

MODEL WN900BST

USER MANUAL

DRAFT 28 Aug., 1998

1.1 Product Description

The Model WN900BST is designed to read RF/ID (Radio Frequency Identification) tags in the 900 Mhz band using a Back Scatter Technology. It is normally installed in a WaveNet Model 3100 Portable AEI (Automatic Equipment Identification) Terminal.

When the trigger button on the Model 3100 is depressed, the module generates a carrier wave at 915 Mhz at a level of 33dbm for a maximum duration of 1.5 seconds. The module receives the back scattered data which is rectified, amplified and decoded.

In order to conserve battery power, the maximum read time may be decreased by entering the following command in the 'RADIO' screen of the Model 3100.

rad Itnn

“nn” is the required time duration in 0.1 second increments.

eg: To reduce the read time to 1 second enter the following:

rad It10

For testing purposes only the transmit duration time may be increased, however, this is not recommended as it may resulting in over heating of the power amplifier.

3100

Portable AEI Terminal

Product Guide



WaveNet 



3100 PORTABLE AEI TERMINAL PRODUCT GUIDE

(Draft, July 1998)

Regulations and Approvals

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the *FCC* rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. All external cables must be shielded to ensure compliance with the *Class A FCC* limits.

WARNING Changes or modifications not expressly approved by <i>WaveNet International Inc.</i> could void the user's authority to operate the equipment and void the warranty.



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WaveNet International Inc. reserves the right to amend the contents of this guide at any time to reflect product development and product improvements.

Regulations and Approvals

The 3100 Series Portable AEI Terminal (PET) equipment has been designed to comply with international standards for product safety, electromagnetic compatibility, and radio transceiver operation. These standards can vary by the country of use, frequency of operation, and modulation technique. At the time of writing, the 3100 has been certified to the several applicable standards for various markets.

In the United States, the 3100 Series PET has been designed to comply with UL/CSA requirements for safety, and the radio transceivers are type approved to FCC Parts 2 and 90 (for 450 to 470 MHz and 900 MHz narrow band operation), FCC Part 15 (for 902 to 928 MHz direct sequence spread spectrum operation and 2.4 to 2.5 GHz direct sequence or frequency hopping spread spectrum operation).

In Canada, the 3100 Series PET has been designed to comply with UL/CSA requirements for safety, and the radio transceivers are type approved to IC RSS119 (for 450 to 470 MHz narrow band operation), IC RSS137 (for 900 MHz narrow band operation), and IC RSS210 (for 902 to 928 MHz direct sequence spread spectrum operation and 2.4 to 2.5 GHz direct sequence or frequency hopping spread spectrum operation).

These standards are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the proper instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area will cause harmful interference, in which case the user will be required to correct the interference at the user's own expense. All external cables must be shielded to ensure compliance with the Class A FCC limits.

In situations where the user elects to install WaveNet specified equipment including high gain antenna kits, the user will be responsible for adhering to all pertinent telecommunications, fire and safety/building code regulations pertaining to the installation.

WARNING: Changes or modifications to the equipment, not expressly approved by WaveNet International Inc. could void the user's authority to operate the equipment and void the warranty.

This product may be covered by one or more of the following Symbol Technology Inc. Patents:

U.S. Patent No. 4,360,798; 4,369,361; 4,387,297; 4,460,120; 4,496,831; 4,593,186; 4,603,262; 4,607,156; 4,652,750; 4,673,805; 4,736,095; 4,758,717; 4,816,660; 4,845,350; 4,896,026; 4,897,532; 4,923,281; 4,933,538; 4,992,717; 5,015,833; 5,017,765; 5,021,641; 5,029,183; 5,047,617; 5,103,461; 5,113,445; 5,130,520; 5,140,144; 5,142,550; 5,149,950; 5,157,687; 5,168,148; 5,168,149; 5,180,904; 5,229,591; 5,230,088; 5,235,167; 5,243,655; 5,247,162; 5,250,791; 5,250,792; 5,262,627; 5,262,628; 5,280,163; 5,280,164; 5,280,498; 5,304,786; 5,304,788; 5,321,246; 5,377,361; 5,367,151; 5,373,148; 5,378,882; 5,396,053; 5,396,055; 5,399,846; 5,408,081; 5,410,139; 5,410,140; 5,412,198; 5,418,812; 5,420,411; 5,436,440; 5,444,231; 5,449,891; 5,449,893; 5,468,949; 5,479,000; 5,479,002; 5,479,441; 5,504,322; 5,528,621; 5,532,469; 5,543,610; 5,545,889; 5,552,592; 5,578,810; 5,589,680; 5,608,202; 5,612,531; 5,619,028; 5,664,229; 5,668,803; 5,693,929; 5,698,835; 5,714,746

Table of Contents

List of Figures

Preface

CHAPTER 1 : INTRODUCTION

WHAT IS A 3100 PORTABLE AEI TERMINAL?	2
RF PORT	3
EXTERNAL INTERFACE PORT	3
EXTERNAL SCANNER PORT	3
DISPLAY	3
KEYPAD	4
ENCLOSURE	4
BATTERY PACK	4
PISTOL GRIP	5
WHAT IS THE WAVENET TRANSACTION NETWORK (WTN)	5
NETWORK DEVICES	5
REMOTE DEVICES	6
WTN RADIO COMMUNICATIONS TECHNOLOGIES	6
NARROW BAND (UHF-FM)	7
SPREAD SPECTRUM (900 MHz)	7
SPREAD SPECTRUM (2.4 GHz)	8
RADIO TECHNOLOGY COMPARISON	8
CHOICE OF RADIO TECHNOLOGY	8
RADIO DATA PROTOCOLS	9
THE WAVE NET PROPRIETARY RADIO DATA PROTOCOL	9
INDUSTRY STANDARD RADIO DATA PROTOCOLS (2.4 GHz SPREAD SPECTRUM)	9
WTN OPERATION	9
ROUTE OPTIMIZATION	10
SINGLE AND MULTI-CHANNEL OPERATION.	10
MULTIPLE RADIO TECHNOLOGY OPERATION	10
MULTIPLE RADIO DATA PROTOCOL OPERATION	10

CHAPTER 2 : SETTING UP

PRELIMINARY CHECKS	11
POWERING UP/DOWN	11
RESTARTING	12
CHANGING THE BATTERY	12

CHAPTER 3 : USING DISPLAY & KEYPAD FEATURES

LCD SCREEN	13
LCD CONTRAST CONTROLS	13

THE TERMINAL SESSIONS	14
THE ACTIVE SESSION	14
SWITCHING BETWEEN SESSIONS	14
MENU BAR & MENU BAR NAVIGATION	15
SAVING MENU SETTINGS	15
THE KEYPAD	15
ASSIGNING A HOT KEY	16

CHAPTER 4 : USING THE PRESENTATION MANAGER **17**

PRESENTATION WINDOW MENU BAR	17
PMTASKS MENU ITEMS	19
SESSION LIST	19
SECURITY OPTIONS	19
LOG-ON PASSWORD (PASSWORD MENU ITEM)	20
SESSION MENU BAR PASSWORD (MENUPASSWORD MENU ITEM)	20
SECURITY LEVELS	21
PM/GLOBAL MENU ITEMS	22
KEYBOARDS MENU ITEM	22
COMMAND KEYS (COMMAND KEY MENU ITEM)	22
KEY LISTS (COMMAND KEYS)	24
CUSTOM KEY MENUS (CUSTOM Kb MENU ITEM)	26
ASSIGNING KEY NAMES & FUNCTIONALITY	26
CONSOLIDATING A CUSTOM KEYBOARD	27
ASSIGNING A HOT KEY TO A CUSTOM KEY MENU	27
PM/LOCAL MENU ITEMS	27
BACKLIGHT MENU ITEM	27
SAVING CONFIGURATION SETTINGS (WRITEPRMS MENU ITEM)	28
POWER CONSERVATION (SHUT TIMEOUT, WAKE TMO MENU ITEMS)	28
EXTERNAL BAR CODE READER PORT (BARCODE MENU ITEM)	29
INTERNAL BAR CODE READER (INTBARCODE)	29
CODEID MENU ITEM	29
ADDCR MENU ITEM	29
AUTO REPEAT	29
PM/DEBUG MENU ITEMS	29
PM/ABOUT MENU ITEMS	30

CHAPTER 5 : USING THE RADIO MANAGER **31**

RADIO SESSION MENU BAR	31
RADIO\SETUP MENU ITEMS	34
RADIO OPERATIONAL PARAMETERS (PARAMETERS MENU ITEMS)	34
NARROW BAND FREQUENCIES (FREQUENCIES ITEMS - 3110 ONLY)	34
PARAMETER CLONING (CLONEPARAM'S ITEMS)	35
RADIO\TEST MENU ITEMS	35
RADIO\MONITORING MENU ITEMS	36
RADIO\ASSIGNKEY MENU ITEMS	36
RF SITE SURVEY KEYS	36
RADIO STATISTICS SUMMARY	37

ON-LINE AND LOCAL USER SESSIONS	39
ON-LINE USER SESSIONS	39
LOCAL USER SESSIONS	40
ON-LINE USER SESSIONS	41
MENU BAR	41
SETUP\EMULATION MENU ITEMS	43
SETUP\COMMUNICATION MENU ITEMS	43
SETUP\DISPLAY MENU ITEMS	45
SETUP\KEYBOARD MENU ITEMS	47
SETUP\OTHER MENU ITEMS	48
ABOUT MENU ITEMS	48
SESSION STATUS MESSAGES	49
LOCAL USER SESSIONS	49
MENU BAR	49
FILE/NO PROGRAM...	51
SAVE/PORT1 & SAVE/SLP/SIO	51
SAVE/RADIO	51
ABOUT MENU ITEMS	52
LOCAL USER SESSION UPLOAD DATA FORMAT	52

List of Figures

FIGURE 1-1 : 3100 PORTABLE AEI TERMINAL	2
FIGURE 1-2 : 3100 BOTTOM VIEW	3
FIGURE 1-3 : 3000 PT PROGRAMMABLE SIDE KEYS	3
FIGURE 1-4 : 3100 WITH OPTIONAL SHOULDER HOLSTER AND EXTERNAL BAR CODE READER	4
FIGURE 1-5 : 3100 AND 3020 BATTERY CHARGER	4
FIGURE 1-6 : 3100 WITH OPTIONAL PISTOL GRIP	5
FIGURE 2-1 : CHANGING THE 3100 BATTERY	12
FIGURE 3-1 : THE SYSTEM MENU	13
FIGURE 3-2 : 3100 KEYPAD	15
FIGURE 4-1 : CUSTOM KEYBOARD MENU	26
FIGURE 4-2 : NAMING A CUSTOM KEYBOARD	26

Preface

This user guide is intended for use by technical support personnel who require information to configure, operate or maintain a WaveNet Model 3100 Portable AEI Terminal unit. This unit is a mobile data device of the WaveNet Transaction Network (WTN) which supports real time, interactive radio data communications within a local area of radio coverage. This guide assumes that the 3100 Portable AEI Terminal is, at least, a minimally configured unit as supplied by WaveNet.

The 3100 Portable Terminal has several product radio data technology configurations, all of which are relevant to this manual :

- 3100 Portable AEI Terminal** : No radio data communications technology used.
- 3110 Portable AEI Terminal** : 450-470 MHz Narrow Band radio data communications technology.
- 3120 Portable AEI Terminal** : 902-928 MHz Direct Sequence Spread Spectrum radio data communications technology.
- 3130 Portable AEI Terminal** : 2.4-2.5 GHz Direct Sequence Spread Spectrum radio data communications technology.

How to Use this Guide

This guide is organized into seven chapters, a glossary and an index. The following chapter descriptions indicate the scope of this guide:

- Chapter 1 :** Introduces the 3100 Portable AEI Terminal, its major hardware features, and its operational network environment.
- Chapter 2 :** Discusses how to power up the 3100 Portable AEI Terminal, change the battery pack and power down the 3100.
- Chapter 3 :** Discusses how to optimize the LCD display and configure the 3100 for operation. Also, screen features of the 3100 Portable AEI Terminal are detailed.
- Chapter 4 :** Explains how to utilize the Presentation Manager window menu functions of the 3100 Portable AEI Terminal.
- Chapter 5 :** Explains how to utilize the Radio Manager window menu functions of the 3100 Portable AEI Terminal.
- Chapter 6 :** Explains how to utilize the Session Manager window menu functions of the 3100 Portable AEI Terminal.

In general, labeled keys, menu items and first occurrences of key terminology are depicted in bold type and with similar character case. In addition, the labeled keys are shown within angle brackets. For example:

- the <ENTER> key.
- the PM\Global\Keyboards menu item.

Comments to be *noted* are highlighted with: 

Chapter 1 : Introduction

This chapter introduces the **3100 Portable AEI Terminal**, its major hardware features, and its operational network environment.

WHAT IS A 3100 PORTABLE AEI TERMINAL?

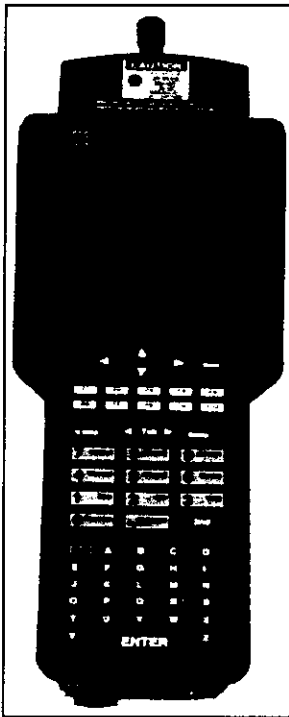


Figure 1-1 : 3100 Portable AEI Terminal

The **WaveNet Model 3100 Portable AEI Terminal (3100)** is a hand held radio data device which operates in the **WaveNet Transaction Network (WTN)**, or independently as a batch terminal, and is capable of reading **ISO (International Standards Organization) Intermodal AEI Tags**, or **AAR (American Association of Railways) Rail AEI Tags** with a fully integrated AEI reader.

The **WTN** facilitates radio data communications among various mobile and static data devices within a local area network environment and stationary host computer systems interfaced to the **WTN**. The function of the **WTN** is to allow these mobile and static data devices, usually operating in remote locations, interactive access to the software applications residing on the host computer systems.

ISO and **AAR Tags** are devices which electronically store digital data, and can transfer this data to an appropriate reading device, using radio frequency technology. This system of data transfer is also known as **Radio Frequency Identification (RFID)**. **ISO** and **AAR Tags** are those which have standardized characteristics which are specified by these organizations in order to promote standardization of implementation and use.

