5 Technical Specification

|	
Power Supply	12-24VDC 500mA Max. (10-15mA)
Relay Output	5A Max. CATII 220VAC
SIM	1.8/3.6V
Compliant with GSM Phase 2/2+	Class 4 (2W @850/900 MHz)
	Class 1 (1W @1800/1900 MHz)
Antenna	50Ω U.FL

6 SMS Command Set Summary

Command	Action			Comments
MASTER	number	.		
ADD	number	.		
REM	number	.		
LIST				
CLEARALL				also clears MASTER
CALL	LIST	ANY	NONE	
TXTRES	DIS	EN		
CONN	NONE	CL	OP	
STAT				
INTXT	DIS	EN		
INLVL	OP	CL		
TXTNUM	*<master>*	number	.	set by MASTER
RLYMODE	NO	TOG		
RLYTIME	<seconds>			default 3s
RLYTIME	<minutes>m	.		relay time in minutes
CSQ				get RSSI
PRGSIM				clear SIM
DIAL	number	interval (days)	time (s)	PAYG Keep Alive
DIAL	OFF			(switch off DIAL)
EXIT	DIS	EN		Exit Switch Enable
OPEN/ON				activate relay
OPEN/ON	<seconds>			open for <seconds> seconds
OPEN/ON	<minutes>m.			open for <minutes> minutes
CLOSE/OFF				reset relay
QUERY/QNUM	number	.		find number in memory
REJECT	ALL	NEVER	OPEN	Call Handling
MUSER	DISABLE	ENABLE		Treat all users as Master
CUSTOM				Custom input message
RESET				Reset Settings to Defaults

QUAD Band GSM Relay Board

Alpha 2.04/Firmware 2.07
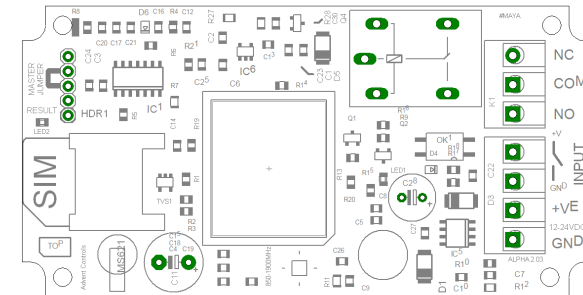
Open-on-Call Access Control with Text Alert

for GSM850MHz, GSM900MHz DCS1800MHz & PCS1900MHz

www.adventcontrols.co.uk

Contents

4.2   Input Connection

The input is optically isolated from the main circuitry and is connected to ground (GND) to become active (LOW). The two terminals labelled 'INPUT' should be connected to an otherwise unused switch.
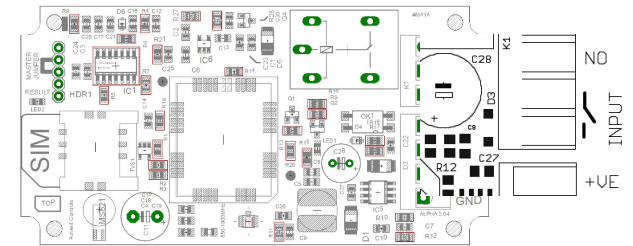
4.3   Output Connection

The relay output has Normally Open (NO) and Normally Closed (NC) relative to COMmon (COM) connections. These can be actuated in a momentary operation or can be toggled (see **3 Setup**).

The connections are 'voltage free' with no connection to +VE or GND. The relay connections have a minimum creepage distance greater than 4mm and are CATII rated to 220V.
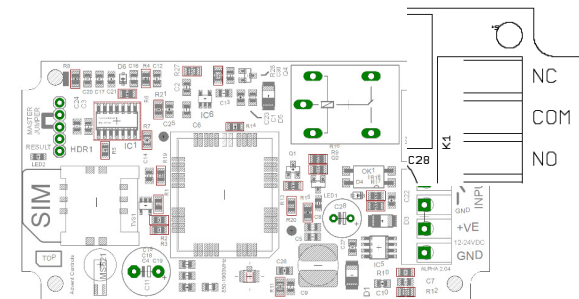
4.4   Antenna Connection

The standard antenna can be used where a strong signal exists. In areas with a poor signal an external antenna is recommended connected via RG174 coaxial cable. The system uses standard SMA connectors. It is not recommended to use an extension greater than 3m in length.

