



## RTC6 Software – Revision History

### Current Software Package: RTC6-1.16.3.zip

|                   |                |                     |
|-------------------|----------------|---------------------|
| RTC6DRV.sys       | 6.1.7600.16385 | 2015-05-20          |
| Software Package  | 1.16.3         | changed from 1.16.2 |
| RTC6DAT.dat       | 604            | unchanged           |
| RTC6RBF.rbf       | 639            | unchanged           |
| RTC6OUT.out       | 646            | unchanged           |
| RTC6ETH.out       | 646            | unchanged           |
| RTC6DLL.dll       | 643            | unchanged           |
| RTC6DLLx64.dll    |                |                     |
| RTC6BIOSOUT_*.out | 23             | unchanged           |
| RTC6BIOSETH_*.out | 40             | Changed from 39     |
| RTC6conf          | 1.3.1.0        | unchanged           |

#### Notation:

B     Bugfix  
 C     Change  
 N     New

## Revisions

| Rev.   | DLL | OUT | ETH | RBF | DAT  | BIOS | BIOS-ETH | RTC6conf | Date       |
|--------|-----|-----|-----|-----|------|------|----------|----------|------------|
| 1.3.0  | 606 | 606 | *   | 611 | 601  | 21   | *        | -        | 2017-09-11 |
| 1.3.1  | 607 | 607 | 607 | 611 | 601  | 22   | *        | -        | 2017-11-09 |
| 1.3.2  | 608 | 608 | 608 | 611 | 601  | 22   | 22       | -        | 2018-01-23 |
| 1.3.3  | 608 | 608 | 608 | 612 | 601  | 22   | 22       | -        | 2018-04-19 |
| 1.4.1  | 609 | 609 | 609 | 614 | 601  | 23   | 23       | 1.0.1.0  | 2018-08-03 |
| 1.4.2  | 610 | 610 | 610 | 615 | 602  | 23   | 23       | 1.0.1.0  | 2018-11-15 |
| 1.4.4  | 611 | 611 | 611 | 615 | 603  | 23   | 24       | 1.0.1.0  | 2019-03-01 |
| 1.5.0  | 614 | 614 | 614 | 619 | 603a | 23   | 25       | 1.1.0.4  | 2019-07-26 |
| 1.5.2  | 615 | 615 | 615 | 621 | 603a | 23   | 25       | 1.1.0.5  | 2019-09-11 |
| 1.6.0  | 616 | 616 | 616 | 622 | 603a | 23   | 25       | 1.1.0.5  | 2019-11-25 |
| 1.6.1  | 617 | 617 | 617 | 623 | 603a | 23   | 25       | 1.1.0.5  | 2020-02-07 |
| 1.7.0  | 618 | 618 | 618 | 623 | 603a | 23   | 26       | 1.1.0.5  | 2020-03-13 |
| 1.7.1  | 618 | 618 | 618 | 623 | 603a | 23   | 26       | 1.1.0.5  | 2020-03-19 |
| 1.7.3  | 619 | 619 | 619 | 624 | 603a | 23   | 27       | 1.1.0.5  | 2020-06-19 |
| 1.7.4  | 620 | 620 | 620 | 625 | 603a | 23   | 27       | 1.1.0.5  | 2020-07-10 |
| 1.7.5  | 621 | 621 | 621 | 625 | 603a | 23   | 27       | 1.1.0.5  | 2020-07-24 |
| 1.7.6  | 622 | 622 | 622 | 625 | 603a | 23   | 28       | 1.1.0.5  | 2020-10-02 |
| 1.7.7  | 623 | 623 | 623 | 626 | 603a | 23   | 28       | 1.1.0.5  | 2020-12-11 |
| 1.7.8  | 624 | 624 | 624 | 627 | 603a | 23   | 28       | 1.1.0.5  | 2021-01-22 |
| 1.7.9  | 625 | 625 | 625 | 628 | 603a | 23   | 28       | 1.1.0.5  | 2021-02-05 |
| 1.7.10 | 625 | 626 | 626 | 628 | 603a | 23   | 28       | 1.1.0.5  | 2021-02-26 |
| 1.7.11 | 626 | 627 | 627 | 629 | 603a | 23   | 28       | 1.1.0.5  | 2021-04-30 |
| 1.7.12 | 627 | 628 | 628 | 629 | 603a | 23   | 29       | 1.1.0.5  | 2021-07-09 |
| 1.9.0  | 628 | 629 | 629 | 630 | 603a | 23   | 30       | 1.2.0.0  | 2021-09-03 |
| 1.10.0 | 629 | 630 | 630 | 631 | 603a | 23   | 31       | 1.2.0.0  | 2021-10-15 |
| 1.11.0 | 630 | 631 | 631 | 631 | 603a | 23   | 32       | 1.2.0.0  | 2021-11-12 |
| 1.12.0 | 631 | 632 | 632 | 632 | 604  | 23   | 33       | 1.2.1.0  | 2021-12-22 |
| 1.13.0 | 632 | 633 | 633 | 633 | 604  | 23   | 33       | 1.2.1.0  | 2022-02-08 |
| 1.14.0 | 633 | 634 | 634 | 633 | 604  | 23   | 34       | 1.2.2.0  | 2022-06-03 |
| 1.14.1 | 634 | 635 | 635 | 634 | 604  | 23   | 35       | 1.2.2.0  | 2022-07-22 |
| 1.15.0 | 635 | 636 | 636 | 635 | 604  | 23   | 36       | 1.2.2.1  | 2022-09-16 |
| 1.15.2 | 637 | 637 | 637 | 636 | 604  | 23   | 36       | 1.2.2.1  | 2022-11-24 |
| 1.15.3 | 638 | 638 | 638 | 636 | 604  | 23   | 36       | 1.2.2.1  | 2022-12-22 |
| 1.15.4 | 638 | 639 | 639 | 637 | 604  | 23   | 36       | 1.2.2.1  | 2023-01-20 |
| 1.15.5 | 639 | 640 | 640 | 637 | 604  | 23   | 37       | 1.2.2.1  | 2023-02-15 |
| 1.16.1 | 643 | 645 | 645 | 639 | 604  | 23   | 39       | 1.3.1.0  | 2023-07-21 |
| 1.16.2 | 643 | 646 | 646 | 639 | 604  | 23   | 39       | 1.3.1.0  | 2023-09-15 |
| 1.16.3 | 643 | 646 | 646 | 639 | 604  | 23   | 40       | 1.3.1.0  | 2023-09-25 |

\* cannot be updated in the field/version cannot be queried



### **Firmware RTC6RBF.rbf Version 600 to Version 601**

|    |          |
|----|----------|
| N: | Initial. |
|----|----------|

### **Firmware RTC6RBF.rbf Version 601 to Version 602**

(Intermediate version 602 wasn't an official release)

|    |                        |
|----|------------------------|
| C: | Internal changes only. |
|----|------------------------|

### **Firmware RTC6RBF.rbf Version 602 to Version 603**

|                               |   |
|-------------------------------|---|
| C: status word                | Auxiliary bits PowOK, TempOK, PosAck, ASC are available.  |
| N: RTC6 cycle synchronization | The RTC6 cycle can be synchronized to external laser pulses having a frequency of an integer multiple of 100 kHz. |

### **Firmware RTC6RBF.rbf Version 603 to Version 604**

(Intermediate version 604 wasn't an official release)

|    |                        |
|----|------------------------|
| C: | Internal changes only. |
|----|------------------------|

### **Firmware RTC6RBF.rbf Version 604 to Version 605**

(Intermediate version 605 wasn't an official release)

|   |  |
|---|--|
| N: set_laser_power, peripheral outputs to control laser power | The laser power can be set by set_laser_power synchronous to the LaserOn delay. This supports long LaserOn delays with short vectors as well as the excelliSCAN scan head. |
| B: RS232  | RS232 input could lose data.   |
| B: Encoder  | Encoder numbers had been interchanged. One of them counted into the wrong direction.   |

### **Firmware RTC6RBF.rbf Version 605 to Version 606**

|                                |   |
|--------------------------------|---|
| C: Laser power                 | Between two vectors as well as within poly lines a change of the laser power will be executed synchronous to the corresponding marking. |
| C: Parameterized mark commands | The parameter gets outputted synchronous to LaserOn.  |



### **Firmware RTC6RBF.rbf Version 606 to Version 607**

|                 |  |
|-----------------|--|
| C: Laser delays | The laser delays are now handled with a resolution of 1/64 $\mu$ s (see <code>set_laser_delays</code> , <code>set_sky_writing_para</code> ). |
| N: Pixel mode   | Supports now also excelliSCAN systems.   |

### **Firmware RTC6RBF.rbf Version 607 to Version 608**

(Intermediate version 608 wasn't an official release)

|                  |                                |
|------------------|--------------------------------|
| B: Laser control | Several internal bugs removed. |
|------------------|--------------------------------|

### **Firmware RTC6RBF.rbf Version 608 to Version 609**

(Intermediate version 609 wasn't an official release)

|               |                         |
|---------------|-------------------------|
| C: Pixel mode | Generalized pixel mode. |
|---------------|-------------------------|

### **Firmware RTC6RBF.rbf Version 609 to Version 610**

(Intermediate version 610 was a preliminary release for RTC6eth)

|               |                          |
|---------------|--------------------------|
| C: In general | Internal reorganization. |
|---------------|--------------------------|

