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SyncServer S200, S250, S250i

The SyncServer S200 is discontinued.
The replacement model is the SyncServer S600.

The SyncServer S250 and S250i are discontinued.
The replacement model is the SyncServer S650.

User Guide

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Quick Start Guide

This topic guides the user on how to:

- ***Configure a SyncServer*** (see "Configuring the SyncServer" on page 13) that still has its original factory configuration.
- Read the status LEDs on the front panel.
- Shut the SyncServer down correctly.

This topic is included in the main User Guide. For more information about the features and tasks described here, consult the following sections in the main User Guide:

- ***Web Interface*** (on page 19)
- ***Keypad/Display Interface*** (on page 73)
- ***Specifications*** (on page 83)
- ***Tasks*** (on page 97)

Configuring the SyncServer

Recommended Tasks

GPS antennas not rated for 12 VDC power may be damaged if connected to the SyncServer.

1. Mount the standard L1 GPS antenna (supplied) in a location that offers good visibility of GPS satellites, such as a rooftop or outdoor antenna mast with wide open views of the sky and horizon. Avoid obstructions and sources of Radio Frequency Interference. Observe building codes and regulations. Also see ***Using GPS*** (on page 100) and ***WARNING: GPS Antenna*** (see "Safety Considerations" on page 100).
2. On the rear panel:
   - Connect the GPS antenna cable (supplied) to the **GPS Ant** connector.
   - Connect **LAN1** and any of the other network ports to the network.
   - Consult Warnings and Cautions for safety information regarding grounding and power.
   - Connect the power and turn the power switch on.
3. Using the front panel keypad:
   - Configure **LAN1** with a static IP address using the **MENU** button and **1) LAN1**.
   - View the **LAN1** IP address by pressing the **STATUS** button repeatedly until the **LAN1 STATUS** screen is shown.
4. Go to the SyncServer **Login** page by entering the LAN1 IP address as the URL in Internet Explorer.
5. Log in. The user name is "admin". The password is "symmetricom".
6. Configure the SyncServer using **WIZARDS - 1st Setup**. Select the following options:

- "Configure Password Recovery" (Ask the IT department for the IP address of the SMTP server).
- "Send test mail when finished"
- "Set Local Time Zone"

7. Configure the remaining network ports using **NETWORK - Ethernet**.
   - Assign static IP addresses.
   - Protect LAN1 and the other ports from unauthorized IP addresses or address ranges using the **Allowed Access** feature.
8. Configure the NTP clients on your network with the IP address(es) of the SyncServer's network ports.

The SyncServer is providing synchronized time to the network when the SYNC LED (front panel) is orange or green.

Optional Tasks

In the web interface:

- Connect any other Input References to the rear panel and configure them using the pages under the **REFERENCES** section.
- Use the **NTP – Config** page to synchronize the SyncServer with any other NTP servers.
- Use **WIZARDS - SNMP** to set up alarm notification by SNMP.
- Use **SERVICES - Email** to set up alarm notification by email.
- When the SyncServer is completely configured, use **WIZARDS - Backup** to save a backup file of the configuration to a safe location. Write the location of the backup file on this printed document and store it in a location that is easy to find.

Status LEDs

The four tricolor LEDs provide the following status information:

	Red	Orange	Green	Dark
Sync	SyncServer is not synchronized to a reference. NTP Stratum 16.	SyncServer is synchronized to a remote NTP server. NTP Stratum 2-15.	SyncServer is synchronized to an Input Reference. NTP Stratum 1.	Power off.
Network	Link failure on the LAN1.	Link failure on the LAN2, or LAN3.	All configured ports operational.	Power off.
NTP	>3200 NTP packets per second.	> 2000 packets per second.	NTP activity within the last second.	No NTP activity in the last second.
Alarm	Major Alarm.	Minor Alarm.	No Current/Enabled Alarms.	Power off.

See the ***Troubleshooting*** (on page 115) topics to resolve problems with Red and Orange LEDs.

Also see ***Stratum*** (on page 181).

Halting the SyncServer

Microsemi recommends shutting the operating system down before removing the power.

Using the keypad/display interface:

1. Press the **MENU** button.
2. Select **3) Shutdown**.
3. Select **1) Yes**.
4. Press the **ENTER** button.
5. When the display shows "System Stopped - OK to Turn Power Off Now!" turn the power off.

Or, using the web interface:

1. Go to the **SERVICES - Startup** page.
2. Select **Halt** and click the **APPLY** button.
3. Wait approximately 30 seconds before removing power.

Product Overview

The SyncServer Network Time Server offers the following protocols for synchronizing equipment over a network:

- NTP
- SNTP
- Time (TCP and UDP versions)
- Daytime (TCP and UDP versions)
- Sysplex Output (dedicated port)

These protocols are capable of synchronizing computers, servers, and networking equipment on an enterprise-scale network to within milliseconds of official UTC time. This degree of synchronization is desirable for precise time-stamping of events and data correlation.

See also: ***SyncServer signal feature comparison*** (on page 18)

In This Chapter

Key Features and Benefits **17**
Software Features **18**
SyncServer Signal Feature Comparison **18**

Key Features and Benefits

Key Features

- Ultra High-Bandwidth NTP Time Server
- Stratum 1 Operation via GPS Satellites
- Three (3) 10Base-T/100Base-TX Ports
- Independent Time References: GPS, IRIG-B, 1PPS, 10MHz (S250)
- Versatile Timing Outputs: IRIG-B, IRIG-B (Legacy Truetime), IRIG-B with IEEE 1344 Extension, 1PPS, 10MHz, Sysplex (S250)
- Stratum 2 Operation via NTP Servers
- MD5 Authentication
- Secure Web-Based Management
- SSH, SSL, SNMP, Custom MIB, HTTPS, Telnet, and More
- IPv6 and IPv4 Compatible
- Nanosecond Time Accuracy to UTC
- Rubidium & OCXO Oscillator Upgrades

Key Benefits

- Synchronize Hundreds of Thousands of Client, Server & Workstation Clocks
- Very Reliable and Secure Source of Time for Your Network

- Multiple NTP Ports for Easy Network Configuration and Adaptation
- Extremely Accurate Time Source for Network Synchronization
- Enhanced Network & Security Features
- Automatic Reference Selection between, GPS, IRIG-B, 1PPS and 10MHz
- Intuitive Web Interface for Easy Control & Maintenance

Software Features

Manageability

- Copy a SyncServer configuration to multiple units.
- Web-based user interface.
- Simple, intuitive, Keypad/Display and Command Line Interface.
- Easy set up and configuration.

Security

- Encrypted username password.
- Lock down the LAN1 network port.
- Lock down HTTPD.

SyncServer Signal Feature Comparison

Use the following table to compare signal features between different models of SyncServer.

	S200	S250	S250i
GPS	X	X	
1PPS		X	X
10 MHz		X	X
IRIG-B		X	X

Web Interface

This section provides a topic for each page in the web interface, with an explanation of each field, notes, and links to related topics.

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Login

Use the **Login** page to:

- Log in to the SyncServer's web interface.
- Recover lost passwords.
- View and configure the system status. Use the ***ADMIN - Web*** (on page 55) page to configure the status information on the **Login** page.

The Login page includes the following elements:

- **Username**: Enter the username here. (Factory default: "admin")
- **Password**: Enter the corresponding password here. (Factory default: "symmetricom")
- **Secure**: Opens an encrypted web session (HTTPS, port 443). For this feature to be available, the user must enable it by using the **SERVICES - HTTP** page.
- **Recover Password**: Prompts the user to answer a password recovery question. If the user answers correctly, the SyncServer resets the password to a random string and emails it to the user's email address. For this feature to be available, the user must enable it using the **ADMIN - Users** or **WIZARDS - 1st Setup** pages. Enabling this feature requires:
  - Selecting and giving an answer to a recovery question.
  - Providing an email address
  - Providing SMTP Gateway configuration settings.

Also see ***Recovering a Password*** (on page 110)

Properties of User Names and Passwords

Usernames

Quantity & Length

There is an upper limit of 32 individual users, each username has a maximum of 32 characters in length.

Character set (Charset)

Each username is limited to the following printable ASCII characters:

- Upper case letters {A-Z}
- Lower case letters {a-z}
- Numbers {0-9}
- Period {.}
- Dash {-}
- Underscore {_}
- Plus {+}

Usernames may **NOT** contain any of the following:

- Standard ASCII keyboard characters not described above, i.e. ! @ # $ % ^ & * ( ) = { } [ ] | \ ; : ' " < > ? , /
- Grave accent {`}
- Tilde {~}
- Whitespace characters (space, tab, linefeed, carriage-return, formfeed, vertical-tab etc.)
- Non-ASCII characters
- Non-printable characters

Passwords

Length

The password can have a maximum of 64 characters in length.

Character set (Charset)

Passwords **must** contain, at minimum, either a mix of upper and lowercase letters, or a mix of letters and numbers.

Passwords are limited to the following printable ASCII characters:

- Upper case letters {A-Z}
- Lower case letters {a-z}
- Numbers {0-9}
- Tilde {~}
- Most standard ASCII keyboard symbols, i.e. ! @ # $ % ^ & * ( ) _ - = { } [ ] | : ; " < > , . ? /

Passwords may **NOT** be all-lowercase, all-uppercase, all-numeric, or match the username. They additionally may **NOT** contain any of the following:

- Single-quote / apostrophe {'}
- Grave accent {`}
- Plus {+}
- Backslash {\}
- Whitespace characters (space, tab, linefeed, carriage-return, formfeed, vertical-tab etc.)
- Non-ASCII characters
- Non-printable characters

STATUS Tab

Select a topic from below to learn more about the STATUS features of the Web Interface:

STATUS - General

Overall System Information

- **Hostname**: The network hostname of the SyncServer, which can be configured on the **SYSTEM - General** web page.
- **Model**: The model number of the SyncServer.
- **Serial Number**: The unique serial number of the SyncServer.
- **Local Time**: The local time, determined by the time zone setting on the **TIMING - Time Zone** web page.
- **Release Version**: The system release version.
- **Software Version**: The software version.
- **Hardware Clock Version**: The version of the software on the Hardware Clock.
- **Up Time**: The time elapsed since the operating system started.
- **Load Average**: A figure of merit for the operating system “load” for the previous 1, 5, and 15 minutes (left to right).
- **Memory Used (Mbyte)**: The amount of memory occupied by the system.
- **Memory Free (Mbyte)**: The amount of free memory remaining.
- **Flash:** The type of compact flash card installed.
- **CPU Vendor**: The CPU vendor/manufacturer.
- **Model**: The CPU model.
- **Number**: The CPU number.

STATUS - Network

Network Status for each of the SyncServer's network ports:

- The name of the **Port**.
- The following **Address** information for each network port:
  - **mac**: The MAC Address.
  - **v4**: The IPv4 Address, if used.
  - **v6 link**: The IPv6 Address, if used.
- The **State** of the physical network port device (not of the connection). An "Up Arrow" means it is "running". A "Down Arrow" means it is "not running".

Management Port DNS Servers: Both user-entered and DHCP-assigned DNS Server addresses that are available from the LAN1 port.

The SyncServer requires at least one valid DNS server to resolve domain names, which may be used in NTP associations, and SMTP gateways (email). Without a DNS server, any function that uses a DNS name instead of an IP address may be affected. These can include NTP, password recovery, and email notification of alarms.

See ***Network Port default settings*** (see "Network Ports - default settings" on page 171)

STATUS - Timing

Hardware Clock Status

Current Sync Source: The Input Reference currently used by the Hardware Clock. Consult the **TIMING - HW Clock** topic for more information.

Hardware Clock Time: The time according to the Hardware Clock.

Hardware Clock Status: "Locked" means the Hardware Clock is synchronized to one of its references, or to the internal oscillator in "Holdover". "Unlocked" means the Hardware Clock doesn't have an Input Reference and the Holdover period has expired. Also see TIMING - HW Clock and ***TIMING - Holdover*** (on page 45).

Oscillator Type: The type of the oscillator installed in the Hardware Clock for operation and holdover.

For each of the following **Input Status** lines, "Locked" means that the reference is valid and can be selected by the Hardware Clock. "Unlocked" means the reference is not valid, and is therefore not available for use by the Hardware Clock. Also see TIMING - HW Clock to arrange the priority of the Input References.

Some of these references are options or are only available in specific SyncServer models. (Consult ***Product Overview*** (on page 17) for more information about features and models):

- **GPS Input Status**
- **IRIG-B Input Status**
- **1PPS Input Status** (see note below)
- **10MHz Input Status** (see note below)
- **Leap Warning**: The state of the ***Leap Indicator*** (on page 180) as reported by the current input reference.

Also see

- ***SyncServer signal feature comparison*** (on page 18) to see the available source signals for each model of SyncServer.
- ***Hardware Clock Configuration*** (on page 172) default settings

STATUS - GPS

GPS Receiver Operation

This page displays the status of the GPS Receiver.

See ***SyncServer signal feature comparison*** (on page 18) to see the available source signals for each model of SyncServer.

Receiver Description: "GPS" indicates the presence of a 12-channel GPS receiver.

Receiver Status:

- Receiver Down: The Hardware Clock can't communicate with the receiver.
- Unknown Mode: An undefined mode of the GPS receiver.
- Acquiring Signal: The receiver is attempting to track a GPS signal.
- Bad Geometry: The geometry of the tracked satellites is unsatisfactory for a position solution.
- Propagate Mode: A position estimation mode used in highly dynamic environments.
- 2d Solution: The receiver is able to perform position fixes for latitude and longitude but does not have enough satellites for altitude.
- 3d Solution: The receiver is now able to perform position fixes for latitude, longitude and altitude.
- Position Hold: Position fixes are no longer attempted, and the surveyed or user-entered position is used.
- Time Valid: The receiver has valid timing information from GPS satellites (including GPS-UTC Offset and Leap Indicator). If the GPS receiver and antenna are set up correctly, the receiver status should eventually reach and remain in this state.

Mode:

- Survey: The receiver is surveying and averaging its position. When it has finished surveying, the receiver switches to Position Hold mode. Survey mode and Position Hold mode are appropriate for static applications, such as a typical server room environment. This is the default mode when the SyncServer starts.
- Dynamic: The GPS receiver surveys continuously to determine its position and doesn't switch to another mode. This mode must be initiated by a user, and is appropriate for mobile applications such as ships, land vehicles, and aircraft. The degree of accuracy this mode offers is fine for NTP time over networks, but is less than optimal for the timing outputs available on some SyncServer models.
- Position Hold: The GPS receiver has completed Survey mode and switched to this mode, or the user has manually entered a position and "forced" it into this mode. The accuracy and stability of the SyncServer's timing outputs are optimal when the receiver has its exact position and is in this mode.

Antenna Cable Delay (nS):

The user-configured value (on the **REFERENCES - GPS** page) to compensate for GPS signal propagation from the antenna along the length of the cable to the receiver.

Antenna Status:

The GPS receiver supplies power to the GPS antenna through the antenna cable. It also monitors the current to that circuit to detect open or short circuits.

- Good: The current to the GPS antenna and cable is normal.
- Open: The current is too low. The GPS antenna or cable is probably disconnected or broken. Some splitters may cause this condition as well.
- Short: The current is too high. The GPS antenna or cable probably has a short circuit.

Position: The latitude and longitude of the GPS antenna in degrees, minutes, and fractional seconds. Referenced to WGS-84.

Altitude: The altitude of the antenna in meters. Referenced to WGS-84.

Satellites: The list of GPS satellites visible to the receiver:

- Sat Number: The GPS satellite's Satellite Vehicle (SV) number, a unique identification number
- Signal: The relative strength of the GPS signal (dBW = decibels relative to 1 Watt).
- Status: "Current" means that the receiver is using the GPS signal in its timing solution. "Tracked" means the receiver is tracking the signal, but isn't using it in the timing solution.

See ***GPS*** (on page 173) default settings

STATUS - NTP

This page displays the status of the NTP Server.

Values are displayed for:

- system peer
- system peer mode
- leap indicator
- stratum
- precision
- root distance
- root dispersion
- reference ID
- reference time
- system flags
- jitter
- stability
- broadcast delay
- authdelay

See default settings:

- ***NTP*** (on page 171)
- ***NTP Override Behaviour*** (on page 172)

STATUS - Alarms

Current Major or Minor Alarms

Alarms with Severity set to:

- *Major* are displayed in red text.
- *Minor* are displayed in orange text.
- *Notify* are not displayed.

Alarms can be configured using the **ADMIN - Alarms** page.

For each listing:

Time: The local date and time at which the alarm was raised.

Severity: The severity of the alarm event (Major/Minor).

Name: The name of the alarm, from the list of alarms on the **ADMIN - Alarms** page.

See ***Alarms*** (on page 174) default settings

NETWORK Tab

Select a topic from below to learn more about the NETWORK features of the Web Interface:

NETWORK - Ethernet

Use this page to get status and configure Ethernet LAN port network settings, including DNS servers.

Ethernet Port Configuration

Edit the network port configuration and view network port status.

EDIT: Clicking this button opens a dialog box for configuring the network port.

Pending Changes: A check mark indicates that settings have changed, reminding the user to click the **APPLY** button.

Port: The name of the network port.

IP Address: The port's MAC, IPv4, and/or IPv6 network addresses.

Usage: These icons summarize information about the port:

- (Checkmark): The user has changed the configuration, but hasn't clicked the APPLY button at the bottom of the page yet.
- (Management Port): This network port is configured as the management port (web interface, SNMP, email, DNS).
- (Up Arrow): The physical network port is enabled and functioning (does not indicate a valid physical connection or configuration).
- DHCP (DHCP): The network configuration is automatic via DHCP
- ? (Question Mark): Status unknown - usually when there are pending changes.
- 6 (Number "6"): Uses IPv6
- B (Letter "B"): Configured for bonding with another port in a redundant pair.

DNS Servers

The DNS Server fields display the IP addresses of Domain Name Service (DNS) servers. The SyncServer requires a valid DNS server address to resolve domain names. If a DNS server isn't provided, NTP associations (**NTP - Config**) and the SMTP Gateway (**SERVICES - Email**) must be specified using an IP address. DNS messages are only communicated through LAN1 port. The specified DNS servers must be reachable from the LAN1 port.

- **Management Port User DNS Servers**: Manually enter one or more DNS Server IP addresses here, if not supplied by DHCP.
- **Management Port DHCP DNS Servers (Read Only):** If LAN1 has DHCP enabled, and DHCP is configured to supply DNS server addresses, displays the DNS server IP addresses supplied by DHCP. These values are not user-editable.

Note: If the SMTP Gateway (which supports Password Recovery and Email Notification of Alarms) and NTP associations are addressed using domain names, a valid DNS server address must be supplied to the SyncServer.

Network Port Configuration

To edit the settings for a network port, click the corresponding **EDIT** button on the **NETWORK - Ethernet** page. This opens a dialog box titled with the name of the port followed by "Configuration".

To apply configuration changes, click **APPLY** buttons on both this configuration window and later on the **NETWORK - Ethernet** page.

Connection Mode:

- **Static**: A user must configure the network port manually.
- **DHCP**: A DHCP server will automatically configure the network port when changes are applied. Not available for IPv6.
- **Disabled**: This disables the network port.

Note: If the Connection Mode is DHCP and the lease expires or the SyncServer reboots, a DHCP server could assign a new IP address to the SyncServer's network port. If this occurs with the LAN1 port, use the **STATUS** button on the front panel to obtain the new IP address. Furthermore, if it occurs to a network port servicing NTP requests, NTP clients will no longer be able to get a response from that port. In that case, the NTP clients would have to use an alternate NTP source or become unsynchronized. For this reason, Microsemi recommends using static IP addresses, only using DHCP for convenience during temporary installations.

IP Version:

- **IPv4:** The port uses IPv4 exclusively. (Static or DHCP)
- **IPv6:** The port uses IPv6 exclusively. The user must enter a static IPv6 address.

IP Address: The port's IPv4 address (e.g., "192.168.0.100") or IPv6 address(es) with scope (e.g., fe80::2a0:6dff:fe00:10).

Mask: The port's IPv4 subnet mask (e.g., "255.255.255.0"). With IPv6, the mask is the length of the prefix.defined in CIDR format (Classless Inter Domain Routing). Typically, the IPv6 mask is 64.

Note: The SyncServer does not support masks on IPv6 gateway entry. While the user interface will accept/display a user entered mask, such as "/64" for the IPv6 gateway, the underlying software checks for the entered mask and removes it, before sending the unmasked IPv6 gateway address down to the lower level Linux system components to configure the network interface.

Gateway: The port's IPv4 or IPv6 gateway (e.g., "192.168.0.1"). This is an optional configuration parameter.

Redundant: Bonds LAN3 to LAN2 as virtual device with a single network address.

- **Active**: The Active port handles network traffic. LAN2 is "Active" by default.
- **Backup**: The Backup port handles network traffic if the connection to the Active port fails. LAN3 is the "Backup" port by default.

Scenario #1

If the connection to LAN2 fails, LAN2 becomes backup and LAN3 becomes active. After repairing the connection, the user can manually reconfigure LAN2 as the **Active** port. While LAN3 is working, LAN2 will remain as backup. It is only if and when LAN3 fails, LAN2 will become Active. LAN2 does not automatically replace LAN3 while LAN3 is working correctly.

Reconfigure LAN2 as the **Active** port:

1. In the "LAN2 Configuration" window, select the "Redundant" checkbox, select "Active", and then click the **APPLY** button.
2. On the **NETWORK - Ethernet** page, click the **APPLY** button.

To release a redundant bond, deselect the "Redundant" checkbox and apply the changes. If the bond doesn't release, reboot the SyncServer.

Scenario #2

Following scenario #1, the backup LAN2 is repaired and available again to be the Active port. If LAN3 now fails, LAN2 will takeover as the Active port.

Scenario #3

Following scenario #1, the backup LAN2 is not repaired, and now LAN3 fails. Connections are not available.

For more information see ***Port Bonding*** (on page 30)

Allowed Access: Restricts the LAN port to access by specified IP addresses or address ranges. If the user leaves this field blank, the LAN port accepts connections from any IP address. Allowed Access applies to all forms of network traffic, including NTP and HTTP connections. Reconfiguring the IP address of the LAN port erases the Allowed Access list.

The user can specify address ranges by setting the IP address followed by the mask prefix length, as described RFC 1518 and RFC 1519 for Classless Interdomain Routing. The **mask prefix length** specifies the number of masked bits **starting from the left-most position**. For example, to allow access from the network represented by 192.168.0.0, 255.255.0.0, the user would enter 192.168.0.0/16. In other words, the first 16 bits of the address, 192.168, are masked bits representing the network address The remaining bits are host address which is set to 0.

Note: When configuring **Allowed Access**, take care to avoid blocking DNS, HTTP, NTP, SMTP, SNMP, and SSH traffic.

Side Effects

Applying changes to the Ethernet port configuration restarts the NTP and xinetd daemons (services). During that time:

- The NTP daemon, NTP stratum, web interface are temporarily unavailable.
- The Status LEDs, NTP stratum, and Alarms change states.

Cables need to be attached to IPv6 configured ports

The NTP daemon rescans all interface ports every five minutes. If a cable is not attached to an IPv6 configured port when the network settings are applied, the NTP daemon will not be able to bind to that IPv6 port. If a cable is attached later to the IPv6 configured port, up to five minutes can pass before the next rescan. At the time of the next rescan, the NTP daemon would then be able to bind the port, and respond to NTP packets.

The solution to this behavior is to have the cable connected to the SyncServer IPv6 configured
port before applying the network settings.

Port Bonding

Setting-up Port Bonding (LAN2 and LAN3 not previously configured):

1. On the NETWORK->Ethernet page, edit LAN2 and configure as desired. Select the "Redundant" checkbox, and choose "Active". Click Apply.
2. When the LAN2 edit window closes, click Apply on the NETWORK->Ethernet page. LAN3 is now activated for Port Bonding, and shares the network configuration information you entered for LAN2.

Setting-up Port Bonding (LAN2 and LAN3 must be previously configured):

1. On the NETWORK->Ethernet page, edit either LAN2 or LAN3. Select the "Redundant" checkbox, and choose "Active" or "Backup". Click Apply.
2. When the LAN Configuration edit window closes, click Apply on the NETWORK->Ethernet page. Port Bonding is now active.

NOTE: Selecting "Backup" automatically sets the opposite interface (LAN2 or LAN3) to "Active". Any previously assigned network settings for the Backup port are erased (because that interface is now sharing settings with the "Active" port).

To Release Port Bonding:

1. On the NETWORK->Ethernet page, edit LAN2 (or LAN3), and deselect the "Redundant" checkbox. Make any other necessary changes (IP Address, etc.), then click Apply.
2. On the NETWORK->Ethernet page, edit LAN3 (or LAN2) to make any desired configuration changes, if any, then click Apply.
3. Reboot the SyncServer.

NOTE: When releasing Port Bonding, you will need to reassign the network settings of the interface that was previously the "Backup" port.

NETWORK - SNMP

This page provides configuration of basic SNMP settings and the creation of SNMPv3 users.

Basic Configuration

Establish the identity and community membership of the device.

sysLocation: Identify the location of the SyncServer (e.g. Server Room A, Company Division B, etc). Used by network management consoles.

sysName: Provide the SyncServer with a unique name. (This is distinct and separate from "hostname" on the **SYSTEM - General** and **STATUS - General** pages.) Used by network management consoles.

sysContact: The name of the individual responsible for the SyncServer. Used by network management consoles.

Read Community: The SNMP read community string. The string must be provided for SNMP v1/v2c GETS/WALKS to gain access.

Write Community: The SNMP write community string.

Note: At this time, the SyncServer does not support any writable SNMP variables.

V3 Users

SNMP user names are separate and distinct from the access control list usernames used to log in to the SyncServer's user interfaces. SNMP user names are used by the network management software.

This is the list of SNMP v3 users. To delete a user, select the checkbox for a user name and click the **DELETE** button. When prompted, enter the passphrase specified when the user was created. The SNMP admin user cannot be deleted.

(Using SNMP v3 requires an SNMP v3 user on the recipient systems' SNMP v3-capable agent/client)

User Name: Name of v3 User.

Mode: Currently only rouser (read-only user) mode is supported.

Level: Shows the Min Priv level of the user (see Min Priv, below):

- auth: Authentication
- noauth: No Authentication
- priv: Auth and Privacy
- blank: default level for admin

Add v3 User

To create an SNMPv3 user, complete the form and click the **SAVE** button.

Name: Alphanumeric user name, with no spaces or special characters.

Auth Phrase: Create a unique authentication passphrase for the user. It must be at least eight characters long.

Auth Crypt: The authentication type, MD5 or SHA1. It uses the Auth Phrase as its key when calculating the message hash.

Priv Phrase: Creates a unique encryption passphrase for messages exchanged between the network management software and the SyncServer. It must be at least eight characters long.

Min Priv: Establishes the minimum authentication level required for the user. One of the following must be selected:

- Authentication (Auth): Auth Phrase is always required
- Auth and Privacy (Priv): Auth and Priv Phrase are always required

NETWORK - SNMP Traps

Use this page to configure, add, or delete SNMP trap recipients. The page is divided into two sections. The first section displays the current recipients. The second section provides a form for adding recipients or modifying existing recipients. The first section only displays basic information for each recipient.

For information on configuring the SyncServer for SNMP queries and sending SNMP traps, see ***Configuring SNMP*** (on page 120)

Trap Recipients

Destination: The IP address to which traps are to be sent.

