

EMM-Tek RMC301 User Manual

**Measure, Monitor &
Control**

via the GSM network

from wherever you are

Instructions on how to use the EMM-Tek RMC301, GSM enabled remote monitoring and control system.

www.emmtek.co.uk



EMM - Tek Ltd

RMC-301 User Notes: 17 July 2011

This manual is suitable for use with Firmware revision R1.0 The firmware and operating instructions are identical for RMC301L and RMC301R devices. The R suffix signifies that the product is equipped with relays. Where relays are not fitted, the relay commands will have no effect.

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IMPORTANT - TRY IT OUR WAY FIRST

We suggest that in order to get your RMC301 operating as quickly as possible, in your application, you start with a brief skim read through this manual. It will give some ideas about just what the RMC301 is capable of.

Then read pages 4-5 for how to insert your SIM card (the RMC301 will not function without a SIM card). Read this in conjunction with the connection diagram on page 22 so that power and sensor connections can be made at the same time.

Move to page 20 which walks you through the initial set-up procedure for USER 1. Power down the RMC301 and then step through the standard power up procedure on page 21.

Now you're ready to start exploring how to use the functions of the RMC301.

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCT DESCRIBED HEREIN CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from EMM-Tek Ltd and its authorised distributors provide product or systems options for further investigation by users having technical expertise.

The user through its own analysis and testing is solely responsible for making the final selection of the system and components and assuring that all endurance, maintenance, safety and warning requirements of the application are met. The user must analyse all aspects of the application, following applicable industry standards and follow the information concerning the product in the appropriate release of documentation and any others materials provide by EMM-Tek or authorised distributors.

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Overview

The RMC301 is a versatile, SMS configurable, Remote Monitor and Control System. The user configurable parameters and flexible input/output (I/O) options make this device suitable for a wide variety of uses in domestic, commercial and industrial applications.

The RMC301 allows the user or users to retrieve remote data, control equipment and receive user definable alarms via SMS. The device is easily interfaced to a range of sensors and / or existing systems.

RMC301 Basic Specification	
Input Supply Voltage:	5.5V to 30V DC
Current Consumption:	35 mA Network Registered. (approx average reading) 65 mA with optional GPS module fitted 10mA Sleep (approx average reading no GPS)
Dimensions (approx. bare PCB version)	55mm wide x 100mm long x 25mm tall
Antenna Connector:	Flying lead / SMA Female connector
SIM Colder Holder:	Locking Amphenol
SIM Card:	Any Contract or PAYG SIM (Not provided)
Analogue Inputs:	3 user inputs. 3V Maximum (extendible by external resistor divider) 1 fixed input to measure the power supply voltage
Analogue input bit resolution:	10
Digital Inputs:	2 user inputs. 5V Maximum
Digital Outputs:	2 Relays: Double Pole Change Over (30V 2A 60W max) Relays are intended as low voltage switches only. They are not to be used for 'mains' voltage isolation. 2 digital outputs - 3.3v Sink 24mA Source 24mA
Operating temperature range SuperCaps not fitted*:	-20 to +60 degrees C (non-condensing)
Storage temperature range SuperCaps not fitted:	-40 to +85 degrees C
Operating temperature range SuperCaps fitted:	-20 to +60 degrees C (non-condensing)
Storage temperature range SuperCaps fitted:	-25 to +70 degrees C

* SuperCap back up is fitted to the RMC301RC & RMC301LC (cased products) and is available as an option on RMC301R and RMC301L.

When SuperCaps are not fitted, the RMC301 (and variants) will continue to function from +60 to +80 degrees C, but some deviations from the GSM specification may occur. For example frequency error or phase errors may be larger than defined by the GSM specification.

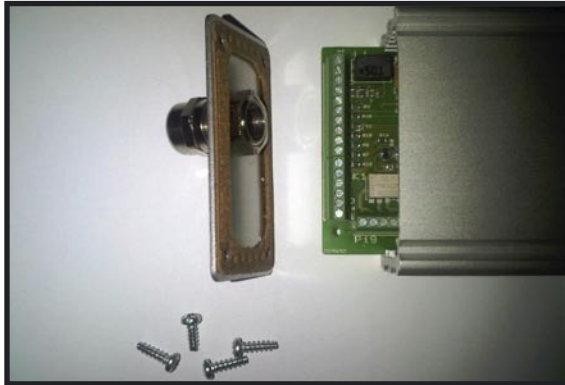
Power Supply Requirements

The external power supply for the RMC301 should be capable of supplying a minimum of 200mA continuous DC current and peak current of 1A.

Getting started

Opening the case & fitting the SIM card for the first time

You will need a small to medium size Pozidrive screwdriver and a flat blade screwdriver with a 2mm blade width.



Remove the 4 cross head screws which secure the end plate containing the cable gland. Carefully slide out the main PCB from within the extrusion about 25mm (1 inch)

Pass your electrical connection through the cable gland and using the wiring diagram on page 22 of this manual, connect up the power, ground and other inputs/outputs as required.

Inserting the SIM Card



Remove the antenna end-plate by unscrewing the 4 Pozidrive screws.



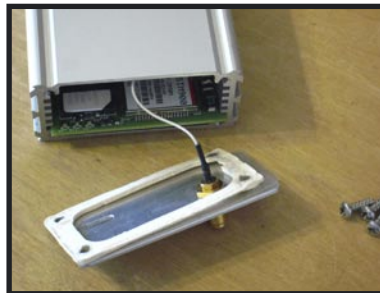
Gently slide out the board being careful with the antenna lead.



Slide the SIM card carrier lid towards the case and gently lift. It is hinged.



Slide the SIM card into the 'lid' of the holder and close it down. When shut, slide the SIM lid slightly away from the case until the holder locks shut.



Gently slide the board back into the metal case. Be careful to avoid trapping the antenna wire or any wires already fitted at the screw terminal end of the board.



Re-attach the end panel to the case using the 4 Pozidrive screws. Make sure the antenna wire is not trapped anywhere! Tighten the screws and then attach the external GSM antenna.

Now you can move to closing the case on the next page.

Closing the case

If you have not already done so, replace the endplate with the antenna connector.

Replace the endplate with the cable gland. Ensure that no leads are trapped by the end plate and tighten the four retaining screws.



Finally tighten the cable gland itself so that a compression seal is formed around the wires entering the case.

You can now proceed to the rest of the set-up.

Configuration Command Conventions

General

Commands are not case sensitive and will operate with upper, lower or mixed cases. For clarification only, all commands in this document are shown in upper case. All user defined labels are limited to 8 characters and users must avoid labels that are, or that contain command keywords.

Caution

Care should be taken when defining labels, as characters over the 8 character limit, will be ignored. This could result in two apparently different labels appearing identical to the device.

Spacing is generally open but in some cases spaces are required as part of the correct command format. For the purposes of this document a 'space' will be represented by an underscore `_` in the Format: sections

Some commands can only be modified when the device is **not** in the armed state as indicated in the command tables. Commands defined using **'ON_CALL, COM_DEF1 or COM_DEF2** will operate when armed only if the user assigned command is active when the system is armed. As a general rule when armed, the only active commands are **DISARM, ARM** and the report functions **STATUS, REPALL, SETTINGS USERS, LOCATION, COMMANDS** and **NETWORK**.

Note that the standard Firmware includes GPS (Global Positioning System) related commands but these may only be used when a suitable GPS receiver module is connected.