### **Firmware RTC6RBF.rbf Version 610 to Version 611**

|                 |   |
|-----------------|---|
| N: Master/Slave | Master/Slave functionality implemented. |
|-----------------|---|

### **Firmware RTC6RBF.rbf Version 611 to Version 612**

|                    |  |
|--------------------|--|
| B: LaserOff Timing | Under circumstances a LaserOff delay could be missed. The laser kept switched on for a jump. |
|--------------------|--|

### **Firmware RTC6RBF.rbf Version 612 to Version 613**

(Intermediate version 613 wasn't an official release version)

|                                     |  |
|-------------------------------------|--|
| C: Master/Slave                     | Functionality improved.  |
| C: <code>get_sync_status</code>     | Extended with error returns.   |
| N: <code>master_slave_config</code> | Configures the master/slave connection of a board.                     |
| C: Automatic laser control          | Improved control of HalfPeriod (geometrically constant spot distance). |



### **Firmware RTC6RBF.rbf Version 613 to Version 614**

|              |   |
|--------------|---|
| B: Polylines | Under circumstances changes of the laser power within a polyline could erroneously be addressed to the next following vector. |
|--------------|---|

### **Firmware RTC6RBF.rbf Version 614 to Version 615**

|   |   |
|---|---|
| B: get_encoder, read_encoder, wait_for_encoder, encoder reset | As of version 614 FlyScale-scaled encoder values have been returned or used.<br>Reset did not function for Encoder Y.   |
| B: Automatic laser control: SDC (SpotDistanceControl)         | At very high speeds the spot distance has been calculated incorrectly.  |
| B: pixel mode   | With long pixel lines (> 2.56 ms) pixel data could have been lost.<br>After cancelling the pixel line by stop_execution or /STOP the next pixel line didn't function correctly.   |
| B: Laser control  | After set_timelag_compensation in conjunction with other commands for laser control the laser signal could have been controlled incorrectly.<br>especially excelliSCAN: with sequences of many short marks and jumps it could happen that the laser remained on for a jump. |

### **Firmware RTC6RBF.rbf Version 615 to Version 616**

(Intermediate version 616 wasn't an official release version)

|         |  |
|---------|--|
| C: UART | Replaces previous RS232 (higher baud rate possible). |
|---------|--|

### **Firmware RTC6RBF.rbf Version 616 to Version 617**

(Intermediate version 617 wasn't an official release version)

|            |   |
|------------|---|
| C: Encoder | PreviewTime corrected encoder values for excelliSCAN. |
|------------|---|

### **Firmware RTC6RBF.rbf Version 617 to Version 618**

(Intermediate version 618 wasn't an official release version)

|    |                   |
|----|-------------------|
| C: | Internal Changes. |
|----|-------------------|

### **Firmware RTC6RBF.rbf Version 618 to Version 619**

|                 |  |
|-----------------|--|
| C: Master/Slave | Improved functionality. Synchronizes automatically. Call of sync_slaves no more necessary. |
|-----------------|--|



### **Firmware RTC6RBF.rbf Version 619 to Version 620**

(Intermediate version 620 wasn't an official release version)

### **Firmware RTC6RBF.rbf Version 620 to Version 621**

|            |                   |
|------------|-------------------|
| C: General | Internal changes. |
|------------|-------------------|

### **Firmware RTC6RBF.rbf Version 621 to Version 622**

|                  |   |
|------------------|---|
| C: General       | Internal changes.   |
| N: Laser control | SubCycleSwitching, only for laserDESK and RTC6AddOnDll  |
| B: Laser control | Pulse Picking Number was only updated if additional laser control parameters were written at the same time. |

### **Firmware RTC6RBF.rbf Version 622 to Version 623**

|                        |  |
|------------------------|--|
| B: set_control_mode    | Despite set bit #1, the queue of external starts was not completely cleared.     |
| B: set_ext_start_delay | Sometimes the external start was not executed after the track delay had expired. |

### **Firmware RTC6RBF.rbf Version 623 to Version 624**

|                  |  |
|------------------|--|
| B: Laser control | In special timing situations extended mark vectors could be output due to faulty processing of the LaserOff delay. |
|------------------|--|

### **Firmware RTC6RBF.rbf Version 624 to Version 625**

|                  |   |
|------------------|---|
| B: Laser control | With activated pulse completion it could happen that Laser1 pulses continued to be output after a pixel line was interrupted. |
|------------------|---|

### **Firmware RTC6RBF.rbf Version 625 to Version 626**

|                         |   |
|-------------------------|---|
| B: set_laser_power      | An additional latch signal could be issued on the first call to load_program_file.                      |
| B: set_scanahead_params | The LaserON signal could be output incorrectly if the command was called without excelliSCAN connected. |

#### **Firmware RTC6RBF.rbf Version 626 to Version 627**

|                  |                   |
|------------------|-------------------|
| C: Laser control | Internal changes. |
|------------------|-------------------|

#### **Firmware RTC6RBF.rbf Version 627 to Version 628**

|                  |                   |
|------------------|-------------------|
| C: Laser control | Internal changes. |
|------------------|-------------------|

#### **Firmware RTC6RBF.rbf Version 628 to Version 629**

|                  |                   |
|------------------|-------------------|
| C: Laser control | Internal changes. |
|------------------|-------------------|

#### **Firmware RTC6RBF.rbf Version 629 to Version 630**

|                  |  |
|------------------|--|
| B: Laser control | In special timing situations, incorrect pixel lines could be output. |
|------------------|--|

#### **Firmware RTC6RBF.rbf Version 630 to Version 631**

|                    |   |
|--------------------|---|
| B: set_laser_power | In special timing situations, the power change between two mark commands could occur too early. |
|--------------------|---|

#### **Firmware RTC6RBF.rbf Version 631 to Version 632**

|            |                   |
|------------|-------------------|
| C: General | Internal changes. |
|------------|-------------------|

#### **Firmware RTC6RBF.rbf Version 632 to Version 633**

|                  |  |
|------------------|--|
| B: Laser control | In special timing situations, the LaserON signal could stay on after a mark or pixel line. |
|------------------|--|

#### **Firmware RTC6RBF.rbf Version 633 to Version 634**

|                    |   |
|--------------------|---|
| N: write_port_list | New command to output analog/digital values. With the parameter NoDelay the value can be output before the PreviewTime elapsed. |
|--------------------|---|



### **Firmware RTC6RBF.rbf Version 634 to Version 635**

|   |   |
|---|---|
| N:<br>get_rcm_low_bw_value_ctrl,<br>get_rcm_low_bw_block_ctrl,<br>get_rcm_high_bw_value_ctrl,<br>demux_rcm_high_bw_ctrl | Commands for Return Channel Multiplexing. See manual. |
|---|---|

### **Firmware RTC6RBF.rbf Version 635 to Version 636**

|                  |   |
|------------------|---|
| B: Laser control | LaserOn-Delays > 2.55ms could lead to shift of the LaserOn signal if at the same time one of the output ports (Analog Out1, Analog Out2, Digital Out0, Digital Out1) was updated each 10us cycle. |
|------------------|---|

### **Firmware RTC6RBF.rbf Version 636 to Version 637**

|                  |   |
|------------------|---|
| B: Laser control | In special timing situations, the LaserON signal could stay on during a jump. |
|------------------|---|

### **Firmware RTC6RBF.rbf Version 637 to Version 638**

|                               |   |
|-------------------------------|---|
| N:<br>set_encoder_filter_ctrl | New command to configure a filter for the encoder signals.  |
| B: Laser control              | Changes of the parameters PulseLength or HalfPeriod within a polyline were sometimes not applied at the correct time. |

### **Firmware RTC6RBF.rbf Version 638 to Version 639**

|                                |  |
|--------------------------------|--|
| B: EXTENSION 1,<br>EXTENSION 2 | For each write operation two LATCH OUT pulses were output. |
|--------------------------------|--|



### **DSP Program RTC6OUT.out Version 600 to Version 601**

|                 |   |
|-----------------|---|
| N:              | Initial.  |
| N: set_dsp_mode | Mode = 3: no automatic scanner delay adjustment.<br>Mode = 2: RTC5 compatibility. |

### **DSP Program RTC6OUT.out Version 601 to Version 602**

|   |  |
|---|--|
| N: set_laser_power, peripheral outputs to control laser power | The laser power can be set by set_laser_power synchronous to the LaserOn delay. This supports long LaserOn delays with short vectors as well as the excelliSCAN scan head.   |
| B: Sky Writing mode 2   | Within a sequence jump_* → set_end_of_list → auto_change → arc_* the arc has been marked incorrectly.<br>Within a sequence laser_on[_pulses]_list → jump_* the laser remained switched on during the jump.   |
| C: set_auto_laser_control                                     | Mode = 6: automatic laser power control with combined galvanometer and encoder speed.<br>Mode <n>+16: excelliSCAN support.<br>Mode <n>+32: Correction file-dependent galvanometer speed correction (converting from angle bits to image field bits). |
| B: rs232_read_data  | The command could lose data.   |
| 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 wobbel 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 RTC6OUT.out Version 602 to Version 603**

|  |  |
|--|--|
| C: set_laser_delays,                     | LaserOnDelay and LaserOffDelay are now handled with a resolution of 1/64 µs. |
| C: set_sky_writing, set_sky_writing_para | LaserOnShift and TimeLag are now handled with a resolution of 1/64 µs.       |
| B: set_pixel_line                        | Did not reset the z step size back to 0.                                     |

