



GPS Monitoring Software

Meinberg Radio Clocks GmbH & Co. KG

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1 Imprint

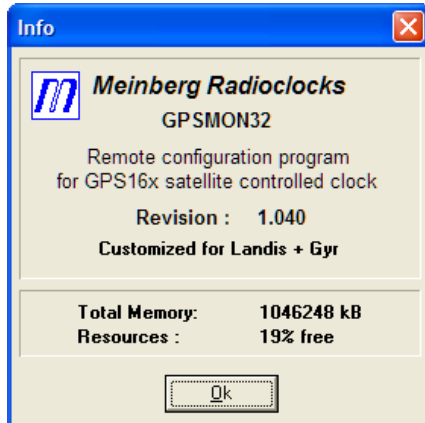
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2 General



The program GPSMON32 can be used to monitor and control all essential functions of the Meinberg GPS-Receivers. The software is executable under WINDOWS operating systems. The current revision number of the program can be checked in Window "About".

Installing the program

To install the software just run the program **Setup.exe** from the included USB memory device and follow the instructions from the installation program.

Conneting the GPS to the PC

To obtain a serial connection from PC to the GPS receiver it is necessary to connect a free serial port of the PC with the serial Port COM0 of the GPS. The serial port used by the PC must be configured in menu "**Connection** → **PC-Comport**". Please make sure that the serial port to be used by GPSMON32 is not accessed by any other application during execution. The monitoring program is configured to use the serial parameters 19200Bd, 8N1. If serial port COM0 of the GPS receiver is not configured the same, no communication comes about. In this case, it is necessary to enforce a serial connection by using menu "**Connection** → **Enforce Connection**". Just click the "**Start**" button in the apperaring window.

The change of an entry done by the user is indicated by the 'Update' field. If any value differs from the corresponding value in GPS memory, the color of the 'Update' fields changes from green to yellow, its label changes from 'Updated' to 'Changed'.

As long as the data was not sent, you can reload the old values by clicking the 'Refresh' button.



Note: Some variants of our GPS Receivers do not support this way of setting up a connection. These versions need to be configured to the correct serial paramters manually.

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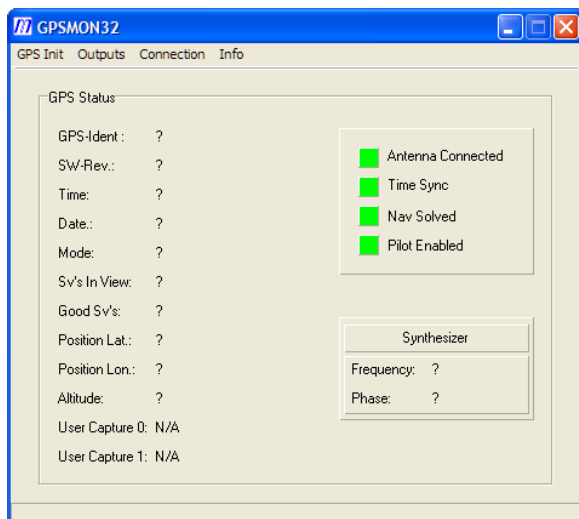
2.1 Problem duplicate allocation of COM0

COM0 can be configured for various functions, for example a serial timestring. Please refer to chapter "Serial Parameter, Timestring". As long as GPSMON32 is connected to the GPS, these functions are suspended and only recovered when the connection with GPSMON32 is closed by exiting the program or changing the serial

port parameters. The connection must be refreshed by GPSPMON32 periodically, hence the connection is terminated automatically after a timeout period of abt. 30s when no refresh commands are received.

Note: Dupliacte allocations of the serial port must be considered particularly when using GPS170AHS for this unit has no serial port COM1 available to the user. In any other configuration, duplication allocations be avoided by using serial port COM1 for synchronization with timestring.

2.2 The Main Window



This window provides a concise overview of all data essential to the user. Here date, time, position and several status informations are displayed.

