User's Guide

NTCIP Message Sign Software

Wanco, Inc.
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1. Introduction

1.1. Instructions

Before use, please read this manual carefully. For questions, contact Service/Sales.

1.2. Scope

This manual explains control of the message sign using the local software user interface. Mechanical operation, safety, maintenance, troubleshooting and parts diagrams are covered in the Owner's Guide. Operation of the optional remote control software is covered separately.

1.3. Sign Types

This software is designed to operate a variety of sign models, each with slightly different power management requirements, user input configurations and/or auxilliary device options. Some information presented here may not apply to all sign models running this software, or to all software versions in-use, or may refer to optional or added-cost features. Ignore sections that do not apply.

1.3.1. Character Signs

Character signs display messages in a single font, in fixed row/column positions. These signs typically use the 4 line by 20 character LCD panel. Graphics and multiple fonts are not supported.

1.3.2. Matrix Signs

Matrix signs can display bitmap graphics and a variety of font sizes. These signs use the 160x128 pixel graphic LCD panel. The upper half of the LCD displays the menu system, and the lower half displays graphic versions of the messages.

1.3.3. Trailer-Mount Signs

These signs are solar-powered and fan-cooled, with a weatherproof electronics control cabinet, run unattended, and require extensive controls to maintain optimum battery charge life.

1.3.4. Truck-Mount Signs

These signs are powered from the truck engine and require less-critical power-management.

1.3.5. Pole-Mount Solar Signs

These signs have the same power management requirements as the trailer-mount signs.

1.3.6. Fixed-Mount Signs

Fixed-mount signs have hard-wired power systems and require almost no power management.

1.4. Contact Service/Sales

For tech support, product questions, sales support, customer service or product service, contact the number below with the sign type, model number and software version.
For trailer-mount signs, also have the VIN number ready. It is available on the label mounted on the front inside of the A-frame tongue of the trailer.

Address: Wanco, Inc.
5870 Tennyson St
Arvada, CO 80003-6903

Phone: 303.427.5700
Fax: 303.427.5725

E-mail: info@wanco.com
Web: www.wanco.com

1.5. NTCIP

1.5.1. Overview

NTCIP stands for the "National Transportation Communications for ITS Protocol". It is a family of standards for communicating with traffic control equipment (over modem, LAN, serial cable, etc.), to facilitate creation of intelligent traffic systems (ITS). It includes the protocols and data vocabulary necessary for a message sign to interact with a remote control program. It does not explicitly define local sign control or user interface issues.

1.5.2. Local Operation

No knowledge of NTCIP is required for basic sign operation. However, the data fields and terminology used here should be familiar to knowledgeable users. Some NTCIP advanced features are also supported through the local menus.

1.5.3. Conformance

This software conforms to the relevant standards for Changeable Message Signs and uses a standard MIB OID database internally. All signs support direct serial communication with an NTCIP-compatible Central Control program, however, not all signs are equipped with a cellular modem or LAN option.

2. Basic Operation

2.1. Local Console

2.1.1. Power

Power-on the console by setting the console switch to **ACTIVE**. Set the console switch back to **INACTIVE** when finished. The console switch does not affect the sign display. The console will automatically timeout after 20 minutes of inactivity.

2.1.2. Keyboard

The local console uses a standard full-size Windows-style PC keyboard (some brands may not be compatible). The keyboard powers up with CAPS LOCK enabled, forcing all alphabet characters to upper case. Turn off CAPS LOCK to change to lower case.

2.1.3. LCD Contrast

Adjust display contrast with the nearby knob. Extreme temperatures may affect LCD contrast.

2.1.4. Reset

The reset button is located on the console panel. Press it to force a software/power reset of the sign (including the local console hardware, the CPU/controller, the power control system and the sign display cards).

2.1.5. Menu Key

Press the menu key  to return to the **`Main Menu`**. This key is between Ctrl and  on the lower right of the keyboard.

2.2. Menu Navigation

An arrow cursor ➔ at the left of the console display points to the active menu item.
Use the keyboard arrow keys ↑, ↓, PageUp, PageDown, Home or End to move the menu cursor.
Press ENTER or → to make a menu selection.
Press ESC or ← to return to the previous menu (or to exit a screen).
Or press the first letter of a menu item to make a selection (without scrolling to it first).

2.3. Passwords

Be sure to record your passwords in a safe location.

2.3.1. Restricted User Password

This allows access to basic sign operation, message activation, radar control and turning the sign off. The message sign is shipped with a default restricted password of "Guest".

2.3.2. Normal User Password

This allows access to basic sign operation, plus permission to create, modify and delete messages. The message sign is shipped with the default NTCIP user password of "Public", plus "ABCD".

2.3.3. Advanced/Service Password

This allows full access to the advanced/service menu features and power management settings, including LED brightness, fan temperatures, solar relay control voltages, and battery control voltages. Incorrect settings of these parameters may significantly affect battery charge life, particularly for solar signs. The message sign is shipped with the default NTCIP admin password.

2.3.4. Upper/Lower Case

Passwords are not case sensitive when typed at the local console, but are case sensitive when accessed through NTCIP remote communications.

2.4. Front Panel LEDs

Some sign models have a column of LED indicators near the LCD. These will light when the console door is opened – the user does not have to be logged in. Not all LEDs are on all sign models.

Alarm/Warning	Check alarm and status screens for details
Message Sign On	Message sign is not powered off
Solar Charging	Charging relay is on, and charging current detected
Schedule Active	Message scheduler is enabled
Radar Pwr On	Radar head has power and radar message system is active
Hwy Radio On	HAR has power and alert system is active
Encoder Active	Sign accepting message changes from encoder hardware
Battery Saver	Battery voltage very low, system shutdown or sleep mode. Press reset button, if still in shutdown, recharge batteries.