SMS Security Commands

Command	Description	Access	Modify when Armed?	Multi Command SMS?
PASSWORD	Enables USER1 only to change the password for the device. Default password is 'RMC301'. The password is only required when changing the USER1 name and number.	User 1 only	N	N
Command format	PASSWORD *old*new* spaces between the * delimiters will be included. Example: PASSWORD *RMC301*ABC123* changes from default password to ABC123			
USER1	Changes USER1 settings. Must be initiated from the current USER1 mobile number and must contain the current password. Make sure the new number is correct before sending this message. If set in error to a mobile number that you do not have access to, you will NOT be able to change it.	User 1 only	N	N
Command format	USER1password *newname*newnumber* Do not include spaces in the number. Example: USER1RMC301 *fred*+447887xxxxx* Changes user1 to FRED, +447887xxxx. We recommend that you include the international dial code for your location when setting numbers.			
USER2	Changes USER2 settings. Must be initiated from the USER1 mobile number. If set in error simply resend with correct data.	User 1 only	N	N
Command format	USER2 *newname*newnumber* Do not include spaces in the number. Example: USER2 *fred*+447887xxxxx* Changes USER2 to fred , 447887xxxx. We recommend that you include the international dial code for your location when setting numbers.			
USER3	As USER2 above.	User 1 only	N	N
ON CALL	Defines which command will be activated when any registered user calls the device. Two commands maybe specified. Care should be taken to check the device behaviour is as expected when using more than one command.	User 1 only	N	N
Command format	ON_CALL *command1_command2* Command2 is optional. Example: ON_CALL *DISARM PULSE OUT1* Disarm and pulse output1 when called.			
COMMAND DEFINE (1 & 2)	Enables user1 (only) to assign a label to a command or commands. The specified command will be actioned when the label is sent as an SMS to the device by a registered user. Avoid defining a label that contains a keyword . Two commands <i>may</i> be specified. Care should be taken to check the device behaviour is as expected when using more than one command. Two versions may be configured COMDEF1 & COMDEF2 .	User 1 only	**	N
Command format	COMDEF1 *label*command1_command2* Command2 is optional. Example: COMDEF1 *reports*settings users* returns settings and user reports when an SMS containing 'reports' is sent to the device by a registered user. **COMDEF is unavailable when Armed, the defined command can be used when Armed.			

SMS Reports

STATUS: By sending an SMS with the word 'STATUS' the device will respond with the current status including:

- User defined name for the device (see DEVNAME)
- Alarm status (disarmed, Armed or triggered),
- Device input supply voltage (VIN)
- Voltage of the analogue inputs A1, A2, A3 user defined label will be displayed in place of Ax (see Ax LABEL).
- Status of the Digital Inputs D1~D2. '0' indicates low or gnd. User defined label will be displayed in place of Dx (see Dx LABEL).
- The status of Outputs RELAY1, RELAY2, OUT1 & OUT2 along with the user defined label of OUTx (see OUTx LABEL)
- **Note that only enabled I/O will be reported.**

Each input will also have an indicator showing the status of the input compared to the limits assigned to it (see Ax LIMIT and Dx ALARM commands).

Example message:

```
RMC301 ARMED  
VIN=11.7 OK  
A1=0.3 OK  
A2=0.6 OK  
A3=0.7 OK  
D1=0 OK  
D2=0 OK  
  
RELAY1=ON  
RELAY2=ON  
OUT1=OFF  
OUT2=OFF
```

REPALL: It is possible to enable or disable any or all of the inputs or outputs using the **INENA**, **INDIS**, **OUTENA** and **OUTDIS** commands. Using the **REPALL** command enables user 1 to see the status of every input and output regardless of whether they are enabled or disabled. This makes it possible to have simpler reports as standard but a full report to users when required. See the command table at the end of the document for full details.

SETTINGS: On sending an SMS containing the keyword 'SETTINGS' the device will respond with an SMS detailing the current device settings: The label name, upper and lower limit for the analogue inputs. The label name and logic trigger level of each digital input, the label names of the outputs, the user definable command to be actioned when the device receives a call (see CALL COM) and the user defined SMS label and command to be actioned (see COM DEF).

Example Message:

RMC301

VIN L7.5 H19.0

(Sets a power supply low limit of 7.5V & upper limit of 19 .0V)

A1 L0.0 H4.0

(Sets analogue1 low limit of 0V & upper limit of 4V)

A2 L0.0 H4.0

A3 L0.0 H3.3

D1 Tr 1

D2 Tr 0

Tr1 means trigger on high voltage (logic 1). Normal condition is low (0), alarm condition is high voltage (1)

Tr0 means trigger on low voltage (logic 0). Normal condition is high voltage (1), alarm condition is low voltage (0).

Move=4

(Sets a relatively tight area GPS alarm - Only applies when GPS is fitted)

Rpt=1 M

(Time in minutes between a repeated command)

Slp=7 H

(The time in hours for the device to Sleep or Nap)

Pul=30 S

(Pulse output length is 30 seconds)

USERS: Sending an SMS containing 'USERS' will cause the users report to be returned. This will show the name, number and Notify level (see NOTIFY command) of the three users.

Example Message:

RMC301 Users

1 JAMES

07929112233

Notify=BOTH

2 MARK

07822123456

Notify=SMS

3 NOT SET

0

Notify=OFF

Server 0778111122 (This for use where SMS messages are sent to a web gateway)

COUPLE: Sending an SMS containing 'COUPLE' on its own (without ON or OFF) will send a report on which inputs are 'coupled' and shows if 'COUPLE' is on or off.

NETWORK: Returns a report showing Firmware revision, the network operator the device is connected to, signal strength and Bit Error Rate. Mostly used during installation or maintenance.

Example Message:

RMC301

356895034659881

(This is the unit serial number)

FW 301 R1.0

(The firmware version of the device)

T-MOBILE

(Network Name)

+CSQ: 13,6

(Signal strength & Bit Error rate)

COMMANDS: Returns with device commands report showing Device Name and user definable commands On Call, On Wake, On Repeat and Comdef.

Example Message:

***RMC301 Commands
On Call=Status
On Wake=PUSHSMS
On Repeat=PRELAY1 PRELAY2
Comdef1=HOME
Comdef2=OPEN
PRELAY1 PRELAY2***

For more information about how to use the commands refer to the comprehensive table at the end of this manual.

Directing reports to individual users

The System can be configured to send reports to individual users. This capability is available for:

**STATUS
REPALL
LOCATION
GPRMC**

For the full detail of how to use this feature please refer to the command table that start on page 26 of this manual.

SMS Input & Output Configuration Commands

Input & Outputs

Analogue Inputs

There are three analogue inputs available on the RMC301, A1 to A3. One additional analogue channel is internally fixed to monitor the device input voltage and has a fixed label VIN. Analogue inputs A1, A2 and A3 are user configurable as are their labels.

All analogue inputs A1 to A3 have user definable upper and lower limit thresholds.

The input voltages applied to A1 to A3 must never exceed 3V or be lower than 0V with respect to GND. If these limits are exceeded, permanent device damage may occur. If a higher voltage requires monitoring then an external voltage divider should be fitted.

Note that voltages applied directly to the analogue inputs above 3.3V will be reported as 3.3V. i.e. If 5V were applied to the analogue input it would still report the voltage as 3.3V. This high input would also risk damaging the device.

Remember to take an external voltage divider into consideration when setting high and low limits for A1 to A3. If, for example, a divide by 10 voltage divider is fitted then voltages of up to 30V can be monitored. In this case measurements and limits set will need to be multiplied by 10 (15V applied to the divider will produce a measured voltage at the analogue input of 1.5V)

Digital Inputs

Two digital inputs are available on the RMC301. Each has a user definable label and trigger polarity. The user must take care to ensure that any voltage applied to a digital input never exceeds 5V or is lower than 0V with respect to the GND terminal of the RMC-301. There is a 100ohm resistor in series with each digital input to act as a current limit, but exceeding the electrical limits may result in device damage.

Outputs

A total of four outputs can be remotely switched with the RMC301. **RELAY1** and **RELAY2** have double pole change over relays, **OUT1** and **OUT2** are logic level (3.3V) outputs capable of sinking and sourcing 24mA. All four outputs have user definable labels and can be turned ON, OFF or PULSED momentarily by any registered user.

