

SNAP Ultimate I/O Firmware README

Updated 7/23/13

This readme applies to the following Opto 22 products:

SNAP-UP1-ADS brain (UIO)
SNAP-UP1-D64 brain (UIO)
SNAP-UP1-M64 brain (UIO)
SNAP-LCE brain (LCE)

KB numbers: A number with the prefix "KB" next to an item in this readme, such as KB49909, refers to a Knowledge Base article published by Opto 22. A KB article provides additional information about a feature or bug. To find a particular KB article, go to the Opto 22 website, <http://www.opto22.com>, and enter the KB number in the search engine.

Version R7.2i

June 15, 2010

Enhancement

* [KB80959](#) (UIO) Design changes to Ethernet interface on Ultimate I/O and Ethernet I/O.

Due to a component that was used and is no longer available, the Ethernet interface has changed.

Bug Fixes

[KB80103](#) Control engine port 22001 may become unresponsive if bootup is interrupted.

[KB60572](#) SNMP v2 traps may cause a management system crash.

[KB59290](#) Unexpected SNMP cold start traps from Ethernet Devices.

Version R7.2h

December 10, 2007

New Features and Enhancements

* Improved the handling of disabled I/O units for commands that have no IVAL to return. Remaining retries are now skipped, and an informational message is posted in the queue.

* When communicating with I/O Units, retries are now logged in the message queue with an informational message: -539 "I/O error; performing retry" which could help in troubleshooting communication issues.

Bug Fixes

The following problems have been corrected:

[UIO, LCE]

* KB54622 The Transmit Pointer Table and Receive Pointer Table ioControl commands returned corrupt data when used with a pointer table with pointers to 64 bit integers.

* KB56323 Repeated use of FTP communication handles by Ultimate or SNAP PAC controllers could cause problems. Eventually, error 222 was reported by the controller when trying to access a file. Cycling power to the controller corrected the problem.

* KB58048 If the source for a PID setpoint was an I/O point, and the destination for the output was set to Host, the PID output gave unexpected results.

* KB58160 If a NULL pointer variable was requested from a control engine strategy by a PAC Display project or an OPC client, a recoverable Stack Overflow error may have occurred.

* KB58310 Some 64-bit integer table element bit values in PAC Display projects or OptoOPCServer clients may have had unexpected results. The variables appeared not to change, and no error was reported. This behavior was related to controller firmware.

Control commands affected:

Numeric Table Element Bit Clear

Numeric Table Element Bit Set

Table Element Bit Clear

Table Element Bit Set

For example, if the PAC Display project contained a graphic with an operator driven dynamic attribute to set a bit in a 64-bit table element, the selected bit may not have changed at Runtime.

* KB58578 When using the Move I/O Unit to Numeric Table command in a PAC Control strategy, a possible "-3 Buffer overrun or invalid length error" message was sometimes posted to the control engine message queue.

[UIO]

* KB58607 The Ultimate I/O unit states of some points on digital modules may not have reported accurately.

* KB59458 The initial call to the PAC Control Ramp Analog Output command may have worked correctly, but not subsequent calls. For example, the command may have had no effect, or it may have ramped up to a smaller number than expected.

* KB58676 (-nan input to PIDs) Resetting SNAP analog modules could cause unexpected behaviors on some Ethernet brain features. Analog modules could reset if there was low voltage, or if the module was unplugged from the rack. They displayed an "invalid float value" such as -1.#QNAN, -1.#QNAN0, or -nan.

As a result, if one of these invalid float values was used as the input to a PID loop, the output option for when the input was out of range may not have been

applied since the PID loop did not recognize the invalid float value as an out-of-range value.

* KB58962 Load cell configurations were lost when PAC Manager was used to configure and inspect the module after a power cycle to the brain.

Version R7.2e through R7.2g were internal releases

Version R7.2d

June 8, 2007

Bug Fix

[UIO]

* (KB57605) A problem has been corrected where bank read and write commands on I/O units using standard (4 channel) digital modules returned incorrect data when modules were installed in positions 8 through 15.