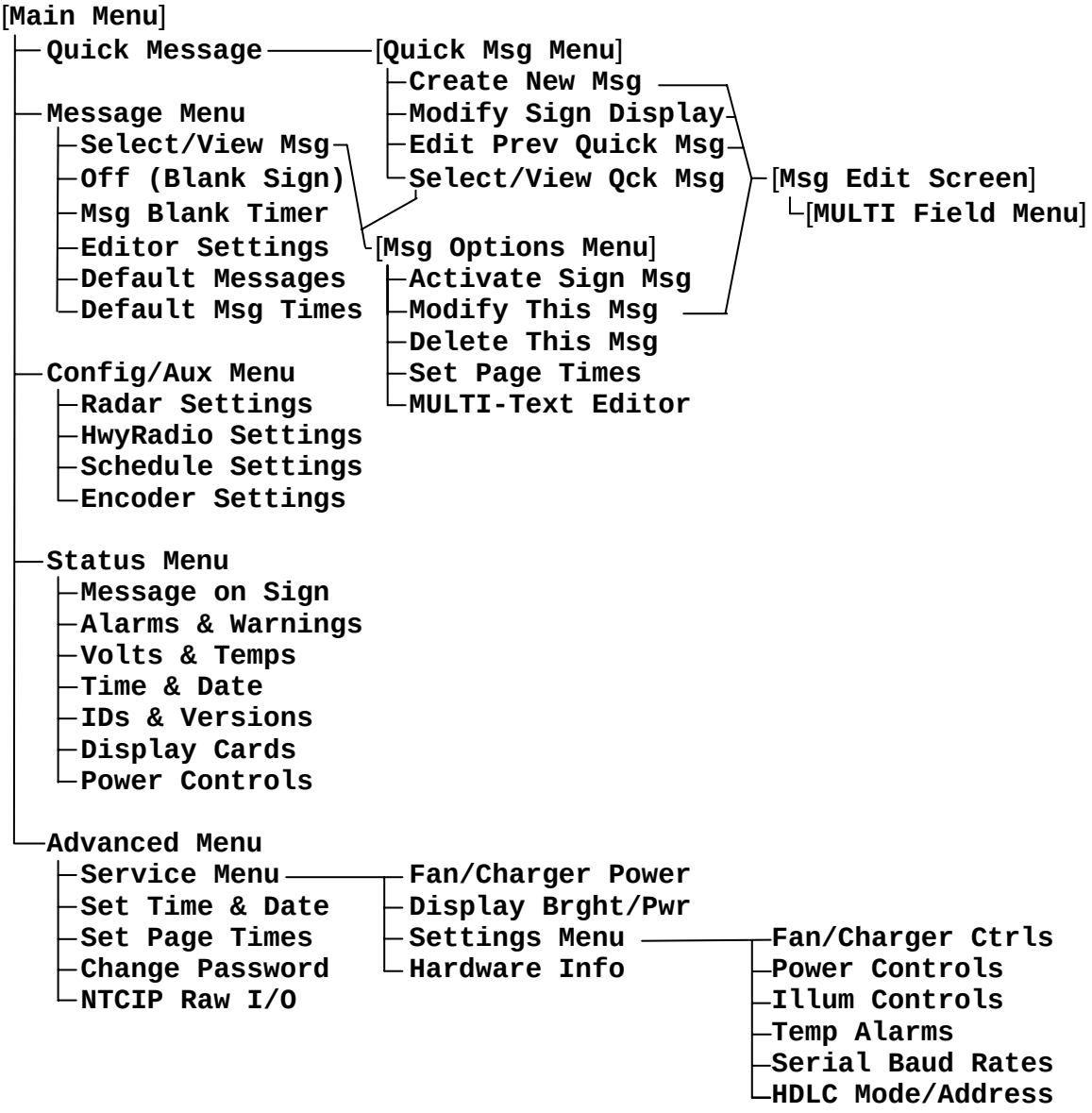
2.5. Power-Off The Sign Display

To disable power to the sign (and blank the sign display cards), select **"Message Menu"** at the **Main Menu**, then select **"Off (Blank Sign)"** (or press Alt-B). Note: this does not also turn off the aux devices (e.g. radar), use the specific config screen to turn them off if desired.

3. Menus

3.1. Menu Hierarchy

(Note, menu titles in brackets [] do not actually appear on the console display.)



3.2. Main Menu

(from password login screen or menu hotkey)

Quick Message	Show quick message edit options
Message Menu	Show message options
Config/Aux Menu	Show aux devices/event menu
Status Menu	Show status options
Help: Menu Keys	Help screen of menu navigation keys
Advanced Menu	Show advanced options (admin/service password only)

3.3. Quick Msg Menu

(from **Main Menu**)

Create New Msg	Pre-fill quick message with blanks, then edit
Modify Sign Display	Pre-fill quick message with sign msg, then edit
Edit Prev Quick Msg	Pre-fill quick message with msg# C100, then edit
Select/View Qck Msg	Message preview with msg# C100

3.4. Message Menu

(from **Main Menu**)

Select/View Msg	Message preview and/or select
Off (Blank Sign)	Disable power to the sign display cards (does not disable radar or HAR)
Help: Msg Types	Help screen of message types
Help: <F#> Keys	Help screen of features of the function keys, F1 – F12
Msg Blank Timer	Set time remaining for current message (until sign is blanked)
Editor Settings	Set default justification and font for message editor
Default Messages	Set messages for special NTCIP events
Default Msg Times	Set time parameters for NTCIP events

3.5. Msg Options/Maintenance Menu

(from **Select/View Msg**, or after editing a message)

Activate Sign Msg	Send this message to the sign display cards
Modify This Msg	Start standard edit mode (WYSIWYG pages) for this message
Delete This Msg	Erase this message
Help: Edit Keys	Help screen of keys used for advanced edit features
Help: Font Keys	Help screen of keys used for entering special characters
Set Page Times	Set page display and flash (blink) timing
MULTI-Text Editor	Start advanced NTCIP edit mode for this message

3.6. Status Menu

(from **Main Menu**)

Message on Sign	Show the message currently on the sign display cards
Alarms & Warnings	Show current state of the system alarms
Volts & Temps	Show current state of the system sensors
Help: <Alt> Keys	Help screen of hot keys for the status screens
Time & Date	Show current date, time, time zone and DST settings
IDs & Versions	Show machine ID, software version and model number
Display Cards	Show versions and error state of the sign display cards
Power Controls	Show current state of the power control system

3.7. MULTI Field Menu

(press Alt-F when editing a message)

Date m/d/y [f82,8]	Date, US format, 8 chars
Date d-m-y [f83,8]	Date, European format, 8 chars
Date y.m.d [f84,8]	Date, Japanese format, 8 chars
Date dd [f08,2]	Day of the month, 2 chars
Date mm [f09,2]	Month, 2 chars
Date yy [f10,2]	Year, 2 chars
Date yyyy [f11,4]	Year, 4 chars
Date day [f07,3]	Day of the week, English, 3 chars
Frequency [f68,4]	AM radio frequency, 4 chars (e.g. for traffic info)
Speed mph [f06,2]	Radar speed, mph, 2 chars
Speed mph [f06,3]	Radar speed, mph, 3 chars
Speed kph [f05,3]	Radar speed, kph, 3 chars
Speed kph [f05,2]	Radar speed, kph, 2 chars
SpeedLim m [f72,2]	Speed limit, mph, 2 chars
SpeedLim k [f71,3]	Speed limit, kph, 3 chars
SpeedMin m [f74,2]	Minimum speed, mph, 2 chars
SpeedMin k [f73,2]	Minimum speed, kph, 2 chars
SpeedXX m [f70,2]	Radar speed, mph, 2 chars, XX for over-speed
SpeedXXX m [f70,3]	Radar speed, mph, 3 chars, XXX for over-speed
SpeedXX k [f69,2]	Radar speed, kph, 2 chars, XX for over-speed
SpeedXXX k [f69,3]	Radar speed, kph, 3 chars, XXX for over-speed
Temp ambi°F[f04,3]	Temperature, ambient, °F, 3 chars
Temp ambi°C[f03,3]	Temperature, ambient, °C, 3 chars
Temp ambi°F[f04,2]	Temperature, ambient, °F, 2 chars
Temp ambi°C[f03,2]	Temperature, ambient, °C, 2 chars
Temp ctrl°F[f78,3]	Temperature, control box, °F, 3 chars
Temp ctrl°C[f77,3]	Temperature, control box, °C, 3 chars
Temp disp°F[f76,3]	Temperature, sign display box, °F, 3 chars
Temp disp°C[f75,3]	Temperature, sign display box, °C, 3 chars
Time 12:00 [f01,5]	Time, hours & minutes, 12-hr format, 5 chars
Time 12 AM [f81,8]	Time, hours & minutes, 12-hr format w/ AM/PM, 8 chars
Time 12:ss [f79,8]	Time, hours, minutes & seconds, 12-hr format, 8 chars
Time 24:00 [f02,5]	Time, hours & minutes, 24-hr format, 5 chars
Time 24:ss [f80,8]	Time, hours, minutes & seconds, 24-hr format, 8 chars
Time :ss [f67,3]	Time, seconds only, 3 chars
Timer msg [f85,8]	Msg time remaining, days, hours & minutes, 8 chars
Volts line [f66,5]	Line voltage (solar charger), 5 chars
Volts sign [f65,5]	Sign voltage (battery or main power), 5 chars
Weight lb [f86,6]	Scale weight, pounds, 6 chars

3.8. Config/Aux Menu

(from **Main Menu**)

Radar Settings	Turn radar power on/off, set speed limits & messages for radar events
HwyRadio Settings	Turn HAR power on/off, set traffic advisory radio frequency
Schedule Settings	Turn schedule system on/off, create day plans and set message times
Encoder Settings	Turn encoder system on/off

3.9. Advanced Menu

(from **Main Menu**, admin/service password only)

Service Menu	Show service options
Set Time & Date	Set date, time, time zone & DST options
Set Page Times	Set default page display and flash (blink) timing
Change Password	Set new password
NTCIP Raw I/O	View/set NTCIP OIDs directly

3.10. Service Menu

(from **Advanced Menu**, admin/service password only)

Fan/Charger Power	Manual control of fans, charger and console light
Display Brght/Pwr	Manual control of display card power and LED brightness
Settings Menu	Show settings options
Hardware Info	Show hardware subsytem version numbers
Main Menu	Return to top level menu

3.11. Settings Menu

(from **Service Menu**, admin/service password only)

Fan/Charger Ctrls	Set points for fan and charger control
Power Controls	Set points for low power warning
Illum Controls	Set points for photocell control of display card LED brightness
Temp Alarms	Set points for temperature out-of-range warnings
Serial Baud Rates	Set baud rates for RS-232 ports
HDLC Mode/Address	Set NTCIP PMPP HDLC drop address and SNMP mode

4. Hot Keys

4.1. Overview

Hot keys are quick shortcuts to screens or menus using one or two keys instead of navigating the menu structure. They are not required for basic sign operations, but simplify or speed many common tasks (or provide advanced edit features). Most hot keys involve pressing the Alt key with a letter key.

