# Software Update History

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Product:        **MC664(X), MC464, MC403(Z), MC404-Z, MC405, MC508, Euro404, Euro408, MC4N_ECAT, MC4N-ECAT, MC6N-ECAT, Flex-6 Nano.**
Applies to:
Started:        **Version 2.0011**
Notes:

| Version Number: | Bug Fixes: | New Features: | Notes: |
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| 2.0011 | | Initial release for change monitoring.<br><br>Notes :<br>This release included MC464 BOOT version identified as 0.0005 | 23rd June 2008 |
| 2.0012 | Improved startup time for both BOOT and System code.<br><br>Added range checks for TABLE parameter access.<br><br>ATYPE was not always read correctly. | Added bus tests for module consistency.<br><br>Implemented feature enable checks for axis support.<br><br>Added internal module support for encoder/stepper axis types.<br><br>Added built-in analogue (2 of) support.<br><br>Added SCHEDULE_TYPE flash parameter for reverting back to previous Trio scheduling scheme ie no thread sleeping support (0=normal[default], 1=no sleep support).<br><br>Added DRIVE_READ support for System IDS, Alarms and Monitor commands.<br><br>Added new parameter COMMSPOSITION for identifying where a comms module has been connected – for MC464 -1=Internal, 0=Bottom, 1=Top. | 3rd July 2008 |
| 2.0013 | Corrected MotionPerfect problem when read Panasonic ID strings via | Included support for 'data connections' running through the | 4th July 2008 |

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| | DRIVE_READ.<br><br>Corrected Panasonic drive detection at powerup – added fixed time delay to allow drives more time to power up. | IPC FIFO. These are required to support the ModbusTCP and Ethernet/IP protocols. | |
| 2.0014 | Corrected Panasonic drive detection at powerup, solution implemented @2.0013 was not reliable, Ring Config now monitored for up to 3 seconds to allow drives to power-up.<br><br>DRIVE_INTERFACE(0,x) did not behave correctly to re-scan Panasonic drives.<br><br>Axes unlocked via Feature Enable codes now correctly used to support >4 Panasonic drives. | | 8th July 2008 |
| 2.0015 | Corrected MOVEABS problem whereby the desired position would not be acquired. | | 10th July 2008 |
| 2.0016 | Problem with program edits that could potentially cause a controller crash at startup. | | 15th July 2008 |
| 2.0017 | Commands DRIVE_READ/WRITE are now thread safe. | Added DATUM option 7 to clear the error status of a single axis.<br><br>For Panasonic A4N drives, the drive alarm condition is now replicated in AXISSTATUS bit 3 (Remote Drive Error).<br><br>Added REGIST_SPEED & REGIST_SPEEDB for acquiring the MSPEED at the point of registration. R_REGISTSPEED added specifically for Panasonic A4N drive support. | 22nd July 2008 |
| 2.0018 | Corrected serial port problem whereby data could be lost if not read from the buffer via GET quick enough causing the data read to be out of sync.<br><br>SDcard problems resolved – project names could not be > 8 chars, and Autorun attributes not saved/loaded correctly for a project.<br><br>A label at the start of a program would be rejected as not defined.<br><br>Corrected MOVELINK/CAMBOX controller crash when linking to a reversing axis with the repeat option (BIT 2) selected.<br><br>Only the axes resolved from the last Panasonic module scanned would be visable in list of axes, all other Panasonic axes would be reset to a 'virtual' axis type.<br><br>Improved power-up time when multiple Panasonic modules are connected. | Added CANIO support.<br><br>Added Ethernet IP support.<br><br>Added CRC16 command to generate 16-bit CRCs from VR/TABLE data.<br><br>Added support for Panasonic registration events when using MOVELINK/CAMBOX option 1 – the channel ID is now passed as an extra parameter.<br><br>Changed LOAD_PROJECT command to accept a string parameter to load projects from an SDcard – similar to 'FILE "LOAD_PROJECT"'.<br><br>After downloading and successfully storing new System Code a soft restart (ex) is now performed automatically for consistency with other Trio controllers.<br><br>Added IEEE_IN and IEEE_OUT commands. | 14th August 2008 |

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| | Setting or clearing a break-point on the currently selected program would cause the compiled code to be erased. | | |
| 2.0019 | Corrected textual output when displaying numbers with > 20 digits<br><br>Added fix for potential process buffer lock-up.<br><br>Encoder/Stepper_Ratio functions now operate for position mode axis types.<br><br>PSWITCH command corrected to allow access to CANIO outputs.<br><br>Corrected operation of TRON command.<br><br>Added fix for reading CANIO analogues numbered 2 and above.<br><br>Corrected 'EX' command, an exception could occur if a flash sector was being erased when the command was executed. | Implemented registration for internal encoder/stepper axis.<br><br>Implemented support for >31 Panasonic axes – duplicate axis IDs will be offset by 32. | 29th August 2008 |
| 2.0020 | Corrected problem for Panasonic axes when activating a registration channel that is already active.<br><br>Fixed problem of Panasonic drive generating an Err27 when WDOG is set OFF whilst a move is active and the Encoder/Stepper ratios have been changed from 1:1. Any position mode axis type would also have side effects.<br><br>Corrected problem when WDOG (or SERVO) is toggled from ON->OFF->ON when moves are still active on the axis – the DPOS potentially had an offset applied causing a sizeable Following Error. | Implemented the DISABLE_GROUP command. | 3rd September 2008 |
| 2.0021 | Added low-level exception handling code for non-IEEE754 FPU exception, previously it was possible for the controller to enter an unknown state depending on where this exception occurred potentially causing a 'dead' controller.<br><br>Corrected issue with DISABLE_GROUP meaning that axes > 31 could not be controlled.<br><br>Corrected MOVE_MODIFY problem causing sudden changes in demand position.<br><br>Corrected R_REGPOS to return data in axis UNITS as expected.<br><br>Corrected PSWITCH command so that when a Pswitch is disabled the | Added SERVO_READ command to allow servo-synchronous access to system/axis parameters.<br><br>PSWITCH command can now specify either MPOS or DPOS as the source of position analysis (software pswitches only), bit 2 of the 2nd parameter 'en' controls this – 0=MPOS as normal, 1=DPOS.<br><br>Added Pansonic drive checks to ensure that the cyclic data is being updated every servo period.<br><br>Added new axis keywords DRIVE_VELOCITY/TORQUE to provide access to the cyclic data provided by the Panasonic drives. | 30th September 2008 |

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| | linked output is reset otherwise an output could becomes locked on. | |
| 2.0022 | FLASH_DUMP command now dumps the correct range of flash addresses using S3 format records.<br><br>R_REGPOS and R_REGISTSPEED did not return the correct data values. | | 2nd October 2008 |
| 2.0023 | Corrected possible error in deceleration profile following a MoveModify command or if the DECEL is changed to a lower rate during a move.<br><br>v2.0021 prevented access to Panasonic drive system ID parameters, this has been rectified.<br><br>Corrected possible issue of outputs 8-15 becoming locked in an ON state following PSWITCH and OP accesses to those outputs. | Added function 13 to Ethernet command for automatic setting of MAC ID address, function 13 that was used for Ethernet IP configuration is now function 14.<br><br>Feature Enable codes for extra axes now 2 banks of 6 codes, 0..5 and 12..17 (previously 2 banks of 5 codes, 0..4 and 5..9).<br><br>Added registration support for SERCOS modules. | 13th October 2008 |
| 2.0024 | Corrected fix applied in 2.0023 for the deceleration profile following a DECEL change or MOVEMODIFY command - there was a high chance of a move not completing correctly with a see-sawing of the position demand near the end of a move.<br><br>CAM command did not work correctly, the command completed within 1 servo cycle. | Following a successful download of system code the PRP processor is reset also, previously only the main processor would be reset even when PRP code has been updated. | 15th October 2008 |
| 2.0025 | Corrected fix applied in 2.0024 for deceleration, the fix did not behave correctly for small moves with small DECEL settings.<br><br>IF command did not behave correctly when executed from the command line or from within the TRIOINIT.BAS file.<br><br>Corrected assignment of INTERNAL_AXIS_UNIT from 38 to 39, CAN_OPEN_UNIT reverts to type 38. | Added ability to upgrade boot/system firmware via SDcard using FILE "LOAD_SYSTEM" "<filename>" command format.<br><br>Added Anybus module display during startup.<br><br>Added STICK_READVR & STICK_WRITEVR commands that behave as the STICK_READ & STICK_WRITE commands but operate on VR data rather than TABLE data. | 6th November 2008 |
| 2.0026 | CANIO startup corrected to ensure NIO is correct when first read by a BASIC command.<br><br>MC464 LCD display now supports errors/low battery warnings/WDOG correctly.<br><br>Registration via internal axis corrected.<br><br>Corrected FPU configuration to use 'round to nearest' when converting floating-point values to integers, it was incorrectly always rounding down to -∞.<br><br>Upgraded version of BOOT firmware | Added new servo cycle period of 125us – limits number of useable axes to 8.<br><br>New CAN modes added for CAN command and CANopenIO support.<br><br>IEC startup processes now started when required ie when IEC port traffic is detected or if there is a loaded IEC program on the controller. Previously this was controlled by the user with the IEC_ENABLE flash flag; this flag has therefore been removed.<br><br>When upgrading the firmware via the SDcard the LCD display will | 27th November 2008 |

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| | (0.008) due to the PRP co-processor changes made for the CAN command support. | cycle a single segment of the middle digit to indicate that upgrading is in progress, this is to aid users when upgrading the controller without using an available terminal window so they have feedback for when the upgrade is in progress, only when the display has returned to normal should the power be removed. | |
| 2.0027 | ModbusTCP – fix to enable ModbusTCP support broken in v2.0026.<br><br>Corrected motion bug causing axis demand position to 'jump'. | Added support for serial baud rate of 57600.<br><br>FLASH_DUMP command now outputs to SDcard. FLASH_DUMP also changed to allow either S-Record or binary format to be selected. | 8th December 2008 |
| 2.0028 | Bugfix to correct get/set controller Vr or table memory using the inter-processor protocol required by EthernetIP and ModbusTCP.<br><br>CAN controller within PRP code corrected to send the number of bytes as defined per buffer. | | 15th December 2008 |
| 2.0029<br>+<br>Boot 0.09 | Millisecond delays requested by a WA command corrected to ensure that at least the requested delay time is satisfied, previously WA(1) could potentially only delay 250us.<br><br>Corrected problem when downloading an IEC611-31 project into flash when the directory structure is invalid or locked.<br><br>Corrected S-Record generation for FLASH_DUMP command. Also made more efficient by only outputting S-Records that contain at least 1 non-FF byte.<br><br>Corrected 'ON x GOSUB a,b,c,...' behaviour when x is > than the range of labels provided.<br><br>Corrected problem when loading a project from SDcard with the PRJ file containing a section name > 20 chars.<br><br>Increased SDcard SPI interface baud rate from 10MHz to 25MHz, previously this had been unreliable.<br><br>Corrected OCX related problem when reading negative floating-point values.<br><br>Corrected FPU configuration to ensure denormalised results are flushed to 0.0 rather than generating an unhandled FPU exception. | PRP code in flash now has a checksum to prevent corrupted code from being loaded onto Coldfire Processor.<br><br>Toshiba DDR calibration algorithm implemented (Boot code).<br><br>BASIC code lines can be extended over multiple lines using the '_' character at the end of each line.<br><br>Added detection of too many top or bottom modules connected to the controller rather than just too many modules.<br><br>New priority based scheduling added for IEC611-31 tasks.<br><br>Added INCLUDE command functionality.<br><br>Added COMPILE_ALL command for quick re-compilation of loaded programs.<br><br>Integrated version 2.0 of KW-Software eCLR for IEC program execution, this supports 64-bit data types and 'Download Changes'. In addition all Trio function Blocks renamed from 'Trio_' to 'MC_'. VR and TABLE memory can now be accessed using array access from within IEC programs.<br><br>Maximum token lengths increased from 16 to 32 characters.<br>Initial SLM axis support added | 23rd February 2009 |

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| | | including DLINK command. | |
| 2.0030 + Boot 0.10 | Corrected PRP co-processor upgrade problem introduced with v2.0029 above. | | 24th February 2009 |
| 2.0031 + Boot 0.11 | Number of digital IOs and analogue inputs now correctly displayed at startup, previously CAN sourced IO would be missing.<br><br>Corrections made for PC OCX remote command support, any command with parameters did not execute correctly due to the floating-point format differences.<br><br>Axis status flags now updated for all axes, previously only axes 0 to 3 were updated with regard to limit switches.<br><br>Version 2.0030 introduced a problem with break-point management but only on the currently selected program, the compiled code would inadvertently be removed.<br><br>If the last line of a program was an ENDIF or WEND then the controller would incorrectly indicate that the program had become corrupt.<br><br>FLASH_DUMP did not work for a binary format dump request.<br><br>Text file management corrected.<br><br>Corrected problem with MotionPerfect being able to see the KW eCLR 'eCLRremoting' process, this should be filtered from the list of processes.<br><br>Corrected OCX related problem when writing and reading negative floats. | Download process changed to only store to flash boot and PRP code when they have changed.<br><br>Added new AXIS_OFFSET flash parameters for specifying Axis assignment offsets per slot at power-up eg AXIS_OFFSET SLOT(1)=16.<br><br>FEC enabled axes count now reflects just the number of remote axes enabled.<br><br>Boot code version number now displayed at startup.<br><br>Added new commands PLM_OFFSET and REG_INPUTS. | 11th March 2009 |
| 2.0032 | | Changed number of enabled axes per Panasonoc/Sercos module from 4 to 2. | 11th March 2009 |
| 2.0033 | Corrected IEC related problems if an IEC project is created whilst BASIC programs are executing.<br><br>Removed old IEC projects before downloading a new IEC project.<br><br>Improved INCLUDE file handling to ensure only variable assignments are contained within the file. Also corrected behaviour when more than 1 INCLUDE file was referenced.<br><br>FLASH_DUMP now fails if the IP address is not set to the default.<br><br>The controller could misbehave if a system code download file did not | Added EXECUTE command for remote processing.<br><br>Added Backlash support.<br><br>Added Anybus support for passive modules, modules are assigned to channels 50 upwards in slot number order.<br><br>Added REGIST_DELAY keyword.<br><br>Upgraded MC_LIB for full 64-bit parameter support in function blocks.<br><br>Increased task support for full MULTIPROG which provides up to | 20th April 2009 |

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| | contain any boot or prp code (only affected informal build files). IOs above 271 now behave correctly.<br><br>Corrected problem when cancelling a repeat Movelink(option 4) via the REP_OPTION cancel bit 1. | 16 tasks for program execution. | |
| 2.0034<br>+<br>Boot 0.12 | Implemented SERCOS specific changes to support servo periods other than 1ms.<br><br>MC464 IEC library now specified as MC464_LIB with functionality specific to MC464, new MC_GetTICKS/MC_SetTICKS function blocks added..<br><br>PRP code updated for Modbus changes. | An additional 65536 TABLE locations are now located in battery backed RAM – 196608 in total (1.5MB worth).<br><br>Added Anybus support for Profibus module type via new ANYBUS command. Data configuration is mapped from the master automatically, 32-bit data can be selected as integer or floating-point.<br><br>Added SYSTEM_ERROR keyword for accessing the System error code. | 12th May 2009 |
| 2.0036 | Corrected CONNECT problem when modifying applied ratio to a smaller value – the axis would 'jump' to an incorrect demand position.<br><br>Corrected issue of BASIC error handlers not being activated when a program is stopped.<br><br>Corrected EXECUTE command, numerical parameters were not processed correctly. | Added TABLE_POINTER axis parameter.<br><br>Flex8 for SSI support added.<br><br>LAST_AXIS is no longer updated when the ATYPE parameter is read.<br><br>FLASH_DUMP now resets all flash parameters automatically before proceeding but only if SERIAL_NUMBER=-1 | 19th May 2009 |
| 2.0037 | | Added INTEGER_READ/WRITE for 64-bit integer support. | 8th June 2009 |
| 2.0038 | Modified Stepper/Encoder out axis types to also drive the DAC output.<br><br>Corrected problems with loading encrypted programs within projects, only encrypted programs up to 200 bytes long would be guaranteed to load successfully. | | 10th June 2009 |
| 2.0039 | PSWITCH function corrected to OR multiple PSWITCH outputs | | 12th June 2009 |
| 2.0040<br>+<br>Boot 0.13 | Corrected FLASH_DUMP problem, flash data was dumped before the erase cycle to reset flash parameters was complete.<br><br>Corrected issue of incomplete project downloads causing the project flash image to become corrupt.<br><br>Modified HEX command display range to support 53-bits of integer data. | Disabled unused blocks of MIPS processor.<br><br>Added recognition of Anybus CC-Link and DeviceNet modules, attached functionality is still TBD. | 16th June 2009 |
| 2.0041 | | Added Anybus support for CC-Link and DeviceNet.<br><br>Added system error recognition for invalid Flex Axis configurations. | 18th June 2009 |

| 2.0042 | Added module detection to allow for an Anybus card being in a slot but no actual Anybus module housed within it, this scenario should not generate a system error.

Corrected Anybus CClink/DeviceNet mapping RX/TX terminology when configuring ADIs, only a matching size of RX & TX definitions would result in a successful setup.

Corrected ANYBUS command function 3 for reading the module status byte, problems could occur if this byte was polled repetitively. | Upgraded DeviceNet support to include CIP Trio (0x8A) object requests. | 24th June 2009 |
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| 2.0043 | | Initial support for CANOpen IO | 25th June 2009 |
| 2.0045 | Corrected Anybus DeviceNet, cyclic and asynchronous comms did not function together correctly.

INPUTS1 was not readable by the scope or from the command line, a processor exception would occur resulting in the boot code becoming active | | 1st July 2009 |
| 2.0048 | Battery backed SRAM test corrected to use non-cached locations.

Interpolation mode added to MHELICAL.

CAMBOX operation could cause controller reset when option bits 2 (repeat) & 3 (pattern mode) are set.

Scheduling modified to ensure that 1 slow BASIC task cannot be given more execution time than 2 fast tasks when IEC is active.

Absolute encoder support corrected for EnDat & Tawagawa.

When writing to canio_address at runtime it will now correctly setup data-structures required for the canopen 64/128 bit IO modes (v12.0043 only worked from power-on.)

CANOpen: Added interlock mechanism to enable SDO's to be read whilst cyclic PDO data exchange running. | Added PRMBLK command for configuration of up to 64 lists of parameters consisting of Axis/System/Vr/Table/local BASIC variables.

Added ENCODER related keywords - ENCODER_STATUS, ENCODER_ID, ENCODER_TURNS & ENCODER_CONTROL.

Added lookahead buffering related commands MOVESP, MOVEABSSP, MOVECIRCSP & MHELICALSP.

SERCOS – added support for a second encoder input within the cyclic telegram. | 14th July 2009 |
| 2.0050 | If a program was stopped using 'STOP <progname>,<task no>' it would stop successfully but if the same command was repeated again the old task would reappear in the process list but as an unknown program. | Absolute encoder (EnDat/Tamagawa) functionality implemented. | 17th July 2009 |
| 2.0051 | WDOG relay and DAC did not function for Tamagawa and Endat. | | 21st July 2009 |

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| 2.0052 | AXIS_OFFSET error checking improved.<br><br>Running IEC project with process number shouldn't be allowed.<br><br>CRC16 does not return -1 after successful initialization via function 0.<br><br>NTYPE behaving strange.<br><br>Add 5 second delay to be able to stop autostarting programs.<br><br>MTYPE can't be cleared when SPEED exceeds the max value.<br><br>Corrected second encoder axis behaviour for SERCOS. | Encoder axis parameters implemented.<br><br>FE_LIMIT_MODE implemented. | 23rd July 2009 |
| 2.0053 | Defining GLOBAL variable on command whilst a program is executing results in "Program corrupt".<br><br>PORT modifier was unimplemented.<br><br>When programs fail compilation at startup no programs should autorun.<br><br>'!' within a program results in side effects such as rebooting the controller.<br><br>Having more than 22 BASIC programs in directory results in side effects from RAM being overwritten. | AXIS_OFFSET can be overwritten with 0 regardless of module type. | 24th July 2009 |
| 2.0054 | New PRP version which supports TX enable signal for RS485. | Red enable LED now supported. | 28th July 2009 |
| 2.0055 | CClink Anybus module was no longer operable, a fix has been added for this.<br><br>Corrected problem of default REG_INPUTS not being loaded into FPGA at startup.<br><br>Corrected unreliable auto-starting of IEC projects.<br><br>Pswitch support CAN outputs had stopped working.<br><br>Corrected DATE problems associated with 31-Dec-xxxx, date must now be entered with 4 digit years >=2000.<br><br>FE_LIMIT_MODE corrected. | ModbusTCP now able to access extended IO.<br><br>IEC programs now given greater priority than Slow BASIC programs when selecting a program to run in slot 3.<br><br>MOVE_TANG implemented.<br><br>Lookahead move types implemented - MOVESP, MOVEABSSP, MOVECIRCSP, MHELICALSP. | 7th August 2009 |
| 2.0056 | Corrected Tamagawa and EnDat encoder processing – Tamagawa didn't update MPOS correctly when wrapping around, EnDat didn't work with < 16 bit encoders. | ENCODER_READ/WRITE now implemented (PR 95). | 14th August 2009 |
| 2.0059<br>+<br>Boot 0.14 | EnDat encoder data fixed for encoders with less than 16 bits. | Added feature to prevent system code downloads for the wrong controller. | 27th August 2009 |

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| | Corrected Anybus problem that prevented DeviceNet messages writing > 12 VR entries from executing successfully.<br><br>Corrected 2 Hostlink issues<br>(1) Bug causing 1 extra table location to be written to.<br>(2) Corrected response behaviour to QQ-IR requests – the response header was being added to each block (it should just be the first block) and there was the potential to miss a ',' if it could not be added to the end of a block.<br><br>ADDAX_AXIS generated an 'out of range' error when there was no axis connected; it now returns -1 in this scenario. | Added new COORDINATOR_DATA function (11) to allow logging of all port data to table locations. | |
| 2.0061 | Fix to cyclic read of SLM DRIVE_STATUS.<br><br>Added DEMAND_SPEED keyword and associated functionality.<br><br>Corrected scope behaviour of MSPEED (parameter as it was not scaled correctly) and also SPEED (scope did not receive any data).<br><br>DATE could give invalid readings when read from more than one program simultaneously. | ENCODER_FILTER keyword added.<br><br>Added SIN profile mode to MOVELINK using option BIT4.<br><br>Added BIT5 option (no reverse motion link) to MOVELINK and CAMBOX.<br><br>Axis types 63 Stepper+Z and 64 Quadrature out+Z added. | 2$^{nd}$ September 2009 |
| 2.0062 | When changing ATYPE the new ATYPE value is verified with regard to making sure the FPGA addressing is configured where appropriate.<br><br>DATE can be set again using a 2-digit year ie 00..99 is equivalent to 2000..2099. | Encoder/Stepper out overspeed now indicated in AXISSTATUS bit 12.<br><br>Modified SCOPE command to accept IN(x) as a scopeable parameter.<br><br>SCOPE data is now scaled automatically where appropriate.<br><br>Added new PLC_STATUS command for interrogating the current PLC operating status. | 11$^{th}$ September 2009 |
| 2.0063<br>+<br>MC464_LIB<br>v0.1 | CAN inputs can now be used for motion PLC activity control ie FHOLD_IN, DATUM_IN etc. | Added new PLC_ERROR command for interrogating the current PLC error status.<br><br>Required IEC library version now displayed at startup.<br><br>IEC Function Block re-design started which includes renaming all FBs from MC_ to TC_. All system and axis parameters now use an improved FB interface, TC_MOVE1, TC_FORWARD and TC_REVERSE are the only motion specific FBs to be implemented with this new interface so far, the remaining FBs will be updated for the next firmware release. | 18$^{th}$ September 2009 |

| | | FRAME_TRANS command added. | |
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| 2.0064 + MC464_LIB v0.2 | Flex axis : REGIST_SPEED(B) was not latched. | IEC : Function Block re-design completed (MC464_LIB v0.2).<br><br>IO : INVERT_IN can now be read. | 25th September 2009 |
| 2.0066 + MC464_LIB v0.3 | General : Added fix to prevent processor exceptions causing re-boots.<br><br>ModbusRTU : Optional Dataconfig parameter (default=VR) added to SETCOM command to allow VR or TABLE access.<br><br>Hostlink : Modified to support access on more than 1 port.<br><br>IEC : TC_REGISTB updated to include MARKB output.<br><br>ModbusTCP : Corrected access to VR/Table entries above 32767.<br><br>IEC : Corrected FB 'Buffered' output flag behaviour.<br><br>IEC : Corrected FASTDEC Get/Set FBs.<br><br>IEC : Corrected TC_GetOPENWIN FB.<br><br>DeviceNet : Implemented support for built-in CAN port -1 via DEVICENET command. | BASE command changed to allow the array to be dumped to VRs rather than the terminal – format = BASE(-1, VR Base Address). | 1st October 2009 |
| 2.0067 + MC464_LIB v0.4 | DeviceNet : The support added in 2.0066 introduced a threading problem with the 'IO server' process which is responsible for protocol management. The Devicenet use of the low level CAN driver was causing this process to have delays preventing the other protocols from executing frequently enough hence the fix applied extracts the DeviceNet and CANopenIO handling into their own thread (process 2), the number of Slow BASIC processes is now 17 reduced from 18.<br><br>Ethernet : Port addresses can now be modified via the ETHERNET command.<br><br>Hostlink : Corrected problem with default Master timeout period which was changed to 0 in 2.0066 but should be 500ms was before.<br><br>IEC : Corrected FB interfaces for TC_MOVECIRCSP and TC_MOVEHELICALSP as they did not include inputs for ForceSpeed and EndmoveSpeed. Corrected output | | 2nd October 2009 |

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| | error flag behaviour of non-motion FBs. | | |
| 2.0070 + MC464_LIB v0.7 | Improved bus test which detects a 'lost' module, previously it was possible for a faulty module not to be detected.<br><br>Modbus TCP : Corrected writing of signed 16-bit integers to VR/TABLE.<br><br>Modbus RTU : Corrected problem with reading multiple registers that extends beyond 65535.<br><br>Modbus RTU : Corrected reading of coil status.<br><br>Modbus RTU : Corrected IO address range.<br><br>Modbus RTU : Implemented error response for an invalid function.<br><br>IEC : Corrected 'Aborted' and 'Done' flag behaviour of FBs TC_CONNECT, TC_CAMBOX and TC_MOVELINK.<br><br>IEC : Corrected TC_MSPHERICAL parameters Mode and GtPI to be inputs rather than outputs.<br><br>IEC : Problems with FB TC_MOVEMODIFY.<br><br>Corrected use of FASTDEC, it should only be used when a move is cancelled.<br><br>Corrected MSPHERICAL floating-point error.<br><br>Corrected problem with radius speed control when FULL_SP_RADIUS is used. | IEC : Implemented FBs TC_GET, TC_KEY, TC_PRINTCHR and TC_SETCOM.<br><br>ModbusRTU : Implemented function 23. | 15th October 2009 |
| 2.0071 + MC464_LIB v0.8 | Corrected CORNER_MODE=0 problem after a CORNER_MODE=2 has been used on the same axis - caused by STARTMOVE_SPEED being modified.<br><br>Corrected stepping/breakpoint problem caused by using the extended line character '_' at the end of a PRINT command terminated with a comma eg 'PRINT a,b,c,_' would cause a breakpoint to be set on the following line for all lines after the PRINT command. | IEC : Added TC_DISABLEGROUP, TC_PSWITCH, TC_DRIVECLEAR, TC_DRIVEINTERFACE, TC_DRIVEREAD, TC_DRIVEWRITE, TC_STEPRATIO and TC_PRINTSTR<br><br>IEC : Provided direct access to analogue IO. | 22nd October 2009 |
| 2.0072 + MC464_LIB v0.9 | IEC : Event task support added for 256 inputs and outputs.<br><br>IEC : Function block TC_INVERTERCOMMAND_CONTROL renamed to TC_INVERTERCOMMAND_CONTR due to length limit of 24 chars (PR 236). | Modified LOAD_PROJECT so that compilation text messages are filtered.<br><br>Added REMOTE_PROC flash parameter to specify which process should run the remote program when started via comms activity. | 4th November 2009 |

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| | IEC : TC_MOVETANG updated to change LinkAxis to USINT and to add a new DisableLinkAxis input flag to disable the LinkAxis when desired (PR 238).