Input / Output Enabling & Disabling

Using the commands INENA (Input enable), INDIS (Input disable), OUTENA (Output enable) and OUTDIS (Output disable) the user can choose which inputs and outputs of the RMC301 are available for use. Disabled outputs can not be remotely switched on, off or pulsed and do not appear in the 'STATUS' report. This can be useful when a number of inputs or outputs are not used as it simplifies the report sent by SMS.

This feature also enables the user to disable unwanted inputs to prevent false triggering of the alarm, prevent switching (or provide a 'safety setting' to outputs) and customise the 'STATUS' report. Note that the 'REPALL' (Report All) report shows the status of all inputs and outputs regardless of their enabled or disabled state.

To establish which I/O are enabled use the 'STATUS' command. Only the enabled I/O will be reported.

SMS Input & Output Configuration Commands

Command	Description	Access	Modify when Armed?	Multi Command SMS?
PULSE DELAY	Specifies the output time in seconds of a pulse applied to a relay or digital output. Minimum 1, maximum 3600 (1 hour) Default is 1.	User 1 only	N	N
Command format	PULSE_DELAY*x* (X = seconds of delay)			
OUTx ON OUTx OFF POUTx PRELAYx	Turns OUTx ON (x=1 or 2) Default is off Turns OUTx OFF (x=1 or 2) Turns OUTx ON for approx. 1 second (x=1 or 2)	All Users	N	Y
Examples	OUT1_ON Turns Output1 ON OUT2_OFF Turns Output2 OFF POUT2 Turns Digital Output 2 ON for PULSE DELAY time. PRELAY1 Turns on relay 1 for PULSE DELAY time.			
A1 TEMP	Set A1 TEMP ON when optional EMM-Tek temperature sensor is connected to Analogue input 1 (A1). The input will then read temperature in degrees Celcius.	User 1 only	N	N
Command format	A1_TEMP_ON A1_TEMP_OFF			
INENA	Enables device inputs	User 1 only	N	N
Command format	INENA*inputs(multiple)* to enable (VIN A1 A2 A3 D1 D2) or ALL. Default is all inputs on			
INDIS	Disable device inputs	User 1 only	N	N
Command format	INDIS*inputs(multiple)* to disable device inputs (VIN A1 A2 A3 D1 D2) or ALL. Default is all inputs on			
OUTENA	Enables device outputs	User 1 only	N	N
Command format	OUTENA*outputs(multiple)* to enable device outputs (R1 R2 O1 O2) or ALL. Default is all outputs on			
OUTDIS	Disables device outputs	User 1 only	N	N
Command format	OUTDIS*outputs(multiple)* to disable device outputs (R1 R2 O1 O2) or ALL. Default is all outputs on			
Ax LIMITS	Sets the upper and lower limits for analogue input in volts to one decimal place. If the voltage applied to the analogue input is within the limits then the status of the input will be 'OK' and the alarm (if armed) will not be triggered. If the applied voltage is higher than the upper limit the input status will be 'HI' and if lower than the lower limit it will be 'LO'. If the status is 'LO' or 'HI' and the alarm is armed then the alarm will be triggered. Default for VIN = Lower 8.0 Upper 19.0 Default for A1-A3 = Lower 0.00 upper 3.5	All Users	**	N
Command format	Ax_LIMITS*lower*upper* x=1 to 3. Lower & Upper should contain only characters 0 (zero) to 9 Example: A2 LIMITS*1.5*3.0* Sets limits for analogue input A2 to Low=1.5V High=3.0V ** Limits are used while the alarm is set but may not be changed whilst the alarm is set.			

CONFIGURING THE DIGITAL INPUTS (ALARM TRIGGERS)				
Dx LOW Dx HIGH	Sets the logical condition that will trigger the alarm for digital input x. If the normal condition (non-alarm) of Digital Input 2 is Logic Low (0v / GND) then the alarm state of digital input 2 should be set to 'High'. Under normal input conditions the status of Digital input 2 will be 'OK', when the state is changed to logical 1 the status will be 'AL' and if armed the alarm will be triggered.	All Users	N	N
Command format	Dx_LOW Set digital input x to trigger on logic low Dx_HIGH Set digital input x to trigger on logic high D1 & D2 available Example: D1_LOW Set digital input 1 to trigger when logic 0 is applied to Input D1			

SMS Input & Output Configuration Commands

The RMC301 enables the user to assign meaningful labels to both the device itself (useful where a number of RMC301s are being deployed) and for individual inputs and outputs.

A message that says FRIDGE1 is TEMPHI is far more meaningful than referring to analogue input 2 for example. Similar label styles can be applied for both the analogue and digital inputs as well as the relay and digital outputs.

LABELS		Access	Modify when Armed?	Multi Command SMS?
Label messages can be sent in upper or lower case but will be displayed in upper case only in messages from the device				
DEVNAME	Sets the identifier (name) of the device. This is used to identify the device on alarm messages and reports. The default name is RMC301R.	User 1 only	N	N
Command format	Format: DEVNAME*name* Example: DEVNAME*OFFICE1* Sets device name to 'OFFICE1'			
OUTx LABEL	Sets the label for output x. This is used to identify OUTx on all messages. Output 1 is relay 1, output 2 is relay 2, outputs 3 and 4 are logic level digital signals driven by the microcontroller. The default names are OUT1-OUT4	User 1 only	N	N
Command format	Format: OUTx_LABEL*name* x=1 to 4 Example: OUT1_LABEL*BUZZER* Sets out1 label to 'BUZZER'			
Ax LABEL	Sets the label for Analogue Input x. This is used to identify Ax on all messages. Valid inputs are A1, A2 & A3.	User 1 only	N	N
Command format	Format: Ax_LABEL*name* x=1 to 3 Example: A3_LABEL*BATT2* Sets A3 label to 'BATT2'			
Dx LABEL	Sets the label for Digital Input x. This is used to identify Dx on all messages.	User 1 only	N	N
Command format	Format: Dx_LABEL*name* x=1 or 2 Example: D2_LABEL*TAMP SW* Sets D2 label to 'TAMP SW'			

Using The Alarm Function

Alarm Feature

The alarm feature of the RMC301 is sophisticated, yet easy to configure and use. Follow the guidance below and make reference to the command tables if required.

Alarm Configuration

Analogue Inputs - Stage 1

Once you have determined which Analogue inputs will be monitored whilst the alarm is activated, you should decide on the limits and set them using the Ax LIMITS command (see page 12). If an input is unused, it should be disabled using the INDIS command. This can be done on individual inputs or on all.

INDIS*A1* (Disables analogue input A1)
(INENA can be used to re-enable inputs. INEA*A1* re-enables A1 input)

Digital Inputs - Stage 2

Each digital input need to be set to trigger on the appropriate digital level using D1 HIGH / D1 LOW commands. For Example; If you have a PIR connected to D1 which goes high when movement is detected you should set D1 to trigger the alarm when it detects a high level using D1_HIGH. If a digital input is unused it should be disabled using the INDIS command.

INDIS*D2* (Disables digital input D2. Use INEA to re-enable if needed.)

Users - Stage 3

Set additional users, if required, using the **USER2** and **USER3** commands. Once set, use the **NOTIFY** function to set their notify preference to OFF, SMS, CALL or BOTH.

To set User2 to 'Fred', with the number '07929112233' and notified by SMS only send the following 2 commands in separate SMS messages:

USER2*FRED*07929112233*
NOTIFY_USER2*SMS*

External Sounder Driver - Stage 4

If you require **RELAY1** to drive an external sounder in the event of the alarm being triggered, use the **COUPLE** function to turn **RELAY1** on if triggered.

COUPLE_ON

Alarm Operation

Once the four stages of alarm configuration are complete the alarm is ready for use. It can be **ARMed** or **DISARMED** by any of the 3 users. In the event that the alarm is **ARMed** and triggered, **RELAY1** will switch on if the **COUPLE** command is set to on. All users who have been setup by the notify command to receive a SMS message, will receive a message *****ALARM***** followed by the status report to indicate which input(s) have caused the alarm to trigger.

