CLIFT INNOVATIONS

WAC-07M

Wireless Annunciation Controller

Technical Reference Manual

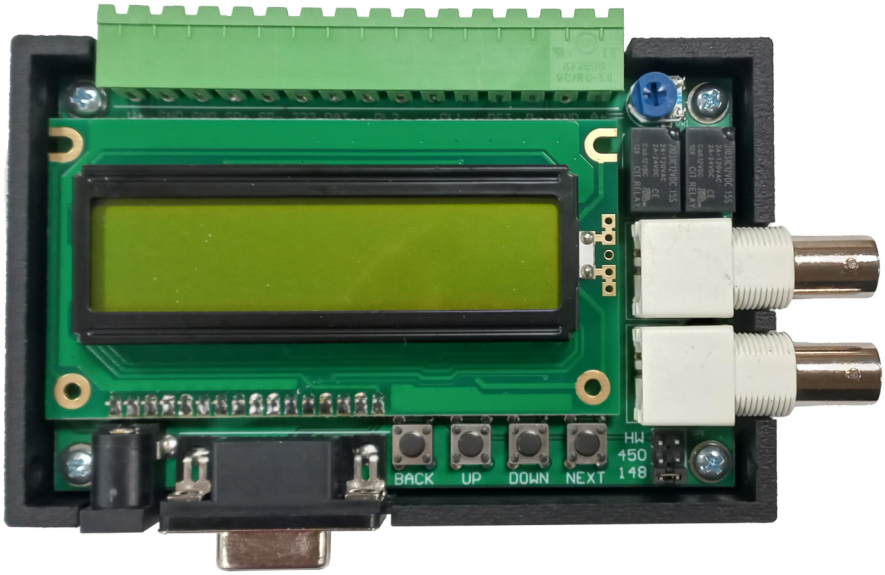
CONTENTS

INTRODUCTION

This document is to assist with the installation and configuration of the CLIFT WAC-07M (Wireless Alert Controller) modules.

The WAC-07M is a radio or hard-wired controller for CLIFT BestLite displays. WAC-07M stores the call messages internally, and provides a variety of means for refreshing the messages on the displays.

Multiple formats and configuration options are available, making WAC-07 flexible enough for a wide range of applications.

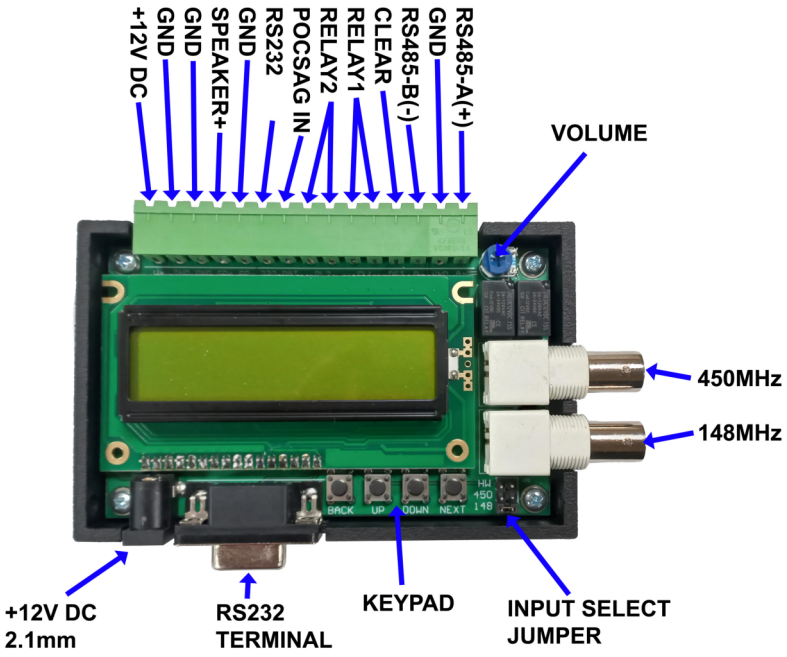


WAC-07 INTERNAL VIEW

IMPORTANT CONSIDERATIONS

1. Do not allow moisture or foreign items to enter the WAC07 housing.
2. Beware of static discharge which may occur when touching PCB components.

