

# *Flextrack Lommy® Phoenix platforms*

## *Technical Description Draft*

Version 0.38



**Lommy Personal**



**Lommy Pro**

**Lommy® is a registered trademark of JAX Invest A/S**

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## Introduction

The Flextrack Lommy® Phoenix platform is highly portable “Personal Tracking Units”, which allows persons or belongings to be followed with the help of the global GPS system (see the section “*What is the GPS system?*” for an explanation of the GPS system). The unit communicates with the “outside” world using GSM/GPRS technology. The use of GPRS allows monitoring of the units position in almost real-time as the unit is “always on”, and is very cost-effective as one only pays for the amount of data sent, and not for the time spent “online” (see the section “*What is GPRS?*” for an explanation of the GPRS technology).

The unit has it’s own internal high-capacity battery, which will allow the unit to run continuously for many hours (days) before recharging is needed.

The Flextrack Lommy® unit can communicate with the outside world through different means, ranging from simple SMS messages, HTTP web requests, and for maximum flexibility, the FlexCI protocol. All 3 possibilities are described in detail throughout this document.

Up to 3000 positions can be stored i a cylindrical memory if there it no continual connection to a server

The Lommy Personal is equipped with a speaker and microphone, this allows the user to accept and initiate voice calls, for example should an emergency situation occur.

It can play different audible messages for different events. Battery level low, emergency alarm sent etc.

Depending on the model the Lommy Personal can be equipped with a 433MHz RF tranceiver, 868MHz tranceiver, 3-axis G-force sensor and up to two additional buttons for additional functionality.

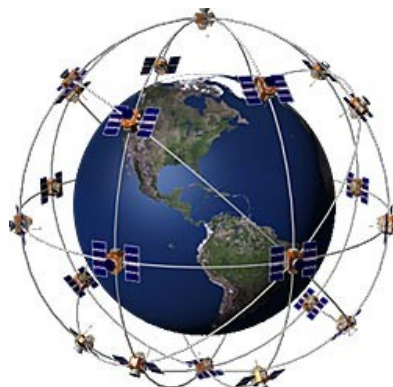
The Lommy Pro is meant for fixed mount usage, but can be carried for personnel use as well. Depending on the model the Lommy Personal can be equipped withIt's equipped with and option-2 board with 4 analog input ports and two digital output ports. Other options are 433MHz RF tranceiver, 868MHz tranceiver, 3-axis G-force sensor and up to two additional buttons for additional functionality.

## What is the GPS system?

GPS is a satellite-based radio navigation system developed and operated by the U.S. Department of Defence (DOD). GPS permits land, sea, and airborne users to determine their three-dimensional position, velocity, and time 24 hours a day, in all weather, anywhere in the world with a precision and accuracy far better than other radio navigation systems available today or in the foreseeable future.



*One of the 28 satellites*



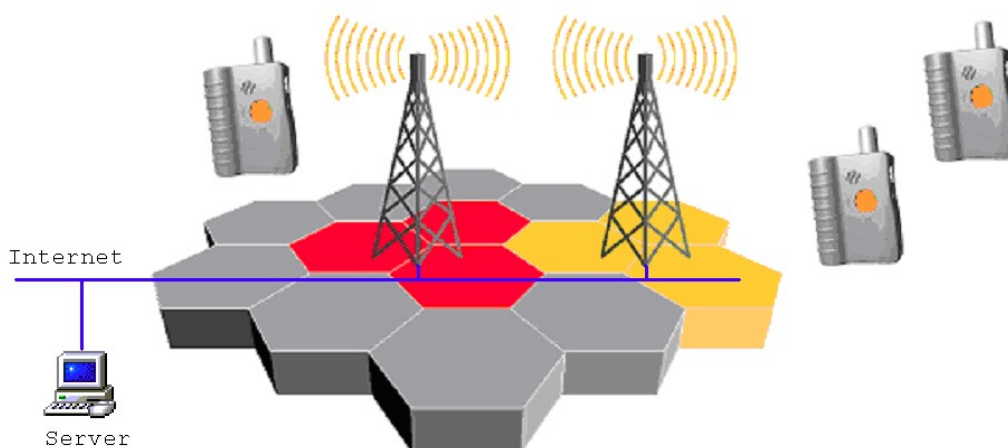
*The 28 satellites orbits the earth in 6 planes*

The GPS concept of operation is based upon satellite ranging. Currently the GPS network consists of 28 satellites orbiting the earth. Users figure their position on the earth by measuring their distance from the group of satellites in space. The satellites act as precise reference points. Each GPS satellite transmits an accurate position and time signal. The user's receiver measures the time delay for the signal to reach the receiver, which is the direct measure of the apparent range to the satellite. Measurements collected simultaneously from at least four satellites are processed to solve for the three dimensions of position, velocity and time.

## What is GPRS?

GPRS facilitates instant connections whereby information can be sent or received immediately as the need arises, subject to radio coverage. No dial-up modem connection is necessary. This is why GPRS users are sometimes referred to as being "always connected". Immediacy is one of the advantages of GPRS (and SMS) when compared to Circuit Switched Data. High immediacy is a very important feature for time critical applications such as tracking persons or vehicles where it would be unacceptable to wait for a dial-up connection to be established, or where the added cost of sending SMS messages would make running the application too expensive.

Because of the Flextrack Lommy® unit is equipped with GPRS (and GSM) technology, the unit is connected to the global Internet, making system integration with back-end (server) systems easy. The GPRS service runs on the same frequencies as the GSM network, and is an integrated part of that.



## Operating the unit

The Lommy has 1 button, 4 light indicators (green, red, yellow and blue) and a connector at the bottom.

To turn the unit on, press the red button shortly. The yellow light will indicate that it is starting up. Shortly afterwards the rest of the lights will flash.

To turn it off again press and hold the red button until the yellow indicator flashes slowly. Now release and press the button again shortly within 2 seconds.

The green indicator is the GSM indicator. It will blink 50/50 until it has connected the GSM network.

After then you will only see it on, when the Lommy is receiving/sending data. If it keeps flashing, please make sure that a SIM-card is properly inserted and PIN-code control is either disabled or set to 10000 minus the last 4 digits of the serial number. Ex. a unit having the serial number 0061102002 must have the PIN-code  $10000 - 2002 = 7998$ .

The red indicator is flashing while charging and fully lit up when charging has completed.

If the red indicator are flashing with no charger connected, the battery must be recharged.

The yellow indicator is on while the Lommy is starting up. Giving one flash the unit is on and giving two flashes it is connected to a server using the FlexCI protocol

The blue light is indicating GPS reception. Giving one flash there is no GPS coverage, else it will give one flash and a number of short flashes indicating the number of GPS satellites seen while the GPS is on.

The bottom connector is used for charging the Lommy and preconfiguration.

## **Changing the configuration**

In order to get started configuring the Lommy, you need to download and install a software tools on your PC.

On this link <http://www.flextrack.dk/files/PConfig.zip> you can download PConfig, a tool to configure and firmware upgrade the Lommy.

Unpack the file to C:\ and connect the Lommy to your PC using a mini-USB cable.

When prompted for the location of the driver, let it search in [C:\Phoenix](#)

Now start the program C:\Phoenix\PConfig.exe and select "File -> Connect"

The status bar should now show "Connected". If not please make sure the Lommy is turned on (by pressing the red button), cable is properly connected and driver successfully installed.

In "Configuration" you can read or write the configuration. When read it will store the configuration in a textfile that can be altered using ex. Notepad and written back using the "write" option.

To upgrade the firmware select "File -> Upload Firmware.."

If you have further questions and/or wants a notification when new firmware are available, just send an email to [flextrack@flextrack.dk](mailto:flextrack@flextrack.dk)

### Inserting the SIM-card.

1. Place the Lommy with the front down and remove the 5 torx-screws (size 6).
2. Hold the plastic parts together and turn it around so the backside are now downwards.
3. Gently remove the front cover and remove the rubber ribbon
4. Insert the SIM-card (see figure 1)
5. Now follow point 1-3 in reverse order.

**Do not take out the module, and be very carefull not to bend the GPS antenna!!**

figure 1



figure 2





## System commands

The Flextrack Lommy® unit can be controlled using a number of commands sent to it. The messages can be sent using either SMS messages or thru the FlexCI protocol.

The messages allow you to query the state of different sub-systems in the unit, modify configuration parameters etc.

Please note that the syntax for the commands has to be followed exactly, all commands must be written as stated below; especially note the commands are case sensitive!

The "SL" field describes the security level needed for the command to be executed, high level means that only a sender that has its number listed in the "SMSSENDER" or "FLEXSERVER-SMS" parameter are allowed to send this command by SMS, low security level can be accepted from any sender.