The information displayed in this window can be explained as follows:

Clock-Ident	Here the serial number of the connected GPS-receiver is displayed
SW-Rev	Displays the receivers software revision
Time,Date	Show time and date
Mode	Here the receivers operating mode is displayed. Possible modes are 'COLD BOOT', 'WARM BOOT' and 'Normal Operation'. Since this point is updated only when starting the program, a question mark "?" can be displayed here too. This is no faulty.
Sv's In View	Shows the number of satellites with an elevation of at least five (newer GPS eight) degrees.
Good Sv's	This point shows how many satellites can actually be received and used for navigation. A differences of the number of good satellites from those that are in view theoretically, can be caused by screenings of the antenna due to buildings.
Position Lat, Position Lon, Altitude	Shows the receivers position in degrees, minutes and seconds as well as the height referred to mean sea level.
User Capture 0, User Capture 1	Shows the user capture values. This point is disabled when a GPS163xHS is connected.
LED Antenna Connected	This field shows, whether the antenna is connected to the receiver. If the antenna is disconnected, this field is displayed in red.
LED Time Sync	Shows whether the GPS-clock is synchronized.
LED NAV Solved	This field is displayed green, if the position was calculated after a power up reset.

LED Pilot enabled (Option) This LED is displayed in green when the pilot frequency is synchronized. If the pilot frequency output is disabled, the LED is displayed in red.

When the LED is displayed yellow with an exclamation mark:
The pilot frequency output is currently disabled if additionally the text "Pilot free running" is displayed. Please refer to chapter „Enable Flags“ if you want to enable the pilot frequency output in asynchronuos mode.

If the text "Pilot drifting" is displayed, the pilot frequency was synchronized once after power up, but currently the GPS has no sufficient reception of satellites to keep up synchronization. In this case the pilot frequency output remains enabled for a timeout period ("Sync. Outage Delay"). Please refer to chapter „Synthesizer“ for more information.

When the timeout period is exceeded, the pilot frequency output is disabled and the LED is displayed in red.

Synthesizer Frequency and Phase of the integrated frequency synthesizer are displayed here. If the configured frequency is 0Hz, the text "Synth. Disabled" is displayed on a red background. Refer to chapter "Synthesizer". The pilot frequency output is suspended until the GPS has synchronized when the text "Synth Inhibit" is displayed. Please refer to chapter "Enable Flags".

Note: On state change of the pilot frequency output, it takes a few seconds until the current state of the pilot frequency output is displayed correctly in GPSPMON32.

2.3 The menu GPS-Init

The main window includes the pull down menu 'GPS-Init' with its topics 'Send Configuration', 'Receive Configuration', 'Init User Parameter', 'Init System Parameter', 'Set Time from PC', 'Force Boot Mode', 'Set Timezone', 'Initial Position', 'Cable Length' and 'Exit'.

Send/Receive Configuration

'Send Configuration' transfers configuration data from your host PC to the connected GPS-System. To avoid compatibility problems, a difference between GPS164 and GPS170 radioclocks is made. Configuration files for GPS170 clocks contain serial port parameters, the initial position, the enable flags and the time zone settings. Files which are meant for GPS164 clocks additionally contain the pulse/timer programs and the time string settings, though the initial position is neglected. A file select box pops up when clicking on 'Send Configuration'. All configuration files must have the extension .cfg. Before transferring the data, it is checked whether the selected file fits into the connected GPS. It is impossible to transfer a GPS164 configuration file into a GPS170, and vice versa. After the transfer of configuration data the serial ports of the connected GPS are re-initialized with the new settings. Therefore the connection between GPS and host may get lost, if the new serial port settings are unsuitable for communication. In this case GPSPMON32 shows a popup which allows the user to start a reconnection sequence afterwards. Please pay attention to the fact that some firmware versions of GPS receivers do not support the enforced serial connection. All settings mentioned above can be read from the GPS and saved to a configuration file by using the menu item 'Receive Configuration'.

Init User Parameter, Init System Parameter

'Init User Parameter' resets all user defined settings like serial port parameter etc. to their default values. When clicking 'Init System Parameter' the connected GPSreceiver will remove all navigation and satellite data from its buffered memory. The receiver switches to 'COLD BOOT' mode after that. 'Init UserParameter' resets all user configurable parameters like timezone or serial port settings. Serial port parameter will only be reset to default if invalid settings are stored in the GPS. Hence, if GPSPMON32 is not operated at default settings 19k2/8N1 the serial connection will break down. In this case it is necessary to enforce a new connection. Please refer to chapter „Connecting the GPS to the PC“.

