



**12-62-0000  
SYNTHESIZED 4 WATT  
PAGING/NRZ TRANSMITTER**

# USER'S MANUAL

## 12-62 POCSAG PAGING TRANSMITTER

### 1.0 DESCRIPTION

The 12-62 is a 136 - 174 MHz (VHF) or 427.5 - 475 MHz (UHF) 4 watt POCSAG paging transmitter with an in-built encoder. All parameters are programmable such as: frequency, power output, deviation, POCSAG or NRZ data transmission.

The unit can be controlled via a USB port or an RS232 serial interface to provide numeric, alphanumeric and tone-only POCSAG encoding. This enables a user to call a pager (over 2,000,000 codes), append an appropriate priority level (1 of 4), and add a numeric or alphanumeric message.

The 12-62 supports multiple message queuing, and will queue up to eight 240 character messages, or as many smaller messages that will fit into the available memory buffer (up to 80). Pre-defined input messages are limited to a maximum length of 40 characters which may be configured using the Salcom programming software. Control via the USB or Serial port is achieved using ASCII character commands.

The unit supports 4 discrete inputs with a different pre-programmed message on high and/or low transition, plus voltage detection messages on the power input.

The inputs can be configured for a number of options. Provision to transmit a message more than once and variable time between transmissions are catered for.

The USB port or the RS232 serial port can be used to initiate paging transmissions using the SALCOM propriety protocol, Paging Entry Protocol (PET) or Telocator Alphanumeric Protocol (TAP) PG1 protocol. These ports can be used concurrently making it possible to connect a telephone interface unit and still initiate paging transmissions via the USB port.

**Over temperature cutout:** If the transmitter operates for extended periods in a hot environment, a protective thermal cutout may operate to reduce the output power to a safe level. It will reset when the unit temperature has fallen to below 70 deg.

**Transmitter Duty cycle:** The transmitter duty cycle is rated as 50% with a max 'on' time of 5 minutes. Higher duty cycles may be possible. Contact Salcom for advice.

## 2.0 WARRANTY

Our Products are warranted for a period of 12 months from date of purchase against faulty materials and workmanship.

Should any fault occur the unit should be returned to the vendor, freight pre-paid. Please include a description of the fault to assist with prompt return. Any unauthorized alterations or repairs will invalidate the warranty.

## 3.0 DISCLAIMER

All information provided in this document is carefully prepared and offered in good faith as a guide in the installation, use and servicing of our products. Installers must ensure that the final installation operates satisfactorily within the relevant regulatory requirements. We accept no responsibility for incorrect installation. We reserve the right to change products, specifications, and installation data at any time, without notice.

## 4.0 MECHANICAL DESCRIPTION

The 12-62 is enclosed in an extruded aluminium box. The end-plates unscrew and the lid slides off to allow access to the component side of the pcb. The complete pcb can then be slid out of the case if required, the heatsink relies on a light pressure contact with the case for heat dissipation, The case has four holes for mounting the unit. The 12-62 must be mounted away from sources of heat, damp or vibration.

## 5.0 INSTALLATION

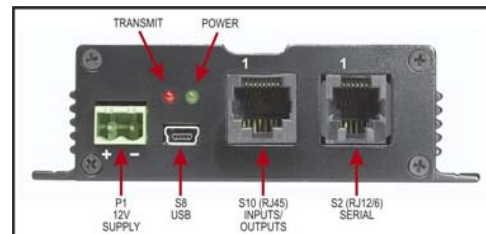
The power supply is connected via P1, green power connector to +13.8 Volts and Ground. The supply input is protected against reversed connection. The aerial connection is via the BNC connector, and should present a nominal load of 50  $\Omega$ , with a VSWR of better than 1.8:1. It is recommended to site the aerial a few metres away from the 12-62 to avoid the possibility of RF feedback causing problems with the transmitter operation. An outside aerial is preferable and will provide better radio coverage.

External indicators consist of a power indicator GREEN LED, normally flashing ON once per second to indicate healthy microcontroller operation. After a debounce period, the green LED will flash rapidly if the low supply detector is activated. The RED LED will indicate when the unit is transmitting. A flashing RED LED indicates the unit cannot transmit as either the synthesiser is out of lock, the 12-62 is critically hot or an internal fault has been detected.