Ver: The SNMP version (v1, v2c or v3).

(Send as Inform): If trap is to be sent as inform, 'inform' is written, otherwise is blank.

User/Community: For SNMPv1/v2c traps, an optional community. For SNMPv3 traps, a required SNMP v3 user on the recipient system. (Using SNMP v3 requires an SNMP v3 user on the recipient systems' SNMP v3-capable agent/client)

Add/Edit Trap Recipient

IP Address: The IP address to which traps are to be sent.

The SNMP version: **v1**, **v2c**, or **v3**.

User/Community: For SNMPv1/v2c traps, an optional community. For SNMPv3 traps, a required SNMP v3 user on the recipient system.

Send as Inform: Sends an INFORM-PDU, otherwise a TRAP-PDU or TRAP2-PDU is sent.

Auth Phrase: For SNMPv3 traps, an optional Auth Phrase.

The hash algorithm used for the Auth Phrase: **MD5** or **SHA1**.

Priv Phrase: For SNMPv3 traps, an optional Priv Phrase.

To edit a trap recipient, select the checkbox of a specific recipient and click the **EDIT** button. Edit the values displayed in Add/Edit Trap Recipient and click the **SAVE** button. Similarly, use the **DELETE** button to remove trap recipients from the list.

NETWORK - Ping

Network Ping Test

Use this page to PING a network node from one of the SyncServer's network ports. This feature can be used to test and troubleshoot network connectivity issues. The network ping test is supported on LAN1, LAN2, and LAN3.

To use PING:

1. Select the network port from which to send the PING packets. See "Ping 6 Command" on page 33
2. For IPv6 networks, select **Ping 6**.
3. Enter the **IP address** of the host and click the **APPLY** button. **Ping Output** displays the results five seconds after clicking apply.

Note: The approximate command line equivalent is "ping -c 5 -w 5", where "-c 5" means "send five request packets to the requested destination" and "-w 5" means "timeout after 5 seconds if no responses". The network port that sends the ping request also receives the responses.

Ping 6 Command

The SyncServer software executes the following command when pinging an IPv6 address.

ping6 -c 5 -w 5 -I <eth dev> ipv6address

-c 5 sends 5 ping requests.
-w 5 times out after 5 seconds regardless of the target is reachable or not.
ipv6address is the target address (Customer inputs this address in the SyncServer entry box)
-I <eth dev> specifies the interface which corresponds to the drop down choice:
LAN1 – "-I eth0"
LAN2 – "-I eth1"
LAN3 – "-I eth2"
LANG – "-I eth3"

The drop down choice of the interface, suggests that it corresponds to where the ping6 packet will be sent out from. This is not entirely correct.
For example, the "-I eth0" only means to set the source IP address in the ping packet to that of the eth0, it does not specify which interface it actually will always use to send out the packets.
The interface the ping6 uses to send out the packets is entirely determined by the Linux kernel routing table.

If the target Ipv6address is a link-local IPv6 address, the -I <eth dev> must also be a linklocal address as specified in the way that SyncServer port was configured.

For example:

ping6 -c 5 -w 5 -I <LAN1> ipv6address

If the ipv6address is a link-local address, then the LAN1 specified from the SyncServer drop down menu on the ping page must also be configured with a link-local address. If it is configured that way then the ping packet will be sent out that LAN1 port.

If the ipv6address address is a global address, then the -I <eth dev> information is ignored and the Linux kernel routing table decides which port to send the ping packet out of. This is how it is possible to specify a global address to send a ping6 to, but not have the packet exit the specified LAN port. It is because either the LAN port did not have a global address specified, or if it did, the Linux kernel chose not to send the packet out that port, but rather another LAN port that had a global address assigned.

NTP Tab

Select a topic from below to learn more about the NTP features of the Web Interface:

NTP - Sysinfo

This page shows the NTP Daemon Status and Control values:

Values are displayed for:

- system peer
- system peer mode
- leap indicator
- stratum
- precision
- root distance
- root dispersion
- reference ID
- reference time
- system flags
- jitter
- stability
- broadcastdelay
- authdelay

See also: ***RESTART button*** (on page 34)

RESTART button

After changing the NTP configuration, click the **RESTART** button to put the new configuration into effect. While the NTP daemon restarts, its services are temporarily unavailable, and it

generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.

NTP - Assoc

Use this page to view the status of NTP associations listed on the **NTP - Config** page.

Also see NTP Associations in the Glossary.

NTP Associations

Remote: The domain name or IP address of the remote end of the NTP association. “Hardware Clock” is the SyncServer's Hardware Clock. In the case of a remote NTP connection, this will be the IP address of the remote end.

The character in the left margin indicates the mode in which this peer entry is operating:

- * (asterisk) the association with which the NTP daemon is synchronizing (the *system peer* on **NTP - Sysinfo**), marked "synchronizing".
- + (plus) indicates the SyncServer is *symmetric active* mode.
- - (minus) indicates the SyncServer is *symmetric passive* mode.
- = (equal) means the SyncServer is in *client* mode, marked "being polled".
- ^ (caret) indicates that the SyncServer is broadcasting to the remote node, marked "broadcasting to".
- ~ (tilde) denotes that the remote node is broadcasting to the SyncServer.

Local: The IP address of the SyncServer network port at the local end of the NTP association. For the Hardware Clock it is "127.0.0.1", the IP address of the loopback port.

St: The stratum level of the remote clock in the NTP hierarchy. Lower values are given more emphasis. For the local Hardware Clock, stratum 0 is a special value that indicates the Hardware Clock it is synchronized by a "timing root" reference such as GPS. Values in the range of 1 through 15 indicate the number of steps the remote NTP connection is from its timing root. Stratum 16 is a special value that indicates that the remote connection is not synchronized. The stratum reported by the SyncServer is incremented by one from its synchronizing peer. For example, while synchronized to the Hardware Clock (Stratum 0), the stratum of the SyncServer is one (Stratum 1).

Poll: The length of the interval (in seconds) with which the SyncServer polls the remote server, usually starting at 64 seconds and gradually increasing to 1024 seconds. Valid values range from 16 to 65535, increasing by powers of 2. The polling interval for the Hardware Clock is fixed at 16 seconds. The user-configured Minimum and Maximum Poll Interval settings on the NTP - Config page limit this interval.

Reach: This is an 8-bit shift register that keeps track of the last 8 attempts to reach the remote end of the association. New bits are added to the rightmost end of the register (1 for reached or 0 for unreached) and old bits "fall off" the left hand side. The shift register is represented in octal. For example, by converting "377" from octal to binary, one gets "11111111", indicating 8 successful polls. For a sequence of eight successful polling attempts on a new association, the octal value of Reach increases as follows: 1, 3, 7, 17, 37, 77, 177, 377. If the value isn't one of those just shown, there may be a problem polling the remote end of the association. If

the value remains at 0, or decreases to 0, the association is becoming unreachable. The reach value stays 0 if the SyncServer is a broadcast or multicast server.

Delay: The total delay, in seconds, of the round trip to the remote end of the NTP association. For example, a value of "0.07817" equals approximately 78 milliseconds. The Delay for the Hardware Clock is "0". For most NTP associations, typical values range from tens to hundreds of milliseconds. The NTP daemon's clock selection algorithm gives preference to lower *Delay* values.

Offset: The time offset between the SyncServer and the remote server, in seconds, of the last poll. The NTP daemon's clock selection algorithm gives preference to lower *Offset* values. The Offset for the Hardware Clock is usually in the microsecond range. For external NTP associations, the offset is affected by the time base of the remote node and the characteristics of the network path, with values typically in the 1 - 10 millisecond range.

Disp: Dispersion represents the maximum error of the SyncServer relative to the NTP association. There are two components in dispersion, those determined by the peer relative to the primary reference source of standard time and those measured by the SyncServer relative to the peer. They provide not only precision measurements of offset and delay, but also definitive maximum error bounds, so that the SyncServer can determine not only the time, but the quality of the time as well.

NTP - Config

Use this page to create, edit, or delete NTP associations.

Also see ***Configuring NTP*** (see "Adding NTP Servers to the NTP Associations List" on page 109) for more information.

Current NTP Associations

To edit or delete an association, select it using the checkbox and then click the **EDIT** or **DELETE** button below. If the user selects **EDIT**, the details for that association are displayed under *Add/Edit NTP Association* for the user to edit. Use the **SAVE** button to save the changes and the **RESTART** button to make any changes take effect.

The list of Current NTP Associations always includes the Hardware Clock, which:

- Cannot be deleted or edited.
- Is configured as a preferred server ("server 127.127.45.0 prefer # pseudoaddress for the timing engine" in ntp.conf).
- Is displayed at the top of the list.

Additionally, the factory default configuration includes three Stratum 1 NTP servers operated by Microsemi on the Internet.

The user should consider adding NTP servers available on the local network to the list of Current NTP Associations.

Add/Edit NTP Association

Use Add/Edit NTP Association to edit existing associations or to add new ones. The SyncServer can have multiple associations, each with a different *Role*.

In the following explanations, the term "SyncServer" means "the local NTP daemon on the SyncServer".

Role

- **Server**:
  - Addressing: Use with IPv4 class A, B and C addresses.
  - Description: Creates a persistent association between the SyncServer (client) and an NTP node (server). The client synchronizes with the server if the client's *clock selection algorithm* selects this server as the best clock. Typical server associations include: the hardware clock, the factory default NTP servers, and servers added by the user. Also see *system peer mode: client* under NTP Daemon Status.
  - Typical Usage: The user creates a *Server* association to designate an NTP node that has an NTP Stratum better or equal to that of the SyncServer (client). Often, the NTP server is another Stratum 1 server with a GPS reference that is outside the user's administrative jurisdiction. The NTP servers operated by Microsemi that are part of the factory default configuration are an example of this.
- **Peer:**
  - Addressing: Use with IPv4 class A, B and C addresses.
  - Description: Creates a persistent symmetric-active association between the SyncServer (peer1) with an NTP node (peer2). For the NTP node running in symmetric passive mode, there is nothing needs to be done on the NTP node. However, the NTP node can be configured in symmetric active mode too. When configured, the two nodes can synchronize with each other in a variety of failure scenarios, such as loss of GPS and Internet connectivity. See *system peer mode: symmetric-active* under NTP Daemon Status.
  - Typical Usage: The user configures NTP associations on two NTP nodes that point to the each other. The two nodes are usually of equal stratum and have independent references, such as two separate GPS installations or two separate network paths to NTP servers on the Internet. In the event of a reference failure, the peers can synchronize to the node that has the best remaining reference.
- **Broadcast:**
  - Addressing: Use an IPv4 broadcast address of the local subnet. To broadcast NTP messages on a subnet, if the local interface IP address were 192.168.61.58 and the mask were 255.255.255.0, the broadcast address could be 192.168.61.255.
  - Description: Creates a broadcast server association. When configured with a broadcast address (e.g., 192.168.61.255), the association broadcasts NTP messages from the network interface with the matching IP address (e.g., 192.168.61.58). Broadcast messages go out to all nodes on the subnet, and are usually blocked by routers from reaching adjacent subnets. Consult with the network administrator to select a correctly-scoped address and **Time to live** value.
  - This type of association requires *authentication on both the server and the clients*. See Using NTP Authentication.

    - Typical Usage: *Broadcast* associations to reduce network traffic with a large number of NTP clients.
- **Broadcast Client:**
    - Addressing: The user does not specify an address with this setting.
    - Description: Creates an association that listens for NTP broadcast messages on all of the network interfaces. Upon receiving the first broadcast message, the broadcast client association initiates a brief exchange with the server to calibrate the propagation delay. Afterwards, the broadcast client association listens to and gets the time from the broadcast server messages. This type of association requires *authentication on both the server and the clients*. See Using NTP Authentication.
    - Typical Usage: Broadcast client associations can get authenticated time on networks that have a broadcast server.
- **Multicast Server:** Create a **Broadcast** association with members of a multicast group. The multicast address is a class D address starting from 224.0.0.1. (The IANA assigned 224.0.1.1 to be the NTP multicast address.) However, user can choose any class D address that is not used on the local network by other protocols. Routers can be configured to transmit multicast messages to adjacent subnets.
- **Multicast Client:**
    - Addressing: Use the same IPv4 class D multicast address as the Multicast Server (potentially 224.0.1.1).
    - Description: Creates an association that listens for NTP multicast messages on all of the network interfaces. Upon receiving the first message, the multicast client association initiates a brief exchange with the server to calibrate the propagation delay. Afterwards, the multicast client association listens to and gets the time from the server messages. This type of association requires *authentication on both the server and the clients*. See Using NTP Authentication.
    - Typical Usage: Multicast client associations can get authenticated time on networks that have a multicast server.

Note: When authentication is configured, the same authentication scheme is available for all NTP associations and over all network interfaces.

Address: The IP address or DNS name of the NTP association.

Burst

- **Burst:** When the server is reachable, send a burst of eight packets instead of the usual one. The packet spacing is about two seconds. This is designed to improve timekeeping quality for server associations. This setting should only be used in agreement with the administrator of the remote NTP device as the traffic load may be onerous.
- **iBurst:** When the server is unreachable, send a burst of eight packets instead of the usual one. As long as the server is unreachable, the packet spacing is about 16s. Once the server is reachable, the packet spacing is about two seconds. This is designed to speed the initial synchronization acquisition with the **server** command.

Version: Specifies the version number to be used for outgoing NTP packets. Versions 1-4 are the choices, with version 4 the default.

Minimum / Maximum Poll Interval: These options specify the minimum and maximum poll intervals for NTP messages, in seconds to the power of two. The maximum poll interval defaults to 10 (1,024 s), but can be increased to an upper limit of 17 (36.4 h). The minimum poll interval defaults to 6 (64 s), but can be decreased to a lower limit of 4 (16 s).

MD5 Key: Use this field to authenticate NTP messages to and from the SyncServer for this specific association. When enabled, the NTP packet header includes authentication fields encrypted using either the MD5 key number (1 to 16).

Time to Live: This option is used only with broadcast association. It specifies the time-to-live on broadcast server. Consult with the network administrator to specify a correct value. If this field is left blank, the value of TTL defaults to 127.

RESTART button

After changing the NTP configuration, click the **RESTART** button to put the new configuration into effect. While the NTP daemon restarts, its services are temporarily unavailable, and it generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.

NTP - MD5 Keys

Use this page to generate or manipulate keys generated using the RSA Message Digest 5 (MD5) algorithm authentication method. MD5 Keys are used to authenticate (not encrypt) NTP messages sent or received by the SyncServer, using a cryptochecksum.

Also see Using MD5 Keys on a SyncServer.

NTP MD5 Security Keys

Use this page to manage MD5 keys as follows:

- View and copy the current keys.
- Upload a file containing keys from a local PC drive to the SyncServer.
- Download the SyncServer's current key file to a local PC drive.

Generate: This button generates new random MD5 keys, immediately replacing any previous MD5 keys.

Current Keys: This window displays the current list of keys.

The first line gives the SyncServer's hostname and the NTP time stamp of when the keys were created. The second line shows the local time and date the keys were generated.

Each row of key information provides the following information:

- The key number, 1 through 16
- The key type, "MD5".
- The key, an ASCII string containing only displayable characters. As an example, the random key generator may produce "\jdh.u$r;x"y:upH"
- A comment that identifies the key type. For example: "# MD5 key"

Upload Keys: Use this text field, with the **BROWSE** button, to enter the file path of the keys file. Then click the **UPLOAD** button to load the keys to the SyncServer.

Download Keys: Press the **Save As**... button to save the Current Keys to your PC as a file.

After keys are generated, the user can select **Key** and a *key number* in the **MD5 key** field on the **NTP - Config** page.

Note: Disregard the "Unable to Open Key File" message while the Current Keys field is empty.

NTP - Prefs

The settings on this page determine whether the NTP daemon, once synchronized, can report an unsynchronized state.

Out of the three following stages of operation, the **NTP - Prefs** settings only apply during the *Loss of All References* stage:

1. *Startup*: Upon starting, before synchronizing with any NTP associations, the NTP daemon reports to potential NTP clients that it is unsynchronized by setting leap indicator to 11 and stratum to 16.
2. *Typical Operation*: After synchronizing to an NTP association the NTP daemon uses leap indicator and stratum normally. Leap indicator reports whether a leap event is pending (usually 00 - no alarm). Stratum reports the stratum of the NTP daemon relative to the *system peer* (system peer number + 1).
3. *Loss of All References*: If the NTP daemon cannot get the time from any association:
    - With **Standard NTP Rules** (Factory Default) The *stratum* and *leap indicator* remain the same as they were in the *Typical Operation* stage. The *system peer* remains the unchanged, but the *reference time stamp* isn't updated and the *reach* statistic gradually decreases to zero.
    - With **Override Behavior**, if the estimated time error exceeds the *Time Error Limit* on the *TIMING - Holdover* page, *stratum* reports 16 and *leap indicator* reports 11, as they did during in the *Startup* stage.

After *Loss of All References*, if the NTP daemon synchronizes with an NTP association again, it resumes *Typical Operation*.

Comments:

- Given a pool of NTP associations from which to choose, an NTP client typically synchronizes with the best one, and does not require *Override Behavior* to declare an unsynchronized state.
- Given a lack of NTP associations from which to choose, an NTP client may reject a SyncServer with better timing accuracy and stability than itself, if Override Behavior is enabled.
- The SyncServer's NTP daemon can get time from a server, peer, broadcastclient, and multicastclient associations.

- Also see NTP Daemon Status, TIMING - HW Clock, ***TIMING - Holdover*** (on page 45), ***Leap Indicator*** (on page 180), and ***Stratum*** (on page 181).

TIMING Tab

Select a topic from below to learn more about the TIMING features of the Web Interface:

TIMING - Time Zone

Local Time Zone

This setting affects:

- The time shown on the SyncServer front panel display when the user presses the **TIME** button. Also see ***TIME Button*** (on page 73).
- The time output by the *IRIG out* connector (if available), when the *Output Type* is set to *Local* on the **REFERENCES - IRIG-B** page.

To determine the timecodes associated with each model of SyncServer, see ***SyncServer feature comparison*** (see "SyncServer Signal Feature Comparison" on page 18).

The Time Zone setting does not affect NTP or any of the other timing outputs.

To set the time zone, select a profile from the list of **Time Zones** and click the **APPLY** button.

Each profile contains the offset from UTC to the time zone, plus any rules for daylight saving time or summer time adjustments.

The Time Zones are alphabetically organized as follows:

- Most Time Zones are sorted by *continent* and *city name*.
- Some Time Zones are sorted by *country* and *city name*.
- Some Time Zones are sorted by *acronym* (e.g., UTC, EST).
- Some *islands* are sorted by ocean (e.g., Atlantic, Pacific, Indian) or national affiliation.

Current shows the time zone in effect and the local time at the moment the page was generated.

TIMING - HW Clock

Use this page to configure the HW Clock.

See also: ***Steering with a Frequency Reference*** (on page 44), and ***Frequency Reference - Power-Down / Reboot*** (on page 45)

The Hardware Clock (HW Clock) provides accurate time to the SyncServer from one of its timing references, allowing it to operate as a Stratum 1 Network Time Protocol server.

The SyncServer automatically detects and synchronizes the Hardware Clock to the highest available reference in the following order:

- GPS
- IRIG
- 1 PPS
- 10 MHz

Any available source for a SyncServer can be enabled or disabled via a checkbox associated with the source.

Note 1: At least one clock reference must be enabled.

Note 2: See ***SyncServer feature comparison*** (see "SyncServer Signal Feature Comparison" on page 18) to see which sources are available for each model of SyncServer.

If the reference becomes unavailable, the HW Clock uses the next highest available reference in the list.

If no other references are available, the HW Clock provides holdover by "flywheeling" on its oscillator until a reference becomes available again. During this time, "REF" on the front panel TIME screen (press the **TIME** button) is "None", while the "NTP Stratum" remains "1". “REF” on the front panel NTP Status screen (press the **STATUS** button) changes to “FLY”.

If no references become available, the NTP daemon gets its time from other available NTP references. At this time, "REF" on the TIME screen becomes "NTP" and "NTP Stratum" degrades from "1" to the stratum of the NTP reference plus one. For example, with an NTP Stratum 1 reference as its primary reference, the SyncServer's "NTP Stratum" becomes "2". “REF” on the STATUS screen changes to the IP address of the synchronizing peer.

If references that **set the time** (GPS, IRIG, and NTP references) are not available, but a timing reference (1 PPS, 10 MHz) is, the user can set the time manually. See the "Setting the Time Manually" section below.

NOTE 3: When providing a **backup** reference source for the GPS or IRIG Input references, Microsemi recommends **using the 10 MHz Input**. An unsynchronized 1 PPS Input may cause the NTP daemon to disqualify the HW Clock and rely on a lower-stratum NTP reference instead, if one is available.

Oscillator Type: The type of oscillator in use. Three different oscillator types are offered in the SyncServer.

- **TCXO** – This is the standard temperature compensated oscillator.
- **OCXO** – This optional oven oscillator is more stable and offers better holdover performance than the TCXO.
- **Rubidium** – This optional oscillator is more stable and has better holdover performance than the OCXO.

Forced Timing Source: Forces the Hardware Clock to synchronize to a specific timing source.

- **Auto:** The SyncServer automatically detects and synchronizes the Hardware Clock to the timing reference(s) in the following order: GPS, IRIG-B, 1 PPS, 10 MHz. This is the factory default setting.
- **Free Run:** Forces the Hardware Clock to ignore all references. This puts the SyncServer oscillator into free running mode. If needed, the user **can manually set** the SyncServer's UTC time while using this mode. The SyncServer takes submission of this page using the **APPLY** button as the on-time mark.

UTC Time: Enter the UTC time here to set the Hardware Clock. Available when "Forced Timing Source" is set to Auto or Free Run.

NOTE 4: When a timing source or user sets the Hardware Clock time, the SyncServer synchronizes its Software Clock (a.k.a, the "ntpd" or "NTP daemon") and its battery-backed Real Time Clock (RTC) to the new time. The SyncServer also RESTARTS the NTP daemon after any clock change.

Setting the Time Manually

When Forced Timing Source is set to Auto or Free Run, the user can set the time manually from the web interface or the command line interface. An adjust time command is also available from the command line interface.

NOTE 5: IMPORTANT: If the user is preparing to switch from Free Run to Auto and the time is more than 1000 seconds off UTC time, manually set it within 1000 seconds of UTC time before switching to Auto.

Using the Web Interface: Enter the **UTC Time** on the **TIMING - HW Clock** page and click the **APPLY** button. The SyncServer applies the UTC Time at the next internal PPS rising edge after receiving the web page.

Using the Command Line: Open a command line session to the Console RS-232 port or the <LAN*> network port and log in as "admin" followed by the password. Enter the **SETTIMEOFYEAR** command followed by the time in one of the following formats:

```
x.y
mm/dd/yyyy hh:mm:ss.x
yyyy ddd hh:mm:ss.x
MON dd yyyy hh:mm:ss.x
hh:mm:ss.x
```

In "x.y" format:

- x = UTC seconds
- y = fractions of a second

In the remaining formats:

- mm = month 01 through 12
- dd = day 01 through 31
- ddd = day of year 001 through 366
- yyyy = four-digit year
- MON = first three letters of the month (e.g., "JAN")
- hh = hours 00 through 23
- mm = minutes 00 through 59
- ss = seconds 00 through 59
- x = fractions of a second

Steering with a Frequency Reference

To steer the clock using a frequency reference (1PPS, 10MHz), that frequency reference must first be "qualified" by a valid timing source (see note below). To do this, connect the SyncServer to a valid timing source (GPS, IRIG-B, NTP Peer) then wait for the Sync Server to lock to it. Once the SyncServer hardware clock locks to a valid timing source, all connected frequency reference(s) will become "qualified" for Time-of-Day (TOD).

Frequency sources qualified by a hardware TOD source (GPS, IRIG-B) will be stratum-1, and will continue to serve stratum-1 time even after the original timing reference is disconnected.

Frequency sources qualified by an NTP Peer will reflect the same stratum number and Reference Id / IP Address as the source that qualified them, and will continue to serve time (at that same stratum) if the Peer is lost.

Frequency sources not qualified by any valid timing source are stratum-16.

Note: If you do not have access to a GPS, IRIG-B or NTP Peer timing reference, then an alternate – but not recommended -- option is to force-set the TOD through the serial interface. This forces the hardware clock to stratum-1, qualifying any attached frequency references also at stratum-1.

Once a frequency source has been locked and is actively steering the hardware clock, that frequency source can then be used to qualify additional frequency sources.

Example:

1. Lock to GPS;
2. Connect 1PPS to "qualify" it.
3. Disconnect GPS; 1PPS remains qualified and steers the clock.
4. Connect 10MHz; the 10Mhz reference is now also qualified with the same stratum and Reference Id as the 1PPS.

Frequency Reference - Power-Down / Reboot

Power Down

Upon power down, the frequency source essentially becomes "unqualified" due to the real time clock's (RTC) "time away" (no matter how long) from monitoring that frequency input. The SyncServer now comes back up as stratum-16 and will stay there until it is re-qualified with a valid time source.

Reboot

When the system starts up, it is forced to stratum-16. It can only ever claim stratum-1 once it has been connected and locked to a valid TOD reference (GPS, IRIG-B, NTP Peer). Once this happens, any connected frequency reference is then "qualified" to serve stratum-1 time. See ***Steering with a Frequency Reference*** (on page 44).

TIMING - Holdover

Overview

The SyncServer uses holdover to continue operating as a stratum 1 NTP server/peer for a period of time if the Input References become unavailable.

For example: A SyncServer in a downtown office building gets time from GPS. Surrounding skyscrapers occasionally block signals from the GPS satellites as they move across the sky, causing "gaps" that last several hours. The SyncServer uses holdover to continue operating as a stratum 1 NTP server during these gaps.

The factory default settings are appropriate for most situations. However, the user should consider extending holdover to cover the longest anticipated "gap" if more than one of the following conditions is true:

- The SyncServer is the only NTP server available to the NTP clients.
- The SyncServer only has one Hardware Clock Input Reference (e.g., GPS, Timecode).
- The Hardware Clock is the only NTP association listed on the **NTP - Assoc** page.
- Restoring an Input Reference would take longer than the holdover period in days.

Please note the Holdover settings on this page also affect NTP if *Override Behavior* is selected on the **NTP - Prefs** page.

Also see ***Stratum*** (on page 181).

The Settings

The user can simply set the number of days **Holdover** lasts, or specify a **Time Error Limit**. Setting either field generates an equivalent value in the other field.

About *Time Error*: When no Input References are available, the oscillator drifts away from the correct time, accumulating *time error*. The type of oscillator affects how quickly time error grows. The SyncServer keeps an ongoing estimate of the time error. Holdover ends when the estimated time error is equal to or greater than the user-configured Time Error Limit.

The **Oscillator Type** affects the rate at which the oscillator accumulates time error when no Input References are available.

- **TCXO** – The standard temperature-compensated oscillator.
- **OCXO** – The optional oven-compensated oscillator is more stable and offers better holdover performance than the TCXO.
- **Rubidium** – The optional rubidium oscillator has the best stability and holdover performance.

Several methods are available for the user to adjust Holdover or Time Error Limit:

- Entering a value for **Holdover Limit** or **Time Error Limit** and click the **SET** button.
- Sliding the green vertical bar on the *Holdover* graph left or right.
- Sliding one of the black spheres under **Holdover Limit** or **Time Error Limit** left or right.

