

## SNAP Ethernet I/O Firmware README

This readme applies to the following Opto 22 products:

SNAP-B3000-ENET brain  
SNAP-ENET-D64 brain  
SNAP-ENET-S64 brain  
SNAP-ENET-RTC brain

**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 R7.1i

June 3, 2010

Enhancement  
-----

- \* [KB80959](#) 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.

---

### Version B7.1h

November 1, 2006

Bug Fixes  
-----

- \* [KB52706](#) Incorrect default millivolt scaling for SNAP-AITM and SNAP-AIMV type modules on Ethernet I/O units
- \* [KB53950](#) Analog input point filtering continues to include out of range count values, -32768, on Ethernet I/O units.

---

### Version B7.1g

October 17, 2006

Bug Fixes  
-----

- \* [KB52885](#) Analog output modules in positions 8 to 15 do not respond to ioControl 'Ramp Analog Output' command.
- \* [KB52733](#) Event timers on Ethernet I/O units begin counting down as soon as they are configured.

---

### Version B7.1f

May 24, 2006

June 13, 2006

Bug Fix

-----

\* [KB52254](#) Ethernet I/O units drop UDP messages and may timeout if too many messages are received at once.

---

---

**Version B7.1e**

May 24, 2006

Bug Fix

-----

\* [KB51599](#) I/O unit limits Type C thermocouple temperature range on SNAP-AITM-2.

---

---

**Version B7.1d**

April 26, 2006

Bug Fixes

-----

\* [KB50974](#) SNAP-AOD-29 TPO module and setting the analog TPO period.

\* [KB51176](#) SNAP-AILC scaling remains at default setting.

\* [KB51071](#) TPO digital outputs and setting the period to 0 (zero).

---

---

**Version B7.1b**

Internal release only

---

---

**Version B7.1a**

March 29, 2006

Internal release only

---

---

**Version R7.0a**

December 16, 2005

Bug Fixes

-----

\* 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.

\* Corrected a problem where the number of PID Loops available, stored in memory map address F030011C, incorrectly showed 0 instead of 16. This could confuse

ioManager's Tools->Inspect->PID->PID Loops dialog to not display the PID Loops, though the PID Loops did function correctly.

\* (KB48510) Corrected a problem where Rapid I/O activity on a rack with a SNAP B3000-ENET and a SNAP-IDC5Q caused the SNAP-B3000-ENET to reset. RM\_ALL\_ENET\_FW

---

## **Firmware R6.1c for SNAP Ethernet Brains**

September 29, 2005

---

-----

SNAP Ethernet I/O firmware R6.1c adds support for the following SNAP I/O modules:

SNAP-AIARMS-i  
SNAP-AIVRMS-i  
SNAP-AILC  
SNAP-AOA-23-iSRC

This update also incorporates fixes to the following problems:

\* First seen in firmware R6.1a, PPP failures would occur at data rates at or above 19200 bps.

\* The brain used an incorrect scaling factor, which would cause an incorrect reading from an RTD.

\* Multiple incoming Modbus packets were not being handled correctly, causing the first packet to sometimes not be received.

\* With 64-bit integers, part of a passed-in value was not handled correctly.

\* Incorrect counting at high frequencies. (Note that this applies only to brains with counting capability.)

\* Ethernet TCP/IP communication, where the brain improperly handled communication with a remote device after that device had its power cycled.

\* The following Ethernet communication settings kept their original default values, even after these values were modified and saved:

- TCP Minimum Retransmission Timeout
- TCP Initial Retransmission Timeout
- TCP Retransmission Attempts

---

## **Firmware R6.1b for SNAP Ethernet Brains**

June 15, 2005

---

SNAP Ethernet I/O firmware R6.1b was made available briefly as a beta version to a small number of testers, but this version was never formally released.

---

## Firmware R6.1a for SNAP Ethernet Brains

April 1, 2005

### Enhancements

-----

\* Support for high-density digital input and output modules. Opto 22 high-density digital modules include the SNAP-IDC-32, SNAP-ODC-32-SRC, and SNAP-ODC-32-SNK. Each of these modules provides 32 digital input or digital output points in one SNAP module, for up to 512 digital points in one SNAP rack. For more information on SNAP high-density digital modules, see Opto 22 form 1556, the SNAP High-Density Digital Module data sheet.

### Bug Fixes

-----

\* Fixed Modbus support to correctly change between degrees F and degrees C.

