



RTC5 Software – Revision History (as of 2022-11-11)

Current Software Package: RTC5 Software 2022 11 11.zip

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| RTC5DRV.sys | 6.1.7600.16385 | 2012-06-23 |
| RTC5DAT.dat | 500 | unchanged |
| RTC5RBF.rbf | 533 | unchanged |
| RTC5OUT.out | 552 | changed from 551 |
| RTC5DLL.dll | 550 | unchanged |

Notation:

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| B | Bugfix |
| C | Change |
| N | New |

Firmware RTC5RBF.rbf Version 506 to Version 507

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| N: Equidistant external starts | set_control_mode and set_control_mode_list (bit #10 = 1) allow track delays to commence counting from the time point of the last external list start (triggered via simulate_ext_start or an external start signal). This way, equidistant external list starts can be created that are independent of the time point of the start trigger as long as they occur within the specified track delay. In contrast, bit #10 = 0 (default) causes track delays to commence counting at the time of the start request. |
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Firmware RTC5RBF.rbf Version 507 to Version 509

(intermediate version 508 wasn't an official release)

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| C: SL2 transfer | 508: With a disconnected scan head, the firmware didn't forward any error bits. Now the pulse length error bit is forwarded (see get_startstop_info, bits #17 and 25), thus allowing disconnected scan heads to be identified at runtime. |
| B: Softstart, pixel mode | 508: Under some circumstances the first pixel was incorrect. The most recently set pixel value (default pixel) was always applied. |

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| B: Laser delays | <p>Newly written LaserOn or LaserOff delays were ignored if a prior delay hadn't yet expired.</p> <p>Example of this error situation: Mark1-Jump1-Mark2-Jump2 combinations with LaserOn/Off delays so large that Mark1's LaserOn delay hadn't yet expired during Mark2 or Jump1's LaserOff delay hadn't yet expired during Jump2. In such cases, the second delay was always ignored. Therefore, even after a set_end_of_list (in place of Jump2), for example, the laser would have actually remained on.</p> <p>Now delays are overwritten. Thus, Mark1's LaserOn delay and Jump1's LaserOff delay would be "ignored." Accordingly, the laser will always actually be off after set_end_of_list. Also see bugfix DSP program file version 511 to version 512.</p> |
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Firmware RTC5RBF.rbf Version 509 to Version 511

(intermediate version 510 wasn't an official release)

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| N: set_laser_mode(6) | see manual version 1.0. |
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Firmware RTC5RBF.rbf Version 511 to Version 512

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| B: encoder reset | The encoder reset always occurred with an external /START, even if the external /START was suppressed while a list was active. |
| C: master/slave | Improvements of master/slave initialization. |
| N: sync_slaves | Resynchronization of master/slave chain. |
| N: laser control | Counter for external pulses at DIGITAL_IN1, see DLL version 514 to version 515 or DSP program file version 513 to version 514. |
| C: set_laser_control | Bit #5: polarity of external pulses at DIGITAL_IN1. |

Firmware RTC5RBF.rbf Version 512 to Version 513

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| B: rs232_read_data | external data synchronization error resolved. |
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Firmware RTC5RBF.rbf Version 513 to Version 515

(intermediate version 514 wasn't an official release)

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| C: sync_slaves | Improved synchronization of master/slave chain. |
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Firmware RTC5RBF.rbf Version 515 to Version 516

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| B: ANALOG OUT1 | With the very first laser pulse after load_program_file the ANALOG OUT1-Voltage was reset wrongly. |
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Firmware RTC5RBF.rbf Version 516 to Version 517

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| B: LaserOn and LaserOff delays | Refinement of the laser delay's control, see RTC5OUT.out Version 521 to Version 524. |
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Firmware RTC5RBF.rbf Version 517 to Version 518

(intermediate version 518 wasn't an official release)

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| C: Encoder reset | Both encoders can be separately reset (see set_fly_x, set_fly_y). |
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Firmware RTC5RBF.rbf Version 518 to Version 519

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| C: get_marking_info | If one or more of the status word bits are set for monitoring via set_laser_control, any possible error can be read out via get_marking_info. |
| B: simulate_ext_start | Other than documented, a simulated external start within an activated debouncing time has been prevented. |

Firmware RTC5RBF.rbf Version 519 to Version 520

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| N: set_pulse_picking, set_pulse_picking_list | Laser control with Pulse Picking Mode. |
| B: Pixel mode | If the first pixel after load_program_file had the value 0 this analog value wasn't output, provided another value had been explicitly written to the AnalogOut channel previously selected via set_pixel_line. |

Firmware RTC5RBF.rbf Version 520 to Version 521

(intermediate version 521 wasn't an official release)

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| C: set_pulse_picking, set_pulse_picking_list | If No = 0, the LASERON signal is output as LASER2 signal. |
| N: Output synchronization | Synchronization of the galvanometer's output with the incoming pulses of an external free running laser. |

Firmware RTC5RBF.rbf Version 521 to Version 522

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| B: set_fly_...commands | The encoder counters didn't reset sometimes. |
| B: Encoder counters | The encoder counters didn't count sometimes, if the encoder pulses were simultaneously connected to several boards. |
| B: stop_execution and external /STOP | Sometimes the laser was switched on again after the stop. |
| C: Output synchronization | Synchronization also with Pulse Picking signals, minimal incoming pulse length 125 ns. |

Firmware RTC5RBF.rbf Version 522 to Version 523

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| N: get_sync_status | Measurement of a SLAVE-board's synchronization status. |
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Firmware RTC5RBF.rbf Version 523 to Version 524

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| C: Laser signals in general | The laser signals LASERON, LASER1, LASER2 and the FirstPulseKiller signal can be freely redirected to the laser connector pins 1, 2 and 9 (config_laser_signals). |
| C: Pulse Picking Mode | A constant pulse length can be programmed for the pulse picking mode (set_pulse_picking_length). |
| C: set_laser_control | Provided, the pulse picking mode is switched on, Bit #7 = 1 activates the constant pulse length mode. |

Firmware RTC5RBF.rbf Version 524 to Version 526

(intermediate version 525 wasn't an official release)

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| B: Track delay and external encoder signals | When the track delay expired, sometimes two start triggers with a time delay of 10 μ s have been created. |
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Firmware RTC5RBF.rbf Version 526 to Version 527

(intermediate version 526 wasn't an official release)

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| C: Output synchronization | Now laser frequencies down to 50 kHz are supported. |
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Firmware RTC5RBF.rbf Version 527 to Version 528

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| B: Output synchronization | control_command was handled like a normal output signal. |
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Firmware RTC5RBF.rbf Version 528 to Version 529

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| B: Laser control | Under certain circumstances, the laser remained switched on during a jump. |
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Firmware RTC5RBF.rbf Version 529 to Version 533

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| B: Output synchronization | Special timing conditions could lead to one missing LASER1 pulse. |
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DSP Program RTC5OUT.out Version 510 to Version 511

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| B: get_marking_info | Processing-on-the-Fly application: image field overflow detection was faulty, get_marking_info always returned "OK." |
| B: arc_abs, arc_rel | Sky-Writing: under some circumstances the starting point was incorrect. |
| B: mark_date, mark_time, mark_serial | Undefined characters sometimes caused a program hang. They are now ignored (as is already the case with mark_char and sub_call). mark_time wouldn't fully execute if the command wasn't issued twice. |
| B: /START | List starts externally triggered within 10 µs after a set_end_of_list would cause a program hang. This has now been fixed. |
| C: get_startstop_info | The return value now contains in the upper 16 bits the SL2-100 transferred error bits. |
| C: set_control_mode, set_control_mode_list | Bits #12-15 are now reserved. The suppression of /STOP is no longer supported. |
| B: list_jump_rel_cond, list_jump_pos_cond | Jump commands initiating a jump to themselves failed to function. |
| C: set_auto_laser_ctrl | Mode = 5 allows laser control dependent on the encoder speed. |
| N: set_encoder_speed, set_encoder_speed_ctrl | Defines the target encoder speed for automatic laser control with mode = 5. |
| N: switch_ioport | Expansion of list_jump_..._cond commands. Branching to N (>1) addresses via selectable bits of the 16-bit I/O port. |
| C: set_control_mode, set_control_mode_list | Mode bit #10 is now handled (see Firmware version 506 to version 507, N: equidistant external starts). |

DSP Program RTC5OUT.out Version 511 to Version 512

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| B: mark_date, mark_time, mark_serial | The command didn't function properly in every situation, e.g. in "suppress leading zeros" mode. |
| C: mark_date | Months and weekdays can now also be marked with normal digits (parameter parts = 6, 7). |
| B: Softstart | Softstart wasn't activated. |
| C: Softstart | After expiration of the power-off waiting time, the value for Index = 0 will be issued (RTC®4 compatibility). |

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| B: Laser control | For very large laser delays extending across a Mark-Jump or Jump-Mark change, appropriate scanner delays will be inserted to prevent overlaps with not-yet-expired laser delays (the example error situations for Firmware version 507 to version 509, B: laser delays are thereby avoided). Laser switchoff during polygonal traversal with sharp corners (EdgeLevel parameter in set_delay_mode) will only occur if the laser was already on during this polygonal traversal (i. e., when the LaserOn delay has already expired and no LaserOff delay remains active). |
| C: simulate_ext_start, set_ext_start_delay_list | These are now normal commands instead of short list commands (otherwise conflict with set_control_mode_list possible) |
| N: set_offset_xyz, set_offset_xyz_list | An offset is now also specifiable for the Z axis (direction opposite set_defocus). |
| C: set_trigger, get_value | Parameters 20-23 return the final output values (incl. gain/offset). |
| C: get_value | Parameter 0 also returns the current laser status from outside a list execution. |
| C: get_head_status | Reserved bits are now returned as 1 (as is already the case with get_value and set_trigger). |