[LCE, UIO]

* (KB56787) A problem has been fixed where the PAC Control MoveIoUnitToNumTable script command read the state of all of the modules and points, but then attempted write to the wrong index locations in the destination table, possibly resulting in lost data.

Version B7.2c

Internal release only

Bug Fixes

[LCE, UIO]

* (KB54562) Fixed a problem with the PAC Control Ramp Analog Output command; if the ramp's endpoints were set outside the range of the analog output module, the analog output did not function correctly. The next Move command to the output caused the output to ramp to the position of the prior Ramp Analog Output command.

* (KB57162) Corrected a problem where outgoing TCP communications through PPP sometimes failed with some Outgoing PPP configurations. For example, if Specify Local IP Address was enabled for outgoing PPP and Set Default Gateway to PPP was not enabled for outgoing PPP, if the remote server negotiated an IP address that was not on the same subnet as that specified by Local IP Address for PPP Interface and Local subnet mask for PPP Interface, then packets destined for the remote device on the specified subnet could be dropped.

Version B7.2b

Internal release only

Bug Fixes

[LCE, UIO]

- * (KB56600) A problem has been fixed where if the PAC Control and ioControl Move Numeric Table To I/O Unit command was sent to an Ethernet-based I/O unit, the controller performed a write to the unit's analog points, even if the unit was disabled. If the I/O unit was online, this could cause the unit's analog output values to change unexpectedly.
- * (KB56657) A problem has been fixed where multiple controllers could stop communicating after an intense burst of general broadcast traffic on the Ethernet network. Disconnecting and reconnecting the Ethernet cables attached to the units restored communication to them.
- * (KB56666) A problem has been fixed where two or more ioControl communication file handles used in different charts at the same time could cause unexpected results, including a controller reset.
- * (KB56793) A problem has been fixed where if the Get & Clear On-Latch or Get & Clear Off-Latch PAC Control commands were used with a standard digital input point, the corresponding IVAL could not be cleared once the latch was set.
- * (KB57034) A problem has been fixed where if two or more Ethernet interfaces (such as a computer and another SNAP-PAC control engine) simultaneously attempt to connect to the same TCP port (such as the Host Task on TCP port 22001, or OptoMMP on TCP port 2001), the device could reset.

Version B7.2a

Internal release only

New Features

- * There are new get.to/set.to options for setting and getting the timeout values for "ser:" and "tcp:" communication handles.
- * You can now set up an FTP username and password for greater security when sending files via FTP to and from an Opto 22 controller or brain that has file capability. The username and password can be set up in the Network Security dialog box either in a configuration file or in Inspect mode.

Bug Fixes

[LCE, UIO]

- * (KB51181) A problem has been fixed where the Config EEPROM 'Set' button in PAC Control Debug mode disabled the I/O unit.
- * (KB51806) A problem has been fixed where a paused, expired uptimer in PAC Control, evaluated false when used with the conditional command Timer Expired?. Since the timer time had expired, this command should evaluate true.