<i>Command</i>	<i>Example</i>	<i>SL</i>	<i>Description</i>
<b>CONF:</b> <name,value>	CONF:PIN,1234	High	Modify/add a configuration parameter in the unit. If the "name" does not exist, it will be created in the configuration parameters.
<b>CONF?</b> <name>	CONF?PIN	High	This will return the value of the parameter "name".
<b>STAT</b>	STAT	Low	Sends a SMS message with the status of the unit, battery voltage, signal level etc. 1)
<b>RELOAD</b> [<IP> <NAME>]	RELOAD 120.121.122.123 application.pfw	High	This start the download of a new application from a web-server using OTAP. Please note that 'APN', 'DNS', 'USERNAME' and 'PASSWORD' must be configured correctly for this to work. If for some reason the RELOAD command fails (maybe just downloading half of the program) the unit will continue on the current firmware version.
<b>RESET</b>	RESET	High	The Flextrack unit will be reset.
<b>POS</b>	POS	High	A message containing the last good GPS fix is sent back with information about lat/lon, speed, direction and number of satellites used in the fix. If there was no GPS fix the last time a report was sent, "No fix" will be indicated in the answer.
<b>NEWPOS</b>	NEWPOS  NEWPOS 3,60	High	Same behavior as the "POS" command above, except that the unit will try to get a GPS fix before sending the answer. (This command ONLY works when issued via SMS message !) It can also be used with two; (parameters (number of positions, delay between positions)
<b>LOADPARAM</b>	LOADPARAM	High	Loads the non volatile configuration into the running configuration. This can be used to get back to normal if some values have been altered and no SAVEPARAM has been sent.
<b>SAVEPARAM</b>	SAVEPARAM	High	Saves the current parameter set into non-volatile memory (in the sysconfig.cfg file on the Unit)

<i>Command</i>	<i>Example</i>	<i>SL</i>	<i>Description</i>
<b>GEOFENCE</b>	[GEOFENCE:SET /GEOFENCE:ON /GEOFENCE:OFF /GEOFENCE:AUTO]	High	Use the current/existing position as the center of the geofence (only if there is a valid position, will wait GEOFENCE-GIVEUP period for a fix) A message will be sent back telling if the geofence was successfully set or not. OFF, SET & AUTO is equivalent to the parameter GEOFENCE value 0, 1 & 2 ON will use the existing center or acquire one if none is present.
<b>POWERDOWN</b>	POWERDOWN 60	High	The unit will power down and wake up again in the specified number of minutes. During power down, the unit can be switched on manually as normal.
<b>POWEROFF</b>	POWEROFF	High	The unit will be switched off. You must manually switch on the unit again.
<b>SMS</b>	[SMS:ON/SMS:OFF]	High	Tell the unit if SMS is to be used when sending unsolicited messages to the FlexCI server (UNITSTAT etc). Default after power on, is OFF.
<b>UNITSTAT</b>	UNITSTAT	High	Forces unit to send a UNITSTAT message. The unit will NOT attempt to make a new GPS fix, the data from last time fix was attempted will be returned.
<b>NEWUNITSTAT</b>	NEWUNITSTAT	High	Forces unit to send a UNITSTAT message. The unit will attempt to make a new GPS fix.
<b>GETCONF</b>	GETCONF	High	Unit sends the complete current configuration (will only return the configuration if the command is issued on the FlexCI protocol, if sent using SMS, the answer is too big to be returned (max 160 characters))
<b>IMEI</b>	IMEI	High	Returns the IMEI of the unit.
<b>BEACON</b>	[BEACON:ON/ BEACON:OFF]	High	Turns the RFID transceiver on or off (Only in some models)
<b>OPT-DO1:ON</b>	OPT-DO1:ON	High	Is setting output port 1 logic high. 2)
<b>OPT-DO1:OFF</b>	OPT-DO1:OFF	High	Is setting output port 1 logic low. 2)
<b>OPT-DO2:ON</b>	OPT-DO2:ON	High	Is setting output port 2 logic high. 2)
<b>OPT-DO2:OFF</b>	OPT-DO2:OFF	High	Is setting output port 2 logic low. 2)
<b>LPOS</b>	LPOS	High	When LPOS command is received, a special formatted response (much like the FLEETMAN HTTP GET requests) is sent back with the current position in, this can be used on cellphones as a link to, for example, Google Maps

1) The content of the STAT response is:

Version=Phoenix<version>

BattV=<battery voltage in mV>

Chg=<1 if charger is connected>

Runtime=<number of seconds since the unit started>

Signal=<GSM signal strength in dBm>

Sat=<number of satellites receiving on the GPS>

HDOP=<GPS HDOP value>

GPS Power=<1 if the GPS is powered on>

NodeID=<serial number of the unit>

[www.flextrack.dk](http://www.flextrack.dk)

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Uusb=<charging voltage in mV>

Ichg=<charging current>

Bt=<battery temperature in Celcius degrees>

MCC=<Mobile Country Code + Mobile Network Code>

2) Only in the Pro model with option 2 board (OPT2)

## Parameters

The Flextrack Lommy® unit can be configured with a number of parameters. The parameters are normally set to fixed values from the factory; the individual parameters can be changed by sending the “CONF:” SMS message to the unit (see the section “System Commands”). Whenever the unit is started, the parameters are read from non-volatile storage (the sysconfig.cfg file on the unit) into the unit’s internal memory (RAM). If a parameter is changed with the “CONF:” command, it is only this internal representation in RAM that is changed. The command “SAVEPARAM” must be issued in order to write the current parameters into non-volatile memory.

Please note that all the parameters **MUST** be typed exactly as shown (all in uppercase), or the module will not recognize them!!

All default values are shown in bold underlined text.

<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>PIN</b>	1234	*	Pin code for the SIM card
<b>APN</b>	internet	*	APN name for attaching to internet via GPRS
<b>USERNAME</b>	user	*	Username for attaching to internet via GPRS
<b>PASSWORD</b>	password	*	Password for attaching to internet via GPRS
<b>DNS</b>	122.133.144.155	*	DNS server IP address, on some networks this must be specified, on other networks it can be blank.
<b>FLEXSERVER-IP</b>	<a href="http://www.server.com">www.server.com</a> :12345 <b><u>fs1.care4all.dk:30000</u></b>	*	IP address and port number to use for contacting a Flexserver. If this parameter is set to SMS, no connection will be made, but instead the FlexCI interface will behave as if there is no connection (SMS messages will be used for sending UNITSTA messages)
<b>FLEXSERVER-IP-SEC</b>	www.server-2.com:12345	*	IP address and port number to use for contacting a secondary Flexserver. This IP will be used if the “FLEXSERVER-IP” is not responding.
<b>FLEXSTREAM-IP</b>	<a href="http://www.server.com">www.server.com</a> :12345		IP address and port number to use for contacting a Flexserver using UDP. Only UNITSTAT’s will be sent to this service
<b>FLEXSERVER-SMS</b>	+4512345678,+4577665544 <b><u>+4550503185</u></b>		List of SMS phone numbers to use for contacting a Flexserver if not possible to establish a GPRS connection. A message is sent to each number in the list
<b>FLEXSERVER-IDLE</b>	0/180..60000	*	Number of seconds between “keep alive” communication to the FlexServer. If set to 0, no “keep alive” communication is sent. The keep alive communication consists only of a <CR>. The FlexServer should answer back with a <CR>.
<b>FLEXSERVER-CIRCULAR</b>	[0..3000] <b><u>10</u></b>	*	Circular buffers for UNITSTAT messages over GPRS. The parameter FLEXSERVER-CIRCULAR sets the number of entries in the buffer, if set to 0 the buffers are disabled (the unitstat messages are sent immediately if connected else discarded). Max allowed number is 3000. If REPORT-INTERVAL is equal or below 7 seconds, the buffers are disabled (they would not be able to keep up with the high rate of reports)

