12-84-7000

VHF / UHF Relay Output Receiver

PRODUCT MANUAL

Version 1.04

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Salcom Product Documentation

This document is designed to familiarise you with Salcom products and guide you through the hardware, configuration, installation and overall system management.

Salcom is an environmentally conscious company and in an effort to conserve paper no longer prints manuals with shipped products. All relevant documentation can be downloaded in PDF form from our website www.salcom.com

Warranty and Disclaimer

Salcom products are warranted for a period of 12 months from the 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 unauthorised alterations or repairs will invalidate the warranty.

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

Product Overview

The 12-84-7000 Relay Output Receiver is available in two versions, a VHF 12-84-7150 and a UHF 12-84- 7450 both of which provide four outputs (2 relay and 2 open collector) which can be controlled remotely via SALCOM transmitters or wide area paging networks.

The unit can also be used as a programmable general purpose channel busy output module. When used as a channel busy output module, it can also be used on any non-paging channel.

Suitable for site monitoring as network activity is delivered by the serial port of the 12-84.

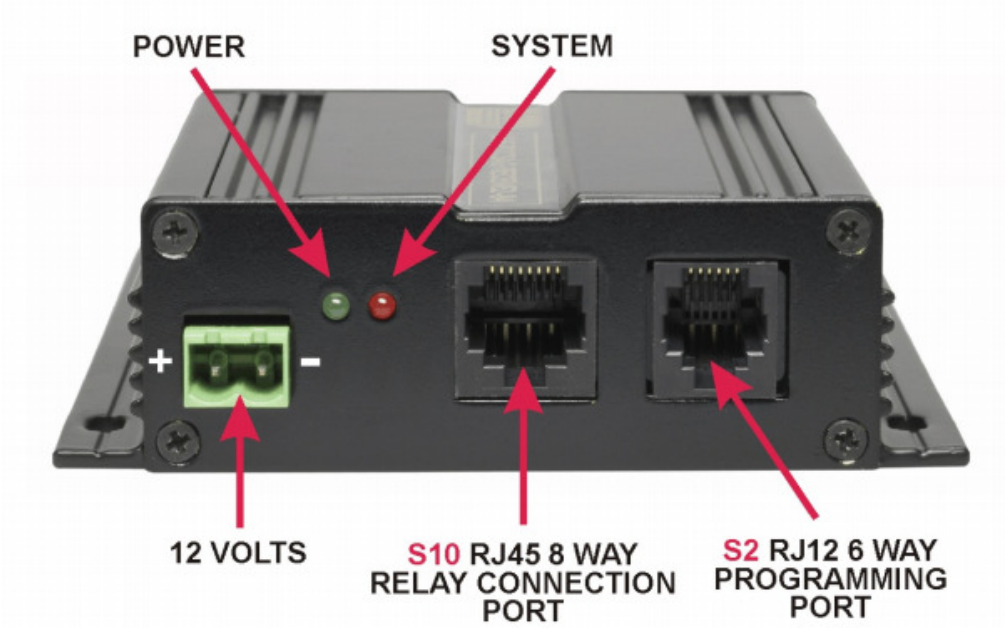
Installation and Connections

Situate the 12-84 away from direct sunlight, vibration and strong heat sources and avoid close proximity to radio transmission equipment. The unit is not certified as intrinsically safe.

In good coverage areas fit the aerial directly to the aerial socket. An external aerial may be needed where reception is poor.

Connect a 12 volt DC power supply to the power terminals (see figure 1). The 12-84 is protected against reversed supply connection. The power source must be reasonably noise free.

Relays are not to be connected directly to mains voltages. Open collector outputs are best suited to drive external relays, as indicators or to drive inputs that have moderate to low current requirements.



Pin numbering: looking into the sockets with the power connector on the left, pin 1 is on the left.

S2 RJ12 6 Way Programming Port	
Pin	**Description**
1	Ground
2	System LED
3	+12V
4	Not Used
5	RS232 Out
6	RS232 In

S10 RJ45 8-Way Relay Connection Port	
Pin	**Description**
1	Open Collector Output 4
2	Open Collector Output 3
3	Relay 2 Normally Open
4	Relay 2 Normally Closed
5	Relay 2 Common
6	Relay 1 Normally Open
7	Relay 1 Normally Closed
8	Relay 1 Common

Operation

The unit receives and decodes a numeric or alphanumeric pager call. If the received unit number matches the 12-84 unit number or group number, the outputs are switched according to the ON/OFF fields of the message.

