

NB-SD USER MANUAL



NB-SD User Manual

Part Number 1E-04-00-0138

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7/18/2013 - Corresponds with API-Pro v1.0.13 release

- . Support for the Windows 8 operating system.
- . Revised Setup Wizard for API-Pro software.

2/5/2013

- . Added Slideshow Functionality
- . Updated user Interface setup
- . Updated references from “screen dimming” to “screen saver”
- . Added Slideshow duration configuration setting
- . Updated SD/MMC Card Operations to include the ability to load slides from card
- . Added Appendix B

10/5/2012

- . Updated Network Statistics Functionality
- . Updated Network Configuration:
 - Slave discovery functionality
 - MSTP Addressing temporary override
- . Updated Setup: User Interface Wizard

1/18/2012

- . Updated biasing resistor value from 3.32k to 510 Ohms.

2/4/2008 - Initial Manual Release

This manual describes the installation and operation of the NB-SD. This document is divided into the following sections, each beginning with a table of contents for the section:

- . One: Product Overview, describing the features of the NB-SD and presenting the specifications for the controller.
- . Two: Wiring & Installation, detailing the wiring and installation procedures.
- . Three: Fundamental Concepts, listing rudimentary concepts of American Auto-Matrix technology.
- . Four: Product Configuration, reviewing product setup and configuration through API-Pro software.
- . Five: Using the NB-SD, provides an overview of the operator interface for the NB-SD.

This document contains certain style and formatting conventions for conveying information in a clear and concise manner:

- . Property names are shown in **bold**. For example: **PV**.
- . Menu commands appear with a ">" symbol between levels. For example: File>Open.
- . *Italics* indicate a section of this manual or another publication.
- . The following formats are used to highlight important information:

NOTE



Notes indicate noteworthy information and appear in boxes with this format separated from the running text.

CAUTION



Cautions indicate information that may prevent serious system or user problems and appear in boxes with this format separated from the running text.

WARNING



Warnings indicate information that prevent personal injury or equipment damage and appear in boxes with this format separated from the running text.

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SECTION 1: OVERVIEW

This section provides a product overview of the NB-SD, an American Auto-Matrix BACnet MS/TP networkable Small Display. The information contained within this section covers general details regarding the product and a quick-start reference, as well as a quick-start sheet for setup and configuration.

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1.1 PRODUCT DESCRIPTION

The NB-SD is a compact, addressable network display device capable of interfacing with Native Series products, as well third-party BACnet products that communicate using MS/TP data link layer. Easily adaptable to most standard applications requiring an operator interface, the NB-SD provides a configurable data interface environment with a button driven design. The NB-SD can have up to 50 configurable display screens and reference a maximum of 150 points from one or multiple controllers networked on the same communication bus. This product also provides useful maintenance utilities that allow you to access any object property on the network. Interfacing with the unit is achieved through the use of the 12-bit, 480 x 272 pixel LCD-based touch screen display.

The size of the NB-SD is approximately 6 inches by 3.5 inches, making it small enough to be mounted in areas with limited space requirements. The display is housed in a chemical resistant “Kydex” plastic case, which can be mounted on both US and Euro switch boxes. The touch screen interface is protected by a chemically resistant polyester membrane - thereby providing an additional layer of protection for the roughest of environments.



Figure 1-1 NB-SD

1.1.1 FEATURES

The NB-SD contains many features, including:

- . Button Driven Navigation
- . Configurable Data Screens
- . Alarm and Event Services
- . Network Diagnostics
- . Operator Password Protection
- . Local Analog and Binary Value Data Storage
- . Slideshow Screensaver capabilities

1.1.1.1 BUTTON DRIVEN NAVIGATION

The operator interface consists of a multi-tiered button driven navigation environment with backlighting. The buttons are used for penetrating menus, accessing utilities and modifying parameters of the data displayed on the unit. The button driven interface consists of an intuitive navigation menu, providing quick access to the Main Menu, Recent Alarms, Previous Screen and many other areas.

1.1.1.2 CONFIGURABLE DISPLAY SCREENS

The NB-SD provides up to 50 configurable data screens containing live network data. Each piece of live data (commonly referred to as a data slot) can be interrogated for modification purposes. To allow users to create a logical grouping of point data, each display screen can reference other display screens in a group-based format for easy system navigation. A total of 150 points can be programmed into the NB-SD for quick monitoring or modification.

1.1.1.3 ALARM EXTENSIONS

The NB-SD can examine all network traffic on the communication bus to store and display alarm summary and alarm notification data requested/sent by devices. A total of 128 alarms can be stored within the NB-SD at any given time.

1.1.1.4 NETWORK DIAGNOSTICS

For users or building managers who need to access advanced information not configured within the display, the NB-SD provides the ability to manually address, view, and modify any writable data point on the local MS/TP network. This time-saving feature allows users to make quick changes to a system without the need to connect commissioning software to the network, or interrupt on-going network communications.

1.1.1.5 OPERATOR PASSWORD PROTECTION

The NB-SD provides support for a maximum of eight (8) definable operators; each assigned with a unique numeric pass code (up to 5 digits in length). To provide secure application flexibility for environments with more than one operator, the product provides three-level administration. These access levels of administration are applied to any of the eight (8) defined operators to provide read/write permissions, and access to certain areas of the user interface.

1.1.1.6 LOCAL ANALOG AND BINARY VALUE DATA STORAGE

The NB-SD can contain up to 32 definable Analog or Binary Value objects. These objects can be utilized by the NB-SD, or another BACnet device for the purpose of displaying information from a remote network that the NB-SD may not have access to. Additionally, local users of the NB-SD may write to any of the defined Analog or Binary Values as place holders for extended building automation applications.

1.2 PRODUCT SPECIFICATIONS

1.2.1 NETWORKING

- . **Line signaling:** EIA-485
- . **Data isolation:** GMR Data Isolated
- . **Termination:** 249 Ohm, switch selectable
- . **Biassing:** 510 Ohm, switch selectable
- . **Protocol:** BACnet MS/TP
- . **Baud Rates Supported:** 9.6kbps, 19.2kbps, 38.4kbps, 57.6kbps, 76.8kbps, 115.2kbps

1.2.2 PRODUCT SETUP AND CONFIGURATION

- . **Software:** API-Pro v1.00 or greater (required to program NB-SD)
- . **USB Copy Protection:** NB-Pro v2.x License Key (required to run API-Pro)

1.2.3 RESOURCES

- . **Screens:** up to 50 data screens maximum
- . **Points:** up to 150 addressed points maximum

1.2.4 HARDWARE

- . **Processor:** ARM7-TDMI, 86Mhz
- . **Memory:** 8MB-flash
- . **Expansion slot:** SD card socket for applying firmware updates; future expansion
- . **LCD:** 4.3 in, 480x720 - 16:9 color TFT with white LED backlight
- . **Touch screen:** 4-wire analog resistive with protective flex window
- . **Beeper:** 4Khz On/Off

1.2.5 POWER REQUIREMENTS

- . **Power source:** 12-29 VAC/VDC, 50/60Hz
- . **Consumption:** 2.5W, 4W maximum
- . **Line protection:** 0.5A PTC, self-resetting fuse

1.2.6 OPERATING CONDITIONS

- . **Temperature:** 41-122^o F (5 - 50^o C) ambient
- . **Humidity:** 0-90%, non-condensing
- . **Altitude:** -2000 to + 10,000 ft. (-650 to + 3500m)

1.2.7 DIMENSIONS

- . **Size:** 3.400 in. (8.65cm) x 6.000 in. (15.24cm) x 1.019 in. (2.59cm)

1.2.8 AGENCY APPROVALS

- . CE Approved
- . FCC, Class A Computing Device; Part 15
- . UL listed 916, Management Equipment, Energy (PAZX)
- . UL Listed 873, Component Temperature-Indicating and Regulating Equipment (XAPX2)
- . UL Listed, Component Temperature-Indicating and Regulation Equipment for Canada (XAPX8)

NOTE



This product has been developed and manufactured including components designed for applications of mobile instrument products. If this product is to be used for any other system that requires high reliability and safety in performance, accuracy, etc. such as transportation systems (aircraft, rail, mobile), security or fire prevention systems, any other safety devices, etc. you are request to allow for safety design of the entire system or device, such as fail safe and redundancy design so as to maintain and assure its reliability and safety.

NOTE



Do not apply this product to aerospace systems, mainline communication systems, nuclear power control systems or medical equipment involved in life support that require high reliability and safety, as it is not intended for such use or application.

NOTE



This device complies with Part 15 of the FCC Rules. Operation of this equipment is subject to the following conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation

WARNING



This is a Class A product. If installed in a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

1.3 QUICK START - NB-SD SETUP

Use the quick-start to learn the order of tasks to perform when you configure an NB-SD. The following table lists a logical order to follow for setup and configuration of the NB-SD. Each step provides references to this document, or other documentation.

Table 1-1: Quick Start Setup for NB-SD

Task		In This Document	In Other Documents
1	Determine the NB-SD's BACnet Network Configuration		Site Engineering Documentation
2	Install base-plate and hardware elements	Mounting the NB-SD - Page 2-5	
3	Connect and apply power and network communications	Connecting Power - Page 2-6 Connecting the EIA-485 Network - Page 2-7	
4	Installing API-Pro Engineering Environment	API-Pro Installation - Page 4-4	
5	Product Configuration	Section 4 - Product Configuration - Various	
6	Applying the Configuration to the NB-SD	Applying a Configuration File - Page 4-20	

SECTION 2: WIRING & INSTALLATION

This section reviews general wiring and installation practices for the NB-SD. Detailed information is given to many areas including wiring for power, communications, and important safety requirements.

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2.1 PREPARATION

Unpack the NB-SD unit and inspect the contents of the package for damaged or missing components. If damaged, notify the appropriate carrier at once and return any damaged components for immediate repair or replacement.

2.1.1 INCLUDED ITEMS

Included in this package you should find the following items:

- . NB-SD BACnet Touch-Screen Display unit
- . Two-position terminal block for MS/TP network connectivity
- . Two-position terminal block for line power
- . NB-SD Quick-Start Guide
- . Field Wiring Accessories
- . Two (2) Ferrite Beads
- . One (1) EARTH Ground Lead

2.1.2 TOOLS REQUIRED

The following tools and supplied may be requires for installation of the NB-SD:

- . **Torx screw driver:** used to disassemble T-10 Torx screws from the NB-SD housing
- . **Small flat-blade screw driver:** used for EIA-485 and Power connections
- . **2 inch hole saw:** to cut hole into wall for unit wire runs
- . **Wire strippers:** for wiring purposes
- . **Voltage meter:** for verifying power connections

The installation of the NB-SD involves mounting the product, supplying power, and connecting to the communications network. All wiring connections to the NB-SD are made with the use of plug (male) & socket (female) terminal blocks (TB). The plug consists of terminal ports and adjustment screws. The socket consists of a row of pins and is permanently mounted to the printed circuit board (PCB).

When connecting/disconnecting the two parts of the terminal block, align the holes on the plug with the pins on the socket and avoid twisting, as this could damage the assembly and void the product warranty.

2.2 SAFETY PRECAUTIONS

WARNING



Disconnect power to service installed product equipment.

NOTE




This device is only intended for use as a monitoring and control device for BACnet MS/TP-based building automation equipment and is not intended for life safety applications.

2.3 MOUNTING THE NB-SD

The NB-SD may be installed near the equipment it is monitoring, or at a remote location, provided that the distance meets EIA-485 requirements (see *Connecting the MS/TP Network* for more details).

WARNING



The mounting area must be free from moisture and or leakage, and should be unobstructed by equipment and machinery.

The housing back-plate of the NB-SD provides pre-drilled areas for different methods of mounting the product. Using the mounting plate, the NB-SD can be mounted simply on a wall, on top of a US standard 2x4 junction box, or UK standard junction box. The middle of the backplate contains an open area to accommodate the EIA-485 networking port and power port for the NB-SD. If you are going to mount the NB-SD onto a wall surface, be sure to have the appropriate tools in order to do so (such as a 2 inch hole saw). Figure 2-1 provides a reference of housing back-plate dimensions for the NB-SD.

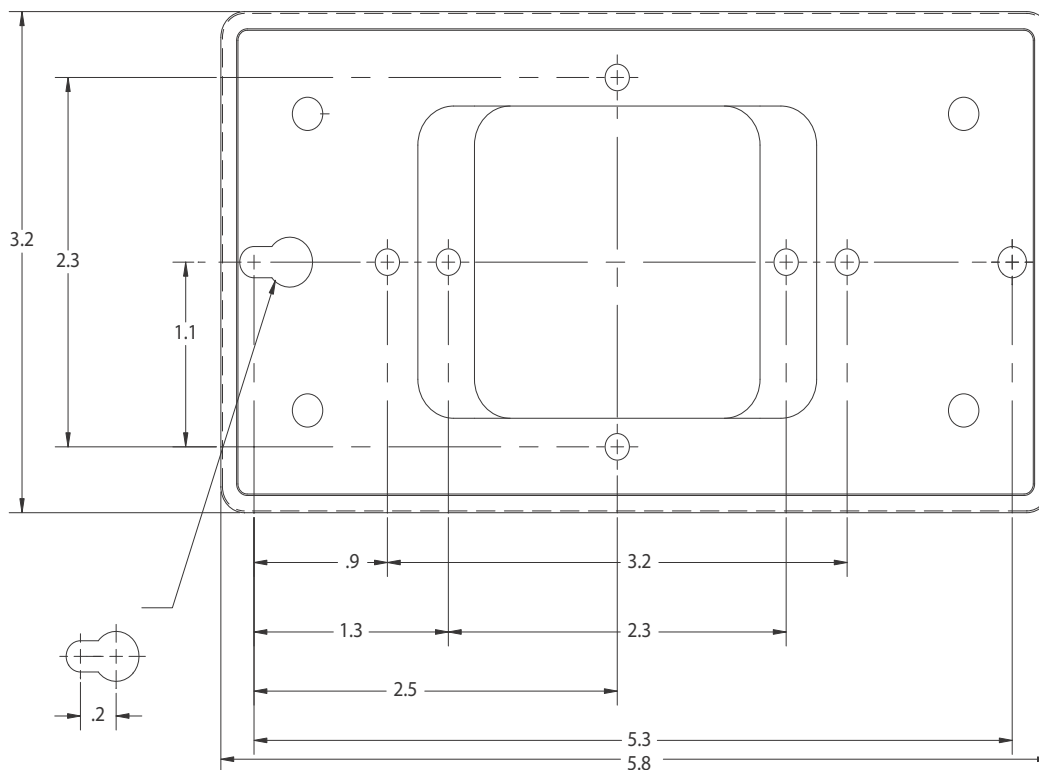


Figure 2-1 NB-SD Housing Backplate Dimensions (not to scale)

2.3.1 STATIC DISCHARGE PRECAUTION



Static charges can produce voltages high enough to damage electronic components. The microprocessor and associated circuitry within the product are sensitive to static discharge. Follow these precautions while working with the product in both disassembled and assembled modes.

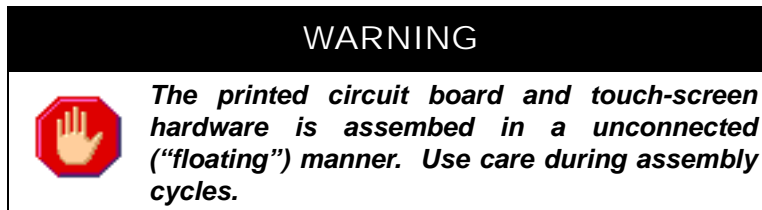
- Work in a static free environment
- Discharge any static electricity you may have accumulated by touching a known, securely grounded object.

Do not handle the printed circuit board (PCB) without proper protection against static discharge. Users should handle PCB components while wearing a ground bracelet or strap (connected to Earth ground).

2.3.2 DISASSEMBLING THE NB-SD

Prior to mounting, you will need to disassemble the NB-SD. To do this, you will need a Torx screw driver that accommodates size T-10 screws. To disassemble the NB-SD, perform the following steps:

1. Carefully loosen the four (4) T-10 Torx Drive screws located at the front of the NB-SD and remove the cover.



2. Remove PCB component set of the NB-SD from housing (if still installed).
3. Retain all screws, spacers, and housing components for later reassembly.

2.3.3 MOUNTING THE BACKPLATE

As discussed earlier, the back-plate of the NB-SD’s housing can accommodate direct wall mounting, or mounting applications on electrical junction boxes. The back-plate includes pre-formed screw holes that will align with drill holes located on the junction box. These screw holes are located near the middle of the back-plate, adjacent to the cut out areas for power and network wiring.


For junction box mounting, use junction box screws to mount the back-plate.

For direct wall mounting, a keyhole-style screw hole is located on the outer left side of the back-plate, whereas the outer right side contains a standard screw hole. The middle contains an open area that accommodates network and power connections. To mount the back-plate onto a wall, you may draw trace lines prior to drilling, or use the drilling template provided in this quick start guide.

2.4 WIRING REQUIREMENTS

Follow the recommended wiring guidelines to reduce the chance of operation and communication errors. All EIA-485 communications networks should employ shielded, twisted pair wiring. Each twisted pair must be individually shielded. Unshielded cables must be placed in solid metal conduit alone. Communications wiring **should not** be routed together with—or close to—other wiring carrying DC switching, AC lines, fluorescent lighting or any other RFI/electromagnetic interference (EMI)-emitting source. Failure to use these types of conductors may result in various system communications problems such as excessive network retries, noise susceptibility, and loss of communication.


WARNING



If you do not use proper wiring techniques, your site may not meet Federal Communications Commission (FCC) Class A regulations for radio frequency interference (RFI) emissions.

2.4.1 CONNECTING POWER

WARNING



Disconnect main line power prior to making any connections to the product.

You must use a power supply capable of providing 12-29 VAC/VDC, 50/60Hz, to the NB-SD. It is recommended that at least 18AWG wiring be used (the terminals can accommodate 18–22AWG). Connect power to the X1 and X2 pins located at J2. The J2 terminal is located next to the *EARTH* tab, as illustrated in Figure 2-2.