In Depth

Before entering holdover:

- The Hardware Clock is synchronized to one of the Input References and reports Stratum 0 to the NTP daemon.

- The NTP daemon is synchronized to the Hardware Clock "reference clock" and reports Stratum 1 to the network.

The Hardware Clock enters holdover when the Input Reference becomes unavailable and no other Input References are available.

While in holdover:

- The Hardware Clock uses the internal oscillator to keep time (flywheeling).
- The NTP daemon (Stratum 1) remains synchronized to the Hardware Clock (Stratum 0, Reference = the name of the last Input Reference).
- The SyncServer estimates the time error (difference) between the oscillator-based Hardware Clock time and UTC.
- If two or more synchronizing NTP associations are available and the Hardware Clock accumulates too much time error, the NTP daemon "drops" the Hardware Clock and synchronizes with the best association, with a corresponding adjustment to its Stratum.

The Hardware Clock leaves holdover when one of the following occurs:

- An Input Reference becomes available again. (As a result, the NTP daemon returns to Stratum 1 operation.)
- The estimated time error exceeds the user-configurable *Time Error Limit*.

If the estimated time error exceeds the user-configurable *Time Error Limit*:

- If one or more synchronizing NTP associations are available, the NTP daemon synchronizes with the best one, with a corresponding change to its stratum.
- If no synchronizing NTP associations are available, the NTP daemon's behavior is determined by the settings on the **NTP - Prefs** page. See ***NTP - Prefs*** (on page 40).
- The Hardware Clock synchronizes to the NTP daemon.

TIMING - Sysplex

The Sysplex Timer port outputs serial time strings for IBM mainframe Sysplex systems. The Sysplex Timer provides a common time reference across all the members of an IBM Sysplex. The Sysplex Timer is a key component when systems on multiple CPCs share access to the same data.

See ***Sysplex Out*** (on page 94) for specifications and more information on the format of the Sysplex output string.

Sysplex Output Configuration

The **Sysplex Out** port located on the rear panel outputs the time of day once per second.

Autostart:

- *Yes*: The **Sysplex Out** connector automatically outputs the time of day after system startup. The user cannot stop or restart the output by entering the "C" or "R" commands.
- *No*: The user starts or stops the Sysplex output by sending the following characters to the **Sysplex Out** connector:
  - "C" or "c" to start the output.
  - "R" or "r" to stop the output.

Parity: (Odd, None, Even) The parity setting of the Sysplex Out port (should match that of the receiving device).

Flywheel Quality Character:

The user can set the Flywheel Quality Character to:

- " " (space)
- "X"
- "F" (for **F**lywheel Quality Character)

About Sysplex and the Hardware Clock

To achieve the highest levels of precision and accuracy, the Sysplex Timer port gets its time directly from the Hardware Clock. The Hardware Clock synchronizes with the highest priority Input Reference (e.g. GPS, IRIG-B).

If an Input Reference becomes unavailable, and Holdover expires, the Hardware Clock synchronizes to the time the NTP daemon gets from other synchronizing NTP associations (if any are present). The default configuration includes three NTP servers on the Internet. If no synchronizing NTP associations are present, the Hardware Clock is unsynchronized and uses the internal oscillator to keep time.

The time quality character at the end of the Sysplex output string reflects the synchronization state of the Hardware Clock. The user can select the time quality character used after holdover expires and the hardware clock is:

- Synchronized to the NTP daemon, or
- Using the internal oscillator to keep time.

This setting is called the *Flywheel Quality Character*.

About the Flywheel Quality Character

The time quality character at the end of the Sysplex output string has three states:

- The first state is "X", time is invalid. The Hardware Clock has not yet synchronized to an Input Reference.
- The second state is " " (space), time is valid. Hardware Clock has synchronized to an Input Reference, or is in Holdover.

The third state is "F", the Flywheel Quality Character. The Hardware Clock has no Input References and Holdover has expired.

The time quality character can progress through a number of states:

1. After the user starts the SyncServer, the Sysplex port starts outputting a time string. Initially, the time quality character is "X" (time invalid).
2. When the Hardware Clock locks to an Input Reference, the time quality character becomes " " (time valid).
3. If the Hardware Clock loses all Input References and enters Holdover, the time quality character remains " " (time valid).
4. If Holdover expires, the time quality character becomes the Flywheel Quality Character, determined by the user.

5. If an Input Reference becomes available again, the Hardware Clock synchronizes with it and the time quality character becomes " " (time valid) again.

Usually there is a short delay between the Hardware Clock changing state and the time quality character changing.

Here are some potential guidelines for configuring the Flywheel Quality Character (FQC):

- The user sets the FQC to " " if one or more of the following are true:
  - The SyncServer is configured with two or more synchronizing NTP associations and the user is satisfied with using time from other NTP associations.
  - The SyncServer oscillator type has superior time keeping properties compared to the receiving equipment. This is usually the case since most computer equipment uses uncompensated quartz oscillators.
- The user sets the FQC to "F" if the receiving equipment can handle "F" as a time quality character in some way that is useful and distinct from the " " or "X" time quality characters.
- The user sets the FQC to "X" so that the receiving equipment to handles time from NTP or the Hardware Clock internal oscillator as "X" (time invalid).

Troubleshooting: If the time quality character remains "X" (time invalid) even though Input References are connected to the SyncServer.

- Verify that the physical connection to the input connector is valid and that there are no cable breaks or short circuits.
- On the **TIMING - HW Clock** page, verify that the Input Reference is *Enabled* and that *Forced Timing Source* is set to *Auto*.
- For IRIG-B, on the **REFERENCES - IRIG-B** page, check that the *Timecode Input* setting matches the input signal type.
- For GPS, wait for the GPS receiver to complete the GPS acquisition process and achieve "locked" status. Also see ***Operating in "Window Mode"*** (on page 102).

Also see ***TIMING - Holdover*** (on page 45) and TIMING - HW Clock.

Note: If the user sets *Forced Timing Source* on the **TIMING - HW Clock** page to *Free Run*, the *Flywheel Quality Character* in effect at that moment remains in effect thereafter.

REFERENCES Tab

Select a topic from below to learn more about the REFERENCES features of the Web Interface:

REFERENCES - GPS

Note: This option is not available for the S250i model

GPS Position and Operating Mode

This page can be used to view or set the GPS receiver's Position and Mode, as well as the GPS Antenna Cable Delay.

Status: Indicates whether the GPS receiver is a valid reference (locked) or not (unlocked).

Current Position: The GPS antenna position in Latitude and Longitude by degrees, minutes, and seconds, and the cardinal points of the compass followed by the altitude in Meters. These values can be permanently set when the **GPS Mode** is set to **Position Hold**.

Mode:

- **Survey**: In this mode, the receiver surveys and averages its position before switching to Position Hold mode. Use this setting for stationary applications, such as server rooms. This is the default setting.
- **Dynamic**: In this mode, the receiver continuously updates its position. Use this setting if the position of the SyncServer could change occasionally or continuously, such as vehicles, aircraft, and ships. This setting provides lower timing precision and accuracy than the Survey and Position Hold modes.
- **Position Hold**: In this mode, the receiver calculates the time based on a fixed position that has been provided by Survey Mode or entered by the user. Use this setting if GPS visibility is poor and the receiver has difficulty establishing its position using Survey mode after one day. The accuracy of the user-entered position affects the accuracy of the timing solution from the GPS reference. Also see ***Operating in "Window Mode"*** (on page 102).

Position Entry: Allows values of latitude, longitude, and altitude to be manually entered. Once the values have been entered, click the **APPLY** button.

Antenna Cable Delay:

Use this setting to achieve the highest timing precision and accuracy on the timing outputs such as IRIG Out or 1PPS Out. This setting has a negligible effect on NTP synchronization because the scale of the adjustment (nanoseconds) is not significant compared to millisecond latencies on typical networks.

The Antenna Cable Delay *advances* the Hardware Clock slightly to cancel out the signal *delay* caused by the length of the GPS antenna cable.

To calculate the adjustment, select the signal propagation rate for the appropriate cable type from the table below and multiply it by the length of the cable.

Type	Rate per foot	Rate per meter
RG-58	1.4 nS/foot	4.59 nS/meter
RG-59	1.24 nS/foot	4.06 nS/meter

For example, the standard 50 foot RG-59 antenna cable x 1.24 nS/foot = 62 nS of Antenna Cable Delay.

Or, using meters, the standard 15.24 meter RG-59 antenna cable x 4.06 nS/meter = 62 nS of Antenna Cable Delay.

Note: The Antenna Cable Delay option is used to compensate for the signal delay caused by the GPS antenna cable. Do not use this setting to compensate for the length of the Timecode Output cable, use REFERENCES, IRIG-B instead.

REFERENCES - IRIG-B

Note: This option is not available for the S200 model.

Use this page to configure the **IRIG In** and **IRIG Out** connectors on the rear panel.

Locked: (Yes, No) Indicates the presence of a valid IRIG input.

Input Mode (IRIG In connector) and **Output Mode** (IRIG Out connector):

- **IRIG-B**: Standard IRIG-B 123 time code.
- **IRIG-B (Legacy TrueTime):** Standard IRIG-B with four time-quality bits and a lock indicator encoded in the control bits.
- **IRIG-B with IEEE 1344 extension:** Standard IRIG-B with information encoded in the control bits per the IEEE 1344 standard. These include year, daylight saving time, leap second, time quality, and parity information.
- **Auto**: (Input Mode only) Automatically selects one of the modes above, based on the incoming signal.

NOTE: IRIG-1344 only provides a leap warning during the last minute of the day of the event. In this case, while the SyncServer will propagate that information via NTP, most NTP clients will not query the SyncServer in time to be warned of the leap event.

Output Type: Set the type of time encoded in the IRIG-B time code output.

- **UTC**: Standard IRIG encodes UTC. This is the factory default setting.
- **Local**: *Non-standard* IRIG encoded with the local time offset instead of UTC. See the **TIMING - Time Zone** page for information on setting the local time.

Cable Delay (nS): Compensate for the time delay in the output cable. This adjustment is used to put the end of the output cable “on-time”. Select the signal propagation rate from the table below and multiply it by the length of the cable to arrive at the cable delay.

RG-58 1.4 nS/foot 4.59 nS/meter
RG-59 1.24 nS/foot 4.06 nS/meter

See ***IRIG-B (S250i and S250)*** (see "IRIG-B" on page 173) default settings

SYSTEM Tab

Select a topic from below to learn more about the SYSTEM features of the Web Interface:

SYSTEM - General

Use this page to manage:

- The network Hostname for the SyncServer.
- Automatically check for software upgrades.

Hostname: (Default: "SyncServer") The hostname identifies the SyncServer on the network and is also an important element of NTP autokey authentication. When operating multiple SyncServers on a network domain, or when using NTP autokey, replace the hostname with a unique descriptive string composed of alphanumeric characters with no spaces or special characters. The field has been programmed to reject invalid characters.

Software Update Availability Check: (Default: Enabled) When enabled, the SyncServer checks a file on the Microsemi web site for software upgrades shortly after noon, local time, Monday through Friday, as determined by the *Local Time Zone* setting on the **TIMING - Time Zone** page. If the software *Release* and *Revision* on upgrade.txt (for S2XX models) is more recent than that of the software on the SyncServer, the SyncServer displays a notice on the **STATUS - General** page, and generates a *System Upgrade Alarm* on the **ADMIN - Alarms** page.

In order for the *Software Update Availability Check* to function, LAN1 must have:

- Firewall access to the Internet (port 80)
- A valid DNS server

To manually check if an upgrade is available, or if network conditions prevent *Software Update Availability Check* from checking automatically, compare the **STATUS - General** page with:

- ***http://update.symmetricom.com/upgrade.txt*** for S200, S250, and S250i

Note: S2XX models have versions 1.XX

For example, compare "Version=1.10" and "Last Checkpoint: 1.103" on upgrade.txt with "Release Version 1.10 Build 1.103" on the **STATUS - General** page. Since the values are the same, no upgrade is available.

If an upgrade is available, go to ***Upgrading System Software*** (on page 107) to find out how to upgrade the system software.

Note: The default configuration of the *System Upgrade Alarm* on the **ADMIN - Alarms** page is "Severity = Minor", "Send SNMP trap", "Write to log", and "Send email notification" when upgrades become available. SNMP and alarm email must be configured correctly to function.

The user can also contact ***Microsemi Customer Assistance*** (on page 3) for information about upgrades.

SYSTEM - Upgrade

Use this page to upgrade the SyncServer's software. This can be done using the web interface to upload the new software from workstation, or using the keypad/display interface to upload the new software from a USB flash memory device connected to one of the SyncServer's USB ports. Please consult ***Upgrading System Software*** (on page 107) before upgrading the software.

Note: Please avoid decompressing the *.tar upgrade file prior to upgrading the SyncServer. The SyncServer will not install software from an upgrade file that has been modified or decompressed and recompressed. If needed, please download a new software file from Microsemi.

Upload Upgrade Package to SyncServer

BROWSE button: Choose an upgrade file that's accessible from your workstation, such as a network drive or Desktop.

UPLOAD button: Upload the upgrade file to the SyncServer.

Manage Files in SyncServer

Current Files: This window displays upgrade files and an upgrade history file.

Optional Parameters: This field can be used to supply optional installation parameters, if required. This field is not required for normal operation.

INSTALL button: To install the upgrade file, select the file and click the INSTALL button.

VIEW button: To see the upgrade history, select the upgradehist.txt file and click the VIEW button.

DELETE button: To delete a file, select the file and click the DELETE button. It may be necessary to upload a file before the upgradehist.txt file can be selected and deleted.

SYSTEM - Factory Reset

Use this page to reset the SyncServer to its original factory default configuration.

Before resetting the factory defaults, the user may want to back up the current configuration if they intend to use it again in the future.

To reset the factory defaults, select **Reset to Factory Defaults** and click the **APPLY** button. This clears *ALL* of the current settings on the SyncServer, restores the original factory default configuration, and reboots the SyncServer.

After restarting, the user may need to configure LAN1 before reconnecting to the web interface. The default username and password (admin, symmetricom).

See ***Factory Default Settings*** (on page 171)

A partial list of the defaults restored by this operation:

- Network port settings
- NTP Associations

- Hostname
- All settings defined on the **ADMIN** pages (Web, Users, Alarms, Logs Config), including the username and password settings.
- All services are reset to their default modes of operation.
- Hardware Clock settings, including forced mode, Time Zone, Position and Time Error Limit, IRIG Input and Output, etc.
- All cryptographic materials (NTP keys, sshd keys, SNMP users and communities) deleted.
- Logs are erased.

Also see ***Backing Up/Restoring Configurations*** (on page 118), ***Configuring LAN1*** (on page 111), and ***Logging in to the Web Interface*** (on page 112).

ADMIN Tab

Select a topic from below to learn more about the ADMIN features of the Web Interface:

ADMIN - Web

Use this page to:

- Configure the appearance and information displayed on the login page.
- Modify the behavior of the web interface.

Login Page Configuration

The settings in this section configure the Login page to:

- Display status information. This is convenient for monitoring status without logging in, particularly if LAN1 is on a private administrative network.
- Remove status and information that identifies the SyncServer from the login page. This makes it more difficult for unauthorized users to recognize the SyncServer via its web interface.

The login page choices are:

- **Plain:** Login page does not contain any identifying text or graphics.
- **Graphic**: Login page contains identifying text, graphics, and user-selected status information.

The configurable system information includes the following choices:

- **Title**: A user-determined text string at the top of the login page.
- **Time, Hostname and LEDs**: The local time, the hostname, and the status LEDs.
- **NTP Status**: The NTP Stratum and Reference ID.
- **Hardware Clock Status**: The current Sync Source and whether the Hardware Clock is locked.
- **GPS Receiver Status and the Satellite Count**: GPS receiver is providing timing information and the number of satellites visible.
- **Highest Severity Alarm:** The name of the most recent and most severe pending alarm.
- **Version Information and Uptime**: The model number, software version, and uptime since the unit was started.
- **IP Addresses for all Configured LAN Ports**: The MAC, IPv4, and IPv6 addresses of the LAN ports.

Save Configuration Settings

Beyond the login page, the user can determine the behavior of the web pages.

Warn when Navigating without saving Changes: (Enabled by default)

- When this feature is enabled, the SyncServer sends warnings messages if the user makes settings changes and navigates away from the page without clicking the **APPLY** button. This reduces the possibility of accidentally losing unsaved changes.
- When this feature is disabled, the SyncServer suppresses these warning messages.

Updating the Configuration Backup File: (Enabled by default)

- When this feature is enabled, the SyncServer updates the configuration *backup file* in non-volatile memory when the user applies or saves changes to the configuration. This may slow the web interface's response time, but ensures that the current configuration is backed up and will be restored if the SyncServer is rebooted.
- When this feature is disabled, the SyncServer does not update the backup file when the user applies or saves changes to the configuration. This may improve the web interface's response time to applied changes but leaves the backup file unchanged. This option can be useful for keeping a "known good configuration" available while trying out experimental configurations. If the experimental configurations aren't satisfactory, use the **WIZARDS - Restore** page to restore the known good configuration. Once the desired configuration is reached, manually save the configuration backup file to non-volatile memory using the **WIZARDS - Backup** page.

Send Browser hint to not Auto-complete login page username / password: (Disabled by default)

- Enabling this setting enhances security. It prompts browsers to suppress the "auto-complete" and "remember password" features. This makes it more difficult for unauthorized users to gain access to the SyncServer from an authorized user's workstation or by exploiting stored browser settings.

Web Session Timeout

Select one of the following, and then press Apply:

- 5 Min
- 10 Min (default)
- 15 Min
- 30 Min
- 60 Min

ADMIN - Users

User Creation, Deletion and Password Maintenance

Use this page to:

- Add new users
- Delete existing users
- Set a new password
- Enable and configure password recovery
- Send a test email for password recovery

User

Select either **New User** or **admin**:

- **New User**, allows new Username and password information to be entered. If **Password Recovery** checkbox is selected, recovery information can be entered, and a test email can be generated.
- **admin**, allows usernames and passwords for existing users to be maintained.

Note: The **Delete Selected User** checkbox when checked, deletes information in the **Recovery Question** fields. If the **Apply** button is clicked, the user information will be deleted.

Passwords

Passwords must contain six or more characters, including lower and upper case letters, or letters and at least one number.

With password recovery enabled, the user can reset the password to a random string from the Login page by correctly answering the password recovery question. The SyncServer then sends an email message containing the new password to the email address supplied on the **ADMIN - Users** page.

The SyncServer must have a valid SMTP Gateway addresses for password recovery to work. If a DNS server is not available to <LAN*>, the SMTP gateway must be entered as an IP address, not as a DNS name. If needed, contact the system administrator to obtain this information.

See also: ***Changes to Passwords and User Names*** (see "Properties of User Names and Passwords" on page 20)

Changing the Password and Enabling Password Recovery

1. Enter the **Old Password**.
2. Enter the **New Password** and **Retype New Password**.
3. Select the **Password Recovery** checkbox.
4. Select a **Recovery Question** and enter the **Answer**.
5. Enter an **Email Address** and the **SMTP Gateway**'s IP address or DNS name (if DNS is configured for <LAN*>).
6. (Optional) Select the **Send Test Email** checkbox.
7. Click the **APPLY** button.

NOTE: Once applied, test question, answer, and email address data will not remain visible on the page. The SMTP Gateway entered here is also used for email notification of alarms. However, email addresses for alarm notification are entered on the **SERVICES - Email** page. Email notification of alarms is configured on the **ADMIN - Alarms** page.

ADMIN - Alarms

Alarm Configuration and Notification

Use this page to view alarm status and to perform the following tasks:

- Configuring Alarm Severity (ALARM LED color).
- Manually clearing alarms.

- Configuring Alarms to clear automatically after 15 minutes.
- Configuring notification by SNMP traps and email messages.
- Logging of alarms, notification events.

The **Alarm LED** at the top left corner of the web interface and on the front panel indicates the highest severity alarm on the **ADMIN - Alarms** page:

- Red: Alarm with severity = *Major*.
- Orange: Alarm with severity = *Minor.*
- Green: Alarm with severity = *Notification*, or no alarms.

Alarm Configuration and Notification

Name: Describes the system event that causes the alarm. Also see ***Alarm Descriptions*** (on page 59), and ***Alarms and Notification*** (on page 116).

State: A graphic LED indicating the alarm *state* and *severity* at the time the page was generated:

- Grey LED: Severity is set to *Notify*.
- Green LED: Severity is *Major* or *Minor*, and there is no alarm.
- Orange LED: Severity is set to *Minor*, and there is an alarm.
- Red LED: Severity is set to *Major*, and the alarm there is an alarm.

Note: To check the current state, click the refresh icon (rotating arrows) at the lower right corner of the page.

Clear Now: This checkbox is only available during an alarm. To clear the alarm, select the *Clear Now* checkbox and click the APPLY button. Doing so returns the alarm to a "No Alarm" state.

Auto Clear: Automatically clears the alarm after 15 minutes, regardless of the condition that caused it.

Severity: Determines the Alarm LED response to an alarm and sets the "Level:" in the SNMP trap, email message, and log entry.

- Notify: Does not raise an alarm (No change to Alarm LED color).
- Minor: Raises a minor system alarm (Alarm LED = Orange).
- Major: Raises a major system alarm (Alarm LED = Red).

Note: If enabled, *Send Trap*, *Write Log*, and *Send Email* operate in response to alarms, regardless of Severity.

Send Trap: Sends an SNMP trap when the alarm occurs and ends. SNMP must be configured correctly on the **NETWORK - SNMP** and **NETWORK – SNMP Traps** pages for this to work.

Write Log: Generates a log entry in syslog when the alarm occurs and ends. The log can be viewed from the **LOGS - syslog** page.

Send Email: Generates a descriptive entry in an email message when the alarm occurs and ends. The SyncServer compiles the entries over a 5-minute period and sends email messages at five-minute intervals, so an email alert may contain more than 1 alarm. For Send Email to work, the **SERVICES - Email** page must be configured with a valid SMTP Gateway

and email address. If the SMTP gateway is a DNS name, LAN1 on **NETWORK - Ethernet** must be configured with a valid DNS server address.

Note: When *Clear Now* and *Auto Clear* are used to clear an alarm, *Send Trap*, *Write Log*, and *Send Email* do not generate notification messages or log entries.

Alarm Descriptions

Note: Alarm indicators for optional features or equipment appear when the related option is present and enabled.

NTP System Peer Change Alarm: The SyncServer's current NTP synchronization peer has changed.

NTP Stratum Change Alarm: The NTP Stratum level has degraded. For example, the NTP Stratum has gone from 1 to 2.

NTP Leap Change Alarm: The SyncServer raises this alarm when the *leap indicator* changes state. See ***STATUS - NTP*** (on page 25).

This change of state has two potential causes: The first is that the SyncServer was reconfigured, causing the NTP daemon to be restarted. More rarely, this can occur when the SyncServer is within 24 hours of a leap second adjustment.

System Network Alarm: Alarms if a configured port has no connection (network link). Clears if all configured ports have connections.

System Upgrade Alarm: The SyncServer checks for software upgrades and raises this alarm if a software upgrade is available. Microsemi recommends leaving this alarm enabled. Microsemi recommends enabling *Send Trap* and/or *Send Email* for this alarm on the **ADMIN - Alarms** page.

Note: In order to detect upgrades, the SyncServer must be correctly configured with a DNS server and must have http access to the Internet through port 80. This feature is enabled by default, but can be disabled on the **SYSTEM - General** page.

System Config Change Alarm: Generates an alarm if the system configuration has been changed. If the Auto Clear is not selected, this alarm will remain pending until cleared by the administrator.

System Health Alarm: The web interface has been unable to automatically save user configuration changes to the backup file. The user might need to perform a manual backup using the **WIZARDS - Backup** page.

System Up/Down Alarm: The Syncserver has been restarted.

System Authentication Alarm: The SyncServer detected a failed login attempt on the web interface.

Timing No Source Alarm: The Hardware Clock does not have a valid timing reference.

Timing GPS Source Alarm: (Displayed on GPS-equipped SyncServers only) The GPS time reference is not providing valid timing information. This may be caused by:

- An insufficient number of visible GPS satellites.

- The GPS satellite signals may be blocked from reaching the antenna, or are too weak to be detected by the receiver.
- The GPS antenna cable may be disconnected, broken, shorted, or too long.

Timing Timecode Source Alarm: The Hardware Clock is not detecting a valid input signal on the IRIG In connector.

Timing PPS Source Alarm: The Hardware Clock is not detecting a valid input signal on the 1PPS In connector.

Timing 10MHz Source Alarm: The Hardware Clock is not detecting a valid input signal on the 10MHz In connector.

Timing GPS Antenna Short Alarm: (Displayed on GPS-equipped SyncServers only) The GPS receiver detects an overcurrent condition on the GPS antenna cable. The likely cause is a short circuit.

Timing GPS Antenna Open Alarm: (Displayed on GPS-equipped SyncServers only) The GPS receiver detects too little current in the power supplied to the GPS antenna. The likely cause is a disconnected or broken GPS antenna cable. A GPS splitter may also cause this condition.

Timing Oscillator DAC Range Alarm: The SyncServer is applying the maximum or minimum DAC value to steer the oscillator. If this recurs frequently or over a sustained period of time, there may be a problem with the oscillator.

Timing Rubidium Lock Alarm: The optional Rubidium oscillator, if installed, has not stabilized its frequency output. After power up, this alarm may be raised for up to several minutes until the Rubidium warms up and stabilizes its frequency output.

Timing Oscillator Unlock Alarm: The Hardware Clock's oscillator frequency is not locked to the reference source.

Timing Source Change: The Hardware Clock has switched timing references.

Timing Source Change Lower Accuracy Input: The Hardware Clock has switched to a lower-priority timing source.

Timing PLL Unlock Alarm: The Hardware Clock oscillator's PLL unlocked.

Timing Time Quality 1e-6 Alarm: The Hardware Clock's estimated time error has exceeded 1e-6 seconds (1 microsecond).

Timing Time Quality 1e-5 Alarm: The Hardware Clock's estimated time error has exceeded 1e-5 seconds (10 microseconds).

Timing Time Quality 1e-4 Alarm: The Hardware Clock's estimated time error has exceeded 1e-4 seconds (100 microseconds).

Timing Time Quality 1e-3 Alarm: The Hardware Clock's estimated time error has exceeded 1e-3 seconds (1 millisecond).

Timing Leap Event Alarm: The leap indicator from the Hardware Clock's GPS or IRIG 1344 timing references, indicates that a leap event is pending. The pending event can be a Leap Second Insertion, Leap Second Deletion, or Clear Alarm, which indicates that the alarm has passed. See STATUS - Timing for more information.

Note: IRIG-1344 only provides a Leap Indicator warning during the last minute of the day of the event. In this case, while the SyncServer will propagate that information via NTP, NTP clients may not query the SyncServer in time to be warned of the leap second adjustment.

LAN1 Link Alarm: A network connection is not available on LAN1. Note that if LAN1 is down, SNMP and Email notification do not work and the web interface is not available.

Note: The Network LED indicates the status of the "LAN* Link Alarms". Please consult Status LEDs.

LAN2 Link Alarm: LAN2 has lost its network connection.

LAN3 Link Alarm: LAN3 has lost its network connection.

Timing NTP Daemon Alarm: The NTP Daemon is no longer a valid source of timing to the Hardware Clock.