In addition to the integrated AEI reader, the 3100 provides a keypad interface and display for interactive multi-session communications with host computer systems and their applications, or for interaction with one or more locally stored and executed programs. When equipped with a radio data communications technology, the 3100 communicates to a host computer system via radio data technology compatible **WaveNet Network Devices** (Model 7000 Base Controllers and 6000 Access Points), or through an RS-232 compatible communications link when not equipped with a radio data communications technology. The 3100 can work independently of the **WTN**, storing data, until the 3100 returns to the coverage range of the **WTN Network Devices**, and then it will automatically upload the stored data.

The 3100 supports an optional internal integrated bar code reader (Class II/III Laser product).

The 3100 provides one RF port at the antenna connector. The unit also provides one external interface port (incorporating a console port and external RS-232 Interface) and a bar code scanner port at the bottom of the unit (see Figure 1-2).

RF Port

This port uses an RF connector, (SMA type) bulkhead jack, to connect a 1/4 wave whip radio antenna that matches the installed radio transceiver. The coaxial connector is typically 'reverse threaded' to prevent an inappropriate antenna from being inadvertently attached.

External Interface Port

The square **External Port** (20 pins) provides a servicing interface for the configuring, testing, monitoring, and reporting functions that can be applied to the 3100 (Console Port). This port supports full RS-232 modem (RTS, CTS) functionality for RS-232 based data exchange with a host computer system.



The Console Port is disabled when the integrated Scanner is installed and enabled.

External Scanner Port

The round **External Scanner Port** is RS-232 compatible, and is primarily used to attach a tethered decoding bar code laser scanner. This port can also be used for other serial input/output applications.

This port is enabled via the **BarCode** menu item of the **Presentation Manager's** Local menu.



Figure 1-3 : 3100 Programmable Side Keys

The 3100 supports an internal integrated bar code scanner (a Class II/III Laser product). Scanning is typically triggered by the side keys (see Figure 1-3) or by the pistol grip trigger switches, but this function can be programmed for activation in a number of ways. Scanning remains active for a four second period following initialization.



The 3100 with the internal scanner option is a Class II or Class III device and appropriate care should be taken in its use. Please observe the warning labels affixed to the 3100 when this option is installed.

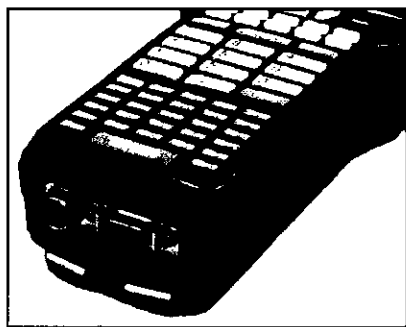


Figure 1-2 : 3100 Bottom View

Display

The 3100 is assembled with a display screen (2.5 inches square) which houses a Transflective Monochrome LCD (192 x 192 pixels) with automatic LED back-lighting, 4 gray scale levels, and maximum of 24 lines x 32 characters (various fonts can be used which result in differing line and column formats).

Optimum contrast is maintained by an integrated ambient light-level sensor.

The screen should be kept clean (use a mild cleaning agent) and away from corrosive materials, so as to ensure viewing clarity and dependable operation.

Keypad

The 3100 supports 58 keys offering full alpha-numeric and function key control. The keypad is used for both unit configuration and manual data entry. All keys may be assigned functionality other than the labeled default function by the user, but typically this is confined to the F1-10 and the side keys. Key areas are color-coded and sized for easier verification. The yellow keys are function keys; other keys are numeric data entry (larger keys); alpha-numeric data entry; and cursor control keys. The more frequently used keys being larger or colored more vividly.



Figure 1-4 : 3100 with Optional Shoulder Holster and External Bar Code Reader

Enclosure

The 3100 is packaged in a dust and water resistant polycarbonate enclosure suitable for operation in industrial environments. See Figure 1-1 for a front view of the enclosure. See Figure 1-2 for a bottom view of the enclosure.

The 3100 can operate within a -20 to +50 degree Celsius temperature range and within a 5 to 95 % relative humidity range. With optional internal heater, the 3100 can operate in temperatures as cold as -30 degrees Celsius. The enclosure occupies a space 4.1 inches wide, 10.1 inches long, and 2.8 inches deep.

The enclosure may be used with or without the pistol grip option. Figure 1-4 shows the unit with the optional holster and tethered barcode scanner.

Battery Pack

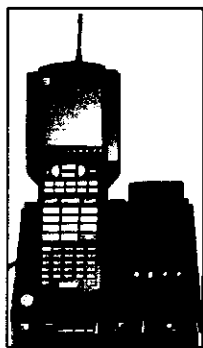


Figure 1-5 : 3100 and 3020 Battery Charger

The 3100 is powered by a 2200 mAh (Ni-MH) 7.2 Volt removable battery pack mounted in the back of unit.

A battery pack can be charged using WaveNet's Model 3020 Battery Charger. This charging system allows simultaneous standard or quick charge of two battery packs (either battery option) as well as charging of a complete 3100 with battery installed. The individual battery pack slots also allow optional "battery conditioning" of the battery packs, a process which completely discharges the battery pack before charging. This process typically extends the battery pack life and prevents "memory" effects which artificially limit the battery capacity.

The Figure 1-5 shows the 3100 and additional battery pack with the 3020 Battery Charger.

Pistol Grip

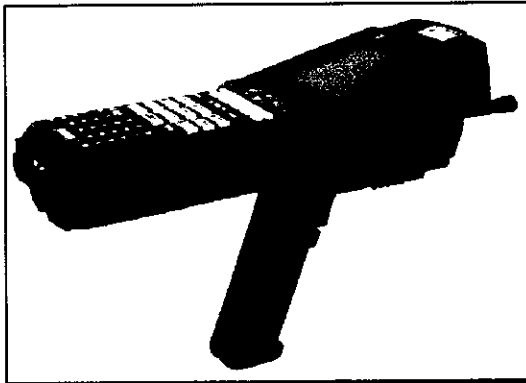


Figure 1-6 : 3100 with Optional Pistol Grip

An optional pistol grip may be attached to the 3100. The two grip trigger switches assume the functionality of the two pairs of (assignable) side switches on the 3100. The upper and lower trigger switches correspond to the upper and lower side switches respectively. The following figure shows a side view of a 3100 with an installed pistol grip.

AEI Reader

The AEI reader circuitry is enclosed within the 3100 itself. However, the antenna for the AEI Reader is integrated into front-bottom of the terminal. The

nominal range of the AEI Reader is designed to be 12-15 feet (varying by the mounting method used, quoted range is using ISO and AAR specified mounting conditions).

 *For optimal reading of ISO and AAR AEI tags, the terminal should be pointed at the tag, at an angle of approximately 20 degrees (so reading of the display is comfortable). The nominal range may be extended if a slight up-down waving motion of the terminal is used while reading the tag.*

WHAT IS THE WAVENET TRANSACTION NETWORK (WTN)

The WTN is a local area radio data network, designed for scalable, real-time, bi-directional, digital radio data communications, which allows a variety of computer systems to communicate, interactively, to a number of mobile data devices.

A WTN consists of a combination of WaveNet products. These products are categorized into two groups : **Network Devices** and **Remote Devices**.

Network Devices

Network Devices connect to computer systems and provide **zones** of radio data coverage - enabling a real time, bi-directional pathway between the various mobile data devices within the coverage zones and the software applications residing on the host computer systems.

The various **Network Devices** provided by WaveNet are :

Model 7000 Base Controller - provides host computer connectivity functions and a **radio data coverage zone**, communicates via wired Ethernet based network paths to other 7000 Base Controllers and 6000 Access Points and can utilize radio data communications to 6000 Access Points located in it's coverage zone.

Model 6000 Access Point - provides a radio data coverage zone, communicates via wired Ethernet based network paths to other 7000 Base Controllers and 6000 Access Points and can also utilize radio data communications to 7000 Base Controllers or 6000 Access Points located in its coverage zone.

Remote Devices

Remote Devices, when in the **coverage zones** of the Network Devices, utilize the real time, bi-directional radio data communications pathway to the various computer systems connected to the Network Devices - enabling interactive communications to the transaction-based applications resident on each computer system.

In addition to the 3100 Portable AEI Terminal, other **Remote Devices** provided by WaveNet are :

Model 5000 Mobile Terminal - utilizes a full 24x80 LCD screen and integrated touch-screen interface, housed in a full metal enclosure, for multi-windowed interactive multi-session communications. External bar code scanner and external RS-232 communications for printers, process controllers, etc., are also supported. The 5000MT is designed for use within industrial vehicles of all types, or stationary wired terminal replacement.

Model 3000 Portable Terminal - utilizes a full keypad and large LCD display, housed in a small plastic enclosure, for interactive multi-session communications. External bar code scanner and external RS-232 communications for printers, process controller, etc., are also supported. The 3000 also has several optional selections such as internal or bar code readers, a pistol grip, various holsters, battery technologies and charging systems. The 3000 is designed for portable industrial applications of all types.

Model 1100 Network AEI Reader - provides remote, unattended reading of ISO and AAR Tags with read reporting via the WTN or a RS-232 modem.

Model 1000 Network Modem - provides connectivity to external RS-232 devices and allows these devices to utilize the WTN for communications to remote computer systems. The 1000 is well suited for remote printer, process control or monitoring, on on-board vehicular control applications.

WTN RADIO COMMUNICATIONS TECHNOLOGIES

Three types of radio technologies can be used within a WTN. These technologies are the **Narrow Band (UHF-FM)** and two types of **Spread Spectrum (900 MHz and 2.4 GHz)**. Each WaveNet product is independent of the radio communications technology. All radio technologies are designed into radio modules which can be exchanged at any time in any WaveNet product without affecting the radio network operations.

Narrow Band (UHF-FM)

This technology takes the digital information, converts it to an audible analog signal (like a common computer modem) and uses radio circuitry to modulate this analog signal onto a single radio frequency (the “**carrier frequency**”). The digital to analog conversion utilizes a proprietary WaveNet scheme, and the modulation of the analog signal onto the radio frequency uses Frequency Modulation (which changes the carrier frequency in accordance with the digital data). The process is reversed at the receiving device. The deviation of the carrier frequency is called the **channel bandwidth or spacing**, and the carrier frequency and channel bandwidth is commonly called the **radio frequency (RF) channel**.

In the WTN, digital synthesized radio transceivers with up to eight different pre-programmed radio channels are used. These transceivers are available in various frequency bands within 380 to 512 MHz, and various channel bandwidths. The radio channels can be re-programmed to different carrier frequencies if desired.

WTN Narrow Band communications typically operate at a baud rate of 14.4 Kbps (25 kHz channel spacing, or 9.6 Kbps at 12.5 KHz channel spacing). WaveNet data compression schemes increase the effective baud rate by a 3-4 times factor (typical). The maximum RF power is 2.0 Watts, but can be adjusted to operate as low as 100 mW.

In each country, official government organizations regulate the use of Narrow Band radio systems (voice and digital), and appropriate licensing procedures must be observed by the manufacturer and user of such systems. These licenses specify the allowed operating frequencies, power, channel bandwidth, and antenna systems. The purpose of these licenses is to co-ordinate frequency usage and eliminate interference from Narrow Band transmitters operating in close proximity.

Spread Spectrum (900 MHz)

This technology takes the digital information and passes it directly to a spread spectrum transceiver (SST). The SST “spreads” the digital information over a large band of frequencies using a high speed coding scheme. The receiving SST “recovers” the digital information by a reverse decoding scheme. Originally developed for military uses, the concept of SS technology is to avoid concentrated interference on several discrete frequencies by the spreading process. The coding and spreading technique is called “**Direct Sequence**”. Like Narrow Band, the SST uses a center frequency around which the spreading process occurs. Unlike Narrow band, which uses a relatively small bandwidth of 12.5 or 25 kHz, the spreading process takes place over several MHz of bandwidth.

Digital radio transceivers with synthesized frequencies for seven channels in the 902 - 928 MHz band are used in a WTN 900 MHz Spread Spectrum system. The center frequency of each channel is fixed and cannot be changed.

Spread Spectrum communications have a maximum nominal baud rate of 122 Kbps (6 MHz channel width). WaveNet data compression schemes increase the effective baud rate by a 3-4 times factor (typical). The maximum RF power is approximate 350 mW, and cannot be adjusted.

900 MHz Spread Spectrum systems are only allowed by certain countries (Canada, United States, Australia, South Africa are some examples). The governments of these countries do not require licenses for these systems, however, users do not have exclusive use of the operating frequencies.

Spread Spectrum (2.4 GHz)

This technology operates in two fashions ; the Direct Sequence method described in the 900 MHz Spread Spectrum system, and the **Frequency Hopping** method.

The channel hopping method is similar to the Narrow Band system, but along with wider bandwidths and higher modulation rates, the carrier frequency is changed rapidly along a pre-programmed sequence. Thus the modulated carrier frequency “hops” around the total allowed bandwidth. “Virtual” operating channels are created by different hopping sequences, designed to never, or rarely, interfere with each other.

Various digital radio transceivers are used in the WTN 2.4 GHz Spread Spectrum system. These digital radio transceivers utilize Direct Sequence as well as Frequency Hopping, and allow for 1 to 15 channels of operation (physical and “virtual”). These digital radio transceivers can be used with the WaveNet Proprietary Protocol, while others are employed to be compatible with several recognized and de-facto protocols (see following section on Radio Data Protocols).

The WTN 2.4 GHz Spread Spectrum systems maximum nominal baud rate of between 1.0 - 2.0 Mbps (depending on actual digital radio transceiver). WaveNet data compression schemes increase the effective baud rate by a 3-4 times factor (typical). The maximum RF power is ranges between 100 - 500 mW (depending on local regulations), and cannot be adjusted.

2.4 GHz Spread Spectrum systems are allowed by many countries. The governments of these countries do not require licenses for these systems, however, users do not have exclusive use of the operating frequencies.

Radio Technology Comparison

In broad terms, Narrow Band technology offers secure, lower speed radio data communications with a large coverage. Spread Spectrum technologies offer unsecure, higher speed radio data communications with smaller coverage areas.

Choice of Radio Technology

The choice of technology is best determined by application profiles and licensing logistics.

Application throughput, transaction rates and desired response time are the first determination of which technology to use. Narrow Band systems offers lower throughput, handles less transactions per second, and provides slower response times in comparison to Spread Spectrum systems. However, many applications can be well served by the capabilities of Narrow Band systems. Other applications required the higher throughput, and higher transaction rates available with Spread Spectrum systems.