## S2 and S10 Connections

S2 Connections:-	
Pin 1	Ground
Pin 2	Interrupt
Pin 3	SCL
Pin 4	SDA
Pin 5	RS232 Tx
Pin 6	RS232 Rx

S10 Connections:-	
Pin 1	PTT OUT, 50mA max.
Pin 2	GROUND
Pin 3	Discrete Input 4
Pin 4	Discrete Input 3
Pin 5	Discrete Input 2
Pin 6	Discrete Input 1
Pin 7	PTT Input for NRZ operation
Pin 8	Modulation Input for NRZ operation



## 6.0 OPERATION

The 12-62 can transmit 3 types of POCSAG message, with any one of 4 function levels:

- Alphanumeric transmissions. Message can contain any alphanumeric 'ASCII' character.
- Numeric transmissions. Message contains only Numeric characters and some symbols.
- Tone Only transmissions (Alphanumeric or numeric with no message)

### 6.1 Alphanumeric transmissions

Messages can contain any alphanumeric character. The 12-62 will accept the standard ASCII 7 bit character set.

### 6.2 Numeric transmissions

Messages can contain numeric characters and some symbols.

These can convey a telephone number, or other numerically coded information. The transmitted message is shorter, and therefore there is a smaller chance of errors received by the pager.

The numeric character set is as follows: **0 1 2 3 4 5 6 7 8 9 [ ] - U <space>**

### 6.3 Tone Only transmissions

Any numeric or alphanumeric paging message without an actual text message is also considered 'Tone Only'. A function level will control the number of beeps on the receiver (four different function levels can be sent).

## 7.0 INITIATING TRANSMISSION

There are four ways of initiating a paging message transmission:

- (1) Using the external discrete inputs (action)
- (2) Supply detector threshold (action)
- (3) Watchdog (action)
- (4) RS232 Serial commands

An action is defined as a paging message, RIC (Receiver Identification Code or capcode) and flags. Flags are discussed in the PSD (product support disk) section.

### 7.1 External Discrete Inputs

An action can be initiated from the 4 external inputs with an input transition to LOW (connection to GND) and/or HIGH (input floating or connection to >+3.5v).

### 7.2 Low supply message

After a debounce period, the low-supply detector can initiate an action for both "supply going high" and "supply going low" conditions.

### 7.3 Watchdog

The watchdog feature will initiate an action after a predetermined period. The watchdog also optionally allows the transmission of the current state of selected inputs (including supply level).

### 7.4 Using the RS232 Serial Commands

Serial commands can be "manually" issued to an 12-62 using a terminal program such as PROCOMM or Hyper-terminal. Tone only, numeric and alphanumeric pagers can be called using serial commands. These commands will be processed in parallel with other inputs actions for transmission. Some basic commands are described in section 7.4.1. Information on the full protocol command set is available on request.

## 8.0 PROTOCOL COMMAND SET

### CA

Usage: CA<pager#>[<space>]<level>[<space>]<message><CR>  
 Description: Call alphanumeric pager  
 Example: CA1119358 1 Please return to reception<CR>  
 Response: CA11193581<CR><SPACE>Page Sent<CR><LF>

### CN

Usage: CN<pager#>[<space>]<level>[<space>]<message><CR>  
 Description: Call numeric pager  
 Example: CN1119358 1 777<CR>  
 Response: CN11193581<CR><SPACE>Page Sent<CR><LF>

### RES

Usage: RES<CR>  
 Description: Reset 12-62 microcontroller  
 Example: RES<CR>  
 Response: SALCOM 12-62-0000 VX.XX<CR><LF>

### SN?

Usage: SN?<CR>  
 Description: Retrieve unit serial number and firmware revision  
 Example: SN?<CR>  
 Response: SALCOM 12-62-0000 VX.XX 5122345<CR><LF>

## 8.1 Error Codes/Reports

**ER1 SYNTAX** You entered an invalid command  
**ER3 OPERND** You entered a valid command with invalid values  
**ER6 BUSY** 12-62 is too busy to process the entered command, try again later.  
**ER7 OVERTEMP** 12-62 is critically hot, transmission not possible until cooler.

## 9.0 TROUBLE SHOOTING

The following table may help in problem solving where necessary.

Fault	Check
No illumination of Green LED	Bad power supply connection
Input activated but no transmission	PSD configuration incorrect
Unit transmits but nothing received	Poor aerial. Wrong frequency, RIC, baud-rate. Power too low. Unit too hot. Too much vibration
No RS232 serial communication	Comport connections, baud-rate 9600 no parity, eight data bits, one stop bit
Red LED flashes rapidly	VCO out of lock, unit too hot or internal fault detected. Connecting a serial lead to the 12-62 will allow the nature of the fault condition to be determined.
Green led flashes rapidly	Low supply detector threshold
Unit starts, but does not complete transmission	Poor supply volts, RF interference.

