

NAME

changes – highlights of modifications for spec release 5.08

February 5, 2010 – RELEASE 5.08.05-6**Support For Revised Amptek MCA 8000A Firmware**

spec now supports the new firmware included with the Amptek MCA 8000A with serial numbers 3660 and higher. The new firmware can be used with USB-to-serial adapters on *Linux*. See the *amptek* help file for details.

Fine Tuning Of New Micos VENIX-3 Support

This spec release contains a minor update to the Micos motor controller support added in the previous release to better handle error responses from the controller.

January 12, 2010 – RELEASE 5.08.05-5**Can Now Assign PCI Bus and Slot Numbers For NI 6601/2 Cards**

It is now possible to specify the PCI bus and slot numbers of National Instruments 6601/2 timer/counters cards in the spec configuration editor, so that a particular card can be selected when more than one is installed in the same PC. See the *ni660x* help file for details.

Files Opened For `array_dump()` Will Close Automatically

If an unopened output file is used as the optional first argument for the `array_dump()` (or `data_dump()`) functions, spec will now automatically close the file when the function finishes. Previously, such files remained open and an explicit `close()` call to remove the file from spec's list of open output files was required. If the file is already open when the function is called, it will stay open and on the list of open files.

Updates To the New Micos VENUS-3 Support

This release includes a couple of updates to the support for the Micos VENUS-3 protocol as used with the new Hydra models introduced in spec release 5.08.05-1. The new *setorgconfig* command included with Hydra firmware 2.034 is used so that the spec `set_dial` command will work as expected. Also, the error stack is now cleared when an error is detected, preventing spurious error messages on subsequent commands.

Fix For Recent Bug Concerning EPICS Motor Numbering

A bug introduced in spec release 5.08.04-3 which prevented an EPICS motor with channel number one from being used has been fixed.

December 3, 2009 – RELEASE 5.08.05-4

Fix For Macro Hardware Parameters

A bug introduced in spec release 5.08.05-1 that removed the unit number from the argument list in calls to the `prefix_cmd()` macro-hardware macro function has been fixed. In addition, an issue where the value of the `prefix_ADDR` and `prefix_CONPAR` parameters would be cleared if the `prefix_par()` macro function was called from the `prefix_cmd()` macro function has been partially addressed. With this release, the above parameters are not available in `prefix_par()` although the value of `prefix_ADDR` can be retrieved using the `counter_par()` or `motor_par()` "address" argument.

November 25, 2009 – RELEASE 5.08.05-3**New Write-Only I/O Port Configuration Option**

Due to issues with certain PC cards freezing a Linux system when a write-only I/O port is accessed for reading, spec now supports write-only I/O port configuration on the Interfaces screen of the hardware configuration editor.

Fix and Additional Support For Measurement Computing PCI-DDA Cards

Newer revisions of the Measurement Computing PCI-DDA DAC cards (supported via spec's DAC motor facility) appear to freeze a Linux PC if write-only ports are accessed for reading or if ports associated with channels not present on the card are accessed at all. The presence test for the cards now no longer attempts a read of the write-only ports. Also, spec now determines the maximum number of channels for PCI DACs automatically and will overrule a misconfigured value from the `config` file. In addition, spec now supports Measurement Computing models PCI-DDA02/12, PCI-DDA04/12, PCI-DDA08/12, PCI-DDA02/16 in addition to the PCI-DDA04/16 and PCI-DDA08/16 models previously supported. See the `dac` help file for more details.

Fix For PI Motor Controller Crash

A bug introduced in release 5.08.05-1, where spec would crash during hardware configuration if the device associated with a Physik Instrumente motor controller channel couldn't be opened, has been fixed.

Fix For McLennan PM595 Delays On Exit

Previously, when quitting spec, each McLennan PM595 motor controller configured would add a delay of one second to the time it took for the spec process to exit. Those delays are now gone.

Fix For `unix()` Return Value

A very old bug, where the return value of the `unix()` function when used with more than one argument was not the return status of the executed command, has been fixed.

November 16, 2009 – RELEASE 5.08.05-2**Fix For Broken Macro Hardware** *prefix_ADDR*

A bug introduced in the previous release that broke the availability of the *prefix_ADDR* variable inside macro-hardware macro functions has been fixed.

October 30, 2009 – RELEASE 5.08.05-1**New Support For Controller Parameter Configuration**

It is now possible to access the nonstandard optional controller parameters available from the configuration editor **Devices** screen. These parameters are entered and modified by typing the `p` command and appear in the *config* file prefixed with `CONPAR`. Values can now be accessed from the `spec` user level using the `motor_par()` and `counter_par()` functions. The parameter will be associated with the controller used by the motor or counter mnemonic given as the first argument. In addition, the parameters are accessible from within macro hardware functions as elements of the associative array *prefix_CONPAR[]* where the array elements are indexed by the parameter name and *prefix* is the macro function prefix.

Fix For Disabled Calculational Macro Motors

Previously, if the `motor_par()` "disable" command was used to disable a calculational macro-hardware pseudomotor, a move command for that motor would generate an error message that the motor was disabled, but `spec` would still send move commands to the associated real motors. That problem is fixed in this release. `spec` will no longer make `mode=1` calls to the `prefix_calc()` function when the pseudomotor is in a disabled state. The associated real motors are not disabled, but will not move as a result of a move command to the pseudomotor.

A ^C Will Now Override "keep_going" Mode

The `spec_par()` "keep_going" option (introduced in `spec` release 4.05.01), which tells `spec` to keep reading and executing commands from a command file no matter what errors occur, will now return to command level if there is a ^C abort entered at the keyboard.

Shared Arrays Now Working on Mac OS X

A long-standing issue with the experimental `spec` support on the Mac OS X platform with respect to shared data arrays not working properly has been resolved.

