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AsteRx2e
Command Line Interface Reference Guide

Applicable to version 3.4.0 of the GNSS Firmware

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List of Acronyms

Abbreviation	Description
AGC	Automatic Gain Control
ARP	Antenna Reference Point
ASCII	American Standard Code for Information Interchange
ASN.1	Abstract Syntax Notation One
CMR	Compact Measurement Record
DGPS	Differential GPS
DLL	Dynamically Linked Library
EGNOS	European Geostationary Navigation Overlay System
ENU	east-north-up
FTP	File Transfer Protocol
GLONASS	Global Orbiting Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IERS	International Earth Rotation Service
IGS	International GPS Service
IMU	Inertial Measurement Unit
INS	Inertial Navigation System
ITRF	International Terrestrial Reference Frame
L1	L1 carrier
L2	L2 carrier
L2C	L2C code
LED	light emitting diode
MIB	Management Information Base
NATO	North Atlantic Treaty Organisation
NAVSTAR	Navigation Satellite Timing And Ranging
NMEA	National Marine Electronics Association
P	P(Y) code
PLL	Phase Locked Loop
PPP	Precise Point Positioning

PRN	Pseudo Random Noise
PVT	Position, Velocity and Time
QZSS	Quasi-Zenith Satellite System
RAIM	Receiver Autonomous Integrity Monitoring
RINEX	Receiver Independent Exchange Format
RTCA	Radio Technical Commission for Aeronautics
RTCM	Radio Technical Commission for Maritime Services
RTK	Real-Time Kinematic
SBAS	Space-Based Augmentation System
SBF	Septentrio Binary Format
USB	Universal Serial Bus
UTC	Coordinated Universal Time
WAAS	Wide Area Augmentation System
WGS84	World Geodetic System 1984
XERL	External Reliability Levels

1 Introduction

1.1 Scope

This document describes the ASCII command-line interface supported by your receiver. The Command and Log Reference Card provides a synopsis of all commands.

1.2 Typographical Conventions

abc	Commands to be entered by the user;
`abc`	Replies from the receiver;
abc	Command argument name.

2 Outline

The receiver outputs a prompt when it is ready to accept a user command. The prompt is of the form:

```
CD>
```

where `CD` is the connection descriptor of the current connection (e.g. `COMx` or `USBx`). For instance, if a user is connected to `COM1`, the prompt will be:

```
COM1>
```

Most commands fall into one of the following categories:

`set`-commands to change one or more configuration parameters;
`get`-commands to get the current value of one or more configuration parameters;
`exe`-commands to initiate some action;
`lst`-commands to retrieve the contents of internal files or list the commands.

Each **`set`**-command has its **`get`**-counterpart, but the opposite is not true. For instance, the **`setNMEAOutput`** command has a corresponding **`getNMEAOutput`**, but **`getReceiverCapabilities`** has no **`set`**-counterpart. Each **`exe`**-command also has its **`get`**-counterpart which can be used to retrieve the parameters of the last invocation of the command.

The prompt indicates the termination of the processing of a given command. When sending multiple commands to the receiver, it is necessary to wait for the prompt between each command.

2.1 Command Line Syntax

Each ASCII command line consists of a command name optionally followed by a list of arguments and terminated by <CR>, <LF> or <CR><LF> character(s) usually corresponding to pressing the "Enter" key on the keyboard.

To minimize typing effort when sending commands by hand, the command name can be replaced by its 3- or 4-character mnemonic. For instance, **`grc`** can be used instead of **`getReceiverCapabilities`**.

The receiver is case insensitive when interpreting a command line.

The maximum length of any ASCII command line is 2000 characters.

For commands requiring arguments, the comma "," must be used to separate the arguments from each other and from the command's name. Any number of spaces can be inserted before and after the comma.

Each argument of a **set**-command corresponds to a single configuration parameter in the receiver. Usually, each of these configuration parameters can be set independently of the others, so most of the **set**-command's arguments are optional. Optional arguments can be omitted but if omitted arguments are followed by non-omitted ones, a corresponding number of commas must be entered. Omitted arguments always keep their current value.

2.2 Command Replies

The reply to ASCII commands always starts with "$R" and ends with <CR><LF> followed by the prompt corresponding to the connection descriptor you are connected to.

The following types of replies are defined for ASCII commands:

- For comment lines (user input beginning with "#") or empty commands (just pressing "Enter"), the receiver replies with the prompt.

```
COM1> # This is a comment!  <CR>
COM1>
```

- For invalid commands, the reply is an error message, always beginning with the keyword "$R?" followed by an error message. The different error messages are listed in Appendix A.

- For all valid **set**-, **get**- and **exe**-commands, the first line of the reply is an exact copy of the command as entered by the user, preceded with "$R:". One or more additional lines are printed depending on the command. These lines report the configuration of the receiver after execution of the command.

```
COM1>setNMEAOutput, stream1, com1, GGA, sec1 <CR>
$R: setNMEAOutput, stream1, com1, GGA, sec1
  NMEAOutput, stream1, com1, GGA, sec1
COM1>
```

  For commands which reset or halt the receiver (e.g. **exeResetReceiver**), the reply is terminated by "STOP>" instead of the standard prompt, to indicate that no further command can be entered.

- For all valid **lst**-commands, the first line of the reply is an exact copy of the command as entered by the user, preceded with "$R;". The second line is a pseudo-prompt "−−−−>" and the remaining of the reply is a succession of formatted blocks, each of them starting with "$−− BLOCK".

ASCII replies to **set**-, **get**- and **exe**-commands, including the terminating prompt, are atomic: they cannot be broken by other messages from the receivers. For the **lst**-commands, the replies may consist of several atomic formatted blocks which can be interleaved with other output data. If more than one formatted block is output for a lst-command, each of the intermediate blocks is terminated with a pseudo-prompt "−−−−>". The normal prompt will only be used to terminate the last formatted block of the reply so that one single prompt is always associated with one command.

2.3 Command Syntax Tables

All ASCII commands are listed in Section 3, "Command List" Each command is introduced by a compact formal description of it called a "syntax table". Syntax tables contain a complete list of arguments with their possible values and default settings when applicable.

The conventions used in syntax tables are explained below by taking a fictitious **setCommandName** command as example. The syntax table for that command is:

scn gcn	**setCommandName** **getCommandName**	***Cd*** *Cd*	*Distance*	*Time*	*Message (120)*	*Mode*	*PRN*
		+Com1 +Com2 all	-20.00 . . . 0.00 . . . 20.00 m	1 . . . 50 sec	Unknown	on off	none +G01 ... G32 +S120 ... S138 +SBAS +GPS all

RxControl: Navigation > Receiver Operation > Example
Web Interface: Configuration > Navigation > Receiver Operation > Example

The associated **set**- and **get**-commands are always described in pairs, and the same holds for the associated **exe**- and **get**-commands. The command name and its equivalent 3- or 4-character mnemonic are printed in the first two columns. The list of arguments for the set- and getcommands is listed in the first and second row respectively. In our example, **setCommandName** can accept up to 6 arguments and **getCommandName** only accepts one argument. Mandatory arguments are printed in bold face. Besides the mandatory arguments, at least one of the optional arguments must be provided in the command line.

The list of possible values for each argument is printed under each of them. Default values for optional arguments are underlined.

The fictitious command above contains all the possible argument types:

- *Cd* serves as an index for all following arguments. This can be noticed by the possibility to use this argument in the **get**-command. This argument is mandatory in the **set**-command. The accepted values are `COM1`, `COM2` and `all`, corresponding to the first or second serial ports, or to both of them respectively. The "+" sign before the first two values indicates that they can be combined to address both serial ports in the same command.

  Examples: `COM1, COM1+COM2, all` (which is actually an alias for `COM1+COM2`).

- *Distance* is a number between `-20` and `20` with a default value of `0`, and up to 2 decimal digits. An error is returned if more digits are provided. The "m" indicates that the value is expressed in meters. Note that this "m" should not be typed when entering the command.

  Examples: `20, 10.3, -2.34`

- *Time* is a number between `1` and `50`, with no decimal digit (i.e. this is an integer value). This value is expressed in seconds.

Examples: `1, 10`

- *Message* is a string with a maximum length of 120 characters. The default value of that argument is "`Unknown`". When spaces must to be used, the string has to be put between quotes and these enclosing quotes are not considered part of the string. The list of allowed characters in strings is:

  ```
  ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789
  !#%@()*+-./:;<=>?[\]^_`{|}~
  ```

  Example: "`Hello World!`"

- *Mode* is a range of individual values that cannot be combined (they are not preceded by a "+" sign). Either `off` or `on` can be selected for that argument and the default value is `on`.

  Example: `on`

- *PRN* is a range of values that can be combined together with the "+" sign. The default value `GPS` is an alias for `G01+G02+ ... +G32`, `SBAS` is an alias for `S120+ ... +S138` and `all` an alias for `GPS+SBAS`. A "+" sign can be set before the argument to indicate to add the specified value(s) to the current list. If the value "`none`" is supported (which is the case in this example), a "−" sign can be set before the argument to remove the specified value(s) from the current list. It is possible to add or remove multiple values at once by "adding" or "subtracting" them with the "+" or "−" operator. However, "+" and "−" can never be combined in a single argument.

  Examples: `G01+G02, +G03, GPS+S120, +G04+G05, -S122-S123, -GPS`

The lines printed in blue under the syntax table show under which menu the command can be found using RxControl or the Web Interface (the latter is only relevant for receivers supporting a web interface).

3 Command List

3.1 Receiver Administration Commands

lai	**lstAntennaInfo**	***Antenna***								
		Overview Main [antenna name]								

Use this command with the argument *Antenna* set to `Overview` to get a list of all antenna names for which the receiver knows the phase center variation parameters (see Firmware User Manual for a discussion on the phase center variation).

Use this command with the argument *Antenna* set to one of the antenna names returned by **`lstAntennaInfo, Overview`** to retrieve the complete phase center variation parameters for that particular antenna. Do not forget to enclose the name between double quotes if it contains whitespaces.

Using the values `Main` will return the phase center variation parameters corresponding to the main antenna type as specified in the command **`setAntennaOffset`**.

Examples

```
COM1>  lai, Overview <CR>
$R; lai, Overview
<?xml version="1.0" encoding="ISO-8859-1" ?>
<AntennaInfo version="0.1">
    <Antenna ID="AERAT1675_29    NONE"/>
    <Antenna ID="AERAT2775_150   NONE"/>
    <Antenna ID="AERAT2775_159       "/>
    <Antenna ID="AERAT2775_159   SPKE"/>
    <Antenna ID="AERAT2775_160       "/>
    ...
    <Antenna ID="TRM_R8_GNSS         "/>
</AntennaInfo>
COM1>

COM1>  lai, "AERAT2775_159 SPKE" <CR>
$R; lai,"AERAT2775_159   SPKE"
<?xml version="1.0" encoding="ISO-8859-1" ?>
<AntennaInfo version="0.1">
    <Antenna ID="AERAT2775_159   SPKE"/>
        <L1>
            <offset north="0.4" east="0.1" up="77.2"/>
            <phase elevation="90" value="0.0"/>
            <phase elevation="85" value="-0.2"/>
...
            <phase elevation=" 5" value="0.0"/>
            <phase elevation=" 0" value="0.0"/>
        </L2>
</AntennaInfo>
COM1>
```

help	lstCommandHelp	*Action (255)*								
		Overview								

Use this command to retrieve a short description of the ASCII command-line interface.

When invoking this command with the `Overview` argument, the receiver returns the list of all supported **set**-, **get**- and **exe**-commands. The **lstCommandHelp** command can also be called with any supported **set**-, **get**- or **exe**-command (the full name or the mnemonic) as argument.

The reply to this command is free-formatted and subject to change in future versions of the receiver's software. This command is designed to be used by human users. When building software applications, it is recommended to use the formal **lstMIBDescription**.

Examples

```
COM1>  help, Overview <CR>
$R; help, Overview
$-- BLOCK 1 / 0
MENU: communication
  GROUP: ioSelection
    sdio, setDataInOut
    gdio, getDataInOut
...
COM1>

COM1>  help, getReceiverCapabilities <CR>
$R; help, getReceiverCapabilities
... Here comes a description of getReceiverCapabilities ...
COM1>

COM1>  help, grc <CR>
$R; help, grc
... Here comes a description of getReceiverCapabilities ...
COM1>
```

lcf	**lstConfigFile**	***File***								
		Current Boot RxDefault User1 User2								

Use this command to list the contents of a configuration file. A configuration file contains the list of user commands needed to bring the receiver from factory default to a certain non-default configuration.

The following configuration files are available:

File	Description
`Current`	The current configuration.
`Boot`	The configuration that is loaded at boot time, after a power cycle or after a hard reset (see also the **`exeResetReceiver`** command).
`RxDefault`	The default configuration.
`User1`	A user-defined configuration.
`User2`	A user-defined configuration.

See also the related **`exeCopyConfigFile`** command to learn how to manage configuration files.

Example

```
COM1>  smp, TestMarker <CR>
$R: smp, TestMarker
  MarkerParameters, "TestMarker"
COM1>  lcf, Current <CR>
$R; lcf, Current
$-- BLOCK 1 / 1
  setMarkerParameters, "TestMarker"
COM1>
```

eccf gccf	**exeCopyConfigFile** **getCopyConfigFile**	***Source***	***Target***							
		Current Boot User1 User2 RxDefault	Current Boot User1 User2							

RxControl: File > Copy Configuration

Use this command to manage the configuration files. See the **`lstConfigFile`** command for a description of the different configuration files.

With this command, the user can copy configurations files into other configuration files. For instance, copying the `Current` file into the `Boot` file makes that the receiver will always boot in the current configuration.

Examples

To save the current configuration in the `Boot` file, use:

```
COM1>  eccf, Current, Boot <CR>
$R: eccf, Current, Boot
  CopyConfigFile, Current, Boot
COM1>
```

To load the configuration stored in `User1`, use:

```
COM1>  eccf, User1, Current <CR>
$R: eccf, User1, Current
  CopyConfigFile, User1, Current
COM1>
```

lif	**lstInternalFile**	***File***								
		Permissions Identification Debug Error SisError DiffCorrError SetupError								

Use this command to retrieve the contents of one of the receiver internal files:

File	Description
`Permissions`	List of permitted options in your receiver.
`Identification`	Information about the different components being part of the receiver (e.g. serial number, firmware version, etc.).
`Debug`	Program flow information that can help support engineers to debug certain issues.
`Error`	Last internal error reports.
`SisError`	Last detected signal-in-space anomalies.
`DiffCorrError`	Last detected anomalies in the incoming differential correction streams.
`SetupError`	Last detected anomalies in the receiver setup.

Example

```
COM1>  lif, Permissions <CR>
$R; lif, Permissions
---->
$-- BLOCK 1 / 1

... here follows the permission file ...

COM1>
```

lmd	lstMIBDescription	*File (255)*								
		Overview SBFTable								

Use this command to retrieve the ASN.1-compliant syntax of the user command interface. The name of the command refers to the MIB (Management Information Base), which holds the whole receiver configuration. There is a one-to-one relationship between the formal MIB description and the ASCII command-line interface for all **exe**-, **get**- and **set**-commands.

When the value `Overview` is used, the general syntax of the interface is returned. With the value `SBFTable`, the receiver will output the list of supported SBF blocks and whether they can be output at a user-selectable rate or not. The **lstMIBDescription** command can also be called with every supported **set**-, **get**- or **exe**-command (the full name or the mnemonic) as argument.

No formal description of the **lst**-commands can be retrieved with **lstMIBDescription**.

Examples

```
COM1>  lmd, Overview <CR>
$R; lmd, Overview
... Here comes the generic command syntax ...
COM1>

COM1>  lmd, grc <CR>
$R; lmd, grc
... Here comes the description of getReceiverCapabilities ...
COM1>
```

epwm gpwm	**exePowerMode** **getPowerMode**	***Mode***								
		ScheduledSleep StandBy								

RxControl: File > Power Mode > Shut Down

Use this command to set the receiver in sleep or stand-by mode, in which it consumes only a fraction of its normal operational power.

When in `ScheduledSleep` or `StandBy` mode, the receiver can be awoken by sending the appropriate signal to one of its input pins, or by sending a character to the first COM port (see the Hardware Manual for details).

When in `ScheduledSleep` mode, the receiver can also automatically wake up at a given time or at regular intervals. This functionality is controlled by the **`setWakeUpInterval`** command.

Upon waking up, the receiver applies the configuration that is stored in the boot configuration file (see the **`lstConfigFile`** command).

Before entering sleep or stand-by mode, the receiver broadcasts a "`$TE PowerMode`" message to all active communication ports, to inform all users of the imminent halt.

Example

```
COM1>  epwm, ScheduledSleep <CR>
$R: epwm, ScheduledSleep
  PowerMode, ScheduledSleep
STOP>
$TE PowerMode ScheduledSleep
STOP>
```

grc	getReceiverCapabilities									

RxControl: Help > Receiver Interface > Permitted Capabilities

Use this command to retrieve the so-called "capabilities" of your receiver. The first returned value is the list of supported antenna(s), followed by the list of supported signals, the list of available communication ports and the list of enabled features.

The three values at the end of the reply line correspond to the default measurement interval, the default PVT interval and the default integrated INS/GNSS interval respectively. This is the interval at which the corresponding SBF blocks are output when the `OnChange` rate is selected with the **`setSBFOutput`** command. These values are expressed in milliseconds.

Each of the above-mentioned lists contain one or more of the elements in the tables below.

Antennas	Description
`Main`	The receiver's main antenna.

Signals	Description
`GPSL1CA`	GPS L1 C/A signal.
`GPSL1PY`	GPS L1 P(Y) signal.
`GPSL2PY`	GPS L2 P(Y) signal.
`GPSL2C`	GPS L2 C signal.
`GPSL5`	GPS L5 signal.
`GLOL1CA`	GLONASS L1 C/A signal.
`GLOL2P`	GLONASS L2 P signal.
`GLOL2CA`	GLONASS L2 C/A signal.
`GALL1BC`	Galileo L1 BC signal.
`GALE5a`	Galileo E5a signal.
`GEOL1`	SBAS L1 C/A signal.
`GEOL5`	SBAS L5 signal.
`QZSL1CA`	QZSS L1 C/A signal.
`QZSL2C`	QZSS L2 C signal.
`QZSL5`	QZSS L5 signal.

ComPorts	Description
`COM1`	Serial port 1.
`COM2`	Serial port 2.
`COM3`	Serial port 3.
`COM4`	Serial port 4.
`USB1`	Virtual serial port 1.
`USB2`	Virtual serial port 2.

Capabilities	Description
SBAS	Positioning with SBAS corrections.
DGPSRover	Positioning with DGPS corrections.
DGPSBase	Generation of DGPS corrections.
RTKRover	Positioning with RTK corrections.
RTKBase	Generation of RTK corrections.
RTCMv23	Generation/decoding of RTCM v2.3 corrections.
RTCMv3x	Generation/decoding of RTCM v3.x corrections.
CMRv20	Generation/decoding of CMR v2.0 corrections.
xPPSInput	Internal clock synchronisation with xPPS input signal.
xPPSOutput	Generation of xPPS output signal.
TimedEvent	Accurate time mark of event signals.
InternalLogging	Internal logging.
APME	A-Posteriori Multipath Estimator.
RAIM	Receiver Autonomous Integrity Monitoring.
PPPGlobal	PPP through Wide Area Augmentation Service for global use.
PPPLand	PPP through Wide Area Augmentation Service for land based use.

Example

```
COM1>  grc <CR>
$R: grc
  ReceiverCapabilities, Main, GPSL1CA+GEOL1, COM1+COM2+COM3+COM4+
     USB1+USB2,
APME+SBAS, 100, 100, 100
COM1>
```

gri	**getReceiverInterface**	*Item*								
		+ RxName + SNMPLanguage + SNMPVersion all								

RxControl: Help > Receiver Interface > Interface Version

Use this command to retrieve the version of the receiver command-line interface. The reply to this command is a subset of the reply returned by the **`lstInternalFile, Identification`** command.

Example

```
COM1>  gri <CR>
$R: gri
  ReceiverInterface, RxName, AsteRx1
  ReceiverInterface, SNMPLanguage, English
  ReceiverInterface, SNMPVersion, 20060308
COM1>
```

era gra	**exeRegisteredApplications** **getRegisteredApplications**	***Cd*** *Cd*	***Application (12)***							
		+ COM1 + COM2 + COM3 + COM4 + USB1 + USB2 all	Unknown							

RxControl: Communication > Registration

Use these commands to define/inquire the name of the application that is currently using a given connection descriptor (*Cd*).