INTERNAL COMPONENTS



CONNECTORS

Power Connector

The power connector is a DC jack with a 2.1mm pin. The power requirements are 12V @ 200mA. The centre pin is positive. Beware that plugs designed for 2.5mm pins, will work intermittently.

Ground and DC-input connections

These are physically connected in parallel with the DC jack, and are provided as a power supply connection if an alternate DC source is used.

If these terminals are used to power accessories, the maximum current between these connections and the DC jack should not exceed 4A.

Antenna connector

These are 50-ohm BNC connectors, for receiving 148.3375MHz or 450.3375MHz FM transmissions. If used, it must be cabled to an appropriate antenna with correct orientation.

A 148MHz quarter wave antenna is provided with this model.

Do NOT wire this directly to a paging transmitter.

Do NOT install the receiving antenna within 2 meters of the transmitter's antenna.

Serial Maintenance / Craft Port DB9

The RS-232 interface may be used to configure the WAC-07M using a terminal program such as HyperTerminal or Hercules (preferred). It can also be used to display & monitor diagnostic information, or to upload new WAC-07M operating firmware. This port also has alternative modes which can be selected in the terminal.

Details on specific DB9 functions are described below in the section 'Console menu'

The port is configured as standard DCE, for connection with a PC's COM ports.

RS485 output

This is the preferred interface to the BestLite LED display panels.
Each run of cable between devices use a **single twisted pair** for A & B only, and must be terminated in a 120-ohm resistor at the end of the run length. Tee-off branches, or star topologies can only be attempted with additional hardware data repeaters.

RS232 output

This outputs the same data as the RS485 but at RS232 levels. It was historically used for early model Bestlite displays which did not support RS485. It has no application for current models.

Hardwired Clear input

This is used where display messages must be purged with a manual or external contact closure.
The clear input is a momentary closure to GND.

When the input is asserted, all messages which have been displayed at least once will be deleted.

Messages which have not yet displayed due to higher priority events will be retained.

Relays 1 & 2

These utility relays are available to interface accessories to the WAC-07.

They may be configured to actuate on fault and alarm events - with a pulse or other cadence.

The relays are rated at 1A for low voltage operation (max. 50VDC).

Details on specific relay operations are explained in the section 'Relay outputs' below.

Hardwired data input (terminal 9)

This input can accept hard wired POCSAG data at 0:5V levels. It may be used as an alternative to the radio receiver. An onboard jumper selects between this input, and the radio receivers. It may also be used to receive serial 1200baud data at RS232 levels from a number of devices. Details on specific modes are explain below in the section 'Console menu'.

Speaker output

A local 8 ohm speaker may be connected between this terminal and ground. This audio output sounds all tones applicable to Bestlite channel #1. Volume for this output is controlled by an on-board trim pot.

Volume control

This adjusts the volume of the speaker output provided on the terminal block only. It does not affect the volume of the tones generated by the addressable Bestlite displays.

Hardwired / Radio Jumper setting

This jumper must be positioned correctly depending on if the 148MHz or 450MHz radio receiver is used, or if the hardwired input is used.

CONTROLS & DISPLAYS

The buttons BACK, UP, DOWN, NEXT, are used when configuring the device using the LCD display. The device cannot be fully configured using this method, and the serial port is preferred.

LCD display

During operation, the LCD display will rotate through the operating status of the device, showing device version, capacity used, etc… It is also used when configuring the device via the pushbuttons.

Information shown on the display:

Firmware version

DB9 serial port mode, Console / Winmonitor / Sedco / Austco

Input mode (terminal 9), POCSAG / Hardwired / Paging / Austco

%Ram used

Number of messages (1 includes fallback message)

Highest alert priority, Diagnostic / Call / Wet area / Staff assist / Emergency

POCSAG paging data Input

(Post Office Code Standardization Advisory Group)

POCSAG input can be via the on-board radio receivers, or hardwired via terminal 9.

The input has three polarity options.

Normal (default),
Inverted
Auto.

The default ‘Normal’ operates with the optional onboard receiver.

If the *external* POCSAG data input is used, the polarity may need to be inverted depending on the source device generating the POCSAG data.
If the polarity of the POCSAG data cannot be determined, the ‘Auto’ option can be used to auto-detect.

Note that auto polarity cap codes 52088 through 52095 cannot be used.

The input has two baud rate options.