IEC : Task priorities now correctly implemented, previously the MultiProg task priority was not being transferred correctly to the process management interface.

Flex Axis : EnDat support fixed.

'DIR X' output text corrected for MPE channel.

IO processing corrected for 'INVERT_IN' (PR 73), 'OP(x)' (PR 157) and IN (PR 156). | | |
| 2.0073 | Corrected flash checksum command &k, it would return 0 unless system code had been downloaded during the same cycle.

Corrected CANIO digital input processing (issue in 2.0072).

Corrected AIN(0) processing (issue in 2.0072).

Corrected PRMBLK issue when asking for changed axis data.

Added READPACKET command. | Implemented new linked axis processing scheme for efficiency when there are 'holes' in the axis map. | 23rd November 2009 |
| 2.0074 | Applied fixes to prevent a potential flash memory problem causing corrupt projects.

Corrected CANopen IO behaviour because it no longer functioned. In addition it was noticed that the Endian parameter of CAN function 23 wasn't implemented correctly.

IEC : corrected an issue introduced with 2.0072 whereby IEC programs would not execute if a BASIC program was also executing.

Corrected behaviour of AIN0..AIN3.

Corrected Software PSWITCH behaviour when the same output is driven by more than one PSWITCH, also virtual outputs can now be selected as the output destination.

Corrected and issue with using [0] when displaying ?FILE "DETECT".

Corrected SGN value for SGN(0.0) – it displayed 1.0 but should have been 0.0. | Command Line and MPE command processing now operate within their own processes, this is more efficient and prevents one or the other from holding up each other. A part of this change the 'system' processes are now located at 22..25 allowing 0..2 to be used for slow BASIC programs.

Changed the MPE channel output for 'DIR X' such that 'EEPROM' is now 'EPROM' – this is for consistency with other controllers (PR 239). | 2nd December 2009 |

| | SERCOS changes made to improve reliability of startup sequence. | | |
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| 2.0075 | Corrected potential startup problem whereby the controller would not start correctly. | Added new HTTP command.<br><br>This version onwards requires TrioPC ActiveX V2.6.13.0 or later. | 4th December 2009 |
| 2.0076 | Added FLEXLINK command. | Modified startup text to display CAN mode information. | 8th December 2009 |
| 2.0077 | Corrected problem with executing BASE (no parameters) on the command line.<br><br>Added fix (cache flush) if a VR/TABLE location is modified followed by an immediate EX eg >> VR(100) = 1234:EX.<br><br>FILE "LOAD_SYSTEM" was broken in v2.0074 | Added new Servo-Analogue ATYPE (30).<br><br>IDLE and LOADED can now freely be used as normal axis parameters as per other controllers.<br><br>Virtual IO can now be accessed via Modbus.<br><br>Implemented missing SETCOM parameters for timeout and 2-wire Modbus selection. | 17th December 2009 |
| 2.0079 | MSPHERICAL uses incorrect axes defined by BASE.<br><br>Updated Anybus interface so that all dynamic module types are supported with the same setup commands, the automated Profibus mode is now requested via function 4.<br><br>Corrected 'glitch' at the beginning of a MSPHERICAL profile for the non-main VPU axes.<br><br>Drive position is now correctly maintained when operating in Velocity/Torque modes in case a hot (WDOG=ON) change to Position mode is performed. | For consistency with ModbusRTU virtual IO can now be accessed via ModbusTCP. | 11th January 2010 |
| 2.0080 + Boot 0.15 | Implemented small change DDR calibration algorithm in the boot code because some boards had DDR configuration problems.<br><br>Implemented parameter checks for ETHERNET command function 14 used for configuring Ethernet IP.<br><br>Corrected problems with SLM/PLM axis setup.<br><br>Corrected Ethernet IP problem when exchanging 32-bit integers. | | 15th January 2010 |
| 2.0081 + Boot 0.16 | Improved change to DDR calibration algorithm made in boot code 0.15.<br><br>EthernetIP : TABLE locations > 65535 could not be accessed via implicit comms.<br><br>EthernetIP : precision lost when outputting 32-bit integers from controller. | | 21st January 2010 |

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| | Corrected problem of missing 'OK' messages when stepping code via MPE channels. | | |
| 2.0082 | SERCOS : improved FPGA syncing when accessing SERCON RAM.<br><br>Corrected problem when a controller is locked by the user via LOCK just after edits have been applied to a program, in this scenario all programs in the directory would be erased with no warning.<br><br>EthernetIP : corrected problem of data not being exchanged when data is > 250 bytes.<br><br>The following commands could incorrectly generate a floating-point error when optional parameters are omitted :<br>OP<br>PEEK<br>POKE<br>FLAG<br>FLAGS<br>IN<br>OP<br>READ_OP<br>MOVE_TANG<br>PSWITCH<br>HW_PSWITCH | When a number is displayed that is deemed to be too large then the number will now be displayed using scientific notation eg 1.2345e+62, previously ############# would have been displayed. Also if a number is too large to fit within the requested field width then it will re-try using scientific notation as best it can but if the number of characters required is still too many then ********** will be displayed as before. | 25th January 2010 |
| 2.0084 | Anybus : improved data processing when large amounts of data are exchanged cyclically.<br><br>Corrected problems with scientific notation output and enabled input of scientific notation numbers.<br><br>Modified Token Table entries for HEX, CHR and VRSTRING commands such that these are now identified as functions (f attribute) although only available within a PRINT command. This change also corrected the behaviour when attempting a command such as 'VR(0)=DATE$' which was incorrectly accepted.<br><br>Fixed problems when using the ':' character to specify more commands on the same line.<br><br>Corrected SETCOM mode 1 (XON/XOFF).<br><br>Modified behaviour of POWER_UP parameter such that it cannot change from 0. This parameter has no real function on the MC464 but if changed to 1 then MotionPerfect would complain that programs could not be edited. | Added IO support for module IO, MODULE_IO_MODE controls where these appear in the IO map (0=Disabled, 1=before CAN IO, 2=after CAN IO).<br><br>New ModbusTCP holding register addressing mode available – which halves the address used in the function to keep the modbus and vr/table indices in sync.<br><br>Implemented AXIS_MODE axis parameter – bit 1 of this when set disabled cancellation of an active connect.<br><br>WDOG disabled automatically when performing system code downloads. | 17th February 2010 |

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| | PSWITCH : When disabling a PSWITCH the associated pswitch output is now reset so that only OP has an effect on its state, previously only built-in outputs would be reset.<br><br>PSWITCH : Corrected processing of negative start/stop window positions. | | |
| 2.0087 | CAN : Corrected startup of CANopen IO via CANIO_ADDRESS=40/41.<br><br>CAN : PSWITCH outputs were not working.<br><br>S-profiling made to work with FO, RE, MM etc.<br><br>PSWITCH command can now select an output > 255.<br><br>Negative STEP_RATIO parameters now behave as required.<br><br>Corrected problems caused with symbol table being locked when compiling within MotionPerfect – this only occurred when programs failed to compile at startup. | Programs can now be loaded, edited and deleted whilst other programs are running. Only a program that is already running cannot be modified in any way. | 15th March 2010 |
| 2.0088 | Corrected problem where NEW ALL could be run when programs are still running.<br><br>Corrected potential timing problems when selecting a different program for editing/loading.<br><br>Corrected DIR X output via MPE channel so that a program is correctly identified as being editable.<br><br>Corrected Modbus RTU behaviour when requesting 0 items. | Added new PLC_READ command for reading IEC program variables, this command can also be used within a SCOPE command request. | 22nd March 2010 |
| 2.0089 | Problem displaying Subnormal numbers, new error messages displayed depending upon invalid state of floating-point numbers to be displayed or used within expressions.<br><br>The REMOTE program could not be used to load other programs.<br><br>PRMBLK command changed so that when invalid floating point numbers are read an appropriate error string is returned instead of BASIC exception code causing the command to terminate.<br><br>FLAG/FLAGS updated to support 32-bits and to also return -1 to the BASIC for successful write requests. | AXIS_ERROR_COUNT added, used within SLM/PLM axis types for each comms error detected.<br><br>SLM/PLM axis types now make use of FE_LIMIT_MODE to filter out single comms errors detected.<br><br>Registration windowing enabled for time based registration.<br><br>Non-battery backed TABLE locations now initialized to 0.0. | 26th March 2010 |

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| | IEC : A program using Function Block TC_MOVECIRCSP could not be downloaded due to a problem with its interface definition | | |
| 2.0090 | Corrected Hardware Pswitch operation.<br><br>Changed EX to echo 'OK' when the request is received via the MPE channel<br><br>Corrected ENDMOVE update problem.<br><br>Correction made to MOVETANG due to profile issues. | Made changes to scheduling algorithm to ensure a fairer distribution of CPU time.<br><br>COORDINATOR_DATA fn 0 now available for slot timing. | 1st April 2010 |
| 2.0091 | Corrected problem with motion performance being affected by many VR/TABLE accesses in quick succession eg CLEAR or NEW "TABLE" commands.<br><br>Fixed response transmitted after an EX request via the MPE channel 8 in MPE(1) mode. | IEC : Modified function blocks that invoke BASIC commands where a 0 return value can be used to indicate a failure so that the FB indicates a 'command execution error' with code 1000. | 9th April 2010 |
| 2.0092<br>+<br>MC464_LIB<br>v0.10 | CORNER_MODE from a previous move request was applied to following FORWARD or REVERSE requests.<br><br>IEC : Function block TC_FINSCOMMS contained an input named 'Type' which is an IEC reserved word and therefore does not compile successfully within a Structured Text program.<br><br>HW_PSWITCH did not accept an AXIS modifier.<br><br>FLEXLINK could potentially generate NaN floating points that would cause problems later when they are used. | Add new FLASHTABLE command to control writing/reading TABLE pages (16000 points each) to flash memory. This change also means increasing TABLE points from 500000 to 512000.<br><br>MSPHERICALSP to be added to BASIC and IEC. AXIS_MODE controls 2D or 3D direction calculations via BIT2.<br><br>Implement FRAME 14 for applying a 3D Spider transformation. | 23rd April 2010 |
| 2.0093+<br>MC464_LIB<br>v0.11 | IEC : Implemented interface changes for TC_ADDAC, TC_ADDAC and TC_DISABLEGROUP to allow the settings to be cancelled. | Made improvements to PLM performance (requires FPGA v10). | 30th April 2010 |
| 2.0095+<br>MC464_LIB<br>v0.12 | Corrected an issue where an EX after a FLASHVR request could cause the processor watchdog to trip but then start executing bad code from flash after which a power-cycle would be required. | IEC : TC_KEY input 'Count' changed from DINT to UDINT.<br><br>IEC : TC_GET modified so that lowering the 'Execute' input cancels the request which may be required if no data arrives for the requested channel input.<br><br>IEC : TC_BASE and TC_DISABLEGROUP modified to expect an array input of USINT. | 7th May 2010 |
| 2.0096 | IEC : Corrected TC_DISABLEGROUP modification made in 2.0095 , the FB expected the correct array type (USINT) but didn't read the content correctly. | | 17th May 2010 |

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| 2.0097 | IEC : TC_KEY and TC_GET updated to reject channel #0 (PR 338). Corrected problems with REGIST modes > 20. | | 24th May 2010 |
| 2.0098 + PRP App 0.0.63 | Corrected problems when connected to MotionPerfect whilst a program executes a FLASHTABLE command.<br><br>When a Software Pswitch is disabled it maintains the current state of the output, previously it could change the output state to OFF even though it was ON. | Added support for new CAN modules P317, P318 and P326.<br><br>Added support for frames 1 (SCARA robot) and 13 (Dual arm robot).<br><br>Modified startup sequence such that programs are always compiled regardless of whether the autorun is interrupted by a key press or Trioinit.BAS running from an SDcard.<br><br>Added new system parameters NIN and NOP to record the number of separate digital inputs and outputs – NIO is now MAX(NIN,NOP). | 28th May 2010 |
| 2.0099 | Corrected problem with a non-VPU axis then becoming the main VPU'd axis, the S-Ramp data was inconsistent. | | 9th June 2010 |
| 2.0100 | SLM/PLM : Corrected support for FPGA version 10.<br><br>Corrected MOVE_TANG issue when the move is updated before completion. | | 15th June 2010 |
| 2.0101 | CAN analogue outputs saturated to 12-bit signed values.<br><br>Corrected digital-input registration for internal axis. | | 21st June 2010 |
| 2.0102 | | Added support for file commands OPEN, CLOSE, OUTPUT, FIFO_READ and FIFO_WRITE. | 25th June 2010 |
| 2.0103 | PLM : Implemented fix for DRIVE_STATUS reliability. | | 5th July 2010 |
| 2.0104 | IEC : TC_ADDDAC did not cancel the connected ADDAC correctly, it cancelled the ADDAX instead.<br><br>Parsing change made to ensure that quoted parameters have a following comma before any other numerical parameters. | ENCODER_RATIO and STEP_RATIO modified so that a 3rd parameter (0 or 1) can be specified to force the reciprocated ratio to be automatically applied in the opposite direction.<br><br>ENCODER_RATIO and STEP_RATIO modified so that their current settings are displayed when no parameters are specified | 14th July 2010 |
| 2.0105 | Parsing change in 2.0104 meant that commands with quoted parameters followed by numerical parameters did not always work (PR 419). | | 14th July 2010 |
| 2.0106 | Fix in 2.0105 for quoted parameters did not work for BREAK_ADD – parsing reverted to 2.0103 behaviour for safety (PR 420). | | 14th July 2010 |
| 2.0107 | Corrected issue introduced with 2.0102 that caused a side effect when asking Motion Perfect to run a program that cannot compile, the error message is written to channel | IO points increased from 512 to 1024 | 23rd July 2010 |

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| | #0 window with MP side effects.<br><br>Panasonic : Corrected issue with absolute encoder positions not being copied to MPOS at startup.<br><br>Corrected automatic reciprocation of ENCODER_RATIO with STEP_RATIO. | | |
| 2.0110 | Ethercat startup fix. | Support for MC_CONFIG startup control file. | 9th August 2010 |
| 2.0111 | | | 10th August 2010 |
| 2.0112 | | | 11th August 2010 |
| 2.0113 | | | 17th August 2010 |
| 2.0114 | Corrected potential HW watchdog trigger during startup when a very large project is loaded on the controller.<br><br>Corrected SW limits to check against DPOS and to be support FRAMEs.<br><br>IEC : Corrected TC_SetENDMOVE<br><br>Corrected problem whereby processes wouldn't be scheduled for 1 extra slot after an event occurred for example after a WA(n) command.<br><br>Corrected problem when using SDcard FILE commands within MP2 that caused them to be rejetected with error 24. | Added INTERP_FACTOR axis parameter (default = 1.0) for use with interpolated moves.<br><br>Added new 'fraction' parameter to ADDAX command.<br><br>Added new 'ratio' parameter to CONNPATH command.<br><br>FRAME 14 : modified TABLE locations used so that they are contiguous. | 27th August 2010 |
| 2.0115 | IEC : MPOS data collected by an IEC task scheduled at 1ms intervals did not always read the correct value.<br><br>The DAY token did not behave correctly, generating an error 21.<br><br>IEC : The controller could reset (due to HW watchdog timeout) when an IO changes state. | | 3rd September 2010 |
| 2.0116 + PRP App 0.1.1 | Corrected problem preventing a WAIT IDLE AXIS (n) 'Comment, from being compiled successfully due to the space before the comment prefix ' character.<br><br>EthernetIP had stopped working.<br><br>Problem when editing or loading a program whilst other programs are running. | | 10th September 2010 |
| 2.0117 + MC464_LIB v0.13 | | IEC : Integrated eCLR v2.2 | 24th September 2010 |
| 2.0118 | Modified HW_PSWITCH to be aware of ENCODER_RATIO when configuring the Hardware FIFO buffer. | Added ability for the user to configure the PRP memory allocation (requires PRP version 0.1.2 or above) | 8th October 2010 |

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| | Corrected tokenization of '..' range identifier (broken in 2.0110).

Corrected IEC library version from 0.12 to 0.13 – no functional changes. | Added T_REF_OUT as an alternative name for DAC_OUT – S_REF_OUT already existed as an alternative.

Added FRAME 15 support.

Added one parameter SETCOM to read the communications parameters for a given port.

Added optional rotational parameter to MOVE_SPHERICAL. | |
| 2.0119 | Invalid MOVECIRC combinations not handled. | Increased command line history buffer from 10 lines to 20.

Add S_REF, S_REF_OUT, T_REF and T_REF_OUT to the token table. | 15th October 2010 |
| 2.0120 | CAMBOX requests caused some instant motion even though the linked axis was stationary

Invalid MOVECIRC combinations weren't handled correctly, they caused problems for the next command that followed. | Added S_REF/T_REF and S_REF_OUT/T_REF_OUT to token table as unique entries. | 22nd October 2010 |
| 2.0121 | | Improved GLOBAL/CONSTANT processing time. | 29th October 2010 |
| 2.0122 | Changes to ethercat protocol to prevent immediate unit error from startup. | | 2nd November 2010 |
| 2.0123 | Moved ethercat protocol scheduler to slot 2, hence allowing FPGA/MAC more time to transfer data onto the bus. | | 5th November 2010 |
| 2.0125 | Increased refresh rate of AXISSTATUS flags to every cycle.

Corrected REMOTE program communications with ActiveX and modified REMOTE program to de-schedule itself when not busy. | Initial support for strings added. | 19th November 2010 |
| 2.0126 | Support for strings removed due to problems.

Corrected FS/RS_LIMIT. | | 25th November 2010 |
| 2.0127 | Corrected IEC program when SERVO_PERIOD < 1ms. | Doubled default FS/RS_LIMIT values. | 2nd December 2010 |
| 2.0128 + PRP App v66 | LIMIT_BUFFERED now reset to 1 by INITIALISE command. | Added TEXT_FILE_LOADER support.

Added HMI channel support. | 10th December 2010 |
| 2.0129 | Corrected SERVO_READ problem whereby the data could become inconsistent and possibly lead to FPU NaN errors. | | 17th December 2010 |

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| 2.0130 | Corrected potential problem causing a hardware watchdog timeout after AXIS_ADDRESS is set to 0 for digital axis types.<br><br>Corrected IDLE evaluation causing VP_SPEED to be non-zero even though IDLE is TRUE.<br><br>Corrected ETHERNET command function 13 (write) so that the MAC address can be read again correctly. | Added extra IPC config parameters to tune comms timeouts.<br><br>SDcard : Added FILE "REN" command for renaming. | 23rd December 2010 |
| 2.0132 | ECAT : Corrected module based registration. | | 7th January 2011 |
| 2.0133 | Corrected registration jitter on module registration when servo periods other than 1ms are used.<br><br>Moved when MOVETANG performs VPU to remove problems at certain speeds.<br><br>Corrected controller hang caused when FRAME=15. | Increased number of software PSWITCHes from 16 to 64. | 28th January 2011 |
| 2.0134 | Implemented new tokenizing scheme due to 8-bit tokens becoming exhausted.<br><br>ECAT : G5 latching blocked after CONFIG.<br><br>ECAT : Change default ERRORMASK for MX2-ECT from 268 to 12. | Implemented new low-level interrupt/scheduling scheme to improve CPU resource sharing amongst processes and to be able to process more ECAT axes.<br><br>Implemented new transformation requirements for robot features. | 11th February 2011 |
| 2.0135 + TC_IO v1.1 | ECAT : Added new 'encoder in' axis type (69).<br><br>IEC : Updated TC_IO library to support accessing IOs using arrays – TC_IO library version now displayed within startup text.<br><br>IEC : Corrected task priority scheduling. IEC task priorities now listed within the 'Line' column of PROCESS command output as this is more useful than a blank field; higher number=higher priority.<br><br>Added TOOL_OFFSET command for applying x, y & z tool offsets within a 3-axis frame group. | Added support for 16-bit tokens now that all 8-bit tokens are exhausted.<br><br>MPv3 support changes :<br>MC_CONFIG file now reported as file type 'MC_CONFIG' within DIR command. Project loading changes made specific for MPv3.<br><br>Keyword BOOST is now translated to AXIS_ENABLE rather than AXIS_DEBUG_A. | 18th February 2011 |
| 2.0136 + MC464_LIB v0.14 | Corrected a PSWITCH problem whereby there was a very small window of opportunity for a PSWITCH to be disabled but with the output stuck in an ON state. | IEC : Added new Function Blocks to support robot transformations<br>TC_DEFINEUSERFRAME<br>TC_SELECTUSERFRAME<br>TC_DEFINETOOLOFFSET<br>TC_SELECTTOOLOFFSET | 28th February 2011 |

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| | Corrected syntax problem of not being able to use a bracket immediately after operators MOD, XOR, AND, OR and NOT eg. 20 MOD(3) would not compile. This problem had been introduced in 2.0134 with extended token support. | TC_SYNC<br>TC_VOLUMELIMIT<br><br>TokenTable updated to support 16-bit extended tokens. | |
| 2.0137 | MC_CONFIG functionality was broken in release 2.0135. | Added USER_FRAMEB for controlling dual frame syncing.<br><br>Added CANIO_MODE (0=New CANIO modules configured as new modules, non-zero=configured as old CANIO modules, default = 0) | 14th March 2011 |
| 2.0138 | Corrected problem of spurious interrupts introducing side effects when running programs that access TABLE memory.<br><br>Corrected display refresh problem.<br><br>Corrected problem of DEMAND_EDGES not working with the scope.<br><br>Loading .BAS files that didn't end with a CR-LF would fail to load with a CRC error.<br><br>ECAT : Runtime errors (19) now generated for CO_READ, CO_READ_AXIS, CO_WRITE, CO_WRITE_AXIS, IO_STATUS and IO_STATUSMASK when invalid parameters are used. | Updated user frame functionality to allow 2-axis frame groups to be used.<br><br>ECAT : Added support for Kuebler slave encoder input. | 18th March 2011 |
| 2.0139<br>+<br>Boot 0.17 | Number of EtherCAT axes available now controlled with Feature Enable Codes.<br><br>Boot code modified to ensure correct cache behaviour when performing the DDR RAM calibration.<br><br>Corrected potential power-up problem with SSI that could cause MPOS to be incorrect. | Added support for new SSI slave axis FPGA.<br><br>Robotics : User frames now accepted for 2-axis frame groups regardless of the 'Z' factors. SYNC changes to support multiple user frames. | 1st April 2011 |
| 2.0140 | Corrected FS/RS_LIMIT operation for encoder axes.<br><br>IEC : Modified scheduling so that a single IEC user task can successfully be scheduled at 1ms intervals.<br><br>ECAT : ETHERCAT commands now return 0 rather than runtime errors. | | 8th April 2011 |
| 2.0141<br>+ | Modbus TCP function 23 didn't work correctly. New MODBUS | Robotics : Added software limit awareness. | 15th April 2011 |

