OSMAC BASE

On-Site Communications System

User Manual

Firmware Version 307D55

Table Of Contents

Copyright Notice

1 Installation

1.1 Environment

The *OSMAC BASE* is designed for an indoor office environment. Ambient air temperature should be between -10 and +40C, and relative humidity in the 20-80% range. Operation outside of this range may cause damage to the unit.

1.2 Licensing

This product operates in the commercial two-way radio communications band. A license to operate on a particular frequency must be obtained from the FCC. Use form 600 to apply for a license to operate this unit in your area. Operation of this product must be in compliance with the applicable FCC rules and regulations. In most cases, the FCC Rules and Regulations are covered in Title 47 of the CFR, part 90 pr Part 22. Form 600 is available at the FCC WEB site: http://www.fcc.gov/formpage.html. See appendix A for a list of frequency coordinating agencies.

This product is Certified for use under FCC Parts 22 and 90. Internal circuitry may not be modified. Modification of circuitry within this unit may void your authority to operate the equipment.

1.3 Radio Communication Interference

The *OSMAC BASE* generates and uses high-frequency radio energy which can cause interference if not installed in accordance to the user manual and using sound radio system engineering practice. For best results, it is recommended that a qualified radio service technician install and configure the *OSMAC BASE*.

The *OSMAC BASE* has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules and Regulations. Operation of this device in a residential area is likely to cause interference in which case the user must, at his own expense, be required to take whatever measures may be required to correct the interference.

1.4 Locating the OSMAC Base

The *OSMAC BASE* is designed to sit on a desktop. Although this is a good location for ease of operation, it is usually not the best place to locate the antenna. For most installations, it is recommended that the antenna be located away from the unit, and high enough to provide good coverage. "Base Station" type antennas will provide much better coverage than will the "rubber duck" type antennas. This is particularly true if an external keyboard is to be used, since many keyboards malfunction in the presence of strong RF fields.

The LCD's contrast may be adjusted through a small hole in the rear of the unit. If the LCD is difficult to read adjust its contrast with a small flat-bladed screwdriver.

1.5 Unit Setup

a)   Connect the antenna or antenna cable to the BNC jack on the rear of the unit.

b)   If you are using the *OSMAC BASE* with a computer system, connect the computer's RS-232 port to the lower serial port on the rear of the unit.

c)   If you are using an external keyboard, connect it to the PS-2 keyboard jack at the rear of the unit.

d)   If the telephone interface will be used, connect a telephone line to the RJ-11 jack on the rear of the unit.

e)   Connect the DC power supply to the *OSMAC BASE*. It connects to the large DIN connector on the rear. Plug the external DC supply into an AC wall socket. Turn the power to the unit ON.

f)   Configure the unit if necessary using the Configuration Mode.

2   Local Operation

2.1   Overview

The *OSMAC BASE* is a desk top system that provides paging and wireless two-way communications. With an Intel 32 bit processor at its core, and 4 megabytes of FLASH memory, the *OSMAC BASE* can handle the wireless communications needs of the small office or a large plant.

OSMAC BASE features:

⇨   *Stand-alone operation with built-in keypad and LCD display.*

⇨   *Two built-in RS-232 serial ports for advanced paging applications.*

⇨   *Built-in telephone interface for remote access.*

⇨   *Internal two-way radio for monitoring the channel and two-way voice communication.*

⇨   *POCSAG paging encoder at 512, 1200, and 2400 baud*

⇨   *Optional two-tone and group-tone paging*

⇨   *1000 pager database*

⇨   *Group paging*

⇨   *8 external alarm inputs for automatic generation of pre-programmed pages.*

⇨   *Pages may be initiated from DTMF equipped two-way radios.*

⇨   *Built-in speaker and microphone, with provisions for external connections.*

⇨   *May optionally be programmed and operated using an external keyboard*

The *OSMAC BASE* operates in one of two basic modes. They are the *Page Mode* and the *Program Mode*. The *Page Mode* is used to send digital pages to a selected pager or group of pagers. It may also be used to communicate with a two-way radio. For the *OSMAC BASE* to send pages to a pager, it must first be programmed with the pager's CAP code. This is done once, using the *Program Mode*. The *Program Mode* is used to set up the individual pager's information, group information, automatic paging information, and some system-level features.

Although the operator may send pages using the built-in keypad or an external keyboard, pages may also be generated in a variety of other ways. Pages may be initiated through the two RS-232 serial ports on the rear of the unit. Another way is to use the built-in telephone interface. When connected to a telephone line, pages may be entered using a touch-tone phone by dialing into the unit. The *OSMAC BASE* may also be configured to automatically generate a page, based upon an electrical input to special input pins on the rear of the unit.

The *OSMAC BASE* is one of the most versatile paging devices on the market today!

The *OSMAC BASE* has an internal database, which stores the CAP code for every pager in your system. The CAP code is the special 7 digit code that identifies an individual pager or paging receiver device. To make paging simpler, you need only configure the CAP codes once by assigning it an easy-to-remember number. For instance, you may have 3 pagers with the following CAP codes: 1924589, 0029111, 0935199. You can program them into the database as pager numbers 1, 2, and 3 as follows:

Pager CAP Code	Pager Number
1924589	1
0029111	2
0935199	3

Now, when it comes time to page pager 2, you will only have to enter the digit 2, rather that the whole CAP code. Other parameters that must be entered into the database for each pager are the pager type (tone, numeric, alpha-numeric), baud rate (512, 1200, 2400) active or inactive status, and which groups it belongs to (if any).

To facilitate sending pages to a large number of different pagers, groups of pagers may be set up in the *OSMAC BASE*. A group is first assigned a number, and the members of the group are programmed into the group pager database. Once a group is set up, a page may be sent to all the members of the group simply by sending the page to the given group.

2.2 Keypad

The built-in keypad is used to program the unit, and to manually enter pages. Its keys have the following functions:

Key	Primary Use	Secondary Use
0 thru 9	Entering numbers	Selecting a sub-menu
F1	Send a page after it is entered	Select options from the sub-menus
F2	Monitor the channel	Back up to previous menu item
F3	Talk to a two-way radio	Monitor the channel if it is busy
F4	Send a tone-only page to a numeric or alphanumeric pager	
DEL	Correct an incorrect entry	
- (Program)	Used as a dash (-) when entering a message.	Enters the programming mode and exits menus
↓↑	Up/down arrows scroll through various options on the display.	
VOL+/-	Adjust the local speaker volume	

The *OSMAC BASE* has a keypad buffer that allows a user to type faster than the prompts on the display come up. Keystrokes will not be lost, and efficient data entry is possible by operators skilled in the operation of the *OSMAC BASE*.

2.3 External Keyboard

An external keyboard with a PS-2 connector may optionally be used if desired. When the external keyboard is connected, the unit's built-in keypad continues to operate normally. The external keyboard's keys function the same way as do the unit's keypad in most cases. Additional features are:

- The alphabetic keys may be used when entering pages to alphanumeric pagers.

- The ESC key is mapped to the keypad's "-" key.

- The ENTER key is mapped to the keypad's F1 key.

- The NUM LOCK key is enabled by default, permitting the operator to use the keyboard's numeric keypad for more efficient entry of numeric data. Note that the keypad's "." key is mapped to the DEL key.

- Pressing CTRL and the Windows "MENU" key simultaneously, or pressing the ALT and TAB keys simultaneously enters the Setup Mode.

Only keyboards which are FULLY compliant with the standard keyboard communication protocol will work properly with the *OSMAC BASE*. It has been found that some keyboards do not properly implement the "retry" protocol and therefore do not work well when the *OSMAC BASE* is busy processing pages from several sources. If an external keyboard does not work properly with the *OSMAC BASE*, try using another brand of keyboard.

*IMPORTANT NOTE: Some keyboards are extremely sensitive to the high RF fields present when an antenna is connected directly to the rear of the OSMAC BASE. The keyboard may stop functioning properly after the OSMAC BASE transmitter is turned on. If this situation occurs, it is recommended that the antenna be mounted at least several feet from the OSMAC BASE or that a different brand of keyboard be used.*

2.4   Display

There is a two-line, twenty-character LCD display on the *OSMAC BASE*. The three LEDs on the top right side of the unit indicate the state of the transmitter, whether the channel is busy, and the programming mode.

2.5   Sending a page

The *OSMAC BASE* is ready to send a page when the LCD display shows:

```
PAGER NO =
```
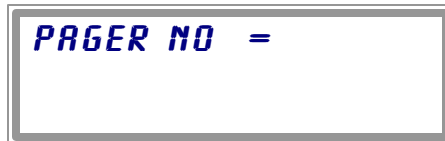
This means the *OSMAC BASE* is waiting for you to enter the pager number to which you which to send a page. Using the keypad or an external keyboard, enter the number (not the CAP code) of the pager you wish to page. Once you enter the pager number, press the **F1** key. There are three standard types of pagers supported by the *OSMAC BASE*. They are: tone-only, numeric and alpha-numeric. An option is available which supports two-tone pagers as well. Depending upon what type of pager you are sending the page to, one of the following sequences will take place:

1.   POCSAG tone-only pagers

If the pager is a tone-only type, it does not have a display. A page sent to it will cause it to beep. When a page is sent to it, the display will show *TONE PAGER* while it is sending the page over-the-air to the pager. This will take about one second, after which it will display *PAGE ACCEPTED* for a couple seconds, and then return back to the *PAGER NO=* prompt.

2.   Numeric and alpha-numeric pagers

If the pager is designated as a Numeric pager or an Alphanumeric pager in the *OSMAC BASE* database, then the LCD display will show *NUMERIC PAGER* or *ALPHA PAGER* for one second, and then the LCD display will show *ENTER MESSAGE*. The user enters the message using the keypad into line 2 of the display. If the message is longer than the length of the display, the display will automatically scroll down to the next line as the message is entered. Pressing the DEL key deletes the previous character entered. Once the data is entered, press the F1 key to send the page. The display will show *PAGE ACCEPTED* for a couple seconds and then the display will return back to the *PAGER NO=* prompt.

Note that:

- Only messages with numbers may be sent when using the built-in keypad.

- Alphanumeric messages may be sent to *alphanumeric* pagers when using an external keyboard or the computer interface.

- The POCSAG characters "[", "]", "-", "space" and "U" may be sent to *numeric* pagers when using the external keyboard, mobile radio or the computer interface.

3.   Two-tone pagers

Two tone pagers accept a sequence of two tones. The CAPCODE is a number between 0 and 999. A large number of standard tone plans are supported by the *OSMAC BASE*. Pagers with non-standard tone frequencies may be programmed via the database upload command. After the paging tones are sent, an alert sound or a voice message from the telephone interface or console may optionally be sent to the pager. Alternatively, the phone patch may be initiated.

Typically it takes a second or more to send a page to a pager. If the page is intended for a group of pagers, it may take longer. A group consisting of 10 pagers may take 5-10 seconds to transmit, and a group of 100 pagers may take 50-100 seconds to transmit.

2.6 Group Page

The *OSMAC BASE* can send a page to a group of pager numbers through the entry of a single group number. The pager numbers that are members of the group must have been previously assigned using the Assign Group configuration menu. When sending a group page, the *OSMAC BASE* sequentially sends the page to each pager in the group.

The procedure for sending a group page is the same as for the individual page described in the above procedure. Group pages generally take longer to send out, so you may find the *OSMAC BASE* will take a bit longer to return to the *PAGER NO=* prompt when a group page is sent.

2.7 Tone Paging to Alphanumeric or Numeric Pagers

Some pagers can receive tone or numeric pages. If you wish to send a tone page (make it beep) to a POCSAG pager that is set-up for numeric or alpha paging, you can press the **F4** (Tone) key when entering the page instead of the **F1** (Enter) key. Pressing the **F4** key after entering the pager number will force the *OSMAC BASE* to send a tone page to the pager.

2.8 2-way voice communications

The *OSMAC BASE* can communicate with portable and mobile two-way radios. The *OSMAC BASE* has a privacy feature called Continuous Tone Coded Squelch System (CTCSS). CTCSS blocks the reception of signals or noise that are not encoded with certain preset low frequency tones. You will only hear signals at the *OSMAC BASE* that have the correct CTCSS tone encoded on them. This means that the radio channel may be in use by someone else, and you will not hear anything come out the speaker because the CTCSS decoder has muted it.