- * (KB51848) A problem has been fixed where writing a table to an Ethernet I/O unit was updating only the IVALS, even if the I/O unit and all its points were enabled.
- * (KB53147) A problem has been fixed where PAC Control commands used to transfer data with a FTP communication handle sometimes failed. Using the Send Communication Handle command sometimes returned error -408. Resetting the control engine might temporarily clear the error.
- * (KB53614) A problem has been fixed where if the streaming feature was configured to send to multiple stream clients, the synchronization code (an integer whose value is changed each time data is streamed) was incremented between each host instead of after transmitting to all hosts. With this behavior, the client could not detect if stream packets were dropped.
- * (KB54363) A problem has been fixed where the ioControl command Generate Reverse CRC-16 on Table (32 bit) might not work when used with SNAP-PAC or Ultimate I/O units.
- * (KB54505) A problem has been fixed that resulted when a communication handle in a subroutine was not closed before the subroutine was exited. For each local communication handle opened, but not closed, in a subroutine, an item was left on the data stack. This could eventually result in erratic controller behavior; in some cases, it could cause the controller to reset.
- * (KB54846) A problem has been fixed where if a default gateway was configured on the primary Ethernet interface, the secondary interface for communication could not communicate via the secondary interface, even after the secondary interface was reenabled.
- * (KB54853) A problem has been resolved where when attempting to read a numeric scratchpad element (for example using GetIoUnitScratchPadInt32Element), or to write a table to numeric scratchpad elements while in a subroutine, a -29 error would be generated, and the value(s) would not be read or written.
- * (KB54940) A problem has been resolved where if a pointer table was passed into a subroutine and an element was changed to point to a subroutine variable, the control engine sometimes locked up when the table element was accessed.
- * (KB55154) A problem has been fixed where the command Set End-of-Message Terminator did not report an error code (-52) when the communication handle connection was not open.
- * (KB55166) A problem has been fixed where the command Set End-of-Message Terminator sometimes caused problems when used with file communication handles if it was set to 0x00 (null). For example, if it was used with the Receive String Table command, the command failed and reported error -44.
- * (KB55168) A problem has been fixed where if the command Receive String Table command was used with a communication handle that had no data waiting, the command did not wait for the configured timeout period to expire.
- * (KB55977) A problem has been fixed with receiving data on via a serial communication handle when there are multiple EOM characters in the receive buffer.

* (KB56192) A problem has been fixed where un-initialized (NULL) Pointers to any type of point (Analog/Digital or Input/Output) could cause a reset following a failed assignment.

* (KB56283) A problem with the command Calc CRC on Table has been fixed.

Version R7.1h

November 1, 2006

Bug Fixes

[LCE UIO]

* (KB52706) A problem has been corrected where using the default scaling for a SNAP-AITM or SNAP-AIMV type module configured as a millivolt input module, caused the value reported to be off by a factor of 1000 (3 decimal places). The SNAP-AITM module types are SNAP-AITM, SNAP-AITM-i, SNAP-AITM-2, and SNAPAITM2-i. The SNAP-AIMV module types are SNAP-AIMV-4 and SNAP-AIMV2-4.

* (KB53950) A problem has been corrected where on Ethernet I/O units, when an analog input module reading was out of range, the counts would go to -32768 and scaling to engineering units would stop, but filtering continued to be calculated. The raw count value of -32768 was passed into the filtering function, affecting the filtered value. Over time, the engineering units incorrectly trended toward -32768. Reapplying a valid signal caused scaling to once again be performed prior to filtering, and engineering units would trend toward the correct value.

* (KB54495) A problem has been corrected where the Modbus server did not properly close connections which could cause it to enter a tight loop that prevented lower priority tasks from running, and leaked Modbus connections.

* (KB54324) A problem has been corrected where when the ioControl Move Numeric Table to I/O Unit command was used in a strategy by SNAP-UP1-ADS or SNAP-UP1-M64, the IVALs for input points on the named I/O unit were changed. Input point IVALs should not change, only IVALs and XVALs for output points should change.

* (KB53811) A counting rollover problem has been corrected where digital count or quadrature count values may not be correct. Digital counts reported could be too low by integer multiples of 256 counts. Quadrature counts could be off (+or-) by integer multiples of 256 counts.

* (KB53751) A problem has been corrected where using the Get & Restart On-Pulse Measurement or the Get & Restart Off-Pulse Measurement commands in an ioControl strategy sometimes caused a reset. Using the command repetitively and in quick succession increased the likelihood of the reset occurring.

Version R7.1g

October 17, 2006

Bug Fixes

[LCE, UIO]

* (KB52885) A problem has been corrected where Analog output modules in mounting rack positions 8 through 15 did not respond to the ioControl Ramp Analog Output command. There were problems on both the I/O side and the controller side, so those systems with non-local I/O (for example, when using PAC-S or LCE controllers), will need firmware upgrades to both sides.

* (KB52485) A problem has been corrected where Ethernet controllers or brains might reset if the Start PPP command was sent while PPP was initializing for the first time.

