Pendant Transmitter

Product Manual

20-86 Series

salcom

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About us

Salcom, derived from Sea, Air, and Land Communication, is a pioneering force in New Zealand, excelling in the development, manufacturing, and supply of cutting-edge wireless and technical solutions. Our ISO 9001:2015 certification underscores our unwavering commitment to quality and durability in every product.

Our solutions transcend borders and industries, with applications in emergency services, healthcare, environmental monitoring, maritime operations, security, agricultural technology, and more. From intricate healthcare systems to sophisticated tsunami warning networks, Salcom empowers global progress with innovative technology.

At Salcom, we evolve in sync with technological advancements, constantly innovating to meet market and client demands. Our approach is rooted in proven methods and technology, ensuring robustness, reliability, and unmatched performance in every solution we deliver.

Our products are co-created with clients, designed, and manufactured in New Zealand. We take immense pride in our unparalleled customer service, delivering quality products that stand the test of time, exceeding expectations.

Salcom was founded over four decades ago as an independent offshoot of one of New Zealand's most iconic providers of telecommunications and electronic solutions. To this day, Salcom employs engineers who were involved with the founding of the electronics industry. Now operating as a stand-alone organization, our relationship with these organisations remain strong, and we participate in many projects across their distribution network.

Our R&D Engineering team boasts members from world leading telecommunication companies, ensuring we produce the best wireless technology solutions in the world. We are proud to manufacture our products in New Zealand, where quality and reliability are necessities, not luxuries.
We have developed wireless solutions for projects around the globe, including:

- Nationwide satellite paging.
- Lighting systems for container ports.
- Tsunami warning systems for the Pacific Islands.
- Paging systems for Scott Base in Antarctica.
- Port entry lighting systems for Maritime Safety.

With a proven track record from years of working with wireless solutions, you can trust us to deliver on projects of any size.

Join us in shaping the future of communication and connectivity, where every solution reflects our dedication to surpassing standards and driving progress. Salcom represents a wealth of knowledge, expertise, energy, and a steadfast commitment to innovation and excellence.

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Pendant Overview

The 20-86 series pendants are IP67 rated UHF paging transceivers. Pressing a button on the pendant will transmit a POCSAG paging message directly to a nearby pager, or to a private paging network based on the Salcom 20-90-0450-0450, or other POCSAG paging receivers.

The 20-86 pendant is available as a single button or 5-button version. The 5-button version can be programmed with different messages, data rate, and CAP codes for each button increasing the versatility beyond simple paging notification.

Typical applications
» Retail assistance
» Rest home and hospital alerting.
» School and commercial alerting.
» Location reporting or call by zone.
» Remote control of lights, alarms, and machinery.
» Interrogation of the status of remote devices.
» Duress situations.
» Relay receiver control (CAP based or using Salcom Relay protocol).

The 20-86 is IP67 rated to withstand dust and mildly corrosive environments, or full immersion in water up to a depth of one-metre. This means the 20-86 can be worn in a shower or carried outdoors in wet weather without compromising the device.

The 20-86 is powered by a CR2032 lithium button cell with the battery life typically up to 5,000 button presses – the equivalent to two years operation with ten presses per day, five days a week. This can be extended by using short messages, high baud rates, and Salcom POCSAG Rapid protocol for control applications.

Standby battery life is typically greater than five years with occasional use. Heavier use will reduce battery life.

The achievable range is dependent on line-of-sight obstructions however in a lightly obscured path the range can be up to 100-metres and may exceed several hundred meters in open spaces. The Salcom 20-90-0450-0450 transceiver can be used as a store and forward repeater to extend the range if required.

Pendant Overview continued

The 20-86 can receive acknowledgments from a Salcom 20-90-0450 Transceiver module (or other paging network) immediately following a button press. Acknowledgments can be used to indicate that the message has been received, that remote equipment has operated correctly, or to provide an indication of a fault at the remote unit. Acknowledgements are indicated by two green LEDs on the pendant.

Please note that the 20-86 cannot be configured to continuously receive paging messages. We recommend using a standard pager if reception is required.

The 20-86 can support UHF POCSAG pagers operating at 512, 1200, or 2400 baud, in channels spacings of 25kHz, 12.5kHz or 6.25kHz.

Pendant Button Options

20-86-0001

One button; Blue case edges

20-86-0005

Five buttons; Black case edges

20-86-0015

Five buttons; Blue case edges

Pendant Layout

The Layout and Indicators of 20-86 variants are shown in the figures below.

