MERLIN

SMS USER COMMANDS

Version 18

This document is valid for Merlin firmware Version 2.00 onwards. Earlier firmware will have some similarities but not all commands will be supported or the syntax may be slightly different.

1. COMMANDS TO UNITS

Must always start with "cmd:". Commands can be sent in upper, lower or mixed case. Merlin is not case sensitive. Phone numbers must have the international numerical prefix and include the initial '+' symbol used for the international notation.

Responses from units will always start "CPM:XXX" where XXX is the message type (for use by CPSM software).

1.1 General (applies to all Transformer Rectifier and Test Post Monitors)

Command	Description	Example	Reply / Example Response
cmd:synctime	Sets the unit clock	**cmd:synctime**	CPM:001 UNIT:00000001 09:24:00 MON 24 JUN 2008 (TIME ZONE GMT+01:00)
cmd:gettime	Read the unit clock	**cmd:gettime**	CPM:002 UNIT:00000001 09:24:30 MON 24 JUN 2008 (TIME ZONE GMT+01:00)
cmd:install	Install unit (set HQ number first)	**cmd:install pipe:pipeline one loc:main tr**	(from CPSM)
cmd:replace	Replace unit (i.e. new unit at an existing location)	**cmd:replace pipe:pipeline one loc:main tr**	(from CPSM)
cmd:report	Send an additional data report (now) to the HQ's	**cmd:report**	No reply to sender
cmd:status	Get status	**cmd:status**	CPM:007 UNIT:00000001 TYPE:POST CHANS:3 FW:001-V1.02 PWR:N GSM:12 BAT:5535mV MODE:DAILY ALARMS:Y STATUS:00 TEST:00 IN:3 OUT:127 RST:1 CAL:Y
cmd:test	Self-test	**cmd:test**	See status response (containing self-test result code) And if a Transformer Rectifier Monitor a **cmd:gpsinfo** response as well.
cmd:read	Take a reading now	**cmd:read**	CPM:020 UNIT:20000001 POST 1DC:-1000mV 1AC:300mV 2DC:-900mV 2AC:200mV 3DC:10.00mV 3AC:0.40mV
cmd:config	Set configuration (only fields to be changed are necessary)	**cmd:config rday:tue rtime:12:30 retry:1 retry-hrs:6**	CPM:009 UNIT:00000001 MTIME:05:00 RDAY:TUE RTIME:12:30 RETRY:1 RETRY-HRS:6 ACK:MSG LED:ON HQ1:+447768123456 HQ2:OFF (Sent to caller, and HQ's if changed)
cmd:unitoff	Unit off (unit advises HQ's)	**cmd:unitoff**	OK, and OK from HQ's
cmd:extend	Keep the unit awake for an extra 10 mins (this time only)	**cmd:extend**	OK

cmd:gsmsig	Measure the GSM signal strength (default 5 mins)	**cmd:gsmsig**	CPM:014 UNIT:00000001 GSM SIG REQUESTED, WAIT:5 MINS CPM:014 UNIT:00000001 AV:16 MIN:12 MAX:19, OVER:5 MINS
cmd:sleep	Turn off until time for next measurement or report	**cmd:sleep**	OK
cmd:getloc	Report location name	**cmd:getloc**	CPM:017 UNIT:00000001 PIPE:MAIN PIPELINE LOC:TEST POST 57
cmd:setmode	Sets the unit into hourly, daily or normal mode (units advises HQ's)	**cmd:setmode daily**	CPM:022 UNIT:00000001 OK SETMODE DAILY
cmd:reset	Forces an immediate reboot And sets the unit time	**cmd:reset**	No reply
cmd:rename	Changes loc: and pipe:	**cmd:rename pipe:pipeline one loc:main tr**	(from CPSM)

1.2 Transformer Rectifier Monitors

This set of instructions is applicable to 5-channel TR Monitors with an external relay or a MERLIN Interrupter only.