<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>FLEXSTREAM-INTERVAL</b>	[0..60000] <u>0</u>		The report interval for UDP datagram messages sent if FLEXSTREAM-IP is defined. Shortest interval possible is 3-4 seconds. Times in seconds between position (status) messages. MAT-LAT, MAX-LON, MAX-HDOP and FORCE-REPORT are taken in consideration before the position is sent.
<b>REPORT-INTERVAL</b>	[10..60000] <u>120</u>		Times in seconds between position (status) messages. MAT-LAT, MAX-LON, MAX-HDOP and FORCE-REPORT are taken in consideration before the position is sent.
<b>REPORT-INTERVAL-SMS</b>	[10..60000] <u>1800</u>		Time in seconds between position (status) messages are sent when a Flexserver is not present, and messages are sent to the "FLEXSERVER-SMS" number if the unit is on its home network (NOT roaming)
<b>REPORT-INTERVAL-SMS-ROAMING</b>	[10..60000] <u>1800</u>		Time in seconds between position (status) messages are sent when a Flexserver is not present, and messages are sent to the "FLEXSERVER-SMS" number if the unit is NOT on its home network (it is roaming)
<b>STATEMASK</b>	[00000000..FFFFFFFF] <u>FFFFFFFFE</u>		A mask used to identify when the "UNITSTAT" message should be sent, a '1' in a bit in the mask will force the unit to send the "UNITSTAT" command whenever the corresponding bit in the Unit State field changes state.
<b>GPS-CHARGE</b>	0/ <u>1</u>		If set to '1', the GPS will be powered on continuously if the charger is connected to the unit (same effect as setting 'GPS-GIVEUP' to 0)
<b>GPS-GIVEUP</b>	<u>300</u>		Number of seconds to keep listening for a GPS position if no fix available, before powering the GPS off. The GPS will be powered on again when a new report is to be sent. If set to 0, the GPS will NOT be powered down between the individual "request for fix".
<b>GPS-TIMEOUT</b>	<u>50</u>		Number of seconds to keep listening for a GPS position. If no valid fix is found within this specified time, the report will be sent with the current information from the GPS receiver (position might be wrong)
<b>FLEETMAN</b>	www.server.com/httprecei ver.dll		The URL for sending HTTP GET requests to. If this parameter is either omitted or left blank, no HTTP GET requests will be attempted. See the section "HTTP Get Request" for an explanation.
<b>FORCE-REPORT</b>	[0.1000] <u>5</u>		If the position has not changed enough this number of times according to "MAX-LAT" and "MAX-LON", send a position report anyway.

<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>MAX-HDOP</b>	[0..500] <b>300</b>		Maximum "Horizontal Dilution Of Precision". When a GPS position is acquired, the precision can be less than optimal, this number basically tells the unit how precise the position must be (as reported by the GPS receiver) before a position report is sent. The factor is based on the "standard accuracy of the GPS receiver" which is typically 5 meters. A HDOP value of 20 (2.0) means that the position error must be better than 5 meters multiplied by 2.0, i.e. 10 meters. Please note that there are other factors that influence the precision of the GPS positions, such as reflected signals etc!
<b>MAX-LAT</b>	[0..9999] <b>250</b>		This is the number of "decimal minutes" a position must change in latitude for the position report to be sent. If the current position has NOT changed by more than this number as compared to the last position reported, no position report is sent (however "FORCE-REPORT" sets an upper limit for the number of not-sent reports).
<b>MAX-LON</b>	[0..9999] <b>500</b>		This is the number of "decimal minutes" a position must change in longitude for the position report to be sent. If the current position has NOT changed by more than this number as compared to the last position reported, no position report is sent (however "FORCE-REPORT" sets an upper limit for the number of not-sent reports).
<b>VOICE</b>	[0/1/2/3]	*	Specifies if the unit supports voice or not. 0: Both speaker and microphone is disabled (silent) 1: Voice is supported (speaker and mic.) 2: speaker is off, microphone is in high sensitivity mode. 3: microphone is disabled, speaker in high volume mode
<b>CYCLIC</b>	[0..60000] <b>0</b>	*	If this parameter is set (greater than 0) the unit will power down for this number of minutes <u>7 minutes AFTER the last command has been received</u> (either by SMS or FlexCI protocol). The 7-minute period is restarted every time a command is received (there is approximately 1 minute overhead when using this feature, if you specify 10 minutes, it will actually take approximately 11 minutes before the unit is powered up again). If no GPS-fix are found within the 7 minutes, the value of GPS-TIMEOUT is added to the 7 minutes.
<b>LASTGOOD</b>	[0/1] <b>0</b>		If this parameter is set to 1, the values of Date, Time, Longitude, Latitude, Speed, Direction, SV and Elapsed time for fix, will be taken from the last good position, if unable to get the most current. Bit 8 in the Unit State will be raised then.
<b>SOSPONE</b>	+4512345678		The number to dial for establishing a voice channel when function button is activated for more than half a second. This parameter only gives meaning if 'voice' is set to 1, 2 or 3

<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>SOSPHONE1</b>	+4512345678		The number to dial for establishing a voice channel when button 1 is activated for more than half a second. This parameter only gives meaning if 'voice' is set to 1, 2 or 3 (Only some models)
<b>SOSPHONE2</b>	+4512345678		The number to dial for establishing a voice channel when button 2 is activated for more than half a second. This parameter only gives meaning if 'voice' is set to 1, 2 or 3 (Only some models)
<b>SOS-SMS</b>	+45123456,+4566778899		This list of numbers (if defined) will receive a position report (like the answer to a "POS" command, only the first line will contain the word "PANIC") if the function button is activated for more than 2 seconds. The word "PANIC" can be changed with the SOS-TEXT parameter. See below for contents of the message sent.
<b>SOS-SMS1</b>	45123456,+4566778899		This list of numbers (if defined) will receive a position report (like the answer to a "POS" command, only the first line will contain the word "PANIC") if the function button is activated for more than 2 seconds. The word "PANIC" can be changed with the SOS-TEXT1 parameter. (Only some models) See below for contents of the message sent.
<b>SOS-SMS2</b>	45123456,+4566778899		This list of numbers (if defined) will receive a position report (like the answer to a "POS" command, only the first line will contain the word "PANIC") if the function button is activated for more than 2 seconds. The word "PANIC" can be changed with the SOS-TEXT2 parameter. (Only some models) See below for contents of the message sent.
<b>SOS-TEXT</b>	ALERT		The pre-text for SOS-SMS If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added.
<b>SOS-TEXT1</b>	ALERT		The pre-text for SOS-SMS1 If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added.
<b>SOS-TEXT2</b>	ALERT		The pre-text for SOS-SMS2 If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added
<b>AUTOANSWER</b>	+451123344,+452233432		Specify a list of phone numbers that will be answered automatically by the unit. If the unit should answer an incoming voice call, and the phone number is NOT in this list, the call will only be accepted if the function switch is pressed. This parameter only gives meaning if "VOICE" is set to 1, 2 or 3. If the parameter is set to "ALL", all callers will be answered automatically.



<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b><i>SMSENDER</i></b>	+451123344,+452233432		A list of phone numbers that are allowed to send SMS messages to the unit (see the section "System Commands"). The numbers MUST include the country code also. (The parameter "FLEXSERVER-SMS" is also checked). If set to "ALL", all senders will be accepted.
<b><i>POWEROFF-VOICE</i></b>	[0..66],[0..100] <b><u>1,20</u></b>		File and volume of the file to be played ("Powering unit off")
<b><i>DEADMAN</i></b>	[0/1]		0: Function disabled 1 Function active. The red function button must be activated in a period given by DEADMAN-TIME or a deadman alarm will be sent (see below)
<b><i>DEADMAN-TIME</i></b>	[30..99999] <b><u>900</u></b>		The interval (in seconds) the red function button must be activated or a deadman alarm is sent
<b><i>DEADMAN-WARNING</i></b>	[5..999] <b><u>15</u></b>		Is the delay time in seconds where beeps (DEADMAN-VOICE1) are played before activating the alarm.
<b><i>DEADMAN-VOICE1</i></b>	[0..66],[0..100] <b><u>2,20</u></b>		File and volume of the file to be played ("beep")
<b><i>DEADMAN-VOICE2</i></b>	[0..66],[0..100] <b><u>3,20</u></b>		File and volume of the file to be played ("Deadman alarm has been sent")
<b><i>DEADMAN-SMS</i></b>	+451123344,+452233432		One or more numbers that will receive the deadman alarm as SMS. Pre-text is "DEADMAN period exceeded" this can be changed with DEADMAN-TEXT The rest of the text is the same as for SOS-SMS
<b><i>DEADMAN-TEXT</i></b>	DEADMAN		The pre-text that will be added to DEADMAN-SMS. If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added
<b><i>MOVEMENT</i></b>	[0/1/2]		0: Function disabled 1: TILT mode (see below) 2: NOMOVE mode (see below)
<b><i>MOVEMENT-TIME</i></b>	[30..99999] <b><u>60</u></b>		The delay in seconds before being in alarm mode.
<b><i>MOVEMENT-VOICE1</i></b>	[0..66],[0..100] <b><u>4,20</u></b>		File and volume of the file to be played ("Movement alarm will be sent in 10 seconds")
<b><i>MOVEMENT-VOICE2</i></b>	[0..66],[0..100] <b><u>5,20</u></b>		File and volume of the file to be played ("Movement alarm has been sent")
<b><i>MOVEMENT-VOICE3</i></b>	[0..66],[0..100] <b><u>6,20</u></b>		File and volume of the file to be played ("Movement alarm reset")
<b><i>MOVEMENT-SMS</i></b>	+451123344,+452233432		One or more numbers that will receive the movement alarm as SMS Pre-text is "MOVEMENT event" this can be changed with MOVEMENT-TEXT The rest of the text is the same as for SOS-SMS
<b><i>MOVEMENT-VOICECALL</i></b>	+4512345678		When a movement (tilt or deadman) occurs, a voicecall will be established to the number in this parameter
<b><i>MOVEMENT-TEXT</i></b>	MOVEMENT		The pre-text that will be added to MOVEMENT-SMS. If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added