20-86-0001

20-86-0005

Pendant LED Indications

Red Transmit (TX) LED indications

Solid: Transmitting or Receiving message.

Flashing rapidly: Low battery condition.

Occasional flash: One, or more, of the buttons is continuously on and draining the battery.

Green Acknowledgement LED indications

A remote transceiver, such as the Salcom 20-90-0450, can send specific acknowledgment messages to the 20-86 to trigger the green LEDs for a brief period after receiving a transmission from the 20-86. The remote transceiver must be properly configured to send the appropriate messages to the 20-86 immediately after it has received a message from the 20-86. The LED shown, and the meaning of the indication is determined by the remote transceiver.

Low battery indication

Indicated by the red TX LED flashing rapidly. If this indication is seen regularly, then the battery may need replacing. Excessive continuous use of the transceiver may temporally deplete the battery. Allow the battery to recover before using again.

Low battery detection

Low battery detection is done in three stages; Normal, Low and Critical. Normal is the voltage the battery must be at when the button is pressed for the 20-86 to begin a transmission. Low is the voltage the battery must fall below during a transmission to show a low battery state. Critical is the battery voltage at which the 20-86 stops transmitting. These voltages are factory set (see specifications for details); please contact Salcom if different levels are required.

Pendant Dimensions

The dimensions of 20-86 pendants transmitter is shown in the figure below.

20-86 dimensions - mm (in)

Pendant Operation

The operating frequency and messages for each button must be configured for operation. The buttons in 20-86-0000 transmitters are pressed to send preprogrammed messages to the pagers.

When transmitting messages, a solid Red TX LED is shown as an indication. Frequent use can cause the battery to become temporarily depleted although it will often recover after a period of inactivity. When the TX LED becomes dim, flashes rapidly or, fail to light when a button is pressed, it is an indication of low battery and the battery should be replaced (see page 6).

Acknowledge receipts

The 20-86 can be programmed to stay active after a transmission to receive a confirmation, or Acknowledgement, from a receiving 20-90-0450 transceiver.

When an acknowledgement is received, either of the green LED's can be programmed to flash providing a visual indication that the message has been received, or actioned, by the 20-90-0450 transceiver.

Low battery message

The 20-86 can be configured to transmit a message when successive low battery conditions have been detected. The number of low battery events required before this is sent can be programmed in Sacoto.

Battery Replacement Procedure

The 20-86 pendant uses a CR2032 Lithium-manganese coin cell battery and care must be taken when replacing it.

1. Loosen the screw battery cover retaining screw using a PH0 driver then lift the cover at the screw end to remove. The screw is held captive in the cover so cannot be removed completely.
2. Push the battery upwards (towards the centre of the case) to clear it from the battery retaining tabs.
3. Lift battery out from the side nearest the edge of the case (blue arrow in the image above).
4. Insert new battery, + side up, by sliding it upward against the spring contact while clearing the bottom retaining tabs.
5. Push the battery into the compartment and allow it to slide down under retaining tabs.
6. Ensure the O-ring seal is still on the battery cover and remains undamaged.
7. Refit the cover, tab end first.
8. Tighten the battery cover screw to ensure the battery is not accidentally removed.

The battery cover screw should be tightened to 0.06nm torque or approximately finger tight plus a quarter turn.

Note: The battery is held in position by plastic tabs at the bottom, a spring contact at the top, and another spring contact under the battery.

Lithium button cells can cause serious injury if swallowed. Ensure the battery cover is properly replaced and the screw tightened to avoid accidental removal of the battery.

Please dispose of old battery carefully and follow any local hazardous material regulations by disposing at recycling facilities.

Battery Replacement Procedure Continued

Pictorial view of battery replacement steps

Figure 4: Battery Replacement Steps

Replace only with the correct CR2032 lithium 3v battery.

After a battery replacement, it is recommended to check the 20-86 is functional by sending a test message. If the unit fails to operate, remove battery, confirm correct battery orientation, and reinsert if necessary.

Programming Guide

20-86-0000 pendants are programmed using the Salcom configuration tool Sacoto, and a 20-51-0001 USB configuration cable (ordered separately).

Installation

The current version of Sacoto can be downloaded from the 20-86 Product page on the Salcom website at www.salcom.com . Unzip the downloaded file and run "setup_Sacoto_n.n.n.exe" to install. Note: n.n.n indicates the version of Sacoto and some features in earlier or later 20-86 firmware versions may not be supported, please contact Salcom if any problems are encountered.