### **DSP-Program RTC6OUT.out Version 603 to Version 604**

(Intermediate version 604 wasn't an official release)

|  |   |
|--|---|
| N: set_pixel_line,<br>set_pixel_line_3d,<br>set_pixel, set_n_pixel | Generalized pixel mode with optional outputs at AnalogOut1, AnalogOut2, pulse length, 8-Bit port, 16-Bit port and frequencies up to 3.2 MHz.                            |
| B: Laser pulse length  | Even though softstart isn't implemented, under some circumstances the restart counter was activated and the laser pulse length was overwritten with an undefined value. |
| C: Short list commands   | The maximum number is limited to 8 (compared to 12 with the RTC5). The maximum of 2 preceding a normal list command persists.   |
| N: RTC6ETH.out   | DSP version for RTC6eth boards.   |

### **DSP-Program RTC6OUT.out Version 604 to Version 605**

(Intermediate version 605 was a preliminary release for RTC6eth)

|   |   |
|---|---|
| N: excelliSCAN                            | excelliSCAN with firmware versions $\geq 5.05.7$ are supported.                           |
| C: set_control_mode                       | Bit #4 = 1 suppresses simulate_ext_start_ctrl.  |
| B: range_checking                         | Didn't work correctly for positions returned from an intelliSCAN.                         |
| B: get_z_distance,<br>get_galvo_controls  | Subsequent movement could have started with a wrong position.                             |
| C: stepper_disable_switch                 | Suppresses the functionality of an end switch, for example, with rotating axes.           |
| C:<br>set_scanahead_laser_shift           | An offset of 20 $\mu$ s is automatically added for internal signal run time compensation. |
| B: set_delay_mode,<br>set_delay_mode_list | The option DirectMove3D didn't work correctly with all cases.                             |

### **DSP-Program RTC6OUT.out Version 605 to Version 606**

|                            |   |
|----------------------------|---|
| B: In general              | Internal timing improved. Some commands didn't work correctly, for example, set_timelag_compensation. |
| B: Automatic laser control | The position-dependent automatic laser control can now also be used together with excelliSCAN.        |

### **DSP-Program RTC6OUT.out Version 606 to Version 607**

|                      |   |
|----------------------|---|
| C: set_trigger       | Signal = 52 added: Time stamp counter.        |
| B: bounce_supp       | Bounce suppression was not effective.         |
| B: get_head_status   | PosAck signal of Head A was wrong.            |
| B: SCANahead support | $V < V_{max}$ is now guaranteed in all cases. |

### **DSP-Program RTC6OUT.out Version 607 to Version 608**

|                                |  |
|--------------------------------|--|
| C: ANALOG_IN                   | AD converting is now available.  |
| B: mark_text,<br>mark_text_abs | Failed to function.  |
| B: list_repeat, list_until     | Didn't repeat correctly, if the loop was placed within the protected memory of „list 3“. |

### **DSP-Program RTC6OUT.out Version 608 to Version 609**

|  |   |
|--|---|
| N: set_pause_list_cond                                 | Conditional pause_list instead of a stop_execution.   |
| N: set_defocus_offset[_list]                           | Globally effective offset to all defocus settings.  |
| N: list_call_repeat,<br>list_call_abs_repeat           | Like list_call or list_call_abs, but with arbitrary repetition.   |
| C: set_trigger, set_trigger4,<br>get_value, get_values | Signals 53 (wobbel amplitudes) and 54 (I <sup>2</sup> C-AnalogIn) as well as 55, 56, 57 (fly correction) added. |
| B: Vector-defined laser control                        | With Ctrl = 1 and 2 (AnalogOut) values had been scaled faulty and overrunning values had been clipped faulty.   |
| C: get_sync_status                                     | Now in addition to the master/slave synchronization status also error bits are returned.                        |
| C: Automatic laser control                             | Improved HalfPeriod control (geometrically constant spot distance), excelliSCAN systems only.                   |
| N: spot_distance,<br>spot_distance_ctrl                | Defines the to-be-controlled constant geometrical spot distance.  |
| B: Automatic laser control                             | excelliSCAN: Changing the marking speed was immediately effective instead of delayed by preview time.           |
| C: Sky-Writing mode 3,<br>polygon delay                | Angle calculation is now entirely in 3D.  |
| C: Micro vector commands                               | Laser delays now automatically take the preview time delay into account.  |
| B: set_timelag_compensation                            | Waiting for „Not HEAD_BUSY“ was infinite.   |
| N: set_port_default_list                               | Like set_port_default, but a list command.  |
| B: fly_return_z  | Z was interpreted as a 16 bit value even with set_rtc6_mode.  |

### **DSP-Program RTC6OUT.out Version 609 to Version 610**

|   |   |
|---|---|
| N: set_pause_list_not_cond                          | Conditional pause_list instead of a stop_execution.   |
| N: set_scanahead_speed_control                      | Controls scanner delays depending on the target or actual achievable speed.   |
| B: list_call, list_call_abs                         | As of version 609 the function has been repeated "Address" times.   |
| N: activate_fly_xy_encoder, activate_fly_2d_encoder | Activates a Processing-on-the-fly session with an encoder offset.   |
| C: set_trigger, set_trigger4                        | Period < 31 bits, bit #31 = 1 activates endless triggering with ring buffering.   |
| B: Pixel mode                                       | With long pixel lines (> 2.56 ms) pixel data could have been lost.<br>After cancelling the pixel line by stop_execution or /STOP the next pixel line didn't function correctly. |
| B: XY-coordinates (sample values)                   | Coordinates far off the real image field (also after a fly correction) have been clipped incorrectly.   |
| B: set_wobbel_vector                                | As of version 609 the amplitudes have been scaled too high by a factor of 32.   |

### **DSP-Program RTC6OUT.out Version 610 to Version 611**

|                                       |  |
|---------------------------------------|--|
| B: set_fly_rot                        | Did not work, when called immediately after load_program_file. (workaround: call set_fly_x(1.0) first.   |
| B: set_laser_pin_out_list             | Caused an erroneous laser control timing.  |
| B: get_z_distance                     | Used current Z position instead of the Z parameter.  |
| B: Automatic laser control            | Because of a reconstruction of the position dependent laser control to an excelliSCAN compatible version the automatic laser control scaled wrong, as long as a table has not been explicitly loaded by load_position_control (see RTC6DAT.dat version 603). |
| C: set_scanahead_speed_control        | In version OUT 610 the laser delays have not been correspondingly adjusted.  |
| B: Sky-Writing mode                   | Only with excelliSCAN: at slow speeds the run-ins could have been lasted very long.  |
| C: mark_ellipse_abs, mark_ellipse_rel | Ellipses can now also be executed with excelliSCAN in sky-writing mode.  |

|  |  |
|--|--|
| C: LaserOn delay                         | excelliSCAN with auto delays activated only: Now the LaserOn delay takes the Q-Switch delay into account instead of the FirstPulseKiller signal. |
| B: Circular arcs with Sky-Writing mode 2 | excelliSCAN with auto delays activated only: The pre run position has been calculated wrong. This could lead to a hard jump.                     |

### **DSP-Program RTC6OUT.out Version 611 to Version 612**

(Intermediate version 612 wasn't an official release)

|  |   |
|--|---|
| N: Real-time clock   | RTC6eth only: time_update also programs the real-time clock.  |
| N: time_control_eth  | Fine-tunes offset and frequency of the real-time clock.   |
| N: load_z_table_no   | Loads ABC values to table No. They are then toggled by select_cor_table. load_z_table is synonymous to load_z_table_no(A, B, C, 0). |
| N: uart_config   | Configures the UART interface (previous RS232).   |
| C: Global coordinate transformations (virtual image field) | Now also available with set_fly_x and set_fly_y.  |
| C: Automatic laser control                                 | Factor-4 overflow replaced by clipping.   |
| N: wait_for_encoder_mode, wait_for_encoder_in_range_mode   | Selectable between PreviewTime corrected and direct encoder values (excelliSCAN only).  |
| B: set_defocus_offset[_list]                               | Offset values were not used.  |

### **DSP-Program RTC6OUT.out Version 612 to Version 613**

(Intermediate version 613 wasn't an official release)

|  |  |
|--|--|
| B: get_table_para  | Returned only values for tables 1-4, not for 5-8.  |
| C: Global coordinate transformations (virtual image field) | Now in general available, even without "Processing-on-the-fly" application. Can be explicitly deactivated. |
| B: para_-commands with Ctrl = 7                            | Defocus is multiplied by 16 in RTC4/5 mode.  |
| C: set_vector_control                                      | Laser synchronous output at ports 1, 2, 3, 6.  |

### **DSP-Program RTC6OUT.out Version 613 to Version 614**

|   |  |
|---|--|
| B: activate_fly_2d_encoder, activate_fly_xy_encoder | Encoder offset values were not used.   |
| N: load_fly_2d_table, init_fly_2d                   | XY-table encoder compensation now implemented. 2 tables are available. init_fly_2d(OffsetX, OffsetY, No) with change of signature: parameter No. |
| "Processing-on-the-fly"                             | Completely implemented for excelliSCAN.  |
| C: set_wobbel_mode                                  | Mode 3: "Freely definable wobbel figure" with different power modulation.  |
| B: Timed circular arcs with Sky-Writing mode 2      | excelliSCAN with auto delays activated only: The pre run position has been calculated wrong. This could lead to a hard jump.                     |