To disable the CTCSS decoder momentarily in order to monitor all of the communications on the channel, press the **F2** key on the built-in keypad.

To talk on the radio channel, press and hold down the **F3** key on the built-in keypad. If the channel is not in use, the *OSMAC BASE* will turn the transmitter on and display *TALK* on the LCD. Your voice will be transmitted out over the air. The microphone is located on the front of the unit, so speak clearly towards it in a normal voice.

2.9 Alarm Pages

The *OSMAC BASE* has 8 alarm inputs located at the rear of the unit. The unit may be configured to send a page when an alarm input changes states. Different messages may be sent for high or low going changes of state.

For convenience sending pre-programmed messages, alarm pages may also be initiated from the external keyboard. Low change alarm messages may be generated by pressing CTRL and a number key "n" simultaneously, where "n" is the desired alarm number. High change alarm messages may be generated by pressing CTRL, SHIFT and the number key simultaneously.

3   Two-way Radio and Telephone Operation

The *OSMAC BASE* has a built-in radio transceiver enabling it to communicate with other two-way radios and to receive over-the-air commands to generate pages, connect to the telephone system, dial phone numbers and answer incoming telephone calls. The telephone interface may be utilized for generating pages or initiating phone patches with two-way-radios.

To remotely control the *OSMAC BASE* with a two-way radio or from a telephone, the two-way radio or telephone must be equipped with a DTMF encoder. All commands sent to the *OSMAC BASE* are entered via the DTMF keypad, and in most cases, the commands are similar to the ones used locally on the *OSMAC BASE*'s built-in keypad. During two-way radio operations, the *OSMAC BASE* will not transmit pages. Any pages entered by the front panel, external keyboard or computer ports will be queued and send later, when the radio is idle.

3.1   Sending Pages from the Two-Way Radio

This section describes how to send a page with the *OSMAC BASE* using a DTMF keypad-equipped two-way radio. The *OSMAC BASE* and the two-way radio must have previously been configured to communicate on the same channel, and utilize the same CTCSS tones.

To send a page to a pager from the two-way radio, you must:

1. Send *** 9** to alert the *OSMAC BASE* that you intend to send a page.

2. If desired, optionally listen to the receiver for the "Enter Pager Number" prompt, which is a sequence of three beeps. A series of alternating high and low beeps indicates an error in the command sequence or a timeout occurred. If voice prompts have been enabled, then a voice message will be heard instead of the beeps.

3. Enter the digits of the pager number you wish to page. If the pager's number is less than three digits in length, then press the ***** key to terminate the pager's number. Note that the ***** key is not used to terminate three digit pager numbers.

4. If desired, optionally listen to the receiver for a low / high beep sequence, which signifies that the pager number was accepted. A series of alternating high and low beeps indicates an error in the pager number or a timeout occurred. If voice prompts have been enabled, then a voice message will be heard instead of the beeps.

5. Enter the numeric digits you wish to send to the pager. Do not enter any digits if you only wish to "beep" the pager. Note that the following DTMF keys have special meanings:

DTMF Key	Pager Character	Comments
*	-	Hyphen character
#	{none}	Send the page
A		Space character
B	]	Right bracket
C	[	Left bracket
D	U	Urgency indicator

6. Press the **#** key to send the page.

To send a new message to the same pager again, you may:

1. Type *** 0** to alert the *OSMAC BASE* that you intend to send a page to the same pager number as before.

2. Continue from step 4 of the instructions above to input the new message to be sent.

3.2 Placing Telephone Calls from the Two-Way Radio

Two-way radios can place "autopatch" telephone calls through the *OSMAC BASE* to a telephone line connected to the rear of the *OSMAC BASE*.

The *OSMAC BASE* operates in a simplex mode. In other words, it can only receive or transmit at any given time, and not both simultaneously. If it is transmitting, it cannot receive, and when it is receiving, it cannot transmit. Because of this, there are a number of things to keep in mind when making or receiving a telephone call through the *OSMAC BASE*. One is that the two-way radio user will hear an occasional ticking sound. This is the *OSMAC BASE* periodically checking for transmissions from the two-way radio. The other is that users must learn to wait about a second before talking whenever the *OSMAC BASE* switches between transmit and receive modes.

The *OSMAC BASE* uses a Voice Operated Switch (VOX) circuit on the telephone line. VOX circuit switches the *OSMAC BASE* from transmit mode to receive mode when it detects that the audio coming in from the telephone line has stopped.

To place a telephone call:

1. Press the *** 7** keys on the two-way radio's DTMF keypad. This tells the *OSMAC BASE* that you wish to place a telephone call.

2. Optionally listen for the confirmation beeps to come back from the *OSMAC BASE*. If autopatch operation has been disabled from the Configuration Menu, then alternating high and low beeps will signal an error. If voice prompts have been enabled, then a dial tone will be heard instead of the beeps.

3. Begin dialing the telephone number you wish to call after the dial tone ends. At the end of the telephone number, you may enter a ***** to dial the phone number. Alternatively, the phone number will be dialed if no keys are pressed after a few seconds. The DTMF tones being sent to the phone line will be heard to confirm dialing.

4. Once the called party answers, the phone VOX circuit takes over. When the called party speaks, the *OSMAC BASE* transmits his or her voice.

5. A periodic ticking sound will be heard by the mobile user as the *OSMAC BASE* briefly switches to receive mode to determine whether the mobile user wishes to interrupt the conversation and has begun transmitting.

6. If neither party is talking, a single beep will be heard periodically to remind the mobile user that the phone patch is still in operation.

7. A timeout timer exists in order to shut down the phone patch automatically in the event that the mobile user goes out of range or has a battery outage. Warning beeps or a voice message will be sent 30 seconds before the timeout timer expires and the phone call is terminated. The mobile or phone user may press ***** in order to reset the timeout timer and continue the phone call.

8. End the conversation from the two-way radio or the phone by pressing the **#** key. A high, then low beep sequence or a voice message should be heard to confirm the disconnection.

3.3 Autodial Calls

The *OSMAC BASE* has 10 "auto-dial" memories containing telephone numbers that can be automatically dialed. See the Programming section for information on how to program these numbers.

In order to make an Autodial call from a two-way radio:

1. Press the *** 6** keys on the two-way radio's DTMF keypad, followed by the number of Autodial memory you wish to place the call to. Memory number 0 will be used if no number is sent after the *6 command.

2. Operation continues from step 4 as described above.

3.4   Receiving Telephone Calls at the Two-Way radio

The *OSMAC BASE* can also be used to route telephone calls from the telephone line to two-way-radios. To initiate a phone call from the telephone interface:

1. Dial the phone number of the telephone line connected to the *OSMAC BASE*.

2. The will display "Phone Ringing" when the ring signal is detected and wait for the number of rings programmed in the Configuration Menu.

3. The *OSMAC BASE* will answer the phone in a manner determined by the settings of the "Remote Paging" and "Call Forwarding" modes as set in the Configuration Menu. The display will read "Phone in Use."

Remote Paging	Call Forwarding	*OSMAC BASE* Operation When Called
Enabled	Enabled	• Phone answered with a "Enter Pager Number" prompt. • User may press * 5 to request a phone patch and send "ringing" tones to the two-way-radio users. • User may enter the number of a pager to be paged and a numeric message.
Enabled	Disabled	• Phone answered with a "Enter Pager Number" prompt. • "Error" tones are generated if the user presses * 5 . • User may enter the number of a pager to be paged and a numeric message.
Disabled	Enabled	• Phone answered with "ringing" tones which are also sent to the two-way-radio users to request a phone patch.
Disabled	Disabled	• The phone line is not answered

4. The telephone user must enter *** 5** to request a "reverse autopatch" phone call if "Remote Paging" is enabled.

5. If "Call Forwarding" is enabled and the telephone line rings, the *OSMAC BASE* will transmit a simulated ring signal over the air. To answer the call, a mobile user must press the ***** key to take the telephone line off-hook.   To hangup the call, either the phone or mobile user must press the **#** key.

6. Once the called party answers, the phone VOX circuit takes over. When the phone user speaks, the *OSMAC BASE* transmits his or her voice.

7. A periodic ticking sound will be heard by the mobile user as the *OSMAC BASE* briefly switches to receive mode to determine whether the mobile user wishes to interrupt the conversation and has begun transmitting.

8. If neither party is talking, a single beep will be heard periodically to remind the mobile user that the phone patch is still in operation.

9. A timeout timer exists in order to shut down the phone patch automatically in the event that the mobile user goes out of range or has a battery outage. The length of the timer is set in the Configuration Menu. Warning beeps or a voice message will be sent a few seconds before the timeout timer expires and the phone call is terminated. The mobile user or phone user must press ***** to reset the timeout timer and continue the phone call.

10. End the conversation from the two-way radio or phone by pressing the **#** key. A high, then low beep sequence or a voice message should be heard to confirm the disconnect.

3.5   Sending Pages using the Telephone Interface

This section describes how to send a page with the *OSMAC BASE* using a DTMF keypad-equipped telephone. Note that the phone will not be answered until any "radio paging" command sequence in progress is completed.

To send a page to a pager from the telephone interface, you must:

1. Dial the phone number of the telephone line connected to the *OSMAC BASE*.

2. If the "Remote Paging" mode has been enabled from the Configuration Menu, the *OSMAC BASE* will answer the phone and send an "Enter Pager Number" prompt, which is a sequence of three beeps. If voice prompts have been enabled, then a voice message will be heard instead of the beeps.

3. Enter the digits of the pager number you wish to page. If the pager's number is less than three digits in length, then press the ***** key to terminate the pager's number. Note that the ***** key is not used to terminate three digit pager numbers.

4. If desired, optionally pause sending beeps and listen for a low / high tone sequence, which signifies that the pager number was accepted. A series of alternating high and low beeps indicates an error in the pager number or a timeout occurred. If voice prompts have been enabled, then a voice message will be heard instead of the beeps.

5. Enter the numeric digits you wish to send to the pager. Do not enter any digits if you only wish to "beep" the pager.

6. Press the **#** key to send the page. You will hear a series of beeps increasing in pitch or a voice message to indicate that the page was sent.

7. If a two tone pager with the "TONE+VOICE" function enabled has been paged, a voice prompt will be given instructing the caller to speak a voice message. If a two tone pager with the "TONE+PATCH" function enabled has been paged, the phone patch will be connected automatically.

8. If the caller hesitates sending DTMF tones for a number of seconds, a series of alternating high and low beeps or a voice message will be sent, indicating that a timeout occurred.

9. The *OSMAC BASE* will then hang-up the phone line.

4 Unit Setup

The **OSMAC BASE** supports numerous functions and operating modes. These are programmed via a series of menus. The following table lists configuration parameters and menus within the **OSMAC BASE** unit that the user may wish to modify. Operating parameters are stored in non-volatile memory, and will not need to be reconfigured during the life of the product unless the user wishes to change them. The default settings are shown in **BOLD**.