* (KB52495) A problem has been corrected where if an email event message set up for Outgoing PPP was sent before the PPP connection was established, the I/O unit would reset once the connection was established.

[UIO]

* (KB52733) A problem has been corrected where after an I/O configuration was stored to flash and the current Time Remaining values was saved to their respective, active timers, when the I/O unit was restarted, the first timer cycle used the Time Remaining value, instead of the Length of Delay.

Version R7.1f

May 24, 2006

June 13, 2006

Bug Fixes

[UIO, LCE]

* (KB51848) Corrected a problem where IVALs for analog points configured on SNAP-UP1-M64 I/O units were not updated in the debug mode, ioControl I/O unit Inspect window. However, when individual analog points were inspected, the updated IVAL values were displayed.

* (KB51834) Corrected a problem where storing the configuration to flash on an I/O unit did not store the SNAP-AILC load cell parameters "Load Cell Fast Settle Level" and "Load Cell Filter Level." After rebooting, the brain did not retain this configuration information and may no longer have detected the module.

* (KB51388) Corrected potential problem with ioControl command GetValueFromName when the named variable, passed in the first parameter to this command, was a table element. A possible incorrect error -12 could be returned as the status code.

[LCE]

* (KB52143) Corrected a problem where when a strategy was stored to the SNAP LCE's flash eprom, and the controller was turned off and then back on, the controller would no longer communicate. Attempts to communicate to the controller with ioControl caused error -10038 to be reported.

New Features and Enhancements

[UIO, LCE]

* The control engine now supports SNAP-PAC-R2s. Be sure to upgrade controllers running strategies that refer to an I/O unit configured in ioControl as 'Type: SNAP-PAC-R2'. Otherwise, unexpected behavior may result because the point configuration information will not be sent to the SNAP-PAC-R2. The unexpected behaviors include outputs not turning on, scaling, and other point or I/O Unit configuration parameters having no effect.

Version R7.1e

May 24, 2006

Bug Fixes

[LCE UIO]

- * (KB51599) Corrected a problem where the maximum reading of a SNAP-AITM-2, Type C thermocouple was approximately 1550° C instead of 2320° C.

Version R7.1d

April 26, 2006

Bug Fixes

[UIO, LCE]

- * (KB50153) Corrected a potential problem using files stored to flash, which could cause the device to reset shortly after power up, when flash files are copied into the RAM file system, if the file lengths in flash are corrupt. File length validation has been enhanced to prevent this problem. Files with invalid lengths are now ignored.
- * (KB51039) Corrected a problem using digital points configured as TPOs, on Ethernet I/O units, where in ioControl's debug mode, if you disabled communication to a TPO point, communication to the whole I/O unit would become disabled also.
- * (KB51056) Corrected a problem where inspecting a pointer variable during ioControl debug mode sometimes resulted in an "undefined command" error, and caused the controller's host port to stop responding.
- * (KB51067) Corrected a potential problem where, as an error is added to the queue, the controller could get into a completely non-responsive state, requiring a power cycle to recover.
- * (KB51068) Corrected a problem where attempts to reconnect to an Ethernet I/O unit when a prior attempt failed, sometimes causes problems and required a power cycle. In ioControl, if the Is I/O Unit Ready? condition is used, error code -17 "Port already locked" is added to the error queue.
- * (KB51283) Corrected a problem where, when a task was stopped while in the middle of a subroutine, the subroutine local variables weren't being cleaned up, causing memory corruption which could cause the controller to lock up or to reset.
- * (KB51071) Corrected a problem with TPO digital outputs, on Ethernet I/O units, where setting the period to 0 could cause the I/O Unit to reset. Now setting the period to 0 stops the pulsing.
- * (KB50301) Corrected a problem using a Digital Output type pointer inside a subroutine, which caused errors in the queue.

[UIO]

* (KB50974) Corrected a problem with firmware dates between 4/06/05 and 4/10/2006 related to setting the TPO Period for the SNAP-AOD-29 module on I/O Units.

* (KB51176) Corrected a problem where attempts to configure a SNAP-AILC module to something other than the default +/- 2 mV/V scale resulted in no change from the default.