Coverage requirements are a second determination of the technology choice. Typically, Narrow Band technology offers four times the coverage area as 900 MHz Spread Spectrum technology, and up to 15-20 times the coverage area as 2.4 GHz Spread Spectrum technology. Small facilities are well served by 2.4 GHz Spread Spectrum systems, medium sized facilities by 900 MHz Spread Spectrum systems, and extremely large or complicated facilities by Narrow Band. Large facilities may require an un-attractive number of Network Devices to provide 2.4 GHz or even 900 MHz Spread Spectrum coverage.

Certain mission critical applications require a high level of redundancy in the Network Devices. Narrow Band provides for less Network Devices for a given coverage area, while the Spread Spectrum systems provide for progressively more Network Devices. With more Network Devices required for Spread Spectrum systems, the higher the probability of downtime, and cost/complexity of providing redundancy increases. The licensed channel required of Narrow Band system also provides additional security against outside interference, and a method of legal recourse if such interference is received. No such security or recourse is provided with Spread Spectrum systems.

Narrow Band systems require a discrete licensing procedure for each application site. With many application sites, this can create a large logistical challenge, and also significant yearly licensing fees. Spread Spectrum systems, with unlicensed usage, do not present any logistical challenge, and do not require yearly licensing fees.

RADIO DATA PROTOCOLS

The WaveNet system can use a proprietary radio data protocol, as well as industry standard protocols with the 2.4 GHz Spread Spectrum radio technology.

The WaveNet Proprietary Radio Data Protocol

In all types of radio technologies, the proprietary WaveNet protocol is used. This protocol is a dynamic **Time Division Multiplexing (TDM), Collision Sense Multiple Access with Carrier Detection (CSMA/CD)** scheme which continually adapts itself to radio data transaction loading for optimal throughput and minimal response time.

Industry Standard Radio Data Protocols (2.4 GHz Spread Spectrum)

With certain 2.4 GHz Spread Spectrum digital radio transceivers, other industry standard (de-facto) radio data protocols can be utilized. Such protocols are those which are utilized by other mainstream vendors of 2.4 GHz digital radio transceiver systems, or those protocols supported by International Standards organizations. WaveNet constantly engineers such protocols into the WTN.

WTN OPERATION

In the WTN, Network Devices work together, via wired Ethernet based network links and radio data links, to provide a seamless **coverage area** comprised of an overlapping series of coverage zones.

Data from any Remote Device, located anywhere in the coverage area, is reliably **routed** to the appropriate computer systems, and vice versa. As Remote Devices move within the coverage area, **the routing paths** through the Network Devices to the various computer systems changes automatically.

Route Optimization

Each Remote Device is constantly aware of each possible **route**, from it's present location, through the Network Devices to each computer system that it must communicate with. As it moves through the various coverage zones in the complete coverage area, it is informed of alternate routes, and constantly changes to the most **optimal route** - based on a complicated formula of criteria such as radio signal strength, communications quality, and required wired or radio data **"hops"** to the 7000 Base Controller which desired computer system is connected to. At all times the radio signal strength and communications quality is maximized, and the number of "hops" minimized.

Single And Multi-Channel Operation.

Each different radio technology offers multiple channels of operation. Each coverage zone in the WTN can utilize different radio channels, and the Remote Device will include **cellular switching** between channels, if required, in determining the best route.

Multiple Radio Technology Operation

Different radio technologies can be utilized within coverage zones in the WTN. The network operation of the WTN remains unchanged even though different radio technologies may be used from coverage zone to coverage zone. However, Remote Devices with one type of radio technology will only be able to communicate to those Network Devices employing the same radio technology.

This capability is exceptional for tailoring the WTN to differing physical areas with differing transaction loading or Remote Device populations. For example, a high speed Spread Spectrum technology can be utilized for a high transaction, localized shipping/receiving zone in a warehouse, where a lower speed Narrow Band technology can be used for picks and putaways in the remaining areas of the warehouse.

Multiple Radio Data Protocol Operation

Like the capability with different radio technologies, the WTN can also operation in a similar fashion with different radio protocols used with different radio data transceivers in the 2.4 GHz Spread Spretum systems. However, Remote Devices utilizing one type of radio data protocol and the corresponding digital radio transceiver will only be able to communicate to those Network Devices utilizing the same radio data protocol and digital radio transceiver.

Chapter 2 : Setting Up

This chapter discusses how to set up the 3100 Portable AEI Terminal (3100) to prepare for configuration, monitoring, or operation.

PRELIMINARY CHECKS

Before beginning any operation on the 3100 Portable AEI Terminal unit, the following items should be checked:

1. Ensure that the 1/4 wave whip antenna, if used, is directly connected to the RF SMA connector port. The connection can be tightened by hand. The 3100 Portable AEI Terminal will not use such an antenna, while the 3110 - 3130 Portable AEI Terminals will use such an antenna.
2. Install a charged battery pack in the back of the 3100 Portable AEI Terminal. If the battery pack has not been energized, it must be charged with the WaveNet battery charger.
3. The pistol grip can be attached with or without the battery pack.

POWERING UP/DOWN

Power up the 3100 by pressing the **<Mode>** key. If the terminal has been **re-started** (see “restarting”) the LCD screen will display the **Presentation Manager (PM)** and the WaveNet logo. Pressing any key on the keypad will clear this logo. If terminal security is enabled (see section on 'Security Levels' in Chapter 4), this logo will momentarily be displayed, then the LCD screen will change automatically to a “secure” information display.

If the terminal has not been re-started, then the terminal will immediately display on the LCD the information present at the time that the 3100 was powered down.

If the battery is low the 3100 will automatically display an on-screen window showing the state of charge, unless this feature has been specifically disabled.



The 3110, 3120 or 3130 models should not be powered up without their antenna. Improper antenna port termination causes impedance mismatches which can reflect damaging levels of RF power back to the transceiver.



At the start of a power up sequence the terminal an audible “click” will be produced by the terminal. However, several seconds may be required for the unit to conduct internal checks, and initialize the LCD display.

Pressing **<2nd><0>** (the System key) causes the terminal to display the on-screen system menu. This menu is directly mapped to the number key pad.

Powering down the 3100 is accomplished by pressing **<2nd> <0>** which displays a pop-up menu screen. This menu screen corresponds to numeric keypad on the 3100. Pressing **<1>** or **<Off>** will power down the 3100 Portable AEI Terminal.

The 3100 internal battery unit provides RAM Backup for up to 48 hours. Thus, if the 3100 is powered down and then powered up within 48 hours, the most recent RAM memory entries will be restored.

RESTARTING

The 3100 is never completely turned off. As long as the battery is installed and has some charge, the terminal is only in a **“powered down”** state, and ready to immediately **“power up”** and continue on from the point that it was “powered down”. To completely restart the 3100 for a fresh initialization, a specific keystroke must be invoked, or the battery must be un-installed for several days.

The 3100 can be re-started by pressing the **<2nd> <0>** (to invoke the pop-up menu screen) followed by pressing **<4> <4> <4> <1>** in rapid succession. This will power-down the terminal.

To finish the re-start of the 3100, press the **<Mode>** key. Provided that no security levels have been assigned (see section on 'Security Levels' in Chapter 4), the terminal will then display the Presentation Manager (P.M.) window and the WaveNet logo. Pressing any key on the overlay keypad will clear the logo and allow operation of the terminal.

CHANGING THE BATTERY

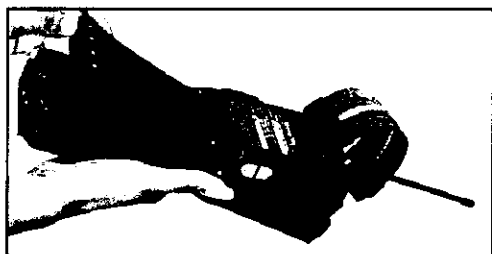


Figure 2-1 : Changing the 3100 Battery

The 3100 does not require to be powered down prior to changing the battery - when the battery is removed, the terminal will sense this event and immediately power-down. Upon replacement, the terminal can be powered-up and resume operations with no re-start required. The following figure demonstrates changing the 3100 battery pack.



The battery is retained by a 1/4 turn locking screw.

Chapter 3 : Using Display & Keypad Features

This chapter discusses the LCD interface and how to navigate through the menu structure of the 3100 Portable AEI Terminal (3100) unit.

In particular the following areas are addressed:

- Display Attributes
- Session & Service Windows
- Hot Key Assignment

LCD SCREEN

The LCD screen displays the terminals' radio communications status, current session name, security level, data from the various computer systems that the 3100 may in communications with, and visual confirmation of keyed or scanned data. Each of these areas are explained in more detail in this Chapter and following Chapters. The LCD used is a high contrast, 192x192 graphics display with capability of translating color information into 4 gray-scale levels.

LCD displays, by their nature, are prone to variations in contrast (and therefore legibility) due to ambient temperature and light levels. The unit is equipped with controls which allow the user to optimize performance for his work conditions.

LCD Contrast Controls

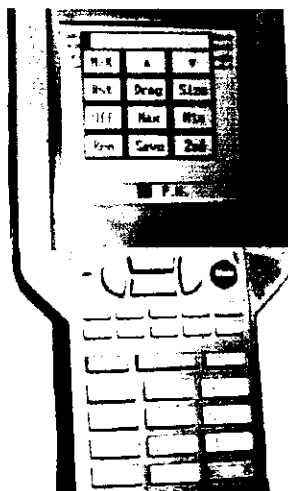


Figure 3-1 : The System Menu

Figure 3-1 shows the 3100 LCD Screen with the System Menu displayed.

The LCD contrast controls may be adjusted at any time by accessing the System menu. The System screen may be activated by pressing **<2nd>** **<0>** (the **<System>** key). This brings up a menu which consists of on-screen "buttons" which correspond to actual keypad buttons "2nd" through to "9". The LCD contrast is mapped to the "8" key (to increase contrast) and the "9" key (to decrease contrast).

The new settings should be saved using the **Save** button (Space on the keypad).



The contrast level is affected by temperature so if the terminal is being used in a refrigerated environment, then you should adjust for optimum contrast in this location and not outside where the temperature is higher.

The Terminal Sessions

The 3100 is a multi-taking, multi-session device. Various tasks simultaneously “run” in the 3100, and some of these tasks create and control the LCD display via sessions.

Sessions are separated into two types : the **Local** and **User Sessions**. The **Local Sessions** are created by tasks that manage local functions of the 3100, and provide various interfaces to configure and monitor these functions. **User Sessions** are created by tasks which work specifically with computer systems connected to the WTN, or local programs in the 3100. These tasks also provide some configuration ability to tailor the operation of these sessions.

Local Sessions are :

- **Presentation Manager Session** - used to control and configure all aspects of the LCD and keypad.
- **Radio Manager Session** - used to control and configure all aspects of the radio transceiver and radio data communications.
- **Console Session** - used to provide direct access to the 3100 operating system when the external RS-232 Console Port is disabled by use of the external or internal barcode reader.

The Active Session

Although the 3100 can display several sessions simultaneously (in the form of **session windows**) this capability is not normally used due to the smaller relative size of the LCD screen.

In normal operation, there is one session showing on the LCD screen. This session is the **Active Session**, and all AEI reader, bar code reader and keypad input is directed to this Active Session. Other sessions not displayed may still update with information from local tasks or the radio link, but no bar code reader or keyboard input will be directed to these sessions.

Switching Between Sessions

Any available session may become the visible or Active Session by pressing the **<2nd><BackTab>** or **<2nd><ForwardTab>** key sequences (hereafter referred to the **<2nd><TAB>** key sequence). Repeating this sequence will “swap” through all sessions in turn. Various security levels can be employed to restrict the accessibility of sessions, and if security is in effect, only those sessions which have the appropriate security level will be displayed when the **<2nd><TAB>** key sequence is used.

MENU BAR & MENU BAR NAVIGATION

In any Active Session, the **Menu Bar** is displayed on-screen when the **<Mode>** key is pressed. If security is enabled (see Chapter 4 : Security), a password entry will be required to access the Menu Bar. The current possible selection is shown in reverse video, and can be selected by **<ENTER>**. Current possible selections can be changed by using the **<Arrow-Left>** or **<Arrow-Right>** keys. Upon making a particular selection, additional sub-menus may be shown, which can be navigated using the **<Arrow-Up>** and **<Arrow-Down>** keys.

 The entire menu structure may be exited using the **<Mode>** key repeatedly until the menu bar disappears.

Saving Menu Settings

Some parameter changes need to be saved manually while others are saved automatically. This topic is fully covered subsequent Chapters associated with Session Configuration – see the Table of Contents for details.

THE KEYPAD

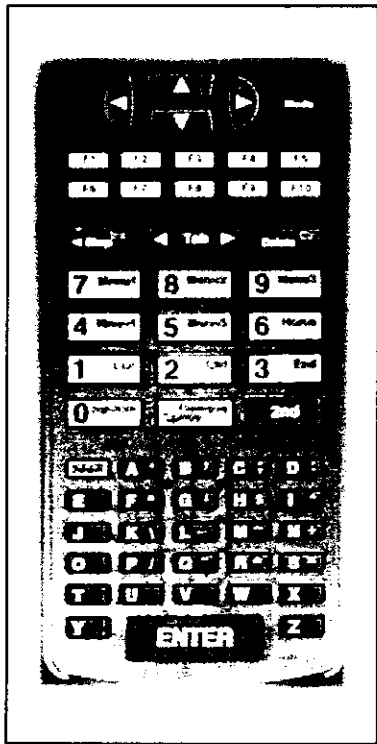


Figure 3-2 : 3100 Keypad
of which window is active.

Your portable terminal has a 49 keypad design structure. There are a number of distinct areas on the keypad which are reserved for unique functions. See Figure 3-2.

The **<2nd>** key is used to access secondary key functions (labeled in green on applicable keys).

Any key function may be re-assigned as a **Hot Key** to perform various Menu Bar functions, or as a **Command Key** for various functions or repetitive entries (See Chapter 4 : Presentation Manager). Normally, only the keys assigned to perform as Hot Keys or Custom Keys are F1-F10 keys, the side keys on the terminal, and the 2nd-Menu keys (located in the number key area) as these keys normally do not have any particular function, aside from those which are meaningful to the computer system application.

Specifically hot keys are most often used for selecting :

- Any standard or custom **Key Menu** in the Presentation Manager Session KB Assign menu
- Any Presentation Manager Session **Global Menu** item.

Once a hot key has been assigned you can use these keys, regardless

Assigning a Hot Key

To assign a menu function to a hot key, you must make the desired session the Active Session, press the Mode Key to show the Menu Bar, then navigate the Menu Bar to the desired Menu item.