System Reset Default Config Alarm: Typically, during a reboot, the SyncServer applies the current configuration. This alarm is raised when the system failed to initialize itself to the current configuration and it automatically restored itself to the default configuration. The circumstances are usually caused by missing or corrupted current configuration.

ADMIN - Logs Config

System Log Configuration

Use this page to configure the SyncServers logging subsystem. The SyncServer uses klogd and syslogd, the standard logging facilities. What is logged and where it is logged is based on the options selected in this page. A default set of options is preconfigured that should provide a level of detail sufficient for the majority of applications. Each entry is broken down into facility and priority, where facility is the part of the system such as the kernel or the application daemons and priority indicates the severity of the message. The priority ranges from "Emerg", which represents only very significant events like kernel panics to "Debug", where even debug messages are logged. Messages are generally logged to different files to allow easier parsing. The messages file is unique however in that its default configuration captures all messages flowing through the logging daemons. But, due to the high volume of traffic, it is cleared at each power cycle or reboot.

Note: Most users should leave the logs configured in the default manner unless directed to make changes by Microsemi technical support.

Log Types

syslog: syslog holds messages about system level events. Examples of system events are privilege changes (e.g., sudo) and messages about regularly schedules events such as cron.

auth.log: The authentication log contains entries regarding authentication events from login or PAM (Pluggable Authentication Module).

kern.log: The kernel log contains entries submitted by the kernel. Examples of kernel events are network errors or hardware changes.

daemon.log: The daemon log contains entries submitted by the daemon processes that provide the services in the SyncServer. Examples of daemon log entries are NTP changes, SNMP events, and xinetd events.

messages: The messages file is something of a catchall file. By selecting various priorities, it is possible to capture large amounts of data regarding system operation. However, the volume of data becomes impractical to manage quickly. As such, this file is cleared at each power cycle or reboot.

events: The events log is not configurable. This log is maintained outside syslogd and contains configuration and event data related to operations performed in the web interface.

Log Priorities

In the case of kernel, syslog, auth and daemon logs, the priority specified will cause all messages less than or equal to the selected priority to be logged. The priorities are defined in descending order.

In the case of the messages log, only the selected priorities are logged. As such, up to four priority levels are supported.

Debug: This priority level captures debug output from applications designed to produce this type of output. This level generates a large volume of traffic and is not recommended unless it is done under the direction of technical support personnel. An example may be a signal handler called.

Info: This level captures informational output. This level typically provides information regarding successful operations. An example may be a successful file save or a normal application startup.

Notice: This level captures transactional information. An example of this could be a network connection or login.

Warning: This level captures information that is not expected by the application or system. This could be something the system is not configured to handle. An example might be a malformed network packet or a drive change caused by inserting a thumb drive into a USB slot.

Err (deprecated): The use of this level is deprecated.

Crit: This level captures critical information. This data can often be used to debug the failure of a system or application under abnormal conditions. An example of this may be a memory error.

Alert: This level captures information about which the administrator should be made aware. An example of this could be a failed login attempt.

Emerg: This level captures messages of the highest priority. These are typically last resort messages before an abnormal exit of the calling application or the system itself. An example of this would be a hardware error or memory exhausted message.

Remote Log System

It is possible to send a copy of all messages to up to 8 (eight) remote system running syslogd. This allows centralized management of alarm messages. As the system logs are written to a RAM based volume, messages may be lost if the system is rebooted or power cycled or

experiences an unexpected failure. They may also be overwritten if memory is low. Microsemi recommends rotating log files, if needed. Specifying the DNS name or IP address of a remote server will configure the SyncServer to send a copy of each message received by the syslog and kernel log daemons to the remote address, if it is reachable. The remote server can then be configured to filter the messages using its configuration file.

A complete definition of how Syslog is configured may be obtained by consulting the standard syslog.conf man pages that are widely available on the Internet.

See ***Admin Logs Config*** (see "Logs Config" on page 175) default settings

SERVICES Tab

Select a topic from below to learn more about the SERVICES features of the Web Interface:

SERVICES - Startup

Daemon Current State and Startup

The SyncServer uses a number services that operate continuously to support its functions.

Use this page to:

- View the current state of the services and to turn them on or off.
- Enable or disable services from starting automatically when the SyncServer is started.
- Run, Reboot, or Halt the SyncServer's operating services and operating system.

Daemon

A list of the user controllable daemons supported by the SyncServer:

Web Server (HTTPD): Provides the SyncServer's web interface. If Auto Startup is deselected and the SyncServer reboots, the web interface will not be available.

To start the web server after it has been stopped, open a command line session through the *Console RS-232* port located on the front panel or, if available, through a Telnet session with LAN1 port. Once logged in, restart the web server by typing "HTTP on".

NTP: Network Time Protocol daemon. Supports all NTP functions.

SNMP: Simple Network Management Protocol daemon. Responds to SNMP requests and sends SNMP traps.

SSH: Secure Shell daemon. Provides an encrypted channel for command line sessions with the SyncServer through the LAN1 port.

Sysplex: Sysplex timing information on the **Sysplex Timer-Out** connector.

Time: Time Protocol requests per RFC 868 over TCP.

Time - UDP: Time Protocol requests per RFC 868 over UDP.

Daytime: Daytime Protocol per RFC 867 over TCP.

Daytime - UDP: Daytime Protocol per RFC 867 over UDP.

Telnet: Telnet protocol service for remote access to the command line interface on LAN1.

Current State/Startup

Shows the current state of the service. To change the state, select the desired state and click the **APPLY** button.

On: The service is running.

Off: The service is stopped.

Auto: When selected, the service starts automatically when the SyncServer reboots.

Note: Services that cannot be directly turned off display grayed out **On** and **Off** radio buttons. These services can only be controlled by selecting or deselecting Auto Startup. Applying the change will then stop or start the service as appropriate.

System Control

Run: The SyncServer continues to operate normally. This is the default setting.

Reboot: Reboots the SyncServer. During this process, the browser displays "This browser will attempt to reconnect..." When the SyncServer finishes rebooting, the browser displays the login screen (provided DHCP hasn't changed the IP address).

Halt: Halts the operating system after about 15 seconds, typically. While the SyncServer is halting, the web interface displays "Halting System - This browser session cannot continue..." and the front panel display states "Shutting down. Please wait...". Wait at least 15 seconds, and shut the power switch off.

See ***Services Startup*** (see "Startup" on page 176) default settings

SERVICES - HTTP

Web Server Configuration

The SyncServer's web interface allows both standard and secure (encrypted) network access. Standard access is provided by default. To use encrypted access, a secure certificate must be created. The SyncServer can only use self-signed certificates.

Creating a new certificate overrides previously created certificates. The certificate values used are not significant to the SyncServer. They are provided to any user using the certificate. All of the fields must contain values.

When a certificate has been created, the *Secure* log in option appears on the login page. The entire session uses the selected communication method.

Security

Standard (Port 80) Only: The web interface is available using a standard non-encrypted http connection. This is the factory default configuration.

Secure (Port 443) and Standard (Port 80): The web interface is available using either type of connection.

Secure (Port 443) Only: The web interface is available using an SSL-encrypted connection.

Note1: To connect to Port 443, the URL in the browser must begin with "https".

Protocols

If the secure port 443 has been selected, the following the security protocol selections can be checked:

- TLS 1.0
- SSL 3.0
- SSL 2.0 (appears only if previously used)

Note2: the default is to have both TLS 1.0 and SSL 3.0 selections checked.

Note3: SSL 2.0 exists only for the purposes of backwards compatibility on systems previously enabling this protocol. SSL 2.0 is a deprecated security protocol, and this option will no longer appear on the SERVICES - HTTP page if at any time Port 443 or SSL 2.0 is disabled, or the system is restored to factory defaults.

Note4: At least one protocol needs to be selected. In addition, if at any time the protocol being used is changed, the certificate will need to be regenerated. See the following.

Certificate Info:

Common Name: SyncServer's hostname, as entered on the **SYSTEM - General** page. The default factory configuration is "SyncServer".

Bits: Number of RSA Key Bits, 1024 or 2056 bits. The default factory configuration is "1024".

Days to Expiration: The number of days before the certificate expires.

ISO Country Code: The Two-Character International Country Code.

State: The state where the SyncServer is located.

Locality: The locality where the SyncServer is located.

Organization: The organization or company the SyncServer belongs to.

Organizational Unit: The organizational unit or division that uses or is responsible for the SyncServer.

Email Address: The email address of the administrator responsible for the SyncServer.

See ***Services HTTP*** (see "HTTP" on page 176) default settings

SERVICES - SSH

SSH Security Configuration

After setting the other options on this page, select **Regenerate SSH Secure Keys** and click the **APPLY** button to generate a new set of SSH secure keys. This step is required before the user can log in to LAN1 using SSH.

Protocol: Sets the protocol to one of the following:

- SSH-1 & SSH-2
- SSH-1 Only
- SSH-2 Only (default)

Allowed Users: List user names that are allowed SSH access.

Denied Users: List user names to exclude from SSH access.

Note: Use a space character between user names. This list supports the ? wild card as a substitute for an individual character, and the * wild card as a substitute for the rest of a word. For example, *Allowed Users* = Bird* would let *Bird1* and *Birddog* log in. *Allowed Users* = Bird? would let *Bird1* log in, but not *Birddog*.

Log Level: The level of verbosity for logging ssh messages.

Can be set to one of the following:

- QUIET
- FATAL
- ERROR
- INFO (default)
- VERBOSE
- DEBUG

Server Key Bits: The number of bits to use when generating the keys.

Can be set to one of the following:

- 512
- 768 (default)
- 1024
- 2048

Key Regeneration: The interval, in seconds, with which to regenerate keys (default 3600 seconds).

See ***Services SSH*** (see "SSH" on page 177) default settings

SERVICES - Email

SMTP Gateway and Alarm Email Recipients

This page establishes the SMTP gateway and email addresses used by the SyncServer for email notification of alarms and password recovery emails. This page must be configured correctly for "Send Email" notification on the **ADMIN - Alarms** page to work.

SMTP Gateway: Enter the DNS name or IP address of a SMTP server that's reachable from LAN1.

User 1-10: Enter the email address of the individuals who should receive email notifications of alarms.

LOGS Tab

System Event Log

The Logs page provides access to system activity and messages that are generated by the various subsystems in the SyncServer. The logs are separated by function. The logging behavior can be configured using the **ADMIN - Logs Config** page. Each of the logs records a series of time-stamped events.

In the case of the system, auth, daemon, kern and messages logs, the entries take the standard form defined by the syslog daemon. These entries are:

date time system facility message: Here "system" is the hostname that generated the message. The "facility" is a component of the system generating the message. This could be anything like the kernel itself, system daemons and even applications. Finally, there is the text of the message itself. Here are two messages on the system SyncServer. One is from daemon.log and the other from the kernel:

```
Sep 19 19:20:26 SyncServer ntpd[3577]: ntpd 4.2.0b@1.1396-o Tue Aug 9
01:05:42 UTC 2005 (7)
Sep 10 00:06:18 SyncServer kernel: Jida-Driver installed
```

In the case of the event log, the entries take the form of:

```
Date time user source description
```

Here "user" is the user logged into the web interface, "source" is the IP address of the remote system using the web interface and "description" provides information regarding the nature of the event. Here is a message showing a successful remote login along with the user id and IP address of the contact.

```
10/01/2005 22:36:28 admin     192.168.7.16    Successful login
```

Events: The events log is not configurable. This log is maintained outside syslogd and contains configuration and event data related to operations performed in the web interface.

syslog: syslog holds messages about system level events. Examples of system events are privilege changes (e.g., sudo) and messages about regularly schedules events such as cron.

auth.log: The authentication log contains entries regarding authentication events from login or PAM (Pluggable Authentication Module).

daemon.log: The daemon log contains entries submitted by the daemon processes that provide the services in the SyncServer. Examples of daemon log entries are NTP changes, SNMP events, and xinetd events.

kern.log: The kernel log contains entries submitted by the kernel. Examples of kernel events are network errors or hardware changes.

messages: The messages file is something of a catchall file. By selecting various priorities, it is possible to capture large amounts of data regarding system operation. However, the volume of data becomes impractical to manage quickly. As such, this file is cleared at each power cycle or reboot.

Every 20 minutes, if no new messages were logged, the Syslog daemon logs a -- MARK -- message to indicate that it is alive and well.

WIZARDS Tab

Select a topic from below to learn more about the WIZARDS features of the Web Interface:

WIZARDS - 1st Setup

Microsemi strongly recommends using the 1st Setup to perform the initial configuration of the SyncServer.

1st Setup guides the operator through the following procedures:

- Setting a new password
- Enabling Password Recovery (optional)
- Configuring the IP address, hostname, and DNS for <LAN*>.
- Setting the local time zone (optional)

WIZARDS - NTP

Microsemi recommends using this wizard to perform an *initial* NTP configuration of up to 5 server associations.

To modify an *existing* NTP configuration, use the **NTP - Config** page instead.

Note: This Wizard deletes all NTP associations that are not *server* associations.

Also see: NTP - Config and NTP - MD5 Keys.

WIZARDS - SNMP

Use the SNMP wizard to add or change the following SNMP v1/v2c settings:

- Set SysLocation, SysContact and SysName
- Set the Read and Write Community Strings
- Add up to four v1/v2c Trap Destinations

Advanced SNMP configuration (e.g., SNMP v3) is performed on the **NETWORK - SNMP** and **NETWORK - Traps** pages. Upon completing the Wizard, the new SNMP settings replace the previous ones and the SNMP daemon restarts.

See also ***NETWORK - SNMP*** (on page 31) and ***NETWORK - SNMP Traps*** (on page 32).

WIZARDS - Backup

The Backup wizard guides the operator through saving the SyncServer's current configuration to nonvolatile memory in the SyncServer, and optionally transfers the backup configuration to a remote location. The backup file can be used to:

- 'Clone' the configuration to other SyncServers with the same Software Version.
- Restore the SyncServer's configuration if it is lost or becomes unusable.

WIZARDS - Restore

Use the **WIZARDS - Restore** page to restore a saved configuration from a backup file, or to restore the factory default configuration.

Reset to Factory Defaults: Returns the SyncServer to its original factory configuration, removing ALL user-entered and operational information including password, IP addressing, GPS position, and time zone. See ***SYSTEM - Factory Reset*** **(on page** 53**).**

Restore Last Backup from SyncServer: Restores the configuration as it was when the user created the most recent backup configuration file. The backup file is located in the SyncServer's nonvolatile memory.

Restore From USB flash drive: Restores the configuration from a backup file located on a USB drive attached either of the USB ports on the front panel.

Restore backup from workstation hard-drive or network directory: Restores the configuration from any backup file located on local or network drive accessible to the browser.

Note: Resetting or restoring the configuration reboots the SyncServer. If LAN1 is configured to use DHCP, the DHCP server may assign a new IP address to LAN1. If needed, use the front panel STATUS button to view the new IP address on the LAN1 STATUS screen.

WIZARDS - Upgrade

Use **WIZARDS - Upgrade** to update the SyncServer software.

SyncServer upgrade packages are available at ***http://www.microsemi.com/ftdsupport*** and then following the links from the **Support** menu

Users are required to register in order to download software. Some export restrictions may apply.

To upgrade the software, download the upgrade package file to:

- A file area that is accessible to the web browser.
- To a USB flash drive, or to an area where it can be copied to a USB flash drive.

Then use **WIZARDS - Upgrade** to copy the upgrade file to the SyncServer and perform the upgrade.

Note: The SyncServer automatically decompresses the software upgrade ".tar" file. Please do not decompress the ".tar" file prior to upgrading the SyncServer.

HELP Tab

Select a topic from below to learn more about the HELP features of the Web Interface:

HELP - Contacts

Customer Assistance Centers are:

Worldwide (Main Number) 1-408-428-7907

USA toll-free 1-888-367-7966

Europe, Middle East & Africa 49 700 32886425

Technical Support personnel are available by phone 24 hours a day, 7 days a week, through the Main Customer Assistance number above and from 8 a.m to 5 p.m Central European Time, weekdays, at the Europe, Middle East and Africa number.

Customers who have purchased Technical Support Contacts may e-mail support to:

- Americas, Asia, Pacific Rim ftd.support@microsemi.com
- Europe, Middle East & Africa ftd.emeasupport@microsemi.com

Text box

Save local support contact information here such as Microsemi representative or company IT contact.

Note: Any information entered in the text box will be deleted when a Reset to Factory defaults is executed.

HELP - Docs

On-Line Manual

SyncServer Manual

To view the SyncServer Manual, click the **View Manual** link.

To **download SNMP mib to local filesystem**, click the Save As... button, navigate to a folder on your hard drive, and save the SNMP mib file

Further help can be found at the **Microsemi Web Site** www.microsemi.com/ftdsupport

Keypad/Display Interface

The keypad/display interface displays the time, system status, and provides the following functions:

- Configuring and enabling/disabling the LAN1 network port.
- Setting the time and entering freerun mode.
- Adjusting the brightness.
- Locking the keypad.
- Shutting down the SyncServer.
- Backing up and restoring the configuration from the USB port.
- Upgrading the software from the USB port.

Overview

When the SyncServer starts, the display shows the Microsemi logo followed by booting messages. After a minute or so, the SyncServer displays the default time screen.

The following buttons are user-input devices for the keypad/display interface.

- **ENTER**: Use with MENU - Applies a menu selection or function setting.
- **CLR**: Use with MENU - Returns to the previous screen without saving changes.
- **Left/Right Arrow Buttons**: In functions, moves the cursor left or right. In status, scrolls a screen horizontally when "<previous:next>" is displayed.
- **Up/Down Arrow Buttons**: In functions, increments/decrements the value the cursor is on. In status, displays the previous/next screen.
- **Number Buttons**: Enters a number, or selects a numbered menu item.

The following three buttons change the function of the display.

- **TIME:** Changes the format and contents of the time display.
- **STATUS:** Displays status the network ports and aspects of the SyncServer.
- **MENU**: Displays a menu of functions.

In This Chapter

TIME Button **73**
STATUS Button **74**
MENU Button **76**

TIME Button

Pressing the **TIME** button repeatedly changes the format and contents of the time display:

- Large numeric time display on full screen. Hours:Minutes:Seconds
- Medium numeric time display on the left, current reference and NTP Stratum on the right

- Small date and time, reference, and NTP stratum.

The time display also indicates a time scale:

- If the time zone setting on **TIMING - Time Zone** page is set to UTC, the time display shows "UTC" as the time scale.
- If the time zone setting on **TIMING - Time Zone** page is set to a non-UTC (local) time zone, the time adds AM/PM.
- If the *Ignore UTC Corrections from GPS Reference* setting on the **TIMING - HW Clock** page is enabled (selected), the time display shows "GPS" as the time scale.

Note: The **TIMING - Time Zone** page configures the display for UTC or local time. The **TIMING - HW Clock** can be used to display GPS time (not recommended). Also see ***TIMING - Time Zone*** (on page 42) and TIMING - HW Clock.

STATUS Button

Pressing the **STATUS** button repeatedly displays a series of status screens for:

- NTP
- Alarms
- Network Ports
- Hardware Clock
- GPS Receiver
- SyncServer model, serial number, software version, and software upgrade availability.

The upper right corner of each screen displays the user-configured UTC, local, or GPS time. See ***TIME Button*** (on page 73).

NTP Status Screen

Network Time Protocol (NTP) daemon status.

Stratum: The Stratum number of the SyncServer. Stratum 1 means it is locked to a Hardware Clock Input Reference. Stratum 2-15 means the SyncServer is locked to another NTP time source. Stratum 16 means that the SyncServer is unsynchronized.

REF: This field identifies the "system peer". While stratum is 16, this field shows the progression of the NTP clock PLL. The field starts with a value of "INIT". Once a peer has been selected, the clock may be stepped, in which case the reference ID field changes to "STEP". Once the PLL is locked, the stratum is updated and the reference ID provides information about the selected peer. When the SyncServer is operating at stratum 1, the reference ID displays the name of the Hardware Clock reference input. If the selected peer is another NTP server, the reference ID displays the address of the server.

NTP Packet I/O: The number of NTP packets the SyncServer has replied to and initiated. The SyncServer replies to clients that send NTP requests. The SyncServer also sends NTP requests when the NTP daemon isn't synchronized (i.e., Sync LED is RED) and when it is configured to synchronize to an NTP association (e.g., a Server type association).

Also see ***STATUS - NTP*** (on page 25).

Alarm Status Screen

Current alarm status.

Current: The total number of active alarms. Use the left/right arrows for search through the list of alarms.

Major: List of current major alarms

Minor: List of current minor alarms

Also see ***ADMIN - Alarms*** (on page 57).

LAN Status Screens

Multiple screens, one for each network port.

State: Shows “Up” if the port is enabled and “Down” if the port is disabled.

IPv4 Addr: Shows the address of the port.

SM: Shows the subnet mask (IPv4) or scope (IPv6).

GW: Gateway address.

IPv6 Addr: The IPv6 Link local address for this port.

Also see ***NETWORK - Ethernet*** (on page 27).

Hardware Clock Status Screen

Hardware Clock and Input Reference status.

Source: (2 fields) The first field is the name of the current reference. The second field indicates "Locked" when the Hardware Clock is synchronized to that reference.

HH:MM:SS H/W: The UTC or GPS time from the Hardware Clock, depending on the "Ignore..." setting on the **TIMING - HW Clock** page.

GPS In: Indicates "Locked" if the GPS receiver is a valid source of time.

1PPS In: Indicates "Locked" if 1PPS In is a valid source of phase.

IRIG-B In: Indicates "Locked" if IRIG In connector has a valid source of time.

10MHz In: Indicates "Locked" if 10MHz In is a valid source of frequency.

Also see TIMING - HW Clock.

GPS Receiver Status Screen

GPS receiver status.

Status: Indicates "Locked" when the receiver has a valid timing solution.

Satellites: The number of satellites the receiver is using.

Antenna: The electrical state of the GPS Antenna. "Good" for a normal antenna load current. "Open" for an open electrical circuit in the antenna. "Short" for an electrical short circuit.

Note: If you use a GPS antenna splitter, the status can become Open while the GPS receiver is still able to operate normally.

Lat: The latitude of the SyncServer.

Mode: The acquisition mode of the receiver: Survey (GPS receiver is determining its position), Dynamic (a user-configured mode for mobile applications) or Hold (the GPS receiver has determined its precise location, or the user has manually entered the location).

Lon: The longitude of the SyncServer.

Also see REFERENCES - GPS.

SyncServer Status Screen

Hardware and software identification. Software upgrade availability.

Model: The model number.

S.N.: The serial number.

Version: The software "Release Version" number.

Upgrade Available: Shows "Yes" if the SyncServer detects that more recent version of software is available at www.microsemi.com.

Also see ***SYSTEM - General*** (on page 52) and ***SYSTEM - Upgrade*** (on page 53).

MENU Button

Pressing the **MENU** button presents a tree-structured menu of functions:

```
1) LAN1
   1) Config
      1) IPv4
         1) Static Addr (Apply a static IP address)
         2) DHCP (Automatically get a dynamic IP address)
      2) IPv6 (Automatically configure LAN1 with an IPv6
         link local address. IPv6-only mode.)
   2) On/Off
      1) On (Enable the LAN1 network port)
      2) Off (Disable the LAN1 network port - all traffic
         types)

2) Brightness (Adjust the brightness of the front panel
   display)
      1) Low (Extends display life)
      2) Medium
      3) High

3) Shutdown (Press 1 to halt the SyncServer)
      1) Yes
      2) No

4) USB (Backs up or restores the configuration to/from a USB
   flash drive)
```

```
1) Backup Cfg (Backs up the current configuration of the
   SyncServer to the USB drive.)
2) Restore Cfg (Applies the SyncServer configuration on
   the USB drive to the SyncServer.)
```

Notes:

- Using **1) LAN1, 1) Config** clears all other network port settings.

Command Line Interface

The Command Line Interface (CLI) is available on LAN1 and the Console RS-232 port.

The user can connect to LAN1 using SSH or TELNET. By default, SSH is on and TELNET is off. Use the **SERVICES - Startup** web page to change these settings.

The username and login are the same as for the web interface.

Note: Physical access to the console port on the SyncServer should be controlled. The interactive bootloader could allow a malicious user to override boot parameters and gain restricted access to the device. If more information is required, contact ***Microsemi Customer Assistance*** (on page 3).

The CLI command structure has two levels: a top-level command set of system commands and an intrinsic help command set. Commands are entered as ASCII strings typed at the command prompt. The specific commands available at the particular tree level can be displayed by entering a "?" ("?" followed by "Enter" on the keyboard).

The CLI interface interprets the input on a character-by-character basis. As a result, only enough characters to uniquely identify the command need to be entered for the CLI to recognize which command you want to invoke. The CLI also accepts multiple commands on a single line when they are separated by spaces, so you don't have to press Enter after each command.

It is suggested that commands marked "Use all caps" be entered in all caps. This helps prevent accidental entry of those commands.

The following **Top-level**, and **Intrinsic Help** commands are available from the CLI.

Top-level Commands

GPSSTRENGTH: (Status only) Displays the GPS satellite tracking information in the following format:

```
N,X1,Y1,Z1,...,XN,YN,ZN
```

Defined as follows:

- N = Number of satellites. If one or more satellites are available, Xi,Yi,Zi follows N.
- X1 = Satellite vehicle number.
- Y1 = Satellite signal strength in dBW where less than -200 dBW means no signal.
- Z1 = Z1 can be either T or C:
  - T(racking) means the SyncServer receives the information from the satellite but the information is not used in its timing solution.
  - C(urrent) means the SyncServer currently uses satellite information in its timing solution.

For example, no satellites:

```
0
```

For example, one satellite with vehicle number 16:

```
1,16,C,-158
```

For six satellites:

```
6,12,C,-156,14,C,-155,8,T,-162,24,C,-158,18,C,161,6,C,-160
```

HALT: Halts the operating system. After entering the command, it prompts "Enter 'Y' to confirm". Halt the SyncServer before turning the power off. Action only command.

REBOOT: Halts and reboots the operating system. After entering the command, it prompts "Enter “Y” to confirm". Action only command.

DEFAULTS: Replaces the current configuration of the SyncServer with the factory default configuration. After entering the command, it prompts ‘Enter “Y” to confirm’. The command also halts and reboots the SyncServer. Action only command.

IPV4ADDRESS <aaa.bbb.ccc.ddd>: Displays or sets the LAN1 IPv4 address. Without input, the command displays the current IPv4 address. With input, the command sets the new IPv4 address. Query and action command.

IPV4MASK <aaa.bbb.ccc.ddd>: Displays or sets the LAN1 IPv4 subnet mask. Without input, the command displays the current IPv4 subnet mask. With input, the command sets the new IPv4 subnet mask. Query and action command.

IPV4GATEWAY <aaa.bbb.ccc.ddd>: Displays or sets the LAN1 IPv4 gateway. Without input, the command displays the current IPv4 gateway. With input, the command sets the new IPv4 gateway. Query and action command.

IPV4DHCP: Enables DHCP for LAN1. Action only command.

IPV6AUTO: Enables the automatically generated IPv6 link local address for LAN1. Action only command.

HTTP <on|off>: Without input, the command returns the current status of the SyncServer http daemon (running or stopped). Use input “on” or “off” to start or stop the SyncServer http daemon. Query and action command.