Connecting to SACOTO

After installing and starting the Sacoto configuration software, plug the 20-51-0001 programming cable into a free USB socket on the PC. Windows will usually install the driver automatically but, if it does not, the driver can be found on the download tab on the Silabs website at:
https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers

20-86-0001 and 20-86-0005 pendants need the rear cover removed to be programmed.

Remove the battery cover and battery as described in the Battery Replacement section on page 6.

Using a Philips PH0 screwdriver, undo the six screws around the edge of the back cover. The screws will remain captive in the cover but should be loose and not engaged with the internal metal thread. The seal can be quite tight so open the cover from the lanyard end where there is a small gap for this purpose.

Pic to show 6 screws to be removed

Figure 7: Programming Lead Position

Connect the configuration cable to the programming interface on the 20-86 as shown above holding the lead on an angle to ensure contact with the pads. The programming lead is only to be connected one way around so cannot be plugged in incorrectly. The programming lead supplies power to the device being programmed so the battery does not need to be fitted.

Sacoto must now be configured to the correct device type and the USB COM port assigned to the programming configuration lead set. The configuration and operation of Sacoto is described in the next section.

The following configuration guide uses images from Sacoto V1.1.4. The current release version may differ slightly in appearance, layout or have additional features.

Salcoms Sacoto - Getting started

Welcome to Sacoto!
Sacoto is Salcoms configuration tool for programming the pendant transmitter and can be located and downloaded from our website.
Please navagate to the resourses tab and then to programming software to find the latest version.

Figure 6: Navigation to Sacoto Download

When Sacoto is run for the first time, there is an option to read the Getting started guide if you are unfamiliar with the software.
There is a configuration item in the setup window to disable or enable showing the guide message again at startup.

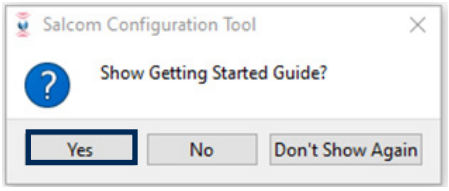

Figure 7: Getting Started Guide

The Getting Started Guide can be found later through a link from the HELP page.
Help menu > Help > getting started guide link**.**

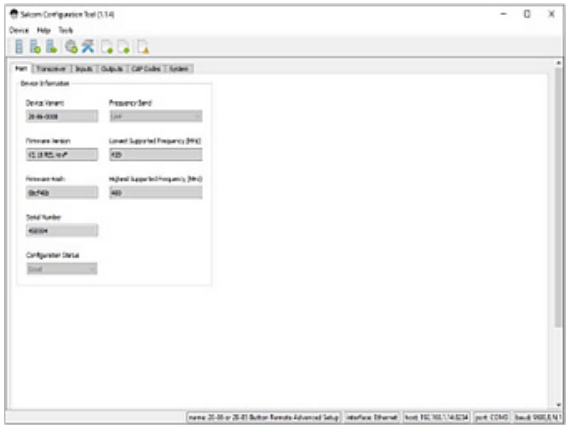

Figure 8: Opening Tab and Device Menu

Salcoms Sacoto - Icons

In addition to the Device menu, there are eight icons below the tool bar.

Read from the selected device
Reads the configuration from the connected device. In the case of the 20-86, this will be displayed as either be a partial (Quick) or full (Advanced) configuration depending on the Device Type selected.

Write changes to the selected device
Writes any changes made to the last read configuration. This option is most useful when making a small number of changes to one device.

Write all to the selected device
Writes all configuration parameters to the device. This option must be used when programming new devices, loaded files, or multiple identical devices.

Find Ethernet enabled device
Finds Salcom Ethernet enabled devices on a network – not used with the 20-86 series.

Edit device settings (Click to refresh serial ports)
Opens the Device window for setting the device type, serial ports, and programming options.

Read data from a file
Reads a configuration from disc.

Write data to a file
Writes the current configuration file to disc.

Read data from file version 1.0.1 or earlier
File compatibility for older devices; not used with 20-86.

Salcoms Sacoto - Device menu

Reading, writing and setup functions can also be accessed from the "Device" menu.

Figure 9: Device Toolbar

Sacoto connection settings

For setting up the device connection, choose **Device - Set up Device** from the menu or click the "device settings" icon to open the setup window. The connection settings are effective immediately so you can close this window any time; there is no OK button.

Sacoto v1.1.4 or later gives the Quick setup and Advanced setup configurations for the 20-86 as two separate device types.