4.2. Menu Hot Keys

(menu key) Show **`Main Menu`**
Alt-U Show **`Message Menu`**

4.3. Function Keys

Alt-F1 - F12 Activate arrow message 1-12 (see Permanent Message list)
Shift-F1 - F12 Activate standard message 1-12 (see Permanent Message list)
Ctrl-F1 - F12 Activate custom message `C001-C012`
F1 - F12 Preview custom message `C001-C012` if defined, else preview `P001-P012`

4.4. Message Hot Keys

Alt-B or Alt-K **`Off (Blank Sign)`** (does not disable radar or HAR)
Alt-N Edit **`Quick Message`** (new/blank message)
Alt-O Edit **`Quick Message`** (pre-fill with message on sign)
Alt-Q Show **`Quick Message Menu`**
Alt-S **`Select/View Msg`** (pre-select last message)

4.5. Config Screen Hot Keys

Alt-R Show radar screen: **`Radar Settings`**
Alt-H Show HAR screen: **`HwyRadio Settings`**
Alt-C Show schedule screen: **`Schedule Settings`**
Alt-E Show encoder screen: **`Encoder Settings`**

4.6. Status Screen Hot Keys

Alt-M Show status screen: **`Message on Sign`**
Alt-A Show status screen: **`Alarms & Warnings`**
Alt-V Show status screen: **`Volts & Temps`**
Alt-T Show status screen: **`Time & Date`**
Alt-I Show status screen: **`IDs & Versions`**
Alt-D Show status screen: **`Display Cards`**
Alt-P Show status screen: **`Power Controls`**

4.7. Service Screen Hot Keys

(admin/service password only)
Alt-F Show fan service screen: **`Fan/Charger Power`**
Alt-L Show LED service screen: **`Display Brght/Pwr`**

4.8. Test Message Hot Keys

(service/testing use)
Alt-+ Activate message: LED test (1 page)
Alt-— Activate message: alphabet test (1 page)
Alt-[Activate message: factory test (multi-page)

4.9. Editor Hot Keys

(only when modifying a message)

Alt-C or Alt-↑	Center all text in page
Alt-L or Alt-←	Left justify all text in page
Alt-R or Alt-→	Right justify all text in page
Alt-F or Alt-M	Show **MULTI Field Menu** (real-time fields) to insert in message
Alt-G	Show graphics menu to insert a full-page arrow in message
PageDown	Add a new page (frame) to this message sequence (up to 6)
Alt-*	Turn flash (blink) on/off for a line
Alt-+	Increase font size for a line (Matrix only)
Alt-—	Decrease font size for a line (Matrix only)

4.10. Special Character Hot Keys

(only when modifying a message)

Alt- # # #	Use NumPad keys to type ASCII code of desired character
Alt-/	Insert ⁄ character (left arrow, top)
Alt-<	Insert ⟨ character (left arrow, middle)
Alt-`	Insert ⧹ character (left arrow, bottom)
Alt-\	Insert ⧹ character (right arrow, top)
Alt->	Insert ⟩ character (right arrow, middle)
Alt-'	Insert ⁄ character (right arrow, bottom)

5. Messages

5.1. Overview

The sign contains individual messages, each of which can contain one to six pages to form a multi-page sequence. Each message is completely independent from all other messages; pages from one message can not be inserted or transferred into another message.

5.2. Quick Message

To quickly create and put up a new message on the sign, select **"Quick Message"** from the **Main Menu**. Then select **"Create New Msg"**, or press Alt-N. (To copy and edit the message currently on the sign, select **"Modify Sign Display"** instead, or press Alt-O.) The message edit screen will display. Type the desired text. Press ESC when finished, **"Save & preview msg?"** will display. Press ENTER to answer **"yes"** to save the changes. The preview screen will simulate the new message. Verify the correct message appearance. Press ENTER again, the **Msg Options Menu** will display. Select **"Activate Sign Msg"** to send this to the sign display (or select **"Modify This Msg"** to re-edit).

5.3. Message Types

There are four types of messages. Not all types can be selected from all screens.

- P: Permanent (not user programmable)
- C: Custom/Changeable (user programmable, stored in permanent memory)
- T: Temporary/Volatile (user programmable, stored in RAM and erased after reset)
- B: Blank (not user programmable, also disables sign display power)
  Note: there are 255 blank messages, each with a different priority, for use in conjunction with the NTCIP message scheduler. Most users can ignore these and just use `B001` to blank the sign and disable sign power to the sign display cards.

Some screens also allow the following keys for message selection:

- Q: Quick (changeable message# `C100`)
- A: Active (message# currently displayed on the sign)
- L: Last (last message displayed before NTCIP reset event)
- N: None (no message used – event ignored)

5.4. Message Activation

To activate a message, first select **"Message Menu"** from the **Main Menu**, then select **"Select/View Msg"**, or press Alt-S. Type the number of the desired message (e.g. `P002, C055`), verify the correct message is shown in the preview. Press ENTER again to select the message, then select **"Activate Sign Msg"** (press ENTER again).

5.5. Activate Custom Messages

To quickly activate Custom message 1 through 12, press Ctrl-F1 through Ctrl-F12.

5.6. Activate Standard Messages

To quickly activate one of the 12 standard messages, press Shift-F1 through Shift-F12. Each SHIFT function key activates a different message, e.g. CONSTRUCTION AHEAD, MERGE LEFT or PAINT CREW – see the list of permanent messages for more information. These messages can also be previewed and activated by number, just like any other message.

5.7. Activate Arrow Messages

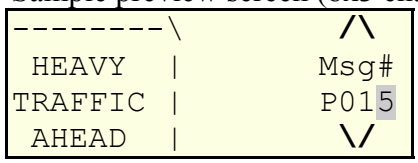
To quickly activate a flashing arrow message (emulating a standard arrow sign), press Alt-F1 through Alt-F12. Each ALT function key activates a different arrow board message, e.g. sequential arrow or 4-corner caution – see the list of permanent messages for more information. The timing and appearance of these messages is designed to comply with federal and state specifications, and they can not be modified or deleted. These messages can also be previewed and activated by number, just like any other message.

5.8. Message Preview

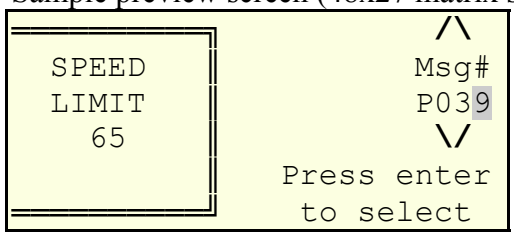
To preview the messages in the system, first select **"Message Menu"** from the **Main Menu**, and then select **"Select/View Msg"**. A screen showing the message will appear, with the simulated sign display in a box on the left, and the current message number on the right. Arrows above or below the message number indicate when the ↑ or ↓ keys can be used to scroll to the next or previous message. Note that only standard characters will be shown on this display; special characters may be shown as an empty box: ▯.

For matrix signs, the true graphic message (with actual fonts, spacing, centering, bitmaps, etc.) will be shown in the "**Preview Message**" window in the lower half of the LCD panel.

Sample preview screen (8x3 character sign):



Sample preview screen (48x27 matrix sign):



Preview Message

- Press A for the active message on sign, or Q for the quick message.
- To browse a desired message type, press its letter key (P, C or T).
- To browse the messages within a type, use ↑, ↓, PageUp, PageDown, Home or End.
- To preview a specific message, type its number directly (e.g. 001).
- If a custom message is selected which has not been defined, **"Unused!"** appears.
- If an invalid message number is selected (e.g. B999), **"Err ###!"** appears.

5.9. Message Selection

When the desired message is shown in the preview screen, press ENTER to select it (for edit, delete or activation), and the **Msg Options Menu** will appear. Invalid message numbers can not be selected.

5.10. Message Deletion

First select a message from the preview screen, and then select **"Delete This Msg"** from the **Msg Options Menu**. Only custom and temporary messages can be deleted.