Command	**Description**	**Example**	**Reply / Example Response**
cmd:interrupt	Sets the Transformer Rectifier Monitor into interrupter mode	**cmd:interrupt on:0.8 off:0.2** **cmd:interrupt end** **cmd:interrupt status**	Various responses possible, see below in ADDITIONAL COMMAND INFORMATION.
cmd:gpsinfo	Gets info from the GPS in a Transformer Rectifier monitor	**cmd:gpsinfo**	CPM:031 UNIT:10000001 GPS VALID:Y LAT:51.4301 LONG:-2.6527 SATELLITES:4 ANTENNA OK:Y
cmd:cpoff	Turns the CP off (Transformer Rectifier Monitor with relay only) for set number of hours	**cmd:cpoff 1**	CPM:032 UNIT:10000001 OK, CP OFF UNTIL 12:17:01 MON 1 APR 2009 (TIME ZONE GMT+1:00)
cmd:cpon	Restores CP after cmd:cpoff (Transformer Rectifier Monitor with relay only)	**cmd:cpon**	CPM:033 UNIT:10000001 OK, CP IS ON, INTERRUPTING IS OFF

2. LED OPERATION

In general the:

- Green LED shows processor activity
- Red LED indicates an error condition
- Blue LED indicates some kind of event

A Transformer Rectifier Monitor with AC power will remain active most of the time (2 second LED flash).

A Post Monitor will stay active for 20 minutes after a reset (2 second LED flash) but after that will snooze until it needs to report in (10 second LED flash).

2.1   LED set to ON

LED indication	Description
Double green LED flash	Start of reset
Brief green LED flash every 2 seconds	Unit awake and active. In this mode the unit will respond to SMS messages. Battery is OK.
Brief double green LED flash every 2 seconds	Unit awake and active, but GSM modem not 100% logged onto the GSM network. In this mode the unit may respond to SMS messages. Battery is OK.
Brief red LED flash every 2 seconds	Unit awake and active. In this mode the unit will respond to SMS messages. Battery is low.
Brief double red LED flash every 2 seconds	Unit awake and active, but GSM modem not 100% logged onto the GSM network. In this mode the unit may respond to SMS messages. Battery is low.
Brief green LED flash every 10 seconds	The unit is snoozing between measurements and reporting. In this mode the unit will **not** respond to SMS messages. Battery is OK.
Brief red LED flash every 10 seconds	The unit is snoozing between measurements and reporting. In this mode the unit will **not** respond to SMS messages. Battery is low.
Periods of no LED indication	Unit is busy initialising GSM communication or sending / receiving an SMS
Sequences of red LED flashes	See error indications (below)
Blue LED in addition to other LEDs	On a Transformer Rectifier monitor with synchronised interruption the blue LED shows the OFF period of the interrupter output pattern

2.2   LED set to DIS (DISCREET)

Only a Test Post can be set to DISCREET mode.

LED indications are the same as ON (above) during the initial installation period (of 20 minutes) after a reset, but after that the LEDs are switched off.

2.3   LED set to OFF

Double green LED flash at start of reset, but no other LED indications (except GSM errors after a reset).

Note that with the LED set to OFF the unit will appear to be dead!

3. ERROR INDICATIONS

3.1   Red LED flashes after reset

Relate to GSM problems. These are shown approximately 30 seconds to 2 mins after a reset.

```
NO_NETWORK          3
NO_SIM              4
SIM_ERROR           5
PIN_ERROR           6
SETTING_ERROR       7
NO_MODEM            8
```

3.2   Self-test result codes

The self-test result is provided as two ASCII hexadecimal characters.

Fault codes are OR'ed together.

```
PASS                0x00
PSU_12V_FAIL        0x01
BATTERY_LOW         0x02
ADC_FAIL            0x04
UNIT_TYPE_ERROR     0x08
ISO_RELAY_FAIL      0x10            (Transformer Rectifier isolation relay fail)
```

4. ADDITIONAL COMMAND INFORMATION

4.1 cmd:synctime

Without an additional parameter this command sets the unit's clock to the network timestamp decoded from the command message. The message delay through the network will be apparent in the clock setting. The timestamp is the time the message is received by the network from the sender, <u>not</u> the time the message is delivered.