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| PRP App 0.1.6 | command added.<br><br>Improvement made to CANIO performance. | Robotics : Error now reported when a user frame is selected that has not been defined.<br><br>Robotics : Changes made to support MOVEABS. | |
| 2.0142 | ECAT : Axis error not directly cleared when initializing at 2ms.<br><br>ECAT : An axis error can be triggered when quickly setting ATYPE followed by WDOG.<br><br>ECAT : AIN0..AIN3 not correct for negative values.<br><br>AIN(x) did not SCOPE correctly, the data recorded was always 0.<br><br>Corrected problem that could cause BASIC programs to become suspended when connecting to MotionPerfect after 1 hour of runtime if the IEC FEC is not available. | | 21st April 2011 |
| 2.0143 | Corrected problem with MPE command causing an error when connecting with MotionPerfect 2. | | 26th April 2011 |
| 2.0144 | Added support for AOUT0..3 for use in SCOPE command.<br><br>ECAT : ETHERCAT(0,0) times out too quickly at 2ms.<br><br>Corrected RAPIDSTOP when used immediately after a motion command ie the new request should be cancelled. | Robotics : Corrected RS/FS_LIMIT to use the change in WORLD_DPOS rather than DPOS when deciding if motion is moving back inside the limit.<br><br>Robotics : Improved IDLE processing so that MOVE_MODIFY can function as expected across user frames.<br><br>Added RAPIDSTOP(1) to cancel all buffered moves on all axes.<br><br>Robotics : USER_FRAME and USER_FRAMEB updated to return the currently active frame selections when used with no parameters. | 28th April 2011 |
| 2.0145 + TC_LIB v0.15 | Robotics : Applied fix so that 2-axis frames function correctly with MOVEABS across different user frames.<br><br>Removed unused ADDAX parameters for specifying a 'Frcational' axis and value. | IEC : Added missing Robot functionality.<br><br>Enabled HMI and STRING support. | 6th May 2011 |
| 2.0146 | Robot SYNC accuracy fixes.<br><br>Fix for ModbusTPC –ve numbers issue introduced in 2.0141. | ECAT : Added VIPA and IAI drive support. | 13th May 2011 |

| 2.0147 | Robot SYNC accuracy fixes in addition to those made in 2.0146 previously.<br>Corrected Robot SYNC problems caused by SYNC(4).<br><br>EC-02xx: Invalid registration event triggers new registration event when reissueing REGIST command. | ECAT : Added support for Wago Ethercat Bus Coupler 750-354<br><br>Modified ENCODER/STEP_RATIO so that when their current settings are read back the original values are returned rather than the internally modified values, eg previously 1,1 could later be read back as 8,8 which is the same ratio of course but not ideal.<br><br>Updated DATE command to accept DATE(0), DATE(1) and DATE(3) as per other Trio controllers with RTC support. | 20th May 2011 |
| 2.0148 | Robotics : Corrected problem where a non-frame group axis loading a new move could affect the DPOS of another axis within a frame group.<br><br>Corrected problem when 3D mode is used for new move requests on 6 axes which could result in an unexpected runtime error. | | 26th May 2011 |
| 2.0149 | Corrected SET_BIT, CLEAR_BIT and READ_BIT when using bits > 31. | Implemented Feature Enable Code (22) of Robot features.<br><br>ECAT : Added Kollmorgen AKD drive support. | 3rd June 2011 |
| 2.0150 | Corrected potential problem when starting several programs in quick succession causing a 'Symbol Table' error.<br><br>IEC : Corrected problem with Multiprog communications introduced with v2.0146.<br><br>If DISABLE_GROUP(…,63) was used then DISABLE_GROUP(-1) would fail with an out of range error 19. | ECAT : Added support for AMC drives. | 8th June 2011 |
| 2.0151 | Real Time Clock (RTC) modification due to some controllers having timing problems.<br><br>ECAT : Corrected support for GRT1-ECT with byte alignment.<br><br>ECAT : Support for MX2-ECT (v1.10) added.<br><br>Added support for frames 6 & 10. | Added FEC control of robot features.<br><br>SDcard : Progress of loading system code now displayed.<br><br>SDcard : Added support for encrypted projects.<br><br>Added new B_SPLINE mode (3) for up to 6-axis splines. | 24th June 2011 |
| 2.0152 | A potential problem with a SYNC(4,t) request has been corrected. Previously the 3rd and 4th optional parameters were still being checked to make sure they | Added new CANCEL(2) and RAPIDSTOP(2) modes to cancel all active, buffered and PMOVE requests. | 1st July 2011 |

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| | were in range even though they were not specified and could cause an unexpected out or range error 19 to occur. | BASE command updated to ensure list of axes is increasing.<br><br>Modified Frame 6 so that a table index can be used to specify the units.<br><br>Modified Frame 10 so that multiple revs are supported. | |
| 2.0153 | Corrected WAIT LOADED and WAIT UNTIL MARK, a bug caused these to function unreliably.<br><br>Writing to outputs 0..7 should generate an our of range error 19<br><br>Added fix to issue a compile eror when bracketed parameters are terminated with ',)', eg vr(7,)=100 would compile but then generate a runtime error when in fact it is more useful to generate a compile error.<br><br>Corrected REMOTE_PROC token table entry to reject the AXIS modifier, this was incorrectly accepted with no compile error.<br><br>Corrected problem executing last line of TRIOINIT.BAS from SDcard if the line doesn't terminate with CR/LF.<br><br>2.0152 corrupted SDcard TRIOINIT.BAS support. | ECAT: Applied a fix for position mode control to allow for drifting of motor when drive enabled but not close looped.<br><br>Added back support for the ModbusTCP 'address halving' mode. | 15th July 2011 |
| 2.0154 | Corrected problem using arguments > 32 bits for operations MOD, AND, XOR, OR.<br><br>Corrected problem when using a GLOBAL variable as a loop control index – the loop would not execute for the correct number of iterations. | Added DRIVE_CONTROLWORD and DRIVE_CW_MODE. | 22nd July 2011 |
| 2.0155 | Improved CANIO throughput, it had been found that CANIO network could have timeout problems when other communication protocols (modbusTCP etc.) are also active.<br><br>Corrected problem at startup when using MC_CONFIG to set ATYPE of flex-axis axes.<br><br>Corrected HALT command so that it doesn't stop a remote program.<br><br>Corrected behaviour of distance parameter so that it is processed as a floating-point value. | Added support for Panasonic A5N drives.<br><br>Added optional parameter to EXECUTE command to indicate if the command should actually run or not – default is to run as before.<br><br>Modified CAN command to ensure that TRUE (-1) is returned for any successful request. | 8th September 2011 |

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| 2.0156 | ECAT : Corrected problem introduced with 2.0155 causing unexpected problems. | | 14th September 2011 |
| 2.0157 | Improved process scheduling when using WAIT LOADED. | MC464 : Removed KW IEC support.<br><br>Added DISTRIBUTOR_KEY command. | 11th October 2011 |
| 2.0158 | MC464 : Fix to Modbus TCP that exists in 2.0157 which caused Modbus TCP to not function. | ECAT : Added support for user defined slave configuration information. Added support for moving between different ESM states. New startup sequence, which transmits up to a maximum of 15000 timing messages whilst checking the system time diff of all slaves on the network. Initial support for 'complex' slaves which use the Modular Device Profile. Increased state change timeout, to enable Yaskawa SGDV drive to startup into operational mode. Added ability to read slave device ESC registers in Init mode, and CoE objects via SDO in preop mode. New telegram format based on data blocks per EtherCAT command instead of per slave device. | 17th October 2011 (not released) |
| 2.0159 | Corrected potential reboot problem after a system code download. | Added new MPv3 feature to allow modified programs to be forced into flash. | 26th October 2011 (not released) |
| 2.0160 | Corrected syntax checking to allow PRINT FILE "DETECT"[n].<br><br>Corrected problem caused when using DRIVE_CURRENT, DRIVE_FE or DRIVE_MODE as these had not been fully implemented so resulted in a processor exception. | MC403/5 : Second Alpha release for these products.<br><br>PROCESS command now displays 'halting' for a program that has been requested to stop but hasn't yet completed the request.<br><br>ATYPE can now be set within MC_CONFIG.<br><br>Added new ATYPE 76 to support an encoder only axis.<br><br>ECAT : Node slave errors now raised as a unit error. Improved motion scheduler. New drive support added, including Elmo, LTi, KEB and ABB. Max telegram length at 1msec reduced to allow more axes per module. Slow flash of P876 module red LED whilst network not in operational mode. | 9th November 2011 |

| Version | | | Date |
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| 2.0162<br>+<br>Boot 0.18<br>(MC464)<br>+<br>MC403/5<br>Boot 0.04 | MC464 : Boot upgraded to v0.18 to give better DDR RAM initialisation.<br><br>MC403/5 : ModbusTCP corrected for 32-bit access.<br><br>Scope use for DRIVE_CONTROL corrected.<br><br>Fix added to prevent lockup occurring when a running programming runs another program that is un-compiled.<br><br>MC464 : DRIVE_READ/WRITE Panasonic fixes for A5N added.<br><br>Corrected VRSTRING, it always counted the number of characters from VR index 0.<br><br>ECAT : Bug fix to mailbox length used during startup.<br><br>ECAT : EtherCAT(0,x) did not re-initialise the network. | MC403/5 : Startup LCD/LED scheme changed to help identify the configuration.<br><br>MC403 : System code reprogramming via SDcard now highlighted by red/green LEDs flashing in sync until reprogramming complete.<br><br>MC403/5 : Automatic VR backup to flash memory implemented.<br><br>COORDINATOR_DATA(15) returns the number of VR flash page erase cycles that the controller has performed.<br>ECAT - Added support for GX-JC03 and -JC06 and VIPA coupler slices with < 8 bits. Less stringent error checking for Kuhnke IO devices. | 24th November 2011 |
| 2.0163<br>+<br>MC403/5<br>FPGA v9 | Fix for ATYPE 76 (encoder only), MPOS was not being updated.<br><br>Fix applied when verifying downloaded system code, potentially the flash check could fail because interlocking was missing.<br><br>IEC : Fixed TC_FORWARD, TC_REVERSE and TC_MOVE – they did not retry the request if the motion buffer was full. | DRIVE_PROFILE axis parameter added. | 7th December 2011 |
| 2.0164 | Corrected DPOS update for encoder axis type (76). | Added new MODULE_IO_MODE (3) to allow CAN IO to start at 32 and disable module IO.<br><br>Added new << and >> operators for bit shifting.<br><br>Added ability to disable BASE descend check by using COORDINATOR_DATA(16,x) where x is non-zero to disable the check.<br><br>ModbusTCP : Added support for Trio defined ModbusTCP functions 0x41 and 0x42 - which use a 32 bit address.<br><br>ECAT : The set/get wk cnt/wdog err limit per slave functions have been replaced by per network | 20th December 2011 |

| | | functions (required due to the new multiple slaves per logical command in the ethercat telegram.) Added ability for the user to define the maximum telegram length at different servo periods. Increased startup timeout for 2msec servo period. AKD - added support for second drive profile (PDO set), which includes the FE and drive digital inputs. Added specialisations to enable us to delay polling the Omron encoder input devices mailbox for a period after entering operational mode. | |
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| 2.0165 | | Added IEC61131-3 support accessed via MPv3 (single project/task only).<br><br>Modified REG_INPUTS behaviour so that setting ATYPE doesn't affect REG_INPUTS – this was previously inconsistent anyway due to some ATYPEs modifying REG_INPUTS and other ATYPEs not.<br><br>ECAT - reduced startup timeout back to 50 seconds (since we have improved the startup speed now.) | 22nd December 2011 |
| 2.0166<br>+<br>MC403/5<br>Boot 0.05 | MC403/5 : Boot code updated to correctly configure DDR RAM registers. The original boot code wasn't 100% correct even though no obvious problems were noticed.<br><br>Analogue servo ATYPE (30) could not be set.<br><br>ECAT : module registration corrected to match 2.0152. | MC403/5 : User tasks count revised as per spec sheets – 6 for MC403, 10 for MC405.<br><br>MC464 : FPGA_VERSION of the internal module (ie the last module) now returns the main FPGA version when using slot(-1), previously it would return 0.<br><br>IEC : IEC program tasks now execute within the user task range that was previously only for BASIC programs. | 5th January 2012<br>(First FULL release of MC403/MC405 system software) |
| 2.0167 | Corrected problem introduced with 2.0166 that caused controller misbehaviour when adding a new program. | ECAT - Write out LRW command in safeop, in order to support drives which require the PDO control mode object (0x6060:0x00) written prior to entry into op state. | 6th January 2012 |
| 2.0168 | Corrected problem introduced with 2.0166 that caused a controller reset if a BASIC program is set to AUTORUN.<br><br>IEC : corrected potential problems caused by IEC communications | | 10th January 2012 |

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| | being present during startup before the main IEC communications task has been created.<br><br>IEC : Corrected problem (reset) caused by running more than 8 IEC projects. | | |
| 2.0169 | | MC405 : New PSwitch modes.<br><br>IEC outputs are now 'OR'ed with normal and PSwitch outputs to produce actual output state.<br><br>IEC : Multi-tasking support implementation ready to use but requires MPv3 update.<br><br>ECAT : ETHERCAT() command will return FALSE if a particular slave has gone offline.<br>Axis slaves using the LRW logical command set the comms error flag in AXIS_STATUS if they cause a cyclic telegram error.<br>A protocol restart ensures the Start->Init functionality is executed, to improve reliable starts after an error or network change. | 23rd January 2012 |
| 2.0170 | Corrected ATYPE 76 (encoder) MPOS update in MC403/MC405. | MC403/5 : Added support for second ModbusTCP port.<br><br>Added 'dot' notation to select binary bits in variables. e.g. fe_bit = AXISSTATUS.8 will put bit 8 of the axis status in local variable. | 27th January 2012 |
| 2.0171 + MC405 FPGA image version $030B | MC403/5 : Corrected CANopen I/O operation.<br><br>MC403/5 : Corrected SETCOM so that Modbus RTU can be used.<br><br>MC403/5 : Corrected PROC_STATUS behaviour, after a program had stopped its status value would display 16777216.<br><br>MC464 : Improved Panasonic DRIVE_TYPE detection. | Added new ATYPE 77 for 'Encoder Input' with 'Z Output'.<br><br>MC403/5 : Added support for AXISSTATUS bit 18 – Encoder Over Voltage.<br><br>Robotics : Added support for 6-axis transformation and increased number of scopeable parameters from 4 to 8.<br><br>Added check to prevent an older boot image being stored in flash.<br><br>Added new PRMBLK function 'SET' for MPv3 use. | 9th February 2012 |
| 2.0172 + MC405 FPGA | MC464 : Added fix for power failure corrupting VRs during battery backed RAM testing at startup. | | 16th February 2012 |

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| image version $030C | MC403/5 : Added default settings for REG_INPUTS.<br><br>Added fix for EDPROG1 (fixes MPv3 issue.)<br><br>Added fix for FILE "LOAD_PROJECT" for MPv3 projects on SDcard.<br><br>MC403/5 : Added fix for HW_PSWITCH to support up to 512 points. | | |
| 2.0173 + MC405 FPGA image version $030E | MC405 : HW_PSWITCH : Added range check on 16-bit Timer value in modes 3&4. | MC403/5 : Modified ATYPE 77 to support the DAC output for servoing.<br><br>Added axis parameter MOVE_COUNT; increments each time a new move starts in MTYPE.<br><br>ECAT : Added support for additional Beckhoff IO devices (EP1018, EP2008, EP2624) and initial support for for slave encoder input (EP5101).<br><br>ECAT : Initial support for AKD torque mode added.<br><br>ECAT: Support for CT Digitax speed and torque modes added. | 27th February 2012 |
| 2.0175 + MC405 FPGA image versions $10A $20A $30F + MC403 FPGA image versions $10A $20A | MC403 : FPGA updates to rectify a startup problem with initialising DAC channels.<br><br>MC403 : Corrected problem resetting IP address via reset switch when other flash activity is ongoing, also changed behaviour so that MAC address is not reset.<br><br>MC403/5 : Corrected side effects caused when a software PSWITCH is active when flash activity is initiated.<br><br>IEC : Corrected problems with halting an IEC task within MPv3.<br><br>Corrected side effects with DIR command when followed by another command, eg DIR:PROCESS.<br><br>Corrected potential problem with INCLUDE if an MC_CONFIG file is the first file in directory. | MC403 : Added P825 functionality.<br><br>MC403 : Added code to display warning during startup if the IO/DAC power is not detected.<br><br>MC403/5 : Improved speed of FLASHVR(-100) when flushing changed VRs to flash.<br><br>ECAT : added support for DIO and AIO included in a PDO set via user defined configuration.<br><br>Added check to prevent SSI encoders being used with a SERVO_PERIOD < 500us | 6th March 2012 |

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| | Corrected some problems with editing programs in MPv3 causing programs or the whole directory to be removed at startup.<br><br>Increased maximum number of significant floating-point digits that can be displayed because, for example, when the LSB of the mantissa is set the number could not be displayed.<br><br>MC403/5 : Fixed potential problems when connected to MPv3 and performing an FPGA_PROGRAM command, MPv3 may be polling the SDcard status which uses the same SPI port. | | |
| 2.0176 | Corrected problem when downloading system code that can cause axes to be in an enabled state, all axes should be forced into a disable state for safety during the download. | MC403/5: Added support for ModbusTCP client.<br><br>MC403/5 : Added dummy support for RTC commands and also COMMSTYPE and COMMSPOSITION to allow re-use of BASIC programs (without modification) targeted at other controllers that support those commands.<br><br>FILE command options "LOAD_PROGRAM", "SAVE_PROGRAM" and "SAVE_PROJECT" can now be initiated from within BASIC programs rather than being restricted to the command line.<br><br>Initial support for FILLET command added. | 9th March 2012 |
| 2.0177 | IEC : Corrected 1 hour timeout behaviour when FEC 21 is disabled and added new error 152 to be generated when an attempt is made to run an IEC program after 1 hour.<br><br>IEC : TC_DATUM updated to correctly set the 'Done' output rather than 'Abort' output after successful completion of request.<br><br>IEC : Corrected potential controller reset when executing certain FBs on a task that is being used for the first time during this cycle, if a user ran a BASIC program on the task first then the problem would not occur. | MC403/5 : SLOT modifier no longer range checks the supplied slot number.<br><br>IEC : VR data can now be updated by IEC or BASIC, previously IEC tasks would overwrite any VRs that it referenced at the end of each cycle. | 16th March 2012 |

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| | SDcard : Added fix to prevent other processes from executing FILE command requests concurrently.<br><br>Corrected parsing of quoted parameters so that a line of BASIC such as<br>  IF FILE "DETECT" THEN<br>Can execute successfully.<br><br>Corrected problem parsing lines containing floating point numbers without a leading 0 between 0 and 1.0 such as<br>P_GAIN=.5<br>IF x<.5<br>IF x>.5<br>TABLE(0,.5)<br>This problem was introduced with allowing bit nuber referencing using '.' Notation eg. X.3<br><br>FRAME 1 correction. | | |
| 2.0178<br>+<br>TW405<br>Boot 0.06 | Corrected parsing problem with FILE command.<br><br>Corrected problem with tokenizer removing leading '\' eg FILE "CD" "\\" would be tokenized as FILE "CD" "\" which when re-loaded would cause compile problems.<br><br>Corrected displayed error when multiple errors are present. | Added new error message (153) to generate when an ATYPE doesn't support the requested feature, ie HW_PSWITCH.<br><br>TrioBASIC file operations (OPEN, CLOSE, PRINT, GET, KEY) now work on TEMP files.<br><br>TEXT_FILE_LOADER changes; a connection on port 3241 auto-starts the transparent protocol. A connection on port 10001 auto-starts the standard protocol. There are no parameters for this command any more as all the configuration data comes down the standard protocol.<br><br>Frame 1 & 15 changes, FRAME 1 increases the possible angle range.<br><br>ECAT : added support for speed control mode for the Yaskawa Sigma5 drive. | 23rd March 2012 |
| 2.0179 | Corrected parsing problem with a command such as<br>>> SELECT "prog" 0<br>This would generate an error expecting a comma after "prog" and was introduced in 2.0177.<br><br>ECAT : Corrected display value when a config error is generated. | Added new AXISSTATUS bits 19 (HW Pswitch FIFO empty) and 20 (HW Pswitch FIFO full). | 27th March 2012 |

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| 2.0180 | MC403/5: Now dumps transmit chars on Ethernet if socket is closed. | | 30th March 2012 |
| 2.0181<br><br>PRP App 0.1.10 (MC464) | MC464: New PRP version to support optionally opening listening socket on Port 3241 | Added support for 32-bit Integers on Modbus serial, using setcom mode = 9.<br><br>MC403/5: Ethernet auto-negotiation now only run if cable inserted (to reduce startup delay.) | 5th April 2012 |
| 2.0183 | Fix to serial Modbus function 16 start address (was fixed to value 0.) | MC405 : Added ability to control the 3 character LCD segments using DISPLAY.16=1 and LCDSTR.<br><br>Added string support functions STR,VAL,LEN,LEFT,RIGHT and MID.<br><br>Added STRTOD command (32-bit numbers only). | 13th April 2012 |
| 2.0184 | MC403 : Modified IP reset mechanism so that it will only reset the IP when the switch is depressed during startup and will allow overriding of any IP settings changed within MC_CONFIG.<br><br>Added check on the link distance of a MOVELINK to ensure it is at least 1 edge in length. | Added string support functions LCASE, UCASE and INSTR.<br><br>MC405 : During startup or re-connection of Ethernet cable, the IP data display has priority over the user control of the LCD display.<br><br>STRTOD now supports 64-bit numbers. | 20th April 2012 |
| 2.0185 | Corrected display of BASIC version number during startup text.<br><br>Fixed TEXT_FILE_LOADER(1,..) and TEXT_FILE_LOADER(2,..) functions. | All available digital inputs can now be used with motion activity ie FWD_JOG, DATUM_IN etc.<br><br>Improved protection of VR/TABLE data during power-down.<br><br>ECAT : added initial support for Schneider Electric LX32M drive. | 25th April 2012 |
| 2.0186 | MC403/5 : Corrected default OUTLIMIT to for 12-bit DACs for various ATYPEs.<br><br>Robotics : Corrected transformation processing of a non-servo ATYPE (eg 43) when determining whether or not to apply forward kinematics. | MC403/5: EtherNet/IP support enabled.<br><br>ECAT: added support for Schneider Electric, and Mitsubishi drives, and Baumer Thalheim Encoders.<br><br>LCDSTR keyword now available for all controllers.<br><br>Implemented support for ARRAY via DIM keyword.<br><br>DIR command now displays run | 4th May 2012 |

| | | type as "Power Up" for MC_CONFIG and "None" for non-executing files.<br><br>Added NODE_IO predefined 2D array for potential EtherCAT IO configuration within MC_CONFIG.<br><br>LOOKUP updated to support HMI canned operations.<br><br>Updated MC_CONFIG parsing to accept the ON keyword as a constant.<br><br>String parsing now supports embedded quotes using an escape quote itself eg """Hello world""" will display "Hello world".<br><br>ECAT: initial support added for node data mapping, Baumer 2/4/10 byte encoders, Hilscher IO devices, Nanotec N10 drive, Grossenbacher IO and ACS Motion Control IO.<br><br>MC403/5: FPGA images upgraded to rev C. | |
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| 2.0187 + MC405 FPGA image versions $10C $20C | Fixed bug when reading string variables causing its internal datatype to change to a numerical datatype.<br><br>Corrected another string bug causing internal memory allocation problems when using string functions such as MID leading to random side effects with variables.<br><br>Corrected MOVELINK problems causing the master axis to not move the full vector length when expected and to also remove the MTYPE when the vector length remaining reaches 0.<br><br>MC403/5 Hostlink : Corrected problem when transferring negative numbers. | ARRAY support now allows multi-dimensional writes/reads.<br><br>ECAT - initial support for ABB ACSM1, Baumueller BMAxx 4400, Dunkermotoren BG65EC, JAT EcoCompact, and Lenze i700 drives; Baumer IVO, and TR Electronic encoders. | 11th May 2012 |
| 2.0188 + MC403 FPGA image versions $30C $10C $20C | Fixed problem when using OPEN to create a new file on a LOCKed controller, the request would be rejected.<br><br>Fixed problem when using OPEN where the file could be deleted while the file is still being accessed by the program. | ARRAYS : added support for adding or subtracting compatible arrays together.<br><br>ARRAYS : added support for adding, subtracting or multiplying an array by a single scalar value.<br><br>ARRAYS : added support for multiplying compatible arrays | 21st May 2012 |

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| | Improved HW_PSWITCH when clearing the FIFO, it was possible for a BASIC program to clear the FIFO and load a new set of positions but for the FIFO to be immediately cleared again before processing the new positions.<br><br>Fixed bug when protecting a directory with LOCK that could cause directory to be lost if no program is currently selected.<br><br>Fixed problem when stopping a program that used OPEN to create a file, the file would not be committed to flash if a reset/EX occurred immediately after.<br><br>Fixed bug with MPv3 watch window when the first item in the window is a string variable, the other items would not be displayed as expected.<br><br>Corrected LIST so that Temp and FIFO files can be listed correctly. | together as matrices and for producing an inverse matrix with ^-1 notation.<br><br>ARRAYS : Updated PRINT so that arrays are displayed using the last dimension as the number of items to display per line.<br><br>MC403/5 : to avoid confusion with any errors the AXISSTATUS bit 19 'FIFO empty' has been inverted to mean 'FIFO not empty' so that by default this bit will be 0.<br><br>Improved OPEN command so that any string function or string variable can be used as the filename.<br><br>MC403/5 : Updated FPGA_PROGRAM to allow option value -1 to be used to list the available FPGA images. | |
| 2.0189 | MC403/5 : Using the CAN command to create message buffers would crash the controller unless a CAN(-1,2,baud) command was used first.<br><br>Fixed INCLUDE bug where a local variable also defined inside an INCLUDE file would cause a variable offset error if used before the INCLUDE command.<br><br>Corrected LOOKUP bug when used with no program or process modifier, it would try to access process -1 by mistake rather than default to the executing process.<br><br>MC403/5 - EtherNet/IP – added ability to change IO data configuration whilst CIP connection is open. | Modified INCLUDE file processing to allow IF, THEN, ELSE, ELSEIF, ENDIF, VR, TABLE and DIM commands.<br><br>EtherCAT – startup message will now include error information if an SDO access fails during startup. The Protocol will attempt to continue the startup into operational mode.<br><br>EtherCAT – The ethercat read ESC command (func $31) now writes the register content to the first vr address instead of the number of bytes. (To be consistent with the read SDO and read SII commands.)<br><br>EtherCAT – new CT drive_profile added to support SM universal encoder input module (a second reference encoder) in drive slot 1. | 22nd May 2012 |
| 2.0190 | MC64: EtherNet/IP - Reset application state whenever enter data section of packet. | | 25th May 2012 |
| 2.0191 + PRP App 0.1.13 (MC464) | ARM : Added RTC timeout fix to allow for a misbehaving device.<br><br>MC464 : Implemented fix for module startup issue causing | IEC : Added new file to support IEC libraries.<br><br>ARM : FPGA_VERSION modified to display FPGA_PROGRAM | 1st June 2012 |

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| | controller restarts.<br><br>MC464 : Implemented fix for LCD display refresh.<br><br>MC464 Panasonic A5N : Implemented fix for error 27.4 caused by dropping WDOG to 0 while motion is active.<br><br>Implemented fix for DEFPOS to allow for a program halting while DEFPOS is still waiting to complete.<br><br>Corrected parsing issue with something like MOVE(.5). | variant in upper byte.<br><br>Added new ATYPE 78 based on stepper axis 43 but with VFF_GAIN applied for DAC output.<br><br>AXIS_Z keyword added for controlling Z output of compatible axis types. | |
| 2.0192 | Corrected problem with NTYPE when used with SCOPE.<br><br>MOVELINK : Corrected problem when a MOVELINK instantly follows another MOVELINK, the 2nd MOVELINK would complete immediately.<br><br>Corrected problem with multiple REMOTE processes being created, this would happen if REMOTE_PROC was set to 0 causing the process to be created twice – the HMI and Text File Loader processes could also have the same problem and has been addressed.<br><br>ECAT : applied fix to prevent encoder misbehaviour when changing from an ECAT ATYPE to another ECAT ATYPE.<br><br>Corrected STEP_RATIO for stepper output axes when used with negative ratios.<br><br>MC_CONFIG will no longer be executed if the directory is corrupt, previously it would execute regardless of whether or not corruption had occurred and could lead to unwanted side effects. | Added COMPILE_MODE (MC_CONFIG param) to control whether or not all variables must be declared via DIM before use.<br><br>Keyword ARRAY renamed to FLOAT although ARRAY can still be used as an alternative name.<br><br>HMI : Added support for transferring HMIClient firmware via the HMI_SERVER command. | 15th June 2012 |
| 2.0193 | Digital IO parameters such as DATUM_IN, etc. could not be used within SCOPE as expected.<br><br>FPGA_PROGRAM modified to be runnable from the command line only and for a warning message to be displayed about turning the power off. | Implemented POSI_SEQ_DELAY for applying a delay (in servo periods) to the outgoing demand position for an axis.<br><br>DRIVE_INDEX can now be used in MC_CONFIG.<br><br>Ethernet/IP : Added support for 32 bit floating point. Fixed ability | 27th June 2012 |