Correct Operation

Normal operation of the unit is indicated by the green system LED flashing. If the LED does not light, check the voltage on the supply terminal block.

During the reception of a valid command with the correct RIC code, the system LED will stay on for approximately one second.

Unit Number

Each unit will respond only to messages containing a matching Unit Number. Up to 99 unique unit numbers are available. Any number of units can be programmed with the same unit number. The Unit Number comprising of 2 digits is selected using the configuration software.

Monoshot

Output mono-shot (momentary) operation can be enabled by using the configuration software. Each output can have its own mono-shot time, ranging from 25mS to 30 minutes in 25mS steps. Setting the value to 0 disables the mono-shot timer altogether, and the output is latched until commanded off.

Commands

The outputs of the 12-84-7000 are controlled by a series of numeric commands sent in the form of a numeric or alphanumeric pager message. Note: Control strings can be sent as numeric or alpha-numeric messages. Numeric messages are shorter, and are therefore more efficient to transmit.

The control string can be embedded anywhere within the message e.g. "TEST MESSAGE 01109". Multiple control strings can be present in the message if desired. E.g. "PUMP ON 01209 23209". By allowing multiple control strings, a 12-34 output module(s) can be connected for simple control of any number of relay outputs.

Command Format:

UUx..x0y..y9

UU ***Unit number:***
This must be entered as 2 digits 00 - 99.

x ***Output to go ON:***
This digit can be 1-4 (represents output). Any combination of digits 1-4 before the '0' can be entered in any order. If no digits are entered before the '0' then no outputs are turned on.

0 ***End entry of Output ON values***:
This terminates the list of outputs to turn on. This character in mandatory.

y ***Output to go OFF:***
As per "Output to go ON" above, but this designates the output to go OFF instead.

9 ***End entry of Outputs OFF values***:
This terminates the list of outputs to turn OFF. This terminating digit is required to consider this as a valid control string

Examples:
(All examples are for latching relay/output control, so "Hold Time" is set to 0. Examples assume a unit id of 44):

Action	Message Received
To turn output 1 on	44109
To turn output 1 off	44019
To turn output 3 on	44309
To turn output 3 off	44039
To turn on outputs 1,2 and 4	4412409
To turn output 1 on and output 3 off	441039

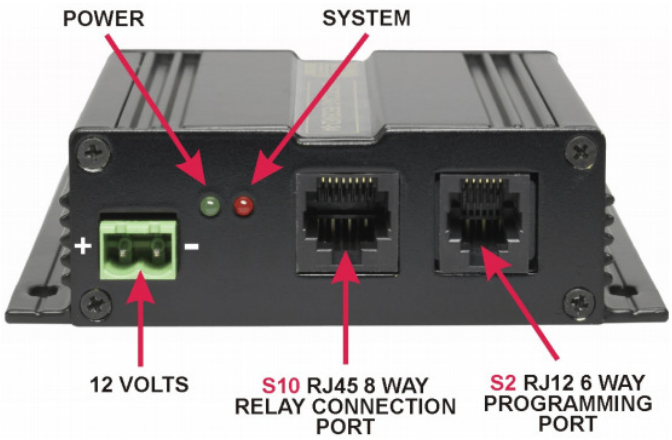
Programming

Preparing to Use the Programming Software

To change the field programmable options, the unit must be connected to a PC using Windows XP or later, running the 12-8 PSD programming software, downloadable from Salcom's website http://www.salcom.com/media/software/Salcom-12-84SE-PSD-v1014.zip

Connection should be from the serial port S2 on the 12-84 to a com port on the PC.

To make this connection Salcom's serial programming cable, part number 12-45-0000, as shown below, can be used.