The unit sets its clock then returns what it believes the current time to be:

CPM:001 UNIT:00000001 09:24:00 MON 24 JUN 2006 (TIME ZONE GMT+01:00)

There is an optional additional parameter of 'timezone:'. This must be in the form of +/-HH:MM e.g.

cmd:synctime timezone:-01:00

This tells the unit the time zone it is working within; in the example above 1 hour behind GMT. For this synctime command, and from now on each time a synctime is received, the unit will work out what GMT is - then set its clock according to the time zone it is in (1 hour behind GMT in the example above).

The timezone parameter only needs to be included in the command when the time zone needs to be set. (Note that time zones and offsets from GMT can be obtained on a PC running Windows XP by double clicking the time on at the bottom right of the PC screen then selecting the Time Zone tab.)

Note that a cmd:install or cmd:replace will also set the time zone, but in their case automatically (the user does not specify the time zone).

When a unit is fitted with GPS it is important to set the time zone or the unit will work to GMT. However this will be done automatically by the cmd:install.

4.2 cmd:install

This command installs the unit on the HQ database(s).

Before this command is used a config command must be sent to setup the HQ1 and HQ2 numbers (so that the unit knows where to send its install message).

There are two parameters:

Parameter	Content
pipe:	Up to 30 ASCII characters to describe area or pipeline
loc:	Up to 50 ASCII characters to describe the unit location

The pipe: and loc: text are not case sensitive and will be converted to uppercase by the system.

The descriptions can include spaces, punctuation and numbers but not "loc:" or "pipe:".

The term 'location reference' (below) is the combination of 'pipe' and 'location'.

An install command requires either: a new unique location reference or no location reference.

For a new install a new unique location reference should be supplied.

To resurrect a unit that has previously been installed at this location, but turned off, no location reference is required, just the 'install' command.

When the unit receives the message it sends install messages to HQ1 and HQ2 (if the numbers have been programmed).

The unit also sends the 'unit type' to the HQ(s) (invisible to user) to allow CPSM to differentiate between rectifiers monitors and test post monitors.

A confirmation is then sent to the originator from the HQ(s) (not the unit). In this way the full system integrity is verified.

An install command will also set the time and time zone, it will do this based on the timestamp of the cmd:install message it receives.

Note: an install or replace command will always clear all the alarm thresholds.

4.3   cmd:replace

This command must be used when a new unit is being installed at an existing location reference. In other words a new unit is being fitted in place of an existing unit.

It allows the HQ software to continue to report the data for a specific location even though the monitoring unit has been replaced.

If the 'replaced' unit continues to send in data it will be ignored.

To prevent confusion, the <u>new</u> unit to be used for the replacement must either be new to CPSM or be tagged as 'unitoff' (new unit has had HQ numbers programmed and has been sent a unitoff command).

There are two parameters:

Parameter	Content
pipe:	Up to 30 ASCII characters to describe area or pipeline
loc:	Up to 50 ASCII characters to describe the unit location

The pipe: and loc: text are not case sensitive and will be converted to uppercase by the system. The loc: and pipe: text must otherwise match the original loc: and pipe: for that location. It may be worth sending a 'getloc' command to the old unit to ensure this.

The descriptions can include spaces, punctuation and numbers but not "loc:" or "pipe:".

A confirmation is then sent to the originator from the HQ(s) (not the unit). In this way the full system integrity is verified.

A replace command will also set the time and time zone, it will do this based on the timestamp of the cmd:replace message it receives.

Note: an install or replace command will always clear <u>all</u> the alarm thresholds.

4.4   cmd:status

This command is used to read the status of the unit. No parameters are sent with the command.