5.11. Message Edit/Modify

First select a message from the preview screen, and then select **"Modify This Msg"** from the **Msg Options Menu**. Only custom messages can be edited. A screen similar to the preview screen will appear, with the message text in a box on the left, and the current message number on the right. In addition, the current and total number of pages in the message is shown below the message number.
For matrix signs, the true graphic message (with actual fonts, spacing, centering, bitmaps, etc.) will be shown in the "**Page Preview**" window in the lower half of the LCD panel. For the 48x27 matrix sign, the edit window will allow 4 lines of 10 characters, however, the smallest font must be used to display this many characters. If the edit text does not fit on the sign, it will be truncated in the preview window, and not saved with the message.

The edit box (left-hand panel) will be sized to match the sign model:

Sample edit screen (8x3 character sign):

```
--------\  Msg#:C015
  TEST  |↑     Pg1/2
MESSAGE |↑ Alt↑=Cntr
        |↑ Alt*=Flsh
```

Sample edit screen (4x1 character sign):

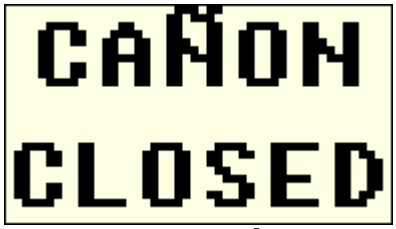
```
           Msg#:C015
----\          Pg1/2
TEST|↑     Alt↑=Cntr
----/      Alt*=Flsh
```

Sample edit screen (48x27 matrix sign):

```
╔══════════╗      Msg#:C021
  CA□ON    ╟↑        Pg3/5
  CLOSED   ╟↑    Alt↑=Cntr
  TODAY    ╟↑    Alt*=Flsh
           ╟↑    Alt+=Fnt+
╚══════════╝      Alt-=Fnt-
```

Sample edit screen (72x40 matrix sign):

```
╔═══════════════╗  #:C021
     CA□ON      ╟↑  Pg3/5
     CLOSED     ╟↑ ↑=Cntr
     TODAY      ╟↑ *=Flsh
                ╟↑ +=Fnt+
╚═══════════════╝  -=Fnt-
```



Page Preview

Type the desired message in the text box.

- Press ESC to exit.
- Press ENTER to go down a line, or to exit (when on the last line).
- Press Insert to toggle between insert (underbar cursor) and overstrike (block cursor)
- Press Delete or Backspace to delete a character.
- Press ↑, ↓, →, ←, Home or End to move the cursor in the text box.
- Press Ctrl-Home to go to the top left corner.
- Press Ctrl-End to go to the bottom right corner.
- Press PageUp or PageDown to change pages.
- Press PageDown to add a new page, up to 6 total (when on the last page).
- Arrows next to the message box indicate the line justification (center, left, right).

Note: individual pages can not be deleted or re-ordered, the entire message must be deleted and recreated.

5.12. Message Save/Exit

After exiting the message edit screen (by pressing Esc), the message save screen will appear.

Sample save message screen:

```
Save & preview
 msg# C015 (Y/N)? Y
 PgDn=add new page
<Esc>=return to edit
```

- Press ENTER or Y to save the changes and return to the message preview screen.
- Press N to discard the changes and return to the **`Msg Options Menu`**.
- Press Esc to return to the edit screen.
- Press PageDown to add a new page and return to the edit screen.

5.13. Justification/Centering

To justify all the text on the current page, use the edit hot keys, (Alt-↑, Alt-←, Alt-→; or Alt-C, Alt-L, Alt-R) for center, left or right justification. An arrow (↑, ←, →) will display to the right of each line indicating the current justification.

5.14. Flashing/Blinking

To turn character flashing (blinking) on/off for a line, press Alt-*. To mix flashing and non-flashing, first enter the flashing characters and press Alt-*, then enter the non-flashing characters.

5.15. Arrows

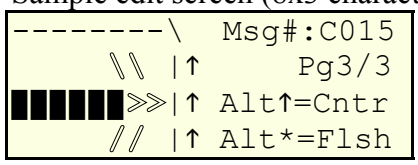
To add a row of chevrons to a message page, use the chevron hotkeys (Alt-< or Alt->).

Sample edit screen (8x3 character sign):

```
--------\  Msg#:C015
 EVENT  |↑     Pg2/2
PARKING |↑ Alt↑=Cntr
<<<<<<< |↑ Alt*=Flsh
```

To add a full-page arrow to a message, use the graphic hotkey (Alt-G). Select a left, right or double arrow. Note that any text or formatting on this page will be erased. The edit screen will show a text version of the arrow, however, the sign will display an actual arrow graphic.

Sample edit screen (8x3 character sign):



5.16. Graphics

Matrix signs can display simple bitmap graphics. To add a full-page graphic to a message, use the graphic hotkey (Alt-G). Select either a full-page arrow, or enter the message number containing the desired graphic. Several permanent messages contain graphics, and custom graphics can be downloaded to custom messages using the Remote Control software (using a laptop or a modem). Each message may hold one graphic page and five text pages – inserting a second graphic page may reduce the number of text pages available.

On a character sign, the graphic menu only allows insertion of full-page arrows.

5.17. Fonts

Matrix signs can display a variety of fonts. While editing, use the font hotkeys (Alt-+ or Alt-—) to change the font. Monitor the actual sign display in the lower half of the LCD panel until the desired font is selected. Portions of the message which are too large to fit on the sign will not be shown; reduce the font size until the entire message can be seen.

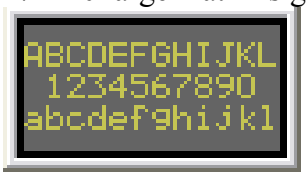
On a character sign, all font numbers refer to the standard 5x7 font.

To increase or decrease the font size on a line, press Alt-+ or Alt-—. Each page may use multiple fonts.

To enter an accented character (using its ASCII code), hold down Alt while typing the ASCII code (using the number keys on the NumPad), then release the Alt key. Note: the standard text sign models only support standard US keyboard characters, and the console display shows unknown characters as an empty box, ☐. See the Accented Character Code section for a list of codes.

Note that federal highway safety standards require 18"-high characters for 800 feet of visibility at highway speeds (55 mph and over). When deploying a full-size matrix sign on a highway, do not use the 4x5 font. When deploying a mini-matrix sign on a highway, use only the 5x12 or 7x12 fonts (2 lines of text). Do not deploy the small-size character signs (14", 12") on federal highways. Smaller size fonts and characters are only intended for use on residential streets (45 mph and under), parking areas and at special events.

Note: fonts shown on 72x40 large matrix sign, standard signs display fewer characters and/or lines:

Font 1: 

5x7 Standard fixed font with lowercase.

Font 2: 

5x7 Same as #1, but with greater spacing for legibility.

Font 3: 

6x9: Bold proportional font, 4x9 capitals for lowercase.

Font 4: 

6x11 Same as #3, but with lowercase and accented letters.

Font 5: 

6x11 Same as #4, but with greater spacing for legibility.

Font 6: 

5x12 Tall fixed font, 5x8 capitals for lowercase.

Font 7: 

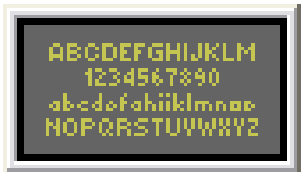
7x12 Bold fixed font, 6x8 capitals for lowercase.

Font 8: 

7x23 Large fixed font, no lower case.

Font 9: 

11x23 Bold fixed font, no lower case.

Font 10: 

4x5 Mini proportional font, limited lower case.

5.18. Editor Default Settings

To configure the default message justification and font, select **"Editor Settings"** from the **Message Menu**.

5.19. Real-Time Data (MULTI Fields)

MULTI fields display live data when the message is activated. These fields are not fixed when the message is edited. This includes date, time, sensors (temperatures, voltages), auxiliary devices (radar speed, scale weight), message time remaining, and NTCIP database fields (radio frequency, speed limit, minimum speed).

Press Alt-F (or Alt-M) to show the **MULTI Field Menu** (when editing a message). This menu contains a list of all the available real-time fields. Each line shows a different field, with its description, MULTI field code number, and character width. Scroll to the desired field, then press ENTER to select it and return to edit mode. If there is sufficient room on the current line, a field *placeholder* will appear in the message (e.g. **Σxxxxx**), blocking out the required number of characters. This field can be moved or deleted, but can not be modified. Several fields can be embedded into the same message or page. To find out what an existing field refers to, place the cursor on the field and press Alt-F, the field type will be pre-selected when the **MULTI Field Menu** appears.