DSP Program RTC5OUT.out Version 512 to Version 513

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| B: set_laser_control | Laser hardware was enabled too early: For low-active polarities, LASERON could be active for some microseconds. |
| B: set_offset, set_offset_list | Z coordinate drove up to the limit stop (this occurred only in version 512, but not with set_offset_xyz or set_offset_xyz_list). |
| C: set_fly_... | set_fly_...with an unallowed parameter value always deactivated all fly corrections (Example: set_fly_x(Kx); set_fly_y(0) also deactivated the set_fly_x-correction, on the other hand set_fly_y(0); set_fly_x(Kx) operated successfully). Now a fly command with unallowed parameter value only deactivates the fly correction, previously activated via the same command with allowed parameter value (example: now set_fly_y(0) only deactivates a fly correction previously activated via set_fly_y(...), set_fly_rot(0) only deactivates a fly correction previously activated via set_fly_rot(...)). |
| C: McBSP interface (SPI/I ² C connector) | Data of the McBSP interface will not be continuously retrieved any longer. Data will be retrieved only while a list is executed and if a Processing-on-the-fly application with usage of McBSP position data has been activated. |

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| N: get_mcbasp_list | Queries data from the McBSP buffer (once), in order to make way for the current data transfer (see McBSP interface). |
| N: get_overrun | Returns the number of 10µs clock overruns which occurred since the last call of get_overrun (see manual version 1.0). |
| B: laser_signal_on, laser_signal_on_list | Under some circumstances, only the LASERON but no LASER1 signal and no LASER2 signal were output. |
| B: mark_serial, mark_serial_abs | M ₂ = 1 did not work, the serial number was always incremented after marking (as via M ₂ = 0). |
| B: simulate_ext_start | Was disabled via set_control_mode(bit #0 = 0) as the external start input (via /START, /START2 or /Slave-START). Now the command is always allowed. |
| B,C: goto_xy, goto_xyz | B: Were not executed (without any error message!), if an external stop signal (/STOP, /STOP2 or /Slave-STOP) was low. C: (Deliberately) will not be executed (get_last_error return code: RTC5_BUSY), if an external stop signal is low. |
| B: home_position | A home jump was not executed, if an external stop signal was low longer than approx. 10 µs. Now, a home jump is always executed and cannot be stopped via an external stop signal. |
| N: home_position_xyz | Enables home jumps also for the Z axis. |

DSP Program RTC5OUT.out Version 513 to Version 514

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| B: Encoder-Reset | See change for firmware version 511 to version 512. |
| N: get_standby | Return value: current standby parameters. |
| N: get_master_slave | Return value: master/slave status of the addressed board. |
| N: simulate_ext_start_ctrl | Analog to the list command simulate_ext_start, this new control command simulates an external start, but without track delay definition. |
| N: Fast RTC®5 | Identification and settings for faster RTC®5 boards. |
| B: get_marking_info | ENCODER error bits were shifted to the left by 8 bit. |
| N: sync_slaves | Stably synchronizes the slave boards' 10µs clock phase with the master board's 10µs clock. |
| N: laser_on_pulses_list | Laser control: LASERON only for a specified number of external pulses at DIGITAL_IN1, otherwise as laser_on_list. |
| C: set_laser_control | Bit #5: polarity of external pulses at DIGITAL_IN1. |
| B: laser_on_list | For Period > 1, the LaserOn period was 10 µs too short. |
| B: get_head_para | For 3D tables, only returned the calibration factor (since DSP program file version 511). |

DSP Program RTC5OUT.out Version 514 to Version 515

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| B: auto_change | An auto_change command within a few µs after a set_end_of_list could cause a program hang. |
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| B: Softstart mode | Softstart wasn't activated at all situations and was deactivated too early at some other situations. |
| B: set_defocus | Didn't function for 3D correction tables without F-Theta lens. |
| B: Z-Axis | C value was scaled too small. |
| B: measurement_status | Return value Pos was too big by 1 count. |
| B: set_fly commands | Switched off too early (the delay has not yet expired). |
| B: Processing-on-the-fly | Some commands, for example list_nop, didn't propagate the galvanometer position during a Processing-on-the-fly application. |
| B: Pixel mode | At some situations an extra pixel had been marked. |
| B: rs232_write_text_list | A runtime problem on writing several chars has been resolved. |
| N: upload_transform | Retrieves transformation data. |
| N: get_values | Retrieves up to 4 signal types simultaneously, see get_value (without s) also. |
| C: Scanner delay | Vectors of length 0 are ignored for calculating the (variable) polygon delay. |

DSP Program RTC5OUT.out Version 515 to Version 516

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| B: switch_io_port | SwitchNo was calculated without using Mask. |
| N: set_auto_laser_params, set_auto_laser_params_list | Ctrl, Value, MinValue, MaxValue can be subsequently changed (see set_auto_laser_control). |
| N: write_io_port_mask, write_io_port_mask_list | Only the masked bits are newly written, the other bits remain unchanged (see write_io_port). |
| N: timed_para_mark_abs, timed_para_mark_rel, timed_para_jump_abs, timed_para_jump_rel | Simultaneously timed and parameterized 2D commands, also see timed_mark_abs, para_mark_abs, timed_jump_abs, para_jump_abs or ~rel. |
| N: timed_para_jump_abs_3d, timed_para_jump_rel_3d, timed_para_mark_abs_3d, timed_para_mark_rel_3d | Simultaneously timed and parameterized 3D commands, also see timed_mark_abs_3d, para_mark_abs_3d, timed_jump_abs_3d, para_jump_abs_3d or ~rel_3d. |
| N: arc_abs_3d, arc_rel_3d | Linear z movement during the angular xy movement. |
| N: stop_trigger | Terminates data storage, when no list is currently active (see measurement_status, set_trigger). |
| B: Control commands with option set_verify | Sending a command a very short period of time (a few RTC®5 CPU clock cycles) before executing that command could possibly cause a not existing transfer error being reported. Neither the command's execution nor the verification of any other download was affected by this bug. |

DSP Program RTC5OUT.out Version 516 to Version 517

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| B: list_jump_rel | Operated within protected subroutines and sub_call like list_jump_rel(delta+1). |
| B: set_end_of_list | The finalizing scanner delay wasn't counted by save_and_restart_timer. |
| B: 3D output | Changing the image field size (stretching) by a variation of z wasn't handled correctly. |
| B: time_fix, time_fix_f | Didn't always correctly initialize leap year and week day for mark_date and mark_date_abs. |
| B: select_cor_table, select_cor_table_list | Didn't execute pending coordinate transformations subsequently, when a correction table was reassigned to the scan head. |
| N: set_ellipse | Defines shape and section of an ellipse. |
| N: mark_ellipse_abs, mark_ellipse_rel | Mark an ellipse around an absolutely or relatively defined center. |
| N: set_sky_writing_para, set_sky_writing_para_list | Like set_sky_writing, but run-in and run-out freely adjustable. |
| C: get_rtc_version | New: Bits #16–23 = DSP version info. |

DSP Program RTC5OUT.out Version 517 to Version 519

(intermediate version 518 wasn't an official release)

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| C: Short list commands | <p>518: Up to a maximum of 12 short list commands are allowed within one 10 μs cycle. The real maximum number may be reduced depending on the load of the board and the DSP version. There are still two short list commands allowed to precede normal list commands within one 10 μs cycle. Short list commands, which change the output pointer (e.g. sub_call, list_return or list_jump), count as two commands. When the maximum number of allowed short list commands is exceeded, list_nop will not be inserted any longer, instead a 10μs cycle is inserted (the laser keeps switched on during a polyline).</p> <p>For several short list commands in a row, a delayed short list command will execute undelayed only if a further delayed short list command is following, but not any longer if an undelayed short list command is following.</p> |
| C: Markings of length 0 | <p>518: At markings of length 0 the laser won't be influenced anymore, i.e. it will stay switched off, if it's still off and it will stay switched on, if it's already on. See also DSP program version 514 to version 515: C: Scanner delay.</p> |

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| B: set_sky_writing_para, set_sky_writing_para_list | Nprev, Npost = 0 didn't function always correctly. |
| C: In general: Coordinate transformations | New: at_once = 2. Collecting like at_once = 0, and executing in a shared jump together with goto_xy, goto_xyz, jump_abs or jump_rel. |
| B: para_mark commands | Did indeed use the wobble mode provided that it was switched on, but didn't activate it by themselves. |
| B: para_mark- and para_jump commands | The analog output voltages were too small by a factor of 16 (see set_vector_control: Ctrl = 1 oder 2). |
| N: store_encoder | Internally stores the current encoder values. |
| N: read_encoder | Reads out the internally stored encoder values. |
| B: set_wobble_mode | Incidental disturbance by a data overflow at eight-shaped wobble mode. |
| N: auto_cal | Command = 4: Determines and stores the ASC sensor type. Supports the new ASC sensor type 2. |
| C: auto_cal | After the command, the galvanometer scanners will now always be in the same position as before the command (or – if applicable – in the gain/offset corrected position), but not at their mid-positions. |

DSP Program RTC5OUT.out Version 519 to Version 521

(intermediate version 520 wasn't an official release)

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| B: In general | Under certain circumstances – due to a timing gap – a list command could have been sporadically executed with faulty parameters. This has been fixed. |
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DSP Program RTC5OUT.out Version 521 to Version 524

(intermediate versions 522 and 523 weren't official releases)