To assign the hot key use the following procedure:

1. Press **<F2> (Hot Key Assign)**. A pop-up field showing the current hot key sequence will be displayed adjacent to the menu item.
2. Press a hot key or a hot key sequence. The selection will show in the pop-up key field. If the selection is already taken then the function will be executed. If that happens press **<ENTER>** twice and repeat the procedure making an alternate selection.
3. Press the **<ENTER>** key. The selected menu item will now show the hot key or hot key sequence.

The following example whenever the assigned hot keys are touched, the corresponding menu item function will be enacted.

The following example procedure illustrates assigning the hot key sequence **<End> (<2nd><3>)** to the WritePrms menu item in the **Presentation Manager's Local** menu.

1. Make the Presentation Manager the Active Session by the **<2nd><TAB>** key sequence.
2. Show the Menu Bar by using the **<Mode Key>**.
3. Navigate to the **PMLocal\WritePrms** menu item.
4. Press the **<F2>** key.
5. Press the **<End> (<2nd> <3>)** key sequence.
6. Press the **<ENTER>** key.

From now on, whenever the key sequence **<End>** is pressed, the terminal will write all current Presentation Manager configurations to memory.

You can remove hot keys from assigned menu items. To remove a hot key from a selected menu item, use the following procedure:

1. Press the **<F2>** key. A pop-up field for showing the current hot key sequence will be displayed adjacent to the menu item.
2. Press the **<Bk Sp>** key (Back Space). The hot key sequence entry in the pop-up field will be deleted.
3. Press the **<ENTER>** key. The selected menu item will no longer show a hot key assignment.

Chapter 4 : Using the Presentation Manager

This chapter explains how to utilize the Presentation Manager Session Menu Bar of the 3100 Portable AEI Terminal unit.

This chapter discusses the menu items associated with:

- Task (Sessions Lists, Security Options)
- Global (Key Functions, Standard and Customer Key Menus, Command Keys)
- Local (Backlight Control, Power Conservation, Bar Code Reader Functions, Parameter Saving)
- Debug (Debug Options)
- About (Installed Software Versions)

PRESENTATION WINDOW MENU BAR

The Presentation Manager window supports a menu structure consisting of a pop-up menu bar and a hierarchy of drop-down lists of menu items. When this window is active (has keyboard focus), you can press the <Mode> key to activate the menu bar. See the section on 'Menu Navigation' in Chapter 3 for general operational details.

The following outlines the menu bar and the scope and organization of the menu item options :

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
TASKS	Protect		Start terminal security protection
	Password		Power-up/re-start password
	MenuPassword		Session menu bar password
	Session List ...		List of current terminal sessions (Multiple Entries will be shown)
GLOBAL	Keyboards	SymbKB	Current hot key assignment for this standard key menu
		SysteCtrl	Current hot key assignment for this standard key menu
		FuncKb	Current hot key assignment for this standard key menu
		VT220Kb	Current hot key assignment for this standard key menu
		5250Kb	Current hot key assignment for this standard key menu
		KeyList	Current hot key assignment for this standard key menu
		*****	Current hot key assignment for custom key menus (up to Four key menus may be shown)
	NextApp		Current hot key assignment for this function (default of <2 nd ><Forward TAB>)

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
	PrevApp		Current hot key assignment for this function (default of <2 nd ><Reverse TAB>)
	Tile		Current hot key assignment for this function (not commonly used on 3100)
	Cascade		Current hot key assignment for this function (Not commonly used on 3100)
	Command Key		Starts Command Key creation / assignment / review procedures
	Custom Kb		Starts Custom Key Menu creation / assignment / review procedures
LOCAL	Backlight	Enable	Enables automatic backlighting of LCD display
		Level	Sets ambient light level to turn on LCD backlighting
		Hist.	Sets ambient light variation before backlighting is turned on or off.
		Timeout	Sets amount of time (in seconds) before backlighting is automatically turned off
	Features	WaveNet	Displays WaveNet logo when selected (any key cancels)
		WaveDemo	Displays WaveNet product information when selected (any function key cancels)
		Colors	Displays greyscale bars when selected (any key cancels)
		Blocks	Displays a large random block pattern when selected (any key cancels)
		Blocksx	Displays a random translucent block pattern when selected (any key cancels)
	ShutTmo		Inactive time period, which when expired, the terminal automatically turns off LCD and backlighting (increments of 6 seconds)
	WakeTmo		Inactive time period, which when expired, the terminal automatically powers down (in increments of 6 seconds)
	BarCode		Enable the external bar code reader port
	IntBarCode	Enable	Enable the internal bar code reader
		ScanTrig	Current hot key assignment to turn on the internal bar code reader
		2of5 Len1	First code length for Code 2 of 5 bar code
		2of5 Len2	Second code length for Code 2 of 5 bar code
		StripUPC0	Strips the UPC identifier from UPC code
	CodeID		Includes the bar code identifier from the bar code reader
	AddCR		Add a <ENTER> to the scanned bar code
	AutoRep		Enables automatic repetition of any key when depressed for more than 1 sec. Repetition increases in frequency with a greater time duration
DEBUG	Input		Enables window for debugging various terminal inputs
	Debug		Enables window for debugging various internal terminal operations.

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
ABOUT	Eprom		EPROM version date
	OS		Operating System version date
	Menu		Menu system version date
	System		System version date
	PM		Presentation Manager task version date
	Radio		Radio task version date
	Ansi		ANSI task version date

The following sections describe some of the above Menu Bar items in greater detail.

PM/TASKS MENU ITEMS

These items deal with terminal security options.

Session List

All the menu items below the menu item **MenuPassword** constitute the list of the current sessions. This list contains the Local PM (Presentation Manager) session, the Local Radio session, and at least one User Session (naming used is configurable in each User Session). There may be up to 8 session listed. If the bar code scanner port is enabled, there will be a Local Console Session listed. The order of the session list can change with any new session activation.

Adjacent to each window entry, may be an optional assigned security level code (F1, F2, or F3). See the section on “Security Levels” in this chapter for details.



Selecting any listed session twice, will make that session the Active Session.

Security Options

Access to certain operations of the 3100 can be secured via user password and security level assignments. There are two types of passwords:

- **Power-Up Password** : this prevents unauthorized use of the 3100.
- **Session Menu Bar Password** : this prevents unauthorized access to the menu bar of Sessions with F2 or F3 security level assignments, provided that menu password protection is currently enabled.



Passwords are case sensitive.

Log-on Password (Password Menu Item)

You may assign a new log-on password if you have access to the PM Session (i.e. there is no previous password assigned or the current password is known) and access to the menu bar (i.e. this window does not have menu protection enabled). Also, you may remove any current password if you have access to the menu bar.

To assign a new log-on password, use the procedure while the PM Session is the Active Session :

1. Select the PM/Tasks/Password menu bar item. A text entry keyboard will pop up.
2. Enter a password (up to 7 characters) at the 'New password' prompt.
3. Press the <ENTER> key.
4. Re-enter your password at the 'Confirm password' prompt.
5. Press the <ENTER> key.
6. Select the **Local\WritePrms** menu item to write the password to the 3100's configuration memory.

Whenever you power-up or restart the 3100, you will be prompted for a password before any further operations can be conducted with the 3100.



To remove the current password, use the procedure of Steps 1, 3, 5, and 6 (skip Steps 2 and 4). Whenever you restart the 3100, there will be no prompt for a password.

Session Menu Bar Password (MenuPassword Menu Item)

You may assign a new Session Menu Bar Password (**Menu Password**) if you have access to the P.M. window's menu bar. Also, you may remove any current password if you know the password. This feature is used to guard against unauthorized changes to the terminal session configurations.

This password is used in conjunction with sessions in the session list which have F2 or F3 security level assignments (see the section on 'Security Levels', in this chapter).

This password can be assigned and saved once, but must be enabled each time after each assignment or save.

To assign a new menu password, use the procedure:

1. Select the **PM\Tasks\MenuPassword** menu item. A text entry keyboard will pop up.
2. Enter a password (up to 7 characters) at the 'New password' prompt.
3. Press the <ENTER> key.
4. Re-enter your password at the 'Confirm password' prompt.
5. Press the <ENTER> key.
6. Select the **PM\Local\WritePrms** menu item to write the password to the 3100's configuration memory.



To remove the current password, use the procedure of Steps 1, 3, 5, and 6 (skip Steps 2 and 4).

To enable the Menu Password protection, select the **PM/Tasks\Protect** menu bar item. This will enable the menu password protection without having to reboot the 3100. That is, whenever the <Mode> key is touched for an active window that is assigned a security level of F2 or F3, a text entry keyboard will pop up and prompt for a password. Once a valid password has been entered, pressing the <Mode> key again will pop up the menu bar, and the protection will be disabled.

Alternatively, hard reboot the terminal and let the terminal restart normally. The terminal will automatically restrict session window access according to the pre-set security levels.

Security Levels

A security level can be assigned to any window listed in the Tasks drop-down menu items list. There are three possible assignments which define increasing limits to window functionality:

- F1 - No limits to window functionality.
- F2 - Menu password protection is available.
- F3 - Menu password protection is available, and window sizing/relocation is disabled.

 *In practical terms, Security Levels F2 and F3 are identical for the 3100 (this is not the case for the 5000 Mobile Terminal).*

The security level of the active window is indicated on the Status Bar. The reverse video square at the bottom of the LCD screen contains the current security level number (1, 2, or 3).

 *The bottom of the LCD screen can display a **Status Line** showing the Active Session name, the current security level, radio data activity indications, and various key pad indicators (CAPS lock, Control Keys, etc.. The **Status Line** can be displayed or hidden by striking the <2nd> key twice in rapid succession.*

To assign a security level to a window, use the procedure:

1. Select the PM/Tasks menu bar item.
2. Select the applicable Session in the Session List.
3. Press the <F2> key.
4. Press the <F1> or <F2> or <F3> key for level 1 or 2 or 3.
5. Press the <ENTER> key.

For security levels F2 and F3, ensure that the menu password is also assigned (see previous section on 'Window Menu Password', in this chapter).

 *Any Local Sessions can be assigned F2 or F3 security levels, but any assignment other than F1 is ignored by the terminal.*

PM/GLOBAL MENU ITEMS

One of the unique features of the 3100 is the ability to re-configure the operation of the keypad, as well as design custom key menus for use specifically with computer system applications. Configuring the key pad and creating custom key menus are contained in this area of the Presentation Manager Menu Bar.

Keyboards Menu Item

Selecting this menu item will display a list of pre-designed standard key menus that can be assigned hot keys which will display the key menu on the LCD at any time. In addition to the standard key menus, there can be up to four custom keyboards (see Custom Kb section following) which can also be assigned hot keys.



The various key menu selections are usually mapped to the <Menu1 - Menu4> keys. The key menus are selected by the configured key sequence, and cleared by the same key sequence.

The available standard key menus are :

SymbKB	Displays a menu of Symbol and Punctuation characters. Some of these characters are accessible via the normal keypad, while others are not.
SysCtrl	The System Key Menu, which controls the LCD contrast, the immediate power down and re-starting of the 3100. The <Drag>, <Size> keys are not implemented on the 3100, and the <Min>, <Max> keys are implemented, but not normally used on the 3100>
FuncKb	Allows access to Function Keys F11 - F30.
VT220Kb	Allows access to special keys used specifically for DEC VT220 terminal functions used with some DEC and UNIX computer systems.
5250Kb	Allows access to special keys used specifically for terminal terminal functions used with IBM AS/400 computer systems.
KeyList	Allows access to special local terminal functions when building macro key functions with the Command Key capability of the 3100 (See Command Keys section).

Command Keys (Command Key Menu Item)

Command Keys are allow complete re-assignment of any key on the key pad to a different value, text string or macro function. Whereas Hot Keys allow assignment of specific Menu Bar items to a key, Command keys have a complete, unhindered flexibility of re-assigning the operation of any key.



CAUTION! *Ensure care NOT to assign Command Key functionality to those keys which are required for global terminal operations. Such keys are <Enter> or <Cursor Right / Left / Up / Down>. Command Key functions cannot be assigned to <2nd> or <Mode> keys.*

Selection of **PM/Global/Command Key** displays the **Command Key** dialog box which has the following options ; **Review** (1), and **NewKey** (2).

Selecting **Review** (1) allows review of the current Command Key assignments. The following selections are available : **Next** (1), **Change** (2), and **Delete** (2). Next and Delete functions are self explanatory and the Change function is identical to the NewKey function of the previous option menu.

 The **<Mode>** key exits the current operation and returns to the previous operation. Use the **<Mode>** key to return to previous Command Key Dialog options. Any other key will become part of the NewKey assignment macro.

The NewKey selection starts the assignment of a new Command Key. The following example, which creates a **<F10>** Command Key for the **Battery Fuel Gauge** show the assignment procedure :

 A Command Key cannot be created for a key that already has a Hot Key assignment.

 Many special functions such as "Enter", "CTRL", "ESC" can be generated from the Key List Standard Menu. Ensure that the Key List Standard Menu is assigned to a hot key before defining a Command Key. This example assumes that the Menu List is assigned to Hot Key **<Menu3>**.

1. Select **PM/Global/Command Key**
2. Select **NewKey** (2). A dialog box is displayed which asks for the desired new Command Key to be pressed.
3. Press the **<F10>** key. A dialog box is displayed which asks for the key or function sequence to be entered.
4. Press the **<2nd><9>** or **<Menu3>** key to display the Key List.
5. Use the **<0>** and **<Space>** key to scroll through the Key List until "Battery" is displayed. Enter the number beside "Battery" to select this function.
6. Clear the Key List by the key sequence **<Menu3>**.
7. Use **<ENTER>** to complete the Command Key assignment.

Strike the **<Mode>** key to return to the Global sub-menu, and strike the **<F10>** key to display the battery charge fuel gauge. This gauge will disappear in a few seconds, or can be immediately cleared from the display by hitting any key.

 The **<Bksp>** key can be used to delete entries in the NewKey macro string.

Note that multiple alpha-numeric keys can be used to build up a text string which will be processed as key pad entries when the Command Key is pressed. Using the Menu List, which also provides access to the Standard Key Menus, macros can be built up of multiple keystrokes or functions. Function keys can also be included in the macros, and their assigned function will be included in the Command Key. In this manner, nested Command Keys can be created.

 **CAUTION!** Once the NewKey assignment operation is started, the operation cannot be cancelled. The operation must be completed as shown above, terminating with the **<ENTER>** key and then the Command Key can be deleted if desired.