Powder-mode Macro Update

The `waitmove` call in the `_pcount` macro associated with the powder-mode macros has been replaced by the new `_pcount_em` macro which adds calls of `user_precount` and `user_postcount` before and after the `move_cnt`

command.

Fix For Position Resolution For Huber H9000

The support for the Huber H9000 motor controller will now send up to nine significant figures to specify the target position in move commands. Previously, only up to six significant figures were used.

Fix For OMS PC48 Issue

Recent updates to the spec support for OMS motor controllers resulted in a bizarre problem with the ISA bus PC48 model OMS motor controller on at least one platform, where the modified initialization sequences sent to all the OMS controllers resulted in a *Linux* crash. Although the exact mechanism of this crash is unknown, it has been suppressed by adding a couple of ten millisecond delays around the new commands.

Fix For PA In OMS "init_sequence"

The OMS support now correctly recognizes and requires a parameter of 0 or 1 for the PA (power automatic) command when included as part of an "init_sequence" nonstandard optional motor parameter.

New OMS Position Maintenance Details

By default, spec will now turn off position maintenance on OMS_P configured motors on exit. This default behavior can be disabled by setting the nonstandard optional parameter "keep_pos_maint" to a non-zero value. The parameter can be a controller parameter which will set values for all motors on the controller, or a motor parameter which will only set values for the individual motor (and override a controller parameter setting). In addition, spec now turns on position maintenance for OMS_P on start up rather than on the first move command. See the *oms* help file for details.

Preliminary Support For Micos VENUS-3 and Hydra Model

Support for the latest revision of the Micos firmware, called VENUS-3, as implemented in the Hydra model of their motor controller, is included in this spec release. The support is for both serial and Ethernet interfaces.

Preliminary Support For Physik Instrumente Model C-863 Motor Controller

This spec releases includes support for the Physik Instrumente (PI) model C-863 single-axis DC-motor controller.

Preliminary Support For Korean HMT HCC1 Motor Controller

This spec release includes preliminary support for the Korean-made HMT HCC1 motor controller over a serial interface. See the company's site (www.e-hmt.kr) for a product description.

September 10, 2009 – RELEASE 5.08.04-4**Fix For Crash When Using CAMAC RTC-018**

A bug, where configuring an RTC-018 module could sometimes lead to a program crash, introduced when spec was updated over four years ago to support multiple CAMAC crates (release 5.06.02-1), has been fixed.

September 9, 2009 – RELEASE 5.08.04-3**New `remote_par()` Command For spec Clients**

For spec clients communicating with a spec server, a new `remote_par()` command is available, currently with the following options: "connect" to open a connection to a remote server, "close" to close a connection, "abort" to send a ^C-type event to the remote server and "timeout" to set a timeout for `remote_eval()` calls. See the *server* help file for additional details.

A ^C During a `remote_eval()` Now Passed To Server

If a call to `remote_eval()` from a spec client is interrupted by a ^C from the keyboard, the client will send the spec server an SV_ABORT event, to which the server will respond as if a ^C had been typed at its keyboard. In addition, any pending commands in the server queue from that client will be flushed from the queue.

Cleanup Macros Now Called From Commands Sent To Server

If a command sent to a spec server encounters an error or is otherwise interrupted, the server will now run the standard cleanup macros, `cleanup_once` and `cleanup_always` (and the deprecated `cleanup` and `cleanup1`), if any such macros are defined.

Preliminary Support For the Newport Agilis Piezo Actuators

This spec release contains preliminary support for Newport's Agilis Model AG-UC2 controller over a USB interface. Each controller supports two piezo actuators. To distinguish multiple AG-UC2 modules, configure the device serial number in the address field of the configuration editor.

***libedit* Command Completion For Directory Names Restored**

From time to time, the version of the *libedit* command-line editing library included with the spec distribution is updated to track changes at the upstream source repository. A recent change in the upstream sources, which was included in spec release 5.08.03-5 and subsequent releases, eliminated the feature where command completion for directory names appended a / rather than a space character. The prior behavior is now restored in the patched version distributed with spec. See the *editline* help file for details on spec's command-line editing library support.

August 9, 2009 – RELEASE 5.08.04-2**Fix For Recently Created OMS Bug**

A bug created in the previous release, where OMS motor channels were not necessarily marked as unusable when the associated controller was unresponsive, has been fixed. It was possible for spec to crash in some instances due to this bug.

August 1, 2009 – RELEASE 5.08.04-1**Fix For Server Position/Count Update Throttling**

The update in release 5.08.03-1 which limited the rate at which a spec server sends position and count updates to clients inadvertently blocked sending position updates for more than one motor when more than one motor was active. That issue has been corrected. Note, the problem only affected the updates during motion. The final position at the end of the move was always sent correctly for all motors.

Support For Struck PCI Express SIS1100E VME Card

This spec release supports the Struck model SIS1100E PCI Express to VME interface.

Updates For OMS Motor Controllers

Slip detection for OMS motor controllers configured with stepper motors and encoders is now supported. Also, additional OMS commands are permitted in the `init_sequence` optional parameter introduced in spec release 5.08.03-8. See the *oms* help file for details.

Encoder Update For Huber 9300 Motor Controller

When moving a motor configured with an encoder on the Huber 9300 motor controller, spec now sends a relative-move command rather than an absolute-move command. Relative moves make it more likely the position after a small move will match the commanded position.

July 17, 2009 – RELEASE 5.08.03-13**Additional Serial Baud Rates Supported**

Serial devices can now be configured for 7200, 14400 and 28800 baud. Those rates were not previously supported by spec.

Fix For Canberra Multiport II Support

A bug in the support for the Canberra Multiport II MCA devices for configurations with less than the full complement of six MCA modules, where certain spec commands such as `mca_sel ("?")` would cause spec to crash, has been fixed.