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| | HMI : HMI_SERVER now handles all file transfers correctly.<br><br>SDcard : Corrected FILE "SAVE_PROJECT" MPV3 project creation. | to access top VR index. Updated SetParameter so the ethernet(14) command now keeps the same IO message packet size for open connections. | |
| 2.0194<br>+<br>MC403 FPGA image versions<br>$10D<br>$20D<br>$30D<br>+<br>MC405 FPGA image versions<br>$10D<br>$20D | ARM : Implemented fix for potential loss of transmitted characters over Ethernet.<br><br>Corrected rounding problem for CAMBOX related negative moves.<br><br>INCLUDE : Corrected problems caused by an include file that references a variable more than once.<br><br>SDcard : Corrected problems when loading individual programs. | Added support for new data types INTEGER and BOOLEAN with array support for these included. In addition predefined keywords have been defined to return either floating-point or integer data.<br><br>Modified MPE so that it only processes the request if it is new.<br><br>Updated CLEAR_PARAMS so that it is possible to clear user-defined flash parameters. | 6th July 2012 |
| 2.0195 | Corrected problem when multiple programs cause a large number of temporary strings to be created, corruption could occur.<br>MC_FILE updated for latest MPv3 support.<br><br>Low level exception handling did not work correctly, this has been corrected on all platforms. | HALT/STOP modified to force halt any processes that refuse to stop within 2 seconds.<br><br>SDcard : Added check to ensure only Fat32 is used.<br><br>Changed startup to ensure programs are always compiled even if an SDcard is inserted.<br><br>ECAT : Added support for monitoring, logging, and raising (via system_error) emergency messages. User can check status and error codes raised using ethercat() command.<br><br>ECAT : Additional startup error messages. Also, if the ethernet cable is not in place, or the first slave powered down the startup will fail immediately and display error message. Introduced new debug startup, enabled using ethercat($d8) command.<br><br>ECAT : New mode for the reset fault (ETHERCAT ($64)) command, enabling it to run until the fault flag is cleared in the status register or a timeout (1 .. 10,000 msec).<br>ETHERCAT($64, slave_axis [,mode [,timeout]]) | 16th July 2012 |
| 2.0196 | Corrected REGIST(21) to support windowing. | Renamed AXIS_Z keyword to AXIS_Z_OUTPUT and added AXIS_A_OUTPUT and | 31st July 2012 |

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| | Corrected PROCESS output for Motion %.<br><br>Corrected REGIST(0) behaviour to allow Panasonic axes to cancel registration and return to normal parameter read/write mode.<br><br>Corrected potential problems caused by changing SERVO_PERIOD via MC_CONFIG, the controller could misbehave until another restart.<br><br>Fix for ModbusTCP potential timing issue.<br><br>ECAT - Fix to prevent master from raising unit lost error when Omron GRT1-EC coupler has only input devices. | AXIS_B_OUTPUT.<br><br>Added SERVO_OFFSET to allow microsecond offset adjustment of servo execution in relation to FPGA synchronisation.<br><br>Added POSI_SEQ_MODE.<br><br>Added SYSTEM_LOAD and SYSTEM_LOAD_MAX for monitoring (and scoping) of system loading in % - SYSTEM_LOAD_MAX can be reset.<br><br>Added support for 64 SW timers. Added SET_ENCRYPTION_KEY, IS_ENCRYPTION_KEY and VALIDATE_ENCRYPTION_KEY.<br><br>Added NODE_AXIS predefined 2D array for potential EtherCAT axes configuration within MC_CONFIG.<br><br>ECAT - 2nd profile for Sanyo Denki RS2 drive maps actual torque (0x6077:0x00) to DRIVE_TORQUE via PDO. | |
| 2.0197<br>+<br>MC403<br>FPGA<br>image<br>versions<br>$10E<br>$20E<br>$30E<br>+<br>MC405<br>FPGA<br>image<br>versions<br>$10E<br>$20E | Implemented fix for REPDIST/Link position triggering, if for example the link position is set at the beginning or end of the REPDIST range then the trigger may be missed due to the detection logic used.<br><br>ECAT - bugfix to error log emergency message data byte display.<br><br>MC403/5 : FPGA_PROGRAM needed access to the flash to read the FPGA image but did not use interlocking leading to potential programming failure.<br><br>IEC : Corrected TC_CONNECT behaviour, it should allow for the ratio parameter to be updated on a rising edge enable, previously the active connect had to be cancelled first before a new ratio parameter could be accepted.<br><br>Fixed potential corruption of a program that has just been modified before power-cycling (very infrequent).<br><br>GOSUB : possible RETURN from a | ECAT - added Beckhoff EL1088 io device.<br><br>Virtual axes can now support DAC output control as expected. | 23rd August 2012 |

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| | GOSUB to an invalid address if the programs were moved around in memory between the GOSUB and RETURN commands.<br><br>AOUT with a CAN output that does not exist could cause the controller to die (MC403/5) or just CAN communications to stop (MC464).<br><br>SDcard : MPv3 project files now parsed successfully from SDcard, also MPv3 project files now have the higher priority if an MP2 project file also exists in the directory.<br><br>Corrected problem when the same INCLUDE variable is used within 2 different INCLUDE files and both files are included by a BASIC program.<br><br>Modbus TCP Slave : Corrected range checking for fn 3, it always range checked for VRs even when TABLE was selected as the data source.<br><br>MC_CONFIG : Rather than generating a tokenization error (149) when an invalid token is used in MC_CONFIG - which causes issues for MPv3 - the line will instead be commented out with an included error message to allow the user to edit the problem line.<br><br>Changes made to HALT to allow for HALT being executed from within a BASIC program, it should stop (or step) in the same way as using the STOP command.<br><br>Added fix to program starting that fixes a small possibility that the process was not initialised fully with execution side effects. | | |
| 2.0198 | MC403/5 : Improved FPGA_PROGRAM to allow for problematic SDcards that need to be initialized before the FPGA can be programmed successfully.<br><br>MC403/5 : REG_INPUTS was being initialized at startup but the FPGA was not. So unless another action caused the FPGA to be updated (eg, changing ATYPE) the registration would not function on the desired input. | MC403/5 : Added new FLASH_DATA keyword (MC_CONFIG only) to control whether the VR content or first 4096 TABLE entries are automatically backed-up into flash (0=VR, default; 1=TABLE).<br><br>FRAME 5 support added.<br><br>SCOPE_CYCLE_COUNT added for MPv3 purposes. | 6th September 2012 |

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| | The fix added in 2.0197 for REPDIST/Link position triggering inadvertently caused MSPEED to misbehave during the cycle where REPDIST is applied.<br><br>The fix added in 2.0197 for starting BASIC programs caused a problem when starting IEC programs. | READ_OP(n) can now be SCOPEd as per IN(n).<br><br>When writing bit values eg VR(10).2=1, any non-zero value will cause the bit to be set rather than limiting the accepted range to 0 or 1. This was rectify the problem of Boolean expressions that return -1 or 0 to be used for setting bits.<br><br>MSPHERICAL updated to support 3 additional axes rather than just 1. | |
| 2.0199<br>+<br>ARM Boot<br>0.07 | MC405 : Display behaviour updated to be more consistent with MC464 display when errors are present.<br><br>Implemented SRAMP fix when used with Lookahead Buffer move types, the firmware would incorrectly produce cycles of decreased speed and increased speed when a constant speed demand was expected.<br><br>Implemented MOVELINK/CAMBOX fix when starting on a link position.<br><br>SLM/PLM : Implemented timeouts to prevent requests potentially locking the process.<br><br>SDcard : Fix for FPGA_PROGRAM being executed from within TRIOINIT.BAS.<br><br>SDcard : Corrected MPv3 project loading and saving.<br><br>ARM controllers : Corrected IEEE_OUT behaviour. | ARM Boot unified across ARM controllers to v0.07.<br><br>EU408 : Initial Alpha version.<br><br>Anybus : Initial ProfiNet module support added.<br><br>SDcard : SDHC card support added.<br><br>VR/TABLE checking adding during startup for invalid Floating-point numbers – these are reset to 0.0 and a message displayed with system warning raised.<br><br>Frame 16 support added - XYZ Robot with 2 Axis Wrist.<br><br>Added new 'HMI design' controller file type.<br><br>Hostlink : Added new HostLink Slave SC.<br><br>ECAT : Beckhoff class specialisation now supports both EL3356 and EP2308.<br><br>ECAT : Support added for new COMET, Panasonic, Beckhoff and MKS devices. | 5th October 2012 |
| 2.0200<br>+<br>PRP App<br>0.1.15<br>(MC464) | CANIO : Fixed potential communication problems with new modules.<br><br>EU408 : Added LED control via DISPLAY parameter.<br><br>EU408 : Corrected default axis assignments at startup. | Added FRAME_ANGLE_SCALE axis keyword for use with FRAME 16.<br><br>SLM/PLM virtual axes added for loading simulation.<br><br>Added MC_CONFIG parameters SLOTn_TIME for modifying the slicing of free time between servo cycles.<br><br>Support added for FRAME 17 & | 1st November 2012 |

| | | 18.<br><br>FPGA image encryption added to be controlled by OEM encryption code.<br><br>Added support for EtherNet/IP unicast producer, and longer EtherNet/IP consumer watchdog timeout (updated PRP image).<br><br>Added CHANNEL_READ. | |
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| 2.0201 | Corrected HMI support for scopeable parameters. | Modified FPGA encryption to be more robust to prevent possible erasure of FPGA followed by invalid image programming. | 5th November 2012 |
| 2.0202 | Anybus : Fixed automatic Endian detection for data transfers.<br><br>Corrected Integer parameter processing (only affected EdProg).<br><br>MC403/MC405/EU408 : Fixed the DAC output behaviour (forced to 0V) when a high virtual axis is accessed.<br><br>Corrected MSPHERICAL behaviour when used with rotational axes that may be set to 0.0.<br><br>SDcard : SDHC support now fully implemented.<br><br>MC403/MC405/EU408 (CANIO): Corrected problem when modifying analogue outputs across more than 1 module.<br><br>MC464 : Corrected potential Ethernet communication lockup after approximately 25 days when system contains a CANIO network. | MC403/MC405/EU408 : Added support for DeviceNet.<br><br>Anybus : ProfiNet module support completed for 1 & 2 port versions.<br><br>TEXT/TEMP files now handled identically from TrioBASIC file operations and project management operations.<br><br>SDcard : Implemented contiguous file functions "CONTIGUOUS_MARK", "CONTIGUOUS_INIT", "CONTIGUOUS_READ", "CONTIGUOUS_WRITE" and "CONTIGUOUS_END". | 23rd November 2012 |
| 2.0203 | Anybus : Large configurations were not captured correctly due to low-level hand-shaking which has now been improved.<br><br>Fixed problem when INTEGER type variables are used to store the data from an INPUT or GET request.<br><br>There was potential for side effects when COMPILE_ALL was used with programs already running, this has been modified to only compile programs that require compiling. The same problem could be seen at | Anybus : The ability for the user to change endian has been added as an optional last parameter for functions 0 (define map) and 4 (auto-configuration).<br><br>New error message added when COMPILE_MODE=1 is used and a programs INCLUDEs a file with a a non-declared variable, the error now makes it clear the problem is with the INCLUDE file. | 30th November 2012 |

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| | startup if TRIOINIT.BAS is used to run (or AUTORUN) programs because the startup sequence re-compiles all programs after TRIOINIT.BAS has been processed.<br><br>If a file was INCLUDEd and it only contained DIM statements then the main program would generate an error, this has been corrected. | | |
| 2.0204 | MC_CONFIG : Fixed problem when configuring ATYPE leading to the axis not being correctly initialized. Also fixed issue with setting ATYPE to virtual.<br><br>Fix for INCLUDE files in 2.0203 broke OCX, HMI & 'Text File Loader' functionality.<br><br>Corrected compiling problem when using a string variable within an OPEN command.<br><br>MC_CONFIG : HMI_PROC did not control the HMI process as expected. | HMI : Improvements made for clean restarting of a session.<br><br>MC_FILE : Upgraded including access to 'P' (product) number of controller.<br><br>SDcard : Temp files can now be saved and loaded with extension ".tmp".<br><br>ECAT : REGIST(20/21) support for Yaskawa SGDV, Lti, and Kollmorgen AKD drives added.<br><br>ECAT : New device support added : AKD profile 4 with DIO and AIO support, Wago stepper driver, Panasonic MINAS A5 drive, Phase Motion Control AxM II drive in profiled velocity mode, Baldor Microflex e150, Maxonmotor EPOS3, and Estun ProNet drive<br><br>ECAT : Initial support added for Lenze i700 dual axis drive, Copley XE2 dual axis, and Delta Electronic Asda A2 drive.<br><br>ECAT : Added NODE_INDEX system parameter used to configure base address of VR mapped data, and initial mapping of integer and float PDO objects into the VR memory. New cyclic data PDO implementation. | 6th December 2012 |
| 2.0205 + PRP App 0.1.16 (MC464) | Fixed MOVELINK problems of non-triggering on link position.<br><br>Corrected PMOVE problems introduced with 2.0084 (when PMOVE was made SCOPEable) - another running process could cause false PMOVE readings. | Added new RND functions to produce random numbers, a single parameter specifies the upper range (exclusive) of values required eg RND(256) will produce values in the range 0..255.<br><br>Added new ASC function to return the ASCII code of a single character, if the string specified is longer than 1 character then only the first character is used eg ASC("ABCDE") will return 65 as | 8th January 2013 |

| | | this is the code for 'A'.

Changes made to improve consistency of motion and other servo activity processing time.

Implemented new parameter parsing so that all commands can now have flexible access to parameters passed via string or integer variables for example. This also means that maximum 64-bit integers can be passed to functions such as HEX.

MC464 PRP firmware : Added a 'protocol control' mechanism, to enable the main processor to enable/disable the EtherNet/IP protocol on the co-processsor.

ECAT : added initial support for LS Mecapion L7N drive. | |
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| 2.0206 | 2.0205 inadvertently changed NEW "TABLE" to be case sensitive, this has been corrected. | | 8th January 2013 |
| 2.0207 + EU408 FPGA image version $103 | Error checking added for MOVESEQ/MOVEABSSEQ

DATE$, TIME$ and DAY$ corrected.

SDcard : Support for loading/saving projects with HMI design files corrected. | IO mapping has been added. The command IOMAP will display the current Digital Input/Output map.

The ability to map IO from RTEX drives has been added.

New MC_CONFIG parameters are available for project configuration of IO mappings: CANIO_BASE, MODULEIO_BASE and DRIVEIO_BASE.

EtherCAT IO can be mapped using the 2D array NODEIO.

If an overlap of IO mappings is found then a SYSTEM_ERROR bit 10 will be raised and the IO map reset to all virtual IO.

DEL command can now be used within a BASIC program.

SDcard : Removed contiguous file functions and replaced with ZIP_READ. | 23rd January 2013 |
| 2.0208 + PRP App 0.1.17 (MC464) | MOVELINK : when last parameter (7th) was >2^31-1 this caused a Floating-point evaluation error in the next command – this problem was first introduced in v2.0179. | PRP : TCP timeout control added with new MC_CONFIG keyword IP_TCP_TIMEOUT. | 24th January 2013 |

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| | Corrected compilation problem when using GOSUB/GOTO to jump over a line containing the DRIVE_WRITE keyword.<br><br>MODULE_IO_MODE name corrected. In v2.0207 it was changed to MODULEIO_MODE which is not correct. | | |
| 2.0209 | IEC : Corrected problems accessing VR/TABLE/IO points from multiple tasks. The last task to run would 'win' and prevent the other tasks from updating their outputs.<br><br>ECAT : Corrected ESTUN drive velocity control mode. | Added new feature to allow modified scheduling @2ms to improve CAN (eg DeviceNet) throughput. Feature is enabled by setting bit 1 of SCHEDULE_TYPE. | 31st January 2013 |
| 2.0210<br>+<br>Boot v0.19<br>(MC464) | Boot MC464 : Boot upgraded to v0.19 to support 128MB expanded MC464 and to resolve potential, but rare, controller startup issues.<br><br>SLM/PLM : v2.0205 introduced a timing issue, default SERVO_OFFSET when an SLM module is connected has now been changed to 260us to compensate, this can still be overridden within MC_CONFIG.<br><br>IO : Outputs 8..15 were not refreshed when OP command with single parameter was used. | IO Mapping : First 8 outputs are now reserved to prevent inadvertent allocation to this block. Module Inputs & Outputs now positioned together when there are both available.<br><br>TABLEVALUES updated to remove NULL characters which caused problems for ActiveX communications and were also displayed as 'NULL' by MPv3. | 7th February 2013 |
| 2.0211<br>+<br>ARM Boot 0.08 | IEC : Problems with running large IEC programs (> 32KB) corrected. Error checking also added to trap memory problems and IO/VR/TABLE index range problems.<br><br>ECAT : problems caused by IO mapping that prevent EtherCAT from starting successfully corrected.<br><br>Corrected error messages when not enough parameters are supplied.<br><br>HMI : Put locking around the async message response handling to avoid race conditions with the HMIClient(s) when calling multiple async responses.<br><br>SDcard : Corrected SD card loading of text & MC_CONFIG files.<br><br>SDcard : Corrected problem when | ARM Boot : Upgraded to v0.08, non-functional changes.<br><br>MC403-Z : Initial release version.<br><br>New ATYPE 79 added – Step & Direction feedback only.<br><br>FRAME 115 added - SCARA Robot with Wrist, same as FRAME 15 but uses right hand coordinate system.<br><br>FRAME_ANGLE_SCALE primary name changed to FRAME_SCALE, FRAME_ANGLE_SCALE is still accepted as an alternative.<br><br>Keywords DRIVE_CLEAR, DRIVE_READ, DRIVE_WRITE, DRIVE_INTERFACE, DRIVEIO_BASE, MODULE_IO_MODE, MODULEIO_BASE & UNIT_SW_VERSION made available for all controllers to | 25th February 2013 |

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| | FILE "SAVE_PROGRAM" is used with an extension parameter, the file was written with no extension.<br><br>ECAT : Corrected LinMot E1250 PDO writes. | prevent compilation issues when loaded on other controllers.<br><br>AUTO_ETHERCAT behaviour modified so it can only be written to within MC_CONFIG.<br><br>ECAT : New stober profile added, number 3 (speed mode). | |
| 2.0212 | MOD function was broken by 2.0211 | | 25th February 2013 |
| 2.0213 + EU408 FPGA image version $104 | | EU408 : FPGA image updated.<br><br>Process command updated to provide extended information to MPv3. | 27th February 2013 |
| 2.0214 | SDcard : v2.0211 broke support when using the syntax 'IF FILE "DETECT" = TRUE'.<br><br>ECAT : IO mapping was not correct when a module had more than 8 IO points to be mapped.<br><br>CANIO : IO mapping not correct when a CAN module was running a version less than 1.0.0<br><br>MOVE_COUNT corrected to increment for commands such as FLEXLINK and when automatic re-loading is used for CAMBOX etc.<br><br>FWD_JOG/REV_JOG now stops on active limits.<br><br>MC403/MC405: MSPHERICAL corrected to detect invalid inputs that could cause a NaN to be generated.<br><br>MPv3 : Report correctly the BOOLEAN and ARRAY variables.<br><br>Corrected writing to individual bits of an item with a floating-point value as it could cause floating-point exceptions eg PLC_CONFIG.0 = 1.5. | IEC : Added PLC_RUN, PLC_ERROR and PLC_OVERFLOW for interrogating task status.<br><br>IEC : Added PLC_CONFIG (MC_CONFIG compatible) for IEC configuration. Bit 0 controls whether or not an IEC task should reset all of its bound digital outputs when it stops executing - TRUE/1=reset, FALSE/0(default)=leave as they are.<br><br>IEC : Added support for new IO profile mode for using Digital Outputs as an input - similar to the BASIC READ_OP command. Note : requires an MPv3 update to be accessible.<br><br>IEC : Updated Function Block TC_CANCEL to use a USINT as the mode parameter rather than BOOL. Note : requires an MPv3 update to be accessible.<br><br>IEC : Updated Function Blocks TC_IN, TC_OP and TC_READOP to use type BOOL for IO status rather than USINT – this is more useful when used within ladder diagrams for example. Note : requires an MPv3 update to be accessible.<br><br>MPv3 : Directory now reported when opening/closing an SD card file.<br><br>ECAT : increased 2msec startup timeout to 80 seconds, to allow | 7th March 2013 |

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| | | for 30000 telegrams x 2 msec attempting to tune DC PLL.<br><br>ECAT : Initial IAI drive support, Bonfiglioli support running, fix to ensure change of DRIVE_MODE updates SM's ok.<br><br>ECAT : Initial VR PDO mapping support added. | |
| 2.0215<br>+<br>ARM Boot 0.09 | ARM boot updated: Boot failed to store system code to flash after a download over serial.<br><br>Anybus: Profibus module support had been broken with v2.0203.<br><br>Corrected LINKAX behaviour - it should return -1 unless an active linked command (MOVELINK, CONNECT etc.) is active in which case it returns the linked axis number.<br><br>HMI: Fixed throughput issue on the MC403/5 HMI_SERVER.<br><br>P825/P828: Corrected default ATYPE assignments, 2.0211 incorrectly affected the way these were assigned.<br><br>MOVELINK/CAMBOX: Corrected start on position which required the link axis to move 1 extra unit of movement to complete.<br><br>INCLUDE files: improved error messages generated for MPv3.<br><br>FLEXLINK: fix implemented for unexpected 'spike' in profile.<br><br>ATYPE=76 (Encoder) did not support SYNC requests when used as a conveyor axis.<br><br>Fixes applied to FRAME 115.<br><br>MPv3: Corrected IOMAP line endings so that it will be handled correctly on channel 8.<br><br>Corrected potential problem when writing to RS/FS_LIMIT when UNITS is high.<br><br>MC403/5 EthernetIP: cyclic data signed integer fix.<br><br>Corrected forward transformation | Added new ATYPE 84 for Quadrature Output with VFF support.<br><br>Added support for simple axis registration using any DIN via REGIST(20,…).<br><br>MSPHERICAL: New option bits 8..10 for generating a ramped velocity profile on the optional auxiliary axes.<br><br>MHELICAL: New option bit 1 for generating a ramped profile on linear axis rather than linear interpolation.<br><br>HMI: Removed the port closing when the HMI closes a connection because we lose connectivity.<br><br>ECAT: added support for Panasonic A5 drive (including registration profiles), Beckhoff EP1258 IO device, Sanyo Denki PB drive (but only first axis), bugfix to CT drive profile 2 ( includes encoder input), and LS Mecapion L7N registration.<br><br>EU408: Increased number of user tasks from 10 to 22. | 12th April 2013 |

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| | for Panasonic and other digital drive axes. | | |
| 2.0216 + ARM Boot 0.10 | ARM boot updated: PSU config updated during boot to increase core voltage from 1.35V to 1.45V. This was due to a small number of controllers exhibiting some side effects (eg failing to download system code) particularly with heavy Ethernet activity when the lower voltage was active.<br><br>IEC : Corrected problem when a shutdown exception handler attempts to write to IO/VR/TABLE points, these would be ignored. This problem was introduced with a fix made in 2.0209.<br><br>ASIS_FS_LIMIT and AXIS_RS_LIMIT checks now corrected so that they can be active even when the axis has no move loaded, this is to allow for movement caused by a FRAME. | New C_SPLINE command added.<br><br>CAN function 23 updated to support Digital IO, Analogue IO and VR data sources.<br><br>CAN function 24 added to configure automatic SYNC telegrams. | 26th April 2013 |
| 2.0217 | HMI : Corrected behaviour when design is deleted.<br><br>Implemented fix for DIM statements containing line extender character '_'.<br><br>Fixed behavioral problems caused when a program opens another program that needs to be compiled.<br><br>INCLUDE are now locked from editing when a program that uses them is currently running.<br><br>SDcard : FILE command now correctly works with string variables.<br><br>Frame 115 fixes, FRAME_TRANS now works and 4-axis mode also works.<br><br>DISABLE_GROUP(-1) had been broken.  Now fixed.<br><br>FRAME : Defaults for User Frame 0 were wrong.  Now fixed.<br><br>ECAT : Prevent error which caused ETHERCAT(0,slot) startup command to periodically fail with a 'error network network or cable detected.' when this was not the | ARM : single channel UDP support added. (not MC464)<br><br>Implemented SEEK token for SD card files, standard communication channels and also RAM files.<br><br>HMI : Enabled BOOLEAN and INTEGER variables.<br><br>NEW "TABLE" now valid inside a BASIC program.<br><br>Removed BASIC error when CLOSE is called on a channel that is already closed.<br><br>ECAT : Added support for NODE_PROFILE and NODE_AXIS_COUNT.<br><br>ECAT : Added support for multi-axis slaves and VR mapped PDO objects. IAI drive support with multiple VR-mapped profiles (since the drive is not DS402 compliant). Additional AKD drive profiles including the second encoder input. Added support for the multi-axis Linmot B8050 drive (runs at 2msec), and changed the timing of the start/stop command stream commands in the PDO interface (to prevent raising a | 17th May 2013 |