Registering an application name for a connection does not affect the receiver operation, and is done on a voluntary basis. Application registration can be useful to developers of external applications when more than one application is to communicate with the receiver concurrently. Whether or not this command is used, and the way it is used is up to the developers of external applications.

Example

```
COM1>  era, com1, MyApp <CR>
$R: era, com1, MyApp
  RegisteredApplications, COM1, "MyApp"
  RegisteredApplications, COM2, "Unknown"
  RegisteredApplications, COM3, "Unknown"
  RegisteredApplications, USB1, "Unknown"
  RegisteredApplications, USB2, "Unknown"
COM1>
```

erst grst	**exeResetReceiver** **getResetReceiver**	***Level***	***EraseMemory***							
		Soft Hard Upgrade	none + Config + PVTData + SatData + BaseStations all							

RxControl: File > Reset Receiver

Use this command to reset the receiver and to erase some previously stored data. The first argument specifies which level of reset you want to execute:

Level	Description
`Soft`	This is a reset of the receiver's firmware. After a few seconds, the receiver will restart operating in the same configuration as before the command was issued, unless the "`Config`" value is specified in the second argument.
`Hard`	This is similar to a power off/on sequence. After hardware reset, the receiver will use the configuration saved in the boot configuration file.
`Upgrade`	Set the receiver into upgrade mode. After a few seconds, the receiver is ready to accept an upgrade file (SUF format) from any of its connections.

The second argument specifies which part of the non-volatile memory should be erased during the reset. The following table contains the possible values for the *EraseMemory* argument:

EraseMemory	Description
`Config`	The receiver's configuration is reset to the factory default. The `Current` and `Boot` configuration files are erased (see the **`exeCopyConfigFile`** command). Note that the `User1` and `User2` configuration files are not erased: use the **`exeCopyConfigFile`** command instead.
`PVTData`	The latest computed PVT data stored in non-volatile memory is erased.
`SatData`	All satellite navigation data (ephemeris, almanac, ionosphere parameters, UTC, ...) stored in non-volatile memory is erased.
`BaseStations`	All base stations stored in non-volatile memory are erased.

Before resetting, the receiver broadcasts a "`$TE ResetReceiver`" message to all active communication ports, to inform all users of the imminent reset.

After a reset, the user may have to adapt the communication settings of his/her terminal program as they may be reset to their default values.

Example

```
COM1>  erst, soft, none <CR>
$R: erst, soft, none
```

```
  ResetReceiver, Soft, none
STOP>
$TE ResetReceiver Soft
STOP>
```

3.2 Tracking Configuration Commands

sam gam	**setAGCMode** **getAGCMode**	***Band*** *Band*	*Mode*	*Gain*						
		+ L1 + L2L5 all	auto frozen manual	0 . . . 35 . . . 70 dB						

RxControl: Navigation > Advanced User Settings > Frontend and Interference Mitigation > Frontend Settings

Use these commands to define/inquire the operation mode of the Automatic Gain Control (AGC) in the receiver frontend. The AGC is responsible for amplifying the input RF signal to an appropriate level.

By default (*Mode* is set to `auto`), the AGC automatically adjusts its gain in function of the input signal power. In `frozen` mode, the AGC gain is kept constant at its current value (after a ten-second stabilisation period) and does not follow any subsequent variation of the input signal power. In `manual` mode, the user can set the gain to a fixed value specified by the *Gain* argument. The *Gain* argument is ignored in `auto` and `frozen` modes.

The first argument (*Band*) specifies for which frequency band the settings apply.

Example

```
COM1>  sam, all, frozen <CR>
$R: sam, all, frozen
  AGCMode, L1, frozen, 30
COM1>
```

sca gca	**setChannelAllocation** **getChannelAllocation**	***Channel*** *Channel*	*Satellite*	*Search*	*Doppler*	*Window*				
		+ Ch01 ... Ch29 all	auto G01 ... G32 F01 ... F21 E01 ... E32 S120 ... S140 J01 J02 J03	auto manual	-50000 . . . 0 . . . 50000 Hz	1 . . . 16000 . . . 100000 Hz				

RxControl: Navigation > Advanced User Settings > Channel Allocation

Use these commands to define/inquire the satellite-to-channel allocation of the receiver.

The action of the **`setChannelAllocation`** command is to force the allocation of a particular satellite on the set of channels identified with the *Channel* argument, thereby overruling the automatic channel allocation performed by the receiver. It is possible to allocate the same satellite to more than one channel. If you assign a satellite to a given channel, any other channel that was automatically allocated to the same satellite will be stopped and will be reallocated.

The values `Gxx`, `Exx`, `Fxx`, `Sxxx` and `Jxx` for the *Satellite* argument represent GPS, Galileo, GLONASS, SBAS and QZSS satellites respectively. For GLONASS, the frequency number (with an offset of 8) should be provided, and not the slot number (hence the "F"). Setting the *Satellite* argument to `auto` brings the channel back in auto-allocation mode.

The user can specify the Doppler window in which the receiver has to search for the satellite. This is done by setting the *Search* argument to `manual`. In that case, the *Doppler* and *Window* arguments can be provided: the receiver will search for the signal within an interval of *Window* Hz centred on *Doppler* Hz. The value to be provided in the *Doppler* argument is the expected Doppler at the GPS L1 carrier frequency (1575.42MHz). This value includes the geometric Doppler and the receiver and satellite frequency biases. Specifying a Doppler window can speed up the search process in some circumstances. A satellite already in tracking that falls outside of the prescribed window will remain in tracking.

If *Search* is set to `auto`, the receiver applies its usual search procedure, as it would do for auto-allocated satellites, and the *Doppler* and *Window* arguments are ignored.

Be aware that this command may disturb the normal operation of the receiver and is intended only for expert-level users.

Examples

```
COM1>  sca, Ch05, G01 <CR>
$R: sca, Ch05, G01
  ChannelAllocation, Ch05, G01, auto, 0, 16000
COM1>

COM1>  gca, Ch05 <CR>
$R: gca, Ch05
  ChannelAllocation, Ch05, G01, auto, 0, 16000
COM1>
```

gcc	**getChannelConfiguration**	*Channel*								
		+ Ch01 ... Ch29 all								

RxControl: Navigation > Advanced User Settings > Channel Configuration

Use this command to get the list of signals that a given channel can track.

Example

To display the different signals that the first channel can track, use:

```
COM1>  gcc, Ch01 <CR>
$R: gcc, Ch01
  ChannelConfiguration, Ch01, GPSL1CA
COM1>
```

scm gcm	**setCN0Mask** **getCN0Mask**	***Signal*** *Signal*	*Mask*							
		+ GPSL1CA + Reserved1 + Reserved2 + GPSL2C + GPSL5 + GLOL1CA + GLOL2P + GLOL2CA + GALL1BC + GALE5a + GEOL1 + GEOL5 + QZSL1CA + QZSL2C + QZSL5 all	0 . . . 10 . . . 60 dB-Hz							

RxControl: Navigation > Receiver Operation > Masks

Use these commands to define/inquire the carrier-to-noise ratio mask for the generation of measurements. The receiver does not generate measurements for those signals of which the C/N_0 is under the specified mask, and does not include these signals in the PVT computation. However, it continues to track these signals and to decode and use the navigation data as long as possible, regardless of the C/N_0 mask.

The mask can be set independently for each of the signal types supported by the receiver, except for the GPS P-code, of which the mask is fixed at 1 dB-Hz (this is because of the codeless tracking scheme needed for GPS P-code).

Examples

```
COM1>  scm, GEOL1, 30 <CR>
$R: scm, GEOL1, 30
  CN0Mask, GEOL1, 30
COM1>

COM1>  gcm, GEOL1 <CR>
$R: gcm, GEOL1
  CN0Mask, GEOL1, 30
COM1>
```

sfm gfm	**setFrontendMode** **getFrontendMode**	*Mode*								
		Nominal GLOL2Blocked								

RxControl: Navigation > Advanced User Settings > Frontend and Interference Mitigation > Frontend Settings

Use these commands to define/inquire the frontend operating mode. The following modes are available.

Mode	Description
`Nominal`	Nominal operation.
`GLOL2Blocked`	GLONASS L2 band blocked. This mode should only be selected in case of a strong interferer in the GLONASS L2 band. In `GLOL2Blocked` mode, GLONASS L2 cannot be tracked.

Example

```
COM1>  sfm, Nominal <CR>
$R: sfm, Nominal
  FrontendMode, Nominal
COM1>
```

smm gmm	**setMultipathMitigation** **getMultipathMitigation**	*Code*	*Carrier*							
		off on	off on							

RxControl: Navigation > Receiver Operation > Tracking and Measurements > Multipath

Use these commands to define/inquire whether multipath mitigation is enabled or not.

The arguments *Code* and *Carrier* enable or disable the A-Posteriori Multipath Estimator (APME) for the code and carrier phase measurements respectively. APME is a technique by which the receiver continuously estimates the multipath error and corrects the measurements accordingly.

This multipath estimation process slightly increases the thermal noise on the pseudoranges. However, this increase is more than compensated by the dramatic decrease of the multipath noise.

Examples

```
COM1>  smm, on, off <CR>
$R: smm, on, off
  MultipathMitigation, on, off
COM1>

COM1>  gmm <CR>
$R: gmm
  MultipathMitigation, on, off
COM1>
```

sst gst	**setSatelliteTracking** **getSatelliteTracking**	*Satellite*								
		none + G01 ... G32 + R01 ... R24 + E01 ... E32 + S120 ... S140 + J01 + J02 + J03 + GPS + GLONASS + GALILEO + SBAS + QZSS all								

RxControl: Navigation > Advanced User Settings > Tracking > Satellite Tracking

Use these commands to define/inquire which satellites are allowed to be tracked by the receiver. It is possible to enable or disable a single satellite (e.g. `G01` for GPS PRN1), or a whole constellation. `Gxx`, `Exx`, `Rxx`, `Sxxx` and `Jxx` refer to a GPS, Galileo, GLONASS, SBAS or QZSS satellite respectively. GLONASS satellites must be referenced by their slot number (from 1 to 24) in this command.

A satellite which is disabled by this command is not considered anymore in the automatic channel allocation mechanism, but it can still be forced to a given channel, and tracked, using the **`setChannelAllocation`** command.

Tracking a satellite does not automatically mean that the satellite will be included in the PVT computation. The inclusion of a satellite in the PVT computation is controlled by the **`setSatelliteUsage`** command.

Examples

To only enable the tracking of GPS satellites, use:

```
COM1>  sst, GPS <CR>
$R: sst, GPS
  SatelliteTracking, G01+G02+G03+G04+G05+G06+G07+G08+G09+G10+G11
+G12+G13+G14+G15+G16+G17+G18+G19+G20+G21+G22+G23+G24+G25+G26+G27
+G28+G29+G30+G31+G32
COM1>
```

To add all SBAS satellites in the list of satellites to be tracked, use:

```
COM1>  sst, +SBAS <CR>
$R: sst, +SBAS
  SatelliteTracking, G01+G02+G03+G04+G05+G06+G07+G08+G09+G10+G11
+G12+G13+G14+G15+G16+G17+G18+G19+G20+G21+G22+G23+G24+G25+G26+G27
+G28+G29+G30+G31+G32+S120+S121+S123+S123+S124+S125+S126+S127+S128
+S129+S130+S131+S132+S133+S134+S135+S136+S137+S138+S139+S140
  COM1>
```

To remove SBAS PRN120 from the list of allowed satellites, use:

```
COM1>  sst, -S120 <CR>
```

```
$R: sst, -S120
  SatelliteTracking, G01+G02+G03+G04+G05+G06+G07+G08+G09+G10+G11
+G12+G13+G14+G15+G16+G17+G18+G19+G20+G21+G22+G23+G24+G25+G26+G27
+G28+G29+G30+G31+G32+S121+S122+S123+S124+S125+S126+S127+S128+S129
+S130+S131+S132+S133+S134+S135+S136+S137+S138+S139+S140
  COM1>
```

snt gnt	**setSignalTracking** **getSignalTracking**	*Signal*								
		+GPSL1CA +GPSL1PY +GPSL2PY +GPSL2C +GPSL5 +GLOL1CA +GLOL2P +GLOL2CA +GALL1BC +GALE5a +GEOL1 +GEOL5 +QZSL1CA +QZSL2C +QZSL5 all								

RxControl: Navigation > Advanced User Settings > Tracking > Signal Tracking

Use these commands to define/inquire which signals are allowed to be tracked by the receiver.

Beware that disabling a given signal can prevent the receiver from tracking other signals: disabling `GPSL1CA` prevents the tracking of `GPSL1PY`, `GPSL2PY` and `GPSL2C`, disabling `QZSL1CA` prevents the tracking of `QZSL2C`, and disabling `GLOL2CA` prevents the tracking of `GLOL2P`.

Invoking this command causes all tracking loops to stop and restart.

Examples

To configure the receiver in a single-frequency L1 GPS+SBAS mode, use:

```
COM1>  snt, GPSL1CA+GEOL1 <CR>
$R: snt, GPSL1CA+GEOL1
  SignalTracking, GPSL1CA+GEOL1
COM1>

COM1>  gnt <CR>
$R: gnt
  SignalTracking, GPSL1CA+GEOL1
COM1>
```

ssi gsi	**setSmoothingInterval** **getSmoothingInterval**	***Signal*** *Signal*	*Interval*	*Alignment*						
		+ GPSL1CA + GPSL2PY + GPSL2C + GPSL5 + GLOL1CA + GLOL2P + GLOL2CA + GALL1BC + GALE5a + GEOL1 + GEOL5 + QZSL1CA + QZSL2C + QZSL5 all	0 . . . 1000 sec	0 . . . 1000 sec						

RxControl: Navigation > Receiver Operation > Tracking and Measurements > Smoothing

Use these commands to define/inquire the code measurement smoothing interval.

The *Interval* argument defines the length of the smoothing filter that is used to smooth the code measurements by the carrier phase measurements. It is possible to define a different interval for each signal type. If *Interval* is set to 0, the code measurements are not smoothed. The smoothing interval can vary from 1 to 1000 seconds.

To prevent transient effect to perturb the smoothing filter, smoothing is disabled during the first ten seconds of tracking, i.e. when the lock time is lower than 10s. Likewise, the smoothing effectively starts with a delay of 10 seconds after entering the **`setSmoothingInterval`** command.

Code smoothing allows reducing the pseudoranges noise and multipath. It has no influence on the carrier phase and Doppler measurements. The smoothing filter has an incremental effect; the noise of the filtered pseudoranges will decrease over time and reach its minimum after *Interval* seconds. For some applications, it may be necessary to wait until this transient effect is over before including the measurement in the PVT computation. This is the purpose of the *Alignment* argument. If *Alignment* is not set to 0, measurements taken during the first *Alignment*+10 seconds of tracking will be discarded. The effective amount of *Alignment* is never larger than *Interval*, even if the user sets it to a larger value.

Examples

```
COM1>  ssi, GPSL1CA, 300 <CR>
$R: ssi, GPSL1CA, 300
  SmoothingInterval, GPSL1CA, 300, 0
COM1>

COM1>  gsi, GPSL1CA <CR>
$R: gsi, GPSL1CA
  SmoothingInterval, GPSL1CA, 300, 0
COM1>
```

stlp gtlp	**setTrackingLoopParameters** **getTrackingLoopParameters**	***Signal*** *Signal*	*DLLBandwidth*	*PLLBandwidth*	*MaxTpDLL*	*MaxTpPLL*	*Adaptive*			
		+ GPSL1CA + Reserved1 + Reserved2 + GPSL2C + GPSL5 + GLOL1CA + GLOL2P + GLOL2CA + GALL1BC + GALE5a + GEOL1 + GEOL5 + QZSL1CA + QZSL2C + QZSL5 all	0.01 . . . 0.25 . . . 5.00 Hz	1 . . . 15 . . . 100 Hz	1 . . . 100 . . . 500 msec	1 . . . 10 . . . 200 msec	off on			

RxControl: Navigation > Advanced User Settings > Tracking > Tracking Loop Parameters

Use these commands to define/inquire the tracking loop parameters for each individual signal type.

The *DLLBandwidth* and *PLLBandwidth* arguments define the single-sided DLL and PLL noise bandwidth, in Hz.

The *MaxTpDLL* argument defines the maximum DLL pre-detection time, in millisecond. The actual pre-detection time applied by the receiver (*TpDLL*) depends on the presence of a pilot component. For signals having a pilot component (e.g. GPS L2C), *TpDLL* = *MaxTpDLL*. For signals without pilot component (e.g. GPS L1CA), *TpDLL* is the largest divider of the symbol duration smaller than or equal to *MaxTpDLL*.

The *MaxTpPLL* argument defines the maximal PLL pre-detection time, in millisecond. The actual pre-detection time in the receiver (*TpPLL*) is computed in the same way as indicated for the *MaxTpDLL* argument.

Setting the *Adaptive* argument to `on` allows the receiver to dynamically change the loop parameters in order to optimize performance in specific conditions.

After entering this command, all active tracking loops stop and restart with the new settings.

This command should only be used by expert users who understand the consequences of modifying the default values. In some circumstances, changing the tracking parameters may result in the impossibility for the receiver to track a specific signal, or may significantly increase the processor load. It is recommended that the product of *TpPLL* (in milliseconds) and *PLLBandwidth* (in Hz) be kept between 100 and 200.

Note that decreasing the predetection times increases the load on the processor.

Example

```
COM1>  stlp, GPSL1CA, 0.20, 12 <CR>
$R: stlp, GPSL1CA, 0.20, 12
  TrackingLoopParameters, GPSL1CA, 0.20, 12, 100, 10
COM1>
```

3.3 Navigation Configuration Commands

sal gal	**setAntennaLocation** **getAntennaLocation**	***Antenna*** *Antenna*	*Mode*	*DeltaX*	*DeltaY*	*DeltaZ*				
		+ Base all	auto manual	-1000.0000 ...0.0000 ...1000.0000 m	-1000.0000 ...0.0000 ...1000.0000 m	-1000.0000 ...0.0000 ...1000.0000 m				

RxControl: Navigation > Positioning Mode > GNSS Attitude

Use this command to define/inquire the relative location of the antennas in the vehicle reference frame in the context of attitude determination.

The attitude of a vehicle (more precisely the heading and pitch angles) can be determined from the orientation of the baseline between two antennas attached to the vehicle. These two antennas must be connected to two receivers configured in moving-base RTK operation. Use the command **`setGNSSAttitude`** to enable moving-base attitude determination.

The **`setAntennaLocation`** command should be invoked at the rover receiver with the *Antenna* argument set to `Base` to specify the relative position of the base antenna with respect to the rover antenna.

In `auto` mode, the receiver determines the attitude angles assuming that the baseline between the antenna ARPs is parallel to the longitudinal axis of the vehicle, and that the base antenna is in front of the rover antenna (i.e. towards the direction of movement). The length of the baseline is automatically computed by the receiver, and the baseline may be flexible. The *DeltaX*, *DeltaY* and *DeltaZ* arguments are ignored in `auto` mode.

In `manual` mode, the user can specify the exact position of the base antenna with respect to the rover antenna in the vehicle reference frame. That reference frame has its X axis pointing to the front of the vehicle, the Y axis pointing to the right, and the Z axis pointing down. Selecting `manual` mode implies that the baseline is rigid. The *DeltaX*, *DeltaY* and *DeltaZ* coordinates are ARP-to-ARP.

Example

In the case of moving-base attitude determination, if the moving-base antenna is located one meter to the left of the rover antenna, and 10 cm below, you should use:

```
COM1>  sal, Base, manual, 0, -1, 0.1 <CR>
$R: sal, Base, manual, 0, 1, 0.1
    AntennaLocation, Base, manual, 0.0000, -1.0000, 0.1000
COM1>
```

sao gao	**setAntennaOffset** **getAntennaOffset**	***Antenna*** *Antenna*	*DeltaE*	*DeltaN*	*DeltaU*	*Type (20)*	*SerialNr (20)*	*SetupID*		
		+ Main all	-1000.0000 ...0.0000 ...1000.0000 m	-1000.0000 ...0.0000 ...1000.0000 m	-1000.0000 ...0.0000 ...1000.0000 m	Unknown	Unknown	0...255		

RxControl: Navigation > Receiver Setup > Antennas

Use these commands to define/inquire the parameters that are associated with the antenna connected to your receiver.

