SAGE LX-800 (C3414 CPU) RTU
Firmware Version S02 Release Notes

Product Applications:
Sage 1410
Sage 1430
Sage 1450
Sage 2400
Sage 3030M
Sage 4400
LANDAC II

K5 Update – 20-Oct-2020:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

NOTE: Due to California 2020 cyber-security regulations, users must immediately change the user access account from the default using the Sage User Manager tool. The user account file named "*Schneider_Electric_1_USERS.tar.gz*" located in the *"FW_Update/Secure/updateGen"* directory, only has up/download permission to enforce this policy, is delivered on new RTUs and installed when using the Initial Installer to convert a G3_P6 or earlier revision.

The user account file named *"Schneider_Electric_2.tar.gz"*, located in the same path, has the old default "Admin" credentials. Use this user account file at your own risk.

Fixes:

☑ SERIAL COMM HDW: Fix issue where protocols assigned to serial comm channels where no Comm Expansion hardware exists, causes RTU reset. Serial comm protocol tasks now self-terminate if no serial hardware exists on the channel.

☑ FTPPUSH: Give ability to rename push error STS and attempts/successes ACC points.

☑ COMMAND LOG: Fix save-to-disk function where configured size limit was not obeyed, causing flash partition to fill up if command log files not culled manually.

☑ SEL PROTOCOL: Fix problem where all ACCs, ANAs, or STS points are deselected from being saved into RTU database, protocol would try to save them anyway, causing reboot.

Enhancements:

☑ FTPPUSH: Add support for SFTP protocol for file transfer operations.

☑ DNPR: Add selector whether to include Float Ana (Obj 30 Var5) in Class 0 reply.

☑ SEL PROTOCOL: Add ability to retrieve custom event reports that are available from connected relay, higher resolution sample rate, filtered or unfiltered, and specialized reports like DIF, GND, or SEC, if available. Works in conjunction with FTPPUSH application, custom event files are pushed to designated S/FTP server.

☑ GUI: Mouse movements and keyboard interaction with RTU webpage extends the timeout period so that as long as user is interacting with the web page, even just viewing, it will not timeout and log user off.

K4_P4 Update – 29-Jul-2020:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
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Fixes:
☑ SEL Protocol: Fixed issue preventing successful login with 501 relay, preventing Autoconfigure process to complete.
☑ SEL Protocol: Force protocol to issue EVE command to 321 relay even though it supports CEV command, if configured to obtain event reports. 321 relay does not include relay settings in CEV event report, the EVE report does.
☑ DNPR Protocol: Fixed duplicate response messages to Record Current Time function. Duplicate response also incremented application sequence number, causing some SCADA masters to lose sync.
☑ DNPR Protocol: Fixed lag response time when using unsolicited over UDP, when multiple DNPR channels use the same UDP listening port.
☑ AutoSectionalizing Task: Fix bug where Backfeed Overcurrent STS points are not latched if Forward fault is specified as trigger. Backfeed OC STS points should be asserted if ACI annunciates them regardless if used to trigger AST switch operation.
☑ AutoSectionalizing Task: Fixed time threshold to assert Phase Loss of Voltage STS points was incorrectly set to 4 seconds, shoud only be 1 second.

Enhancements:
☑ SEL Protocol: Add event buffer size configuration to items adjusted by autoconfigure process, eliminating previous trial and error process of determining suitable buffer size.

K4_P3 Update – 21-Apr-2020:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
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Fixes:

☑ SEL Protocol: Fixed issue causing spurious reboot upon restart immediately after updating with configuration converted from an earlier firmware release (prior to K4).

☑ SEL Protocol: Fixed issue causing autoconfigure process to fail. If port is already configured and talking to relay, any control operations sent to relay can cause ASCII reads to abort, causing autoconfigure process to fail.

☑ Command Log: In Syslog feature, removed network Ping function to detect if Syslog server available, as not all systems allow Pings. Relying on UDP socket write to detect if Syslog Server available or not.

☑ ISaGRAF: RLL created I/O points now marked as online at startup, even if not mapped into RLL program.

☑ XMLtoXLS Utility: Revamped the Save As function.

☑ Config Converter Utility: RADIUS information was not getting updated correctly, causing vxWorks OS to abort startup when enabling the RADIUS feature.
NOTE: If using RADIUS with an earlier version, even K4_P2, use the Config Converter in the K4_P3 Update Package to update your configuration to contain the correct RADIUS configuration information.

K4_P2 Update – 11-Mar-2020:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

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The user account file named *"Schneider_Electric_2.tar.gz"*, located in the same path, has the old default "Admin" credentials. Use this user account file at your own risk.

Fixes:
- ☑ SEL Protocol: Fixed analog scaling issue when Autoconfig performed with K4 through K4_P1 releases, causing some Analogs to get zeroed or incorrect values.
- ☑ DO Controls: When DO controls were operated, ONLINE flag was getting reset, making DO appear as "FAILED" in GUI display.
- ☑ GUI: Header info was not showing up in Internet Explorer browser due to browser incompatibility issue.
- ☑ Isagraf: Some I/O points health flags were not getting initialized correctly at startup, making those points show up as "FAILED" in GUI display.
- ☑ Config Converter: Wasn't handling new ASCII timeout parameters conversion properly.

K4_P1 Update – 13-Jan-2020:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
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The user account file named *"Schneider_Electric_2.tar.gz"*, located in the same path, has the old default "Admin" credentials. Use this user account file at your own risk.

Fixes:

☑ ACI task: If I/O point names are left blank, will restore to default names on restart so they will show up in mapping lists.

☑ MCD task: Task was incorrectly waiting until after startup init period completed to initialize MCD I/O points, causing initialization to generate unwanted events. Modified startup behavior so that I/O initialization happens during startup init period.

☑ ALTIED task: Fixed bug preventing it from clearing SBO initialization flag, making other tasks needlessly wait the full initialization timeout period before being allowed to use ALTIED data points.

☑ Data Transfer: Improved startup initialization to only wait on data types it is watching to be initialized.

☑ DNPR Protocol: Fix bug where DNP3 frames read from TCP sockets might have 0x0564 sync bytes or CRC bytes be split across separate socket reads, causing otherwise valid received message to be discarded. Also fixed health flag byte position for (obsolete Obj 100) Floating Point, it was reversed with Units byte. Fixed syslog message causing crash if constructed message was too long to fit in buffer.

☑ SEL Protocol: Fix bug where task would crash if all relay I/O points were deselected from RTU database.

☑ GUI CDC I Protocol: Fix bug in point mapping where number of ACC points created did not match Scan Address sequence numbers, creating too many ACC points.

☑ User Account Manager utility: Fixed bug preventing deletion of existing user accounts. Also now enforce assignment of Roles to all users, and assignment of at least one permission to Roles.

☑ Sage 4400 Special Function Bus: Fixed bug preventing Sage 4400 SFB cards from being correctly detected and configured.

Enhancements:

☑ GUI Initialization: Improved initialization process to speed up time between restart and slave protocol communications begins. GUI displays message in display pages if I/O database initialization not completed yet.

☑ SEL Protocol: Add support for SEL 2411 device.

K4 Update – 30-Sep-2019:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

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The user account file named *"Schneider_Electric_2.tar.gz"*, located in the same path, has the old default "Admin" credentials. Use this user account file at your own risk.

Fixes:

☑ vxWorks Urgent/11vulnerability: Security update to mitigate Ethernet communications vulnerability. See link for detailed information: https://www.sage-rtu.com/updates/vxworks-urgent11-update

☑ SEL Protocol: Update to make autoconfig and HIS, EVE, and SER report retrieval work correctly with newer relay models. Fix to repopulate list of Event Files after a Restart so "Get Event" button will work.

☑ DNPR Protocol: Fix to scan correct state of Local/Remote switch at startup for Internal Indications.

☑ DNPR Protocol: Fixed bug where request for OBJ 1 VAR 1 used qualifier 0x17, STS data was not returned as packed bits as expected for that variation. Qualifier 0,1, and 6 only are allowed for OBJ 1 VAR1 data objects, and if none of those qualifiers are received, PARAMETER_ERROR IIN is set.

☑ DNPR Protocol: Multiple DNPR sessions can now use same DNP ID if using TCP/IP communications and Master IP address filtering is enabled. The Master IP addresses must be unique in this case.

☑ DNPM Protocol: Fix UDP Time Sync Broadcasts not working correctly.

☑ DNPM Protocol: Fix bug casing DNPM to incorrectly issue counter reads after a failed Binary Output control operation.

☑ Data Transfer: Fixed AI-AO display page to correctly display AO if corresponding AI is offline or in commfail.

☑ Forced Data: Fix analog calculation bug preventing some analog events from being detected.

☑ GUI: Fix bug when specifying new points as time tagged default class, mapping page would show an invalid Class value (eg. If specifying Class 1 Time Tagged, mapping page would display Class 4).

☑ GUI: Baseboard configuration I/O points were 1-relative, but display page made them 0-relative, now consistent to be 1-relative on configuration and display pages.

☑ GUI: Fix bug in CPU Configuration page, DNP Profile section, GUI now prevents fields from being left blank.

☑ RTU Time: Fixed time constraint when time updates can be used. If time source sends time ahead of configured schedule, RTU will accept it.

Enhancements:

☑ RADIUS Authentication: Authentication option improves security by using RADIUS server to authenticate users access and permissions so that user accounts need not be created and loaded into RTU.

☑ FTPPUSH Application: New application allows SEL History, Event, and Sequential Event Recorder reports to be retrieved from SEL relay and pushed using FTP to a remote FTP server.

☑ SEL Tunnel: The SEL Tunnel Eumulator task now supports connectivity with the SEL 5030 QuickSet software.

☑ Annunciator Panel: Increased number of I/O points per cell from 16 to 60, and number of cells from 30 to 60.

☑ DNPR Protocol: Now sets "local forced" flag in object health byte (in supported object variations) when point is forced on GUI.

☑ Data Trap: Now supports up to 5 simultaneous capture sessions, now launched from applications menu block.