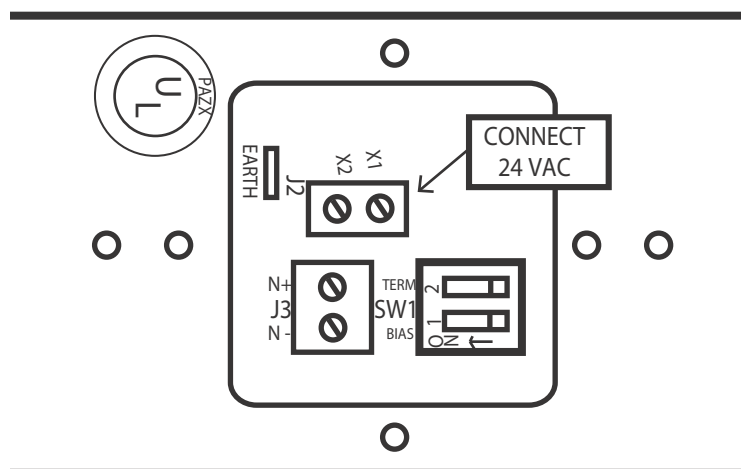


Figure 2-2 Power Connection on NB-SD

Using the ground lead included with product packaging, the NB-SD should be connected to a good known Earth ground connection at all times through the ground tab marked EARTH, located below the power input terminal block.

To reduce the possibility of electrical interference or noise, two (2) ferrite beads have been included with your NB-SD. In properly designed application, a ferrite bead must be placed on each end of your power line (near the transformer and near the NB-SD unit itself).

WARNING

Use the ground lead provided in product packaging to connect the product to a good known Earth ground connection at all times through the grounding tab located on the PCB with the designation EARTH, located below the power input terminal block.

NOTE

To meet the FCC Part 15 requirements, ferrite beads must be installed at each end of the power cable (connecting to terminal designation J2). Two (2) ferrite beads (AAM Part# 5G-05-00-0005) have been included with the product.

WARNING

The practice of sharing power transformers between devices is discouraged. If this technique is used, AC polarity must be maintained throughout the power network.

2.4.2 CONNECTING THE EIA-485 NETWORK

Figure 2-3 illustrates the EIA-485 communications network wiring for the NB-SD. Similar to EIA-485 standards, BACnet MS/TP networks support a maximum network distance of 4000 feet. Connect the NB-SD to the BACnet MS/TP network by connecting the positive network drive signal to the N+ terminal and the negative network drive signal to the N- terminal.

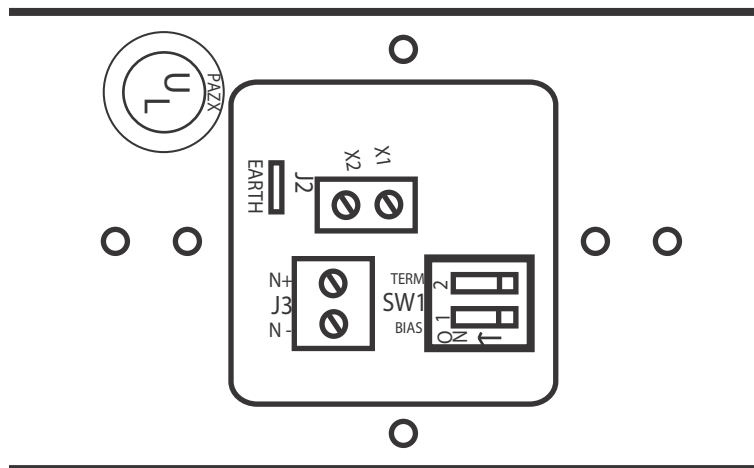


Figure 2-3 EIA-485 Network Connection on NB-SD

2.4.2.1 TERMINATION

Located to the right of the Network port is Switch Block 1 (SW1). SW1, DIP 2 (refer to Figure 2-3) can be configured to provide 249 ohms of EIA-485 network termination. If the NB-SD is electrically installed at an end of the network, you may choose to apply termination by moving the respective switch into the *ON* position (moved to left).

Terminating resistors are used to prevent line and data reflection. In a multi-drop network, one resistor at each end of the network is required. When applying termination, be certain that it is applied at both physical ends of your EIA-485 network at the two end devices. In networks with termination applications, biasing should also be enabled to ensure a proper idle state voltage. In most cases, biasing should always be enabled.

2.4.2.2 BIASING

Located to the right of the Network port is Switch Block 1 (SW1). SW1, DIP1 (refer to Figure 2-3) can be configured to provide 510 ohms of biasing to the EIA-485 network. Biasing is typically used to drive the network with enough current to create an idle state voltage and promoting sound communications on the network. If no biasing is enabled on any other device on the network, biasing can be enabled on the NB-SD.

NOTE



variables.

Biasing and Network Termination rules may vary between different manufacturers of BACnet equipment, therefore you should always consult third-party vendor documentation regarding these

2.4.2.3 SHIELDING

In traditional EIA-485 standard application, the cable shield from your EIA-485 network wiring should be tied to earth ground at the first device on the network. Each successive device on the network should have its shield connected to the shield of the previous device. The shield of the last controller on the network should be taped back.

SECTION 3: FUNDAMENTAL CONCEPTS

This section provides information on general concepts and theory that must be understood prior to setup and configuration of the NB-SD.

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3.1 FUNDAMENTAL CONCEPTS

This section of the user manual reviews standard fundamental concepts and provides an explanation of the prerequisite information necessary to know prior to installing American Auto-Matrix NB-Series products.

3.1.1 BACNET MS/TP PROTOCOL INFORMATION

BACnet MS/TP (**M**aster **S**lave **T**oken **P**assing) is an EIA-485 network layer intended for use with lower-level devices such as Unitary Controllers. In comparison to BACnet/IP and BACnet/Ethernet, MS/TP is more cost-effective to implement due to lower cost of wiring. Given the MS/TP network is a serial-based network, devices may be configured to communicate at different baud rates specified by BACnet. Therefore it is essential to know information regarding the BACnet network you are connecting to prior to installing and implementing the NB-SD.

3.1.2 MS/TP TOKEN PASSING

BACnet MS/TP uses token passing to allow devices to communicate on the network. Token passing is controlled by each device, which contains an internal memory list of other MS/TP peers connected to the network. The token is passed in order of the MAC Address (Unit ID) from lowest to highest. In most MS/TP networks, each device is configured to be a master. Given all devices may be a master, MS/TP may appear and react slower than traditional building automation protocols. However, configuring your network for faster baud rates will help provide better bandwidth and transport speed of network messaging.

Token passing is a communications scheme that allows connected devices connected to inter-communicate with one another. A network “token” is passed from unit to unit on the network in a round-robin fashion by order of the MAC Address (lowest to highest) to provide a transport to access the network. When a unit possesses the token, it may perform any network activity for which it is responsible. When finished, the token is then passed onto the next device. At any time, the unit that possesses the token is the only device permitted to initiate communications with another device on the network or to request information from it. A device that receives the token may or may not need to perform network functions (e.g. read values from a remote device, broadcast information, etc.). If not, it will simply pass the token along the network.

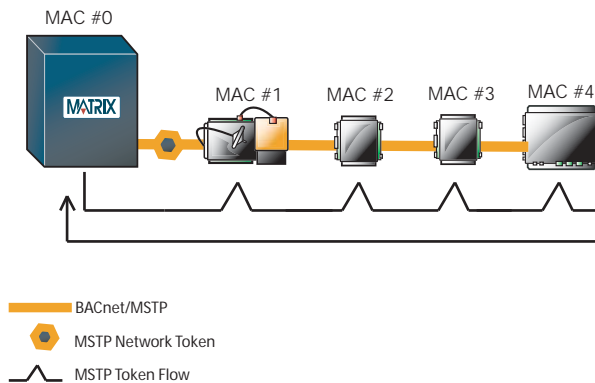


Figure 3-1 MS/TP Token Passing Example

Because each device can be an MS/TP master, it is important to realize that each MS/TP network should be optimized. Later sub-sections of this manual explain this process.

3.1.3 MS/TP LAN WIRING

Similar to EIA-485 standards, BACnet MS/TP networks support a maximum network distance of 4000 feet maximum with 18-AWG, 2-wire, shielded-twisted-pair cabling. American Auto-Matrix devices are designed with half-watt serial drivers, allowing up to a maximum of 64 devices to be connected to a single MS/TP network bus.

If you are connecting the NB-SD to an existing MS/TP network consisting of third-party devices, consult third-party vendor documentation regarding MS/TP network considerations.

3.1.4 DEVICE ADDRESSING

BACnet MS/TP devices contain two unique numbers as addresses. One device address is known as a Device Instance, and the other is a MAC Address.

The Device Instance is an address assignment that is used to identify the BACnet device on a global BACnet network. When a device is connected to a global BACnet network consisting of multiple data layers joined together using routers, the Device Instance is used to uniquely identify the device on a global basis. The valid range for the device instance in a BACnet device is 0 to 4,194,302. The NB-SD must be configured for a unique, non-conflicting Device Instance. In the event that multiple devices are assigned the same Device Instance, both devices will simply not communicate on the BACnet network, or could be subject to mis-directed messaging (a message intended for Device-A may be routed to Device-B)

The MAC Address is an address assignment used within the BACnet MS/TP segment to permit a device to actively communicate on the BACnet MS/TP network. Valid MAC Address assignments range from 0 to 127 and are typically assigned in a logical and incremental order to permit faster token passing between devices. The MAC Address of a BACnet MS/TP device must be a unique, non-conflicting value that exists on the local MS/TP network. In the event that multiple devices are assigned with the same MAC Address, the effects can be far detrimental than that of a conflicting Device Instance; potentially resulting in a failure of the entire local MS/TP network. In the event that the NB-SD encounters its MAC Address may be a duplicate, the NB-SD will inform the user that a duplicate MAC Address has been detected and will not perform client communications until resolved.

3.1.5 COMMUNICATION RATES

As a serial based protocol, BACnet MS/TP supports the following baud rates: 9.6kbps, 19.2kbps, 38.4kbps, 57.6kbps, 76.8kbps, and 115.2kbps. The NB-SD can be configured for any of these baud rates.

Each device communicating on an MS/TP network must be configured for the same baud rate at all times. In the event that the NB-SD's communication baud rate is incorrect for the network it is connected to, the NB-SD will inform the user that a different baud rate has been detected and will not perform client communications until resolved.

3.1.6 NETWORK OPTIMIZATION

In BACnet MS/TP devices, specific device properties are available to permit optimization. network communications. By adjusting Device properties max-master and max-info-frames, users can adjust the token passing abilities of devices. The functionality of these two properties is described as follows:

- **Max-Master** - defines the highest unit ID of a MSTP master that is connected to the network. This value specifies to what address extent a token may pass. For example if you have 64 devices addressed in logical order, this value would be assigned to 64. This value should be set to the same value across all devices connected to an MSTP network.
- **Max-Info-Frames** - defines the amount of data frames that a MSTP master can use the token before passing onto the next device. This value is typically set to a value of 5 at the factory, but can be modified if necessary. In the event a device does not need to keep the token for the amount of frames specified, AAM devices will automatically pass the token onto the next device.

3.2 CLIENT/SERVER OBJECT SUPPORT

The NB-SD provides object support in manners of a client and server aspect. Each manner is discussed within this section.

3.2.1 CLIENT OBJECT SUPPORT

As a BACnet device providing client functionality, the NB-SD can be configured to monitor and modify object properties from any device residing on the local MS/TP network. Using API-Pro, the setup environment for NB-SD, users can define any object property - whether it be a standard BACnet object and property or a vendor specific object and property (referred to as non-standard or proprietary). The object property datatype must be one of the supported primitive datatypes from the BACnet standard. The NB-SD supports *REAL*, *BOOLEAN*, *UNSIGNED*, *ENUMERATED*, *SIGNED*, *TIME*, *DATE*, *CHARACTER-STRING*, and *BITSTRING*. *NULL* is supported exclusively for relinquishing priority array control over an object

Complex datatypes such as lists and arrays are not directly supported for standard point monitoring except for support of Schedule and Calendar objects, which are accessed differently than mapped object properties.

3.2.2 SERVER OBJECT SUPPORT

As a BACnet device, the NB-SD contains an object list which can be read by any BACnet device/client whom wishes to discover information about it. The NB-SD contains up to 5 types of objects:

- . Device Object
- . File Object
- . AV Object(s)
- . BV Object(s)
- . MSV Object(s)

NOTE



The term “Server” describes that the NB-SD contains discoverable objects. The NB-SD does not provide gateway functionality or the ability to dynamically create/delete objects to represent other external data to interrogating BACnet clients/devices.

3.2.2.1 DEVICE OBJECT

The Device object makes information about the device and its capabilities available to other devices/clients on the BACnet network. Information commonly found within this object includes the model number and software/firmware of the product, as well as BACnet services and objects supported by the device. Information found within this object is typically referenced by interrogating clients that wish to learn more about the device prior to performing in-depth communications.

3.2.2.2 FILE OBJECT

The File object provides information regarding a stored file in a BACnet device. Within functionality of the NB-SD, the file object is used to store/archive the setup and configuration of the product. Using NB-Pro's BACnet File Services (Atomic Read File and Atomic Write File), users can respectively upload or download the configuration of the NB-SD for viewing and editing through API-Pro.

3.2.2.3 ANALOG VALUE OBJECT

The Analog Value Object(s) of the NB-SD are useful as placeholders for building automation applications. For example, an Analog Value can be written to by another BACnet device in order to show information on the NB-SD. This situation may occur when a BACnet device acting as a gateway to a non-BACnet network may wish to send information for display purposes. Alternatively, Analog Values within the NB-SD can be modified by the local user of the touch-screen display for the purpose of extending building automation applications (e.g. setpoint values, etc.).

Analog Value object(s) are created by defining a slot as Local.

3.2.2.4 BINARY VALUE OBJECT

The Binary Value object(s) of the NB-SD are useful as placeholders for building automation applications. For example, a Binary Value can be written to by another BACnet device in order to show information on the NB-SD. This situation may occur when a BACnet device acting as a gateway to a non-BACnet network may wish to send information for display purposes. Alternatively, Binary Values within the NB-SD can be modified by the local user of the touch-screen display for the purpose of extending building automation applications (e.g. start/stop commands, etc.).

Binary Value object(s) are created by defining a slot as Local.

3.2.2.5 MULTI STATE VALUE OBJECT

Multi State Value 1, which cannot be deleted, permits other BACnet devices to change the idle-screen during idle times. This is useful for situations where users wish to have a screen-tour setup and controlled. This variable replaces the previous association with AV-100.

Multi State Value 2 has been added which reflects whether any locally created AV's or BV's Present Values should be preserved. If any local AV's or BV's are present this object will be available.

Slot numbers 1 through 150 can be selected as the idle screen by specifying a number between 1 and 150. The "home screen" can be declared the idle screen by leaving this MSV at a value of 151.

3.3 COMMAND PRIORITIZATION

BACnet uses a command prioritization scheme for objects that control equipment or software parameters that affect the operation of equipment connected to devices. Through the use of this command prioritization scheme (commonly referred to as Priority Array), a method is provided that allows a device to determine the order in which an object is controlled. Command Prioritization assigns unique levels of priority to the different types of devices that could write values to a device. There are 16 prioritization levels with Level 1 being highest and Level 16 the lowest. A complete list of BACnet Priority Array Levels and their uses is given in Table 3-1.

Table 3-1 : Command Prioritization Levels

Priority Level	Application	Priority Level	Application
1	Manual-Life Safety	9	Available
2	Automatic-Life Safety	10	Available
3	Available	11	Available
4	Available	12	Available
5	Critical Equip. Control	13	Available
6	Minimum On/Off	14	Available
7	Available	15	Available
8	Manual Operator	16	Available

BACnet defines the types of objects that are either required or may optionally support the command prioritization scheme. While many factors depend on whether an object may support the feature, Table 3-2 provides a list of objects that are subject to Command Prioritization.

Table 3-2: Objects Subject to Command Prioritization Support

Object Type	Support Required?	Notes
Analog Output	Yes	n/a
Analog Value	No	An Analog Value which is "writable" is not required to support Command Prioritization, rather the out-of-service property must be set to TRUE in order for the object to accept write commands. The ability to set an Analog Value into an out-of-service mode may be limited by the manufacturer of the device, as the functionality of the object may be intended to be read-only.
Binary Output	Yes	n/a

Table 3-2: Objects Subject to Command Prioritization Support

Object Type	Support Required?	Notes
Binary Value	No	A Binary Value which is “writable” is not required to support Command Prioritization, rather the out-of-service property must be set to TRUE in order for the object to accept write commands. The ability to set an Binary Value into an out-of-service mode may be limited by the manufacturer of the device, as the functionality of the object may be intended to be read-only.
Multi-State Output	Yes	n/a
Multi-State Value	No	A Multi-State Value which is “writable” is not required to support Command Prioritization, rather the out-of-service property must be set to TRUE in order for the object to accept write commands. The ability to set an Multi-State into an out-of-service mode may be limited by the manufacturer of the device, as the functionality of the object may be intended to be read-only.

3.4 NETWORK POLLING

The NB-SD is designed to have a minimal impact of a BACnet MS/TP network by actively managing the polling of object property information. In working conditions, the NB-SD will poll the network for data when it needs to, rather than continuously poll and potentially reduce MS/TP network performance.

The NB-SD will poll for point data at a reduced rate when no one is actively navigating through configured data screens. Once a user interacts with the MS/TP network through the touch-screen display, the product will increase its polling speed to allow “fresh” data to be displayed to the user. The polling rates are constantly adjusted through an advanced fuzzy logic algorithm controlled by the NB-SD.

The fuzzy logic algorithm monitors various data and network aspects. Once the data is acquired, the algorithm will then keep all data refreshed as often as needed with preferential treatment to any variables currently being displayed. The performance of this algorithm can be adjusted through the *Polling Aggressiveness* parameter of the NB-SD.

By default, the *Polling Aggressiveness* parameter is set to 5 and has been tested to be acceptable for most monitoring applications. In applications where the NB-SD is installed onto a communication network that requires controlled bandwidth, the *Polling Aggressiveness* parameter can be lowered so that the NB-SD takes up less time on the network. In applications where data being displayed on the NB-SD is time sensitive and critical, the *Polling Aggressiveness* parameter can be increased to allow the NB-SD to poll data faster.

SECTION 4: PRODUCT CONFIGURATION

This section provides information on how to configure the American Auto-Matrix NB-SD BACnet Touch-Screen display using API-Pro.

