12-88-7000

VHF / UHF Relay Output Receiver

PRODUCT MANUAL

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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 12-88-7000 is a high sensitivity VHF/UHF paging receiver which is able to control 3 outputs (one relay and two as open collector). It operates over the two frequency ranges, VHF 148Mhz to 165MHz (model 12-88-7150) and UHF 440Mhz to 470MHz (model 12-88-7450). The 12-88-7000 decodes 512 or 1200 baud, alphanumeric or numeric Salcom control protocol messages.

By default the 12-88-7000 is configured to use an internal PCB aerial, but an indoor external aerial can be used if required by attaching a flying lead to the PCB. If the application requires an outdoor external aerial, the Salcom 12-84-7000 is a more suitable receiver.

Installation and Connections

Install the 12-88 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 reasonable coverage areas an aerial will not need to be fitted - the internal PCB aerial will perform well in most situations.

Connect a 12 volt DC power supply to the power pins (pins 1 and 2). The 12-88 is protected against reversed supply connection. The power source must be reasonably noise free.

The 12-88-7000 uses a RJ45 (8C) connector for the relay and open collector outputs.

The connections to the relay contacts are made using pins 6(normally open contact), 7(relay common) and 8(normally closed contact). The relay is not to be connected directly to mains voltages.

Open collector outputs (pins 3 and 4) can be used to sink up to 80mA. The open collector outputs can be easily damaged if used incorrectly. These outputs are well suited for low current applications, or being used to control larger switchgear (with suitable protection).

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

Pin Connections For RJ45 (8C) Connector	
Pin	**Description**
1	+12V
2	GND
3	Output 3
4	Output 2
5	Do not connect
6	Relay Normally Open
7	Relay Normally Closed
8	Relay Common

Operation

When operating normally, D3 (visible with case removed) will flash green once every second. When the relay is in the closed state the red LED D1 will be lit. The relay will operate only when a correct Salcom relay control message is received with a matching unit ID.

There is no visible indication when either of the two open collector outputs are operated, making them well suited for extremely low current applications. When only open collector output control is required the 12-88 can be supplied with any voltage down to 4 volts. A 12 volt supply is required for relay operation.

To control the outputs a message must be received that matches the unit ID with a suitable control code sequence (Salcom relay control protocol). The received message must also be the expected baud rate (512 or 1200) and format (alphanumeric or numeric). The 12-88 will also respond to a group unit ID of "00". The onboard relay is addressed as output 1, open collector outputs as output 2 and output 3.

A mono-shot timer can be set for each output allowing the output to open automatically after being closed. This mono-shot timer can be set to between 100mS seconds to 100 minutes (in 100ms steps).

Setting any output mono-shot timer to 0000 results in the output remaining latched until a message is received to change its current state.

If configured to do so, each output state will be stored and restored to the last set state on power up.

The 12-88 can be configured to respond to up to 4 different cap codes. Setting any cap code to 0000001 will result in all cap code messages being examined for the output control message.

Unit Number

Each unit will respond only to messages containing a matching unit ID or a group ID of 00. Up to 99 unique unit numbers are available when configured as a numeric receiver (00-99). Approximately 8000 unique unit codes are available when used as an alphanumeric receiver (any 2 printable characters).

Any number of units can be programmed with the same unit number.

Mono-Shot

Output mono-shot (momentary) operation can be enabled if required. Each output can have its own Mono-shot time, ranging from 100mS to 100 minutes in 100mS steps. Setting the value to 0000 disables the mono-shot timer altogether, and the relay output is latched until commanded off.

If the unit is configured to restore output states on power on, output state restoration will not be applied to any output with a configured mono-shot time set.

Output Control

Outputs are controlled using Salcom relay control protocol. The control message must be at the start of the paging message in order to be processed. Outputs 2 and 3 are treated as relays in the examples below for clarity.

Control commands take the form UUxxx0yyy9 where:

UU is the 2-character unit ID

xxx = outputs to close, combinations of 1(relay), 2,3(open collector).

0 marks the end of outputs to close.

yyy = outputs to open, combinations of 1(relay), 2,3(open collector).

9 marks the end of the relay command data.

A red LED will display on the PCB showing when the relay is closed, but there is no indication when open collector outputs 2 or 3 operate.

e.g.

|	
23109	Will only address a unit with matching ID 23. Relay 1 will be closed. No other action taken.
23019	Will only address a unit with matching ID 23. Relay 1 will be opened. No other action taken.
231209	Will close relay 1 and 2 on a unit with the ID of 23.
230129	Will open relay 1 and 2 on a unit with the ID of 23.
2301239	Will open relay 1,2 & 3 on a unit with the ID of 23.
231029	Will close relay 1 and open relay 2 on a unit with the ID of 23.