Key Lists (Command Keys)

The Key List actually automatically places into the Command Key string the key code which internally represents each key for the terminal. The Key List contains the following terminal functions and corresponding key codes :

Terminal Function	Key Code
Enter	_e
2nd	_2
CTRL	_c
Caps	_s
Mode	_m
ContUp (Contrast Up)	_K^
ContDown (Contrast Down)	_Kv
PowerOff	_Ko
StatLine (Status Line Toggle)	_K*
Insert	_I
Home	_H
End	_E
PageUp	_U
PageDown	_P
RemAllKb (Remove All Keyboards)	_2_D
RqList (Menu List)	_L0
Battery	_KB
RFID	_KR
Voice	_KV
StatMsg	_KA
RqSymbKB	_R0
RqSysKB	_R3
RqFncKB	_R4
RqVT220Kb	_R8
Help	_A5
Do	_A6
Find	_aF
Insert	_aI
Remove	_aE
Select	_aC
Prev	_aV
Next	_aX
PF1	_aP
PF2	_aQ
PF3	_aR
PF4	_aS
Rq5250Kb	_R:
PA1	_C6
PA2	_C7

Terminal Function	Key Code
PA3	_C8
Clear	_C5
Roll Left	_S3
Roll Right	_S4
Roll Up	_S2
Roll Down	_S1
Print	_C:
Help	_C9
Rec.Back	_S5
Sel.Pen.Ent	_S6
F.Edge.Trig	_S7
RqCust1Kb	_R;
RqCust2Kb	_R<
RqCust3Kb	_R=
RqCust4K	_R>

When configuring a command key string, the codes can be typed in manually, bypassing the Key List Menu. In addition, the following key codes and functions are available for manual entry, but not in the Key List :

Terminal Function	Key Code
Function key 'n'	_Fn
Ctrl function key 'n'	_Cn
Alt function key 'n'	_An
Shft function key 'n'	_Sn
Cursor keys	_u/d/r/l
Tab/Backtab	_t/b
Delete	_D
Backspace	_B
Save Parameters	_Kp
Reset (before shutdown)	_Kr

 *The AEI Reader is normally controlled by the SIDE1 key, or the large TRIGGER button (if the pistol grip is installed) as defined in the Command Keys. A Command Key assignment must be made in order to control the AEI Reader.*

Custom Key Menus (Custom Kb Menu Item)

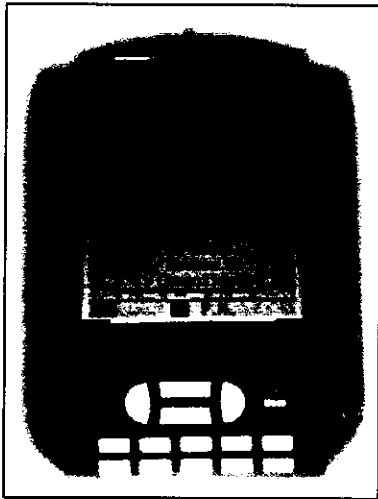


Figure 4-1 : Custom Keyboard Menu

When this option is selected, a dialog box appears, which asks which of four available custom key menus is desired. A selection from <1> to <4> can be made at this point.

When the selection is made, the menu of Figure 4-1 is displayed showing several options of :

- Review Key by pressing any one of the keys 1-9 you can review the custom title and data;
- A. **KB Name** - assign a unique keyboard name;
 - B. **Review Kb** - this allows you to review the keyboard as it currently exists in memory;
 - C. **Consolidate** - this function re-orders the new keyboard segments into a contiguous memory block and saves it. This action is normally carried out when a custom keyboard has been edited.

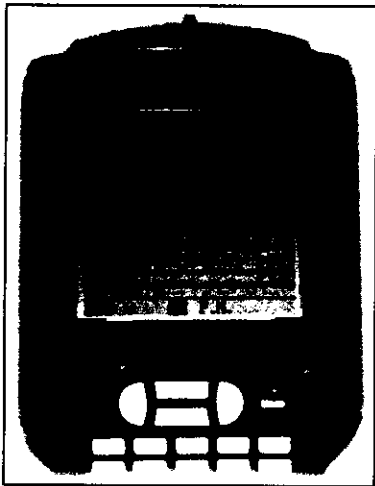


Figure 4-2 : Naming A Custom Keyboard

As a first step assign your new keyboard a name by pressing <A> on the alpha keypad. This will show the screen of Figure 4-2, in which you can enter the new name (this may be up to four characters long) - NEW and press <ENTER>.

Assigning Key Names & Functionality

Select a key to which you wish to assign a name;
To change 7 to Pick for example press 7. A box will appear displaying the current name displayed for key 7 and the data assigned to it. You may now select either:

- A - to change the displayed name;
- B - to change the associated data.

Press <A> and enter P i c k and then press <ENTER>.

To assign data to a key select the B option as described above and enter the data you wish to associate with the key - 0 4 P I C K and <ENTER>. This data string will be transmitted each time the 7 key is used when the new custom keyboard is active.

 *Each key may be selected in turn, renamed and have data appended as described above. To return to the Custom Key Option Menu from the individual key menus, simply hit any key.*

 *The data assignment procedure is similar to the Command Key assignment procedure.*

 *To review the current Custom Key Menu, select Option B from the Custom Key Option Menu*

Consolidating A Custom Keyboard

When you have edited your Custom Key Menu it is necessary to consolidate the data within the 3100's memory and save it for future use. To do this press C on the alpha keypad. This action will automatically consolidate and save the keyboard and then return you to the editing process.

If you do not wish to edit or generate any further Custom Key Menus press the <Mode> button to escape from the menu structure.

Your Custom Key Menu is now almost ready for use however before you do so you must assign a means by which to call it up as needed and this is done by assigning a Hot Key to it.

Assigning A Hot Key To A Custom Key Menu

To assign a hot key to your new Custom Key Menu or to change an existing designation, select the Keyboards item from the Global menu. This will display a drop down list of key menus which are currently stored in your unit. Use the arrow keys to select the keyboard you want and then press <F2>. Choose a key or key sequence to assign and press <ENTER>.

Your Custom Key Menu may now be accessed by using the hot key(s) you assigned.



To clear a Custom Key Menu screen you should use the same hot key assignment as you used to display the Custom Key Menu.

PM/LOCAL MENU ITEMS

The menu items under the Local Menu Bar selection control operation of various terminal hardware.

BackLight Menu Item

The sub-menu under PM\Local\Backlight controls at which light level (default of 0) the Backlight will automatically turn on, and how long the Backlight will remain in effect.



The 3100 Backlight will only turn on when the ambient light falls below the pre-set level AND any key on the keypad is depressed, OR the internal or external barcode reader is triggered, OR a radio data message is received.



Hysteresis prevents flickering of the backlight when the ambient light remains very close to the pre-set threshold. A recommended value for this setting is 4.

Saving Configuration Settings (WritePrms Menu Item)

In general, to save any new configuration settings select the WritePrms option in the Local menu. However, the 3100 does require re-booting for most new parameters to take effect.

 *When configuring the 3100 with any of the capabilities described in this section, it is good practice to save the new configuration settings, Command Keys, Custom Key Menus and other changes using the WritePRMs option, and to re-start the 3100 via the <4><4><4><1> sequence (see Chapter 2).*

 *In most cases, when configuration changes have been made, and the WritePrms option should be selected, a diamond shape will appear in front of this option.*

Power Conservation (Shut TimeOut, Wake Tmo Menu Items)

The 3100 is designed to operate for eight hours on a single battery charge. Factors adversely effecting battery life are: low temperature, excessive transmission time (operating in less than optimum coverage areas where repeats are required) and poor lighting conditions (use of backlight option). Avoiding these conditions or minimizing their effects is desirable.

In applications where the 3100 is not in constant use there are several configuration settings you can use to minimize battery draw and therefore prolong its life. These are located in the PM/Local :

Shut TimeOut

This feature allows you to program the 3100 to shut down the LCD if no keys have been pressed for a predetermined time - much like a conventional screen saver feature. The default setting is 0 and is inoperative if this value is selected. Incrementing the value by one adds six seconds to the wait period; a value of 10 gives a wait-before-sleep period of 60 seconds or one minute.

Wake Tmo

If the shut down timer feature is active in your terminal, a wake up time should also be programmed. The wake time setting will govern the time that the 3100 will wait and when any key is pressed, simply turn on the LCD again. If the wake time period has expired the <Mode> key must be used to power-up the 3100.

Other steps to conserve battery power which may be taken include:

- Minimize your use of the backlight option in the **PM/Local/Backlight** menu items.
- Use the optional protective holster to regulate temperature if working in refrigerated areas.

External Bar Code Reader Port (BarCode Menu Item)

The port for the external bar code scanner may be toggled on or off at any time. The action of going from one state to the other is known as "toggling".

To use this feature, activate the BarCode option in the Local menu.

Internal Bar Code Reader (IntBarCode)

In addition to the external bar code reader your 3100 may have an internal reader. To enable this internal reader, select **<Enable>**. To assign a trigger key, select **<ScanTrig>** and use the Hot Key procedure to assign the desired key trigger.



Normally, the side keys or corresponding pistol grip triggers are used to trigger the internal bar code scanner.

CodeID Menu Item

This menu item is used in conjunction with external bar code scanners. Generally, the **CodeId** data is sent from the scanner to the 3100. If you are using a scanner which cannot be configured to send CodeId, you should activate the CodeId option. This will cause the 3100 to add a default CodeId to a data string from the scanner.

AddCR Menu Item

The **AddCR** menu item is used in conjunction with external bar code scanners. In some cases a **<ENTER>** is desired at the end of a bar code scan to automatically return the data to the computer system that the 3100 is communicating with. If you are using a scanner which cannot be configured to send carriage returns, you should activate the AddCR option. This will cause the 3100 to add carriage returns to the data strings from the scanner.

Auto Repeat

This option causes any key which is continuously pressed to start sending a continuous character string after a preset time has elapsed. The longer the key is depressed, the faster the repetition rate.

PM/DEBUG MENU ITEMS

The Debug menu consist of two options; Input and Debug. These options are used by service personnel for monitoring reference operation parameters.

PM/ABOUT MENU ITEMS

The About menu bar selection is used to display a list of the current firmware (EPROM) and other software module release dates (YYYYMMDD format). The “system” date code is your version release identifier.

Chapter 5 : Using the Radio Manager

This chapter explains how to utilize the Radio Session Menu Bar of the 3100 Portable AEI Terminal unit. This Chapter is only applicable to the 3110, 3120 and 3130 versions of the 3100 Portable AEI Terminal.

This chapter discusses the menu items associated with:

- Setup
- Test Options
- Monitor Options
- The AssignKey
- RF Site Survey Keys



CAUTION! Procedures detailed in this Chapter should only be performed by certified WaveNet technicians. Unauthorized use of the radio spectrum may occur, or significant degradation of the 3100's performance may result, or significant degradation of the WTN system may result if the following configuration parameters are not correctly set.

RADIO SESSION MENU BAR

The Radio Manager window supports a menu structure consisting of a pop-up menu bar and a hierarchy of drop-down lists of menu items. When this window is active, you can press the <Mode> key to activate the menu bar. See the section on 'Menu Navigation' in Chapter 3 for general operational details.

The following outline illustrates the menu bar and the scope and organization of the menu item which are unique to **WTN Narrow Band** systems used in the **3110 Portable AEI Terminal** :

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
SETUP (Narrow Band)	Parameters	Header Size	Size (in characters) of synchronization header (default = 12)
		Channel	RF channel used when the 3100 first powers up
		ChanSelect	RF channels which can be switched to (consecutive numbers indicate order) when the 3100 performs cellular channel switching
		Node Address	Unique radio data network address for the 3100
		14.4	14.4 Kbps radio data link speed
		9600	9600 bps radio data link speed
		7200	7200 bps radio data link speed
	Frequencies	1:	Center channel frequency for Radio Channel 1
		2:	Center channel frequency for Radio Channel 2
		3:	Center channel frequency for Radio Channel 3
		4:	Center channel frequency for Radio Channel 4

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
		5:	Center channel frequency for Radio Channel 5
		6:	Center channel frequency for Radio Channel 6
		7:	Center channel frequency for Radio Channel 7
		8:	Center channel frequency for Radio Channel 8
	SaveParam's		Save current radio configuration in memory
	CloneParam's	Debug	Turns on additional on-screen reporting during the parameter cloning process
		NewVer	Sets the version number to be used after the cloning process
		OldVer	Sets the version number of current parameters
		AllVersions	Clones parameters, regardless of version numbers
		Reboot	Configures cloned parameter recipient terminal to re-start after cloned parameters received
		Clone	Starts the cloning process
TESTS	Frequency		Sets the frequency of the tests
	Adjust	Power	Adjusts the radio RF output power through use of the TAB key when selected.
		Speaker	Adjusts the speaker volume through use of the TAB key when selected
		Deviation	Adjusts the radio deviation through use of the TAB key when selected
		Frequency	Adjusts the radio frequency error through use of the TAB key when selected
	StopAll		Stops all radio functions when selected
	StopTest		Stops the current test when selected
	XmitLong		Transmits a long test pattern when selected
	RcvAnalog		Receives an analog signal when selected
	Voice		Turns on voice operation when selected
	RcvMsg		Receives a data message when selected
	XmtBro		Continuously broadcasts a test message when selected
	XmtBro(20)		Broadcasts a test message 20 times when selected
	XmtMsg		Transmit the entered characters when selected

The following outline illustrates the menu bar and the scope and organization of the menu item which are unique to **WTN Spread Spectrum** systems which are used in the **3120 and 3130 Portable AEI Terminals** :

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
SETUP (Spread Spectrum)	Parameters	Channel	RF channel used when the 3100 first powers up
		ChanSelect	RF channels which can be switched to (consecutive numbers indicate order) when the 3100 performs cellular channel switching
		Node Address	Unique radio data network address for the 3100
	SaveParam's		Save current radio configuration in memory
	CloneParam's	Debug	Turns on additional on-screen reporting during the parameter cloning process
		NewVer	Sets the version number to be used after the cloning process

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
		OldVer	Sets the version number of current parameters
		AllVersions	Clones parameters, regardless of version numbers
		Reboot	Configures cloned parameter recipient terminal to re-start after cloned parameters received
		Clone	Starts the cloning process
TESTS	Adjust	Power	Adjusts the radio RF output power through use of the TAB key when selected.
		Speaker	Adjusts the speaker volume through use of the TAB key when selected
		Deviation	Adjusts the radio deviation through use of the TAB key when selected
		Frequency	Adjusts the radio frequency error through use of the TAB key when selected
	StopAll		Stops all radio functions when selected
	StopTest		Stops the current test when selected
	XmitLong		Transmits a long test pattern when selected
	RcvAnalog		Receives an analog signal when selected
	Voice		Turns on voice operation when selected
	RcvMsg		Receives a data message when selected
	XmtBro		Continuously broadcasts a test message when selected
	XmtBro(20)		Broadcasts a test message 20 times when selected
	XmtMsg		Transmit the entered characters when selected

The following outline illustrates the menu bar and the scope and organization of the menu item which are common to both WTN Narrow Band and Spread Spectrum systems :

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
MONITOR	Data	Receive	Provides real time display of received data
		Xmit	Provides real time display of transmitted data
		Error	Provides real time display of received data in error
	Stats		Displays current radio statistics
	Info		Displays summary of radio configuration
	RcvBro		Provides real time display of received network broadcasts
	Mac		Provides real time display of MAC level activity
	Net		Provides real time display of NET level activity
	Rout		Provides real time display of current routes
	Sess		Provides real time display of SESS level activity
ASSIGNKEY			Assigns text string of up to 15 characters to a Hot Key (used with radio tests)

RADIO\SETUP MENU ITEMS

Radio Operational Parameters (Parameters Menu Items)

You can modify any of the main radio parameters by selecting the Parameters menu item in the Setup menu.