IN THIS SECTION

Product Configuration	4-2
API-Pro System Requirements	4-2
API-Pro Installation	4-3
Starting and Using API-Pro	4-6
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4.1 PRODUCT CONFIGURATION

To setup and configure the NB-SD to inter-communicate with other networked BACnet MS/TP devices, a configuration file for the NB-SD must be created and defined. This is achieved by using API-Pro. API-Pro is a software configuration environment, providing users with a method to configure the NB-SD BACnet Touch-Screen Display. Through the use of this program, technicians can define the various parameters of the configuration file to monitor and modify data from the BACnet MS/TP network. When the configuration has been defined, a file can then be saved and loaded to the NB-SD using either NB-Pro's BACnet File Services or through the NB-SD's on-board SD-Card Socket.



Figure 4-1 API-Pro

4.1.1 API-PRO SYSTEM REQUIREMENTS

- **Operating System:** Windows XP (Home/Pro) with SP2; Windows Vista; Windows 7(32-bit or 64-bit); Windows 8 (32-bit or 64-bit)
- **Additional Software:** Microsoft.NET Framework v3.0 or greater - operating system dependent
- **System Memory:** 256MB RAM or greater
- **Disk Space:** 10MB for system file (additional disk space required for configuration files)
- **Additional Hardware/Utilities:** Valid NB-Pro USB Copy Protection Key (required to run API-Pro)

4.2 API-PRO INSTALLATION

To install API-Pro onto your computer, perform the following steps:

1. Insert the API-Pro CD into the CD-ROM drive of your computer. The Setup Wizard process should start automatically after a few moments. If it does not, navigate to the CD and run the executable file.
2. InstallShield will examine your computer to check for an installed instance of .NET Framework v3.0. If it is not found, you will be prompted that API-Pro requires it to be installed on your computer. To install the .NET Framework, click *Install*. This process may take a few minutes. Once prepared, you will be welcomed to the Setup Wizard for API-Pro. To continue, click *Next*.

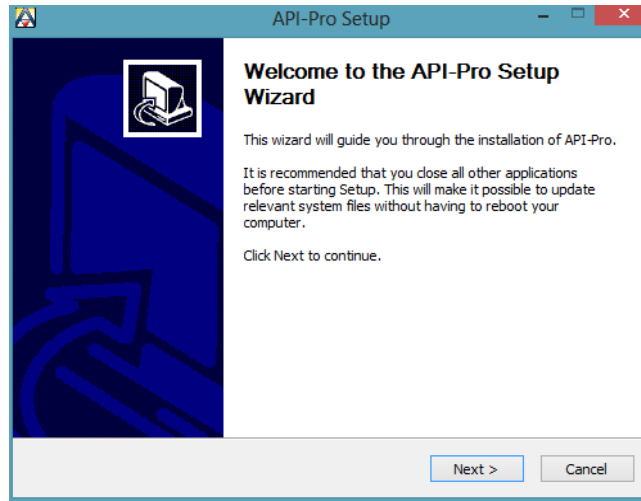


Figure 4-2 Setup Wizard Welcome

3. The Setup Wizard will allow you to choose which features of API-Pro you want to install. By default, all Program Files, Software License Key files, and .NET Framework v3.5 (if needed) are mandatory items. You are free to choose whether you want a Start Menu Shortcut or Desktop Shortcut to be created. Once you have made your selections, click *Next* to continue.

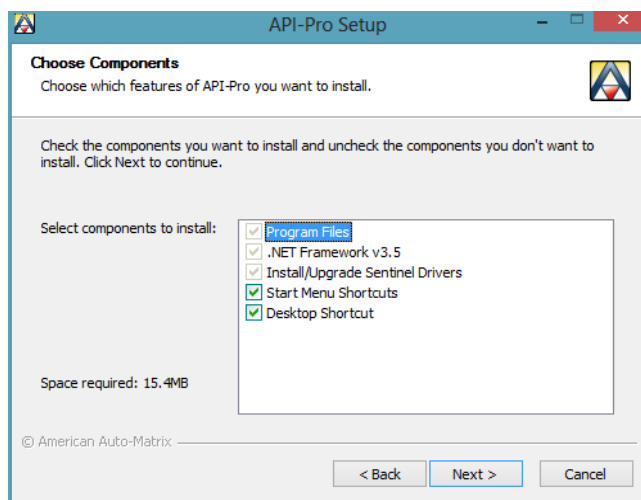


Figure 4-3 Choose Components in Setup Wizard

4. You can choose the destination folder where API-Pro will be installed to. By default, the program will install to *C:\Program Files\American Auto-Matrix\API-Pro* for 32-bit operating systems or *C:\Program Files (x86)\American Auto-Matrix\API-Pro* for 64-bit operating systems. If you wish to change the install directory, click *Browse...* and select the desired path. Then, click *Install* to continue.

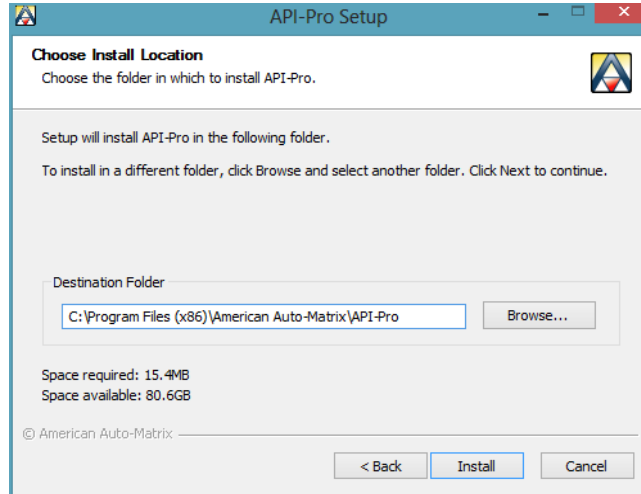


Figure 4-4 Choose Install Location for API-Pro

5. The Setup Wizard will copy all of the necessary files required to run API-Pro, as well as configure other elements of your computer to correctly run the process.

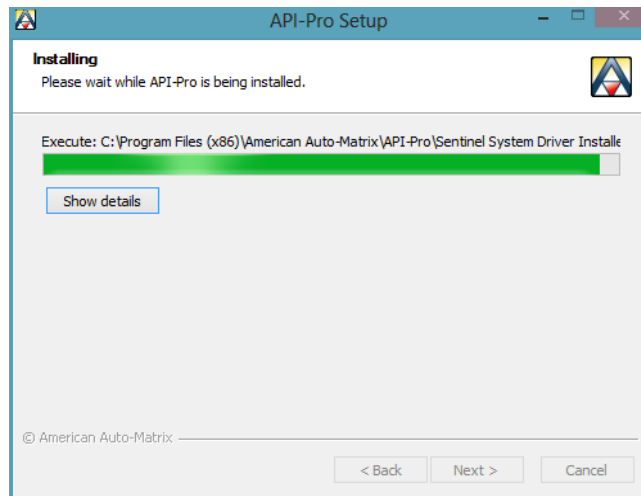


Figure 4-5 Installing API-Pro

6. When complete, the Setup Wizard Completed screen will appear, providing a notification that the wizard has successfully installed the program. To exit the Setup Wizard, click *Finish*.

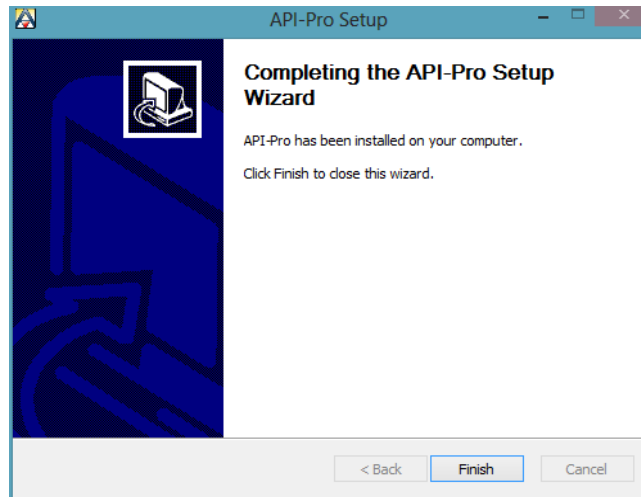



Figure 4-6 Setup Wizard Complete

4.3 STARTING AND USING API-PRO

To start API-Pro, perform the following steps:

1. Insert your NB-Pro USB Software Copy Protection key into an available USB port on your computer.
2. Navigate to *Windows Start>Programs>American Auto-Matrix>API-Pro* and select the API-Pro icon listing from the program menu.

NOTE	
	<p>API-Pro requires that the Software Copy Protection key be connected during configuration file engineering. If the key is not present, API-Pro will not execute, save or open configuration files.</p>

4.3.1 MENU BAR OPERATIONS

API-Pro provides a basic menu bar consisting of a *File* drop-down menu and a *Help* drop-down menu. Table 4-1 and Table 4-2 provide a quick reference for each operation feature available through the respective drop-down menus.

Table 4-1: File Drop-Down Menu

File Menu Option	Shortcut Keys	Operation
New	CTRL + N	Creates a new, blank configuration file template.
Open	CTRL + O	Provides the capability to load an existing configuration file saved on the local PC or a removable storage drive.
Save	CTRL + S	Allows the user to save changes to a configuration currently opened for editing.
Save As		Allows the user to save a configuration currently opened for editing, but also permits the user to choose the destination of where the configuration file is saved to.
Exit		Closes and terminates the API-Pro program.

Table 4-2: Help Drop-Down Menu

Help Menu Option	Shortcut Keys	Operation
About		Provides information about the program name and revision and any copyright information associated to it.

4.3.2 THE NAVIGATION BAR

The layout of API-Pro provides easy navigation and usage of programming various aspects of the NB-SD. Within the engineering environment, there are five configuration areas which are reviewed in this manual.

The configuration areas include:

- . Data Slot Configuration
- . Home Screen Configuration
- . Data Screen Configuration
- . Schedules
- . Extended Setup

Navigation to each configuration area is performed by clicking on the navigation bar, located at the bottom of the API-Pro window.

4.4 DATA SLOT CONFIGURATION




The Data Slot Configuration section provides access to setup and define referenced object properties within the NB-SD. The Data Slot Configuration area provides a data grid view of defined points from the BACnet MS/TP that will be displayed by the NB-SD during operator interaction. A maximum of 150 object properties can be defined for display on the NB-SD through the Home Screen or Data Screens. Slots are defined in a “one at a time” manner. As each slot is added, a slot number is defined in the application.

Slot Number	Unit ID	Vendor Type	Unit Type	Object	Object Instance	Property	Priority for Writing
131	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	11	sp	None Used
132	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	12	sp	None Used
133	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	17	sp	None Used
134	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	18	sp	None Used
135	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	19	sp	None Used
136	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	20	sp	None Used
137	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	21	sp	None Used
138	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	22	sp	None Used
139	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	23	sp	None Used
140	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	24	sp	None Used
141	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	25	sp	None Used
142	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	26	sp	None Used
143	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	27	sp	None Used
144	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	28	sp	None Used
145	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	17	ob	None Used
146	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	17	ob	None Used
147	52	American Auto-Matrix	6-NB-GPC1-7	FAXX	17	ob	None Used

Figure 4-7 Data Slot Configuration

4.4.1 ADDING A DATA SLOT

To add a slot, either right-click in the slot configuration area and select *New* from the shortcut menu, or click the  button located on the top right hand side of the Slot Configuration window.

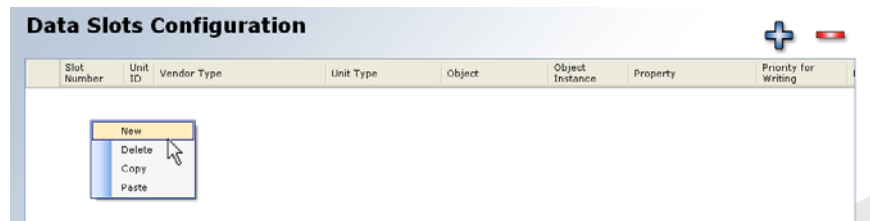


Figure 4-8 Adding a Data Slot

4.4.2 DEFINING THE DATA SLOT

A new slot with a slot number will be added to the form. From this point, you will then be required to specify field information regarding the object property you wish to reference in the NB-SD. While most field information is required, a few parameters are optional. Table 4-3 provides a complete description of each field, its usage, and whether or not a value is required.

Table 4-3: Data Slot Fields

Field	Notes	Required?
Slot Number	Defines the slot number of the referenced object property. The first slot typically starts with the number 1 and work in an incremental fashion. If an intermediate slot is deleted, the slot number is as well - thereby not affecting other slot or data screen configurations.	Yes
Unit ID	Defines the MAC Address of the BACnet MS/TP device you are addressing. This value can be of a range from 0 - 254, where 0 - 127 is commonly reserved for MS/TP master units, and 128-254 is commonly reserved for MS/TP slave units.	Yes
Vendor Type	Provides a vendor type definition for the manufacturer of the BACnet device you are working with. Each vendor may have a library of static devices that contain specific object and property information referenced in XML files as part of this program. XML File Usage is described later in this section	No
Unit Type	Provides a unit type (model) definition for the BACnet device you are working with. Each vendor may have specific object and property information referenced in XML files as part of this program. XML File Usage is described later in this section	No
Object	Defines the BACnet Object Type you wish to address. Standard Objects are available from the combo-box. If you wish to define a proprietary object, simply the type BACnet Identifier number into the combo box.	Yes
Object Instance	Defines the instance number of the referenced BACnet object.	Yes

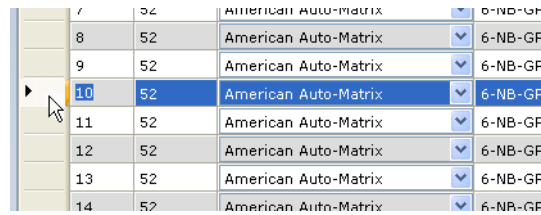
Table 4-3: Data Slot Fields

Field	Notes	Required?
Property	Defines the property of the referenced BACnet object. For any object defined, all standard properties are available for selection from the drop-down menu. If you wish to define a proprietary property, simply type the BACnet identifier number into the combo box.	Yes
Priority for Writing	If the referenced BACnet Object Property you have defined is commandable through Priority Array, you may select a specific priority for override conditions. If the object is writable, set this value to None Used .	Varies by defined object
Name	Provides a short descriptive name for the BACnet object property referenced. This short name will display on the left area of the slot line when viewing multiple points in a group fashion. A maximum of 24 characters can be entered/displayed by NB-SD.	Yes
Description	Provides a long description for the BACnet object property referenced. This long description can be used to provide a description of the value's functionality or meaning. A maximum 150 characters can be entered/displayed by NB-SD.	No
Units	Provides the ability to display an engineering unit next to the point value when displayed on NB-SD. A maximum of 5 characters can be entered/displayed by NB-SD.	No
Password Level	Defines the minimum required login level that an operator must have in order to gain value edit access. A value of 0 allows all users to gain value edit access. A value of 4 will disable value editing of the point from NB-SD	Yes
Focus Bit	Focus Bit is assigned a value for situations where a specific bit position of a bitstring needs to be referenced. Additionally, this field is also set for situations when a text overlay for a logical 0 or 1 value is required.	No
Text Overlay - Logical 1	Defines text data that will be displayed when a logical value of 1 is received by NB-SD for the specified object property. The BACnet datatype must be UNSIGNED, SIGNED, BOOLEAN, or ENUMERATED). For applications involving bitstring datatypes, text will be displayed when the focus bit position has been set for a specific bit.	No
Text Overlay - Logical 0	Defines text data that will be displayed when a logical value of 0 is received by NB-SD for the specified object property. The BACnet datatype must be UNSIGNED, SIGNED, BOOLEAN, or ENUMERATED). For applications involving bitstring datatypes, text will be displayed when the focus bit position has been set for a specific bit.	No

4.4.3 DELETING A DATA SLOT

To delete a slot, perform the following steps:

1. Select the slot you wish to delete by performing a single mouse click on the left edge of the data grid as displayed in Figure 4-9. Note that multiple slots can be selected by holding the single mouse click and moving your mouse up or down to select multiple rows above or below the selected slot.



7	52	American Auto-Matrix	6-NB-GF
8	52	American Auto-Matrix	6-NB-GF
9	52	American Auto-Matrix	6-NB-GF
10	52	American Auto-Matrix	6-NB-GF
11	52	American Auto-Matrix	6-NB-GF
12	52	American Auto-Matrix	6-NB-GF
13	52	American Auto-Matrix	6-NB-GF
14	52	American Auto-Matrix	6-NB-GF

Figure 4-9 Clicking on Data grid to Select a Slot

2. Right-click the area of the indented data grid to invoke the shortcut menu. Select Delete from the shortcut menu. Alternatively, you can also select the icon from the top right side of the Data Slot Configuration window to perform the same action.

4.5 HOME SCREEN CONFIGURATION



The Home Screen Configuration section provides access to setup and define the Home Screen within the NB-SD. The Home Screen is the first screen with live data or links displayed upon start-up, and is also the screen displayed when a user touches the Home button. Each line of the home screen can be programmed to display a configured slot, or provide a link to a configured data screen (refer to next section on how to create and define data screens), or simply display blank lines for organizational group structuring. The design of the Home Screen is static and provides 5 configurable lines.

The Home Screen provides a configurable title displayed at the top of the screen. This can be used to define the site name, building, or environment in which the NB-SD has been installed. A maximum of 24 printable characters can be entered for display.

A screenshot of the 'Home Screen Configuration' web interface. The title 'Home Screen Configuration' is at the top. Below it is a text input field for 'Home Screen Title' containing 'Your Site Name Here'. There are five rows, each representing a line on the home screen. Each row has a 'Line X Type' dropdown menu set to 'Screen Link' and a 'Line X Value' dropdown menu. The values are: Line 1: '(1) Schedule Overview', Line 2: '(11) Input Statuses', Line 3: '(13) Outputs', Line 4: '(16) ALC Router', and Line 5: '(17) Program 1 in GPC1'. A faint house icon is visible in the background on the right side of the form.

Line	Type	Value
1	Screen Link	(1) Schedule Overview
2	Screen Link	(11) Input Statuses
3	Screen Link	(13) Outputs
4	Screen Link	(16) ALC Router
5	Screen Link	(17) Program 1 in GPC1

Figure 4-10 Home Screen Configuration

4.6 DATA SCREEN CONFIGURATION



The Data Screen Configuration section provides access to setup and define data screens within the NB-SD. A maximum of 50 screens, each with 15 lines of definable data can be stored within the NB-SD. Each line of a data screen can be programmed to display an object property configured as a slot, provide a link to another defined data screen or home screen, or simply display blank links for cosmetic purposes or organizational group structuring.