The following parameters are returned:

Parameter	Value and Description
TYPE:	TR or POST, up to 4 ASCII characters
CHANS:	The number of channels the unit has: 1, 2 or 3, one ASCII digit
FW:	Firmware type and version, up to 10 ASCII characters
PWR:	Whether the unit is being supplied external power: Y or N, one ASCII character
GSM:	Current GSM signal level, up to 2 ASCII digits
BAT:	Battery level in mV, up to 5 ASCII characters plus 'mV' A new battery is around 7200mV a flat battery is 5800mV, but the discharge curve is not a straight line
MODE:	Unit operating mode: DAILY, NORMAL or HOURLY, up to 6 ASCII characters
ALARMS:	Whether alarm reporting is enabled: Y or N, one ASCII character
STATUS:	Factory use only: unit status code, 2 ASCII digits (hex)
TEST:	Last self-test result, 00 = pass; else <error code> 2 ASCII hex digits
IN:	Count of incoming SMS messages Up to 5 ASCII digits
OUT:	Count of sent SMS messages Up to 5 ASCII digits
RST:	Number of times the unit has been reset Up to 5 ASCII digits
CAL:	Whether the unit is calibrated. Y or N, 1 ASCII character.

A reply would look like:

CPM:007 UNIT:00000001 TYPE:POST CHANS:3 FW:001-V1.02 PWR:N GSM:12 BAT:5535mV MODE:DAILY ALARMS:Y STATUS:00 TEST:00 IN:3 OUT:127 RST:1 CAL:Y

4.5   cmd:test

Initiates a self-test. When complete a status report is sent, see cmd:status.

The self-test:

- Exercises the LED's and relays
- Measures the 12V PSU voltage
- Measures the battery voltage
- Turns on the analogue rails and confirms the ADC is functional

The fact that you can communicate with the unit proves that:

- The processor is running
- The GSM modem is operational
- The processor can communicate with the modem

The self-test result is provided as two ASCII hexadecimal characters.

Fault codes are OR'ed together.

PASS   0x00
PSU_12V_FAIL   0x01
BATTERY_LOW   0x02
ADC_FAIL   0x04
UNIT_TYPE_ERROR   0x08
ISO_RELAY_FAIL   0x10

If the unit is a Transformer Rectifier Monitor a second SMS will also be sent in reply. This gives the status of the GPS module e.g.:

CPM:031 UNIT:10000999 NO GPS FITTED
Or:
CPM:031 UNIT:10000999 GPS VALID:N LAT:0.0 LONG:0.0 SATELLITES:0 ANTENNA OK:Y

4.6   cmd:read

Takes a full set of channel readings.

Calibration is applied and the results are scaled.

The result is sent back to the sender in text format (results are normally sent to CPSM in machine readable format).

Different responses are sent by the Transformer Rectifier and the POST.

A reply for a Post Monitor would look like:

CPM:020 UNIT:20000001 POST 1DC:-1000mV 1AC:300mV 2DC:-900mV 2AC:200mV 3DC:10.00mV 3AC:0.40mV

A reply for a Transformer Rectifier Monitor would look like:

CPM:020 UNIT:10000001 TR VOLTS:18.00V SHUNT:20.00mV ON:0mV OFF:0mV

4.7   cmd:config

Command used to (re)configure unit settings. The parameters shown are always returned irrespective of which parameter is changed.

This is the command used to set the HQ numbers.

Parameter	Content	Values
unit:	Serial number of unit (can't be changed)	8 ASCII digits
mtime:	Daily measurement time HH:MM (Default is 18:00)	2 ASCII digits for hour 2 ASCII digits for mins Separated by ':'
rday:	Reporting day of week, or LOW (every 28 days)	3 ASCII characters
rtime:	Reporting time of day HH:MM	2 ASCII digits for hour 2 ASCII digits for mins Separated by ':'
retry:	Number of report retries: 0,1,2	Single ASCII digit
retry-hrs:	Interval between report retries	1 ASCII digit (max 8 hours)

ack:	The type of acknowledge the unit should request: an SMS message (MSG) or a Delivery Report (REP)	3 ASCII characters
LED:	OFF, DIS or ON (DIS stands for DISCREET)	2, 3 or 4 ASCII characters
hq1:	Phone number of HQ1 or 'OFF'	Max 16 ASCII digits including the '+'
hq2:	Phone number of HQ2 or 'OFF'	Max 16 ASCII digits including the '+'

One or more parameter(s) may be changed with a single text message. If the command is sent without any parameters, the reply still contains all current configuration settings.