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| | case. | 'user motion error' when dropping the WDOG, and to enable user controlled homing using the DRIVE_CW_MODE command.) | |
| 2.0218 | CAMBOX : re-loading of CAMBOX was broken in 2.0217, also the start on master axis position did not work correctly if the master and slave had different REP_DIST values.<br><br>FRAME_GROUP(<group id>,-1) did not fully erase the FRAME from memory.<br><br>ENCODER_FILTER did not function correctly.<br><br>RTC fix to allow repeated access from multiple processes.<br><br>Implemented change so that any corrupted TABLE locations recovered from flash during startup are reset to 0 in flash memory as well as in RAM for the current cycle otherwise the system error '4' will always be displayed.<br><br>TRIOINIT : Implemented fix for when the SPI port may have been reconfigured by an executing BASIC command (eg FPGA_PROGRAM) thus affecting the SDcard SPI interface and the continued execution of TRIOINIT.BAS.<br><br>Corrected Din registration via REGIST(20,…) when input selected is > 64. | ECAT : DRIVE_FE now pushed through to FE when position mode is used.<br><br>IEC : Access to the following parameters have been updated to correctly use LREAL rather than LINT:<br>  REP_DIST<br>  AXIS_DPOS<br>  TRANS_DPOS<br>  AXIS_FS_LIMIT<br>  AXIS_RS_LIMIT<br>  FS_LIMIT<br>  RS_LIMIT.<br><br>MC403/4 : ATYPE=30 can be used on any axis.<br><br>REGIST : Added support for automatic repeat registration.<br><br>RTEX Drive IO extended to include all drive inputs.<br><br>Added extra support for BOOLEAN variables so they can be used in operations such as '+' and '-' .<br><br>MPv3 support : extended PROCESS command output.<br><br>ECAT : Enabled support for 2 modules.<br><br>FRAME : Added Frame 114 for up to 5 axes high resolution Delta robot. Modified FRAME 116 so that it has the variable axis count.<br><br>MC405 : For consistency with MC464 system errors are now displayed as 'Enn' rather than 'Snn'.<br><br>HMI : HMI_SERVER(1,4) now returns all connections. | 1st July 2013 |
| 2.0219 + ARM Boot 0.12 | The symbol table is reset for a program whenever it becomes uncompiled eg modified, deleted.<br><br>FILLET : updated to trap 0 length inputs. | ARM Boot : Upgraded to support MC4N LCD display.<br><br>Modbus RTU : Debug facility (via COORDINATOR_DATA fn 22) has been added so that all transmit and receive data can be recorded | 19th July 2013 |

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| | CORNER_MODE only produced the correct VP_SPEED profile (3D) when there were exactly 3 axes in the move request. Now supports more than 3 axes.<br><br>Corrected string handling when watching string variables during debugging. This problem also affected HMI string handling.<br><br>TABLE_POINTER is now read only.<br><br>Corrected REGIST(20,input#,4) when used with a MOVELINK / CAMBOX option 1.<br><br>Modbus : Fixed problems when used in a multi-drop system.<br><br>HMI : Corrected issues where the symbol table could become locked. | to TABLE locations.<br><br>ECAT : additional product ID for ESTUN drive, enabled use of TrioBASIC REGIST() command with the Panasonic and LS Mecapion drives. | |
| 2.0220<br>+<br>ARM Boot<br>0.13 | Fix for frame 116.<br><br>RTEX : SLOT_NUMBER and DRIVE_TYPE were not reset following a DRIVE_INTERFACE(slot,0) request.<br><br>RTEX : Improvements made in re-initialising RTEX network via DRIVE_INTERFACE.<br><br>SSI : Minimum SERVO_PERIOD now changed to 250us.<br><br>MC405 : Correction to text messages on LCD display when in IP address mode.<br><br>CHANNEL_READ returning NULL characters corrected.<br><br>Implemented fix for potential Hostlink race condition problem with HLM_READ.<br><br>HMI : Fixed potential memory corruption when a received message doesn't contain any fields.<br><br>HMI : Corrected HMI client list command HMI_SERVER(1,4). Now uses end of line as delimiter between client data.<br><br>SDcard : Corrected FILE "LOAD_PROGRAM" behaviour when in MPv3 connected mode.<br><br>SPHERE_CENTRE corrected. | ARM Boot : Upgraded to configure EIM CS0 for flash memory and to fix timeout behaviour of I2C accesses.<br><br>Added new ATYPE 85 for monitoring 2 axes and producing the difference in MPOS between them.<br><br>HMI : HMI_SERVER now receives and returns the full HMI_CLIENT executable version number (major.minor.build.revision).<br><br>FILLET command updated for new mode  (2 curves from 2 points+direction).<br><br>ECAT: Added initial support for Lenze 9400 drive, Beckhoff EL4132 2 channel Analog output device, and Dunkermotoren BGE45 drive.<br>Added support for Lika HM58 and HS58 encoders.<br>New drive profiles for Sanyo Denki RS2 pos ctrl mode profile 2 (+ actual drive FE), pos ctrl profile 3 (+ actual FE and touch probe).<br>New profiles for Yaskawa SGDV position control mode drive profiles 2 (+ drive FE) and 3 (touch probe + drive FE).<br>New profiles for Delta Asda-A2 drive pos control mode drive profile 1 ( + drive fe) and 2 ( + 2 x touch probes, and drive fe.) | 23rd August 2013 |

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| | | Enabled use of Panasonic drive telegram which includes drive FE. | |
| 2.0221 | Fix for problems with jogging when very large UNITS are used.<br><br>EDPROG was removing leading commas at start of line.<br><br>Added fix to allow for an MPv3 project file on SDcard with a missing 'ENCRYPTIONCRC' field.<br><br>There was a window of opportunity for the symbol table to be locked when a program is being compiled at the same time another program is executing a GLOBAL statement.<br><br>Added fix for remote program not starting after being rejected due to no processes being available but then a process does become available.<br><br>Added fix for controller side effects caused by BASIC errors being generated within the REMOTE command.<br><br>User Defined CANopen Digital IO (via CAN fn 23) was not mapped correctly.<br><br>IEC main task 't5main' now reported as type SYS via channel 8.<br><br>Fix implemented to ensure that when ATYPE is set only FPGA registers for axes that actually exist are configured.<br><br>HMI : server can now be paused and fixed design download issues.<br><br>HMI : Fixed issue when HMI Client connects before all programs that it references are running.<br><br>SCOPE_CYCLE_COUNT point of increment changed to aid MPv3.<br><br>MC403/5 CAN : Implemented fix for spurious messages transmitted from controller during initial power-on. | MC_CONFIG check added to make sure controller has been started with current settings before allowing any programs to be run.<br><br>DRIVE_READ updated to allow the success and value read to be accessed by using a second parameter < -1.<br><br>Implemented DRIVE_CLEAR for RTEX.<br><br>Added support for STRING variables to LINPUT command.<br><br>Added new LOOKAHEAD_FACTOR axis parameter.<br><br>Added new configuration error (SYSTEM_ERROR bit 11) when not enough axes are available to allocate all connected digital drives.<br><br>Implemented SCOPE_DELAY and SCOPE_TRIGGER_POS.<br><br>DRIVE_INTERFACE(slot,0) updated to keep any RTEX axis types intact rather than simply re-initialise them with Position Mode value 50.<br><br>STOP now accepts the PROC modifier.<br><br>Added new ATYPE values for absolute encoders with no servoing - Tamagawa (86), EnDat (87) and SSI (88).<br><br>VR updated to allow STRING/ARRAY assignments.<br><br>Added new SYSTEM_ERROR (bit 4) for an invalid MC_CONFIG file.<br><br>HMI : Added support for array variables in HMI_SERVER.<br><br>HMI : Enabled write array bindings.<br><br>Added transition curve implementation for MOVECIRC.<br><br>ECAT: First release with the | 16th October 2013 |

| | | configuration information created automatically from the slave ESI files. Added initial support for 'generic' slave type, with direct mapping of the process data into the Vrs. Initial support for runtime extend configuration XML file. Added Stober torque mode. Added Max Torque axis parameter. | |
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| 2.0222 | Fixed PRMBLK variable setting. | ECAT : Startup configuration file EC_CONFIG renamed to EC_EXTEND.<br><br>ECAT : Added initial support for Adlink EP0001 DIO device, Moog Animatics drive, Stober SD6 drive, Sanyo Denki RS2 CST profile with AT in feedback, and new Vr mapped Comet, MKS, TDK (Turck) and Watlow slave devices. Enabled generic use of VR PDO mapping for all slave slaves (not just axis based.) Runtime config extended to enable PDO objects to be defined by index:subindex (which is checked before our standard definitions in the object <name> element.) | 31st October 2013 |
| 2.0223 | Setting ATYPE now defaults PP_STEP to 1. | Implemented MODBUS_TX_DELAY (ms) keyword to allow a programmable delay between request and response packets – default is 2ms.<br><br>ECAT - Initial Stober SD6 touch probe profile added, and Jenny Science Xvi SDO startup sequence changed to remove writes to control mode (0x6060:00). Also note that the Touch Probe default support is now based on the Pansonic implementation (instead of the AKD) since the former is closer to the EtherCAT spec. | 6th November 2013 |
| 2.0224 + ARM Boot 0.14 | When COMPILE_MODE=1 global/constant variables used that have already been defined will be accepted.<br><br>SETCOM Timeout parameter was not working for RS485 2-wire. Improvements also made to general Modbus performance.<br><br>Fix for CAM multiplier which was | ARM Boot : Updated to ensure that if a controller does not have an LCD then the boot does not try to access it, the MC405Y had startup problems because of this.<br><br>ECAT : AKD Profiles 4 and 5 updated to contain full set of cyclic data objects. New AKD torque profile (since drive appears to reject base profile as | 5th December 2013 |

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| | behaving as an integer.<br><br>SRAMP problem fixed that was causing a VP_SPEED spike.<br><br>REGIST_SPEED was not behaving correctly for stepper type axes.<br><br>Anybus : Fixed problems discovered @500us servo.<br><br>ECAT : Number of DIN/DOUT and AIN/AOUT for all devices corrected (error introduced in v2.0221. Affected IO devices with differing numbers of DIN and DOUT) | listed in ESI file.) Changes to user config parsing to support multiple mailbox protocols. Initial support for SICK encoders, and Beckhoff EL4004 AOUT slave. Added MDP to list of EtherCAT IO devices which appear in IO_MAP. | |
| 2.0225 | CANopen problems caused by CANIO protocol interference on ARM controllers MC403/5 etc.<br><br>ECAT : Enabled drives with a second encoder input (AKD and CT) to be located anywhere in an EtherCAT network (previously they could only be located as the final slave.) Fixed issue which caused an EtherCAT restart to fail in pre-op if the network had drives with a second encoder input. Corrected use of network activity symbol on the MC4NE display. | AXIS_ADDRESS and ENCODER_BITS can now be used within MC_CONFIG.<br><br>ECAT - Added (initial untested) configuration for many Beckhoff IO slices, MTS Linear encoder, and the Delta Asda Drive touch probe support in CSV and CST mode. | 11th December 2013 |
| 2.0226 + ARM Boot 0.15 | ARM BOOT : P157 now modifies lower voltage thresholds checks to 4.0V.<br><br>Fix to stop spurious CAN messages in CANopen mode from ARM controllers. This was due to the Trio CANIO protocol still being active when CANIO_ADDRESS was not 32.<br><br>Fixed STRING handling problems when accessed using CHANNEL_READ, Watch Window (PRMBLK) and HMI server.<br><br>Fix to stop Multiple instances of HMI_PROGRAM running.  HMI server now starts only when there is data present through the socket, previously it would start based on the socket being open or not regardless of whether data was present or not.<br><br>Break-points were not deleted correctly if the line had been commented out after the break-point was originally set. | Changes made to support GLOBAL/CONSTANT declared variables when COMPILE_MODE set to 1.<br><br>PSWITCH(channel, OFF) will now accept an optional 3rd parameter to force the PSWITCH output to be reset rather than being maintained via an internal copy of the PSWITCH output state to the standard OP state.<br><br>Implements functions IS_NAN and IS_INF to interrogate whether numerical values are invalid ie represents a NaN or Infinity.<br><br>Implemented dedicated HMI commands HMI_CONNECTIONS, HMI_SET_PAGE, HMI_GET_PAGE and HMI_GET_STATUS.<br><br>Added FRAME 119 for Cylindrical robot.<br><br>Updated ENCODER_RATIO to allow for large (64-bit) | 10th January 2014 |

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| | Improved flash behaviour when deciding whether to reprogram boot code but also when reading VR/TABLE data from flash memory.<br><br>FRAMES : FE related parameters updated to use AXIS_UNITS rather than UNITS when a frame is active. FRAME is now set to zero when a FRAME_GROUP is deleted. DEFPOS (OFFPOS) is now applied before automatically creating a FRAME_GROUP.<br><br>ECAT : Corrected Omron MX2 SM size. Corrected the information displayed on the command line when the 'info service' (MC4NE only), or vendor ID values which have the MSBit set are viewed by the user. | mult/divide integers but also so it has no upper limit.<br><br>AXIS_ADDRESS and ENCODER_BITS now MC_CONFIG compatible.<br><br>ECAT : Added 'output module' to EtherCAT slave module list in IOMAP, and enabled the display of Omron PDO data to the command line.<br>The ETHERCAT($104) command now returns -1 as the profile index for all vid/pid entries for which a complete profile has not yet been created. | |
| 2.0227<br>+<br>ARM Boot 0.16<br>+<br>MC403 FPGA image version $210 | Break-points were not clearing properly while program was still running, if the program was re-started then the break-point would no longer be present. In MPE mode break-points can no longer be managed from the command line.<br><br>HL slave reads now OK, they were broken in 2.0220 when a potential race condition was fixed.<br><br>SERVO_OFFSET=0 caused a continuous reset (MC464). New 'safe start' mode added to try and recover from a processor watchdog timeout. E06 displayed to show Safe Mode.<br><br>DAC/DAC_OUT did not function for ATYPE=79.<br><br>FRAME removed from list of SCOPEable parameters that Mpv3 provides access to.<br><br>EtherCAT : Corrected ABB ACS350/355 mailbox sizes to 248 bytes. | MC403 FPGA updated to support EnDat encoders with >32-bits (other controller support will follow in later builds).<br><br>EnDat support for encoders with more than 32-bits added to firmware.<br><br>Analogue data now readable in IOMAP.<br><br>IEC: Updated IO point bindings so that the data type is taken into consideration and used to map an appropriate number of IO points, BOOL for example will map a single IO point whilst SINT will map 8 IO points.<br><br>IEC, added new FBs TC_RUN, TC_STOP, TC_EXECUTE and TC_VALIDENCKEY. (requires support in future release of MPv3)<br><br>IEC, added new functions TCR_TABLE32 and TCW_TABLE32 to support TABLE point access > 16-bits.<br><br>Changes made to support GLOBAL/CONSTANT declared variables when COMPILE_MODE=1.<br><br>Frames : New FRAME_REP_DIST axis parameter added. New internal axis parameter counting revolutions for use within FRAMEs | 30th January 2014 |

| | | Implemented new revolutions for orientation axes on FRAME 114 New mode to REP_OPTION, bit 3, this is used with orientation axes on FRAME and USER_FRAME to limit the DPOS to FRAME_REP_DIST.<br><br>ModbusTCP : added ability to map modbus request register address to any VR address for read/write register commands.<br><br>EtherCAT : the configuration library display functions now have MPv3 specific support. Added support for SICK encoder, initial support for Fastech Eziservo, Kollmorgen S600 drive and JVL Industri Elektronik 's MAC00-ECx. | |
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| 2.0228 | ARM : RS485 TX default timeout behaviour was broken in 2.0224. A SETCOM could be used as a workaround.<br><br>FRAME : Fixed User Frames for Orientation axes (incomplete) | ECAT : Update to support IAI RCGW as byte per VR slave; added CSV and CST profiles for JVL Industri Elektronik drive, and enabled DC for these and existing CSP profile; added Omron AD0471 Ain device support. | 7th February 2014 |
| 2.0229 + MC405 FPGA image version $000F | Adding arrays to the Mpv3 watch window could cause the MC464 controller to reset. Access to the first element of an array is now supported. Mpv3 needs to be updated before access to the other array elements can be provided.<br><br>Fixed issue where MC4NE could only support the internal axis at position 0 but should be moveable to any axis.<br><br>Running IEC tasks should not prevent GLOBAL/CONSTANT from being used, only running BASIC programs is relevant.<br><br>Version 2.0228 broke RTC DATE/TIME write ability.<br><br>Tamagawa encoder behaviour corrected, firmware only used 16 bits rather than 17.<br><br>HMI : Modifiers were not being processed correctly when building the parameter blocks for the HMI.<br><br>ECAT : fixed issue which meant it was possible to create an empty mailbox init command for a slave (this had prevented the Kuhnke | PWM support added for MC405, FPGA reprogrammed to version F is required. New ATYPE 36 added for Stepper output with PWM.<br><br>Added DIR A to explicitly report the AutoRun status on MPV3.<br><br>USER_FRAME : Improvements made.<br><br>ECAT : Initial support for Motec, Technosoft iPos and iMot, Linmot C1100, C1250, and E1450 drives, and IAI MSEP (RCGW) devices. Protocol will now ignore alias address set on axis slave if NODE_AXIS has been defined. | 27th February 2014 |

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| | and SMC SEC260 from starting up.) Kuebler encoder startup SDO corrected (not tested), ABB ACS355 inverter PDO set now defined as 4 bytes Rx and Tx. | | |
| 2.0230 | COMPILE_MODE is now only be changeable within MC_CONFIG or the command line.<br><br>MC4N now powers up with different 'P' numbers depending upon the FECs enabled.<br><br>GLOBAL/CONSTANT removed side effects when any special BASIC programs are also active.<br><br>IOMAP fixes for CAN Analogue modules, Mpv3 expected a different syntax (P326). | IP_ADDRESS (and IP_NETMASK, IP_GATEWAY) have been updated to support direct string support and also to be used in comparison statements.<br><br>MC4N : Implemented EXAR PSU interface and reprogramming scheme.<br><br>ECAT : Initial Higen EDA7000 CoE Servo Drive, and Brunner drive (GER_1002 and GER_1080) support added. | 7th March 2014 |
| 2.0231 | Hostlink compound slave requests were broken ie QQMR/QQIR. Now fixed.<br><br>ECAT : Corrected LinMot C1100, C1250 and E1450 configuration. Corrected implementation of drive reset at 500usec. | MC4N-RTEX initial release.<br><br>RTEX : When re-starting an RTEX network any MC_CONFIG ATYPE settings should take priority over any other RTEX ATYPE value that has been subsequently set via the command line or in a program or indeed the default position mode value of 50.<br><br>DRIVE_INTERFACE now supports re-initialising an EtherCAT network.<br><br>MC4N : Improved EXAR PSU reprogramming so that it does not attempt to reprogram the device if there is no valid I2C response.<br><br>CAMLINK added as new keyword.<br><br>Frame 11 added and Frame 18 updated to support scaling of all 6 axes.<br><br>ECAT : Added support for MPv3 startup progress and error messages via sync channel 9. Initial support for SoE procedure commands. Automatically parse and use EC_EXTEND file if present during protocol startup. | 18th March 2014 |
| 2.0232 | Fix for REMAIN when used with MOVECIRC.<br><br>Fix applied to prevent DIR D causing an endless cycle when in | RTEX axes now have a default DAC_SCALE of 1<br><br>Using ATYPE to set EtherCAT axes is permitted but must be used | 11th April 2014 |

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| | MPv3 sync mode.<br><br>Temporary storage (for strings for example) now cleaned after every command line token is executed rather than after the whole line has been executed, otherwise the command line could exhibit memory exhaustion.<br><br>Fix implemented for potential ARM RTC sync problems.<br><br>Fix for inverse matrix a^-1, the firmware would only accept a^-1.0.<br><br>Fix implemented to ensure all axes addressed within a move request are active. | only with drives that support it. (Otherwise use DRIVE_MODE)<br><br>Kinematics runtime now available for 1 hour without FEC.<br><br>New ATYPE 31 added for analogue input and output channels controlled via FEC 25.<br><br>Initial implementation of FRAMEs 21 & 22 added. | |
| 2.0233<br>+<br>ARM Boot 0.17 | Fix so that DRIVE_WRITE functions for RTEX drives when ATYPEs 51 (velocity) or 52 (torque) are used.<br><br>Fixed SYSTEM parameters for HMI VAR_SET.<br><br>RTC : writes to DATE and TIME now compile when used on non-RTC controllers. | ARM boot updated to 0.17 to support FPGA watchdog strobe.<br><br>ARM CAN updated to allow access to all 64 CAN buffers.<br><br>ROBOT_SP_MODE keyword added.<br><br>UTF-8 BOM characters now removed from any files if they are found.<br><br>ECAT : initial support for Beckhoff BK1120 coupler, Lust/Lti Servo One CM multi axis drive, and added new profiles for LS Mecapion L7N drive. | 17th April 2014 |
| 2.0234 | CAMBOX pattern mode caused the next move request to not load into MTYPE.<br><br>ECAT : Improved thread safety of the mailbox mechanism to resolve issue encountered by MPv3 EtherCAT intelligent drive support.<br><br>Mpv3 : Fix applied to DIR command that could cause an Mpv3 SYNC mode connection to fail. | When Kinematics 1-hour runtime expires it now drops WDOG for safety reasons.<br><br>Frame 23 added; corrections for frames 18 & 22.<br><br>ECAT : added ETHERACT command functions $91 and $92 to set and get the system sync0 start time offset, increased auto-negotiation timeout, and added drive profile to startup message. Added support for Yaskawa SGDV in speed and torque modes, CT Unidrive M, Delta IO, all Panasonic drives, and the Estun Pronet drive.<br><br>WET protocol updated to support 32-bit signed position data and to allow for changes to SPEED after | 2nd May 2014 |

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| | | the protocol becomes active.<br><br>BASIC speed execution improved after a change made in 2.0231 caused a performance slow down.<br><br>IEC : Support added for new VR_BIT profile. | |
| 2.0235 | The following statement would fail parsing, in older firmware it was OK ...<br>IF FILE "DETECT" = FALSE THEN<br><br>Corrections for Frame 22. | When Kinematics 1-hour runtime expires it now sets bit 21 of AXISSTATUS for the affected axes.<br><br>ECAT :  added initial Phoenix AXL F BK EC Coupler support. | 9th May 2014 |
| 2.0236<br>+<br>ARM Boot 0.18<br>+<br>MC4NE FPGA image version $0008<br>+<br>MC4NR FPGA image version $0102 | MC4N-EtherCAT – corrected problem when stopping EtherCAT via ETHERCAT(1,slot) that caused the internal axis to lose its configuration within the FPGA.<br><br>MC4N time based registration did not function.<br><br>ARM exception handling corrected to remove potential side effects.<br><br>Corrected FPGA_VERSION generation, the firmware sometimes reported the wrong version.<br><br>During download any BASIC errors generated are now cleared because we are only interested in transfer errors.<br><br>ECAT : fixed EtherCAT inverter (open loop speed) target speed write. | ARM boot code updated to v0.18 to support MC4N FPGA changes.<br><br>IEC table bindings; A new flexible scheme has been implemented to allow either VR or TABLE bindings to support bi-directional until available memory is exhausted.<br><br>Where possible an out of range (19) error now reports which parameter is out of range. In addition a new out of range bit number error (174) is now reported rather than a generic out of range error 19.<br><br>MC4N available flash parameters now limited to only those considered necessary, all other config parameters are now MC_CONFIG 'write' only – the following flash parameters are therefore no longer written to flash memory – CANIO_ADDRESS, CANIO_MODE, SERVO_PERIOD, AXIS_OFFSET, SCHEDULE_TYPE, REMOTE_PROC and MODULE_IO_MODE.<br><br>HMI : scheduling made more efficient and HMI design CRC now calculated at startup.<br><br>CAMBOX added to CONNECT as move types that can move whilst in limit if BIT1 of AXIS_MODE is set.<br><br>Frames 3, 24 & 25 added.<br><br>WET protocol updated to allow for axis UNITS.<br><br>New MOVEABSFR keyword added. | 30th May 2014 |

| | | ECAT : The EtherCAT startup message now displays the drive profile and drive mode used for axis slaves. The 'byte per vr' and 'vr mapped profile' slaves now both use common mechanism to define the vr base addresses for receive and transmit data. The user runtime configuration now uses the defined PDO sets to determine the SM lengths ( and not the <Length> elements in the <slvcfg> or <Sm> sections of EC_EXTEND.) Added support for additional CT drives, and Burster processor controller. | |
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| 2.0237 | ModbusTCP : fix to ensure we start processing ModbusTCP message immediately after it has been received.<br><br>Sdcard : Loading projects from SDcard failed if a program name was longer than 20 chars, saving projects to SDcard was OK however. | Introduced new directory backup scheme to make general operation more efficient and to remove any need to pause running programs. New FLASH_STATUS system parameter added to provide feedback of when it is safe to power-off the controller - bit 0 = flash busy (1) or not busy (0)<br><br>Don't send compile error messages when doing SELECT in MPV3 mode.<br><br>ECAT : additional support for user defined COE object index:subindex PDO profile. Initial support added for Metronix ARS2102, Danfoss slave, ESD IO and bridge slaves, Festo FB37, Kollmorgen AKD-C PSU and AKD-N servo drive, Orientalmotor NETC servo drive, Vacon Optec drive, Omron G5 linear drives, new Panasonic drives and also support for Linmot profile with target position (along with accel and velocity). | 17th June 2014 |
| 2.0238 + MC405 FPGA image versions $0110 $0210 | Fix for BASIC evaluation error if an operator such as > was used to generate a boolean parameter, eg ABS(angle > 0).<br><br>ECAT : bug fix for Beckhoff EK1100 module (controller reported failed to find configuration information for slave device which did not have any mailbox commands). | Serial ports: Added 115200 to the accepted baud rates.<br><br>Improvement to wait on PMOVE automatically when reading certain axis parameters.<br><br>New frame 12 added.<br><br>ECAT : added initial configuration for Leine Linde encoder, Baumueller drives, new Beckhoff IO slice support, including EL5101 encoder (including latched value), | 10th July 2014 |

| | | EL1809 & EL2809 DIO, EL3608 & EL4008 AIO. | |
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| 2.0239 | Frame 12 fixes. | Added new FPGA images: EU404 FPGA version $0102<br><br>EU408 FPGA version $0105<br><br>MC403 FPGA versions $010F, $0211, $030F<br><br>MC403Z FPGA version $0302<br><br>MC405 FPGA version $0111, $0211<br><br>MC4N-ECAT FPGA version $0109<br><br>MC4N-RTEX FPGA version $0104 | 24th July 2014 |
| 2.0240 | HW_PSWITCH status bits 19/20 were not updated as expected for flex axes on MC464.<br><br>Fix for potential startup/EX freezing problems. | ECAT : Initial basic support for Balluff Bis V coupler. | 6th August 2014 |
| 2.0241 | Arrays declared with dimension (1024,1024,1024) did not generate an out of memory error 35 which was expected.<br><br>Fix for possible corruption of last edited program if Mpv3 issues an immediate EX before the program is compiled. Startup also improved to ensure a corrupt MC_CONFIG file doesn't inhibit the controller from starting. | TICKS now 64-bit.<br><br>Frame 12 restricted to bespoke versions only.<br><br>ModbusTCP: packet support changes. | 14th August 2014 |
| 2.0242 | TC_DATUM fixed so that it controls the 'Done' and 'Abort' flags as expected for Z-mark datuming, the 'Abort' flag was being set instead of 'Done' upon completion of the move. Datuming using digital inputs did work as expected and has not been changed. | TextFileLoader now allows files to be sent from the controller to the PC. | 22nd August 2014 |
| 2.0243 | Fixed problem with reading HMI_GET_STATUS.<br><br>Fixed problem with reading internal inputs 8..15 – affected MC403/5, MC464, MC4N | New parameter INTERNALIO_BASE to support remapping of internal IO for special hardware versions.<br><br>Modification to OPEN command to allow appending to an existing file. OPEN sytanx is now OPEN #channel AS filename FOR {INPUT|OUTPUT|FIFO_READ|FIFO_WRITE|APPEND} | 5th September 2014 |
| 2.0244 | EtherCAT – fixes for Omron GX IO devices, including GX-0C1601 and GX-OD1622 with 8 bit input and | SCOPE(ON,rate) is now accepted to change the poll rate on the fly and TRIGGER now has an | 12th September 2014 |