The RMC301 will then call each user that has been set by **NOTIFY** to receive call notification in turn with 2 minute gap (approx. time) between calls. This will continue until the alarm is disarmed by any user sending the **DISARM** command. When disarmed after a trigger event, all users who received notification that the alarm had been triggered, will receive a message indicating who disarmed it.

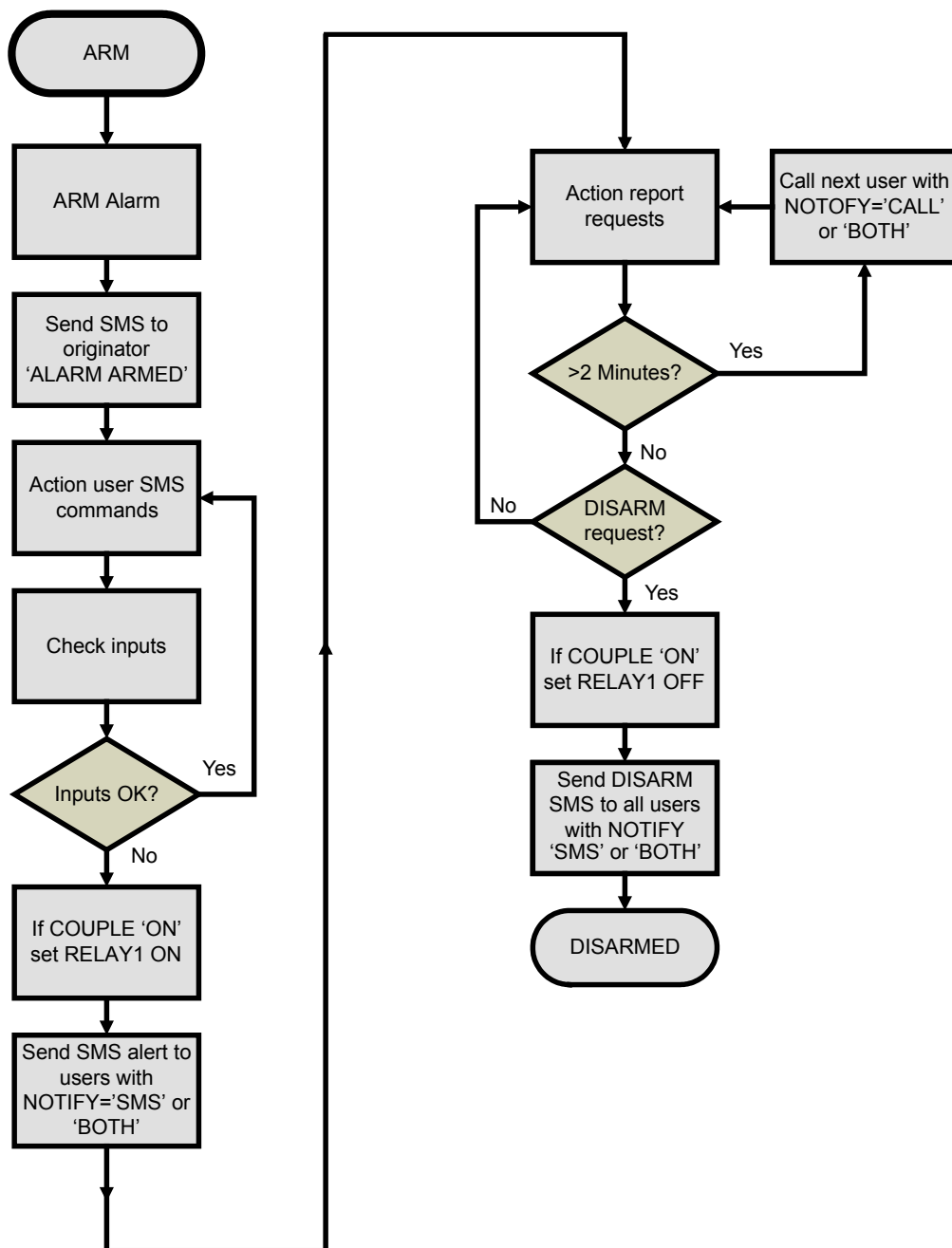
COMDEF1, COMDEF2 and **ON CALL** commands can be very useful in situations where the user would like to disarm the RMC301 and then carry out another function. For example when the device is configured as a garage alarm and **RELAY2** is connected to the electric door opener. Commands could be assigned that simultaneously disarmed the alarm and opened the door:

ON_CALL*DISARM_PRELAY2* calling disarms and activates door
COMDEF1*OPEN*DISARM_PRELAY2* SMS 'OPEN' to disarm and open

When the RMC301 is armed or triggered it will still respond to report requests such as **STATUS** (very useful for assessing the current status), **RECALL SETTINGS, NETWORK, USERS, COMMANDS, LOCATION** (when GPS fitted) and **NETWORK**.

Refer to the Command list for details.

Flowchart showing Alarm Operation



Alarm Configuration Commands

Command	Description	Access	Modify when Armed?	Multi Command SMS?
ARM	<p>Activates the Alarm function. If any analogue input goes outside of its user defined, upper or lower limit, or a digital output is driven to the logic state set by Dx alarm, command then the alarm will be triggered.</p> <p>The alarm will also be triggered if a GPS unit is fitted and the RMC301R is moved outside of the Geo-Fence area set in the MOVE command.</p> <p>Once triggered, user notification will commence as selected by the notify command. Once armed, the device will NOT respond to all commands. Refer to the command list for further details.</p> <p>If ARM is sent when the alarm is triggered the device will 'Reset' the alarm state to not triggered. If all inputs are at their non-trigger status the alarm will be silenced. If not, it will be triggered again and trigger notifications will continue.</p> <p>The default setting is Disarmed.</p>	All Users	Y	Y
Command format	<p>Format: ARM Device sends message to requesting user indicating new alarm status.</p> <p>Example: ARM Arms Alarm Function</p>			
DISARM	<p>Deactivates alarm function. If alarm not triggered, a message will be sent to the requesting user indicating new device status (Disarmed). If the alarm was triggered, the alarm will be silenced and alarm triggered SMS / calls from the device will cease. A message will be sent to all users if specified to receive notification by 'NOTIFY' command, indicating which user disarmed the triggered alarm.</p>	All Users	Y	Y
Command format	<p>Format: DISARM Device sends message to requesting user indicating new alarm status</p> <p>Example: DISARM Disarms Alarm Function</p>			
COUPLE	<p>This command couples RELAY1 to the alarm status. When set, RELAY1 will be turned on if the alarm is armed and triggered. It will remain on until the alarm is DISARMED or ARMed by a registered user, even if the condition(s) that triggered the alarm revert to their acceptable (non trigger) state.</p> <p>This enables RELAY1 to drive a siren / sounder which will sound if the alarm is triggered. If 'COUPLE_ON' is set, users will no longer have control of the output RELAY1 via ON, OFF or PULSE commands.</p> <p>Default setting is COUPLE_OFF</p>	All Users	N	N
Command format	<p>Format:</p> <p>COUPLE_ON Latches RELAY1 on when alarm triggered</p> <p>COUPLE_OFF Returns RELAY1 to normal operation</p> <p>Example: COUPLE_ON latches an alarm condition to output1 (Relay1)</p>			
NOTIFY	<p>Sets which users should be notified when the alarm is triggered and the method of the notification. For each user notification can be set as follows:</p> <p>OFF = No notification</p> <p>SMS = SMS Only</p> <p>CALL = Call Only</p> <p>BOTH = SMS and Call</p> <p>The default setting is User 1 SMS all other users off.</p>	User 1 Only	N	N
Command format	<p>Format: NOTIFY_USERx*notification*</p> <p>Example: NOTIFY USER1*BOTH* Sets user1 to receive call and SMS alarm notification</p>			

Alarm Configuration Commands (cont.)