July 9, 2009 – RELEASE 5.08.03-12**New *d2ps* Geometry Variation**

A variation on the standard *psic* geometry for the ERSF BM02 (D2AM) beamline is now included. The diffractometer differs in that the sample circles are stacked as eta, chi, mu, phi rather than eta, mu, chi, phi as in the standard *psic*. Currently only the “d1 d2 s1” modes are implemented and only for the eta sample circle fixed at zero. The configuration should be installed as geometry *psic* with name *d2ps*. The motor mnemonics and macros are otherwise the same as for *psic*.

Fix For ESRF/TACO Serial Device Configuration

A bug, introduced in spec release 5.08.03-4, where the spec configuration editor, *edconf*, did not properly read in serial devices configured to use the ESRF or TACO interface type, has been fixed. With the bug, the configuration editor would display the initial TACO: from the *config* file as part of the device name and not show the interface type as TACO.

Fix For Using ^C Around TANGO Calls

A problem, where a ^C keyboard interrupt during the TANGO user-level calls of *tango_io()*, *tango_get()* and *tango_put()* could cause memory corruption leading to a subsequent segmentation fault crash, has been fixed.

July 1, 2009 – RELEASE 5.08.03-11**Fix For Out-Of-Bounds Array Bug**

A bug, introduced in spec release 5.08.01-9, where repeated access to out-of-bounds data array elements would lead to the message “Out of temporary cells” and made spec unusable, has been fixed.

June 30, 2009 – RELEASE 5.08.03-10**Support For the National Instruments VME-GPIB Module**

spec now includes built-in support for the National Instruments VME-GPIB module. See the *nigpib* help file for more details.

June 20, 2009 – RELEASE 5.08.03-9**Improved GPIB Error Messages**

The more frequent GPIB error messages, such as “GPIB timeout”, now show the associated GPIB controller number (for other than controller zero) and device address, which may be useful in diagnosing hardware problems when many GPIB devices are involved. This update is only for the National Instrument GPIB controllers, but covers both the built-in and the external driver (or library) support.

Fix To Accommodate Old OMS Cards

Some of the recent updates to the OMS support had made very old OMS controllers (particularly ISA bus models) unusable. That issue is fixed in this release, and the older cards are again usable.

June 18, 2009 – RELEASE 5.08.03-8**Fixed Missing Shared Array Update In `array_pipe()`**

When the `array_pipe()` function obtains new array data, it now updates the shared-array update flag used by other processes to detect changes in the shared array data.

Minor Fix For Reading Optional Motor Parameters

A small issue, where `spec` would send a command to certain models of motor controller to set the current value of an optional motor parameter when a `motor_par()` command was used to read the value, has been fixed. This fix simply eliminates an unnecessary hardware access. The parameter value returned by the command is as before.

Update To Attocube ANC350 Support

The code for the Attocube ANC350 will now update the current values (values returned by `motor_par()`) for non-standard optional motor parameters included in the `config` file to the values contained in a `.aps` file sent to the controller using the `motor_par()` "load" option.

An Initialization Sequence Can Now Be Configured For OMS Motors

If a non-standard optional motor parameter named "init_sequence" is created for an OMS motor controller motor, the string value of the parameter will be sent to the controller by `spec` during hardware configuration as an initialization sequence. Only certain commands, such as those for configuring limits and the general purpose I/O pins, are allowed in the string. See the `oms` help file for complete details.

June 15, 2009 – RELEASE 5.08.03-7**New TIFF Support With `fmt_write()`, `fmt_read()`**

`spec` now includes basic support to save two-dimensional array data to TIFF output files using the `fmt_write()` function. Code for reading TIFF files using `fmt_read()` is included, but is disabled by default, as it requires linking with `libtiff.a`, which is not part of the `spec` distribution. See the `fmt_tiff.c` file in the `spec` distribution for implementation details and how to enable the TIFF read functionality.

Fixed Delimiter Issues With `array_dump()` From Previous Release

A couple of problems when using the "D=" option introduced for `array_dump()` in the previous release have been fixed.

Update To Attocube ANC350 Support

The support for the Attocube ANC350 will now track changes to the "sensorunit" parameter made by loading *.aps* files, by reading the *config* file or directly through `motor_par()`. Previously, the parameter's value was read from the controller during hardware configuration and that value was used to label units displayed with the `motor_par()` "dump" option.

June 11, 2009 – RELEASE 5.08.03-6**New `array_dump()` Options**

Additional options are now available to the `array_dump()` function. In particular, additional `printf()`-style format options are available for integer data types, one can now specify an arbitrary delimiter character, and one can now control the number of data elements printed per line when outputting two-dimensional arrays. See the `array_dump()` entry in the *arrays* help file for complete details.

Improved Support For UDP Sockets

The user-level socket support for UDP socket connections has been updated to provide more robust functionality. Previously, reading from UDP sockets did not work well.

Improved `sock_par()` "queue" Option

The "queue" option to the `sock_par()` command has previously returned the number of available bytes that have been read from the socket into `spec`, but have not yet been retrieved using `sock_get()`. (Data could remain in the queue due to a previous `sock_get()` call only reading up to an end-of-string match or a specific number of bytes.) In this release, if there are leftover bytes remaining in the queue from the prior `sock_get()` call, that number will still be returned. However, if there are no leftover bytes, `spec` will now query the underlying kernel driver to see if there is data available and will return that value.

Fix For `ser_par()` "queue" Option

The "queue" option to the `ser_par()` function has been long documented to return the number of bytes in the input queue, but has instead returned a fixed value of one if there were one or more bytes available (for UNIX-type serial devices). The function now returns the number of bytes available.