4.5   Mounting

The PCB has been designed to fit into a Hammond 1591B enclosure. When mounting the unit into such an enclosure the enclosure must be modified to allow for the antenna/coaxial cable to be connected. When mounting in a metal cabinet, an external antenna must be used, connected using 50ohm impedance coaxial cable. If required, please contact support@adventcontrols.co.uk for assistance.

3.3 Signal Strength Indicator

When setting up the system it is important to know the strength of signal for reliable operation. To receive a message showing the Received Signal Strength Indicator (RSSI) the CSQ command is sent to the system as follows:

CSQ

When the system SIM card has sufficient credit a SMS text message is sent to the number which sent the command displaying the current RSSI.

e.g. >RSSI 21

The RSSI can be converted to an approximate Signal to Noise Ratio (SNR) in decibels using the following formula:

RSSI (dBm) = -113 + 2x(CSQ value)

It is recommended that the minimum signal level for the installation is 15 (-83dBm) to ensure reliable operation. The system will operate below –100dBm but may become unresponsive at times.
To achieve an improved RSSI the standard antenna can be upgraded to a model with higher gain and/or the antenna should be positioned in an area with less physical obstruction. An extension lead can be attached to the SMA connector on the PCB to locate the antenna away from the control unit housing.

3.4 Purging Messages from SIM

The PRGSIM command is used to remove any unwanted messages from the SIM card or to stop the system processing any messages sent when it was switched off. The master number send the following command to purge all messages from the SIM:

PRGSIM

4 Installation

4.1 Power Connection

A fused DC power supply of between 12 and 24VDC should be used with this product. The power connection should be made to the terminals labelled +VE and GND.
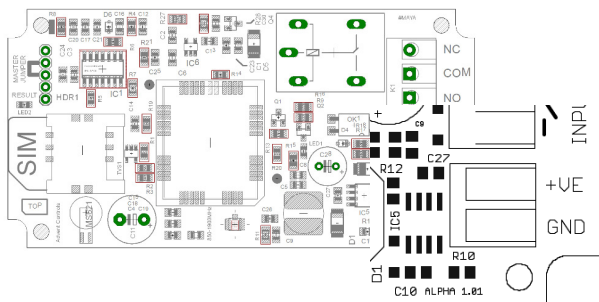
1. Introduction

The Advent Controls Alpha GSM relay board has been primarily designed for barrier access control applications although can be used as a general purpose call/SMS activated relay. The board also features an optically-isolated DC input which can be used to trigger the sending of a customisable Short Message Service (SMS) alert message to up to 512 numbers.

The relay can be activated by a call or SMS text from up to 512 stored telephone numbers or can be configured to activate when receiving a call from any number. By default the call will not be answered and hence costs the caller nothing. However, the system can also be set to reject the call or connect a call when either the input is open or closed. This allows the input status to be determined even when the SIM card does not have credit for SMS text messages.

Setup and operation is performed by simple SMS text messages including adding and removing user telephone numbers. A complete list of accepted telephone numbers can be viewed via SMS text message. The memory can also be scanned to see if it contains an individual number and the result is display by the on-board LED and (if enabled) by SMS text message.

The output relay has both Normally Open (NO) and Normally Closed (NC) with Common (COM) connections. The action of the relay can be a single timed actuation from either 1s to 999s or 1 to 999 minutes or the relay can be set to toggle between calls.