Command	Description	Access	when Armed?	Multi Command SMS?
POWER ALERT	When set to 'ON'. Provides notification of power up and power failure of the device. Will be sent to each user who has 'notify' settings of SMS or both. Independent of Alarm status, operates if 'Armed' or 'Disarmed' The default setting is POWER ALERT OFF	All Users	N	N
Command format	POWER_ALERT_OFF POWER_ALERT_ON			

Using The Sleep, Nap & Repeat Functions

The RMC301 has powerful functions that enable the user to perform intermittent timed actions. The **SLEEP** and **NAP** functions enable the user to benefit from some substantial power saving whilst asleep (useful if the device is battery powered) and perform a pre-set sequence of actions when waking up. **SLEEP TIME** is set in whole hours from 1 hour to 720 hours (30 days).

The **SLEEP** command sends the RMC301 to sleep, once for the pre-determined time. The **NAP** function causes the device to enter a sleep / wake / sleep cycle that continues until the **NAP OFF** command is received by the device or the alarm is triggered.

When you need a command to be repeated at regular intervals and do not wish to use the **NAP** function, **REPEAT** performs this task. The **REPEAT** time is set in whole minutes with a minimum of 1 minute and a maximum of 43200 (exactly 30 days). You might for example use repeat to give you an hourly **STATUS** report.

REPEAT cannot be used when either **SLEEP** or **NAP** are active

Command	Description	Access	Active when Armed?	Multi Command SMS?
SLEEP TIME	Sets the time in hours for the RMC301 to SLEEP or NAP. Maximum 720 hours, minimum 1 hour.	User 1 Only	N	N
Command format	SLEEP_TIME *x* Where x is the number of hours to sleep. The default setting is 1 hour.			
ON WAKE	The command to actioned when the RMC301 wakes from SLEEP or NAP .	User 1 Only	N	N
Command format	ON_WAKE *command* The default setting is to provide a status report.			
SLEEP	Enter SLEEP mode. The device will sleep for the time set the SLEEP_TIME command. If the RMC301 is ARMED before entering sleep mode, the module will return to full function mode if the alarm is triggered.	All Users	Y	Y
Command format	SLEEP			
NAP ON	The device will NAP for the time set by SLEEP_TIME . Once the sleep time has elapsed, the RMC301 will wake, receive and action any SMS messages. Once the message processing is completed, the device will re-enter nap mode. If the RMC301 is ARMED before entering the nap, the system will return to full function mode if the alarm is triggered.	All Users	Y	Y
Command format	NAP_ON			
NAP OFF	Will return the device to full function mode from the NAP mode. This will only take effect when the module wakes up after SLEEP TIME has expired. (It needs to wake up to process the SMS command that turns NAP off.)	All Users	Y	Y
Command format	NAP_OFF			

See the following page for the **REPEAT** command usage.

Using The Sleep, Nap & Repeat Functions (cont.)

Command	Description	Access	Active when Armed?	Multi Command SMS?
REPEAT TIME	Sets time in minutes for device to repeat function defined by 'On Repeat'. Maximum 43200 (30 days), minimum 1 minute.	User 1 Only	N	N
Command format	REPEAT_TIME*x* The default setting is 60 minutes.			
ON REPEAT	Specifies the command to be actioned when device in repeat mode and repeat time is reached.	User 1 Only	N	N
Command format	ON_REPEAT*command* The default command is STATUS			
REPEAT ON	Activates repeat mode. Device will action command defined by 'On Repeat' at time interval specified by 'Repeat Time' Cannot be used when SLEEP or NAP are active	All Users	Y	Y
Command format	REPEAT_ON			
REPEAT OFF	Deactivates repeat mode	All Users	Y	Y
Command format	REPEAT_OFF			

Setting USER1 – New Device Start Up

When the device is first powered up, or when the SIM card is changed, the settings of USER1 must be stored. The following procedure will store the user name and number of user1 and set all other settings and functions to the factory default values (refer to Command list for detail of factory defaults).

The SIM card must have credit (if PAYG) and we recommend disabling any diverts (including to voice mail) and SIM PIN Lock. This is best achieved by fitting the SIM into a mobile phone and following your network provider's instructions.

NOTE: Any information stored on the SIM will be erased when inserted into the RMC301.

- 1) Power Off
- 2) Insert SIM
- 3) Power On
 - Power LED comes on
 - Netlight Fast Flash (Acquiring Network)
- 4) Wait Approximately 30 seconds
 - Netlight transitions to slow flash (Network Acquired)
 - Wait 5 Seconds
 - Alarm LED slow flashing once per second (SIM card not initialised)
 - After 10 seconds
 - Alarm LED low flashing once per second (initialisation started)
 - After 30 seconds
 - Alarm LED rapid flashing (waiting for User1 SMS)
- 5) Send User1 SMS (any case but no spaces)
USER1RMC301*name*number*
After 15 seconds
receive SMS on designated user1 number
- 6) Send Confirmation SMS (must be from User1 number any case, with space)
CONFIRM USER1
Alarm LED stops flashing
User1 stored
- 7) Successful User1 setup results in SMS to User1 reporting 'Data stored'. The system will automatically reboot. Wait 1 minute before sending further messages.
- 8) RMC301 performs normal startup (without power off/on or reacquiring network)

If after step 5) you do not get a message back from the device, check that the power light is on and the Netlight is flashing slowly.

You can resend the user1 setup message without powering down the device, rechecking the user1 number provided in your SMS. Check your SIM is active by fitting into a mobile phone and check credit if using a Pay As You Go SIM card.

RMC301 Normal Start Up

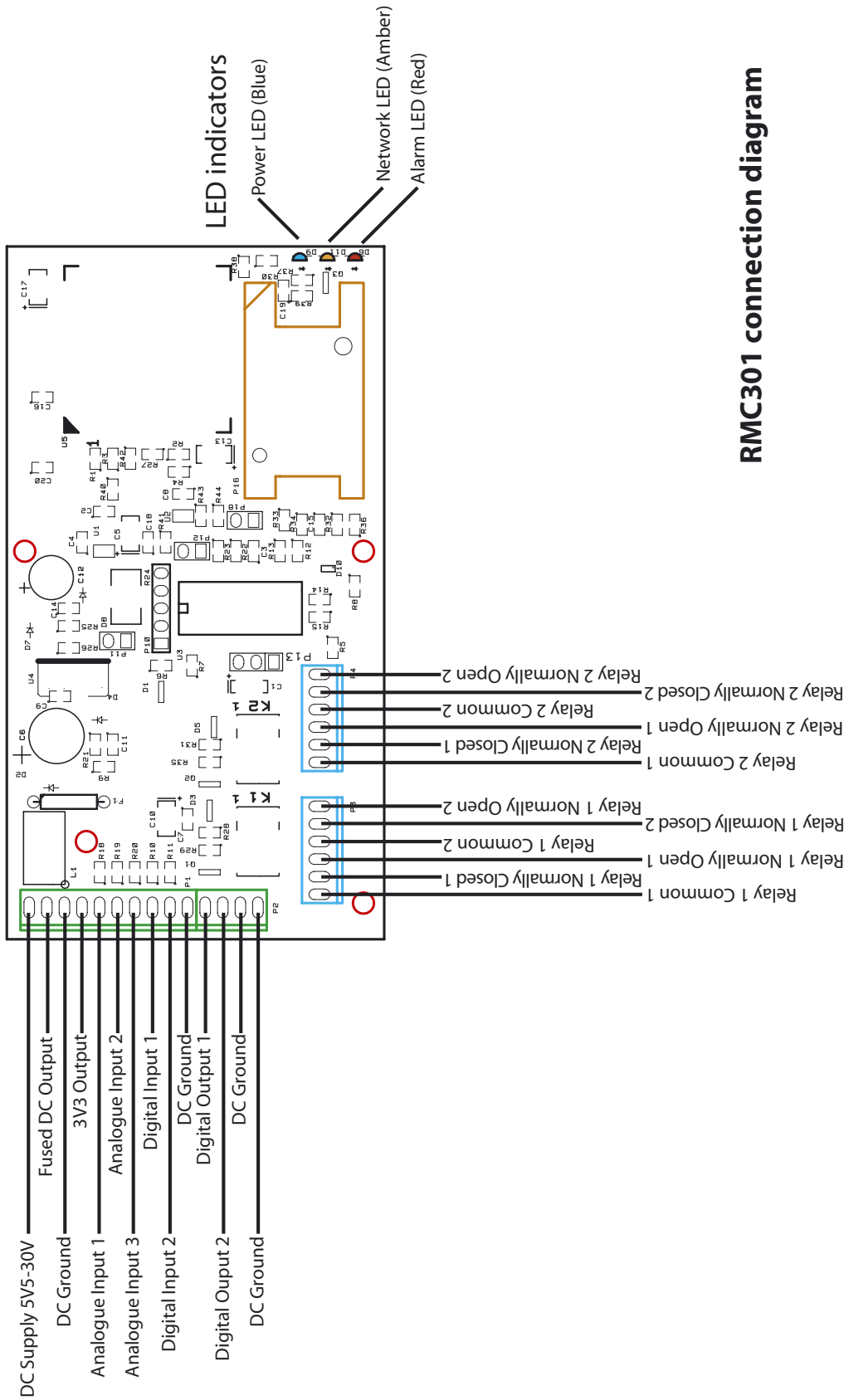
- 1) Power On
 - Power LED comes on (when fitted)
 - Delay of a few seconds
 - Netlight Fast Flash (Acquiring Network)