Quick setup only shows the frequency, channel spacing and buttons closed options. It is used for a basic setup when sending to devices such as pagers.

Using the Advanced setup gives access to all configuration options available on the 20-86.

Salcoms Sacoto - Settings

Device Name:
20-86 or 20-85 Button remote Quick Setup
or
20-86 or 20-85 Button Remote Advanced set up

Reset device after writing:
Check as Yes

Interface:
Check as Serial

Serial port:
Set to the COM port assigned by the PC when the programming cable was plugged in.

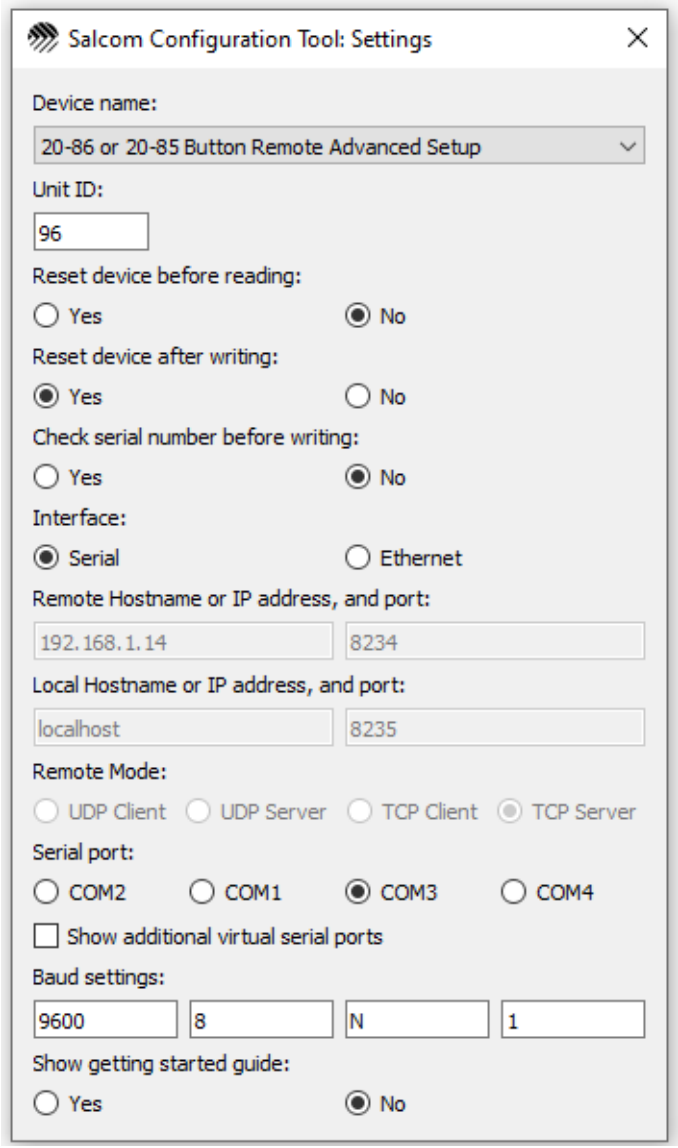

Figure 10: Configuration Tool Settings

Other settings must be left unchanged.

To help identify your COM port, you can refresh the list of COM ports by clicking the "Device settings" icon or select "Device > Set up device" from the main menu; it is not necessary to close the settings window first.

The new COM port will be shown in the Serial port options along with a message indicating the new port has been discovered.

Reset Configuration to Factory Defaults

Sacoto connection settings

There is a Reset configuration option in the Tools menu which will reset configuration of 20-86 module to the default settings in the event the module has been incorrectly configured or programmed. This allows a “clean slate” approach to reconfiguring an incorrectly functioning module.

This option is only available after reading the unit.

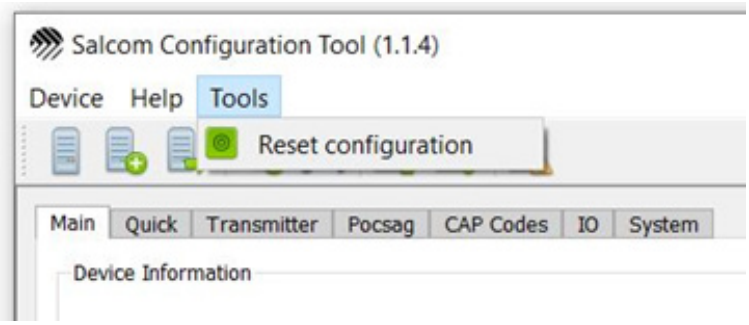

Figure 11: Reset Configuration Visual

Configuring the 20-86 using Sacoto

Read the Configuration

When Sacoto is run, and the 20-86 product selected, it does not initialise with a default configuration so one must be read, either from a connected 20-86 or loaded from a previously saved file. This can then then be modified as required and written to the 20-86.