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| B: laser_on_list, laser_on_mask_list | 522: With laser delays less than 10 μ s the LASERON time was too long by 10 μ s. |
| C: Laser delays and scanner delays in general | 522: The scanner delay control was generally revised to prevent a crossover of LaserOn and LaserOff (see manual chap. 7.2.3). Therefore, an additional 10 μ s scanner delay can be more frequently dispensed (RTC5RBF.rbf version 517 required). |
| B: get_z_distance | 523: Returned wrong results since version 512. |
| B: Z-output for 3D systems | The Z-output to a varioSCAN could overflow, provided a blasting occurred by the use of improper ABC values (output equals 0 instead of +Zmax, not visible via set_trigger or get_value with signal SampleAZ_Corr = 12). |

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| C: In general: Coordinate transformations | Since RTC5OUT version 519 control commands with parameter at_once = 2 initiated a scanner delay, being executed at the start of a list. Thus, using a master/slave chain, an equally timed execution of a list might be disturbed. The scanner delay will now be suppressed for control commands. |
| N: set_dsp_mode | This command adjusts the maximum number of short list commands within a 10µs cycle to the allowed number for a smaller CPU frequency (smaller DSP version, see get_rtc_version). |

DSP Program RTC5OUT.out Version 524 to Version 526

(intermediate version 525 wasn't an official release)

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| B: set_fly_rot | 525: Rotation angle was scaled too small. |
| B: rs232_read_data | 526: led to an endless loop within the DSP (version 525 only). |
| B: arc_rel_3d | Could be possibly executed with wrong speed. |
| C: Timed mark vectors or arcs with zero length | Are no more short list commands, but now behave like normal vectors or arcs. |
| N: para_laser_on_pulses_list | Marks a parameterized discrete point. |
| C: SPI/I ² C interface (McBSP) | No more sticking, if more than two data words are sent to the board and no list with active "processing-on-the-fly" with position data is executing. |
| N: read_mcbasp | Reads a memory location of a completed McBSP transfer. |
| C: get_mcbasp_list | Is now an empty short list command, has no functionality any more. |
| N: set_mcbasp_x/y/rot, set_mcbasp_x/y/rot_list | Definition of a McBSP transfer's data words interpretation for a coordinate transformation. |
| N: apply_mcbasp, apply_mcbasp_list | Applies the coordinate transformation. |
| N: time_fix_f_off | Fixes time + offset to be marked. |
| B: variable jump delay | A minimal jump delay (set via set_delay_mode) larger than the ordinary jump delay (set via set_scanner_delays) could result in an excessive variable jump delay. |
| N: move_to | The control command controls a varioSCAN _{FLEX} Z-axis via the 16-Bit-IO-Port and a StepperMotorExtension board. |
| B: list_jump_rel | If the command followed a sub_call command within a list (even if it did not <i>immediately</i> follow the sub_call command) the command could have been ignored. Within a nested sub_call call, the command could have been executed faulty. |

DSP Program RTC5OUT.out Version 526 to Version 527

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| C: set_fly... | The encoder counter reset needs an additional 10µs cycle to execute completely. This cycle is now automatically provided by the set_fly... command. |
| C: Marking commands with zero length (vectors, arcs, ellipses) | If the laser is switched off, it will be switched on and the command will last 10 µs to execute. Otherwise, it is a short list command and doesn't switch the laser signals. Thus, single points can be marked alternatively to laser_on_list or timed_mark.... |
| B: rs232_write_text_list | The command always sent only the first character of the text to the rs232 interface and ignored the others. |
| C: set_vector_control, parametrized vectors | Parameterized vectors now can be executed with the focus shift (Ctrl = 7) as parameter type. |
| C: Coordinate transformations | With at_once = 3 the laser stays on during the jump (if it is on), in other respects like at_once = 1. |
| N: list_continue | Separation between short list commands, which in opposite to list_nop keeps the laser on and doesn't execute scanner delays. |
| N: micro_vector_abs, micro_vector_rel | Executes a single micro step without scanner delays, but with individually programmable laser delays. |
| N: set_fly_limits | Defines variable limits for Fly-Overflow detection. |
| N: if_fly_x_overflow, if_fly_y_overflow, if_not_fly_x_overflow, if_not_fly_y_overflow | List command to poll Fly-Overflow detection with the possibility of program branching like, for example, if_cond or if_not_cond. |
| N: clear_fly_overflow | Deletes detected Fly-Overflows. |
| C: get_marking_info | Now also returns Fly-Overflow detections with the variable limits. |

DSP Program RTC5OUT.out Version 527 to Version 528

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| B: Coordinate transformations | The parameter at_once = 3 executed correctly only for the list commands. |
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DSP Program RTC5OUT.out Version 528 to Version 529

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| N: Sky-Writing | Sky-Writing mode 2 available. |
| N: set_sky_writing_mode, set_sky_writing_mode_list | Switch the Sky-Writing mode. |
| B: set_fly_? commands | Even if bit #9 (reset with ext. start) has been set in set_control_mode, the set_fly_? commands did nevertheless reset the encoders. |

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| C: set_fly_x, set_fly_y, set_fly_rot | Now these commands only reset the encoder assigned to the command, but no more both encoders simultaneously. |
| N: read_analog_in | PCI-Express board: Returns the voltages AnalogIn0 and AnalogIn1 after they have been digitized by the on-board AD converter. PCI board: Only applicable, if an external plug-on AD converter board (article number 121126) has been attached to the SPI/I2C connector. |
| C: get_marking_info | Returns the status word error bits, if a surveillance has been set via set_laser_control and if an error has occurred. |
| B: set_delay_mode: DirectMove3D | The z dependent XY stretching was faulty calculated for the intermediate micro steps. The values at the beginning and at the end were always correct. |
| B: long_delay | Delayed short list commands have executed only after a long delay command. |
| N: Stepper motor signals | The stepper motor signals are available now (see manual as of version 1.5). |

DSP Program RTC5OUT.out Version 529 to Version 530

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| B: set_fly_limits | The limits have been used with a too small scaling factor. |
| B: Pixel mode | If the final Default pixel had not been explicitly defined the AnalogOut2 could rise up to 10 Volts, even if AnalogOut1 had been selected via set_pixel_line. |
| B: Vector defined automatic laser control | If the focus shift was selected via set_vector_control (Ctrl = 7) the focus shift was scaled too small. |
| B: set_fly commands | If the fly mode was switched off via parameter 0 (and not via fly_return) the position of the galvanometer scanners (as of version OUT529) wasn't corrected. |
| C: set_control_mode, set_control_mode_list | If Bit #1 is set, an external /STOP and stop_execution now also completely delete the waiting queue of not yet expired external starts. |
| N: set_pulse_picking, set_pulse_picking_list | Laser control with pulse picking mode. |

DSP Program RTC5OUT.out Version 530 to Version 531

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|--------------------------|--|
| B: set_matrix_list | The parameter at_once was ignored. |
| B.: get_marking_info | The surveillance error bits for the secondary scan head weren't returned. |
| B: Stepper motor signals | The stepper-busy flag wasn't set. Therefore the list command stepper_wait didn't function. |

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|---|---|
| C: laser_on_pulses_list | If Period > 2 ³¹ , the command will finish even before the complete wait time (Period – 2 ³¹) has expired, if the required number of external laser pulses at DIGITAL_IN1 is detected. |
| C: set_laser_control | Bit #6 = 1 activates the output synchronization. |
| N: set_fly_z | Activates a fly-z application with encoder values. |
| N: fly_return_z | Like fly_return, in addition it terminates a fly-z application. |
| N: set_fly_limits_z | Defines variable limits for fly-z-overflow detection. |
| N: if_fly_z_overflow, if_not_fly_z_overflow, | List command to poll fly-z-overflow detection (like if_fly_x_overflow, if_not_fly_x_overflow, a.s.o.) |
| C: clear_fly_overflow | Bits # 5, 6: delete Error bits # 24, 25 from get_marking_info. |
| C: get_marking_info | Bits # 22 – 25: show fly-z-overflow errors. |

DSP Program RTC5OUT.out Version 531 to Version 532

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| N: get_sync_status | Measurement of a SLAVE-board's synchronization status. |
| N: set_free_variable[_list], get_free_variable[_list] | 4 freely usable variables for set_trigger and McBSP output. |
| C: set_trigger | Further data types added for recording via set_trigger. |
| C: McBSP output | Data formats adapted to data types. |
| N: set_mcbasp_out_ptr | Up to 8 data types can be output circularly. |
| N: set_mcbasp_in | New input mode for McBSP interface. |
| B: apply_mcbasp | Faulty Bit #31 to distinguish between data types. |
| C: read_mcbasp | Now, up to 4 internal memory positions can be readout. |
| B: wait_for_encoder_mode | Didn't operate correctly for Mode > 0 and Wait < 0. |
| B: fly_x_pos, fly_y_pos | Didn't operate, if both options were used together. |
| N: set_mcbasp_freq | The output clock frequency is tunable between 4 and 16 MHz (Default: 8 MHz). |
| B: stop_execution | During a subroutine, the CallStack wasn't adjusted correctly. |
| C: set_sky_writing_mode | Mode = 3 available. |
| N: set_sky_writing_limit, set_sky_writing_limit_list | Definition of a limit value to switch between Sky-Writing modes 2 and 3. |
| B: Sky-Writing mode 2 | Arc commands didn't function correctly in all cases. |

DSP Program RTC5OUT.out Version 532 to Version 534

(intermediate version 533 wasn't an official release)