☑ Syslog: Added type of Binary Control (Pulse/Latch, On/Off, Trip/Close) operation to syslog.

☑ USER Log: Authentication method used for all RTU logins is recorded now.

K3 Update – 19-Jan-2019:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

K3 firmware was redacted due to issues in upgrading pre-existing SEL protocol configurations.

K2_P4 Update – 4-May-2018:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
☑ Data Transfer: Fix AO-Float computation bug.

☑ DNPM Protocol: Fix bug when sending control to an IED caused scanning of other IED's to suspend, was due to Fast Scan algorithm not correctly selecting the "next" IED to scan.

☑ DNPM Protocol: Added support for Obj 30 VAR 5/6 and Obj 32 VAR 5/6/7/8 – IEEE Single and Double Precision floating point numbers are now processed if returned in both static and event data scans and converted into integer analogs based on configured Min/Max values of both Engineering Units and Counts.

☑ DNPM Protocol: If all IEDs were detected as "Comm Fail" on serial port, DNPM would issue reset to serial port controller sometimes during trasmit attempt, causing serial port to stop transmitting. Fixed to ensure no transmit in progress before resetting controller.

☑ DNPM Protocol: Time Between Messages can be a large value again (hours).

☑ DNPM Protocol: Fix "Internal Indications" display in "IED Comm Counters" page to correctly interpret Internal Indications bits.

☑ DNPR Protocol: A previous bug fix to discard an "echo" of DNPM command in common code was incorrectly filtering out DNPR messages if master address is same as RTU address. Is proper to have each device have a unique address, but DNP does not have specific rule forbidding it, so master and slave address being identical must be allowed.

☑ DNPR Protocol: Fixed STS points generating two events when going from "offline" to "online", now generates just the single event.

☑ Modbus Protocol: Fix bug where MB sends message to Command Log, it would crash the Modbus task.

☑ Conitel 2100H Protocol: Section numbers were ordered in mapping page in same order they were selected, instead of ascending order.

☑ SEL Protocol: Fix config bug, fix IB and B4 timer bugs making timers not work as expected.

☑ Conitel C2100H(M): Fix configuration, "Edit Config" button did not work properly.

☑ Conitel C2100H(M): Fix "Copy to IEDn" function.

☑ vxWorks OS: Fix incorrect user login credential causing HTTP server to crash.

☑ GUI: Fix problem editing hardware AOUT, changes were not saved correctly after submitting.

☑ GUI: Pasting values from Excel spreadsheet into configuration point lists works properly on all config pages.

☑ GUI: Fix problem where "Home Page Message" is left completely blank would prevent subsequent editing of message.

☑ GUI: Fix PCAP status for Secondary Port (J2) showing up on Primary Port (J3) line in PCAP Capture page.

☑ GUI: Command Log config now requires valid IP address if "Write to Syslog" is enabled.

Enhancements:

☑ Modbus Master: Analog Input point mapping page adds support for Lo-Hi/Hi-Lo word order of floating point values from one or two registers, was only processing in Hi-Lo order before.

☑ Modbus Master: Floating point mapping page adds support for Lo-Hi/Hi-Lo word order of floating point values from one or two registers, was only processing Hi-Lo order before.

☑ Sage 4400 SFB Do support: Added support for DO points on the Special Function Bus to the Sage 4400 to work the same as with the Sage 2400.

☑ GUI: Serial and Ethernet Configuration Boxes on GUI now indicate number of configured ports/sockets for quick reference.

K2_P3 Update – 21-Nov-2017:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

☑ Data Transfer: Fix display issue with points being displayed incorrectly if different rates are used, and ensure analog points are initialized with FRF between 0 and 1.
☑ DNPR Protocol: Remove limitation of 1 AO point operation in single request. This was a hardware SBO limitation that does not apply to AO points.
☑ DNPR Protocol: Add support for Status Events without time (Obj 2 Var 1).
☑ C3835 1msSOE : Fix bug in initialization of PC104 1mssoe hardware causing causing crash if point names omitted in configuration of points.
☑ GUI: Allow ampersand (&) to be used in point names.
☑ vxWorks OS: Fixed Telnet initial connection being slow.

Enhancements:

☑ DNPR: Added time of operation and number of operations information to DNPR Status point displays.
☑ Boolean Status: Increase point count per gate to 100.

K2_P2 Update – 17-Aug-2017:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

☑   Data Transfer: Fixed configuration bug where setting rates in random order (instead of ascending) caused some points to not get mapped properly or be displayed properly.

☑   DNPR Protocol: Fixed bug in Ethernet DNP messages where if 0x0564 appears in middle of message, DNPR would sometimes thing it found the start of a new message.   Also make AOUT processing notify "Too Many Ops" error if more than one AOUT is operated in same message.

☑   Sage 4400: Fix bug in shared code with Landac II making Sage 4400 unable to execute digital outputs because it cannot clear a flag controlled by dedicated switch only on Landac II.

☑   GUI: Updated links to access the Alarming functions even if not logged into the GUI.

Enhancements:

☑ GUI: Give user ability to extend timeout time when popup notification window appears warning GUI is about to time out and log user out.

K2_P1 Update – 29-Jun-2017:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

☑   DNPR protocol: Fix parsing error causing occurrence of 0x0564 sequence in DNP message to fool parser into thinking it was the start of a new DNP message.

☑   GUI: Fix session timeout popup so it correctly extends the time when that is selected.

☑   Offline Edit tool: Fix code error causing offline edit tool to hang.

Enhancements:

☑ none

K2 Update – 05-Jun-2017:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412). Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
- ☑ DNPR protocol: Fix unsolicited over TCP to listen for App Confirms on same socket event messages were sent out on.
- ☑ DNPR protocol: Restored code to set health flags on STS points when IED goes in and out of comm fail.
- ☑ DNPR protocol: Make multi-data link comm status items match single DNPR comm status page.
- ☑ L&G 8979 protocol: Fix ACC display to correctly show frozen accumulator values for both Global Freeze accumulators and local copy accumulators.
- ☑ SEL Protocol: Fix initialization bug sometimes causing Targets to not get initialized properly.
- ☑ GUI: Allow some commands to be executed without having command privilege (set clock, start/stop Data Trap and PCAP captures).
- ☑ MCD App: Fixed problem mapping newly created MCD Points in Chrome Browser.
- ☑ 2179 Protocol: Configuration fix for the Copy to IED function. Point names were not being retained in the configuration.
- ☑ 2179 Protocol: Configuration fix for Simple Status/2-bit Status point selection issue with the GUI.
- ☑ 1MSSOE Protocol: Fix for blank point names cause RTU to crash.
- ☑ Forced Data: Added forced data support to the Alt-IED application.
- ☑ Fixed a problem with Copy from Excel (Internet Explorer only). Point names were shifted up one point on some screens after being submitted.

Enhancements:
- ☑ Sage 4400 RTU Support added.
- ☑ DNPR supports Multi-Masters to Multi-DNPR sessions over single socket (IP addr:TCP port pairs).
- ☑ PCAP captures from the GUI added.
- ☑ Firewall rules configuration file editor from the GUI added.
- ☑ Alarming App: Added Auto Acknowledge feature.
- ☑ Added support for sending command log entries to a Syslog server using UDP over RFC 3164 protocol specifications.
- ☑ Calculation App: Added Absolute Value function.
- ☑ Add Data Link Reject report function to be called from console (similar to App Layer Reject report function).
- ☑ Add Check IED Configuration function to SEL protocol.
- ☑ Configuration Change Accumulator added to allow tracking of changes.
- ☑ Local/Remote switch generates syslog entry.
- ☑ Failed system packet send generates syslog entry.
- ☑ DNPR: Added option to Invert a range of points in configuration.

- ☑ HMI: Added ability to view Alarming and Annunciator Panel display pages without logging into RTU.
- ☑ Timeout message: Session timeout message now has an option to extend the time.

K1_P2 Update – 13-Jan-2017:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
- ☑ DNPR: Fixed Comm associations timeout parameter not being updated properly when edited in GUI. Fixed Comm Associations comm counters display to put counts in correct slot.

Enhancements:
- ☑ None.

K1_P1 Update – 15-Dec-2016:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
- ☑ CDC I & II protocol: Fix MCD display. Point numbering was incorrect.
- ☑ CDC I & II protocol: Fix AO Display page not showing up.
- ☑ IED Comm Fail LED: Fix 3030M management of IED Comm Fail LED and STS point. Would sometimes illuminate despite all IED's communicating properly.
- ☑ GUI: Ability to reset RTU from Up/Download page was restored due to popular request.
- ☑ Console: Add console command to generate detailed report of tracked reasons for incrementing the Data Link Rejects counter for debug purposes.
- ☑ Startup: Fix for AO, DO, SBO Online Flags at startup.
- ☑ 1MSSOE display page: Added columns for number of changes and time of last change.

Enhancements:
- ☑ Added support for the new Linx GPS Card. Choose between old Trimble and new Linx from the GPS Configuration section on the main configuration page.

K1 Update – 26-Sept-2016:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

- ☑ DNPM protocol: Fix management of AOUT health flags at startup.
- ☑ DNPM protocol: Scan Type 4 can now be configured for large (>256) point counts.
- ☑ DNPM protocol: Fix ACC scanning where large point count would cause scan function to ask for same ACCs multiple times.
- ☑ =SE= MBM Protocol: Initialize health flags for binary and analog output types at startup so that display page is correct.
- ☑ Data Transfer Task: Assigning different time rates to same conversions types would cause Data Transfer task to crash.
- ☑ MCD task: Fix to ensure MCD out point follows MCD state if invalid state detected.
- ☑ Calc task: Fix ability to add/edit constants.
- ☑ GUI: In analog mapping screens, some CMIN/CMAX, EGU MIN/MAX fields did not allow sufficient digits to be entered to represent a large 32-bit negative number including negative sign.