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| | output slices, with FQM and FQZ vision sensors, and EC0211 and EC0241 dual encoders. | optional parameter to set auto-reload. | |
| 2.0245 + MC403 FPGA image versions $0110 $0212 $0310 | MC403 FPGA fixes for DAC startup problem.<br><br>HMI : Fix to allow the HMI to load PRMBLK for encrypted program variables. | | 16th September 2014 |
| 2.0246 | Fixed TextFileLoader SD card transfer from controller. | ECAT :  New system process added to handle all EtherCAT asynchronous data transfers, this was previously contained within the 'IO Server' process.<br><br>ECAT : Updated Copley, Panasonic and Yaskawa drive config to include FoE protocol. Added initial support for Copley TEL drive.<br><br>COMPENSATE_XY keyword added. | 22nd September 2014 |
| 2.0247 | | Implemented SCOPE changes to write to a TrioBASIC file.<br><br>Output data now purged when TextFileLoader socket is closed.<br><br>AXIS_MODE BIT8 added to select FS_LIMIT comparison with DPOS rather than WORLD_DPOS.<br><br>SCOPE functionality updated to support writing of trigger data to a BASIC file. | 6th October 2014 |
| 2.0248 + ARM Boot 0.19 + EU404 FPGA images $0103 $0203 $0303 $0403 + EU408 FPGA images $0106 $0206 $0306 $0406 | Fix for "label not found" errors which did not report the correct line number.<br><br>Fix for IEC problem with multiple VR_BIT bindings to the same VR variable.<br><br>Fix implemented for when an Autorun program does not compile, as it was possible to freeze the controller.<br><br>Improved program flash storage routines.<br><br>Textfileloader : Fixed 'Out by 1' error when reading FIFO files. | ARM Boot : Upgraded in line with MC664 (iMX6) boot changes – the serial settings are now displayed on LCD in boot mode.<br><br>ARM : RTC interface made more robust, date/time now reset automatically when device indicates that the oscillator had stopped. Individual fields are also validated and any invalid data will result in a default date/time of 01-Jan-2000 00:00 being used.<br><br>SDcard : When an invalid timestamp is read it will be displayed as 00/00/0000 00:00 rather than **/**/**** **:** as this can cause problems with | 7th November 2014 |

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| | | MotionPerfect.<br><br>FPGA : When upgrading FPGA the LCD/LEDs now indicate that it is active.<br><br>SCOPE : Added FIFO file name to the SCOPE command and removed it from the TRIGGER command<br><br>MOVELINK_MODIFY parameter added to allow modification of a loaded MOVELINK. | |
| 2.0249 | Stepper axes now function correctly below 500us.<br><br>LCD test mode corrected. | MC4N 'MC_CONFIG only' parameters (such as SERVO_PERIOD) can now be written to within a program or via the command line.<br><br>CANopen hearbeat monitoring added to firmware. New CAN functions 25 & 26 added to support this.<br><br>Improved load packet handling when scoping to a FIFO file.<br><br>Frame 26 (XY Parallelogram Robot with Wrist) initial support added.<br><br>ECAT : added initial support for MaxonMotor's Maxpos, and RTA PLUS ET stepper drive. | 14th November 2014 |
| 2.0250 + MC4NR FPGA image $0105 | MC_CONFIG : Corrected issues related to the auto-update scheme introduced with 2.0249, mainly the fact that if the file is created and power switched off immediately then the MC_CONFIG file would be missing upon restart.<br><br>MC4NR : FPGA fixes due to 500us servo period not functioning correctly.<br><br>MC464: Battery alive input signal now de-bounced for 1 second before latching E03 error.<br><br>ECAT : Fix to prevent CO_READ/WRITE_AXIS from occasionally failing to execute because it had made an unnecessary resource check. | Real Time Clock : Implemented changes required to enable new 'trickle charge' feature of Dallas DS1339A RTC device. | 3rd December 2014 |
| 2.0251 + ARM Boot | Fixed CANopen SYNC mechanism which was broken for MC464 controller. | ARM : Implemented FPGA recovery scheme if FPGA is accidentally erased during | 16th December 2014 |

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| 0.20 | Slow system code downloads reported on EtherCAT supporting controllers, especially noticeable on MC464 due to slower ethernet comms.  Now fixed.

MC464 : Implemented E06 filtering to remove false errors being generated immediately after short power-cycles (only a small number of controllers exhibit this behaviour). In addition E06 errors will clear after the next restart (EX or power-cycle) previously only a power-cycle would clear the error. | reprogramming (boot updated to aid this).

MotionPerfect : Implemented 'ReplaceProgram' interface.

BASIC : Added ability to produce inverse 4x4 matrix using x^-1.

Frames 18 & 26 improvements.

ECAT : initial support for WEG drive (which requires CW value of 0xF to enable, and only returns 16 bit encoder value), LS Mecapion Pegasus, L7NH and L7P drives, and AMK CoE drives. | |
| 2.0252 | V2.0251 broke the loading of encrypted programs. Now fixed.

Fixed P876 LED which did not flash as expected before Normal Op mode.

CAMBOX problem fixed when starting at non-zero table values.

Fixed parsing error if a comment is added after a DIM statement for FLOAT variables, for example DIM f AS FLOAT 'My floating-point variable would be rejected.

INTEGER, BOOLEAN & STRING were OK with the same syntax. | ModbusRTU client added.

Support added for formatting SD/SDHC cards with FAT32 format using command FILE "FORMAT" "<disk label>".

CANIO_ADDRESS bits 8 & 9 now be used to define the CAN bus speed at startup.

DATE/TIME can be now assigned a value using a string or individual variables eg.
DATE = day:month:year
TIME = "09:41:30"

Increased number of available Analogue IO points from 36 to 64.

MSPEEDF and MSPEED_FILTER axis parameters added to provide a filtered version of MSPEED.

OPEN is now both a command and a function.

ECAT : Asynchronous process now only starts when a module is present in system. | 23rd January 2015 |
| 2.0253 + PRP App 0.1.19 (MC464) | When a program stopped itself by using the STOP command and its program name, the program failed to stop although using STOP with no program name worked successfully – this has been fixed.

Fixed problem with transferring negative numbers to controller.

Added fix to prevent user defining a variable and label with the same | User can now gain full control of LCD characters at all times using DISPLAY.17=1, the controller can override user control when using DISPLAY.16=1.

TCP/IP Stack ARM controllers - add ability for user to limit number of received Ethernet packets processed per servo period (using Ethernet command parameter 15.) | 12th March 2015 |

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| | name as it can lead to confusion.<br><br>CAN function 2 always cleared the CAN buffers which caused problems if user defined baud rate after defining buffers. | ModbusTCP : on the MC464 has been updated to transmit responses in a single TCP packet whenever possible.<br><br>ECAT : Fix for ABB Microflex e150 startup and CSV profile, Fastech EziServoII drive, and many new Panasonic drives. Added ability to support multiple SM's of the same type.<br><br>MOVELINK : Added new 'base distance' parameter (8) for controlling the 'base speed'.<br><br>MotionPerfect : Improvements to PRMBLK to help polling a variable in a program that is being stopped/started.<br><br>Frame 19 updates.<br><br>SYNC now incorporates a smoother S-ramp profile.<br><br>ATYPEs 89, 90 & 91 added.<br><br>ATYPE processing now executes only when a different ATYPE is selected.<br><br>SDcard : FAT32 formatting now provides progress % | |
| 2.0254<br>+<br>ARM Boot 0.21 | Motion Perfect process output window did not display any active processes.<br><br>ARM boot code updated to 0.21 due to problem with storing system code after RS232 download.<br><br>ECAT : the product name displayed in the startup message now selected from appropriate internal or user defined profile. Corrected VID for Parker Hannifin Compax drive (company has 3 different VIDs for different products.) | | 26th March 2015 |
| 2.0255 | ON <expression> GOSUB a,b,c did not compile if the list of labels is split over multiple lines using the line extension token '_'. Now fixed.<br><br>PWM support enabled for MC403, MC403Z, MC4NE/R, EU404/408.<br><br>Controller would reject valid matrices for multiplication - it only | Implemented new registration scheme to allow gating via a digital input.<br><br>If a command supports bracketed parameters and the brackets are specified then it should expect at least 1 parameter inside the brackets, otherwise an error 4 "Operand expected" will be | 5th June 2015 |

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| | allowed matrices with opposite dimensions that matched. Now fixed.<br><br>Fixed RTEX digital inputs issue when system also uses CAN input modules.<br><br>Fixed the setting of ATYPE on an axis already with the same ATYPE. It left interrupts disabled, problem was introduced in 2.0253.<br><br>BITNUMBER operator precedence increased to be greater than arithmetic operations. | generated.<br><br>Added support for 4ms servo cycle on MC4NE/R.<br><br>New error added for duplicate program label and variable name error (187).<br><br>TCP/IP Stack - improvement to stack API interlocking.<br><br>Removed display of I/O definition at the top of the startup message as this is out of date (assumes at least 8 digital I/O) and is replicated later on from the IO map.<br><br>WA implementation changed to synchronise with servo cycle.<br><br>HMI/REMOTE/etc procs will not autorun if corresponding default process is set to -2.<br><br>Added TEXT_FILE_LOADER(,2,) to implement a 'have loaded' flag.<br><br>Frame 19 improvements and also new frames 27, 28 & 29 have been added. | |
| 2.0256 | OPEN #21 failed if IEC program is running, now fixed.<br><br>Fix for issue: MOVEABSSP frozen in NTYPE while MTYPE is Idle.<br><br>Maximum channel buffer size increased so all the startup messages can be seen. | PROJECT_NAME keyword added to read/write a project name associated with the currently loaded programs.<br><br>IS_OPEN implemented : (ARM processor) Support up to 10 TCP/UDP client connections, and enable status check of a client connection using the IS_OPEN command. Return error status (and don't raise TrioBASIC exception) when TCP client port fails to open. New TCP/IP stack API access mechanism, increased the number of connections supported, EtherNet/IP IO watchdog timeout change.<br><br>Anybus support added for Modus TCP (2-port).<br><br>FEATURE_ENABLE can be used to interrogate the enabled FEC codes.<br><br>REGIST mode 20 updated to support independent gating | 14th August 2015<br><br>Do not use in MC464 serial numbers 1 to 50. |

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| | | inputs for dual registration.<br><br>Improvements for ATYPE 36 (Stepper with PWM output).<br><br>Frame 19, 27, 28 & 29 improvements. TCP_CALIBRATE also added.<br><br>FLASH_LOG feature added : enabled for MC4N controllers. | |
| 2.0257 | | | Not released |
| 2.0258 | Fixed display issue with output of PROCESS command when more than 2^31 milliseconds has elapsed since a process starting.<br><br>Fixed issue causing problems stepping WA/WAIT statements if the process enters a 'sleep' state.<br><br>Fixed PRMBLK array reading.<br><br>Fixed memory issue when individual programs with a length > 128KB would become corrupt after a restart (Affected V2.0256 and 2.0257 only). | Allow TRON/TROFF on encrypted/locked programs.<br><br>Support added for BiSS absolute encoders.<br><br>COMPENSATE_XY updated now supports either MPOS or DPOS.<br><br>SETCOM can now enable the REMOTE protocol on different ports, eg will set the REMOTE protocol to the RS232 port: SETCOM(38400,8,1,2,1,8).<br><br>Enable user to change TELNET port number (ARM controllers only).<br><br>ARM controllers : added support for the IP_PROTOCOL_CTRL system parameter which can be used to prevent the ModbusTCP server and EtherNet/Ip protocols starting from power on. Enable user to change the default TELNET port number using the Ethernet() command. Shutdown consuming IO connection when EtherNetIP wdog timeout occurs.<br><br>ECAT : initial support for Yaskawa Sigma7 and AMK ihXT drive support. New Baumuller bma4400 and bma3200 config data ( created during testing with Baumueller apps engineer in Trio India office.) New AIN/AOUT_CH PDO object for individual analog channels, enabling PDO set with to be defined for a multi-channel analog IO device consisting of the analog actual value and status values. | 18th September 2015<br><br>Do not use in MC464 serial numbers 1 to 50. |
| 2.0259 + EU408 | Fix for Runtime error reported for GLOBALs when compiled with COMPILE_MODE=1 | Maximum number of symbols per process increased from 1280 to 4096. | 6th November 2015 |

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| FPGA image $0207 | Euro408 : FPGA image for SSI encoders, updated to fix REG_POS errors.<br><br>Mpv4 : multidimensional arrays are now handled correctly. | Added support for multi-dimensional STRING arrays<br><br>Modbus Client : user can specify the Unit Identifier.<br><br>SDCARD : Redesigned software for loading code from SDcard so it does not require a 6MB buffer. | |
| 2.0260 | ENCODER_RATIO now supports 64-bit signed parameter on ARM11 platforms.  Previously only 32 bits.<br><br>HMI problems displaying STRING variables were fixed.<br><br>Fix for ModbusTCP disconnection. | Support added for Anybus EtherNet/IP 2-port module<br><br>Support added for copying strings and string arrays to VR/TABLE memory.<br><br>LOOKUP command now handles arrays. | 20th November 2015 |
| 2.0261 | EnDAT support for encoders >32 per turn did not initialize correctly.<br><br>REMOTE program no longer functioned, now fixed.<br><br>ARM controllers : Data abort and undefined instruction exceptions now handled correctly. New critical error E09 (SYSTEM_ERROR.24) added for when exceptions are raised within system processes including servo processing. | Initial release for new MC664 & MC508 controllers.<br><br>ARM controllers : DS402 CAN drive support enabled – FECs 0..5 are used to double number of remote axes available per FEC (first FEC gives 2).<br><br>ARM controllers with LCD : New 'Display Manager' process added to control LCD updates without affecting other general system activities.<br><br>PROCESS command : Added 'X1' modifier to return CORE information to MP.<br><br>Frame 19 improvements.<br><br>ECAT : Added support for the Explict Device ID addressing mechanism, which has been enabled for the all Panasonic drives and the Wago coupler. It can be added to an EC_EXTEND file using the element <SlvCfg<InitialisationReg134>.<br><br>ECAT : Added NW_NODE_IO parameter to enable user to define node IO base address using slave's configured station alias address.<br><br>ECAT : Previously if more than one slave on a network had the same alias address then the EtherCAT protocol startup would abort. If this situation is | 21st January 2016 |

| | | encountered now the master shall use the alias address for the first slave, and ignore for all other slaves with the same defined alias.

ECAT : The sub-nodes of a multi-axis slave will now use the profile defined VR input/output base address for VR mapped PDOs (previously the sub nodes used address 0.) Note that NODE_INDEX should be used to offset the VR mapping if more than one of these multi-node slaves is in a network. (The VR mapped based address is the vr input/output address + NODE_INDEX value.)

ECAT : Axor and Hiwin identified as PDPs.

ECAT : Added HiWin D2, Shanghai Moons SS EtherCAT drive, Maxsine drive, multi-axis Oriental motor drive, and touch probe profile to Technosoft drives. Corrected Parker PSD1S startup following feedback from user (removing accesses to 0x1C12/3), and adding DC support, corrected TxPDO length for RS Automation's CSD7 drives, and added initial support for a number of new drives in this range.

ECAT : Added ability to set sync0 offset per slave (using NODE_SYNC_OFFSET) and improved network accuracy of sync0 timing. | |
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| 2.0262 + MC4N-R FPGA image $0106 + MC508 FPGA image $0105 | Fix for setting SCOPE_DELAY to small negative values EG -1 msec (50msec timebase) which produced a divide by zero in the firmware.

MC464 v2.0261 problem when used with CANIO modules - connecting to MP tool/sync mode often caused a reset followed by an E06 (watchdog timeout) error.

MOVEMODIFY now does not use FASTDEC when causing a change in direction, it uses DECEL.

HMI : Fixes for processing IP | MC508 : Number of VR points available: 16384, maximum number of TABLE backup points is 64000.

MC508 : Added new 'High Density' ATYPEs starting at 100.

MC508 : The first 8 axes are initialized by default.

FRAME : Updates to frame 28/41. AXIS_D_OUTPUT keyword added to control D channel output where appropriate.

HMI : RTC now synchronises with | 9th February 2016 |

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| | addresses and strings. | HMI.<br><br>MC405 : Modbus RTU client support fixed.<br><br>ECAT : support for 32 bit floating point using co_read/write, co_read/write_axis, Ethercat($40,41,42), using datetype = 8. Initial support for for Beckhoff AX52xx SOE drive, BnR MDP Coupler X20BC00G3, and Muscle Corporations Cool Muscle Drive.<br><br>SCOPE : TRIGGER now locked when in autorepeat mode.<br><br>BASIC : Floating point comparisons now use bit level tolerance (1-bit) rather than a fixed-point epsilon for determining equality. | |
| 2.0263 | MC664 : First production release. | Added support for shared/global IEC variables.<br><br>Added support for online change.<br><br>EtherCAT module support added.<br><br>IEC : Added new functions for floating point read/write access to FE_LIMIT and FE_RANGE.<br><br>EU404/408 : Modbus RTU client support added.<br><br>Enabled Cubic/Jerk VPU capability via AXIS_MODE bit 9.<br><br>ECAT : Improved Infranor startup SDO sequence.<br><br>ECAT : Initial support for Parker multi axis drives. Trio / HMS Anybus module support added. | 22nd February 2016 |
| 2.0264 + MC508 FPGA image $0105 | Fix implemented for MOVEABSSEQ.<br><br>Added fix to correct an issue that could cause the FPGA_PROGRAM command to never complete even though the programming did finish. | ECAT : Initial support for Fastech EziServoII profile set.<br><br>ECAT : support for floating point (Real32) data type accesses using the mailbox.<br><br>Anybus : New function 12 added to ANYBUS command to control maximum number of cyclic words exchanged per cycle (default=32).<br><br>MC508 : New FPGA image and | 1st March 2016 |

| | | added new High Density ATYPEs for axis 8 to support incremental/SSI encoders. Mpv4 : Added new channel 9 event messages when a program needs to be recompiled. | |
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| 2.0265 | Fixed problem with MSPHERICAL choosing the wrong direction.

CO_WRITE_AXIS failed to write correctly with data type=4 (32-bit integer) and the data value passed as a floating point value. Now fixed.

MC464 problem reading table data from flash to 16-bit battery backed memory; fixed.

Corrected MOVEABSSEQ, line moves always loaded with MOVEABSSP instead of MOVEABS as expected.

MOVEABSSP fixed, use of FORCE_SPEED had been broken.

Modbus RTU :  Corrected multiple register write (function 0x10) when using different source and destination addresses, and read input register function (to use command 0x04).

Corrected VP_ACCEL as it did not function. | ECAT now uses ENCODER_BITS to allow optional configuration of ENCODER bit wrapping, default is 32-bits. The following encoder types may need to set ENCODER_BITS manually as a result : Baumer, Baumer Thalheim, Beckhoff Slave, Kuebler Single/Multiturn 5868 Series Slave, Sick and WEG drive.

ECAT : added full profile set for AXOR drives, and initial support for Phoenix IO. Added support for slave devices with a second encoder input (ENCODER_INPUT2) in the EC_EXTEND file.

Modbus TCP : Reduced sleep delays to improve throughput.

Support for BASIC Libraries added.

FRAME : Improvements for frames 19 & 28. | 18th March 2016 |
| 2.0266 + EU408 FPGA image $0501 | Fix for AUTOSTART failure which might cause controller directory problems.

Fix for MC664 motion issues.

MC664: First axis of a flex axis module did not initialise correctly (when located at axis 0) due to a conflict with the internal flex axis.

CANIO timeouts changed to reduce chance of a heartbeat error.

IEC TC_CAMBOX did not use the requested axis. Now fixed.

Fix for error in SEEK command when requesting a position that is exactly on a 512-byte sector boundary.  SDcard files.

Files : Updated BASIC file | BASIC Library : Improvements prior to release.

Modbus - additional Modbus client and server status information now available using MODBUS($100) command. Close Modbus socket if recv or send command fails.

Modbus - modify server dispatch handlers to ensure socket - modbus connection consistency.

ARRAYS : Added array attributes 'dims' and 'dimsize' for collecting information on arrays.

New Frame 31 added.

ECAT : added ability to change ESM state of individual slave. Reset error code on Master when | 18th May 2016 |

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| | handling.<br><br>Modbus : Fix to prevent loss of resolution between int and floating point conversions.<br><br>ModbusTCP : update to prevent ethernet port lockup potentially caused by ModbusTCP client frequently re-opening connection (without closing), introduced after increasing number of server connections in fw versions > v2.0255.<br><br>Updated LIST for listing temporary files correctly when a carriage return or line feed is processed.<br><br>Robotics : Fix for AXIS_JOGSPEED and WORLD_JOGSPEED. | user calls 'reset master error status' (ETHERCAT($8)), in addition to clearing unit_error & system_error. Enabled support of 64 bit integers for SoE IDN read/write.<br><br>ECAT : Initial support for RTA Hi-Mod ET drive, fix for RS Automation CSD7 TxPDO length, removed the use of the explicit device ID with the Wago 750-354 ( it appeared to cause a problem with non-dip switch units, seen as a mailbox error ( ESC 0x134 = 0x16 )), initial Trio FlexSlice information, and ECAT_ROBOTICS ECAT drive.<br><br>ECAT : Kollmorgen AKD drive now uses CiA402 touch probe by default (requires recent drive fw.)<br><br>Firmware download : Modification to ensure context switches are more frequent during firmware downloading @ 2ms otherwise the download time is much slower.<br><br>MC508/MC664/MC4N-RTEX/P157 : Enabled Modbus client.<br><br>ATYPE 85 improvements to allow PID gains to be applied and CONNECT functionality.<br><br>A_SPLINE command added to support Akima Splines.<br><br>EU408 : New FPGA variant (4) image added to support BiSS encoders. | |
| 2.0267 + MC508/ MC664 Boot v0.02 | Fixed problem where CHANNEL_WRITE did not work with channel numbers outside of the client channel range 20..29.<br><br>REGIST(20,...) now works OK for the MC664 internal flex axis.<br><br>Fixed an issue that only affected MC405 firmware related to processing of tokens when a NEW "TABLE" command was present in a program, subsequent GOTO/GOSUB labels would not be evaluated correctly.<br><br>MC664/508 : Updated recovery | STICK_READ/WRITE etc. can now specify the SDcard filename as either string or numerical value.<br><br>New FEC codes installed via the RFID interface become active immediately rather than requiring a restart.<br><br>ECAT : Initial support for Cannon-Automata SMC3 drive. | 31st May 2016 |

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| | boot to use empirical DDR 'write leveling' values rather than calibrated values.<br><br>Modbus TCP client: fix to give correct TRUE return when writing multiple registers in 32 bit mode.<br><br>ECAT : Fix for NODE_IO offset index. | | |
| 2.0268 | MC664-X : Corrected 2.0267 problem with FEC codes not working.<br><br>Corrected parsing problems leading to GOSUB/GOTO misbehaviour.<br><br>ATYPE=92 did not function correctly, MPOS did not update as expected.<br><br>Variable names > 32 chars prevented programs compiling.<br><br>VIEW command output corrected as compiled lines were not displayed as expected.<br><br>MC4N : Now allows AIN(32) and AIN(33) to be used by other analogue inputs as there are no built-in Analogue inputs.<br><br>ECAT : Fix for slaves with multiple contiguous AIN values which had been returning zero values for all channel. | BASIC : Optimized link stage of program compilation.<br><br>ECAT : Added support for NODE_AIO and NW_NODE_AIO system parameters used to define AIO mapping based on slave position or configured alias address.<br><br>ECAT : ETHERCAT command updated to support internal slot references eg -1,-2 etc.<br><br>ECAT : Introduced ability to define initialisation commands per slave, and specialized definition for Kollmorgen AKD-C network coupler. Initial support for Berghoff IO and Moog MSD drive, and additional Panasonic drives (in-particular MMDHT variants.). Maxsine VID changed to 0x7DD.<br><br>BASIC : Max number of AIO channels increased to 128. | 17th June 2016 |
| 2.0269 | GLOBAL/CONSTANT statement now rejects invalid variable names eg "VAR%123" which could cause subsequent HMI issues.<br><br>Fix for negative SRAMP buffer profile data.<br><br>Robotics : Improvements including frame 31/41 updates.<br><br>BASIC Library: Fix for local function variables used within GET statement. | Support for P328 16-bit CAN Analogue module added. Analogue outputs remain 12-bit, only the inputs are 16-bit. NOTE: MC464 will not be able to support the P328 module.<br><br>CANIO : Support added for 1MBaud Trio mode and servo syncing.<br><br>MotionPerfect : Added initial version of MC_FILE2 for new versions of MP.<br><br>Improvements to INCLUDE file operations :<br> - INCLUDE files can be nested up to 5 levels<br> - INCLUDE files can contain any normal BASIC commands & constructs, apart from ON | 13th July 2016 |

| | | BASICERROR. INCLUDE files can still of course be used simply for common variable initialisation.

BASIC Library : Added support for writeable array parameters. Updated FUNCTION_LIST to support array parameters.

ETHERCAT command updated to support internal slot references eg -1,-2 etc.

Added OP support to the HMI.

Changed startup sequence to reduce time to first program auto-running and command line becoming active - but only when an SDcard is not present in the controller.

VPU : Added new VPU control mode 2 and axis parameters VP_JERK & VP_MODE.