512bps (default)

1200bps

Pager message formats

Messages sent to the WAC-07 have one of the following purposes:

None - if the CAP code is not recognised.
Add - a new message to the message stack.
Remove - a message from the message stack.
Reset - remove ALL messages from the stack.
Mute – silence an existing message.
Watchdog - clear the watchdog timer only.

CAP codes (RIC)

Received POCSAG messages must be sent to one of the following CAP codes.

Global CAP code (default 0123464), message will affect ALL 16 channels.
Watchdog CAP code (default 0123456), message will ONLY reset the watchdog.
321408, message will be 'Emergency' level, if plain format is used, affects all displays.
321416, message will be 'Assist' level if plain format is used, affects all displays.
321424, message will be 'Wet area' level if plain format is used, affects all displays.
1 of 4 CAP codes configured for any of the 16 displays (64 CAP codes total).

Message parameters

The WAC-07 determines, or assumes certain message parameters, dependent on the input format used.

Priority.
Auto cancel option.
Night / Day volume.
Client Code.
Zone.
Display text.

Priority

There are 6 possible message priorities:

Emergency (highest).
Assist.
Wet Area.
Call.
Diagnostic (also referred to as Nurse present).
System.
Fallback (also referred to as Idle).

Each priority level has independent options for display colour, display mode, and cadence.

Higher priority messages are always displayed before lower priority messages, with the exception of System messages, which will be included in any display rotation.

Currently the only system message is the internally generated "System Down" which occurs during a fault.

The *fallback* priority displays a message, when no other messages are pending.

Auto Cancel

With some input formats, it is not possible to cancel a message by means of a POCSAG transmission. In these cases messages must time out automatically.

Night / Day volume

This parameter informs the device if lower volume cadences should be used. It does not affect Emergency priority messages, which will always sound full volume alerts.

Client Code

This is a number used for identification purposes.

Zone

This is a number used for identification purposes.

Display text

This is the text shown on the display panel.

In some formats, this is also used for identification, and may have some processing applied before being displayed (for example, the Smart Link format removes the [] characters before displaying the message).

BestLite LED Display Control

Message selection

Each display panel cycles through all messages of the highest available priority.

If a new message of equal or higher priority is received, the display will jump immediately to this new message.

If the current display message is cancelled, the panel will refresh immediately with the next message of the highest available priority.

Sounds

Each display message is associated with a tone.

There are a total of 13 alert tones available, and 4 types of presentation pattern.

Silence – (silence).
Single – a sound which sounds only once.
Periodic – a sound that repeats over a specific period of time.
Repeating – an ongoing sound, such as repetitive beeping.

There is a “Repeat all/cycle” option, which allows single tones to be repeated, each time the display updates.

By default, a tone will only sound once, the first time a new message is displayed.

A ‘Periodic’ cadence is one which is required to repeat after a specific period, there is currently only one recurring cadence, which sounds a dingdong every 30 seconds. Periodic cadences re-sound and re-start the interval every time a new message is displayed for the first time.

The tone cadences available are:

Silence	-	silence.
2 Beeps	-	single.
8 Beeps	-	repeating.
8 Slow beeps	-	single.
Beeping	-	repeating.
Ding Dong	-	single.
Ding	-	repeating.
Ding Dong	-	repeating.
Dong Dong	-	single.
Ding Ding Ding	-	single.
2 Beeps	-	repeating.
3 Beeps	-	repeating.
Ding Dong	-	periodic 30sec.

Display types

Addressable

When using addressable BestLite displays, the panels should be configured in the addresses range 1-16.

Multiple displays can share the same address, providing identical operation of all the like-addressed panels.

WAC-07M will use separate CAP code and priority filter settings for each of the 16 unique addresses.

Relay Outputs

Possible relay operating modes are:

CALL

The relay will activate for the duration of the highest priority in the message stack .
Message priority: CALL or higher .

The relay will not activate for diagnostic level messages (lower priority than 'call')

If the relay is configured to *pulse*, it will trigger when the highest priority in the message stack *transitions* to 'Call' or higher.
The relay will *not generate a pulse for every message received*, unless each message is cancelled before the next occurs.

EMERGENCY

Identical function to mode 'Call'.
The alert trigger level is EMERGENCY.