Set Time from PC

The GPS receiver cannot calculate correct elevation and doppler frequency for the satellites in view, if the real time clock holds incorrect time or date after power up. In this case the receiver will start in „WARM BOOT“ mode and search for satellites. This can be avoided by setting correct time and date.

FORCE BOOT MODE

This menu enables the user to reset the satellite and position data stored in the buffered memory and let the receiver change into Boot mode. This may be necessary if the almanac data stored in buffered ram is too old or the system was moved to a new location a few hundred kilometers away from where the unit was operated before. In this case receiver is not able to calculate the correct satellites in view. Manually changing the receivers mode into boot mode will shorten time to correct synchronization, nevertheless the receiver would change into boot mode automatically under conditions as described above.

2.4 Set Timezone

(Configuring timezone and daylight saving times)

Refer to manual "Technical Data GPS170AHS; Chapter Timezone".

The following window pop up, after clicking on 'Set Timezone':

Daylight Saving On						
Name	Offset from UTC	Weekday	Day	Month	Year	Time
MESZ	+ 2 00	Sunday	25	March	****	2:00:00

Daylight Saving Off						
Name	Offset from UTC	Weekday	Day	Month	Year	Time
MESZ	+ 1 00	Sunday	25	October	****	3:00:00

Updated ■ Refresh Send

Here the user can enter the name of the local time and the offset from universal time coordinated (UTC). Start and end of daylight saving may either be defined by exact dates for a single year, or using an algorithm which allows the receiver to recompute the effective dates year by year. In the first case the user must enter day, day of week, month and year, in the second case the day, day of week, month and three asterisks in the respective year-fields. Then daylight saving changes the next day-of-week after the specified day in month which matches the configured day-of-week.

Fixed daylight saving changeover times

In this case a year number must be entered in the year field. The weekday settings have no effect.

Automatic daylight saving changeover times

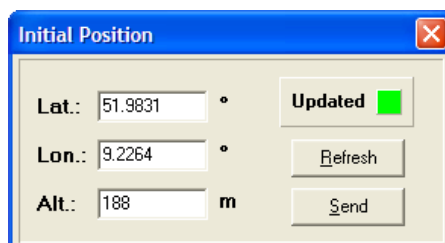
Using this method, it is necessary to define the day of week, day of month, month and the time of the changeover. Field 'Year' must be filled with three asterisks. (***). The changeover will take place the next matching day of week after the specified day of month in the specified month at specified time. In picture shown above, 25th of march is a saturday in 2006. The changeover will take place on the following sunday 26th at specified time.

No daylight saving changeover

If no daylight saving changeover is desired, just enter the same date and time into the fields for daylight saving on and off. Further the 'Offset from UTC' fields must contain the same values.

2.5 Initial Position

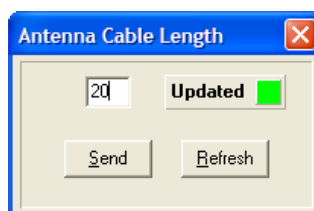
By using submenu 'Initial Position' the receiver's position can be set manually. When the receiver is installed at a new location far away from the last position saved in the receiver's memory, the satellites in view and their dopplers will differ so much from those expected due to the wrong position, that the GPS receiver has to scan for satellites in 'WARM BOOT' mode. Making the new approximately known position available to the receiver can avoid 'WARM BOOT' and speed up installation.



The 'Initial Position' dialog box has a blue title bar with a close button. It contains three input fields: 'Lat.: 51.9831 °', 'Lon.: 9.2264 °', and 'Alt.: 188 m'. To the right of these fields is an 'Updated' button with a green indicator light, and below it are 'Refresh' and 'Send' buttons.

2.6 Cable Length

The menu 'Cable Length' is used to enter the length of the coaxial cable between the GPS receiver and the antenna unit. GPS radio clocks use this information to compensate the cable delay error.