<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>LOWBAT-VOICE</b>	[0..66],[0..100] <b>7,20</b>		File and volume of the file to be played ("Battery level is low")
<b>CHARGING-VOICE</b>	[0..66],[0..100] <b>8,20</b>		File and volume of the file to be played ("Currently charging")
<b>CHARGECOMPLETE-VOICE</b>	[0..66],[0..100] <b>9,20</b>		File and volume of the file to be played ("Charging complete")
<b>GEOFENCE</b>	<b>[0/1/2]</b>		0: Function disabled 1: Manual mode, geofence enabled 2: Auto mode, will follow input 1 of the option 2 board (Only some models) See below the table for a description.
<b>GEOFENCE-CFG</b>	<b>[0000]</b>		Configuration of the various Geofence features (G sensor enable etc)
<b>GEOFENCE-CENTER</b>			Center in Lat/Lon of the geofence center ("N55.38.1234,E009.12.2234")
<b>GEOFENCE-RADIUS</b>	[100..99999] <b>1000</b>		Radius of the geofence in meters
<b>GEOFENCE-GIVEUP</b>	[0..99999] <b>60</b>		Number fo seconds to wait for a GPS fix
<b>GEOFENCE-TIME</b>	[0..99999] <b>60</b>		Number of seconds between Geofence checks (if GPS is not already powered on, it will be switched on for mininum GEOFENCE-GIVEUP seconds)
<b>GEOFENCE-SMS</b>	+451123344,+452233432		List of numbers to send SMS to. Pre-text is either "Outside of geofence" or "Inside geofence". This can be changed with the parameters GEOFENCE-OUT-TEXT and GEOFENCE-IN-TEXT.
<b>GEOFENCE-OUT-TEXT</b>	OUTSIDE-ZONE		The pre-text that will be added to GEOFENCE-SMS. The rest of the SMS is the same as POS. If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added
<b>GEOFENCE-IN-TEXT</b>	INSIDE-ZONE		The pre-text that will be added to GEOFENCE-SMS. The rest of the SMS is the same as POS. If the text is followed by a "/" only the text in the parameter is sent, otherwise position etc is added
<b>GEOFENCE-VOICE1</b>	[0..66],[0..100] <b>10,20</b>		File and volume of the file to be played ("Geofence activated")
<b>GEOFENCE-VOICE2</b>	[0..66],[0..100] <b>11,20</b>		File and volume of the file to be played ("Geofence deactivated")
<b>GEOFENCE-VOICE3</b>	[0..66],[0..100] <b>12,20</b>		File and volume of the file to be played ("Outside geofence zone")
<b>GEOFENCE-VOICE4</b>	[0..66],[0..100] <b>13,20</b>		File and volume of the file to be played ("Inside geofence zone")
<b>DOUT1</b>			If defined, the value it is set to, plus ":ON"/":OFF" will activate/deactivate the digital output 1 on an OPT2 board
<b>DOUT2</b>			If defined, the value it is set to, plus ":ON"/":OFF" will activate/deactivate the digital output 2 on an OPT2 board
<b>DIN1-SMS</b>			Number to send message to when DIN1 changes state
<b>DIN2-SMS</b>			Number to send message to when DIN2 changes state
<b>DIN1-HIGH-TEXT</b>	DIN1 is high		Text to send when DIN1 goes high on the OPT2 board

<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>DIN1-LOW-TEXT</b>	DIN1 is low		Text to send when DIN1 goes low on the OPT2 board
<b>DIN2-HIGH-TEXT</b>	DIN2 is high		Text to send when DIN2 goes high on the OPT2 board
<b>DIN2-LOW-TEXT</b>	DIN2 is low		Text to send when DIN2 goes low on the OPT2 board
<b>IDLE-TIME1</b>	[0..99999] <b>60</b>		Number of seconds the reported GPS speed must be above the value in "IDLE-SPEED" for bit 15 in the unitstate to be '1'
<b>IDLE-TIME2</b>	[0..99999] <b>60</b>		Number of seconds the reported GPS speed must be below the value in "IDLE-SPEED" for bit 15 in the unitstate to be '0'
<b>IDLE-SPEED</b>	[0..99999] <b>0</b>		Speed in km/hour for the "moving bit" to be set in unitstate (bit 15). If set to "0", no detection is active (bit 15 is always '0')
<b>CHARGER-SMS</b>	+451123344,+452233432		List of numbers an SMS is sent to whenever the charger is connected/disconnected (new state must be stable for at least 30 seconds before message is sent)
<b>BATT-LEVEL</b>	[0..9999] <b>0</b>		If the battery voltage gets below this number of millivolts (for more than 30 seconds) a SMS (if "BATT-LEVEL" is set to "3700" the message will be: "Battery voltage is 3700 mV") is sent to the numbers in "BATT-SMS"
<b>BATT-SMS</b>	+451123344,+452233432		List of numbers to send an SMS to if battery voltage goes below "BATT-LEVEL"
<b>SMSLOWBAT</b>	+451123344,+452233432		List of numbers to send "Low battery" message to
<b>MOVE-WAKEUP</b>	[ <b>0</b> /1]		If set to '1' and the unit is moved more than "MOVE-SENSITIVITY", the unit will poweron for "MOVE-TIMEOUT" number of seconds before powering off again. If unit is moved with the "MOVE-TIMEOUT" period, the time is "restarted" When using this function, the NOMOVE and TILT functions can not be active (and vice-versa)
<b>MOVE-TIMEOUT</b>	[0..99999] <b>300</b>		Number of seconds the unit will be active if powered on because of "MOVE-WAKEUP" feature
<b>MOVE-SENSITIVITY</b>	[100..6000] <b>1000</b>		Number of mG of movement (minimum 100) before the unit is turned on (if "MOVE-WAKEUP" is set to '1')
<b>SOS-NOWAIT</b>	[ <b>0</b> /1]		If set to '1' and the red button is pressed, the UNITSTAT (and fleetman) reports are send regardless if there is a GPS fix, and before a configured voicecall/sms is sent
<b>REPORT-STARTUP</b>	[ <b>0</b> /1]		If set to '1', a unitstat is sent when the device is powered on. Ex. to be used with CYCLIC
<b>CONF-SERIAL</b>			This is a 5 digit number, whenever a SAVEPARAM is executed, this number is incremented with 1 by the unit
<b>BUTTON-VOICE</b>	[0..66],[0..100] <b>14,20</b>		Voice message to play when one of the buttons are pressed

<i>Parameter</i>	<i>Value</i>	<i>*</i>	<i>Description</i>
<b>LPOS-PREFIX</b>			The prefix to put before the response (always prefixed with "http://") back to the LPOS command (typically something like "www.something.com/position.php?")
<b>OPT-CFG</b>	[00000000..FFFFFFFF] <b>00000000</b>		This is a hex number setting different options on the OPT2 board present in some Pro models bit 0: enables the OPT2 board bit 1: Input 2 will mimic the function button bit 2: Input 3 will mimic button 1 bit 3: Input 4 will mimic button 2 bit 6: Output 1 will be grounded when a phone call is in progress bit 7: The powersupply (which we charge our battery from) is shut off when charging is complete, and on when the battery level goes below 3.9V
<b>BEACON</b>	[0/1/2]		If set to '1' beacon will transmit on 433.92 MHz, if set to '2' beacon transmits on 868.2 Mhz. The frequency is hardware dependent 4X1X are 433.92 MHz models and 4X2X are 868.2 Mhz. It sends data at 1200 baud, FSK modulation (sends 20 bytes, first 10 bytes is serial number followed by 10 bytes with a value of 0) The transmission is started/stopped using the command BEACON
<b>REPORT-INTERVAL-SMS-VOICE</b>	[0..99999] <b>1800</b>		Number of seconds between SMS reports when voicecall is in progress
<b>STEALTH</b>	[0/1]		When set to '1' and the "red function button" is pressed, the unit will keep calling the number in SOSPHONE (all LED's are off)
<b>SUPERCAP</b>	[0/1]		When set to '1', the low battery warning is lowered by 0.15V. Only to be used if the supercap hardware is present. This is only possible in the Personal model.
<b>AUTOSTART-CHARGE</b>	[0/1/2/3/4]		Specify what the unit should do if charger is connected: 0: Unit should stay off (if off) 1: Unit should turn on (if off) 2: Unit should switch off (if on) 3: Unit switches on when charger is disconnected, and off when charger connected 4: Unit switches off when charger is disconnected, and on when charger connected
<b>DTMF-ID</b>	[NODEID/0-9/A-D/*,#]		When parameter DTMF-ID is set to "NODEID", the units serialnumber/nodeid will be sent as a series of DTMF touch tones whenever the unit establishes (initiates) a voicecall, if set to something else (f.ex "1234") this is sent as a DTMF string.