OSMAC BASE COMMAND MENU STRUCTURE

System Configuration
(Key **1** held down during power-up, or CTRL-MENU or ALT-TAB from an external keyboard)
PASSWORD = Contact Distributor

1 SERIAL PORT #1
  1 SERIAL DATA BITS
    7 DATA BITS
    8 DATA BITS
  2 SERIAL PORT RATE
    1 - 300 BAUD
    2 - 600 BAUD
    3 - 1200 BAUD
    4 - 2400 BAUD
    5 - 4800 BAUD
    6 - 9600 BAUD
    7 - 19200 BAUD
  3 SERIAL STOP BITS
    1 STOP BIT
    2 STOP BITS
  4 SERIAL PARITY
    EVEN PARITY
    ODD PARITY
    NO PARITY
  5 FLOW CONTROL
    NO FLOW CONTROL
    HARDWARE CONTROL
  6 SERIAL PROTOCOL
    1 TAP
    2 COMP1
    3 COMP2
  7 TAP TIMEOUT
    {30 Seconds default}
  8 COMP TIMEOUT
    {60 Seconds default}
  9 MANUAL TIMEOUT
    {90 Seconds default}

2 SERIAL PORT #2
  1 SERIAL DATA BITS
    7 DATA BITS
    8 DATA BITS
  2 SERIAL PORT RATE
    1 - 300 BAUD
    2 - 600 BAUD
    3 - 1200 BAUD
    4 - 2400 BAUD
    5 - 4800 BAUD
    6 - 9600 BAUD
    7 - 19200 BAUD

  3 SERIAL STOP BITS
    1 STOP BIT
    2 STOP BITS
  4 SERIAL PARITY
    EVEN PARITY
    ODD PARITY
    NO PARITY
  5 FLOW CONTROL
    NO FLOW CONTROL
    HARDWARE CONTROL
  6 SERIAL PROTOCOL
    1 TAP
    2 COMP1
    3 COMP2
  7 TAP TIMEOUT
    {30 Seconds default}
  8 COMP TIMEOUT
    {60 Seconds default}
  9 MANUAL TIMEOUT
    {90 Seconds default}

3 MODE SELECTION
  1 SPEAKER ENABLE
    ENABLE
    DISABLE
  2 BUSY CH LOCKOUT
    ENABLE
    DISABLE
  3 REMOTE PAGING
    ENABLE
    DISABLE
  4 CALL FORWARDING
    ENABLE
    DISABLE
  5 AUTOPATCH TIMER
    0 = PATCH DISABLED
    DEFAULT = 10 MINUTES
  6 VOICE PROMPTS
    ENABLE
    DISABLE
  7 WARMUP SIGNAL
    ENABLE
    DISABLE
  8 RINGS TO ANSWER
    0= ANSWER IMMEDIATELY
    1= DEFAULT

4 TRANSCEIVER
  1 TX SETUP
    1 TX FREQUENCY
      { 464.5 MHz}
    2 TX SIGNALING
      1 (CARRIER ONLY)
      2 CTCSS
    3 TX BANDWIDTH
      NARROW BAND
      WIDE BAND
    4 TX DATA DELAY (MS)
      { 20 mS default}
  2 RX SETUP
    1 RX FREQUENCY
      { 464.5 MHz}
    2 RX SIGNALING
      1 (CARRIER ONLY)
      2 CTCSS
    3 SHIFT CPU CLOCK?
      DISABLED
      ENABLED
  3 INVERT CARRIER DETECT
    YES
    NO
  4 INVERT TRANSMIT DATA
    YES
    NO
  5 TX TYPE
    NO TYPE SELECTED
    VHF (MODEL 204)
    UHF
    VHF (MODEL 3464)
    UHF (MODEL 3412-X)
  6 TX/RX SWITCH TIME (MS)
    DEFAULT = 50 MS

5 CW CALL SIGN
  {DEFAULT = NONE}

6 DIAGNOSTICS MODE
  {See below for details}

Reset FLASH Memory
(Key **8** held down during power up)

RESET FLASH?
PASSWORD = 42983
RESET FLASH?
   NO
   YES

Program Mode
(Key "**-**" held down during normal operation)
PASSWORD = 7531

1 ASSIGN PAGER
  PAGER NO =
  ACTIVE?
    YES
    NO
  TYPE =
    POCSAG 512
    POCSAG 1200
    POCSAG 2400
    TWO TONE
  FUNC =
    TONE
    NUMERIC
    ALPHA
    TONE ONLY
    TONE+ALERT
    TONE+VOICE
    TONE+PATCH

ALERT OR VOICE DURATION
  {0 TO 31 SEC}
  0 = 1/2 SECOND
SELECT TONE GROUP
CAPCODE =
DIAGONAL TONE SELECT
  FIRST TONE
  SECOND TONE
  GROUP TONE
SAVE CHANGES?
  YES
  NO

2 ASSIGN GROUP
  SELECT GROUP
  ASSIGN PAGER NUMBER
  SELECT GROUP FUNC
    TONE
    NUMERIC
    ALPHA

ENTER MEMBER NUMBER
ENTER PAGER NUMBER

3 TEST PAGE
  PAGING PAGER 0

4 ALARM PAGES
  ALARM NUMBER =
  ALARM x PAGER
  ENTER ALARM MESSAGE

5 AUTODIAL MEMORY
  AUTODIAL MEMORY =
  ENTER PHONE NUMBER
    {DEFAULT = NONE}

Diagnostics Mode
(Menu item 6 from the System Configuration Mode)

F1 TOGGLE PHONE CONNECTION
  DISCONNECTED
  CONNECTED

F2 TOGGLE RADIO CONNECTION
  DISCONNECTED
  RECEIVE MODE
  TRANSMIT MODE

F3 CONNECT MICROPHONE
  DISCONNECTED
  CONNECTED

F4 TOGGLE SPEAKER CONNECTION
  DISCONNECTED
  CONNECTED

1 PAGER BIT TEST
  512 BAUD
  1200 BAUD
  2400 BAUD

2 SOUND TESTS
  {Press number , function or arrow keys}

3 DTMF TESTS
  (UP ARROW key selects modes)
  ENCODER TEST MODE
  DECODER TEST MODE
  ENCODER BEEP MODE
  ENCODER LOW TONE
  ENCODER HIGH TONE

4 DAC RAMP TEST
5 LCD TESTS
6 KEYPAD & KEYBOARD TESTS
7 ALARM INPUTS
8 FIRMWARE VER

4.1 Configuration Mode

The System Configuration Mode is entered by holding the 1 key down on the front panel while the power is turned on, by pressing the CTRL and MENU keys, or by pressing the ALT and TAB keys simultaneously from the external keyboard. The *OSMAC BASE* will prompt the user for a password before entering the configuration programming mode. Press the arrow keys to cycle through the configuration parameters. The Menu number in the table above lists the location within the *OSMAC BASE* Programming menus that the particular parameters may be found.

To change any of the parameters that require a numeric entry, press the number key to enter the value and then press the **F1** key. In the case of values that will scroll, press any number key to scroll through the available selections.   Press the **-** key to exit from sub-menus to the upper level menus.

To exit the configuration mode, press the **-** key. Note that values are not permanently stored until the Configuration Mode is exited by pressing the **-** key. If the unit is turned off, or power is lost before the **-** key is entered, changes to the configuration are not stored.

4.1.1 Serial Port Setup

Each of the two serial ports may be configured independently. The table above lists the parameters which may be programmed. The serial ports are located at the rear of the unit and are labeled PORT 1 and PORT 2.

Timeout parameters for the various protocols are given in seconds. Set the timeout to 0 if no timeout is desired.

4.1.2 Speaker Enable

If this mode is disabled, then the speaker is muted at all times except in the Diagnostics Mode. This may be used if the *OSMAC BASE* is in a location where sounds from the speaker are not desirable.

4.1.3 Busy Channel Lockout

If this mode is enabled, then the *OSMAC BASE* will not transmit if the channel is busy. This may be desirable in order to avoid interfering with other users on the channel. This mode should be disabled if there is so much activity on the channel that the pages are not sent out in a timely manner.

4.1.4 Remote Paging

If this mode is enabled, then remote users are permitted to call the *OSMAC BASE* via a telephone line and to generate pages to be transmitted.

4.1.5 Call Forwarding

If this mode is enabled, then remote users are permitted to call the *OSMAC BASE* via a telephone line and to request a phone autopatch with two-way-radio users.

4.1.6 Autopatch Timer

The autopatch timer establishes the length of time the *OSMAC BASE* waits before hanging up the autopatch automatically. This is needed in case the two-way-radio user's batteries fail or he goes out of range

Enter the number of minutes the autopatch may be operated before the disconnect warning tones are sent. The DEL key may be used to delete digits. Press the "**-**" key to exit the menu. Note that autopatch operation may be disabled by setting the Autopatch Timer value to 0.

4.1.7   Voice Prompts

This mode selects whether beeps or voice prompts are used to confirm radio and phone operations with the *OSMAC BASE*. The language of the voice prompts is determined by which firmware file has been loaded. If you are interested in a language other than English, contact your distributor for availability.

4.1.8   Warmup Signal

If this mode is enabled, then a special "warmup" signal is transmitted for a brief period of time at the beginning of each page. This is required for more reliable operation by some pagers.

4.1.9   Rings to Answer

The phone will be answered after the number of rings specified. Enter 0 to answer the phone immediately after detection of a phone ring.

4.1.10   Transceiver Setup

The *OSMAC BASE* either contains a two-way transceiver or works with an external transceiver. In either case, the factory has programmed the correct Transmitter Type, Carrier Detect inversion, Transmit Data inversion, and the TX Bandwidth. The user should not change these settings or improper operation will result.

4.1.11   TX/RX Switch Time

This parameter is used by the autopatch to determine the sampling time to listen for the mobile radio user when transmitting the phone user's voice. If it is set too small, the mobile radio user will not be able to interrupt the transmitter when in the autopatch mode. If it is set too large, then the transmitter's dropout time will be excessive.

4.1.12   Transmit and Receive Frequencies

Enter the desired transmit or receive operating frequency using the number keys. The decimal point will automatically be entered. Use the DEL key to delete any correct entries. Press the **F1** or "**-**" key to accept the new frequency.

4.1.13   Transmit and Receive Signaling

Carrier Squelch operation may be desirable if there are no other users on the channel and there is no interference. In this mode, the two-way-radio users will be able to hear the paging signals transmitted by the *OSMAC BASE*. To enable this mode, press **1** to select (CARRIER ONLY). Press the "**-**" key to exit the menu.

If there are other users sharing the channel, if there is excessive interference, or if the two-way-radio users do not want to hear the paging signals, then CTCSS operation should be used. In this mode, a low frequency tone is transmitted along with the desired audio. The receiver will only be enabled if this tone is present at the correct frequency.

To enable this mode, press **2** to select CTCSS, then use the arrow keys to select the desired tone frequency. Press the "**-**" or **F1** key to accept the frequency and exit the entry mode.

4.1.14   TX Data Delay

This parameter controls the delay between the time the transmitter is turned on and the start of the transmit preamble for POCSAG pages. The delay is given in milliseconds.

4.1.15   Shift CPU Clock

In rare cases, the desired receive frequency may coincide with computer noise generated by the internal CPU. This option enables the user to change the CPU's timing, which may shift the CPU's computer noise away from the desired receive frequency.

4.1.16 CW Identification Call Sign

In many cases, the rules and regulations under which the *OSMAC BASE* is licensed by the government require that the station's Call Sign be transmitted at regular intervals for identification purposes using Morse Code. The *OSMAC BASE* sends the Call Sign (with CTCSS turned off so the mobile radio users won't hear it) every 10 minutes if the Call Sign has been programmed. This feature is disabled when the unit comes from the factory.

To enable this feature, press **5** from the main configuration menu. At the prompt, enter your station's Call Sign from your license as follows:

- Numbers are entered directly from the keypad.

- Letters and other special symbols are entered from the keypad by pressing the arrow keys. Alternatively, an external keyboard may be used to enter alphanumeric characters directly as typed.

- Press the **F2** key to accept the displayed letter when using the unit's keypad or to enter a "space" character which is displayed as a "_" and results in a pause in the Morse Code.

- Press the **DEL** key to delete errors or to disable CW Identification by totally clearing the display.

- Press the **F1** or "**-**" key to accept the Call Sign and exit the menu.

- Up to 19 characters may be contained in the CW Identification string.

5   Program Mode

The Program Mode is used to program CAP codes, add pagers, delete pagers, assign pagers to groups, configure the alarm pages, and set up various features of the *OSMAC BASE*.

To enter the programming mode, press the dash "**-**" key on the keypad or the ESC key on the external keyboard. The *OSMAC BASE* will prompt you to enter the password. After entering the Program Mode password (**7531**) and pressing **F1**, you can select one of the following menu items:

1 = ASSIGN PAGER	**Assigns pager CAP codes**
2 = ASSIGN GROUP	**Assigns pagers to groups**
3 = TEST PAGE	**Sends periodic test pages**
4 = ALARM PAGES	**Configures alarm triggered pages**
5 = AUTODIAL MEMORY	**Configures Autodial memories**
- = RETURN TO PAGE	**Return back to the page mode**

When you enter the Program Mode you will see the first selections. Use the UP/DOWN arrows to scroll through the available options. To exit the Program Mode, press the **-** (Program) key or the ESC key. Any changes you make will automatically be saved.

Note: When the *OSMAC BASE* is in the Program Mode, it will revert back to the Page Mode if it is idle (no keyboard inputs) for two minutes, except that test pages may be sent for an unlimited period of time.