To read from a connected 20-86, select “Read device” in the Device tab or click the Read device icon. If changes are made to a read file, these can be quickly written to the 20-86 using the Write Changes Icon. Once these changes have been written, selecting Write Changes is not available until further changes have been made.

When writing to a new 20-86 or writing a saved file which has been loaded, use the Write All option to ensure all parameters are programmed. Write All will program a device even if no changes have been made to the configuration.

Always read the full configuration from a unit using the Advanced device type before using “Write data to file” and “Read from file” or “Read” from another unit before using “Write All”

Any changes made since a read, write or file load are highlighted in yellow making it easy to identify which parameters, if any, have been changed before programming a device.

Configuring a button or input

Programming buttons or inputs to send messages is done on the Inputs tab. Each button can use different CAP codes, data types or over-air data rates. The image below shows part of the settings on the inputs tab for button closures. The options are explained from left to right.

Figure 12: Input tab settings

BUTTON 1	**Button label**	Identifies the button or LED these settings are for.
Enabled	**Active**	Sets the Button or LED as enabled or disabled. Click the slider to change.
512 A	**Data Rate and Type**	The over-air data rate and message type; the digits are the Baud rate, the letter is A = Alphanumeric, N = Numeric. Pull-down menu using down arrow at right.
123456	**Cap Code**	The seven-digit CAP code of the receiving device.
Button 1	**Alert Level**	Message alert level; 1 – 4. Pull-down menu using down arrow at right.
☑	**Display option**	Sets how the Data type, CAP code, level and message displayed by Sacoto; unchecking this box displays these parameters as Salcom protocol string.
Off	**POCSAG Rapid**	When checked to On, this enables the proprietary Salcom Rapid protocol for use with Salcom relay receivers. Note: pagers will not decode POCSAG Rapid messages.
Off	**While held**	When checked to On, continually sends the message while the button is held on.
Off	**At Power Up**	The expected button state when the battery is inserted. If the state is different, the message for the active state is sent.

Quick options layout

Quick setup is a device option which shows the minimal options needed to configure a 20-86. It is intended for rapid configuration of pendants where only the button closure, bandwidth, and frequency are changed. Only two tabs are shown