2. Operation

2.1 Registration

A valid GSM Subscriber Identity Module (SIM) card must be present in the SIM holder for the system to operate. Immediately on power up the system will attempt to register on the SIM card on it's home network. Once registration has occurred LED1 will change from flashing approximately once every second to a momentary flash once every two seconds. If the LED1 continues to flash once every second for some time, the system cannot register the SIM on the network. The system will restart should this occur. If the problem persists check the antenna and strength of signal in your area/validation of the SIM card. Observe anti-static precautions when inserting the SIM.

The second LED, LED2 found by the 5 pin header, is used to display the result of a command. **The LED will flash twice to acknowledge the successful receipt of a command** and will light continuously for 2s to show the instruction has failed. It also illuminates during any call (valid or invalid) and lights continuously when a signal cannot be found.

2.2 Command Message Format

To operate the system a master GSM phone is used to send SMS text messages to the system telephone number. All message follow a similar format as follows:

COMMAND<space>*action.* *(eg.* Master 07000000000.)

The command (see Table 1) is always written first followed by a space and the action required. Although not necessary, it is useful to include a full stop immediately after the action as some mobile phones can enter superfluous characters at the end of a message, which can invalidate the message. The message is **not** cAsE sensitive.

2.3   Master Number Setup

The system is controlled by the master GSM mobile phones. The system must first be associated with at least one master phone's number before it can be used. To do this the supplied 2.54mm jumper connector must be fitted to pins 3 & 4 on HDR1 as shown in red in Figure 1. Do not connect the jumper to any other pins or damage may result.
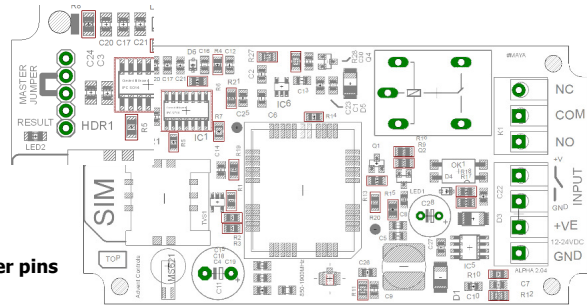
Figure 1. Jumper pins

The master phone number must then be sent via a SMS text message to the system phone number as follows:

MASTER *number.*

For example, if the master telephone number is 07000 000 000:

MASTER 07000000000.

Also valid are the following:

Master 07000000000 and master 07000000000

The following messages are invalid:

master 07000 000 000. (spaces in the number)
master07000000000 (no space after 'master')

The result LED, LED2, will flash two times to indicate the master number has been successfully setup. Calling the board's telephone number with the master phone will now activate the relay. Once one master number has been setup further masters (up to 512) can be setup by this and subsequent master phones without the jumper fitted (using the same message).

Using the PIN for Master Setup

The Master Number can also be set up using the PIN. The PIN is the last 5 characters of the IMEI number written on the GSM module. The command is sent as follows:

Master 07000000000,37212.   for module with IMEI 355073034**37212**

To enable any user to control master commands (such as adding and removing numbers) the MUSER command is sent to the board, by the master, as follows:

MUSER ENABLE   Allows any valid user number to modify settings
MUSER DISABLE   Only master numbers can modify settings

By default MUSER is set to disable full access for all users.

2.19   Exit Switch Enable

The input connection can be used to activate the output relay which is ideal for connection to a secure-side exit switch. It uses the trigger level for the input text message (see INLVL) and activates the relay as per a phone call. To enable the exit switch input the EXIT command is sent to the board as follows:

EXIT EN   enables the exit switch input
Exit dis   disable the exit switch input

2.20   SIM Keep Alive Call

When using a Pay As You Go (PAYG) SIM card, to avoid SIM card deactivation, the system can periodically call a telephone number to keep the SIM active. Ensure the SIM card has sufficient credit to make a call even if the call goes unanswered. To setup the Keep Alive Call function the following SMS text message is sent to the system:

DIAL<space>*number,frequency,call-time.*

e.g. **DIAL 07000000000,10,25.** (dial 07000000000 every 10 days for 25 seconds)

Frequency—number of days interval
Call-time—total call time including dialling & connection