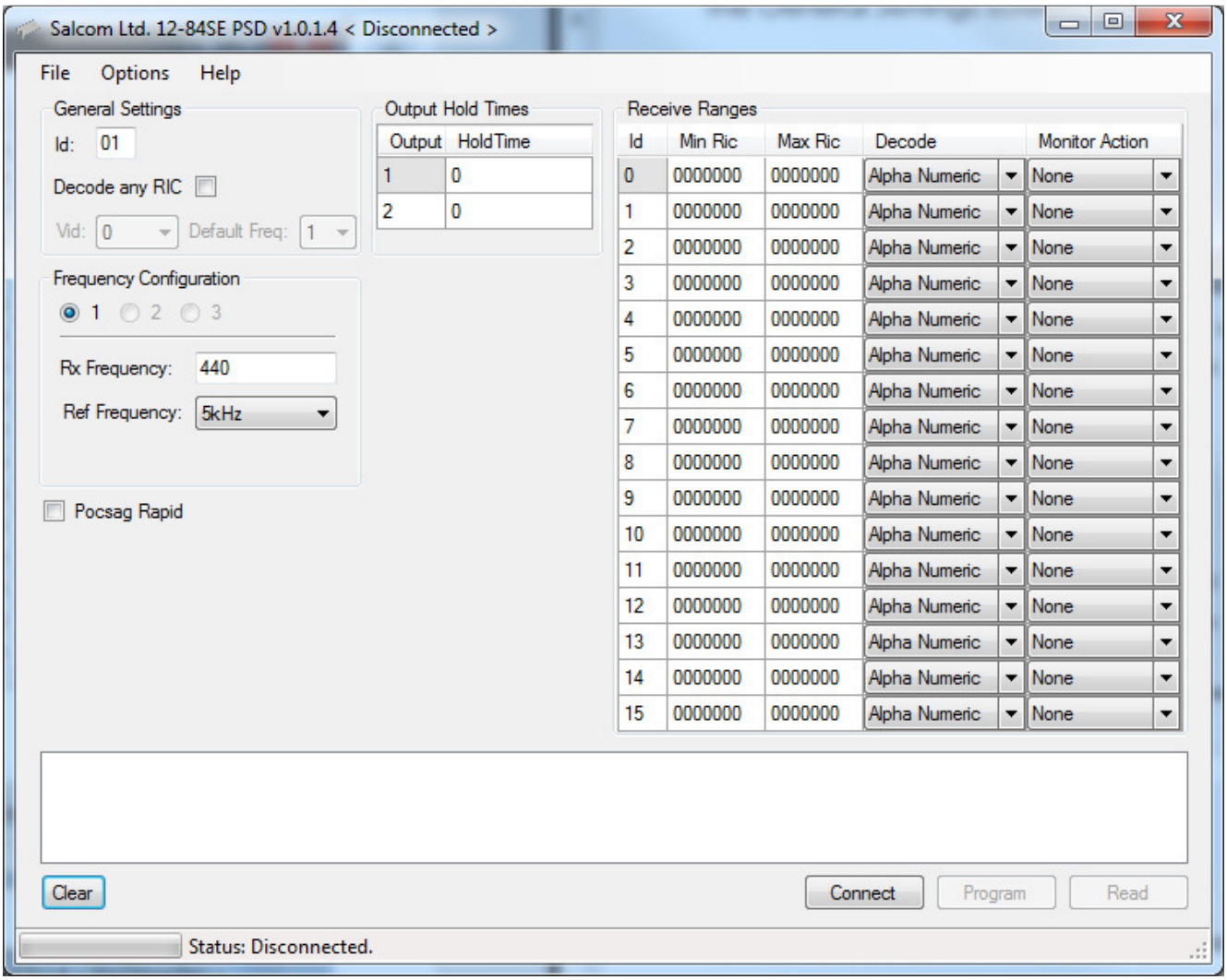
Where the PC only has USB ports a DB9 to USB adaptor can be used (not supplied by Salcom).

Note: If you do not have a serial cable you can make one with the S2 connections as shown in the section Connectors and Pin-outs in this document.

Once the cables are correctly connected apply power to the 12-84.

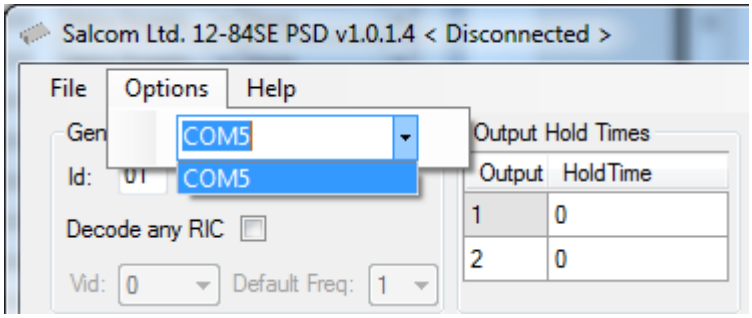
Getting started with the Programming Software

Load the 12-84 PSD programming software, this should bring up a screen as shown below.