### **DSP-Program RTC6OUT.out Version 614 to Version 615**

|                            |   |
|----------------------------|---|
| B: Automatic laser control | An incorrect power output was calculated for a combined galvanometer and encoder speed. |
| C: range_checking          | New: Mode 2: a simulate_ext_stop is forwarded to all slave boards.                      |

### **DSP-Program RTC6OUT.out Version 615 to Version 616**

|                  |  |
|------------------|--|
| N: Laser control | SubCycleSwitching, only for laserDESK and RTC6AddOnDII |
|------------------|--|

### **DSP-Program RTC6OUT.out Version 616 to Version 617**

|  |  |
|--|--|
| B: set_fly_limits, set_fly_limits_z<br>get_marking_info  | User FlyLimits were too large by a factor of 32. Accordingly, fly over/underflows were not recognized. |
| C: get_startstop_info                                    | Bit #14 indicates whether the laser is enabled (1 to enable_laser, 0 to disable_laser).                |
| N: store_timestamp_counter, store_timestamp_counter_list | Stores the current TimestampCounter value on the board.  |
| N: wait_for_timestamp_counter                            | Pauses the list execution until the specified Offset TimestampCounter to the stored value is reached.  |
| N: "Fly Extension"                                       | Commands for generic control of "processing on the fly". Encoders and axes can be freely assigned.     |
| N: Global Online Positioning                             | Coordinate transformations in the virtual image field transmitted through McBSP.                       |
| B: Laser control   | When combining marks/jumps and microvector commands, the laser sometimes did not switch correctly.     |
| C: set_angle   | HeadNo = 4 is now allowed.   |

|                              |  |
|------------------------------|--|
| C: set_trigger, set_trigger4 | Signals 59...62.   |
| B: Automatic laser control   | Mode = 1 corrected wrong.  |
| B: set_fly_z, set_fly_x      | When calling set_fly_x after set_fly_z the fly correction could be faulty. |

### **DSP-Program RTC6OUT.out Version 617 to Version 618**

|   |  |
|---|--|
| N: Standalone                             | Ethernet cards can now be operated in standalone mode.       |
| C: store_program                          | New Mode > 1, stores data for "Standalone Full State".       |
| N: set_eth_boot_control                   | (De-)activates automatic booting in standalone mode.         |
| N: eth_boot_dcnd,<br>set_eth_boot_timeout | Commands to configure the standalone boot sequence.          |
| N: read_image_eth,<br>write_image_eth     | Commands to clone boot images.                               |
| B: set_ellipse                            | For specific values the marking of ellipses could get stuck. |
| B: set_angle                              | With Head 4 the transformation sometimes was not applied.    |

### **DSP-Program RTC6OUT.out Version 618 to Version 619**

|   |  |
|---|--|
| B: set_default_pixel  | The default pixel was not output in extended mode (channel = 21).  |
| N:<br>wait_for_timestamp_counter_mode                                     | Like wait_for_timestamp_counter. Parameter mode defines the behavior when the counter has already expired.   |
| C: get_startstop_info   | Bit #5 indicates whether the start time at wait_for_timestamp_counter_mode has already expired.  |
| B: para_mark_abs<br>para_mark_abs_3d<br>para_mark_rel<br>para_mark_rel_3d | For null-vectors (no position change) changes of the signal parameter were not output. The immediately following para command could produce wrong parameter outputs. |
| B: release_wait   | Sometimes list execution was not continued after release_wait.   |

### **DSP-Program RTC6OUT.out Version 619 to Version 620**

|                         |   |
|-------------------------|---|
| B: periodic_toggle      | Output to the ports did not work.           |
| B: periodic_toggle_list | Output to the ports did sometimes not work. |





### **DSP-Program RTC6OUT.out Version 620 to Version 621**

|                    |  |
|--------------------|--|
| B: load_z_table_no | With assigned 3D correction table and No != 0 the ABC values were not written correctly. |
|--------------------|--|

### **DSP-Program RTC6OUT.out Version 621 to Version 622**

|                            |   |
|----------------------------|---|
| N: eth_configure_link_loss | Link loss can now be detected on ethernet cards. This command sets the behavior when a link loss is detected. |
|----------------------------|---|

### **DSP-Program RTC6OUT.out Version 622 to Version 623**

|    |                        |
|----|------------------------|
| C: | Internal changes only. |
|----|------------------------|

### **DSP-Program RTC6OUT.out Version 623 to Version 624**

|                                    |  |
|------------------------------------|--|
| N: get_timestamp_long              | Reads the 64-bit TimestampCounter from the card.                           |
| N: wait_for_timestamp_counter_long | Waits for an absolute 64-bit TimestampCounter value during list execution. |

### **DSP-Program RTC6OUT.out Version 624 to Version 625**

|                         |   |
|-------------------------|---|
| B: load_correction_file | When loading correction tables with No >= 3, the card got stuck in INTERNAL-BUSY state. |
|-------------------------|---|

### **DSP-Program RTC6OUT.out Version 625 to Version 626**

|    |                   |
|----|-------------------|
| C: | Internal changes. |
|----|-------------------|

### **DSP-Program RTC6OUT.out Version 626 to Version 627**

|    |                   |
|----|-------------------|
| C: | Internal changes. |
|----|-------------------|



### **DSP-Program RTC6OUT.out Version 627 to Version 628**

|   |   |
|---|---|
| B: Timed mark/jump commands               | An incorrect speed value was used for the calculation of laser delays.                      |
| B: set_io_cond_list<br>clear_io_cond_list | Sometimes bits could be overwritten by following outputs on the same port.                  |
| B: regulation3                            | Laser frequency and pulse length were not updated properly upon changing encoder frequency. |

### **DSP-Program RTC6OUT.out Version 628 to Version 629**

|  |   |
|--|---|
| B: wait_for_encoder,<br>wait_for_encoder_mode,<br>wait_for_encoder_in_range,<br>wait_for_encoder_in_range_mode,<br>wait_for_mcbbsp | It could happen that subsequent jump/mark commands were not executed correctly. |
| N: clear_fly_overflow_ctrl   | Like clear_fly_overflow but a control command.                                  |

### **DSP-Program RTC6OUT.out Version 629 to Version 630**

|                  |   |
|------------------|---|
| B: laser_on_list | In combination with sky writing mode 2/3, the LaserOn signal sometimes wasn't switched off. |
| B: regulation3   | Wobbel output was ignored in regulation3 mode.  |

### **DSP-Program RTC6OUT.out Version 630 to Version 631**

|                             |  |
|-----------------------------|--|
| B: set_multi_mcbbsp_in_list | In some situations the command could be repeated indefinitely during list execution.             |
| N: set_wobbel_control       | New control parameter (Ctrl = 8) for alternating power variation of ANALOG OUT1 and ANALOG OUT2. |

### **DSP-Program RTC6OUT.out Version 631 to Version 632**

|                           |   |
|---------------------------|---|
| B: load_list              | In some situations the wrong list was loaded for ListNo = 3.                                    |
| B: load_program_file      | In some situations a wrong error code was returned for ethernet errors.                         |
| B: set_auto_laser_control | For Mode = 50 the output of the Laser1 signal stopped too early at the end of a list.           |
| B: SCANahead              | Sometimes the LaserON signal was not switched correctly for very short vectors with AutoDelays. |

|                        |  |
|------------------------|--|
| N: get_temperature     | New command to read the temperature of the card.                                       |
| N: set_wobbel_vector_2 | New command for alternating laser power variation with freely definable wobbel shapes. |

#### **DSP-Program RTC6OUT.out Version 632 to Version 633**

|                            |  |
|----------------------------|--|
| C: set_mcbbsp_out_ptr      | New parameter Number (Bit 31): The LaserON status is output in every cycle with bit 31 of the McBSP value. |
| N: set_mcbbsp_out_ptr_list | Like set_mcbbsp_out_ptr but a list command.  |
| C: enduring_wobbel         | Now works with SCANahead autodelays.   |
| B: load_fly_2d_table       | The corrected encoder values were not calculated correctly.  |

#### **DSP-Program RTC6OUT.out Version 633 to Version 634**

|  |  |
|--|--|
| C: General   | Runtime optimizations.   |
| B: laser_on_list                                       | With SCANahead autodelays the LaserON signal could be output incorrectly.                                      |
| B: Coordinate Transformations                          | For all transformation commands with parameter at_once = 2 the z output value could be calculated incorrectly. |
| B: set_multi_mcbbsp_in_list                            | Repeated calls could lead to a hard jump.  |
| N: set_mcbbsp_out_oie_ctrl,<br>set_mcbbsp_out_oie_list | New McBSP output mode for OIE applications (see manual).   |
| N:<br>set_controlpreview_compensation_ctrl             | New command to compensate the ControlPreview time of a scan head.  |

#### **DSP-Program RTC6OUT.out Version 634 to Version 635**

|                    |   |
|--------------------|---|
| N: write_port_list | New command to output analog/digital values. With the parameter NoDelay the value can be output before the PreviewTime elapsed. |
|--------------------|---|

#### **DSP-Program RTC6OUT.out Version 635 to Version 636**

|  |   |
|--|---|
| N:<br>eth_config_waveform_streaming_ctrl | Configure Data-Streaming. See manual.   |
| N: set_trigger8                          | Record up to 8 channels simultaneously.   |
| B: Vector commands                       | The execution time for any vector command (jump/mark/arc) with a length greater $2^{25}$ (virtual image field) were calculated incorrectly. |