3   Setup

3.1   Relay Activation Mode

When a valid call is received the relay can be set to activate for a set period of time (set by the RLYTIME command) or to toggle between states on each call. By default the relay mode is set for timed activation. To switch to toggle mode the following message is sent to the system by the master number:

RLYMODE TOG   enables toggle mode

To revert to timed mode the following message is sent:

RLYMODE NO   relay Normally Open (NO)

3.2   Relay Activation Time

The RLYTIME command is used to adjust the time the relay is active following a call when RLYMODE is set to NO. By default the relay time is set to 3s. The time can be set from 1s to 999 seconds or 1 to 999 minutes using this command.

To change the activation time the master number sends a SMS text message as follows:

RLYTIME *seconds.*

e.g.   **rlytime 10.**   1 second activation time
          rlytime 250s   250 second activation time
          Rlytime 1m.   1 minute activation time
          RLYTIME 960m.   16 hour (16 x 60mins) activation time

If the user requires the system to send a status message when the input goes open (+5V) the following message is sent by the master number:

INLVL OP   text when open (+5V)

The change state service becomes inactive whilst the input remains in the active state (i.e. GND for INLVL CL/+V for INLVL OP) and remains inactive for 5 seconds after returning to the idle state.

If two messages are received for one event then this indicates that the INLVL settings are incorrect and should be reversed.

2.16   Customising the Input Alert Message

The default input alert message is 'INPUT ACTIVE'. This can be customised by the user using the CUSTOM command. The maximum length of the message is 128 characters and it **must** end with a full stop. The custom command is used as follows:

CUSTOM THE GATE IS OPEN.
CUSTOM THE PUMP HAS STOPPED PLEASE CALL 07000000000.

Use only text or number characters in the message. The message will end where there is a full stop. Do not use a full stop in the middle of the message.

2.17   OPEN/ON & CLOSE/OFF Commands

The OPEN and ON commands are used to activate the relay with a SMS text message. The CLOSE and OFF commands deactivate the relay, whether activated by the OPEN or ON command or a call. When the OPEN command is sent without any additional instructions the relay is activated indefinitely. When sent with a value and **m**(inutes) or **s**(econds) parameter the relay activates for a set period of time. The maximum number length is three characters therefore the timer is limited to 999 seconds or 999 minutes. If the **m** or **s** parameter is not sent then the timer value is read as the number of seconds.
The ON and OFF commands are identical to the OPEN and CLOSE commands respectively and can be used interchangeably.

When sent with additional time information the relay is activated for however many seconds or minutes specified.

e.g.	**OPEN**	activates relay indefinitely
	on	activates relay indefinitely
	open 10.	10 second activation time (**s** parameter optional)
	Open 250s	250 second activation time
	ON 1m.	1 minute activation time
	open 960m.	16 hour (16 x 60mins) activation time
	CLOSE	deactivates relay under all conditions
	OFF	deactivates relay under all conditions

2.18   Alarm SMS Text Numbers

The system can send the Input Alert Message (2.16) to up to all 512 numbers. To add a alarm text number the following SMS text message is sent to the system by any master number:

TXTNUM<space>***number.***

e.g. **txtnum 07000000000.**

N.B. Text numbers can also activate the output—there is no need to add the number twice!

2.4   Adding a User Number

Any telephone number of at least 5 digits where caller ID is available is valid. The system only compares the last 8 digits of any calling number against the numbers stored in memory. Therefore it is not necessary to enter the international dialling code format of the telephone number.

i.e. for 070**00000000** only the characters shown in **BOLD** text are considered

The ADD command is used to add a new telephone number. To add a new number any master phone must send the following SMS text message to the system telephone number:

add<space>*number.*   e.g. **Add 07000000000.**

If TXTRES is enabled the system will respond with the 'Operation Successful' message.

2.5   Removing a User Number

The REM command is used to remove an existing telephone number. To remove an existing telephone number any master phone must send the following SMS text message:

rem<space>*number.*   e.g. **REM 07000000000.**

If TXTRES is enabled the system will respond with the 'Operation Successful' message. If the number is not found the 'Operation Failed' message will be sent by the system.