\* Fixed a problem where writing to multiple memory map fields at once would sometimes incorrectly process subsequent fields. This behavior resulted in diverse effects. For example, if you changed the stream interval using the ActiveX command SetStreamConfiguration, the new value would be copied into the memory map but the actual stream interval would not change.

\* Corrected a problem that could temporarily drop a counter value by 256 counts on standard input modules configured as counters.

\* Fixed a problem that resulted in excess counts in multiples of 256 on standard input modules configured as counters. This problem would appear only on the first 16 of 32 digital channels. The second 16 channels did not show this problem.

\* Fixed a problem reading off-latches via Modbus on standard module points above 16.

\* Corrected a problem with writing three or fewer bytes, via Modbus, to the Status Write area of the memory map.

\* Added more debugging information to the Status Read area of the memory map, mostly relating to communication (via ARCNET) with the special-purpose modules on the rack.

\* Added an "invalid float" check on the output. If, for whatever reason, the output results in an invalid float, the output will get clamped to the lower clamp. This situation could occur if a bad setpoint is configured.

\* Fixed a problem that occurred when performing a string function that required two strings, (for example, "String Equal?", "Append String to String", "Get Substring", etc.). If the same string was passed as both the source and the destination, one of the string descriptors was inadvertently left on the data stack. Each time this happened, the data stack would build down, until it reached a point where it would cause a bus error, which would cause the brain to reset.

---

---

## **Firmware R6.0a for SNAP Ethernet Brains**

January 12, 2005

### Enhancements

---

- \* Added two new counters to status read area of memory map:
  - F0300110 (4 bytes) - Number of Ethernet MAC resets detected
  - F0200114 (4 bytes) - Number of digital output point resets detected
- \* Enhanced recovery logic for stalled output and stalled Ethernet communication failures observed in electrically noisy environments.
- \* Added logic that sends a reset command to any analog module that identifies itself as module type "0", which is not a valid module type. Sending the reset command forces the module to perform a soft reset and re-read the module type from non-volatile storage.
- \* Increased the number of messages that can be held in the email transmit queue from 5 to 128 to reduce the probability of dropped messages when the transmit queue fills up.
- \* Altered powerup clear (PUC) algorithm to be compatible with the new ARCNET comm watchdog feature in analog module firmware dated Dec. 2004 and later. This change is backwards compatible with old module firmware, but leaves the new watchdog enabled on modules with new firmware. (The ARCNET comm watchdog on the analog modules resets the ARCNET interface on the analog module if no commands are received from the brain for ~3 seconds.)

### Bug Fixes

---

- \* Fixed "Arcnet Reconfigs Initiated By this Brain" counter (visible in Read Status area). The value shown in this counter was about 10% lower than the actual count.

---

---

## **Firmware R5.1g for SNAP Ethernet Brains**

July 30, 2004

### Bug Fixes

---

- \* Corrected a checksum error in LCP terminate-request packets that prevented orphaned PPP links from being correctly terminated at brain powerup or reboot.

---

---

## **Firmware R5.1f for SNAP Ethernet Brains**

July 8, 2004

### Enhancements

---

- \* Added a counter showing the total number of msec elapsed since the brain was powered up.

### Bug Fixes

-----  
\* Fixed a memory leak related to network operation.

---

### **Firmware R5.1e for SNAP Ethernet Brains**

May 18, 2004

#### Enhancements

-----

\* Multiple improvements have been made to the TCP/IP stack, primarily for handling communication over less-reliable connections (e.g. via satellite links, where packets are more likely to be dropped or to become corrupted).

---

### **Firmware R5.1d for SNAP Ethernet Brains**

March 26, 2004

#### Bug Fixes

-----

\* Fixed an error where the brain would return a "-1" error to the first application that communicated with it after power had been cycled.

\* (SNAP Simple I/O only) Several missing Modbus features related to analog signals have been added.

---

### **Firmware R5.1c for SNAP Ethernet Brains**

January 27, 2004

#### Bug Fixes

-----

\* (Does not apply to SNAP-ENET-D64 brain) Corrected problem where the processor would not reply properly to the first command sent after a kernel download.

---

### **Firmware R5.1b for SNAP Ethernet Brains**

December 30, 2003

#### Enhancements

-----

\* Added support for new SNAP-AIPM power module.