Fix For `array_pipe()` With 2D Data Arrays

A bug, where the `array_pipe()` (or `data_pipe()`) function would only fill the first row of a returned two-dimensional array, has been fixed,

Fix For `array_pipe()` With Big Shared Arrays

A bug, where the `array_pipe()` (or `data_pipe()`) function would generate a spurious error about a too large array when trying to read into a shared array larger than half a megabyte, has been fixed.

May 28, 2009 – RELEASE 5.08.03-5

Fix For Struck SIS1100 Driverless Support

A small timing problem with the Struck SIS1100 PCI cards using spec's recently added driverless support, where the card could become unresponsive to spec after repeated initializations, has been fixed.

New Emergency Stop Feature For OMS MAXv Controllers

For Oregon Microsystems MAXv VME motor controllers, if both limits are found active at the same time, spec will treat that as an emergency stop signal. The effect is very similar to what happens when a single hard limit, in that spec will stop all active motors and reset to command level. The difference is that a different message will be displayed on the screen, and if using spec in server mode, an "emergency_stop" event will be sent to clients. Note, with most models of OMS controllers, it is not possible to detect when both limits are set.

Fix For EPICS Encoder Motor Initial Value

An issue dealing with the initial value displayed for EPICS motors after spec release 5.08.01-4 (and partially fixed in spec release 5.08.02-3), has been fixed for motors where the `UEIP` (use encoder if present) process variable is nonzero. The order of events produced by the standard EPICS motor record caused spec to report the initial motor position based on the `RRBV` (raw read back value) process variable without correcting for the encoder resolution. spec will now recalculate the motor position whenever a `UEIP` event is received.

May 21, 2009 – RELEASE 5.08.03-4

New Polled Macro-Hardware Counter Type

A new polled macro-hardware counter type is available. These counters will be polled using the standard `wait()` function. Counting won't end until both the master timer and all polled macro-hardware counters have finished. See the `mac_hdw` file for details.

Support For Attocube ANC350 Piezo Controller

This spec release contains preliminary support for the Attocube ANC350 piezo controller over an Ethernet connection. See the `attocube` help file for implementation details. The controllers should have current firmware (later than 0.0.2.1) in order for spec's limit sensing to work properly.

New `ser_par()` Options for DTR, RTS, DSR

The `ser_par()` function can now be used to set values for the modem control Data Terminal Ready (DTR) and Request To Send (RTS) signals on standard serial interfaces. Also, the Data Set Read (DSR) signal can be read. See the *serial* help file for details.

Parameter Settings Can Be Combined With `ser_par()`

Multiple serial interface parameters can now be set with one call of `ser_par()` using a comma-delimited string of assignments. See the *serial* help file for details.

Configuration Editor Now Uses TACO For Serial Device Type

The serial interface device type used in the hardware configuration file and configuration editor that was formerly named `ESRF` is now called `TACO`. Both `spec` and the configuration editor will continue to recognize the old name, but the configuration editor will use `TACO` when writing out updated *config* files. `spec` binaries since release 5.01.01 will recognize both names. Previous releases of the configuration editor will not.

May 11, 2009 – RELEASE 5.08.03-3**Final Fix For Local Variables in Recursive Macro Functions**

A remaining problem with the fixes in the two previous releases for local variables in macro functions, where a macro function could no longer return an associative array local variable, has been fixed.

May 5, 2009 – RELEASE 5.08.03-2**Tweak Of Fix For Local Variables In Recursive Macro Functions**

A bug, introduced in the previous release and associated with the fix for macro function local variables used in recursive calls, where a `local` declaration of a variable as an associative array within a macro function was broken, has been fixed. Also, a second introduced bug, where using a local associative array within a macro function as an argument to a call of another macro function caused a segmentation fault when running `spec` in server mode, has been fixed.

March 16, 2009 – RELEASE 5.08.03-1**Install Script Simplified**

Questions related to obsolete or little-used hardware options asked by the *Install* script have been eliminated. Specifically, questions for the `cib`, `cvxi`, `ksc_scsi` and `sicl` parameters are gone. Note, though, if the associated object files or libraries are still needed, they should be entered as values for the `site_obj` or `site_lib` parameters, as appropriate. The updated *Install* script will automatically convert old *install_data* files to the new format. Also, the *Install* script no longer asks whether to include CAMAC or

VME support. Such support will be included for all standard installations. (As before, it is still possible to prevent linking in hardware support by manually editing the `u_hdw.c` file, although there is little reason to go to that trouble.)

Can Link With TANGO Without TACO

It is now possible to install spec with TANGO support included but TACO support left out.

Local Variables Now Behave Well In Recursive Macro Functions

Previously, local variables used in a macro function would be reset to zero on return from a recursive call to the same macro function. Now, local variables behave as expected.

spec Server Position/Counts Update Frequency Throttled

Position update events while moving and counter update events while counting sent by a spec server to its clients will now be limited to a rate no higher than four times per second.

spec_par("?") Now Shows Default Values

When the current value differs from the default value, the `spec_par("?")` command now displays the default value in parenthesis.

New spec_par("set_defaults") Option

A new `spec_par("set_defaults")` command will now set all the `spec_par()` parameters to their default values.

New spec_par() Option For Enabling a Motor Warning Message

A new `spec_par()` option `"warn_not_at_pos"` enables printing of a warning message whenever a motor doesn't reach its final position. Previously, the warning message was not optional, but was only available when spec was linked with TACO libraries.

Fix For plot_cntl("kill") With Multiple Windows

An ancient bug, where using the `plot_cntl("kill")` command with multiple plot windows open would make reopening some of the windows impossible, has been fixed.

February 26, 2009 – RELEASE 5.08.02-7

Fix For Recently Broken OMS Encoder Support

The support added in spec release 5.08.02-4 for position maintenance mode with Oregon Micro Systems motor controllers (OMS_P controller type) inadvertently broke the basic encoder support (OMS_E controller type). That problem is fixed in this release.