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| B: n_load_program_file with RTC®5-express boards | 533: After the PC's warm boot the command could cause the DSP's initialization procedure to hang up (see also RTC5DLL.dll version 531 to 533). This has been solved. But now under circumstances the analog inputs at the "SPI / I2C" connector could be permanently switched off. The analog inputs would then be available again only after a cold boot of the PC. |
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| C: ANALOG INx with RTC®5 -express boards | 533: The analog inputs at the "SPI / I2C" connector are now disabled per default at start up, but not permanently. They will be automatically enabled at the first use, unless they haven't been disabled permanently before (see above). |
| B: Sky-Writing | 533: With every Sky-Writing mode the LASERON time was too short by 10 µs compared to no Sky Writing mode. Thus short markings with a time duration of 10 µs have not been marked with LaserOnShift = 0 (default value). That's changed now. To be compatible with already optimized parameters the application should add 10 µs to the parameter LaserOnShift to compensate for the change. |
| B: set_mcbasp_in_list | 533: The parameter Scale was applied incorrect. |
| N: set_pulse_picking_length | Defines a constant pulse length for the pulse picking signal, independently from the current "Laser active" pulse length. |
| C: set_laser_control | Provided, the pulse picking mode is switched on, Bit #7 = 1 activates the constant pulse length mode. |
| N: config_laser_signals | The laser control signals LASERON, LASER1, LASER2 and the FirstPulseKiller signal can be freely redirected to the laser connector pins no. 1, 2 and 9. |
| B: Pixel mode | Any marking command with a large LaserOn delay immediately in front of set_pixel_line didn't cause an automatic delay adjustment to be executed . |
| C: load_correction_file, select_cor_table, select_cor_table_list | Up to 4 correction tables can be loaded on the RTC5 board at the same time. |

DSP Program RTC5OUT.out Version 534 to Version 535

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|--|---|
| N: set_fly_tracking_error | POF: Defines an encoder value dependent tracking error compensation. |
| N: set_mcbasp_matrix, set_mcbasp_matrix_list | Online Positioning: Specification of interpretation of the McBSP transferred data words as matrix coefficient for the coordinate transformation. |
| C: Sky-Writing | If LaserOnShift is larger than the upcoming marking length, the laser will not be switched on for the current command. |
| C: stop_execution | The command now switches off the laser, even though no list is currently active. Apart from that the command will (still) have no effect, when no list is currently active (still get_error return code RTC5_BUSY). |
| B: auto_cal | The command can now also be executed with external /STOP permanently active. |

DSP Program RTC5OUT.out Version 535 to Version 536

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| N: micro_vector_abs_3d | Like micro_vector_abs, but with a 3D micro vector end point. |
| N: micro_vector_rel_3d | Like micro_vector_rel, but with a 3D micro vector end point. |
| N: set_softstart_level_list | Similar as set_soft_start_level, but a list command. |
| N: set_softstart_mode_list | Like set_soft_start_mode, but a list command. |
| N: set_delay_mode_list | Like set_delay_mode, but a list command. |
| N: load_fly_2d_table | Downloads an XY stage encoder compensation table (for set_fly_2d sessions only). |
| N: set_fly_2d | Activates a 2D fly session (for XY stages). |
| N: init_fly_2d | Initializes the start position of an XY stage for an encoder compensation table. |
| N: get_fly_2d_offset | Returns the current offset values for the encoder compensation table. |
| N: wait_for_encoder_in_range | Waits until both encoders fall within the given range (2D fly or XY fly sessions only). |
| N: set_trigger4 | Allows to simultaneously record 4 channels with half of the storage space for each channel. |
| C: set_trigger, get_value | Signals 43 and 44 (Encoder0 and Encoder1) can be recorded and read out. |
| B: get_head_status | PosAck y wasn't returned. |
| C: set_encoder_speed | Sets the 100% value for the vector speed from both encoder channels for the encoder-speed-dependent automatic laser control. |
| C: Automatic laser control | New option: vector encoder speed for 2D fly or XY fly sessions. |
| B: Automatic laser control | The possible range was only a factor 2 instead of the specified factor 4. |
| B: Online-Positioning | Sometimes the coded data has been stored at the wrong position. |
| C: set_laser_control | Bit #28 = 1: In the case of an error, the laser-signal auto-suppression will automatically create a /STOP signal (the list stops, the laser switches off permanently). |
| N: load_stretch_table | Extended 3D correction (z-dependent field rectification). |
| N: activate_fly_2d, activate_fly_xy | Activates the fly corrections like set_fly_2d resp. set_fly_x and set_fly_y, but without an encoder reset. |
| N: if_not_activated | In the case of an error with activate_fly_2d or activate_fly_xy, allows a list jump, for example. |
| N: park_position, park_return | Jumps to a secure parking position and returns within fly correction sessions (2D fly and XY fly only). |
| N: repeat_list, until_list | Structured programming: Allows a numbered repetition of a group of list commands. |
| N: set_pixel_line_3d | Pixel mode along a 3D vector. |

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| N: Coordinate transformations within the virtual image field | In set_fly_2d sessions only: the total virtual image field can be translated and rotated. |
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DSP Program RTC5OUT.out Version 536 to Version 537

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|--|---|
| N: select_serial_set, select_serial_set_list, set_serial_step_list, get_list_serial | Up to 4 serial-number-sets available. |
| C: set_sky_writing_para | Timelag < 1/8 μ s switches sky-writing off, Timelag < 1/4 μ s switches sky-writing on using Timelag = 0. |
| B: Automatic laser control | At higher speeds the auto laser control value was sometimes calculated wrong. |
| B: Softstart | Softstart with less than 4 level values didn't work. |
| N: config_laser_signals_list | Redirection of laser signals to other pins (like config_laser_signals). |
| B: set_pixel_line, set_pixel_line_3d | As of version 536 ANALOG_OUT2 didn't work and set_pixel_line also used two list spaces. Now set_pixel_line_3d uses only one list space like set_pixel_line, if dZ equals 0, otherwise two list spaces. |
| N: set_wobbel_direction | Presets a direction of movement to align wobbel shapes. |
| N: set_wobbel_vector | Defines a section of a „Freely definable wobbel shape“. |
| N: set_wobbel_control | Configures laser control parameters for „Freely definable wobbel shapes“. |
| N: set_wobbel_offset | Transversal and longitudinal offset of a wobbel shape. |
| N: set_multi_mcbasp_in, set_multi_mcbasp_in_list | Activates the receiving of up to 8 different data types from the McBSP interface to be used for a 3D Processing-on-the-fly application with position values as well as for laser control. |
| N: read_multi_mcbasp | Reads out the type sorted values transferred via McBSP after being activated with set_multi_mcbasp_in. |
| N: range_checking | Implements an emergency action at a galvanometer position range overflow. |
| B: Automatic laser control | For mark-jump combinations and a LaserOn delay longer than the mark vector length no laser parameter output has been calculated for the first few cycles, but 0 was put out instead. |

DSP-Program RTC5OUT.out Version 537 to Version 538

(intermediate version 538 wasn't an official release)

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|--|---|
| B: wait_for-loops | With wait_for_encoder, wait_for_encoder_in_range or wait_for_mcbasp just before set_end_of_list the list execution wasn't correctly.finished |
| N: periodic_toggle, periodic_toggle_list | These commands generate a periodic toggling signal at user defined output pins. For example, it can be used to trigger external peripheral devices synchronous to list execution. |
| C: mcbasp_init_spi | The McBSP-interface can now be operated in SPI mode as well. |
| B: list_repeat | The first command following list_repeat was ignored for all passes except the first one. |
| N: get_z_control | Returns the Z axis output value for the given position/parameters. |
| N: sub_cal_repeat, sub_cal_abs_repeat | Like sub_call or sub_call_abs, but with arbitrary repetition. |

DSP-Program RTC5OUT.out Version 538 to Version 539

| | |
|-----------------------|---|
| N: get_galvo_controls | Returns the output values for all addressed axes for the given position/parameters (replaces the version 538-only command get_z_control). |
| C: Free variables | Now 8 free variables are available. |

DSP-Program RTC5OUT.out Version 539 to Version 540

| | |
|---|---|
| N: list_call_repeat, list_call_abs_repeat | Like list_call or list_call_abs, but with arbitrary repetition. |
| B: sky-writing 2/3 | Within a sequence jump_* → set_end_of_list → auto_change → arc_* the arc has been marked incorrectly. Within a sequence laser_on[_pulses]_list → jump_* the laser remained switched on during the jump. |
| N: set_auto_laser_control | Mode = 6 for combined galvanometer and encoder speeds. |
| B: MOF and start_loop | Any of the set_fly_* commands switched off start_loop. |
| B: set_wobbel_mode | After switching from classical wobbel figures to the "freely definable wobble figures" the latter possibly could have been executed incorrect. |
| B: mark_ellipse_abs, mark_ellipse_rel | For positive LaserOnShift values being an integer multiple of 10 µs, an ellipsis command was not terminated in sky-writing mode. |

DSP-Program RTC5OUT.out Version 540 to Version 542

(intermediate version 541 wasn't an official release)

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|--|---|
| B: set_pixel_line | 541: set_pixel_line didn't reset the Z-propagation from a previous 3D-command. |
| B: LASER1 pulselength signal | 541: At very short marking vectors with very short LaserOn delays (for example, hatching) the laser pulselength could be overwritten erroneously. |
| B: set_offset_xyz and goto_xyz | 541: After set_offset_xyz with at_once = 2 and goto_xyz get_value(7, 8 or 9) returned false sample values (until the next regular output to the galvanometers). |
| B: mark_ellipse_abs/rel | 541: At certain half axes ratios (especially for small ellipses) the speed along the curve wasn't always correct. |
| C: Coordinate transformations within the virtual image field | 541: Now also available with the commands set_fly_x and/or set_fly_y. |
| N: list_next | 541: Place holder command: executes the next list command immediately. |
| N: get_lap_time | 541: Returns the elapsed time since the last call of save_and_restart_timer (even if a time measurement is in progress). |
| N: stepper_disable_switch | Ignores the end switch at normal movements. |
| B: auto_cal | At certain mechanical setups of a scan head with ASC sensors of type 2 auto_cal could have failed. |
| B: Sky-Writing mode 2 | At combinations of jump_abs and mark_abs the Z-movement could be wrong. |