The radio parameters are as follows for the **3110 Portable AEI Terminal** :

HeaderSize	The number of radio message headers to be transmitted before actual message transmission begins (default = 12).
Channel	The first radio channel number used when the 3100 initializes (default = 1).
ChanSelect	The channels and which the 3100 can search when in cellular operation (default = 1, non-cellular mode). Since any channel number is a single digit, the channel numbers can be entered with no spaces or commas. For example, 234 represents channel numbers 2, 3, and 4. The order of entry is the search order used by the 3100 when a cellular search is performed.
NodeAddress	A unique network node address number (1 - 65555) for the 3100.
Bit Rate	One of three possible rates: 14.4 Kbps, 9600 bps, or 7200 bps. Only one can be selected.

The first four parameters are each entered via a numeric keyboard which pops up when the corresponding menu item is selected. The fifth parameter is one item selected from the three corresponding menu items.

These parameters are only slightly different for the 3120 and 3130 Portable AEI Terminals :

Channel	The first radio channel number used when the 3100 initializes (default = 1).
ChanSelect	The channels and which the 3100 can search when in cellular operation (default = 1, non-cellular mode). Since any channel number is a single digit, the channel numbers can be entered with no spaces or commas. For example, 234 represents channel numbers 2, 3, and 4. The order of entry is the search order used by the 3100 when a cellular search is performed.
NodeAddress	A unique network node address number (1 - 65555) for the 3100.

In the WTN Spread Spectrum systems, the Header and Bit Rate parameters are not used, as these configurations are pre-set.

Narrow Band Frequencies (Frequencies Menu Item - 3110 Only)

If a Narrow Band radio has been installed, the available radio frequencies are determined by the frequencies licensed and assigned to the site. These frequencies need to be assigned to specific channels. The assignments can be in any order.

You may assign a licensed frequency to a channel by selecting the Frequencies menu item in the Setup menu, which will produce a list of 8 channel numbers. Selecting a 'channel number' menu item will pop up a numeric keyboard. Enter a frequency (MHz) in the format of xxx.xxxx.

Parameter Cloning (CloneParam's Items)

The WTN technology allows the cloning of one 3100's parameter setup (excluding terminal-unique parameters) onto one or more other 3100s in the network, via radio data transmission.

To clone the current parameter setup, use the procedure:

1. Select the **CloneParam's** menu item in the **Setup** menu.
2. Select the **NewVer** menu item, which will pop up a numeric keyboard. Add 1 to the current value and enter the new value.
3. Select the **OldVer** menu item, which will pop up a numeric keyboard. Add 1 to the current value and enter the new value.
4. Enable each of the menu items, **Debug**, **AllVersions**, and **Reboot**.
5. Activate the menu item **Clone** - this will cause the 3100 to transmit it's current parameter setup to other receptive 3100s.

RADIO\TEST MENU ITEMS

Test options are available for analyzing or troubleshooting radio operations. Testing is done by WaveNet certified technical support personnel. The test parameters are accessed via the Tests menu. This menu allows the following actions:

- Selecting a test radio frequency (Frq:).
- Adjusting RF Power output, Speaker volume level, Deviation, or frequency (Freq.) error. Each of these adjustments are accomplished by pressing the Tab Right key for increasing a value or the Tab Left key for decreasing a value (**3110 Only**).
- Entering a test message (XmtMsg) up to 8 characters. The message will show on the menu item.
- Broadcasting (XmtBro) the test message continuously.
- Broadcasting (XmtBro(20)) the test message 20 times only.
- Transmitting (XmitLong) a 'long' test message.
- Stopping the current test (StopTest).
- Stopping all radio operations (StopAll).
- Receiving messages (RcvMsg).
- Enabling/disabling Voice operation which disables/enables data operation. This causes the radio (Narrow Band only) to switch to Channel 8 for analog voice operation.
- Receiving an analog signal (RcvAnalog).

RADIO/MONITORING MENU ITEMS

Data monitoring options are available for analyzing or troubleshooting communication operations. Monitoring is usually done by WaveNet certified technical support personnel. The monitoring options are accessed via the Monitor menu. This menu allows the following actions:

- Enabling/disabling the monitoring of up to three kinds of Data; Receive, Transmit (Xmit), or Error.
- Displaying of radio statistics (Stats).
- Displaying of radio configuration information (Info).
- Displaying of receive broadcast (RcvBro) history.
- Enabling/disabling MAC layer (Mac) monitoring.
- Enabling/disabling NET layer (Net) monitoring.
- Enabling/disabling route information (Rout) monitoring.
- Enabling/disabling SESSION layer (Sess) monitoring.

RADIO/ASSIGNKEY MENU ITEMS

The AssignKey menu item provides a way of assigning a text string up to 15 characters to any key on the overlay keypad. The assignment allows the repeated entry of a text string by using only one or two keys.

RF SITE SURVEY KEYS

An RF site survey involves the transmitting of pre-defined messages to a reference terminal which returns the messages - the ensuing statistics provide the RF coverage measurements.

Three Function keys F3, F4, and F8 are reserved for RF site surveys whenever the Radio window is the active window. A site survey is done by WaveNet certified technical support personnel. These function keys will only perform the described operations when the Menu Bar is not being used.

Pressing the F3 key will pop up (or remove) a dialogue box for entering site identification information and modifying any site survey parameters. Pop-up keyboards are used for entering data. You may select (activating a text cursor) any data field by pressing it or move across the data fields by pressing the cursor arrow keys or the tab keys.

Pressing the F4 key will toggle the text cursor between the dialogue box and the Radio window screen. The text cursor must be removed from the dialogue box before using the F3 key to remove the dialogue box.

Pressing the F8 key will start (or stop) the site survey test.

RADIO STATISTICS SUMMARY

Pressing the F2 key when the Menu Bar is not being used will display a summary of current radio statistics, which is updated in real time during the display.

Chapter 6 : Using the Session Manager

This chapter explains how to utilize the User Session Menu Bar functions of the 3100 Portable AEI Terminal unit.

A User Session is a dialogue interface to a software application, residing on a computer system connected to the WTN (On-Line User Session) **OR** a local program residing in the 3100 (Local User Session). The 3100 supports a minimum of 1 and a maximum of 8 On-line or Local User Sessions. Each User Session type supports an identical menu structure and can be assigned a user-defined title.

This chapter discusses the menu functions associated with On-Line User Sessions:

- Emulation Settings
- Communication Settings
- Display Settings
- Barcode Tab Toggle
- Cursor Captive Toggle
- Serial I/O Toggle
- Session Cloning
- Page Caching
- About the Current Session

This chapter also discusses the menu functions associated with Local User Sessions :

- File
- Save
- About

ON-LINE AND LOCAL USER SESSIONS

The 3100 supports both On-Line and Local User Sessions. The operation and use of each type of user session is quite different and tailored to different uses of the 3100.

On-Line User Sessions

On-Line User Sessions in the 3100 receive on-screen information from the host computer system, via the radio link. This data is used to instruct the user's operation of, and data entry into the 3100. When the user is finished with the current operation, and supplied the required data, the data is immediately sent back to the computer system.

In this manner, the 3100 works much like a “dumb” terminal which is connected via wires to a computer system. With a “dumb” computer terminal, the host computer directs the actions of the terminal, interprets any user input or operation of the terminal, and responds accordingly.

In fact, the 3100 can emulate several types of IBM and UNIX type “dumb” terminals. Emulation allows the 3100 to be used directly with these types of computer systems with no changes to hardware and minor software changes to the host computer system.

Like wired, “dumb” terminals which stop working if disconnected from the host computer system, the 3100 On-Line User Session will also stop working if the 3100 goes outside the radio data coverage area of the WTN. *As such, On-Line User sessions should only be used if the 3100 will be within radio data coverage of the WTN at all times.*

Local User Sessions

Local User Sessions in the 3100 are controlled by local software programs loaded into the 3100. The local software programs present on-screen information to the user, control and interpret operator actions, and collect and store the data entered into the terminal by the user (via keyboard, AEI Reader or barcode reader).

In this manner, the 3100 works much like a PC which runs local programs, stores data on disk which can be exchanged by various means with other computer systems or PC users. The methods by which the 3100 can exchange data with other computer systems are via the RS-232 Port, or via the radio data link established by the WTN.

Unlike the 3100 On-Line User Session, the Local User Session does not require connection to a computer system, either by the RS-232 or radio data link, at all times. The 3100 will automatically upload data collected by the local program at such time that the RS-232 link is established (by plugging in a RS-232 cable connected to the computer system) or radio data link becomes available .

However, the Local User Session does not perform any emulation. As such, the computer system that the 3100 uploads data to, by either method, must be programmed to handle the data and data format supplied by the 3100.

Local User sessions should be used when the 3100 may not always be within the radio data coverage area of the WTN, or when the 3100 is not outfitted with radio data communication technologies.

The local program is created using WaveC, an interpreted language very similar to the C language. WaveC programs can be created according to customer specifications by WaveNet, WaveNet WaveC certified software developers, or even by the customer. Information regarding WaveC is available from WaveNet, or WaveNet approved partners.

ON-LINE USER SESSIONS

Menu Bar

An On-Line User Session Manager window supports a menu structure consisting of a pop-up menu bar and a hierarchy of drop-down lists of menu items. To access this menu structure you must first be in any ANSI type task from where you can press the <Mode> key to pop up the menu bar. See the section on 'Menu Navigation' in Chapter 3 for general operational details.

The following outline illustrates the menu bar and the scope and organization of the menu item options.

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
EMULATION	WaveNet		Sets ANSI Emulation with non-destructive Backspace
	VT220		Sets ANSI Emulation with F1-F4 performing the DEC PF1-PF4 functions
	Unix		Sets ANSI Emulation with destructive Backspace
COMMUNICATION	Service	5250	Sets on-line session to utilize 7000BC 5250 interface services
		TN5250	Sets on-line session to utilize 7000BC TN5250 interface services
		3270	Sets on-line session to utilize 7000BC 3270 interface services
		TN3270	Sets on-line session to utilize 7000BC TN3270 interface services
		Telnet	Sets on-line session to utilize 7000BC TNANSI interface services
		SLP-TCP	Set on-line session to utilize 7000 BC ANSI interface service using SLP and TCP/IP
		PC Link	Sets on-line session to utilize 7000BC serial SLP/SIO interface services on Port 1.
		PC Link (2)	Sets on-line session to utilize 7000BC serial SLP/SIO interface services on Port 2.
		PC Link (3)	Sets on-line session to utilize 7000BC serial SLP/SIO interface services on Port 3.
		Demo	Sets on-line session to utilize 7000BC computer system simulation service
	Session	Copy	Copy the current on-line user session settings to a new user session
		Rename	Rename the current on-line user session with a new name
		Delete	Delete the current on-line user session (not shown on default user session)
	Host ID		The unique network identifier of the 7000 Base Controller which will provide the selected interface service to the desired computer system

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
DISPLAY	8 Bit		Set to YES for 8-bit ANSI data stream or NO for 7-bit ANSI data stream communications
	Page Caching		The number of computer system screens which can be stored in the terminal memory
	Character Set	ASCII	Data from the computer system processed as ASCII data when selected
		Chinese	Data from the computer system processed as MSB double-byte Chinese characters when selected
		Korean	Data from the computer system processed as MSB double-byte Korean characters when selected
	Font	F8x8	Terminal display uses this font on-screen when selected (ASCII data must be selected)
		F8x16	Terminal display uses this font on-screen when selected (ASCII data must be selected)
		F16x32	Terminal display uses this font on-screen when selected (ASCII data must be selected)
		TF16x32	Terminal display uses this font on-screen when selected (ASCII data must be selected)
		F6x8	Terminal display uses this font on-screen when selected (ASCII data must be selected)
		F6x12	Terminal display uses this font on-screen when selected (ASCII data must be selected)
		Korean16	Terminal display uses this font on-screen when selected (Korean data must be selected)
		Chinese16	Terminal display uses this font on-screen when selected (Chinese data must be selected)
		Chinese Song 16	Terminal display uses this font on-screen when selected (Chinese data must be selected)
		Chinese Hei 16	Terminal display uses this font on-screen when selected (Chinese data must be selected)
	Font Map	Font = n	Allow mapping of fonts to numeric values which can be referenced by the computer system for pre-set font selection of the terminal display.
	Screen Size	Rows	Allows setting of the maximum number of rows which will be handled by the terminal from the computer system.
		Columns	Allows setting of the maximum number of columns which will be handled by the terminal from the computer system.
	Origin Scroll		Minimizes screen shifts which can be caused by cursor positioning.
KEYBOARD	Gray Scale		Enables grey scale representation of computer system colors
	Barcode Tab		Enables automatic tabbing to the next available field after the bar code reader input has been inserted in the screen
	Cursor Captive		When enable, the terminal will allow the cursor to only be moved within and between entry fields

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
OTHER	Serial I/O		Assigns the serial input/output terminal function to this User Session

SETUP\Emulation Menu Items

The 3100 supports three types of host application session terminal emulators:

- WaveNet (ANSI)
- VT220
- Unix

You can select one of the emulators by selecting the Emulation menu item in the Setup menu, and then selecting the chosen emulation menu option.

The VT220 emulation allows the Function keys F1 - F4 to be used for the VT220 PF1 - PF4 keys.

SETUP\Communication Menu Items

The communication settings for each session window involve:

- Selecting the desired host communications service.
- Entering the required host identifier.
- Setting the number of data bits (protocol).

You can access these settings by selecting the Communication menu item in the Setup menu.