A simple example of changing the reporting day & time would be:

cmd:config rday:tue rtime:12:30

An example of setting the HQ numbers would be:

cmd:config hq1:+447799123456 hq2:off

When setting the HQ numbers include the leading + but do not include any other punctuation or spaces in the number.

The LED settings work as follows:

- In OFF mode the green LED will flash when the unit is swiped to indicate a reset but at all other times the LEDs will remain off. Note that after using this command the unit will appear to be dead!
- Discreet mode is only available on the Test Post and allows the status LED to be active after a reset and during the initial 20 minute installation period. From that point onwards the LEDs are switched off.
- In ON mode the status LED flashes briefly at 2 second intervals during service mode and at 10 second intervals at all other times.

A measurement time of 18:00 is suggested for two reasons:

1) Abriox have observed that this is a peak time for AC interference from national power lines.
2) If CIPS or DCVG surveys are conducted during the working day the Post measurements will be unaffected.

If a config is requested (no parameters supplied) the reply is only sent to the caller. If the config is changed a reply is sent to the caller and both HQ's.

A config command reply would look like:

CPM:009 UNIT:00000001 MTIME:05:00 RDAY:TUE RTIME:12:30 RETRY:0 RETRY-HRS:8 ACK:MSG LED:ON HQ1:+447768123456 HQ2:+447768123457

4.8   cmd:unitoff

Note: *Once a unitoff command has been sent to a unit it will need a manual magnet swipe to wake it back up. It cannot be woken up remotely.*

Note: *be very careful with unitoff commands – always make sure the message validity at the sending phone is 1 hour and never send more than one command to a unit. If this is not done and two unitoff commands are sent one will wait in the network and may get delivered at some point after the unit is woken up!*

No additional parameters.

This command instructs the unit to turn off permanently. In this mode reports are not generated and the unit does not respond to SMS commands. The unit **must** be manually reset using the magnetic switch to return it to its normal operating state. No LED indication is present when in this state.

A simple conformation reply is returned to the origin of the command.

A reply would look like:

CPM:012 UNIT:00000001 OK UNITOFF

Before the unit turns off it also sends a message to HQ1 and HQ2 requesting that the unit be tagged as 'unitoff' in the database.

HQ1 and HQ2 will no longer expect to see messages from the unit. If messages are received they will be filed as 'unrecognised messages'.

4.9   cmd:gsmsig

This command resets all parameters associated with the GSM signal measuring feature and starts a measuring period. The duration of the period may be specified in minutes (1 to 99), if omitted the default is used which is 5 minutes.

cmd:gsmsig mins:3

 A simple acknowledge is sent to the user to confirm the command has been accepted.

CPM:014 UNIT:00000001 GSM SIG REQUESTED, WAIT:3 MINS

A further message follows after the specified interval containing the results of the measurement, this has the form:

CPM:014 UNIT:00000001 AV:16 MIN:12 MAX:19, OVER:3 MINS

The signal levels are in the range 0 to 31 with 31 being the strongest (0 to 31 is defined by the GSM network).

4.10   cmd:setmode

Sets the unit operating mode.

Post Monitor can be in: DAILY or HOURLY

- DAILY: Daily reads, weekly report of min, max average
- HOURLY: Hourly reads, daily report of raw data (in addition to DAILY mode reports)

Rectifier Monitor can be in: DAILY, NORMAL or HOURLY

- DAILY: Daily reads, weekly report of min, max average (special low power mode)
- NORMAL: Hourly reads, weekly report of min, max average
- HOURLY: Hourly reads, daily report of raw data (in addition to NORMAL mode reports)

Parameters are:

daily
normal
hourly

E.g. **cmd:setmode daily**

Hourly mode will send a significant number of SMS messages and will also compromise unit battery life. The acknowledge will therefore warn the user, as should CPSM.