Line	Type / Value	Value
Line 1	Screen Link	(2) Schedule 1
Line 2	Screen Link	(3) Schedule 2
Line 3	Screen Link	(4) Schedule 3
Line 4	Screen Link	(5) Schedule 4
Line 5	Screen Link	(6) Schedule 5
Line 6	Screen Link	(7) Schedule 6
Line 7	Screen Link	(8) Schedule 7
Line 8	Screen Link	(9) Schedule 8
Line 9	Screen Link	(10) Programmed Holidays
Line 10	Screen Link	(0) Home Screen
Line 11	Blank Line	0
Line 12	Data Slot	(150) Host Override Enabled?
Line 13	Blank Line	0
Line 14	Blank Line	0
Line 15	Blank Line	0

Figure 4-11 Data Screen Configuration

Each line of a data screen has a type and value associated to it. The type defines the data element you wish to display on the line (whether it be a slot, screen link or blank line). If you have selected a slot, the value associate combo box will index all referenced slots in the Slot Configuration area. If you have selected a screen link, additional screens you have configured within the Data Screen Configuration area will display in the combo box. For blank lines, the value drop down will be set to a hard coded value of zero (0).

To define each screen, a series of left and right arrows for navigating between each screen definition is located below Line 15's setup area. An additional set of left and right arrows with a line in front/behind allows quick navigation to the beginning or end of data screen configuration (Screen 1 and Screen 50, respectively).

4.7 SCHEDULES CONFIGURATION



The Schedules Configuration section provides access to setup and define the ability to read and write BACnet Schedule and BACnet Calendar objects information. NB-SD will support a maximum of 16 definitions - providing support for a total of 16 Schedules and 16 Calendars.

4.7.1 DEFINING SCHEDULE INFORMATION

When defining information in a Schedule definition, the user can choose to address both a Schedule object and Calendar object by entering the correct object instance number for each. In the event that an instance number is not entered (field is left blank), display icons on NB-SD used to view property information from corresponding object properties will not be displayed during runtime. This functionality accommodates devices that may only support one of the two object types.

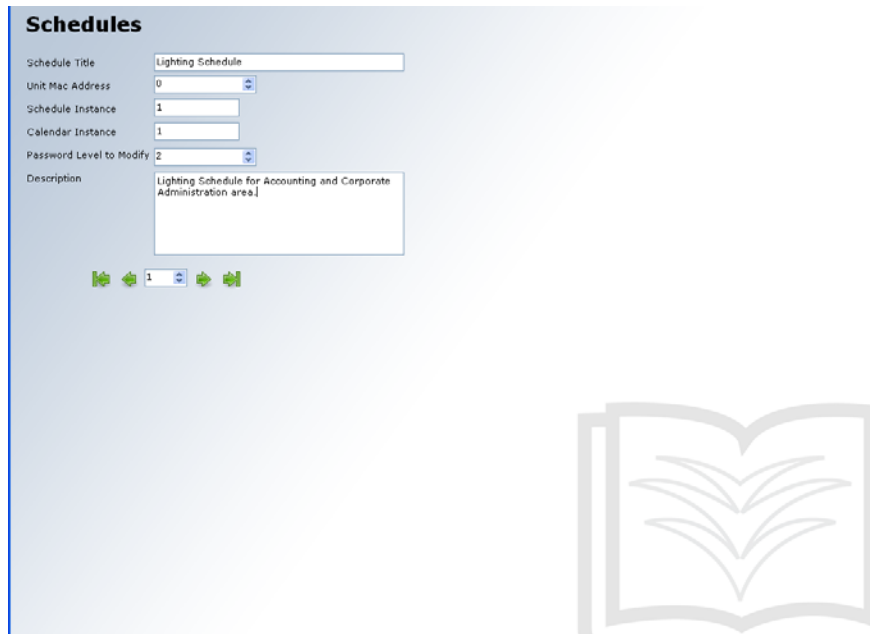


Figure 4-12 Schedules Configuration

Similar to a data slot, each Schedule definition can be assigned a required password level to modify, allowing schedules to be adjusted by operators with the correct privilege levels.

4.8 EXTENDED SETUP CONFIGURATION

The Extended Setup section provides a method to define specific device related configuration parameters for NB-SD. Extended Setup is intended to be used in situations where a user may wish to program device parameters of the NB-SD in an offline and local manner, rather than through the touch-screen user interface. Additionally, leaving this unchecked, Extended Setup can also be used in situations where multiple NB-SD units will be configured to display the same data slots, screen, and schedules; but operate using different MS/TP network configuration parameters (such as MAC Address, Device Instance, etc.).

Figure 4-13 Extended Setup Configuration

Prior to saving a file and applying it to NB-SD, users can choose whether or not they wish to download the extended setup of the configuration file by placing a check mark in the *Use Extended Setup* field, located at the top left corner of the configuration panel. Upon applying the configuration to the NB-SD, the unit will reboot and resume operation using the defined parameters.

Table 4-4: Extended Setup Fields

Field	Notes
Unit ID	Specifies the MS/TP MAC Address for the NB-SD. Configurable between 0 and 127.
Device Instance	Specifies the BACnet Device Instance for the NB-SD. Configurable between 0 and 4,134,302
Max Master ID	Specifies the value for Device;max-master. This value should be set to the highest MAC Address that exists on the local MS/TP network. Configurable between 1 and 127.

Table 4-4: Extended Setup Fields

Field	Notes
Max Transaction Frames	Specifies the value for Device;max-info-frames. This value is set by default to 5 and is considered the optimal setting for most network installations. Configurable between 2 and 10.
Login Level for Slot Info Display	Specifies the minimum login level that allows operators to view detailed information regarding a slot through the NB-SD.
Volume	Defines the volume output for audible clicks made when a valid touch occurs on the NB-SD. Configurable between 0 and 11.
Polling Aggressiveness	Defines the aggressiveness of data refresh for the NB-SD. The value can be set as low as 1 or as high as 10. The higher the value, the fast data is polled by the NB-SD.
Alarm Logging Mode	Defines how alarms encountered by the NB-SD are handled. Choices are either to Log Alarm Notifications, Log Alarm Summaries, Log Both, or Log None.
Enable Screen Dimming	Defines whether or not screen dimming is enabled, as well as the inactivity time that must elapse before dimming occurs.
Clock Display Mode	Defines time to be displayed in either standard or military format.
Date Display Mode	Defines date to be displayed in either MM-DD-YY or DD-MM-YY format.
Boot-up Time Server Address	Defines a MAC Address of a BACnet MS/TP devices used by the NB-SD to obtain local time and date information.
Boot-up Time Server Device Instance	Defines the Device Instance for the MAC Address of the BACnet MS/TP device used by the NB-SD to obtain local time and date information.

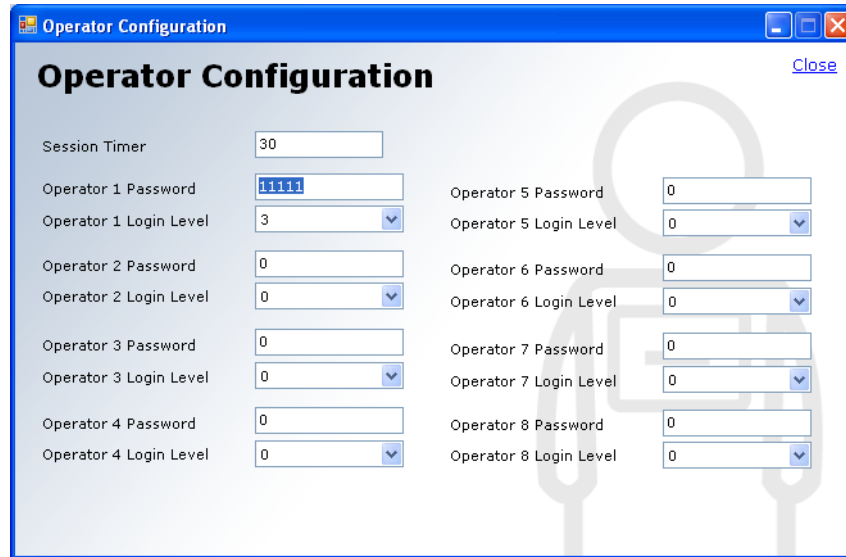
4.8.1 CONFIGURING OPERATORS

From the Extended Setup area, Operators are also configured. To invoke the Operator Configuration window, click on the Operators icon, displayed on the upper right hand side of the Extended Setup panel.



Figure 4-14 Operators Icon

The NB-SD supports a maximum of 8 defined operators, each with their own configurable login password and assignable privilege level that can be used to login to invoke write capabilities to points, as well as access advanced areas of the NB-SD touch-screen user interface. Operator passwords can be assigned any value from 0 to 99999. A login level can also be configured for each operator, where 1 is the lowest level and 3 is the highest level. A login level of zero disables a user from logon capabilities.



The screenshot shows a window titled "Operator Configuration" with a "Close" button in the top right corner. The window contains the following fields:

Field	Value
Session Timer	30
Operator 1 Password	11111
Operator 1 Login Level	3
Operator 2 Password	0
Operator 2 Login Level	0
Operator 3 Password	0
Operator 3 Login Level	0
Operator 4 Password	0
Operator 4 Login Level	0
Operator 5 Password	0
Operator 5 Login Level	0
Operator 6 Password	0
Operator 6 Login Level	0
Operator 7 Password	0
Operator 7 Login Level	0
Operator 8 Password	0
Operator 8 Login Level	0

Figure 4-15 Operator Configuration

4.9 APPLYING A CONFIGURATION FILE

Applying a configuration file to the NB-SD can be done through either BACnet File Services using NB-Pro, or through local transfer methods using an Secure Digital (SD) card. The process and steps for each method are covered in the following sub-sections.

4.9.1 APPLYING THROUGH BACNET FILE SERVICES

An NB-SD configuration file can be downloaded to an NB-SD hardware over the MS/TP network using the NB-Pro Engineering Environment. In this scenario, the NB-SD and its object list must be discovered by NB-Pro prior to performing a download. To load a configuration file in this manner, perform the following steps with NB-Pro started and the NB-SD discovered:

1. Select the NB-SD Configuration File object from the NB-SD and view its properties.
 - 1.a **VERIFY** - *file-size* = 0
 - 1.b **VERIFY** - *description* = "File is empty"
 - 1.c If one of the two conditions above does not match what is returned by the NB-SD, write a value of zero (0) to the *file-size* property and refresh the object to verify if the file is then empty.

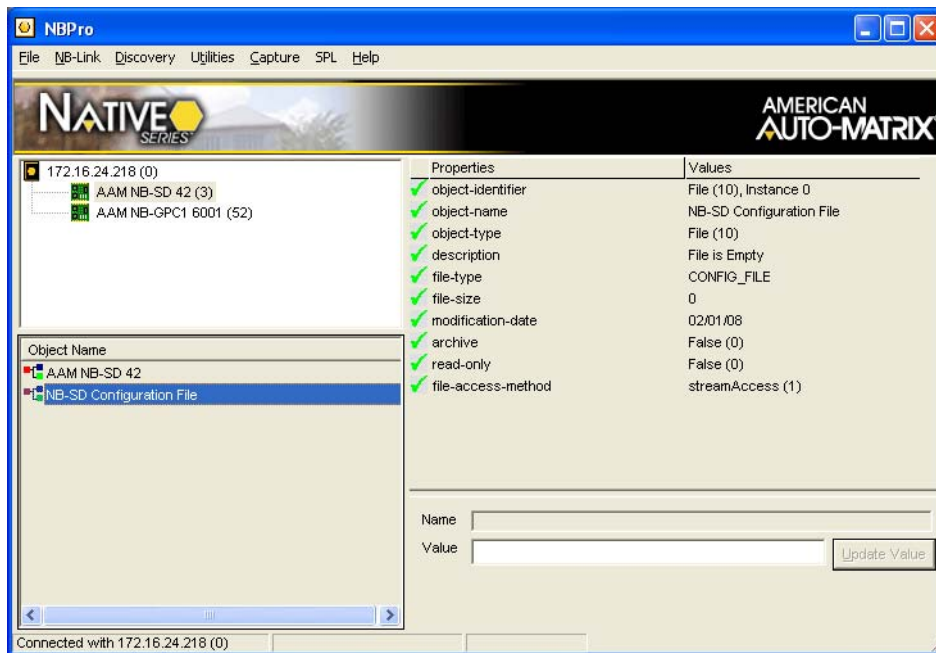


Figure 4-16 Monitoring NB-SD Configuration File Object

2. From NB-Pro's file bar, select *Utilities>Upload/Download (CTRL+U)*.
3. At the Program Operations dialog, click the Device combo-box and select NB-SD from the list.
4. Single-click the NB-SD Configuration File listing under the Programs list.
5. Click *Download-->*. Browse your PC for the NB-SD Configuration file (contains a *.lej file extension). In order to view .lej files, make certain that the Files of Type option located at the bottom of the Open dialog references Small Display Configuration Files. When you have located your file, single-click to highlight your file, then click *Open*
6. The file download process will begin to commence. Depending on the amount of defined configuration data and MS/TP network bandwidth, the process may take a few moments.
7. When the download process has completed, NB-SD will display an acknowledgment on the screen indicating that new setup file information has been successfully loaded, followed by an automatic reboot. Once restarted, NB-SD will begin to operate with the configuration file applied.

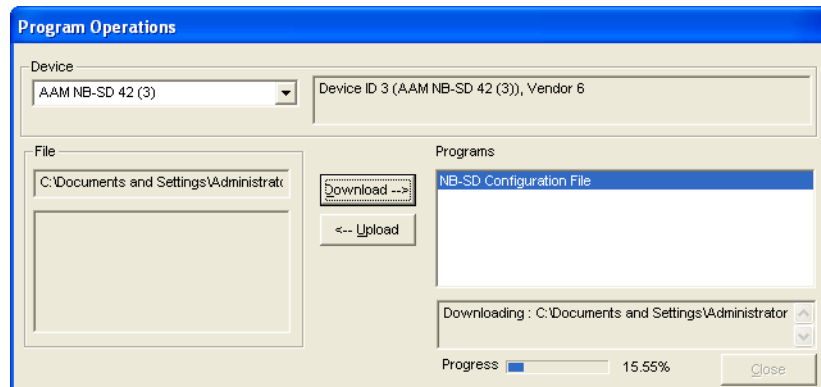


Figure 4-17 NB-SD Configuration Download

4.9.1.1 MAKING THE FILE READ-ONLY

Once the configuration file has been downloaded, you may optionally decide whether to mark the configuration file to be read-only, thereby preventing third-party operator workstations from uploading or downloading data for application to NB-SD. To make contents of the File object read only, perform the following steps:

1. With NB-Pro running and the NB-SD discovered, access the NB-SD Configuration File object.
2. Select property *read-only*.
3. Modify the value to a True value (writing logical value of 1).

NOTE



Once the read-only property has been configured to be true, NB-SD will reject all attempts by BACnet clients to have a file written to the NB-SD Configuration File object. If you need to update the configuration file, you must first change the read-only property to a False value (writing logical value of 0) prior to attempting another file download.

4.9.1.2 TRIGGERING A FILE SAVE OVER BACNET


At times, it may be necessary to perform a file save of the current operating parameters of NB-SD prior to uploading for examination through API-Pro. To perform a file save over BACnet, perform the following steps:

1. With NB-Pro running and the NB-SD discovered, access the NB-SD Configuration File object.
2. Select archive.
3. Modify the value to a logical value of 1 (BOOLEAN True).
4. When the value is written, NB-SD will display an acknowledgment on the screen indicating that new setup file information has been successfully loaded, followed by an automatic reboot.


4.9.2 APPLYING VIA SECURE DIGITAL (SD) CARD

An NB-SD configuration file can be downloaded to an NB-SD hardware by transferring the saved NB-SD configuration file from your computer to a SD-card. Once transferred to the SD-card, the file can then be loaded locally at NB-SD through use of its on-board SD card socket and touch-screen display. Tools requires to do this process include:

- . Torx Screw Drive - Size T-10
- . SD Memory Card - at least 4MB in size and less than or equal to 2GB
- . SD Card Reader - to transfer files from computer to SD card.
- .

NOTE	
	<p>The use of High Capacity SD(HCSD) cards are not supported. Standard SD cards 2GB or less in size must be used.</p>

First, you must transfer the configuration file from your computer to the SD card. In order for NB-SD to accept a configuration file from the SD card, the file must be named **NB-SD.lej**, which is the default name API-Pro will attempt to save with. This file must be loaded in the root directory of the SD card.

NOTE	
	<p>The configuration file copied to the SD card must be named NB-SD.lej. If a file with a different name exists on the SD card, the NB-SD will not be able to load it into its memory for runtime.</p>

To load the configuration file to NB-SD, perform the following steps:

1. Carefully remove the housing cover of the NB-SD.
2. Locate the on-board SD card socket. It is located behind the bottom right corner of the display screen, as shown in Figure 4-18. Insert the SD card into the socket. The card socket uses a spring-loading mechanism to hold the card, therefore, a click noise will occur when the card is pushed up into the socket.

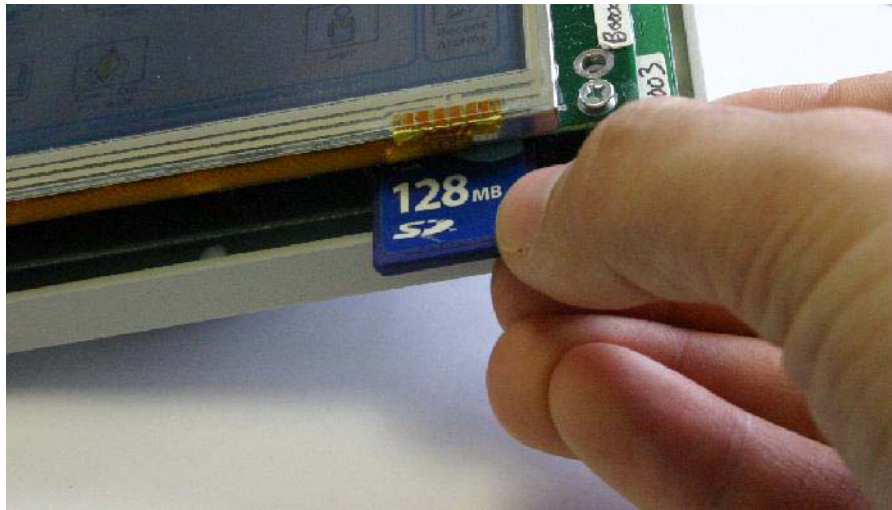


Figure 4-18 Loading an SD-Card into NB-SD

3. Place the housing cover back onto the NB-SD.
4. With NB-SD powered, login as an operator with Level 3 Permissions.
5. From the Main Menu, press *Configure*.