Fix For Keyboard Generated Stop Signal Issue

The keyboard generated stop signal (usually associated with \^Z) has always been purposely ignored by `spec`. However, when running a subprocess via the `unix()` command, such as with `unix("vi somefile")`, a \^Z would stop the subprocess and `spec` would hang (although recovery was possible by sending a kill signal to the subprocess via another terminal window). This `spec` release fixes that problem by allowing `spec` to receive the stop signal while such a subprocess is running. Thus, both the subprocess and `spec` are stopped (and both can be resumed with the shell `fg` command). Note, `spec` still ignores the keyboard stop signal at all other times.

February 24, 2009 – RELEASE 5.08.02-6**New `strdef()` Built-In Function**

The new `strdef()` function returns a string containing the definition of the macro name given as an argument. If there is no such defined macro, the function returns its argument.

New Optional "Units" Argument To `getval()`

The `getval()` built-in function now takes an optional third argument. If present, it will be appended to the current value displayed in parenthesis after the first argument prompt string:

```
SPEC.1> p getval("Sample to detector", 100, " mm")
Sample to detector (100 mm)?
```

New "*lisa*" surf Geometry

A new liquid surface diffractometer geometry for the LISA instrument at Petra III is included in this `spec` release.

Support For Additional Physik Instrumente Motor Controllers

The Physik Instrumente (PI) model C-663, C-862 and C-863 motor controllers are now supported by `spec`. In addition, `spec` now supports the "home_method" standard optional motor parameter for PI motor controllers. If set, its value will be used as the argument to the controller's `FE` (find edge) command.

February 20, 2009 – RELEASE 5.08.02-5**Fix For AI Solutions DAQ Modules**

A bug introduced with the recent updates to the support for the AI Solutions DAQ (formerly called HANARO KISIM) USB modules, where the elapsed counts, elapsed time, external triggers and count events could sometimes have preposterous incorrect values, both when displayed by `mca_par("dump")` and when returned by the associated `mca_par()` option, has been fixed.

February 18, 2009 – RELEASE 5.08.02-4**Server/Client Now Maintains Associative Elements As Strings**

The spec server/client protocol transfers associative array index and value elements as strings. Previously, strings containing numbers would be converted to numbers when received. That would cause strings such as "090105" or "0123" to be converted to 0 and 81 respectively, as both would be treated as octal values (the first contains an invalid octal digit so becomes zero). spec now maintains the received values as strings. Note, conversion to numbers will be automatic when the values are used in a number context, just as with any locally generated value.

The *local* Help File Now Displayed On Start Up

A long documented but never implemented feature, where an optional file named *local* in the spec help directory would automatically be displayed on start up, is now available.

Fix For OMS Position Maintenance With Steppers

A problem associated with the position-maintenance support added for OMS stepper motor controllers in release 5.08.02-1 has been fixed. The problem was that a motor would run away under certain conditions associated with changing the position registers (as with the `spec chg_dial()` function).

Fix For XIA DXP Elapsed Time Value

The spec code for the XIA DXP modules now reads the clock rate from the module when it is available rather than using compiled-in values (20 or 40 MHz, depending on model). The clock rate is only used with two `mca_par()` parameters: elapsed real time as returned by "real" and dead time as returned by "dead".

January 28, 2009 – RELEASE 5.08.02-3**New *tlog* Log File Type**

A new type of *log* file is available. If the name of an output file begins with the characters "*tlog*" or ends with the characters ".*tlog*", all output sent to the "tty" device (the screen) will be written to that file, but unlike regular *log* files, output sent to other files or devices will not be saved to a *tlog* file. As with all types of *log* files, output is not turned off on errors or ^C interrupts, and output generated by functions that "paint" the screen, such as `tty_fmt()`, `tty_move()`, `plot_move()`, `show_help()` and `data_plot()`, isn't written to the file.

Log File Carriage Returns Translated

spec now translates carriage return characters to newline characters in *log* file output. This change will make *log* files that contain output from updated moves and counts easier to handle with editors and other file handling

utilities.

Debugging Now Available For TANGO Functions

The `tango_io()`, `tango_get()` and `tango_put()` functions can now display debugging information. Set the `DEBUG` level to 128 to see the debugging output.

Extra TANGO Attribute Information Available With `tango_get()`

Additional information associated with data obtained using `tango_get()` is available by passing an associative array as an optional third argument. Elements of the array will be assigned the data quality factor, time stamp and other attribute information. See the *tango* help file for details.

Fix For EPICS Motors

An issue, where `spec` would display the wrong motor position for an EPICS motor under certain conditions, has been fixed. The problem would only occur if the first event sent to `spec` for the motor's `RRBV` process variable had a value of zero while the corresponding dial position from the `spec settings` file was nonzero. This problem has only been an issue since `spec`'s 5.08.01-4 release, which began using only event notifications for keeping track of EPICS motor positions.

January 22, 2009 – RELEASE 5.08.02-2

Fixes For Image Device Support

A buffer size limitation in `image_par()` that caused problems with the Frelon cameras has been fixed. A bug, where region-of-interest parameters used with the

```
image_par(sel, "roi", beg_row, end_row, beg_col, end_col)
```

invocation couldn't be greater than 128, has been fixed.

Updates For AI Solutions DAQ Modules

The support for the AI Solutions DAQ (formerly HANARO KISIM) USB modules has been updated to enable readout of the 256x256 preview images returned when the device is acquiring data. Also, the restriction on the absolute value of the `offset_x` and `offset_y` parameters to the current resolution has been removed. See the updated *kisim* or *aisolutions* help file for more information.