A reply would look like:

CPM:022 UNIT:00000001 OK SETMODE DAILY

Or:

CPM:022 UNIT:00000001 OK SETMODE HOURLY – WARNING BATTERY LIFE WILL BE REDUCED

A status message is also sent to both HQs (the status message shows the unit measurement mode setting).

4.11   cmd:interrupt

Sets the Transformer Rectifier Monitor into interrupter mode.

With this command you can:

- Set interrupter patterns for the Transformer Rectifier output relay
- Close the Transformer Rectifier output relay (and end any pattern being output)
- Ask what the interrupter is currently doing

The patterns that are supported cater for both CIPS and DCVG surveys. CIPS surveys usually require the majority of the pattern to be ON to maintain the CP protection of the pipeline. DCVG surveys are the reverse and usually have a longer OFF than ON so that a short "blip" of ON can be seen by the survey tool.

Example commands are:

Cmd:interrupt on:0.8 off:0.2
Cmd:interrupt end
Cmd:interrupt status

The interrupter pattern setting is given in seconds to 1 decimal place (although the actual pattern precision is 1ms).

The following rules must be adhered to when selecting an interrupter pattern or the command will be refused.

- Minimum OFF   0.1 seconds
- Maximum OFF   4 seconds
- Minimum ON   0.1 seconds
- Maximum ON   59.9 seconds
- Minimum complete cycle   1 second
- Maximum complete cycle   60 seconds
- Complete cycles must be whole seconds
- 60 seconds must be divisible by the complete cycle time

The following are examples of valid settings and commands:

Cmd:interrupt on:0.8 off:0.2
Cmd:interrupt on:2.5 off:0.5
Cmd:interrupt on:4 off:1

And for DCVG perhaps:

Cmd:interrupt on:0.3 off:0.7

The unit will respond with a confirmation. A Post Monitor will ignore this command and respond with a bad command error message.

Where the ON period or OFF period is too short for the Merlin Transformer Rectifier to take readings during interruption the Merlin will automatically disable reads (whilst interrupting only). The response indicates whether the Merlin is able to take readings or not.

The reason behind disabling the reads is as follows. If the interruption pattern is 100ms OFF with an instant off delay of 100ms (the default programmed into Merlin) there is not enough time for a reading to be taken. However, the Merlin takes a number of readings, typically over a period of 200ms, so for the Merlin Transformer Rectifier to continue to take readings during interruption there must be a long enough OFF period to allow for both the reading and for the instant off delay. During the ON period at a Transformer Rectifier the Merlin needs to take 3 readings: the Transformer Rectifier Volts, Transformer Rectifier Current and ON potential. To do this it requires at least 400ms plus the instant off delay.

The omitted readings will not affect the weekly min/max/average report.

The Merlin Transformer Rectifier will still continue to check the AC power even if it cannot take the other readings.

Possible responses (with example values where applicable) to an interrupt command are:

CPM:026 UNIT:00000001 INTERRUPT OK, ON:0.8s OFF:0.2s, TR READS:OFF, SATELLITES:5
CPM:026 UNIT:00000001 OK, CP IS ON, INTERRUPTING IS OFF
CPM:026 UNIT:00000001 INTERRUPT ERROR
CPM:026 UNIT:00000001 INTERRUPT ERROR, CYCLE INVALID
CPM:026 UNIT:00000001 INTERRUPT ERROR, ON INVALID (0.1s to 59.9s allowed)
CPM:026 UNIT:00000001 INTERRUPT ERROR, OFF INVALID (0.1s to 4.0s allowed)
CPM:026 UNIT:00000001 INTERRUPT WARNING, ON:4.0s OFF:1.0s BUT NOT SYNCHRONISED, TR READS:ON, SATELLITES:2
CPM:026 UNIT:00000001 ERROR, NO EXTERNAL POWER
CPM:026 UNIT:00000001 INTERRUPT ERROR, NO GPS

Anything other than an interrupt status request will result is a response not only to the sender but also to both HQ's.