### **DSP-Program RTC6OUT.out Version 636 to Version 637**

|   |  |
|---|--|
| B: set_multi_mcbasp_in,<br>set_multi_mcbasp_in_list | The initial value for analog ports was output incorrectly. |
| B: set_mcbasp_in_list                               | Repeated calls could lead to a hard jump.                  |

### **DSP-Program RTC6OUT.out Version 637 to Version 638**

|                           |   |
|---------------------------|---|
| B: set_trigger/4/8        | Sometimes wrong values could be recorded for signals with head feedback when recording outside of a list (bit #30 = 1). |
| B: set_auto_laser_control | For Mode = 50 the automatic laser control stopped too early in PAUSED state.  |

### **DSP-Program RTC6OUT.out Version 638 to Version 639**

|                 |  |
|-----------------|--|
| B: set_trigger8 | When stopping a measurement invalid data could be sent via Data-Streaming. |
|-----------------|--|

### **DSP-Program RTC6OUT.out Version 639 to Version 640**

|  |  |
|--|--|
| B: set_ellipse   | Phi >= +-2880.0 did lead to an infinite loop.  |
| B: wait_for_encoder,<br>wait_for_encoder_mode  | When combined with set_fly_rot the output position was calculated incorrectly and could lead to a hard jump. |
| B: activate_fly_2d,<br>activate_fly_2d_encoder,<br>activate_fly_xy,<br>activate_fly_xy_encoder | The scale factors were not used.   |

### **DSP-Program RTC6OUT.out Version 640 to Version 641**

|                              |   |
|------------------------------|---|
| N: eth_set_remote_tgm_format | Boot command to activate Remote Interface mode. |
|------------------------------|---|

### **DSP-Program RTC6OUT.out Version 641 to Version 642**

|                            |   |
|----------------------------|---|
| N: set_encoder_filter_ctrl | New command to configure a filter for the encoder signals.              |
| N: set_auto_laser_control  | New mode +64 for backwards transformation of coordinate transformation. |
| B: set_auto_laser_control  | The correction of mode +4 did not work for set_fly_x and set_fly_y.     |



### **DSP-Program RTC6OUT.out Version 642 to Version 643**

|            |                   |
|------------|-------------------|
| C: General | Internal changes. |
|------------|-------------------|

### **DSP-Program RTC6OUT.out Version 643 to Version 644**

|                |  |
|----------------|--|
| B: Sky-Writing | For Sky-Writing the LaserON signal was sometimes not output correctly. |
|----------------|--|

### **DSP-Program RTC6OUT.out Version 644 to Version 645**

|                         |  |
|-------------------------|--|
| B: mcbasp_init          | A random frequency was used if mcbasp_init was used without a prior call to set_mcbasp_freq. |
| B: list_jump_rel(_cond) | In nested subroutines relative list jumps were sometimes not executed.                       |
| N: init_fly_2d_list     | Like init_fly_2d but a list command.   |

### **DSP-Program RTC6OUT.out Version 645 to Version 646**

|                               |  |
|-------------------------------|--|
| B: Coordinate Transformations | The jump delay for jumps caused by a coordinate transformation with SCANahead auto delays was too short. |
|-------------------------------|--|

### **DLL RTC6DLL.dll Version 600 to Version 601**

|                      |   |
|----------------------|---|
| N:                   | Initial.  |
| N: set_rtc6_mode     | All Z coordinates are handled as 20 bits as with X and Y (default).<br>set_rtc5_mode: All Z coordinates have 16 bits only (RTC5 compatibility). |
| C: load_program_file | Procedure changed (see manual).   |

### **DLL RTC6DLL.dll Version 601 to Version 602**

|   |  |
|---|--|
| N: set_laser_power, peripheral outputs to control laser power | The laser power can be set by set_laser_power synchronous to the LaserOn delay. This supports long LaserOn delays with short vectors as well as the excelliSCAN scan head.   |
| B: set_verify   | Possibly the verify check failed.  |
| B: auto_cal   | Is now available. Error code 8 now means flash error.  |
| C: set_auto_laser_control                                     | Mode = 6: automatic laser power control with combined galvanometer and encoder speed.<br>Mode <n>+16: excelliSCAN support.<br>Mode <n>+32: Correction file-dependent galvanometer speed correction (converting from angle bits to image field bits). |
| B: rs232_write_data   | The command could have sent false data.  |
| C: Import declarations for C/C++                              | ULONG_PTR is now defined as a function of _WIN64.<br>WIN32 is already used by WINDOWS elsewhere.   |

### **DLL RTC6DLL.dll Version 602 to Version 603**

|  |   |
|--|---|
| C: set_laser_delays,                     | LaserOnDelay and LaserOffDelay are now handled with a resolution of 1 bit = 1/64 $\mu$ s (set_rtc6_mode).<br>set_rtc5_mode (RTC5 compatibility): Resolution 1 bit = 0,5 $\mu$ s.  |
| C: set_sky_writing, set_sky_writing_para | LaserOnShift is now handled with a resolution of 1 bit = 1/64 $\mu$ s (set_rtc6_mode).<br>set_rtc5_mode (RTC5 compatibility): Resolution 1 bit = 0,5 $\mu$ s.<br>TimeLag is always handled with a resolution of 1/64 $\mu$ s. |
| B: set_pixel_line                        | Did not reset the z step size back to 0.  |
| B: get_galvo_controls                    | Returned wrong data.  |



### **DLL RTC6DLL.dll Version 603 to Version 604**

(Intermediate version 604 wasn't an official release)

|  |  |
|--|--|
| N: in general  | Support for RTC6eth implemented.   |
| N: set_pixel_line,<br>set_pixel_line_3d,<br>set_pixel, set_n_pixel | Generalized pixel mode with optional outputs at AnalogOut1, AnalogOut2, pulse length, 8-Bit port, 16-Bit port and frequencies up to 3.2 MHz. |

### **DLL RTC6DLL.dll Version 604 to Version 605**

(Intermediate version 605 wasn't an official release)

|  |   |
|--|---|
| C: set_scanahead_params,<br>get_scanahead_params | Import declarations: Parameter Amax is now of type double.  |
| N: excelliSCAN                                   | excelliSCAN with firmware version $\geq 5.05.7$ is supported.   |
| C: set_control_mode                              | Bit #4 = 1 suppresses simulate_ext_start_ctrl.  |
| N: get_bios_version                              | Returns the bios version of the board.  |
| C: stepper_disable_switch                        | Suppresses the functionality of an end switch, for example, with rotating axes.   |
| C: set_rtc6_mode                                 | The Z position inputs are now resolved with 20 bits, as with X and Y. set_rtc5_mode restores the RTC5 compatible 16-bit resolution. |
| N: Options                                       | SCANa = 16 activates the excelliSCAN support.<br>UFPM = 32 activates pixel mode frequencies above 800 kHz.                          |
| C: periodic_toggle                               | Endless toggling with period = 4294967295.  |

### **DLL RTC6DLL.dll Version 605 to Version 606**

|                     |  |
|---------------------|--|
| B: auto_cal         | Also available for RTC6eth.  |
| C: Master/Slave     | Now available.   |
| N: RTC6eth support  | Now available (as of bios version 0x21 or higher). New RTC6eth commands see RTC6 manual. |
| N: get_bios_version | Returns the current bios version (as of bios 0x21).                                      |

### **DLL RTC6DLL.dll Version 606 to Version 607**

|                         |  |
|-------------------------|--|
| C: set_trigger          | Signal = 52 added: Time stamp counter.               |
| B: set_scanahead_params | Amax is clipped to ( $>1/256$ ).                     |
| B: load_program_file    | Memory leak removed.                                 |
| B: get_z_distance       | False Z values with set_rtc4_mode and set_rtc5_mode. |

### **DLL RTC6DLL.dll Version 607 to Version 608**

|   |   |
|---|---|
| N: eth_get_error                                      | Returns accumulated Ethernet errors.  |
| N: eth_check_connection                               | Checks whether an Ethernet connection exists and the RTC6eth board responds.                                    |
| N: eth_get_ip_search                                  | Returns the IP address of an RTC6eth board from the search result list.   |
| N: eth_get_serial_search                              | Returns the serial number of an RTC6eth board from the search result list.                                      |
| B: Loading tables, such as load_varpoly_delay         | The DLL could have thrown an exception.   |
| C: load_program_file                                  | Performs a version check for RTC6eth boards too.  |
| C: eth_convert_ip_to_string, eth_convert_string_to_ip | Now also execute without prior calling init_rtc6_dll.   |
| B: load_sub, load_char, load_text_table               | These commands were rejected (error 64), even if the protected memory area ("List3") was set to a finite value. |
| B: set_verify   | Now works for list commands as well.  |
| B: save_disk, load_disk                               | The binary file could possibly be kept open as long as the application was active.                              |
| B: eth_get_ip   | Functioned only for the default board.  |