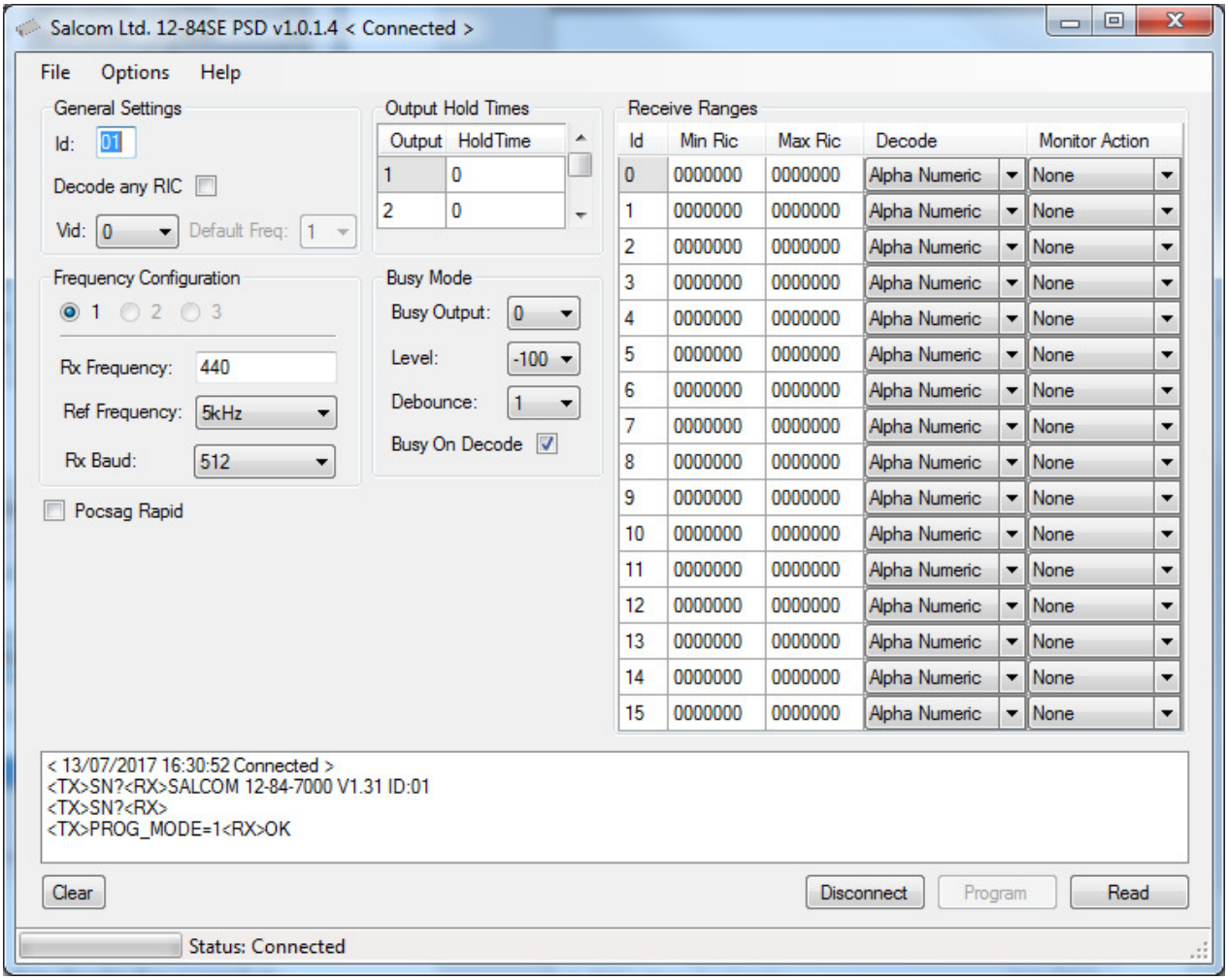


To connect your PC to your 12-84 select Options and click on the Com Port dialog arrow to select the Com Port your 12-84 is connected to.

Note: Ensure that the 12-84 PSD has the correct com port selected



Next select '**Connect**'. The status at the bottom of the 12-84 PSD will indicate if successfully connected, see below:



To get a valid set of parameters to start your programming configuration, either press the read button. This will load all settings of the 12-84.