## 10.0 PROGRAMMING

### 10.1 Installing the VCP USB Driver

To use the USB port to communicate with the 12-62, a Virtual Com Port driver must be installed on the PC.

To install the Silicon Laboratories USB driver, run the driver installer CP210x\_VCP\_Win2K\_XP\_S2K3.exe provided on the supplied PSD CD and follow the on screen instructions. Once the driver is installed, an additional COM port will be available via the Salcom PSD programming software.

VCP USB driver updates are provided periodically by Silicon Laboratories and may be downloaded free of charge from <https://www.silabs.com/support>.

### 10.2 Preparations for Connecting the Programming Software

To change the field programmable options, the unit must be connected to a PC running the 12-62 PSD programming software in Windows XP via either the preferred USB port S8 (using the supplied USB mini cable), or the standard serial port S2. To use the USB connector, the supplied virtual COM port USB driver must be installed

*Note: To make up a serial cable, the S2 connections are shown on page 3. Alternatively purchase an optional Salcom serial programming cable.*

The 12-62 must be powered during programming, +13.8V to power terminals.

Ensure that the 12-62 PSD has the correct com port selected. Once correctly configured perform the following:

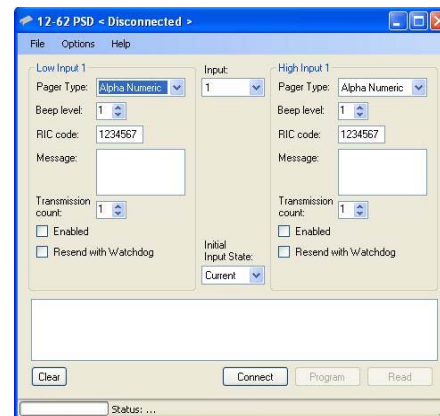
- 1 Press connect. The status at the bottom of the 12-62 PSD will indicate if successfully connected.
- 2 Press the read button, or load a PSD configuration file. This will load all settings of the 12-62, which is required before any changes can be programmed. The 12-62 PSD will provide feedback if the user selected operations are successful.

### 10.3 Using the Programming Software

The 12-62 PSD allows the user to configure the following characteristics:

- > Input actions, watchdog, low supply detector and POCSAG transmission settings
- > Pre-defined messages
- > RF frequency and output power
- > 99 pager numbers for use with the Salcom 11-36 telephone interface.

Once the program is running, the opening screen appears. Use the mouse to select the configuration fields for each feature.



### 10.4 PSD Input Configuration

All inputs may be configured in a similar fashion, including supply voltage monitoring. The input drop down box provides support for the 4 inputs available on S10.

The battery input is at the very bottom of the input list. Each input may have a message defined for both a high and low state. Input parameters may be configured as follows:

**Pager type:** Numeric or Alpha numeric. Tone only pagers are supported by ensuring that the message field is left blank.

**Beep Level:** Page beep levels 1-4.

**RIC Code:** Pager ID. Valid Codes are:

0000008 to 2007663

2007672 to 2045055

2045064 to 2097143

0000000 may be used as a "drop" code. This may be used for the watchdog when the watchdog is used, but a watchdog message is to be suppressed.

**Message:** User message, up to 40 characters in length.

**Transmission Count:** How many times that message will be sent if triggered.

**Enabled:** When selected, the configured message will be sent when triggered.

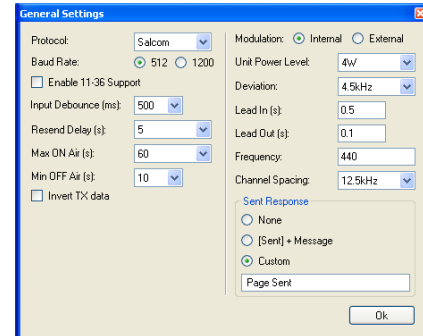
**Resend with Watchdog:** When the watchdog is enabled, the input message will be sent periodically as configured if in the enabled state.

**Initial Input State:** Input messages are sent when transitioning to the enabled state. If on start-up "Current" has been selected the current input state is read, so that the input message will not be sent on start-up. If "High" is selected, the input on startup is assumed to be in the high state, so when found to be low (if this is the case) the transition will result in a message being sent (if enabled). If "Low", the opposite will occur, the input is assumed to be low on startup, the transition to high resulting in message being transmitted (if enabled, and the input is in the high state).

## 10.5 PSD General configuration

Selecting *Options->General* will display the general configuration screen as shown overleaf. The following items may be set here.