WATCHDOG

The relay will activate, for the duration of an error condition caused by no traffic being received for longer than the watchdog period. If the relay is configured to pulse, it will pulse once when this condition occurs. The pulse duration is 1-sec.

By default, the watchdog is disabled. The watchdog may be used to detect system failure... timing out if no messages are received within a configurable period of time.

If the watchdog times out , "System down" will be shown on all the displays.
It will be cleared when a new message is received.

Messages to the watchdog CAP code (default -0123456), will clear only the watchdog, and not show on any of the display panels. Systems required to specifically produce a transmission to clear a watchdog should use this CAP code over any other method.

PULSE/STEADY

The relay may be configured to produce a pulse or activate in a steady state for the duration of it's trigger condition.

CONSOLE MENU

The console menu is the easiest way to setup and configure the WAC-07.

Connect a serial craft terminal configured for 38400,n,8,1 and press the space bar.
The main menu will appear:

```
****** WAC-07 V4.17.0 Main Menu ******
1.  Global CAP Code      123464
2.  Watchdog CAP Code    123456
3.  Display Settings
4.  Priority colours, modes, and sounds.
5.  Timing Settings
6.  Relay Settings
7.  Protocol Settings
8.  Default Settings
9.  Upload Firmware
10. Display test
11. Select debug output
12. DB9 Serial port mode
13. Pocsag settings
14. Hard wired input Settings
15. Terminal-9 input type : POCSAG data
0.  Exit
>
```

If an option is not selected for 30sec, the menu will exit automatically.

---

1. Global Cap Code

Select this option to change the global CAP code. Messages sent to this CAP code will be sent to all 16 display addresses. The default for this setting is 123464.

---

2. Watchdog Cap Code

Select this option to change the watchdog CAP code. Messages sent to this CAP code will only reset the watchdog timer, and will not show on the displays. The default for this setting is 123456.

3. Display Settings

Select this option to configure the type of display, display CAP codes, and priority filters. The following submenu will appear:

```
****** Display Menu ******
1. Display type ADDRESSABLE
2. Cap Codes
3. Priority Filters
4. Fallback message "* * * * * *"
5. Fault message    "Attend System"
```

Option 1 toggles the display type between addressable and non-addressable. This should normally be set to Addressable.

Option 2 shows the following sub-menu:

```
DISPLAY#    CAPCODE-1   CAPCODE-2   CAPCODE-3   CAPCODE-4
 1          0           0           0           0
 2          0           0           0           0
            ::          ::          ::          ::
15          0           0           0           0
16          0           0           0           0
Select display (1-16) >
```

To modify a CAP code for a particular display, enter the display address number (1-16), then select a CAP code 1-4, and enter a new value between 0 and 2097151. 0 means disabled.

Option 3 shows the following sub menu:

```
DISPLAY# 1.SYSTEM     2.DIAGNOSTIC 3.CALL       4.WET AREA   5.ASSIST     6.EMERGENCY

 1         YES          YES          YES          YES          YES          YES
 2         YES          YES          YES          YES          YES          YES
::         ::           ::           ::           ::           ::           ::
15         YES          YES          YES          YES          YES          YES
16         YES          YES          YES          YES          YES          YES

Select display (1-16) >
```

To enable or disable a priority for a certain display address, select the display address 1-16, then a priority 1-5, the filters will toggle between **YES/NO.**

Note: These settings may be used to prevent certain messages (such as the system message "SYSTEM DOWN") from showing on displays which are visible to the public.

Option 4 edits the default fallback message. This is shown when no calls are present.

Option 5 edits the system fault message. In earlier firmware revisions this was fixed to "System Down", the default for this message is now "Attend System", and it is configurable.

4. Priority colours, modes, and sounds

Select this option to configure the colours, display modes, sounds, volume, fonts, and brightness levels for different priorities. The following sub menu will appear:

```
****** Priority Options ******
1. Colours
2. Modes (scroll/static)
3. Sounds
4. Volume
5. Font
6. Brightness
>
```

Select option 1 to modify colours. The following sub menu will appear:

```
****** Priority Colours ******

1. Fallback   GREEN
2. System     RED
3. Diagnostic AMBER
4. Call       AMBER
5. Wet Area   AMBER
6. Assist     FLASH AMBER
7. Emergency  RED
Select >
```

Choose a Priority, and then select a colour (1-7).