The arguments *DeltaE*, *DeltaN* and *DeltaU* are the offsets of the antenna reference point (ARP) with respect to the marker, in the East, North and Up (ENU) directions respectively, expressed in meters. All absolute positions reported by the receiver are marker positions, obtained by subtracting this offset from the ARP. The purpose is to take into account the fact that the antenna may not be located directly on the surveying point of interest.

Use the argument *Type* to specify the type of your antenna. For best positional accuracy, it is recommended to select a type from the list returned by the command **`lstAntennaInfo, Overview`**. This is the list of antennas for which the receiver can compensate for phase center variation (see Firmware User Manual for details). If *Type* does not match any entry in the list returned by **`lstAntennaInfo, Overview`**, the receiver will assume that the phase center variation is zero at all elevations and frequency bands, and the position will not be as accurate. If the antenna name contains whitespaces, it has to be enclosed between double quotes. For proper name matching, it is important to keep the exact same number of whitespaces and the same case as the name returned by **`lstAntennaInfo, Overview`**.

The argument *SerialNr* is the serial number of your particular antenna. It may contain letters as well as digits (do not forget to enclose the string between double quotes if it contains whitespaces).

The argument *SetupID* is the antenna setup ID as defined in the RTCM standard. It is a parameter for use by the service provider to indicate the particular reference station-antenna combination. The number should be increased whenever a change occurs at the station that affects the antenna phase center variations. Setting *SetupID* to zero means that the values of a standard model type calibration should be used. The value entered for this argument is used to set the setup ID field in the message type 23 of RTCM2.3, and in message types 1007 and 1008 of RTCM3. It has otherwise no effect on the receiver operation.

Example

```
COM1>  sao, Main, 0.1, 0.0, 1.3, "AERAT2775_159 SPKE", 5684, 0<CR>
$R: sao, Main, 0.1, 0.0, 1.3, "AERAT2775_159   SPKE", 5684, 0
  AntennaOffset, Main, 0.1000, 0.0000, 1.3000, "AERAT2775_159
     SPKE", 5684, 0
COM1>
```

sto gto	**setAttitudeOffset** **getAttitudeOffset**	*Heading*	*Pitch*							
		0.0 . . . 360.0 deg	-90.0 . . . 0.0 . . . 90.0 deg							

RxControl: Navigation > Positioning Mode > GNSS Attitude

Use this command to specify the offsets that the receiver applies to the computed attitude angles.

The attitude of a vehicle (more precisely the heading and pitch angles) can be determined from the orientation of the baseline between two antennas attached to the vehicle. By default, the receiver determines the attitude angles assuming that the baseline between the antenna ARPs is parallel to the longitudinal axis of the vehicle. Attitude biases appear when this is not the case. The user can use this command to provide the value of the biases, such that the receiver can compensate for them before outputting the attitude. The receiver subtracts the offsets specified by the *Heading* and *Pitch* arguments from the attitude angles before encoding them in NMEA or SBF.

Another way to avoid attitude biases is to provide the accurate position of the antennas in the vehicle reference frame. See the command **`setAntennaLocation`** for more details.

Example

```
COM1>  sto, 10.2, -2.5 <CR>
$R: sto, 10.2, -2.5
  AttitudeOffset, 10.2, -2.5
COM1>
```

sdca gdca	**setDiffCorrMaxAge** **getDiffCorrMaxAge**	*DGPSCorr*	*RTKCorr*	*PPPCorr*	*Iono*					
		0.0 . . . 120.0 . . . 3600.0 sec	0.0 . . . 20.0 . . . 3600.0 sec	0.0 . . . 360.0 . . . 3600.0 sec	0.0 . . . 600.0 . . . 3600.0 sec					

RxControl: Navigation > Positioning Mode > PPP and Differential Corrections

Use these commands to define/inquire the maximum age acceptable for a given differential correction type. A correction is applied only if its age (aka latency) is under the timeout specified with this command and if it is also under the timeout specified with the *MaxAge* argument of the **`setDiffCorrUsage`** command. In other words, the command **`setDiffCorrUsage`** sets a global maximum timeout value, while the command **`setDiffCorrMaxAge`** can force shorter timeout values for certain correction types.

The argument *DGPSCorr* defines the timeout of the range corrections when the PVT is computed in DGPS mode.

The argument *RTKCorr* defines the timeout of the base station code and carrier phase measurements when the PVT is computed in RTK mode.

The argument *PPPCorr* defines the timeout of the wide-area satellite clock and orbit corrections used in PPP mode (only applicable if your receiver supports PPP positioning mode).

The argument *Iono* defines the timeout of the ionospheric corrections (such as transmitted in RTCM2.x MT15) used in DGPS PVT mode.

If the timeout is set to 0, the receiver will never apply the corresponding correction.

Note that this command does not apply to the corrections transmitted by SBAS satellites. For these corrections, the receiver always applies the timeout values prescribed in the DO229 standard.

Example

```
COM1>  sdca, 10 <CR>
$R: sdca, 10
  DiffCorrMaxAge, 10.0, 20.0, 300.0, 300.0
COM1>
```

sdcu gdcu	**setDiffCorrUsage** **getDiffCorrUsage**	*Mode*	*MaxAge*	*BaseSelection*	*BaseID*	*MovingBase*	*MaxBase*	*MaxBaseline*		
		LowLatency	0.1 . . . 3600.0 sec	auto manual	0 . . . 4095	off on	2 . . . 5 . . . 10	0 . . . 2500000 m		

RxControl: Navigation > Positioning Mode > PPP and Differential Corrections

Use these commands to define/inquire the usage of incoming differential corrections in DGPS or RTK rover mode.

The *Mode* argument defines the type of differential solution that will be computed by the receiver. If `LowLatency` is selected, the PVT is computed at the moment local measurements of the receiver are available. At that time, measurements from the base receiver for the same epoch are not yet available due to latency in the transmission, and the PVT is computed with measurements from two different epochs.

The *MaxAge* argument defines the maximum age of the differential corrections to be considered valid. *MaxAge* applies to all types of corrections (DGPS, RTK, satellite orbit, etc), except for those received from a SBAS satellite. See also the command **`setDiffCorrMaxAge`** to set different maximum ages for different correction types.

The *BaseSelection* argument defines how the receiver should select the base station(s) to be used. If `auto` is selected and the receiver is in DGPS-rover mode, it will use all available base stations. If `auto` is selected and the receiver is in RTK-rover mode, it will automatically select the nearest base station. If `manual` is selected, the receiver will only use the corrections from the base station defined by the *BaseID* argument (in both DGPS and RTK modes).

The *MovingBase* argument defines whether the base station is static or moving.

MaxBase sets the maximum number of base stations to include in the PVT solution in multi-base DGNSS mode.

MaxBaseline sets the maximum baseline length: base stations located beyond the maximum baseline length are excluded from the PVT.

Examples

```
COM1>  sdcu, , 5 <CR>
$R: sdcu, , 5
  DiffCorrUsage, LowLatency, 5.0, auto, 0, off, 20, 20000000
COM1>

COM1>  gdcu <CR>
$R: gdcu
  DiffCorrUsage, LowLatency, 5.0, auto, 0, off, 20, 20000000
COM1>
```

sem gem	**setElevationMask** **getElevationMask**	***Engine*** *Engine*	*Mask*							
		+ Tracking + PVT all	-90 . . . 0 . . . 90 deg							

RxControl: Navigation > Receiver Operation > Masks

Use these commands to set or get the elevation mask in degrees. There are two masks defined: a tracking mask and a PVT mask.

Satellites under the tracking elevation mask are not tracked, and therefore there is no measurement, nor navigation data available from them. The tracking elevation mask does not apply to SBAS satellites: SBAS satellites are generally used to supply corrections and it is undesirable to make the availability of SBAS corrections dependent on the satellite elevation. The tracking elevation mask does not apply to satellites that are manually assigned with the **`setChannelAllocation`** command.

Satellite under the PVT mask are not included in the PVT solution, though they still provide measurements and their navigation data is still decoded and used. The PVT elevation mask do apply to the SBAS satellites: the ranges to SBAS satellites under the elevation mask are not used in the PVT, but the SBAS corrections are still decoded and potentially used in the PVT.

Although possible, it does not make sense to select a higher elevation mask for the tracking than for the PVT, as, obviously, a satellite which is not tracked cannot be included in the PVT.

The mask can be negative to allow the receiver to track satellites below the horizon. This can happen in case the receiver is located at high altitudes or if the signal is refracted through the atmosphere.

Examples

```
COM1>  sem, PVT, 10 <CR>
$R: sem, PVT, 10
  ElevationMask, PVT, 10
COM1>

COM1>  gem <CR>
$R: gem
  ElevationMask, Tracking, 0
  ElevationMask, PVT, 10
COM1>
```

sfr gfr	**setFixReliability** **getFixReliability**	***Engine*** *Engine*	*SearchVolume*	*Ratio*						
		+ RTK all	0.001 . . . 0.200 . . . 10.000	1.00 . . . 4.40 . . . 20.00						

RxControl: Navigation > Receiver Operation > Position > Ambiguities

Use these commands to define/inquire the criteria that control the ambiguity fixing process of the RTK and/or attitude-determination engines.

The ambiguity fixing algorithm searches for the most likely integer carrier phase ambiguity set within the prescribed *SearchVolume*.

All integer ambiguity vectors contained in the search volume are sorted according to their distance to the float ambiguities. The candidate with the lowest value will be selected as the most likely ambiguity set. The likelihood of this candidate with respect to other candidates is characterized by the ratio between the best and the second-best candidate. If this ratio is lower than the prescribed threshold (*Ratio*, the third argument), the candidate is rejected and the ambiguity search will restart at the next epoch.

Lowering *SearchVolume* and increasing *Ratio* will increase the time to fix but also decrease the probability of fixing incorrect ambiguities.

This command should only be used by expert users who understand the consequences of modifying the default values. It is strongly recommended to leave all settings to their default values.

Examples

```
COM1>  sfr, RTK, 0.2 <CR>
$R: sfr, RTK, 0.2
  FixReliability, RTK, 0.200, 4.40
COM1>

COM1>  gfr, RTK <CR>
$R: gfr, RTK
  FixReliability, RTK, 0.200, 4.40
COM1>
```

sgd ggd	**setGeodeticDatum** **getGeodeticDatum**	*TargetDatum*								
		WGS84 ETRS89 NAD83 NAD83_PA NAD83_MA GDA94 Default User1 User2								

RxControl: Navigation > Receiver Operation > Position > Datum

Use this command to define the datum to which you want the coordinates to refer.

TargetDatum	Description
`WGS84`	Equivalent to `Default`
`ETRS89`	European ETRS89 (ETRF2000 realization)
`NAD83`	NAD83(2011), North American Datum (2011)
`NAD83_PA`	NAD83(PA11), North American Datum, Pacific plate (2011)
`NAD83_MA`	NAD83(MA11), North American Datum, Marianas plate (2011)
`GDA94`	GDA94(2010), Geocentric Datum of Australia (2010)
`Default`	Default datum, which depends on the positioning mode as explained below
`User1`	First user-defined datum. The corresponding transformation parameters must be specified by the **`setUserDatum`** and **`setUserDatumVel`** commands, while the corresponding ellipsoid must be defined by the **`setUserEllipsoid`** command.
`User2`	Second user-defined datum

By default (argument *TargetDatum* set to `Default`), the datum depends on the positioning mode. For standalone and SBAS positioning, the coordinates refer to a global datum: WGS84 or ITRF (recent realisations of WGS84 and ITRF are closely aligned and the receiver considers them equivalent). When using corrections from the LBAS1 service (multi-base DGNSS or PPP), the coordinates refer to ITRF. When using DGNSS or RTK corrections from a local DGNSS/RTK provider, the datum is defined by the coordinates of the base station.

With this command, the user can select the datum the coordinates should refer to. In case you are using corrections from a local DGNSS/RTK provider, the datum to be specified here must be the datum used by your correction provider.

When a non-default datum is selected, the receiver transforms all the WGS84/ITRF coordinates to the specified datum. Positions obtained using local or regional DGNSS/RTK corrections are not transformed, as it is assumed that the selected datum is the one used by the DGNSS/RTK provider.

In the current firmware version, the `WGS84` value for the *TargetDatum* argument has no effect, but it is kept for backwards compatibility reasons. Setting *TargetDatum* to `WGS84` is equivalent to setting it to `Default`.

Example

```
COM1>  sgd, ETRS89 <CR>
$R: sgd, ETRS89
  GeodeticDatum, ETRS89
COM1>
```

sgu ggu	**setGeoidUndulation** **getGeoidUndulation**	*Mode*	*Undulation*							
		auto manual	-250.0 . . . 0.0 . . . 250.0 m							

RxControl: Navigation > Receiver Operation > Position > Earth Models

Use these commands to define/inquire the geoid undulation at the receiver position. The geoid undulation specifies the local difference between the geoid and the WGS84 ellipsoid.

If *Mode* is set to `auto`, the receiver computes the geoid undulation with respect to the WGS84 ellipsoid using the model defined in 'Technical Characteristics of the NAVSTAR GPS, NATO, June 1991', regardless of the datum specified with the **`setGeodeticDatum`** command. In `auto` mode, the *Undulation* argument is ignored.

The geoid undulation is included in the `PVTCartesian` and the `PVTGeodetic` SBF blocks and in the NMEA position messages.

Examples

```
COM1>  sgu, manual, 25.3 <CR>
$R: sgu, manual, 25.3
  GeoidUndulation, manual, 25.3
COM1>

COM1>  ggu <CR>
$R: ggu
  GeoidUndulation, manual, 25.3
COM1>
```

sga gga	**setGNSSAttitude** **getGNSSAttitude**	*Source*								
		none MovingBase								

RxControl: Navigation > Positioning Mode > GNSS Attitude

Use this command to define/inquire the way GNSS-based attitude is computed.

The attitude of a vehicle (more precisely the heading and pitch angles) can be determined from the orientation of the baseline between two antennas attached to the vehicle. See also the **`setAntennaLocation`** command.

The *Source* argument specifies how to compute the GNSS-based attitude:

Source	Description
`none`	GNSS attitude computation is disabled.
`MovingBase`	Attitude is computed from the baseline between antennas connected to two receivers configured in moving-base RTK operation (moving-base attitude).

Example

```
COM1>  sga, MovingBase <CR>
$R: sga, MovingBase
    GNSSAttitude, MovingBase, Fixed
COM1>
```

shm ghm	**setHealthMask** **getHealthMask**	***Engine*** *Engine*	*Mask*							
		+ Tracking + PVT all	off on							

RxControl: Navigation > Receiver Operation > Masks

Use these commands to define/inquire whether measurements should be produced for unhealthy satellite signals, and whether these measurements should be included in the PVT solution. All satellite signals of which the health is unknown to the receiver (because the health information has not been decoded yet or is not transmitted) are considered healthy.

If *Mask* is `on` for the `Tracking` engine, no measurements are generated for unhealthy signals, but these signals will remain internally tracked and their navigation data will be decoded and processed. This is to ensure immediate reaction in the event that the signal would become healthy again.

If *Mask* is `on` for the `PVT` engine, measurements from unhealthy signals are not included in the PVT. Setting this mask to `off` must be done with caution: including a non-healthy signal in the PVT computation may lead to unpredictable behaviour of the receiver.

Although possible, it does not make sense to enable unhealthy satellites for the PVT if they are disabled for tracking.

Examples

To track unhealthy satellites/signals, use:

```
COM1>  shm, Tracking, off <CR>
$R: shm, Tracking, off
  HealthMask, Tracking, off
COM1>

COM1>  ghm <CR>
$R: ghm
  HealthMask, Tracking, off
  HealthMask, PVT, on
COM1>
```

sim gim	**setIonosphereModel** **getIonosphereModel**	*Model*								
		auto off Klobuchar SBAS MultiFreq								

RxControl: Navigation > Receiver Operation > Position > Atmosphere

Use these commands to define/inquire the type of model used to correct ionospheric errors in the PVT computation. The following models are available:

Model	Description
`auto`	With this selection, the receiver will, based on the available information, automatically select the best model on a satellite to satellite basis.
`off`	The receiver will not correct measurements for the ionospheric delay. This may be desirable if the receiver is connected to a GNSS signal simulator.
`Klobuchar`	This model uses the parameters as transmitted by the GPS satellites to compute the ionospheric delays.
`SBAS`	This model complies with the DO229 standard [1]: it uses the near real-time ionospheric delays transmitted by the SBAS satellites in MT18 and MT26. If no such message has been received, the `Klobuchar` model is selected automatically.
`MultiFreq`	This model uses a combination of measurements on different carriers to accurately estimate ionospheric delays. It requires the availability of at least dual-frequency measurements.

Unless the model is set to `auto`, the receiver uses the same model for all satellites, e.g. if the `Klobuchar` model is requested, the Klobuchar parameters transmitted by GPS satellites are used for all tracked satellites, regardless of their constellation.

If not enough data is available to apply the prescribed model to a given satellite (for instance if only single-frequency measurements are available and the model is set to `MultiFreq`), the satellite in question will be discarded from the PVT. Under most circumstances, it is recommended to leave the model to `auto`.

Examples

To disable the compensation for ionospheric delays, use:

```
COM1>  sim, off <CR>
$R: sim, off
  IonosphereModel, off
COM1>

COM1>  gim <CR>
$R: gim
  IonosphereModel, off
COM1>
```

smv gmv	**setMagneticVariance** **getMagneticVariance**	*Mode*	*Variance*							
		auto manual	-180.0 . . . 0.0 . . . 180.0 deg							

RxControl: Navigation > Receiver Operation > Position > Earth Models

Use these commands to define the magnetic variance (a.k.a. magnetic declination) at the current position. The magnetic variance specifies the local offset of the direction to the magnetic north with respect to the geographic north. The variance is positive when the magnetic north is east of the geographic north.

By default (the argument *Mode* is set to `auto`), the receiver automatically computes the variance according to the International Geomagnetic Reference Field (IGRF) model, using the IGRF2010 coefficients corrected for the secular variation.

Note that the magnetic variance is used solely in the generation of NMEA messages.

Examples

```
COM1>  smv, manual, 1.1 <CR>
$R: smv, manual, 1.1
  MagneticVariance, manual, 1.1
COM1>

COM1>  gmv <CR>
$R: gmv
  MagneticVariance, manual, 1.1
COM1>
```

snrc gnrc	**setNetworkRTKConfig** **getNetworkRTKConfig**	*NetworkType*								
		auto VRS								

RxControl: Navigation > Positioning Mode > PPP and Differential Corrections

Use these commands to define/inquire the type of the RTK network providing the differential corrections.

In most cases, it is recommended to leave the *Type* argument to `auto` to let the receiver autodetect the network type. For some types of VRS networks (especially for those having long baselines between the base stations), optimal performance is obtained by forcing the type to `VRS`.

Example

```
COM1>  snrc, VRS <CR>
$R: snrc, VRS
NetworkRTKConfig, VRS
COM1>
```

snl gnl	**setNWALevels** **getNWALevels**	*Mode*	*HAL*	*VAL*						
		off on	0.00 . . . 1.20 . . . 1000.00 m	0.00 . . . 2.00 . . . 1000.00 m						

RxControl: Navigation > Receiver Operation > Position > Integrity

Use this command to set the navigation warning algorithm alert levels.

When *Mode* is "`on`", the receiver compares the 2DRMS horizontal and vertical accuracies of the position to the specified *HAL* and *VAL* values respectively. If one of the 2DRMS accuracies exceeds the corresponding alert limit, an "accuracy-not-met" flag is set in the `AlertFlag` of the `PVTCartesian` and `PVTGeodetic` SBF blocks.

When *Mode* is `off` (default), the accuracy test is disabled.

Example

```
COM1>  snl, on, 20, 30<CR>
$R: snl, on, 20, 30
  NWALevels, on, 20.0, 30.0
COM1>
```

epss gpss	**exePPPSetSeedGeod** **getPPPSetSeedGeod**	***Latitude***	***Longitude***	***Altitude***	***Datum***					
		-90.000000000 ...0.000000000 ...90.000000000 deg	-180.000000000 ...0.000000000 ...180.000000000 deg	-1000.0000 ...0.0000 ...30000.0000 m	WGS84 ETRS89 NAD83 NAD83_PA NAD83_MA GDA94 User1 User2 Other					

RxControl: Navigation > Receiver Initialization > PPP Set Seed

Use this command to seed the PPP engine with the specified position. The geodetic coordinates in the *Latitude*, *Longitude* and *Altitude* arguments are that of the marker, and not of the ARP. The argument *Longitude* is positive to the east of Greenwich.

