rx_pkt =	19	Async_tx_pkt = 27	
Sync_rx_pkt =	0	Sync_tx_pkt = 0	
Air_CRC_Err =	0		
Air_Drr =	0		
Air_State =	OUT_OF_SYNC		
Air_Tx_Backoff =	0		
Air_Rx_Len_Err =	0		
Sync_Port_Speed =	64000		
SYNC_Port_Rx_Err =	0	ASYNC_Flow_Ctrl_Cnt = 0	
SYNC_Tx > 64 Byte =	0	SYNC (>64 Pkt) lost = 0	
SYNC_Rx >1024 Cnt =	0	SYNC_Tx > 1024 Cnt = 0	
SYNC_Use_Fake_Buf =	0	Air_Use_Fake_Buf = 0	
Preamble_code_inx =	8	Preamble_threshold = 5	
Spread_Code_Inx =	0	Async_flow_cntl = 2	
bufque_put = 38	bufque_get = 57		
power level = 4 (AUTO)	Channel = 0	Air_Bsy_Cnt = 0	
module_availq = 41			

Current active port: SYNC
0 0 0 0 0 0 0 0 ‖ 0 0 0 0 0 0 0 0

Verifying the Local Address

Each WINC 2400C has been identified at the factory with a unique address (identical to the serial number listed on the label on the left-hand side of the unit)[2]. For a remote terminal, this represents the destination address. The local address can be verified using the ATI command, where ATI0 refers to the equipment identification number or local address. Please refer to the following table for more details about ATI commands:

ATI COMMANDS	SYSTEM RESPONSES
ATI0	MODEM address: 2500155
	Peer address : 3467777
	Current channel: 0
ATI1	Release version: 1.15
ATI2	MODEM Manufacture: Teletronics International Inc.
ATI3	Model: WINC-2400C-SYNC128
ATI4	Current Crystal Type: 16.384M

APPENDIX B : WINC 2400C Interface Status

The WINC 2400C interface status refers to the state of the RS-232 serial ports between the local terminal or computer and the WINC 2400C. The state, in turn, is determined by the signal levels on each of the signal lines that comprise that serial port. These status lines have been brought to the front panel in the form of two sets of light emitting diodes (LED). The lower set refers to the synchronous port and the upper set refers to the asynchronous port.   A default button has been provided to the right of this series of LEDs and if this button is depressed when the system is powered ON, the unit will return to the default state.

To the right of the default button are two additional indicators, one above the other and each rectangularity shaped. When the unit is powered ON, the upper indicator turns red and stays red until the unit is powered down. The lower indicator provides a measure of the receive signal strength. When the indicator is green, the receive signal on the current channel is sufficiently strong to maintain a connection with the remote terminal. A weak signal will cause the indicator to turn off.

Each LED displays one of two different colors, green or red. Green indicates an active state or signal presence, whereas red indicates an inactive state or signal absence. The configuration of the two rows of LEDs is shown above and the table below indicates the function of each signal beginning with the left most indicator.

Asynchronous Interface

Panel L E D	Function
Data Carrier Detect (DCD)	Indicates "connection established" with remote.
Data Terminal Ready (DTR)	Signal from host (DTE) to device (DCE). May indicate command mode escape or ignored by device.
Data Set Ready (DSR)	Signal from device to host. May indicate connection established or always on.
Clear To Send (CTS)	Indicates device ready to accept data from host. Used in H/W flow control.
Request To Send (RTS)	Indicates host ready to send data to device. Used in H/W flow control.
Receive Data (RxD)	Serial data input to DTE from modem.
Transmit Data (TxD)	Serial data input to modem from DTE.
Default Reset Button	Reset device to factory defaults.

When the WINC 2400C is initially powered up the CTS and DSR indicators should be green, whereas the RI and DCD indicators are red.

Once the connection is established, the DCD indicator turns green.

If the port is configured to use hardware flow control the CTS indicator will change to RED when the WINC's internal buffer becomes full. When data is removed from the buffer the CTS indicator will turn green again.

When a connection request from a remote terminal is received the RI turns green. It will turn red when the connection is established or the connection request has timed out.

The DTR, DSR, RTS, and CTS indicators follow the AT configuration commands as issued to the WINC 2400C. For example, if the device has been configured for S/W flow control then the RTS and CTS indicators will be red.

Since the WINC 2400C alternatively transmits and receives when online, the TXD and RXD indicators cycle between green and red at the configured data rate.

When the default reset button is pressed while powering ON the unit, the asynchronous port of the WINC 2400C defaults to the factory preset configuration of 9600 bps, 8 bits per character, no parity, 1 start bit, 1 stop bit, hardware flow control, and auto answer.   Similarly, the synchronous port defaults to Powering ON the unit without depressing the default button resets to their previously configured state. To ensure that the unit resets to the default conditions, first power down the unit and then power it on while depressing the default button.

To the right of the serial line LEDs are two small rectangular LED indicators. The lower green indicator lights when the power is on, while the upper red LED indicates the receive signal level. Solid ON indicates sufficient signal strength, while solid OFF indicates either no received signal or a signal too weak to sustain communications. A blinking signal indicates a marginal signal level.

If you experience difficulty in establishing connections between a local and remote WINC 2400C, first reset both units to the factory default conditions and retry before calling for technical assistance.