[www.flextrack.dk](http://www.flextrack.dk)

Please note that the “APN”, “USERNAME”, “PASSWORD” and “DNS” are specific for the individual GSM provider.

Parameters marked with a \* (star) will only be effective when the unit is reset (this requires the current set of parameters to be saved with the “SAVEPARAM”)

Message sent if **SOS-SMS**, **SOS-SMS1** or **SOS-SMS2** is set, and the function button is pressed:  
The Lat/Lon information, is from the last time the GPS receiver got a position fix:

```
PANIC
Time=05-10-24 12:22:32
Lat=N55.33.22
Lon=E009.38.06
Speed=120Km/H
Direction=112Deg
Sats=8
```

if GPS receiver did not get a valid position fix:

```
PANIC
No fix, last fix:
Time=05-10-24 12:22:32
Lat=N55.33.22
Lon=E009.38.06
Speed=120Km/H
Direction=112Deg
Sats=8
```

The pre-text PANIC can be changed with the SOS-TEXT, SOS-TEXT1 & SOS-TEXT2 parameters.

If the text ends with a slash "/" only the SOS-TEXT(x) will be sent

### **TILT:**

If MOVEMENT is set to 1 tilt mode is enabled

When the Lommy is tilted more than 70 degrees from vertical, the timer for MOVEMENT-TIME is started. When the timer has exceeded MOVEMENT-VOICE1 is played and after 10 seconds the alarm is sent (MOVEMENT-SMS and/or bit 11 in the unit state) and MOVEMENT-VOICE2 is played. If the Lommy is placed vertical again before the timer exceeds the voice file MOVEMENT-VOICE3 is played and the timer for MOVEMENT-TIME is reset.

### **NOMOVE:**

If MOVEMENT is set to 2 nomove mode is enabled

When the Lommy hasn't moved in the period set with MOVEMENT-TIME the voice file MOVEMENT-VOICE1 is played. After 10 seconds MOVEMENT-VOICE2 is played and the alarm is sent (MOVEMENT-SMS and/or bit 11 in the unit state). If the Lommy moving again before the timer exceeds the voice file MOVEMENT-VOICE3 is played and the timer for MOVEMENT-TIME is reset.

**DEADMAN switch:**

If DEADMAN is set to 1 the deadman switch function is enabled.

When the DEADMAN-TIME period has expired DEADMAN-VOICE1 will be played and the DEADMAN-WARNING timer starts. In this period the alarm can be reset by pressing the red function button. If not reset DEADMAN-VOICE2 will be played and the alarm will send (DEADMAN-SMS and/or bit 12 in the unit state is raised).

If SOSPHONE and/or SOS-SMS is defined the alarm can only be reset in the DEADMAN-WARNING period

If SOSPHONE and SOS-SMS is undefined and bit 12 in the STATEMASK is 0, the period can be reset in both the DEADMAN-TIME and DEADMAN-WARNING period.

**GEOFENCE, manual mode (GEOFENCE = 1)**

In Manual mode, the center (latitude/longitude) of the Geofence is set either by the GEOFENCE-CENTER parameter, or by sending the GEOFENCE-SET command to the unit. If the center is set using the GEOFENCE-SET command, the Geofence function will switch the GPS receiver on, and try to get a valid fix within the number of seconds set by GEOFENCE-GIVEUP parameter. The parameter MAX-HDOP sets the maximum HDOP (Horizontal Dilution Of Precision) that is allowed before the GPS position is taken as "valid" (high enough precision).

If the position becomes valid, it will be stored in the GEOFENCE-CENTER non-volatile parameter in the device, and it will be used as the center until a new position is set either using the GEOFENCE-SET command or the GEOFENCE-CENTER parameter is changed.

If the position does not become valid with the number of seconds set by parameter GEOFENCE-GIVEUP, the Geofence function will not do any further checking of the position (effectively disabled)

If a valid fix was obtained, and the center therefore was set, the Geofence function will check the current position each GEOFENCE-TIME number of seconds. When the check is to be performed, the function will wait a maximum of GEOFENCE-GIVEUP number of seconds for a valid fix (that obeys the MAX-HDOP value). If no valid fix is obtained within the GEOFENCE-TIME period, the check will be aborted, and the function will again wait GEOFENCE-TIME number of seconds before making another test if the position is within the specified geofence (center/radius).

If either the GEOFENCE-SET command is received or the GEOFENCE-CENTER parameter is changed, a new new center position will be used in subsequent checks

When checking if the current position is within the specified circle, the following steps are performed (same procedure as in Auto mode):

- 1) If the position is within the specified radius, the position is regarded as "within limits", and the position is reported as "inside the geofence"
- 2) If the position is outside the specified radius, but inside the calculated "outer radius", the GPS will continue to "run", and the position is checked 10 times (12 seconds between each check) and if the position does not come inside the specified radius any of the 10 times it is checked, the position

is "outside limits", and a report is generated. "Outer radius" is calculated as: if GEOFENCE-RADIUS is less than 1000 meters, then "outer radius" is 2 x GEOFENCE-RADIUS, else it's GEOFENCE-RADIUS x 1,20

3) If the position is outside the calculated "outer radius", the GPS will continue to "run", and the position is checked 2 times (12 seconds between each check) and if the position does not come inside the specified radius any of the 2 times it is checked, the position is "outside limits", and a report is generated.

After the device have determined that it's "outside" and a report is generated, the current position needs to be 10 % closer to the center than the inner circle (if radius is set to 1000 meter, we have to be within 900 meters of the center in order to re-arm the geofence function again)

When the position is outside the geofence zone bit 13 in the unit state will be raised  
Bit 14 is raised when the geofence checking is active (if a center has been acquired or set).

#### **GEOFENCE, auto mode (GEOFENCE = 2)**

In Auto mode, the Input 1 input on the OPT2 board is used as the "activation" signal for the Geofence function. When the input 1 signal is at a high level (typically signalling that a car is driving) no check is performed.

When the input 1 signal goes to a low level (the car is stopped, ignition is removed) the unit will try for GEOFENCE-GIVEUP number of seconds to get a valid fix. The parameter MAX-HDOP sets the maximum HDOP (Horizontal Dilution Of Precision) that is allowed before the GPS position is taken as "valid" (high enough precision).

When the position becomes valid, it will be stored non-volatile internally in the device, and it will be used as the center.

If the position does not become valid with the number of seconds set by parameter GEOFENCE-GIVEUP, the Geofence function will not do any checking of the position (effectively disabled)

If a valid fix was obtained, and the center therefore was set, the Geofence function will check the current position every GEOFENCE-TIME number of seconds for the first 24 hours. After the first 24 hours, the check will be performed every 15 minutes for power saving.

When the check is to be performed, the function will wait a maximum of GEOFENCE-GIVEUP number of seconds for a valid fix (that obeys the MAX-HDOP value).

If no valid fix is obtained within the GEOFENCE-TIME period, the check will be aborted, and the function will again wait GEOFENCE-TIME number of seconds (or 15 minutes if within the first 24 hours of activation) before making another test if the position is within the specified geofence (center/radius).

If bit 0 in GEOFENCE-CFG is set to '1', then the function will make a check for the position if the G sensor signals movement (more than +/- 200 mG)

If either the GEOFENCE-SET command is received or the GEOFENCE-CENTER parameter is changed, a new new center position will be used in subsequent checks (the center position will be

overwritten on the next high to low transition of the Ignition signal)

When checking if the current position is within the specified circle, the following steps are performed (same procedure as in Manual mode):

- 1) If the position is within the specified radius, the position is regarded as "within limits", and the position is reported as "inside the geofence"
- 2) If the position is outside the specified radius, but inside the calculated "outer radius", the GPS will continue to "run", and the position is checked 10 times (12 seconds between each check) and if the position does not come inside the specified radius any of the 10 times it is checked, the position is "outside limits", and a report is generated. "Outer radius" is calculated as: if GEOFENCE-RADIUS is less than 1000 meters, then "outer radius" is 2 x GEOFENCE-RADIUS, else it's GEOFENCE-RADIUS x 1,20
- 3) If the position is outside the calculated "outer radius", the GPS will continue to "run", and the position is checked 2 times (12 seconds between each check) and if the position does not come inside the specified radius any of the 2 times it is checked, the position is "outside limits", and a report is generated.