The datum to which the coordinates refer must be specified with the *Datum* argument:

Datum	Description
`WGS84`	WGS84 or ITRFxx (the receiver does not make a distinction between them)
`ETRS89`	European ETRS89 (ETRF2000 realization)
`NAD83`	NAD83(2011), North American Datum (2011)
`NAD83_PA`	NAD83(PA11), North American Datum, Pacific plate (2011)
`NAD83_MA`	NAD83(MA11), North American Datum, Marianas plate (2011)
`GDA94`	GDA94(2010), Geocentric Datum of Australia (2010)
`User1`	First user-defined datum. The corresponding transformation parameters must be specified by the **`setUserDatum`** and **`setUserDatumVel`** commands, while the corresponding ellipsoid must be defined by the **`setUserEllipsoid`** command.
`User2`	Second user-defined datum
`Other`	Datum not in the list or unknown

The receiver applies the necessary transformations to ITRF (the datum used by the PPP engine) automatically. If the *Datum* argument is set to `Other`, no datum transformation is applied.

It is the user's responsibility to ensure that the specified marker position is centimeter-accurate and that the datum is properly specified. Inaccurate seeding will result in a long convergence time, and/or in an incorrect estimate of the variance/covariance matrix of the PPP solution.

At the moment when the command is entered, the receiver must be static. To prevent gross errors, the command is ignored when the seed significantly differs from the current position computed by the receiver, or when the current velocity is not zero.

In the event that the command is issued when the receiver is already in PPP mode, the PPP filter is reset and re-seeded.

Example

```
COM1>  epss, 4.5, 3.568, 0.1 <CR>
$R: epss, 4.5, 3.568, 0.1
  PPPSetSeedGeod, 4.500000000, 3.568000000, 0.1000
COM1>
```

spm gpm	**setPVTMode** **getPVTMode**	*Mode*	*RoverMode*	*StaticPosition*	*ExtSensorIntegratic*				
		Static Rover	+ StandAlone + SBAS + DGPS + RTKFloat + RTKFixed + PPP + RTK all	auto Geodetic1 Geodetic2 Geodetic3 Geodetic4 Geodetic5 Cartesian1 Cartesian2 Cartesian3 Cartesian4 Cartesian5	off				

RxControl: Navigation > Positioning Mode > PVT Mode

Use these commands to define/inquire the PVT mode of the receiver. The argument *Mode* specifies the general positioning mode. If `Rover` is selected, the receiver will assume that the receiver is moving and compute the best PVT allowed by the *RoverMode* argument. If `Static` is selected, the receiver will assume that it is fixed and will use the position defined by the *StaticPosition* argument.

The argument *RoverMode* specifies the allowed PVT modes when the receiver is operating in `Rover` mode. Different modes can combined with the "+" operator. Refer to the "Operation Details" chapter of the Firmware User Manual for a description of the PVT modes. The value `RTK` is an alias for `RTKFloat+RTKFixed`. When more than one mode is enabled in *RoverMode*, the receiver automatically selects the mode that provides the most accurate solution with the available data.

The position provided in the *StaticPosition* argument must be defined with the **`setStaticPosCartesian`** or the **`setStaticPosGeodetic`** commands. If the value `auto` is selected for this argument, the receiver will wait till a reliable PVT solution is available and it will use that solution as static position. In `auto` mode, the static coordinates computed by the receiver refer to the datum specified with the **`setGeodeticDatum`** argument.

The argument *ExtSensorIntegration* defines how to compute an INS/GNSS integrated navigation and attitude solution in case an IMU sensor is connected to the receiver. The following options are available:

ExtSensorIntegration	Description
`off`	INS data not used by the PVT (GNSS-only solution)

Examples

```
COM1>  spm, Rover, StandAlone+RTK <CR>
$R: spm, Rover, StandAlone+RTK
  PVTMode, Rover, StandAlone+RTK, auto, off
COM1>
```

To set up a fixed base station at a known location, use the following:

```
COM1>  sspg, Geodetic1, 50.5209, 4.4245, 113.3 <CR>
$R: sspg, Geodetic1, 50.5209, 4.4245, 113.3
  StaticPosGeodetic, Geodetic1, 50.52090000, 4.42450000, 113.3000
COM1>  spm, Static, , Geodetic1 <CR>
```

```
$R: spm, Static, , Geodetic1
  PVTMode, Static, StandAlone+RTK, Geodetic1, off
COM1>
```

srl grl	**setRAIMLevels** **getRAIMLevels**	*Mode*	*Pfa*	*Pmd*	*Reliability*					
		off on	-12 . . . -4 . . . -1	-12 . . . -4 . . . -1	-12 . . . -3 . . . -1					

RxControl: Navigation > Receiver Operation > Position > Integrity

Use these commands to define/inquire the parameters of the Receiver Autonomous Integrity Monitoring (RAIM) algorithm in rover PVT mode. Refer to the Firmware User Manual for a description of RAIM in your receiver.

The *Mode* argument acts as an on/off switch: it determines whether RAIM is active or not. If *Mode* is set to `off`, the test statistics are still computed and the results are available in the `RAIMStatistics` SBF block. However, the outcome of the tests has no effect on the positional output: there is no attempt to remove outliers from the PVT.

The *Pfa* argument sets the probability of false alarm of the w-test used in the "identification" step of the RAIM algorithm. Increasing this parameter increases the integrity but may reduce the availability of the positional solution.

The *Pmd* argument sets the probability of missed detection, which the receiver uses to compute the Minimal Detectable Bias and hence the XERL values.

The *Reliability* argument sets the probability of false alarm of the Overall Model test used in the "detection" step of the RAIM algorithm.

The value to be provided in the *Pfa*, *Pmd* and *Reliability* arguments are the base-10 logarithms of the desired probabilities. For instance, if you want a probability of false alarm of 1e-6, you have to set the *Pfa* argument to -6.

Note that this command has no effect when the receiver is configured in static PVT mode with the **`setPVTMode, static`** command.

Examples

To configure the receiver outlier detection with a probability of 1e-4 (0.01%) that a false alarm will be raised (type I error), a probability of 1e-4 (0.01%) that an outlier will be missed (type II error) and an Overall Model probability of false alarm of 1e-6 (0.0001%), use:

```
COM1>  srl, on, -4, -4, -6 <CR>
$R: srl, on, -4, -4, -6
  RAIMLevels, on, -4, -4, -6
COM1>
```

To disable the outlier detection, use:

```
COM1>  srl, off <CR>
$R: srl, off
  RAIMLevels, off, -4, -4, -6
COM1>
```

srd grd	**setReceiverDynamics** **getReceiverDynamics**	*Level*	*Motion*							
		Max High Moderate Low	Static Quasistatic Pedestrian Automotive RaceCar HeavyMachinery UAV Unlimited							

RxControl: Navigation > Receiver Operation > Position > Motion

Use these commands to set/inquire the type of the dynamics the GNSS antenna is subjected to. The receiver adapts internal parameters for optimal performance for the selected type of dynamics.

The *Level* argument indicates the level of short-term acceleration and jerk the antenna is subjected to. That argument has effect on the navigation Kalman filter and on the tracking loops (only if the loops are in adaptive mode, see the **`setTrackingLoopParameters`** command). Setting this argument to `low` will reduce the noise on the GNSS measurements and PVT at the expense of filtering out rapid dynamic changes. Setting it to `high` will allow more dynamics to be visible at the expense of noise. The `max` level is primarily meant for test purposes: in that level, the Kalman filter is disabled and the receiver computes epoch-by-epoch independent PVT solutions.

Note that rapid displacements such as the ones caused by shocks, drops, oscillations or vibrations lead to high jerk values, even if the amplitude of the motion is not larger than a few centimeters. It is recommended to set *Level* to `high` for antennas subjected to that type of displacements.

The *Motion* argument defines the type of motion the antenna is subjected to.

Motion	Description
`Static`	Fixed base and reference stations.
`Quasistatic`	Low speed, limited area motion typical of surveying applications.
`Pedestrian`	Low speed (<7m/s) motion. E.g. pedestrians, low-speed land vehicles, ...
`Automotive`	Medium speed (<50m/s) motion. E.g. passenger cars, rail vehicles, ...
`RaceCar`	High speed terrestrial vehicle. E.g. race cars, ...
`HeavyMachinery`	Construction equipment, tractors, ...
`UAV`	Unmanned Aerial Vehicle.
`Unlimited`	Unconstrained motion.

Example

```
COM1>  srd, Max <CR>
$R: srd, Max
  ReceiverDynamics, Max, Automotive
COM1>
```

ernf grnf	**exeResetNavFilter** **getResetNavFilter**	***Level***								
		+ PVT + AmbRTK all								

RxControl: Navigation > Receiver Initialization > Reset Navigation Filter

Use this command to reset the different navigation filters in the receiver. The user can reset each navigation filter independently or together with the value `all`.

The following values for *Level* are defined:

Level	Description
`PVT`	Reset the whole PVT filter such that all previous positioning information is discarded, including the RTK ambiguities and the INS/GNSS integration filter when applicable.
`AmbRTK`	Only reset the ambiguities used in RTK positioning to float status.

Example

```
COM1>  ernf, PVT <CR>
$R: ernf, PVT
  ResetNavFilter, PVT
COM1>
```

ssu gsu	**setSatelliteUsage** **getSatelliteUsage**	*Satellite*								
		none + G01 ... G32 + R01 ... R24 + E01 ... E32 + S120 ... S140 + GPS + GLONASS + GALILEO + SBAS all								

RxControl: Navigation > Advanced User Settings > PVT > Satellite Usage

Use these commands to define/inquire which satellites are allowed to be included in the PVT computation. It is possible to enable or disable a single satellite (e.g. `G01` for GPS PRN1), or a whole constellation. `Gxx`, `Exx`, `Rxx` and `Sxxx` refer to a GPS, Galileo, GLONASS and SBAS satellite respectively. GLONASS satellites must be referenced by their slot number (from 1 to 24) in this command.

This command only affects the usage of range and Doppler measurements within the PVT computation. Navigation data transmitted by the satellite such as the SBAS corrections are always used if applicable.

Examples

To only use GPS measurements in the PVT computation, use:

```
COM1>  ssu, GPS <CR>
$R: ssu, GPS
  SatelliteUsage, G01+G02+G03+G04+G05+G06+G07+G08+G09+G10+G11
+G12+G13+G14+G15+G16+G17+G18+G19+G20+G21+G22+G23+G24+G25+G26
+G27+G28+G29+G30+G31+G32
COM1>
```

To add the usage of SBAS measurements in the PVT, use:

```
COM1>  ssu, +SBAS <CR>
$R: ssu, +SBAS
  SatelliteUsage, G01+G02+G03+G04+G05+G06+G07+G08+G09+G10+G11
+G12+G13+G14+G15+G16+G17+G18+G19+G20+G21+G22+G23+G24+G25+G26
+G27+G28+G29+G30+G31+G32+S120+S121+S122+S123+S124+S125+S126
+S127+S128+S129+S130+S131+S132+S133+S134+S135+S136+S137+S138
+S139+S140
COM1>
```

To remove the measurement of one satellite from the PVT, use:

```
COM1>  ssu, -S120 <CR>
$R: ssu, -S120
  SatelliteUsage, G01+G02+G03+G04+G05+G06+G07+G08+G09+G10+G11
+G12+G13+G14+G15+G16+G17+G18+G19+G20+G21+G22+G23+G24+G25+G26
+G27+G28+G29+G30+G31+G32+S121+S122+S123+S124+S125+S126+S127
+S128+S129+S130+S131+S132+S133+S134+S135+S136+S137+S138
+S139+S140
```

```
COM1>
```

ssbc gsbc	**setSBASCorrections** **getSBASCorrections**	*Satellite*	*SISMode*	*NavMode*	*DO229Version*					
		auto EGNOS WAAS MSAS S120 ... S140	Test Operational	EnRoute PrecApp	auto DO229C					

RxControl: Navigation > Positioning Mode > SBAS Corrections

Use these commands to define/inquire the details on the usage of SBAS data in the PVT computation. This command does not define whether SBAS corrections are to be used or not in the PVT (this is done by the **`setPVTMode`** command), but it specifies how these corrections should be used.

The *Satellite* argument defines the provider of SBAS corrections, being either an individual satellite or a satellite system. If `EGNOS`, `WAAS` or `MSAS` is selected, the receiver restricts the automatic selection of a satellite to those that are part of the EGNOS, WAAS or MSAS system. When `auto` is selected for the *Satellite* argument, the receiver will automatically select a satellite on the basis of the location of the receiver and on the availability of SBAS corrections.

The *SISMode* argument defines the interpretation of a "Do Not Use for Safety Applications" message. When set to `Operational`, the receiver will discard all SBAS corrections received from a satellite upon reception of a MT00 from that satellite. Note that MT02 content encoded in a MT00 message will be interpreted by the receiver as a MT02 message: only MT00 with all '0' symbols will be interpreted as a true "Do Not Use for Safety Applications". When the argument *SISMode* is set to `Test`, the receiver will ignore the reception of a "Do Not Use for Safety Applications" message. This provides the possibility to use a signal from a SBAS system in test mode.

The DO 229 standard, which has its origin in aviation, makes a distinction between two positioning applications: en-route and precision approach. The choice between both applications influences the length of the interval during which the SBAS corrections are valid. During a precision approach the validity of the data is much shorter. The receiver can operate in both modes, which is controlled by the *NavMode* argument.

The *DO229Version* argument can be used to specify which version of the DO 229 standard to conform to.

Example

To force the receiver to use corrections from PRN 122 and ignore message MT00:

```
COM1>  ssbc, S122, Test <CR>
$R: ssbc, S122, Test
  SBASCorrections, S122, Test, EnRoute, auto
COM1>
```

snu gnu	**setSignalUsage** **getSignalUsage**	*Signal*	*NavData*							
		+ GPSL1CA + GPSL1PY + GPSL2PY + GPSL2C + GPSL5 + GLOL1CA + GLOL2P + GLOL2CA + GALL1BC + GALE5a + GEOL1 + GEOL5 all	+ GPSL1CA + GPSL1PY + GPSL2PY + GPSL2C + GPSL5 + GLOL1CA + GLOL2P + GLOL2CA + GALL1BC + GALE5a + GEOL1 + GEOL5 all							

RxControl: Navigation > Advanced User Settings > PVT > Signal Usage

Use these commands to define/inquire which signals are allowed to be included in the PVT computation. This command has a similar role as **`setSignalTracking`**, but its effect is limited to the PVT engine. Removing an entry from the argument *Signal* will disable the usage of the corresponding range, phase & Doppler measurements in the PVT computation. Removing an entry from the argument *NavData* will disable the usage of the corresponding navigation information (ephemeris, ionosphere parameters ...).

Example

To force the receiver to only use the L1 GPS C/A measurements and navigation information in the PVT solution, use:

```
COM1>  snu, GPSL1CA, GPSL1CA <CR>
$R: snu, GPSL1CA, GPSL1CA
  SignalUsage, GPSL1CA, GPSL1CA
COM1>
```

sspc gspc	**setStaticPosCartesian** **getStaticPosCartesian**	***Position*** *Position*	*X*	*Y*	*Z*	*Datum*				
		+ Cartesian1 + Cartesian2 + Cartesian3 + Cartesian4 + Cartesian5 all	-8000000.0000 ... 0.0000 ... 8000000.0000 m	-8000000.0000 ... 0.0000 ... 8000000.0000 m	-8000000.0000 ... 0.0000 ... 8000000.0000 m	WGS84 ETRS89 NAD83 NAD83_PA NAD83_MA GDA94 User1 User2 Other				

RxControl: Navigation > Positioning Mode > PVT Mode

Use these commands to define/inquire a set of Cartesian coordinates. This command should be used in conjunction with the **setPVTMode** command to specify a base station position. The Cartesian coordinates in the *X*, *Y* and *Z* arguments must refer to the antenna reference point (ARP), and not to the marker.

The argument *Datum* specifies the datum to which the coordinates refer:

Datum	Description
WGS84	WGS84 or ITRFxx (the receiver does not make a distinction between them)
ETRS89	European ETRS89 (ETRF2000 realization)
NAD83	NAD83(2011), North American Datum (2011)
NAD83_PA	NAD83(PA11), North American Datum, Pacific plate (2011)
NAD83_MA	NAD83(MA11), North American Datum, Marianas plate (2011)
GDA94	GDA94(2010), Geocentric Datum of Australia (2010)
User1	First user-defined datum. The corresponding transformation parameters must be specified by the **setUserDatum** and **setUserDatumVel** commands, while the corresponding ellipsoid must be defined by the **setUserEllipsoid** command.
User2	Second user-defined datum
Other	Datum not in the list or unknown

Example

To set up a static base station in Cartesian coordinates, use the following sequence:

```
COM1>  sspc, Cartesian1, 4019952.028, 331452.954, 4924307.458 <CR>
$R: sspc, Cartesian1, 4019952.028, 331452.954, 4924307.458
  StaticPosCartesian, Cartesian1, 4019952.0280, 331452.9540,
     4924307.4580,
WGS84
COM1>  spm, Static, , Cartesian1 <CR>
$R: spm, Static, , Cartesian1
  PVTMode, Static, StandAlone+SBAS+DGPS+RTKFloat+RTKFixed,
     Cartesian1
COM1>
```

sspg gspg	**setStaticPosGeodetic** **getStaticPosGeodetic**	***Position*** *Position*	*Latitude*	*Longitude*	*Altitude*	*Datum*				
		+ Geodetic1 + Geodetic2 + Geodetic3 + Geodetic4 + Geodetic5 all	-90.000000000 ...0.000000000 ...90.000000000 deg	-180.000000000 ...0.000000000 ...180.000000000 deg	-1000.0000 ...0.0000 ...30000.0000 m	WGS84 ETRS89 NAD83 NAD83_PA NAD83_MA GDA94 User1 User2 Other				

RxControl: Navigation > Positioning Mode > PVT Mode

Use these commands to define/inquire a set of geodetic coordinates. This command should be used in conjunction with the **`setPVTMode`** command to specify a base station position. The geodetic coordinates in the *Latitude*, *Longitude* and *Altitude* arguments must refer to the antenna reference point (ARP), and not to the marker.

The argument *Datum* specifies the datum to which the coordinates refer. See the **`setStaticPosCartesian`** command for a short description of the supported datums.

Example

To set up a static base station in geodetic coordinates, use the following sequence:

```
COM1>  sspg, Geodetic1, 50.86696443, 4.71347657, 114.880 <CR>
$R: sspg, Geodetic1, 50.86696443, 4.71347657, 114.880
  StaticPosGeodetic, Geodetic1, 50.86696443, 4.71347657, 114.8800,
     WGS84
COM1>  spm, Static, , Geodetic1 <CR>
$R: spm, Static, , Geodetic1
  PVTMode, Static, StandAlone+SBAS+DGPS+RTKFloat+RTKFixed,
     Geodetic1
COM1>
```

sts gts	**setTimingSystem** **getTimingSystem**	*System*								
		GST GPS								

RxControl: Navigation > Receiver Operation > Timing

Use these commands to define/inquire the time system in which the receiver should operate. Galileo System Time (GST) is only supported on Galileo-enabled receivers. The selected *System* time will be used as reference time for clock bias computation.

Note that at least one satellite of the selected system (GPS or Galileo) must be visible and tracked by the receiver. Otherwise no PVT will be computed.

Examples

```
COM1>  sts, GPS <CR>
$R: sts, GPS
  TimingSystem, GPS
COM1>

COM1>  gts <CR>
$R: gts
  TimingSystem, GPS
COM1>
```

stm gtm	**setTroposphereModel** **getTroposphereModel**	*ZenithModel*	*MappingModel*							
		off Saastamoinen MOPS	Niell MOPS							

RxControl: Navigation > Receiver Operation > Position > Atmosphere

Use these commands to define/inquire the type of model used to correct tropospheric errors in the PVT computation.