Or alternatively load a PSD configuration file, by selecting the "**File->Load**" menu item and browsing and selecting a saved configuration.

Note: One of these actions is recommended before any changes can be programmed to ensure the unit is not programmed with the PSDs default values.

Make any desired changes by entering data or modifying data in the appropriate fields.

Reprogram the unit by clicking the Program button to upload the changes to the 12-84.

After programming the PSD will provide feedback if the user selected operations are successful.

Using the Programming Software

The 12-84 PSD allows the user to configure the following characteristics:

- Unit IDs
- Receive frequency configurations
- Output Hold Times and Busy Mode
- RIC receiving parameters

Use the mouse to select the configuration fields for each feature, which you want to change and then select 'Program' to update your 12-84's configuration.

*Note: After programming the 12-84 you must select "**Disconnect**" for the changes to take affect and for the 12-84 to return to its normal operational state.*

ID: 2-character id which identifies this unit when the 12-84 relay protocol is used. Valid settings are "**00**" to "**99**".

Decode any RIC: When "**Selected**" all messages are to be decoded and sent to serial port. Messages, if not defined within a range are assumed to be alphanumeric.

When "**Not Selected**", default, the receiver will only decode messages within valid ranges (not beginning with 0000000) or using the POCSAG Rapid Relay control RIC.

Vehicle ID: Is a feature that allows the setting of an ID from "**0000**" to "**9999**". The "**Vehicle Id**" precedes the Unit id in the received message e.g.

- *Format:* ***VVVVS*IIC0X9<CR>** where:

  VVVV is the 4-character Vehicle Id

  II is the 2-character Unit Id

  S is a space

  C is a variable number of relays to close (1-8)

  0 marks the end of relays to close

  X is a variable length list of relays to open (1-8)

  9 marks the end of relays to open

- Typical Usage: ***0123 011029<CR>*** *where Vehicle Id is 0123, Unit Id is 01, relay 1 is closed and relay 2 is opened.*

Default Freq: When using Vehicle Id, up to 3 frequencies can be pre-defined using the programming tool for use with this feature. Valid settings are "**1**", "**2**" *and* "**3**".

Frequency Configuration: Under normal operation a single frequency is defined for use with your 12-84. When a Vehicle ID value other than "**0"** is set up to 3 pre-defined frequencies can be set. The frequency setting consists of 3 parameters:

Rx Frequency: The frequency to set receiver to.

Frequency	Minimum	Maximum
VHF	148.0000	161.0000
UHF	450.0000	470.0000

Note: The selected frequency must be evenly divisible by the channel spacing.

Note: With the VHF version of the 12-84 there is only moderate adjustment (within approximately +/-3MHz) that can be made from the factory preset receiver frequency, before your unit may become unstable and unable to receive a useable signal.

Ref Frequency: This defines the channel spacing that the 12-84 is using. Available settings are "**5kHz**" default or "**6.25kHz**" baud.

Rx Baud: Changing this setting will allow messages to be received at the selected baud rate. Available settings are "**512**" default or "**1200**" baud.

Pocsag Rapid: When "**Selected**", if a message with a RIC that matches the POCSAG Rapid > Relay Control RIC is received, then the message is decoded and the relay control action is undertaken.

Note: Decoded messages matched to the Relay control RIC are not sent out the serial port.

RIC: The POCSAG Rapid control RIC to be matched. This RIC also includes the 7 RIC codes following the one specified. Valid RIC values are between 8 and 2000000.

Decode: The expected format for the message to be decoded from. Available options are '***Alpha Numeric***" or "***Numeric***".

Output Hold Times: *For each of the 4 outputs (**1, 2, 3** and **4**) it* sets the time for that output to stay on after it has been turned on.

If an output hold time is set, an output when turned on will turn off again after the Hold Time (in ms) has elapsed.

Setting	Description	Hold Time
0	Output will stay on until instructed to turn off (default)	Indefinite
1	Minimum Hold Time	1ms
1,800,000	Maximum Hold Time	30mins
1	Step size = 1ms	

Note: If POCSAG Rapid is used, then for reliable operation, this Hold Time should not be less than 150ms (otherwise the relays may chatter).

Busy Mode: Defines the behaviour when "**Busy**" and consists of 4 parameters:

Busy Output: The output to close when the receiver channel is busy.