Enhancements:

- ☑ New Modbus R Protocol: Add generic Modicon-style Modbus R protocol that adheres to Modbus spec with regard to function codes and has feature to specify which Function Code to be used to scan that point at data point level.
- ☑ DNPR Protocol: Add new "Level" choice for specific customer with non-Level 2 compliant master station to allow it to communicate in unsolicited mode.
- ☑ L&G 8979 Protocol: Add Comm Status point.
- ☑ VxWorks OS: Increased interrupt stack size improves performance of heavily loaded serial communications at high baud rate.

K0_P5 Update – 27-May-2016:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!
Fixes:
- ☑ DNPR Protocol: Bug fix for intermittent communications over UDP.
- ☑ L&G 8979 Protocol: Bug fix for STS display page if point is marked "inverted".
- ☑ Quantum Meter protocol: Init and manage I/O points health flags properly.
- ☑ Command Log: Don't send events to Command Log if it is disabled to prevent causing sending tasks to stall or crash.
- ☑ Data Transfer: Bug fix where task was changing forced value instead of actual value in AO-FLT type.
- ☑ Hardware STS: Handle points marked as spare correctly.
- ☑ ACI: Bug fix causing primary power STS point being set instead of backup power STS point.
- ☑ GUI: Fix GPS strength of satellite signal display.
- ☑ GUI: Toggle function in Force Data popup dialog made more specific to indicate only state is toggled, not flags.
- ☑ GUI: Fix Primary Secondary time configuration popup, frequency and timeout values revert to default when time base changed.
- ☑ GUI: Fix Series 5 Master configuration to display correct number of points configured.
- ☑ GUI: Change All functionality improved in all configuration pages.
- ☑ GUI: Copy IED configuration Harris and Symax protocols fixed.
- ☑ GUI: Analog mapping screen show Class column header only for DNPR protocol.
- ☑ GUI: SEL Command Page now shows up correctly.
- ☑ GUI: Fix DNPR unsolicited RTU master address assignment if using TCP.
- ☑ GUI: Size of SOE log enforced to 300 entries now.
- ☑ User Manager Program: Catch and handle space character in password if entered. Space character is not allowed.

Enhancements:
None

K0_P4 Update – 30-Mar-2016:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!
Fixes:

- ☑ DNPM protocol: Initialize health flags on Obj 10 Var 2 (Binary Output Status) to be Online.
- ☑ DNPR protocol: Make per-point Class assign default to Class 1 instead of Class 0 in the event config file corrupted.
- ☑ Donut protocol: Init Comm STS point to Online at startup.
- ☑ JEM2 Ascii protocol: Init Comm STS point to Online at startup.
- ☑ Modbus Slave protocol: Fix ACC register range to be calculated based on 16- or 32-bit selection. 32-bit ACCs need 2 register per point, 16-bit ACCs need 1 register per point.
- ☑ Modbus Master protocol: Init IED Comm STS points to Online at startup.
- ☑ Quantum Meter protocol: Init and manage I/O points health flags properly.
- ☑ SEL Protocol: Init Comm STS point to Online at startup.
- ☑ SY/MAX Protocol: Init Comm STS point to Online at startup.
- ☑ Transdata Protocol: Init Comm STS point to Online at startup.
- ☑ Alarm Relay: Add diagnostic report to aid troubleshooting.
- ☑ Hardware STS: Handle points marked as spare correctly.
- ☑ vxWorks OS: Fix directory path bug in firmware restore function.

Enhancements:
- ☑ Improve Initial Installer pre-checks to ensure not being executed when secure firmware is already installed.

K0_P3 Update – 22-Feb-2016:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!
Fixes:
- ☑ DNPM: Receiving packed STS (OBJ1 Var1) would not clear initial "offline" flag for STS points unless received point state was 1 (Closed, On), leaving any/all unchanged points marked as "F" (failed) until such time as the state changes to 1.
- ☑ GPS: Fixed Trimble Extended GPS Week Number bug for ACE II/SK8 II GPS card.

Enhancements:
- ☑ None

K0_P2 Update – 02-Feb-2016:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

- ☑ GUI: Don't show C3835 1MSSOE in list of mapping sources if no points are configured.
- ☑ GUI: Session timeout was incorrectly changed to be a fixed value, is now configurable again.
- ☑ GUI: Add 'U' flag in legend explaining its meaning.
- ☑ Hardware STS: Fixed event generation mechanism for hardware STS points to insert correct health flag information.
- ☑ C3835 1MSSOE: Change init process so that DNP does not generate events for every point that is marked online at bootup.

Enhancements:

- ☑ None

K0_P1 Update – 14-Jan-2016:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

- ☑ Config Converter: Auto-Sectionalizing task configuration parameter was omitted when using K0 Config Converter.
- ☑ Config Converter: Problem loading new templates (Add/Change) into K0 Config Converter fixed.
- ☑ Command Log: Log file compression routine task priority reduced to prevent it from affection RTU operations under heavy load conditions.
- ☑ DNPM Protocol: Echoed commands from fiber loop now handled properly on Ethernet channels and serial channels configured as Full Duplex.
- ☑ GUI: Auto-Sectionalizing display page was missing some timer parameters.
- ☑ Modbus: Improved command processing for DO and AO controls.

Enhancements:

- ☑ GUI: I/O point display pages now have legend to indicate meaning of flags.
- ☑ Transdata Protocol: User can now configure the RTU to expect an echo of meter command if meter is on fiber loop.

☑ DNPR Protocol: Event class for STS, ANA, and ACC points are now set on per point basis.

K0 Update – 30-Oct-2015:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).
Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
☑ Auto-Sectionalizing: Fixed operation of "AST Active" control point so it doesn"t operate control at RTU startup if conditions are preventing AST from going active.
☑ Command Log: Fix task crash at startup if no files in Cmd Log folder..
☑ Web Server: Fixed browser responsiveness and lockup issues from non-secure firmware.

Enhancements:
☑ Force Data: Ability to force Input data points to desired state/value for checkout testing..
☑ Chrome: The Chrome Browser is now supported.
☑ Initial Installer: Initial installation procedure overhauled to make it easier to use.
☑ Cfg Converter: Simplified look of utility to make it easier to use.
☑ User Manager: Improved security of User Manager, Admins can now hide passwords from being visible.

J2 Update – 17-Apr-2015:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
☑ vxWorks OS: Added fix for ICS-VU-532813 VxWorks Vulnerability (RE: Case: 00001357/VXW6-83790) regarding predictable TCP sequence number generation.
☑ DNPR: Change response to Reset User Process Data Link message, making it configurable, Ack/Nack, No Response, or "Not Supported" replies.
☑ SEL protocol: Added support for REF_NUM column in CHI and CEV commands.

Enhancements:

☑ C3835 SOE: Added support for C3835 1msSOE board.
☑ MCD4:   Added applcation to support MCD4 status points.

J1_P1 Update – 15-Jan-2015:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
☑ DNPM: Fixed bug causing bad serial COMMs at slower (<9600) baud
                 rates.

J1 Update – 03-Oct-2014:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:
☑ Auto-Sectionalizing Task: Don't monitor switch position in "disabled" state, as
                 it can be open for maintenance work and thus not an error
                 condition.
☑ Calc Task: Only write STS point state if it is a change of state.

☑ Data Transfer Task: AIACC, AI32ACC, and DIAI point types now handle spares correctly. Fixed display function.

☑ DNPR Protocol: Unsolicited Mode fixes, correctly test if incoming message is an expected App Confirm before marking message as "deferred", fixed replies to "deferred" messages received over TCP that were incorrectly being sent over UDP causing Master to not see the reply.

☑ DNPR Protocol: Fix point number overflow in range qualifier calculation. Secure Authentication fixes. Fix memory corruption caused by Missing Points.

☑ DNPR Protocol: Fix the way floating point object processing handles spare points.

☑ DNPM Protocol: Fix fast scan algorithm to work properly with single IED on scan, and can now set fast scan count to zero.

☑ DNPM Protocol: Time syncs no longer sent to IED in comm fail.

☑ DNPM Protocol: The processing of Frozen ACC objects is now selectable by user.

☑ DNP3 Data Link: Ensure DNPM cannot participate in multi-data link schema.

☑ DNP3 Data Link: Handle incorrect data link header parameters to make data link more robust and non-susceptible to certain denial of service attacks.

☑ DNP3 Data Link: Do not create application layer Comm STS and TCP New Connection STS points for DNPM like is done with DNPR.

☑ DNP3 Data Link: Handle error condition properly when trying to accept new socket connection.

☑ DNP3 Data Link: DNP free frame management fixed to handle various DOS attack scenarios without corruption of data.

☑ FM Protocol: Handle error condition properly when trying to accept new socket connection.

☑ Modbus Protocl: Handle error condition properly when trying to accept new socket connection.

☑ Series 5 Protocol: Test for unmapped points in raise/lower command.

☑ SEL Tunnel Protocol: Free and recycle sockets when TTE connection is closed.

☑ SES-92 Protocol: Fix a memory corruption issue caused by "Missing points".

☑ L&N Protocol: Fix a memory corruption issue caused by "Missing points".

☑ IDLC Protocols Fix a memory corruption issue caused by "Missing points".

☑ Command Log: Add fixes to improve performance to logging information to log files.

☑ Command Log: Startup values of ACC, DOUT and AOUT are now written to log.

☑ Event Timing: Average Time AI & Newest Time AI retains value after reset unless a configuration change occurs.

☑ AutoInstaller Task: Now removes all previous configuration components before installing new configuration (ISaGRAF files, templates, etc.).

☑ User Manager Utility: Fixed bug preventing the ability to delete a user from an imported User file.

☑ User Manager Utility: Now checks that at least one of the users has up/download privilege before allowing package to be built.

☑ SOE Log: Fix startup where SOE log task thinks log file is corrupt when it is not, forcing re-creation of log file.

☑ GUI: Add display for internal STS, ANA, and ACC points.

☑ GUI: Reset consecutive failed logins counter to zero after any successful login.

☑ GUI: Fix count of internal references for each RTU type.