The 'Antenna Cable Length' dialog box has a blue title bar with a close button. It contains a single input field with the value '20'. To the right of this field is an 'Updated' button with a green indicator light. Below the input field are 'Send' and 'Refresh' buttons.

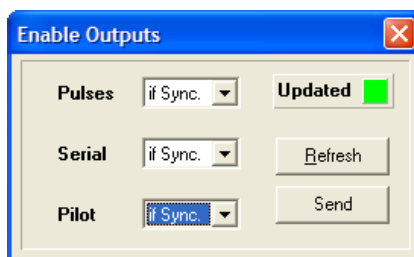
2.7 The menu Outputs

In the main window you'll also find the menu 'Outputs' with its items 'Enable Flags', 'Serial Parameter', 'Pulses/Timer' and 'Synthesizer'.

Enable Flags

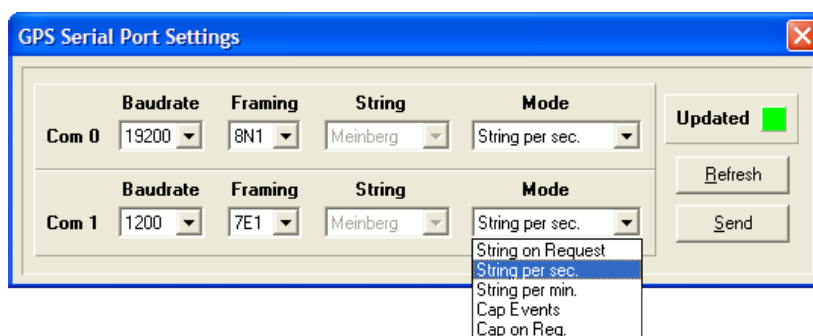
The submenu 'Enable Flags' lets the user configure at which time after power up the serial ports and pulse/frequency outputs are to be enabled. Outputs which are shown to be enabled '**always**' will be enabled immediately after power-up. Outputs which are shown to be enabled '**if Sync**' will be enabled after the receiver has decoded the signals from the satellites and has checked or corrected its on-board clock. The default setting for all outputs is '**if Sync**'.

The item '**Pilot**', which is used to control the enable flag of the programmable pilot frequency synthesizer is disabled, if no GPS170 type is connected.



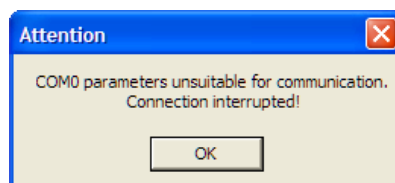
Serial Parameter, Timestring

Here the user can enter the serial port settings like baud rate, framing, kind of used timestring and the mode of operation for both serial ports COM0 and COM1. Timestrings can be issued once per second, once per minute or on request by ASCII char "?". The sort of used time string is not selectable if a GPS170 receiver is connected. Remember that communication between GPS and PC breaks down if the selected transfer rate and framing for COM0 are unsuitable. In this case the program shows a popup which allows starting a reconnection sequence.



If mode '**string per min.**' is selected for customized versions GPS170SV and GPS170AHS, the timstring will be transmitted 10 seconds after minute changeover. with second field set to '00'. As already mentioned, communication can break down after sending the parameters if COM0 shall use other settings than 19200Bd, 8N1.

In this case the following message is displayed :



After confirming the message by pushing the [OK] button, a new connection must be enforced, if desired. Refer to chapter "Connecting GPS and PC".

2.8 Pulses/Timer

(GPS164 railmount clocks only)

Here the user can establish settings for the programmable pulse outputs. Clicking on '**Pulses/Timer**' opens a window as shown below. Depending on the selected mode some entry fields may be invisible.

General

The field '**Channel**' selects the output of the GPS Receiver. When changing this field, the data for the respective output is loaded from the GPS. If you want to transfer certain channel settings to the GPS, you must click to '**Send**' before selecting the next channel. Otherwise all changes will be lost. The home position of an output can be determined by using the '**Inverted**' Checkbox. Please pay attention to the fact, that an output's optocoupler –of course– cannot be through connected in case of brown-out or a system reset of GPS164.