The *ZenithModel* parameter indicates which model the receiver uses to compute the dry and wet delays for radio signals at 90 degree elevation. The modelled zenith tropospheric delay depends on assumptions for the local air total pressure, the water vapour pressure and the mean temperature. The following zenith models are defined:

ZenithModel	Description
`off`	The measurements will not be corrected for the troposphere delay. This may be desirable if the receiver is connected to a GNSS signal simulator.
`Saastamoinen`	Saastamoinen, J. (1973). "Contributions to the theory of atmospheric refraction". In three parts. Bulletin Geodesique, No 105, pp. 279-298; No 106, pp. 383-397; No. 107, pp. 13-34.
`MOPS`	Minimum Operational Performance Standards for Global Positioning/Wide Area Augmentation System Airborne Equipment RTCA/DO-229C, November 28, 2001.

The `Saastamoinen` model uses user-provided values of air temparature, total air pressure referenced to the Mean Sea Level and relative humidity (see **`setTroposphereParameters`** command) and estimates actual values adjusted to the receiver height.

The MOPS model neglects the user-provided values and instead assumes a seasonal model for all the climatic parameters. Local tropospheric conditions are estimated based on the coordinates and time of the year.

The use of the `Saastamoinen` model can be recommended if external information on temperature, pressure, humidity is available. Otherwise it is advisable to rely on climate models.

The zenith delay is mapped to the current elevation for each satellite using the requested *MappingModel*. The following mapping models are defined:

MappingModel	Description
`Niell`	Niell, A.E. (1996). Global Mapping Functions for the atmosphere delay at radio wavelengths, Journal of Geophysical Research, Vol. 101, No. B2, pp. 3227-3246.
`MOPS`	Minimum Operational Performance Standards for Global Positioning/Wide Area Augmentation System Airborne Equipment RTCA/DO-229C, November 28, 2001.

Examples

```
COM1>  stm, MOPS, MOPS <CR>
$R: stm, MOPS, MOPS
  TroposhereModel, MOPS, MOPS
COM1>

COM1>  gtm <CR>
$R: gtm
  TroposhereModel, MOPS, MOPS
COM1>
```

stp gtp	**setTroposphereParameters** **getTroposphereParameters**	*Temperature*	*Pressure*	*Humidity*						
		-100.0 . . . 15.0 . . . 100.0 degC	800.00 . . . 1013.25 . . . 1500.00 hPa	0 . . . 50 . . . 100 %						

RxControl: Navigation > Receiver Operation > Position > Atmosphere

Use these commands to define/inquire the climate parameters to be used when the zenith troposphere is estimated using the Saastamoinen model (see the **`setTroposphereModel`** command).

The troposphere model assumes the climate parameters to be valid for a receiver located at the Mean Sea Level (MSL). If you want to use your receiver with a weather station, you have to convert the measured *Temperature*, *Pressure* and *Humidity* to MSL.

Example

```
COM1>  stp, 25, 1013, 60<CR>
$R: stp, 25, 1013, 60
  TroposphereParameters, 25.0, 1013.00, 60
COM1>
```

sud gud	**setUserDatum** **getUserDatum**	***Datum*** *Datum*	*Tx*	*Ty*	*Tz*	*Rx*	*Ry*	*Rz*	*D*	
		+ User1 + User2 all	-2000000.00 ...0.00 ...2000000.00 mm	-2000000.00 ...0.00 ...2000000.00 mm	-2000000.00 ...0.00 ...2000000.00 mm	-100.0000 ...0.0000 ...100.0000 mas	-100.0000 ...0.0000 ...100.0000 mas	-100.0000 ...0.0000 ...100.0000 mas	-100.00000 ...0.00000 ...100.00000 ppb	

RxControl: Navigation > Receiver Operation > Position > Datum

Use these commands to define datum transformation parameters from the global WGS84/ITRF datum to the user datum identified by the first argument.

The receiver applies the linearized form of the Helmert similarity transformation. The coordinates in WGS84/ITRF are transformed to the user datum using the following formula:

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix}_{User} = \begin{pmatrix} T_x \\ T_y \\ T_z \end{pmatrix} + \begin{pmatrix} D+1 & -R_z & R_y \\ R_z & D+1 & -R_x \\ -R_y & R_x & D+1 \end{pmatrix} . \begin{pmatrix} X \\ Y \\ Z \end{pmatrix}_{WGS84/ITRF}$$

where T_x, T_y and T_z are the three translation components, R_x, R_y and R_z are the rotation angles and D is the scale factor. Note that the rotation angles are expressed in radians in the above formula, but they must be provided in milliarcsecond (1 mas = $2\pi/360/3600000$ radians) in the arguments of the command. The sign convention corresponds to that of the IERS Conventions (2010), Technical Note No. 36.

The time derivative of the transformation parameters can be specified with the command **`setUserDatumVel`**.

For the receiver to apply the transformation parameters, the corresponding user datum must be selected in the **`setGeodeticDatum`** command.

Example

```
COM1>  sud, User1, 52.1, 49.3, -58.5, 0.891, 5.390, -8.712,
   1.34<CR>
$R: sud, User1, 52.1, 49.3, -58.5, 0.891, 5.390, -8.712, 1.34
  UserDatum, User1, 52.10, 49.30, -58.50, 0.8910, 5.3900, -8.7120,
     1.34000
COM1>
```

sudv gudv	**setUserDatumVel** **getUserDatumVel**	***Datum*** *Datum*	*TxVel*	*TyVel*	*TzVel*	*RxVel*	*RyVel*	*RzVel*	*DVel*	*RefYear*
		+ User1 + User2 all	-2000.00 . . . 0.00 . . . 2000.00 mm/yr	-2000.00 . . . 0.00 . . . 20000.00 mm/yr	-2000.00 . . . 0.00 . . . 2000.00 mm/yr	-10.0000 . . . 0.0000 . . . 10.0000 mas/yr	-10.0000 . . . 0.0000 . . . 10.0000 mas/yr	-10.0000 . . . 0.0000 . . . 10.0000 mas/yr	-1.00000 . . . 0.00000 . . . 1.00000 ppb/yr	1900.00 . . . 2000.00 . . . 2100.00 yr

RxControl: Navigation > Receiver Operation > Position > Datum

Use these commands to define the time derivative of the seven datum transformation parameters defined with the **setUserDatum** command.

For instance, *TxVel* is the yearly change of the X-translation component. At the epoch specified with *RefYear* (in decimal years), the X-translation component is *Tx* as defined in **setUserDatum**. One year later, the X-translation component is *Tx*+*TxVel*, etc.

Refer to **setUserDatum** command for a description of the datum transformation formula implemented in the receiver.

Example

```
COM1>  sudv, User1, 0.1, 0.1, -1.8, 0.081, 0.49, -0.792, 0.08,
   2000<CR>
$R: sudv, User1, 0.1, 0.1, -1.8, 0.081, 0.49, -0.792, 0.08, 2000
  UserDatumVel, User1, 0.10, 0.10, -1.80, 0.0810, 0.4900, -0.7920,
     0.08000, 2000.00
COM1>
```

sue gue	**setUserEllipsoid** **getUserEllipsoid**	***Datum*** *Datum*	*a*	*Invf*						
		+ User1 + User2 all	6300000.000 . . . 6378137.000 . . . 6400000.000 m	290.000000000 . . . 298.257223563 . . . 305.000000000						

RxControl: Navigation > Receiver Operation > Position > Datum

Use these commands to define the ellipsoid associated with the `User1` or `User2` datums.

a is the reference ellispoid semi-major axis and *Invf* is the inverse of the flattening.

See also the **`setGeodeticDatum`** and the **`setUserDatum`** commands.

Example

```
COM1>  sue, User1, 6378388, 297 <CR>
$R: sue, User1, 6378388, 297
  UserEllipsoid, User1, 6378388.000, 297.000000000
COM1>
```

3.4 Receiver Operation Commands

scst gcst	**setClockSyncThreshold** **getClockSyncThreshold**	*Threshold*								
		ClockSteering usec500 msec1 msec2 msec3 msec4 msec5								

RxControl: Navigation > Receiver Operation > Timing

Use these commands to define/inquire the maximum allowed offset between the receiver internal clock and the system time defined by the **`setTimingSystem`** command.

If the argument `ClockSteering` is selected, the receiver internal clock is continuously steered to the system time to within a couple of nanoseconds. Clock steering accuracy is dependent on the satellite visibility, and it is recommended to only enable it under open-sky conditions.

If any other argument is selected, the internal clock is left free running, and synchronization with the system time is done through regular millisecond clock jumps. More specifically, when the receiver detects that the time offset is larger than *Threshold*, it initiates a clock jump of an integer number of milliseconds to re-synchronise its internal clock with the system time. These clock jumps have no influence on the generation of the xPPS pulses: the xPPS pulses are always maintained within a few nanoseconds from the requested time, regardless of the value of the *Threshold* argument.

Please refer to the Firmware User Manual for a more detailed description of the time keeping in your receiver.

Example

To enable clock steering, use:

```
COM1>  scst, clocksteering <CR>
$R: scst, clocksteering
  ClockSyncThreshold, ClockSteering
COM1>
```

sep gep	**setEventParameters** **getEventParameters**	***Event*** *Event*	*Polarity*							
		+ EventA + EventB all	Low2High High2Low							

RxControl: Navigation > Receiver Operation > Timing

Use these commands to define/inquire the polarity of the electrical transition on which the receiver will react on its `Event` input(s). The polarity of each event pin can be set individually or simultaneously by using the value `all` for the *Event* argument.

Example

```
COM1>  sep, EventA, High2Low <CR>
$R: sep, EventA, High2Low
  EventParameters, EventA, High2Low
COM1>
```

sgpf ggpf	**setGPIOFunctionality** **getGPIOFunctionality**	***GPPin*** *GPPin*	*Mode*	*Input*	*Output*					
		+ GP1 + GP2 + GP3 all	Output	none	LevelLow LevelHigh					

RxControl: Navigation > Receiver Operation > GPIO

Use these commands to define/inquire the functionality assigned to every GPIO pin.

Currently, only the output pins (`GPx`) can be controlled by this command, and the *Mode* and *Input* arguments can only take the values `Output` and `none` respectively. The argument *Output* sets the electrical level to be applied to the pin specified in *GPPin*.

In housed products, the number of GPIO pins configurable by this command is larger than the number of GPIO pins available to the user. The extra pins are used for internal purposes, and their settings should not be modified. Please refer to the Hardware Manual of your product to check which GPIO pins are available.

Example

To set the signal on GP2 to a logical 1, use:

```
COM1>  sgpf, GP2, Output, , LevelHigh <CR>
$R: sgpf, GP2, Output, , LevelHigh
  GPIOFunctionality, GP2, Output, none, LevelHigh
COM1>
```

slm glm	**setLEDMode** **getLEDMode**	*GPLED*								
		DIFFCORLED PVTLED LOGLED								

RxControl: Navigation > Receiver Operation > GPIO

Use these commands to define/inquire the blinking mode of the General Purpose LED (GPLED).

The different LED blinking modes are described in the Hardware Manual of your receiver.

Example

```
COM1>  slm, DIFFCORLED <CR>
$R: slm, DIFFCORLED
  LEDMode, DIFFCORLED
COM1>
```

spps gpps	**setPPSParameters** **getPPSParameters**	*Interval*	*Polarity*	*Delay*	*TimeScale*	*MaxSyncAge*				
		off msec100 msec200 msec500 sec1 sec2 sec5 sec10	Low2High High2Low	-1000000.00 . . . 0.00 . . . 1000000.00 nsec	TimeSys UTC RxClock GLONASS	1 . . . 60 . . . 3600 sec				

RxControl: Navigation > Receiver Operation > Timing

Use these commands to define/inquire the interval, the polarity, the delay and time scale of the x-pulse-per-second (xPPS) output. Please refer to the Firmware User Manual for a detailed description of the xPPS functionality.

The *Interval* argument specifies the time interval between the pulses. A special value "`off`" is defined to disable the xPPS signal.

The *Polarity* argument defines the polarity of the xPPS signal.

The *Delay* argument can be used to compensate for the overall signal delays in the system (including antenna, antenna cable and xPPS cable). Setting *Delay* to a higher value causes the xPPS pulse to be generated earlier. For example, if the antenna cable is replaced by a longer one, the overall signal delay could be increased by, say, 20 nsec. If *Delay* is left unchanged, the xPPS pulse will come 20 nsec too late. To re-synchronize the xPPS pulse, *Delay* has to be increased by 20 nsec.

By default, the xPPS pulses are aligned with the satellite time system (*TimeSys*) that is defined by the **`setTimingSystem`** command. Using the *TimeScale* argument, it is also possible to align the xPPS pulse with the local receiver time (`RxClock`), with GLONASS time or with UTC.

When *TimeScale* is set to anything else than `RxClock`, the accuracy of the position of the xPPS pulse depends on the age of the last PVT computation. During PVT outages (due for instance to signal blockage), the xPPS position is extrapolated on the basis of the last available PVT information, and may start to drift. To avoid large biases, the receiver stops outputting the xPPS pulse when the last PVT is older than the age specified in the *MaxSyncAge* argument. *MaxSyncAge* is ignored when *TimeScale* is set to `RxClock`.

Examples

```
COM1>  spps, sec1, , 23.4 <CR>
$R: spps, sec1, , 23.4
  PPSParameters, sec1, Low2High, 23.40, TimeSys, 60
COM1>

COM1>  gpps <CR>
$R: gpps
  PPSParameters, sec1, Low2High, 23.40, TimeSys, 60
COM1>
```

swui gwui	**setWakeUpInterval** **getWakeUpInterval**	*WakeUpTime (30*	*AwakeDuration*	*RepetitionPeriod*						
		2000-01-01 00:00:00	0 . . . 604800 sec	0 . . . 604800 sec						

RxControl: File > Power Mode > Scheduling

This command can be used to set up an automatic receiver awake/sleep pattern. It is possible to order the receiver to awake at a given time, for a certain period, and/or at regular intervals. A possible application is keeping fast time-to-first-fix even after days in sleep mode. This can be done by waking up the receiver every few hours for a few minutes, such that it can regularly refresh its ephemerides.

The *WakeUpTime* argument defines the epoch when the receiver should automatically wake up the first time. It also serves as reference epoch for the *RepetitionPeriod* argument. The time system in which the user should express the *WakeUpTime* is the one defined by the **setTimingSystem** command. The format of the *WakeUpTime* argument is "YYYY-MM-DD hh:mm:ss".

The *AwakeDuration* argument defines the period for which the receiver should stay awake. If this argument is set to 0 (the default value), the receiver will remain awake indefinitely.

The *RepetitionPeriod* can be used to repeat the awake/sleep pattern at regular interval. *RepetitionPeriod* should be at least 5 seconds longer than *AwakeDuration* to allow a minimum sleep time of 5 seconds between awake periods. If *RepetitionPeriod* is set to a value smaller than *AwakeDuration*, the repetition functionality is disabled.

Be aware that the receiver must know the time to automatically go into sleep mode, which requires signal tracking: if no antenna is connected to the receiver or if no satellite can be tracked during the *AwakeDuration*, the receiver will continue operating beyond its prescribed awake duration, and only possibly enter sleep mode at the next scheduled "go-to-sleep" epoch, if any.

To force the receiver to go into sleep mode immediately, use the command **exePowerMode, ScheduledSleep** instead.

If interaction with the receiver is needed during the sleep period, the user can always force the receiver to wake up by hardware means. The different ways to do so are described in the Hardware Manual. Usually, simply sending any character at the correct baud rate to the COM1 port wakes up the receiver. When maintenance is done, the user should put the receiver back in sleep mode by typing **exePowerMode, ScheduledSleep**. This does not perturb the awake/sleep pattern: the receiver will continue to automatically wake up at the next wake-up epoch.

Examples

If you want the receiver waking up on December 31, 2012 at 23h00 for 2 hours, use:

```
COM1>  swui, "2012-12-31 23:0:0", 7200 <CR>
$R: swui, "2012-12-31 23:0:0", 7200
  WakeUpInterval, "2012-12-31 23:00:00", 7200, 0
COM1>
```

If you want to set up an automatic wake up every day at midnight for 1 hour, use:

```
COM1>  swui, , 3600, 86400 <CR>
```

```
$R: swui, , 3600, 86400
    WakeUpInterval, "2000-01-01 00:00:00", 3600, 86400
COM1>
```

3.5 Session Settings Commands

smp gmp	**setMarkerParameters** **getMarkerParameters**	*MarkerName (60)*	*MarkerNumber (2*	*MarkerType (20)*						
		SEPT	Unknown	Unknown						

RxControl: Navigation > Receiver Setup > Station Settings

Use these commands to define/inquire the marker parameters.

The set of allowed characters for the *MarkerName* argument is:

```
_0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
```

If internal SBF or NMEA logging is enabled in one of the `IGS` file naming modes (see **`setFileNaming`** command), the file name is determined by the *MarkerName* argument. Changing *MarkerName* will cause the current log file to be closed, and a new file to be created.

When generating a RINEX observation file with the **`sbf2rin`** utility, the marker parameters are reflected in the header section and a "new site occupation" event is inserted between observation records each time the marker name or number is changed with this command.

Example

```
COM1>  smp, Test, 356, GEODETIC<CR>
$R: smp, Test, 356, GEODETIC
  MarkerParameters, Test, 356, GEODETIC
COM1>
```

soc goc	**setObserverComment** **getObserverComment**	*Comment (120)*								
		Unknown								

RxControl: Navigation > Receiver Setup > Station Settings

Use these commands to define/inquire the content of the `Comment` SBF block.

Examples

```
COM1>  soc, "Data taken with choke ring antenna" <CR>
$R: soc, "Data taken with choke ring antenna"
    ObserverComment, "Data taken with choke ring antenna"
COM1>

COM1>  goc <CR>
$R: goc
    ObserverComment, "Data taken with choke ring antenna"
COM1>
```

sop gop	**setObserverParameters** **getObserverParameters**	*Observer (20)*	*Agency (40)*							
		Unknown	Unknown							

RxControl: Navigation > Receiver Setup > Station Settings

Use these commands to define/inquire the observer name or ID, and his/her agency. These parameters are copied in the `ReceiverSetup` SBF block and in the header of RINEX observation files.

The length of the arguments complies with the RINEX format definition.

Examples

```
COM1>  sop, TestObserver, TestAgency <CR>
$R: sop, TestObserver, TestAgency
    ObserverParameters, "TestObserver", "TestAgency"
COM1>

COM1>  gop <CR>
$R: gop
    ObserverParameters, "TestObserver", "TestAgency"
COM1>
```

3.6 Input/Output Commands

scs gcs	**setCOMSettings** **getCOMSettings**	***Cd*** *Cd*	*Rate*	*DataBits*	*Parity*	*StopBits*	*FlowControl*			
		+ COM1 + COM2 + COM3 + COM4 all	baud1200 baud2400 baud4800 baud9600 baud19200 baud38400 baud57600 baud115200 baud230400 baud460800	bits8	No	bit1	none RTS|CTS			

RxControl: Communication > COM Port Settings

Use these commands to define/inquire the communication settings of the receiver's COM ports. By default, all COM ports are set to a baud rate of 115200 baud, using 8 data-bits, no parity, 1 stop-bit and no flow control.

Depending on your receiver hardware, it may be that not all COM ports support flow control. Please refer to the Hardware Manual to check which COM ports are equipped with the RTS/CTS lines.

In some housed products, the number of COM ports configurable by this command is larger than the number of COM ports available to the user. The extra COM ports are used for internal purposes, and their settings should not be modified. Please refer to the Hardware Manual of your product for further details.

When modifying the settings of the current connection, make sure to also modify the settings of your terminal emulation program accordingly.

Examples

```
COM1>  scs, COM1, baud19200 <CR>
$R: scs, COM1, baud19200
  COMSettings, COM1, baud19200, bits8, No, bit1, none
COM1>

COM1>  gcs, COM1 <CR>
$R: gcs, COM1
  COMSettings, COM1, baud19200, bits8, No, bit1, none
COM1>
```

sdio gdio	**setDataInOut** **getDataInOut**	***Cd*** *Cd*	*Input*	*Output*	*Show*					
		+ DSK1 + COM1 + COM2 + COM3 + COM4 + USB1 + USB2 all	none CMD RTCMv2 RTCMv3 CMRv2 DC1 DC2 RTCMV ASCIIIN auto	none + RTCMv2 + RTCMv3 + CMRv2 + SBF + NMEA + ASCIIDisplay + DC1 + DC2	(off) (on)					

RxControl: Communication > Input/Output Selection

Use these commands to define/inquire the type of data that the receiver should accept/send on a given connection descriptor (*Cd*).