DSP-Program RTC5OUT.out Version 542 to Version 543

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|--|--|
| B: range_checking | Did not work correctly with intelliSCAN data and negative limits. |
| B: get_z_distance, get_galvo_controls | The immediate next output could be erroneous. |
| B: Variable Jumpdelay | As of version OUT 540 the RTC5 could get stuck. |
| C: periodic_toggle, periodic_toggle_list | With Count = $2^{32}-1$ the command toggles endless. |
| C: set_control_mode, set_control_mode_list | Bit #4 = 1 disables simulate_ext_start_ctrl. |
| C: set_trigger, set_trigger4 | Signal 52: Time stamp counter. Signal 53: Wobbel amplitude. Signal 54: AnalogIn. |
| N: set_pause_list_cond | Defines the condition at EXTENSION 1 16-bit digital input for an automatic pause_list command. |

DSP-Program RTC5OUT.out Version 543 to Version 544

| | |
|---|---|
| B: list_call_[abs_]cond, sub_call_[abs_]cond | As of version OUT 540 these commands could have been repeated several times. |
| N: set_port_default_list | Like set_port_default, but a short list command. |
| N: activate_fly_2d_encoder activate_fly_xy_encoder | Like activate_fly_2d, activate_fly_xy, but with programmable encoder offsets. |
| B: get_z_distance | Used current Z position instead of the Z parameter. |
| B: get_galvo_controls | Caused intermediate Z outputs, when the current Z position and the Z parameter did not match. |
| B: para commands | Caused parameter outputs even if set_vector_control has not been activated. |
| N: set_pause_list_not_cond | Defines the NOT-condition at EXTENSION 1 16-bit digital input for an automatic pause_list command. C: A conditional pause_list takes precedence over stop_execution. |
| C: Variable polygon delay, set_sky_writing_limit | The angle is now calculated in 3D. |

DSP-Program RTC5OUT.out Version 544 to Version 545

| | |
|------------------------------|---|
| B: Automatic laser control | The combination of galvanometer and encoder speed did not work properly. |
| N: Global Online-Positioning | Similar to the previous online positioning (without global), but affects the coordinate transformations in the virtual image field. |
| C: set_angle | Now also available with HeadNo = 4. |

DSP-Program RTC5OUT.out Version 545 to Version 546

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|-----------------------|--|
| C: get_startstop_info | The status of the laser control signals can now be read out via bit #14. |
| B: set_ellipse | Some ellipses could cause the card to stop responding for some time. |
| B: park_position | With Mode = 0 a wrong starting point was set for the jump. |

DSP-Program RTC5OUT.out Version 546 to Version 547

| | |
|-------------------|---|
| B: list_return | Two consecutive list_return commands without a corresponding list_call caused the card to hang in BUSY state. |
| B: range_checking | The combination of range_checking mode 0 with pixel mode could cause incorrect pixel lines to be output. |

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| B: Softstart | It could happen that some pulses were skipped. |
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DSP-Program RTC5OUT.out Version 547 to Version 548

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| B: list_on_list | In combination with sky writing mode 2/3, the LaserOn signal sometimes wasn't switched off. |
| N: clear_fly_overflow_ctrl | Like clear_fly_overflow but a control command. |
| B: set_multi_mcbasp_in set_multi_mcbasp_in_list | In combination with freely definable wobble shapes, the laser power output could sometimes not work. |

DSP-Program RTC5OUT.out Version 548 to Version 549

| | |
|--|--|
| B: load_list | In some situations the wrong list was loaded for ListNo = 3. |
| C: set_multi_mcbasp_in set_multi_mcbasp_in_list | New parameter Mode = 2, laser power value is transmitted but never used. |

DSP-Program RTC5OUT.out Version 549 to Version 550

| | |
|--|---|
| N: set_mcbasp_out_ptr_list | Like set_mcbasp_out_ptr but a list command. |
| C: set_multi_mcbasp_in set_multi_mcbasp_in_list | Parameter Mode = 2 now additionally disables fly correction. |
| B: stepper_abs_no, stepper_abs | The commands executed relative instead of absolute movements. |

DSP-Program RTC5OUT.out Version 550 to Version 551

| | |
|---|---|
| B: set_fly_2d | The fly correction did not work. |
| B: load_wobbel_power, load_wobbel_power_list | The power values were calculated incorrectly. |

DSP-Program RTC5OUT.out Version 551 to Version 552

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|---|--|
| B: Coordinate Transformations | For all transformation commands with parameter at_once = 2 the z output value could be calculated incorrectly. |
| B: wait_for_encoder, wait_for_encoder_mode, wait_for_mcbasp | The output position was calculated incorrectly when using set_fly_rot or set_fly_rot_pos. |

DLL RTC5DLL.dll Version 511 to Version 512

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|---|---|
| C: init_rtc5_dll, load_program_file | RTC5_TIMEOUT errors are suppressed during an RTC®5 new start. |
| B: wait_for_encoder, wait_for_encoder_mode | As of version 511, the commands no longer functioned (due to an interchanged parameter). |
| B: jump_abs_3d | Didn't vary z. |
| C: set_auto_laser_ctrl | Mode = 5 enables laser control dependent on the encoder speed. |
| N: set_encoder_speed, set_encoder_speed_ctrl | Defines the target encoder speed for automatic laser control with mode = 5. |
| N: switch_ioport | Extension of list_jump..._cond commands. Branches to N (>1) addresses via selectable bits of the 16-bit I/O port. |
| B: list_jump_rel_cond, list_jump_pos_cond | Jump commands initiating a jump to themselves failed to function, relative jumps were handled as absolute. |
| N: set_verify, verify_checksum | Verification of all downloads from the PC to the RTC®5, and (separate) checksums of correction files. |

DLL RTC5DLL.dll Version 512 to Version 513

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|---|--|
| B: load_text_table | Didn't function properly (address incorrect). |
| C: mark_date | Parameter Part = 6, 7: Month and weekday as digits. |
| C: get_startstop_info | The return value now contains in the upper 16 bits the SL2-100 transferred error bits. |
| B: load_program_file, load_correction_file | Verify: error return value got set, but not RTC5_VERIFY_ERROR for get_last_error. |
| C: verify_checksum | Return value = 0 now indicates OK, > 0 error or warning. |
| N: set_offset_xyz, set_offset_xyz_list | Offsets are now also specifiable for the Z-axis (direction opposite set_defocus). |
| B: save_disk, load_disk | Didn't function due to an interchanged parameter (abort with get_last_error = RTC5_PARAM_ERROR). |
| C: load_disk | Parameter Name = 0 now initializes (as with Mode = 0) the internal management tables for list buffer area 3 (for indexed subroutines and characters) without requiring an "empty" file to be loaded. |
| B: load_z_table | Value range checking in C always failed (return value 16). |
| C: get_head_status | Reserved bits are now returned as 1. |
| B: get_table_para | Didn't function properly in all cases, instead only if the table was also assigned to a scan head connector. |
| C: set_trigger, get_value | Parameters 20-23 return the final output values (incl. gain and offset). |

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| C: get_value | Parameter 0 also returns the current laser status from outside a list execution. |
| N: In general | During calling of commands, the DLL immediately returns instead of hanging when no board is present on the PCI bus. Eventual return values are undefined. get_last_error then returns RTC5_ACCESS_DENIED. |

DLL RTC5DLL.dll Version 513 to Version 514

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|--|--|
| B: set_laser_control | Laser hardware was enabled too early: For low-active polarities, LASERON could be active for some microseconds. |
| B: load_disk | Name = 0: address pointer was not reset. |
| B, C: load_z_table | C: New error bit 64 for "execution denied", B: Previously error 13 (no 3D table assigned) was returned. |
| B: n_wait_for_encoder | n_wait_for_encoder(...) operated as wait_for_encoder(...) |
| B: auto_change_pos | A command immediately following get_status could erroneously retrieve "not BUSY" for up to 10µs. This has now been fixed. |
| C: set_fly_... | Now a fly command with unallowed parameter value only deactivates the fly correction, previously activated via the same command with allowed parameter value (also see change for Hexfile version 512 to version 513). |
| N: get_mcbasp_list | Queries data from the McBSP buffer (once), in order to make way for the current data transfer (see McBSP interface). |
| N: get_overrun | Returns the number of overruns of the 10 µs clock period which occurred since the last call of get_overrun (see manual version 1.0). |
| B: list_call_abs, sub_call_abs | Abs functionality missed. The commands operated as list_call and sub_call. |
| B: set_port_default, set_laser_off_default | For the analog output ports (ANALOG OUT1 and ANALOG OUT2), deactivation of default value output via "-1" did not correctly work in the RTC®4 compatibility mode. With set_port_default it didn't work even in the RTC®5 mode. |
| N: set_laser_mode(6) | See change for firmware version 509 to version 511. |
| B: set_encoder_speed, set_encoder_speed_ctrl | Parameter Smooth missed. |
| C: set_ext_start_delay, set_ext_start_delay_list, simulate_ext_start | RTC®4 compatibility mode for parameter Delay. |
| N: home_position_xyz | Enables home jumps also for the Z-axis. |