Setting	Description
0	Disable the "Busy Output" feature (default)
1, 2, 3 & 4	Busy output to operate in preference over any other output control operations.

Level: This is the received signal strength that must be exceeded in order to close the configured busy output. The level is configured in dBm.

Setting	Description
-40dBm	Minimum busy level to be exceeded
-125dBm	Maximum busy level to be exceeded
-80dBm	Default busy level to be exceeded

Debounce: *How long the channel must exceed the configured "Level" before operating the configured output.*

Setting	Description
0	No debounce (default)
1	Minimum debounce time (25ms)
40	1 second debounce time
255	Maximum debounce time (6s)
1	Step Size = 25ms

Busy on Decode: If this option is "**Selected**" and a busy output has been set, then the busy output will operate when decoding any POCSAG message regardless of the received signal strength. When "**Selected**", the busy output will continue to operate when the busy level has been exceeded.

Receive Ranges: *Describes ranges of RICs that should be managed in a similar fashion. To disable a range, set the first RIC in the range to 0000000.*

Min RIC: *The RIC code between 8 and 2000000 that identifies the beginning of the range.*

Max RIC: The RIC code between 8 and 2000000 that identifies the end of the range. Max RIC may be the same as the min RIC, but may not be less than the min RIC.

Decode: Decode Describes how the messages matched in this range will be decoded. Available values "**Alpha Numeric**" or "**Numeric**".

Monitor Action: If a RIC is matched in this Range this action will be performed, either "**None** (no action)", "**Close Relay 1**" or "**Close Relay 2**".

Note: this type of relay control is more vulnerable to false triggering than using the relay control protocol. This should not be used for general relay control, using the relay control protocol is the preferred method.

Serial Data Output

If the need arises to monitor paging messages on a network, the 12-84 can provide serial data output (9600 Baud N:8:1) via the programming connector. The 12-84 can be connected to the serial port of a PC using a Salcom 12-45 programming lead. The format of the carriage return terminated output string is as follows: 5

12.A.S.0.1234567 TXT

512/1200	**=**	***Baud Rate***
A or N	**=**	***Alpha or Numeric***
S or I	**=**	***S) non inverted (I) inverted***
0	**=**	***Level***
1234567	**=**	***RIC***
TXT	**=**	***message***

Salcom's "***VisualPET"*** paging software can be used to log the received data.

Technical Specification

Technical Specification 12-84-7000 – VHF / UHF Relay Output Receiver	
Frequency Range	148-165MHz - VHF (Model No. 12-84-7150) 440-480MHz - UHF (Model No. 12-84-7450)
Frequency Selection	User configurable *Note: VHF model is only adjustable by ±5MHz from (customer defined) factory preset frequency*
Power Supply	+13.8V typical (11 to 15 VDC range)
Power Consumption	Standby: 40mA Relays: 18mA per energised relay
Modulation	FSK with NRZ data
Receiver Sensitivity	Approx -124 dBm
Baud Rates	512, 1200
Message Format	POCSAG
Configuration Application	12-84 configuration tool
Programming Cable	12-45-0000 (RJ12 to DB9) Can be used with a USB to RS232 DB9 Serial Adapter Cable
Serial Port	9600 , N, 8, 1; RS232
Discrete Outputs	2 Relay Contacts (1A @ 24VDc); 2 Open Collector (100mA max) Note: Not suitable for 240VAC Connections
Connectors	Serial Port (RS232) = RJ12 (6P6C) Outputs (Relay / Open Collector) = RJ45 (8C)
Power Connector	2-way plug & socket, screw connections (supplied)
RF Connector	50Ω BNC (Product supplied with aerial)
Environmental Protection	Not suitable for outdoor use and should be protected from adverse environmental conditions
Operating Temperature	-10°C to +50°C (+14°F to +122°F)
Indicators	Power LED (Green) - Slow Flashing = Normal Operation - Solid (up to 5s) = Receiving Data Status LED (Red) - Flashing = Error Condition
Weight	180g
Enclosure Dimensions	70mm x 100mm x 30mm (WxDxH)
Enclosure Material	Extruded aluminium
Colour	Matt black

How to Contact Us

Sea Air and Land Communications (Salcom) Ltd
10 Vanadium Place
Addington
Christchurch 8024
New Zealand
T: +64 (0)3 379 2298
W: www.salcom.com
E: sales@salcom.com

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