☑ GUI: Fix internal STS and ACC initialization.

☑ GUI: Add validation functions to CGI calls.

☑ GUI: Fix web server crash if data submitted after session timeout.

☑ GUI: Gui content checking now does not allow the apostrophe character in point names.

☑ GUI: Fixed bug where blank name on SBO config page was causing RTU to enter crash recovery mode.

☑ GUI: Enabling the "Post Message" on GUI log-in screen now requires Configuration Privilege.

☑ GUI: Fixed a page lock-up issue with the Up/Download GUI page using Win7 64-bit IE9.

☑ vxWorks OS: Eliminate unnecessary TCP and UDP ports opening by adding IPsec and PPP to list of protocols that can be enabled or disabled by customer.

☑ vxWorks OS: SSH, Telnet and FTP Services now clean up sockets properly when sessions are ended.

Enhancements:

☑ DNP3 Protocol: Add new comm counters in display pages to track message rejects by data link layer, transport layer, and application layer.

☑ Web Server: Update OpenSSL source to version 0.9.8za. Disabled SSL v2 and weak cypher protocols using short security key sizes (< 64bits).

☑ GUI: Printable versions of mapping pages (sink points) were added, this also can be used to copy & paste to Excel.

☑ GUI: After configuration update, GUI checks for and alerts user if network IP address has been changed.

☑ GUI: Applications are listed in alphabetical order.

☑ GUI: Paste from Excel feature works with Data Tranfser, RLL & SEL.

☑ GUI: Display pages for Data Transfer task adn Internal Status points were added.

J0 Update – 26-Nov-2013:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Operating System
Must update OPERATING SYSTEM to use this update!

Fixes:

- ☑ DNPR: Fix ACC reporting under PJM mode (buffered accumulator events). Frozen accumulators handled properly now.
- ☑ DNPR: Fix bug in validating certain messages received via TCP/IP.
- ☑ DNPR: Time & Date Object now returned with proper message format.
- ☑ DNPR: Management of buffer overflow for STS and PJM accumulators fixed to prevent causing stuck Buffer Overflow flag.
- ☑ DNPR: Fix writing time object received into the rtu_time field of the PCB as it screws up time stamping.
- ☑ DNPR: Fix bug with IIN bits not being processed correctly.
- ☑ DNPR: Fix bug processing secondary frame when not expecting one.
- ☑ DNPR: Fix bug testing data link frame length. Must be minimum length.
- ☑ DNPR: Fix unsolicited retries counting down past zero making limited retries seem unlimited, fix Buffer Overflow management between STS and ACC points. Each data type has its own Buff OVFLW flag now. Fix unsolicited reporting in "limited retries", if retries exhausted and DNPR goes silent, any new events will force DNPR to try reporting events until limited retries is exhausted again. Fix bug obtaining TCP port number correctly.
- ☑ FMS: Fixed bug causing data to be out of order in FMS reply.
- ☑ SEL: Serial hardware test now works correctly on ports assigned with SEL protocol. Fix RTS LED staying on. SER time is now processed correctly.
- ☑ Userlog: Fixed string formatting error.
- ☑ CDCI: Display more than 16 AOUTs.
- ☑ CDCII: Display more than 16 AOUTs.
- ☑ ALarm Task: Fix state changes getting counted twice.
- ☑ Calc Task: Fix SQRT and ROUND display bug.
- ☑ Cap Bank Ctlr: Fixed "Time of Op" counting down past zero to negative numbers.
- ☑ Global Freeze: Fix init code to handle missing tags caused by Cfg Updater.
- ☑ NRG Calc: Fix analog mapping bug to detect and handle non-existent analog points.
- ☑ Modbus R: Fix Fuction Code 02 is now processed correctly.
- ☑ Modbus R: Fix bug preventing fast turnaround from Transmit to Receive data.
- ☑ Modbus M: Fixed turnaround time from TX to RX to catch msgs from fast replying devices. Fix Cyclic AO Writes to work correctly if on FC 06 has been selected, instead of requiring FC 16 be selected as well. Fix FC 01 reply to return number of bytes instead of number of coils. Fixed expected size of FC 5 message. FC 02 can now process more than 255 bytes.

- ☑ Pri/Sec IED: Fix BO and SBO points now show up in mapping list.
- ☑ GUI: Fix fast timeout bug in GUI. Fixed temperature calculation for 2400 and C3830 baseboards.
- ☑ VanComm: Fix GUI config where DO's are incorrectly mapped as SBO points.
- ☑ ACI: Heap memory corruption problem fixed.
- ☑ Syslog: Fix bug where syslog msg longer than 72 characters caused crash.
- ☑ Cmdlog: Fixed bug causing command log process to hang.
- ☑ RTU App: Improved file checksums for Application and vxWorks files.
- ☑ RTU App: Fix bug indexing internal STS points due to C3810 RTU STS points not being accounted for.
- ☑ RTU App: Fix detection of incorrect HTTP/HTTPS settings at startup, must have one or the other configured!

Enhancements:

- ☑ OS: Both secure and non-secure protocols are now selectable from GUI.
- ☑ OS: loginUserShow command displays users & permissions to console.
- ☑ OS: Added SSH fixes to eliminate known security vulnerabilities.
- ☑ OS: Added SSL fixes to eliminate known security vulnerabilities.
- ☑ OS: AutoInstaller feature added to handle backing up of existing firmware and install new firmware files into proper location.
- ☑ OS: Firmware update results are logged to Syslog and SOE Logs.
- ☑ RTU App: Command Log added.
- ☑ RTU App: Added ACC points to count login successes and failures. Added STS point to alert for failed login attempts.
- ☑ RTU App: Added internal STS and ACC points to indicate firmware update package installation success or failure.
- ☑ RTU App: Added configurable start/stop dates for Daylight Savings Time.
- ☑ GUI: Copying of Slave Protocol configurations between serial and Ethernet now supported.
- ☑ GUI: Can change temperature setting on the fly, reboot no longer required. Fixed misspellings.
- ☑ GUI: Display status messages during firmware installation of update packages.
- ☑ DNPM: Time between messages field now supports very long times (>1 hour) to accommodate pay-per-byte networks.
- ☑ DNPR: Time tagged accumulators now supported.
- ☑ DNPR: Comm associations timeout is now user adjustable via GUI.
- ☑ DNPR: Master Station ID filtering on serial ports added.
- ☑ Modbus: DO cyclic writes now supported.
- ☑ Modbus M: Add "auto-increment" feature to all register numbers.
- ☑ SEL protocol: Add "ALL POINTS TO DATABASE" feature.
- ☑ TTE: Can now have a separate TTE instance per network interface, can use either Telnet or SSH to connect.
- ☑ Series 5: SBO commands can be used to control DO points now.
- ☑ Van Com: Raise/Lower command returns response data now.
- ☑ UserLog: Login attempts, successes and failures from GUI, console, remote shell, and file transfers now logged into the userlog.
- ☑ H/W ANA: Allow dither around "Low" reading before setting ANA_IFL flag.

☑ Calc Task: Added Min & Max functions.
☑ NRG Calc: Increased rate of energy calculation to improve accuracy.

H1_P1 Update – 03 May 2012:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Operating System
Must update OPERATING SYSTEM to use this patch!

Fixes:
☑ Config_Converter_H1_2.9.2.1 is now signed
☑ User_Manager_2.9.2.1 is now signed. Key file handling changed so that they do not have to be reloaded.
☑ New access_Telvent_1.cfg file created that is compatible with the changes to the User_Manager_H1_2.4.1
☑ New Bootparams_USERS_Telvent_1.tar.gz file created.

H1_P1 Update – 14 Sep 2012:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Operating System
Must update OPERATING SYSTEM to use this patch!

Fixes:
☑ Annunciator Panel problem with panel being marked in alarm with no active alarms
☑ Capacitor Bank Control clears previous time of operation when starting validation of new event, problem with large time until next operation displayed
☑ Global Freeze problem with clock always doing the freeze
☑ DNP3 Slave packed qualifier now sent in response when reading time
☑ DNP3 Slave correct count or number of points now sent in response
☑ DNP3 Slave problem with using wrong table when serial was primary and Ethernet was secondary in Communications Associations
☑ Quantum protocol analogs now report dead band violations
☑ User Log shows username and connection method

- ☑ User Log Logouts are now included in log
- ☑ SSH/Console Logins now displays contents of the GUI Post Message Box (NERC/CIP)
- ☑ GUI Display of Communications Assignments shows Display instead of Config
- ☑ SEL protocol correction of timestamp on SER messages for protocol SOE times

H1 Release – 21 Jun 2012:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ IKE/IPsec support added
- ☑ Automatic Sectionalization Task enhanced to work with loss of voltage events
- ☑ DNP3 Master now supports select, operate, direct operate and direct operate no acknowledgment for analog outputs
- ☑ DNP3 Master broadcast of time via UDP can now be disabled
- ☑ Configuration Converter has better error messages
- ☑ Data Transfer allows 2048 transfers for all types

Fixes:
- ☑ DNP3 Slave unsolicited functions on TCP/UDP
- ☑ DNP3 Slave Scan Type 5 now honors the tries counter when multiple fragments are reported
- ☑ DNP3 Slave now supports "Connection Establishment – Method 1", multiple masters using the same IP/Port number
- ☑ DNP3 Slave now responds to event requests when the number of points defined is 256 and 256 events are to be reported for analog inputs and counters
- ☑ GUI downloading of files improved for packages and data trap files
- ☑ Timing Application problem with generating bad entity IDs corrected
- ☑ Initial Installer task problem with spaces in file path names corrected
- ☑ When getting or putting package files, debug messages are redirected to the null device except when placed in debug mode
- ☑ MODBUS Slave now allows reading of SBO control states using function code 1 but always returns state equal to 0
- ☑ SEL protocol "Default delay for first byte" changed to 1000 and "Rx Timeout" changed to 5000 to allow for relays that are slow to respond
- ☑ Calculation processor does not crash web server when using round or sqrt functions

H0 Release – 30 Mar 2012:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ VxWorks now version 6.9.
- ☑ Total change out of non-secure protocols to secure protocols
- ☑ Firmware feature set same as G3

Following is from C3414-500-001YZ Firmware (Parent)

G3_P2 Update – 13 Mar 2012:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ In MODBUS Master, add support for MODBUS/TCP exception codes 10 and 11.