The *Input* argument is used to tell the receiver how to interpret incoming bytes on the connection *Cd*. If a connection is to be used for receiving user commands or differential corrections in RTCM or CMR format, it is recommended to leave it in the default `auto` input mode. In this mode, the receiver automatically detects the input format.

It is also possible to set the input format explicitly. `CMD` means that the connection is to be used for user command input exclusively. `RTCMv2`, `RTCMv3` and `CMRv2` can be used to manually select the differential correction format, overriding the auto detection. `RTCMV` is the LBAS1-proprietary differential correction stream decoded from L-Band. `ASCIIIN` is used for connections receiving free-formatted ASCII messages, e.g. from an external meteo sensor.

In `auto` mode, the receiver automatically detects the `CMD`, `RTCMv2`, `RTCMv3`, `RTCMV` or `CMRv2` formats. The other input formats must be specified explicitly.

A connection that is not configured in `CMD` mode or `auto` mode will be blocked for user commands. There are two ways to re-enable the command input on a blocked connection. The first way is to reconfigure the connection by entering the command **`setDataInOut`** from another connection. The second way is to send the "escape sequence" consisting of a succession of ten "S" characters to the blocked connection within a time interval shorter than 5 seconds.

A connection that is configured in `auto` mode will initially accept user commands and differential corrections. However, as soon as differential corrections have been detected, the connection is blocked for user commands until the escape sequence is received.

The *Output* argument is used to select the types of data allowed as output. The receiver supports outputting different data types on the same connection. The `ASCIIDisplay` is a textual report of the tracking and PVT status at a fixed rate of 1Hz. It can be used to get a quick overview of the receiver operation.

`DC1` and `DC2` represent two internal pipes that can be used to create a daisy-chain. Set the *Input* argument to `DCi` to connect the input of pipe *i* to the specified connection. Set the *Output* argument to `DCi` to connect the output of pipe *i* to the specified connection.

After the *Cd*, *Input* and *Output* arguments, an extra read-only *Show* argument will be returned in the command reply. This last argument can take the value `on` or `off`, depending on whether the connection descriptor is open or not.

The *Input* argument is ignored for output-only connections, such as `DSK1`.

By default, pressing the log button (or, in OEM receivers, driving the Button pin low) has the effect of executing the commands **sdio,DSK1„SBF+NMEA** and **sdio,DSK1„none** in turn: it toggles internal SBF and NMEA logging on and off (pressing the log button has no effect on the internal RINEX logging).

Examples

```
COM1>  sdio, COM2, RTCMv2 <CR>
$R: sdio, COM2, RTCMv2
  DataInOut, COM2, RTCMv2, SBF+NMEA, (on)
COM1>
```

To setup a two-way daisy-chain between COM1 and COM2:

```
COM1>  sdio, COM1, DC1, DC2 <CR>
$R: sdio, COM1, DC1, DC2
  DataInOut, COM1, DC1, DC2, (on)
COM1>  sdio, COM2, DC2, DC1 <CR>
$R: sdio, COM2, DC2, DC1
  DataInOut, COM2, DC2, DC1, (on)
COM1>
```

eecm gecm	**exeEchoMessage** **getEchoMessage**	***Cd***	***Message (242)***	***EndOfLine***						
		DSK1 COM1 COM2 COM3 COM4 USB1 USB2	A:Unknown	none +CR +LF all						

RxControl: Communication > Output Settings > Echo Message

Use this command to send a message to one of the connections of the receiver.

The *Message* argument defines the message that should be sent on the *Cd* port. If the given message starts with "A:", the remainder of the message is considered an ASCII string that will be forwarded without changes to the requested connection. If the given message starts with "H:", the remainder of the message is considered a hexadecimal representation of a succession of bytes to be sent to the requested connection. In this case, the string should be a succession of 2-character hexadecimal values separated by a single whitespace.

Make sure to enclose the string between double quotes if it contains whitespaces. The maximum length of the *Message* argument (including the A: or H: prefix) is 242 characters.

The *EndOfLine* argument defines which end-of-line character should be sent after the message. That argument is ignored when the *Message* argument starts with H:.

To send a message at a regular interval instead of once, use the command **setPeriodicEcho**.

Examples

To send the string "Hello world!" to COM2, use:

```
COM1>  eecm, COM2, "A:Hello world!" <CR>
$R: eecm, COM2, "A:Hello world!"
  EchoMessage, COM2, "A:Hello world!", none
COM1>
```

To send the same string, the following command can also be used:

```
COM1>  eecm, COM2, "H:48 65 6C 6C 6F 20 77 6F 72 6C 64 21" <CR>
$R: eecm, COM2, "H:48 65 6C 6C 6F 20 77 6F 72 6C 64 21"
  EchoMessage, COM2, "H:48 65 6C 6C 6F 20 77 6F 72 6C 64 21", none
COM1>
```

enoc gnoc	**exeNMEAOnce** **getNMEAOnce**	***Cd***	***Messages***							
		DSK1 COM1 COM2 COM3 COM4 USB1 USB2	+ ALM + DTM + GBS + GGA + GLL + GNS + GRS + GSA + GST + GSV + HDT + RMC + ROT + VTG + ZDA + HRP + LLQ + RBP + RBV + RBD + AVR + GGK							

RxControl: Communication > Output Settings > NMEA Output Once

Use this command to output a set of NMEA messages [2] on a given connection. This command differs from the related **`setNMEAOutput`** command in that it instructs the receiver to output the specified messages only once, instead of at regular intervals.

The *Cd* argument defines the connection descriptor on which the message(s) should be output and the *Messages* argument defines the list of messages that should be output. The `HRP`, `RBP`, `RBD` and `RBV` messages are non-standard. They are described in the Firmware User Manual.

Please make sure that the connection specified by *Cd* is configured to allow NMEA output (this is the default for all connections). See the **`setDataInOut`** command.

Example

To output the receiver position on COM1, use:

```
COM1>  enoc, COM1, GGA <CR>
$R: enoc, COM1, GGA
  NMEAOnce, COM1, GGA
COM1>
```

sno gno	**setNMEAOutput** **getNMEAOutput**	***Stream*** *Stream*	*Cd*	*Messages*	*Interval*					
		+ Stream1 ... Stream10 all	none DSK1 COM1 COM2 COM3 COM4 USB1 USB2	none + ALM + DTM + GBS + GGA + GLL + GNS + GRS + GSA + GST + GSV + HDT + RMC + ROT + VTG + ZDA + HRP + LLQ + RBP + RBV + RBD + PUMRD + AVR + GGK	off OnChange msec10 msec20 msec40 msec50 msec100 msec200 msec500 sec1 sec2 sec5 sec10 sec15 sec30 sec60 min2 min5 min10 min15 min30 min60					

RxControl: Communication > Output Settings > NMEA Output > NMEA Output Intervals

Use this command to output a set of NMEA messages [2] on a given connection at a regular interval. The *Cd* argument defines the connection descriptor on which the message(s) should be output and the *Messages* argument defines the list of messages that should be output. The `HRP`, `RBP`, `RBD`, `RBV` and `PUMRD` messages are non-standard. They are described in the Firmware User Manual.

This command is the counterpart of the **`setSBFOutput`** command for NMEA sentences. Please refer to the description of that command for a description of the arguments.

Examples

To output GGA at 1Hz and RMC at 10Hz on COM1, use:

```
COM1>  sno, Stream1, COM1, GGA, sec1 <CR>
$R: sno, Stream1, COM1, GGA, sec1
  NMEAOutput, Stream1, COM1, GGA, sec1
COM1>  sno, Stream2, COM1, RMC, msec100 <CR>
$R: sno, Stream2, COM1, RMC, msec100
  NMEAOutput, Stream2, COM1, RMC, msec100
COM1>
```

To get the list of NMEA messages currently output, use:

```
COM1>  gno <CR>
$R: gno
  NMEAOutput, Stream1, COM1, GGA, sec1
  NMEAOutput, Stream2, COM1, RMC, msec100
  NMEAOutput, Stream3, none, none, off
  NMEAOutput, Stream4, none, none, off
  NMEAOutput, Stream5, none, none, off
```

```
  NMEAOutput, Stream6, none, none, off
  NMEAOutput, Stream7, none, none, off
  NMEAOutput, Stream8, none, none, off
  NMEAOutput, Stream9, none, none, off
  NMEAOutput, Stream10, none, none, off
COM1>
```

snp gnp	**setNMEAPrecision** **getNMEAPrecision**	*NrExtraDigits*	*Compatibility*							
		0 . . . 3	Nominal Mode1 Mode2							

RxControl: Communication > Output Settings > NMEA Output > Customize

Use these commands to define/inquire the number of extra digits in the latitude, longitude and altitude reported in NMEA sentences and to tune certain sentences to be compatible with third-party applications that are not fully compliant with the NMEA 0183 standard.

By default (*NrExtraDigits* is 0), latitude and longitude are reported in degrees with 5 decimal digit, and altitude is reported in meters with 2 decimal digit. These default numbers of digits lead to a centimeter-level resolution of the position. To represent RTK positions with their full precision (millimeter-level), it is recommended to set *NrExtraDigits* to 2.

It is important to note that increasing the number of digits (setting *NrExtraDigits* to a non-zero value) may cause the NMEA standard to be broken, as the total number of characters in a sentence may end up exceeding the prescribed limit of 82. This is why it is not done by default.

When setting the argument *Compatibility* to `Mode1`, the GPS Quality Indicator in GGA sentences is set to the value "2: Differential GPS" for all non-standalone positioning modes, the Mode Indicator in GNS sentences is set to "D: Differential" for all non-standalone positioning modes, and the Course Over Ground in the VTG sentences is not a null field for stationary receivers.

When setting the argument *Compatibility* to `Mode2`, the Course Over Ground in the VTG sentences is not a null field for stationary receivers.

Examples

```
COM1>  snp, 2 <CR>
$R: snp, 2
  NMEAPrecision, 2, Nominal
COM1>

COM1>  gnp <CR>
$R: gnp
  NMEAPrecision, 2, Nominal
COM1>
```

snti gnti	**setNMEATalkerID** **getNMEATalkerID**	*TalkerID*								
		GP GN								

RxControl: Communication > Output Settings > NMEA Output > Customize

Use these commands to define/inquire the "Device Talker" for NMEA sentences. The device talker allows users to identify the type of equipment from which the NMEA sentence was issued.

This command has no effect on the ALM, GGA, GNS, GSV and ZDA sentences. For ALM, GGA and ZDA, the Device Talker is always set to `GP`. For GNS and GSV, it is set to `GP`, `GN` or `GL` depending on the contents, as per the NMEA standard.

Example

```
COM1>  snti, GN <CR>
$R: snti, GN
  NMEATalkerID, GN
COM1>
```

spe gpe	**setPeriodicEcho** **getPeriodicEcho**	***Cd*** *Cd*	*Message (201)*	*Interval*						
		+ COM1 + COM2 + COM3 + COM4 all	A:Unknown	off once msec100 msec200 msec500 sec1 sec2 sec5 sec10 sec15 sec30 sec60 min2 min5 min10 min15 min30 min60						

RxControl: Communication > Output Settings > Periodic Echo message

Use this command to periodically send a message to one of the connections of the receiver.

The *Message* argument defines the message that should be sent on the *Cd* port. If the given message starts with "A:", the remainder of the message is considered an ASCII string that will be forwarded to the requested connection. All occurrences of the %%CR character sequence are replaced by a single carriage return character (ASCII code 13d) and all occurrences of the %%LF character sequence are replaced by a single line feed character (ASCII code 10d). If the *Message* argument starts with "H:", the remainder of the message is considered a hexadecimal representation of a succession of bytes to be sent to the requested connection. In this case, the string should be a succession of 2-character hexadecimal values separated by a single whitespace.

Make sure to enclose the string between double quotes if it contains whitespaces. The maximum length of the *Message* argument (including the A: or H: prefix) is 201 characters.

The *Interval* argument defines the interval at which the message should be sent.

To send a message only once, set *Interval* to once. The only difference with the command **exeEchoMessage** is that **exeEchoMessage** cannot be stored in the boot configuration file, while **setPeriodicEcho** can. This can be used to output a message once at each reset or reboot. The third example below shows how to do this.

Examples

To send the string "Hello!<CR><LF>" to COM2 every minute, use:

```
COM1>  spe, COM2, "A:Hello!%%CR%%LF", sec60 <CR>
$R: spe, COM2, "A:Hello!%%CR%%LF", sec60
  PeriodicEcho, COM2, "A:Hello!%%CR%%LF", sec60
COM1>
```

The same can be achieved with the following command:

```
COM1>  spe, COM2, "H:48 65 6C 6C 6F 21 0D 0A", sec60 <CR>
$R: spe, COM2, "H:48 65 6C 6C 6F 21 0D 0A", sec60
```

```
  PeriodicEcho, COM2, "H:48 65 6C 6C 6F 21 0D 0A", sec60
COM1>
```

To let the receiver output the string "Hello!<CR><LF>" to COM2 at each reset, use the following command sequence:

```
COM1>  spe, COM2, "A:Hello!%%CR%%LF", once <CR>
$R: spe, COM2, "A:Hello!%%CR%%LF", once
  PeriodicEcho, COM2, "A:Hello!%%CR%%LF", once
COM1>  eccf, Current, Boot <CR>
$R: eccf, Current, Boot
  CopyConfigFile, Current, Boot
COM1>
```

ssgp gsgp	**setSBFGroups** **getSBFGroups**	***Group*** *Group*	*Messages*							
		+ Group1 + Group2 + Group3 + Group4 all	none [SBF List] + Measurements + RawNavBits + GPS + GLO + GAL + GEO + PVTCart + PVTGeod + PVTExtra + Attitude + Time + Events + DiffCorr + Status + Rinex + Support + RawData + GUI							

RxControl: Communication > Output Settings > SBF Groups

Use these commands to define/inquire user-defined groups of SBF blocks that can be re-used in the **exeSBFOnce** and the **setSBFOutput** commands. The purpose of defining groups is to ease the typing effort when the same set of SBF blocks are to be addressed regularly.

The list of supported SBF blocks [SBF List] is to be found in Section 3.12, "SBF List".

A number of predefined groups of SBF blocks are available (such as `Measurements` or `RawNavBits`). See the command **setSBFOutput** for a description of these predefined groups.

Example

To output the messages `MeasEpoch`, `PVTCartesian` and `DOP` as one group on COM1 at a rate of 1Hz, you could use the following sequence of commands:

```
COM1>  ssgp, Group1, MeasEpoch+PVTCartesian+DOP <CR>
$R: ssgp, Group1, MeasEpoch+PVTCartesian+DOP
  SBFGroups, Group1, MeasEpoch+PVTCartesian+DOP
COM1>  sso, Stream1, COM1, Group1, sec1 <CR>
$R: sso, Stream1, COM1, Group1, sec1
  SBFOutput, Stream1, COM1, Group1, sec1
COM1>
```

esoc gsoc	**exeSBFOnce** **getSBFOnce**	***Cd***	***Messages***							
		DSK1 COM1 COM2 COM3 COM4 USB1 USB2	[SBF List] + Measurements + GPS + GLO + GAL + GEO + PVTCart + PVTGeod + PVTExtra + Attitude + Time + Status + UserGroups + Rinex + Support + RawData + GUI							

RxControl: Communication > Output Settings > SBF Output Once

Use this command to output a set of SBF blocks on a given connection. This command differs from the related **`setSBFOutput`** command in that it instructs the receiver to output the specified SBF blocks only once, instead of at regular intervals.

The *Cd* argument defines the connection descriptor on which the message(s) should be output and the *Messages* argument defines the list of messages that should be output. The list of SBF blocks [SBF List] is to be found in Section 3.12, "SBF List". Only a subset of SBF blocks can be sent with the **`exeSBFOnce`** command: refer to the SBF Reference Guide for a list of them.

Make sure that the connection specified by *Cd* is configured to allow SBF output (this is the default for all connections). See also the **`setDataInOut`** command.

Predefined groups of SBF blocks (such as `Measurements` or `PVTCart`) can be addressed in the *Messages* argument. These groups are defined in the table below.

Messages	Description
`Measurements`	+MeasEpoch +MeasExtra +IQCorr +EndOfMeas
`GPS`	+GPSNav +GPSAlm +GPSIon +GPSUtc
`GLO`	+GLONav +GLOAlm +GLOTime
`GAL`	+GALNav +GALAlm +GALIon +GALUtc +GALGstGps
`GEO`	+GEONav +GEOAlm
`PVTCart`	+PVTCartesian +PosCovCartesian +VelCovCartesian +BaseVectorCart
`PVTGeod`	+PVTGeodetic +PosCovGeodetic +VelCovGeodetic +BaseVectorGeod +PosLocal
`PVTExtra`	+DOP +PVTSatCartesian +PVTResiduals +RAIMStatistics +GEOCorrections +BaseLine +PVTSupport +EndOfPVT
`Attitude`	+AttEuler +AttCovEuler +EndOfAtt
`Time`	+ReceiverTime
`Status`	+SatVisibility +ChannelStatus +ReceiverStatus +InputLink +OutputLink +QualityInd +DiskStatus

Messages (Continued)	Description
UserGroups	+Group1 +Group2 +Group3 +Group4
Rinex	+MeasEpoch +GPSNav +GPSIon +GPSUtc +GLONav +GALNav +GALUtc +GALGstGps +GEONav +PVTGeodetic +ReceiverSetup +Comment
Support	+MeasEpoch +MeasExtra +EndOfMeas +GPSNav +GPSAlm +GPSIon +GPSUtc +GLONav +GLOAlm +GLOTime +GALNav +GALAlm +GALIon +GALUtc +GALGstGps +GEONav +GEOAlm +PVTGeodetic +PosCovGeodetic +BaseVectorGeod +AttEuler +DOP +PVTSupport +EndOfPVT +ChannelStatus +ReceiverStatus +InputLink +OutputLink +ReceiverSetup +Commands +QualityInd +DiskStatus
RawData	+MeasEpoch +MeasExtra +GPSNav +GLONav +GALNav +GEONav +PVTGeodetic +ReceiverSetup +Commands +Comment
GUI	+MeasEpoch +EndOfMeas +EndOfPVT +SatVisibility +ChannelStatus +Commands +PVTGeodetic +PosCovGeodetic +VelCovGeodetic +DOP +PVTSatCartesian +PVTResiduals +RAIMStatistics +BaseLine +AttEuler +ReceiverTime +ReceiverStatus +InputLink +OutputLink +ReceiverSetup +Comment +QualityInd +DiskStatus

Example

To output the next MeasEpoch block, use:

```
COM1>  esoc, COM1, MeasEpoch <CR>
$R: esoc, COM1, MeasEpoch
  SBFOnce, COM1, MeasEpoch
COM1>
```

sso gso	**setSBFOutput** **getSBFOutput**	***Stream*** *Stream*	*Cd*	*Messages*	*Interval*					
		+ Stream1 ... Stream10 + Res1 + Res2 + Res3 + Res4 all	none DSK1 COM1 COM2 COM3 COM4 USB1 USB2	none [SBF List] + Measurements + RawNavBits + GPS + GLO + GAL + GEO + PVTCart + PVTGeod + PVTExtra + Attitude + Time + Event + DiffCorr + Status + UserGroups + Rinex + Support + RawData + GUI	off OnChange msec10 msec20 msec40 msec50 msec100 msec200 msec500 sec1 sec2 sec5 sec10 sec15 sec30 sec60 min2 min5 min10 min15 min30 min60					

RxControl: Communication > Output Settings > SBF Output

Use this command to output a set of SBF blocks on a given connection at a regular interval.

A *Stream* is defined as a list of messages that should be output with the same interval on one connection descriptor (*Cd*). In other words, one *Stream* is associated with one *Cd* and one *Interval*, and contains a list of SBF blocks defined by the *Messages* argument.

The list of supported SBF blocks [SBF List] is to be found in Section 3.12, "SBF List".

Predefined groups of SBF blocks (such as `Measurements` or `RawNavBits`) can be addressed in the *Messages* argument. These groups are defined in the table below.