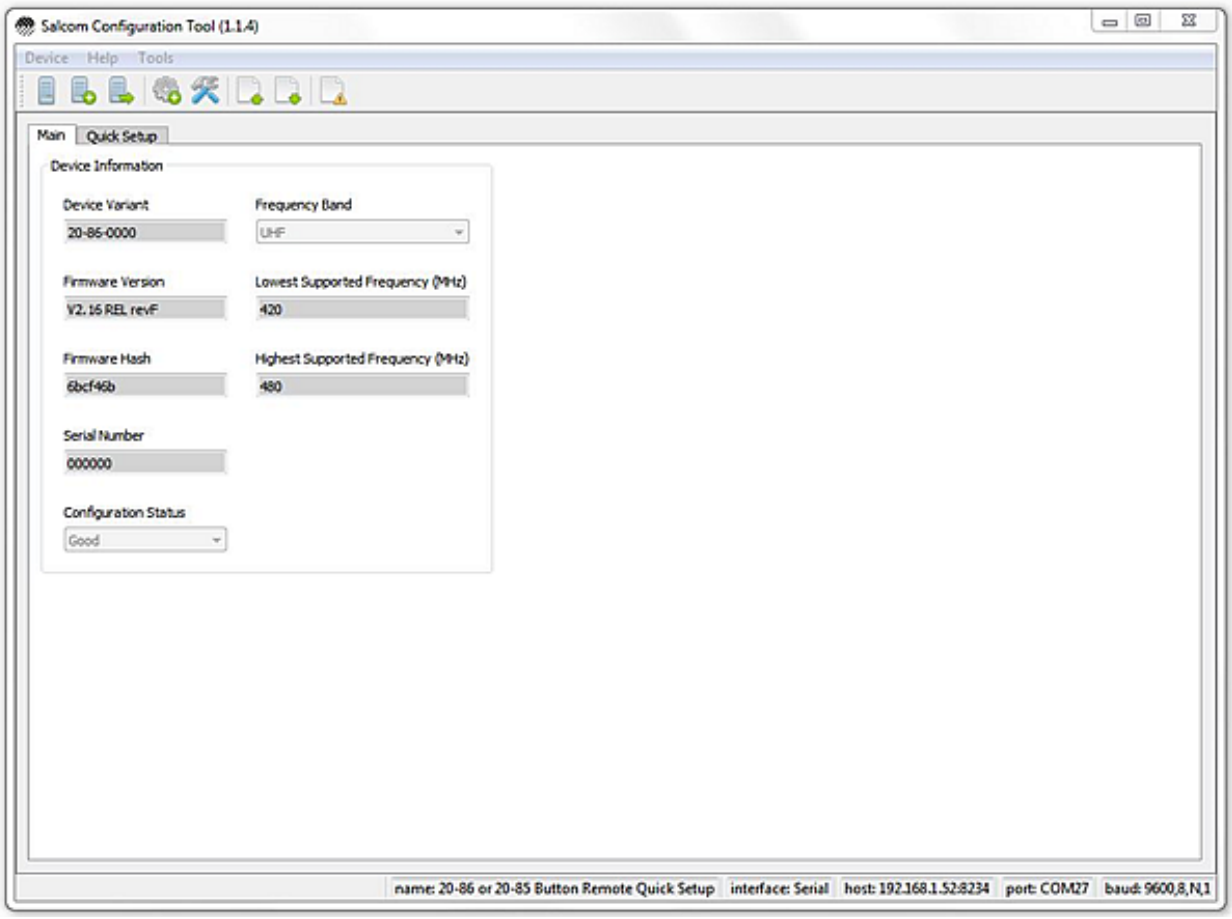

Figure 13: Quick Setup option

Main: Information panel

Quick: Rapid configuration options; frequency, bandwidth, and button closure messages only.

Advanced options layout

This device selection gives access to the full range of configuration options including button opening actions, receive options, LEDs, and sleep options. Intended for more complex configurations, this device type provides access to the greater functionality of the 20-86.

