



TECHNICAL MANUAL

WAC-07

ANNUNCIATOR DISPLAY CONTROLLER

MODELS

WAC-07-01 POCSAG Wireless Controlled

WAC-07-02 Hard-Wire RS485 Controlled

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Smart-Caller Pty Ltd
PO Box 78
Mentone 3194
AUSTRALIA
Phone 03 9588 0833
Fax 03 9588 0933
Email sales@smartcaller.com.au
www.smartcaller.com.au

CLIFT INNOVATIONS

WAC-07

**Wireless Annunciator Controller
Technical Reference Manual
(Hardware model WAC710)**



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INTRODUCTION

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

The WAC-07 is a radio or hard-wired controller for CLIFT BestLite displays.

WAC-07 stores the annunciator messages internally, and provides a variety of means for refreshing the messages on the displays.

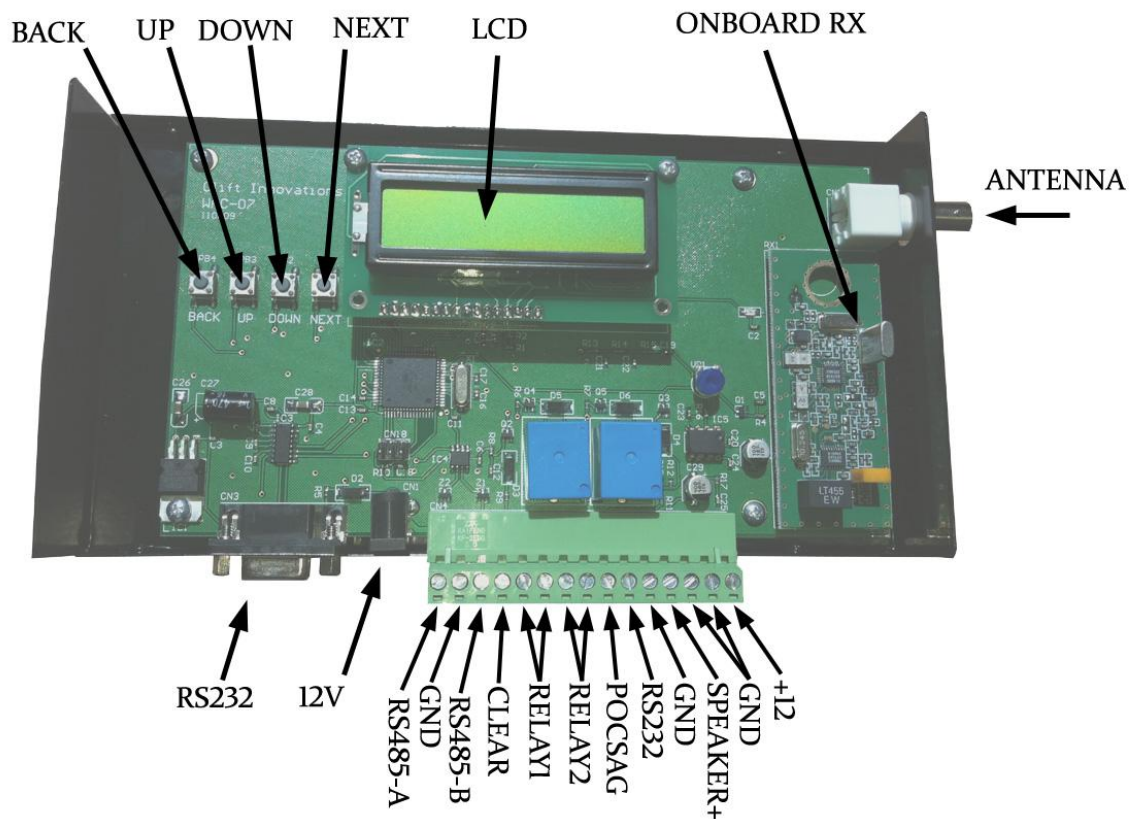
WAC-07 operates with either addressable or non-addressable BestLite displays.

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

Order Codes: Off air with on board receiver: WAC-07-01

Hard wired pocsag data: WAC-07-02

WAC-07 INTERNAL VIEW



CONNECTORS

Power Connector

The power connector is a DC jack with a 2.1mm pin. The power requirements are 9-12V @ 200mA. The centre pin is positive.