Messages	Description
`Measurements`	+MeasEpoch +MeasExtra +IQCorr +EndOfMeas
`RawNavBits`	+GPSRawCA +GPSRawL2C +GPSRawL5 +GLORawCA +GALRawFNAV +GALRawINAV +GEORawL1 +GEORawL5 +QZSRawL1CA +QZSRawL2C +QZSRawL5
`GPS`	+GPSNav +GPSAlm +GPSIon +GPSUtc
`GLO`	+GLONav +GLOAlm +GLOTime
`GAL`	+GALNav +GALAlm +GALIon +GALUtc +GALGstGps +GALSARRLM
`GEO`	+GEOMT00 +GEOPRNMask +GEOFastCorr +GEOIntegrity +GEOFastCorrDegr +GEONav +GEODegrFactors +GEONetworkTime +GEOAlm +GEOIGPMask +GEOLongTermCorr +GEOIonoDelay +GEOServiceLevel +GEOClockEphCovMatrix
`PVTCart`	+PVTCartesian +PosCovCartesian +VelCovCartesian +BaseVectorCart
`PVTGeod`	+PVTGeodetic +PosCovGeodetic +VelCovGeodetic +BaseVectorGeod +PosLocal

Messages (Continued)	Description
PVTExtra	+DOP +PVTSatCartesian +PVTResiduals +RAIMStatistics +GEOCorrections +BaseLine +PVTSupport +EndOfPVT
Attitude	+AttEuler +AttCovEuler +EndOfAtt
Time	+ReceiverTime +xPPSOffset
Event	+ExtEvent +ExtEventPVTCartesian +ExtEventPVTGeodetic
DiffCorr	+DiffCorrIn +BaseStation +RTCMDatum
Status	+SatVisibility +ChannelStatus +ReceiverStatus +InputLink +OutputLink +QualityInd +DiskStatus
UserGroups	+Group1 +Group2 +Group3 +Group4
Rinex	+MeasEpoch +GEORawL1 +GPSNav +GPSIon +GPSUtc +GLONav +GALNav +GALUtc +GALGstGps +GEONav +PVTGeodetic +ReceiverSetup +Comment
Support	+MeasEpoch +MeasExtra +EndOfMeas +GPSRawCA +GPSRawL2C +GPSRawL5 +GLORawCA +GALRawFNAV +GALRawINAV +GEORawL1 +GEORawL5 +QZSRawL1CA +QZSRawL2C +QZSRawL5 +GPSNav +GPSAlm +GPSIon +GPSUtc +GLONav +GLOAlm +GLOTime +GALNav +GALAlm +GALIon +GALUtc +GALGstGps +GEONav +GEOAlm +PVTGeodetic +PosCovGeodetic +BaseVectorGeod +AttEuler +DOP +PVTSupport +EndOfPVT +ExtEvent +DiffCorrIn +BaseStation +ChannelStatus +ReceiverStatus +InputLink +OutputLink +ReceiverSetup +Commands +QualityInd +DiskStatus
RawData	+MeasEpoch +MeasExtra +GPSRawCA +GPSRawL2C +GPSRawL5 +GLORawCA +GALRawFNAV +GALRawINAV +GEORawL1 +GEORawL5 +QZSRawL1CA +QZSRawL2C +QZSRawL5 +GPSNav +GLONav +GALNav +GEONav +PVTGeodetic +DiffCorrIn +ReceiverSetup +Commands +Comment
GUI	+MeasEpoch +EndOfMeas +GEOIGPMask +GEOIonoDelay +EndOfPVT +ExtEvent +DiffCorrIn +SatVisibility +ChannelStatus +Commands +PVTGeodetic +PosCovGeodetic +VelCovGeodetic +DOP +PVTSatCartesian +PVTResiduals +RAIMStatistics +BaseLine +AttEuler +ReceiverTime +BaseStation +ReceiverStatus +InputLink +OutputLink +ReceiverSetup +Comment +QualityInd +DiskStatus

The *Interval* argument defines the rate at which the SBF blocks specified in the *Messages* argument are output. If set to `off`, the SBF blocks are disabled. If set to `OnChange`, the SBF blocks are output at their natural renewal rate. Please refer to the "Output Rate" section of the SBF Reference Guide for further details. If a specific interval is specified (e.g. `sec1` corresponds to an interval of 1 second), the SBF blocks are decimated from their renewal rate to the specified interval. Some blocks can only be output at their renewal rate (e.g. the `GPSNav` block). For these blocks, the receiver ignores any decimation interval and always assumes `OnChange`. The list of those blocks can be found in the SBF Reference Guide.

Please make sure that the connection specified by *Cd* is configured to allow SBF output (this is the default for all connections). See the **setDataInOut** command.

Res1 to Res4 are reserved values of *Stream*. These streams are not saved in the configuration files and, as a consequence, they will always be reset at boot time. For most users, it is not recommended to use these streams.

Examples

To output the MeasEpoch block at 1Hz and the PVTCartesian block at 10Hz on COM1, use the following sequence:

```
COM1>  sso, Stream1, COM1, MeasEpoch, sec1 <CR>
$R: sso, Stream1, COM1, MeasEpoch, sec1
  SBFOutput, Stream1, COM1, MeasEpoch, sec1
COM1>  sso, Stream2, COM1, PVTCartesian, msec100 <CR>
$R: sso, Stream2, COM1, PVTCartesian, msec100
  SBFOutput, Stream2, COM1, PVTCartesian, msec100
COM1>
```

To get the list of SBF blocks currently output, use:

```
COM1>  gso <CR>
$R: gso
  SBFOutput, Stream1, COM1, MeasEpoch, sec1
  SBFOutput, Stream2, COM1, PVTCartesian, msec100
  SBFOutput, Stream3, none, none, off
  SBFOutput, Stream4, none, none, off
  SBFOutput, Stream5, none, none, off
  SBFOutput, Stream6, none, none, off
  SBFOutput, Stream7, none, none, off
  SBFOutput, Stream8, none, none, off
  SBFOutput, Stream9, none, none, off
  SBFOutput, Stream10, none, none, off
  SBFOutput, Res1, none, none, off
  SBFOutput, Res2, none, none, off
  SBFOutput, Res3, none, none, off
  SBFOutput, Res4, none, none, off
COM1>
```

3.7 RTCM v2.x Commands

sr2c gr2c	**setRTCMv2Compatibility** **getRTCMv2Compatibility**	*PRCType*	*GLOToD*							
		Standard GroupDelay	Tk Tb							

RxControl: Communication > Input Settings > Differential Corrections > RTCMv2

Use these commands to define/inquire the compatibility of the RTCM 2.x input correction stream. This command applies to rover receivers only and should be used in case the available base station correction stream is not fully compatible with the latest version of the RTCM 2.x standard.

The argument *PRCType* is used to handle a difference in the interpretation of DGPS corrections between the version 2.0 of the RTCM standard and later versions. If the base station is sending RTCM Message Type 1 based on version 2.0, the value `GroupDelay` must be selected to have a correct usage of incoming corrections.

The argument *GLOToD* specifies how to interpret the time-of-day field in the differential GLONASS correction message (MT31). Select `Tb` to be compatible with RTCM version up to 2.2, and select `Tk` to be compatible with RTCM 2.3 and later.

Example

To make to rover receiver compatible with a base station sending RTCM 2.2 corrections, use:

```
COM1>  sr2c, , Tb <CR>
$R: sr2c, , Tb
  RTCMv2Compatibility, Standard, Tb
COM1>
```

sr2f gr2f	**setRTCMv2Formatting** **getRTCMv2Formatting**	*ReferenceID*	*GLOToD*							
		0 . . . 1023	Tk Tb							

RxControl: Communication > Output Settings > Differential Corrections > RTCMv2

Use these commands to define/inquire the reference station ID assigned to the receiver when operating in base station mode. The reference station ID is transmitted in the first word of each outgoing RTCM v2.x message.

The argument *GLOToD* specifies how to encode the time-of-day field in the differential GLONASS correction message (MT31). Select `Tb` to be compatible with RTCM version up to 2.2, and select `Tk` to be compatible with RTCM 2.3 and later.

Examples

```
COM1>  sr2f, 345 <CR>
$R: sr2f, 345
  RTCMv2Formatting, 345, Tk
COM1>

COM1>  gr2f <CR>
$R: gr2f
  RTCMv2Formatting, 345, Tk
COM1>
```

sr2i gr2i	**setRTCMv2Interval** **getRTCMv2Interval**	***Message*** *Message*	*ZCount*							
		+ RTCM1 + RTCM3 + RTCM9 + RTCM16 + RTCM22 + RTCM23|24 + RTCM31 + RTCM32 all	1 . . . 2 . . . 1000							

RxControl: Communication > Output Settings > Differential Corrections > RTCMv2

Use these commands to define/inquire at which interval the RTCM v2.x messages specified in the *Message* argument should be generated. The related **`setRTCMv2IntervalObs`** command must be used to specify the interval of some RTK-related messages such as messages 18 and 19.

The interval for every message is given in the *ZCount* argument, in units of 0.6 seconds. For example, to generate a message every 6 seconds, *ZCount* should be set to 10.

The intervals specified with this command are not connection-specific: all the connections which output a given RTCM v2.x message will output it with the same interval.

Note that this command only defines the interval of RTCM messages. To make the receiver actually output these messages, use the **`setRTCMv2Output`** and **`setDataInOut`** commands.

See the **`setRTCMv2Usage`** command for a short description of all supported RTCM v2.x message types.

Examples

```
COM1>  sr2i, RTCM22, 15 <CR>
$R: sr2i, RTCM22, 15
  RTCMv2Interval, RTCM22, 15
COM1>

COM1>  gr2i <CR>
$R: gr2i
  RTCMv2Interval, RTCM1, 2
  RTCMv2Interval, RTCM3, 2
  RTCMv2Interval, RTCM16, 2
  RTCMv2Interval, RTCM22, 15
  RTCMv2Interval, RTCM23|24, 2
COM1>
```

sr2b gr2b	**setRTCMv2IntervalObs** **getRTCMv2IntervalObs**	***Message*** *Message*	*Interval*							
		+ RTCM18|19 + RTCM20|21 all	1 . . . 600 sec							

RxControl: Communication > Output Settings > Differential Corrections > RTCMv2

Use these commands to define/inquire at which interval the RTCM v2.x messages specified in the *Message* argument should be generated. The related **setRTCMv2Interval** command must be used to specify the interval of other supported RCTCM v2.x messages.

The intervals specified with this command are not connection-specific: all the connections which output a given RTCM v2.x message will output it with the same interval.

Note that this command only defines the interval of RTCM messages. To make the receiver actually output these messages, use the **setRTCMv2Output** and **setDataInOut** commands.

Examples

```
COM1>  sr2b, RTCM20|21, 2 <CR>
$R: sr2b, RTCM20|21, 2
  RTCMv2IntervalObs, RTCM20|21, 2
COM1>

COM1>  gr2b <CR>
$R: gr2b
  RTCMv2IntervalObs, RTCM18|19, 1
  RTCMv2IntervalObs, RTCM20|21, 2
COM1>
```

sr2m gr2m	**setRTCMv2Message16** **getRTCMv2Message16**	*Message (90)*								
		Unknown								

RxControl: Communication > Output Settings > Differential Corrections > RTCMv2

Use these commands to define/inquire the string that will be transmitted in the RTCM v2.x message 16. The argument *Message* can contain up to 90 characters.

Note that this command only defines the content of message 16. To make the receiver actually output this message, use the **`setRTCMv2Output`** and **`setDataInOut`** commands.

Example

To send the string "Hello" in message 16 over COM2 at the default interval, use the following sequence:

```
COM1>  sr2m, Hello <CR>
$R: sr2m, Hello
  RTCMv2Message16, "Hello"
COM1>  sr2o, COM2, RTCM16 <CR>
$R: sr2o, COM2, RTCM16
  RTCMv2Output, COM2, RTCM16
COM1>  sdio, COM2, , RTCMv2 <CR>
$R: sdio, COM2, , RTCMv2
  DataInOut, COM2, auto, RTCMv2
COM1>
```

sr2o gr2o	**setRTCMv2Output** **getRTCMv2Output**	***Cd*** *Cd*	***Messages***							
		+ COM1 + COM2 + COM3 + COM4 + USB1 + USB2 all	none + RTCM1 + RTCM3 + RTCM9 + RTCM16 + RTCM18|19 + RTCM20|21 + RTCM22 + RTCM23|24 + RTCM31 + RTCM32 + DGPS + RTK all							

RxControl: Communication > Output Settings > Differential Corrections > RTCMv2

Use these commands to define/inquire which RTCM v2.x messages are enabled for output on a given connection descriptor (*Cd*). The *Messages* argument specifies the RTCM message types to be enabled. Some pairs of messages are always enabled together, such as messages 18 and 19. `DGPS` is an alias for "`RTCM1+RTCM3`" and `RTK` is an alias for "`RTCM3+RTCM18|19+RTCM22`".

See the **`setRTCMv2Usage`** command for a short description of all supported RTCM v2.x message types.

Please make sure that the connection specified by *Cd* is configured to allow RTCMv2 output, which can be done with the **`setDataInOut`** command. The interval at which each message is output is to be specified with the **`setRTCMv2Interval`** or the **`setRTCMv2IntervalObs`** command.

Example

To enable RTCM v2.x messages 3, 18, 19 and 22 on COM2, use the following sequence:

```
COM1>  sr2o, COM2, RTCM3+RTCM18|19+RTCM22 <CR>
$R: sr2o, COM2, RTCM3+RTCM18|19+RTCM22
  RTCMv2Output, COM2, RTCM3+RTCM18|19+RTCM22
COM1>  sdio, COM2, , RTCMv2 <CR>
$R: sdio, COM2, , RTCMv2
  DataInOut, COM2, auto, RTCMv2
COM1>
```

sr2u gr2u	**setRTCMv2Usage** **getRTCMv2Usage**	*MsgUsage*								
		none + RTCM1 + RTCM3 + RTCM9 + RTCM15 + RTCM18|19 + RTCM20|21 + RTCM22 + RTCM23|24 + RTCM31 + RTCM32 + RTCM59 all								

RxControl: Communication > Input Settings > Differential Corrections > RTCMv2

Use this command to restrict the list of incoming RTCM v2.x messages that the receiver is allowed to use in its differential PVT computation.

MsgUsage	Description
RTCM1	Differential GPS Corrections
RTCM3	GPS Reference Station Parameters
RTCM9	GPS Partial Correction Set
RTCM15	Ionospheric Delay
RTCM18|19	RTK Uncorrected Carrier Phases (RTCM18) and Pseudoranges (RTCM19)
RTCM20|21	RTK Carrier Phase Corrections (RTCM20) and High-Accuracy Pseudorange Corrections (RTCM21)
RTCM22	Extended Reference Station Parameters
RTCM23|24	Antenne Type Definition Record (RTCM23) and Antenna Reference Point (ARP) (RTCM24)
RTCM31	Differential GLONASS Corrections
RTCM32	GLONASS Reference Station Parameters
RTCM59	Proprietary Message (interpreted as FKP message)

Example

To only accept RTCM1 and RTCM3 corrections from the base station 1011, use the following sequence:

```
COM1>  sr2u, RTCM1+RTCM3 <CR>
$R: sr2u, RTCM1+RTCM3
  RTCMv2Usage, RTCM1+RTCM3
COM1>  sdcu, , , manual, 1011 <CR>
$R: sdcu, , , manual, 1011
  DiffCorrUsage, LowLatency, 3600.0, manual, 1011, 20, 20000000
COM1>
```

3.8 RTCM v3.x Commands

sr3t gr3t	**setRTCMv3CRSTransfo** **getRTCMv3CRSTransfo**	*Mode*	*TargetName (32)*							
		auto manual								

RxControl: Communication > Input Settings > Differential Corrections > RTCMv3

Use this command to specify how to apply the coordinate reference system (CRS) transformation parameters contained in RTCM v3.x message types 1021 to 1023.

In `auto` mode (the default), the receiver decodes and applies the coordinate transformation parameters from message types 1021-1023. If your RTK provider sends transformation parameters for more than one target CRS, the receiver selects the first transformation parameters it receives.

In `manual` mode, you can force the receiver to only apply the transformation to the target CRS specified with the second argument. The *TargetName* argument must exactly match the name used by the RTK provider. The available target datum names can be found in the `RTCMDatum` SBF block.

Example

To force using the target CRS identified as "4258" by the RTK network, use:

```
COM1>  sr3t, manual, "4258" <CR>
$R: sr3t, manual, "4258"
  RTCMv3CRSTransfo, manual, "4258"
COM1>
```

sr3d gr3d	**setRTCMv3Delay** **getRTCMv3Delay**	*Delay*								
		0 . . . 600 sec								

RxControl: Communication > Output Settings > Differential Corrections > RTCMv3

Use this command to instruct the receiver to generate and output RTCM v3.x messages with a certain delay.

It is possible to impose a global delay to all RTCM v3.x messages by setting the *Delay* to a non-zero value. This can be used in situations where multiple base stations must be configured to transmit their corrections in a time-multiplexed way. For example, base station A would compute and transmit its corrections at every 10-second epoch (in the GPS time scale), and base station B would compute and transmit its corrections 5 seconds after the 10-second epochs. In that case, receiver B would be configured with the *Delay* argument set to 5.

See also the **`setRTCMv3Interval`** command to configure the message interval.

Example

To generate the RTCM1001 message with an interval of 10 seconds and a time shift of 2 seconds, use:

```
COM1>  sr3i, RTCM1001|2, 10 <CR>
$R: sr3i, RTCM1001|2, 10
  RTCMv3Interval, RTCM1001|2, 10
COM1>  sr3d, 2 <CR>
$R: sr3d, 2
  RTCMv3Delay, 2
COM1>
```

sr3f gr3f	**setRTCMv3Formatting** **getRTCMv3Formatting**	*ReferenceID*								
		0 . . . 4095								

RxControl: Communication > Output Settings > Differential Corrections > RTCMv3

Use these commands to define/inquire the reference station ID assigned to the receiver when operating in base station mode. The reference station ID is transmitted in the header of each outgoing RTCM v3.x message.

Examples

```
COM1>  sr3f, 345 <CR>
$R: sr3f, 345
  RTCMv3Formatting, 345
COM1>

COM1>  gr3f <CR>
$R: gr3f
  RTCMv3Formatting, 345
COM1>
```

sr3i gr3i	**setRTCMv3Interval** **getRTCMv3Interval**	***Message*** *Message*	*Interval*							
		+ RTCM1001|2 + RTCM1003|4 + RTCM1005|6 + RTCM1007|8 + RTCM1009|10 + RTCM1011|12 + RTCM1013 + RTCM1033 all	0.1 . . . 1.0 . . . 600.0 sec							

RxControl: Communication > Output Settings > Differential Corrections > RTCMv3

Use these commands to define/inquire at which interval RTCM v3.x messages should be generated.

The intervals specified with this command are not connection-specific: all the connections which output a given RTCM v3.x message will output it with the same interval.

Using `MSMi` for the *Message* argument sets the interval of all Multiple Signal Messages of type `i`. See the **`setRTCMv3Usage`** command for a short description of all supported RTCM v3.x message types.

By default, RTCM v3.x messages are generated at integer multiples of the specified interval in the GPS time scale. The command **`setRTCMv3Delay`** can be used to introduce a time offset.

Note that this command only defines the interval of RTCM messages. To make the receiver actually output these messages, use the **`setRTCMv3Output`** and **`setDataInOut`** commands.

Example

```
COM1>  sr3i, RTCM1001|2, 2 <CR>
$R: sr3i, RTCM1001|2, 2
  RTCMv3Interval, RTCM1001|2, 2
COM1>
```

sr3o gr3o	**setRTCMv3Output** **getRTCMv3Output**	***Cd*** *Cd*	*Messages*							
		+ COM1 + COM2 + COM3 + COM4 + USB1 + USB2 all	none + RTCM1001 + RTCM1002 + RTCM1003 + RTCM1004 + RTCM1005 + RTCM1006 + RTCM1007 + RTCM1008 + RTCM1009 + RTCM1010 + RTCM1011 + RTCM1012 + RTCM1013 + RTCM1033 all							

RxControl: Communication > Output Settings > Differential Corrections > RTCMv3

Use these commands to define/inquire which RTCM v3.x messages are enabled for output on a given connection descriptor (*Cd*). The *Messages* argument specifies the RTCM message types to be enabled.

See the **setRTCMv3Usage** command for a short description of all supported RTCM v3.x message types.

Please make sure that the connection specified by *Cd* is configured to allow RTCMv3 output, which can be done with the **setDataInOut** command. The interval at which each message is output is to be specified with the **setRTCMv3Interval** command.