Fixes:
- ☑ In Command Inhibit, fix bug with having no physical DO points defined while inhibiting soft DO points crashing application.
- ☑ In SOE Log, fix problem with formatting of record extending past end of buffer.
- ☑ In User Log, fix problem with formatting of record extending past end of buffer.
- ☑ In MODBUS Master, MODBUS/TCP sequence number now ranges from 0 to 65535, not 0 to 255.
- ☑ In MODBUS Master, No Reply counter is incremented on exception responses.

G3_P1 Update – 07 Feb 2012:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ Add separate COMM Status points for DNPR, one for Data Link layer and one for Application Layer. These STS points can be mapped like any other status points to monitor the health of individual Data Links and Application Layer.

Fixes:
- ☑ fix bug in DNPR Ethernet COMMs where queued messages did not get processed correctly.
- ☑ changed DNPR multi-data link method of operation. Now only one link is considered "hot" link until: **A)** App layer times out (in polled only mode), or **B)** Configured number application confirm timeouts has occurred (in unsolicited mode). At that point, the first data link to successfully communicate with App

Layer, becomes the designated "hot" link. All data links that are not the designated hot link will not accept application messages, but will respond to data link only messages..

☑ Fix Internal Indications for Class 1,2,& 3 events when changing class assignments, DNPR would still announce there are events available from old class when there are none. Now, Internal Indications correctly reports only if there are events available in that class..

G3 Update – 21 Dec 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
☑ Add support for SEL-735 in SEL protocol.

Fixes:
☑ Fix problem with Data Transfer DIDO updating to current state after reset.
☑ Fix problem with FM/TCP protocol stranding operating system IP sockets.
☑ Fix problem with CDC I protocol doubling number of accumulators in block mode and error message displayed for accumulator error.
☑ Fix problem with CDC II protocol error message displayed for accumulator error
☑ DNPR protocol now tries forever to establish communications with the master station after reset when limited attempts are not configured. Fix problem with multiple fragment responses not requesting application confirms after each fragment except the last one.
☑ Fix problem with Ethernet protocols causing Serial protocols to temporarily lose communications because serial device was reprogrammed.
☑ DNPM again allows 2048 points of all types per IED.
☑ XML parse problem with null pointer passed to getXMLDbl function fixed by returning 0.0
☑ The initial time stored in a data trap file is now correct for use with Protolyzer.
☑ Recognize configuration of second Ethernet device "fei1" with script file commands instead of through the GUI. Requires updated Compact Flash.
☑ Remove "SATEC PM174" and "FMP from list of supported Ethernet protocols.
☑ Configuration Converter program adds tags "TIMED", "TIMEOUT", and "TUNIT" to Data Transfer DODI objects and DNP Authentication tags to DNPR if they are missing. Fix problem with names containing + signs in the ACI configuration.
☑ In DNPR protocol, fix problem with SBO analog outputs. Correct code for unsolicited mode of operation not continuously sending null messages as needed when configured for this mode of operation. Fix problem with not requesting applications confirm after each fragment of a multi-fragment response. Fix

problem with applications confirm not acknowledging events read by a solicited request when in unsolicited startup mode.

- ☑ C2020M SBO point number bits are flipped end for end in select and execute functions. Scan scheduling error corrected. BCH Error logging to system console removed.
- ☑ ALT IEDs did not determine RTU type before displaying point mapping lists.
- ☑ GUI would not display pages if GUI file was deleted and replaced via FTP. GUI now scans for new file if reading file it is current using returns error.
- ☑ Series V Master now checks security on message only if an expected length message is received. Do not use any information from message until after security is checked. Display short message counter.
- ☑ MODBUS Slave allows multiple MODBUS TCP/IP Application Data Units in one request from the MODBUS Master
- ☑ When AST is in disabled state correct problem with resetting AST from error condition. Manual toggle of activate switch, or toggle from SCADA master was not working correctly. Add new state for AST Criteria Met mode of operation to handle waiting for re-arm after indicating Criteria Met.
  SCADA disable state is now kept through reboot, checked at startup. Also, SCADA disable trumps manual reset through toggle of AST_ACTIVATE switch. SCADA enable command is required to re-enable AST if previously disabled through SCADA.

G2 Update – 28 Oct 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ MODBUS Remote now supports 16 bit Accumulators.

G1_P4 Update – 29 Jul 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
- ☑ Fix problem with CDC I protocol displaying analog references on GUI.
- ☑ Fix problem with CDC II protocol displaying analog references on GUI.
- ☑ Fix problem with MODBUS/TCP stranding operating system IP sockets.
- ☑ Fix problem with MODBUS Slave function codes 15 & 16 when controlling Digital Output points.
- ☑ Change message queue size for all tasks from 200 to 300 entries to support larger RTU point configurations.
- ☑ Change GUI configuration pages so special characters can be used in all point names.

☑ Fix GUI race condition problem when configuring equations in the Calculation Processor.

G1_P3 Update – 24 Jun 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
☑ Fix problem with DNPR protocol returning multiple frame responses.
☑ Fix problem with Command Inhibit Digital Outputs inhibiting only hardware points instead of all Digital Outputs.

G1_P2 Update – 17 Jun 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
☑ C2020M protocol allows configuration of relay number to be sent in Execute command.

Fixes:
☑ Fix problem with DNPM protocol task crash at startup.
☑ Fix bug causing event report errors in SEL protocol.
☑ Remove unsupported configuration for FMS from SEL protocol
☑ Create larger window for post message display on Login page of GUI.

G1_P1 Update – 02 Jun 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
☑ Fix problem with displaying device names for SBO points in CP2179 protocol
☑ Fix problem with parsing events when first character was quote in SEL protocol
☑ Fix display for DNPR protocol when part of a Communications Association on the Ethernet

G1 Update – 05 May 2011:

NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ For DNP Remote Protocol, add communications associations – up to 4 data links (serial or Ethernet) to a single application.
- ☑ Change maximum number of Load Calculations from 3 to 10
- ☑ Add support to the GUI for the windows-1252 Character Set

Fixes:
- ☑ Fix deadband problem with Calculation processor
- ☑ Fix CP2179 task startup problem and GUI problem with hex numbers
- ☑ Fix Electran task startup problem
- ☑ Fix deadband problem with hardware analogs
- ☑ Fix problem with MODBUS Remote writing holding registers above 32767
- ☑ Fix problem with MODBUS Remote GUI setting "Accumulator Freeze Support" to "Y"
- ☑ Fix problem with MODBUS Remote SBO output reading past end of database table
- ☑ Fix problem with FM protocol updating ACI card configuration via FMS
- ☑ Fix ETI protocol GUI problem with hex numbers
- ☑ Fix SEL protocol analog deadband problem
- ☑ Fix SEL protocol problem with Sequence of Events Reporting
- ☑ Fix problem with Task Scheduler synchronizing with the beginning of a time period.
- ☑ Fix problem with XML to Excel not putting ACI data into the report
- ☑ Fix problem with XML to Excel with headings being included as data in the report.
- ☑ Fix problem with frequency calculation from ACI/FMR data from C3244 XTs and C3600 Baseboards

G0_P1 Update – 24 Feb 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
- ☑ Fix deadband problem with Calculation processor
- ☑ Fix problem with GUI for 2179 & ETI protocols creating sequence numbers

G0 Release – 21 Jan 2011:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ Comply with NERC/CIP vulnerability document (http://www.us-cert.gov/control_systems/pdf/ICSA-10-214-01.pdf) regarding password hash weakness and remove debug task and port to prevent exploitation
- ☑ L&G 8979 protocol changed to allow IB timeout values of up to 30000ms.
- ☑ Boolean Status application now allows up to 128 equations.

Fixes:
- ☑ SOE Log problem with displaying blank page corrected.
- ☑ SEL Protocol autoconfigure problem corrected.
- ☑ L&N C2100H Master protocol display problem corrected for digital inputs and accumulators displaying 1st page data for all pages defined.
- ☑ Verify version of VxWorks is G0 or greater to allow registration of watchdog service function for use with network security protocols.
- ☑ Changing the name of an ALT IED Accumulator point changed the name of ALT IED Analog point problem corrected.

F0_P4 Update – 29 Dec 2010:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
- ☑ Fix problem with Primary & Secondary Time source status being incorrect

F0_P3 Update – 08 Dec 2010:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
- ☑ Calculation Processor bug with protocol deadbanding fixed
- ☑ XML to EXCEL macro changed to work with F0 and newer configurations.
- ☑ VxWorks changed to remove anonymous FTP login.