Programming

In order to set-up the12-88-7000, configuration software should be downloaded from the Salcom website (www.salcom.com). Alternatively, a suitable terminal program can be used to program the 12-88-7000.

To connect the programming computer to the 12-88-7000 either use a

- 12-47 serial programming interface or
- 12-48 USB programming adaptor with a mini USB to USB cable (not supplied)

These should be connected to the 4-pin programming header, as shown below.
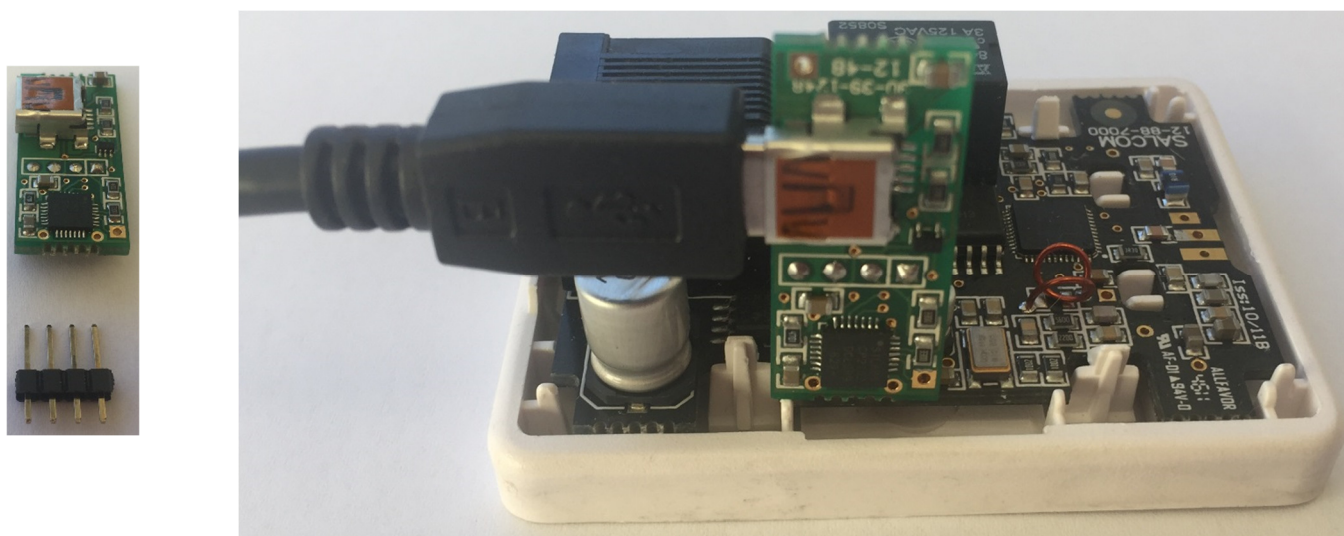

Connecting the 12.48 USB programming adaptor to the 12-88

Note: Remove the header plug, as shown on the left-hand picture

If using the 12-47 programming cable and a terminal program ensure the Serial RS232 RTS (Ready To Send) control line is set to active. The RTS line provides the DC supply to the 12-47 RS232 components inside the D9 cover.

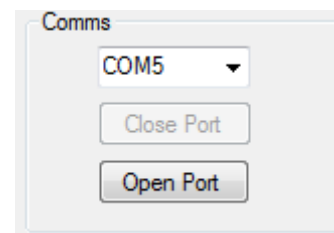**Getting started with the Programming Software**