**Baud Rate:** Changing this setting will result in all configured messages to be sent at the selected baud rate (512 or 1200 Baud).



**Protocol:** Allows the serial protocol to be changed

**Input Debounce:** The time delay between the input being triggered and the message being sent.

**Enable 11-36 Support:** Enabling 11-36 support will allow the Salcom 11-36-0000 telephone interface to be configured. Configuration options will become available through the options tab (refer to 10.7: PSD 11-36 Support).

**Invert Tx data:** Internally generated data is inverted when Internal modulation is selected. The Invert Tx Data option is unavailable when external modulation is selected.

**Resend Delay:** When an input has been configured with a transmission count greater than 1, then the resend delay is the delay in seconds before sending the message again.

**Max On Air:** When the 12-62 is transmitting, this setting controls how long the transmitter may be continuously on air. When this period of has been exceeded the transmitter ceases transmission and will remain off air for the duration defined by the Min OFF Air setting. This setting has no effect when external modulation has been selected.

**Min Off Air:** When the 12-62 has exceeded the max on air continuous transmission time, the Min OFF Air setting controls how long the transmitter will remain powered down before allowing transmission to continue.

**Lead In:** The lead in defines how long the transmitter carrier will be present before data transmission commences.

**Lead Out:** The lead out time controls how long the transmitter will remain on air after data transmission has finished.

**Frequency:** Configures the transmission frequency. Note that the selected frequency must be evenly divisible by the channel spacing.

**Channel Spacing:** Defines the frequency step resolution.

**Unit Power Level:** The power level to transmit at. Note that the power will be reduced when the 12-62 exceeds 70 degrees.

**Deviation:** How much the selected frequency deviates by when transmitting data. Note the custom setting is not to be used unless the 12-62 has been factory set to support this option.

**Modulation:** If external modulation has been selected then no serial or input controlled messages will be sent, data transmission is solely controlled by the PTT and Modulation inputs on connector P2. When internal modulation is selected then the PTT and modulation inputs do not serve any purpose.

**Sent Response:** Controls the serial response when a page has been transmitted. Historically "Page Sent" would be sent by Salcom products to the serial port to provide a controlling application with feedback that another message may be submitted for transmission. Since the 12-62 may queue many messages "Page Sent" may not describe sufficiently which page has been transmitted. Selecting "[Sent] + Message" will allow feedback to the user which message has been transmitted, but may introduce backwards compatibility problems with applications supporting other Salcom products. Selecting "Custom" will allow any user defined response up to 40 characters in length. Selecting "None" will result in no serial feedback on completion of a message transmission.

#### 10.6 PSD Reset Options

Selecting Options-Reset to Factory Defaults will allow the user to restore the 12-62 to its original factory state. This option will not affect any factory calibrated settings.

#### 10.7 PSD Configuration files:

The current 12-62 configuration can be saved using File-Save. Previously saved configuration files can be loaded and edited with, or without a 12-62 connected.

#### 10.7 PSD 11-36 Support:

To use the 12-62 with the Salcom 11-36 telephone interface, Salcom protocol must be selected. Once selected, 11-36 support can be enabled by selecting *Options->General->Enable 11-36 support*. When enabled, the "Preset Messages" and "Pager Database" pages will be available under *Options->11-36 Support*.

### 11.0 SPECIFICATIONS

Power Supply	+11.5 V to 15.2 V nom 13.8 V
RF Frequency	VHF: 136-174MHz UHF: 427.5-475 MHz
Switching Range	Full 47.5MHz with no tuning
Channel Spacing	12.5 KHz or 25 KHz
Output Power	7 settings, 50mW to 4W $\pm$ 1 dB 50 $\Omega$
Input Current	Standby : 40 mA Transmit: 1.2A approx
Modulation	Carrier FSK with NRZ data
Deviation	$\pm$ 2.25KHz or $\pm$ 4.5kHz
Baud rate	512, 1200 Baud
Message format	POCSAG
Spurious Outputs	-37dBm or less
Serial input/output	S2, pins 1, 2, RS-232 (DCE), 9600 baud no parity, 8 data bits, 1 stop bit
Serial paging command protocols	SALCOM proprietary, PET (PG1)
Discrete inputs	Pulled up to +12v (47K), ground to activate PTT on P2 pin 6. Modulation on P2, pin 1
Discrete outputs	PTT sink, 200mA
Case Dimensions	155 x 101 x 30mm
Type Approvals	AS/NZS4769, EN 300 224, FCC Pt 90
Transmit duty cycle	Up to 50%, max 5 minutes 'on' time.

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