After the device have determined that it's "outside" and a report is generated, the current position needs to be 10 % closer to the center than the inner circle (if radius is set to 1000 meter, we have to be within 900 meters of the center in order to re-arm the geofence function again)

When the position is outside the geofence zone bit 13 in the unit state will be raised  
Bit 14 is raised when the geofence checking is active (if a center has been acquired or set).

### **STEALTH:**

If STEALTH is set to 1 stealth mode is enabled.

If the "red button is pressed", the unit will keep calling the number in SOSPHONE

If line goes down, the number will be called again, until STEALTH is set to '0' or the command STEALTH:OFF is received.

The stealth mode can also be activated anytime by sending STEALTH:ON to the unit.

When stealth mode is active (by pressing the red button or command stealth:on) all the LED's but the green, are off.

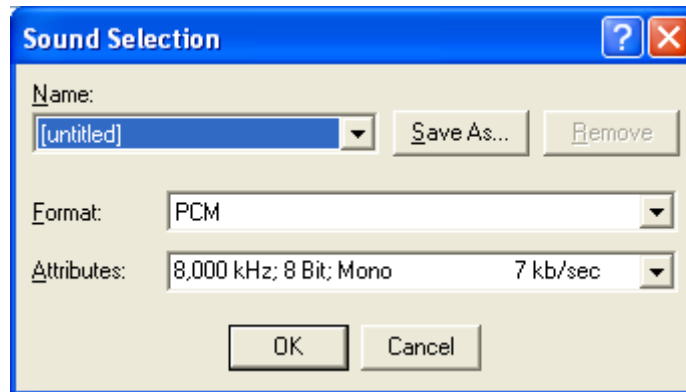
Bit 20 in unitstate in UNITSTAT indicates if Stealth mode is active

## Voice files

The voice files can be recorded with ex. the standard "Sound Recorder" found in Windows (Accessories -> Entertainment)



When saving the file select "File -> Save As..." select the button Format "Change..." and choose the format 8kHz; 8 Bit; Mono.



This is the only correct format for the Lommy

The files can be downloaded to the Lommy using Pconfig "File -> Upload voicemessages.."

It takes a cfg-file containing the index number and path for the wav-file.





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Here is the content of the standard file:

```
; -----  
; Voice messages configuration for Phoenix device  
; -----  
  
1,C:\PConfig\voicefiles\poweroff.wav  
2,C:\PConfig\voicefiles\beep.wav  
3,C:\PConfig\voicefiles\deadman-alarm-sent.wav  
4,C:\PConfig\voicefiles\movement-alarm-warning.wav  
5,C:\PConfig\voicefiles\movement-alarm-sent.wav  
6,C:\PConfig\voicefiles\movement-alarm-reset.wav  
7,C:\PConfig\voicefiles\battery-low.wav  
8,C:\PConfig\voicefiles\currently-charging.wav  
9,C:\PConfig\voicefiles\charging-complete.wav  
10,C:\PConfig\voicefiles\geofence-activated.wav  
11,C:\PConfig\voicefiles\geofence-deactivated.wav  
12,C:\PConfig\voicefiles\outside-geofence-zone.wav  
13,C:\PConfig\voicefiles\inside-geofence-zone.wav
```

The index number is the first value in the VOICE parameters. The second value is the level 0-100 where 0 is max and 100 is min.

## Status messages

The UNITSTAT message consists of a number of fields, each separated by a comma. This message is sent from the unit either at a fixed interval (see parameter “*REPORT-INTERVAL*”), when there is a state-change in the unit (the state-change is compared against a mask, see parameter “*STATEMASK*”), or when an operator initiated voice call is ended (in that case, bit 4 in “Unit State” will be set).

The message contains the following fields:

<i>Field</i>	<i>Example</i>	<i>Description</i>
<b>UNITSTAT</b>	UNITSTAT	Identifies the message
<b>Date [YYYYMMDD]</b>	20050205	The date
<b>Time [HHMMSS]</b>	181923	The time in UTC
<b>NodeID</b>	700004634	The Flextrack unit’s nodeid
<b>Latitude [DD.MM.DECM]</b>	N55.46.0812	The latitude in degrees, minutes and decimal minutes (a leading “N” or “S” identifies the position as north or south of the equator)
<b>Longitude [DDD.MM.DECM]</b>	E9.21.1665	The longitude in degrees, minutes and decimal minutes (a leading “E” or “W” identifies the position as east or west of Greenwich)
<b>Speed</b>	122	Speed over ground in kilometers per hour
<b>Direction</b>	198	The compass heading in degrees
<b>SV</b>	6	Number of GPS satellites used for position fix
<b>Voltage</b>	3934	Current voltage of the LiIon battery in mVolts
<b>Signal strength</b>	-81	Current signal strength of the GSM basestation in dBm
<b>Unit State</b>	01A8	State of inputs and various states, coded as 8 ASCII Hex digits (32 bits). A detailed description of the field can be found below.
<b>Current network</b>	23802	Country code (3 digits) and GSM provider code (2 digits)
<b>Height</b>	213	Meters above sea level (msl)
<b>HDOP</b>	332	The current HDOP value (multiplied with 10, 213 equals 21.3)
<b>CellID</b>	12FE	The cell id of the current GSM basestation, 4 hex digits
<b>Elapsed time for GPS fix</b>	45	The elapsed time for getting a GPS fix after going to report
<b>Locacion Area Code (LAC)</b>	0055	The LAC from the GSM network

Example:

```
UNITSTAT,
20050205,181923,700004634,N55.46.0812,E009.21.1665,122,198,6,3934,-81,01A8,23802,213,55,
37FD,45,0055
```

## Unit State field

Contents of the “Unit State” field (same definition as for the STATEMASK parameter):

<i>Bit</i>	<i>Description</i>
22	DOUT2 state on a OPT2 board is active
21	DOUT1 state on a OPT2 board is active
20	STEALTH mode is active
19	Input port 4 is high (above 4V) (OPT2)
18	Input port 3 is high (above 4V) (OPT2)
17	Input port 2 is high (above 4V) (OPT2)
16	Input port 1 is high (above 4V) (OPT2)
15	Unit is in motion
14	Geofence active
13	Outside geofence zone
12	DEADMAN alarm active
11	MOVEMENT alarm active
10	Button 2 has been pressed (Only on some models)
9	Button 1 has been pressed (Only on some models)
8	Unable to get current GPS fix, so sending last good (if “LASTGOOD” is set to 1)
7	Voicecall is active
6	Leading edge detected on the Aux signal (only if “AUX-ENABLE” is set to 1)
5	Trailing edge detected on the Aux signal (only if “AUX-ENABLE” is set to 1)
4	Function button pressed (whenever this bit is set and the Function button is pressed, a UNITSTAT message is sent)
3	The state of the input signal (if “AUX-ENABLE” is set to 1)
2	Battery low voltage detected if ‘1’
1	Charging state
0	00: No charger connected 01: Charger connected (but not charging) 10: Charging in progress 11: Charging complete The state 01 will only be seen once, after that, the state will change between 10 and 11.

## **FlexCI communication protocol**

The FlexCI protocol is described at both “low-level” and “high-level”. The low-level description explains the basic mechanisms that must be followed in order to transfer data between a Flextrack unit and a Server (or more general, between two “nodes”). The high-level description details the steps needed to establish a connection to the Server, this step is mainly issuing a “LOGON” command to the Server.

To test the protocol when developing a backend, you can download a small "server" listening for incoming connections on port 30000.

You will find the program here <http://www.flextrack.dk/files/FlexCIServer.exe>

### ***Low-level***

FlexCI (Flextrack Communication Interface) is a TCP/IP based communication protocol, that handles the interface to and from the Flextrack units, typically from a PC based Server of some kind. The FlexCI protocol “rides” on normal TCP/IP sockets, which is supported on GPRS.

FlexCI is ASCII based, all data and commands is pure ASCII. This makes it easy to handle in various Web applications, and also for testing purposes, as all information is human readable. The FlexCI protocol uses a single socket connection for the communication between the Flextrack unit and the Server. All commands consist of a transaction number (TNO) and some data. The data is of no interest to the FlexCI protocol itself, only the TNO is important (the data is simply passed to the application layer).

Whenever a node wants to send something to the server, it starts by incrementing its current transaction number and then it sends the command. At the same time, it starts a timer. It will then “listen” for a message from the other node, with the same TNO as it used in the command it just sent. If the timer expires before a frame with the same TNO is received, it will report an error, and try to make a new connection to the server.

It is important to notice, that only ONE command can be “in the air” at one time between the Flextrack unit and the Server, it is NOT allowed to send another command before the previous is either acknowledged or an timeout has occurred!