2.6   Viewing the Valid Number List

The system can send a SMS text message containing a complete list of valid user numbers to any master phone.

To receive the list of numbers the LIST command is used. The master phone must send the following SMS text message to the system:

List

No further characters are required and are ignored if received.

The response format shows the last 8 digits of the stored number followed by a space and the next number and so on…(the master will not appear in the list but will also be valid)

e.g. 00000000 11111111 22222222 33333333 etc…

2.7   Finding a Number in the Memory

To find whether a number is stored in the memory the user send the following command to the board:

QUERY<space>*number.*   or
QNUM<space>*number*

If the number is present the LED will flash 4 times and if not in the memory the LED will light twice for 2 seconds. If TXTRES is enabled an SMS text message will be sent with the result.

2.8   Clearing All Numbers

The CLEARALL command is used to erase all stored user and master numbers. To erase all numbers the following SMS text message is sent by a master number:

CLEARALL

No response is sent by the system to acknowledge the command

2.9   Enabling Any Number and Disabling Open-on-Call

The system can be setup to allow any number to operate the relay output. To enable any call the CALL command is used with the action ANY and is sent by the master phone in the following format:

Call any

To return the system to operate from only valid user numbers the LIST action is sent with the CALL command as follows:

call list

To disable activation of the relay by calling the following command is sent to the board (the relay can still be activated by SMS text; see OPEN/ON & CLOSE/OFF commands):

CALL NONE

2.10   Result Acknowledgement Message

The system can be setup to send an SMS text message to acknowledge a command. This acknowledges the result of the last command processed such as adding a new user number. The SIM card in the system must have sufficient credit for sending SMS text messages.

To enable/disable the service the following text message is sent by the master number:

txtres enable   (or also valid: **TXTRES en**)

TXTRES DISABLE   (or also valid: **txtres dis)**

The result message 'Operation Successful' is sent when the service is enabled

2.11   Connecting a Call

By default, when called the system is set to ring indefinitely or until the SIM card network operator transfers the call to voicemail. However the system can be set to connect a call when the input is **OP**en (high/12V) or **Closed** (low/0V). This is done to allow the caller to know the state of the input even when the system has insufficient credit to send a status SMS text message. See also the REJECT command.

To change the connect mode the CONN command is sent by the master phone with the action **CL** or **OP**. To disable connect on call the **NO**ne action is sent.

e.g.   **CONN CL**   connect when input high
       CONN OP   connect when input low
       CONN NO   do not connect call

2.12   Call Reject

By default any call to the system will be allowed to ring indefinitely (or up to the host network time limit). This is to avoid calls being divert to voicemail when rejected by the system. However the system can be instructed to reject (hang up) calls using the REJECT command:

REJECT ALL   rejects all *valid* calls

The reject command can also be used to determine the status of the relay when in toggle mode by sending the following command:

REJECT OPEN   rejects the call when the call is deactivating the relay
                connects the call when the call is activating the relay

REJECT NONE   disables all call rejection

2.13   Input/Output Status Message

To determine the current status of the input and output the STATUS command is sent to the system telephone number in a SMS text message by a master phone as follows:

STATUS

The system will respond with a SMS text message as follows:

RELAY OPEN INPUT LOW   relay not activated/input closed (GND)
RELAY CLOSED INPUT HIGH   relay activated/input open (+V)

2.14   Input Change State Message Enable

The system is able to send a SMS text message to up to 512 numbers when the input changes state. To enable this service the following command is sent via a SMS text message by any master telephone number:

INTXT En   enables the change state text message
INTXT Dis   disables the change state text message

The system sends the message to all numbers added using the TXTNUM command.

2.15   Input Change State Level

The INLVL sets the active state of the input for sending the change state text message. For example, if the user requires a message to be sent when the input is closed (GND), then the following message is sent by the master number:

INLVL CL   send status message when input closed (GND)