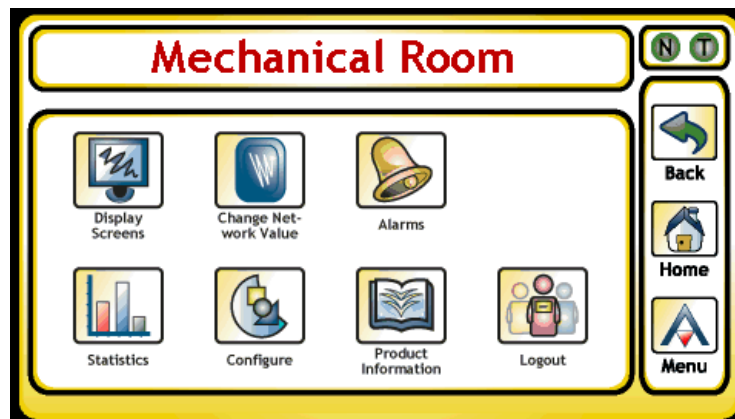


Figure 4-19 Main Menu - Press Configure

6. From the Configure Menu, press *SD/MMC Card Operations*.

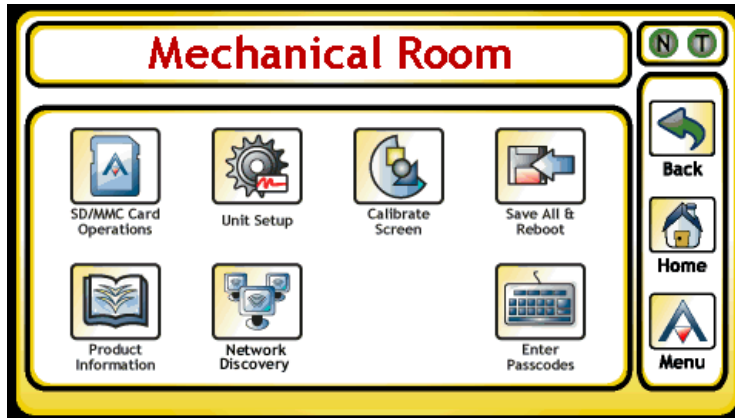


Figure 4-20 Configure Menu - Press SD/MMC Card Operations

- From the SD/MMC Card Operations Menu, press *Slot File Operations*.

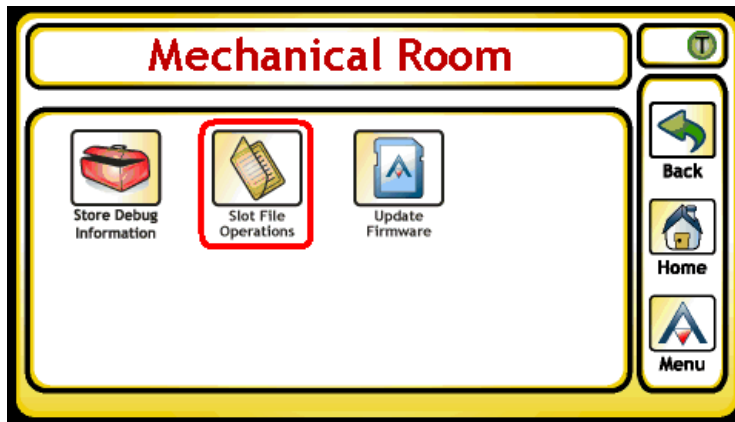


Figure 4-21 SD/MMC Card Operations Menu - Press Slot File Operations

- From the Slot File Operations Menu, press *SD Card -> Display*.

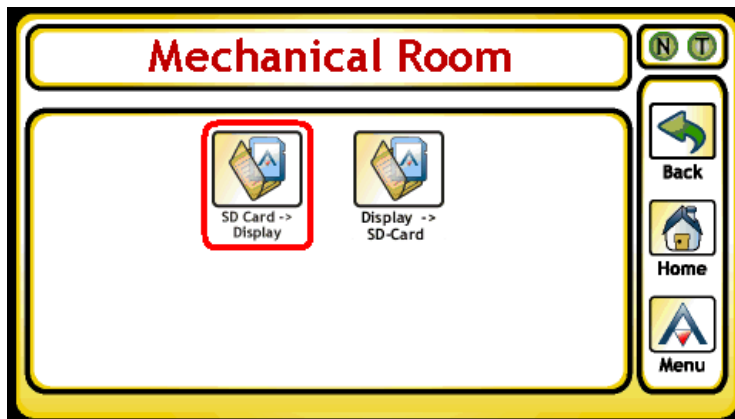


Figure 4-22 Slot File Operations Menu - Press SD Card --> Display

9. Wait for the on-screen confirmation that NB-SD has received the new setup file info. After the confirmation, the NB-SD will reboot.
10. Remove SD card as necessary from unit.

4.10 WORKING WITH CUSTOM XML FILES

As mentioned earlier in Slot Configuration, API-Pro’s functionality provides extended capabilities in defining controller profiles for third-party devices that contain proprietary objects and properties. All XML files used to reference BACnet objects and properties are located in the XML directory of the installed path for API-Pro (commonly *C:\Program Files\American Auto-Matrix\API-Pro*). The following table provides a brief description of default files loaded during installation.

Table 4-5: Default .XML Files Installed

File Name	Purpose
BACnetVendors.xml	References current BACnet vendors and manufacturers registered with ASHRAE as of February 1, 2008.
BACStandardObjectProperties.xml	References currently published BACnet Standard Objects and Properties, as of February 1, 2008.
6-NB-XXX-X.xml (x = model name and/or firmware type)	Contains proprietary object and property information contained in various AAM Native Series products.

4.10.1 CREATING CUSTOM XML FILES

To create a custom XML file for a target third-party BACnet device, you must first know the BACnet vendor ID of the manufacturer’s device you are working with. The vendor ID can be found in the BACnetVendors.xml file by viewing the information with a text editor. For example, if you wish to reference a device by Honeywell, the BACnet vendor ID is 17.

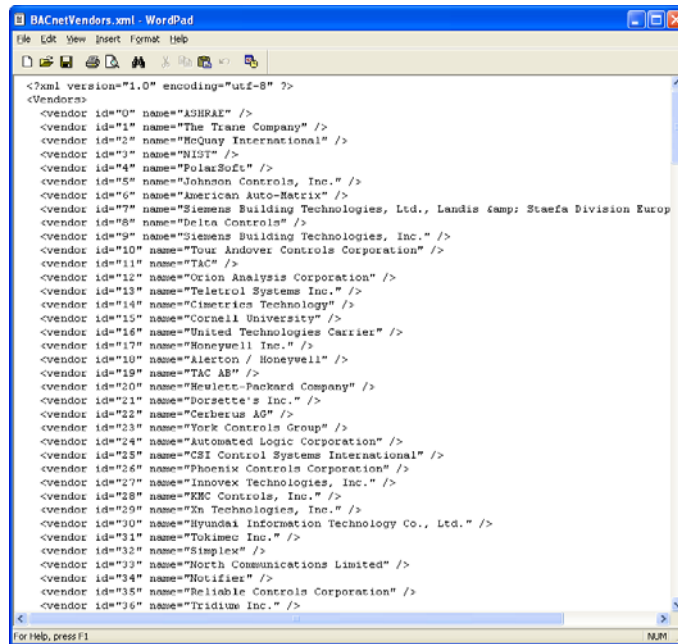


Figure 4-23 BACnetVendors.XML file

Once you have obtained the vendor ID, you may then proceed to create an XML file for the vendor, based on the format of the XML files. To link the vendor ID with the Vendor Type drop-down, the XML file must be named in a format beginning with the vendor ID, followed by a hyphen and a description of the unit. For example, if you are working with a VAV type device from Honeywell, you could name the file *17-HoneywellVAV.xml*.

The format of the XML file must be kept consistently through design and creation. There are multiple areas that should be paid attention to when designing your file. Below is an example.

```
<?xml version="1.0"?>
<ProprietaryInformation>
  <controller modelName="VAVController">
    <Objtype ID="0" name="analog-input" proprietary="0">
      <properties instancerangestart="0" instancerangestop="0">
        <property name="SensorType" id="15000" datatype="2" access="RW" />
        <property name="InputOffset" id="15001" datatype="4" access="RW" />
        <property name="AlarmApplication" id="15002" datatype="2" access="RW" />
      </properties>
      <properties instancerangestart="1" instancerangestop="1">
        <property name="SensorType" id="15000" datatype="2" access="RW" />
        <property name="InputOffset" id="15001" datatype="4" access="RW" />
        <property name="AlarmApplication" id="15002" datatype="2" access="RW" />
      </properties>
      <properties instancerangestart="2" instancerangestop="2">
        <property name="SensorType" id="15000" datatype="2" access="RW" />
        <property name="InputOffset" id="15001" datatype="4" access="RW" />
        <property name="AlarmApplication" id="15002" datatype="2" access="RW" />
      </properties>
    </Objtype>
    <Objtype ID="157" name="SomeObject" proprietary="1">
      <properties instancerangestart="1" instancerangestop="1">
        <property name="Function1" id="15700" datatype="4" access="RW" />
        <property name="Function2" id="15701" datatype="4" access="RW" />
        <property name="Function3" id="15702" datatype="4" access="RW" />
        <property name="Function4" id="15703" datatype="4" access="RW" />
      </properties>
    </Objtype>
  </controller>
</ProprietaryInformation>
```

Once you have finished creating your XML file, copy and paste it to the XML directory. The next time API-Pro is started, and the vendor has been selected, the file name should become available for selection in the Unit Type combo-box.

SECTION 5: USING THE NB-SD

The operator interface provides an intuitive experience between an operator and the building automation system. This section provides detailed information regarding each area of the NB-SD's operator interface, accessed through the local touch-screen display.

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Data Entry Methods.....	5-5
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Product Information.....	5-29
Network Discovery.....	5-29
Enter Passcodes.....	5-30

5.1 USING THE NB-SD

The operator interface of the NB-SD is the gateway between the user and the internal functions of the NB-SD. The operator interface consists of dynamic fields referencing data or other areas of the system, a display title, network icons indication network traffic and token handling, and a navigational pane providing access between different areas of the system. Other aspects of the operator interface may appear with additional buttons that are used to configure the NB-SD, enter pin-passwords, penetrate menus, change system variables, view alarm lists, and perform tests if deemed necessary. Buttons displayed on the NB-SD will perform different functions depending on the situation.

5.1.1 OPERATOR PASSWORD PROTECTION

The NB-SD can define up to eight operator passwords which give access to different areas of the Menu, or provide certain point write privileges when interacting with the system using the touch-screen display.

To login as an operator, touch the Login button. The operator is prompted to enter a password to gain access to additional menu capabilities. From the password prompt screen, you must enter a five-digit password using the direction keys on the touch-screen display. When shipped from the factory, a default operator is programmed into the NB-SD. The default operator password is 11111. This default operator account provides Level 3 permissions to the NB-SD. The default account can be modified at any time.

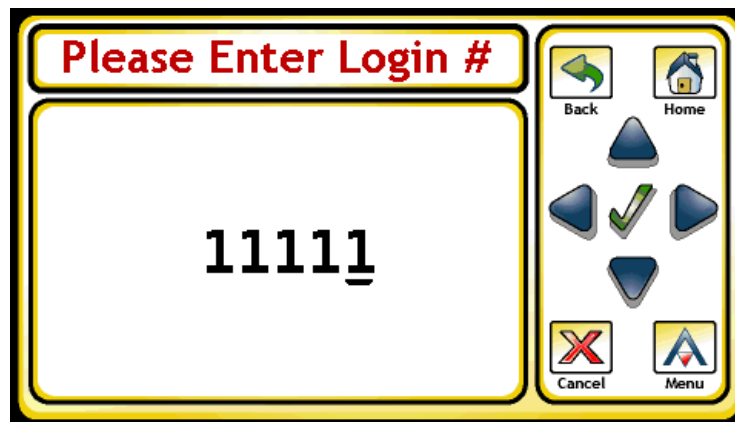


Figure 5-1 Entering an Operator Login

If the five-digit password that you enter matches one of the programmable operator passwords in the NB-SD, the system will log you in as the corresponding operator (having that operator's set of privileges) and the Menu is displayed. If the password does not match one of the programmed passwords, the display will revert back to the Menu. If multiple operators have the same password, the higher access level will be used when this password is used to log in.

Each operator has three possible levels of user privileges, where Level 1 is the lowest, and Level 3 providing the highest level of access. An operator may also be disabled from accessing the system when their corresponding privilege level is set to a value of zero (0). In addition to specific read/write privileges, user privilege levels provide access to advanced areas of the NB-SD.

5.1.2 VALUE EDITING

Before explaining the different data entry methods available to operators in the NB-SD, it is essential to know how to edit a point value displayed on a data screen.

When navigating through different display screens, values are listed as they are programmed from top to bottom. Each data screen can contain up to 15 elements including point values, links to other screens, and blank lines (for cosmetic purposes). To initially view details about a point, touch the line that the point is listed on.

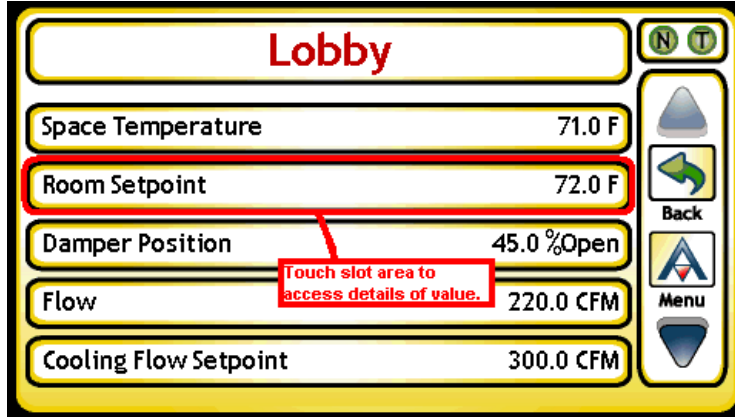


Figure 5-2 Selecting a Point from a Display Screen

By touching the point listing at the display screen, an operator will be navigated to the detail screen (Figure 5-3), which provides additional information about this point. The additional information displayed in this area is derived from slot configuration parameters. If the operator's privilege level meets or exceeds the priority level required to edit the slot, they can then touch the point value displayed on the details screen. This action invokes the value editor, providing the operator a method to enter and manipulate data.

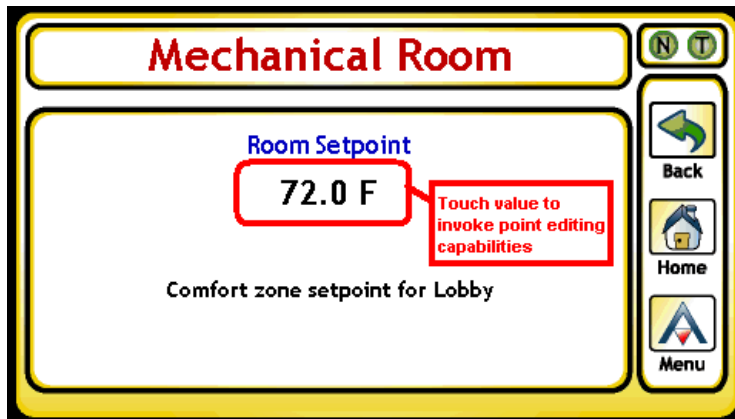


Figure 5-3 Point Details Screen

5.1.3 DATA ENTRY METHODS



Modifying values through the touch-screen display is accomplished through the use of the data entry panel. The data entry panel provides up, down, left, right and check mark buttons. Using these buttons, modifications to numeric values can occur in one of two ways: an *up/down method* or an *individual digit method*.

In the *up/down method*, you use either the up or down arrow buttons to systematically increment or decrement a value to the desired new value. This method is convenient if the desired value is only a few units away from the previous value. A good example of this is changing a setpoint from 72.5 to 72.9. Touching the up or down buttons for longer than one second will result in faster, continuous increments or decrements of the desired value.

The *individual digit method* is typically used for large value changes, thereby permitting the operator to move between each unit position using the left and right arrow buttons. As the operator navigates to each unit position, an “edit cursor” is displayed beneath the unit position that an operator may desire to modify. Once the edit cursor has been placed beneath the desired unit position, the up and down arrow buttons can be used to adjust the value. This method is displayed in Figure 5-4.

In the event that the object property you are working with can be commanded using Priority Array, an option to clear the focused priority will appear to the bottom right of the value. By simply touching this area, a command to relinquish control of the priority will be sent.

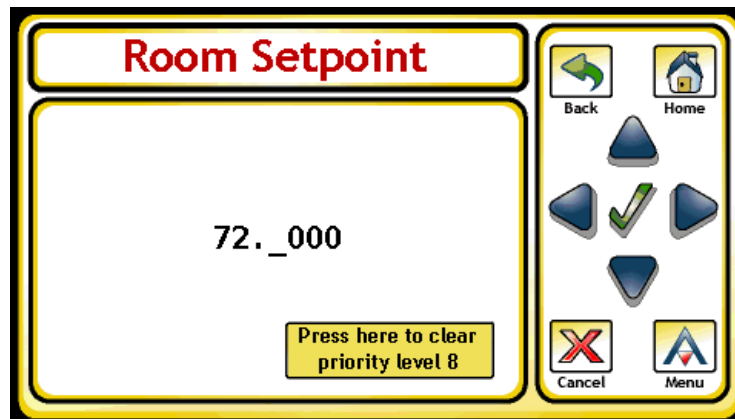


Figure 5-4 Individual Digit Method

5.2 THE HOME SCREEN



Home

Upon start-up, the NB-SD will display the Home Screen. The Home Screen can be configured to display default data from the system at start-up and can also be set as the idle screen which appears during idle times when an operator is not logged in.