Sample edit screen with MULTI field placeholders (8x3 character sign):

```
--------\  Msg#:C015
 Σxxxx  |↑     Pg2/2
TODAY IS|↑ Alt↑=Cntr
 Σx/Σx  |↑ Alt*=Flsh
```

Sample preview screen with live MULTI field data (8x3 character sign):

```
--------\        /\
 10:24  |       Msg#
TODAY IS|       C015
 12/13  |        \/
```

5.20. Scale Weight

To display the actual weight from a compatible truck scale in a message, select the **"Weight lb"** MULTI field from the menu. The weight field takes six characters and is in pounds.

5.21. Radar Speeds

To display the actual speed from a compatible radar unit in a message, select one of the **"Speed mph"** or **"Speed kph"** MULTI fields from the menu. There are different fields for mph or kph, and 2- or 3-character widths. The **"SpeedXXX"** fields display XXX when the actual speed exceeds the set speed limit by 20 mph or more (to discourage speeders from using the radar for high-speed racing). See the radar section for information on assigning these messages to radar events and configuring speed limits. Note that default permanent messages are already provided for the radar system, in either kph or mph, which should work for most applications.

5.22. Page Timing

To modify timing settings for a single message, select the **"Set Page Times"** screen from the **Msg Options Menu**.. To modify the default timing settings for the entire sign, select **"Set Page Times"** screen from the **"Advanced Menu"**. These settings control how long each page (in a multi-page message) is displayed before changing to the next page, and how long the sign display is blanked between pages, and what the character flash rate is on each page. Note that single page messages with no flashing characters will have nothing to configure (they are always on).

5.23. Message Timer (Auto-Blanking)

To display a message for a limited time, select **"Msg Blank Timer"** from the **Message Menu** (after activating a message). Enter the desired message time remaining in minutes; enter 65535 to disable the timer (i.e. no auto-blanking). When the timer ends, the sign display will be blanked automatically. The actual time remaining will update on this screen automatically. This timer will be reset (disabled) whenever a new message is activated.

To use this feature as a countdown timer in a message, edit the message and embed the **"Timer msg"** field from the **MULTI Field Menu**, activate it, then set this timer.

Note that although the default is to blank the sign (display msg# B001), the actual message displayed is for the NTCIP **"End Duration"** event, configured on the **"Default Messages"** screen from the **Message Menu**.

5.24. MULTI-Text Editor

For direct editing of the raw message MULTI-text, select **"MULTI-Text Editor"** from the **Msg Options Menu**. Note: some MULTI codes may not be supported by all sign types.

6. Status

6.1. Sign Display

To view the actual text being displayed on the sign, select **"Message on Sign"** from the **Status Menu**, or press Alt-M. To select this active message from the preview screen, press A.

Sample message status screen (8x3 character sign):

```
--------\       Msg#
 10:24  |       C015
TODAY IS|        on
 12/13  |       sign
```

Sample message status screen (48x27 matrix sign):

```
┌──────────┐          Msg#
-Bitmap-   │          P093
           │           on
           │          sign
           │
└──────────┘
```

Message on Sign

6.2. Alarms and Warnings

To view the alarms, select **"Alarms & Warnings"** from the **Status Menu**, or press Alt-A. Active alarms are shown as **"!!"**, inactive alarms are shown as **"OK"**. These alarms are also summarized on the password login screen. For additional information, see the voltage, power control and display card status screens.

Sample alarm status screen:

```
Dsply=!! VoltWarn=OK
PwrBd=OK TempWarn=OK
NTCIP=OK TempCrit=OK
AuxIO=OK PhtoCell=!!
```

- **Dsply** Sign display card(s) not responding or broken pixel(s) detected
- **PwrBd** Power control system not responding
- **NTCIP** NTCIP system communications error
- **AuxIO** Auxiliary device communications error
- **VoltWarn** Low battery voltage or display in low voltage disconnect mode
- **TempWarn** Sign or control box temperature(s) may be too high
- **TempCrit** Sign temperature critically high, sign display blanked
- **PhtoCell** Photocell(s) reading 0V: ignore this warning at night

The out-of-range warning limits are configurable via the **Settings Menu** (admin/service only).

6.3. Voltages

To view the sensors, select **"Volts & Temps"** from the **Status Menu**, or press Alt-V.

Sample voltage status screen:

```
Ts=156°F  Vs=12.75
Tc=101°F  Is=4.321
P1= 62%   Vl=12.35
P2= 56%   Il=0.543
```

- **Ts** Temperature of sign display box (ambient plus solar heat)
- **Tc** Temperature of control box (near ambient)
- **Ta** Temperature of ambient sensor (if equipped)
- **P1** Illumination detected by photocell #1
- **P2** Illumination detected by photocell #2
- **Vs** Sign voltage, Volts (battery or main power)
- **Is** Sign current, Amps (battery or main power)
- **Vl** Line voltage, Volts (solar charger)
- **Il** Line current, Amps (solar charger)

6.4. Time & Date

To view the time and date, select **"Time & Date"** from the **Status Menu**, or press Alt-T.

Sample time & date status screen:

```
Run Timer: 4.9 hrs
Time Zone: -7 hrs
      DST: Enabled
12/13/2003  16:06:35
```

Hours the sign display has been powered on (not blanked)
Hours relative to Coordinated Universal Time (GMT/Zulu)
US-standard Daylight Saving Time

- Time zone is -5 for Eastern, -6 for Central, -7 for Mountain, -8 for Pacific, etc.
- The date is shown in US-standard month/day/year format.
- The time is shown in 24-hour format, with seconds.

Time settings are changed via the **"Set Time & Date"** screen from the **Advanced Menu** (admin/service password only).

6.5. IDs & Versions

To view the machine ID (serial number, order number and/or VIN), model number, and software version (also visible during power-up on the splash screen, along with the model description), select **"IDs & Versions"** from the **Status Menu**, or press Alt-I.

6.6. Display Cards

To view the state of the sign display cards, select **"Display Cards"** from the **Status Menu**, or press Alt-D. A screen similar to the message screens will appear, with each display card shown in the simulated sign display in the box on the left, and the total number of responsive cards in the upper right. Each responsive card is shown with a letter (indicating its software version), or a **?**, if not responsive. The actual numeric version of the first card is shown in the upper right below the card count.

Sample display cards status screen (8x3 character sign, no errors):

```
--------\        #024
UUUUUUUU|       v3.20
UUUUUUUU|
UUUUUUUU|      S=Scan
```

Sample display cards status screen (8x3 character sign, with errors):

```
--------\      #= 017
TTTTTTTT|       v3.19
TTTTTTTQ|
Q???????|      S=Scan
```

Sample display cards status screen (48x27 matrix sign, no errors):

```
                      #=018
═══════╗              v3.18
SSSSSS╠
SSSSSS╠
SSSSSS╠
═══════╝             S=Scan
```

For normal operation, all display cards should have the same software version (i.e. all the same letter), and no cards should be listed as **?**. Mixing cards of different software versions may result in mismatches in font characters or brightness levels, and is not recommended. Be sure to specify the correct software revision when ordering a replacement card.

To force a retest of all cards, press ENTER. The display map will blank out, and then refresh after several seconds. The sign display must not be blanked, and the test will automatically activate the alphabet test message. Note: a **?** does not automatically indicate the display card needs replacement, just that the controller has lost communications to it. This could be due to a cable problem, or due to problems with an upstream card.

6.7. Power Controls

To view the power system, select **"Power Controls"** from the **Status Menu**, or press Alt-P.

Sample power controls status screen:

```
 Fan 1=0  DispPwr=0
 Fan 2=0  Brght=62%
 Chrgr=0  State=Blnk
  Door=+   MBPC=0x18
```

- **Fan 1** ✚ if Fan #1 is on, **0** if off
- **Fan 2** ✚ if Fan #2 is on, **0** if off
- **Chrgr** ✚ if solar charging system is on, **0** if off
- **Door** ✚ if door switch reads open, **0** if closed
- **DispPwr** ✚ if sign display cards have power, **0** if off
- **Brght** Current brightness level of the LEDs
- **State** Current power control state: **Good**, **Low** (warn), or **Blnk** (sign blanked)
- **MBPC** Current power control command (for service use)

7. Message Scheduler

7.1. Overview

Enabling this system causes the sign display to change automatically based clock/timer changes. Some sign models have an LED on the front panel to indicate when this scheduler is enabled. Note: manually activating any message automatically disables the scheduler. Whenever using the message scheduler, the sign must have the correct date and time. To view the time and date, select **"Time & Date"** from the **Status Menu**, or press Alt-T.