Error detection after power up reset

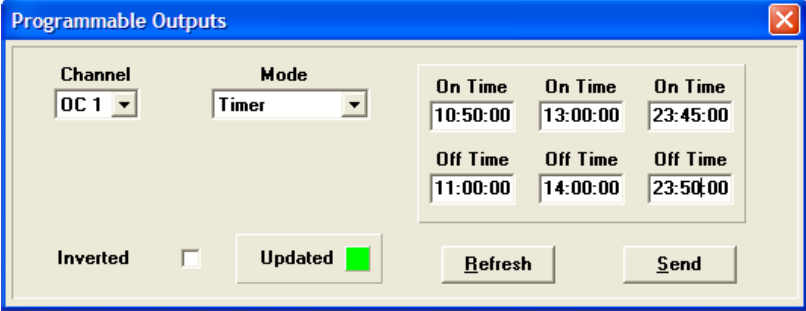
The GPS receiver checks the validity of all pulse/timer-programs after a power up reset. If an invalid program is detected, (loss of memory due to a weak lithium battery e.g.) the program is deleted. The corresponding output is set to idle state, the output's optocoupler is in high impedance state.

Mode

This field selects the operation mode of an output. Available modes are **Timer**, **Cyclic**, **DCF-Sim.**, **Pulse per day**, **Pulse per min**, **Pulse per sec**, **Pulse per hr**, **Status** and **Idle**.

2.9 Timer mode

If the operating mode Timer is selected, the window below is displayed:



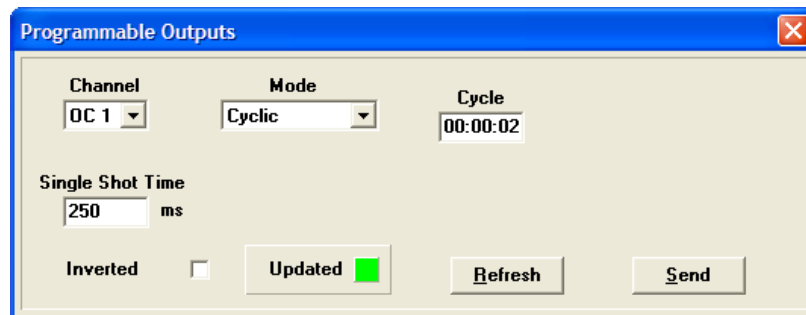
The screenshot shows a software window titled "Programmable Outputs" with a standard Windows-style title bar (blue with a close button). The window has a light beige background. On the left, there are two dropdown menus: "Channel" set to "OC 1" and "Mode" set to "Timer". Below these is an "Inverted" checkbox which is unchecked. To the right of the checkbox is a green square labeled "Updated". On the right side of the window, there is a table with two rows of time inputs. The first row is labeled "On Time" and contains three input fields with values "10:50:00", "13:00:00", and "23:45:00". The second row is labeled "Off Time" and contains three input fields with values "11:00:00", "14:00:00", and "23:50:00". At the bottom right, there are two buttons: "Refresh" and "Send".

On Time	On Time	On Time
10:50:00	13:00:00	23:45:00
Off Time	Off Time	Off Time
11:00:00	14:00:00	23:50:00

The switching plan is day assigned. Three turn-off and turn-on times are programmable for each output. If you want to program a switchtime, enter the turn-on time into the 'On Time' entry field and the turn-off time that belongs to it into the 'Off Time' field below. Thus the example on the top of the page shows switching times from 10.50 to 11.00, 13.00 to 14.00 and 23.45 to 23.50. A turn-on time later than the turn-off time would cause a switch program running over midnight. For example a program 'On Time' 10.45.00, 'Off Time' 9.30.00 would cause an active output from 10.45 to 9.30 (the next day!). If one or more of the three switching times are unused just enter the same time into the entry fields 'On Time' and 'Off Time'. In this case the switch time does not affect the output.