When interrupting the blue LED is lit during the OFF period.

The OFF period is the start of the cycle and always starts at 00 seconds of each minute (UTC time).

All Merlin units will automatically be synchronised in time with each other provided they have GPS lock. The synchronisation error is less than 1ms.

If interruption is started before the GPS has lock the cycle will be corrected and brought into synchronisation when GPS lock is acquired.

At a new installation when power is first applied it can take 15 minutes for the GPS to fully lock.

4.12   cmd:rename

This command changes the location text and/or pipe text for the unit.

The command would normally only be sent from HQ1 or HQ2 when a user decides that the name is now inappropriate and should be changed.

The command ideally needs to be sent from the HQ so that the HQ can verify that the new name is valid.

Note that a large amount of SMS traffic could be initiated by doing this. For example the user changes a pipe name: an SMS will be sent to every unit on that pipe. The units will update their records and advise both HQ1 and HQ2.

There are two parameters:

Parameter	Content
pipe:	Up to 30 ASCII characters to describe area or pipeline
loc:	Up to 50 ASCII characters to describe the unit location

The pipe: and loc: text are not case sensitive and will be converted to uppercase by the system.

The descriptions can include spaces, punctuation and numbers but not "loc:" or "pipe:".

The term 'location reference' (below) is the combination of 'pipe' and 'location'.

The new location reference must be unique.

When the unit receives the message it sends the response to HQ1 and HQ2 (if the numbers have been programmed) only.

The unit also sends the 'unit type' to the HQ(s) (invisible to user) to allow CPSM to differentiate between rectifiers monitors and test post monitors.

4.13   cmd:gpsinfo

Reports the unit's position, the number of satellites it can see and the status of the GPS and GPS antenna.

The GPS position is reported as latitude, longitude in degrees.

The latitude and longitude can be entered directly into Google Maps or Google Earth to show the position.

Possible responses are:

CPM:031 UNIT:10000001 NO GPS FITTED
CPM:031 UNIT:10000001 GPS TURNED OFF
CPM:031 UNIT:10000001 GPS VALID:Y LAT:51.4301 LONG:-2.6527 SATELLITES:4 ANTENNA OK:Y

GPS VALID can be Y or N and indicates valid time and position information being obtained.
ANTENNA OK can be Y or N.
Satellites can be 0 to perhaps 12.
Lat and Long are given to 4 decimal places and can be positive or negative.

Ranges are:

+/- 90 for latitude (North/South from equator)
+/- 180 for longitude (from Greenwich Meridian line)

4 decimal places gives the position to approximately 5 metres.

A Test Post Monitor will respond with:

CPM:031 UNIT:20000001 ERROR, BAD COMMAND

4.14   cmd:cpoff

Open the interrupter relay for the specified number of hours, effectively turning the CP off.

This command will end any other interrupter activity.

An example command would be:

cmd:cpoff 2

Prior to V2.08 firmware a maximum of 12 hours can be selected.
V2.08 firmware or later will accept 1 to 672 hours (4 weeks).

Possible responses prior to V2.08 are:

CPM:032 UNIT:10000001 OK, CP OFF UNTIL 12:17
CPM:032 UNIT:10000001 ERROR, NO EXTERNAL POWER
CPM:032 UNIT:10000001 ERROR, INVALID NUMBER OF HOURS

From V2.08 onwards the unit responds with the time and date the CP will be restored.

Possible responses from V2.08 onwards are:

CPM:032 UNIT:10000001 OK, CP OFF UNTIL 12:17:01 MON 1 APR 2009 (TIME ZONE GMT+1:00)
CPM:032 UNIT:10000001 ERROR, NO EXTERNAL POWER
CPM:032 UNIT:10000001 ERROR, INVALID NUMBER OF HOURS

A Test Post Monitor will respond with:

CPM:032 UNIT:20000001 ERROR, BAD COMMAND

If the command is successful the result is a response not only to the sender but also to both HQ's.