Synchronous Interface

For the synchronous interface, only the LEDs representing the state of the transmit and receive data across the interface are meaningful. These are represented are the two right-most LEDs in the lower row designated as TxD and RxD, respectively. In addition the left-most LED indicates the state of the air-link. A solid light indicates that the link is established and when dark it indicates that he link is down. All other LEDs in that row should be ignored.

Panel L E D	Function
Air-link	Indicates that the air-link is established.
Data Carrier Detect (DCD)	Not applicable.
Data Terminal Ready (DTR)	Not applicable.
Data Set Ready (DSR)	Not applicable.
Clear To Send (CTS)	Not applicable.
Request To Send (RTS)	Not applicable.
Receive Data (RxD)	Synchronous data input to DTE from modem.
Transmit Data (TxD)	Synchronous data input to modem from DTE.
Default Reset Button	Reset device to factory defaults.

APPENDIX C - WINC 2400C Specification

Serial Interface

Async data rates (Kbps)	1.2, 2.4, 4.8, 9.6, 14.4, 19.2, 28.8, 38.4
Async data format	Data: 7, 8 bits, Parity: even/odd/none, Stop bit: 1 or 2
Flow Control	XON/XOFF, RTS/CTS
Sync data rates (Kbps)	9.6, 19.2, 38.4, 56.0, 57.6, 64.0, 72.0, 96.0, 128
Connector	Port 1: RS-232, DB-25 female (synchronous) Port 2: RS-232, DB-9 male (asynchronous)
Compatibility	Hayes AT Command Set

Radio

Frequency Band	2404-2483 MHz (transmit and receive at ISM band)
Channelization	24 independent @ 4 MHz per channel (sync)
Modulation	DQPSK
Spread Spectrum	Direct-Sequence
Sensitivity	-80dbm (not including spreading gain)
Range	1 kilometer outdoors; 50 meters indoors
Antenna	Rubber omnidirectional

Power

Primary Power	100-250 VAC @50/60 Hz, 0.3-0.7A, auto-switching
Internal Power Supply	28 Watts, AC

WINC 2400C CONNECTORS

RS-232 Interface
Port 1 (DB25 Female)

Pin	Designation	Direction	Function
2	RXD	IN	RX Data
3	TXD	OUT	TX Data
7	GND	-	Signal Ground
15	RXC	OUT	RX Clock
17	TXC	OUT	TX Clock
24	ERC	IN	External RX Clock
25	ETC	IN	External TX Clock

RS-232 Interface
Port 2 (DB9 Male)

Pin	Designation	Direction	Function
1	DCD	IN	Data Carrier Dectect
2	TXD	OUT	TX Data
3	RXD	IN	RX Data
4	DSR	OUT	Data Set Ready
5	GND	-	Signal Ground
6	DTR	IN	Data Terminal Ready
7	CTS	OUT	Clear To Send
8	RTS	IN	Ready To Send

RS-422 Interface
Port 1 (DB25 Female)

Pin	Designation	Direction	Function
1	ETC+	IN	External TX Clock (-)
2	RXD-	IN	RX Data (-)
3	TXD-	OUT	TX Data (-)
7	GND	-	Signal Ground
9	TXC+	OUT	TX Clock (+)
11	ERC+	IN	External RX Clock (+)
12	RXC+	OUT	RX Clock (+)
14	RXD+	IN	RX Data (+)
15	RXC-	OUT	RX Clock (-)
16	TXD+	OUT	TX Data (+)
17	TXC-	OUT	TX Clock (-)
24	ERC-	IN	External RX Clock (-)
25	ETC-	IN	External TX Clock (-)

V.35 cable configuration:

The physical interface on WINC900C/2400C is DB-25. For some cases, we need to make one converted cable to connect to external device. connecting to external device's V.35 Winchester type interface, such as interface on RAD Kilomux-2000,

The configuration is as follows:

WINC900C/2400C (DB-25 Type)	Pin Definition (Function)	Direction	RAD Kilomux-2000 (Winchester Type)
1	TXC(B) (EXT)	←-----	Z
2	RXD(A)	←-----	P
3	TXD(A)	-----→	R
4	CTS(A)	←-----	C
5	RTS(A)	-----→	D
6	DTR(A)	-----→	E
7	GND	--------	B
8	DCD(A)	-----→	F
9	TXC(B) (INT)	-----→	X
11	RXC(B) (EXT)	←-----	W
12	RXC(B) (INT)	-----→	AA
14	RXD(B)	←-----	S
15	RXC(A) (INT)	-----→	Y
16	TXD(B)	-----→	T
17	TXC(A) (INT)	-----→	V
20	DSR(A)	←-----	H
24	RXC(A) (EXT)	←-----	U
25	TXC(A) (EXT)	←-----	BB

The V.35 interface is not directly match to standard specifications. But, it will be OK to connect to any other V.35 interface device. In our field test, WINC 2400C connects to the V.35 interface on Kilomux-2000 and 3Com remote bridge interface directly. It works as we expected.

Additional Support

Teletronics International, Inc. is pleased to provide software and integration support to customers desiring to develop special WINC 2400C applications. Teletronics' personnel will assist you in developing functional and technical requirements for your specific application and will work with you in implementing cost effective solutions. Please contact Teletronics directly to discuss your particular needs.