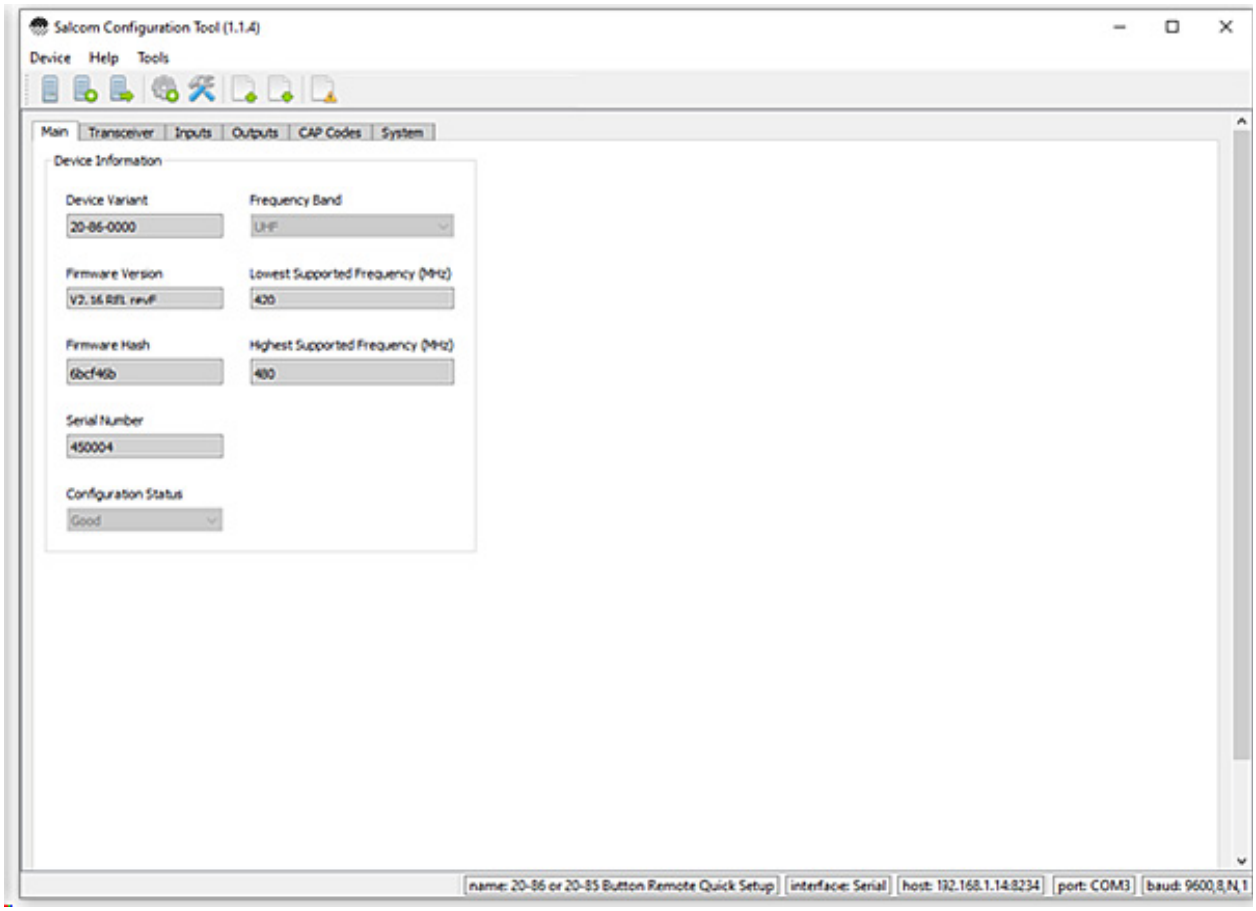

Figure 14: Advanced Setup option

Main: Information panel

Transceiver: Rapid configuration options; frequency, bandwidth, and button closure messages only.

Inputs: Full configuration options for buttons / Inputs including closure and opening messages.

Outputs: Timing options for LEDs and virtual output

Cap Codes: Receiver CAP codes for LED functions and virtual inputs. Note: The CAP codes here are not used for button messages

System: Relay protocol ID used for relay protocol triggered ACK LEDs.

Acknowledgement LED's

The 20-86 can be configured to receive paging messages for a brief period immediately following a transmission which, when used in conjunction with a correctly configured transceiver such as a Salcom 20-90, can be used to activate the green LEDs to indicate a message was received by the remote transceiver. The 20-86 cannot be configured to receive messages at other times so will not function as a pager.

The green LEDs on the 20-86 are activated by matching a CAP code, configured on the CAP CODE tab, or by using Salcom relay protocol. The relay protocol Unit ID can be configured on the SYSTEM tab.

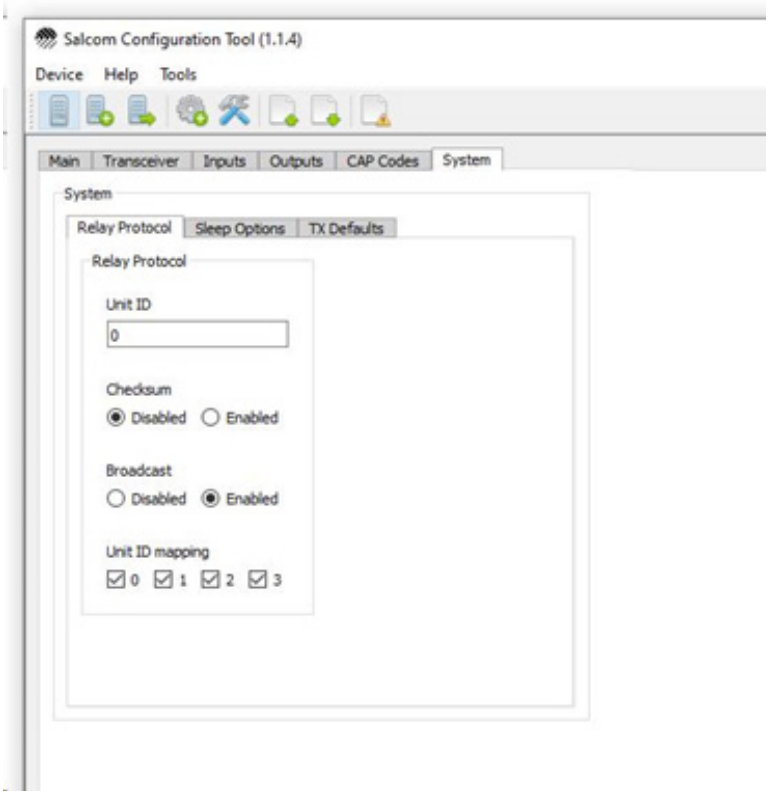

Figure 15: Unit ID location

Extending the range using a store and forward

Where additional range is required for a 20-86, the Salcom 20-90-0450 can be used as a store and forward repeater.