5.1   Assign Pager

All pagers have an ID code, commonly referred to as a *CAP* code. It is a long number, difficult to remember, and may change if a pager is replaced or in for repair. To make paging a pager easy, the *OSMAC BASE* uses a database stored in its memory to remember every pager's CAP code. Within the *OSMAC BASE*, every pager is assigned a Pager Number. Because pagers only recognize CAP codes, the *OSMAC BASE* must translate the pager number into the proper CAP code. The *1 - ASSIGN PAGER* menu is used for this function.

1. Begin by entering the Programming Mode as described above, and pressing the number **1** key. The *OSMAC BASE* will respond with:

    PAGER NO =
    F1:OK F2:BACK -:EXIT

    Note that the **F1** key is used to select an entry, the **F2** key goes back to the previous menu item and the **-** key exits this mode.

2. Enter the number for the pager you wish to add to the database. For example, to add a pager number "15" to the database press **1** then **5** then **F1**.

3. Next, you will be prompted to activate or deactivate the pager. Press **F1** to activate it, or press an arrow key to switch between Y and N on the display to deactivate it. Press **F1** when the correct response has been chosen.

4. Next, tell the *OSMAC BASE* what type of pager is being assigned. For convenience, the will display the type of pager previously selected. Press the arrow keys to cycle through the list of possible pager types. The possible types are: POCSAG 512, POCSAG 1200 and POCSAG 2400. An option is available which also supports TWO TONE pager types. Note that the OSMAC system must have all pagers set to 512 baud POCSAG. Once the correct paging format type is in the display, press the **F1** key on the keypad or ENTER on the external keyboard.

5. After programming the type, you must program in the function type of the pager being used. The function type for POCSAG pagers is one of the following:

- TONE   (pager just beeps)
- NUMERIC   (pager beeps and displays numbers)
- ALPHA   (pager beeps and displays numbers and letters.)

The function type for TWO TONE pagers or GROUP TONE pagers is one of the following:

- TONE ONLY   (send page tones only)
- TONE+ALERT   (send an alert sound after sending the page tones)
- TONE+VOICE   (permit phone caller to speak to the pager after sending page tones.)
- TONE+PATCH   (initiate a phone patch after sending the page tones)

6. Press the arrow keys to cycle through the list of functions. Press the F1 key when the correct function is displayed.

7. If TONE+ALERT or TONE+VOICE was selected, then you will be asked to specify the duration of the alert or the voice connection after the paging tones have been sent. You may give a value between 0 and 31 seconds. Entering 0 will cause an alert tone of 1/2 second or use the default voice duration of 15 seconds.

8. If a TWO TONE pager has been selected, you will be asked to select the tone plan for the pager. Use the arrow keys to scroll through the supported plan types. If the tone plan for your pager isn't listed, then the pager's tone frequencies must be entered using the database upload command.

9. Once a pager number is entered, the *OSMAC BASE* will respond with a prompt asking for the CAP code for this pager.   If the pager number was already in the database, it will display the CAP code already programmed. If it was not in the database, the CAP code will default to the pager number.   To edit the CAP code, use the DEL key to backspace over it. Press **F1** to enter the new CAP code.

10. If a TWO TONE pager has been selected, you may be asked to specify whether the "diagonal frequency" is the first or second tone. Alternatively, you may select a "group tone" for the pager. This will send a single tone to the pager with a pre-determined duration.

11. The *OSMAC BASE* restart back at the *PAGER NO =* prompt. It will automatically increment to the next pager number.   Press the **-** to exit the Program Mode when all of the pagers have been entered into the database. Your entries into the pager database will then be saved in the internal FLASH memory.

5.2   Assigning a Group

The Group-Page feature is used to send the same page to a number of different pagers. Groups have numbers just like pagers, and once you define a group and its members, you send pages to the group just as if it were a single pager. When you assign a number to a group, it is important that the number is not the same as any individual pager.

There is a limit to the number of pagers that may be assigned to any one group. This is listed in the Specifications section of the *OSMAC BASE* User Manual.

1. To do the group assignments, select 2-Assign GROUP from the program mode menu. The display will then show:

    GROUP NUMBER =
    SELECT GROUP

2. Enter the number of the group you wish to work on and then press the **F1** key. Valid group numbers are 1 through 16. The display will then show:

GROUP X PAGER NN
ASSIGN PAGER NUMBER

Where X is the group number you wish to work on and NN is the pager number assigned to this group. **Important Note:** when you wish to page this group, you will enter the pager number NN for it, not the group number.

3. Use the DEL key to backspace over NN if you wish to change the pager number this group is referred to by. If the pager number NN is already assigned to an active pager, the will not allow you to assign that number to the group and the pager number will be erased. If you wish to use NN for a group number instead of an individual pager, you must first de-activate the pager. Section 3.1 describes how to deactivate a pager. Once the pager number for this group is set, press the F1 button. The following prompt will appear.

GROUP X = NUMERIC
SELECT GROUP FUNC

4. Using the arrow keys, select the function (numeric, alpha or tone) for this pager group. Members of the group may be of any type, but this selection will determine the prompt to the user when a page to this group is initiated.   Press F1 when your selection is made. The display will change to :

GROUP X   MEMBER NN
ENTER MEMBER NUMBER

5. X will be the group number you are currently working on, and NN will be a number corresponding to the member number you wish to edit. The first group member you enter will be member 1. The second one you enter will be member 2 and so on. The display always first shows the next member number you can enter a new member as. Use the UP/DOWN arrows if you wish to scroll through the members, or press the DEL key to edit the member number and manually enter the member number to edit. Press F1 key when you are ready to edit/add the selected group member. The display will then show:

MEMBER NN =
ENTER PAGER NUMBER

6. Enter the number of the pager you wish to add to the group. For example if you wish to add pager number 123 to the group, then enter **1 2 3** and then press the **F1** key. Use the DEL key to backspace over any entry if you wish to edit it. Note that:

- To see the pagers in the database are members of this group, you can use the UP/DOWN arrow key to scroll through the members of the group.

- To delete a member, at the *MEMBER NN =* prompt, use the DEL key to erase its number from the screen, and press the F1 key.

7. To finish entering pagers to this group, press the **-** key.

5.3   Sending Test Pages

The test page mode may be used to check the range of the system. With this mode, the *OSMAC BASE* will automatically generate a page to pager number "0" every ten seconds.

1.   Before using this feature, pager number "0" must be programmed as described above.
2.   To enable this feature, enter the program mode and press **3**. The display will show:

   PAGING PAGER 0
   DASH (-) TO EXIT

3.   Press the - key to return to the programming mode menu.

5.4   Alarm Pages

The *OSMAC BASE* has 8 alarm inputs. These digital inputs are used to generate pre-programmed pages, each with its own pre-programmed message to any pager, or group of pagers. These may be used for alarms, but they may also be used to simply generate pre-programmed pages.

The inputs may be connected to normally-open switches or contacts. When any input is pulled low to ground, it will generate a pre-programmed page. When any input is pulled high or allowed to "float high", it will generate a different pre-programmed page.

Alternatively, alarm pages may be initiated from an external keyboard. Hold down the CTRL key and then press a number key which corresponds to the alarm input number to send the "Alarm Low" message. Hold down the SHIFT key also to send the "Alarm High" message.

Note that the alarm inputs are not protected from lighting, so the wires must not be run out of doors. See Section 10.2 for details regarding the wiring of the alarm input connector.

To set up the alarm pages, the user must perform the following steps:

1.   Put the unit into the program mode.
2.   Press **4** to enter the Alarm sub-menu.
3.   When the *ALARM NUMBER =* prompt is shown, enter the number of the alarm you wish to configure. Press the **F1** key.
4.   The *OSMAC BASE* will display *ALARM X PAGER* on the top line, and the pager number that will be paged when the alarm is triggered. Erasing the pager number disables the alarm. Enter the number of the pager you wish to have paged when the selected alarm input is triggered. Press **F1** when done.
5.   *OSMAC BASE* will display *ALARM LOW MSG:* on the top line of the LCD. On the second line, you may enter or edit the message to be sent when the alarm input goes low. Press **F1** when the message has been entered.
6.   *OSMAC BASE* will display *ALARM HI MSG:* on the top line of the LCD. On the second line, you may enter or edit the message to be sent when the alarm input goes high. Press **F1** when the message has been entered.

   When entering the alarm messages, the unit's keys operate as follows:

   - Numeric keys are used to enter numbers
   - **F4** or **UP** keys select the next letter of the alphabet
   - **F3** or **DOWN** keys select the previous letter of the alphabet
   - **-** key enters a "dash" character
   - **F2** key enters a space character or moves to the next character position to the right
   - **DEL** key deletes a character and moves to the next character position to the left
   - **F1** key accepts the entry and exits back to the previous menu.
   - Alphanumeric characters may alternatively be entered directly from an external keyboard

7.   Press the F1 key to return to the programming mode menu.

5.5   Phone Autodial Memories

The *OSMAC BASE* has 10 Phone Autodial Memories. These must be programmed prior to use by two-way-radio users. To program the autodial memories:

1. Enter the number of the autodial memory to be examined. Alternatively press the arrow keys to cycle through the memories. The first 20 characters of the autodial memory's phone number will be displayed. Note that each phone number may be up to 27 characters in length.

2. To change the contents of the autodial memory, enter the new phone number using the number keys on the keypad. The following keys have special functions:

Key	Character Displayed	Function
-	_	Insert a pause in the dialing sequence
DEL	{none}	Delete the previous character
F1	{none}	Save the phone number and exit the entry mode
F2	#	DTMF # key
F3	*	DTMF * key
F4	F	Flash hook

3. Press **F1** to save the phone number.

4. Repeat steps 1 through 3 as desired, then press the "-" key to exit to the main programming menu.

6   Diagnostics

6.1   Built-in Diagnostics

If the user selects DIAGNOSTICS MODE from the Configuration Menu, the goes into a diagnostics mode which allows the operator to exercise many of the 's hardware functions and to help troubleshoot any problems with connections to the unit.   Connections to the phone line, radio, speaker and microphone may be independently toggled for any desired test configuration.

The Functions that are available are:

F1 - Toggle the connection to the phone line between On and Off

F2 - Toggle the radio connection between Off, Receive and Transmit modes

F3 - Connect the microphone to the transmitter

F4 - Toggle the unit's speaker between On and Off

1 – Pager Bit Test (sends alternating 1010 pattern at a specific baud rate and on/off timing)
    1 – 512 baud
    2 – 1200 baud
    3 – 2400 baud

2 –Sound Tests
    – Press any of the number keys or function keys to play one of the first 14 sounds
    – Alternatively, press the arrow keys to select sounds

3 – DTMF tests
    – Press one of the 16 lower buttons to generate DTMF tones in "encode" modes
    – Press the "down arrow" key to exit the DTMF test mode
    – Press the "up arrow" key to toggle between the following test modes:
      - Encode DTMF continuously
      - Decode DTMF from the radio or phone line, depending on which was enabled last
      - Encode DTMF in 50 mS beeps
      - Encode only the low tone continuously
      - Encode only the high tone continuously

4 – DAC ramp test (exercises the sound DAC)
    – Press number keys to change the ramp frequency

5 – LCD display tests
    – Press the - key to sequence between the tests

6 – Keypad and keyboard test
    – Keypad codes and external keyboard scan codes are displayed when keys are pressed
    – Press the - key on the keypad twice to exit this test mode

7 – Alarms & Ring (displays the status of the alarm inputs and phone ring detection circuitry)

6.2   Remote Diagnostics

Test functions may also be initiated remotely via a two-way radio which is equipped with a 16 tone DTMF keyboard.

Key Sequence	Function
* A	Send an "A" DTMF tone to the radio and the phone line continuously for a period of time.
* B	Send all 16 DTMF tones plus all 8 single tones to the radio and the phone line.
* D	Transmit the CW Identification Call Sign in Morse Code. CTCSS is turned on.