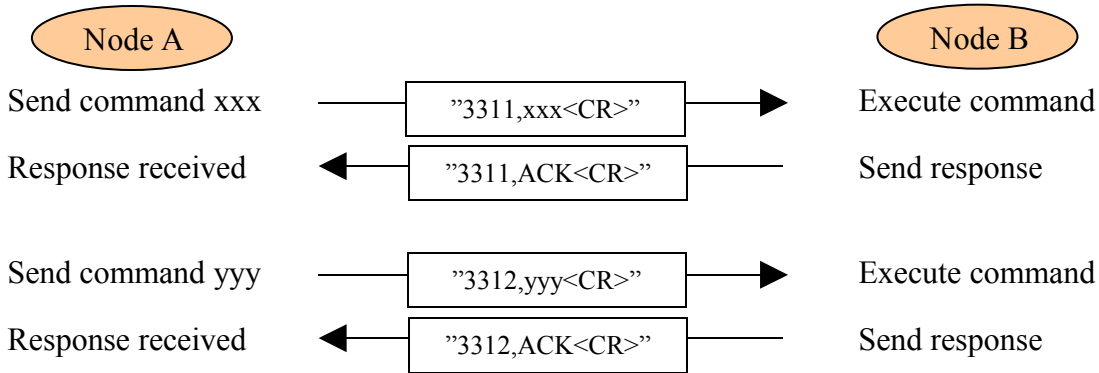
The FlexCI protocol does not distinguish between the Flextrack unit and Server, both are just considered “nodes”.

On some GSM networks it is necessary to send occasional “dummy communication” in order to keep the GPRS socket connection up and running. This communication simply consists of a <CR>. The <CR> character is sent after a number of seconds (for example 600 seconds) inactivity on the FlexCI communication channel (socket). When the Server receives an <CR> only, it should simply respond with a <CR> character.

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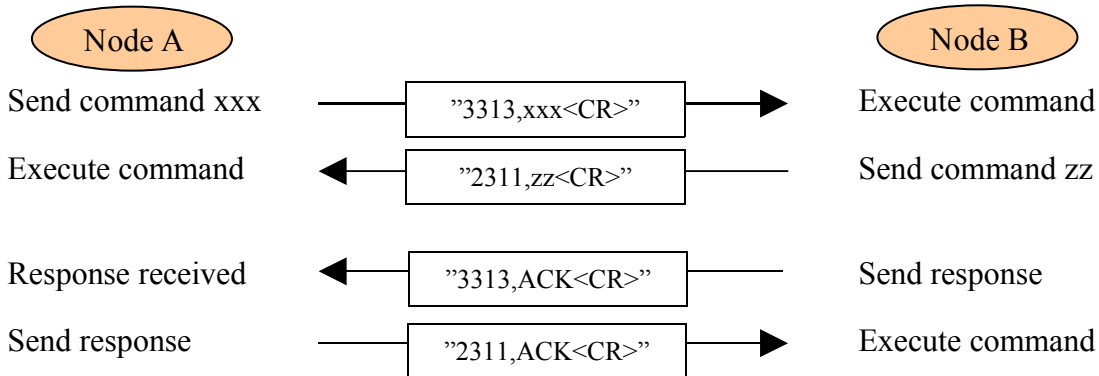
**Normal flow, no errors:**

Node A sends two commands to Node B.



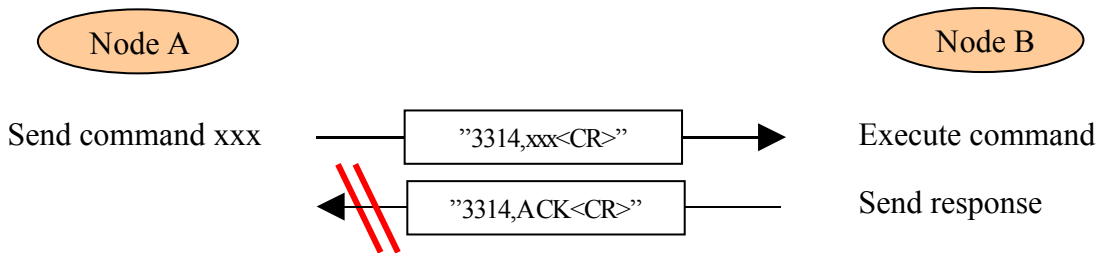
**Normal flow, crossing messages:**

Node A sends a command to Node B, and at the same time Node B send a command to Node A (effectively crossing each other before responses are received at each end)

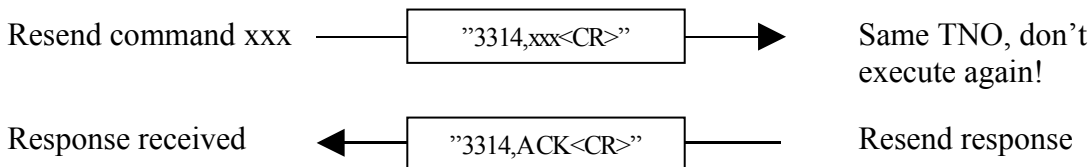


**Abnormal flow, no response received:**

Node A sends a command to Node B which sends a response that is NOT received at Node A. Node A resends the command to Node B (using the same TNO), and receives a response (it is also allowed to close and re-open the connection when the error occurs).

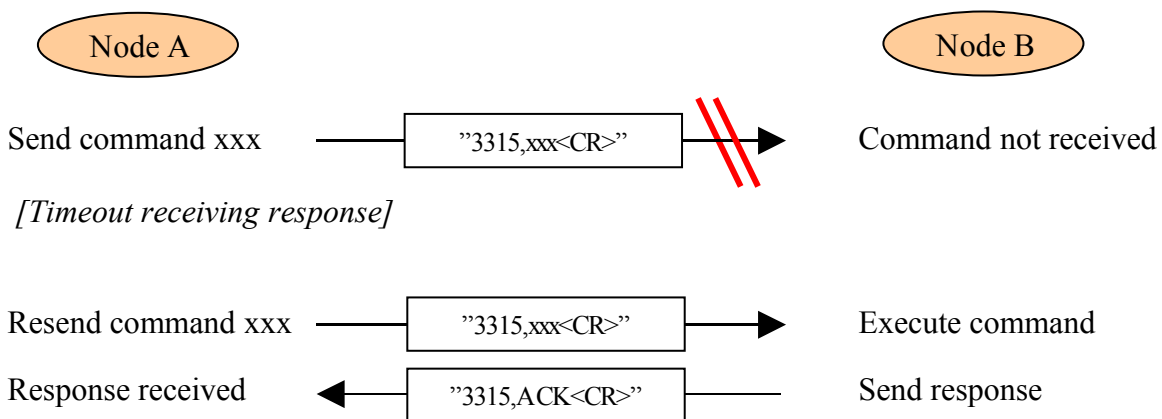


*[Timeout receiving response]*



**Abnormal flow, command not received:**

Node A sends a command to Node B, which does not receive the command. Node A gets a timeout receiving the response (which is never sent as Node A never received the command), and sends the command again (with the same TNO), this time it receives a response (it is also allowed to close and re-open the connection when the error occurs).



## High-level

In order to establish a valid connection where commands can float in both directions, the Flextrack unit must make an “LOGON” sequence with the Server. Basically this just means that the Flextrack unit sends a “LOGON,nnnnnnnnnn” where the “nnnnnnnnnn” is the units 10 digit Node ID (typically the serial number of the unit). When the Flextrack unit receives an “ACK” on this command, it is connected, and further communication can follow between the Flextrack unit and the Server.