2.10 Cyclic mode

Cyclic mode is used for generating periodically repeated pulses:



The screenshot shows a window titled "Programmable Outputs". Inside, there are three main fields: "Channel" with a dropdown menu showing "OC 1", "Mode" with a dropdown menu showing "Cyclic", and "Cycle" with a text field showing "00:00:02". Below these, there is a "Single Shot Time" section with a text field showing "250" and a unit label "ms". At the bottom, there is an "Inverted" checkbox which is unchecked, an "Updated" status indicator which is a green square, and two buttons labeled "Refresh" and "Send".

The value in entry field 'Cycle' determines the time between two consecutive pulses (2sec in example above). This cycle time must be entered as hours, minutes and seconds. The pulse train is synchronized at 0:00 o'clock local time, so the first pulse of a day always occurs at midnight. A cycle time of 2 seconds for example, would cause pulses at 0:00:00, 0:00:02, 0:00:04 etc. Basically it is possible to enter any cycle time between 0 and 24 hours, however usually cycle times that cause constant distances between all pulses make sense. For example a cycle time of 1 hour 45 minutes would cause a pulse every 6300 seconds (starting from 0 o'clock). The appearing distance between the last pulse on one day and the first pulse of the next day (0:00:00 o'clock) would be only 4500 sec. The value in entry field 'Cycle' turns red, when entering a time that causes such an asymmetry.



The field 'Single Shot Time' determines the pulse duration which can vary in steps of 10 msec between 10 msec and 10 sec (= 10000 msec). The program truncates steps smaller than 10 msec. If a pulse duration longer than the cycle time is entered, the output remains activated after the first pulse that occurs. The home position (inactive state) is selected by checkbox 'Inverted'.

2.11 DCF-Sim. mode

In 'DCF-Sim.' mode the selected output simulates the telegram as transmitted by german time code transmitter DCF77 (see chapter DCF77 Emulation). The generated time code is related to the local time zone.

The screenshot shows the 'Programmable Outputs' dialog box. The 'Channel' dropdown is set to 'OC 1'. The 'Mode' dropdown is set to 'DCF-Sim.'. Below this, the 'DCF Suspend After' field is set to '0' with the unit 'min'. There is an 'Inverted' checkbox which is unchecked. A green 'Updated' button is visible. At the bottom right are 'Refresh' and 'Send' buttons.

If you want DCF simulation to turn off if the GPS164 is in free running mode, you can enter the delay (given in minutes) for deactivating the DCF-Simulation in the entry field 'DCF Suspend After'. DCF Simulation is never suspended, if the delay value is zero.

2.12 Pulse per day mode

Selecting 'Pulse per day' generates a single pulse of defined length once per day.

The screenshot shows the 'Programmable Outputs' dialog box. The 'Channel' dropdown is set to 'OC 1'. The 'Mode' dropdown is set to 'Pulse per day'. A 'Time' field is present with the value '01:00:20'. Below this, the 'Single Shot Time' field is set to '250' with the unit 'ms'. There is an 'Inverted' checkbox which is unchecked. A green 'Updated' button is visible. At the bottom right are 'Refresh' and 'Send' buttons.

You can enter the time when the pulse is generated in entry field 'Time'. The value in field 'Single Shot Time' determines the pulse duration. The pulse duration can vary from 10 msec to 10 sec in steps of 10 msec.

Pulse per sec. pulse per min. pulse per hr. modes

These modes generate pulses of defined length once per second, once per minute or once per hour. 'Single Shot Time' determines the pulse duration (10 msec...10 sec). The respective output remains in active state, when selecting a pulse duration longer than 990ms in pulse per sec mode.

Status

In Status mode the output is activated, whenever GPS164 receives at least four satellites to calculate its position.

Idle-mode

Selecting 'Idle' deactivates the output.

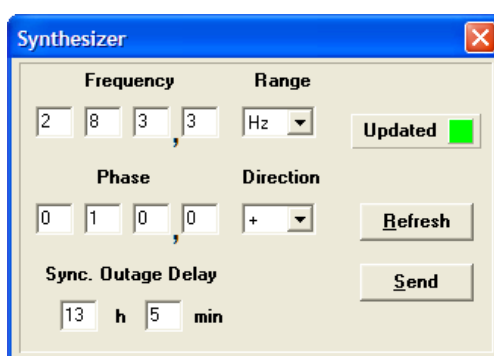
2.13 Synthesizer (GNSS only)

This menu allows to configure frequency and phase of the programmable synthesizer of GPS170 radioclocks. Phase is disregarded if frequency is above 10kHz. When range 'Hz' is selected, valid fractional digits are only .0, .1, .3, .5 or .06.