F0_P2 Update – 24 Nov 2010:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
- ☑ MODBUS Remote/TCP corrected to removed 84ms wait after each byte received from MODBUS Master/TCP

- ☑ Up/Download control verifies that GUI and application match the target RTU.
- ☑ Up/Download control allows <Enter> typed after password to perform the logon function.
- ☑ C2020M changed default idle time from 1000 to 10
- ☑ C2020M changed default point names and section numbers to match customer preferences.
- ☑ C2020M changed default analog input cmin from -2048 to -2047.
- ☑ C2020M changed so SBO, DO and AO select and execute commands occur only once with no retries.
- ☑ CDC I changed so that N can be entered as Scan Address
- ☑ CDC II changed so that N can be entered as Scan Address

F0_P1 Update – 15 Nov 2010:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Fixes:
- ☑ Alarm Task bug that could cause a bad event time.
- ☑ Alternate IED task bug that could cause a bad event time.
- ☑ Calculation Package display bug for SQRT/ROUND functions and failed points.
- ☑ Data Transfer bug that could cause a bad event time.
- ☑ Boolean Status bug that could cause a bad event time.
- ☑ Conitel C2020 Master bug that could cause a bad event time and bug taking IED on/off scan.
- ☑ Conitel C2100H Master bug that could cause a bad event time and bug taking IED on/off scan.
- ☑ DNP3 IP Slave problem with unsolicited mode and bug that could cause a bad event time.
- ☑ ETI Master bug with taking IED on/off scan.
- ☑ Harris Master bug with taking IED on/off scan.
- ☑ MODBUS Master bug with taking IED on/off scan and bug marking points failed by scan group.
- ☑ Series V Master bug that could cause a bad event time.
- ☑ Improve accuracy of seconds since restart counter
- ☑ Configuration Converter fix to add missing tags for DNP3 Master Authentication

F0 Release – 01 Nov 2010:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:

- ☑ L&N C2020 Master protocol added with support for Status Inputs, Analog Inputs, and SBO control points.
- ☑ DNP3 Master configurable to process frozen counter objects.
- ☑ LANDAC II support added.
- ☑ DNP3 Remote toggle status point when new connection is established.
- ☑ Safe Mode restored to GUI to start up RTU in Safe Mode.
- ☑ Calculation task passes data quality flags to cascaded calculations.
- ☑ Support for C3400 baseboards with 12 bit ADC (Red PCBs).
- ☑ ISaGRAF now runs only if some point is mapped (security – removes unused IP ports).
- ☑ Time of Day can be read from the master station protocols from analog points.
- ☑ Up time in seconds for the RTU can be read in an accumulator from master station protocols.
- ☑ Debugger removed from VxWorks (security – removes unused IP ports)
- ☑ Execute time for all SBO control points initialized to non zero such that they can be used with legacy protocols.
- ☑ Counter added to status inputs to count changes and time stamp of last change for hardware status, DNP3 Master and MODBUS Master status points.
- ☑ DNP3 IP Remote unsolicited support.
- ☑ Boolean status now supports 64 equations.
- ☑ MODBUS Master support for configuration of 16 and 32 bit Analog Inputs, Analog Outputs, and Accumulators.

Fixes:
- ☑ Increase task stack sizes.
- ☑ PMS 80 protocol problem with "Reply with Stale Data" corrected, Local/Remote switch now honored for IED controls and SBO controls allowed with stale data in RTU response.
- ☑ MODBUS Master now sets polarity correctly for 3720 ACM electric meters.
- ☑ The system log message for a task crash now prints all the registers.
- ☑ Capacitor Bank application now maps analog points correctly.
- ☑ DNP3 Master accumulator display corrected.
- ☑ Bug with status point for secondary time source changing states when primary time source fails corrected.
- ☑ CDC Protocol display headers corrected.
- ☑ Corrected GUI problem with "/" character in a text box causing configuration files to be truncated.
- ☑ MODBUS Master communication counters (per IED) now display correctly.
- ☑ Removed error messages printed on console from DNP3 Master and MODBUS Master.
- ☑ 1MSSOE display corrected.

E1 Release – 04 May 2010:
NOTE: For use with "LX-800" CPU (C3414) ONLY. Will not work with 5X86 (C3413) or 486 and disk on chip configuration (C3412).

Enhancements:
- ☑ Button added to Display menu to go directly to display for Annunciator
- ☑ SEL protocol can zero fault distance after ignore faults timer expires
- ☑ DNPR & DNPM now have ability to do DNP3 Authentication if enabled
- ☑ GUI now has Strong Passwords enabled, minimum length of 8 characters, at least 1 character from each for the following four groups, Upper Case, Lower Case, Numbers, and Punctuation

D3_PA Upgrade – 14 April 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ C2100H Master protocol now does a Status Scan 1 after a Trip/Close Activate.

Fixes:
- ☑ C2100H Master protocol now sends controls correctly when multiple RTU addresses are used.
- ☑ GUI & Application now validate passwords containing '<', '>" or '&' correctly. Requires Operating System C3413-500-996C3 included with this update to be sent to the RTU by the GUI

D3_P9 Upgrade – 7 April 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ SPR protocol configuration now converted correctly by config converter
- ☑ SPR fault distance configuration data reading problem corrected
- ☑ Capacitor Bank Control application configuration now converted correctly by config converter

D3_P8 Upgrade – 24 March 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ XML parser change to reduce memory usage.

Fixes:
- ☑ Data Transfer DO to AO removed from GUI

- ☑ DNPM Binary Output Display Corrected
- ☑ DNPR allows 8192 points for all types
- ☑ FMS allows 8192 Fast Survey Records
- ☑ DNPM Command point numbering corrected for analog outputs
- ☑ DNPR Display shows spare for spare analog outputs
- ☑ MBM Ethernet no response timeout corrected
- ☑ RLL Status Display point numbering corrected
- ☑ RLL Accumulator Display point numbering corrected
- ☑ RLL Digital Output Display point numbering corrected
- ☑ RLL Analog Output Commands numbered correctly
- ☑ DNPM counter display corrected
- ☑ RLL allows 0.0 for Analog Input engineering unit maximum
- ☑ DNPR shows spare points on floating point display
- ☑ SEL problem calculating protocol deadbands corrected

D3_P7 Upgrade – 19 February 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ Calculator Processor has ROUND function added.

Fixes:
- ☑ DNPM GUI problem corrected for 2048 points of all types.
- ☑ HTTP Server stack size increased to prevent task crash.

D3_P6 Upgrade – 9 February 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ VanComm protocol allows 512 SBO control points.

Fixes:
- ☑ XML parse changed to use less memory to prevent task crashes
- ☑ DNPR does not log missing point messages for spare points

D3_P5 Upgrade – 28 January 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:

- ☑ Calculation package does not round up accumulator results
- ☑ Calculation package truncates analog result if integer constant is used in calculation.

D3_P4 Upgrade – 05 January 2010:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:

- ☑ DNPM processes indexed Object 1, Variation 2 again.
- ☑ SEL 5010 software works with tunnel function.
- ☑ Symax meter accumulators marked online when communications restored

Enhancements:

- ☑ Data Transfer allows 2048 transfers.
- ☑ DNPR allows 8192 points for all types.
- ☑ DNPM allows 2048 points for all types.

D3_P3 Upgrade – 05 October 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:

- ☑ DNPM was incrementing "No replies" counter despite good communications.
- ☑ DNPR was deleting counter events for all "Protocol Level"(s), not just PJM
- ☑ Configuration Converter program now adds tags for DNPM "Scan Type 5 Status Input" when converting templates.

D3_P2 Upgrade – 02 September 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:

- ☑ Calculation package allows 1024 calculations.

Fixes:

- ☑ Calculation package Analog Inputs now retain fractional part of value.

D3_P1 Upgrade – 02 July 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ MODBUS(M) protocol has support for 3720 ACM electric meter polarity for power values.
- ☑ MODBUS(M) 2048 maximum configurable points for all types.
- ☑ MODBUS(R) 2048 maximum configurable points for all types.

Fixes:
- ☑ Calculation package GUI changed to prevent corruption of configuration data.
- ☑ Data Transfer AIAO and DODI corrected to fix problem with timeout on commands.

D3 Upgrade – 19 June 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ Annunciator Panel application enhanced to have 16 points per cell, any combination of analog input or digital input. Points used in application must be configured in the Alarming application for correct usage in the Annunciator Panel.
- ☑ MODBUS(M) special processing to interface to generator controller (DSE opcode in Digital Output configuration).
- ☑ MODBUS(R) maximum number of analog input points is now 2048.
- ☑ DNP(M) now processes objects 2, variation 3, 51,1 and 51,2 when received for DNP3 Level 2 compliance.
- ☑ Data Transfer now has Digital Input to Analog Input function.
- ☑ DNP(R) can now be configured to send Object 32, Variation 3 or O32, V4 time tagged analog input events
- ☑ Timing application GUI change to Start/Stop Digital Input points, not just 2 Digital Input points.
- ☑ Calculation Processor now has a remainder function.
- ☑ GUI now allows name of Administrator account to be changed.
- ☑ C2100H(M) protocol SM & SMA status types removed. MCD flag added to allow MCD points to start on odd bit numbers and have status bit in A block and change bit in B block.

Fixes:
- ☑ Redac 80 protocol GUI corrections and communications improvements.
- ☑ Capacitor Bank Control GUI can configure "Switch Operation Window" and "VARs Delta Delay Time"

- ☑ SV & SVNC protocols no longer hang RTU when missing points are in the analog input configuration.
- ☑ SEL protocol now uses EGU MIN/MAX to calculate analog input counts.
- ☑ DNP(R) now handles 40 DNP messages in a single TCP transmission.
- ☑ DNP TCP/IP changes to handle garbage data in the input stream.
- ☑ Boolean Status display now functions regardless whether or not the application is configured.
- ☑ DNP(R) Analog Output display corrected to show counts for point displayed, not just the first page on every page of the display.
- ☑ Data Transfer function AI32ACC now copies value of analog input to accumulator point correctly.

D2_P1 Upgrade – 07 April 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Enhancements:
- ☑ Change display for MODBUS Master TCP to remove inapplicable counters.

Fixes:
- ☑ DNP TCP fix to discard data received that is not part of a valid message.
- ☑ Configuration converter program adds tags for MODBUS Master TCP.

D2 Upgrade – 20 March 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ MODBUS Master TCP/IP and over TCP/IP
- ☑ Support C3830 (DC Analog) module on SAGE 1330 and SAGE 1310
- ☑ Command Inhibit function for Analog Outputs and Digital Outputs

Enhancements:
- ☑ Annunciator Panel can display analog points. All points used with this application must be manually mapped into the Alarming application for proper operation of the Annunciator Panel application.
- ☑ Data Transfer has a single Analog Input point to Accumulator function added.
- ☑ DNP Remote has support for Object 0, Variations 242, 243, 246, 248, 250, 252, 254 and 255 for all levels of the protocol. Variations 243, 246, and 248 may be configured on the Configuration/CPU page.