The Home Screen Title provides a configurable name which can be used to reference a site or location where the NB-SD has been installed. The Home Screen provides five lines which can be configured to display data programmed in slots, provide links to other screens in order to fully navigate the system, or blank lines for cosmetic purposes.

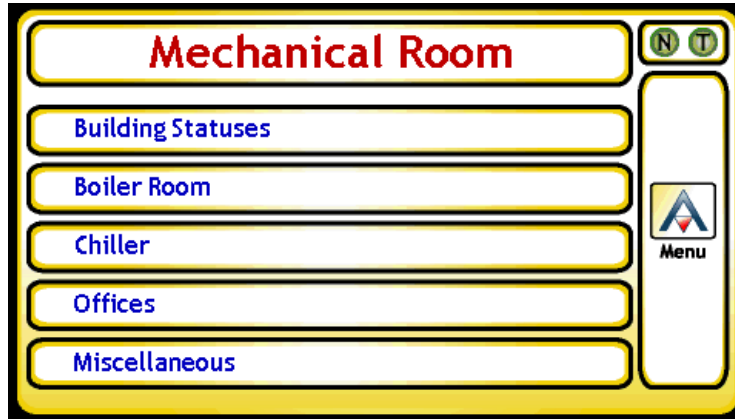


Figure 5-5 The Home Screen

5.3 MENU



The Menu button provides access to the main menu of the system. Depending on privilege level configurations, an operator may access specific functions within the NB-SD. The Menu also displays the current system time and other buttons.

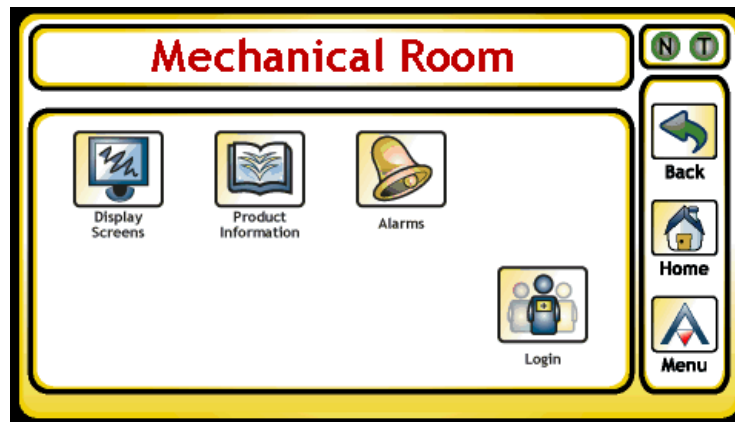


Figure 5-6 Main Menu 1

5.4 DISPLAY SCREENS



The Display Screens button provide a single point of access to a complete index of configured screens programmed into the NB-SD, as illustrated in Figure 5-7. Touching the up and down arrows buttons, an operator can scroll through the entire system index of available programmed screens that can be chosen for navigation. To navigate to a specific display screen, touch the slot containing the screen name title. At any time, an operator may touch the Back button to navigate to previous displayed screens, or touch the Menu button to be taken back to the Menu area.

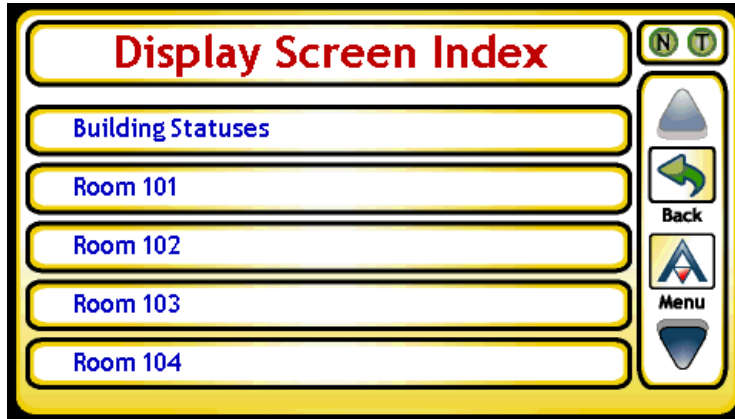


Figure 5-7 Display Screen Index

5.5 ALARMS



Alarms

The Alarms button provides access to the Alarm index of the NB-SD. The Alarm index provides the ability to either view All Alarms, or Recent Alarms. Touching the All Alarms button will display the entire memory buffer of alarms processed by NB-SD. A maximum of 128 alarms can be stored in NB-SD's memory at any given time.

In the event an alarm condition occurs on the system and is reported back to a main host such as an area controller, the Menu will display a Recent Alarms button, indicating that an alarm condition has occurred. To view recent alarms, simply touch the Recent Alarms button displayed at the Menu display. The Recent Alarms section will display any and all alarms that have been received since the NB-SD booted.

For this function to display alarms, a networked host (area controller, building controller) must be actively polling devices for alarm information. Alarms broadcasted by a host controller may also be displayed in this section.

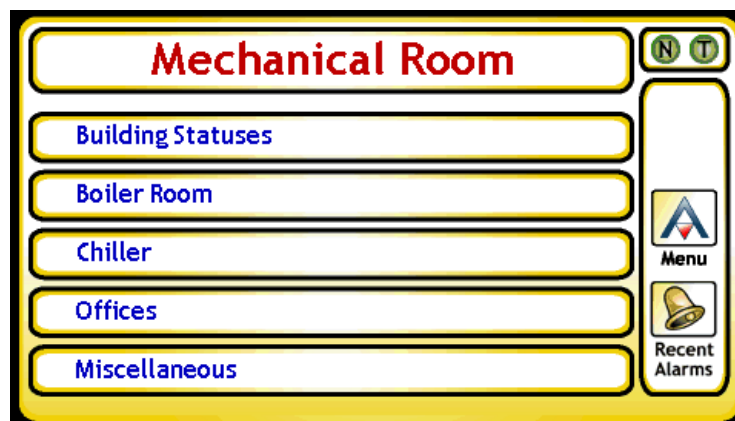


Figure 5-8 Menu - Alarm Reported

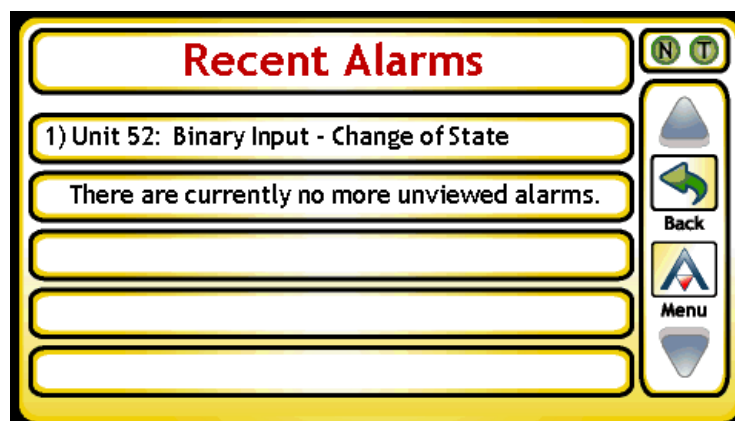


Figure 5-9 Recent Alarms

To view basic information regarding an alarm, simply touch the alarm entry displayed in either list. For received alarm notifications (most common type of alarm), details provided with each alarm notification

interpreted include a time and date, event state transitions, as well as other detailed parameters regarding the occurrence.

When an operator has reviewed the information, they may touch either the Back button or Menu button to return to another point in the system. Once an alarm has been viewed from either Alarm Menu section, it is automatically removed from the Recent Alarms list, but can be reviewed at any time from the All Alarms section.

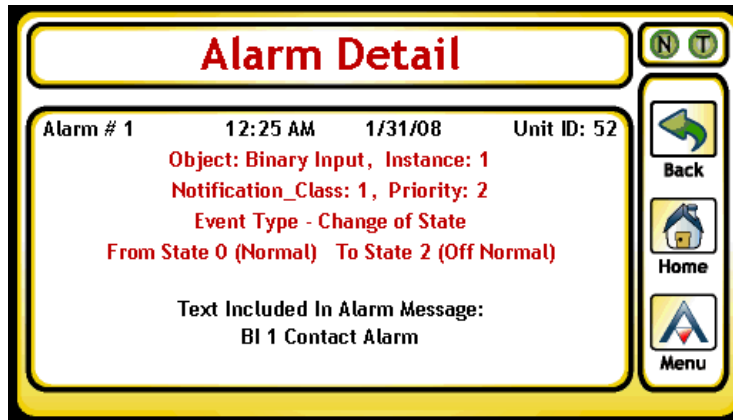


Figure 5-10 Alarm Detail

NOTE



Upon logging more than 128 interpreted alarms, NB-SD will automatically erase the oldest alarm entry and save the most recent alarm in the All Alarms section.

5.6 CHANGE NETWORK VALUE



The Change Network Value button is a useful utility that allows operators to directly communicate with specific BACnet MS/TP units by addressing individual parameters such as object, property, and priority, regardless of whether or not they have been defined as slots within the NB-SD. Intended to provide advanced network access to technicians, the Change Network Value utility can be accessed by operators with Level 3 privileges. Operators can address a network value by entering the numeric identifier values for each corresponding field. To navigate between fields, touch the left and right arrow buttons to move the edit cursor. To edit a field parameter, touch the up and down arrows to adjust the value displayed for each required field.

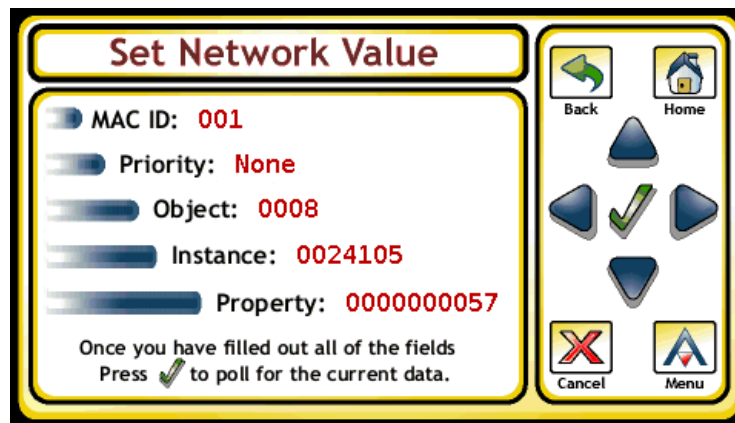


Figure 5-11 Change Network Value

If the controller you have referenced is online, the value will be displayed with ready options for editing. For reference purposes, the Unit ID, Object, and Property will be displayed on the bottom of the touch-screen display. Editing the value is done in the same manner as if the operator selected a slot from a data screen. Similar to data slots, the Change Network Value feature will display primitive BACnet datatypes. If the display encounters a complex datatype (such as a list or array of lists), the NB-SD will display an error.

NOTE



A complete reference list of BACnet objects and properties can be located in Appendix A of this user manual.

5.7 SCHEDULES



Schedules

The Schedules button provides access to up to 16 defined BACnet Schedule and/or Calendar objects referenced by the NB-SD. Through this feature, users have the ability to monitor and modify many commonly accessed and address properties that reside in BACnet Schedule and BACnet Calendar Objects. The functionality of the product is intended to provide client-based Schedule access. XXX provides a list of properties that are accessible from the touch-screen interface, along with notes regarding the usage of these properties, as well as read/write capabilities. To access schedules, simply touch the Schedules button from the Main Menu.

NOTE



Prior to working with BACnet Schedule and Calendar objects from a third-party vendor, reference third-party documentation regarding property support, as well as limitations regarding the use of wildcard characters in time or date entries.

Table 5-1: BACnet Schedule and Calendar Property Access Notes

Field	Object Property	Read/Write Support	Notes
Weekly Schedule	Schedule; weekly-schedule	Read/Write	Defines scheduled time, value actions for all 7 days of the week.
Exception Schedule	Schedule; exception-schedule	Read/Write	Defines a date, date-range, week-n-day, or Calendar-based exception which overrides the weekly-schedule.
Linked Properties	Schedule; list-of-object-property-references	Read Only	A list of object properties which are effected (written to) by the Schedule object.
Present Value	Schedule; present-value	Read/Write	Specifies the current schedule state.
Default Value	Schedule; schedule-default	Read/Write	Specifies the default value a schedule will resume control under for partial time-of-day scheduling
Effective Period	Schedule; effective-period	Read/Write	Specifies an effective date range of when a Schedule is functional.

Table 5-1: BACnet Schedule and Calendar Property Access Notes

Field	Object Property	Read/Write Support	Notes
Calendar	Calendar; date-list	Read/Write	Specifies a list of date, date ranges, or "week n day" definitions (typically used in conjunction with exception-schedules).

5.7.1 WORKING WITH THE WEEKLY SCHEDULE PROPERTY

The weekly-schedule property of a Schedule object defines sequences of schedule actions when no exception schedule is in effect. Providing an array for each day of the week (Monday through Sunday respectively), the weekly-schedule can be configured to command object properties to a specific value. To view weekly schedules, perform the following steps:

1. From the Schedule Index, select the defined schedule you wish to interrogate.

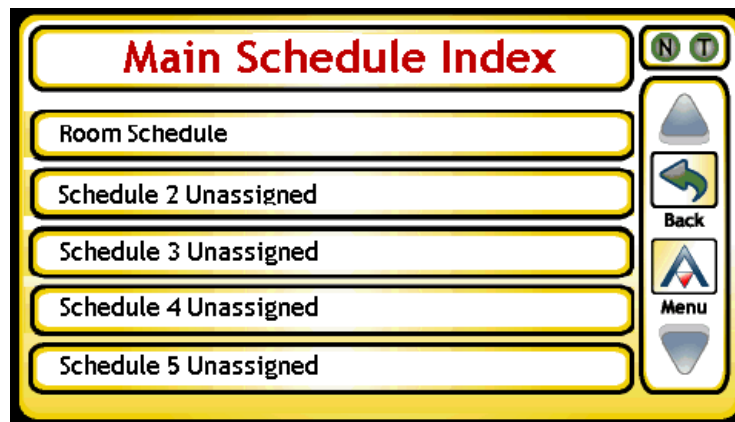


Figure 5-12 Schedule Index

2. From the Schedule menu, select Weekly Schedule.

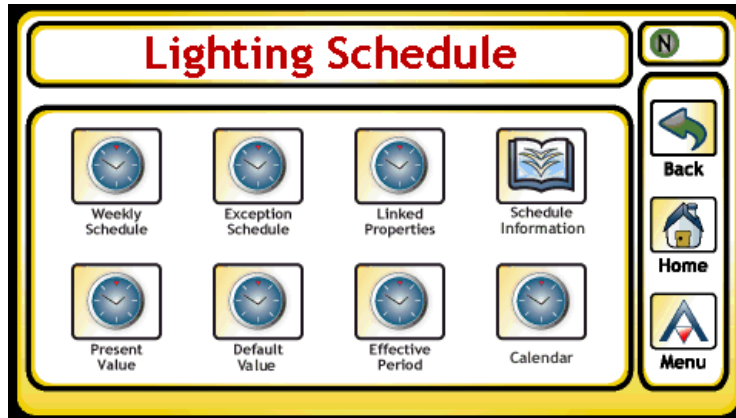


Figure 5-13 Schedule Menu - Weekly Schedule

3. Select the day of week you wish to interrogate.

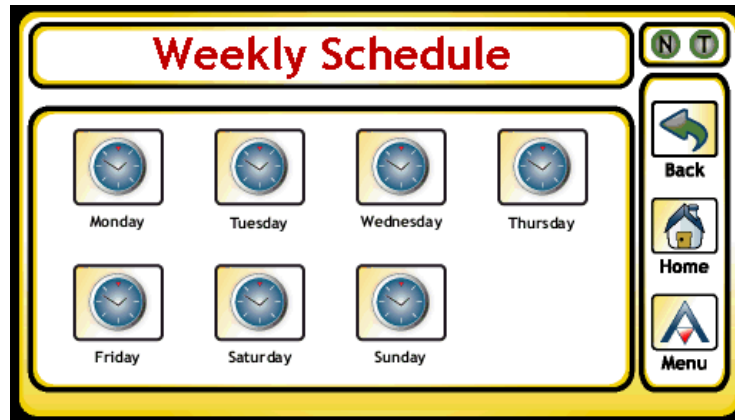


Figure 5-14 Weekly Schedule

4. The information returned will display time-value sequences used by the schedule. A maximum of 15 time & value sequences can be displayed by the NB-SD. Depending on the current state of the device, a specific day of the week could potentially have no time-value pairs defined, or have multiple. If you wish to add a new entry, select *Add a new entry* (Figure 5-15).

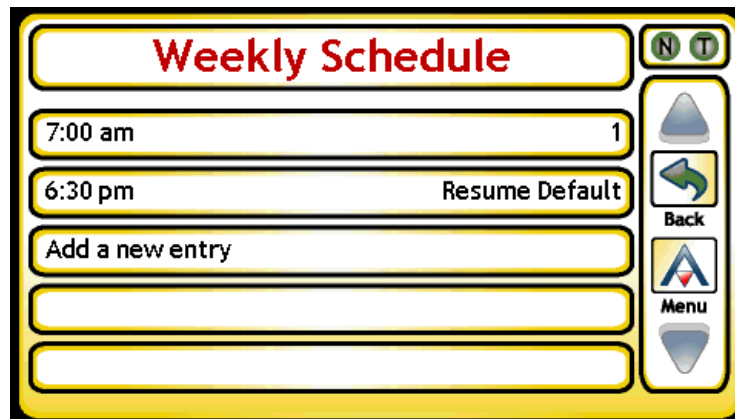


Figure 5-15 Time Values for a Day of the Week

- From the time-value display, users with the appropriate permissions can modify an existing time & value pair by selecting the entry from the list and modifying the data accordingly. Options will exist to allow the user to delete the pair once selected, or simply modify the current information. To delete a time-value pair, simply touch the *Press Here to Delete This Entry* box once you have touched a targeted time-value pair (Figure 5-16).