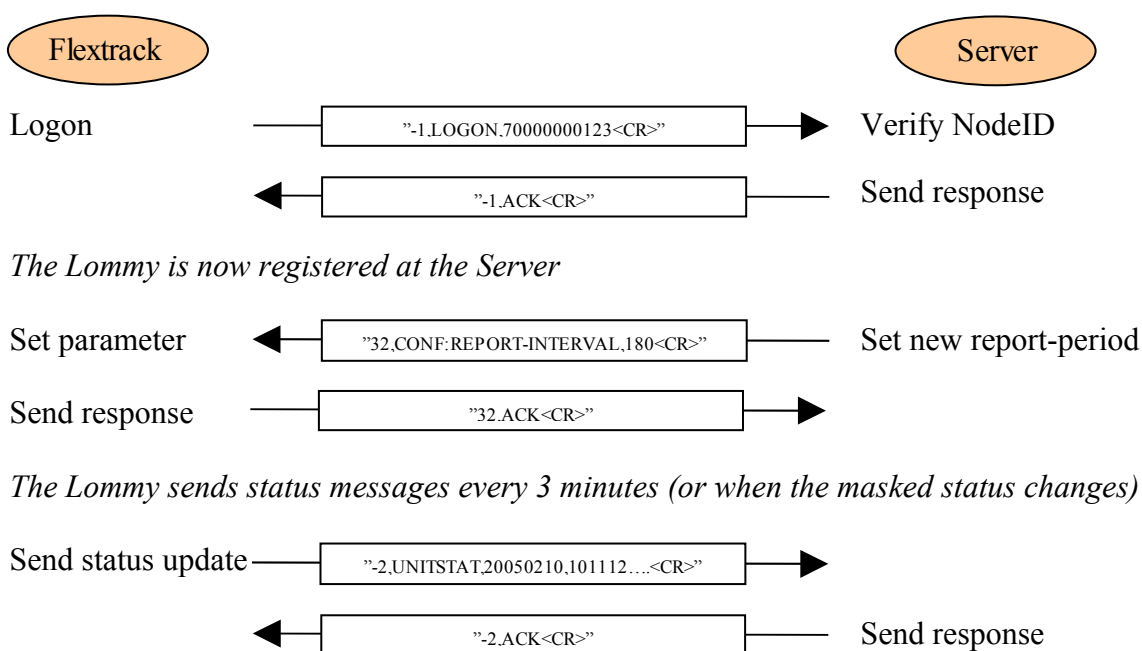
Whenever a Flextrack unit is started, it will try to establish a socket connection to the defined Server. The Flextrack unit has to establish the connection, as the unit often sits behind the GSM operators Firewall, and therefore it's not possible for the Server to establish the connection to the unit.

When the Flextrack unit has created the connection, it must send a “LOGON” command to the Server, in order to identify itself. The logon command contains the Flextrack unit's serial number. When the unit receives an acknowledge message from the Server, both ends are ready to communicate with each other.

If either the Server or the Flextrack unit discovers that the communication is lost (socket closes or timeout on send/receive) it will initiate a socket close. The Flextrack unit will then discover this situation, and re-establish the connection (and make a new “LOGON” attempt).

Whenever a Lommy® unit is switched off by the user (or a RESET command is received from the server, the unit will send a DISCONNECT message to the server. This tells the server that the unit is about to close the socket connection in a “controlled” manner.

Below you will see a typical scenario between a Lommy® unit and a Server, beginning with the Lommy® being switched on.



## HTTP GET Request

The unit can send position reports to a server by using a standard HTTP GET request. The parameter “FLEETMAN” needs just to be set to a correct HTTP URL, and the unit will then automatically send data to the specified server. The layout of the HTTP GET request is as follows:

<i>Field</i>	<i>Example</i>	<i>Description</i>
<b>Server adress</b>	www.server.com/httpreceiver.dll	Constant; identifies the message. This is the content of the “FLEETMAN” parameter.
<b>Node-ID</b>	&nodeid= 7000000637	Nodeid of the unit sending the data
<b>Date/Time</b> [YYYYMMDD] [HHMMSS]	&time=20050314122134	The UTC date and time of the message
<b>Latitude [DD.MM.DECM]</b>	&latitude=N55.46.5003	The latitude in degrees, minutes and decimal minutes. A leading “N” or “S” identifies the position as north or south of the equator.
<b>Longitude</b> [DDD.MM.DECM]	&longitude=E9.38.1330	The longitude in degrees, minutes and decimal minutes. A leading “E” or “W” identifies the position as east or west of Greenwich.
<b>Speed</b>	&speed=89	Speed over ground in kilometers per hour
<b>Direction</b>	&direction=211	The compass heading in degrees
<b>SV</b>	&sv=3	Number of GPS satellites used for this position fix
<b>Voltage</b>	&batt=3788	Current voltage of the Li-Ion battery in mVolts
<b>Charging state</b>	&chg=2	Charging state 0: No charger connected 1: Charger connected (but not charging) 2: Charging in progress 3: Charging complete The state 1 will only be seen once, after that the state will change between 2 and 3.
<b>Emergency call</b>	&ecall=1	0 = no call in progress, 1 = emergency call has been issued  1 = Emergency call was initiated
<b>Unit state</b>	&state=2	Value of the unit state field



<i>Field</i>	<i>Example</i>	<i>Description</i>
<b>GPS quality</b>	&hdop=16	The hdop value is the actual hdop multiplied by 10, so "&hdop=16" is a hdop value of 1.6 The bigger the hdop value is, the less the precision of the LAT/LON values is. Basic accuracy of the GPS receiver used is 5 meters. Therefore an hdop value of 16 means a real accuracy for a given position report of $5m * 1.6 = 8$ meters
<b>I/O state</b>	&aux=1	State of the digital input Please remember that the AUX input only works if parameter "AUX-ENABLE" is set to '1'. And please also note that the blue LED follows the I/O pin (and vice versa). That means, that if the I/O port is enabled with "AUX-ENABLE" set to 1, the blue LED will NOT show the GPS status etc, but only follow the state of the input.
<b>Leading edge</b>	&le=1	Set to 1 if there has been a leading edge on the AUX input. Please remember that the AUX input only works if parameter "AUX-ENABLE" is set to '1'. And please also note that the blue LED follows the I/O pin (and vice versa). That means, that if the I/O port is enabled with "AUX-ENABLE" set to 1, the blue LED will NOT show the GPS status etc, but only follow the state of the input.
<b>Trailing edge</b>	&te=1	Set to 1 if there has been a trailing edge on the AUX input. Please remember that the AUX input only works if parameter "AUX-ENABLE" is set to '1'. And please also note that the blue LED follows the I/O pin (and vice versa). That means, that if the I/O port is enabled with "AUX-ENABLE" set to 1, the blue LED will NOT show the GPS status etc, but only follow the state of the input.
<b>CellID</b>	&cellid=12FE	The cell id of the current GSM base station, 4 hex digits
<b>Location Area Code (LAC)</b>	&lac=0055	The LAC from the GSM network

<i>Field</i>	<i>Example</i>	<i>Description</i>
<b>RSSI</b>	&rssi=-87	Radio Signal Strength Indication of the GSM signal
<b>Provider (MCC+MNC)</b>	&prov=23802	Mobile Country Code & Mobile Network Code of the GSM network

**Wiring the option 2 (OPT2) board**

Pin	Wire color	Connection
1	Pink	Analog Input port 4 (up to 60 VDC)
2	Yellow	Digital Output port 2 (Connects to ground when active) max. 500mA
3	Green	Analog Input port 3 (up to 60 VDC)
4		N/A
5	Purple	Dallas 1-Wire Bus
6	White	Supply +10-60VDC
7	Black	- Ground
8	Brown	Ignition / Analog Input port 1 (up to +60VDC)
9	Grey	Analog Input port 2 (up to 60 VDC)
10	Blue	Digital Output port 1 (Connects to ground when active) max. 500mA

The standard cable is assembled with wires for pin 6-10

**Technical specifications**

<b>Operation</b>	
Battery (at 20 °C)	Personal: 2000 mA/H LiIon battery, giving approx 30 hours operation with position reports every 3 minutes (longer duration with longer times between position reports) Pro: 1000 mA/H LiIon battery, giving approx 20 hours operation with position reports every 3 minutes (longer duration with longer times between position reports)
Buttons	<ul style="list-style-type: none"> <li>Function/On switch (big button on front), normally answers/initiates a voice call (Personal only) (also switches the unit on and off)</li> </ul>
Indicators	<ul style="list-style-type: none"> <li>Red indicator: Charge activity</li> <li>Green indicator: GSM activity</li> <li>Yellow indicator: Connected to server / power off indicator</li> <li>Blue indicator: GPS status</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>Charge connector</li> <li>Mini-USB for charging and configuration</li> </ul>
Audio	Built-in loudspeaker and microphone (Personal)
<b>GSM/GPRS</b>	
Band	Tri band (900/1800/1900 Mhz) or (850/1800/1900 MHz)
Transmit power	Class 4 (2W) at EGSM 900 Class 1 (1W) at GSM 1800 <small>Class 4 (2 W) for EGSM850</small> Class 4 (2 W) for EGSM900 Class 1 (1 W) for GSM1800 Class 1 (1 W) for GSM1900
GPRS	Mobile station class B Class 10, PBCCH support.
Antenna	Built-in tri band antenna
<b>GPS</b>	
Receiver	16 Channel parallel Very High Sensitivity receiver
Sensitivity	Tracking: -158 dBm / -188 dBW
Antenna	High efficiency Helix antenna
<b>Environmental</b>	
Temperature range operating	-20 to +45 °C (Charging of unit is to take place between 0 and +45 °C)
Material	1.5mm ABS Plastic
Dimensions	Personal 74 x 61 x 23 mm (H x W x D) Pro 76/90 x 40 x 20 mm (L x W x D)
Weight	Personal 99 g