ECAT : Changes to support new PDO types of EC_PDO_DIN_CH and EC_PDO_DOUT_CH which can be used in the EC_EXTEND file along with a <CHANNELS> channel count to create a PDO set with DIO interweaved between other objects and not in one contiguous block ( as required by the EC_PDO_DIN and EC_PDO_DOUT elements.) Change to the syntax of the

ETHERCAT set sync0 offset function ($91) is now compatible with other commands, and so has the format ETHERCAT($91,slot, vr_index [,value]) | |
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| 2.0270+ MC464 Boot v0.20 | MC464 boot image updated to employ DDR memory calibration in support of new DDR memory batches.

ARM : Mutual exclusion primitives corrected. | | 19th July 2016 |
| 2.0271 | Corrected problem with EtherNet mutual exclusion. | Added support for Panasonic A6N drives.

Added ROBOTSTATUS to encapsulate status flags specific to robotic functionality.

MotionPerfect : Improved | 27th July 2016 |

| | | | throughput of project loading. | | |
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| 2.0272 | Corrected DRIVE_READ/WRITE support for Panasonic A6N drives.<br><br>Repeated includes of the same file caused problems, fix added to reject repeated includes that cause repeat variables ie. a 'script' include file will still be possible.<br><br>Fixed occasional controller lock up caused by resource handling issues when stopping/pausing programs.<br><br>ECAT : Corrected CoE/SoE writing of type 'real32' drive parameters when BASIC parameter is an integer.<br><br>Fixed problem with nested INCLUDE files not always writing to the correct process variable. | Mpv4 : Added string array support to PRMBLK.<br><br>Mpv4 : LOOKUP can now read and write string array elements correctly. | 26th August 2016 |
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| 2.0273 + MC464 Boot v0.21 | Corrected MC664 issue where it immediately restarted after receiving characters in command line window – introduced with 2.0272.<br><br>MC464 : Boot updated to v0.21 to apply fix to older controllers that did not behave well with the latest DDR calibration implementation in v0.20.<br><br>Corrected problem whereby an incorrect 'parameter out of range' error would be displayed when a program stops but only if the program generated an error of this type during execution and handled it with a BASIC error handler.<br><br>ECAT : Corrected 32 max axes node limit on MC4NE, and SoE write command used during startup.<br><br>ModbusTCP : Change to enable reuse of ModbusTCP server connection after the client end has been lost without issuing the appropriate TCP socket close sequence messages. | ECAT : Added initial support for SoE IDN list writes during startup, for executing SoE procedure commands, and the ability to read SoE string IDNs.<br><br>All Beckhoff DIO slices with IO counts of < 8 changed to 8 bit. Despite this creating padding with dummy IO values, it is required to support kernel DIO allocation (which would be too inefficient to change from byte boundaries.)<br><br>Ethercat($88/$89) syntax changed to add timeout_index parameter. Previously this command only accessed the overall startup timeout, now it can be used to access individual ESM statechange timeouts as well.<br><br>Added system parameter NW_TIMEOUT to enable configuration of individual statechange timeouts in MC_CONFIG. Added initial support for AKD-C string 1 and 2 devices. | 12th September 2016 |
| 2.0274 | Setting SERVO_PERIOD within a user programs caused the program to stop in error.<br><br>Improvements made to VR backup scheme. | TIMER command now supports full range of digital outputs.<br><br>Added IS_PROG and PROG_TYPE commands to interrogate program presence/type. | 26th October 2016 |

Fixed compile error with string = string(n).

CAM/CAMBOX rounding error caused by a fractional length part of the full CAM/CAMBOX length.

FILE "LOAD_PROGRAM" did not support VRSTRING unless a separating comma was used.

Corrected precedence of shift operators '<<' and '>>'.

BASIC Library : fixes applied for parameter passing. Local single entity variables now initialised to 0 each invocation of function. Command line process had memory leaks when using library functions.

BASIC Library : Compile error now generated when FUNCTION keyword is used within a normal BASIC program. A FUNCTION within a FUNCTION will also generate a compile error.

CO_READ/CO_WRITE updated to support internal ECAT slots

PLC_CONFIG bit 1 now used to control whether IEC boolean values transfer -1 (default) or 1 as the represented value.

Output of DIR/PROCESS commands updated to reflect the fact that program names can have up to 32 characters.

DIR B updated to always produce MPE format output.

FLASH_LOG : Entries added when VR/TABLE memory is cleared using CLEAR/NEW "TABLE".

OUTDEVICE/INDEVICE now support channel 4 for HMI client.

BASIC Library : The following commands can now be used within library functions:
DEL, DIR, EDPROG(1), NEW, RENAME, RUNTYPE, SELECT, LOOKUP, BREAK_ADD, BREAK_DELETE, BREAK_LIST, BREAK_LIST, EXECUTE, TROFF, TRON.

BASIC Library : FUNCTION_LIST updated to provide program name & line number information for Motion Perfect to work with.

Robotics : Data type TARGET and GTA/GTAMAP entities added to support compiling of generic test programs. JOG_OPERATION now supports AXIS modifier.

LIST now supports binary files and displays them using hex format.

CanOpen CiA402 : axis support updated to ensure CAN buffer is within range before writing to CAN chip, this will help prevent any strange effects when an encoder only axis is connected - the output CAN buffer can simply be set out of range to prevent PDO transmission.

| 2.0275 | Fix applied previously in 2.0274 to support VRSTRING in a FILE command caused some problems with certain syntax. Fix has been reworked.<br><br>MC664-X did not show all text on startup.<br><br>Extended Module axes were not available during startup.<br><br>Fix for side effects caused by updating SERVO_PERIOD within an IF..ELSE statement.<br><br>PWM support enabled for MC508/MC664.<br><br>Fix for potential corruption of commands received in parallel from command line, MPE and HMI processes.<br><br>MotionPerfect : Core number did not display correctly within process window of MP for multi-core controllers, eg MC664-X.<br><br>BASIC Library : Corrected program dependencies when nested function calls affect multiple programs.<br><br>Invalid STR parameters could cause a controller crash.<br><br>SRAMP : Fix applied for systems that use frames and very high values for UNITS.<br><br>MC664-X : Underlying multi-core synchronisation improvements. | ASC updated to support an optional index parameter.<br><br>BASIC Library : Breakpoints within a function are now ignored if the main executing program is not a user program.<br><br>MP : Runtime error reporting now supports BASIC library files.<br><br>ATYPE 94 Added : PWM output with servo/encoder feedback.<br><br>MC464 : Maximum number of user defined functions increased from 64 to 128.<br><br>HMI : Support added for sending Channel 9 messages.<br><br>IS_PROG/IS_FILE now supports "SD:" and "RAM:" prefixes.<br><br>COPY can now be used from within a BASIC program/library. | 21st November 2016 |
| 2.0276 | MC664-X, downloading firmware @2ms caused the controller to freeze. | COMPILE/COMPILE_ALL/PROCESS can now be used from within a BASIC program/library.<br><br>COMPILE will now accept an optional program name parameter, for example: COMPILE "initdata".<br><br>STRING variables can now be opened as a file.<br><br>MC664-X : SCHEDULE_TYPE bit 2 can be used to disable multi-core. | 24th November 2016 |
| 2.0277 + | MC664 DDR Controller SDCLK Duty Cycle changes, iMX6 boot updated. | BREAK_LIST : updated to support compact output when | 5th December 2016 |

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| MC664 Boot v0.03 | Fixed MC_CONFIG issue related to the use of a modifier (such as AXIS). 'Invalid mix of data types' error was being generated for valid syntax. It was raised when strings are compared and the result subsequently used within a bigger logical expression. Fix for MPv4 value returned for a process occupying 100% CPU time on a multi-core platform. GTA entry did not reset the ID name when changing 'active' flag to FALSE. | requested from a user process. BREAK_LIST/BREAK_RESET : updated to support a request for "ALL" programs. Support added to open STRING variables as a file. Processes now share string heap allocation rather than restricted to a fixed size per process. Added new error (210) to raise when a program fails to start successfully. | |
| 2.0278 | ALL MC664 users MUST upgrade to this version or higher. MC664-X : Multi-core EtherCAT problem fixed that could result in watchdog E06 errors. MC664-X fix for multi-core problem with move requests becoming 'lost'. BASIC Library : Corrected problem relating to nested function calls where functions are called to generate parameters to other functions. | BASIC Library : Improved some error reporting related to duplicate identifiers. Increased maximum number of nested function levels from 5 to 16. | 13th December 2016 |
| 2.0279 | | | Not released |
| 2.0280 + EU404 FPGA image $0404 + MC664 FPGA image $010F | Very long lines (compiled code length > 255); fixed problem when setting breakpoints, and also when using VIEW. IDLE and LOADED can now be scoped as expected. Fix applied for using GOTO to jump from inside a FOR..NEXT structure, this could cause problems for subsequent FOR..NEXT statements. Improvements made to automatic re-compiling of library files when necessary due to program dependencies. Fixed MC664-X/HMI communication problems. Using COMPILE_MODE=1 and | Increased number of programs from 32 – MC403, MC4NE etc. now have 64, MC508 has 96 and MC664(-X) has 256. Added support for CONTINUE and EXIT_LOOP statements within loop structures FOR..NEXT, WHILE..WEND and REPEAT..UNTIL. ActiveX : New 'heartbeat' scheme added for REMOTE_PROGRAM including REMOTE_PROG_STATUS token. BASIC Library : Added check to ensure at least one RETURN statement is present within a function that returns data. Also added checks to ensure parameters and return data are of a suitable data type at compile | 1st February 2017 |

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| | GLOBAL/CONSTANT; names are now not case sensitive. (Names are still read as lower case during run-time.)<br><br>Fix for internal flex module in MC664; when fully loaded with 7 external modules it now correctly ignores the internal EtherCAT module and allocates internal flex module to slot 7 (-1).<br><br>MC664 FPGA update: Fix for Bus Writes that affected DAC outputs, improved analogue input read performance and absolute encoder support added.<br><br>Fixed problem with slow MC464 downloads.<br><br>MC664/MC664-X : Fix for loading SDcard projects using the command line which could cause a reset and an E06 error to be generated – other controllers were OK and using Motion Perfect was OK for any controller. | time even though a runtime error would be generated.<br><br>BASIC Library : GOTO statements including ON … GOTO… are now permitted within the bounds of a function.<br><br>BASIC Library : Support added for cyclic dependent libraries.<br><br>Added new IN_POS, IN_POS_DIST and IN_POS_SPEED keywords.<br><br>MC664-X : PROCESS command output by default no longer displays the 'idle' core processes by default – 'PROCESS X' now needs to be used to request extended data.<br><br>Constant literals such as ON/OFF, TRUE/FALSE etc. now compiled and executed more efficiently.<br><br>EU404 : Support added for time-based registration in EnDAT FPGA variant.<br><br>Mpv4 : Automatic MPE direct mode applied if controller thinks that Mpv4 has exited SYNC/TOOL mode but the controller is still in SYNC/TOOL mode, communication problems can cause this situation to arise. | |
| 2.0281 | SLM/PLM performance was not good on the MC664 controller, it was discovered that this was due to an underlying servo cycle jitter.<br><br>MP : Fix for synchronisation problems with MC664-X when a program generated a runtime error, MP would think the program was still running.<br><br>ECAT : Corrected SoE Touch probe function pointers.<br>Correction to ELMO CSV profile. | INT_BASE : Added new command for converting integers to binary, octal or hexadecimal strings :<br>INT_BASE(number, base <,width>)<br><br>ECAT : Additional Bosch SoE drive profiles added, supporting both Indradrive C and Cs drives. | 9th February 2017 |
| 2.0282 + MC4NR FPGA image $0106 | FPGA for MC4N-RTEX to fix spurious registration triggers on inputs 0 to 7.<br><br>Fix for IEC tasks that do not continue running as expected after modifying a BASIC program or HMI design file. | Implemented SELECT_CASE..END_CASE construct, maximum individual CASE statements is 64 per construct.<br><br>Support added for 'Watch Variable' debugging support of local function | 24th March 2017 |

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| | Fixed SDcard problem when using a SEEK or APPEND request on a file that has been opened but not read - not all of the cluster related data was initialised when the file was initially opened to handle this situation correctly causing incorrect data to be read (SEEK) or written (APPEND).<br><br>Fixed problem viewing multi-dimensional array elements within Motion Perfect Watch Window.<br><br>GLOBAL/CONSTANT references did not work as expected within BASIC Library functions.<br><br>Controller crashing problem fixed when re-loading the last program in the directory and it is > 128KB.<br><br>BASIC Library : Fixed problem when a break-point is set on a RETURN statement - the program would break-again instantly upon returning from the function even though no break-point was present on the calling program line.<br><br>HMI : Fix applied for handling 2 clients simultaneously.<br><br>ECAT : Corrected incorrect axis assignment that could occur when a network containing multiple drives with multiple axes which were using alias address. | variables/parameters within a BASIC Library file.<br><br>PROC_STATUS modified to return a sleeping state value (8) when the process is sleeping - previously it would return the running state value (1) but it would be useful to know when a process is in a sleep state.<br><br>TEXT_FILE_LOADER_STATUS keyword added so the user can monitor what is going on.<br><br>ECAT : additional SoE drive profiles added supporting both Indradrive C and Cs drives and initial SoE touch probe support added, corrected ELMO CSV profile, added VR mapped profile for Trio P375 stepper slice. Increased number of SDO objects supported for startup of 64 axis networks. | |
| 2.0283 | Corrected 2.0282 GLOBAL/CONSTANT program corruption error when a project does not contain any library files.<br><br>Mpv4 : Directory file names containing spaces are no longer reported with the spaces replaced with '*' characters. | Added support for tool tip interrogation of local function variables and parameters. | 3rd April 2017 |
| 2.0284 | BASIC Library : Corrected problem watching single dimension string parameters.<br><br>MOVETANG did not behave as expected (broken in 2.0274).<br><br>Enable outputs are ON even though WDOG=OFF for any ATYPE that uses enable output (Z).<br><br>Short pulse on Enable output when ATYPE changed to ATYPE with Z | Added new mode 4 to MOVE_PA_CONT & MOVE_PB_CONT to allow up to 32 outputs to be set in sync. MOVE_PA(_IDLE) bit pattern is 0..11=First Output, 12..17=Count, 20..51=Pattern<br><br>Added Robotic Features with 1 hour free use controlled via FEC 26.<br><br>LINPUT and INPUT now terminate | 22nd May 2017 |

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| | output (or at power up).

LINPUT now stores characters correctly to string variables. | at end-of-file on a TrioBASIC file.

FRAME : Added frames 32 (3 DOF Delta linear axis) & 33 (XYZ + 2 Axis Wrist with offset).

Error now raised when writing to a file not opened for writing.

ECAT : Initial support for Trio P375 stepper flexslice profiles. | |
| 2.0285 | Minor OS fix for Flash activity.

Fix for OPEN command; OPEN for a text file that already exists caused a corruption error.

Fix for Text File corruption after adding a manual Carriage Return.

Corrected potential program corruption when using FIFOs.

HMI : Fix to avoid HMI async messages hanging the controller.

IEC : Fix for TC_PRINT function block when an error is generated (eg requested channel is not open) - the controller could crash. | New EDPROG function 15 (w/W) added to request a list of DIM defined variables.

LCD$ added as an alternative name for LCDSTR. | 16th June 2017 |
| 2.0286 | MC508 ATYPE settings within MC_CONFIG for axes 8 to 15 were not processed. Now fixed.

Fix for issue with jogging until a limit is reached and then moving away again. It did not behave properly if SRAMP was active.

ENCODER_BITS did not work as expected for EtherCAT encoder axes, the firmware would revert to 32-bits. Now fixed.

MC508 displayed lock code has been fixed.

AXIS_ENABLE is accessible for any ATYPE, not just for axes with a 'Z output'.

Fixes for Frame 33 are included in this version. | AXIS_MODE bit 9 now used to control accumulation of FE errors within I_GAIN. I_GAIN output is frozen during moves and released when IDLE.

ECAT : Revised CoE drive enable/disable state machine, with user definable max delay during disable set by ETHERCAT function $7E.

ECAT : Enabled use of profiled velocity ctrl mode value (3) in target ctrl mode cyclic data. | 12th July 2017 |
| 2.0287 + MC403Z FPGA image $0303 | GLOBAL variables used in HMI bindings did not work if they were declared but not actually used within a program.

Corrected problem when | FILE "LOAD_PROGRAM" now supports overloading of the file type by allowing the user to specify an optional parameter that identifies the extension of the required file type, eg | 4th August 2017 |

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| | comparing 53-bit integer values within float variables or VR/TABLE locations - a difference in value of a single LSB was incorrectly being evaluated as equal. This was traced back to a change made in 2.0262 for comparing floating-point numbers with a 1-bit tolerance.<br><br>Scope : SRAMP parameter was not scoped correctly. | FILE "LOAD_PROGRAM" "MYFILE.XML" "TXT" 'Load XML file as a text file.<br><br>MC403Z : FPGA image update.<br><br>Robotics : ROBOT_LOG command and feature added.<br><br>Robotics : Always send GTA update messages, not just in MPE mode so that the HMI will update correctly.<br><br>ECAT : New Base and SlotPdoIncrement elements supported by EC_EXTEND file. | |
| 2.0288 | Fix for the dynamic memory allocation which was not working correctly for IEC program tasks.<br><br>TC_MOVELINK_v2 prevented ST program from executing.<br><br>GLOBAL could cause a 'corrupt' error if executed within an autorun program before the command line becomes active.<br><br>Improved DEFPOS check where it should only return after all axes have cleared their OFFPOS, it was possible for DEFPOS to return prematurely.<br><br>ECAT : Corrected 0x6060 write (from 1 to 7) for Metronix ARS2000 position profile 0. Corrected issue which caused calculation of incorrect number of DIO on Festo coupler, and corrected use of ethercat ( $200/$201 ) which accesses NODE_DATA for control of the Festo coupler DIO length and offset within the cyclic data telegram. | Added IEC FB TC_FLEXLINK.<br><br>New error E10 reported if RFID system is not operating as expected.<br><br>ECAT : Default sync0 timing changed to 0.<br><br>ECAT : Added read of the slave revision number along with VID & Product code during startup.<br><br>ECAT: Issue warning but continue with protocol startup if ESC writes fail for all actions except state change writes.<br><br>ECAT : Added Sanyo Denki RS3 support and emoved non-standard profiles from Sanyo Denki RS2 set.  Added initial support for a range of Ingenia drives, Inovance IS810N, Panasonic A6, and Shenzhen Han's Motor's 'Meta Servo' Drive.<br><br>ECAT : New Trio Stepper-encoder Flexslice P375 profiles (includes registration support), and support for the ToE protocol re-program for the new larger FPGA devices. | 8th September 2017 |
| 2.0289 | Fixes for MOVECIRCSP corner mode when used with transition angles.<br><br>Corrected COMPENSATE_XY behaviour, broken in 2.0284, but also had another bug meaning that the option to follow MPOS did not work. | Added new SYSTEM_ERROR_MASK to control which SYSTEM_ERROR bits drop the WDOG when an error is raised.<br><br>Frames : Frame 19, 31 & 116 improvements.<br><br>Robotics : Added keywords | 23rd November 2017 |

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| Fix for PSWITCH outputs that could be latched on after turning off the PSWITCH – MC664-X multi-core problem only.<br><br>Startup issue resolved when compiling programs with cyclic dependency.<br><br>HMI : Fixed program loading. | TOOL_COLLISION, COLLISION_OBJECT, ROBOT_PROJECT_NAME, AXIS_FASTDEC and WORLD_FASTDEC.<br><br>Added volatile text files and robot specific BASIC program types.<br><br>ECAT : Revised ETHERCAT $68 & $71 slave information display functions.<br>Updates to ETHERCAT($101) function to enable it to be used to load UCP EC_EXTEND file line by line via the command.<br><br>EDPROG : Added function 16 (B) to produce a list of comment lines.<br><br>IOMAP can now be invoked from a BASIC function.<br><br>TextfileLoader can now support binary image files.<br><br>ModbusRTU client : ModbusTCP client and server changes to :<br>(1) Support 16 ModbusTCP server sockets,<br>(2) Enable the user to define char timeout in Modbus() client open connection command or the ETHERNET() command for ModbusTCP server.<br>(3) Better error recovery achieved when Ethernet/serial cable is removed/re-inserted.<br>(4) Additional stats and diagnostic information available.<br><br>TextfileLoader can now support binary image files.<br><br>Ethernet : Increase number of Rx buffers from 4 to 128.<br><br>ECAT : Increased number of init cmds supported (and recorded as enabled or not) for each slave. Support for 'express' startup in which we do not run the 5 second 'reset errors' after entry into operational state.<br><br>ECAT: Additional warning messages added to the MAC initialisation routine. ( level 3 warning messages, enabled by default, which will print out a message to the commandline |

| | | indicating which MAC initialisation call failed. This will help determine the cause of 'Error – protocol not running' problems.<br><br>ECAT: Support for P375 stepper slice special startup commands. Also support for Revs 1, 2 and 3 of the board with differing FPGA update and startup configuration mechanisms.  Initial ACTI drive support added, base CSP profile. Added P379 (flexslice AIN) v2 config (with CoE & FoE support), and identify P379 as rev 1 and rev 2 in name. [Note, this depends upon the the revision number held in the SII EEPROM on the slices]<br><br>ECAT: Now also uses the device revision (along with Vendor ID, Product ID, control mode and profile number ) when selecting device config from the internal library or user defined profiles. | |
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| 2.0290 | MC508 FPGA_VERSION value was reported incorrectly.<br><br>File "LOAD_PROGRAM" required BAS extension otherwise program is saved with a .BAS extension in its name – bug introduced in 2.0287.<br><br>CAMBOX pattern mode fixes.<br><br>Corrected synchronisation problem when executing a GLOBAL/CONSTANT command whilst another process is starting but not fully initialised.<br><br>HMI : Fixed bug opening SD card files.<br><br>MC464: ModbusTCP client support fix. | New ATYPE 71 added to support a Trio Stepper Slice Position mode axis, this will not require an FEC but will only be available via automatic assignment by the firmware.<br><br>MICROSTEP reverted to its own keyword rather than a pseudonym.  For backwards compatibility.<br><br>ECAT : New ATYPE 70 added to support an EtherCAT encoder input with an Analogue output.<br><br>New keywords introduced : CRANK_CAM, CUSTOM_FUNC, USER_PID, HANDWHEEL_AXIS, MOVEPICK, MOVETURN, PICKLINK.<br><br>MOVELINK : multi-axis support added.<br><br>Added code to prevent certain operations when in FRAME – DEFPOS, OFFPOS, DATUM.<br><br>RFID error (introduced in 2.0288) is now downgraded to warning and FLASH_LOG entry.<br><br>FLASH_LOG improvements : allows for corrupt entries and | 16th February 2018 |

does not record repeated CPU exceptions that could quickly fill the log.

RPS : Added support for the RPS BASIC program type.

RPS : Updated MOVEJ etc. to allow named parameters with more than 1 character eg. MOVEJ ZT2:=1.5.

RPS : Added new PENDANT_USER keyword.

RPS : Robotics : Collision detection improvements.

Added AXIS_MODE bit 10 to allow FASTDEC to be disabled when an axis is being jogged.

Added OUTPUT_PROGRAM_TYPE token. This is used in OPEN #<channel> AS <filename> FOR OUTPUT_PROGRAM_TYPE(<expression>), where the values for <expression> are the same as the SELECT command.

Added TOKENTABLE(1) variant to report array variable dimensions.

PC-MCAT - Added EX(4) which does a reboot as full as possible without stopping the monitor service.

EthernetIP : Added support for second Assembly object (class 0x04) instance pair of 102 (network input, Target to Origin) and 103 (network output, Origin to Target) for ARM controllers. This will enable support for two EthernetIP scanner (clients.) Added ability to parse and use socket address item in the forward open connection string (for the TO connection.)

ECAT : manually changing ATYPE is now probibited and results in error 221.

ECAT : Added ECAT_MODE which enables users to define whether a system error is raised when an EtherCAT emergency message is received; can be added to MC_CONFIG.

| | | ECAT : New profiles: rev 2 profile with CoE and FoE support for Trio's P378 and P379 flexslices. Unified support for P375 profile revisions 1 to 4. Reflect the state of the axis parameter invert_step in bit 11 of the control word (CoE object 0x6040:0) for P375 stepper-encoder flexslices with revision 4 and above. Initial P376 NPN digital output profile, and Elap encoder.

ECAT : Initial MDP Device support added.  Reads CoE object 0xF050:0..n to determine modules connected to coupler.

ECAT : Network slave device profile identification now includes revision number along with vendor ID and product code.

ECAT : Express startup faster in the safe-op to operational state change.

ECAT : When running an FoE file write we now return false and write error code 19 to the EtherCAT runtime error log if the file does not exist. | |
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| 2.0291 | Allow EtherCAT ATYPE change between 65, 66 and 67.

Update to tag invalid values (NaN, infinity) within the variable Watch Window using #INVALID_xxx to ensure Mpv4 behaves correctly and displays the invalid values as 'Nan' or 'Infinity' and the other values as expected.

AXIS_OFFSET SLOT(-1) was incorrectly being copied to SLOT(0) if it was zero, but only on the MC4N/6N controllers.

Function parameter name generated a compile error if it contained the character '0'.

Printing to a file channel could cause a controller crash and also files generated in this way generate a 'program corrupt' error when listed.

If a program fails to compile at startup due to having an INCLUDE cyclic dependency then MPv4 will | FLASH_LOG feature has now been enabled for all remaining controllers that do not currently support it : MC403, MC405, EU404, EU408, MC403Z, MC405Y and P157.

Added PROGRAM_NAME (or PROCESS_NAME) keyword to return name of executing program.

Increased TrioBASIC file channels to 9.

New ATYPE 37 added (PWM output with Step/Direction input).

New command TABLE_PROTECT added.

Improvements to MOVEABSSEQ, MOVETURN, MOVEPICK and PICKLINK.

MC508 : INTERNALIO_BASE functionality added | 31st May 2018 |

fail to connect.

If an axis is part of a FRAME_GROUP and the FRAME value is 0 then a DEFPOS request will be rejected with an error indicating that the axis is in FRAME even though it is not.

Programs could become corrupt due to resource management error when modifying or creating programs.

Bugfix for ETHERNET(0:read) command.

BASIC : STICK write commands did not check the 'Write Protect' status as they should.

ECAT : Corrected P375 rev 1 and 2 PDO lengths configuration. Resolved potential incorrect axis mapping in network with a multi axis node. Enabled support of max slice count in ES8200 MDP device

BASIC : KEY on a FIFO file now returns the number of bytes available.