☑ MODBUS Remote TCP/IP returns the received preamble sequence number in the reply. ID 0 is allowed as well.
☑ MODBUS Master allows for IEEE 754 single precision format floating point data to be corrected for words being reversed in the received data
☑ Command Inhibit application now has display for SBO points.

Fixes:
☑ Set the RTU Clock from the GUI when RTC is time source.
☑ SAGE 2300 Temperature Reference offset correction function now works
☑ DNP Master "Delay to First Byte" now works correctly when changed in real time. Integrity scan now occurs for live IEDs when other IEDs are communications failed.
☑ DNP Remote corrects data quality flags on object 100 analog input points. Correct the point count for object 1 variation 1 responses. Unsolicited confirm timeout now works correctly.
☑ SEL protocol now truncates the relay name to 22 characters to use as the IED device name.

D1_P2 Upgrade – 3 February 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
☑ Add IEEE floating point inputs for Modbus (R).

Fixes:
☑ DNPR: don't reply if there is an error in a Direct Operate, No Ack for digital outputs or analog outputs.
☑ Alarm Monitor: Display was corrected to show digital output quality correctly. Setup was corrected to search all analogs, including references.
☑ Selftest Task: Fixed ability to set the RTU Clock from the GUI.
☑ Calc Task: Don't init Analog Inputs as failed so self-reference will work.

D1_P1 Upgrade – 12 January 2009:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
☑ DNPR can have a list of 576 accumulator freeze events with time tags per accumulator point. Set "DNP 3.0 Protocol Level" to "PJM" to enable.
☑ Global Freeze Task was modified to allow a global accumulator freeze to occur on a specified number of seconds after the hour and make sure a global freeze status point is defined before trying to change its state.

Fixes:
- ☑ XML to XLS macro added to firmware update file.
- ☑ DNPR points assigned to Class 3 are now shown with the correct class number.
- ☑ CMD INHIBIT had a race condition fixed for use with IED points.
- ☑ ALARM task now supports 1024 status and 512 analogs. GUI fix for deleting existing points.
- ☑ Event Task has GUI fix to delete points correctly.

D1 Upgrade – 12 December 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Add battery test function.
- ☑ Add Command Inhibit function for Select Before Operate points.
- ☑ Change function of 'Activate' STS point – now controls only switch operation. New STS point added to indicate AST criteria is met.

D0_P4 Upgrade – 02 December 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ Fix problem with RTU hanging when IRIG-B signal used as input to SAGE 3030.

D0_P3 Upgrade – 13 November 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ In Schweitzer protocol, fix problem with analog input configuration causing memory corruption problems.

D0_P2 Upgrade – 06 November 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ In DNP Remote protocol, correct problem with timestamps changing from Local to UTC after communications failures.

Additions:
☑ Add rudimentary support for Object 30, Variation 5, single precision floating point.

D0_P1 Upgrade – 29 October 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
☑ In MODBUS Master protocol, calculate correct number of registers to read when there is a gap in the range.

D0 Upgrade – 13 September 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
☑ DNPR - Short Floating Point (o100,v1) changed to match DNP documentation.
☑ DNPR – Real time configuration of communications parameters now works.
☑ DNPM – Real time configuration of communications parameters now works.
☑ L&N - Fix problem with counting and configuring points correctly.
☑ SEL - Change to EVE reporting & autoconfigure fail error message added.
☑ SES 92 – Do not set ALG or ACC flags, set validity for status dump.

Additions:
☑ Navigation shortcuts in GUI.
☑ 45 character length for point names.
☑ Alarm application.
☑ Event Timing application.
☑ C2100H(M) - On/Off Scan in real time.
☑ 2179 - On/Off Scan in real time.
☑ ETI - On/Off Scan in real time.
☑ FM - Add SEL Event Reporting.
☑ FM - Add SEL Event reporting in FMS format.
☑ Harris(M) - On/Off Scan in real time.
☑ Incom - On/Off Scan in real time.
☑ Modbus(M) - On/Off Scan in real time & display of floating point values.
☑ Quantum - On/Off Scan in real time.
☑ SEL - get real time data while tunnel is active.
☑ Series V(M) - On/Off Scan in real time.
☑ Symax- On/Off Scan in real time.
☑ Transdata - On/Off Scan in real time.
☑ ISaGRAF - template feature.

CD_P4 Upgrade – 24 September 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
☑ In Jem2 ASCII protocol, increase size of largest expected reply.
☑ In SEL protocol, correct problem with autoconfiguration.

Additions:
☑ In SEL protocol, add display of event headers and ability to upload SEL events when the full (EVE) event is saved in SEL format.

CD_P3 Upgrade – 26 August 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
☑ In Jem2 ASCII protocol, fix communications problem that which caused accumulators to be marked failed intermittently.
☑ Fix file up/download control problem where it would not work in certain PC environments.
☑ Fix problem with time server primary/secondary not setting time. Time server fail timeout is now interval + timeout period.

CD_P2 Upgrade – 13 August 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
☑ Allow 12 bit analog in CDC-I by setting the range min/max counts
☑ Add timers to CBC application for use with IED instead of hardware points

Fixes:
☑ Fix problem in AST which causes erroneous latching of fault status points
☑ Fix issue in DNPM related to controls not working consistently
☑ Fix issue in DNPR where some real-time configuration changes did not take effect in real time

- ☑ Fix issue in DNPR where event counters counted negative (past zero) and issue with polled events and unsolicited messages
- ☑ Increase time for controls in Modbus
- ☑ Fix REDAC80 so port 1 will work
- ☑ Fix issue where IRIG-B PIC processor was not being read correctly.

CD_P1 Upgrade – 06 June 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Add new task for Hydro-Sherbrooke
- ☑ Add Redac 80 protocol
- ☑ Add "tickle" protocol
- ☑ Add per IED comm stat for JemII protocol
- ☑ Add ModbusR/TCP protocol
- ☑ Add IRIG for new PC104 card (option for RTUs other than the 3030)
- ☑ Add DC analog support for 3030 (with optionally PC104 card)
- ☑ Add in DNPR ability to assign class to each data object type
- ☑ Add validation of master IP addresses in DNPR/IP

Fixes:
- ☑ Fix calc task so analog reference can be mapped in
- ☑ Add limit to unsolicited messages from DNPM (to avoid clogging comm lines)
- ☑ Fix floating point object display in DNPR
- ☑ Fix analog deadbands in Donut and Incom protocols
- ☑ Fix IDLC protocol to address stability problem
- ☑ Fix Modbus/M to send 1 byte instead of 2 for multiple coil commands
- ☑ SY/MAX fix for data acquisition
- ☑ Allow configure of SFB DO points without any baseboard SBOs configured
- ☑ Fix on IRIG-B for intermittent initialization problem.
- ☑ Various SEL protocol fixes to fix buffer overflow, etc.
- ☑ Update on config converter to fix some bad configurations automatically

CB_P2 Upgrade – 31 January 2008:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ Fixed issue where config changes were not reflected after being made in: AST, CBC, FMS, RLO
- ☑ Configuration problem on Landac FIMs resolved

☑ Fixed configuration issue on SEL where some fields did not show up properly
☑ Allow op of DNP SBOs when two have the same seq number but only after a new select is performed.
☑ Change AO-FLT data xfer to copy bits as 2 parts of a floating point number and display correctly.
☑ Allow use of 65534 as a non global master address.

CB_P1 Upgrade – 30 November 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
☑ Enhanced data trap on data display screen
☑ Enhanced configuration conversion tool
☑ Jem II ASCII master protocol.
☑ Add "read coil status" support for Modbus R
☑ Add download and view for system log
☑ Add interpretation for IIN bits in DNPR
☑ Add local time and DST support
☑ Increase point counts in DNPM
☑ Add math calculation package application
☑ Make file up/download activeX control signed.
Fixes:
☑ Resolve issue with upgrading SEL configurations from C8 firmware
☑ Fix various issues with SEL regarding delta calculations, autoconfig, fault distance on various relays, etc.
☑ Corrected number of bytes in ModbusM control message.
☑ Fix SES92 clearing exception bits when 2 ports configured

CA_P7 Upgrade – 11 October 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
☑ Fixed bug preventing configuration of more than 8 HDW STS points on 1330.
☑ Fixed bug in Analog Output display causing loss of precision.
☑ Fixed bug in Auto-Sectionalizing preventing AST-owned I/O points from showing up in mapping lists.

CA_P6 Upgrade – 02 October 2007:

NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ Fixed problem where too many 2179 ports would cause the RTU to lock up.
- ☑ Fixed bug wherein bipolar analog outputs would not scale correctly.

CA_P5 Upgrade – 22 August 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Fixes:
- ☑ Fixed ACI comm. status points not showing up.
- ☑ Fixed problem of all ACI points showing up on the first card (when more than one card was configured).
- ☑ Fixed cosmetic AI-ACC data transfer mapping issue.
- ☑ Fix SEL config and autoconfig problems introduced in CA (P4)
- ☑ Fixed DI-DO mapping to show SBO and DO points (P4)

CA_P2 Upgrade – 03 August 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Change DNPM to support up to 1024 Binary Input points
- ☑ Change DNPR to support up to 5120 Binary Input points
- ☑ Change DNPR to support up to 2048 Binary Output points
- ☑ Add SEL Protocol Type NODATA for tunnel only relays
- ☑ Add AST Fault Monitor to sustain fault status points

Fixes:
- ☑ Fix SEL problem with duplicated point identifiers
- ☑ Fix ACI display for nonexistent data
- ☑ Fix error message for valid password characters

CA_P1 Upgrade – 18 July 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:

- ☑ Add Harris 5000 master protocol
- ☑ Add Moore 9000 protocol
- ☑ Add Auto Sectionalizing Task
- ☑ Add Cap Bank Control
- ☑ Add user log
- ☑ Add SOE log download functionality
- ☑ Add port monitoring program (Data Trap)
- ☑ Add point insert and delete in mapping screens
- ☑ Add pop-up ranges for IE 7 compatibility
- ☑ Add ability to clear accumulator values manually
- ☑ Add ability to invert RLL digital points
- ☑ Add health status for 1ms SOE cards
- ☑ Expand baud rates up to 19,200 for all protocols
- ☑ Change passwords to be hidden
- ☑ Add special character allowance for complex passwords
- ☑ Add test to pickup status changes in the event of 1ms SOE card reset
- ☑ Add search for tag name in mapping of MTU-RTU protocols

Fixes:
- ☑ Fix Incom status initialization problem
- ☑ DNPR report no time rather than 0 time if no time sync has been received
- ☑ Fix display size of device field
- ☑ Fix display problem with AO-ACC data xfer task
- ☑ Fix various run time issues with Cap Bank Control
- ☑ Fix problem with DNPM/IP for polling multiple IEDs with one that is dead.