Host Services (Service Menu Item)

Select the Service menu item to display a list of possible host services. Select one of the following communication services:

- **5250** IBM 5250 data stream via SDLC/SNA.
- **TN5250** IBM 5250 data stream via TCP/IP/Telnet.
- **3270** IBM 3270 data stream via SDLC/SNA.
- **TN3270** IBM 3270 data stream via TCP/IP/Telnet.
- **Telnet** ANSI data stream via TCP/IP/Telnet.
- **PC Link** ANSI data stream via RS-232/WaveNet SLP/SIOP, using Port 1.
- **PC Link[2]** ANSI data stream via RS-232/WaveNet SLP/SIOP, using Port 2.
- **PC Link[3]** ANSI data stream via RS-232/WaveNet SLP/SIOP, using Port 3.
- **SLP-TCP** ANSI data stream via TCP/IP/WaveNet SLP.
- **Demo** ANSI data stream per WaveNet host simulation.

Session Menu Items

The 3100 display is capable of presenting multiple sessions originating from multiple and disparate hosts.

This feature lets mobile operators switch between applications on different hosts or switch between different sessions originating from the same host or any combination of both with minimal disruption to the user's work flow. Switching between sessions requires that the user <2nd> <Tab> switch Active Sessions.

Once the multi-session capability has been activated and configured, the terminal display confined to the User Sessions security options in the Presentation Manager. Upon power up, users will see only the authorized pre-configured User Sessions.

You can copy the current session window by using the Copy menu item :

1. Select the **Copy** menu item which will display the **Title=** menu item.
2. Select the **Title=** menu item which will pop up a keyboard.
3. Enter a distinctive title for the new session window.
4. Use <2nd> <Tab> to switch to the new User Session



The User Session name is located in the Status Display between the Security Level indicator and the Radio Communication Gauges. Press <2nd><2nd> to display or clear this Status Display.

You can also rename the title of the new session window by using the **Rename** menu item. Press <ENTER> to display the Rename menu item title. Use <ENTER> again to bring up an alpha entry box. Enter a new title. This title will appear in the title bar of the window.

Any User Session can be removed by using the **Delete** menu item :

1. Select the Session menu item which will display the **Delete** menu item.
2. Select the Delete menu item.
3. Re-start the 3100. The deleted User Session will have been removed.



The Delete item will not appear if the current window is the 'original' session window.

Host ID Menu Item

The host identification entry links the 3100 to the 7000 Base Controller which connects to the desired host. The chosen host ID must be the same as that assigned to the appropriate Base Controller. Any User Session can reference the same or different host ID used by another User Session. The default host ID is 0.

You can enter the host ID number via the Host ID menu item which will pop up a numeric keyboard. The entered ID will show in the menu item.

Data Bits Menu Item

You can use the menu item 8 Bit to set the number of data bits per data byte to either 7 or 8. Touch the menu item, which will pop up a keyboard, and enter Yes for 8 or No for 7. The default is 8. Yes or No will show in the menu item.

SETUP\Display Menu Items

You can customize the display characteristics of a session window in terms of:

- Page Caching
- Character Set
- Font
- Font Map
- Screen Size
- Origin Scroll

Page Caching Menu Item

You can set the number of pages for caching purposes via the Page Caching menu item which will pop up an entry box. The entered number of pages will show in the menu item. The new value will take effect upon rebooting the 3100.

The default value is 0 which denotes that page caching is disabled.

 *Page Caching in the WTN system is automatic for IBM computer systems which use the 5250 or 3270 data stream. All other computer systems must use software applications which explicitly control the 3100 Page Caching function.*

Character Set Menu Item

The 3100 can support one or more different character sets, depending on installation requirements and available memory. The current available character sets are:

- ASCII
- Chinese
- Korean

A character set determines how the terminal will interpret the character codes sent from a host computer. This establishes the graphical rendition the terminal will use for representing information from the host computer.

- Selecting ASCII will enable use of either the F8x8, F8x16, TF8x16, F16x16, F16x32, TF16x32 and English fonts, with ASCII single byte processing. Only these fonts should be used with this character set. (See Font for selection)
- Selecting Chinese will enable use of the 16x16 Chinese standard font, with double byte ASCII processing enabled through use of MSB signaling.

- Selecting Korean will enable use of the 16x16 Korean standard font, with double byte ASCII
- processing enabled through use of MSB signaling. Only the 16x16 Korean font should be used with this character set.

The font names are font types that can be supported, depending on installation requirements and available memory. The current available fonts are listed via the Font menu item. See the section on 'Font' in this chapter.

Font Menu Item

You can list the current available font types by selecting the Font menu item. You can enable the specific font by pressing twice the appropriate menu item. The display will immediately change to reflect the font selection.

When selecting a font, you need to account for the screen size generated by the host and expected by the terminal. See also, the section on 'Screen Size' in this chapter.

Font Map Menu Item

You can assign numerical font identifiers to represent each of the fonts listed via the Font menu item. The 3100 provides a default set of identifiers. The identifiers are listed via the Font Map menu item. You may modify the identifiers via the appropriate menu item which will pop up a keyboard. The entered identifier will show in the menu item.

These font references can be used by the computer system to select the font to be used to display the information from the computer system. Using this capability, the computer system can cause different screens to use different fonts.

 *This capability cannot be used with IBM computer system using the 5250 or 3270 data stream*

Screen Size Menu Item

You can select a User Session screen size by selecting the number of character rows and the number of character columns that can be handled by the 3100. However, depending on the font selection, not all rows and columns may be visible at one time on the LCD screen.

 *Rows and columns that are not visible at any time can be scrolled to by using the <2nd><Cursor Up / Down / Right / Left> keys. Pressing <2nd> again will disable the scroll feature and lock the current screen position in place.*

 *At all times in normal operation, the LCD screen will automatically shift, if necessary, to keep the cursor visible. This feature over-rides the scrolling feature - if the manually scrolled screen positioning does not include the cursor, when the scroll feature is disabled, the screen will automatically shift to make the cursor visible.*

The following chart correlates example font options with the character rows and columns that can be displayed on the LCD Screen at one time.

Font	Columns	Rows
F8x8	24	24
F8x16	24	12
TF8x16	24	12
F16x32	12	6
TF16x32	12	6
F6x8	32	24
F6x12	32	16
Korean16	12	12
Chinese16	12	12
Chinese Song 16	12	12
Chinese Hei 16	12	12

The screen size settings depend on the host application. If the host screen size is larger than that of the row and column setting, the terminal will truncate that screen display.

You can modify the screen size settings by selecting the Screen Size menu item and then selecting the Rows or Columns menu item. A numeric keyboard will pop up. Enter an appropriate value. The value will show in the menu item.

Origin Scroll Menu Item

It is possible that, with the current screen size and font settings, the screen will automatically locate on the cursor in such a way that useful information preceding the cursor may not be seen. You could use the scrolling feature to locate the cursor, but this could be time-consuming. The origin scroll toggle is an alternate way of keeping the cursor on-screen with the necessary preceding information.

Whenever the Origin Scroll menu item is enabled, the terminal will attempt to locate the screen in such a manner as to include the origin (0,0) coordinates at the upper left corner of the window screen with the cursor at the same time.

SETUP\Keyboard Menu Items

Barcode Tab Menu Item

You can use the Barcode Tab menu item in the Keyboard menu to enable or disable the automatic tabbing of the text cursor to the next data entry field for bar code scanner application sessions.

Cursor Captive Menu Item

You can use the Cursor Captive menu item in the Keyboard menu to enable or disable the automatic constraining of the text cursor to the data entry fields only.

SETUP\Other Menu Items**Serial I/O Menu Item**

You can use the Serial I/O menu item in the Other menu to enable or disable the External Interface Port which is RS-232 compatible.

Selecting the Serial I/O menu item will pop up a keyboard for entering Yes to enable or No to disable the port. The entry will show in the menu item.



When this function is enabled, the Serial I/O capability is attached to the current User Session only. It cannot be enabled for other User Sessions. The computer system being used with the enabled User Session is the only computer system that can direct or accept data from the terminal Serial Port. Only one User Session can have Serial I/O = Yes.

ABOUT Menu Items

You can obtain specific information about the Active On-Line User Session with this menu item. Four pieces of information is displayed (for example) :

Ver=19970409	Version of the session manager software installed in the 3100, specified by the software release date (YYYYMMDD format).
Node=48	This value was entered via the NodeAddress menu item in the Radio Manager window's Setup/Parameters menu.
Sess=2	The session sequence number (1 - 8). The sequence number shows the chronological creation of each session.
“48.ansj“	The node number and session name corresponding to session number).

User Sessions are internally named by the 3100 in the following manner :

<u>Session #</u>	<u>Session Name</u>
1	ansi
2	ansj
3	ansk

4	ansl
5	ansm
6	ansn
7	anso
8	ansp

Session Status Messages

Only one of the following session status messages will be displayed in a pop up display box whenever the message is warranted :

NoBase	The terminal has not established a connection to the configured base controller according to the parameter Host ID
NoServ	The terminal session has not been accepted by the base controller. The service specified within the Service menu is not active on the base controller identified by Host ID.
NoData	The terminal session has been established to the base controller, but no data has been received. (Note: that the telnet> prompt from the base controller is counted as data and therefore does not necessarily indicate that the host application has responded.)
Offlin	Indicates that the terminal is offline and is no longer communicating with the base controller. If the terminal has attempted to transmit to the base controller and has not received an acknowledgement, then the terminal declares itself offline; also whenever it receives a broadcast from the base controller that declares it offline and is unable to re-connect to the base controller.
Wait	Indicates that the terminal's keyboard is locked and will reject any operator input. Although this state is automatically entered when the terminal transmits a block mode response, it is normally reset by a control in the data stream from the host application.
Error	Indicates that the terminal is in an error state as determined by the application program. The error state corresponds to the processing and displaying of the Error Message Window, a mechanism for halting the terminal operator until the error message is confirmed by using the Clear key.

LOCAL USER SESSIONS

Menu Bar

A Local User Session Manager window supports a menu structure consisting of a pop-up menu bar and a hierarchy of drop-down lists of menu items. To access this menu structure you must first be in

any Local type task from where you can press the <Mode> key to pop up the menu bar. See the section on 'Menu Navigation' in Chapter 3 for general operational details.

The following outline illustrates the menu bar and the scope and organization of the menu item options.

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
FILE	WritePrms		Saves the Current Local User Session Parameters
	NewSession		Copy the current local user session settings to a new local user session (Only appears on default local user session).
	DeleteSess		Delete the current user session (not shown on default user session)
	No Program		Highlighting this selection and hitting <Enter> will deselect any local program for this local user session.
	...		
	Available Local Programs		A list of local programs will be shown, highlighting any selection and hitting <Enter> will select the local program to be used for this local user session.
SAVE	No Save		Disables any data saving from keyboard, scanner or AEI reader input into the local user session.
	Port1		When enabled, the terminal will save data, and upload this data through the RS-232 port to a computer system using the RAW data protocol.
	SLP/SIO		When enabled, the terminal will save data, and upload this data through the RS-232 port to a computer system using the WaveNet SLP/SIO data protocol.
	Radio	Use Radio	When enabled, the terminal will save data, and upload this data through the radio data link to the host computer.
		Telnet	When selected, the terminal will use a local on-line Telnet user session to connect and upload data over the radio data link, when available.
		SLP-TCP	When selected, the terminal will use a local on-line SLP-TCP user session to connect and upload data over the radio data link, when available.
		PCLink	When selected, the terminal will use a local on-line PCLink user session to connect and upload data over the radio data link, when available.
		PCLink2	When selected, the terminal will use a local on-line PCLink2 user session to connect and upload data over the radio data link, when available.
		PCLink3	When selected, the terminal will use a local on-line PCLink3 user session to connect and upload data over the radio data link, when

Menu Bar Item	1 st Sub-Menu	2 nd Sub-Menu	Comments
			available.

FILE/No Program...

This option allows selection of the local program to be used in the local user session. Any local programs loaded into the terminal will appear under the “No Program” selection, using the name of the program as defined in the local program.

Moving the highlight to the desired local program, and hitting <Enter> will select the program to be used. The setting must be saved using the FILE/WritePrms menu item(highlight and hit <Enter>), and then the terminal must be reset.

Using this feature, combined with the FILE/New Session menu item, allows multiple Local User Sessions to be configured in the 3100 and different local programs to be executed within each Local User session.

SAVE/Port1 & SAVE/SLP/SIO

These menu items control the data upload over the RS-232 Serial Port of the terminal. If the computer system that will accept the data is a Windows95 or WindowsNT system, WaveNet can provide a DLL which will implement the protocols used in the Port1 or SLP/SIO menu items. This DLL greatly simplifies the RS-232 interface procedure and the control/configuration of the host computer system COM Port used to connect to the 3100. For other host computer systems please contact WaveNet for additional information required.

Port1 uses a simple ASCII based protocol to connect and transfer data records to your PC. SLP/SIO uses a more secure, industrial protocol. Both protocols have been developed by WaveNet for other uses and either are adequate for RS-232 data transfer. It is recommended for simplicity that the Port1 setting be used. See Local Session Upload Data Format section in this chapter for more information on the data formats used.

SAVE/Radio

This setting enables the use of the radio data upload method. In this method, an on-line user session, configured with the appropriate Communications parameters, is used to provide a radio link to the 7000 Base Controller which is attached to the computer system accepting the upload data.

Using these parameters, a Telnet link can be used to connect to most UNIX, Windows95 or WindowsNT computer systems via Ethernet-TCP/IP communications, and the other options can be used to connect to Windows95 or WindowsNT computer systems via RS-232 COM Ports (again, the WaveNet DLL will greatly simplify the required software development for Windows based systems).

The data format used over the radio data link is identical to the data format used for the RS-232 based data upload.

ABOUT Menu Items

You can obtain specific information about the Active Local User Session with this menu item. Four pieces of information is displayed (for example) :

Eprom	Version of the EEPROM software installed in the 3100, specified by the software release date (YYYYMMDD format).
OS	Version of the Operating System software installed in the 3100, specified by the software release date (YYYYMMDD format).
System	Version of the Session Manager software installed in the 3100, specified by the software release date (YYYYMMDD format).
LCD	Version of the Program Manager software installed in the 3100, specified by the software release date (YYYYMMDD format).
Radio	Version of the Radio Manager software installed in the 3100, specified by the software release date (YYYYMMDD format).
WW	Version of the session manager software installed in the 3100, specified by the software release date (YYYYMMDD format).