Select option 2 to modify display modes, the following sub menu will appear:

```
****** Priority Display Modes ******
1. Fallback   SCROLL
2. System     STATIC
3. Diagnostic STATIC
4. Call       STATIC
5. Wet Area   STATIC
6. Assist     STATIC
7. Emergency  STATIC
Select >
```

Choose a priority to toggle between STATIC and SCROLL.

Select option 3 to modify sounds. The following sub menu will appear:

```
****** Priority Sounds ******
1. Fallback   SILENCE
2. System     SILENCE
3. Diagnostic DINGDONG
4. Call       2BEEPS
5. Wet Area   2BEEPS
6. Assist     8SLOWBEEPS
7. Emergency  BEEPING_REP
8. Repeat sound every display cycle? NO
9. Listen to sounds
Select >
```

Choose a priority and then select from one of the available sounds.

See the section on ‘Display control’ for a description of option 8.

Select option 4 to configure the volume for each priority. The following sub menu will appear:

******** Priority Volume for day/night ********

1. Fallback Night=-18dB Day=0dB(max)
2. System Night=-18dB Day=0dB(max)
3. Diagnostic Night=-18dB Day=0dB(max)
4. Call Night=-18dB Day=0dB(max)
5. Wet Area Night=-18dB Day=0dB(max)
6. Assist Night=-18dB Day=0dB(max)
7. Emergency Night=0dB(max) Day=0dB(max)
8. Listen to sounds
Choose a priority and select from the available volume levels.

Select option 5 to configure fonts for each priority. The following sub menu will appear:

******** Priority Fonts ********
1. Fallback Standard 5x7
2. System Standard 5x7
3. Diagnostic Standard 5x7
4. Call Standard 5x7
5. Wet Area Standard 5x7
6. Assist Standard 5x7
7. Emergency Standard 5x7
Select >
Choose a priority and select from the available fonts 5x7, 8x8 or small.

Select option 6 to configure brightness for each priority. This setting only takes effect on Bestlite 4.

******** Priority Brightness for day/night ********
(note: supported by Bestlite 4 onward)

1. Fallback Night=9 Day=9
2. System Night=9 Day=9
3. Diagnostic Night=9 Day=9
4. Call Night=9 Day=9
5. Wet Area Night=9 Day=9
6. Assist Night=9 Day=9
7. Emergency Night=9 Day=9
Select >
Choose a priority, and select brightness for day/night.

5. Timing Settings

Select this option to modify timing settings in the WAC-07.

The following sub menu will appear:

```
****** Timing Settings ******
1. Display cycle 5sec
2. Auto cancel   60sec
3. Maximum life  240min
4. Watchdog      0min (disabled)
Select >
```

Choose the setting to modify, and enter a new value.
A short description of the setting will appear.

6. Relay Settings

Select this option to configure the relays, the following sub menu will appear:

```
****** Relay Settings ******

1. Relay 1 mode     Watchdog
2. Relay 1 polarity Normally Open
3. Relay 1 action   Steady

4. Relay 2 mode     Emergency
5. Relay 2 polarity Normally Open
6. Relay 2 action   Steady

Relay 1 will close for the duration of a watchdog timeout.
Relay 2 will close for the duration of emergency alert level.

Select >
```

The available settings are shown, along with a text description of the relays behaviour.
Note that when the cadence mode is selected, the Steady/Pulse option is not available.

7. Protocol Settings

Select this option if you wish to enable or disable any of the available input formats.

The following sub menu will appear:

```
****** Input formats ******
1. Adteck                    YES
2. Smart Caller Plain text   YES
3. Smart Caller alt1 %{type} YES
4. Smart Caller alt2 %9      YES
5. Smart Caller standard     YES
6. Smart Link                YES
7. Smart Link type A         YES
8. Smart Link type B         YES
9. Smart Link type C         YES
10.Sedco ID = capcode        NO
Select >
```

Selecting a format will toggle **YES/NO**
Option 1-9 enable/disable formats delivered by POCSAG.
Option 10 modifies the behaviour of Sedco input. See section 'Input sources' for description.

8. Default Settings

This option will default all settings in the WAC-07. There are default options available to suit Smart Caller and Smart Link installations. Beware that this will erase all display cap codes to 0 (disabled).