### **DLL RTC6DLL.dll Version 608 to Version 609**

|   |  |
|---|--|
| B: eth_check_connection                             | Returned false values > 0 for some errors.   |
| B: Windows service                                  | The RTC6 can now also be used with a Windows service.  |
| C: Import declarations                              | RTC6impl.h, RTC6expl.h, RTC6expl.c, RTC6impl.hpp are prepared for non-Windows operating systems.                             |
| C: Import declarations set_pixel, set_n_pixel       | Parameters PulseLength and AnalogOut are renamed to PortOutValue1 and PortOutValue2.   |
| C: Correction files                                 | The optional command number_of_correction_tables limits the user-defined number of allowed correction tables to less than 8. |
| N: set_pause_list_cond                              | Defines the NOT-condition at EXTENSION 1 16-bit digital input for an automatic pause_list command.                           |
| N: set_defocus_offset, set_defocus_offset_list      | Globally effective offset to all defocus settings.   |
| N: list_call_repeat, list_call_abs_repeat           | Like list_call or list_call_abs, but with arbitrary repetition.  |
| C: set_trigger, set_trigger4, get_value, get_values | Signals 53 (wobbel amplitudes) and 54 (I <sup>2</sup> C-AnalogIn) as well as 55, 56, 57 (fly correction) added.              |



|  |  |
|--|--|
| C: get_sync_status                       | Now in addition to the master/slave synchronization status also error bits are returned.   |
| N: master_slave_config                   | Configures the master/slave connection of a board.   |
| C: Automatic laser control               | set_auto_laser_control, set_auto_laser_params[_list] with Ctrl = 7: geometrically constant spot distance, for excelliSCAN systems only.  |
| N: spot_distance, spot_distance_ctrl     | Defines the to-be-controlled constant geometrical spot distance.   |
| N: set_port_default_list                 | Like set_port_default, but a list command.   |
| B: set_scanahead_params                  | Error 3 (no excelliSCAN active) was not returned.  |
| B: load_fly_2d_table, load_stretch_table | Both tables didn't load with RTC6eth.  |
| C: auto_cal                              | Doesn't write back data to the board, if presumably incorrect data have been read out before (at boot time).   |
| C: Virtual image field                   | The virtual image field is now as big as $\pm 28$ bits.  |
| C: set_matrix                            | Value range for coefficients with HeadNo = 4: $\pm 2.0$ .  |
| C: simulate_ext_start_ctrl               | Now waits internally for 30 $\mu$ s until the list has really started (provided, it is allowed).   |
| B: Import declarations                   | Some function definitions of the next release are erroneously included here.<br>WorkAround: Simply delete them from the import declarations, especially from RTC6Wrap.cs and RTC6expl.h and ~.c. |

### **DLL RTC6DLL.dll Version 609 to Version 610**

|   |   |
|---|---|
| N: set_pause_list_not_cond                          | Defines the NOT-condition at EXTENSION 1 16-bit digital input for an automatic pause_list command.<br>C: A conditional pause_list takes precedence over stop_execution. |
| N: set_scanahead_speed_control                      | Controls scanner delays depending on the target or actual achievable speed.   |
| N: activate_fly_xy_encoder, activate_fly_2d_encoder | Activates a Processing-on-the-fly session with an encoder offset.   |
| C: set_trigger, set_trigger4                        | Period < 31 bits, bit #31 = 1 activates endless triggering with ring buffering.   |
| N: get_waveform_offset                              | Reads data beginning with position Offset.  |
| N: create_dat_file                                  | Creates a current version DAT-file that includes user-definable tables.   |
| B: get_encoder, read_encoder, wait_for_encoder      | As of version RBF 614 FlyScale-scaled encoder values have been returned or used.  |



### **DLL RTC6DLL.dll Version 610 to Version 611**

|   |  |
|---|--|
| B: get_scanahead_params                           | As of version DLL 610 the verification of excelliSCAN type scan head failed.   |
| B: set_scanahead_params                           | As of version DLL 610 mode = 1 did not work because of the error in get_scanahead_params. Mode = 2 scaled image field velocities and accelerations wrong because of erroneous correction file evaluation.                                      |
| B: get_z_distance                                 | Used current Z position instead of the Z parameter.  |
| B: Automatic laser control, load_position_control | Because of a reconstruction of the position dependent laser control to an excelliSCAN compatible version the automatic laser control scaled wrong, as long as the position table has not been loaded explicitly (see RTC6DAT.dat version 603). |
| C: mark_ellipse_abs, mark_ellipse_rel             | Ellipses can now also be executed with <i>excelliSCAN</i> in sky-writing mode.   |
| B: RTC6eth  | A stored static IP address was returned with 0 if FORCE_DHCP was set.<br>If UDP packets were lost, the board could possibly no longer be addressed via Ethernet.   |
| N: RTC6eth  | If FORCE_DHCP is set and no IP address is assigned within 60 seconds after Power-On, a link-local address (169.254.1.0/16) is automatically used.  |

### **DLL RTC6DLL.dll Version 611 to Version 612**

(Intermediate version 612 wasn't an official release)

|  |   |
|--|---|
| N: Real-time clock   | RTC6eth only: time_update also programs the real-time clock.  |
| N: time_control_eth  | Fine-tunes offset and frequency of the real-time clock.   |
| N: load_z_table_no   | Loads ABC values to table No. They are then toggled by select_cor_table. load_z_table is synonymous to load_z_table_no(A, B, C, 0). |
| C: load_program_file                                       | New return values: 11, 14, 16, 17, 18, see manual.  |
| N: uart_config   | Configures the UART interface (previous RS232).   |
| C: Global coordinate transformations (virtual image field) | Now also available with set_fly_x and set_fly_y.  |
| C: Automatic laser control                                 | Factor-4 overflow replaced by clipping.   |
| N: wait_for_encoder_mode, wait_for_encoder_in_range_mode   | Selectable between PreviewTime corrected and direct encoder values (excelliSCAN only).  |
| B: set_defocus_offset[_list]                               | Offset values were not used.  |



### **DLL RTC6DLL.dll Version 612 to Version 613**

(Intermediate version 613 wasn't an official release)

|  |  |
|--|--|
| B: get_table_para  | Returned only values for tables 1-4, not for 5-8.  |
| C: Global coordinate transformations (virtual image field) | Now in general available, even without "Processing-on-the-fly" application. Can be explicitly deactivated. |
| B: para_-commands with Ctrl = 7                            | Defocus is multiplied by 16 in RTC4/5 mode.  |
| C: set_vector_control                                      | Laser synchronous output at ports 1, 2, 3, 6.  |
| B: load_program_file                                       | RTC6eth only: return value 9 with RTC6eth.out error.   |

### **DLL RTC6DLL.dll Version 613 to Version 614**

|   |  |
|---|--|
| B: activate_fly_2d_encoder, activate_fly_xy_encoder | Encoder offset values were not used.   |
| N: load_fly_2d_table, init_fly_2d                   | XY-table encoder compensation now implemented. 2 tables are available. Init_fly_2d(OffsetX, OffsetY, No) with change of signature: parameter No. |
| C: "Processing-on-the-fly"                          | Completely implemented for excelliSCAN.  |
| C: set_wobbel_mode                                  | Mode 3: "Freely definable wobbel figure" with different power modulation.  |
| C: set_pixel_line, set_pixel_line_3d                | Sky-Writing mode.  |

### **DLL RTC6DLL.dll Version 614 to Version 615**

|   |  |
|---|--|
| C: eth_set_com_timeouts, eth_get_com_timeouts | Pure DLL settings are now also possible without access to an Ethernet board. |
| C: range_checking                             | New: Mode 2: a simulate_ext_stop is forwarded to all slave boards.           |
| C: save_disk/load_disk                        | Now with version control.  |
| C: sync_slaves                                | Now no longer has any function (see RBF 619).                                |

### **DLL RTC6DLL.dll Version 615 to Version 616**

|                           |   |
|---------------------------|---|
| N: Laser control          | SubCycleSwitching, only for laserDESK and RTC6AddOnDll. |
| B: load_jump_table_offset | The automatic determination did not work.               |

### **DLL RTC6DLL.dll Version 616 to Version 617**

|  |   |
|--|---|
| B: set_pixel_line, set_pixel_line_3d                     | Pixel Mode with Channel 21 (Port 5 + Mode 16) did not work. Pixel output for PulseLength was not applied.   |
| B: load_list   | For the parameter ListNo 3 the USED status may have been reset in the wrong list.   |
| C: get_startstop_info                                    | Bit #14 indicates whether the laser is enabled (1 after enable_laser, 0 after disable_laser).   |
| N: store_timestamp_counter, store_timestamp_counter_list | Stores the current TimestampCounter value on the board.   |
| N: wait_for_timestamp_counter                            | Pauses the list execution until the specified Offset TimestampCounter to the stored value is reached.   |
| N: "Fly Extension"                                       | Commands for generic control of "processing on the fly". Encoders and axes can be freely assigned.  |
| N: Global Online Positioning                             | Coordinate transformations in the virtual image field transmitted through McBSP.  |
| B: acquire_rtc, select_rtc, n_load_program_file          | An unhandled exception could occur with RTC6eth boards.   |
| B: get_waveform_offset                                   | Special combinations of offset and length could have led to a blue screen.  |
| B: write_abc_to_file                                     | The checksum in the correction file was not adjusted.   |
| C: set_angle   | HeadNo = 4 is now allowed.  |
| C: set_trigger, set_trigger4                             | Signals 59...62.  |
| B: init_rtc6_dll   | When executing simultaneously in different application programs, a program could hang as long as a previously started program was not fully terminated. |
| B: set_multi_mcbasp_in                                   | In some cases incorrect outputs were generated.   |