- 2) Wait Approximately 10-30 seconds
 - Netlight transitions to slow flash (Network Acquired)

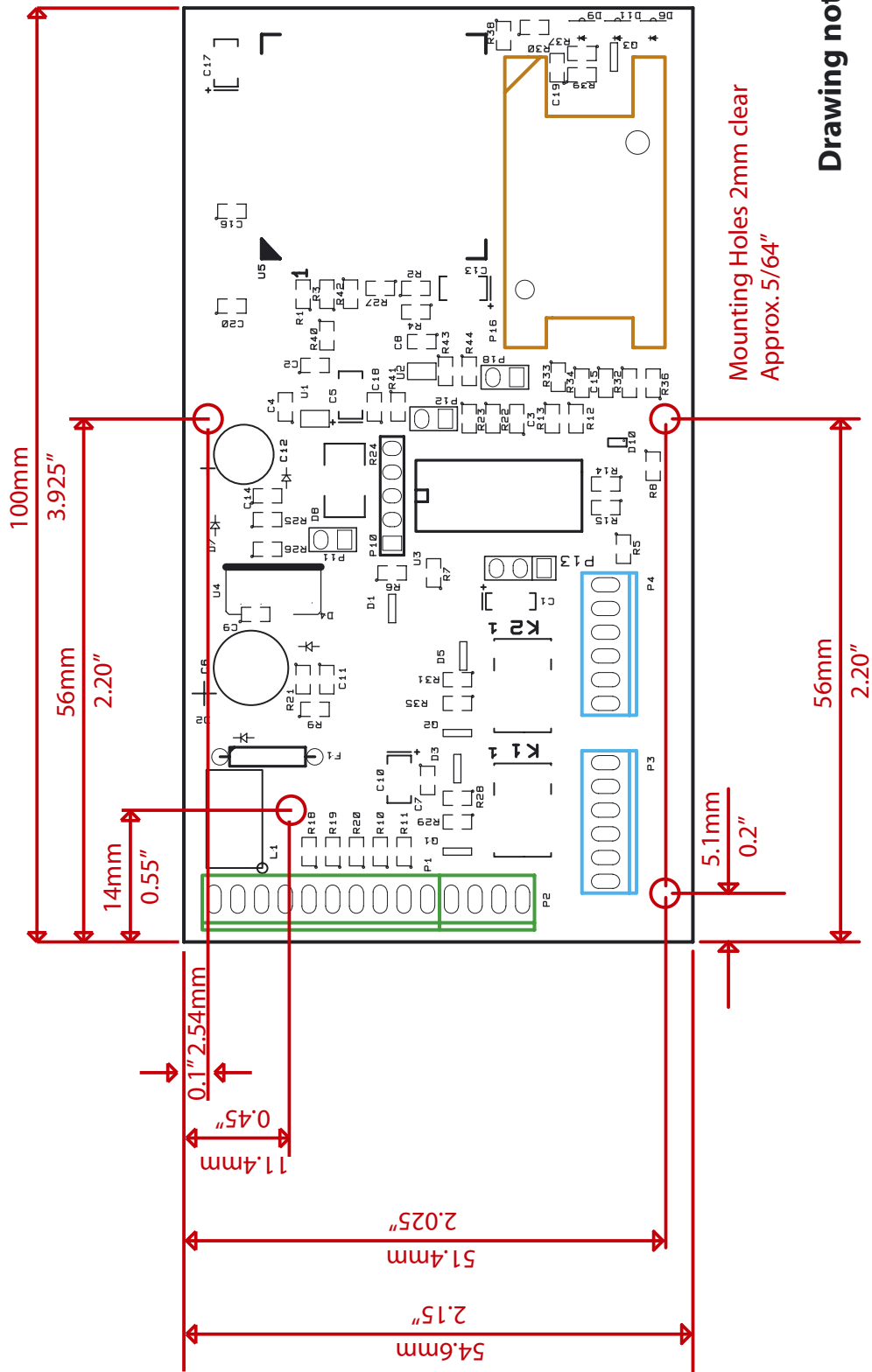
- 3) After 1 Minute
 - Alarm LED rapid flashing for 3 seconds indicating device ready

- 4) If Power Alert was set, a message will be sent by RMC301 indicating device is powered up.

RMC301 is now ready to use.



RMC301 connection diagram



Mounting Holes 2mm clear
Approx. 5/64"

Drawing not to scale

Optional GPS System for RMC301

The RMC301 can be fitted with an optional GPS module. This option significantly adds to the capability of the system bringing the ability to report location by tracking movement and speed as well as Geo-Fencing whatever the RMC301 is installed into. For example, the user can be alerted as soon as the RMC301 moves outside of a set area.

Many of the functions set out in the manual can be combined with the additional GPS information, for example using the REPEAT function to send a LOCATION report at regular intervals.

The MOVE function allows the user to set a geo-fence area based on the current location. In the event of the RMC301R being moved out of the area the alarm will be triggered. The RMC301 accepts an NMEA serial data stream from an external GPS module. Please see the electrical connection diagram for details.

Command	Description	Access	Modify when Armed?	Multi Command SMS?
LOCATION	Provides report of lat, long, heading & speed. Only functional if optional GPS installed. The Google maps link will fix on the nearest address. (Ideal for vehicle tracking)	All Users	Y	Y
Command format	LOCATION			
LOCABS	Provides report of lat, long, heading & speed. Only functional if optional GPS installed. The Google maps link will fix on the absolute latitude & longitude.	All Users	Y	Y
Command format	LOCABS			
REPEAT TIME	Sets time in minutes for device to repeat function defined by 'On Repeat'. Maximum 43200 (30 days), minimum 1 minute.	User 1 Only	N	N
Command format	REPEAT_TIME*x* The default setting is 60 minutes.			
ON REPEAT	Specifies the command to be actioned when device in repeat mode and repeat time is reached.	User 1 Only	N	N
Command format	ON_REPEAT*command* The default command is STATUS			
REPEAT ON	Activates repeat mode. Device will action command defined by 'On Repeat' at time interval specified by 'Repeat Time' Cannot be used when SLEEP or NAP are active	All Users	Y	Y
Command format	REPEAT_ON			
REPEAT OFF	Deactivates repeat mode	All Users	Y	Y
Command format	REPEAT_OFF			
MOVE	Sets Geo fence based on current location. Becomes active when alarm is armed. 0 – Turns feature OFF 1 – Sets smallest through to 99 – Sets Largest Only available when optional GPS installed.	All Users	N	N
Command format	MOVE*0*, MOVE*1*, MOVE*10* etc.			