Load the 12-88-7000 PSD programming software, this should bring up a screen as shown below.
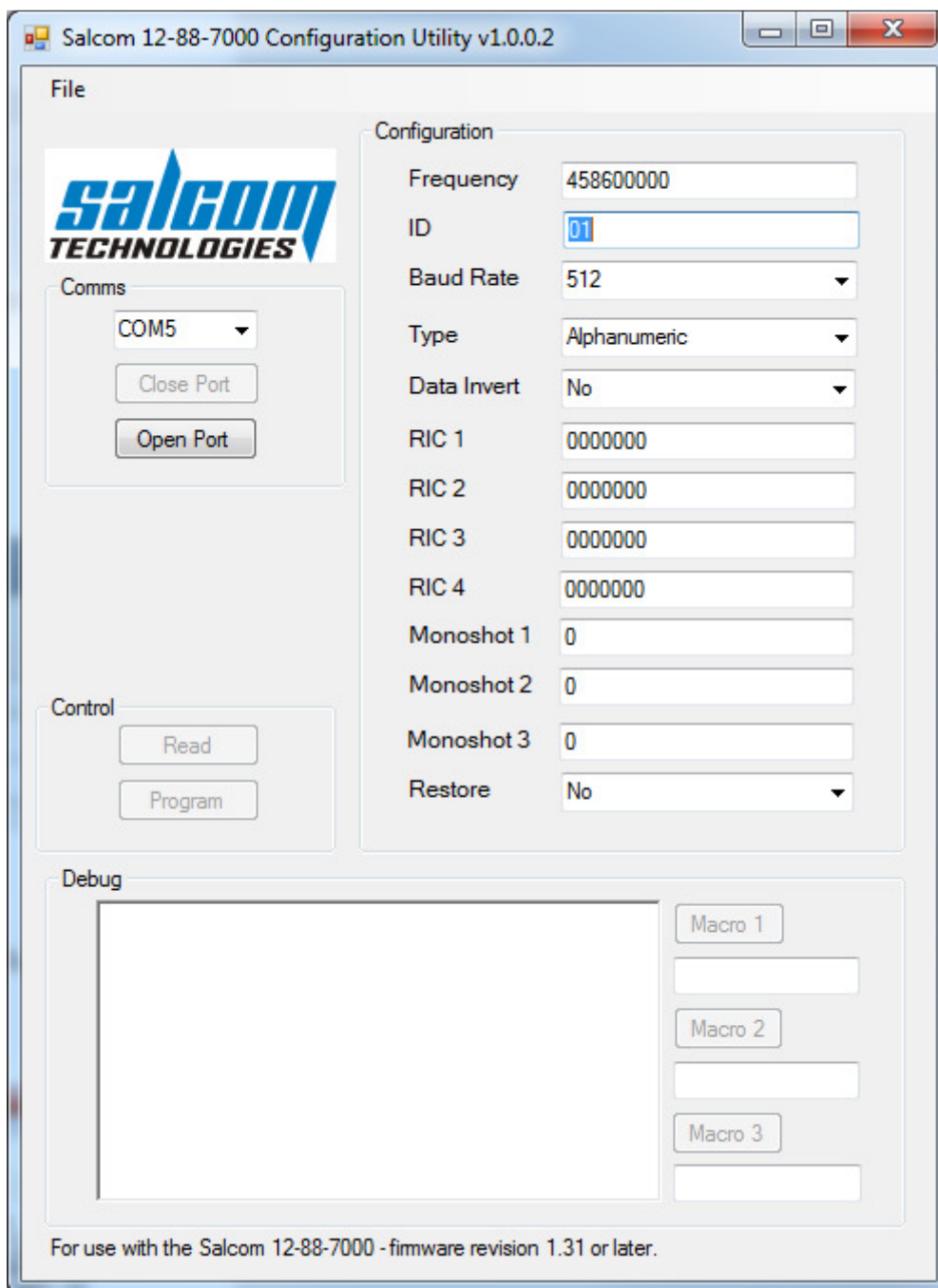

To connect your PC to your 12-88-7000 select click on the Com Port drop down dialog to select the Com Port your 12-88-7000 is connected to.

Note: Ensure the correct com port is selected

Next select '**Open Port**', in order to connect.

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To get a valid set of parameters to start your programming configuration, either press the read button. This will load all settings of the 12-88.
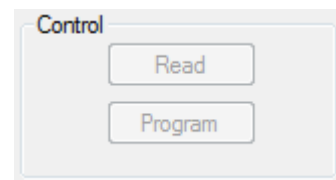
Or alternatively load a PSD configuration file, by selecting the "**File->Load**" menu item and browsing and selecting a saved configuration.
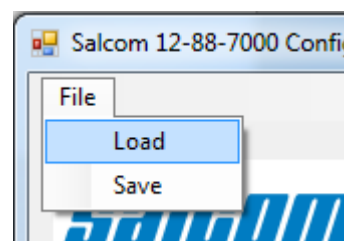
Note: One of these actions is recommended before any changes can be programmed to ensure the unit is not programmed with the PSDs default values.

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 12-88-7000.

Using the Programming Software

The 12-88-7000 PSD allows the user to configure the following characteristics:

Once the configuration fields for each feature you want to change have been updated use the 'Program' button to update your 12-88-7000's configuration.

*Note: After programming the 12-88-7000 you must select "**Close Port**" for the changes to take affect and for the 12-88-7000 to return to its normal operational state.*

Frequency: This is the receive frequency. This parameter should be programmed to be between the values shown below and must be specified in Hz.

> *Rx Frequency:* The frequency to set receiver to.