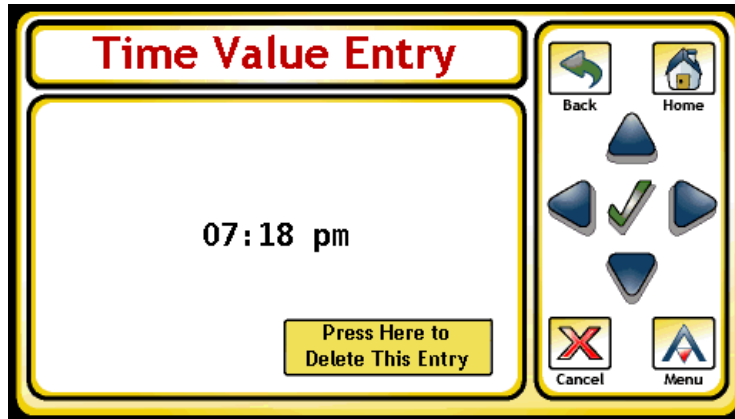


Figure 5-16 Editing a Time, Value Pair

5.7.2 WORKING WITH THE EXCEPTION SCHEDULE

The exception-schedule property of a Schedule object is typically used to define a sequence of scheduled actions that take precedence over a normal day's behavior (controlled by the weekly-schedule) on a specific day or range of days/date. The exception-schedule property can be accessed by touching the Exception Schedule icon on the Schedule Menu.

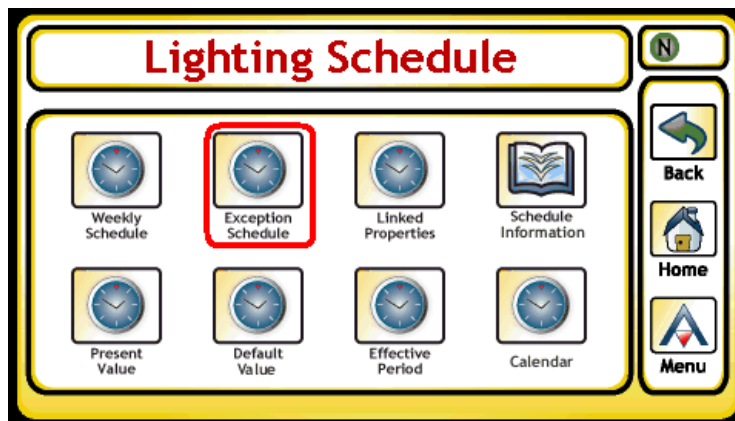


Figure 5-17 Schedule Menu - Exception Schedule

The result of touching the exception schedule button is a list of references that may exist as part of the exception-schedule. Depending on the complexity of support for exception-schedule, additional references can potentially be added. One of the following references could exist, depending on its current configuration:

- Calendar Reference - References a Calendar object within the device
- Single Date Reference - References a single date (may contain wildcard parameters)
- Date Range Reference - References a date range including to/from (may contain wildcard parameters).

- Week & Day Reference - References a Day, Week, Month reference (may contain wildcard parameters).

Contained within that reference are sets of time & value pairs similar to what is seen in the weekly-schedule property. Pairs can be edited, added, or deleted just the same through the user interface.

5.7.3 WORKING WITH CALENDARS

The Calendar object is used to describe a list of calendar dates, which might be thought of as holidays, special events, lists of dates or date ranges that can be used to affect control of parameters within the building automation system. The NB-SD provides access to the date-list property of a Calendar object, allowing users to monitor/modify, and add entries to the list. A maximum of 25 entries can be displayed by the NB-SD. To access it, touch the Calendar icon located on the Schedule menu.

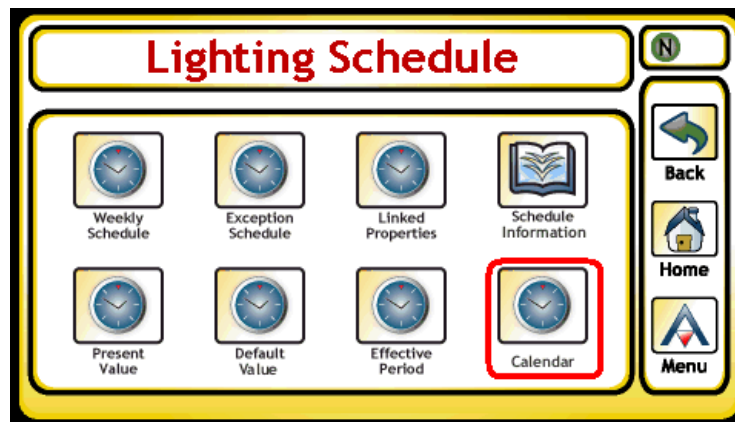


Figure 5-18 Schedule Menu - Calendar

Touching the Calendar icon returns any entries contained within the date-list property.

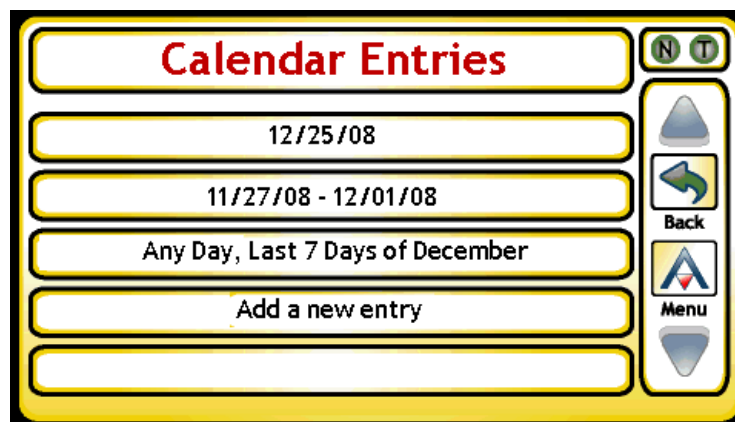


Figure 5-19 Calendar Date List Entries

From this area, users can select an existing entry and make modifications to any of the parameters shown in the list, or add a new entry into the list. Available options for adding entries include:

- Single Date Reference - References a single date (may contain wildcard parameters)
- Date Range Reference - References a date range including to/from (may contain wildcard parameters).

- . Week & Day Reference - References a Day, Week, Month reference (may contain wildcard parameters).

5.7.4 WORKING WITH OTHER PROPERTIES

Other properties accessible from the display such as Present Value, Default Value, and Effective Period can be accessed for read/write modification purposes through the Schedule menu icons. Provided that an operator with the appropriate permission level is logged in, the user can touch the value to edit.

5.8 STATISTICS



Statistics

The Statistics button provides access to diagnostic information related to runtime operation of the NB-SD including Network Statistics and Diagnostics. Both of these areas are explained in further detail.

5.8.1 NETWORK STATISTICS



Network Statistics

By pressing the Network Statistics button, operators can be provided with real-time information regarding MS/TP network communication statistics of the NB-SD. Each parameter can be used to assist with troubleshooting network performance, bandwidth issues, or locating slave devices.

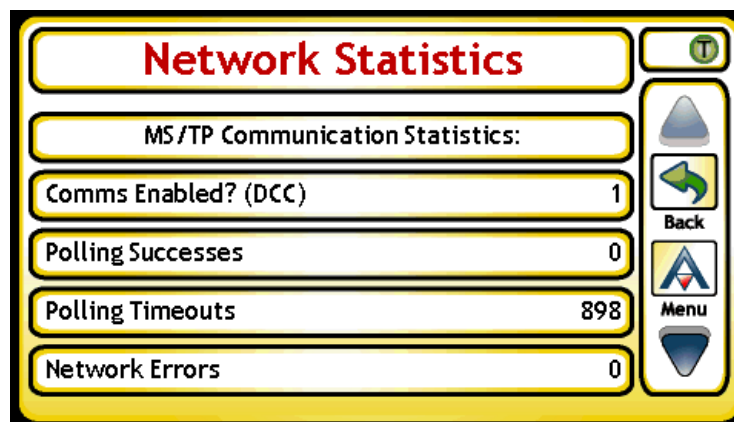


Figure 5-20 Network Statistics

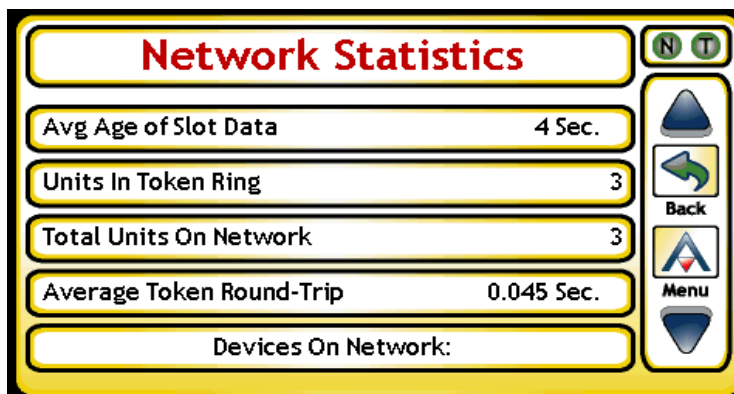


Figure 5-21 Network Statistics (Continued..)

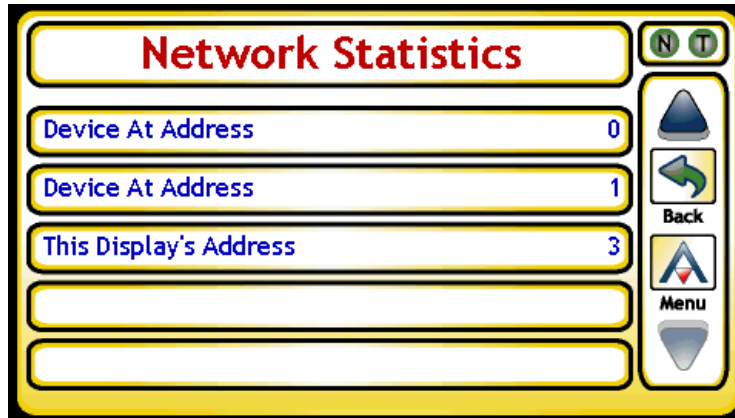


Figure 5-22 Network Statistics- Units on Network

Selecting any of the devices on the network will bring up a screen as shown below. This screen details information about the unit, what its settings are and other useful information including the name of the manufacturer, how fast it is responding to requests, etc.

Using the left and right arrows one can loop through every device on the local network, including all BACnet masters and all BACnet slaves.

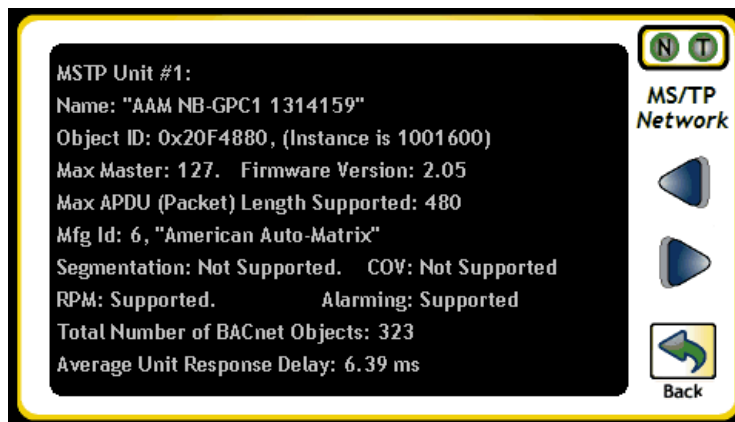


Figure 5-23 Network Statistics- Read from Device

Table 5-2 provides notes on each parameter listed under the Network Statistics menu.

Table 5-2: Network Statistics Variable Notes

Field	Notes
Comms Enabled? (DCC)	Indicates whether or not the unit is enabled for active communications, or if it has been disabled using BACnet's Device Communication Control services from a third-party operator workstation. A value of 1 indicates network communications are enabled, whereas a value of 0 indicates that the unit has been disabled from active BACnet network communications.
Polling Successes	Indicates the number of data polls made to the BACnet network for which an acknowledged response was received back.
Polling Timeouts	Indicates the number of data polls made to the BACnet network for which no response was received back.
Network Errors	Indicates the number of network errors (such as Header CRC, and Datagram) interpreted on the network by the unit.
Avg. Age of Slot Data	Indicates the average of polled Slot Data currently residing within the unit.
Units in Token Ring	Indicates the total number of units connected and actively communicating (passing token, responding, etc.) on the MS/TP network.
Token Units on Network	The Active Token Passers List provides a list of MAC Addresses known by the NB-SD that continually pass the token and are known to be online.
Avg Token Round Trip	Indicates the average time for a token to be passed in the token ring.
Devices on Network	Provides a list of devices currently communicating on the network and provides the address for the device(s).

5.8.2 DIAGNOSTICS



Diagnostics

The Diagnostics button provides access to unit diagnostics. From this area, advanced statistics regarding hardware operation, as well as key software information for the NB-SD. While many variables exist under the Diagnostics menu, this area is typically accessed only under the discretion of factory technical support for advanced troubleshooting needs during runtime operation or during field installation situations where additional information is required from actual working units.

5.9 CONFIGURE



The Configure button provides advanced configuration options for the NB-SD, available when logged into the display. This area includes options for:

- .SD/MMC Card Operations
- .Unit Setup
- .Calibrate Screen
- .Save All & Reboot
- .Product Information
- .Network Discovery
- .Enter Passcodes

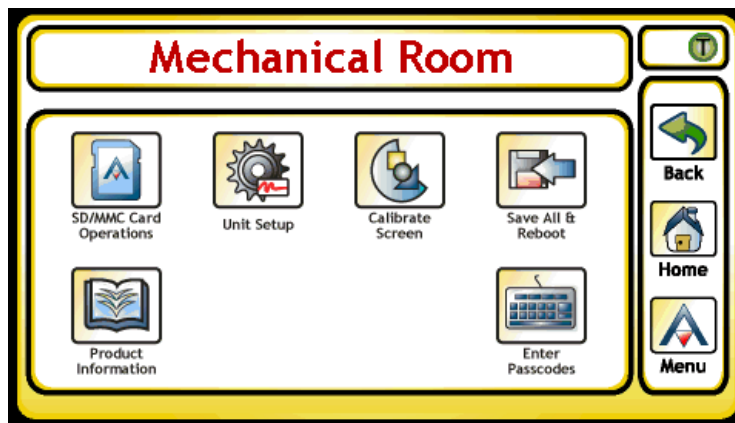


Figure 5-24 Configure Menu

5.9.1 SD/MMC CARD OPERATIONS



The SD/MMC Card Operations area is used to invoke actions that require a SD-card to be inserted into the NB-SD's Secure-Digital Card Socket. From a Secure-Digital card, users can perform various operations including but not limited to:

- .Store Debug Information - collects debug information for factory troubleshooting efforts.
- .Slot File Operations - allows operators to save or load configuration files to/from the NB-SD.
- .Update Firmware - allows operators to update embedded firmware on the NB-SD.

Load Slides From Card- allows up to 10 bitmap images to be loaded onto the NB-SD to be used when the screen saver is set to slideshow.

If the NB-SD has an older firmware version and you want to upgrade the firmware to the latest version, simply place the upgrade file on an SD card and insert it to the NB-SD. When the "Upgrade Firmware" button is pressed, the NB-SD will search the root directory for a file named "NB-SD.aff" and the firmware upgrade process will work automatically.

It is important to note that modifying or renaming the firmware upgrade file will result in it not being visible to the NB-SD.

5.9.2 UNIT SETUP



Unit Setup

The Unit Setup menu provides configuration access to system related variables of the NB-SD. Access to the Unit Setup menu is available from the Main Menu by touching the Unit Setup button, provided that you are logged into the touch-screen display. The following sub-menus are available from Unit Setup:

- .Network
- .User Interface
- .Audio
- .Users
- .Time
- .Alarms
- .Priority Arrays
- .Summary

NOTE



Most Unit Setup variables can be configured through either the local touch-screen display, or NB-Pro engineering software.

5.9.2.1 NETWORK

Setup:
Network

The Network menu provides the method to configure the network communication parameters of the NB-SD; including unit ID assignment and token passing tuning. Note that when the baud rate is changed from this area, the NB-SD will automatically reboot to take effect immediately.

To access this feature, an operator must have (at least) Level 3 Privileges.

Table 5-3: Setup: Network

Variable Names	Value	Description
Unit Address	0 - 127	Specifies the MAC Address assignment.
Device Instance	0 - 4,194,302	Specifies the Device Instance assignment
Communication Speed	0 = 9.6kbps 6 = 38.4kbps 7 = 19.2kbps 8 = 115.2kbps 9 = 57.6kbps 10 = 76.8kbps	Specifies the network communication baud rate of the connected MS/TP network
Max Master ID	0 - 127	Specifies the highest MS/TP master device on the network.
Maximum Frames	2-10	Specifies the amount of frames that can be used before the network token is passed.
Polling Aggressiveness	1-10	Specifies the network impact of screen refresh. A higher value provides faster polling rates.

Table 5-3: Setup: Network

Variable Names	Value	Description
Automatic Slave Discovery	0=Off 1=On	When enabled any slave devices on this network will be displayed in the Network Discovery and Statistics Menu screens.
Temporary Address Override	0=Disabled 1=Enabled	When enabled this feature allows the user to temporarily override a units MSTP address by entering the current address and then redirect this to a new address.
Override: Original address	0-254	Any slots referencing this MSTP address will instead be redirected to a different address. This is cleared every time the unit is rebooted.
Override: New address	0-254	This is the new address of the referenced device. This override will be cleared out every time the unit boots.

The temporary override feature is most useful when using the NB-SD as a generic BACnet tool that is plugged into MS/TP networks to troubleshoot or fix problems with other units.

A typical example would be for someone to create a slot file that references only one device provided the ability to view and modify all of its I/O, setpoints and other pertinent parameters. Once the slot file is loaded, the NB-SD can tap into any MS/TP network. Then using the temporary override feature, that single-unit file can be used to read and write points on any device that is attached to the network.

5.9.2.2 USER INTERFACE



Setup: User Interface

The User Interface menu provides general configuration details for the user interface, including options to show slot information and details on screen dimming functionality.

To access this feature, an operator must have (at least) Level 1 Privileges.

Table 5-4: Setup: User Interface

Variable Names	Value	Description
Idle Screen	0 = Home Screen 1-150 = individual slots	Specifies which screen should be used as the default screen
Slot Information Display	0 = No Login Required 1 = Level 1 2 = Level 2 3 = Level 3	Defines the minimum security level privilege required in order to view extended information about each data slot; including data slot number, object, property and password level required to modify.
Floating Point Precision	1-4	Specifies how many digits to display to the right of the decimal.
Enable Screen Saver	0 = No 1 = Yes	Enables or disables Power off, dimming or slideshow.
Time Until Screen Saver	1 - 1090 (minutes)	A definable idle time which must elapse before screen dimming occurs.
Screen saver type	0 = Screen Off 1 = Very Light 2 = Very Dark 3 = Plasma 4 = Slideshow	Defines the setting of Screen Saver mode. When sufficient idle time has passed, the screen will reflect the configured setting.
Slideshow Duration	5-300	Duration in seconds per slide

NOTE



Loading the bitmap images is performed via the SD/MMC card operations menu. The desired images must be loaded to the root directory of the SD card. Once the images are loaded, the above setup options will determine how the slideshow will be presented. Refer to Appendix B for further detail regarding images and file format.