DISP <time>: Resets the display immediately. Use in rare instances when display and keypad freeze to avoid waiting (<24 hours) for it to clear on its own. After command is entered, it prompts “Do you wish to reset the front panel display? <Y/N>:”

SETTIMEOFYEAR <time>: Sets the current time in UTC. The <time> input format can be any one of the following

```
mm/dd/yyyy hh:mm:ss.x
yyyy ddd hh:mm:ss.x
mm dd yyyy hh:mm:ss.x
hh:mm:ss.x
```

Enter the command without any input, it displays the allowable input time format. Action only command.

ADJUSTTIMEOFYEAR <seconds>: Adjust the current time by a user determined number of seconds. The input can be a positive or a negative integer. If the input is negative, the time is adjusted backward. Action only command.

INTRINSIC HELP: Traverse to the intrinsic command tree.

Intrinsic Help Commands

Intrinsic help commands are commands that can be used in any tree level as a basic shell command tool. Below is the list of available intrinsic commands.

pop: Moves the command shell to the previous level. When issued from the main shell directory (i.e., the root) this disconnects the session.

root: Moves the command shell to point to the main shell directory. This is a convenience command for navigating the command shell. The command “root pop <Enter>” disconnects the session.

exit: Exits the Telnet client session while it is active. This command has no effect if it is executed from a serial session.

trace: Displays the current contents of the trace buffers. Most of the commands currently do not use the trace buffer facility. It is normal that the trace buffers are empty.

clear: Clears the trace buffers.

stamp: Queries the time stamp of the internal operating system clock, which is set to zero when the SyncServer is powered on. The time stamp of the internal operating system clock is in milliseconds.

history: Displays the last fifteen commands that have been executed.

pause <milliseconds>: Waits for user specified number of milliseconds and then executes the next command if it is provided in the same command line following the number. For example, the “pause 5000 history” command would wait for five seconds and then execute the history command. Input any integer number as the number of milliseconds to pause.

repeat <count>: This commands repeats execution user specified number of times of a command specified before it. For example, the “GPSSTRENGTH repeat 5” executes GPSSTRENGTH five times.

 # : (pound sign followed by a space) Creates a comment from the space to the end-of-line character. This is useful for adding a comment to a command being recorded in a logfile. For example, “GPSSTRENGTH pause 1000 repeat 1000 # monitor GPS sats <enter>”. Also, the command could be used to simply have the system ignore the remaining part of a long string of commands. For example, “ipv4address 192.168.2.2 ipv4mask 255.255.255.0 # gateway 192.168.2.1 <enter>” will set the IP address and subnet mask but not the gateway.

?: (question mark) Displays commands available at the current tree level.

Command Examples

Below are a few select examples of commands.

DEFAULTS example

Entering **DEFAULTS** replaces the current configuration of the SyncServer with the factory configuration. Enter "Y" to confirm. For example:

```
1 ? DEFAULTS
Restore SyncServer default factory configuration? Enter "Y" to confirm:
Y
```

REBOOT example

Entering **REBOOT** halts and reboots the SyncServer's operating system. Enter "Y" to confirm. For example:

```
1 ? REBOOT
Reboot SyncServer operating system? Enter "Y" to confirm: Y
```

HALT example

Entering **HALT** halts the operating system. Do this before turning the power switch off. Enter "Y" to confirm. Enter "Y" to confirm. For example:

```
> HALT
Halt SyncServer operating system? Enter "Y" to confirm: Y
```

IPV4ADDRESS example

Entering **IPV4ADDRESS** displays/sets the IPv4 address. For example:

```
1 ? IPV4ADDRESS
192.168.47.150
2 ? IPV4ADDRESS 192.168.46.144
```

IPV4MASK example

Entering IPV4MASK displays/sets the IPv4 subnet mask. For example:

```
3 ? IPV4MASK
255.255.255.0
4 ? IPV4MASK 255.255.0.0
```

IPV4GATEWAY example

Entering IPV4**GATEWAY** displays/sets the IPv4 gateway address. For example:

```
5 ? IPV4GATEWAY
192.168.47.1
6 ? IPV4GATEWAY 192.168.46.1
```

Specifications

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Status LEDs

The four tricolor LEDs provide the following status information:

	Red	Orange	Green	Dark
Sync	SyncServer is not synchronized to a reference. NTP Stratum 16.	SyncServer is synchronized to a remote NTP server. NTP Stratum 2-15.	SyncServer is synchronized to an Input Reference. NTP Stratum 1.	Power off.
Network	Link failure on the LAN1.	Link failure on the LAN2, or LAN3.	All configured ports operational.	Power off.
NTP	>3200 NTP packets per second.	> 2000 packets per second.	NTP activity within the last second.	No NTP activity in the last second.
Alarm	Major Alarm.	Minor Alarm.	No Current/Enabled Alarms.	Power off.

See the ***Troubleshooting*** (on page 115) topics to resolve problems with Red and Orange LEDs.

Also see ***Stratum*** (on page 181).

Keypad/Display

The keypad/display displays the time, status information, and provides functions described by ***Keypad/Display Interface*** (on page 73).

Keypad

Description:19-button firm silicone rubber keypad

Functionality:User input device

Arrow keys: Left, Right, Up, Down

Numeric keys: 0 through 9

Command keys:ENTER, CLR, TIME, STATUS, MENU

Display

Description:256 x 32 pixel vacuum fluorescent display (VFD)

Functionality:Displays time, status, and functions. User-configurable brightness levels.

USB Ports

Description:Two USB 2.0 ports (**USB 1, 2**).

Functionality:Connects with a USB flash drive device, which can be used for loading software upgrades to the SyncServer, as well as for backing up and restoring the SyncServer configuration.

Connection:Requires a compatible USB memory device, such as a SanDisk cruzer micro USB device (recommended). Not all USB flash drives are compatible with the SyncServer's USB ports.

Also see:***Keypad/Display Interface*** (on page 73), ***SYSTEM - Upgrade*** (on page 53), ***WIZARDS - Upgrade*** (on page 71), ***WIZARDS - Backup*** (on page 70), ***WIZARDS - Restore*** (on page 71).

VAC Power Supply

Description:Universal type VAC Power supply

Connector:IEC 320

Input Voltage Range:90-264 VAC

Input Frequency Range:47-63 Hz

Max. Power:

	Initial Power On	Continuous
With Rubidium Osc	45 watts	35 watts
Without Rubidium Osc	25 watts	21 watts

VDC Power Supply

This topic applies to the 48 VDC Operation Model only.

Description:VDC Power Supply

Connector:Two three-position screw terminal blocks

Input Voltage Range:40-60 VDC, 50 watts maximum, 1.5 amps

Isolation, Ground:Input is fully floating. Either input polarity may be strapped to chassis ground at the input terminal block.

Isolation:Input to output 1,000 VAC minimum

Timing Holdover

Temperature Compensated Crystal Oscillator (TCXO)

Feature:Standard

Drift rate:21 milliseconds/day typical after having been locked to a stable reference for at least 30 minutes. (Assumes less than 5°C temperature change over this time period).

Oven Controlled Crystal Oscillator (OCXO)

Feature:Option

Drift Rate:1 millisecond/day typical after having been locked to a stable reference for at least 1 hour. (Assumes less than 5°C temperature change over this time period).

Rubidium Oscillator

Feature:Option

Drift Rate:6 microseconds/day typical for a Model S250 and 25 microseconds/day typical for a Model S200 after having been locked to a stable reference for at least 1 hour. (Assumes less than 5°C temperature change over this time period).

Accuracy & Stability

Synchronization Source	Timing Accuracy to Reference	Comments
GPS, 4 or more satellites tracked	50 nS RMS, 150 nS peak	
GPS, 1 satellite tracked, position known within 200m	1 uS peak	Position from satellite fix or entered by the user.
NTP Client Mode, Local server	2 mS peak	Local server on same subnet.
IRIG-B	10 uS peak	Relative to input signal.
1PPS	100 nS peak	Relative to input signal.

The stability of the 1PPS, 10MHz, and IRIG-B outputs depend on the optional oscillator installed.

GPS Receiver

Description:The internal GPS Receiver is the preferred reference for the SyncServer's Hard-ware Clock. The GPS receiver must be connected to a 12-VDC capable antenna using the **GPS Ant** connector.

Note: The GPS receiver is only available in the S200 and S250 models.

Connector: **GPS Ant**, BNC female, 12 VDC antenna power feed, detects Open and Short circuits.

Frequency:	1575.42 MHz (L1 signal)
Code:	Coarse Acquisition (C/A) code
Tracking:	Up to 12 satellites. All 32 PRN's.
Position Accuracy:	Typically <10m w. four satellites. Available from web interface.
1PPS Accuracy:	50 nS RMS, 150 nS Peak to UTC-USNO
Time standard:	UTC
Signal strength:	1 sat ≥ -166 dBW to acquire, and ≥ -171 dBW to track.
Cabling options:	≤ 150 ft. of Belden 9104 (RG-59 type) ▪ 300 ft. with inline amplifier ▪ Compatible with down/up converter

Also see:

- GPS Antenna
- ***GPS Cable Configurations/Options*** (see "Distance Between Antenna and Receiver" on page 105)

Safety Standards

Meets the following safety standards:

- 73/23 EEC CE Low Voltage Safety Directive
- EN 60950-1:2001
- UL 60950-1:2003
- CSA 22.2 60950-1:2003
- IEC 60950-1:2001
- AS/NZ 60950-1:2003
- PSE Japan

EMC Standards

Meets the following EMC standards:

- FCC Part 15 Subpart B
- 2004/108/ECCE EMC Directive
- EN55022 (1998) EMC Emissions for ITE, Class A
- EN55024 (1998) EMC Immunity for ITE
- EN61000-3-2 (2000)Harmonic Current Emissions
- EN61000-3-3 (1995)Voltage Fluctuations and Flicker Emissions
- VCCI: April 2000Japan EMC Standard
- ICES-003Canada EMC Standard
- AS/NZS CISPR 22:2002Australia/New Zealand EMC Standard

Note: In some cases, for FCC and CE EMC Radiated Emission Compliance, a ferrite EMI suppressor (Fair Rite P/N 0444164951 or equivalent) may need to be placed on the unit end of cables connected to the BNC Connectors. Please contact ***Microsemi Customer Assistance*** (on page 3) for additional information.

VCCI Compliance Information

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

この装置は、情報処理装置等電波障害自主規制協議会
（ＶＣＣＩ）の基準に基づくクラスA
情報技術装置です。この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。 この場合には使用者
が適切な対策を講ずるよう要求されることがあります。

Environmental

Operating Temp:0° to +50° C (+32° F to +122° F)
Storage Temp:-10° to +70° C (14° F to +158° F)
Humidity:0 - 95%, non-condensing
Altitude:0 - 4000 meters AMSL

WARNING: Install the SyncServer to allow adequate airflow through and around the unit. Microsemi recommends leaving 1.4 in. (3.6 cm) above and below the SyncServer or enough space to allow 5 CFM.

AVERTISSEMENT : Installez le SyncServer pour permettre un flux d'air autour et a travers l'unité. Microsemi recommande de laisser 1.4 in. (3.6 cm) au-dessus et au-dessous du SyncServer ou assez d'espace pour permettre 5 CFM.

Maintainability

This unit contains no user-serviceable parts. Please return to Microsemi for servicing.

The SyncServer functions without user adjustments throughout its life span.

CAUTION: Lithium Battery

The SyncServer contains a Lithium Battery that maintains the system's Real Time Clock (RTC) when the SyncServer's power is off. Replace the Lithium Battery only with the same or equivalent type. Do not dispose of the Lithium Battery in a fire or incinerator, or the battery may explode. Follow disposal regulations in your area for Lithium Battery disposal.

ATTENTION : Le SyncServer contient une batterie de lithium pour maintenir l'horloge en temps réel pendent que le courant est debranché. Remplacez la batterie de lithium seulement avec une batterie de type équivalent. Ne vous débarrassez pas de la batterie de lithium dans un feu ou un incinérateur, car la batterie pourrait exploser. Débarrassez-vous de la batterie usagée de lithium selon les instructions du fabricant.

Failure Detection and Reporting

The SyncServer is self-monitoring during normal operation. To the extent possible, any failures in the unit are isolated, to differentiate them from input signal failures, and reported. The SyncServer provides debug and troubleshooting variables of the current status of the unit at the request of an administrator.

CE/WEEE/RoHS Conformance

Declaration of Conformity

In accordance with ISO/IEC GUIDE 22 and EN 45014:

Microsemi, Inc.
3750 Westwind Blvd.
Santa Rosa, Ca 95403 USA

Declares under our sole legal responsibility that the SyncServer Network 1520R-SXXX Network Time Server (Both AC and DC Models):

- MODEL 1520R-S200, MODEL 1520R-S200-DC
- MODEL 1520R-S250i, MODEL 1520R-S250i-DC
- MODEL 1520R-S250, MODEL 1520R-S250-DC
- MODEL 1520R-S300, MODEL 1520R-S300-DC, MODEL 1520R-S300-RB, MODEL 1520R-S300-RB-DC
- MODEL 1520R-S350, MODEL 1520R-S350-DC, MODEL 1520R-S350-RB, MODEL 1520R-S350-RB-DC

CONFORMS TO THE FOLLOWING EUROPEAN UNION DIRECTIVES:

Safety

2006/95/EC Low Voltage Directive

- 73/23/EEC Low Voltage Safety as amended by 93/68/EEC

- IEC 60950-1:2001 (1st Edition)
- EN 60950-1:2001

Electromagnetic Compatibility

2004/108/EC Electromagnetic Compatibility

- EN55022 (1998) EMC Emissions for ITE, Class A
- EN55024 (1998) EMC Immunity for ITE
- EN61000-3-2 (2000) Harmonic Current Emissions
- EN61000-3-3 (1995) Voltage Fluctuation and Flicker Emissions

WEEE

Waste Electrical and Electronic Equipment Directive (WEEE) 2002/95/EC

The SyncServer Model 1520R_SXXX is considered WEEE Category 3 (IT and Telecommunication Equipment) as defined by the WEEE Directive and therefore falls within the scope of the WEEE Directive.

For more information about Microsemi's WEEE compliance and recycle program, please visit Microsemi's website at ***http://www.mircrosemi.com***

RoHS

Restriction of the Use of Certain Hazardous Substances Directive 2002/95/EC

The SyncServer Model 1520R_SXXX is considered WEEE Category 3 (IT and Telecommunications Equipment) as defined by the WEEE Directive and therefore falls within the scope of the RoHS Directive.

These units are RoHS Compliant except that they will be manufactured using the RoHS Directive exemption allowing the use of lead in "solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunications". Reference RoHS Directive Annex Point 7 as amended by 2005/747/EC.

Note: This certification applies to all standard options and accessories supplied with the SyncServer System

Signature

First Date of Marketing with CE Mark: 31 August 2005

I declare that the equipment specified above conforms to the above Directives and Standards.

Signed: Robert Mengelberg, Compliance Engineer

Date: 12 August 2008

Shock and Vibration

The SyncServer has been designed and tested to withstand the following shock and vibration per Telcordia GR-63 Specifications:

Packaged Equipment Shock (Drop):Packaged for shipment. Drop from 29.5 in. - Surface, edge and corner drops

Unpackaged Equipment Shock (Drop):Unpackaged. Drop from 3.9 in. - Surface, edge and corner drops

Office Vibration Environment:Locked to 0.1 g - In equipment rack

Transportation Vibration:To 1.5 g - Packaged for shipment

Console RS-232 Port

Description:A bi-directional EIA standard RS-232C serial port (**Console RS-232**) located on the front panel.

Functionality:Provides access to a the command line interface for limited status and configuration of the SyncServer.

Connection:DCE (Data Communications Equipment). (Use a "straight through" serial cable, not a "null modem" crossover cable.)

Data Rates:9600 baud

Parity:None

Data Bits:8

Stop Bits:1

Connector:Female 9-pin D subminiature

Also see:***Command Line Interface*** (on page 79)

Pin Assignment (Pinout):

- 1N/C
- 2Tx
- 3Rx
- 4N/C
- 5GND
- 6N/C
- 7CTS
- 8RTS
- 9N/C

1PPS Out

Description:**1PPS Out**, a female BNC connector mounted on the rear chassis, provides a once per second pulse that is synchronous with the SyncServer's Hardware Clock.

Note: This feature is not available on the S200 model.

Connector:BNC female (1PPS Out)

Amplitude:TTL Levels into 50 Ohms

Duty Cycle:50% nominal

On Time Edge:Rising

1PPS In

Description:**1PPS In**, a female BNC connector mounted on the rear chassis, accepts a once per second pulse from an external reference into the SyncServer's Hardware Clock. For the SyncServer to maintain lock to this signal, the stability of the 1PPS input must be better than the pull-range of the system oscillator.

Note: This feature is not available on the S200 model.

Connector:BNC female (1PPS In)

Amplitude:TTL Levels

Pulse Width100 nS minimum

On Time Edge:Rising

Impedance:270 Ohms

Typical system oscillator pull-ranges:

- TCXO 1E-6 (1 ppm)
- OCXO 5E-7 (0.5 ppm)
- Rubidium 1E-9 (1 ppb)

Note: If the 1PPS In signal is too noisy, the Hardware Clock may not be able to lock to it.

10MHz Out

Description:**10MHz Out**, a female BNC connector mounted on the rear chassis, provides a 10MHz signal from the SyncServer's Hardware Clock.

Note: This feature is not available on the S200 model.

Connector:BNC female (10MHz Out)

Amplitude:> 3 Vpp and < 7 Vpp into 50 Ohms

Frequency:10MHz

Wave Shape:Sine Wave

10MHz In

Description:**10MHz In**, a female BNC connector mounted on the rear chassis, accepts a 10MHz signal from an external frequency reference into the SyncServer's Hardware Clock. For the SyncServer to maintain lock to this signal, the stability of the 10MHz input must be better than the pull-range of the system oscillator.

Note: This feature is not available on the S200 model.

Connector:BNC female (10MHz In)

Amplitude:1 Vpp to 8 Vpp

Frequency:10MHz

Wave Shape:Sine Wave or Square Wave

Impedance:> 50 k Ohms

Typical system oscillator pull-ranges:

- TCXO 1E-6 (1 ppm)
- OCXO 5E-7 (0.5 ppm)
- Rubidium 1E-9 (1 ppb)

Note: If the 10MHz In signal is too noisy, the Hardware Clock may not be able to lock to it.

IRIG-B Out

Description:**IRIG Out**, provides a selected time code from the SyncServer's Hardware Clock. The time code format is selected via the Web interface. Amplitude Modulated (AM) outputs are supported from the IRIG Out BNC. Also see ***REFERENCES - IRIG-B*** (on page 51).

Note: This feature is not available on the S200 model.

Connector:**IRIG Out**, BNC female

DCLS Amplitude: TTL into 50 ohms

AM Amplitude:3.5 ±0.5 Vpp into 50 Ohms

AM Ratio:3:1 ±10%

Selectable Time Code Output Formats:

- IRIG-B
- IRIG-B (Legacy TrueTime)
- IRIG-B with IEEE 1344 extension

IRIG-B In

Description:**IRIG In** accepts a time code for input from an external timing reference into the SyncServer's Hardware Clock. The time code format is selected via the Web interface. Supports only amplitude modulated (AM) IRIG-B inputs. For the SyncServer to maintain lock to this signal, the stability of the time code input must be better than the pull-range of the system oscillator. Also see ***REFERENCES - IRIG-B*** (on page 51)

Note: This feature is not available on the S200 model.

Connector:**IRIG In**, BNC female

DCLS Amplitude:<1.5 V for logic 0, >2.0 V for logic 1

AM Amplitude:1 to 8 Vpp

AM Ratio:2:1 to 4:1

Impedance:>5k Ohms

Typical system oscillator pull-ranges:

- TCXO 1E-6 (1 ppm)
- OCXO 5E-7 (0.5 ppm)
- Rubidium 1E-9 (1 ppb)

Note: If the inbound signal is too noisy, the Hardware Clock may not lock to it.

Selectable Time Code Input Formats:

- IRIG B AM
    - IRIG-B
    - IRIG-B (Legacy TrueTime)
    - IRIG-B with IEEE 1344 extensions
    - Auto

Sysplex Out

Summary:The Sysplex Timer port outputs serial time strings for IBM mainframe Sysplex systems. The Sysplex Timer provides a common time reference across all the members of an IBM Sysplex. The Sysplex Timer is a key component when systems on multiple CPCs share access to the same data. Also see ***TIMING - Sysplex*** (on page 47).

Description:**Sysplex Out** is a male 9-pin D connector mounted on the rear chassis that transmits Time of Day (TOD) with carriage return on time to an attached Sysplex-compatible device. Configured as DTE (Data Terminal Equipment). Configurable via the Web interface. Sysplex typically uses a "null-modem" serial cable (not supplied) for interconnection with other Sysplex equipment.

Connector:male 9-pin (Sysplex Out)

Data Rates:9600 bps

Parity:Even, Odd, or None

Data Bits:8

Stop Bits:1

Pin Assignment:

- 1N/C
- 2Rx
- 3Tx
- 4N/C
- 5GND
- 6N/C
- 7RTS
- 8CTS
- 9N/C

Format:IBM 9037 Sysplex Timer (First Protocol)

Level:RS-232

Accuracy:<10 mS RMS

Phasing:Carriage return on-time marker
Control:Manual or Automatic start/stop, parity setting, flywheel quality character
String:<SOH>DDD:HH:MM:SSQ<CR><LF>

Where:

- <SOH>Start of Header
- DDDDay
- :Colon separator
- HHHours
- MMMinutes
- SSSeconds
- QTime Quality
- <CR>Carriage Return (On-time marker)
- <LF>Line Feed

Network Ports

Description:Three 10/100 Mbps Ethernet ports (LAN1, LAN2, LAN3).
Connector:Three standard RJ-45 8-pin connectors
Frame Format for LAN1, LAN2, LAN3:

- IEEE 802.3 (10Base-T at 10 Mbps)
- IEEE 802.3u (Fast Ethernet at 100 Mbps)

Roles:

- LAN1:
  - Web interface (HTTP), command line interface (TELNET)
  - The default port for most NTP functions.
  - DNS, SMTP, SNMP
- All ports respond to NTP (port 123), TIME (port 37), and DAYTIME (port 13) requests.

Factory default static IPv4 addresses:

- LAN1192.168.0.100
- LAN2192.168.0.101
- LAN3192.168.0.102

Note: The SyncServer's network ports require Category 5 (or better) network cable.

Network Protocols

The SyncServer supports the following protocols:

- NTP (v2 - RFC1119, v3 - RFC1305, v4 - No RFC) (Port 123)
- NTP Unicast, Multicast
- SNTP v4 for IPv4, IPv6 and OSI (RFC 4330)
- TIME (RFC868) (Port 37)

- DAYTIME (RFC867) (Port 13)
- HTTP/SSL/HTTPS (RFC2616)
- DHCP (RFC2131)
- SSH/SCP (Internet Draft)
- SNMP v1/v2/v3 (RFC3584)
- MIB II (RFC1213)
- Telnet (RFC854)
- MD5 Authentication (RFC1321)
- SMTP Forwarding
- IPv4 and v6

Web Interface Browser Compatibility

The SyncServer web interface is compatible with:

- Internet Explorer 6.0 and 7.0 on Windows XP
- Internet Explorer 7.0 on Windows Vista
- Firefox 2.0/3.0 on Windows and Linux

Tasks

In this section

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Installation Guide

To install the SyncServer in a production environment, or some other of long-term installation, follow the steps in this Installation Guide. To get the SyncServer up and running quickly in order learn about its features, consult the ***Quick Start Guide*** (on page 13).

Unpacking

Open the SyncServer packaging carefully to avoid damaging its contents.

Verify that the box contains the following standard items:

- Printed Quick Start Guide
- SyncServer Network Time Server
- VAC Power cord (unless 48VDC option is ordered)
- GPS antenna kit
    - 12V GPS antenna
    - PVC antenna-mounting tube
    - 50 ft. Belden 9104 coaxial cable

    - 2 pipe clamps
- Product CD (contains the User Guide and other supporting documentation)
- Standard serial cable
- Standard 6 ft. network cable

Please also verify that the box also contains any options purchased with the SyncServer.

If the box is missing any items, please contact ***Microsemi Customer Assistance*** (on page 3).

Rack Mounting

The SyncServer is designed for mounting in a standard 19-inch (48.26 cm) rack. Follow the rack manufacturer's instructions for mounting the SyncServer.

Avoid the following conditions:

- **Elevated Operating Temperatures**: If the SyncServer is installed in a closed or multi-unit rack assembly, the ambient temperature of the rack environment may be greater than the SyncServer's Maximum Operating Temperature of 50°C/122°F. Install the SyncServer in an environment that is compatible with the SyncServer's operating temperature range, which is 0 °C to 50 °C, or 32 °F to 122 °F
- **Reduced Air Flow**: Position the SyncServer with enough space above, below, and adjacent to the chassis to allow an adequate flow of air so that it may operate safely. Microsemi recommends leaving 1.4 in. (3.6 cm) above and below the SyncServer or enough space to allow 5 CFM air flow.
- **Uneven Mechanical Loading**: Mount the equipment so as to avoid uneven mechanical loading that could cause hazardous conditions.
- **Circuit Overloading:** Observe the power ratings on the SyncServer's nameplate and the additional load the SyncServer may place on the supply circuit.
- **Proper Grounding:** Maintain reliable grounding (earthing) of rack-mounted equipment.

Grounding the SyncServer

- For VAC power, verify that a properly grounded three-prong outlet is available for the standard power cord.
- Connect the Chassis Grounding Screw on the rear panel to a reliable earth ground.
- Verify that the equipment rack and other equipment are grounded correctly.

WARNING: Grounding

Microsemi recommends that the user connect the chassis grounding screw to a reliable earth ground.

AVERTISSEMENT : Microsemi recommande que le châssis soit relié à une terre fiable.

Connecting VAC Power

For units equipped with the standard VAC power supply:

- Verify that the power switch, located on the rear panel, is off. (Press "O".)

- Connect the **VAC Input** connector on the rear panel to a grounded three-prong outlet using the standard power cord supplied.

CAUTION: VAC Power

- The VAC Power Supply specification reflects the overall Power Supply ratings. For UL and CE compliance the Power Supply must only be operated at 100 – 240 VAC, 50-60 Hz.
- The SyncServer should only be plugged into a grounded receptacle.

ATTENTION :

- Les spécifications d'approvisionnement de courant alternatif ci-dessus reflètent les estimations globales d'alimentation d'énergie. Pour la conformité d'UL et de CE l'alimentation d'énergie doit être seulement opérée à 100 - 240 VCA, 50-60 hertz.
- Relier le SyncServer à une prise de courant avec contact adéquat de mise à la terre.

Connecting VDC Power

For units equipped with the optional 48 VDC power supply:

- Use a 14 amp DC circuit breaker in series with the DC power source. Do not connect the unit directly to a DC power source without the breaker.
- Provide a circuit disconnect in series with the VDC Power input. The SyncServer DC option does not include a power switch
- The minimum recommended wire size is 14 AWG (1.5mm2) for DC power source hook up. Don't forget to tighten the terminal screws on the input power block.
- The VDC Power supply in the SyncServer is DC isolated. The VDC Power inputs are polarity protected so reversed DC connections will not power the unit but will also not harm the unit.
- Connect VDC Power to the PRI or optionally the SEC set of terminals observing correct polarity (+, -). The SEC set of terminals has been provided for connections to a secondary power source. Note that the PRI and SEC power connections are simply diode OR'ed, so the highest voltage source will be powering the unit.