January 13, 2009 – RELEASE 5.08.02-1

Updates To `spec` Code

The majority of the `spec` package source code has been updated from traditional (or K&R) C to ANSI/ISO Standard C. Although `spec` is still distributed as a 32-bit application, the code updates also include changes to allow 64-bit distributions in the future. Most of the C files that are included in the

distribution will reflect the updates, mainly in terms of function declarations. The software should behave the same as before, although with changes to many thousands of lines of code, it is possible for a new bug to have slipped past the quality control checks. As always, if you note any anomalous behavior in this spec release, please promptly inform CSS.

Position Maintenance Support For OMS Steppers

spec now includes support for the position-maintenance feature for stepper motors with encoders as is available with most OMS motor controllers. See the spec *oms* help file for details.

Removed Sixteen Motor Limit On Huber 9300

The configuration restriction on the number of motors allowed for the Huber 9300 motor controller has been removed to accommodate new versions of the controller that support more than sixteen channels.

USB Reset Added For XIA DXP

The support for the USB interface on the XIA DXP devices now includes sending an initial USB reset, which fixes a problem that appeared with USB 2.0 versions of the device, where spec could only connect once without cycling the power to the device.

Fix For GPIB-ENET Big Reads

A bug, where spec's built-in support for the National Instruments GPIB-ENET device left gaps in the returned data when reading large blocks of data, has been fixed.

Fix For PCI DAC Motors

A bug, where spec did not enable I/O port access when the Measurement Computing DDA04 or DDA08 (or compatible) PCI analog output boards were used, has been fixed. Note, if other I/O port devices were configured, access would be enabled anyway, and no problems would be observed. If not, spec would crash.

Improved Formatting For TANGO Queries

The output for the "?" and "??" options to `tango_io()`, `tango_get()` and `tango_put()` are now better formatted, particularly with respect to columns lining up properly.

Improved Axis Scaling For `timescan` Macro

The code for the automatic rescaling of the x -axis (time) in the standard `timescan` macro has been improved to work better with certain scan parameters, particularly with long sleep times and counting to long monitor times.

November 30, 2008 – RELEASE 5.08.01-13**Update For Tsuji CT16-02/NCT08-01/NCT08-02 Counter/Timers**

spec now supports the socket interface available on the Tsuji CT16-02, NCT08-01 and NCT08-02 counter/timers. In addition, the NCT08 support has been updated to use commands that allow count times and monitor presets to be specified to higher precision than with the CT16 (microseconds versus milliseconds for time and to multiples of eight versus 1000 for monitor presets).

October 29, 2008 – RELEASE 5.08.01-12**Fix For Recent Data Array State File Bug**

A serious bug introduced in spec release 5.08.01-9, where data array sizes would not be restored properly from the saved state file, has been fixed. Please obtain a updated spec release from CSS if affected.

Compumotor SX Updates

The support for the Compumotor model SX motor controller has been updated to work with more than one controller at a time using separate serial device nodes. Previously, multiple controllers were supported only via daisy-chaining over a single serial node. In addition, the "read" `motor_par()` command pass-through option will now return the string received by the motor controller. Previously, it didn't.

October 22, 2008 – RELEASE 5.08.01-11**Fix For *psic* Sectors Limit Check**

A bug in the enhanced *psic* sector search introduced in spec release 5.06.04-1 where possible sectors in the exhaustive search would fail the motor-limit test if the sign (of `userxdial`) parameter for a geometry motor was negative has been fixed.

Improved EPICS Monitor Support

spec's recently added support for EPICS monitors has been updated to insure pending callbacks for monitored values are evaluated prior to an `epics_get()`. Previously, a "monitor_check" `epics_par()` call, some form of a `wait()` call, calls to the built-in EPICS motor, counter, etc. support or a return to the main prompt was necessary.

Update For Ortec 974/995 Counter/Timer

The default "alarm mode" disabled setting added for the Ortec 974/995 counter/timers for the GPIB configuration in spec release 4.03.10 to accommodate modified Ortec firmware has now also been made the default for the serial interface.

September 25, 2008 – RELEASE 5.08.01-10**Fix For Recently Broken State-File Name Behavior**

An error made during a recent code cleanup that resulted in the user-name part of the spec state file names truncated to six characters is corrected in this release. Files in the *userfiles* directories created using spec releases 5.08.01-8 or 5.08.01-9 can be manually renamed to preserve that state file content.

Command Completion Fix

An old bug, where the command-line editing command-completion feature would produce completions for EPICS, TACO or TANGO functions when the functions were not part of the installation configuration, has been fixed.

September 9, 2008 – RELEASE 5.08.01-9**Fix For spec Client Connecting To Many spec Servers**

A problem, where some connection attempts failed when a spec client tried to connect to more than two spec servers by spec name (rather than explicit port number), has been fixed.

Fix For config_mac On spec Server

A bug, where a spec server's config_mac macro wouldn't get called for a reconfig command typed at the spec server keyboard immediately after a client sent a remote command, has been fixed. Note, normally, if a macro named config_mac exists, it will be run automatically after spec reads the hardware *config* file, both on start up and on the reconfig command (included in the standard config macro).

Fix For Error On Out-Of-Bounds Array Assignment

An attempt to access a data array element beyond the array's size is supposed to generate an error message, but not be treated as a fatal error. A bug, where using an out-of-bounds array element on the left side of an assignment expression would produce the spurious error message "Trying to assign to an immutable" and generate a fatal error, has been fixed.

Fix For MDrive Motor Controllers

An issue with spec's initialization of the IMS MDrive motor controllers which caused problems in recognizing all the configured MDrive channels under some conditions has been fixed. Previously, spec would send an EE=0 command to disable encoders if the channel was configured as MDRIVE and send an EE=1 to enable encoders for an MDRIVE_E configuration. For some models that didn't have an encoder capability, the command would generate an unexpected error, which would be associated with the next command spec issued. With this release, spec no longer sends EE=0 for channels configured as MDRIVE, but will send EE=1 for MDRIVE_E channels. Also, spec's

MDrive support has been updated so that unexpected error responses should no longer throw off the command-response synchronization.