DLL RTC5DLL.dll Version 514 to Version 515

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| B: n_set_offset, n_set_offset_list | These multi-board commands worked like their single board commands set_offset, set_offset_list. |
| B: load_correction_file | Under some circumstances, the actual return value could be undefined for get_last_error RTC5_SEND_ERROR. |
| N: get_standby | Return value: current standby parameters. |
| N: get_master_slave | Return value: master/slave status of the addressed board. |
| N: simulate_ext_start_ctrl | Analog to the list command simulate_ext_start, this new control command simulates an external start, but without track delay definition. |
| N: Fast RTC®5 | Identification and settings for faster RTC®5 boards. |
| N: sync_slaves | Stably synchronizes the slave boards' 10 µs clock phase with the master board's 10 µs clock. |
| N: laser_on_pulses_list | Laser control: LASERON only for a specified number of external pulses at DIGITAL_IN1, otherwise as laser_on_list. |
| C: set_laser_control | Bit #5: polarity of external pulses at DIGITAL_IN1. |

DLL RTC5DLL.dll Version 515 to Version 516

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| B: load_z_table | At some situations the C Value was replaced by the B value. |
| N: get_values | Retrieves up to 4 signal types simultaneously, see get_value (without s) also. |
| N: upload_transform | Retrieves transformation data. |
| N: get_transform | Retrieves recorded data and transforms them back. |
| N: transform | Transforms back single data. |
| B: rs232_write_data, rs232_write_text | A runtime problem on writing several chars very fast has been resolved. |
| C: In general: Sending a control command | Improved TIMEOUT handling. The verify option distinguishes between data content errors and PCI transfer errors now. |

DLL RTC5DLL.dll Version 516 to Version 517

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| B: switch_io_port | SwitchNo was calculated without using Mask. |
| N: set_auto_laser_params, set_auto_laser_params_list | Ctrl, Value, MinValue, MaxValue can be subsequently changed (see set_auto_laser_control). |
| N: write_io_port_mask, write_io_port_mask_list | Only the masked bits are newly written, the other bits remain unchanged (see write_io_port). |
| N: timed_para_mark_abs, timed_para_mark_rel, timed_para_jump_abs, timed_para_jump_rel | Simultaneously timed and parameterized 2D commands, also see timed_mark_abs, para_mark_abs, timed_jump_abs, para_jump_abs or ~rel. |

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| N: timed_para_jump_abs_3d, timed_para_jump_rel_3d, timed_para_mark_abs_3d, timed_para_mark_rel_3d | Simultaneously timed and parameterized 3D commands, also see timed_mark_abs_3d, para_mark_abs_3d, timed_jump_abs_3d, para_jump_abs_3d or ~rel_3d. |
| N: arc_abs_3d, arc_rel_3d | Linear z movement during the angular xy movement. |
| C: transform, get_transform | Parameter Code changed. |
| N: stop_trigger | Terminates data storage, when no list is currently active (see measurement_status, set_trigger). |

DLL RTC5DLL.dll Version 517 to Version 518

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|--|---|
| C: sync_slaves | Improved synchronization of master/slave chain. |
| B: timed_para_mark_rel, timed_para_jump_rel | These 2D commands didn't take dZ into account, but moved Z towards its end position. |
| C: load_program_file | Doesn't execute an implicit set_start_list(1) anymore. Thus the list status USED for list 1 maintains at startup. |
| N: set_ellipse | Defines shape and section of an ellipse. |
| N: mark_ellipse_abs, mark_ellipse_rel | Mark an ellipse around an absolutely or relatively defined center. |
| N: set_sky_writing_para, set_sky_writing_para_list | Like set_sky_writing, but run-in and run-out freely adjustable. |
| C: get_rtc_version | New: Bits #16–23 = DSP version info. |
| C: get_error, get_last_error | New error code: RTC5_TYPE_REJECTED = 1024. |

DLL RTC5DLL.dll Version 518 to Version 520

(intermediate version 519 wasn't an official release)

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| B: set_laser_control | 519: Together with set_verify(1) the laser signals didn't become available in all cases. |
| C: control_command | After Code _H = 0x05, 0x0E and 0x21 a waiting time of 60µs will be automatically inserted. Such waiting time won't be necessary anymore separately prior to get_value. |
| C: In general: Coordinate transformations | New: at_once = 2. Collecting like at_once = 0, and executing in a shared jump together with goto_xy, goto_xyz, jump_abs or jump_rel. |
| B: n_laser_on_list | The command operated like laser_on_list (it only effected the default board). |
| N: store_encoder | Internally stores the current encoder values. |
| N: read_encoder | Reads out the internally stored encoder values. |

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|-----------------|--|
| C: auto_cal | <p>N: Command = 4: Determines and stores the ASC sensor type.</p> <p>N: Supports the new ASC sensor type 2.</p> <p>C: After the command, the galvanometer scanners will now always be in the same position as before the command (or - if applicable - in the gain/offset-corrected position), but not at their mid-positions.</p> |
| N: get_auto_cal | Returns the result stored with auto_cal(Command=4). |

DLL RTC5DLL.dll Version 520 to Version 521

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|------------------------------|--|
| C: load_correction_file | <p>Calling load_correction_file after load_program_file some boards could produce unexpected position outputs, provided this call wasn't succeeded by select_cor_table until select_cor_table has been explicitly called or load_program_file newly executed.</p> <p>Now load_correction_file will always call select_cor_table automatically using the last applied table numbers.</p> |
| B: set_sky_writing_para_list | The import declarations erroneously contained the parameter CardNo, whereas the DLL correctly did not. |

DLL RTC5DLL.dll Version 521 to Version 523

(intermediate version 522 wasn't an official release)

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| B: set_pixel_line | 522: Since version 518 the parameter dy was faulty. |
| B: In general: Coordinate transformations | get_status immediately following a corresponding control command could return "not BUSY" within an up to 10 µs gap, before the board could start the command. This has been fixed. |
| N: set_dsp_mode | This command adjusts the maximum number of short list commands within a 10µs cycle to the allowed number for a smaller CPU frequency (smaller DSP version, see get_rtc_version). Thus different CPU frequencies can be simultaneously used within a common master/slave chain, without any disturbance of an equally timed execution of identical lists. |
| C: sync_slaves | sync_slaves – via set_dsp_mode – automatically adjusts the maximum number of short list commands within a 10 µs cycle to the slowest CPU frequency within a master/slave chain. |

DLL RTC5DLL.dll Version 523 to Version 524

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|---|---|
| B: load_correction_file | Loading a 3D correction file and downgrading it to Dim = 2 some header parameters have been wrongly set to zero. |
| N: para_laser_on_pulses_list | Marks a parameterized discrete point. |
| C: SPI/I ² C interface (McBSP) | No more sticking, if more than two data words are sent to the card and no list with active "processing-on-the-fly" with position data is executing. |
| N: read_mcbbsp | Reads a memory location of a completed McBSP transfer. |
| C: get_mcbbsp | Synonymous to read_mcbbsp(0). |
| N: set_mcbbsp_x/y/rot, set_mcbbsp_x/y/rot_list | Definition of a McBSP transfer's data words interpretation for a coordinate transformation. |
| N: apply_mcbbsp, apply_mcbbsp_list | Applies the coordinate transformation. |
| N: time_fix_f_off | Fixes time + offset to be marked. |
| N: move_to | The control command controls a varioSCAN _{FLEX} Z-axis via the 16-Bit-IO-Port and a StepperMotorExtension board. |

DLL RTC5DLL.dll Version 524 to Version 525

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| C: set_vector_control, parameterized vectors | Parameterized vectors now can be executed with the focus shift (Ctrl = 7) as parameter type |
| C: Coordinate transformations | With at_once = 3 the laser stays on during the jump (if it is on), in other respects like at_once = 1. |
| N: list_continue | Separation between short list commands, which in opposite to list_nop keeps the laser on and doesn't execute scanner delays. |
| N: micro_vector_abs, micro_vector_rel | Executes a single micro step without scanner delays, but with individually programmable laser delays. |
| N: set_fly_limits | Defines variable limits for Fly-Overflow detection. |
| N: if_fly_x_overflow, if_fly_y_overflow, if_not_fly_x_overflow, if_not_fly_y_overflow | List command to poll Fly-Overflow detection with the possibility of program branching like, for example, if_cond or if_not_cond. |
| N: clear_fly_overflow | Deletes detected Fly-Overflows. |
| C: get_marking_info | Now also returns Fly-Overflow detections with the variable limits. |
| N: set_jump_tuning, set_jump_tuning_list | Defines tunings for and enables auto-switching between jump mode and vector mode. |
| N: load_jump_table | Loads an external ASCII jump delay table or automatically determines a new jump delay table. |
| N: get_jump_table | Reads the jump delay table. |

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|-------------------|--|
| N: set_jump_table | Loads an external, binary jump delay table. |
| C: auto_cal | Extended algorithm (avoids error 55 for specific ASC-2 systems). |

DLL RTC5DLL.dll Version 525 to Version 526

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|--------------------------------------|---|
| C: set_jump_mode, set_jump_mode_list | The function names have been changed. For compatibility reasons for software, which can't be newly compiled, the previous names set_jump_tuning and set_jump_tuning_list are further available within the DLL, but no more within the current import declarations. |
| N: load_jump_table_offset | Compared to the previous command load_jump_table an additional parameter Offset has been introduced. For compatibility reasons for software, which can't be newly compiled, this function name has been changed to load_jump_table_offset. The previous name is further available without the new parameter and executes like load_jump_table_offset with Offset = 0. |