9. Upload Firmware

The WAC-07M is able to load new firmware via the console interface.
Do not attempt to use HyperTerminal for this action.

It is recommended to use a terminal program called Hercules.
Using Hercules, Press Z (upper case), then right click the background and choose 'Send File', select the .hex file supplied. The loader will report progress as the part programs, you will occasionally see 'Retry' messages this is normal.

If for some reason the upload fails, you will be prompted again to press Z and send the hex file. If the load fails, and the device ends up in a state where you are unable to enter the console menu, the following procedure can be used to activate the boot loader.

1. Configure the terminal for 9600 baud (not 38400).
2. Remove power from the unit.
3. Hold space on the terminal, while powering the unit.

You will see a prompt and be able to upload the .hex file.
The upload will take longer due to the lower data rate of 9600.

Don't forget to change the bit-rate back to 38400 after the load is successful.

10. Display test

This option will send a continuous test sequence to all displays. It is designed to test the displays power supply under load, and communication reliability. It may also be used to identify the address setting on each display.

11. Select debug output

After exiting the main menu (option 0). The serial port will output diagnostic information. By default, this only includes complete POCSAG messages received by the WAC-07. Other options may be enabled, but their output is not intended to be meaningful to installers. Installers who seek technical support may be requested to enable these options and capture their output. These settings are not saved, and always default on reset.

12. DB9 Serial port mode

```
****** DB9 Serial port mode ******
1. Reset with COM port in Winmonitor mode
2. Reset with COM port in Sedco mode
3. Reset with COM port in Austco mode
```

1. Winmonitor mode.

This allows the WAC07 it to be connected directly to a PC running Smart Caller Winmonitor software. In this situation the WAC-07 replaces a POCSAG paging encoder, removing the need for any kind of radio link, and also removing delays associated with POCSAG encoding/decoding. The baud rate of this interface is 1200bps.

As well as receive paging messages directly, the WAC-07 is also able to respond to polling activity from Winmonitor, and generate a fault condition “Attend System” message if polling fails.

2. Sedco mode.

This allows the serial port to be connected directly to a Sedco hardwired input module. The baud rate of this interface is 9600bps. It is possible to interpret the Sedco ID as a capcode (see 7. Protocol settings). This allows steering different Sedco ID’s to different Bestlite address channels.

3. Austco mode.

This allows the serial port to receive display data from an Austco head end. The baud rate of this interface is 1200bps.

Once in an alternative mode, the console menu cannot be accessed until console mode is re-selected. To do this, connect a terminal program to the WAC-07 at 1200 or 9600 baud. Send the text string **WAC07MENU** , you will see a short response message, instructing you to re-connect at 38400 baud and access the console menu. The current mode of the serial port is shown on the LCD display.

13. Pocsag settings

This modifies the POCSAG polarity settings as described above under ‘Pocsag paging data input’.

14. Hard wired input settings

This option supported a 16way hard wired input module which is now discontinued. This feature has no application with currently available hardware.

15. Terminal-9 input type

Terminal 9 was primarily used for receiving POCSAG data at CMOS levels. It could be wired to the output of a POCSAG encoder, bypassing the radio transmitter and receiver.

As extra features have been added to the WAC, this terminal now has 4 possible functions. These are described in detail in the console menu itself. This setting is shown on the LCD rotation as one of:

INPUT-POCSAG
INPUT-HARDWIRED
INPUT-ENCODER
INPUT-AUSTCO

The sub menu shown is:

******** TERMINAL 9 INPUT TYPE (Requires RESET) ********

1. POCSAG.
Select this option if you wish to use the radio receiver,
or hard wire POCSAG data from a paging encoder output to terminal 9
Use jumper to select radio or hardwired.

2. HARDWIRED INPUT MODULE.
Select this option if you are using the 16-way hard wired input module.
Connect the 'B' terminal of the input module to terminal 9.
Use option #14 from main menu to configure the 16 inputs.

3. PAGING ENCODER STRINGS
Select this option, if you wish to parallel terminal 9
with the existing serial data connection between the head end
,and the paging encoder input. This connection is on pin 3 (txd) of the head end DB9.

4. AUSTCO DATA
Select this option if you wish to use terminal 9 to receive Austco strings.
Note that this is also possible with the DB9 serial port.
Select >

0. Exit

Exit the menu and continue normal operation.