7.2. Schedule Config

To configure the message scheduling system, select **"Schedule Settings"** from the **Config/Aux Menu**, or press Alt-C.

Sample schedule config screen:

```
→Schedule: On,Plan#2
 Edit Day Plan #1...
 Edit Day Plan #2...
 Edit Day Plan #3...
```

7.3. Day Plans

Each Day Plan is a separate schedule with a specific date range, valid days of the week, and set of messages. Only one Day Plan is active at a time. Each day, the system automatically selects the Day Plan that most closely corresponds to the current date and day of the week. For example, one plan may be used for weekdays and another for weekends; or one plan may be used to warn of upcoming construction and another may provide information during the construction. It is possible for the schedule system to be enabled, but to have no plan active for the current day.

Sample Day Plan edit screen:

```
→Set Msgs & Times...
 Dates:  04/01-10/31
 Days:   MTWTFss
 Erase Day Plan #2?
```

Use **Dates** to set the start and end date for this plan. Use **Days** to enable each desired day of the week. Move to the desired day and press any key to toggle it on/off. Days with capital letters indicate the plan is active on those days, days with lower case letters indicate the plan is inactive on those days.

Sample message schedule screen (Day Plan #2):

```
→Msg2-1: C001 06:59
 Msg2-2: C002 09:01
 Msg2-3: C003 15:59
 Msg2-4: B001 19:01
```

Enter the desired message number and time for each slot. Times are in 24-hour format. Use blank messages (B001) to turn the sign off. Press N to deactivate a message (**NONE --:--**).

8. Aux Devices

8.1. Overview

Enabling these systems causes the sign display to change automatically based on optional hardware. Some sign models have LEDs on the front panel to indicate when these systems are enabled. Note: enabling multiple systems at the same time may cause important messages to be replaced with lower priority ones.

8.2. Radar

To configure the optional radar event system, select **"Radar/Speed Limits"** from the **Config/Aux Menu**, or press Alt-R.

Sample radar config screen:

```
→Radar Power:  Off
 Speed Limit:   30
 Excess Speed: +20
 Advanced Options...
```

Radar detector power/Radar event system enable
Regulatory speed limit
Value over the speed limit to display special message

By default, when the radar system is active, the sign will display a message indicating the regulatory speed limit. When the radar detects an oncoming car, the message will change to display the actual radar speed. If this speed is over the speed limit, the displayed speed will flash (blink). If this speed is over the excessive speed limit (**Speed Limit** plus **Excess Speed**), the message will change to "SLOW DOWN". This discourages certain drivers from driving at dangerous speeds simply to see it appear on the sign. When no car is detected, the sign reverts to the regulatory speed limit message.

Novice users can simply press Alt-R, enter the desired **Speed Limit** and toggle **Radar Power** as needed. No knowledge of message creation/activation or sign operation is required, and this feature is available to users with restricted-level passwords.

To access additional settings, select **"Advanced Options"**.

Sample advanced radar options screen:

```
→Radar Messages
 Units & Min Speed
 Restore Defaults
```

To change the default radar system behavior, select **"Radar Messages"**.

Sample radar messages screen:

```
→Spd Limit Msg: P039
 Legal Spd Msg: P040
 Overspeed Msg: P041
 Excessive Msg: P046
```

when no radar speed is detected
when radar speed is <= the speed limit setting
when radar speed is > the speed limit setting
when radar speed is >= the excessive speed setting

For example, a user may not want to show the actual speed of a legal driver. Simply assign the same message to both the **Spd Limit** and **Legal Spd** messages. Then the sign display will only change when a driver exceeds the regulatory speed limit.

Similarly, a construction zone may wish to display an informational message most of the time, and only display "SLOW DOWN" when an excessive speed is detected. Simply create a custom message

(e.g. C001) and assign it to the first three slots (**Spd Limit**, **Legal Spd**, and **Overspeed** messages). Then the sign display will only change when a driver reaches the excessive speed limit.

When creating custom messages, use the **MULTI Field Menu** to embed radar speed fields.

To use KPH instead, or set the displayed minimum speed, select **"Units & Min Speed"**.

Sample units and minimum speed screen:

```
→Speed Units:   MPH
 Minimum Speed: 45
 (Min Spd Msg: P038)
```

Select between MPH and KPH messages
Set the value shown on the minimum speed message

Note: changing **Speed Units** will automatically reset the three radar speed messages to defaults, i.e. P038-P041 are MPH only, P042-P045 are KPH only.

The minimum speed message is not normally used by the radar, but could be selected for the **Spd Limit** message, or simply used on its own without a radar system. The **Minimum Speed** field is also available from the **MULTI Field Menu** when creating custom messages.

To restore the default settings for the current units, select **"Restore Defaults"**.

Sample radar reset screen:

```
All radar speeds and
 messages have been
 reset to factory
 default settings.
```

8.3. Highway Alert Radio (HAR)

To configure the optional HAR event system, select **"HwyRadio Alert Msg"** from the **Config/Aux Menu**, or press Alt-H.

Sample HAR config screen:

```
→HwyRadio Pwr:  Off
 AM Frequency:  530
 Advisory Msg: P037
(Default Msg:  P037)
```

Enable/disable radio power and event system
Value displayed on "**TRAFFIC ADVISORY**" message
Displayed when a highway alert is detected.

By default, when the HAR system is active, the sign will display the advisory message whenever an alert is detected, and will revert to the previous message when the alert is over.

Novice users can simply press Alt-H, enter the desired **AM Frequency** and toggle **HwyRadio Pwr** as needed. No knowledge of message creation/activation or sign operation is required, and this feature is available to users with restricted-level passwords.

8.4. Digital Encoder

The encoder system is used to select a custom message directly, and is compatible with several different hardware options.

Sample encoder screen:

```
→Encoder: Enabled

 Current Value: C012
```

9. Sign Settings

9.1. Overview

Select **Advanced Menu** from the **Main Menu** to set system defaults for the sign. Advanced level password required to access this menu.

9.2. Time & Date Settings

To change the date and time settings, select **"Set Time & Date"** from the **Advanced Menu**. Make sure the date, time zone and DST options are correct before setting the local time, else the displayed time will change automatically.

Sample time and date screen:

```
→Time: 09:37:59
 Date: 02/03/04
 Zone: -07 hrs
  DST: Enabled (USA)
```

9.3. Page and Blink Timing

To view or change the default message page display times and character flash rates, select **"Set Page Times"** from the **Advanced Menu**.

Sample page times screen:

```
→Page  On : 02.6 sec
 Page  Off: 00.2 sec
 Flash On : 01.0 sec
 Flash Off: 00.4 sec
```

9.4. Message Centering

To configure the default message justification, select **"Editor Settings"** from the **Message Menu**.

9.5. Character Font

To configure the default message font, select **"Editor Settings"** from the **Message Menu**.

9.6. Change Passwords

To change one of the passwords, select **"Change Password"** from the **Advanced Menu**. The same passwords are used for both local login and remote NTCIP access. For remote access, passwords are case sensitive. Be sure to record your passwords in a safe location.

Sample change password screen:

```
Confirm password:
Old:*****_________
New:*******_______
New:*******_______
```

10. NTCIP Settings

10.1. Modem Setup

If enabled for this sign model, the optional NTCIP modem must be set to auto-answer, 9600-8-N-1 with hardware flow control (to the sign), and connected to the modem port with a standard 9-pin serial cable. Note: to change the default from 9600 baud, select **"Serial Baud Rates"** from the **Settings Menu**, and change the **Modem** port setting.

10.2. Serial Cable Setup

If enabled for this sign model, a laptop computer running an NTCIP Central control program may be connected to the modem port with a standard 9-pin null-modem cable. Communications must be set to 9600-8-N-1 with hardware flow control. Note: to change the default from 9600 baud, select **"Serial Baud Rates"** from the **Settings Menu**, and change the **Modem** port setting.

10.3. SNMP Mode

To view or change the SNMP Data Communications Mode (PMPP, PPP or raw SNMP), select **"HDLC Mode/Address"** from the **Settings Menu**. Note: setting this value incorrectly will disable remote communications to the NTCIP Central software.