C9_P2 Upgrade – 11 April 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Implement filter to eliminate power supply noise from ASE modem.
- ☑ Set execute time on ISaGRAF SBO points to 1000ms to eliminate non-zero execution times.
- ☑ Add floating point type to Modbus master.

Fixes:
- ☑ Fix XML-XLS program intermittent bug.

C9_P1 Upgrade – 16 March 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:

☑ Add DI-DO data transfer function.

Fixes:

☑ Modify SEL interface to make it more flexible with more relays. Modified the way it deal with targets and event data as well to make it more robust.
☑ Modify FM protocol to have milliseconds instead of seconds.
☑ Fix clock repeat problem when RTC is used as a time source.
☑ Fix SOE log display issues (P1).
☑ Change DI-DO to wait for DI change after reset before issuing the DO.

C8_P5 Upgrade – 21 February 2007:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:

☑ Add ability to process targets from a SEL 251C instead of using template for a 251-2 (c8)
☑ In Modbus Master, add IEEE floating point register support and autoincremtn by 2 registers on GUI for double register usage (C8)
☑ In PMS-80, add option to not reply to the master if data mapped to a 'sub-rtu' is stale (C8)
☑ Add DO-DI data transfer points with a timeout to return to 0 (C8)
☑ In DNPR, add direct operate no ACK (C8)
☑ In SAGE3030, add support for LANDAC hardware (C8)
☑ Add ACI/FMR selection in 2300 and 1350 setup (C8)
☑ Add ability to change baud rate, etc., for comms in all protocols (C89)
☑ Add ability to calculate fault distance in ACI (C8)
☑ In Modbus master, add ability on/off scan "on the fly" (C8)
☑ In dataxfer, add AI-AO (C8)
☑ Add Auto Sectionalize application (C8)
☑ Add Relay Lockout application (C8)
☑ Add Capacitor Bank Control application (C8)

Fixes:

☑ In SY/MAX protocol allow bipolar analog values (C8)
☑ In Modbus Master, fix divide error problem with large 32 bit values which caused the task to suspend (C8)

- ☑ In PMS-80 implement several fixes related to flagging failed points, testing for control group in trip/close actions and buffer size checks (C8)
- ☑ Modify Tunnel Function to allow free running I/O. This allows for faster and more compatible comms with more devices (C8)
- ☑ Modify DNPR to clamp min/max values to that of the data type (C8)
- ☑ Fix unexpected crash in SEL protocol (C8-P4)
- ☑ Fix SOE log to allow special character display (C8-P4)
- ☑ Sage 3030 had a problem with 5Vdc assertion on Pin1 (C8-P4)
- ☑ In L9 protocol, fix deadband calculation problem (C8-P5)
- ☑ In DNPM/IP, fix hang up problem when Ethernet comms are temporarily lost (C8-P5)
- ☑ Fix problem with RTC introduced in early C8 version (C8-P5)

C6_P2 Upgrade – 06 September 2006:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ 2 counts per cycle now works on Form A accums as well as Form C accums.
- ☑ Allow 40 IEDs per DNPM port
- ☑ Default primary time source change to Real Time Clock (C6).
- ☑ Event data retrieval added for SEL relays (C6).
- ☑ Clear comm. counters for SEL IEDs added (C6).
- ☑ Added per-IED comm. counters and reset comm. counters to MBM, TD, SYMAX (C6).
- ☑ Add reset of comm. counters to 2179 (C6).
- ☑ Make # events returned in DNPR configurable to shorten messages (C6).
- ☑ Alter DNPR such that sequence numbers for messages increment on every request (per new DNP documentation) (C6).

Fixes:
- ☑ Global freeze functioning with H5 protocol
- ☑ Bug in C5_P7 disabled baseboard DO points (C6_P1).
- ☑ Global accumulator freeze functionality with IDLC (C6_P1).
- ☑ Allow editing of SEL analog scaling (C6_P1).
- ☑ Comm status point did not work correctly for Electran protocol (C6_P1).
- ☑ 1MSSOE display showed only first 16 points (C6_P1)
- ☑ Allow importing of DNPM templates from a serial to Ethernet port and vice versa (C6).
- ☑ SEL change to slow down comms to allow talking to 2516 relay (C6).
- ☑ SEL change to allow autoconfig to 487B relay (C6).
- ☑ Fix reset comm. counters for Ethernet ports (C6).
- ☑ Fix DNPM/IP to allow receipt of multi-frame/fragment messages without RTU crashing (C6).

C5_P7 Upgrade – 22 May 2006:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Support for ABB master controls in DNPR
- ☑ DNPM config and display I/O points increase to 512 (C5-P6).

Fixes:
- ☑ SES92 fix on select function.
- ☑ Fix SOE log to sort on milliseconds when sorting on time (C5-P6).
- ☑ SBO select checkback when using certain cards (C5-P6)
- ☑ ACI config would lockup sometimes when multiple edits were done (C6-P6).
- ☑ MBM write to multiple registers with a cyclic write function(C5-P4/P5).

C5_P3 Upgrade – 13 April 2006:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ SEL protocol support for SEL 2516.

Fixes:
- ☑ DNPR "Central Hudson" level when selected is written to configuration file(C5_P2).
- ☑ Symax PF is returned as absolute value.

C5_P1 Upgrade – 28 March 2006:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Data Trap functionality for both serial and Ethernet ports.
- ☑ InCom Protocol
- ☑ ETI Protocol
- ☑ Series 5 Georgia Power Protocol
- ☑ Data Transfer AI to ACC and Do to AO
- ☑ IDLC now has Global Freeze
- ☑ Annunciator Panel Display
- ☑ MBR now has global frozen accumulators
- ☑ Add IDLC to XML-Excel program.

☑ Series 5 and 8979 show downloaded deadbands
☑ DNPR shows class assignment

Fixes:
☑ Data Transfer AI-Float
☑ Continuation flag on 8979 for AI points
☑ DNPM a time sync from any source (prim or sec) will allow DNPM to send time syncs to IEDs
☑ ACI name displays correctly on GUI
☑ SEL copy port works properly
☑ Accumulator displays only positive values
☑ DNPR the total number of accumulators is increased to 1024
☑ Fixed reset of DNP/IP comm. counters.
☑ MBR/IP invert status to display correctly.
☑ Removed "RTS Continuous" from IDLC and SES92 screens.
☑ MBR - Reset comm counts.

C4 Upgrade – 24 January 2006:
NOTE: For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
☑ Boolean Status Application
☑ Tunnel Emulator
☑ VanComm accumulator startup mode
☑ Transdata analog size option and accumulator size option for each IED
☑ Central Hudson protocol level option in DNPR
☑ Global freeze event status point
☑ Modem dial out option in DNPR
☑ Modbus remote now displays the last exception code
☑ XML to Excel program is now included in the update zip file

Fixes:
☑ SES92 solid state meter data now displays
☑ SEL copying auto-configured ports
☑ 8979 analog display page the "Go To" now goes to page number instead of point number
☑ Modbus remote internal status registers is separate from status register
☑ IDLC displays all status points correctly
☑ ACI card names can now be edited
☑ Symax now initializes in as timely manner, 32 point counts for status (C3_P3)
☑ Modem test GUI page fixed (C3_P2)
☑ Modbus master COS timestamping (C3_P1)
☑ Page error when submitting a config for baseboard SBOs (C3_P1)

C3 Upgrade – 01 November 2005:
NOTE: ->For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Add faster reboot and faster GUI transfer by compression of GUI into 1 file
- ☑ Add data transfer Digital Output -> Analog Output

Deletions:
- ☑ Remove "Safe Mode"

Fixes:
- ☑ Fix IDLC setup problems
- ☑ Change comm. counters to be 32 bits to avoid roll-over.
- ☑ Fix Modbus master time stamping on IED DI points (P1)
- ☑ Fix modem test on GUI (P2)

C2 Upgrade – 02 September 2005:
NOTE: ->For use with "5x86" CPU with compact flash ONLY. Will not work with 486 and disk on chip configuration.

Additions:
- ☑ Add SYMAX master protocol
- ☑ Add Import/Export IED configuration templates
- ☑ Add on/off scan for DNP IED polling without needing reboot
- ☑ Add comm. counters per DNP IED
- ☑ Add zero-out of DNP comm. counters
- ☑ Add mapping of RTU internal status points
- ☑ Add "who" command to SEL tunnel-through to show port assignments
- ☑ Add OS back to file up/download

Fixes:
- ☑ Improve data transfer startup value initializations
- ☑ Fix DNPR accumulator event reporting
- ☑ Improve SEL tunnel through to work with SEL 5010 software
- ☑ LEDs on 3030 now work with exception of "IED Failed"
- ☑ Fix Conitel master for midtransmission mark of other than multiples of 8 bits in message.

C1 Upgrade – 19 July 2005:

Additions:
- ☑ Add IDLC protocol
- ☑ Add Power Calculations (NRG) application
- ☑ Add support for SEL 421 relay auto config

Fixes:

- ☑ Fix problem with data transfer application data access
- ☑ Enhance Conitel master to work with 2 RTU IDs
- ☑ Fix RTU database initialization to avoid reporting stale data after startup
- ☑ Allow % signs in point names.