Version R7.1c

April 5, 2006

Bug Fixes

[LCE UIO]

* (KB50817) Corrected a problem where the control engine could become unresponsive in certain error situations, such as when multiple invalid commands are sent many times. This could happen, for example, if a host requests data for variables that are no longer defined.

Version B7.1b

Internal release only

Version R7.1a

March 29, 2006

New Features and Enhancements

[LCE, UIO]

* The IP Security Area of the memory map now includes an option of selecting the TCP/IP port used by the control engine, with the default of 22001. Setting the TCP/IP port to 0 will disable Ethernet communication to the host port.

* Send Communication Handle Command now has a "dir" option for retrieving a directory listing of a remote or local file system, using an ftp Communications Handle. (Use the loopback address of 127.0.0.1 for listing files local to the control engine.)

* The TCP Idle Session Timeout implementation has changed: Before, each server application closed a TCP connection that was idle for the configured period of time. Now a TCP-level mechanism (TCP keep-alive) probes idle TCP connections. The probe consists of 3 TCP keep-alive segments sent to the remote client at five-second intervals. If no response is received, the connection is aborted. If a response is received, the probe ceases until the next time the connection is idle for the configured period of time. This new mechanism will not close a connection simply because it is idle.

* Added support for SNMP v1 & v2c. Our SNMP agent is now bilingual (SNMPv1 SNMPv2c.) This has required an additional configuration field in the SNMP area

of the memory map: 0xF03C030C (4 byte Unsigned Integer) Trap Version: 0 = SNMPv1
Trap, 1=SNMPv2 Notification

* Added commands to start/stop PPP without restarting the brain/controller.

[LCE]

* Added report by exception for the purpose of SNMP trap generation.

Bug Fixes

[UIO]

* Modbus server now listens on the Ethernet and PPP network interfaces.

[LCE, UIO]

* (KB50414) Corrected a problem where a SNAP-PAC-S1 would sometimes reset or lock up if an ioControl command requiring two string parameters was used within a subroutine. Examples of these types of commands are Get Substring and Move String.

* (KB49909) Fixed a problem where Set Analog Filter Weight always set the filter weight to zero on Ethernet-based I/O units. Mystic I/O units worked properly.

* (KB49881) Corrected a problem where the SNAP-LCE or SNAP-PAC-S control engine might reset if it simultaneously handled a long TCP timeout (such as when trying to access a non-responding IP device), and when it had incoming requests to open a communication session (such as when using ioTerminal to request the status of the control engine).

* (KB49853) Corrected a problem where using the Numeric Table Element Bit Clear and Numeric Table Element Bit Set commands with persistent tables in ioControl caused an error -29 in the control engine error queue.

* (KB49934) Corrected a problem where the ioControl commands Set TPO Percent and Get I/O Unit as Binary Value caused error -22 when used in a strategy on a SNAP-PAC-S1 that attempts to communicate to a serial I/O unit.

* (KB50049) Corrected a problem where ioControl commands used to transfer data with a FTP communication handle would sometimes fail. Previously, using the Send Communication Handle command might return a false error of -11.

* (KB50238) Corrected a problem manually enabling an I/O unit in certain conditions, specifically, when following these steps: Enable I/O unit from debugger w/o running strategy; clear RAM; download strategy again; enable I/O unit from debugger again. This could cause the control engine to stop responding.

* (KB50281) Corrected a problem where the control engine would sometimes hang or reset if the ioControl Call Chart command was executed while the maximum number of charts were already running.

* Corrected a problem causing PPP to always use comm port 0.

* Corrected some communication handle issues in subroutines and pointers to communication handles that could cause a reset, and/or possibly a bus error.

* (KB47890) Corrected a problem where analog input point values of -1.#QNAN might be returned if the I/O unit was also executing commands that erase and write to flash memory. This could occur, for example, while running an ioControl strategy, and when the I/O unit was accessed by ioManager or ioTerminal.