Remote Control Applications

A 20-86 can send a Salcom relay protocol in a message, as either numeric or alphanumeric, for triggering outputs on a remote transceiver such as Salcom's 20-90-0450. Salcom Relay Control Protocol (or Relay Protocol) is proprietary message content used to control relays, other outputs, trigger acknowledgement messages, or command special functions of a 20-90-0450.

A relay protocol command is addressed to a specific Unit ID with each unit ID able to control up to 8 outputs; some devices may have multiple unit IDs to address more than 8 outputs or to control special functions.

The relay control command can be embedded anywhere within the message; e.g., "CLOSE RELAY ONE 10109" where "10109" is the relay control command.

Please refer to Salcom's 20-90-0450 manual, available from our website, for a description of relay protocol. For additional outputs, a 20-03-0000 IO expander may be connected to the 20-90-0450.

POCSAG Rapid

POCSAG rapid allows a faster response to a push button input by using a shorter preamble and a more efficient over-air format. When using POCSAG rapid the CAP code must be a multiple of eight. For best response time keep messages short, use 1200 or 2400 Baud numeric data, and reduce the button debounce time.

Due to the shortened preamble, pagers are unable to reliably decode POSCAG rapid messages.

While Held

The "While Held" option sends messages continuously while the input is in the specified state. Normally used with POCSAG rapid, messages are transmitted continuously until the input is released so allows a receiver programmed with a short mono-shot output timer to provide a momentary action output.
The primary use for "While Held" is to hold a relay active on a receiver only while the input on a transmitter is active safety measure by de-activating a relay if the transmitter signal is lost.

Technical specifications

Options	20-86-0001: Single button 20-86-0015: Five buttons blue 20-86-0005: Five buttons black
Frequency Range	440-470MHz - UHF
Frequency Selection	Via software
Power Supply	3V, CR2032 button cell
Battery Life	Approx. 5,000 transmissions Approx. 5 years standby
Battery Replacement	Battery door on rear case
Power Consumption	Standby: <0.5µA Transmit: 26mA
Transmit Power	10mW
Channel Spacing	25kHz,12.5kHz, 6.25kHz
Modulation	FSK with NRZ data
Deviation	±4.5kHz, ±2.3kHz, ±1.0kHz
Transmit Duty Cycle	Up to 20%; Maximum 30 seconds on time
Baud Rate	512, 1200, or 2400
Message Format	POCSAG; Alphanumeric or Numeric
Configuration Application	Sacoto (Salcom Configuration Tool software)
Programming Cable	20-51-0001 (USB)
Serial Port	9600, N, 8, 1; 3V TTL (accessible only when case open for programming)
Antenna	Internal antenna
Indicators	Red LED (centre): Solid = Transmitting, Rapid flashing = Low battery Green LED's (left and right): On = Received message or command
Environmental Protection	IP67
Operating Temperature	-10°C to +55°C (+14°F to +131°F)
Weight	30g with battery
Case Dimensions	72mm x 43mm x 15mm (L x W x H)
Case Material	ABS plastic
Case Flame Rating	UL94-HB
Screws	PH-00 driver
Screw torque	0.06 – 0.08N*m
Approvals	CE, FCC and AS/NZS Pending

NB: All specifications and applications are indicative only and subject to change without prior notification.

Warranty and Disclaimer

Salcom products are warranted against defects in materials and workmanship for 12 months from the purchase date under normal use. This warranty does not cover damage resulting from misuse, accidents, negligence, unauthorized modifications or repairs, failure to follow provided instructions, or damage from acts of nature or external factors.

During the warranty period, if a defect arises and a valid claim is accepted, Salcom will repair or replace the product at its discretion. All shipping costs related to warranty service are the responsibility of the customer. To obtain warranty service, contact Salcom at info@salcom.com, providing proof of purchase and a description of the problem.

All information provided in this document is carefully prepared and offered in good faith as a guide in the installation and use of Salcom products. Installers must ensure that the final installation operates satisfactorily within the relevant regulatory requirements. Salcom accepts no responsibility for incorrect installation.

Please refer to the product specifications for certification information

Please note

Configuration Software

The programming descriptions in this manual are based on Version 1.1.4 of the configuration - tool, Sacoto.
This can be found here www.salcom.com
If a later version of Sacoto is being used, some of the window layouts may appear different, options could be on different tabs, or there may be new options available which are not described here.

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