August 23, 2008 – RELEASE 5.08.01-8

Updated `epics_home` Syntax

The `epics_home` parameter used in the `spec Install` script can now contain the complete path name to the directory that holds the EPICS channel access libraries. The prior behavior, where `epics_home` contained the path to either the *base* directory or the *lib* directory, continues to be supported.

Preliminary Support For Solaris 10 (x86) Platform

Installation of `spec` on the Solaris 10 (x86) platform is now possible, although such support is still in the preliminary stage and contains no support for direct access to PCI cards, as is available for *Linux* on x86 platforms.

Updates To Preliminary Support For the Canberra Lynx (DSA-3000) MCA

Several updates to the preliminary support for the Canberra Lynx (DSA-3000) have been made. Specifically, the command `mca_par("device_id")` is fixed and no longer causes a segmentation fault, the command `mca_par("group_size")` has been added as a synonym for `mca_par("npts")` and the command `mca_par("select_group")` has been added as a synonym for `mca_par("group")`.

July 14, 2008 – RELEASE 5.08.01-7

Support For Siemens D5000 Diffractometer

This `spec` release includes support for the Siemens D5000 X-Ray Diffractometer, including both motor moving and counting functions. The connection is over a serial interface.

Fix For Obscure `spec` Client Error

A spurious instance of the “Not allowed to connect to self” error that occurred when a `spec` client had configured server resources using the “localhost” host name but where the client was also invoked in server mode with the `-S` flag has been fixed.

Tweak Macro Tweaked

A minor error of ten-year vintage in the definition of the `tw tweak` macro for motors has been fixed. Previously, when the option for displaying counts was active, the macro would display the counts associated with `S[det]` rather than `S[DET]`.

July 2, 2008 – RELEASE 5.08.01-6

Fix For `remote_async()/remote_poll()`

A problem, where the `remote_poll()` function could fail to detect a `spec` server-generated event from a prior `remote_async()` call, has been fixed. See the *server* help file for updated details on using the `remote_async()` and `remote_poll()` `spec` client functions.

June 25, 2008 – RELEASE 5.08.01-5**New** `motor_par()` **Option To Return** "sign"

The "sign" motor parameter, which is +1 or -1 indicating the rotation sense of user angles versus dial angles, can now be read via the `motor_par()` function.

Fix For GPIB Problems After a Serial-Poll Timeout

An old problem with most of the GPIB controller support in `spec`, where a GPIB serial poll that timed out could cause subsequent GPIB accesses to fail, has been fixed.

Fix For OMS MAXv Used With Struck SIS3150 USB-VME Module

A problem has been fixed with the recent support for the Struck SIS3150 USB-VME module that caused `spec` to crash when configured with an OMS MAXv motor controller VME module.

New Configuration Option For Struck SIS1100 PCI Card

It is now possible to configure bus:slot numbers in the ADDR field of the configuration editor to distinguish among identical Struck SIS1100 PCI cards configured to use `spec`'s built-in support. If the ADDR is set to zero, `spec` will behave as before, with multiple identical PCI cards assigned to VME units in the order in which they are discovered by `spec`.

Fix For TANGO Support

A problem with the implementation of the built-in symbol `TANGO_ERR` in the new TANGO C-binding support has been fixed.

June 6, 2008 – RELEASE 5.08.01-4**Fix For EPICS "Monitors"**

A problem in the implementation of EPICS monitors in `spec` release 5.07.02-10 that could result in unexpected timeouts on subsequent `epics_get()` calls has been fixed. In addition, values for EPICS ENUM types for which monitors have been created are now returned as strings rather than integers.

New EPICS "connect" Option For `epics_par()`

It is now possible to bundle many initial channel-access PV connections into a single network access by using the new `epics_par()` "connect" option. Such a call will perform the channel access call to create the connection, but

will not force the channel access code to broadcast the request to the network. Thus many such requests can be put into a single broadcast. See the *epics* help file.

More Efficient EPICS Motor Support

An unnecessary channel access read for motor positions has been eliminated from the *spec* code, as the current motor position for any EPICS motor is already available via callback events.

May 29, 2008 – RELEASE 5.08.01-3

Fix For Reconnecting To *spec* Server Motors

A problem introduced in *spec* release 5.06.03-10, where *spec* clients might not reconnect to *spec* server motors after a server exits and restarts, has been fixed.

Fix For Extra "move_done" Events From *spec* Server Motors

A problem, where "move_done" events would be sent by a *spec* server before the backlash correction had been performed, has been fixed.

Minor Fix For Canberra Multiport

A bug, where an unrecognized `mca_par()` parameter sent to the Canberra Multiport MCA code might cause a segmentation fault, has been fixed.

May 19, 2008 – RELEASE 5.08.01-2

Support for Struck SIS3150 USB-VME Controller

spec now includes support for the Struck SIS3150 USB-VME controller.

May 9, 2008 – RELEASE 5.08.01-1

ENHANCEMENTS

Data-Group Data-Type Install Option Eliminated

The option to choose `float` or `double` for the data-group data-type configuration has been eliminated from *spec*'s installation script. The type now is fixed at `double`. (In ancient times, the megabyte of virtual memory and disk storage space that could be saved by choosing `float` sometimes mattered.) Note, the data-group feature hasn't been used by the standard macros since the release of *spec* 5 (Feb 1, 2001). Eliminating this configuration option should also eliminate the confusion over whether the storage size applied to anything else in *spec* beyond the data groups (it didn't).