7   Serial Port Protocols

The *OSMAC BASE* paging transmitter supports three different serial port communication protocols. Each protocol has its own uses, and the correct one for one application may not be the correct one for another. The *OSMAC BASE* must be configured to support the desired protocol, and only one protocol may be used at a time. The three protocols supported are:

TAP (also called IXO)	The Telocator Access Protocol is an industry standard protocol for communications between paging entry devices and a paging terminal. Individual pagers can be sent individual messages.
COMP1	This protocol is a simple way to send data to one pager. It is designed to allow a person with a simple computer terminal to type a message into the *OSMAC BASE*. The *OSMAC BASE* must be pre-configured with the CAPCODE of the pager to send the data to, and all data sent into the serial port of the *OSMAC BASE* will be sent to that one pager.
COMP2	COMP2 is similar to COMP1, except each page requires two lines of text to be entered. The first line is the pager number to send the page to, and the second line is the alpha or numeric message to send to that pager.

7.1   TAP

The **T**elocator **A**lphanumeric **P**rotocol, or TAP protocol as it is called, is used to send pages to communicate paging information to a transmitter. It is a sequence of characters sent over a serial interface to a transmitter. The transmitter must parse the commands, and take the appropriate actions.

The following sections describe how the TAP protocol works. It assumes that the device communicating to the *OSMAC BASE* Station is directly connected to it via a serial cable. If other means are used (i.e. modem) then the modem connection must first be established. For the purposes of this manual, the *OSMAC BASE* is assumed to be the transmitter, and the device connected to its serial port is the "Entry Device". Typical entry devices are computers, paging terminals, and alarm monitors. Characters listed in brackets **<xx>** are ASCII codes, and the values for them are listed at the end of this document.

Initiating a Page

Entry Device	OSMAC Base Action	Comment
<CR>		The Entry Device should send a <CR> at two second intervals until the *OSMAC BASE* responds with the characters ID=. The <CR> is an ASCII code 13h.
	ID=<CR><LF>	The *OSMAC BASE* will respond within one second of the <CR>, and it does not end the ID= prompt with a <CR> or a <LF>.

After initiating a page, and receiving the ID= prompt, the Entry Device can respond in one of two different ways. One way puts the *OSMAC BASE* into an Automatic Mode, and the other ways puts it into a Manual Mode.

Automatic Entry of a Page

Entry Device	OSMAC Base Action	Comment
<ESC>PG1<CR>		The Entry Device tells the *OSMAC BASE* transmitter that it wants to automatically send a POCSAG page by ending this sequence.
	<CR><ACK><CR> or **<CR><NAK><CR>** or **<ESC><EOT><CR>**	The *OSMAC BASE* will respond within one second of the ACK sequence signifying that the Entry Device has successfully logged on to the *OSMAC BASE*. If paging entries cannot be accepted, it will respond with the NAK sequence or the ETX sequence, which should force the Entry Device to disconnect.
	<ESC> [p <CR>	This "go ahead" sequence tells the Entry Device that it is OK to go ahead and send over the information for the first page or pages. The p is always the lower case "p".
<STX> **PagerID<CR>** **Message<CR>** **<ETX>** **Checksum <CR>**		This Pager/Message Sequence Block tells the *OSMAC BASE* the ID (the Pager Number in the *OSMAC BASE*'s database) of the pager this the Message is to be sent to. The checksum is computed as shown later in this document. The total number of characters sent from the Entry Device per sequence should not exceed 255.
Repeat the above Pager/Message Sequence Block as many times as required, if more pages are to be sent.		
<EOT> <CR>		When the Entry Device does not want to send any more pages, it sends this EOT sequence, to tell the *OSMAC BASE* that it is finished with this automatic session.
	Pages Accepted <CR> or **Invalid Page Entered<CR>** or **<Message><CR>**	One of these status messages will be returned at the end of the session. They are for information purposes only.
	<CR><RS><CR>	This is only sent if there was an error in this session, probably due to an invalid pager ID or a message type mismatch.
	PAGING EXCHANGE DISCONNECT <CR> **<ESC> <EOT>**	The End of Transaction message sent from the *OSMAC BASE* to the entry device, telling it to disconnect.

Manual Entry of a Page

Entry Device	OSMAC Base Action	Comment
M<CR>		The Entry Device tells the *OSMAC BASE* transmitter that it wants to manually send a POCSAG page, by ending the M.
	ENTER PAGER NUMBER:	The *OSMAC BASE* will respond within one second of the M sequence signifying that the Entry Device has successfully logged on to the *OSMAC BASE*, and it is ready to receive paging info. The *OSMAC BASE* begins by responding with this prompt.
PagerID<CR>		The user responds with the ID of the pager he wishes to page.
	Enter Alpha Message: or Enter Numeric Message:	The *OSMAC BASE* responds with one of the following messages, depending upon the type of pager that the PagerID is assigned to.
Message<CR>		The user enters a message to send to the pager.
	Sending Message...<CR>	The *OSMAC BASE* displays this message as it sends the message to the pager.
	MessageSent<CR> or Can't Deliver to xxxxxxx<CR> or Too Slow. Goodby.<CR> or Two many errors. Goodby. <CR>	One of these messages will then be sent from the *OSMAC BASE*, depending upon the current situation with the page that was entered. The serial port has a 45 second activity time, and will force and end to the manual session if the user does not complete the page in that time.

7.2   TAP Protocol Issues

7.2.1   Timing

The *OSMAC BASE* will wait for a response to come back from the Entry Device. If a response is not received before the pre-programmed time-out period, the *OSMAC BASE* will cancel the current transaction, sending the **<ESC> <EOT> <CR>** sequence.

7.2.2   Line Feeds

The *OSMAC BASE* will ignore all <LF> characters it receives. The Entry Device may send a <LF> with any <CR>.

XOFF

In the very unlikely event that the user enters more pages than the *OSMAC BASE* can queue up, the *OSMAC BASE* will send the <XOFF> character before sending a carriage return. It will send the <XON> character when buffer space is available for more pages. If the *OSMAC BASE* does not receive data within 10 seconds after sending an <XON>, it will send another <XON>.

7.2.3   EOT

Whenever the *OSMAC BASE* terminates a session by sending the <EOT><CR> sequence, it will drop the DTR signal on the RS-232 signal for 250mS. This will normally cause any modem connected to it to disconnect.

7.3   Sending Multiple-Line Pages

If you wish a message to continue on another line of a multi-line pager, you cannot send the <CR> return into the serial port. Use the TAB character instead of a <CR>. The *OSMAC BASE* will translate it to a <CR> when it sends the page to the pager.

7.4   Computing the Checksum

The checksum is a simple arithmetic sum of the 7-bit values of all characters preceding it. The checksum reported is the least significant 12 bits of this summation, converted to BCD ASCII.

Checksum Example:

STX		000	0010
1		011	0001
2		011	0010
3		011	0011
<0CR>		000	1101
A		100	0001
B		100	0010
C		100	0011
<CR>		000	1101
ETX		000	0011
Total		10111	1011
Convert to BCD	1	0111	1011
Answer in BCD ASCII	1	7	;

7.5   COMP1

COMP1 allows a "dumb terminal" to be used to send a page, although any device that can output RS-232 data can be used.

All data entering the serial port is sent to pager number 0. The reception of a <CR> initiates the page.

Manual Entry of a Page

Entry Device	OSMAC Base Action	Comment
<Message><CR>		The Entry Device (in this case it is often a user on a terminal) types in the message to send to a pre-set pager.
	Characters are echoed back.	

7.6 COMP2

COMP2 allows a "dumb terminal" to be used to send a page, although any device that can output RS-232 data can be used. It has the added capability of selecting which pager to send the data to.

All data entering the serial port is sent to a specified pager. The reception of a <CR> initiates the page. If the last <CR> is not sent within the pre-programmed timeout period, the *OSMAC BASE* will abort this transaction, and begin waiting for a new <Page #> entry.

Manual Entry of a Page

Entry Device	OSMAC Base Action	Comment
<Page #><CR> **<Message><CR>**		The Entry Device (in this case it is often a user on a terminal) type in the message to send to a pre-set pager.
	Characters are echoed back.	

7.7 ASCII control characters

For your reference, here is a list of the commonly used ASCII control characters.

Decimal	Hex	Code		Decimal	Hex	Code
00	00	<NUL>		16	10	<DLE>
01	01	<SOH>		17	11	<XON>
02	02	<STX>		18	12	<DC2>
03	03	<ETX>		19	13	<XOFF
04	04	<EOT>		20	14	<DC4>
05	05	<ENQ>		21	15	<NAK>
06	06	<ACK>		22	16	<SYN>
07	07	<BEL>		23	17	<ETB>
08	08	<BS>		24	18	<CAN>
09	09	<TAB>		25	19	<EM>
10	0A	<LF>		26	1A	<SUB>
11	0B	<VT>		27	1B	<ESC>
12	0C	<FF>		28	1C	<FS>
13	0D	<CR>		29	1D	<GS>
14	0E	<SO>		30	1E	<RS>
15	0F	<SI>		31	1F	<US>

8   Database Transfer

For convenience managing databases containing a large number of pagers, for backup purposes and to facilitate cloning databases from one unit to another, the *OSMAC BASE* database may be uploaded and downloaded from a host computer which is connected to either serial port which is configured for the TAP protocol.

8.1   Database Format

The *OSMAC BASE* database may be uploaded or downloaded as ASCII characters which can readily be transferred, stored and/or edited as desired. The format of the database output is as follows:

```
DB1
VERSION, {VERSION}, {LANGUAGE}, {OPTIONS},
SERIAL, {PORT}, {BITS}, {STOP}, {PARITY}, {FLOW}, {BAUD}, {TAP-TO}, {COMP-TO}, {MAN-TO}, {PROTO},
MODE, {SPKR}, {BUSY}, {REMOTE}, {CALL}, {AP-TIMER}, {VOICE}, {WARMUP}, {RINGS},
RADIO, {T-REF}, {T-FRQ}, {T-TONE}, {BW}, {R-REF}, {R-FRQ}, {R-TONE}, {CD}, {DATA}, {TYPE}, {TR}, {CPU}, {DLY}, {PWR},
AUTODIAL, {MEMORY NUM}, {PHONE NUM},
PAGER, {0-999}, {TYPE}, {CAPCODE}, {FORMAT}, {GROUP}, {ACTIVE}, {DUR-A}, {DUR-B}, {DUR-C},
GROUP, {NUMBER}, {PAGER NUM}, {MEMBERS}, {SPARE}, {MEMBER 1}, …{MEMBER N},
ID, {ID STRING},
DONE
```


Where:

DB1	Signifies that the database download follows
VERSION	Signifies that the version string follows
{VERSION}	Firmware version string
{LANGUAGE}	Language of the voice prompts
{OPTIONS}	Firmware options
SERIAL	Signifies that this line is data for a serial port
{PORT}	Port number for this line's data
{BITS}	Number of data bits (0= 7 bits, 1= 8 bits)
{STOP}	Number of stop bits (0= 1 bit, 1= 2 bits)
{PARITY}	Parity (0= No Parity, 1= Odd, 2= Even)
{FLOW}	Flow control (0= None, 1= Xon/Xoff, 2= RTS/CTS)
{BAUD}	Baud rate (0= 300, 1= 600, 2= 1200, 3= 2400, 4= 4800, 5= 9600, 6= 19200)
{TAP-TO}	Timeout for TAP protocol in seconds
{COMP-TO}	Timeout for COMP protocol in seconds
{MAN-TO}	Timeout for manual entry mode in seconds
{PROTO}	Port protocol (0 = TAP, 1 = COMP1, 2 = COMP2)
MODE	Signifies that this line is data for mode settings
{SPKR}	Speaker enable mode on/off
{BUSY}	Busy channel lockout on/off
{REMOTE}	Remote enable on/off
{CALL}	Call forwarding on/off
{AP-TIMER}	Autopatch timer in seconds
{VOICE}	Voice Prompts on/off
{WARMUP}	Warmup signal on/off
{RINGS}	Number of rings before the phone is answered