Frequency	Minimum	Maximum
VHF	136000000	174000000
UHF	440000000	470000000

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

ID: The unit ID is used to uniquely address a unit to control outputs. The unit ID must be 2 characters. If numeric decoding is specified, then the unit ID must be between 00 and 99. If alphanumeric decoding is used then any printable character can be used as part of the unit ID allowing for approximately 8000 possible addressing codes. The unit of '00' can also be set, but is also used as a group address code.

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

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

Data Invert: When selected this allows the 12-88-7000 to receive messages that have been sent in an inverted format.

CapCode: Up to 4 receiver codes can be specified. Valid Codes are:

Ranges
0000008 to 2007663
2007672 to 2045055
2045064 to 2097143

Setting a code to 0000001 will result in all CapCodes being decoded.

Monoshot: If specified, the mono-shot will open the relay after the relay has been closed for the configured monoshot period. Setting the relay to 0 results in latched operation (mono-shot timer not operating). The timer can be set in 0.1 second increments from 0-65535 (max 1.8 hours).

Setting	Duration	Description
0	Latched	Latched Operation (Default)
1	0.1s	Minimum Duration
65,535	6,553.5s	Maximum Duration (Approx' 1.8hrs)
1	0.1s	Step size

Restore: If selected then all outputs that are not configured for monoshot operation will be saved so that when the power is cycled the output will return to that state.

Configuration Commands

All serial commands are sent and received using a standard terminal application connected at 9600:N:8:1 using a 12-47 or 12-48 USB programming adaptor.

When the unit is first powered the sign on message and configuration options will be sent from the 12-88:

> Salcom 12-88-7000 V1.2
>
> +01 ID: 01
>
> +02 Freq: 458600000
>
> +03 RX Mode: A512
>
> +05 CapCode 1: 1233333
>
> +06 CapCode 2: 0000001
>
> +07 CapCode 3: 0000000
>
> +08 CapCode 4: 0000000
>
> +21 O/P MS 1: 00100
>
> +22 O/P MS 2: 00000
>
> +23 O/P MS 3: 00000
>
> +30 O/P Restore: 0

ID: 2-character id which identifies this unit when the 12-88-7000 relay protocol is used.

> Typical usage: **+01= 01<CR>**

Freq: This is the receive frequency.

> Typical usage: **+02=458600000<CR>**

CapCode: Up to 4 receiver codes can be specified. Each parameter should be between 0000008 and 2000000. Setting a code to 0000001 will result in all CapCodes being decoded.

> Typical usage: **+05=1234560<CR>**

RX Mode: The mode determines the receiver mode of operation. Possible settings are A512, A1200, N512 or N1200. 'A' specifies alphanumeric operation. 'N' specifies numeric operation. 512 and 1200 specifies the receiver decode baud rate.

Typical usage: **+03=A512<CR>**

O/P MS (Output Monoshot): If specified, the mono-shot will open the relay after the relay has been closed for the configured monoshot period. Setting the relay to 0 results in latched operation (mono-shot timer not operating). The timer can be set in 0.1 second increments from 0-65535 (max 1.8 hours).

Typical usage: **+21=100<CR>**

O/P Restore: If set to 1, then all outputs that are not configured for monoshot operation will be saved so that when the power is cycled the output will return to that state.

Technical Specification

Technical Specification 12-88-7000 – VHF / UHF Relay Output Receiver	
Frequency Range	148-165MHz - VHF (Model No. 12-88-7150) 440-470MHz - UHF (Model No. 12-88-7450)
Frequency Selection	Factory preset
Power Supply	+13.8V typical (11 to 15 VDC range)
Power Consumption	Receive: 25mA Relay: 18mA when energised
Modulation	FSK with NRZ data
Receiver Sensitivity	Approx. -124 dBm
Receive Bandwidth	6.25KHz (minimum)
Baud Rates	512, 1200
Paging Protocol	POCSAG
Configuration Application	Salcom Configuration Tool
Programming Cable	12-47-0000 (Board header to DB9) Can be used with a USB to RS232 DB9 Serial Adapter Cable 12-48-0000 (Board header to mini USB)
Serial Port	9600, N, 8, 1; RS232
Discrete Outputs	1 Relay Contact (1A @ 24VDc); 2 Open Collector (80mA max) Note: Not suitable for 240VAC Connections
Connectors	Outputs Connection = RJ45 (8C)
RF Connector	Internal aerial
Environmental Protection	Not suitable for outdoor use and should be protected from adverse environmental conditions
Operating Temperature	-10ºC to +50ºC (+14ºF to +122ºF)
Weight	30g
Enclosure Dimensions	66mm x 50mm x 26mm (WxDxH)
Enclosure Material	Plastic
Colour	White

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