A 9V / 660mA DC plug-pack is supplied with each unit.

Each display should be powered by it's own nearby power supply.

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.

The standard DC plug-pack provided with the unit will not provide more than its rated current.

Antenna connector

If the internal paging receiver is fitted, this is a 50-ohm BNC connector, for receiving 148.3375 MHz FM transmissions. It must be cabled to an appropriate antenna with correct orientation.

A 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

The RS-232 interface may be used to configure the WAC-07 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-07 operating firmware.

The port is configured as standard 9 pin female DCE, for connection with a PC's COM ports.

The port settings are:

Baud:	38400
Data bits:	8
Parity:	None
Stop bits:	1

Display RS232 output

The RS-232 output on the terminal block can be used to communicate with Bestlite displays over short distances (<25meters).

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 such as the CLIFT RS485 splitter..



Multi-Drop RS-485 cabling and 120-ohm termination

Speaker output

This can be wired to an external 8ohm speaker. It is most useful in situations where the Bestlite display is not used to generate alert tones. The output will sound all alert tones which are sent to display address 01. The volume can be controlled by the VR1 trimmer on the main PCB. The speaker should be connected between this terminal and ground.

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 0V.

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 POCSAG data input

This input can only be used when the WAC-07 is supplied without the onboard radio paging receiver. This input can accept POCSAG data at 0:5V levels.

If the onboard radio receiver is fitted, this input should be left un-assigned.

CONTROLS & DISPLAYS

The buttons BACK, UP, DOWN, NEXT, are used when configuring the device using the LCD display. Although the device can be fully configured using this method, the serial craft 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.

POCSAG paging data Input

(Post Office Code Standardization Advisory Group)

The POCSAG input data rate is 512 bps, higher bit-rates are not supported.

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 to 52095 cannot be used.

Pager message formats

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

- None - if the CAP code is not recognized.
- Add - a new message to the message stack.
- Remove - a message from the message stack.
- Reset - remove ALL messages from the stack.
- Watchdog - clear the watchdog timer only.

CAP codes (RIC)

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

- Global CAP code (default 0123464), message will affect ALL 16 displays.
- 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).
- 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 events.

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. Panels must NOT be left at the default address of 00.

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

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

Non-Addressable

Multiple non-addressable BestLite panels can be used, however the WAC-07 does not have control over the individual displays. Only the settings for Address 01 apply.

Non-addressable displays cannot generate tones. The external speaker output must be used in this mode, or the relays can be used to activate external audible alerts.

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.

CADENCE

There are four relay cadence' available:

- Silence - nothing
- 1 beep - single (to generate this, select cadence option 'DingDong')
- 2 beeps - single
- Beeping - repeating

This feature is intended to generate sounds when non-addressable displays are used.

The relay will generate closures - regardless of which type of display is used. However, when addressable displays are used, the relays will only trigger on events sent to display panel address 01.

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 V1.0 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
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
```

Option 1 toggles the display type between addressable and non-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
3	0	0	0	0

```

      ::      ::      ::      ::
14      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.DIAGNOSTIC  2.CALL  3.WET AREA  4.ASSIST  5.EMERGENCY
1             YES      YES      YES      YES      YES
2             YES      YES      YES      YES      YES
3             YES      YES      YES      YES      YES
:             ::      ::      ::      ::      ::
14            YES      YES      YES      YES      YES
15            YES      YES      YES      YES      YES
16            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**.

4. Priority colours, modes, and sounds

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

```

***** Priority Options *****
1. Colours
2. Modes (scroll/static)
3. Sounds
>

```

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

```

***** Priority Colours *****
1. Fallback GREEN
2. Diagnostic AMBER
3. Call AMBER
4. Wet Area AMBER
5. Assist FLASH AMBER
6. 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. Diagnostic STATIC
3. Call STATIC

```

```
4. Wet Area    STATIC
5. Assist      STATIC
6. 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. Diagnostic  DINGDONG
3. Call        2BEEPS
4. Wet Area    2BEEPS
5. Assist      8SLOWBEEPS
6. Emergency   BEEPING_REP
7. Repeat sound every display cycle? NO
Select >
```

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

See the section on 'Display control' for a description of option 7.

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
Select >
```

Selecting a format will toggle YES/NO

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-07 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.

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.

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 }	<u>Example:</u> "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	All text