The PRI and SEC ground terminals on the VDC Power input block are connected to the chassis. These terminals are normally used to connect to the VDC Power return line.

Note: The 48 VDC Operation Model is supplied with two 48 VDC inputs to accommodate input from an alternate VDC Power Source. Because of diode switching, the polarity can be plus-plus, plus-minus, minus-plus, or minus-minus.

WARNING: VDC Power

For the 48 VDC model of the SyncServer:

- Use a disconnect device, such as a switch, with the appropriate voltage/current rating when connecting a VDC Power source.
- Only use the unit in an restricted area.
- The screw torque on the Power Terminal Block is 4.5 to 5.3 inch pounds.

- The unit chassis must be grounded for proper safety.

AVERTISSEMENT :

Sur le 48 VDC modèle du SyncServer:

- Utilisez un dispositif de débranchement, tel qu'un commutateur, avec le classement de tension/courant approprié en connectant une source de pouvoir de DC.
- Employez seulement l'unité dans un secteur avec l'accès limité.
- Le couple de vis sur le TB de puissance est livres de 4.5 à 5.3 pouces.
- Le châssis d'unité doit être fondu pour la sûreté appropriée

Using GPS

This section guides the user through the process of selecting a good site for the GPS antenna, installing the antenna, and how to use GPS when a good site isn't available.

Safety Considerations

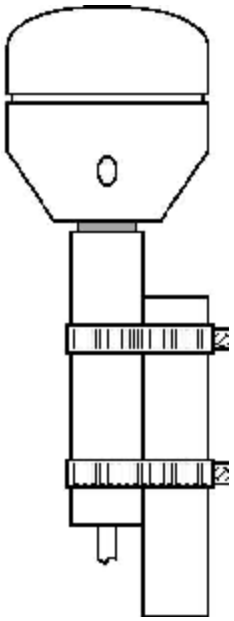
- Avoid electrocution and RF safety hazards such as power lines and high-energy radio transmission antennas.
- Where potential hazards exist, have a qualified technician perform the installation.
- Observe local codes and regulations.
- Use a lightning arrestor when needed.
- Antennas not rated for 12 VDC may be damaged when connected to the SyncServer. The GPS antenna supplied with the Receiver is rated for 12 VDC.
- **Safe Antenna and Cable Connection**: An outside antenna or cable system must be properly grounded to provide some protection against built up static charges and voltage. Section 810 of the National Electrical Code, ANSI/NFPA 70 (In Canada, part 1 of the Canadian Electrical Code) provides information regarding proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
- **Keep Antenna Clear of High Voltage Power Lines or Circuits**: Locate an outside antenna system well away from power lines and electric light or power circuits so it will never touch these power sources should it ever fail. When installing an antenna, absolutely never touch power lines, circuits, or other power sources, as this could be fatal.

Selecting a Site for the Antenna

Roof Antenna Placement: When selecting a site for the roof antenna, find an outdoor location that provides the best visibility of the sky and horizon. In most cases, this means locating the antenna in a high location, such as a roof top. Avoid obstructions that could block GPS satellite signals and delay acquisition.

A short mounting mast and hose clamps are provided with the roof antenna to mount the antenna to a pole or the peak of a building. The antenna mounting mast and clamps are well

suited to attach the antenna to a vent pipe or mast affixed to the roof. The pipe must be rigid and able to withstand high winds without flexing.



A typical roof antenna mounting.

GPS Receivers can be susceptible to reflected GPS signals called multipath signals. Multipath interference is caused by reflected signals that arrive at the antenna out of phase with the direct signal. This interference is most pronounced at low elevation angles from 10 to 20 degrees above the horizon. The height of the mast/antenna may be extended upward to lessen multipath interference. The antenna should also be at least three to six feet (1-2 m) from a reflecting surface.

Use the criteria below to select a good outdoor site for the GPS antenna.

The best locations provide:

- Unobstructed views of the sky and horizon.
- Low electro-magnetic interference (EMI) and radio frequency interference (RFI) - away from high-power lines, transmitting antennas, and powerful electrical equipment.
- Convenient access for installation and maintenance.
- Reasonable access for the antenna cable to reach the SyncServer.
- Safety from hazards to people and equipment.

Avoid:

- Overhanging foliage
- Blocked views
- Strong EMI RFI interference
- Multipath interference (caused by adjacent structures that reflect GPS signals)

Mounting structures:

- GPS antenna masts, vent pipes, or railings are usually satisfactory.

- Radio towers may require the services of a specialist, and may be subject to signal interference.
- Must be able to withstand very high winds.

If a good site is not available, consult ***Operating in "Window Mode"*** (on page 102).

Installing the GPS Antenna

1. Observe all relevant safety precautions and building code regulations. Avoid:
    - Electrocution, RF, lightning, and falling hazards.
    - RFI and EMI sources such as transmitting antennas.
    - Crimping or making sharp bends in the cable.
2. Mount the standard L1 GPS antenna at the selected site:
    - Position the GPS antenna vertically, with its top pointing toward the sky, and the PVC mounting mast and connector pointing down.
    - Secure the PVC mounting mast to the structure using the pipe clamps provided with the antenna kit.
3. Run the antenna cable or cables to the SyncServer. Use a lightning arrestor and grounding, as required to meet building and safety codes.
4. Connect the antenna cable to the **GPS Ant** connector on the rear panel.

Note: Microsemi recommends posting a "Do not paint" notice to prevent the GPS antenna from being painted accidentally.

Tips:

- The user can access the connector underneath the GPS antenna by removing the four recessed screws in the lower half of the GPS antenna with a Phillips-head screwdriver. It is a relatively easy task and does not violate the weatherproofing design of the antenna. Typically, users do this to attach an optional in-line amplifier inside the PVC mounting mast or to replace the standard cable with a longer one. (Avoid unscrewing the PVC mounting mast from the base of the GPS antenna as this may require a vice and lots of torque.)
- When extending the length of the cable, observe the recommended configurations in ***GPS Cable Configurations/Options*** (see "Distance Between Antenna and Receiver" on page 105). Avoid exceeding the recommended lengths by combining the standard 50 foot (15.24 m) cable with the extended-length cable.

Operating in "Window Mode"

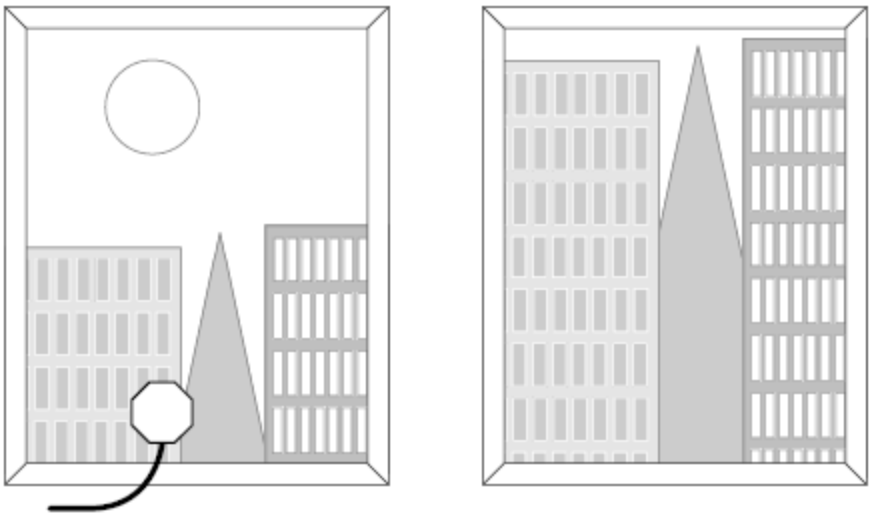
The SyncServer Network Time Servers can provide can provide excellent synchronization to UTC if the GPS receiver has an accurate fix on its position and one *current* GPS satellite most of the time. This capability is known as *Window Mode*.

When a good antenna site isn't available, the user may be able to use sites with limited visibility of GPS satellites and reduced signal strength, such as:

- Indoors, in a window or skylight.
- Outdoors, on a balcony railing, building corner, or surrounded by tall structures (limited view)

Window Antenna Placement

For window mounted antenna installations, use the window with the best view of the sky. For windows with equivalent views, orientations that face the equator are preferred. Generally more satellites will be in view toward the equator than away from it. East or west facing windows will also work. Polar facing windows will also work but in general are not preferred. Windows that have the best view of the sky are always preferred regardless of orientation.



A typical window mounting with the antenna is shown in the preferred window.

Guidelines

For best results with window mode:

- Position the antenna near the lower windowsill. This improves upward visibility of the sky.
- If multiple sites are available, choose the one with the *widest* view of the sky and tilt the antenna toward the "opening".
- On the side of a building, the corners offer better visibility (270 degrees) than flat walls (180 degrees).
- A SyncServer equipped with the high-stability Rubidium oscillator option can provide precise time for extended periods while GPS is unavailable.
- Secure the antenna so it won't fall or get knocked out of position.
- To improve signal strength, test different window locations, shorten the antenna cable length, avoid unnecessary connectors, and use an in-line amplifier option. (Signal strength is visible on the **STATUS - GPS** page.)
- Avoid windows with metallic film coatings, window blinds, overhead obstructions, and foliage, all of which can block GPS signals.
- Verify that the **NTP - Associations** page is configured with valid NTP servers or peers that the SyncServer can rely on if GPS is unavailable.

Configuring Window Mode

After setting up the antenna:

1. On the **TIMING - Holdover** page, set the *Time Error Limit* (milliseconds) to the highest acceptable value for absolute timing error (to UTC). Microsemi recommends a value greater than or equal to 4 milliseconds.
2. On the **STATUS - GPS** page, if the GPS receiver has a valid position (latitude, longitude, altitude), the user can skip to step 3. Otherwise:
   - Determine the approximate latitude, longitude, and altitude of the GPS antenna. This can be done using a handheld GPS device, an online reference such as Google Earth, or by looking up the Latitude and Longitude information provided on the SyncServer Product Information CD-ROM.
   - On the **REFERENCES - GPS** page, enter the approximate latitude, longitude, and altitude.
3. Set the *Mode* to **Position Hold** and click the **APPLY** button.

Other Considerations

The accuracy of the user-entered position affects the timing accuracy of the GPS reference. When GPS status is locked:

Position Accuracy	Timing Accuracy
< 50 m (< 164 feet)	< 0.005 ms
< 1 km (< 0.62 mile)	< 0.1 ms
< 10 km (< 6.2 miles)	< 1.0 ms

During window mode operation, if the GPS receiver is not locked to any satellites and no other Input References are available, the GPS receiver enters holdover mode and is subject to oscillator drift. Also see ***Oscillators*** (see "Timing Holdover" on page 85).

Verifying the GPS Installation

Verify the GPS antenna installation:

1. Press the **STATUS** button on the front panel.
2. Press the up arrow button to display the **GPS STATUS** screen.
3. When the number of **Satellites** is equal or greater than "4", **Status** should be *Locked*.
4. With GPS locked, the **SYNC** LED on the front panel should be green within approximately 15 minutes.

This can also be accomplished in the web interface using the **STATUS - GPS** page.

Verify synchronization over a 24-hour period to ensure that the GPS antenna installation meets requirements. This can be accomplished by:

- Observing the **SYNC** LED or **STATUS - GPS** page.
- Configuring alarm notification (email, SNMP) to receive notification of the **Timing GPS Source Alarm** on the **ADMIN - Alarm** page.
- Using FIND on the LOGS - messages page to search for "Timing GPS Source Alarm".

If the GPS installation does not meet requirements:

- Review the GPS topics in this user guide
- Troubleshoot for issues with the GPS antenna and cable.
- Contact ***Microsemi Customer Assistance*** (on page 3).

Distance Between Antenna and Receiver

GPS satellites signals operate in the L1 band (1575.42 MHz). Practically speaking the antenna must have an unobstructed view of the sky and thus be mounted on a roof, or in some cases in a window. GPS provides continuous operation day and night.

Since the GPS signal is very weak, the antenna amplifies the signal to drive it through the cable to the receiver. Antenna cable however offers some resistance and the GPS signal strength will attenuate as it travels down the cable. GPS receiver sensitivity is finite so if the cable length is too long the signal will be too weak for the receiver to detect it. Consequently it is very important to know the distance in advance between the antenna and the receiver so that the proper cable solution can be installed.

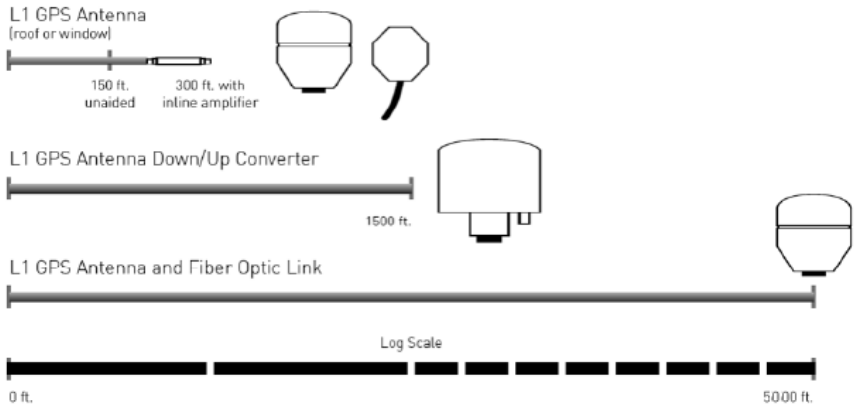
Antenna cabling solutions typically vary depending on how far the antenna is installed from the GPS receiver. Antenna cable runs are supported from the standard 50 ft (15m) to over 1500 ft. (457 m). 150 feet (45 m) is the unaided cable length limit for many GPS timing receivers from Microsemi.

Adding a GPS inline amplifier extends the cable length an additional 150 feet (45 m) up to a total of up to 300 ft. (90 m). The inline amplifier installs in-line with the antenna cable, using the existing antenna power. No extra wiring is required.

The GPS Down/Up converter makes cable runs of 250 to 1500 feet (75 m to 457 m) possible using a special GPS antenna that converts the signal to a lower frequency less susceptible to attenuation, and transmitting it the length of the cable, powered by an external power supply. An external power supply is provided with the GPS Down/Up converter.

The following diagram gives a summary of the cabling solutions for different distances between the antenna and receiver. For more specific cabling information see Cabling between the receiver and antenna:

Cable lengths and antenna solutions



For more information about any of the options described above, please contact ***Microsemi Customer Assistance*** (on page 3).

Configuring GPS for Various Conditions

This topic guides the user on how to configure the GPS receiver to operate under a variety of conditions, including reduced GPS satellite availability and mobile applications.

In all cases, Microsemi recommends configuring the SyncServer with multiple references and/or NTP server associations to provide synchronization if a single reference such as GPS becomes unavailable.

To configure the mode and enter the position of the GPS receiver/antenna, use the **REFERENCES - GPS** page.

To determine the number of "current" GPS satellites, use the **STATUS - GPS** page.

Stationary Applications

If the GPS antenna is in a location that provides 4 or more "current" GPS satellites on a continuous basis, Microsemi recommends letting the SyncServer operate in its factory configuration. In that configuration, when the SyncServer starts, the GPS receiver comes up in *Survey* mode. Upon locking to four or more GPS satellites the receiver determines and averages its position. After averaging the position it shifts to *Position Hold* mode. The user can expect this type of operation when the GPS antenna is mounted outdoors in a high location that provides good clear unobstructed views of the sky and horizon in all directions.

The lack of 4 "current" GPS satellites for sufficient durations may delay or prevent the GPS receiver from determining its position and entering *Position Hold*. If the GPS antenna is in a location that continuously provides 1 or more "current" GPS satellites, the SyncServer can provide excellent synchronization to UTC once it has an accurate position and is in *Position Hold* mode. Therefore, Microsemi recommends that the user perform the following actions (in order of priority):

- Move the GPS antenna to a location that provides better visibility of GPS satellites and improves the strength/quality of GPS signals reaching the GPS antenna input connector. Consult the ***Selecting a Site for the Antenna*** (on page 100) topics.
- Determine and enter SyncServer's position, then put the GPS receiver in *Position Hold* mode. Consult the ***Latitude and Longitude*** (see "Determining Latitude and Longitude" on page 147) topic.
- Let the SyncServer operate for 24 hours to see if it can determine its position and transition into *Position Hold* unaided.

If the number of "current" GPS satellites drops to zero, and every effort has been made to remedy this situation, the user may consider the following actions:

- Using a SyncServer equipped with a higher-stability oscillator, such as the OCXO or Rubidium.

- Setting the *Time Error Limit* to the highest value that meets the requirements of the application for which the SyncServer is being used. In this case, Microsemi recommends 4 milliseconds as an acceptable value for NTP synchronization.

Mobile Applications

If the SyncServer might be transported while operating, put the GPS receiver in *Dynamic* mode. In this mode, the GPS receiver continuously updates its position. This provides:

- Much greater timing accuracy than Position Hold for mobile operation
- Less timing accuracy than Position Hold for stationary operation. If the SyncServer is being used primarily for NTP synchronization, this decrease is negligible compared to the timing latency on most networks. If the SyncServer's other timing outputs are being used, the user should perform field tests to ensure that accuracy meets the requirements of the application.

Note: Avoid using Position Hold while operating the SyncServer from a location that is different from the one that the GPS receiver has. Doing so introduces timing errors that increase with the size of the difference of the latitude, longitude and altitude readings between the SyncServer and the GPS receiver.

Upgrading System Software

Overview of the Software Upgrade Process

In its factory default configuration, the SyncServer automatically checks for software upgrades every weekday shortly after noon local time. If an upgrade is available, the SyncServer generates a *System Upgrade Alarm*.

The user responding to the alarm logs into the web interface. The status bar at the top of the window may show that an alarm has been triggered, and on the **STATUS - General** page, "Release Version" states that an upgrade is available.

Before upgrading, as a precaution, the user should back up the configuration of the SyncServer (**WIZARDS - Backup**). Normally, the SyncServer transfers its settings from one version of the software to the next. However, if the upgrade process is interrupted (e.g., loss of power), the settings may be lost. Having the backup makes it possible to restore the previous settings if that happens.

The user downloads the software upgrade file from the Microsemi web site to their workstation and then follows the steps given below for upgrading the software on the SyncServer.

Note: Please avoid decompressing the *.tar upgrade file prior to upgrading the SyncServer. For security, the SyncServer will reject any file that has been modified or decompressed and recompressed. If needed, download a new software file from Microsemi.

Prerequisites for the System Upgrade Alarm to Work

The SyncServer notifies the user when a software upgrade is available, provided all of the following items are true:

- The *Check for software upgrades* setting is enabled on the **SYSTEM - General** page (factory default = enabled).
- The LAN1 port is configured correctly and has a DNS server on the **NETWORK - Ethernet** page (typically configured during installation).
- The LAN1 port can reach Microsemi.com on the Internet using port 80. Most proxy servers and firewall devices allow this type of traffic, but some may be configured to block it. Consult your network administrator for more information.
- The *System Upgrade Alarm* and its notification settings are enabled on the **ADMIN - Alarms** page (factory defaults = enabled).
- The user is reachable by one or more of the Alarm notification methods: email, Alarm LED, SNMP (typically configured during installation).

See also:

- ***WIZARDS - Backup*** (on page 70)
- ***SYSTEM - Upgrade*** (on page 53)
- ***ADMIN - Alarms*** (on page 57)

Checking if an Upgrade is Available

- Check the *System Upgrade Alarm* on the **ADMIN - Alarms** page to see if a software upgrade is available.
- Or, manually check for an upgrade by comparing the *Release Version* on the **STATUS - General** page with the *Version* at:

    - http://update.symmetricom.com/upgrade.txt

Downloading the Upgrade

1. Unless instructed to use another URL, download the software from Microsemi's online portal at www.microsemi.com.
2. Save the software to your workstation or to the USB flash drive.
3. (Optional) Back up the SyncServer configuration to your workstation or USB flash drive. Also see ***Creating a Backup File*** (on page 118).

Upgrading the Software

The user can upgrade the software using any one of the three methods given below.

Note: Please wait approximately 5 - 10 minutes while the SyncServer upgrades, shuts down, and reboots. Avoid disconnecting or switching the power off during the upgrade process.

Method 1: Using the **4) USB** function on the keypad/display interface:

1. Insert the USB flash drive in either USB port on the front panel.
2. Press the **MENU** button.
3. Select **4) USB**.
4. Select **3) Upgrade Software**.

5. Select **1) Yes**.

Method 2: Using the **WIZARDS - Upgrade** page:

1. Click the **BROWSE** button (*STEP 1: Transfer Upgrade File to SyncServer*).
2. In the **Choose file** window, locate and double-click the upgrade file.
3. Click the **NEXT** button (*STEP 1: Transfer Upgrade File to SyncServer*).
4. Click the **FINISH** button. (*STEP 2: Perform Upgrade*).

Method 3: Using the **SYSTEM - Upgrade** page:

1. On the **SYSTEM - Upgrade** page, click the **BROWSE** button.
2. In the **Choose file** window, locate and double-click the upgrade file.
3. On the **SYSTEM - Upgrade** page, click the **UPLOAD** button.

The SyncServer reports "Downloading Upgrade File!"

4. Select the upgrade file in the *Current Files* window and click the **INSTALL** button.

(Optional) After the upgrade:

When the SyncServer is finished rebooting, the browser shows the login page, while the Front Panel Display shows the model, time and date.

- Log in to the web interface and check the Release Version on the **STATUS - General** page to ensure that it matches the desired version
- Check the overall configuration to verify that the settings are still correct.

Adding NTP Servers to the NTP Associations List

About NTP Associations

The SyncServer's factory configuration includes three NTP associations:

- The **Hardware Clock** makes a timing reference source (e.g., GPS, Timecode) available to the NTP daemon as an NTP association. The Hardware Clock NTP association is always preferred and cannot be edited or deleted. See ***TIMING - HW Clock*** (on page 42) for more information.

Having multiple associations is important for obtaining the best reliability and accuracy from the SyncServer's NTP daemon. The SyncServer uses the NTP associations to qualify one another; synchronizing with the best one and rejecting any that provide the incorrect time. If the Hardware Clock runs without an Input Reference for a sustained period of time, the SyncServer synchronizes with one of the NTP servers instead.

Configuring NTP Associations

If the following conditions are true, the user does not need to reconfigure NTP:

- LAN1 is connected to the network and has Internet access through firewall port 123.
- GPS is set up correctly and operating as a reference source.
- No NTP servers are available on the local or wide area network.
- The list of NTP association contains valid NTP server addresses.

Otherwise:

- Correct any problems with the GPS installation.
- Make arrangements with your IT department to open firewall port 123 so that NTP messages can travel between LAN1 and NTP servers on the Internet
- Add any NTP servers on the local or wide area network, (LAN or WAN) as NTP associations.
- Add public NTP servers to the SyncServer's NTP Associations, as described below.

Adding NTP Servers to the NTP Associations

1. Search the Internet for "NTP servers".
2. Review the lists of NTP servers on the various sites. (Stratum 1 recommended.)
3. Identify several NTP servers operated by trustworthy organizations, including one or two nearby.
4. Verify that your usage complies with the access policies of the NTP servers.
5. Using the SyncServer's **NTP - Config** page, under Add/Edit NTP Association:
    - **Role**: Select "Server".
    - **Address**: Enter the URL or IP address of the NTP server.
    - Leave the other settings at their default values unless there's a reason to change them.
6. Click the **RESTART** button to restart the NTP daemon.

Note: When using a URL as the NTP server address, a valid DNS server must be available for LAN1 on the **NETWORK - Ethernet** page.

Recovering a Password

Enable *Recover Password* when setting up the SyncServer so it is available when needed. This can be done using the **ADMIN - Users** or **WIZARD-1st Setup** pages

To recover a lost or forgotten password:

1. Enter the username, select the **Recover Password** checkbox, and click the **LOGIN** button.
2. Answer the *Recovery Question* and click the **RESET** button. The SyncServer sends a message to the email address of the username.
3. When the email arrives, log into the SyncServer using the new password provided in the email message.
4. Change the password using the **ADMIN - Users** page.

If *Recover Password* wasn't enabled:

- If the SyncServer has multiple user accounts, you may be able to have another user log in and change the password for you.
- If there is no other way to log into the SyncServer, use the hardware jumper to restore the factory configuration. See ***Restoring the Factory Default Configuration*** (on page 119).

See also: ***Changes to Passwords and User Names*** (see "Properties of User Names and Passwords" on page 20)

Halting the SyncServer

Microsemi recommends shutting the operating system down before removing the power.

Using the keypad/display interface:

1. Press the **MENU** button.
2. Select **3) Shutdown**.
3. Select **1) Yes**.
4. Press the **ENTER** button.
5. When the display shows "System Stopped - OK to Turn Power Off Now!" turn the power off.

Or, using the web interface:

1. Go to the **SERVICES - Startup** page.
2. Select **Halt** and click the **APPLY** button.
3. Wait approximately 30 seconds before removing power.

Configuring LAN1

During installation, the user configures LAN1 to gain access to the web interface. After logging in to the web interface, the user can configure the remaining ports on the **NETWORK - Ethernet** page.

The factory default settings for the LAN1 network port are as follows:

- IP Address:192.168.0.100
- Mask: 255.255.255.0
- Gateway: 0.0.0.0

Configure new network settings using the keypad on the front panel:

1. Press the **MENU** button on the front panel.
2. Using the number buttons, select **1) LAN1**, then **1) Config**, and configure the port as needed.
3. Check the new LAN1 settings by pressing the **STATUS** button repeatedly until "LAN1 STATUS" is shown.

Note: Using the keypad/display interface to configure LAN1, erases the previous settings for all of the network ports.

Also see MENU Button.

CAUTION: DHCP Not Available

If the user selects DHCP, the SyncServer tries to reach a DHCP server for approximately 90 seconds before stopping. Please do not disconnect the power during this time.

ATTENTION : Si l'utilisateur choisit *DHCP,* le SyncServer essaye d'atteindre un serveur de DHCP pendant approximativement 90 secondes avant de s'arrêter. Veuillez ne pas enlever le courrant pendant ce temps.

Logging in to the Web Interface

1. Get the LAN1 IP address by pressing the **STATUS** button repeatedly until the **LAN1 STATUS** screen is visible on the display.
2. Using Internet Explorer, enter the IP address as a URL. This displays the **Login** page.
3. At the SyncServer Login page, log in. The username is *admin* and password is *symmetricom*.

Note: When entering the IP address as a URL, leave off any leading zeroes in the IP address. For example, instead of 192.168.047.025, enter 192.168.47.25.

Using the 1st Setup Wizard

Select the **WIZARDS** button and complete the **1st Setup** wizard.

1. Configure the SyncServer using **WIZARDS - 1st Setup**. Select the following options:
   - "Configure Password Recovery" (Ask the IT department for the IP address of the SMTP server).
   - "Send test mail when finished"
   - "Set Local Time Zone"

Note: Reconfiguring LAN1 in the **1st Setup** wizard erases the previous network settings for all Ethernet ports.

Also see WIZARDS - 1st Setup.

Configuring the Network Ports

Configure the remaining network ports using **NETWORK - Ethernet**.

Microsemi Recommends:

- Using static IP addresses. (See explanation below.)
- Using **Allowed Access** to protect the network ports from unauthorized IP addresses or address ranges.

Explanation: NTP associations and authentication may rely on static network addresses. If a DHCP server assigns a new address to a network port that has DHCP enabled, the associations and authentication may stop working.