DLL RTC5DLL.dll Version 526 to Version 527

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|--|---|
| B: load_program_file | Returns the error code 8 (System driver not found), if no board is plugged into the PC. |
| N: set_sky_writing_mode, set_sky_writing_mode_list | Switch the Sky-Writing mode. |
| B: auto_cal | Under some circumstances auto_cal(0) never returned. |
| N: read_analog_in | PCI-Express board: Returns the voltages AnalogIn0 and AnalogIn1 after they have been digitized by the on-board AD converter. PCI board: Only applicable, if an external plug-on AD converter board (article number 121126) has been attached to the SPI/I2C connector. |
| C: get_marking_info | Returns the status word error bits, if a surveillance has been set via set_laser_control and an error has occurred. |
| C: goto_xy, goto_xyz | The commands now wait for the end of the movement. |
| C: load_correction_file | The command waits for the end of the internal jump to the possibly changed galvanometer positions. |
| N: Stepper motor signals | The stepper motor signals are available now (see manual as of version 1.5). |

DLL RTC5DLL.dll Version 527 to Version 528

(intermediate version 528 wasn't an official release)

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|---|---|
| B: set_jump_mode | Did not work correctly since version DLL527. |
| N: set_control_mode, set_control_mode_list | If Bit #1 is set, an external /STOP and stop_execution now also completely delete the waiting queue of not yet expired external starts. |
| N: set_pulse_picking, set_pulse_picking_list | Laser control with pulse picking mode. |

DLL RTC5DLL.dll Version 528 to Version 529

(intermediate version 529 wasn't an official release)

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|---|--|
| C: set_pulse_picking, set_pulse_picking_list | If No = 0, the LASERON signal is output as LASER2 signal. No > 63 will be clipped to 63. |
| B: load_sub | If a subroutine has been deleted (via list_return immediately following load_sub), that address became 0 rather than invalid ("-1"). |
| B: stepper_abs/rel | The parameter WaitTime wasn't correctly taken into account, it was rather undefined. |
| C: set_laser_control | Bit #6 = 1 activates the output synchronization. |

DLL RTC5DLL.dll Version 529 to Version 530

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|---|--|
| C: set_jump_mode | Error codes now distinguish between several causes. |
| B: para_laser_on_pulses_list | Import declarations only: function name was wrong. |
| N: set_fly_z | Activates a fly-z application with encoder values. |
| N: fly_return_z | Like fly_return, in addition it terminates a fly-z application. |
| N: set_fly_limits_z | Defines variable limits for fly-z-overflow detection. |
| N: if_fly_z_overflow, if_not_fly_z_overflow, | List command to fly-z-overflow detection (like if_fly_x_overflow, if_not_fly_x_overflow, a.s.o.) |
| C: clear_fly_overflow | Bits # 5, 6: delete Error bits # 24, 25 from get_marking_info. |
| C: get_marking_info | Bits # 22 – 25: show fly-z-overflow errors. |

DLL RTC5DLL.dll Version 530 to Version 531

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|--|---|
| N: get_sync_status | Measurement of a SLAVE-board's synchronization status. |
| N: set_free_variable[_list], get_free_variable[_list] | 4 freely usable variables for set_trigger and McBSP-Output. |
| C: set_trigger | Further data types added for recording via set_trigger. |

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| C: McBSP output | Data formats adapted to data types. |
| N: set_mcbbsp_out_ptr | Up to 8 data types can be output circularly. |
| N: set_mcbbsp_in | New input mode for the McBSP interface. |
| C: read_mcbbsp | Up to 4 internal memory positions can be readout. |
| B: set_standby[_list] | HalfPeriod = 0 threw a Div#0 exception (since version 530). |
| B: load_correction_file | Loading a 3D correction table and downgrading it to a 2D table didn't work correctly. |
| B: read_io_port_buffer | Faulty assignment of the data. |
| B: Thread safety | Simultaneously using a control command which gives an answer from the board and a control command which doesn't in different threads, the answer could have been wrong. |
| B: sync_slaves | This control command uses internally other control commands with answers from all the boards found. Therefore it wasn't thread safe (see above). |
| C: Multi boards | Now control commands with answers can be executed parallel on two different boards. Up to version 530 only one control command could be executed at one board at the same time. |
| N: set_mcbbsp_freq | The output clock frequency is tunable between 4 and 16 MHz (Default: 8 MHz). |
| C: set_sky_writing_mode | Mode = 3 available. |
| N: set_sky_writing_limit, set_sky_writing_limit_list | Definition of a limit value to switch between Sky-Writing modes 2 and 3. |
| B: set_mark_speed_ctrl | Ellipses didn't mark with the given speed. |

DLL RTC5DLL.dll Version 531 to Version 533

(intermediate version 532 wasn't an official release)

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|--|---|
| B: n_load_program_file with RTC®5-express boards | 532: After the PC's warm boot the command could cause the DSP's initialization procedure to hang up. This has been solved. The command now returns Error = 2 (Unreset error). In contrast, previous versions misleadingly returned Error = 7 (Version error). But now under circumstances the analog inputs at the "SPI / I2C" connector could be permanently switched off. The analog inputs would then be available again only after a cold boot of the PC. |
| B: get_values | 532: 64 bit version only: The command caused an access violation exception. |
| B: get_table_para, get_head_para | 532: The parameters 3 and 4 returned false values for negative stretch factors. |

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| B: select_rtc | In a system with multiple RTC [®] 5 boards installed a call to select_rtc with a board number N (N not equal to the current default board number) could acquire the board number N in spite of a version mismatch. Not correcting the version mismatch, a subsequent call to multi board commands for board number N could have unpredictable results. Any access to that board from a different thread (other than the thread calling select_rtc) could suspend the thread infinitely (since RTC5DLL.dll version 531), in spite of having corrected the version mismatch before. |
| N: set_pulse_picking_length | Defines a constant pulse length for the pulse picking signal, independently from the current "Laser active" pulse length. |
| C: set_laser_control | Provided, the pulse picking mode is switched on, Bit #7 = 1 activates the constant pulse length mode. |
| N: config_laser_signals | The laser control signals LASERON, LASER1, LASER2 and the FirstPulseKiller signal can be freely redirected to the laser connector pins no. 1, 2 and 9. |
| C: load_correction_file, select_cor_table, select_cor_table_list | Up to 4 correction tables can be loaded on the RTC5 board at the same time. |

DLL RTC5DLL.dll Version 533 to Version 535

(intermediate version 534 wasn't an official release)

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|--|---|
| C: Driver | 534: Modification for the new driver 6.1.7600.16385, downward compatible to the previous driver 2.0.6.0. |
| C: Error messages | 534: New error messages: RTC5_OUT_OF_MEMORY, RTC5_EEPROM_ERROR, RTC5_CONFIG_ERROR. |
| C: Energy Saving Mode | 534: As soon as init_rtc5_dll has been called, the PC doesn't switch into an automatic energy saving mode anymore, not even though, if the DLL is unloaded again. |
| N: set_fly_tracking_error | POF: Defines an encoder value dependent tracking error compensation. |
| N: set_mcbasp_matrix, set_mcbasp_matrix_list | Online Positioning: Specification of interpretation of the McBSP transferred data words as a matrix coefficient for the coordinate transformation. |
| C: get_hex_version, get_rtc_version | Now always return the loaded version numbers, even after a version mismatch error. |

DLL RTC5DLL.dll Version 535 to Version 536

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|------------------------|---|
| N: micro_vector_abs_3d | Like micro_vector_abs, but with a 3D micro vector end point. |
| N: micro_vector_rel_3d | Like micro_vector_rel, but with a 3D micro vector end point. |

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| N: set_softstart_level_list | Similar as set_soft_start_level, but a list command. |
| N: set_softstart_mode_list | Like set_soft_start_mode, but a list command. |
| N: set_delay_mode_list | Like set_delay_mode, but a list command. |
| N: load_fly_2d_table | Downloads an XY stage encoder compensation table (for set_fly_2d sessions only). |
| N: set_fly_2d | Activates a 2D fly session (for XY stages). |
| N: init_fly_2d | Initializes the start position of an XY stage for an encoder compensation table. |
| N: get_fly_2d_offset | Returns the current offset values for the encoder compensation table. |
| N: wait_for_encoder_in_range | Waits until both encoders fall within the given range (2D fly or XY fly sessions only). |
| N: set_trigger4 | Allows to simultaneously record 4 channels with half of the storage space for each channel. |
| C: set_trigger, get_value | Signals 43 and 44 (Encoder0 and Encoder1) can be recorded and read out. |
| C: set_encoder_speed | Sets the 100% value for the vector speed from both encoder channels for the encoder-speed-dependent automatic laser control. |
| C: Automatic laser control | New option: vector encoder speed for 2D fly or XY fly sessions. |
| C: set_laser_control | Bit #28 = 1: In the case of an error, the laser-signal auto-suppression will automatically create a /STOP signal (the list stops, the laser switches off permanently). |
| N: load_stretch_table | Extended 3D correction (z-dependent field rectification). |
| N: activate_fly_2d, activate_fly_xy | Activates the fly corrections like set_fly_2d resp. set_fly_x and set_fly_y, but without an encoder reset. |
| N: if_not_activated | In the case of an error with activate_fly_2d or activate_fly_xy, allows a list jump, for example. |
| N: park_position, park_return | Jumps to a secure parking position and returns within fly correction sessions (2D fly and XY fly only). |
| N: repeat_list, until_list | Structured programming: Allows a numbered repetition of a group of list commands. |
| N: set_pixel_line_3d | Pixel mode along a 3D vector. |
| N: Coordinate transformations within the virtual image field | In set_fly_2d sessions only: the total virtual image field can be translated and rotated. |