FRONT-PANEL SETUP

If a serial craft terminal is not available, you may configure the WAC-07 using the buttons and LCD. \

It is not possible to enter the LCD menu while the console menu is active, and vice versa.

Press any button to enter the LCD menu, the options are:

Select Sounds
Colours & Modes
Relay Functions
Display Timing
Cap Codes
Priority Filters
Display Test
Radio Polarity
Protocol
Default Settings
Display Type

Press **BACK** to exit the menu, or **UP** and **DOWN** to rotate through menu items, and **NEXT** to select.

The menu will exit if no buttons are pressed for 30 seconds,.

Select Sounds

BACK to exit.

UP and **DOWN** rotate through priorities, and **Repeat All/Cycle** option.

NEXT rotates through available cadences, or toggles **Repeat All/Cycle** option.

Colours & Modes

BACK to exit.

UP and **DOWN** rotate through priorities and colour/mode.

NEXT rotates through available colours, or toggles display mode SCROLL/STATIC.

Relay Functions

BACK to exit.

UP and **DOWN** rotate through relay parameters.

NEXT rotate through modes, toggles polarity, or toggles PULSE/STEADY.

Display Timing

BACK to exit.

NEXT to select timing parameter.

UP and **DOWN** to modify a timing parameter.

Cap Codes

BACK to exit.

UP and **DOWN** select the CAP code to be modified.

NEXT to begin editing the CAP code.

While editing the CAP code, a flashing cursor will be displayed.

NEXT select which digit to modify.

UP and **DOWN** modify the selected digit.

BACK finished, save modified CAP code.

Priority Filters

BACK to exit.

UP and **DOWN** select which display address.

NEXT begin editing the filter settings for the selected display.

When selecting a display, (**All enabled**) will be shown if none of the priorities have been disabled on this display. When editing filter settings, button controls are:

UP and **DOWN** select the priority level to edit.

NEXT toggle selected priority **YES/NO** (yes means display WILL show this priority).

BACK finished.

Display Test

This sends the same display test sequence as described in console setup.

Radio Polarity

BACK to exit.

UP or **DOWN** or **NEXT** to rotate polarity options of **NORMAL, INVERTED, AUTO**.

See the section above titled “Pocsag input” for a description of polarity options.

Protocol

BACK to exit.

UP and **DOWN** to select which protocol to enable/disable.

NEXT to toggle protocol **YES/NO** (yes means the device WILL respond to this protocol).

Default settings

BACK to exit

UP and **DOWN** to select which default set to use.

NEXT (twice) to default settings.

Display type

BACK to exit.

UP, DOWN, NEXT to toggle display type from **ADDRESSABLE / NON-ADDRESSABLE**.

APPENDIX

PROTOCOL FORMATS

The WAC-07 accommodates protocols from several distributors the contents of which are proprietary to those distributors. Please contact your supplier if you require information on the paging protocol.

Plain text mode is shown below. Contact your system integrator for more information on additional messaging protocols.

Input format Plain text.

{**Message text**}	*Example*: “North Wing Lounge”
Priority	**Call,** or determined by CAP code
Auto cancel option	**Auto Cancel**
Night / Day volume	**Day**
Client Code	**0**
Zone	**0**
Display text	A**ll text**

Contact & Support

Clift Solutions Pty Ltd

50B Mediterranean Circuit, Keysborough VIC, Australia.

Email: michael.j.clift@gmail.com

Phone: (+61) 0417-613-680

Compliance

This product has been tested and found to comply with the following standards:

- **AS/NZS CISPR 15: Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment (EMC)**
- **AS/NZS 3820: Essential safety requirements for electrical equipment (Safety)**

Compliance with these standards allows this equipment to be used in residential, commercial, and light-industrial environments without causing harmful electromagnetic interference, and ensures that it meets the essential safety requirements for electrical equipment.

The product is intended for operation from a safety extra-low voltage (SELV) supply and for connection to an RS485 communication bus. Installation must be carried out in accordance with local regulations by qualified personnel.

This equipment bears the Regulatory Compliance Mark (RCM) in accordance with the requirements of the Australian Communications and Media Authority (ACMA).

Supplied by Clift Solutions Pty Ltd, Responsible Supplier Number: E20891