Example

To enable RTCM v3.x messages 1001, 1002, 1005 and 1006 on COM2, use the following sequence:

```
COM1>  sr3o, COM2, RTCM1001+RTCM1002+RTCM1005+RTCM1006 <CR>
$R: sr3o, COM2, RTCM1001+RTCM1002+RTCM1005+RTCM1006
  RTCMv3Output, COM2, RTCM1001+RTCM1002+RTCM1005+RTCM1006
COM1>  sdio, COM2, , RTCMv3 <CR>
$R: sdio, COM2, , RTCMv3
  DataInOut, COM2, auto, RTCMv3
COM1>
```

sr3u gr3u	**setRTCMv3Usage** **getRTCMv3Usage**	*MsgUsage*								
		none + RTCM1001 ... RTCM1013 + RTCM1015 + RTCM1016 + RTCM1017 + RTCM1021 + RTCM1022 + RTCM1023 + RTCM1033 + RTCM1037 + RTCM1038 + RTCM1039 all								

RxControl: Communication > Input Settings > Differential Corrections > RTCMv3

Use this command to restrict the list of incoming RTCM v3.x messages that the receiver is allowed to use in its differential PVT computation.

A short description of the supported RTCM v3.x message types is shown below:

MsgUsage	Description
RTCM1001	L1-Only GPS RTK Observables
RTCM1002	Extended L1-Only GPS RTK Observables
RTCM1003	L1&L2 GPS RTK Observables
RTCM1004	Extended L1&L2 GPS RTK Observables
RTCM1005	Stationary RTK Reference Station ARP
RTCM1006	Stationary RTK Reference Station ARP with Antenna Height
RTCM1007	Antenna Descriptor
RTCM1008	Antenna Descriptor and Serial Number
RTCM1009	L1-Only GLONASS RTK Observables
RTCM1010	Extended L1-Only GLONASS RTK Observables
RTCM1011	L1&L2 GLONASS RTK Observables
RTCM1012	Extended L1&L2 GLONASS RTK Observables
RTCM1013	System Parameters
RTCM1015	Network RTK (MAC), GPS Ionospheric Correction Differences
RTCM1016	Network RTK (MAC), GPS Geometric Correction Differences
RTCM1017	Network RTK (MAC), GPS Combined Geometric and Ionospheric Correction Differences
RTCM1021	Helmert-Abridged Molodenski Transformation Parameters
RTCM1022	Molodenski-Badekas Transformation Parameters
RTCM1023	Residuals, Ellipsoidal Grid Representation
RTCM1033	Receiver and Antenna Descriptors
RTCM1037	Network RTK (MAC), GLONASS Ionospheric Correction Differences

MsgUsage (Continued)	Description
RTCM1038	Network RTK (MAC), GLONASS Geometric Correction Differences
RTCM1039	Network RTK (MAC), GLONASS Combined Geometric and Ionospheric Correction Differences

Example

To only accept RTCM1001 and RTCM1002 corrections from the base station 1011, use the following sequence:

```
COM1>  sr3u, RTCM1001+RTCM1002 <CR>
$R: sr3u, RTCM1001+RTCM1002
  RTCMv3Usage, RTCM1001+RTCM1002
COM1>  sdcu, , , manual, 1011 <CR>
$R: sdcu, , , manual, 1011
  DiffCorrUsage, LowLatency, 3600.0, manual, 1011, 20, 20000000
COM1>
```

3.9 CMR v2.0 Commands

sc2f gc2f	**setCMRv2Formatting** **getCMRv2Formatting**	*ReferenceID*								
		0...31								

RxControl: Communication > Output Settings > Differential Corrections > CMRv2

Use these commands to define/inquire the reference station ID assigned to the receiver when operating in base station mode. The reference station ID is transmitted in the header of each outgoing CMR v2.0 message.

Examples

```
COM1>  sc2f, 12 <CR>
$R: sc2f, 12
  CMRv2Formatting, 12
COM1>

COM1>  gc2f <CR>
$R: gc2f
  CMRv2Formatting, 12
COM1>
```

sc2i gc2i	**setCMRv2Interval** **getCMRv2Interval**	***Message*** *Message*	*Interval*							
		+ CMR0 + CMR1 + CMR2 + CMR3 all	0.1 . . . 1.0 . . . 600.0 sec							

RxControl: Communication > Output Settings > Differential Corrections > CMRv2

Use these commands to define/inquire at which interval CMR v2.0 messages should be generated.

The intervals specified with this command are not connection-specific: all the connections which output a given CMR v2.0 message will output it with the same interval.

Note that this command only defines the interval of CMR messages. To make the receiver actually output these messages, use the **`setCMRv2Output`** and **`setDataInOut`** commands.

See the **`setCMRv2Usage`** command for a short description of the supported CMR v2.0 messages.

Examples

```
COM1>  sc2i, CMR0, 2 <CR>
$R: sc2i, CMR0, 2
  CMRv2Interval, CMR0, 2
COM1>

COM1>  gc2i <CR>
$R: gc2i CMRv2Interval, CMR0, 2
  CMRv2Interval, CMR1, 1 CMRv2Interval, CMR2, 1
COM1>
```

sc2m gc2m	**setCMRv2Message2** **getCMRv2Message2**	*ShortID (8)*	*LongID (50)*	*COGO (16)*						
		Unknown	Unknown	Unknown						

RxControl: Communication > Output Settings > Differential Corrections > CMRv2

Use these commands to define/inquire the strings that will be transmitted in the CMR v2.0 message 2.

The argument *ShortID* is the short station ID. It can contain up to 8 characters in compliance with the CMR standard. If less than 8 characters are defined, the string will be right justified and padded with spaces.

The argument *LongID* is the long station ID. It can contain up to 50 characters in compliance with the CMR standard. If less than 50 characters are defined, the string will be right justified and padded with spaces. Some CMR implementations use the character "@" in the long name. As this character is not allowed in a command argument, the character "%" should be used instead. The receiver will automatically replace all occurrences of "%" in *LongID* with "@" when CMR2 message is output.

The argument *COGO* is the COGO code. It can contain up to 16 characters in compliance with the CMR standard. If less than 16 characters are defined, the string will be right justified and padded with spaces.

Note that this command only defines the contents of message 2. To make the receiver actually output this message, use the **`setCMRv2Output`** and **`setDataInOut`** commands.

Example

To send the string "Hello" as short station ID and send CMR2 messages through COM2, use the following sequence:

```
COM1>  sc2m, Hello <CR>
$R: sc2m, Hello
  CMRv2Message2, "Hello", "Unknown", "Unknown"
COM1>  sc2o, COM2, CMR2 <CR>
$R: sc2o, COM2, CMR2
  CMRv2Output, COM2, CMR2
COM1>  sdio, COM2, , CMRv2 <CR>
$R: sdio, COM2, , CMRv2
  DataInOut, COM2, auto, CMRv2
COM1>
```

sc2o gc2o	**setCMRv2Output** **getCMRv2Output**	***Cd*** *Cd*	*Messages*							
		+ COM1 + COM2 + COM3 + COM4 + USB1 + USB2 all	none + CMR0 + CMR1 + CMR2 + CMR3 all							

RxControl: Communication > Output Settings > Differential Corrections > CMRv2

Use these commands to define/inquire which CMR v2.0 messages are enabled for output on a given connection descriptor (*Cd*). The *Messages* argument specifies the CMR message types to be enabled. See the **`setCMRv2Usage`** command for a short description of the supported CMR v2.0 messages.

Please make sure that the connection specified by *Cd* is configured to allow CMRv2 output, which can be done with the **`setDataInOut`** command. The interval at which each message is output is to be specified with the **`setCMRv2Interval`** command.

Example

To enable CMR v2.0 message 0 on COM2, use the following sequence:

```
COM1>  sc2o, COM2, CMR0 <CR>
$R: sc2o, COM2, CMR0
  CMRv2Output, COM2, CMR0
COM1>  sdio, COM2, , CMRv2 <CR>
$R: sdio, COM2, , CMRv2
  DataInOut, COM2, auto, CMRv2
COM1>
```

sc2u gc2u	**setCMRv2Usage** **getCMRv2Usage**	*MsgUsage*								
		none + CMR0 + CMR1 + CMR2 + CMR3 + CMR0p + CMR0w all								

RxControl: Communication > Input Settings > Differential Corrections > CMRv2

Use this command to restrict the list of incoming CMR v2.0 messages that the receiver is allowed to use in its differential PVT computation. `CMR0p` and `CMR0w` refer to the CMR+ and CMR-W variants respectively.

MsgUsage	Description
`CMR0`	Observables
`CMR1`	Reference Station Coordinates
`CMR2`	Reference Station Description
`CMR3`	GLONASS Observables

Example

To only accept CMR0 from the base station 12, use the following sequence:

```
COM1>  sc2u, CMR0 <CR>
$R: sc2u, CMR0
  CMRv2Usage, CMR0
COM1>  sdcu, , , manual, 12 <CR>
$R: sdcu, , , manual, 12
  DiffCorrUsage, LowLatency, 3600.0, manual, 12, 20, 20000000
COM1>
```

3.10 Logging Commands

sdfa gdfa	**setDiskFullAction** **getDiskFullAction**	***Disk*** *Disk*	*Action*							
		+ DSK1 all	DeleteOldest StopLogging							

RxControl: Logging > Internal Logging Settings

Use these commands to define/inquire what the receiver should do when the disk identified by *Disk* is full, or when an auto-incremented file name already exists on that disk (see command **`setFileNaming`** for a description of the incremental file naming mode).

The currently supported actions are as follows:

Action	Description
`DeleteOldest`	The oldest file on the disk is automatically removed, unless the oldest file is also the current logging file. In that latter case, the logging stops. In incremental file naming mode, if the auto-incremented file name already exists, the existing file is overwritten.
`StopLogging`	The logging stops. In incremental file naming mode, if the auto-incremented file name already exists, the logging stops.

Examples

```
COM1>  sdfa, DSK1, StopLogging <CR>
$R: sdfa, DSK1, StopLogging
  DiskFullAction, DSK1, StopLogging
COM1>

COM1>  gdfa <CR>
$R: gdfa
  DiskFullAction, DSK1, StopLogging
COM1>
```

ldi	**lstDiskInfo**	***Disk***	***Directory (60)***							
		DSK1 all								

Use this command to retrieve information about one of the internal disks of the receiver. The reply to this command contains the disk size and free space in bytes and the list of all recorded files and directories.

The contents of directories is not shown by default. To list the contents of a directory, use the second argument to specify the directory name.

Example

```
COM1>  ldi, DSK1 <CR>
$R; ldi, dsk1
---->
$-- BLOCK 1 / 0
<xml version="1.0" encoding="ISO-8859-1" ?>
<DiskInfo version="0.1"gt;
  <Disk name="DSK1" total="2030927872" free="2030764032" >
    <File name="log.sbf" size="16384" locked="yes" />
    <File name="leuv2050.07_" size="35196" locked="no" />
  <Disk>
<DiskInfo>
COM1>
```

sfn gfn	**setFileNaming** **getFileNaming**	***Disk*** *Disk*	*NamingType*	*FileName (8)*						
		+ DSK1 all	FileName Incremental IGS15M IGS1H IGS6H IGS24H	log						

RxControl: Logging > Internal Logging Settings

Use these commands to define/inquire the file naming convention applied to name the internal SBF, NMEA or user-message log files.

If *NamingType* is `FileName`, the file name is given by the third argument *FileName*, followed by the extension `.SBF`, `.NMA` or `.ECM` for SBF, NMEA and user-message files respectively. User-message files contain messages entered by the command **`exeEchoMessage`** prefixed with the GPS week number and time of week in seconds.

If *NamingType* is `Incremental`, the file name is given by the first five characters of the *FileName* argument (right padded with "_" if necessary), followed by a modulo-1000 counter incrementing each time logging is stopped and restarted. The file name extension is `.SBF`, `.NMA` or `.ECM` as described above. If the auto-incremented file name already exists on the disk, the receiver takes action as specified by the **`setDiskFullAction`** command.

If *NamingType* is `IGS15M`, `IGS1H`, `IGS6H` or `IGS24H`, the receiver automatically creates a new file every 15 minutes, every hour, every 6 hours or every 24 hours respectively, and the file name adheres to the IGS/RINEX naming convention. The 4-character station name is taken from the marker name as set by the **`setMarkerParameters`** command.

In IGS naming mode, the files are put in daily directories, the directory name being of the form `yyddd` with `yy` the 2-digit year and `ddd` the day of year. If *NamingType* is `FileName` or `Incremental`, the file is put in the root directory.

The set of allowed characters for the *FileName* argument is:

```
_0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
```

Note that the actual file name on the disk is case insensitive and only contains lower-case characters even if the user entered upper-case characters in the *FileName* argument.

If internal logging is ongoing at the moment when the command is entered, the current file is closed and the logging continues in a new file with the name as specified.

Examples

To have a fixed file name "`mytest.sbf`", use:

```
COM1>  sfn, all, FileName, mytest <CR>
$R: sfn, all, FileName, mytest
  FileNaming, DSK1, FileName, "mytest"
COM1>
```

To create a new SBF file every hour on DSK1 with a filename according to the IGS convention, use:

```
COM1>  sfn, DSK1, IGS1H <CR>
```

```
$R: sfn, DSK1, IGS1H
  FileNaming, DSK1, IGS1H, "mytest"
COM1>
```

emd gmd	**exeManageDisk** **getManageDisk**	***Disk***	***Action***							
		DSK1	Unmount Format							

RxControl: Logging > Disk Management

Use this command to manage the internal disk identified by *Disk*.

Specify the action `Format` to format the disk (all data will be lost).

With the action `Unmount`, you command the receiver to stop all internal logging and to cleanly unmount the disk. After unmounting the disk, it is safe to power-off the receiver without danger of file corruption. Be aware that the only way to remount the disk is to reset or power-cycle the receiver. Note that the disk is also automatically unmounted when issuing the command **`exePowerMode, standby`**.

If the specified action could not be performed on the given disk, an error message is returned. For example, attempting to format or unmount the disk during an FTP transfer will result in an error.

Example

To format the first internal disk `DSK1`, use:

```
COM1>  emd, DSK1, Format <CR>
$R: emd, DSK1, Format
  ManageDisk, DSK1, Format
COM1>
```

lrf	lstRecordedFile	*Disk*	*FileName (60)*							
		DSK1								

Use this command to retrieve the contents of one of the internal log files.

The reply to this command consists in a succession of blocks starting with the "`$- BLOCK`" header, and terminating with the pseudo-prompt "`--->`" (see section CommandReplies (Section not found)). The decoding program must remove these headers and pseudo-prompts to recover the original file contents.

The download speed is highly influenced by the processor load. To speed up the download, it is recommended to stop the signal tracking, which can be done by typing the following command before starting the download: **`setSatelliteTracking, none`**. It is also recommended to perform file download over USB if speed is important.

The file download can be interrupted by sending ten uppercase "S" characters (simply by holding the "shift-S" key pressed) to the connection through which the download is taking place.

Examples

To output the contents of the internal log file named `log.sbf` on the first internal disk (DSK1), use:

```
COM1>  lrf, DSK1, log.sbf <CR>
$R; lrf, DSK1, log.sbf
... Here comes the content of log.sbf ...
COM1>
```

If the file `log.sbf` does not exist, an error is returned:

```
COM1>  lrf, DSK1, log.sbf <CR>
$R? lstRecordedFile: Argument 'FileName' could not be handled!
COM1>
```

erf grf	**exeRemoveFile** **getRemoveFile**	***Disk***	***FileName (60)***							
		DSK1	none all							

RxControl: Logging > Remove Internal File

Use this command to remove one file or an entire directory from the internal disk identified by *Disk*.

If *FileName* is the name of a file, only that single file is removed from the disk. Files in a directory can be specified using dirname/filename.

If *FileName* is the name of a directory, the entire directory is deleted, except the file currently written to, if any.

If the reserved string `all` is used for the *FileName* argument, all files are removed from the selected disk, except the file currently written to, if any.

If there is no file nor directory named *FileName* on the disk or if the file is currently written to, an error message is returned.

Examples

To remove the file "`ATRX2980.03_`" from directory "`03298`", use:

```
COM1>  erf, DSK1, 03298/ATRX2980.03_ <CR>
$R: erf, DSK1, 03298/ATRX2980.03_
  RemoveFile, DSK1, "03298/ATRX2980.03_"
COM1>
```

To remove all files from DSK1, use:

```
COM1>  erf, DSK1, all <CR>
$R: erf, DSK1, all
  RemoveFile, DSK1, all
COM1>
```

3.11 L-Band Commands

slpc glpc	**setLBAS1PPPConfig** **getLBAS1PPPConfig**	*Source*								
		ULTRA APEX								

RxControl: Navigation > Positioning Mode > PPP and Differential Corrections

This LBAS1-specific command configures the PPP positioning engine to use PPP corrections of the type specifed by the *Source* argument.

This command is only available if the "`augm_data_svc`" permission is set to "`MBAS1 default provider for global use`". Use the command **`lstInternalFile, Permissions`** to check your permission file.

Example

```
COM1>  slpc, APEX <CR>
$R: slpc, APEX
LBAS1PPPConfig, APEX
COM1>
```

spas gpas	**setPPPAutoSeed** **getPPPAutoSeed**	*Mode*								
		none + DGPS + RTKFixed all								

RxControl: Navigation > Positioning Mode > PPP and Differential Corrections

Use this command to specify which position mode is allowed to be used as a seed for the PPP engine.

If both `RTKFixed` and `DGPS` modes are enabled, the receiver gives priority to `RTKFixed` seeding over `DGPS` seeding.

In any case, a manual seed entered with the command **`exePPPSetSeedGeod`** overrules any automatic seeding.

Before enabling seeding from DGNSS or RTK, make sure that the DGNSS/RTK datum is specified with the **`setGeodeticDatum`** command, or alternatively that the offset between ITRF and the datum to which DGNSS and RTK positions relate is specified with the command **`setPPPDatumOffset`**.

Example

```
COM1>  spas, RTKFixed <CR>
$R: spas, RTKFixed
PPPAutoSeed, RTKFixed
COM1>
```

spdo gpdo	**setPPPDatumOffset** **getPPPDatumOffset**	*Mode*	*DX*	*DY*	*DZ*					
		manual	-1000.000 ...0.000 ...1000.000 m	-1000.000 ...0.000 ...1000.000 m	-1000.000 ...0.000 ...1000.000 m					

RxControl: Navigation > Positioning Mode > PPP and Differential Corrections

If no transformation is applied, PPP positions relate to the ITRFyy datum (yy depending on the PPP service provider), which differs from the regional datum in which DGNSS or RTK positions are computed. In situations where the receiver can switch between DGNSS/RTK and PPP positioning modes, this means that the coordinates reported in SBF would exhibit a jump at each transition from and to PPP mode.

The preferred way to avoid this so-called datum shift is to use the **setGeodeticDatum** command to tell the receiver to transform all PPP coordinates to the regional DGNSS/RTK datum.

The **setPPPDatumOffset** command offers an additional way of removing the datum shift by instructing the receiver to subtract the values (DX, DY, DZ) from all PPP coordinates. This is done prior to the transformation to the datum specified by the **setGeodeticDatum** command.

The command has also an effect on seeding. In manual seeding mode (see the **exePPPSetSeedGeod** command), the receiver first performs the coordinate transformation from the datum specified by the *Datum* argument of the **exePPPSetSeedGeod** command, and then adds the offset (DX, DY, DZ) to the transformed coordinates. In auto-seed mode (see the **setPPPAutoSeed** command), the receiver first transforms the DGNSS/RTK coordinates according to the datum set by the **setGeodeticDatum** command and then adds the offset (DX, DY, DZ) to the transformed coordinates.

In most cases, it is recommended to use the **setGeodeticDatum** command to deal with datum offsets. The command **setPPPDatumOffset** is kept for backwards compatibility reasons though.

Example

```
COM1>  spdo, manual, 0.22, 0.12, 0.54 <CR>
$R: spdo, manual, 0.22, 0.12, 0.54
  PPPDatumOffset, manual, 0.220, 0.120, 0.540
COM1>
```

3.12 SBF List

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Appendix A Error Messages

The following table lists the possible ASCII error messages and their meaning.

Error Message	Description
Invalid command!	Syntax error or unsupported command.
Argument 'xxx' can't be omitted!	Omission of a mandatory argument.
At least one non tabular argument needed!	Omission of a mandatory argument.
Argument 'xxx' is invalid!	Value out of range, or too many decimal digits.
Argument 'xxx' could not be handled!	Argument impossible to parse or invalid combination of values.
ASCII commands between prompts were discarded!	Argument impossible to parse or invalid combination of values.