* (KB50275) Fixed a problem where I/O would sometimes become disabled after re-starting a strategy. Once this occurred, almost any command to the I/O would cause an error. A power cycle was usually required to fix the problem.

* (KB50301) Corrected a problem using a Digital Output type pointer inside a subroutine, which caused errors in the queue.

Version R7.0c

January 19, 2006

Bug Fixes

[UIO, LCE]

* (KB49581) Fixed an issue where IP Filtering (for IP Security) would interfere with the control engine. The control engine would not respond if any IP Filters were configured, unless a filter was also configured for address 127.0.0.1.

[UIO]

* (KB48938) Fixed an issue where the I/O unit would not be enabled when a strategy was started if I/O modules installed on a rack with a SNAP-UP1-M64 did not match what was configured in the ioControl strategy.

Version R7.0b

January 6, 2006

No change to UIO.

Version R7.0a

December 16, 2005

New Features and Enhancements

For more information on the new features introduced with the SNAP-PAC controllers and the other enhancements listed below, see form #1599, the ioProject 7.0 Release Notes.

[LCE UIO]

* Control engine firmware for version 7.0 is now faster for existing SNAP LCE and SNAP Ultimate I/O hardware. The way variables are accessed was improved. I/O communication over Ethernet was changed to non-directed UDP; tasks no longer wait in a queue. Also, tasks not in use do not use CPU time, which the CPU can use for other tasks.

* There is now support for expanded features including analog ramping, on-pulse and off-pulse measurement, time-proportional output (TPO), and pulse generation (N pulses, continuous square wave, on-pulse, and off-pulse).

* The number of Scratch Pad integers and floats has been increased by 7168 to new totals of 10240 integers and 10240 floats.

Bug Fixes

[UIO]

* Corrected a problem where a UDP packet with no payload sent to the OptoMMP command processor would cause it to quit listening on port 2001.

[LCE]

* (KB48069) The scratch pad bits on the LCE are now usable. Previously, scratchpad memory locations F0D80000 through F0D80004 in the SNAP-LCE controller were not being written to by the ioControl WriteNumToIoUnitMemMap command.

[LCE, UIO]

* Corrected a problem where a control engine would sometimes send an empty packet. In older firmware, this could cause UDP port 2001 to go off-line.

* (KB48646) Corrected a problem where in a multichart ioControl strategy, the Copy Current Error To String (or OptoScript's CurrentErrorToString) command would report an incorrect error message. This would occur when CurrentErrorToString corrupted user-defined errors (those errors added to the queue using AddUserErrorToQueue).

* Fixed a problem where UIO I/O Unit variables didn't have enough memory allocated for them, which could cause odd behaviors such as wrong enable / disable and digital point states digital points acting like analog or vice versa, or outputs acting like inputs or vice versa.

* Corrected a problem where an error would occur in the queue in a strategy with a subroutine, where the subroutine had a communication handle (local to the subroutine) defined in it. The chart in which it happened would stop working.

* Changed error -84 text and meaning. This error indicates the firmware is trying to reallocate local (subroutine) memory while it is in use by a subroutine. The code is now issued only if the memory is actually in use at the time a memory allocation is attempted. Previously, an error was issued if any changes were made once a download had been completed, which caused online changes to have problems. Now, online changes are accepted as long as a subroutine isn't executing at the exact time the online change occurs.

* Corrected a problem where if you named a local (subroutine) variable the same as a global (non-subroutine) variable, it was possible for the compiler to use the global variable instead of the variable local to the subroutine, or use the local variable instead of the global variable.

* (KB47464) Corrected a problem where I/O points configured as disabled in ioControl Configure mode became enabled when the strategy was run, even though the "Enable communication" checkbox was not selected for the point.

Versions Previous to R7.0a

For enhancements and bug fixes previous to R7.0a, see the following readme files:

(LCE only)

http://www.opto22.com/documents/RM_LCE_fw_61c.txt

(SNAP-UP1-ADS, SNAP-UP1-D64, SNAP-UP1-M64)

http://www.opto22.com/documents/RM_UIO_fw_61c.txt