Attempted Move of "Unresponsive" Motors Now Fatal Error

Attempts to move an unresponsive motor will now cause a fatal error. That is, *spec* will jump out of any executing statement blocks and return to the highest level prompt. Previously, *spec* would issue an error message but continue. Most motors are marked as unresponsive during hardware initialization when a presence test fails, although several controllers will mark

motors unresponsive after certain communication failures. The EPICS and spec-server support can mark motors unresponsive on disconnect events and responsive again automatically if the connection is restored.

New `motor_par()` Option To Return "offset"

The "offset" motor parameter, which is the difference between the user and dial motor positions, can now be read via the `motor_par()` function.

New `motor_par()` Option To Return "writable" Status

The new `motor_par()` "writable" option returns a value indicating the permission status of a motor, as set in the hardware *config* file. If bit 1 is set in the return value, the motor can be moved. If bit 2 is set, the limits can be changed. A fully protected motor will return zero. A fully open motor will return 3.

New Output Options For `array_dump`

The `array_dump()` function (and `data_dump()`) now accept an `x` (or `X`) format identifier in the *printf*-style optional argument, in addition to the `e`, `g` and `f` formats already recognized. If the "`%x`" format is used, double values will be converted to integers. In addition, initial characters may be included in the format string, for example, "`0x%08x`" is valid.

Server Interactive Screen Re-prompts After Client-Generated Output

When a client to a spec server produces output on the server's interactive screen by way of remote commands, the server will now refresh the prompt and any text an interactive user may have typed. Note, though, this feature is only implemented when spec is linked with one of the optional command-line editing libraries (*libedit* or *readline*).

New "Scan-Active" Bit In Standard Macro Status Variable `_stype`

Bit `0x80` in the `_stype` global variable is now set and cleared by the standard scan macros. The bit is set in the standard `_head` and `resume` macros and cleared by the standard `_tail` and `_scanabort` macros.

Floating Values Saved With Greater Precision In Configuration Editor

The *edconf* configuration editor now writes all floating-point values to the `config` file with twelve digits of precision. Previously the steps-per-degree parameter was written with that precision, but other floating values were written with the default six significant digits.

New Monochromator Configuration Supported

A new two-monochromator configuration is contained in the *energy.mac* macros. The presence of the motor mnemonics `mono` and `monp` selects the new configuration.

New EPICS_ERR, EPICS_ERR_MSG Built-In Variables

The new EPICS_ERR built-in variable (present only when spec is linked with EPICS libraries) will be assigned the return value of the channel access calls associated with the spec user-level functions epics_get(), epics_put() and epics_par(). If the channel access return value is ECA_NORMAL, EPICS_ERR will be assigned a value of zero. If there is a non-EPICS error, such as no connection available, EPICS_ERR will be assigned a value of -1. The new EPICS_ERR_MSG built-in variable is assigned the string message associated with the error.

New TACO_ERR, TACO_ERR_MSG Built-In Variables

New built-in variables TACO_ERR and TACO_ERR_MSG are now included when spec is linked with TACO libraries. The previous global variables ESRF_ERR and ESRF_ERR_MSG are still recognized for compatibility. See the *taco* help file for more details.

Following Error Generates Fault For Delta-Tau PMAC/PMAC2 Controllers

A fatal following error status will now generate a motor fault with Delta-Tau PMAC/PMAC2 motor controllers, which will have the same effect as hitting a limit, in that any other moving motors will be stopped and spec will reset to command level.

FIXES**Fix For Unresponsive Macro-Hardware Controllers**

A bug with the macro-hardware implementation, where a motor channel would be marked unresponsive if the _config() function returned ".error." when called with "mot" argument but not when called with the "ctrl" argument, has been fixed. Now, if the _config() function returns ".error." when called with the "ctrl" argument, not only will all associated channels be marked unresponsive, but also the _config() function won't even be called with the "mot" argument for the associated channels.

Fix For Rare External Shared Array Problem

A bug, where connecting to an external shared memory array could lead to a segmentation fault in spec, has been fixed. The problem could occur if the process that created the shared array was replaced with another process with a shared array of the same name but owned by another user.

Fix For Hardware Parameters Saved In State File

An editing error in spec release 5.07.03-4 that disabled the saving of some miscellaneous parameters associated with hardware and with some of the spec_par() options has been corrected.

Fix For EPICS_M1 Motors With Initial Limit

A problem, where spec didn't flag a limit switch that was active when first connecting to an EPICS_M1 type motor, has been fixed. The symptom would be no limit error message when trying to move the motor in the direction of the limit. (EPICS_M1 motors take initial parameter values from the spec hardware *config* file while EPICS_M2 motors take initial parameter values from the EPICS database.)

NEW HARDWARE SUPPORT**Support For XIA DXP USB 2.0 Interface**

This spec release supports the USB 2.0 interface on the newer XIA Saturn DXP device.

Driverless Support For Struck SIS1100/3100

spec now includes "driverless" support for the Struck SIS1100/3100 PCI-VME bus adapter. With the driverless support, no additional software needs to be installed. Previously, this hardware could only be used with a vendor-supplied Linux kernel driver. Note, the driverless support does not use DMA. If large data blocks are to be transferred, the vendor driver mode may provide better performance.

Preliminary Support For the Newport SMC100CC Motor Controller

This spec release includes preliminary support for the Newport SMC100CC motor controllers over a serial interface.

Preliminary Support For the Canberra Lynx (DSA-3000) MCA

This spec release includes preliminary support for the Lynx (DSA-3000) MCA over an Ethernet interface.

Preliminary Support For the TANGO C-Binding Library

This spec release includes preliminary support for the new TANGO C-binding library, as developed at ESRF. New built-in functions to support the TANGO interface include `tango_io()`, `tango_put()` and `tango_get()`. See the new *tango* help file for preliminary details.