10.4. HDLC Drop Address

To view or change the hardware drop address for PMPP-mode serial/modem communications, select **"HDLC Mode/Address"** from the **Settings Menu**. Note: setting this value incorrectly will disable remote communications to the NTCIP Central software.

10.5. Change Passwords

To change one of the passwords, select **"Change Password"** from the **Advanced Menu**. The same passwords are used for both local login and remote NTCIP access. For remote access, passwords are case sensitive.

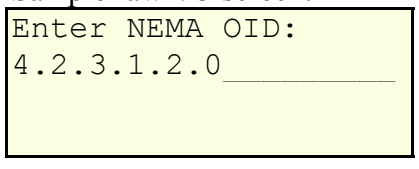
10.6. Event Messages

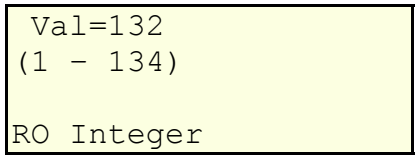
To configure the default messages and time parameters for NTCIP reset events (e.g. power loss), select **"Default Messages"** and/or **"Default Msg Times"** from the **Message Menu**. Press N (none) or L (last msg) to disable a message change for that event.

10.7. NTCIP Raw I/O

To view or change an OID directly, select **"NTCIP Raw I/O"** from the **Advanced Menu**.

Sample raw I/O screen:





10.8. MULTI-Text Editor

For direct editing of the raw message MULTI-text, select **"MULTI-Text Editor"**.

11. Service Mode Settings

11.1. Overview

Select **Advanced Menu** from the **Main Menu** to set system defaults for the sign. Service level password required to access this menu.

11.2. Hardware Info

To view the sign dimensions and the software versions of the hardware subsystems, select **"Hardware Info"** from the **Service Menu**.

Sample hardware info screen (8x3 character sign):

```
Cards: 8 x 3
Pixel: 5 x 7
MTX03: v. 3.20
 MBPC: v. 6
```

number of display cards on sign panel
number of pixels per display card
display card version
power control board version

Sample hardware info screen (48x27 matrix sign):

```
Cards: 6 x 3
Pixel: 8 x 9
MTX03: v. 3.20
 MBPC: v. 6
```

Sample hardware info screen (72x40 hi-def matrix sign):

```
Cards: 6 x 4
Pixel: 12 x 10
MTX03: v. 3.20
 MBPC: v. 6
```

11.3. Fan Temperatures and Solar Charger Voltages

To view or change the fan turn-on temperatures or change the solar charger on-off voltages,, select **"Fan/Charger Ctrls"** from the **Settings Menu**.

Sample fan temperatures screen (recommended values shown):

```
 Fan 1 Temp: 165°F
→Fan 2 Temp: 175°F
 Chrgr Max: 14400 mV
 Chrgr Min: 13100 mV
```

11.4. Low Power Settings

To configure the sign to display a low power warning message, select **"Default Messages"** from the **Message Menu**, and change the **Low Voltage** message setting.

To view or change the battery control voltages, select **"Power Controls"** from the **Settings Menu**. After power on, the sign panel will not turn on unless the voltage is above the **Good** setting. When the voltage drops to the **Warn** setting, the a low voltage alarm is triggered (and the optional warning message is displayed) until the voltage returns to normal. When the voltage drops to the **Disc** setting, the sign display panel is shut off until the voltage returns to the **Good** setting. If the

voltage falls extremely low, all sign and console power will be shut off and the battery saver/shutdown LED will light. The **Vbatt off** setting is used to calibrate the **Vs** screen reading with an actual voltage reading inside the battery box.

Sample power controls screen:

```
 LowV Good: 11900 mV
 LowV Warn: 11500 mV
→LowV Disc: 11100 mV
 Vbatt Off: 00300 mV
```

In cold weather, increase the Disc setting to 11400 mV (batteries below 10.9V may freeze at 19°F). For non-solar applications, decrease all LowV settings by 1000 mV.

11.5. LED Brightness Control

To view or change the illumination settings, select **"Illum Controls"** from the **Settings Menu**. Press S for a standard solar sign, or press H for a non-solar, hi-intensity sign, or set the brightness levels directly. The system uses the 3 set points to construct a table of 16 levels with hysteresis control. The higher the LED setting, the greater the drain on the batteries. Increasing the settings beyond the factory defaults is not recommended, and may cause the battery charge life to be less than 30 days.

Sample illumination control screen:

```
→LED%: 002, 032, 046
    (Night, Day, Hi)
Solar: 002, 032, 046
HiLED: 012, 100, 100
```

recommended for solar signs

recommended for non-solar, high-intensity signs

11.6. Temperature Alarm Limits

To view or change the over-temperature warning settings, select **"Temp Alarms"** from the **Settings Menu**.

12. Service Mode Controls

12.1. Overview

These screens override the power and display control systems, and are intended for troubleshooting and QA use by qualified service personnel only (service password required). After 10 minutes without a key press, these screens automatically exit to the prior menu. Normal automated system controls are automatically restored when leaving these screens (i.e. manual mode is cancelled).

12.2. Fans & Charger

To manually control power to the fans and the solar charger, select **"Fan/Charger Power"** from the **Service Menu**, or press Alt-F. Line voltage and current (solar charger) are also shown.

Sample fan/charger screen:

```
→Fan 1=0    line/
 Fan 2=0     charger
 Chrgr=+   Vl=12.35
 Light=+   Il=2.856
```

12.2.1. Fan Test

Note: may not apply to all sign models. Sign may have 0, 1 or 2 fans.

Turn on each fan and verify it is operational by inspecting air flow at the fan vents on the back of the sign display panel. Clean fan filters and/or replace fans as necessary.

12.2.2. Solar Panel and Charger Relay Test

Note: may not apply to all sign models. Sign may have 0, 2 or 4 solar panels.

Verify solar panels are in good sunlight, charger relay is on, and current reading is 5-10 Amps (if battery is not fully charged and sign display panel has an active message). Cover one solar panel with a large piece of cardboard and verify the current reading drops to half its value. Repeat for the other panel, then remove the cardboard. Manually turn off the charging relay. The current reading should drop to zero, and the indicated voltage will increase to the open-circuit value.

12.3. Display Power & Brightness

To manually control power to the display cards and the LED brightness, select **"Display Brght/Pwr"** from the **Service Menu**, or press Alt-L. For full LED testing, activate the LED test message (press Alt-+) before entering this screen. Sign voltage and current are also shown; sign current (and battery charge life) varies greatly with LED brightness.

Sample brightness/power screen:

```
→DispPwr=+ Vs=12.75
      /\   Is=5.862
 Brght=75%  sign/
      \/     battery
```

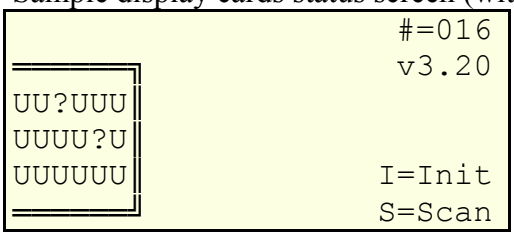
12.4. Diagnostic Messages

To view status and error messages, connect a laptop computer running a serial capture terminal program (e.g. HyperTerminal) to the debug port with a standard 9-pin null-modem cable. Communications must be set to 9600-8-N-1 with hardware flow control enabled. Note: to change the default from 9600 baud, select **"Serial Baud Rates"** from the **Settings Menu**, and change the **Debug** port setting.. For additional output message buffering (to prevent data loss), send XXT to enable and XXF to disable (or press reset). Note: leaving buffering enabled without a connected laptop can reduce system performance.

12.5. Display Card Replacement

The display cards have software programmable addresses to determine their location in the sign board. If a card is replaced or moved to a new location, its new address must be programmed for proper message display. Log in with a service-level password, and select **"Display Cards"** from the **Status Menu**, or press Alt-D. The service option **"Init"** will now appear above **"Scan"**. Press I to reprogram all the display card addresses. The display map will blank out, and then refresh after several seconds. Note: do not perform this initialization unless required due to a card replacement, its effects can not be undone and may interfere with troubleshooting hardware problems.

Sample display cards status screen (with errors), 48x27 matrix sign, service mode:



For normal operation, all display cards should have the same software version (i.e. all the same letter), and no cards should be listed as **?**. Mixing cards of different software versions may result in communications errors or unmatched brightness levels, and is not recommended. Be sure to specify the correct software revision when ordering a replacement card.