DLL RTC5DLL.dll Version 536 to Version 537

| | |
|--|---|
| N: select_serial_set, select_serial_set_list, set_serial_step_list, get_list_serial | Up to 4 serial-number-sets available. |
| C: set_sky_writing_para | Timelag < 1/8 μ s switches sky-writing off, Timelag < 1/4 μ s switches sky-writing on using Timelag = 0. |
| B: load_program_file | “PCI-Error” and “RTC5OUT has wrong format” both returned the error code 4. Now “PCI-Error” returns 16. |
| B: set_pixel_line, set_pixel_line_3d | As of version 536 ANALOG_OUT2 didn't work and set_pixel_line used also two list spaces. Now set_pixel_line_3d uses only one list space like set_pixel_line, if dZ equals 0, otherwise two list spaces. |
| N: config_laser_signals_list | Redirection of laser signals to other pins (like config_laser_signals). |
| N: set_wobbel_direction | Presets a direction of movement to align wobbel shapes. |
| N: set_wobbel_vector | Defines a section of a „Freely definable wobbel shape“. |
| N: set_wobbel_control | Configures laser control parameters for „Freely definable wobbel shapes“. |
| N: set_wobbel_offset | Transversal and longitudinal offset of a wobbel shape. |
| N: set_multi_mcbasp_in, set_multi_mcbasp_in_list | Activates the receiving of up to 8 different data types from the McBSP interface to be used for a 3D Processing-on-the-fly application with position values as well as for laser control. |
| N: read_multi_mcbasp | Reads out the type sorted values transferred via McBSP after being activated with set_multi_mcbasp_in. |
| N: range_checking | Implements an emergency action at a galvanometer position range overflow. |
| C: C# import declarations | Supports the option „Any CPU“. |

DLL RTC5DLL.dll Version 537 to Version 538

(intermediate version 538 wasn't an official release)

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|---|---|
| B: get_serial_list | Import declarations only: Variable name "Set" is not allowed in Delphi. |
| import declarations for implicate linking | RTC5impl.h and RTC5impl.hpp now use __cdeclspec instead of _cdeclspec. |
| N: periodic_toggle, periodic_toggle_list | These commands generate a periodic toggling signal at user defined output pins. For example, it can be used to trigger external peripheral devices synchronous to list execution. |
| C: mcbasp_init_spi | The McBSP-connection can now be operated in the SPI mode as well. |
| N: get_z_control | Returns the Z axis output value for the given position/parameters. |
| N: sub_cal_repeat, sub_call_abs_repeat | Like sub_call or sub_call_abs, but with arbitrary repetition. |

DLL RTC5DLL.dll Version 538 to Version 539

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|-----------------------|---|
| B: arc_rel_3d | arc_rel_3d behaved like arc_abs_3d |
| N: get_galvo_controls | Returns the output values for all addressed axes for the given position/parameters (replaces the version 538-only command get_z_control). |
| C: Free variables | Now 8 free variables are available. |
| B: Windows XP | DLL version 5.39.0.1 now runs on Windows XP, too. |

DLL RTC5DLL.dll Version 539 to Version 540

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|---|---|
| B: set_laser_off_default | The parameter DigitalOut has been ignored as of version 537. |
| B: sync_slaves | Possibly sometimes cards didn't synchronize. |
| N: list_call_repeat, list_call_abs_repeat | Like list_call or list_call_abs, but with arbitrary repetition. |
| N: set_auto_laser_control | Mode = 6 for combined galvanometer and encoder speeds. |
| C: Import declarations for C/C++ | ULONG_PTR is now defined as a function of _WIN64. WIN32 is already used by WINDOWS elsewhere. |

DLL RTC5DLL.dll Version 540 to Version 542

(intermediate version 541 wasn't an official release)

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|--|---|
| B: get_galvo_controls | 541: Returned the values in the array OutPtr shifted by one position. |
| B: set_pixel_line | 541: set_pixel_line didn't reset the Z-propagation from a previous 3D-command. |
| B: set_offset_xyz and goto_xyz | 541: After set_offset_xyz with at_once = 2 and goto_xyz get_value(7, 8 or 9) returned false sample values (until the next regular output to the galvanometers). |
| C: Coordinate transformations within the virtual image field | 541: Now also available with the commands set_fly_x and/or set_fly_y. |
| N: list_next | 541: Place holder command: executes the next list command immediately. |
| N: get_lap_time | 541: Returns the elapsed time since the last call of save_and_restart_timer (even if a time measurement is in progress). |
| N: stepper_disable_switch | Ignores the end switch at normal movements. |
| B: Windows service | The RTC5 can now also be used with a Windows service (as of Win 7 and DLL 536 always an RTC5_ACCESS_DENIED error was generated). DLL 5.42.0.1: Bugfix Multiprocessing. |
| B: auto_cal | At certain mechanical setups of a scan head with ASC sensors of type 2 auto_cal could have failed. |

DLL RTC5DLL.dll Version 542 to Version 543

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|--|--|
| B: camming | With C# and/or 64-bit DLL an exception could have been thrown, if parameter Code = 0 was set. |
| B: range_checking | Mode = 1 could only be selected with Mode > 1. |
| N: set_pause_list_cond | Defines the condition at EXTENSION 1 16-bit digital input for an automatic pause_list command. |
| C: periodic_toggle, periodic_toggle_list | With Count = $2^{32}-1$ the command toggles endless. |
| B: save_disk, load_disk | The binary file could be kept open as long as the application was active. |
| B: load_char, load_sub | After the protected memory area ("List3") was set to 0, these commands were rejected, even if it was reset to a finite value back again. |
| C: Import declarations | RTC5impl.h, RTC5expl.h, RTC5expl.c, RTC5impl.hpp are prepared for non-Windows operating systems. |

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|---|---|
| C: set_trigger, set_trigger4 | Signal 52: Time stamp counter. Signal 53: Wobbel amplitude. Signal 54: AnalogIn |
| C: set_control_mode, set_control_mode_list | Bit #4 = 1 disables simulate_ext_start_ctrl. |

DLL RTC5DLL.dll Version 543 to Version 544

| | |
|---|---|
| B: load_fly_2d_table, load_stretch_table | The functionality could have been activated in spite of an erroneous command (for example, file not found). |
| N: set_port_default_list | Like set_port_default, but a short list command. |
| N: activate_fly_2d_encoder activate_fly_xy_encoder | Like activate_fly_2d, activate_fly_xy, but with programmable encoder offsets. |
| B: get_z_distance | Used current Z position instead of the Z parameter. |
| N: set_pause_list_not_cond | Defines the NOT-condition at EXTENSION 1 16-bit digital input for an automatic pause_list command. C: A conditional pause_list takes precedence over stop_execution. |
| C: load_progam_file | Changed/new error code values: 14: external memory error (up to now: in general) 16: internal memory error (up to now: 14) 17: PCI error (up to now: 16). |
| C: simulate_extern_start | Waits internally for 30 µs for save execution. |
| B: set_vector_control | Limits for parameters 1 and 2 have been scaled wrong. |
| B: load_zoom_correction_file | Memory leak removed. |
| C: In general: load-table commands | get_last_error returns also an RTC5_PARAM_ERROR with some error return values (for example, file not found). |
| B: DLL export definitions | RTC5DLL.dll: set_port_default_list, [n_]set_pause_list_not_cond were missed. New Windows version 5.44.0.9. |

DLL RTC5DLL.dll Version 544 to Version 545

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|----------------------------------|---|
| B: load_jump_table_offset | The automatic determination did not work. |
| N: Global Online- Positioning | New commands: set_mcbasp_global_x, set_mcbasp_global_y, set_mcbasp_global_rot, set_mcbasp_global_matrix, set_mcbasp_global_x_list, set_mcbasp_global_y_list, set_mcbasp_global_rot_list, set_mcbasp_global_matrix_list. Similar to the previous online positioning (without global), but affects the coordinate transformations in the virtual image field. |
| C: set_angle | Now also available with HeadNo = 4. |

DLL RTC5DLL.dll Version 545 to Version 546

| | |
|---|--|
| B: load_program_file | When accessed simultaneously from several applications, the programs could block each other. |
| C: get_startstop_info | The status of the laser control signals can now be read out via bit #14. |
| B: write_abc_to_file | The checksum in the correction file was not updated. |
| B: set_multi_mcbasp_in | It could happen that not all parameters were sent to the card. |
| C: load_sub load_char load_text_table | The input pointer now becomes invalid and the error RTC5_REJECTED is set when the end of list memory 3 in a subroutine is reached. |
| B: periodic_toggle periodic_toggle_list | The output values for ANALOG_OUT1 and ANALOG_OUT2 were too small by a factor of 16. |

DLL RTC5DLL.dll Version 546 to Version 547

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| B: micro_vector_rel_3d | The command was executed with absolute instead of relative coordinates. |
|------------------------|---|

DLL RTC5DLL.dll Version 547 to Version 548

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| N: clear_fly_overflow_ctrl | Like clear_fly_overflow but a control command. |
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DLL RTC5DLL.dll Version 548 to Version 549

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| C: set_multi_mcbasp_in set_multi_mcbasp_in_list | New parameter Mode = 2, laser power value is transmitted but never used. |
|--|--|

DLL RTC5DLL.dll Version 549 to Version 550

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|--|--|
| N: set_mcbasp_out_ptr_list | Like set_mcbasp_out_ptr but a list command. |
| C: set_multi_mcbasp_in set_multi_mcbasp_in_list | Parameter Mode = 2 now additionally disables fly correction. |
| B: set_mcbasp_out_ptr | Could throw an exception when passing a NULL pointer. |
| B: set_trigger | Signal 53 and 54 were not recorded correctly. |