### **DLL RTC6DLL.dll Version 617 to Version 618**

|  |  |
|--|--|
| N: Standalone  | Ethernet cards can now be operated in standalone mode. |
| C: store_program   | New Mode > 1, stores data for "Standalone Full State". |
| N: set_eth_boot_control  | (De-)activates automatic booting in standalone mode.   |
| N: eth_boot_dcnd,<br>set_eth_boot_timeout  | Commands to configure the standalone boot sequence.    |
| N: read_image_eth,<br>write_image_eth  | Commands to clone boot images.                         |
| B: store_timestamp_counter,<br>store_timestamp_counter_list,<br>wait_for_timestamp_counter | The commands were not executed.                        |

### **DLL RTC6DLL.dll Version 618 to Version 619**

|   |  |
|---|--|
| B: load_program_file                        | With Ethernet cards it could happen that an exception was thrown.  |
| C: load_sub<br>load_char<br>load_text_table | The input pointer now becomes invalid and the error RTC6_REJECTED is set when the end of list memory 3 in a subroutine is reached. |
| B: periodic_toggle<br>periodic_toggle_list  | The output values for ANALOG_OUT1 and ANALOG_OUT2 were too small by a factor of 16.  |
| C: eth_get_com_timeouts                     | RTC6_ETH_ERROR is not set anymore if the card is not acquired. 0 for KeepAlive and KeepInterval is returned instead.               |
| C: eth_set_com_timeouts                     | RTC6_ETH_ERROR is only set if the card is not acquired and KeepAlive/KeepInterval are not equal to 0.                              |
| N:<br>wait_for_timestamp_counter_mode       | Like wait_for_timestamp_counter. Parameter mode defines the behavior when the counter has already expired.                         |
| C: get_startstop_info                       | Bit #5 indicates whether the start time at wait_for_timestamp_counter_mode has already expired.                                    |

### **DLL RTC6DLL.dll Version 619 to Version 620**

|   |  |
|---|--|
| B: periodic_toggle  | Output to the ports did not work.  |
| B: periodic_toggle_list                                   | Output to the ports did sometimes not work.                                      |
| N: eth_set_com_timeouts_auto<br>eth_get_com_timeouts_auto | New mechanism to configure UDP timeouts (see command description in the manual). |

### **DLL RTC6DLL.dll Version 620 to Version 621**

|                      |  |
|----------------------|--|
| B: load_z_table_no   | With assigned 3D correction table and No != 0 the ABC values were not written correctly. |
| B: simulate_ext_stop | The following command could sometimes be executed too early.                             |

### **DLL RTC6DLL.dll Version 621 to Version 622**

|                            |  |
|----------------------------|--|
| N: eth_configure_link_loss | Link loss can now be detected on ethernet cards. This command sets the behavior when a link loss is detected.          |
| B: Ethernet                | For several commands which are waiting for a response from the card it could happen that the DLL calls never returned. |
| B: micro_vector_rel_3d     | The command was executed with absolute instead of relative coordinates.  |

### **DLL RTC6DLL.dll Version 622 to Version 623**

|                         |   |
|-------------------------|---|
| B: set_laser_power      | An additional latch signal could be issued on the first call to load_program_file.                      |
| B: set_scanahead_params | The LaserON signal could be output incorrectly if the command was called without excelliSCAN connected. |

### **DLL RTC6DLL.dll Version 623 to Version 624**

|                                       |  |
|---------------------------------------|--|
| N: get_timestamp_long                 | Reads the 64-bit TimestampCounter from the card.                           |
| N:<br>wait_for_timestamp_counter_long | Waits for an absolute 64-bit TimestampCounter value during list execution. |

### **DLL RTC6DLL.dll Version 624 to Version 625**

|                         |  |
|-------------------------|--|
| B: load_correction_file | When loading correction tables with No $\geq 3$ , the card got stuck in INTERNAL-BUSY state.           |
| B: eth_set_com_timeouts | Timeouts were not detected correctly. In case of a connection loss, a deadlock could occur in the DLL. |

### **DLL RTC6DLL.dll Version 625 to Version 626**

|    |                   |
|----|-------------------|
| C: | Internal changes. |
|----|-------------------|

### **DLL RTC6DLL.dll Version 626 to Version 627**

|    |                   |
|----|-------------------|
| C: | Internal changes. |
|----|-------------------|

### **DLL RTC6DLL.dll Version 627 to Version 628**

|   |   |
|---|---|
| N: Linux                                  | New linux package für Debian 11 (bullseye).                                 |
| N: clear_fly_overflow_ctrl                | Like clear_fly_overflow but a control command.                              |
| B: n_read_image_eth,<br>n_write_image_eth | Instead of the multiboard commands, the singleboard commands were executed. |
| N: eth_get_standalone_status              | New command for status query while the card is booting in standalone mode.  |

### **DLL RTC6DLL.dll Version 628 to Version 629**

|             |                                     |
|-------------|-------------------------------------|
| C: Ethernet | Improved acquire/release procedure. |
|-------------|-------------------------------------|

### **DLL RTC6DLL.dll Version 629 to Version 630**

|                       |  |
|-----------------------|--|
| N: set_wobbel_control | New control parameter (Ctrl = 8) for alternating power variation of ANALOG OUT1 and ANALOG OUT2. |
|-----------------------|--|

### **DLL RTC6DLL.dll Version 630 to Version 631**

|                           |   |
|---------------------------|---|
| B: load_list              | In some situations the wrong list was loaded for ListNo = 3.                          |
| B: load_program_file      | In some situations a wrong error code was returned for ethernet errors.               |
| B: set_auto_laser_control | For Mode = 50 the output of the Laser1 signal stopped too early at the end of a list. |

|   |   |
|---|---|
| B: SCANahead  | Sometimes the LaserON signal was not switched correctly for very short vectors with AutoDelays.   |
| N: get_temperature  | New command to read the temperature of the card.  |
| N: load_z_table_20b<br>load_z_table_no_20b<br>write_abc_to_file_20b<br>read_abc_from_file_20b | New commands to load/read/write the ABC coefficients of 3D correction table which have been calculated for a 20-bit focus length value. |
| N: set_wobbel_vector_2  | New command for alternating laser power variation with freely definable wobbel shapes.  |

#### **DLL RTC6DLL.dll Version 631 to Version 632**

|   |  |
|---|--|
| B: set_mcbasp_out_ptr   | Could throw an exception if a NULL pointer was passed.   |
| C: set_mcbasp_out_ptr   | New parameter Number (Bit 31): The LaserON status is output in every cycle with bit 31 of the McBSP value. |
| N: set_mcbasp_out_ptr_list  | Like set_mcbasp_out_ptr but a list command.  |
| B: load_z_table_20b<br>load_z_table_no_20b<br>write_abc_to_file_20b<br>read_abc_from_file_20b | The ABC coefficients were not calculated correctly.  |

#### **DLL RTC6DLL.dll Version 632 to Version 633**

|  |   |
|--|---|
| N: eth_set_high_performance_mode                       | New command to improve download performance of list commands.     |
| N: set_mcbasp_out_oie_ctrl,<br>set_mcbasp_out_oie_list | New McBSP output mode for OIE applications (see manual).          |
| N:<br>set_controlpreview_compensation_ctrl             | New command to compensate the ControlPreview time of a scan head. |

#### **DLL RTC6DLL.dll Version 633 to Version 634**

|                    |   |
|--------------------|---|
| N: write_port_list | New command to output analog/digital values. With the parameter NoDelay the value can be output before the PreviewTime elapsed. |
|--------------------|---|

### **DLL RTC6DLL.dll Version 634 to Version 635**

|                                       |  |
|---------------------------------------|--|
| N: eth_config_waveform_streaming_ctrl | Configure Data-Streaming. See manual.                    |
| N: set_trigger8                       | Record up to 8 channels simultaneously.                  |
| N: get_transform_offset               | Backwards transformation of values from position offset. |
| C: get_transform                      | Maximum number increased from $2^{23}$ to $2^{24}$ .     |

### **DLL RTC6DLL.dll Version 635 to Version 636**

|            |                   |
|------------|-------------------|
| C: General | Internal changes. |
|------------|-------------------|

### **DLL RTC6DLL.dll Version 636 to Version 637**

|                              |  |
|------------------------------|--|
| B: eth_set_com_timeouts_auto | A udp_recv_timeout error could occur before the MaxTimeout duration elapsed. |
|------------------------------|--|

### **DLL RTC6DLL.dll Version 637 to Version 638**

|                  |   |
|------------------|---|
| B: get_transform | No backward transformation was performed (since 635). |
|------------------|---|

### **DLL RTC6DLL.dll Version 638 to Version 639**

|                |  |
|----------------|--|
| B: set_ellipse | Phi $\geq$ +2880.0 did lead to an infinite loop. |
| C: set_ellipse | Phi: Allowed value range reduced to +2880.0      |

### **DLL RTC6DLL.dll Version 639 to Version 640**

|                              |   |
|------------------------------|---|
| N: eth_set_remote_tgm_format | Boot command to activate Remote Interface mode. |
|------------------------------|---|

### **DLL RTC6DLL.dll Version 640 to Version 641**

|                            |   |
|----------------------------|---|
| N: set_encoder_filter_ctrl | New command to configure a filter for the encoder signals.              |
| N: set_auto_laser_control  | New mode +64 for backwards transformation of coordinate transformation. |

### **DLL RTC6DLL.dll Version 641 to Version 642**

|            |                   |
|------------|-------------------|
| C: General | Internal changes. |
|------------|-------------------|