13. Accented Character Codes (Fonts 4 & 5)

€ Alt-128
ć Alt-134
ł Alt-136
Š Alt-138
Ź Alt-141
Ž Alt-142
Ć Alt-143
Ś Alt-151
ś Alt-152
š Alt-154
Ł Alt-157
ž Alt-158
Ÿ Alt-159
¡ Alt-161
ő Alt-162
£ Alt-163
Ą Alt-164
ą Alt-165
¦ Alt-166
Ę Alt-168
ę Alt-169
ź Alt-171
Ń Alt-187
ń Alt-188
Ż Alt-189
ż Alt-190
¿ Alt-191
À Alt-192
Á Alt-193
Â Alt-194
Ã Alt-195
Ä Alt-196
Å Alt-197
Æ Alt-198
Ç Alt-199
È Alt-200
É Alt-201
Ê Alt-202
Ë Alt-203
Ì Alt-204
Í Alt-205
Î Alt-206
Ï Alt-207
Ð Alt-208
Ñ Alt-209
Ò Alt-210
Ó Alt-211
Ô Alt-212
Õ Alt-213
Ö Alt-214
× Alt-215
Ø Alt-216
Ù Alt-217
Ú Alt-218
Û Alt-219
Ü Alt-220
Ý Alt-221
Þ Alt-222
ß Alt-223
à Alt-224
á Alt-225
â Alt-226
ã Alt-227
ä Alt-228
å Alt-229
æ Alt-230
ç Alt-231
è Alt-232
é Alt-233
ê Alt-234
ë Alt-235
ì Alt-236
í Alt-237
î Alt-238
ï Alt-239
ð Alt-240
ñ Alt-241
ò Alt-242
ó Alt-243
ô Alt-244
õ Alt-245
ö Alt-246
÷ Alt-247
ø Alt-248
ù Alt-249
ú Alt-250
û Alt-251
ü Alt-252
ý Alt-253
þ Alt-254
ÿ Alt-255

14. Permanent Messages

The following messages are standard on matrix and 3-line character signs. Matrix messages will use a variety of fonts and bitmap graphics. Character messages will use the standard font, text versions of the MUTCD signs and arrow graphics. Messages for 2-line character signs may be shortened or reformatted. For 1-line signs, most permanent messages will be blank. All sign models will have the 3 standard test messages: LED on (Alt-+), alphabet (Alt-—), and factory test (Alt-[).

P001: Blank Message
P002: Time & Temperature
P003: Standard Message (Shift-F3): CLICK IT OR TICKET
P004: Standard Message (Shift-F4): CONSTR. ZONE FINES DOUBLED
P005: Standard Message (Shift-F5): WORKERS AHEAD GIVE EM A BRAKE
P006: Standard Message (Shift-F6): REPAIRS AHEAD USE CAUTION
P007: Standard Message (Shift-F7): WRECK AHEAD REDUCE SPEED
P008: Standard Message (Shift-F8): DEICING AHEAD STAY BACK
P009: Standard Message (Shift-F9): SNOW REMOVAL STAY BACK
P010: Standard Message (Shift-F10): PAINT CREW LANES WET DO NOT PASS
P011: Standard Message (Shift-F11): PAINT CREW << KEEP LEFT
P012: Standard Message (Shift-F12): PAINT CREW >> KEEP RIGHT
P013: Standard Message (Shift-F1): MERGE <------
P014: Standard Message (Shift-F2): MERGE ------>
P015: Arrow Message: << KEEP LEFT
P016: Arrow Message: >> KEEP RIGHT
P017: FHWA Message: ALL LANES OPEN
P018: FHWA Message: BLOWING SNOW
P019: FHWA Message: BRIDGE CLOSED AHEAD
P020: FHWA Message: CAUTION DUST STORM
P021: FHWA Message: CAUTION FOG AHEAD
P022: FHWA Message: CAUTION HIGH WINDS
P023: FHWA Message: CAUTION ICY ROAD
P024: FHWA Message: CAUTION ROAD FLOODED
P025: FHWA Message: CAUTION SLIPPERY ROAD
P026: FHWA Message: CHAINS REQUIRED AHEAD
P027: FHWA Message: DANGER FALLING ROCKS
P028: FHWA Message: DO NOT PASS
P029: FHWA Message: EMERGENCY VEHICLES
P030: FHWA Message: FLAGGER AHEAD
P031: FHWA Message: FOLLOW DETOURS AHEAD
P032: FHWA Message: FOLLOW PACE CAR
P033: FHWA Message: HEAVY TRAFFIC AHEAD
P034: FHWA Message: LANES CHANGE AHEAD
P035: FHWA Message: LOAD SPILL
P036: FHWA Message: WORKERS AHEAD
P037: FHWA Message: PAINT CREW
P038: FHWA Message: ROAD CLOSED AHEAD

P039: FHWA Message: SLOW MOVING TRAFFIC
P040: FHWA Message: STEEL PLATES
P041: FHWA Message: TRAFFIC SIGNAL OUT
P042: FHWA Message: WATCH FOR TRUCKS
P043: Arrow Message (Alt-F1): 4-Corner Caution (flashing)
P044: Arrow Message (Alt-F2): Diamonds Caution (flashing)
P045: Arrow Message (Alt-F3): Bar Caution (flashing)
P046: Arrow Message (Alt-F4): Double Arrow (flashing)
P047: Arrow Message (Alt-F5): Left Arrow (flashing)
P048: Arrow Message (Alt-F6): Right Arrow (flashing)
P049: Arrow Message (Alt-F7): Left Arrow (walking)
P050: Arrow Message (Alt-F8): Right Arrow (walking)
P051: Arrow Message (Alt-F9): Left Chevrons (walking)
P052: Arrow Message (Alt-F10): Right Chevrons (walking)
P053: Arrow Message (Alt-F11): Left Stem Arrow (walking)
P054: Arrow Message (Alt-F12): Right Stem Arrow (walking)
P055: Hwy Radio Message: ADVISORY TUNE TO #### AM
P056: Speed Message: MINIMUM SPEED ## mph
P057: Radar Message: SPEED LIMIT ## mph
P058: Radar Message: ## mph YOUR SPEED
P059: Radar Message: ## mph YOUR SPEED (flashing)
P060: Speed Message: MINIMUM SPEED ## kph
P061: Radar Message: SPEED LIMIT ## kph
P062: Radar Message: ## kph YOUR SPEED
P063: Radar Message: ## kph YOUR SPEED (flashing)
P064: Radar Message: SLOW DOWN (flashing)
P065: Speed Message: SLOW
P066: Speed Message: STOP
P067: NTCIP Message: LOW POWER
P068: NTCIP Message: POWER RESET
P069: NTCIP Message: COMM LOST
P070: NTCIP Message: SYSTEM RESET
P071: LED Test Page (Alt-+)
P072: Alphabet Test Page (Alt-—)
P073: Time & Voltages
P074: Time & Temperatures
P075: MUTCD Sign, M4-10L: Detour <------
P076: MUTCD Sign, M4-10R: Detour ------>
P077: MUTCD Sign, W1-4bL: <------ Lanes Shift Left
P078: MUTCD Sign, W1-4bR: ------> Lanes Shift Right
P079: MUTCD Sign, W7-1: Steep Grade (Truck Downhill)
P080: MUTCD Sign, W1-5: Curvy Road (Reverse Curve)
P081: MUTCD Sign, W6-1: Median Begins 2-Way Traffic (Begin Divided Hwy)
P082: MUTCD Sign, W6-2: Median Ends 2-Way Traffic Keep Right (End Div Hwy)
P083: MUTCD Sign, R4-7: Keep Right Median Begins

P084: MUTCD Sign, W4-1R: Merge Ahead (Incoming from Right)
P085: MUTCD Sign, W20-7a: Flagger Ahead
P086: MUTCD Sign, W21-1a: Workers Ahead
P087: MUTCD Sign, W8-5: Slippery Road
P088: MUTCD Sign, W1-7: Double Arrow (non-flashing)
P089: MUTCD Sign, W1-6L: Left Arrow (non-flashing)
P090: MUTCD Sign, W1-6R: Right Arrow (non-flashing)
P091: OPEN
P092: CLOSED
P093: Manufacturer/Logo
P094: Factory Test Sequence (Alt-[)