Also see ***NETWORK - Ethernet*** (on page 27).

Adding Server Associations

NTP server and peer associations provide an important backup source of time if the SyncServer's Input References are unavailable. Having two or more server or peer associations is important for reliability and redundancy.

(Optional) The user can add associations for NTP servers that reside on the company network:

- For NTP servers that the user cannot configure, add *server* associations, as described below.
- For NTP servers that the user can configure, add *peer* associations as described in Adding Peer Associations.

Note: Avoid creating *server* associations on two NTP servers that point to each other. Use *peer* associations instead.

(Optional) If the SyncServer is located outside the United States, the user can also add at least one *server* association that points to a local NTP server. This provides a shorter network path, which improves timing precision and accuracy. Often, public NTP servers are operated by national timekeeping authorities, telecommunications companies, and universities. To find a local NTP server, search the Internet for "Public NTP servers". Include the name of your country at the end of the search string. When available, select NTP servers that are stratum 1 over those that are stratum 2.

To add a server association:

1. Go to **NTP - Config** in the web interface.
2. Under *Add/Edit Association*, for **Role**, select **Server**.
3. For **Address**, enter an IP address (recommended) or domain name.
4. (Optional) Configure the other settings under *Add/Edit Association.* For more information, see NTP - Config.
5. Click **SAVE**.
6. Click **RESTART**.

After restarting, the NTP daemon sends regular requests to the server and uses the replies to compare the NTP server with other servers and peers. The NTP daemon selects the best server or peer and synchronizes with it.

Also see Configuring NTP Clients.

Using the Other Input References

(Optional) Connect any additional Input References to the back panel and configure them, if needed:

- For **IRIG In**, see REFERENCES - Timecode.
- **1PPS In, 10MHz In** don't require any configuration.

See ***SyncServer signal feature comparison*** (on page 18) to see the available signals for each model of SyncServer.

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CAUTION: Lithium Battery 123

Troubleshooting

The following troubleshooting scenarios provide high-level guidance on how to solve a range of potential problems with the SyncServer.

- A bullet is a proposed solution. The user should try each solution in turn until the problem is solved.
- A numbered step is a procedure. The user should complete the procedure to solve the problem.

For additional help, contact ***Microsemi Customer Assistance*** (on page 3).

Passwords

You've tried logging in and the password doesn't work.

- Passwords are case sensitive. Check that that **Caps Lock** isn't on.
- Use the **Recover Password** feature, if it is available and configured.
- Have another user log in and change your password settings.

- If all else fails, restore the factory default configuration using the hardware jumper. See ***Restoring the Factory Default Configuration*** (on page 119).

See also: ***Changes to Passwords and User Names*** (see "Properties of User Names and Passwords" on page 20)

Web Interface Troubleshooting

You can't reach the web interface.

- Check that LAN1 is physically connected to the network.
- Ping the IP Address of LAN1.
- Check that the LAN1 IP Address, Mask, and Gateway are valid using the **STATUS** button to display **LAN1 STATUS**.
- LAN1 may be disabled. If needed, turn it on using the Keypad/Display as follows:
    1. Press **MENU**.
    2. Select **1) LAN1**.
    3. Select **2) On/Off**.
    4. Select **1) On**.
- The *Web Server* may be turned off.
    - Cycle the power off and on again. Depending on the configuration of the **SERVICES - Startup** page, the web server may be available when the SyncServer finishes rebooting. See Halting the SyncServer.
    - Otherwise, log into the command line interface and turn the web server on using the *HTTP on* command. See ***Command Line Interface*** (on page 79).
    - After logging in to the web interface, select **Auto** for Web Server on the **SERVICES - Startup** page.
- The **SERVICES - HTTP** page may be configured for *Secure (Port 443) Only*. If so, edit the URL in the browser so that it begins with "https" instead of "http".

Alarms and Notification

You're not receiving alarm notifications by email or snmp.

- Check that the alarm notification settings are enabled, as shown in the Factory Default Settings for Alarms topic that follows.
- To receive SNMP traps, verify that the **NETWORK - SNMP** and **NETWORK - SNMP Traps** pages are configured correctly.
- To receive email notification, verify that the **SERVICES - Email** page is configured correctly.
- Verify that LAN1 is configured with a valid DNS server address.

Factory Default Settings for Alarms

Name	Auto Clear	Severity	Send Trap	Write Log	Send Email
NTP System Peer Change		Notify		X	

NTP Stratum Change	X	**Major**	X	X	X
NTP Leap Change	X	Notify		X	
System Network	X	Notify		X	
System Upgrade		*Minor*	X	X	X
System Config Change		Notify		X	
System Health	X	**Major**	X	X	X
System Up/Down	X	Notify			
System Authentication	X	Notify		X	
Timing No Source	X	**Major**	X	X	X
Timing GPS Source	X	**Major**	X	X	X
Timing IRIG-B Source	X	Notify		X	
Timing PPS Source	X	Notify		X	
Timing 10MHz Source	X	Notify		X	
Timing GPS Antenna Short	X	**Major**	X	X	X
Timing GPS Antenna Open	X	**Major**	X	X	X
Timing Oscillator DAC Range		Notify		X	
Timing Rubidium Lock		Notify		X	
Timing Oscillator Unlock		Notify		X	
Timing Source Change		Notify		X	
Timing Source Lower Accuracy Input		Notify		X	
Timing PLL Unlock	X	Notify		X	
Timing Quality 1e-6	X	Notify		X	
Timing Quality 1e-5	X	Notify		X	
Timing Quality 1e-4	X	Notify		X	
Timing Quality 1e-3	X	Notify		X	
Timing Leap Event	X	Notify		X	
LAN1 Link	X	**Major**		X	
LAN2 Link	X	Notify		X	
LAN3 Link	X	Notify		X	
Timing NTP Daemon		Notify			
System Reset Default Config		Notify			

NTP Clients

The NTP clients can't reach or synchronize with the SyncServer. On the SyncServer:

- The **Network** LED on the front panel should be green. Otherwise, check the physical network port connections. Also see Status LEDs.
- Check the configuration of the network ports on the **NETWORK - Ethernet** page, described in ***Configuring the Network Ports*** (on page 112).
- If the **Sync** LED on the front panel is red, the SyncServer is unsynchronized and NTP clients won't synchronize to it. Configure the SyncServer with a valid reference input and/or

NTP server/peer associations. Also see ***Using GPS*** (on page 100), Using the Other Input References, and ***Adding Server Associations*** (on page 113).

Backing Up/Restoring Configurations

SyncServer's configuration settings can be saved to a "backup" file, which is useful in the following scenarios:

- The user is testing multiple SyncServer configurations. The user saves the "original" configuration before testing, and then saves some of the more promising test configurations. When the testing is complete, the user selects the best configuration and applies it to the SyncServer.
- The user needs to configure several SyncServers. The user configures a single SyncServer, creates a backup file, and then uses the backup file to transfer the configuration to the remaining SyncServers.
- The user needs a "known good configuration" in case the SyncServer's configuration is inadvertently changed or lost.

The SyncServer's backup and restore features are available from two locations:

- From the web interface, using the **WIZARDS - Backup** and the **WIZARDS - Restore** pages.
- From the front panel keypad, using the **MENU** button and the **4) USB** menu item.

The backup/restore features can use a variety of media:

- A USB flash drive plugged into either of the USB ports on the front panel.
- Any directory that is accessible to a browser.

Note 1 - Not all USB flash drives are compatible with the SyncServer's USB ports. Microsemi recommends using SanDisk cruzer micro USB devices.

Note 2 - The backup file includes the configuration of the **NETWORK - Ethernet** page. If restoring a single configuration to multiple units, if the network ports have static IP addresses, avoid IP address conflicts by changing these addresses.

Note 3 - Transferring configurations between a SyncServers with different hardware or software might not work. The user may want to back up the configuration of the "destination" SyncServer before applying the configuration of the "originating" SyncServer. One can also restore the Factory Defaults if the transfer doesn't work. See the ***Restoring the Factory Default Configuration*** (on page 119) topic.

Creating a Backup File

From the front panel keypad

1. Plug a compatible USB flash drive into either USB port.
2. Wait 10 seconds.
3. Press the **MENU** button.
4. Select **4) USB**.

5. Select **1) Backup Cfg**.
6. When the SyncServer finishes "Saving to USB Drive", remove the USB flash drive.

From the web interface

1. On the **WIZARDS - Backup** web page, click the **BACKUP** button to create a backup file on the SyncServer.
2. Then use the **SAVE AS** or **COPY** button to download the backup file to a your workstation or a USB device.

Restoring from a Backup File

From the front panel keypad

1. Plug the USB flash drive into the 'target' SyncServer.
2. Wait 10 seconds.
3. Press the **MENU** button, select **4) USB**, and select **1) Restore Cfg**.
4. The SyncServer reports "Restoring from USB Drive" and "Shutting down, please wait..."
5. When the SyncServer finishes rebooting, remove the USB flash drive.

From the web interface

On the **WIZARDS - Restore** web page, select one of the following options:

- Reset to Factory Defaults. See ***Restoring the Factory Default Configuration*** (on page 119).
- Restore last backup from SyncServer.
- Restore backup from USB flash drive.
- Restore backup from a workstation hard-drive or network directory.

Restoring the Factory Default Configuration

The user may wish to restore the factory default configuration in a variety of circumstances:

- When the password is lost and the *Recover Password* feature is disabled (Use the Hardware Jumper method).
- To erase the previous configuration prior to reconfiguring the SyncServer.
- To erase site-specific information such as the IP addresses and the GPS position, prior to sending the SyncServer off-site.

In some cases, the user may back up the current configuration of the SyncServer prior to restoring the factory default configuration. See ***Creating a Backup File*** (on page 118).

Restoring the default factory configuration removes the current network settings. Afterwards, the user may need to configure the LAN1 port in order to use the web interface.

Using the Web Interface

To restore the factory configuration use the one of the following pages:

- **SYSTEM - Factory Reset**
- **WIZARDS - Restore** (select *Reset to Factory Defaults*).

To clear site-specific information from the SyncServer, disconnect all input network cables and GPS antenna cables from the rear of the SyncServer shortly after clicking the **APPLY** button, before the SyncServer has had time to restart.

Using the Hardware Jumper

This procedure requires:

- A jumper.
- Size 0 philips-head screwdriver
- Tweezers or needle-nosed pliers for handling the jumper.

Note: Observe static protection measures while working inside the SyncServer.

To restore the factory configuration:

1. Halt the SyncServer as described in Halting the SyncServer.
2. **VERY IMPORTANT**: Remove the top cover as described in ***Removing the Top Cover*** (on page 122).
3. Position a jumper (not supplied) across the jumper pins marked *JP4*, next to the circular battery.
4. (Optional) To clear site-specific information, disconnect all network and GPS antenna cables from the rear of the SyncServer and do not reconnect them.
5. Connect the power cable and turn the power switch on. The SyncServer restores the factory configuration.
6. After 100 seconds, turn the power switch off and disconnect the power cable.
7. Remove the jumper from the JP4 jumper pins.
8. Secure the top cover to the SyncServer using the screws.
9. Reconnect the power cable and turn the SyncServer's power on. The default factory configuration has been restored.

Configuring SNMP

On the SyncServer, SNMP:

- Responds to requests for configuration and operational information.
- Sends traps in response to events, as configured on the **ADMIN - Alarms** page.
- Cannot be used to change the SyncServer's configuration (is read only).

SNMP-related pages on the SyncServer:

- **WIZARDS - SNMP:** Configure SNMP quickly (SNMP v1 and v2c only).
- **NETWORK - SNMP**: Configure SNMP and add v3 users.
- **NETWORK - SNMP Traps:** Configure trap recipients.
- **ADMIN - Alarms:** Select which events generate SNMP traps.
- **SERVICES - Startup:** Stop or start the SNMP daemon, and enable/disable it from starting automatically when the SyncServer reboots.

Configuring the SyncServer for SNMP queries

For SNMP v1/v2c queries, specify a *Read Community* string on the **NETWORK - SNMP** page.

For SNMP v3 queries, create *v3 Users* on the **NETWORK - SNMP** page.

Additional standard SNMP values, such as sysLocation and sysContact are also specified on the **NETWORK - SNMP** page.

The SyncServer Product CD includes a copy of the SyncServer custom MIB file that can be loaded into SNMP management stations.

Configuring the SyncServer to send SNMP Traps

To configure SNMP to send v1 or v2c traps:

1. Go to the **NETWORK -> SNMP Traps** page.
2. In the "Add/Edit Trap Recipient" section of the page, do the following:
   - Enter the IP Address of the destination management console.
   - Select whether it is a v1 or v2c trap.
   - Enter the Community string that will be included in the trap PDU.
   - For v2c, mark Send As Inform if you want to send an INFORM-PDU. (Otherwise a TRAP-PDU or TRAP2-PDU is sent.)
   - Click Save.
   - Go to the **ADMIN -> Alarms** page, and specify which events should generate SNMP traps.

To configure SNMP to send v3 traps:

NOTE! To configure SNMP to send v3 traps, you must first create a v3 user which corresponds to a user on the destination management console. (This is done through the NETWORK -> SNMP page.)

1. Go to the NETWORK -> SNMP Traps page.
2. In the "Add/Edit Trap Recipient" section of the page, do the following:
   - Enter the IP Address of the destination management console.
   - Select v3 as the trap type.
   - Enter the name of the v3 User you created on the NETWORK -> SNMP page.
   - Mark Send As Inform if you want to send an INFORM-PDU. (Otherwise a TRAP-PDU or TRAP2-PDU is sent.)
   - Enter the 8-character Auth phrase for the user, and indicate if it is M5D or SHA1.
   - Specify an optional Priv phrase.
   - Click Save.
   - Go to the ADMIN -> Alarms page, and specify which events should generate SNMP traps.

Use SNMP get from the destination management console (as this v3 user), to query the SyncServer for its EngineID. You may then configure any desired SNMP v3 trap receivers on your remote management console.

NOTE: The SyncServer gets a new EngineID on every upgrade (even if "upgrading" to the same system software version you are already running). You MUST re-query the SyncServer via SNMP get and reconfigure your v3 trap receivers to use this new EngineID.

Transferring Configurations

The user can transfer a configuration across multiple SyncServers to save time and effort, provided they are running the same *Software Version* (displayed on the **STATUS - General** page.

If you have physical access to the SyncServer, the easiest method for transferring the configuration is to use a USB flash drive and the front panel keypad.

1. Create a backup file on a configured SyncServer, as described in ***Creating a Backup File*** (on page 118).
2. Restore that backup file to another SyncServer as described in ***Restoring from a Backup File*** (on page 119).
3. **IMPORTANT:** When the SyncServer reboots, immediately change the IP address of LAN1 using the front panel **MENU** button as described in ***Configuring LAN1*** (on page 111). This step resets all of the network port addresses and prevents network address collisions with the previous SyncServer.
4. Log in and use the **NETWORK - Ethernet** page to configure the network ports.
5. On the **SYSTEM - General** page, update the **Hostname**.

Removing the Top Cover

After halting the SyncServer as described in Halting the SyncServer:

1. If needed, remove the SyncServer from the equipment rack.
2. Disconnect the power from the SyncServer.
3. Remove the top cover (lid):
   - Remove the six retaining screws from the top cover.
   - Lift the rear edge of the top cover from the chassis.
   - **SLOWLY** and firmly separate the top cover from the adhesive heatsink pad.

Replacing the Battery

To replace the battery:

1. To safeguard delicate instrument electronics, remove power to the SyncServer.

2. **VERY IMPORTANT**: Remove the SyncServer's top cover as described in ***Removing the Top Cover*** (on page 122).
3. Locate the circular silver-colored disc-shaped lithium battery, located on the front right corner of the motherboard.
4. **Please do not lift or bend the metal clip**. Doing so may damage or break the battery holder, requiring repair.
5. Locate the sloping black plastic latch, opposite from the metal clip.
6. Depress the latch and slide the battery out of the holder
7. Dispose of the battery in accordance with local regulations.
8. Use the new battery to press the latch down while sliding the battery into the holder.
9. Re-apply power to the SyncServer.

CAUTION: Lithium Battery

The SyncServer contains a Lithium Battery that maintains the system's Real Time Clock (RTC) when the SyncServer's power is off. Replace the Lithium Battery only with the same or equivalent type. Do not dispose of the Lithium Battery in a fire or incinerator, or the battery may explode. Follow disposal regulations in your area for Lithium Battery disposal.

ATTENTION : Le SyncServer contient une batterie de lithium pour maintenir l'horloge en temps réel pendent que le courant est debranché. Remplacez la batterie de lithium seulement avec une batterie de type équivalent. Ne vous débarrassez pas de la batterie de lithium dans un feu ou un incinérateur, car la batterie pourrait exploser. Débarrassez-vous de la batterie usagée de lithium selon les instructions du fabricant.

Software

Upgrades

Microsemi (formerly Symmetricom) makes software updates available as downloads on the Internet.

Users are required to register in order to download software. Some export restrictions may apply.

Licenses

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These licenses include, but are not limited to the following:

- Apache Software License
- NTP Software License
- GNU General Public License
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In This section

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*/


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The Apache HTTP Server includes a number of subcomponents with
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* mod_mime_magic: MIME type lookup via file magic numbers
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*
* This software was submitted by Cisco Systems to the Apache Group in July
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*/


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For the  server\util_md5.c component:

/*********************************************************************
* NCSA HTTPd Server
* Software Development Group
* National Center for Supercomputing Applications
* University of Illinois at Urbana-Champaign
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* httpd@ncsa.uiuc.edu
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Written by: Philip Hazel <ph10@cam.ac.uk>

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     Written by Adam Twiss (adam@zeus.co.uk).  March 1996
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Thanks to the following people for their input:
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    3. [3]Viraj Bais <vbais@mailman1.intel.com> and [4]Clayton Kirkwood
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    4. [5]Michael Barone <michael,barone@lmco.com> GPSVME fixes
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    7. [8]Marc Brett <Marc.Brett@westgeo.com> Magnavox GPS clock driver
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   12. [13]Sven Dietrich <sven_dietrich@trimble.com> Palisade reference
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   21. [23]Poul-Henning Kamp <phk@FreeBSD.ORG> Oncore driver (Original
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       PARSE <GENERIC> driver (14 reference clocks), STREAMS modules for
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   27. [30]Louis A. Mamakos <louie@ni.umd.edu> MD5-based authentication
   28. [31]Lars H. Mathiesen <thorinn@diku.dk> adaptation of foundation
       code for Version 3 as specified in RFC-1305
   29. [32]David L. Mills <mills@udel.edu> Version 4 foundation: clock
       discipline, authentication, precision kernel; clock drivers:
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39. [43]Jack Sasportas <jack@innovativeInternet.com> Saved a Lot of
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41. [45]Michael Shields <shields@tembel.org> USNO clock driver
42. [46]Jeff Steinman <jss@pebbles.jpl.nasa.gov> Datum PTS clock
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43. [47]Harlan Stenn <harlan@pfcs.com> GNU automake/autoconfigure
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44. [48]Kenneth Stone <ken@sdd.hp.com> HP-UX port
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```

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```

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Listing of Memory Devices

The following devices contain either volatile or non-volatile memory:

In This section

ETX Module **145**
86-611xPCB **145**
MC9S12DG256 (U2) **146**

ETX Module

- 256MB SDRAM. The 256MB Synchronous Dynamic RAM is installed on the ETX Module in a DIMM socket. This part is used as system RAM memory for the ETX Module's x86 processor. The content in this device is volatile and is lost when the SyncServer is powered down. This part is socketed (ETX).
- BIOS. 512KB FLASH memory used on the ETX module for system BIOS. This part is soldered to the ETX module. This part is not reprogrammed in normal operation. The content in this device is non-volatile and there is no procedure to clear this memory.

86-611xPCB

- 512MB Compact Flash Primary (J3). The 512MB Compact Flash device is installed on the 86-610x PCB. This part is used as a virtual Hard Drive by the ETX Module's x86 processor. There is no procedure to clear this memory. This part is socketed (J3).
- U41 is a Xilinx XC2S200 FPGA that is re-programmed each time the board is powered up. The program for this part is contained in J3's Compact Flash memory and is downloaded into U41 by U39. The content of this device is volatile and is lost when the board is powered down. This part is soldered to the PCB.
- M93C46 1Kb Serial Microwire EEPROM for Intel 82551ER Fast Ethernet Controller configuration (U34). This non-volatile part is used at power-on to initialize registers in the Intel Fast Ethernet Controller. This part is not reprogrammed in normal operation. This part is a DIP that is mounted in an 8-pin socket.
- M93C46 1Kb Serial Microwire EEPROM for system configuration (U40), controlled by PCI9030. This non-volatile part is used to store unit specific data. This part is a DIP that is mounted in an 8-pin socket.

MC9S12DG256 (U2)

- (U2) 256KB Flash program memory. This Flash memory is used for microprocessor program storage. This part is not reprogrammed in normal operation. The content in this device is non-volatile and there is no procedure to clear this memory. This part is soldered to the PCB.
- (U2) 12KB RAM. This RAM is embedded in U2 and is used as operating memory. The content in this device is volatile and is lost when the SyncServer is powered down. This part is soldered to the PCB.
- (U2) 4KB EEPROM. This EEPROM is embedded in U2 and is used to store non-volatile configuration data. This part is soldered to the PCB.

Determining Latitude and Longitude

To determine the position of the GPS antenna, use one of the following methods or resources (sorted by degree of accuracy).

- Use a handheld GPS unit outdoors or temporarily run the SyncServer with its GPS antenna outdoors.
- ***http://jan.ucc.nau.edu/~cvm/latlon_find_location.html***
- ***http://geonames.usgs.gov/pls/gnispublic***

The following reference topics also provide the approximate latitude and longitude for many locations around the world:

- ***United States*** (on page 147)
- ***Canada*** (on page 162)
- ***International*** (on page 164)

United States

ALABAMA		
Alexander City	32° 57' N	85° 57' W
Anniston AP	33° 35' N	85° 51' W
Auburn	32° 36' N	85° 30' W
Birmingham AP	33° 34' N	86° 45' W
Decatur	34° 37' N	86° 59' W
Dothan AP	31° 19' N	85° 27' W
Florence AP	34° 48' N	87° 40' W
Gadsden	34° 1' N	86° 0' W
Huntsville AP	34° 42' N	86° 35' W
Mobile AP	30° 41' N	88° 15' W
Mobile Co	30° 40' N	88° 15' W
Montgomery AP	32° 23' N	86° 22' W
Selma-Craig AFB	32° 20' N	87° 59' W
Talladega	33° 27' N	86° 6' W
Tuscaloosa AP	33° 13' N	87° 37' W
ALASKA		
Anchorage AP	61° 10' N	150° 1' W
Barrow (S)	71° 18' N	156° 47' W
Fairbanks AP (S)	64° 49' N	147° 52' W
Juneau AP	58° 22' N	134° 35' W
Kodiak	57° 45' N	152° 29' W
Nome AP	64° 30' N	165° 26' W
ARIZONA		
Douglas AP	31° 27' N	109° 36' W
Flagstaff AP	35° 8' N	111° 40' W
Fort Huachuca AP (S)	31° 35' N	110° 20' W
Kingman AP	35° 12' N	114° 1' W
Nogales	31° 21' N	110° 55' W

Phoenix AP (S)	33° 26' N	112° 1' W
Prescott AP	34° 39' N	112° 26' W
Tucson AP (S)	32° 7' N	110° 56' W
Winslow AP	35° 1' N	110° 44' W
Yuma AP	32° 39' N	114° 37' W
ARKANSAS		
Blytheville AFB	35° 57' N	89° 57' W
Camden	33° 36' N	92° 49' W
El Dorado AP	33° 13' N	92° 49' W
Fayetteville AP	36° 0' N	94° 10' W
Fort Smith AP	35° 20' N	94° 22' W
Hot Springs	34° 29' N	93° 6' W
Jonesboro	35° 50' N	90° 42' W
Little Rock AP (S)	34° 44' N	92° 14' W
Pine Bluff AP	34° 18' N	92° 5' W
Texarkana AP	33° 27' N	93° 59' W
CALIFORNIA		
Bakersfield AP	35° 25' N	119° 3' W
Barstow AP	34° 51' N	116° 47' W
Blythe AP	33° 37' N	114° 43' W
Burbank AP	34° 12' N	118° 21' W
Chico	39° 48' N	121° 51' W
Concord	37° 58' N	121° 59' W
Covina	34° 5' N	117° 52' W
Crescent City AP	41° 46' N	124° 12' W
Downey	33° 56' N	118° 8' W
El Cajon	32° 49' N	116° 58' W
El Cerrito AP (S)	32° 49' N	115° 40' W
Escondido	33° 7' N	117° 5' W
Eureka/Arcata AP	40° 59' N	124° 6' W
Fairfield-Trafis AFB	38° 16' N	121° 56' W
Fresno AP (S)	36° 46' N	119° 43' W
Hamilton AFB	38° 4' N	122° 30' W
Laguna Beach	33° 33' N	117° 47' W
Livermore	37° 42' N	121° 57' W
Lompoc, Vandenberg AFB	34° 43' N	120° 34' W
Long Beach AP	33° 49' N	118° 9' W
Los Angeles AP (S)	33° 56' N	118° 24' W
Los Angeles CO (S)	34° 3' N	118° 14' W
Merced-Castle AFB	37° 23' N	120° 34' W
Modesto	37° 39' N	121° 0' W
Monterey	36° 36' N	121° 54' W
Napa	38° 13' N	122° 17' W
Needles AP	34° 36' N	114° 37' W
Oakland AP	37° 49' N	122° 19' W
Oceanside	33° 14' N	117° 25' W
Ontario	34° 3' N	117° 36' W
Oxnard	34° 12' N	119° 11' W
Palmdale AP	34° 38' N	118° 6' W
Palm Springs	33° 49' N	116° 32' W
Pasadena	34° 9' N	118° 9' W
Petaluma	38° 14' N	122° 38' W
Pomona Co	34° 3' N	117° 45' W
Redding AP	40° 31' N	122° 18' W

Redlands	34° 3' N	117° 11' W
Richmond	37° 56' N	122° 21' W
Riverside-March AFB (S)	33° 54' N	117° 15' W
Sacramento AP	38° 31' N	121° 30' W
Salinas AP	36° 40' N	121° 36' W
San Bernadino, Norton AFB	34° 8' N	117° 16' W
San Diego AP	32° 44' N	117° 10' W
San Fernando	34° 17' N	118° 28' W
San Francisco AP	37° 37' N	122° 23' W
San Francisco Co	37° 46' N	122° 26' W
San Jose AP	37° 22' N	121° 56' W
San Louis Obispo	35° 20' N	120° 43' W
Santa Ana AP	33° 45' N	117° 52' W
Santa Barbara MAP	34° 26' N	119° 50' W
Santa Cruz	36° 59' N	122° 1' W
Santa Maria AP (S)	34° 54' N	120° 27' W
Santa Monica CIC	34° 1' N	118° 29' W
Santa Paula	34° 21' N	119° 5' W
Santa Rosa	38° 31' N	122° 49' W
Stockton AP	37° 54' N	121° 15' W
Ukiah	39° 9' N	123° 12' W
Visalia	36° 20' N	119° 18' W
Yreka	41° 43' N	122° 38' W
Yuba City	39° 8' N	121° 36' W
COLORADO		
Alamosa AP	37° 27' N	105° 52' W
Boulder	40° 0' N	105° 16' W
Colorado Springs AP	38° 49' N	104° 43' W
Denver AP	39° 45' N	104° 52' W
Durango	37° 17' N	107° 53' W
Fort Collins	40° 45' N	105° 5' W
Grand Junction AP (S)	39° 7' N	108° 32' W
Greeley	40° 26' N	104° 38' W
Lajunta AP	38° 3' N	103° 30' W
Leadville	39° 15' N	106° 18' W
Pueblo AP	38° 18' N	104° 29' W
Sterling	40° 37' N	103° 12' W
Trinidad	37° 15' N	104° 20' W
CONNECTICUT		
Bridgeport AP	41° 11' N	73° 11' W
Hartford, Brainard Field	41° 44' N	72° 39' W
New Haven AP	41° 19' N	73° 55' W
New London	41° 21' N	72° 6' W
Norwalk	41° 7' N	73° 25' W
Norwick	41° 32' N	72° 4' W
Waterbury	41° 35' N	73° 4' W
Widsor Locks, Bradley Fld	41° 56' N	72° 41' W
DELAWARE		
Dover AFB	39° 8' N	75° 28' W
Wilmington AP	39° 40' N	75° 36' W
DISTRICT OF COLUMBIA		
Andrews AFB	38° 5' N	76° 5' W
Washington, National AP	38° 51' N	77° 2' W
FLORIDA		