GPRMC	Provides the complete raw GPRMC sentence from the GPS receiver to the requesting user. Only functional if optional GPS installed.	All Users	Y	Y
Command format	GPRMC			

Example report from the optional GPS module

LOCATION: Returns an SMS report showing the supply voltage, location, heading and speed of the system. It also produces a web link that smart phone users can 'click' on to see the location on Google maps in a web browser.

This report uses the Google map interface, that puts the location to the nearest significant address. (Latitude and Longitude are still reported to the exact location.) This is very useful when the system is reporting the position of a road vehicle. This version of the report is not recommended where the location is off-road or where the tracked system is on a boat at sea.

Example Message:

RMC301
VIN=12.40 OK

Time 13:40:25 (GPS timestamp in 24 hour format)
Lat 5130.4646N (GPS derived Latitude)
Lon 0007.6759W (GPS derived Longitude)
Heading N 339 (Direction and degrees)
Speed 0 MPH

<http://maps.google.com/maps?q=51%2030.4646N++000%2007.6759W>
(The web link is configured to show the location using Google maps)

The location web link can be opened in a web browser to show the RMC301 location.

LOCABS: Returns an SMS report showing the supply voltage, location, heading and speed of the system. It also produces a web link that smart phone users can 'click' on to see the location on Google maps in a web browser. In this case the absolute position will be shown on the map rather than the nearest significant street address.

The **LOCABS** report is ideal for tracking off-road vehicles, ships in coastal waters and farm or construction machinery.

Complete Command List for RMC301

Command	Description	Format	Access	Default	Modify When Armed	Multi Command SMS
Security						
password	Changes password for user1 setup	PASSWORD*old*new*	User1 only	RMC301	N	N
user1	Changes User1 name and number	USER1password*name*number*	User1 only	blank	N	N
user2	Changes User2 name and number	USER2*name*number*	User1 only	blank	N	N
user3	Changes User3 name and number	USER3*name*number*	User1 only	blank	N	N
On Call	Assigns the command to be actioned when user calls device	ON CALL*command*	User1 only	STATUS	N	N
Command Define1	Sets a user definable label for a user definable command	COMDEF1*label*command*	User1 only	RPT1, SETTINGS USERS	**	N
Command Define2	Sets a user definable label for a user definable command	COMDEF2*label*command*	User1 only	RPT2, SETTINGS USERS	**	N
** COMDEF unavailable when Armed, defined command can be used when armed						
Reports						
Status	'STATUS' responds to sender with device status showing enabled input and enabled output status. 'STATUSx' sends STATUS message to user x (1 to 3)	STATUS STATUS1 STATUS2 STATUS3	All Users	N/A	Y	Y
Repall	'REPALL' responds to sender with device status showing all input and all output status even if disabled. 'REPALLx' sends REPALL message to user number x (1 to 3)	REPALL REPALL1 REPALL2 REPALL3	All Users	N/A	Y	Y
Settings	Responds to sender with device settings report showing device name, alarm limits and settings for Move, Repeat, Minutes, Sleep Hours, Pulse Seconds and Power Alert settings.	SETTINGS	All Users	N/A	Y	Y
Labels	Responds to sender with device name and labels associated with each input & output	LABELS	All Users	N/A	Y	Y
Couple	Responds to sender with report indicating if the couple feature is on or off and a list of alarm triggers that will activate relay1	COUPLE	All Users	N/A	Y	Y
Commands	Responds to sender with device commands report showing Device Name and user definable commands Call Assign, On Wake, On Repeat and Comdef.	LIMITS	All Users	N/A	Y	Y
Users	Responds to sender with list of all authorised Users Name and Numbers. Includes Serversms number.	USERS	All Users	N/A	Y	Y
Network	Responds to sender with registered network and signal strength. Also includes device Firmware Revision and Serial Number.	NETWORK	All Users	N/A	Y	Y

Complete Command List for RMC301 continued

Command	Description	Format	Access	Default	Modify When Armed	Multi Command SMS
Location	Provides report of lat, long, speed & heading with link to online map. 'LOCATIONx' sends LOCATION message to user number x (1 to 3) Only functional if optional GPS installed.	LOCATION LOCATION1 LOCATION2 LOCATION3	All Users	N/A	Y	Y
GPRMC	Provides the GPRMC sentence from the GPS receiver. 'GPRMC' returns the GPRMC message to the sender. 'GPRMCx' sends the report to user number x (1 to 3).	GPRMC GPRMC1 GPRMC2 GPRMC3	All Users	N/A	Y	Y
I/O	Pulse Delay	PULSE DELAY*x*	User1 only	1	N	N
	Turn digital output 1 on	OUT1 ON	All Users	OUT1 off	N	Y
	Turn digital output 1 off	OUT1 OFF	All Users	OUT1 off	N	Y
	Pulses digital output1	POUT1	All Users	N/A	N	Y
	Turn digital output 2 on	OUT2 ON	All Users	OUT2 off	N	Y
	Turn digital output 2 off	OUT2 OFF	All Users	OUT2 off	N	Y
	Pulses digital output2	POUT2	All Users	N/A	N	Y
	Turn Relay1 on	RELAY1 ON	All Users	RELAY1 OFF	N	Y
	Turn Relay1 off	RELAY1 OFF	All Users	RELAY1 OFF	N	Y
	Pulses Relay1	PRELAY1	All Users	N/A	N	Y
	Turn Relay2 on	RELAY2 ON	All Users	RELAY2 OFF	N	Y
	Turn Relay2 off	RELAY2 OFF	All Users	RELAY2 OFF	N	Y
	Pulses Relay2	PRELAY2	All Users	N/A	N	Y
A1 Temperature Sensor	Set 'A1 TEMP ON' when optional EMM-Tek temperature sensor is connected to Analogue Input 1 (A1). The input will then read temperature in Celsius	A1 TEMP ON A1 TEMP OFF	User1 only	OFF	N	N
Input Enable	Selects which inputs are able to trigger an alarm. Also selects which inputs are shown on 'STATUS' report. Multiple operators may be contained between the *'s	INENA *operators* to enable inputs Operators are D1, D2, VIN, A1, A3, A3 or INENA *ALL* to enable all inputs	User1 only	All enabled	N	N