\* Analog/digital maximum scan times and all contents of the brain's Status Write area are now stored to non-volatile flash memory.

\* Improved PPP support, including adding the current local PPP IP address to the PPP status area and making login and password fields longer.

\* Improved interoperation with the Nokia 31 GSM Connectivity Terminal by making validation of LCP echo-reply packets less strict. Before this change, a PPP link to the Nokia terminal would be dropped and then be re-established approximately every 30 seconds.

#### Bug Fixes

-----  
\* Corrected problem where digital counts would be zeroed when Ethernet communication was enabled using the ioControl command "Enable Communication to I/O Unit".

\* Corrected problem where a scaled value from an analog input module would be incorrect when Ethernet communication was enabled using the ioControl command "Enable Communication to I/O Unit".

\* Fixed bug where input module types defaulted to incorrect types, instead of defaulting to digital inputs.

\* Corrected problem where data would occasionally be incorrectly stored to flash memory.

---

---

### **Firmware R5.0c for SNAP Ethernet Brains**

October 30, 2003

#### Bug Fixes

-----  
\* Corrected problem where ranges for thermocouple values were clipped.

---

---

### **Firmware R5.0a for SNAP Ethernet Brains**

August 1, 2003

#### Enhancements

-----  
\* Added support for the SNAP-SCM-485-422 serial module, which provides two 2-wire RS-485/422 serial ports or one 4-wire serial port. Version 5.0 firmware is required for 4-wire operation.

\* Added ability to enable RTS/CTS flow control in "Revision A" SNAP-SCM-232 serial modules.

\* Standardized TCP default settings across all Opto 22 Ethernet products. Settings are:

- Initial RTO of 3000 mSec (3 seconds)
- Minimum RTO of 250 mSec
- TCP retries of 5
- Idle session timeout of 240,000 mSec (4 minutes)

\* Added analog point clamping.

#### Changes

-----  
\* Version 5.0 firmware for SNAP Ethernet brains does not provide an HTTP server, so XML functionality and previous Web Config pages are no longer supported. To configure I/O units and functions, use ioManager R5.0 or newer.

#### Bug Fixes -- Network, SNMP, and PPP

-----  
\* Fixed problem with incorrect idle session timeouts that occurred in firmware

prior to R1.0o. In this problem, the timeout value was internally doubled, so that even if a displayed timeout value was 120,000 mSec, for example, the TCP/IP stack would actually use a timeout of 240,000 mSec.

- \* Fixed memory leak that caused BootP requests to stop being sent after several days.

- \* Fixed PPP bug that could cause link negotiation to fail if the network access server requested CHAP authentication.

- \* Fixed SNMP bug that caused SNMP agent to stop communicating after sending an authentication trap.

- \* Added scratch pad areas of memory map to the SNMP agent.

- \* Changed SNMP acknowledgement functionality. Previously, event message acknowledgements via SNMP would not take effect until the event message retransmit timer expired or the event message state was changed to INACTIVE or ACKNOWLEDGED via some method other than SNMP.

#### Bug Fixes -- Miscellaneous

- \* Fixed missing over/underrange analog module correction. The value of -32768 is now returned for counts and Engineering Units when an input is over- or underrange.

- \* Digital I/O scanning is now synchronous with command processor. This benefits some higher-speed I/O configurations that must be synchronized to improve speed.

- \* Added the number of ARCNET Reconfigs detected since powerup to the Status Read area.

- \* Added the number of ARCNET Reconfigs initiated by the brain since powerup to the Status Read area.

- \* Fixed a newly introduced bug that caused the SNAP-PID-V module to go off-line after the 'Store To Flash' operation was used.

- \* Improved serial module behavior so that the current connection on a port is closed when a new connection request is received for that same port. This behavior allows an application to reconnect to a port after a previous connection is stopped ungracefully.

- \* Fixed end-of-file (EOF) problem with Modbus/TCP server.

- \* Fixed the command processor's interpretation of the EOF return. Previously this could cause a shutdown error.