Local User Session Upload Data Format

The format of the data record taken from each terminal, whether over RS-232 or radio data link, is based on a multiple "Page & Field" structure used within the WaveC program. A sample of the data is as follows (data taken from actual operation with several 3100 Portable AEI Terminals) :

```
w
t35056028>2
p35055fc5<vtag>d<egc>RailCar<i>SDEX<n>10262<side>RIGHT<a>4<lfi>57'08"<type>Spare
p35055fd8<ctag>d<side>LEFT<begc>RailCar<bi>SDEX<bn>10262<bsid>RIGHT<ba>4<blfi>57'08"<btyp>Spare
p35055fee<yad>d<trac>000<spot>000<i>SDEX<n>10262
x
```

```
w
t3505626a>2
p3505604f<vtag>d<egc>RailCar<i>SDEX<n>10262<side>RIGHT<a>4<lfi>57'08"<type>Spare
p3505605f<ctag>d<side>LEFT<begc>RailCar<bi>SDEX<bn>10262<bsid>RIGHT<ba>4<blfi>57'08"<btyp>Spare
x
```

```
w
t350562fc>2
p350562fb<vtag>d<egc>RailCar<i>SDEX<n>10262<side>RIGHT<a>4<lfi>57'08"<type>Spare
x
```

```
w
t3505630b>2
```

```
w
t3505631a>2
p35056309<vtag>d<egc>RailCar<i>SDEX<n>10262<side>RIGHT<a>4<lfi>57'08"<type>Spare
```

x

In the above data log, the following delimiting characters are used :

Delimiting Character	Explanation	Note
>	0x11	For purposes of depiction only, actual character is non-printable
<	0x10	For purposes of depiction only, actual character is non-printable
w	start of exchange	
x	end of exchange	

The initial header, (e.g. t3505630b>32) before any actual data records is the 3100 identification line :

Data	Explanation
3505630b	time of exchange (hex) "long time" = seconds since Jan1, 1970
32	Terminal number (hex) which corresponds to the terminal node number

The actual data record is illustrated in the following example :

p35056309<vtag><egc>RailCar<i>SDEX<n>10262<side>RIGHT<a>4<lfi>57'08" <type>Spare

Data	Explanation
35056309	time of page collection (hex)
<vtag>	page name (up-to 4 chars), as defined in WaveC program. Always first delimited text label.
d	key "entering" the page (hex) = ENTER, as defined in WaveC program. If present, always after the page name.
<egc>, <i>, <n>, <side>, <a>, <lfi>, <type>	field name (up-to 4 chars), as defined in WaveC program, delimited by < & > characters (see above). Note that only field names that have data fields that have been modified are sent.
RailCar, SDEX, 10262, RIGHT, 4, 57'08", Spare	field data (up-to field size characters), as either entered by user, via keyboard, barcode or RFID reader. Note that only "modified" field data is sent and that field data may be "null" if data was entered, then cleared by user.

The data transfer protocols used by the 3100 are fail safe protocols. Data records (each record corresponds to a terminal screen, with each screen containing one or more fields of data) are transferred sequentially by the terminal, and acknowledgement of each record must be given by the host computer to cause the terminal to discard that record from memory. If the data transfer connection is lost, the terminal will simply continue to retain records until such time as the serial connection is re-established.

Note that the page line may be received more than once if the communication error occurs after the record have been sent, but before the acknowledgement is received by the terminal. If this occurs, the

“x” character which indicates end of transmission will not be present, and when the terminal does upload the record again, the “page time” will be the same

Common key values which may be used to “enter” or “save” page contents at the terminal by a WaveC program are :

Common key values (hex)	Name
d	Enter
10x	Function key x (for example 103 = F3)
90x	AltFunc key x (for example a03 = ALT_F3)
110x	CtrlFunc key (for example 1103 = CTRL_F3)

Index

“

“memory” effects · 3
 “power up” · 12
 “powered down” · 12
 “secure” information display · 11

<

<2nd> key · 15, 21
 <2nd><0> · 11
 <2nd><BackTab> · 14
 <2nd><ForwardTab> · 14
 <4> <4> <4> <1> · 12
 <Mode> key · 11, 12, 15, 17, 21, 22, 23, 26, 29, 37

2

2nd-Menu keys · 15

3

3020 Battery Charger · i, 3

6

6000 Access Point · 1, 5
 6000 Access Points · 1, 5

7

7000 Base Controller · i, 4, 5, 9, 38, 41
 7000 Base Controllers · 5

9

900 MHz Spread Spectrum · 6, 7, 8

A

a tethered decoding bar code laser scanner · 2
 a Transflective Monochrome LCD · 2

ABOUT · ii, iii, 19
 About the Current Session · 37
 Active Session · ii, 14, 15, 16, 19, 20, 21, 40
AddCR menu item · 27
AllVersions · 30, 31, 33
 alpha-numeric data entry · 3
 alternate routes · 9
 and 6000 Access Points · 1
 ANSI data stream · 38, 40
 antenna connector · 1
 Application throughput · 7
 ASCII single byte processing · 42
ASSIGNKEY · ii, 31, 34
 AssignKey menu item · 34
 available session · 14

B

bar code scanner port · 1, 19
BarCode menu · 2
 BarCode option · 27
 Barcode Tab menu item · 44
 Barcode Tab Toggle · 37
 battery charge fuel gauge · 23
 battery charger · 11
 battery conditioning · 3
Battery Fuel Gauge · 23
 battery pack · i, 3, 11, 12
 battery pack life · 3
 battery pack slots · 3
 baud rate · 6, 7
 bi-directional · 4, 5
Bit Rate · 32

C

carrier frequency · 6, 7
cellular switching · 9
Channel · i, 9, 29, 30, 32, 33
channel bandwidth · 6
 channel spacing · 6
ChanSelect · 29, 30, 32
 Character Set · iii, 38, 41, 42
 Chinese standard font · 42
Class II or Class III device · 2
 Class II/III Laser product · 1, 2
Clone · ii, 30, 31, 33
CloneParam's menu item · 33
 cloning · 30, 31, 33
 coaxial connector · 1
CodeId data · 27

CodeId option · 27
Collision Sense Multiple Access with Carrier Detection (CSMA/CD) · 8
Command Key · ii, 15, 17, 18, 22, 23, 25, 26
Command Key dialog box · 22
Command keys · 22
COMMUNICATION · i, iii, 37
Communication Settings · 37
communications quality · 9
computer systems · 1, 4, 5, 9, 13, 14, 22, 42
configuration · 2, 11, 14, 16, 20, 26, 29, 30, 31, 32, 34
Console Port · i, 2, 14
Console Session · 14, 19
contrast · 2, 13, 14, 22
coverage area · 7, 8, 9, 26
Coverage requirements · 8
coverage zone · 4, 5, 9
coverage zones · 4, 5, 9
current sessions · 19
Cursor Captive menu item · 44
Cursor Captive Toggle · 37
cursor control keys · 3
Custom Key Menu · ii, 18, 24, 25, 26
Custom Key Option Menu · 24, 25

D

data compression · 6, 7
DEBUG · ii, 17, 18, 27, 30, 33
de-facto protocols · 7
Delete menu item · 41
digital radio data communications · 4
Direct Sequence · 6, 7
DISPLAY · iii, 38
Display Attributes · 13
Display Settings · 37
double byte ASCII processing · 42

E

effective baud rate · 6, 7
EMULATION · iii, 37
Emulation Settings · 37
enabled User Session · 45
English fonts · 42
Error · 31, 34, 46
Ethernet based network · 4, 5, 9
External bar code scanner · 5
external interface port · 1
external RS-232 communications · 5
External Scanner Port · i, 2

F

F1-10 · 3
F1-F10 keys · 15

Font · iii, 38, 39, 41, 42, 43
for interactive multi-session communications · 1
for remote servicing · 2
frequency bands · 6
Frequency Hopping · 7
Frequency Modulation · 6
frequency usage · 6
function keys · 3, 34

G

GLOBAL · ii, 17, 22
Global menu · 25
gray-scale levels · 13

H

HeaderSize · 32
holster · 3, 5, 26
hops · 7, 9
host computer systems · 1, 4
Hot Key · ii, 13, 15, 16, 22, 23, 25, 27, 31
Hot Key Assignment · 13

I

IBM 3270 data stream · 40
IBM 5250 data stream · 40
industrial vehicles · 5
industry standard protocols · 8
installed radio transceiver · 1
interactive communications · 5
interactive multi-session communications · 1, 5
internal barcode reader · 14
internal heater · 3
internal integrated bar code reader · 1
internal integrated bar code scanner · 2
internal RFID · 5
International Standards organizations · 8
is RS-232 compatible · 2, 44

K

Key Menu · ii, 15, 17, 18, 22, 23, 24, 25, 26
KEYBOARD · iii, 39
keypad · 1, 2, 5, 11, 12, 13, 14, 15, 22, 24, 25, 34
Korean standard font · 42

L

LCD display · i, 5, 11, 13, 14, 18
LCD interface · 13
LED back-lighting · 2

licensing procedure · 6, 8
licensing procedures · 6
LOCAL · ii, 18
local area network environment · 1
local area radio data network · 4
Local Radio session · 19
Log-on Password · ii, 20

M

MAC layer · 34
manual data entry · 2
memory · 12, 16, 20, 24, 25, 30, 38, 42
Menu Bar · ii, 15, 16, 17, 19, 20, 22, 25, 29, 30, 31, 34, 35, 37
menu functions · i, 37
Menu item · 15, 16, 19, 22
Menu List · 23
Menu Password · 20, 21
mission critical · 8
mobile data devices · 4
Remote Device · i, 4, 5, 9
Remote Devices · i, 4, 5, 9
Mode Key · 16
Model 1000 Data Modem · 5
Model 3100 Portable AEI Terminal · i, 5
Model 5000 Mobile Terminal · 5
Model 6000 Access Point · 5
Model 7000 Base Controller · 1, 4
Model 7000 Base Controllers · 1
modulation rates · 7
MONITOR · ii, 31
Monitor menu · 34
monitoring · 2, 5, 11, 27, 34
multiple sessions · 40
multi-session capability · 40
multi-session device · 14
multi-taking · 14

N

Narrow Band (UHF-FM) · i, 5, 6
NET layer · 34
Network Devices · i, 4, 5, 8, 9
NewKey assignment operation · 23
NewVer menu item · 33
NoBase · 45
NoData · 46
NodeAddress · 32, 45
nominal baud rate · 6, 7
NoServ · 46
number key pad · 11
numeric data entry · 3

O

OffIn · 46
OldVer menu item · 33
operating frequencies · 6, 7
optimal route · 9
Optimum contrast · 2
optional external tethered bar code scanner · 1
optional pistol grip · 4
Origin Scroll · iii, 39, 41, 44
OTHER · iii, 39

P

Page Caching · iii, 37, 38, 41, 42
pistol grip · 2, 3, 4, 5, 11, 27
pistol grip option · 3
pistol grip trigger switches · 2
PM/GLOBAL Menu · ii
PM/Global/Command Key · 22, 23
PM/Tasks menu bar · 21
PMGlobal\Keyboards · i
PM\Local\Backlight · 25
PM\Local\WritePrms · 16, 20
PM\Tasks\MenuPassword · 20
PM\Tasks\Protect · 21
polycarbonate enclosure · 3
portable industrial applications · 5
Power-Up Password · 19
Presentation Manager · ii, i, 2, 11, 12, 14, 15, 16, 17, 19, 22, 40
printer · 1, 5
process controller · 1, 5
proprietary radio data protocol · 8

R

radio antenna · 1
radio channels · 6, 9
radio communications status · 13
radio communications technology · 5
radio data communications · i, 4, 5, 7, 14
radio data coverage · 4, 5
Radio Data Protocols · i, 7, 8
radio frequency (RF) channel · 6
Radio Manager · ii, i, 14, 29, 45
radio modules · 5
radio signal strength · 9
radio statistics · 31, 34, 35
radio technologies · 5, 8, 9
radio technology · 8, 9
radio transceivers · 4, 6, 7, 8
RAM memory · 12
real-time · 4
Reboot · 33
relative humidity range · 3
Rename menu item · 41

response time · 7, 8
re-started · 11, 12
RF connector · 1
RF Port · i
RF power · 6, 7, 11
RF site survey · 34
route · 9, 31, 34
routing paths · 9
RS-232 device · 1
RS-232 devices · 5
RS-232 modem · 2

S

Save button · 13
scaleable · 4
Scanner Port · i, 2
Screen Size · iii, 39, 41, 42, 43, 44
SDLC/SNA · 40
security level · 12, 13, 14, 19, 20, 21
security levels · 12, 14, 21
Serial I/O capability · 45
Serial I/O menu item · 44
Serial I/O Toggle · 37
serial input/output · 2, 39
Session & Service Windows · 13
Session Cloning · 37
SESSION layer · 34
Session List · ii, 17, 19, 21
Session Manager · ii, i, 37
Session menu item · 41
session name · 13, 45
session windows · 14
Sessions · i, ii, 14, 17, 19, 21, 37, 40, 45
Shut TimeOut · ii, 26
side switches · 4
single radio frequency · 6
SMA · 1, 11
software applications · 1, 4, 42
software module release dates · 28
Spread Spectrum (2.4 GHz) · i, 7
Spread Spectrum (900 MHz and 2.4 GHz) · 5
Spread Spectrum (900 MHz) · i, 6
spread spectrum transceiver · 6
Standard Key Menu · 23
standard key menus · 22
Status Line · 21
System Menu · i, 13

T

TASKS · ii, 14, 17, 19
TCP/IP/Telnet · 40

TCP/IP/WaveNet SLP · 40
temperature range · 3
terminal security · 11, 17, 19
TESTS · 30, 31
Tests menu · 33
tethered barcode scanner · 3
the 5250 or 3270 data stream · 42, 43
the best route · 9
The **Local Sessions** · 14
the Network Devices · 5, 8, 9
the side keys · 2, 3, 15, 27
the state of charge · 11
Time Division Multiplexing (TDM) · 8
touch-screen · 5
transaction loading · 8, 9
transaction rates · 7
transaction-based applications · 5
trigger switches · 2, 4
two battery capacity options · 3

U

user password · 19
User Session · 14, 19, 37, 39, 40, 41, 43, 45
User Sessions · 14, 37, 40, 45

V

vehicular control · 5
via RS-232/WaveNet SLP/SIOP · 40
VT220 emulation · 39

W

Wait · 46
Wake Tmo · ii, 26
WaveNet host simulation · 40
WaveNet Proprietary Protocol · 7
WaveNet Proprietary Radio Data Protocol · i, 8
WaveNet Transaction Network · i
whip antenna · 11
wired terminal · 5
WritePrms menu item · 16, 20
WritePrms option · 26
WTN · i, 4, 5, 6, 7, 8, 9, 14, 29, 30, 31, 32, 33, 37, 42

Y

yearly licensing fees · 8