Complete Command List for RMC301 continued

Command	Description	Format	Access	Default	Modify When Armed	Multi Command SMS
Input Disable	Selects which inputs are disabled and are unable to trigger the alarm. Inputs disabled with this command are no longer reported in the 'STATUS' report. Multiple operators may be contained between the '*s'.	INDIS *operators* Operators are D1, D2, VIN, A1, A2, A3 INDIS *ALL* to disable all inputs	User1 only	All Enabled	N	N
Output Enable	Only enabled outputs may be remotely switched with 'ON', 'OFF' and 'PULSE' commands. Outputs that are not enabled do not show in the 'STATUS' report. Multiple operators may be contained between the '*s'.	OUTENA *operators* Operators are O1, O2, R1, R2 OUTENA *ALL* to enable all outputs	User1 only	All Enabled	N	N
Output Disable	Disabled outputs can not be remotely switched with 'ON', 'OFF' and 'PULSE' commands. Outputs that are disabled do not show in the 'STATUS' report. Multiple operators may be contained between the '*s'.	OUTDIS *operators* Operators are O1, O2, R1, R2 OUTDIS *ALL* to disable all outputs	User1 only	ALL ON	N	N
Vin Limits	Sets upper and lower limits for Analogue Input 1 alarm in Volts	VIN LIMITS*lowerlimit*upperlimit*	All Users	Lower 8 Upper 19	N	N
A1 Limits	Sets upper and lower limits for Analogue Input alarm in Volts	A1 LIMITS*lowerlimit*upperlimit*	All Users	Lower 0 Upper 3.5	N	N
A2 Limits	Sets upper and lower limits for Analogue Input 3 alarm in Volts	A2 LIMITS*lowerlimit*upperlimit*	All Users	Lower 0 Upper 3.5	N	N
A3 Limits	Sets upper and lower limits for Analogue Input 4 alarm in Volts	A3 LIMITS*lowerlimit*upperlimit*	All Users	Lower 0 Upper 3.5	N	N
D1 Alarm	Sets input D1 to trigger alarm on high or low input	D1 Low D1 High	All Users	Trigger on high	N	N
D2 Alarm	Sets input D2 to trigger alarm on high or low input	D2 Low D2 High	All Users	Trigger on high	N	N
Labels	Changes the equipment device name	DEVNAME*devicename*	User1 only	RMC301	N	N
	Sets label for output 1	OUT1 LABEL *xxxxx*	User1 only	OUT1	N	N
	Sets label for output 2	OUT2 LABEL *xxxxx*	User1 only	OUT2	N	N

Complete Command List for RMC301 continued

Command	Description	Format	Access	Default	Modify When Armed	Multi Command SMS
Relay1 Label	Sets label for Relay 1	RELAY1 LABEL *xxxxx*	User1 only	RELAY1	N	N
Relay2 Label	Sets label for Relay 2	RELAY2 LABEL *xxxxx*	User1 only	RELAY2	N	N
A1 Label	Sets Label for Analogue Input 1	A1 LABEL *xxx*	User1 only	A1	N	N
A2 Label	Sets Label for Analogue Input 2	A2 LABEL *xxx*	User1 only	A2	N	N
A3 Label	Sets Label for Analogue Input 3	A3 LABEL *xxx*	User1 only	A3	N	N
D1 Label	Sets Label for Digital Input 1	D1 LABEL *xxx*	User1 only	D1	N	N
D2 Label	Sets Label for Digital Input 2	D2 LABEL *xxx*	User1 only	D2	N	N
Alarm	Activate alarms	ARM	All Users	Disarmed	Y	Y
	Disable alarms	DISARM	All Users	Disarmed	Y	Y
Input Enable	Selects which inputs are able to trigger an alarm. Also selects which inputs are shown on 'STATUS' report. Multiple operators may be contained between the **s	INENA *operators* to enable inputs Operators are D1, D2, VIN, A1, A3, A3 or INENA *ALL* to enable all inputs	User1 only	All enabled	N	N
Input Disable	Selects which inputs are disabled and are unable to trigger the alarm. Inputs disabled with this command are no longer reported in the 'STATUS' report. Multiple operators may be contained between the **s.	INDIS *operators* Operators are D1, D2, VIN, A1, A2, A3 INDIS *ALL* to disable all inputs	User1 only	All Enabled	N	N
Couple	Latches RELAY1 ON when alarm triggered if in armed mode. Disables user control of RELAY1	COUPLE ON COUPLE OFF	All Users	COUPLE OFF	N	N
Couple Enable	Selects which alarm triggers will close relay1 when alarm triggered. Note: The input must be enabled using INENA as well as couple enabled to close relay1.	COUPLEENA *operators* Operators are D1, D2, VIN, A1, A2, A3, MOVE, ALL	User1 only	All disabled	N	N
Couple Disable	De-selects which alarm triggers will close relay1 when alarm triggered	COUPLEDIS *operators* Operators are D1, D2, VIN, A1, A2, A3, MOVE, ALL	User1 only	All disabled	N	N
Notify	Defines which users should be notified of alarm trigger and method of notification.	NOTIFY USER*OFF* NOTIFY USER*SMS* NOTIFY USER*CALL* NOTIFY USER*BOTH*	User1 only	User1 SMS All other users off	N	N
Power Alert	When set to 'ON': Provides notification of power up and power failure of the device. Will be sent to each user who has 'notify' settings of SMS or both. Independent of Alarm status, operates if 'Armed' or 'Disarmed'	POWER ALERT OFF POWER ALERT ON	User1 only	Notify OFF	N	N

	Command	Description	Format	Access	Default	Modify When Armed	Multi Command SMS
Sleep	Sleep time	Sets time in hours for device to sleep or nap. Maximum 255hours, minimum 1hour.	SLEEP TIME*x*	User1 only	1	N	N
	On Wake	Command to be actioned when module wakes from 'Sleep' or 'Nap' mode	ON WAKE*command*	User1 only	STATUS	N	N
	Sleep	Enter sleep mode. Device will sleep for time set by Sleep Time. If ARMED before entering sleep mode, module will return to full function mode if alarm is triggered.	SLEEP	All Users		Y	Y
	Nap On	Device will 'Nap' for time set by Sleep Time. Once sleep time has elapsed, device will wake, receive and action SMS messages. Once message processing is complete, device will re-enter Nap mode. If ARMED before entering sleep mode, module will return to full function mode if alarm is triggered.	NAP ON	All Users		Y	Y
	Nap Off	Will return module to full function mode from nap mode. This will only take effect when the module wakes after sleep time has expired	NAP OFF	All Users		Y	Y
Repeat	Repeat Time	Sets time in minutes for device to repeat function defined by 'On Repeat'. Maximum 43200 (30 days), minimum 1 minute.	REPEAT TIME*x*	User1 only	60	N	N
	On Repeat	Command to be actioned when device in repeat mode and repeat time is reached	ON REPEAT*command*	User1 only	STATUS	N	N
	Repeat On	Activates repeat mode. Device will action command defined by 'On Repeat' at time interval specified by 'Repeat Time' Can not be used when sleep or nap are active.	REPEAT ON	All Users		Y	Y
	Repeat Off	Deactivates repeat mode	REPEAT OFF	All Users		Y	Y

Command	Description	Format	Access	Default	Modify When Armed	Multi Command SMS
GPS						
Location	Provides report of lat, long, speed & heading with link to online map. 'LOCATIONx' sends LOCATION message to user number x (1 to 3). Only functional if optional GPS installed. Map marker will show nearest address.	LOCATION LOCATION1 LOCATION2 LOCATION3 LOCATIONUSER (to push location to server)	All Users	N/A	Y	Y
Locabs	Provides report of lat, long, speed & heading with link to online map. 'LOCATIONx' sends LOCATION message to user number x (1 to 3). Only functional if optional GPS installed. Map marker will show absolute location.	LOCABS LOCABS1 LOCABS2 LOCABS3 LOCABSSER (to push absolute location to server)				
Move	Sets Geo fence based on current location. Becomes active when alarm is armed. 0 – Turns feature OFF 1 – Sets smallest continuing through to 99 – Sets Largest Only available when optional GPS is installed.	MOVE*0 through to MOVE*99*	All Users	N/A	N	N
GPRMC	Provides the GPRMC sentence from the GPS receiver. 'GPRMC' returns the GPRMC message to the sender. 'GPRMCx' sends the report to user number x (1 to 3 or SER).	GPRMC GPRMC1 GPRMC2 GPRMC3 GPRMC SER	All Users	N/A	Y	Y
SERVER						
serversms	Sets phone number for server	SERVERSMS*number*	User1 only	N/A	N	N
pushsms	Pushes device data to server via SMS	PUSHSMS	All Users	N/A	Y	Y
Status	'STATUS' responds to sender with device status showing enabled input and enabled output status. 'STATUSx' sends STATUS message to user x (1 to 3 or SER)	STATUSSER				
GPRMC	Provides the GPRMC sentence from the GPS receiver. 'GPRMC' returns the GPRMC message to the sender. 'GPRMCx' sends the report to user number x (1 to 3 or SER).	GPRMC SER				

End of RMC301 manual
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