RADIO	Signifies that this line is data for the radio transceiver
{T-REF}	Transmit reference frequency in Hz
{T-FRQ}	Transmit frequency in Hz
{T-TONE}	Transmit CTCSS code (-1 = CTCSS off)
{BW}	Transmit Bandwidth (0= wide, 1= narrow)
{R-REF}	Receive reference frequency in Hz
{R-FRQ}	Receive frequency in Hz
{R-TONE}	Receive CTCSS code (-1 = CTCSS off)
{CD}	Carrier detect inversion on/off
{DATA}	Transmit data inversion on/off
{TYPE}	Transceiver type code {0= NO_TX, 1= VHF 204, 2= UHF, 3= VHF 3464}
{TR}	Transmit/Receive switching delay in mS, used for autopatch sampling
{CPU}	Number of CPU wait states, used to shift CPU noise from receive channels
{DLY}	Delay from Transmitter ON to start of POCSAG preamble in mS
{PWR}	Transmitter Power Control word (Read only, used by 3412-X radios)
AUTODIAL	Signifies that this line is data for an autodial memory
{MEMORY NUM}	Memory number
{PHONE NUM}	Phone number
ID	Signifies that this line contains the CW ID for the unit
{ID STRING}	The ID String of the unit
PAGER	Signifies that this line is the data for a pager
{0-999}	Pager number for the data on this line
{TYPE}	Pager type: ALPHA, NUMERIC, TONE, ALERT, VOICE or PATCH
{CAPCODE}	Pager CAPCODE. If the pager is a group it will be the group number minus 1. For two-tone pagers, if DUR-A is not zero, CAPCODE contains frequencies of the two tones with the first tone's frequency in units of 1/10 Hz in bits 0 to 15 and the second tone's frequency in units of 1/10 Hz in bits 16 to 31.
{FORMAT}	Paging format: POC512, POC1200, POC2400, TWO-TONE or ONE-TONE
{GROUP}	Is either Y if it is a group pager, or N if it is not a group pager
{ACTIVE}	Is either Y is the pager is enabled, or N if it is de-activated
{DUR-A}	Duration of first tone in units of 50 mS for two-tone pagers with random frequencies, 0 otherwise.
{DUR-B}	Duration of second tone in units of 50 mS for two-tone pagers with random frequencies, 0 otherwise.
{DUR-C}	Duration of the two-tone pager's alert tone or the voice connection in seconds.
GROUP	Signifies that this line is the data for a group of pagers
{NUMBER}	Group number (1-16)
{PAGER NUM}	Pager number that references this group
{MEMBERS}	Number of pagers assigned to this group
{SPARE}	A blank entry for future use
{MEMBER 1}	The pager number for the first member. All other members follow this one, separated by commas.
{MEMBER N}	This is the pager number for the final member of the group
DONE	This entry signifies the end of the database.

8.2   Retrieving the Database

The *OSMAC BASE* will send the contents of its database out the serial port when it is given the command **<ESC>SDB<CR>**. The database is sent out at the currently configured baud rate in an ASCII format, with commas between the parameters and a <CR> at the end of each line.

Note that the "ONE-TONE" pagers in the following example file are used to generate test tones of 5 seconds duration at a frequency of (Pager Number) X 10 Hz.

Example Output of the database:

```
DB1
VERSION,307D51,ENGLISH,1,
SERIAL,0,0,0,2,0,5,30,60,90,0,
SERIAL,1,0,0,2,0,5,30,60,90,0,
MODE,1,0,1,1,10,1,1,1,
RADIO,6250,462850000,-1,0,6250,462850000,-1,0,0,2,50,2,20,
AUTODIAL,0,8531212,
AUTODIAL,1,7521011__225,
AUTODIAL,2,,
AUTODIAL,3,,
AUTODIAL,4,,
AUTODIAL,5,,
AUTODIAL,6,,
AUTODIAL,7,,
AUTODIAL,8,,
AUTODIAL,9,,
ID,WX6L ,
PAGER,0,NUMERIC,100,POC512,N,Y,0,0,0,
PAGER,1,NUMERIC,1,POC512,N,Y,0,0,0,
PAGER,2,ALPHA,2,POC512,N,Y,0,0,0,
PAGER,3,ALPHA,3,POC512,N,Y,0,0,0,
PAGER,4,NUMERIC,4,POC1200,N,Y,0,0,0,
PAGER,5,NUMERIC,5,POC1200,N,Y,0,0,0,
PAGER,6,ALPHA,6,POC1200,N,Y,0,0,0,
PAGER,7,ALPHA,7,POC1200,N,Y,0,0,0,
PAGER,8,NUMERIC,8,POC2400,N,Y,0,0,0,
PAGER,9,NUMERIC,9,POC2400,N,Y,0,0,0,
PAGER,10,ALPHA,10,POC1200,N,Y,0,0,0,
PAGER,11,NUMERIC,10,POC1200,N,Y,0,0,0,
PAGER,12,TONE,120,TWO-TONE,N,Y,0,0,0,
PAGER,13,TONE,130,TWO-TONE,N,Y,0,0,0,
PAGER,14,ALERT,140,TWO-TONE,N,Y,0,0,5,
PAGER,15,ALERT,150,TWO-TONE,N,Y,0,0,5,
PAGER,20,ALPHA,20,POC512,N,Y,0,0,0,
PAGER,21,ALPHA,21,POC1200,N,Y,0,0,0,
PAGER,22,ALPHA,22,POC2400,N,Y,0,0,0,
PAGER,30,TONE,327683000,ONE-TONE,N,Y,0,0,0,
PAGER,40,TONE,327684000,ONE-TONE,N,Y,0,0,0,
PAGER,50,TONE,327685000,ONE-TONE,N,Y,0,0,0,
PAGER,60,TONE,327686000,ONE-TONE,N,Y,0,0,0,
PAGER,70,TONE,327687000,ONE-TONE,N,Y,0,0,0,
PAGER,80,TONE,327688000,ONE-TONE,N,Y,0,0,0,
PAGER,90,TONE,327689000,ONE-TONE,N,Y,0,0,0,
PAGER,100,TONE,327690000,ONE-TONE,N,Y,0,0,0,
PAGER,110,TONE,327691000,ONE-TONE,N,Y,0,0,0,
PAGER,120,ALPHA,12000,POC1200,N,Y,0,0,0,
PAGER,123,ALPHA,123,POC512,N,Y,0,0,0,
PAGER,130,TONE,327693000,ONE-TONE,N,Y,0,0,0,
PAGER,140,TONE,327694000,ONE-TONE,N,Y,0,0,0,
PAGER,150,TONE,327695000,ONE-TONE,N,Y,0,0,0,
PAGER,160,TONE,327696000,ONE-TONE,N,Y,0,0,0,
PAGER,170,TONE,327697000,ONE-TONE,N,Y,0,0,0,
PAGER,180,TONE,327698000,ONE-TONE,N,Y,0,0,0,
PAGER,190,TONE,327699000,ONE-TONE,N,Y,0,0,0,
PAGER,200,TONE,327700000,ONE-TONE,N,Y,0,0,0,
PAGER,201,PATCH,201,TWO-TONE,N,Y,0,0,0,
PAGER,210,TONE,327701000,ONE-TONE,N,Y,0,0,0,
PAGER,220,TONE,327702000,ONE-TONE,N,Y,0,0,0,
PAGER,230,TONE,327703000,ONE-TONE,N,Y,0,0,0,
PAGER,240,ALPHA,24000,POC2400,N,Y,0,0,0,
PAGER,250,TONE,327705000,ONE-TONE,N,Y,0,0,0,
PAGER,260,TONE,327706000,ONE-TONE,N,Y,0,0,0,
PAGER,270,TONE,327707000,ONE-TONE,N,Y,0,0,0,
PAGER,280,TONE,327708000,ONE-TONE,N,Y,0,0,0,
PAGER,290,TONE,327709000,ONE-TONE,N,Y,0,0,0,
PAGER,300,TONE,327710000,ONE-TONE,N,Y,0,0,0,
```

```
PAGER,310,TONE,327711000,ONE-TONE,N,Y,0,0,0,
PAGER,320,TONE,327712000,ONE-TONE,N,Y,0,0,0,
PAGER,512,ALPHA,512,POC512,N,Y,0,0,0,
PAGER,600,TONE,655380000,TWO-TONE,N,Y,20,20,0,
PAGER,700,ALPHA,1,POC512,Y,Y,255,255,31,
PAGER,800,VOICE,800,TWO-TONE,N,Y,0,0,5,
PAGER,900,ALPHA,0,POC512,Y,Y,255,255,31,
PAGER,990,NUMERIC,990,POC1200,N,Y,0,0,0,
PAGER,991,ALPHA,991,POC1200,N,Y,0,0,0,
PAGER,992,TONE,992,POC1200,N,Y,0,0,0,
PAGER,993,TONE,993,TWO-TONE,N,Y,0,0,0,
PAGER,994,ALERT,994,TWO-TONE,N,Y,0,0,5,
PAGER,995,VOICE,995,TWO-TONE,N,Y,0,0,15,
PAGER,996,PATCH,996,TWO-TONE,N,Y,0,0,0,
PAGER,997,TONE,2097352,TWO-TONE,N,Y,0,0,0,
PAGER,998,TONE,4194504,TWO-TONE,N,Y,0,0,0,
PAGER,999,TONE,200,TWO-TONE,N,Y,0,0,0,
GROUP,1,900,6,,2,3,6,7,10,11
GROUP,2,700,5,,2,4,6,8,10
DONE
```

8.3   Restoring/Uploading the Retrieved Database

If the database is stored on a disk in the format shown above, it may be re-loaded into the *OSMAC BASE*. Use a terminal emulation program to send the ASCII file into either serial port in a plain-text format. The serial port must be configured for the TAP protocol.

The *OSMAC BASE* will answer every line sent into it with an OK> if the line was acceptable, or ER> if there was an error in it. If any errors occur during uploading, a message will be displayed at the end of the upload sequence and the information received will not be saved. If this occurs, reduce the data rate of the port in use or enable hardware flow control, then retry the upload operation.

Note that the "**DB1**" sequence in the first line tells the *OSMAC BASE* that a database file is going to be sent to it. The word "**DONE**" at the end of the file tells the *OSMAC BASE* that the file has been sent. Once the word **DONE** is received by the *OSMAC BASE*, it will copy the database into its FLASH memory only if no errors were detected.

8.3.1   Erasing Pagers or Groups from the Database

Uploading the database file to the *OSMAC BASE* only adds and re-programs the pagers and groups specified. It does not erase other pagers with entries stored in the unit's memory.

If you want the pager database erased without changing any of the unit's setup parameters, use a text editor to add a line before the first PAGER entry in the database. The only characters on the line should be:

ERASEDATABASE

This will tell the *OSMAC BASE* to erase whatever is in its pager database before it adds the new pagers and groups from the ASCII file. If you only wish to erase the group information, and not the individual pagers, put a line in the file that reads:

ERASEGROUPS

8.3.2   Programming Two-Tone Pagers with Non-Standard Frequencies

Two-tone pagers using non-standard frequencies and durations may be programmed via the database upload command. Use a text editor to create an entry in the database file for the pager as follows before uploading the file to the unit:

```
PAGER,{0-999},{TYPE},{CAPCODE},TWO-TONE,N,{ACTIVE},{DUR-A},{DUR-B},{DUR-C}
```

Where:

PAGER   Signifies that this line is the data for a pager
   {0-999}   Pager number for the pager
   {TYPE}   Pager type: TONE, ALERT, VOICE or PATCH
   {CAPCODE}   Bits 0 to 15 = First tone's frequency in units of 1/10 Hz
                         Bits 16 to 31 = Second tone's frequency in units of 1/10 Hz
   {ACTIVE}   Is either Y is the pager is enabled, or N if it is de-activated
   {DUR-A }   Duration of the first tone in units of 50 mS
   {DUR-B}   Duration of the second tone in units of 50 mS. Set to 0 for group-tone pagers.
   {DUR-C}   Duration of the two-tone pager's alert tone or the voice connection in seconds.

Example:

Program pager number 320 with a 534.7 Hz tone for 300 mS, followed by a 972.8 Hz tone for 800 mS, then an alert tone for 5 seconds:

TYPE =   ALERT

CAPCODE = $(534.7\,\text{Hz} * 10) + (972.8\,\text{Hz} * 10 * 65536) = 637539555$

DUR-A = $300\,\text{mS} / 50\,\text{mS} = 6$

DUR-B = $800\,\text{mS} / 50\,\text{mS} = 16$

DUR-C =   5

Database Entry =   PAGER,320,ALERT,637539555,TWO-TONE,N,Y,6,16,5

8.3.3 *Programming One-Tone Pagers*

One-tone pagers or test tones using non-standard frequencies and durations may be programmed via the database upload command. Use a text editor to create an entry in the database file for the pager as follows before uploading the file to the unit:

```
PAGER,{0-999},{TYPE},{CAPCODE},ONE-TONE,N,{ACTIVE},{DUR-A},{DUR-B},{DUR-C}
```

Where:

PAGER   Signifies that this line is the data for a pager
   {0-999}   Pager number for the pager
   {TYPE}   Pager type: TONE, ALERT, VOICE or PATCH
   {CAPCODE}   Bits 0 to 15 = Tone's frequency in units of 1/10 Hz
                         Bits 16 to 31 = Duration of the tone in units of mS
   {ACTIVE}   Is either Y is the pager is enabled, or N if it is de-activated
   {DUR-A }   Set to 0
   {DUR-B}   Set to 0
   {DUR-C}   Duration of the two-tone pager's alert tone or the voice connection in seconds.