The real values output for the fractional settings in range 'Hz' are:

0.1 Hz → 1/8 Hz
 0.3 Hz → 1/3 Hz
 0.6 Hz → 2/3 Hz

The "real" frequency values are shown in the main window. Refer to chapter "The Main Window".



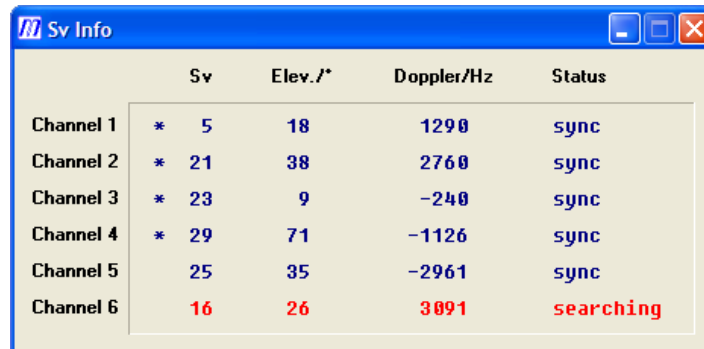
If the connected GPS receiver is a customized GPS170 type, additionally fields '**Sync. Outage Delay**' hr/min are enabled. When reception of satellites is lost the unit can continue operation of the pilot frequency output in holdover mode for a certain time where phase deviation is within a specified range. This time depends on the selected frequency. It will be calculated by the GPS receiver after sending the synthesizer values and displayed in the mentioned fields.

In case of loss of reception the pilot frequency is output for the displayed time in freewheeling mode if the "Pilot Enable Flag" is configured to "if sync.", also see chapter "Enable Flags". If the enable flag is set to "always", the sync outage delay values have no effect. Sync outage delay is calculated on every change of the synthesizer settings. If a user defined sync outage delay shall be applied, the custom value must be entered on every change of the synthesizer settings, otherwise the calculated values will be used.

2.14 The Menu Info

Used Sv's

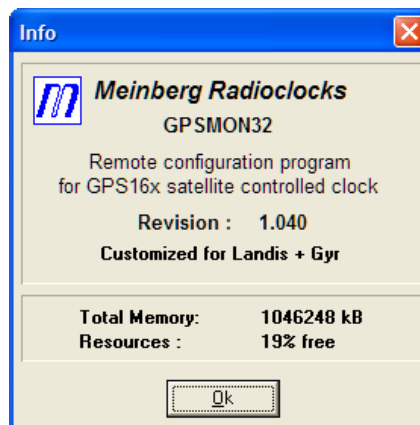
Clicking on 'Used Sv's in menu Info opens an overview of the received satellites. The table shows the satellite number (Sv), elevation, doppler shift and status for all six receiver channels. The elevation symbolizes the height of a satellite above the horizon related to the receiver position. Satellites must have an elevation angle of at least 5° for reception. The doppler shows whether the satellite is coming up from the horizon (doppler positive) or going down to the horizon (doppler negative). If a receiver-channel was able to synchronize to the data stream of a satellite, the status 'sync' is displayed. The message 'searching' indicates that a receiver-channel tries to synchronize to a certain satellite. When scanning for new satellites (an absolutely normal behaviour) the channel is displayed red.



	Sv	Elev./°	Doppler/Hz	Status
Channel 1	* 5	18	1290	sync
Channel 2	* 21	38	2760	sync
Channel 3	* 23	9	-240	sync
Channel 4	* 29	71	-1126	sync
Channel 5	25	35	-2961	sync
Channel 6	16	26	3091	searching

About

Shows informations about the software release and system resources.



Updates

The latest version of the Monitor Program "GPSMON32" can be downloaded by using the link: [Meinberg Software Download - GPS Monitor Program](#)