5.9.2.3 AUDIO



Setup:
Audio

The Audio menu provides the method to configure the audio properties for the NB-SD. When enabled, the NB-SD produces a “click” noise for each touch action performed on the local touch screen display.

To access this feature, an operator must have (at least) Level 1 Privileges.

Table 5-5: Setup: Audio

Variable Names	Value	Description
Clicker Volume	0 - 11	Defines the volume level of clicks produced, scaling from 0 (disabled) to 11 (highest).

5.9.2.4 USERS



The Users menu provides the method to configure user account privileges. The NB-SD will store up to 8 operators, containing a unique pin password and privilege level.

To access this feature, an operator must have (at least) Level 3 Privileges.

Table 5-6: Setup: Users

Variable Names	Value	Description
Operator #n's Password	00000 - 99999	Specifies a unique pin password required for multi-tiered access to the local touch-screen display.
Operator #n's Access Level	0 = Operator Disabled 1 = Level 1 Privileges 2 = Level 2 Privileges 3 = Level 3 Privileges	Specifies the privilege level assigned to the user. To disable an operator account, set this value to 0 (Disable).
Session Timer	5 - 120 (minutes)	Specifies a time-out (in minutes) after which an operator is automatically logged out of the system.

5.9.2.5 TIME



The Time menu provides the method to configure the NB-SD to retrieve system time from another device configured to be the time master for the network (area controller, programmable unitary controller, etc.). It is always good practice to have at least one device broadcast time to the network at regular intervals.

To access this feature, an operator must have (at least) Level 1 Privileges.

Table 5-7:

Variable Names	Value	Description
Clock Display Mode	0 = 12 Hour (am/pm) 1 = 24 Hour (military)	Specifies how time is displayed to users through the local touch-screen display.
Date Display Mode	0 = MM/DD/YY 1 = DD/MM/YY	Specifies how date is displayed to users through the local-touch screen display.
Address of Time Server	0 - 127	Specifies the MAC Address of the MS/TP device referenced for time.
Time Master Device Instance	0 - 4,194,302	Specifies the Device Instance of the MAC Address referenced in <i>Address of Time Server</i> parameter.

If no time server is specified, the NB-SD will locate a device to reference as the time master and populate these fields automatically.

5.9.2.6 ALARMS



Setup:
Alarms

The Alarms menu provides a method through the local touch-screen display to enable or disable logging of network alarms that are reported by devices either as a broadcast or when they have been interrogated by an area controller.

To access this feature, an operator must have (at least) Level 1 Privileges.

Table 5-8: Setup: Alarms

Variable Names	Value	Description
Log network alarms?	0 = Don't Log Alarms 1 = Log Alarm Notifications 2 = Log Summary Alarms 3 = Log Both	Specifies handling of alarms by the unit.

5.9.2.7 PRIORITY ARRAYS



Setup: Prio.
Arrays

The Priority Arrays menu allows the data for local Analog Values and Binary Values to be stored across reboots where the highest priority data is retained or allows for the data to be cleared at boot.

To access this feature, an operator must have (at least) Level 1 Privileges.

5.9.3 CALIBRATE SCREEN



Calibrate
Screen

The Calibrate Screen button provides operators with the ability to calibrate the touch-screen display of the NB-SD. When this option is invoked, a 4-point calibration screen will appear, requesting users to touch specific areas of the display in order for proper calibration to occur. When complete, operators will be returned to the Main Menu of the NB-SD.

To access this feature, an operator must have (at least) Level 1 Privileges.

5.9.4 SAVE ALL & REBOOT



Save All &
Reboot

.When pressed, the Save All & Reboot button will save all current configuration of the NB-SD into memory and perform a warm-reboot without having to press the reset button under the bezel.

To access this feature, an operator must have (at least) Level 1 Privileges.

5.9.5 PRODUCT INFORMATION



Product
Information

The Product Information option provides a basic overview of read-only details regarding the NB-SD. Details provided by this option include current firmware in use, serial number and manufacturing information, as well as network communication details.

To access this feature, an operator must have (at least) Level 1 Privileges.

5.9.6 NETWORK DISCOVERY



Network
Discovery

Through the Network Discovery Option, devices that reside on the MSTP network will be displayed. Information about the device such as the MAC Address, Device Instance number, and more will be shown as read from the device object of the unit.

To access this feature, an operator must have (at least) Level 1 Privileges.

5.9.7 ENTER PASSCODES



Enter
Passcodes

The Enter Passcodes option is used to enter a software upgrade pass code for future major revision updates to the product. As new upgrades are released, this section will be expanded to include more information on this process.

APPENDIX A: BACNET IDENTIFIER REFERENCE

This section lists the BACnet datatypes and object identifier numbers for reference purposes for using the Change Network Value feature of the NB-SD, as well as for creating custom XML files.

A.1 BACNET DATA TYPES

A BACnet property must have one of the following thirteen possible datatypes. When declaring a property in your SPL program, you may use either the identifier number associated with the data type or the SPL data type name.

BACnet Data Type	Data Type Identifier
Null	0
Boolean	1
Unsigned Integer	2
Signed Integer	3
Real	4
Double	5

BACnet Data Type	Data Type Identifier
Octet String	6
Character String	7
Bit String	8
Enumerated	9
Date	10
Time	11
BACnet Object Identifier	12

A.2 BACNET OBJECTS

BACnet Object Type	Object Identifier Number
Analog Input	0
Analog Output	1
Analog Value	2
Binary Input	3
Binary Output	4
Binary Value	5
Calendar	6
Command	7
Device	8
Event Enrollment	9
File	10
Group	11
Loop	12
Multi-State-Input	13
Multi-State-Output	14
Notification Class	15
Program	16
Schedule	17
Average	18
Multi-State-Value	19
Trend Log	20
Life Safety Point	21
Life Safety Zone	22

BACnet Object Type	Object Identifier Number
Accumulator	23
Pulse Converter	24
Event Log	25
Trend Log Multiple	27
Load Control	28
Structured View	29
Access Door	30
Proprietary (Manufacturing on GPC)	128
Proprietary (Occupancy Detector on ASC)	131
Proprietary (Proof of Flow on ASC)	131
Proprietary (Occupancy Detector on ASC)	131
Proprietary (Occupancy Detector on ASC)	133
Proprietary (PID on ASC)	133
Proprietary (Broadcast GPC)	143
Proprietary (UI Summary on GPC)	200
Proprietary (BO Summary on GPC)	201

BACnet Object Type	Object Identifier Number
Proprietary (AO Summary on GPC)	202
Proprietary (BI Summary on GPC)	203
Proprietary (Statbus Summary on GPC)	204
Proprietary (Schedule Summary on GPC)	205
Proprietary (Input Select on GPC)	300
Proprietary (Min/Max/Avg on GPC)	301
Proprietary (Math on GPC)	302
Proprietary (Logic on GPC)	303
Proprietary (Remap on GPC)	304
Proprietary (Piecewise Curve on GPC)	305
Proprietary (Scale on GPC)	306
Proprietary (Netmap on GPC)	307

BACnet Object Type	Object Identifier Number
Proprietary (Enthalpy on GPC)	308
Proprietary (Staging on GPC)	309
Proprietary (Accumulator on GPC)	310
Proprietary (Comm Status on GPC)	400
Proprietary (Season on GPC)	402
Proprietary (Timers on GPC)	403
Proprietary (STATbus on GPC)	450
Proprietary (PID Loop on GPC)	500
Proprietary (Motor Control Loop on GPC)	501
Proprietary (Thermostatic Loop on GPC)	502

A.3 PROPERTY IDENTIFIERS

Property	Identifier #
accepted modes	175
acked-transitions	0
ack-required	1
action	2
action-text	3
active-cov-subscriptions	152
active-text	4
active-vt-sessions	5
actual shed leve	212
adjust value	176
alarm-value	6
alarm-values	7
align interval	193
all	8
all-writes-successful	9
apdu-segment-timeout	10
apdu-timeout	11
application-software-version	12
archive	13
attempted-samples	124
auto slave discovery	169
average-value	125
backup-failure-timeout	153
bias	14
buffer-size	126
change-of-state-count	15
change-of-state-time	16
client-cov-increment	127

Property	Identifier #
configuration-files	154
conformance class	95
controlled-variable-reference	19
controlled-variable-units	20
controlled-variable-value	21
count	177
count before change	178
count change time	179
cov-increment	22
cov period	180
cov-resubscription-interval	128
current-notify-time	129
database-revision	155
datelist	23
daylight-savings-status	24
deadband	25
derivative-constant	26
derivative-constant-units	27
description	28
description-of-halt	29
device-address-binding	30
device-type	31
direct-reading	156
door alarm status	226
door extended pulse time	227
door open too long time	229
door pulse time	230
door status	231
door unlock delay	232

Property	Identifier #
duty window	213
effective-period	32
elapsed-active-time	33
error-limit	34
event-enable	35
event-parameters	83
event-state	36
event-time-stamps	130
event-type	37
exception-schedule	38
expected shed level	214
fault-values	39
feedback-value	40
file-access-method	41
file-size	42
file-type	43
firmware-version	44
full duty baseline	215
high-limit	45
inactive-text	46
input reference	181
in-process	47
instance-of	48
integral-constant	49
integral-constant-units	50
issue-confirmednotifications	51
last notify time	173
last restart reason	196
last-restore-time	157
life-safety-alarm-values	166

Property	Identifier #
limit-enable	52
limit monitor int	182
list-of-group-members	53
list-of-object-property-references	54
list-of-session-keys	55
local-date	56
local-time	57
location	58
lock status	233
log-buffer	131
log-device-object-property	132
log-enable	133
log-interval	134
logging device	183
logging record	184
logging type	197
low-limit	59
maintenance-required	158
manual slave binding	170
manipulated-variable-reference	60
masked alarm values	234
max-apdu-length-accepted	62
maximum-output	61
maximum-value	135
maximum-value-timestamp	149
max-info-frames	63
max-master	64
max-pres-value	65

Property	Identifier #
max-segments-accepted	167
member-of	159
minimum-off-time	66
minimum-on-time	67
minimum-output	68
minimum-value	136
minimum-value-timestamp	149
min-pres-value	69
mode	160
model-name	70
modification-date	71
node subtype	207
node subtype	216
node type	208
node type	217
notification-class	17
notification-threshold	137
notify-type	72
number-of-APDU-retries	73
number-of-states	74
object-identifier	75
object-list	76
object-name	77
object-property-reference	78
object-type	79
operation-expected	161
optional	80
out-of-service	81
output-units	82

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present-value	85
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protocol-revision	139
protocol-services-supported	97
protocol-version	98
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reason-for-halt	100
recipient	101
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relinquish-default	104
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Property	Identifier #
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structured object list	209
subordinate annotations	210
subordinate list	211
system-status	112
time-delay	113
time-of-active-time-reset	114
time-of-state-count-reset	115

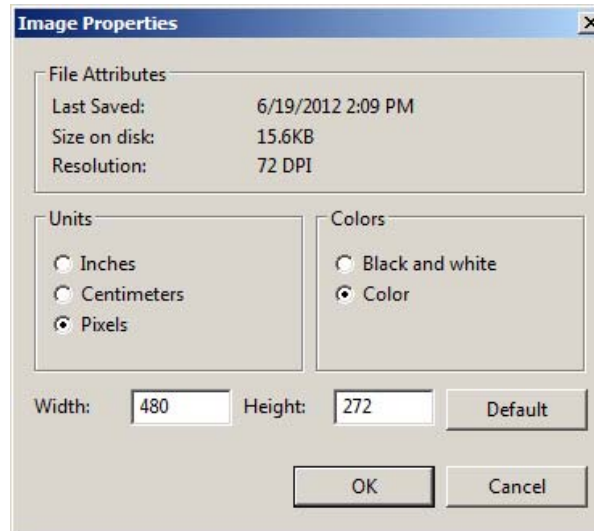
Property	Identifier #
time of device restart	203
time-synchronization-recipients	116
time synchronization interval	204
total-record-count	145
tracking-value	164
trigger	205
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update-interval	118
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APPENDIX B: COMPRESSING IMAGES FOR SLIDESHOW USAGE

This will outline the method for formatting bitmap images to 480x272 pixels and 256 colors to use for the slideshow on the NB-SD.

The method of creating these images can be considered a two step process- the first being designing and scaling or cropping the image and the second being the reduction of colors to use a 256 color palette. Any picture/photo editor program may be used to do the cropping and scaling but some editors are better than others when it comes to the color compression.

Cropping or scaling pictures to be 480 pixels by 272 pixels can easily be accomplished by any editor, including the Windows XP and Windows 7 versions of MS Paint. Once you believe the picture to be the correct size, check the “properties menu” to ensure that the image is indeed 480x272. Below is an example of the Microsoft Paint menu showing that my image is the proper size:



MS Paint has the ability to compress the colors to a 256 color palette but it uses a “standard” palette and it shoehorns each pixel in the image to the best match in the palette. This means that while there may be 256 available colors, the image may only use a handful of them leaving the final result looking less than professional.

As an example, this is a picture that is formatted to 480x272 pixels, but it is still a jpeg with full color resolution:



Figure B-1 Image with full color resolution

Using MS Paint, you can change the image to a 256 color bitmap simply by selecting “Save As” and choosing the “256 Color Bitmap” option as the file type.

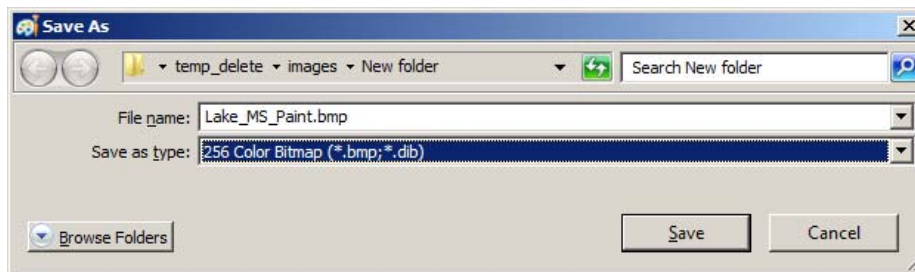


Figure B-2 Compressing the image to 256 colors using MS Paint

Once the picture has been saved as a 256 color bitmap the result can be seen below:



Figure B-3 Image reduced to 256 colors with MS Paint

Using a more powerful program will allow you to automatically assign each of the 256 available colors on the palette resulting in a far better final image. One such free program is called the “GNU Image Manipulation Program” or “GIMP” for short.

Once the file has been opened in GIMP, there are only a couple of steps required to compress the image. To compress the file, select “Image-->Mode-->Indexed” to bring up the following menu:

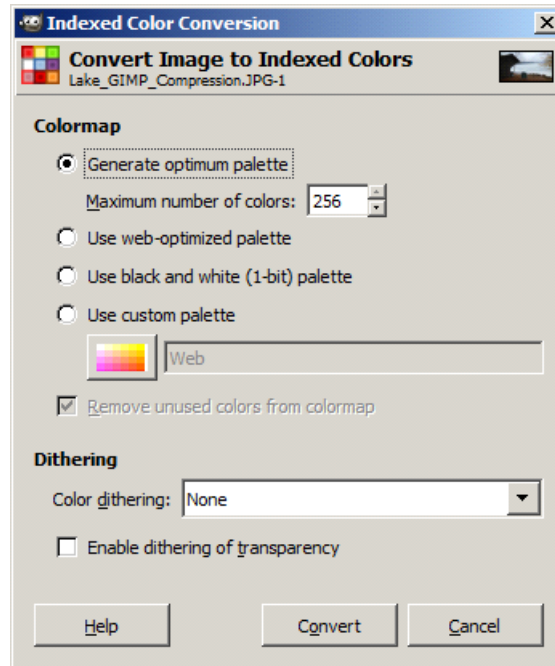


Figure B-4 GIMP Compression Menu

Clicking the “Convert Button” will perform the compression. Then all that is left is to save the file as a bitmap. This is accomplished by selecting “BMP” in the “File-Save As” menu shown below:

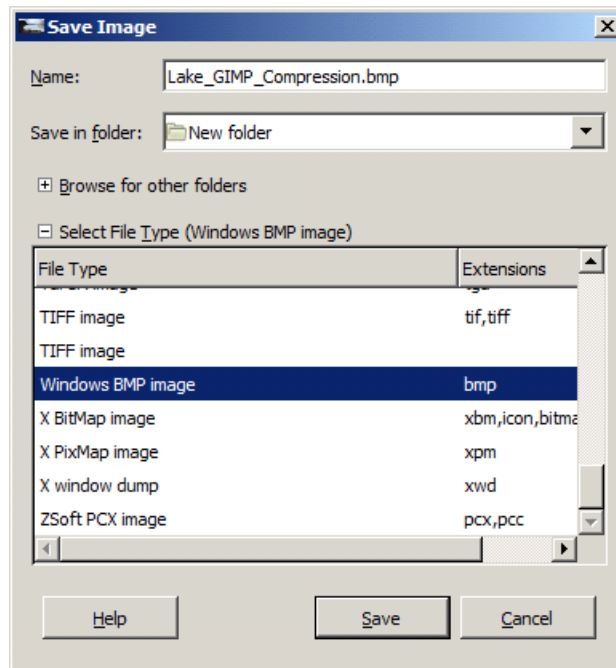


Figure B-5 Saving the compressed image as a bitmap

The resulting picture is far more clear than the MS Paint image, even though it is the same format and contains the same number of bytes of data. This is the actual image as generated via GIMP:



Figure B-6 The 256 color image compressed via “GIMP”

To load the image onto the NB-SD, the image needs to be renamed “SlideX.bmp” where the X represents a number from 1 to 10 designating the viewing order. Once the file has been renamed, it can be loaded onto the root directory of the SD card where it can be read into the unit to be used as the screensaver.



Figure B-7 Uncompressed image with thousands of colors



Figure B-8 Compressed (Final) image with 256 colors. suitable for use on the display