---

---

### **Firmware R3.0q (3.0.2.10) for SNAP Ethernet Brains**

September 3, 2002

- \* Fixed a status read bug that gave incorrect information for the following:
  - Error Code for Previous Command

- Transaction Label for Previous Command
  - Source Address for Previous Command
  - Error Address for Previous Command
- \* Fixed bug with system timer setup.
  - \* Changed the way the loader and firmware versions are displayed to use the more user-friendly release format (for example, "R2.1c") used elsewhere in Opto 22 products.
  - \* Changed PID feature to wait for analog sampler startup and optimize for-loops.
  - \* Fixed Ethernet bug where packets would occasionally get dropped when a full-duplex Ethernet link was used.
  - \* Increased ARCNET communication timeout with serial module from 10 ms to 50 ms to prevent dropped data when serial module port was set to 115200 bps.
  - \* Fixed bug that prevented writing to the ClampEu point configuration area.
  - \* Fixed problem with PPP modem dialer where PPP would stall when the local PPP IP address conflicted with a remote PPP IP address.
  - \* Fixed problem with embedded '&' in event message configuration data
  - \* Fixed problems with dialer used for PPP that could cause it to stall indefinitely.
  - \* Added Modbus access to memory map.
  - \* Fixed low alarm so it triggers on powerup if low-alarm condition exists.
  - \* Changed RBE state machine behavior for event messages with SNMP enabled and SNMP period > 0. Messages now stay active until acknowledged, even if the scratch pad no longer matches the event.
  - \* Fixed vulnerabilities in UDP and IP fragment reassembly discovered by SNMP protocol test used for CERT advisory CA-2002-03.
  - \* Made the following ARCNET driver modifications:
    - Added ARCNET module lock interface to the concurrent ARCNET driver.
    - Added ARCNET buffer pool.
    - Modified ArcnetSendReceive to use new module locks.
    - Modified application code calling ArcnetSendReceive that was not thread-safe with the new version.
  - \* Added support for modes of customer-specific modules.
  - \* Added Rev Date and Rev Time to status read area of memory map.
  - \* Fixed PPP/email problem that caused delays when sending the email and hanging up the PPP link afterwards.
  - \* Fixed incorrect deallocation of TCP data when ACKs are received.
  - \* Fixed error that could cause a hardware reset during extended packet bursts.

\* Fixed resource leak occurring when a RESET packet is received while TCP connection is in the CLOSE\_WAIT state.

\* Added smart module locking to prevent concurrent ARCNET transactions to the same smart module. The problem could cause modules to drop offline when accessed via memory map and I/O scanner concurrently.

\* Fixed email client logic to prevent resource leak.

\* Modified serial download to fix '0x29' error that would occur on first attempt.

\* Added square root of PV to PID.

---

---

### **Firmware R3.0i (3.0.2.8) for SNAP Ethernet Brains**

December 18, 2001

\* Modified Ethernet hardware register test.

\* Fixed XML problem that caused the error message "Unknown parameter out of Token space" to be displayed.

\* Increased the number of plugins allowed in a single XML page.

\* Fixed problem with Event Message State area of memory map where an error would be returned when writing to this area, even if the function was performed successfully.

\* Fixed problem saving some memory map settings to flash.

\* Fixed bug with configuring points on SNAP-ENET-D64 Ethernet brains.

---

---

### **Firmware R3.0f (3.0.2.5) for SNAP Ethernet Brains**

October 11, 2001

\* Added Modbus access to Scratch Pad areas.

\* Fixed problem when using network gateways.

---

---

### **Firmware R3.0e (3.0.2.4) for SNAP Ethernet Brains**

October 04, 2001

\* Added support for SNAP-PID-V module.

---

---

### **Firmware R3.0d (3.0.2.3) for SNAP Ethernet Brains**

August 03, 2001

\* Fixed a problem related to ICTD scaling.

\* Fixed Communications watchdog timer setup.

---

---

## Initial Release

Firmware R3.0a (3.0.2.0) for SNAP Ethernet Brains  
June 21, 2000

---

---

## How to Get Help

-----  
If you have any questions about this product, contact Opto 22 Product Support Monday through Friday, 8 a.m. to 5 p.m., Pacific Time.

E-mail: [support@opto22.com](mailto:support@opto22.com)

Phone: 800-TEK-OPTO (835-6786)  
909-695-3080

Fax: 909-695-3017

Web: [support.opto22.com](http://support.opto22.com)

Please provide the following information about your system to the Product Support engineer:

- Version of this product
- PC configuration (type of processor, speed, memory, operating system)
- A complete description of your hardware system, including:
  - jumper configuration
  - accessories installed (such as daughter cards)
  - type of power supply
  - types of I/O units installed
  - third-party devices installed (e.g., barcode readers)
- Firmware version
- Any specific error messages seen