When the CP is restored the standard CPON message is sent to both HQs and the requester.

CPM:033 UNIT:10000001 OK, CP IS ON, INTERRUPTING IS OFF

4.15   cmd:cpon

This command will end and CP OFF command and an INTERRUPT command.

The response should be:

CPM:033 UNIT:10000001 OK, CP IS ON, INTERRUPTING IS OFF

A Test Post Monitor will respond with:

CPM:033 UNIT:20000001 ERROR, BAD COMMAND

If the command is successful the result is a response not only to the sender but also to both HQ's.

5.   HOW LOCATION REFERENCES, INSTALL AND REPLACE COMMANDS WORK

In CPSM you view data by location reference (user assigned). This means that the history of a specific test post or rectifier will be maintained. It allows units to be moved or replaced whilst maintaining a continuous and correct history for the location without any cutting and pasting of data.

The location references will be displayed in 'folders' which are the 'pipe'. The unique location reference is a combination of the 'pipe' and 'location'. For example if the location reference is "Church Street" and the pipe is "Bristol" it would also be possible to have "Church Street" in the pipe "London".

The 'pipe' text, however, is optional. If it is not used then even more care must be taken with the location text because it would only be possible to have one "Church Street", for example.

The term 'location reference' (below) is the combination of 'pipe' and 'location'.

All location references **must** be unique (i.e. two geographical locations must **not** have the same name). If this safeguard was not present the following would be possible:

- You could accidentally overwrite an existing and valid location reference with the same name e.g. "Newcastle". At the CPSM data from the old "Newcastle" would cease to be recorded and data from the new "Newcastle" would be appended to the history of the old "Newcastle".
- Two units may end up be installed with a location reference of say "Newcastle", but be in completely different geographical locations, and the CPSM would end up merging the data and presenting it as one.
- Data for two locations called "Newcastle" would be presented on CPSM and the actual source of the data may not be clear.

To ensure that the uniqueness of the location reference is maintained the following commands are required:

install
unitoff
replace
rename

Characters that can be used for pipeline and location name are:

! " # % & ' ( ) * + , - . / : ; < = > ?
0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

Characters than cannot be used are:

@ £ $ _ ^ { } \ [~] | € ¡ ¿

install

An install command requires a new unique location reference. If the reference has been used before an error is reported and the install is denied.

To prevent installation of the same unit at multiple locations (e.g. by accidentally sending multiple install commands to a single unit) it is necessary to turn a unit off (send it a 'unitoff' command) and on again (magnet swipe) before it can be installed again (at a different location).

A unit that has been installed and then turned off can be resurrected with an install command with no parameters. The unit sends an install with the saved location reference to CPSM. The confirmation is sent from CPSM.

(An automatic resurrection at CPSM, upon receipt of a periodic message, is not possible because that the same unit may have been previously installed at a number of locations so it is ambiguous which location CPSM should resume.)

unitoff

As well as turning the unit off it also:

- advises CPSM not to expect anymore messages from this unit (i.e. tag the unit as 'unitoff'),
- advises CPSM that the unit is now available for a future new 'install' command.

If a report (periodic or alarm) is received by CPSM from an 'off' unit (i.e. the unit has been manually reset) the message is stored in 'unrecognised messages'.

replace

This command must be used when a new unit is being installed at an existing location reference.

CPSM will assign the new unit to the location reference. From this time forward data from previous units assigned to this location reference will be ignored.

To prevent confusion, the new unit to be used for the replacement must either be new to CPSM or be tagged as 'unitoff'.

Note: Sending a 'unitoff' command to the old unit may not be possible if the unit has failed or been stolen, so this is not essential.

rename

This command is to be used when a unique reference needs to be changed (for example when a new naming convention is chosen). The logged data remains unchanged. The reference must be unique and have not been used before.

The unique reference is changed both in the unit and at CPSM.

This command ideally needs to come from CPSM, not a mobile phone, because the unit cannot validate the location reference before it changes its EEPROM.