Example:

Program pager number 124 with a 1240.5 Hz Tone for 5 seconds, followed by an alert tone for 10 seconds:

TYPE =   ALERT

CAPCODE = $(5\,\text{sec} * 1000 * 65536) + (1240.5\,\text{Hz} * 10) = 327692405$

DUR-C =   10

Database Entry =   PAGER,124,ALERT,327692405,ONE-TONE,N,Y,0,0,10

8.3.4   Programming the Unit's Configuration

The unit configuration data stored in the SERIAL, MODE, RADIO and AUTODIAL entries are normally ignored when the database file is uploaded to the **OSMAC BASE** as a security feature in order to prevent unauthorized users from changing the unit's configuration.

If it is desired to change the **OSMAC BASE**'s configuration with data downloaded previously from a **OSMAC BASE** unit, use a text editor to add the following line to the database file immediately after the "DB1" entry:

PASSWORD,xxxxxx,[0D]

Where xxxxxx is the same password required to access the Configuration Mode from the **OSMAC BASE**'s front panel.

Note that the unit's Firmware Version and CW ID String are not changed when uploading the database file. These entries in the database file are ignored during the upload process.

8.3.5   Keyboard Emulation

Key presses from an external keyboard may be simulated from the computer ports for use in automated test stations or other special applications. As a security feature, the PASSWORD command must have been sent prior to using this feature.

To simulate key presses from an external keyboard, use a text editor to add the following line to the database file after the PASSWORD line:

KEY,nnn,[0D]   or   KEY,nnn,nnn,nnn, [0D]

Where nnn represents the desired keycode represented in decimal ASCII representation. Several keycodes may be placed on a line if desired as indicated above. Note that the following special numbers are defined:

Decimal ASCII Code	Function
1	F1 Key
2	F2 Key
3	F3 Key
4	F4 Key
5	Dash Key
6	Delete Key
7	Down Key
8	Up Key
31	Enter Configuration Mode

9   Firmware Updating

The firmware in the *OSMAC BASE* can be loaded with firmware updates via the serial port number 1 (lower of the two serial ports). Use the following procedure:

1. You may need to reset the Flash memory and reload the database of pagers after loading the new firmware into the unit. Therefore, before updating the firmware, it is recommended that the pager database be downloaded and saved as described in the "Retrieving the Pager Database" section of this manual.

2. Connect a computer's serial port to the *OSMAC BASE*, and on the computer, run a terminal emulation program such as Hyperterminal or ProComm. Set the baud rate to 38.4kbps, 8 data bits, 1 stop bit, no parity.

3. When powering up the *OSMAC BASE*, hold the "-" button down. You should see a sign-on message from the *OSMAC BASE* that looks like this:

   ```
   PageCenter software installation utility
   Copyright (c) 1999, Sonik Technologies Corp.
   San Marcos, CA
   Version: 306D1

   Erase current software and begin download?
   ```

4. On the computer, press Y for yes if you would like to load new firmware into the unit.

5. The file name for the *OSMAC BASE* firmware is 307xxxxL.BIN, where xxxx is the revision code and L is a code for the language of the voice prompts. If you are interested in a language other than English, contact your distributor for availability.

6. Begin the file transfer of the new firmware from the computer, using either YMODEM or XMODEM. If one protocol fails to work, try the other. When the update is complete, the unit will reset and begin operation.

7. Check to see whether the old pager database is compatible with the new firmware version. If the previously programmed pagers function properly, then the installation is completed and the following steps do not have to be performed. If the pagers do not function properly, then the following steps must be performed to restore the pager database:

8. Edit the pager database previously saved and add the following on a line by itself before any of the pager entries:

   ERASEDATABASE

9. Upload the revised pager database using the procedure described in the "Restoring/Uploading the Retrieved Database" section of the manual.

10 External Connectors

10.1 External Transceiver

The *OSMAC BASE* may utilize an internal transceiver, an external transmitter, or an external transceiver. A 15 pin D-sub connector is located on the rear of the *OSMAC BASE* to facilitate interfacing an external transmitter or extemal transceiver to the . The pin-out of this connector is as follows:

External Transceiver I/O Connector Pin Out

Pin Number	Function
1	Ground
2	B+ for the radio. Internally jumper selectable between +8V and +12V. 1 Amp maximum current draw.
3	+8V TX. This pin floats when in the RX mode, and will be pulled to +8V when in the TX mode. 50 mA maximum current source.
4	+5V for radio. 50 mA maximum current draw.
5	+5VRX. This pin floats in the TX mode, and will have +5V when in the RX mode. 50 mA maximum current source.
6	TX audio. Approximately 1.7V p-p for full system deviation. 2.5V DC nominal bias on this signal.
7	PTT out. Open collector output, pulls low to ground when the transmitter's PA should be on.
8	Do not use and do not connect to anything.
9	Do not use and do not connect to anything.
10	Do not use and do not connect to anything.
11	TX data out. This is the TTL POCSAG data output in the transmit mode.
12	Receiver signal strength indication input. Positive voltage represents carrier present on channel.
13	RX audio input. 1.0V p-p for a signal with full system deviation.
14	CTCSS tone encoder output.
15	Do not use and do not connect to anything.

10.2 Serial I/O Ports

The *OSMAC BASE* has two RS-232 type serial I/O ports on it. The EIA/TIA RS-232, and the equivalent European CCITT V.28, are electrical standards that cover the signal levels, drive level, and slew rate of compliant devices. It is important to note that they do not specify baud rates, data formats, or connector pin-outs. These are set by industry standards and practices.

Equipment using RS-232 ports is grouped into two categories:

DTE Data Terminal Equipment   (computers, mainframes, terminals)
DCE Data Communications Equipment   (modems, printers, etc.)

The *OSMAC BASE* is wired as a peripheral (DCE) device.

The control lines on the serial port are used for controlling the flow of data and the peripheral attached to the port. The most signals provided for on RS-232 serial interfaces are shown in the following table:

Pin #	Name	Typical RS-232 Serial Signal Functions
3	TXD	Transmit data from the computer to the *OSMAC BASE*.
2	RXD	Receive Data from the *OSMAC BASE* to the computer.
7	RTS*	Request to send data. This is an output from the computer to the *OSMAC BASE*. It indicates to the *OSMAC BASE* that it is ready to exchange data.
8	CTS*	Clear to send. This is a signal from the *OSMAC BASE* to the computer indicating that it is OK to send data.
4	DTR*	Data Terminal Ready to the *OSMAC BASE*. This signal indicates to the peripheral that the host is ready to receive data.
1	DCD*	Data Carrier Detect from the *OSMAC BASE*.
9	RI*	Not implemented.
6	DSR	Data Set Ready from the peripheral. Indicates the peripheral is ready.
5	GND	System Ground

*The hardware flow control signals, RTS, CTS, DTR, DSR, and DCD are active low. In other words, they are set to binary zero (0) to assert them and binary one (1) to negate them. Over an RS-232 cable, they are again inverted because RS-232 specification calls for negative logic. Negating RTS is a binary 1, which is a negative voltage on the RS-232 port.

10.3 Auxiliary/Alarm Connector

A 15 pin D-Sub female connector is located on the rear of the unit. This connector has digital inputs used for triggering alarms. It also has contacts for two relay outputs. The digital inputs may be programmed to automatically generate a page or dial the phone. The relay outputs may be switched on remotely via the telephone, radio, or console.

Note that all digital alarm inputs have an internal 10K pull-up resistors connected. Alarms are activated by pulling the input to ground. Open circuit or a TTL/CMOS high level is the inactive state. Do not pull these inputs above 5V.

Auxiliary/Alarm I/O Connector Pin Out

Pin Number	Function
1	Alarm 8
2	Alarm 7
3	Alarm 6
4	Alarm 5
5	Alarm 4
6	Alarm 3
7	Alarm 2
8	Alarm 1
9	Relay 1 contact A
10	Relay 2 contact A
11	Relay 2 contact B
12	Relay 1 contact B
13	No connection
14	No connection
15	Ground

10.4 Keyboard Connector

The *OSMAC BASE* may be used with standard external keyboards for use with Personal Computers which have PS-2 style connectors. Only keyboards that are fully compliant with the two-way keyboard signaling protocol

will work with the *OSMAC BASE*. It has been found that some brands of keyboards do not function properly with the *OSMAC BASE* due to an incomplete implementation of the signaling protocol by the keyboard.

11 Specifications

Principles of Operation

The *OSMAC BASE* is a multi-functional unit which can be used to communicate between the built-in speaker/microphone, pagers, two-way radios and the telephone interface. The internal circuitry is comprised of numerous elements as shown on the block diagram below. These include radio transceiver, telephone interface, microprocessor, front panel I/O, DTMF encoder/decoder, CTCSS encoder/decoder, speech synthesizer (DAC), microphone amplifier, speaker amplifier, analog filters, limiting amplifier and analog switch matrix. The microprocessor controls all circuitry as needed for the desired communication function. The encoders generate needed audio signals and the decoders detect incoming control signals on the received audio. Analog switches route the analog signals within the unit.
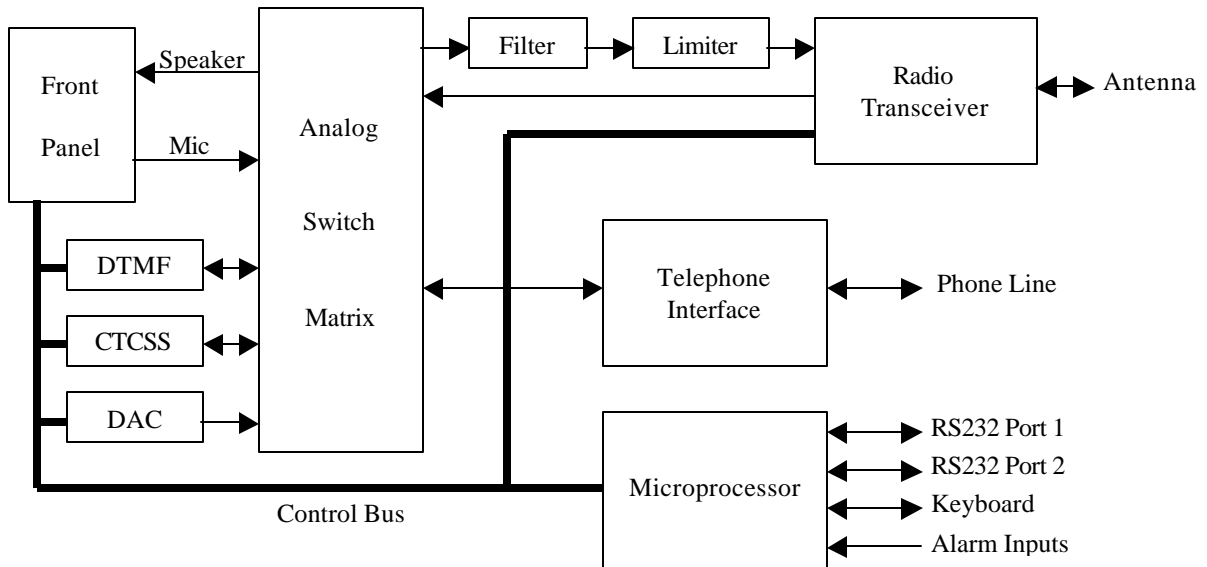
OSMAC BASE **Block Diagram**