### **DLL RTC6DLL.dll Version 642 to Version 643**

|                     |                                      |
|---------------------|--------------------------------------|
| N: init_fly_2d_list | Like init_fly_2d but a list command. |
|---------------------|--------------------------------------|



#### **Auxiliary file RTC6DAT.dat Version 600**

|    |                                     |
|----|-------------------------------------|
| N: | Initial (identical to RTC5DAT.dat). |
|----|-------------------------------------|

#### **Auxiliary file RTC6DAT.dat Version 600 to Version 601**

|    |                      |
|----|----------------------|
| C: | Data format changed. |
|----|----------------------|

#### **Auxiliary file RTC6DAT.dat Version 601 to Version 602**

|    |  |
|----|--|
| C: | Initialization with user-definable tables. |
|----|--|

#### **Auxiliary file RTC6DAT.dat Version 602 to Version 603**

|    |   |
|----|---|
| C: | New Initialization of the load_position_control table.<br>603a: Bugfix for load_auto_laser_control table. |
|----|---|

#### **Auxiliary file RTC6DAT.dat Version 603 to Version 604**

|    |  |
|----|--|
| N: | New table for data from set_wobbel_vector_2. |
|----|--|



## RTC6e

### **BIOS file RTC6BIOSOUT.out Version xx to Version 21**

|                          |   |
|--------------------------|---|
| N: RTC6conf:: FLASH BIOS | This and newer BIOS versions can be on-site updated per software.<br>Older BIOS versions (not readable with get_bios_version) must be updated at SCANLAB. |
|--------------------------|---|

### **BIOS file RTC6BIOSOUT.out Version 21 to Version 22**

|             |  |
|-------------|--|
| C: Start-up | Time to boot reduced. PC-Motherboards with critical timing conditions "PCIe-Reset to RTC6-PCIe-Link Training Start" may now recognize the RTC6-PCIe board. |
|-------------|--|

### **BIOS file RTC6BIOSOUT.out Version 22 to Version 23**

|                      |  |
|----------------------|--|
| B: load_program_file | Could fail with program packet < Rev.1.4.1 with error 2 (board not running). |
|----------------------|--|

## RTC6eth

### **BIOS file RTC6BIOSETH.out Version xx to Version 22**

|                          |   |
|--------------------------|---|
| N: RTC6conf:: FLASH BIOS | This and newer BIOS versions can be on-site updated per software.<br>Older BIOS versions (not readable with get_bios_version) must be updated at SCANLAB. |
| B: Ethernet              | Some timings have been optimized.   |

### **BIOS file RTC6BIOSETH.out Version 22 to Version 23**

|                      |  |
|----------------------|--|
| B: load_program_file | Could fail with program packet < Rev.1.4.1 with error 2 (board not running).<br>An on-site upgrade is not possible with program package < Rev.1.3.2. |
| C: Start-up          | Automatic loading of the program files from the NAND memory is temporarily deactivated.  |

### **BIOS file RTC6BIOSETH.out Version 23 to Version 24**

|                      |   |
|----------------------|---|
| B: eth_get_static_ip | A stored static IP address was returned with 0 if FORCE_DHCP was set.   |
| B: release_rtc       | If UDP packets were lost, the board could possibly no longer be addressed via Ethernet.   |
| N: FORCE_DHCP        | If FORCE_DHCP is set and no IP address is assigned within 60 seconds after Power-On, a link-local address (169.254.1.0/16) is automatically used. |
| C: Ethernet          | Improvement of Ethernet communication (sudden disconnections).  |

### **BIOS file RTC6BIOSETH.out Version 24 to Version 25**

|                 |   |
|-----------------|---|
| B: get_waveform | Could occasionally provide obsolete data packets (since BIOS 24). |
|-----------------|---|

### **BIOS file RTC6BIOSETH.out Version 25 to Version 26**

|               |  |
|---------------|--|
| N: Standalone | Ethernet cards can now be operated in standalone mode. |
|---------------|--|

### **BIOS file RTC6BIOSETH.out Version 26 to Version 27**

|               |   |
|---------------|---|
| B: Standalone | The yellow LED could occasionally flash in error state despite correct standalone boot process. |
|---------------|---|

### **BIOS file RTC6BIOSETH.out Version 27 to Version 28**

|                            |   |
|----------------------------|---|
| N: eth_configure_link_loss | Link loss can now be detected on ethernet cards. This command sets the behavior when a link loss is detected. |
| B: List execution          | Simultaneous execution and writing of list commands could result in exceeding the 10µs clock.                 |

### **BIOS file RTC6BIOSETH.out Version 28 to Version 29**

|            |  |
|------------|--|
| B: Gateway | The gateway settings from eth_set_static_ip were not used. |
|------------|--|



### **BIOS file RTC6BIOSETH.out Version 29 to Version 30**

|                              |  |
|------------------------------|--|
| N: eth_get_standalone_status | New command for status query while the card is booting in standalone mode. |
|------------------------------|--|

### **BIOS file RTC6BIOSETH.out Version 30 to Version 31**

|             |                                     |
|-------------|-------------------------------------|
| C: Ethernet | Improved acquire/release procedure. |
|-------------|-------------------------------------|

### **BIOS file RTC6BIOSETH.out Version 31 to Version 32**

|             |                                     |
|-------------|-------------------------------------|
| C: Ethernet | Improved acquire/release procedure. |
|-------------|-------------------------------------|

### **BIOS file RTC6BIOSETH.out Version 32 to Version 33**

|             |                                       |
|-------------|---------------------------------------|
| B: Ethernet | Internal bugfix in acquire procedure. |
|-------------|---------------------------------------|

### **BIOS file RTC6BIOSETH.out Version 33 to Version 34**

|                                  |   |
|----------------------------------|---|
| N: eth_set_high_performance_mode | New command to improve download performance of list commands. |
|----------------------------------|---|

### **BIOS file RTC6BIOSETH.out Version 34 to Version 35**

|                                  |  |
|----------------------------------|--|
| B: eth_set_high_performance_mode | In some situations control commands could cause a UDP timeout. |
|----------------------------------|--|

### **BIOS file RTC6BIOSETH.out Version 35 to Version 36**

|                   |  |
|-------------------|--|
| N: Data-Streaming | Allows to transfer data independent of user program. See manual. |
|-------------------|--|

### **BIOS file RTC6BIOSETH.out Version 36 to Version 37**

|                   |                                |
|-------------------|--------------------------------|
| B: Data-Streaming | Incomplete data could be sent. |
|-------------------|--------------------------------|

### **BIOS file RTC6BIOSETH.out Version 37 to Version 38**

|                     |   |
|---------------------|---|
| N: Remote Interface | Remote Interface mode for card control without RTC6DLL                              |
| B: Ethernet LED     | In Some situations the orange LED misleadingly dimmed like in Standalone boot mode. |



### **BIOS file RTC6BIOSETH.out Version 38 to Version 39**

|                     |  |
|---------------------|--|
| B: Remote Interface | When starting an application in Remote Interface mode the seqnum variable was not initialized correctly. |
| B: Data-Streaming   | The firmware crashed when trying to establish a Data-Streaming connection with BIOS 38.                  |
| B: Ethernet LED     | The orange LED could misleadingly turn on even if there was no IP address assigned to the card.          |

### **BIOS file RTC6BIOSETH.out Version 39 to Version 40**

|                   |  |
|-------------------|--|
| B: Data-Streaming | Included BIOS version in streaming metadata. |
|-------------------|--|

#### **RTC6conf Version 1.0.1.0 to Version 1.1.0.4**

|            |   |
|------------|---|
| B: General | The program could hang after rebooting cards.   |
| B: General | While storing a static IP configuration, under certain circumstances a wrong IP/netmask could be flashed on the card. |
| B: General | Underscores in the path of upgrade files (BIOS/Option) could lead to errors.  |
| N: General | The parameters in „Network Settings“ are now saved in an ini file and loaded automatically at program start.          |

#### **RTC6conf Version 1.1.0.4 to Version 1.1.0.5**

|            |   |
|------------|---|
| B: General | Upgrading options or BIOS failed when upgrade files were not placed in the current working directory. |
| B: General | Upgrading options or BIOS of RTC6eth could fail RTC6 were present.                                    |

#### **RTC6conf Version 1.1.0.5 to Version 1.2.0.0**

|            |  |
|------------|--|
| N: General | The laserDESK Standalone option will now be displayed, if available. |
| N: General | New button „Erase SA Memory“ to erase standalone program/data.       |

#### **RTC6conf Version 1.2.0.0 to Version 1.2.1.0**

|             |  |
|-------------|--|
| C: Ethernet | Increased timeouts for Ethernet communication. |
|-------------|--|

#### **RTC6conf Version 1.2.1.0 to Version 1.2.2.0**

|            |   |
|------------|---|
| B: General | Failed option upgrades could sometimes display a success message. |
|------------|---|

#### **RTC6conf Version 1.2.2.0 to Version 1.2.2.1**

|            |  |
|------------|--|
| C: General | Changed message after BIOS and option upgrade. |
|------------|--|

#### **RTC6conf Version 1.2.2.1 to Version 1.3.0.0**

|                     |  |
|---------------------|--|
| N: Remote Interface | Can detect cards in Remote Interface mode and can disable Remote Interface mode. |
|---------------------|--|



### **RTC6conf Version 1.3.0.0 to Version 1.3.1.0**

|                     |  |
|---------------------|--|
| B: Remote Interface | Cards in Remote Interface mode were not correctly detected on repeated starts. |
|---------------------|--|