BASIC : UTF8 support added including changes to CHR to request UTF8.

Added new keywords : AXIS_BLENDING, AXIS_DIRECTION, AXIS_JERK and WORLD_JERK.

Error 115 now reports the variable name in error string.

FLASH_LOG : update to to record the active SERVO_PERIOD in startup message.

BASIC : Maximum number of CASE statements increased from 64 to 200.

BASIC : Support added for PROJECT_KEY_REGISTRY

Infinity VR/TABLE points no longer backed up to flash as per NaN data points.

LOOKUP : variable names now case sensitive.

ECAT : The profile revision number is now used when looking up the slave Tx and Rx PDOs and mailbox configuration in the internal library and EC_EXTEND files.

ECAT : Enable user to set a working counter limit of 1 and to over-ride the default startup procedure of waiting for the sync0 startup period to expire before requesting network change to operational state (using bit 1 of ECAT_MODE, eg ECAT_MODE SLOT( n ) = 0x02).

ECAT : Enable the user to define the CW value used by a drive when in enabled state (using the ETHERCAT($7e/7f) commands.)

ECAT :  Added support for read/write CoE VS (Visual Strings), using ETHERCAT command ($40/$41) and to/from VRs or variable of TrioBASIC string datatype.

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| | | ECAT : Initial Leadshine Technology stepper drives config, Fastech profiles for Ezi-SERVO2 EtherCAT 86 and S-SERVO EtherCAT, Trio P600 profile used for the ESC IC on the Flex6Nano board, Leuze AMS338i, new CT Profile for M700 RFC-S drive (PID 0x01030102) to include max current, and actual speed and actual torque (on profile index 10), and empty profile for Beckhoff CU1128 switch.<br><br>ECAT : WDOG no longer dropped when stopping the Ethercat protocol. | |
| 2.0292 | Change to increase TrioBASIC file channels to 9 was incomplete and did not function.  Now fixed.<br><br>Fixed BASIC Library problems when programs are created using OPEN in a project containing library files that do not compile successfully.<br><br>MC664 : Undefined Instruction exceptions could cause E06.  Now fixed.<br><br>Using VR(n).bitnum=… inside a FUNCTION generated a runtime error.<br><br>Using OPEN on an Sdcard file did not function correctly for MC664, MC508, MC6N-ECAT and Flex6Nano controllers.<br><br>Fix applied for LOOKAHEAD_FACTOR.<br><br>Fix applied for MSPHERICAL when using rotational axes.<br><br>Fix applied for when a client file is opened via OPEN after a local file is also opened via OPEN, an error would be raised by mistake indicating that the channel was already open.<br><br>BASIC Library : Subtracting 2 array parameters from each other incorrectly generated a compile error of data types not matching.<br><br>ECAT : Fix for startup of the Balluff BLT6 device (don't attempt to | FLASH_LOG now records more details about any exceptions that occur – a type code (0=Data Abort, 1=Undefined Instruction, 2=Prefetch Abort) and address of where it occurred.<br><br>SETLINE added to change the current line of BASIC being executed.<br><br>STICK_READ/WRITE and STICK_READVR/WRITEVR updated to support a new format option (2) where the CSV data is defined using pairs of <index,value> data. Existing format option 1 also updated to support commas being used to separate data values.<br><br>IEC : Implemented RTC related functions for accessing date/time information. Enabled support for random number generation function.<br><br>RPS : Local TARGET variables are now assigned an ID using the variable name. Added KINEMATIC_MOVEDATA command.<br><br>Frames : Added support for 25 (4 DOF Palletizing Robot) & 35 (Dual SCARA ARM Robot).<br><br>ECAT : EcatFrameRetry parameter added to enable the user to define the number of times the master re-sends the initial network discovery frame (required by Profichip's ESC | 31st July 2018 |

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| | initialise SM 2 & 3.) Fix to ensure the ethercat startup message displays the correct profile name when there are profiles for multiple control mode types (eg pos/speed/torque) for the same device in the EC_EXTEND file.<br><br>Improved service channel frame release mechanism (as this is performed atomically and was causing excessive servo period jitter in 2.0291.) | chip.) | |
| 2.0293 + MC664/MC508 Boot v0.05 | Corrected an effect where NTYPE was indicating IDLE when LIMIT_BUFFERED=64 and MOVES_BUFFERED=64.<br><br>Fix for program storage reported by some users.<br><br>MC464 Pendant user data was not initialised correctly. Now fixed.<br><br>GLOBAL/CONSTANT stopped functioning via the command line in 2.0287. Now fixed.<br><br>REMOTE : Improved remote program error handling for TrioPC ActiveX connection.<br><br>Boot code improved for MC664 and MC508 controllers to make checking the recovery mode switch more robust by also checking for FPGA activity. | Increased the maximum number of GLOBAL and CONSTANT declarations for all Motion Coordinators (not MC464) –<br>• ARM 11; (MC403, MC405, MC4N) from 1024 to 4096.<br>• ARM Cortex-A7/A9; (MC508, MC664(X), Flex-6 Nano) from 1024 to 8192.<br><br>Fix to restore operation of Ethernet IP multi-cast which was broken in V2.0290. | 15th August 2018 |
| 2.0294 | Fix for ActiveX problems with 'GetTable.<br><br>Flex-6 Nano P600 TICKS token fixed.<br><br>Volatile file types (created using OPEN #n AS "filename" FOR OUTPUT(1 or 2) are not behaving as volatile as they used to, they are currently preserved in flash memory.<br><br>BASIC Library : Corrected incorrect compile error when a local function variable is said to duplicate a main program variable.<br><br>CAN : Fixed intermittent connection problems found on MC508 controller. | Added FLASHTABLE function 4 to erase a flash page.<br><br>Added new non-volatile and non-sync'd text file type created using OPEN #n AS "filename" FOR OUTPUT(3).<br><br>BASIC : Added new PATH_FLOW command. | 7th September 2018 |

| 2.0295 | Fix for APPEND. | AXIS_MODE bit 13 added to enable FE limit checks for ATYPE=85. | 15th November 2018 |
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| | 3D Simulation Tool highlighted a potential deadlock situation related to channel 8/9 comms causing MPv4 synchronisation problems for active processes.  Now fixed. | Using INCLUDE inside a BASIC Library now generates a less confusing error message. | |
| | Fix for program corruption after loading a large project with some large individual programs. | Improved parsing for double quotes in Trio BASIC. | |
| | Fix for problems after creating a program that causes an 'out of memory' error. | Improved parsing for '?' (shortcut for PRINT) when no space char follows. | |
| | CHANNEL_READ should return a negative value when using a string variable to store the data, it was returning a positive value. | Increased max size of PROJECT_NAME and ROBOT_PROJECT_NAME to 128 chars. | |
| | MC664 failed to reset as expected after an EX was executed.  Now fixed. | Added OUTPUT_PROGRAM_TYPE token. This is used in OPEN #<channel> AS <filename> FOR OUTPUT_PROGRAM_TYPE(<expression>), where the values for <expression> are the same as the SELECT command. | |
| | Fix for GLOBAL/CONSTANT variables which were rejected with COMPILE_MODE=1. | MOVEABSSEQ : New features added, options bit 6 = transferred to mode bit 11 of MSPHERICAL for MOVETURN or MOVE activation; bit 7 = table has 2 positions for each auxiliary axis to allow specification of position at start and end of blend. | |
| | MOVE/MOVEABS : Fix applied for 3D mode. | | |
| | MOVEABSSEQ : Fixes and new features added. | | |
| | CAMBOX : Multi-Axis mode fix. | | |
| | HMI : Now closes the socket when a session ends. Also clean up the HMI command shutdown sequence. | FILLET : Added an extra mode so that three points can be used instead of two vectors. Command now allows the radius to be specified as a percentage of the largest possible radius. | |
| | | CHANNEL_READ : Added support for float arrays and multi-dimension arrays. | |
| | | FRAME 41 (4 axis SCARA) improvements. | |
| | | MOVETURN improvements (mode 4) | |
| | | STRTOD : Added new mode to support GCODE style command strings. | |
| | | PC-MCAT : Shutdown improved. | |
| | | MC508 : Added support for | |

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| | | Tamagawa absolute encoders using High Density connectors.<br><br>ECAT: Added initial Estun Buffalo (ED31) drive config.<br><br>Added support for two new PDO objects in EC_EXTEND files. There are a second encoder input and a TARGET_DPOS which can be linked with an axis_offset.<br><br>Enabled EC_EXTEND files to be used with the Omron G5 drive. Previously this was prevented due to specialisation of this drive within the firmware.<br>Enabled use of the actual torque PDO object within the Omron G5 telegram. (G5 fw rev 2, 2.1 and above)<br><br>EthernetIP : Change to support TCP messages to be transmitted in one Ethernet packet. | |
| 2.0296 + MC464 Boot v0.22 | Improved MC464 'display on' time from 13 seconds at power-on to around 2 seconds, overall boot time (to command line prompt) is still the same but this gives confidence that the controller is starting up successfully. The MC464 boot code was updated to achieve this. | Ethernet : Enable user to define controller TCP client connection keep alive parameters.<br><br>RPS : Added DISABLE_ROBOT to allow fast stop of RPS programs and all motion.<br><br>FLASH_LOG : improvement to improve order of program create/save events.<br><br>COMBINE_AXES : Added new mode 2.<br><br>MOVEABSSEQ now updated TABLE_POINTER to show progress.<br><br>PC-MCAT : Improve ECAT detection messages.<br><br>EtherNetIP : Support for AB specific read/write tag (services 0x4c/0x4d) | 21st December 2018 |
| 2.0297 | MC464 : Fix for potential lock-up during startup if RTC does not communicate. (Affects 2.0293 – 2.0296)<br><br>Fix for DISABLE_ROBOT to prevent programs loading new move requests before halting.<br><br>An empty ON BASICERROR label | Added facility to configure all user tasks as 'slow' tasks ie. no fast tasks. (SCHEDULE_TYPE.6)<br><br>DIM statements for single entity variables (BOOLEAN, INTEGER, FLOAT) can be given initial default values, eg. DIM x,y,z AS FLOAT = 123.456. | 11th April 2019 |

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| | triggered a 'program corrupt' run error. | USER_PID modified so it can provide an automatic update mode. | |
| | Fixed side effects (eg. token table displayed) when compiling a program whilst other programs are running that use BASIC library functions. | CASE statements will now accept hex format numbers eg. $FF | |
| | BOOLEAN variables did not behave as expected when used within a divide operator. | New ATYPE (95) added with stepper output and Tamagawa position verification. | |
| | FORCE_DWELL would cause problems if a cancel is requested during the dwell period, the next buffered move would load but not activate any motion demand. | Activated SLOTn_TIME parameters on dual-core configurations.  Some core 0 processes can now be moved to core 1 on multi-core controllers via bits within SCHEDULE_TYPE : Bit 3 = TCP/IP stack, Bit 4 = Protocol scheduler, Bit 5 = EtherCAT Asynchronous. | |
| | Potential E06 watchdog trip after enabling 3D Sim tool followed by closing laptop. | MC664-X now supports up to 128 EtherCAT axes. | |
| | Improved directory checksum sum mechanism to prevent corrupt directory being reported. | Added new background process to offload general purpose activities from main protocol handling process as they may contribute to slow response times. | |
| | ECAT : Fix to resolve issue when running 2 EtherCAT networks on an MC664X. It was possible for a protocol restart on one network to fail to reach ESM Operational because of an SDO telegram error between the networks. | TANG_DIRECTION support added for MOVEABSSEQ. | |
| | ECAT: Fix to enable correct operation of the DIO associated with an MDP coupler on the F6Nano and PC-MCAT. | ECAT : Change to support multi axis configuration definitions defined in EC_EXTEND files. This enables use of single PDO definition (<Base>1</Base>), and then multiple ACTUAL_POS or ACTUAL_ENCODER_POS PDO elements each with <AxisOffset>0/1/2/3 etc</AxisOffset>) | |
| | ModbusTCP : client function 23 wasn't storing the register values read back from the server at the correct address in VR or TABLE memory. | | |
| 2.0298 + MC508 FPGA image version $010A + MC403 FPGA image version $0213 + MC4NE | MC508/MC664 fix implemented for MP uploading of HwDef zip file, it was possible for the wrong data to be sent to MP and error reported.  Fix for axis creep when FWD_IN/REV_IN are active or FS/RS_LIMIT are active, each new move request can move a little before being canceled again.  VP_MODE=5 blending (merge) did not function correctly.  Including an INCLUDE file that | Added new optional parameter to EXECUTE to allow the command output to be displayed via OUTDEVICE.  Added FMOD operator to provide floating-point modulo arithmetic.  Added more bits to SCHEDULE_TYPE: bit 7 = Run HMI on core 1; bit 6 = Flat task scheduling.  MC664/X, MC508, MC6NE, F6Nano : Pswitch count increased | 2nd October 2019 |

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| FPGA image version $010B + F6NANO/ MC6NE/M C664/MC5 08 Boot v0.07 | initialised DIM variables in the declaration did not inherit those initial values.<br><br>EnDat encoders stopped working in 2.0297<br><br>Fix for potential controller crash when multiple processes try to stop the same IE program.<br><br>Fix applied to prevent potential E09 when FWD_JOG/REV_JOG (and other motion inputs) are used.<br><br>MC_CONFIG : After an E06 error the MC_CONFIG file would always be flagged as being changed.<br><br>Flex6Nano : Fix for communications loss when the system load exceeded 70% approximately.<br><br>SDCard interface improvements :<br>- SPI interfaced SD cards did not succeed on the first access<br>- SD interfaced controllers did not always detect an SDcard correctly due to SD card Pull Up resistor being disconnected prematurely – boot updated as required<br>- SD format operation did not clean all required blocks | to 256.<br><br>Programs that do not generate any 'object' code are now marked as being successfully compiled.<br><br>MOVE_ADD command added to provide an additional profiled offset to an axis, FORCE_SPEED, FORCE_ACCEL/DECEL and FORCE_JERK used to control the profile. Use CANCEL(5) to cancel this new additional motion. AXISSTATUS bit 28 indicates when additional offset is active, bit 29 indicates when it is being cancelled.<br><br>Added CALC_COMP_XY keyword.<br><br>FPGA images : updates for EnDat not working correctly. | |
| 2.0299 | MC464; Improved startup with Boot 22 to solve EtherCAT operation reliability.  (fixes issue in 2.0296-2.0298)<br><br>Fixed MC4N-RTEX problems with re-initialising the RTEX network via DRIVE_INTERFACE, absolute encoders would stop operating.<br><br>Parameters such as WORLD_POS_JOG_SPEED not properly scaled when read via PRMBLK.<br><br>After 64 moves had been loaded on an axis then any subsequent CANCEL(2) request (while the axis is idle) followed by an immediate move request would incorrectly cancel the move.<br><br>Version 2.0298 broke support for Modbus TCP function 16.<br><br>MotionPerfect could not re- | CAN : Added support for new P329 16-in & 16-out CANIO module.<br><br>WAIT IDLE with optional post-idle time delay added, eg. WAIT IDLE(100).<br><br>IEC tasks now have the option to be started in 'paused' mode to fully support break-points in MotionPerfect.<br><br>SDCard improvements to card detection  in MC664, MC6NE, MC508 and F6Nano) : successful card initialisation is now used to determine if a card is inserted or not.<br><br>SELECT_CASE will now accept strings (up to 8 chars) to be specified as the CASE value. | 18th December 2019 |

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| | download successfully a program that already resides in the controller directory.<br><br>An existing text file could become corrupt after being updated during an OPEN/PRINT/CLOSE sequence.<br><br>Corrected potential WAIT IDLE problems caused by the introduction of an optional time delay parameter.<br><br>Fix for XON/XOFF serial handshaking which did not function.<br><br>IEC programs could cause E06/E09 errors when they are running while other files are deleted.<br><br>Fix for MPOS/DPOS which could become offset after an EtherCAT network re-initialisation.<br><br>P375 had an FE problem introduced with 2.0298.<br><br>RPS : Corrected stepping problems with MOVEL/MOVEJ/MOVEC when the axis is not idle.<br><br>FUNCTION line definitions failed to compile if the line ended with a comment. | | |
| 2.0300 + EU404 FPGA image version $0405 + MC4N-R FPGA image version $0108 | DRIVE_INTERFACE incorrectly modified EtherCAT Analogue IO mappings.<br><br>SYNC command did not function correctly (broken in 2.0298).<br><br>MC464 HWDEF_ZIP incorrect data block transferred to MP.<br><br>Stepper output at 2ms did not function correctly.<br><br>MC6N-ECAT Time Based registration did not function.<br><br>Added support for the ERR_STATUS PDO object mapping in EC_EXTEND file to prevent controller error.<br>ECAT : Corrected functionality of NODE_AXIS_COUNT.<br><br>Multi-core : Corrected various synchronisation issues. (eg ignored CANCEL requests) | TCP server support added.<br><br>Support added for serial baud rates 128000, 153600 and 230400.<br><br>RTEX support added for A6N-Dual axis drive (supports 500us only, system error raised if using unsupported SERVO_PERIOD).<br><br>FPGA : updates for EU404 and MC4N-RTEX for PWM and EnDat<br><br>ECAT : Initial Trio DX4 drive, Estun ED3M, and Panasonic A6multi drive profiles. Revised Estun ED3S, Estun Pronet, and Copley drive profiles.<br><br>Longer cyclic telegram on the F6Nano at 500usec is now permitted.<br><br>Added system parameters NODE_AXIS_MAP and | 4th March 2020 |

| | | NW_NODE_AXIS_MAP to enable independent axis assignment for multi axis slave drives.

NODE_AXIS and NW_NODE_AXIS can now be used to assign an axis number of 0. (previously it had to be > 0) These arrays are now initialised to -1. An axis assignment must be reset to -1 to remove it.

Added NW_NODE_AXIS_COUNT. | |
|---|---|---|---|
| | Multi-core : TIMER had intermittent problems, now fixed. | | |
| 2.0301 | Up to 1024 Library functions can be declared within a project but only 256 could be uniquely invoked.

Fix for ON BASICERROR GOSUB which no longer compiled.

Improved error message handling when errors occur (compile & runtime) within INCLUDE files.

Ethernet : Improved communication throughput for single core controllers. | Support added for axis numbering 0..1023 regardless of how many axes can be used.

Support added for compile time constant definitions via DEFCONST keyword.

Support added for analogue axes being located beyond axis 63, previously there was a firmware/hardware limitation that prevented this.

Support added for moving built-in axes to axis addresses > 63.

TCP Client Channels : improvement made so that channels are not automatically closed by the program that opened the channel when it stops running, another program can inherit the channel via the OPEN command.

RPS v2 : SETLINE updated to allow base axis and selected robot to be changed.

RPS v 2 : New ROBOT_FUNCTIONS keyword added and new robot library file types. | 14th May 2020 |
| 2.0302 | Corrected issue with a soft reset (EX) and CAN modules entering a Bus-Off error state.

INCLUDE file problems when file contains labels, variables are not accessed correctly if they appear after a label name. | | 4th June 2020 |
| 2.0303 | UTF8 support fix

Loading a project from SDcard did | RPS – Function execution at specific time. | 20th July 2020 |

not load any included HMI files.

PRMBLK could not read data for axes numbered > 127.

Flex6Nano reported to Motion Perfect (within MC_FILE) that it has an FPGA version but it does not have an FPGA.

Euro408 build-in analogue axes all defaulted to virtual at startup (2.0301 bug)

EDPROG1 had some side effects when used within a library function, potentially overwriting string parameter values.

3D vector mode for 2D move requests could result in possible E09 processor exceptions.

FLASHVR(index) would hang if the VR value had not changed

RPS – New 'Robot Library' and 'Robot Library Basic' file types added, new command ROBOT_FUNCTIONS added.

RPS – Improvements to ROBOT command. New command STOP_ROBOT added.

RPS – GTAJ and TARGETJ added for joint space operation.

RPS -MOVEJREL and MOVELREL added.

RPS -ROBOT_LPOS and ROBOT_JPOS added.

Decode and use emergency messages from DX4.

Added PLCopen for Motion Control support.

Initial version of MC404-Z firmware.

COMBINE_AXES and COMBINE_CONTROL added.

TOKENTABLE content now mirrores to special controller file TOKENTABLE_FILE.

Channel 9 event message now sent when AXISLIST changes.

IEC CTD/CTDr updated to ensure that the Q output is not set TRUE on the first invocation.

Added bit 8 to SCHEDULE_TYPE to prevent IEC programs automatically enabling 'flat' scheduling.

MOTION_ERROR modified to support > 64 axes , new MOTION_ERROR_ACTIVE flag added.

Channel #9 event notifications added for EtherCAT network state changes.

Added control words $77 & $7F for Yaskawa Inverter.

Added axis keywords DRIVE_POS_TORQUE and DRIVE_NEG_TORQUE for PDO mapping.

| 2.0304 | Fixed problem with REGIST(20) on MC664-X, required multi-core synchronisation. | Support for axis numbers 0..1023 reworked for PC-MCAT compatibility. | 4th November 2020 |
|---|---|---|---|
| | Executing the INITIALISE command can cause side effects (eg E09 on MC405). Now fixed. | HMI disconnect alerts added. | |
| | | Don't send channel 9 OPEN/CLOSE messages for STRING files. | |
| | Fix for unexpected watchdog trip errors (E06) reported by customers | | |
| | | HMI : Optimize character receive in HMI Server. | |
| | Parser updated to allow divide expressions within library functions to reference array parameters, these would normally be rejected at compile time because the number of dimensions is unknown until runtime and a division using arrays is now permitted - a runtime error (148) will however be raised if the divide operator does not receive single entity scalar operands. | HMI : Fixed data loss when more than one message worth of data is read before processing the message. | |
| | | HMI : Reduce CPU usage when HMI process is running. | |
| | | FLASH_LOG : Modified high SYSTEM_LOAD_MAX events so a single large jump doesn't cause a consecutive sequence of 5% messages to be recorded | |
| | Fix for use of DIN_CH within an EC_EXTEND file (E09). | | |
| | | FLASH_LOG : Sector Erase events no longer recorded by default | |
| | EtherCAT string fetching can cause E09 (type 3, invalid SWI) exception error. Now fixed. | FLASH_LOG : New -2 option to display last 'n' entries in log, eg FLASH_LOG(-2,10) to display last 10 events | |
| | RTEX DRIVE_READ commands could sometimes fail on MC664-X. | | |
| | Deleting MC_CONFIG does not require a subsequent reset to run programs. | FLASH_LOG : MPE state changes now recorded. | |
| | PRMBLK could be used to set TABLE points that are protected. Now blocked. | ActiveX : connection now runs faster. | |
| | | ECAT : Record EtherCAT telegram transmit times. | |
| | Fix for Motion Perfect sometimes having wrong program compile state. | ECAT : Changes to support internal virtual servo slave. | |
| | ECAT : Corrected support for the internal virtual slaves. | ECAT : Initialise slave node state when creating the internal virtual slaves (created using the ETHERCAT($1da) command for system, telegram and load testing.) | |
| | AXIS_OFFSET : non-zero value caused E09. | | |
| | RPS : STOP_ROBOT now permitted within robot programs. | | |
| | MC404Z : FPGA image 0 v.8 re-integrated. | ECAT : Use 0x10 for axis PDO sets offset for multi-axis Panasonic drives. | |
| | Fix for FE_LATCH when triggered | ECAT : Add initial P389 (RTA | |

| | | | |
|---|---|---|---|
| | by DRIVE_FE/DRIVE_FE_LIMIT.<br><br>Frame 41 fixes.<br><br>Command line : Fixed editing delete word forward and overwrite mode. | stepper) and Trio DX5 configuration, and specialise support for the latter because it is a multi axis slave configured by writes to 0xF030:0/1/2.<br><br>DISABLE_GROUP/RAPIDSTOP : Axis performance improvements.<br><br>FLASH_LOG : Missed servo cycles message recorded in log.<br><br>MC_FILE2 : Added built-in analogue outputs tag.<br><br>Mach4 : Added VRSTRING 'File' support.<br><br>IEC : Added new function TC_WA(milliseconds) to support task delays.<br><br>RTEX : Removed 500us limitation for A6N dual-axis drive.<br><br>Added new MOVE_CONTOUR/ MOVE_DISPENSE feature | |
| 2.0305<br>+<br>MC6NE<br>FPGA<br>image<br>version<br>$0104<br>+<br>MC404Z<br>FPGA<br>image<br>version<br>$0112 | Fix to enable firmware to support EC_EXTEND with axis + second encoder input.<br><br>PSWITCH channels > 63 can now function without another channel 0..63 being enabled.<br><br>Fixed issue with XON/XOFF behaviour and ensured port settings are consistent at startup with values read back via SETCOM as used by MotionPerfect.<br><br>Using an AXIS modifier within IEC TC_EXECUTE string data now functions correctly.<br><br>Fixed problems with HMI (Teach Pendant) potentially freezing.<br><br>MPE_MODE did not return the correct value (broken in 2.0304). | Added AXIS_ENABLE_OVERRIDE to support DX5 functionality, supporting the ability to enable individual axes.<br><br>Added FWD_START and REV_START to allow forward/reverse jog on an axis parameter.<br><br>PLCopen elements only supported by PLCopen enabled controllers can now be filtered by MP using HWDEF_FEATURES.<br><br>MC6NE : New FPGA image integrated with increased hardware pswitch and timer functionality.<br><br>MC404-Z : New FPGA image ($0112).<br><br>New FRAMEs added : 36 (Simple XZ and Theta) and 117 (3 Axis Robot with Angled Y). Frame 34 improved.<br><br>Mach4 : Reenable Remote socket disconnection detection.<br><br>ECAT : Add blocking functionality to FoE read command. | 8th January 2021 |

| | | MP : Added optional string parameter to the EDPROG V command to receive the name of the variable to be listed. | |
|---|---|---|---|
| 2.0306 + MC404Z FPGA image version $010D | MC404-Z : Latest FPGA image $010D including absolute encoder support.<br><br>ENCODER_RATIO and STEP_RATIO updated to correctly display negative values when they are specified.<br><br>Incorrect HWDEF_ZIP CRC could be returned if FPGA flash page register is not refreshed first.<br><br>Incorrect MC404-Z FPGA image version reported to MotionPerfect via FPGA_PROGRAM(-1),<br><br>MC404-Z CAN analogue channels were incorrectly limited to 1023. | Maximum IO point for IEC functions such as TCW_DATUMIN corrected from 63 to the full range of IO.<br><br>Added new FILE "DISK_SIZE" and FILE "DISK_FREE" commands to return byte counts.<br><br>Potential for comms to lock up fixed when channel buffer becomes full. | 17th February 2021 |