Encoder/Terminal general

Frequencies	450-470MHz, 403-512MHz
Paging Format	POCSAG (tone, numeric, and alpha at 512, 1200 or 2400bps)
	TWO-TONE and GROUP-TONE optional
Squelch formats	CTCSS or carrier squelch
Serial port protocols	TAP, COMP2, COMP1
Pager database maximum size	1000 individual pagers
Maximum page length	250 characters
Maximum pre-programmed alarm message	40 characters
Maximum number of pager groups	16
Maximum number of pagers per group	75
LCD display size	20 characters X 2 lines
Speaker audio	1 watt maximum at <5% THD
Power supply	External 12.0V&5.0VDC, 2A, DIN connector.
Weight	3.5lbs.
Temperature range	-10-+40C
Processor	80386EX
Non-volatile flash memory size	2M bytes

External keyboard interface...Standard PS/2
Telephone interface ....RJ-11 female, DTMF signaling
DTMF signaling timing ....> 40 mS   (telco receive mode)
                                                                                                > 100 mS   (radio receive mode)
                                                                                                100 mS   (telco transmit mode)
Alarm/data inputs 8

RF Section

RX channel spacing ....12.5kHz (narrowband) or 25kHz (wideband)
                                                                                                models available
Frequency Stability ....2.5ppm (12.5kHz BW version)
                                                                                                5ppm (25kHz version)
RX Sensitivity ....0.5uV for 12dB SINAD
                                                                                                0.35uV for 12.5kHz version)
RX Modulation acceptance ....±2.5kHz for 12.5kHz versions
                                                                                                ±5kHz for 25kHz version
RX Intermodulation...55dB
RX Image and 1/2 if rejection...55dB
RX Selectivity ....55dB (25kHz version)
                                                                                                55dB (12.5kHz version)
TX power output ....2 or 4 watts nominal,
                                                                                                selected via internal jumper for some versions
                                                                                                and factory programming for others.
FM hum and noise..38dB or better
Spurious emissions ....-52dBc
Modulation..Frequency Modulation
Modulation limit ....±4.5kHz or ±2.25kHz, programmable by
                                                                                                channel.
Emission Designators 16K0F1D, 11K0F1D, 16K0F3E, 11K0F3E

The above specifications are preliminary product specifications, and are subject to change, without notice.

Ordering

6A373	-⇓	-⇓	OSMAC Base Communication system
			Built-in Transceiver
		N	Narrow band transceiver (12.5kHz)
		W	Wide-band transceiver (25kHz)
	UA		UHF band, 403-416MHz*
	UC		UHF band, 450-470MHz
	UD		UHF band, 470-480MHz*
	E		Encode only, no transceiver
			* (For export only, not FCC approved)

For example, a VHF wide-band **OSMAC BASE** in the 150-174MHz band is part number 6A373-VB-W.

12 Alignment

12.1 Adjustments

The following table lists the internal adjustments.

Reference Designator	Function
Rear Panel	Squelch/carrier detect threshold level.
Rear Panel	LCD Contrast.
R20	Receive audio level.
R16	RX audio bias.
R32	CTCSS encode level.
R34	Paging data level.
R41	Voice limiter.
R60	Microphone gain.
R52	Telco audio to transmitter level.
R69	Telco line driver level.

12.2 Alignment Procedure

12.2.1 General Setup

1. Apply DC power to the unit. Connect the service monitor to the ANT port.

2. Download the Flash code to the unit if it is not already programmed. Hold down the "-" key while powering up the unit to enter Flash code programming mode. See the section on "Firmware Updating" for additional information.

3. Adjust the LCD contrast control on the rear panel of the unit.

12.2.2 Radio Interface

This procedure assumes a properly tuned transceiver is installed in the unit. You will need a DC power source, service monitor, oscilloscope, and DVM. Full System Deviation =5.0 kHz for wide-band versions, and FSD=2.5 kHz for narrow-band versions. Depending upon the type bandwidth of the transceiver used, you will have to make slightly different adjustments.

1. Program the unit's transmit and receive frequencies. Disable sub-audible signaling.

2. Set the TX bandwidth to "wide band" or "narrow band" depending on the bandwidth of the transceiver unit installed.

3. Generate an RF carrier on the receive frequency, 1 kHz tone, 60% FSD = 3 kHz (wideband units) / 1.5 kHz. (narrowband units), RF level 10 uV.

4. Adjust R16 for a 1.5 V p-p (530 mV RMS) signal on TP8.

5. Adjust the RF generator to .35 uV. Adjust the squelch (located on the rear panel) so that the carrier detect LED is on, and so that it goes off when the RF level is below .25 uV.

12.2.3 Telco Interface - Receive Mode

1. Generate an RF carrier on the receive frequency, 1 kHz tone, 60% FSD = 3 kHz / 1.5 kHz. RF level 10 uV.

2. Connect the TELCO line to the RX audio by holding the 1 button down on power up to bring-up the test mode, then enter the password and press 6 F1 and F2.

3. Adjust R69 (telco line level) for a level of –13 dBm on the line.

4. Disable the RX audio by pressing F2 twice more. Generate a DTMF tone from the by pressing 3 and then F4.

5. Verify that the line level is between -15 and -12 dBm. Then press the DOWN arrow to turn off the DTMF.

12.2.4 Telco Interface - Transmit Mode

1. Set the service monitor to measure the transmitter's FM deviation.

2. Generate a 2500 Hz tone onto the TELCO line from an external test instrument with a power level of > 5 dBm into 600 ohms.

3. Connect the TELCO to the transmitter by pressing F1, then press F2 twice to key the transmitter.

4. Adjust R52 clockwise for maximum gain, then adjust R41 (limiter) for 4.5 kHz / 2.25 kHz deviation.

5. Adjust the TELCO signal to a power level of -15 dBm.

6. Adjust R52 so that the deviation is at half scale (2.25 kHz / 1.125 kHz).

12.2.5 Paging Modulation

1. Turn the unit off.

2. Generate a 1200 baud paging test signal by holding the 1 button down upon power up, then entering the password and pressing 6 1 2. Specify an ON time of 30000 mS and an OFF time of 0 mS.

3. Adjust R34 for 5 kHz / 2.5 kHz (0 to peak) deviation.

4. Turn off the power to the unit.

12.2.6 Voice Modulation & CTCSS

1. Turn the unit back on.

2. Key the transmitter using the F3 key.   Adjust R160 so the carrier is on frequency.

3. Adjust R60 (mic gain) for 3 kHz / 1.5 kHz deviation when speaking into the mic with a normal voice level from a distance of about 1 foot away.

4. Enable a 100 Hz CTCSS encoder on the transmit frequency.

5. Key the transmitter with the F3 key. Adjust R32 for 500 Hz / 250 Hz deviation of the CTCSS tone.

6. Measure the transmitter's power level to verify that it is set to the desired level with the internal jumpers.

13 Appendix A - Frequency Coordinators

The following is a list of frequency coordination agencies. Contact the agency which coordinates frequency assignments for the industry your business is in.

13.1 For frequencies designated with an "IW" in Section 90.35 of the Commission's rules:

UTC, The Telecommunications Association
Attn: Frequency Coordination Department
1140 Connecticut Avenue, NW, Suite 1140
Washington, DC 20036
Phone: (202) 872-0030
Fax: (202) 331-7639

13.2 For frequencies designated with an "IP" in Section 90.35 of the Commission's rules:

Petroleum Frequency Coordinating Committee (PFCC)
c/o Industrial Telecommunications Association, Inc.
Attn: Frequency Coordination Department
1110 North Glebe Road, Suite 500
Arlington, Virginia 22201
Phone: (703) 528-5115

13.3 For frequencies designated with an "LR" in Section 90.35 of the Commission's rules:

Association of American Railroads
Communications and Signal Division
Attn: Chris Allman
50 F Street, NW
Washington, DC 20001
Phone: (202) 639-2217

13.4 For all other frequencies, applicants may use any of the coordinators listed above or one of the following:

American Automobile Association (AAA)
Attn: Gary M. Ruark
1000 AAA Drive, Mailspace 15
Heathrow, Florida 32746-5063
Phone: (407) 444-7786
Fax: (407) 444-7380

Central Station Alarm Association (CSAA)
Attn: Robert Bitton, President
P.O. Box 775
1565 Union Avenue
Union, New Jersey 07083-0775
Phone: (908) 810-8822
Fax: (908) 810-8844

Personal Communications Industry Association (PCIA)
Attn: Lori Baynton, Director
Frequency Coordination Department
500 Montgomery Street, Suite 700
Alexandria, Virginia 22314-1561
Phone: 1-800-759-0300
FAX: (703) 739-0300

Forest Industries Telecommunications (FIT)
Attn: Kenton E. Sturdevant
871 Country Club Road, Suite A
Eugene, Oregon 97401
Phone: (541) 485-8441

Manufacturers Radio Frequency Advisory
Committee, Inc.(MRFAC)
Attn: Frequency Coordination Department
1041 Sterling Road, #106
Herndon, Virginia 20171
Phone: (703) 318-9206
Fax: (703) 318-9209

Alliance of Motion Picture and Television
Producers
c/o Industrial Telecommunications Association, Inc.
Attn: Spectrum Management Department
1110 North Glebe Road, Suite 500
Arlington, Virginia 22201
Phone: (703) 528-5115

American Trucking Association, Inc. (ATA)
Attn: Kathy Garrett
2200 Mill Road
Alexandria, Virginia 22314
Phone: (703) 838-1731

Newspaper Association of America (NAA)
c/o Industrial Telecommunications Association, Inc.
Attn: Frequency Coordination Department
1110 North Glebe Road, Suite 500
Arlington, Virginia 22201
Phone: (703) 528-5115

Industrial Telecommunications Association, Inc.
Attn: Frequency Coordination Department
1110 North Glebe Road, Suite 500
Arlington, Virginia 22201
Phone: (703) 528-5115

International Taxicab and Livery Association
(ITLA)
Attn: Cecelia M. Hayes
3849 Farragut Avenue
Kensington, Maryland 20895
Phone: (301) 946-5702

Telephone Maintenance Frequency Advisory
Committee (TELFAC)
c/o Industrial Telecommunications Association, Inc.
Attn: Frequency Coordination Department
1110 North Glebe Road, Suite 500
Arlington, Virginia 22201
Phone: (703) 528-5115

14 Appendix B - Regulatory Compliance Information Statements

14.1 Federal Communications Commission Part 68 Statements:

This equipment complies with Part 68 of the FCC rules. Located on the equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN.) If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's contact the telephone company to determine the maximum REN for the calling area.

This equipment cannot be used on the telephone company-provided coin service. Connection to Party Line Service is subject to State Tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact:

Sonik Technologies
310 Via Vera Cruz, #111
San Diego, CA 92069
(760) 752-1011

If the trouble is causing harm to the telephone network, the telephone company may request you to remove the equipment from the network until the problem is resolved.

This equipment uses the following USOC jacks: RJ11C

It is recommended that the customer install an AC surge arrester in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightening strikes and other electrical surges.

14.2 Industry Canada CS-03 Statements:

1. NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements documents(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

   Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

   Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

   Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate."

2. The Ringer Equivalence Number (REN) of this device is 0.6

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5."

3. The standard connecting arrangement (telephone jack type) for this equipment is CA11A.

15 Appendix C - "Voice Prompt" Technical Details

Voice prompt files are linked with the *OSMAC BASE* object code as the final part of the build process. Voice prompts of any language or any speaker's voice may easily be incorporated.

Voice prompt files must be recorded in the following formats:

1. File Format: .wav

2. Encoding Format: PCM

3. Bits Per Sample: 8

4. Mode: Mono

5. Amplitude: Amplitude should be adjusted so voice peaks are about 75% full scale

6. Equalization: Bandpass filtering of the audio from 300 Hz to 4 KHz prior to recording is recommended

The following voice file names are used, with the given function and sample rates:

- callend.wav   Call ended   22 KHz
- callext.wav   Call extended   22 KHz
- dialtone.wav   Dial tone   11 KHz
- ent_err.wav   Entry error   22 KHz
- msgdeliv.wav   Message delivered   22 KHz
- null.wav   zero length null file
- pagerms g.wav   Enter pager message   22 KHz
- pagernum.wav   Enter pager number   22 KHz
- phtimeo.wav   Phone timeout   22 KHz
- sine300.wav   300 Hz sine wave   11 KHz
- sine1k.wav   1 KHz sine wave   11 KHz
- talknow.wav   Prompt user to talk   22 KHz
- timeout.wav   Timeout error   22 KHz

The following additional files are used:

- language.txt   Text file containing the name of the language