Belle Glade	26° 39' N	80° 39' W
Cape Kennedy AP	28° 29' N	80° 34' W
Daytona Beach AP	29° 11' N	81° 3' W
E Fort Lauderdale	26° 4' N	80° 9' W
Fort Myers AP	26° 35' N	81° 52' W
Fort Pierce	27° 28' N	80° 21' W
Gainsville AP (S)	29° 41' N	82° 16' W
Jacksonville AP	30° 30' N	81° 42' W
Key West AP	24° 33' N	81° 45' W
Lakeland Co (S)	28° 2' N	81° 57' W
Miami AP (S)	25° 48' N	80° 16' W
Miami Beach Co	25° 47' N	80° 17' W
Ocala	29° 11' N	82° 8' W
Orlando AP	28° 33' N	81° 23' W
Panama City, Tyndall AFB	30° 4' N	85° 35' W
Pensacola Co	30° 25' N	87° 13' W
St. Augustine	29° 58' N	81° 20' W
St. Petersburg	27° 46' N	82° 80' W
Stanford	28° 46' N	81° 17' W
Sarasota	27° 23' N	82° 33' W
Tallahassee AP (S)	30° 23' N	84° 22' W
Tampa AP (S)	27° 58' N	82° 32' W
West Palm Beach AP	26° 41' N	80° 6' W
GEORGIA		
Albany, Turner AFB	31° 36' N	84° 5' W
Americus	32° 3' N	84° 14' W
Athens	33° 57' N	83° 19' W
Atlanta AP (S)	33° 39' N	84° 26' W
Augusta AP	33° 22' N	81° 58' W
Brunswick	31° 15' N	81° 29' W
Columbus, Lawson AFB	32° 31' N	84° 56' W
Dalton	34° 34' N	84° 57' W
Dublin	32° 20' N	82° 54' W
Gainsville	34° 11' N	83° 41' W
Griffin	33° 13' N	84° 16' W
LaGrange	33° 1' N	85° 4' W
Macon AP	32° 42' N	83° 39' W
Marietta, Dobbins AFB	33° 55' N	84° 31' W
Savannah	32° 8' N	81° 12' W
Valdosta-Moody AFB	30° 58' N	83° 12' W
Waycross	31° 15' N	82° 24' W
HAWAII		
Hilo AP (S)	19° 43' N	155° 5' W
Honolulu AP	21° 20' N	157° 55' W
Kaneohe Bay MCAS	21° 27' N	157° 46' W
Wahiawa	21° 3' N	158° 2' W
IDAHO		
Boise AP (S)	43° 34' N	116° 13' W
Burley	42° 32' N	113° 46' W
Coeur D'Alene AP	47° 46' N	116° 49' W
Idaho Falls AP	43° 31' N	112° 4' W
Lewiston AP	46° 23' N	117° 1' W
Moscow	46° 44' N	116° 58' W
Mountain Home AFB	43° 2' N	115° 54' W

Pocatello AP	42° 55' N	112° 36' W
Twin Falls AP (S)	42° 29' N	114° 29' W
ILLINOIS		
Aurora	41° 45' N	88° 20' W
Belleville, Scott AFB	38° 33' N	89° 51' W
Bloomington	40° 29' N	88° 57' W
Carbondale	37° 47' N	89° 15' W
Champaign/Urbana	40° 2' N	88° 17' W
Chicago, Midway AP	41° 47' N	87° 45' W
Chicago, O'Hare AP	41° 59' N	87° 54' W
Chicago Co	41° 53' N	87° 38' W
Danville	40° 12' N	87° 36' W
Decatur	39° 50' N	88° 52' W
Dixon	41° 50' N	89° 29' W
Elgin	42° 2' N	88° 16' W
Freeport	42° 18' N	89° 37' W
Galesburg	40° 56' N	90° 26' W
Greenville	38° 53' N	89° 24' W
Joliet	41° 31' N	88° 10' W
Kankakee	41° 5' N	87° 55' W
La Salle/Peru	41° 19' N	89° 6' W
Macomb	40° 28' N	90° 40' W
Moline AP	41° 27' N	90° 31' W
Mt Vernon	38° 19' N	88° 52' W
Peoria AP	40° 40' N	89° 41' W
Quincy AP	39° 57' N	91° 12' W
Rantoul, Chanute AFB	40° 18' N	88° 8' W
Rockford	42° 21' N	89° 3' W
Springfield AP	39° 50' N	89° 40' W
Waukegan	42° 21' N	87° 53' W
INDIANA		
Anderson	40° 6' N	85° 37' W
Bedford	38° 51' N	86° 30' W
Bloomington	39° 8' N	86° 37' W
Columbus, Bakalar AFB	39° 16' N	85° 54' W
Crawfordsville	40° 3' N	86° 54' W
Evansville AP	38° 3' N	87° 32' W
Fort Wayne AP	41° 0' N	85° 12' W
Goshen AP	41° 32' N	85° 48' W
Hobart	41° 32' N	87° 15' W
Huntington	40° 53' N	85° 30' W
Indianapolis AP	39° 44' N	86° 17' W
Jeffersonville	38° 17' N	85° 45' W
Kokomo	40° 25' N	86° 3' W
Lafayette	40° 2' N	86° 5' W
La Porte	41° 36' N	86° 43' W
Marion	40° 29' N	85° 41' W
Muncie	40° 11' N	85° 21' W
Peru, Grissom AFB	40° 39' N	86° 9' W
Richmond AP	39° 46' N	84° 50' W
Shelbyville	39° 31' N	85° 47' W
South Bend AP	41° 42' N	86° 19' W
Terre Haute AP	39° 27' N	87° 18' W
Valparaiso	41° 31' N	87° 2' W

Vincennes	38° 41' N	87° 32' W
IOWA		
Ames (S)	42° 2' N	93° 48' W
Burlington AP	40° 47' N	91° 7' W
Cedar Rapids AP	41° 53' N	91° 42' W
Clinton	41° 50' N	90° 13' W
Council Bluffs	41° 20' N	95° 49' W
Des Moines AP	41° 32' N	93° 39' W
Dubuque	42° 24' N	90° 42' W
Fort Dodge	42° 33' N	94° 11' W
Iowa City	41° 38' N	91° 33' W
Keokuk	40° 24' N	91° 24' W
Marshalltown	42° 4' N	92° 56' W
Mason City AP	43° 9' N	93° 20' W
Newton	41° 41' N	93° 2' W
Ottumwa AP	41° 6' N	92° 27' W
Sioux City AP	42° 24' N	96° 23' W
Waterloo	42° 33' N	92° 24' W
KANSAS		
Atchison	39° 34' N	95° 7' W
Chanute AP	37° 40' N	95° 29' W
Dodge City AP (S)	37° 46' N	99° 58' W
El Dorado	37° 49' N	96° 50' W
Emporia	38° 20' N	96° 12' W
Garden City AP	37° 56' N	100° 44' W
Goodland AP	39° 22' N	101° 42' W
Great Bend	38° 21' N	98° 52' W
Hutchinson AP	38° 4' N	97° 52' W
Liberal	37° 3' N	100° 58' W
Manhattan, Ft Riley (S)	39° 3' N	96° 46' W
Parsons	37° 20' N	95° 31' W
Russell AP	38° 52' N	98° 49' W
Salina	38° 48' N	97° 39' W
Topeka AP	39° 4' N	95° 38' W
Wichita AP	37° 39' N	97° 25' W
KENTUCKY		
Ashland	38° 33' N	82° 44' W
Bowling Green AP	35° 58' N	86° 28' W
Corbin AP	36° 57' N	84° 6' W
Covington AP	39° 3' N	84° 40' W
Hopkinsville, Ft Campbell	36° 40' N	87° 29' W
Lexington AP (S)	38° 2' N	84° 36' W
Louisville AP	38° 11' N	85° 44' W
Madisonville	37° 19' N	87° 29' W
Owensboro	37° 45' N	87° 10' W
Paducah AP	37° 4' N	88° 46' W
LOUISIANA		
Alexandria AP	31° 24' N	92° 18' W
Baton Rouge AP	30° 32' N	91° 9' W
Bogalusa	30° 47' N	89° 52' W
Houma	29° 31' N	90° 40' W
Lafayette AP	30° 12' N	92° 0' W
Lake Charles AP (S)	30° 7' N	93° 13' W
Minden	32° 36' N	93° 18' W

Monroe AP	32° 31' N	92° 2' W
Natchitoches	31° 46' N	93° 5' W
New Orleans AP	29° 59' N	90° 15' W
Shreveport AP (S)	32° 28' N	93° 49' W
MAINE		
Augusta AP	44° 19' N	69° 48' W
Bangor, Dow AFB	44° 48' N	68° 50' W
Caribou AP (S)	46° 52' N	68° 1' W
Lewiston	44° 2' N	70° 15' W
Millinocket AP	45° 39' N	68° 42' W
Portland (S)	43° 39' N	70° 19' W
Waterville	44° 32' N	69° 40' W
MARYLAND		
Baltimore AP	39° 11' N	76° 40' W
Baltimore Co	39° 20' N	76° 25' W
Cumberland	39° 37' N	78° 46' W
Frederick AP	39° 27' N	77° 25' W
Hagerstown	39° 42' N	77° 44' W
Salisbury (S)	38° 20' N	75° 30' W
MASSACHUSETTS		
Boston AP	42° 22' N	71° 2' W
Clinton	42° 24' N	71° 41' W
Fall River	41° 43' N	71° 8' W
Framingham	42° 17' N	71° 25' W
Gloucester	42° 35' N	70° 41' W
Greenfield	42° 3' N	72° 4' W
Lawrence	42° 42' N	71° 10' W
Lowell	42° 39' N	71° 19' W
New Bedford	41° 41' N	70° 58' W
Pittsfield AP	42° 26' N	73° 18' W
Springfield, Westover AFB	42° 12' N	72° 32' W
Taunton	41° 54' N	71° 4' W
Worcester AP	42° 16' N	71° 52' W
MICHIGAN		
Adrian	41° 55' N	84° 1' W
Alpena AP	45° 4' N	83° 26' W
Battle Creek AP	42° 19' N	85° 15' W
Benton Harbor AP	42° 8' N	86° 26' W
Detroit	42° 25' N	83° 1' W
Escanaba	45° 44' N	87° 5' W
Flint AP	42° 58' N	83° 44' W
Grand Rapids AP	42° 53' N	85° 31' W
Holland	42° 42' N	86° 6' W
Jackson AP	42° 16' N	84° 28' W
Kalamazoo	42° 17' N	85° 36' W
Lansing AP	42° 47' N	84° 36' W
Marquette Co	46° 34' N	87° 24' W
Mt Pleasant	43° 35' N	84° 46' W
Muskegon AP	43° 10' N	86° 14' W
Pontiac	42° 40' N	83° 25' W
Port Huron	42° 59' N	82° 25' W
Saginaw AP	43° 32' N	84° 5' W
Sault Ste. Marie AP (S)	46° 28' N	84° 22' W
Traverse City AP	44° 45' N	85° 35' W

Ypsilanti	42° 14' N	83° 32' W
MINNESOTA		
Albert Lea	43° 39' N	93° 21' W
Alexandria AP	45° 52' N	95° 23' W
Bemidji AP	47° 31' N	94° 56' W
Brainerd	46° 24' N	94° 8' W
Duluth AP	46° 50' N	92° 11' W
Fairbault	44° 18' N	93° 16' W
Fergus Falls	46° 16' N	96° 4' W
International Falls AP	48° 34' N	93° 23' W
Mankato	44° 9' N	93° 59' W
Minneapolis/St. Paul AP	44° 53' N	93° 13' W
Rochester AP	43° 55' N	92° 30' W
St. Cloud AP (S)	45° 35' N	94° 11' W
Virginia	47° 30' N	92° 33' W
Willmar	45° 7' N	95° 5' W
Winona	44° 3' N	91° 38' W
MISSISSIPPI		
Biloxi--Keesler AFB	30° 25' N	88° 55' W
Clarksdale	34° 12' N	90° 34' W
Columbus AFB	33° 39' N	88° 27' W
Greenville AFB	33° 29' N	90° 59' W
Greenwood	33° 30' N	90° 5' W
Hattiesburg	31° 16' N	89° 15' W
Jackson AP	32° 19' N	90° 5' W
Laurel	31° 40' N	89° 10' W
Mccomb AP	31° 15' N	90° 28' W
Meridian AP	32° 20' N	88° 45' W
Natchez	31° 33' N	91° 23' W
Tupelo	34° 16' N	88° 46' W
Vicksburg Co	32° 24' N	90° 47' W
MISSOURI		
Cape Girardeau	37° 14' N	89° 35' W
Columbia AP (S)	38° 58' N	92° 22' W
Farmington AP	37° 46' N	90° 24' W
Hannibal	39° 42' N	91° 21' W
Jefferson City	38° 34' N	92° 11' W
Joplin AP	37° 9' N	94° 30' W
Kansas City AP	39° 7' N	94° 35' W
Kirksville AP	40° 6' N	92° 33' W
Mexico	39° 11' N	91° 54' W
Moberly	39° 24' N	92° 26' W
Poplar Bluff	36° 46' N	90° 25' W
Rolla	37° 59' N	91° 43' W
St. Joseph AP	39° 46' N	94° 55' W
St. Louis AP	38° 45' N	90° 23' W
St. Louis CO	38° 39' N	90° 38' W
Sikeston	36° 53' N	89° 36' W
Sedalia--Whiteman AFB	38° 43' N	93° 33' W
Sikeston	36° 53' N	89° 36' W
Springfield AP	37° 14' N	93° 23' W
MONTANA		
Billings AP	45° 48' N	108° 32' W
Bozeman	45° 47' N	111° 9' W

Butte AP	45° 57' N	112° 30' W
Cut Bank AP	48° 37' N	112° 22' W
Glasgow AP (S)	48° 25' N	106° 32' W
Glendive	47° 8' N	104° 48' W
Great Falls AP (S)	47° 29' N	111° 22' W
Havre	48° 34' N	109° 40' W
Helena AP	46° 36' N	112° 0' W
Kalispell AP	48° 18' N	114° 16' W
Lewiston AP	47° 4' N	109° 27' W
Livingstown AP	45° 42' N	110° 26' W
Miles City AP	46° 26' N	105° 52' W
Missoula AP	46° 55' N	114° 5' W
NEBRASKA		
Beatrice	40° 16' N	96° 45' W
Chadron AP	42° 50' N	103° 5' W
Columbus	41° 28' N	97° 20' W
Fremont	41° 26' N	96° 29' W
Grand Island AP	40° 59' N	98° 19' W
Hastings	40° 36' N	98° 26' W
Kearney	40° 44' N	99° 1' W
Lincoln Co (S)	40° 51' N	96° 45' W
McCook	40° 12' N	100° 38' W
Norfolk	41° 59' N	97° 26' W
North Platte AP (S)	41° 8' N	100° 41' W
Omaha AP	41° 18' N	95° 54' W
Scottsbluff AP	41° 52' N	103° 36' W
Sidney AP	41° 13' N	103° 6' W
NEVADA		
Carson City	39° 10' N	119° 46' W
Elko AP	40° 50' N	115° 47' W
Ely AP (S)	39° 17' N	114° 51' W
Las Vegas AP (S)	36° 5' N	115° 10' W
Lovelock AP	40° 4' N	118° 33' W
Reno AP (S)	39° 30' N	119° 47' W
Reno Co	39° 30' N	119° 47' W
Tonopah AP	38° 4' N	117° 5' W
Winnemucca AP	40° 54' N	117° 48' W
NEW HAMPSHIRE		
Berlin	44° 3' N	71° 1' W
Claremont	43° 2' N	72° 2' W
Concord AP	43° 12' N	71° 30' W
Keene	42° 55' N	72° 17' W
Laconia	43° 3' N	71° 3' W
Manchester, Grenier AFB	42° 56' N	71° 26' W
Portsmouth, Pease AFB	43° 4' N	70° 49' W
NEW JERSEY		
Atlantic City CO	39° 23' N	74° 26' W
Long Branch	40° 19' N	74° 1' W
Newark AP	40° 42' N	74° 10' W
New Brunswick	40° 29' N	74° 26' W
Paterson	40° 54' N	74° 9' W
Phillipsburg	40° 41' N	75° 11' W
Trenton Co	40° 13' N	74° 46' W
Vineland	39° 29' N	75° 0' W

NEW MEXICO		
Alamagordo°		
Holloman AFB	32° 51' N	106° 6' W
Albuquerque AP (S)	35° 3' N	106° 37' W
Artesia	32° 46' N	104° 23' W
Carlsbad AP	32° 20' N	104° 16' W
Clovis AP	34° 23' N	103° 19' W
Farmington AP	36° 44' N	108° 14' W
Gallup	35° 31' N	108° 47' W
Grants	35° 10' N	107° 54' W
Hobbs AP	32° 45' N	103° 13' W
Las Cruces	32° 18' N	106° 55' W
Los Alamos	35° 52' N	106° 19' W
Raton AP	36° 45' N	104° 30' W
Roswell, Walker AFB	33° 18' N	104° 32' W
Santa Fe CO	35° 37' N	106° 5' W
Silver City AP	32° 38' N	108° 10' W
Socorro AP	34° 3' N	106° 53' W
Tucumcari AP	35° 11' N	103° 36' W
NEW YORK		
Albany AP (S)	42° 45' N	73° 48' W
Albany Co	42° 39' N	73° 45' W
Auburn	42° 54' N	76° 32' W
Batavia	43° 0' N	78° 11' W
Binghamton AP	42° 13' N	75° 59' W
Buffalo AP	42° 56' N	78° 44' W
Cortland	42° 36' N	76° 11' W
Dunkirk	42° 29' N	79° 16' W
Elmira AP	42° 10' N	76° 54' W
Geneva (S)	42° 45' N	76° 54' W
Glens Falls	43° 20' N	73° 37' W
Gloversville	43° 2' N	74° 21' W
Hornell	42° 21' N	77° 42' W
Ithaca (S)	42° 27' N	76° 29' W
Jamestown	42° 7' N	79° 14' W
Kingston	41° 56' N	74° 0' W
Lockport	43° 9' N	79° 15' W
Massena AP	44° 56' N	74° 51' W
Newburgh, Stewart AFB	41° 30' N	74° 6' W
NYC-Central Park (S)	40° 47' N	73° 58' W
NYC-Kennedy AP	40° 39' N	73° 47' W
NYC-La Guardia AP	40° 46' N	73° 54' W
Niagara Falls AP	43° 6' N	79° 57' W
Olean	42° 14' N	78° 22' W
Oneonta	42° 31' N	75° 4' W
Oswego Co	43° 28' N	76° 33' W
Plattsburg AFB	44° 39' N	73° 28' W
Poughkeepsie	41° 38' N	73° 55' W
Rochester AP	43° 7' N	77° 40' W
Rome, Griffiss AFB	43° 14' N	75° 25' W
Schenectady (S)	42° 51' N	73° 57' W
Suffolk County AFB	40° 51' N	72° 38' W
Syracuse AP	43° 7' N	76° 7' W
Utica	43° 9' N	75° 23' W

Watertown	43° 59' N	76° 1' W
NORTH CAROLINA		
Asheville AP	35° 26' N	82° 32' W
Charlotte AP	35° 13' N	80° 56' W
Durham	35° 52' N	78° 47' W
Elizabeth City AP	36° 16' N	76° 11' W
Fayetteville, Pope AFB	35° 10' N	79° 1' W
Goldsboro,Seymour-Johnson	35° 20' N	77° 58' W
Greensboro AP (S)	36° 5' N	79° 57' W
Greenville	35° 37' N	77° 25' W
Henderson	36° 22' N	78° 25' W
Hickory	35° 45' N	81° 23' W
Jacksonville	34° 50' N	77° 37' W
Lumberton	34° 37' N	79° 4' W
New Bern AP	35° 5' N	77° 3' W
Raleigh/Durham AP (S)	35° 52' N	78° 47' W
Rocky Mount	35° 58' N	77° 48' W
Wilmington AP	34° 16' N	77° 55' W
Winston-Salem AP	36° 8' N	80° 13' W
NORTH DAKOTA		
Bismarck AP (S)	46° 46' N	100° 45' W
Devils Lake	48° 7' N	98° 54' W
Dickinson AP	46° 48' N	102° 48' W
Fargo AP	46° 54' N	96° 48' W
Grand Forks AP	47° 57' N	97° 24' W
Jamestown AP	46° 55' N	98° 41' W
Minot AP	48° 25' N	101° 21' W
Williston	48° 9' N	103° 35' W
OHIO		
Akron-Canton AP	40° 55' N	81° 26' W
Ashtabula	41° 51' N	80° 48' W
Athens	39° 20' N	82° 6' W
Bowling Green	41° 23' N	83° 38' W
Cambridge	40° 4' N	81° 35' W
Chillicothe	39° 21' N	83° 0' W
Cincinnati Co	39° 9' N	84° 31' W
Cleveland AP (S)	41° 24' N	81° 51' W
Columbus AP (S)	40° 0' N	82° 53' W
Dayton AP	39° 54' N	84° 13' W
Defiance	41° 17' N	84° 23' W
Findlay AP	41° 1' N	83° 40' W
Fremont	41° 20' N	83° 7' W
Hamilton	39° 24' N	84° 35' W
Lancaster	39° 44' N	82° 38' W
Lima	40° 42' N	84° 2' W
Mansfield AP	40° 49' N	82° 31' W
Marion	40° 36' N	83° 10' W
Middletown	39° 31' N	84° 25' W
Newark	40° 1' N	82° 28' W
Norwalk	41° 16' N	82° 37' W
Portsmouth	38° 45' N	82° 55' W
Sandusky Co	41° 27' N	82° 43' W
Springfield	39° 50' N	83° 50' W
Steubenville	40° 23' N	80° 38' W

Toledo AP	41° 36' N	83° 48' W
Warren	41° 20' N	80° 51' W
Wooster	40° 47' N	81° 55' W
Youngstown AP	41° 16' N	80° 40' W
Zanesville AP	39° 57' N	81° 54' W
OKLAHOMA		
Ada	34° 47' N	96° 41' W
Altus AFB	34° 39' N	99° 16' W
Ardmore	34° 18' N	97° 1' W
Bartlesville	36° 45' N	96° 0' W
Chickasha	35° 3' N	97° 55' W
Enid, Vance AFB	36° 21' N	97° 55' W
Lawton AP	34° 34' N	98° 25' W
McAlester	34° 50' N	95° 55' W
Muskogee AP	35° 40' N	95° 22' W
Norman	35° 15' N	97° 29' W
Oklahoma City AP (S)	35° 24' N	97° 36' W
Ponca City	36° 44' N	97° 6' W
Seminole	35° 14' N	96° 40' W
Stillwater (S)	36° 10' N	97° 5' W
Tulsa AP	36° 12' N	95° 54' W
Woodward	36° 36' N	99° 31' W
OREGON		
Albany	44° 38' N	123° 7' W
Astoria AP (S)	46° 9' N	123° 53' W
Baker AP	44° 50' N	117° 49' W
Bend	44° 4' N	121° 19' W
Corvallis (S)	44° 30' N	123° 17' W
Eugene AP	44° 7' N	123° 13' W
Grants Pass	42° 26' N	123° 19' W
Klamath Falls AP	42° 9' N	121° 44' W
Medford AP (S)	42° 22' N	122° 52' W
Pendleton AP	45° 41' N	118° 51' W
Portland AP	45° 36' N	122° 36' W
Portland Co	45° 32' N	122° 40' W
Roseburg AP	43° 14' N	123° 22' W
Salem AP	44° 55' N	123° 1' W
The Dalles	45° 36' N	121° 12' W
PENNSYLVANIA		
Allentown AP	40° 39' N	75° 26' W
Altoona Co	40° 18' N	78° 19' W
Butler	40° 52' N	79° 54' W
Chambersburg	39° 56' N	77° 38' W
Erie AP	42° 5' N	80° 11' W
Harrisburg AP	40° 12' N	76° 46' W
Johnstown	40° 19' N	78° 50' W
Lancaster	40° 7' N	76° 18' W
Meadville	41° 38' N	80° 10' W
New Castle	41° 1' N	80° 22' W
Philadelphia AP	39° 53' N	75° 15' W
Pittsburgh AP	40° 30' N	80° 13' W
Pittsburgh Co	40° 27' N	80° 0' W
Reading Co	40° 20' N	75° 38' W
Scranton/Wilkes-Barre	41° 20' N	75° 44' W

State College (S)	40° 48' N	77° 52' W
Sunbury	40° 53' N	76° 46' W
Uniontown	39° 55' N	79° 43' W
Warren	41° 51' N	79° 8' W
West Chester	39° 58' N	75° 38' W
Williamsport AP	41° 15' N	76° 55' W
York	39° 55' N	76° 45' W
RHODE ISLAND		
Newport (S)	41° 30' N	71° 20' W
Providence AP	41° 44' N	71° 26' W
SOUTH CAROLINA		
Anderson	34° 30' N	82° 43' W
Charleston AFB (S)	32° 54' N	80° 2' W
Charleston Co	32° 54' N	79° 58' W
Columbia AP	33° 57' N	81° 7' W
Florence AP	34° 11' N	79° 43' W
Georgetown	33° 23' N	79° 17' W
Greenville AP	34° 54' N	82° 13' W
Greenwood	34° 10' N	82° 7' W
Orangeburg	33° 30' N	80° 52' W
Rock Hill	34° 59' N	80° 58' W
Spartanburg AP	34° 58' N	82° 0' W
Sumter, Shaw AFB	33° 54' N	80° 22' W
SOUTH DAKOTA		
Aberdeen AP	45° 27' N	98° 26' W
Brookings	44° 18' N	96° 48' W
Huron AP	44° 23' N	98° 13' W
Mitchell	43° 41' N	98° 1' W
Pierre AP	44° 23' N	100° 17' W
Rapid City AP (S)	44° 3' N	103° 4' W
Sioux Falls AP	43° 34' N	96° 44' W
Watertown AP	44° 55' N	97° 9' W
Yankton	42° 55' N	97° 23' W
TENNESSEE		
Athens	35° 26' N	84° 35' W
Bristol-Tri City AP	36° 29' N	82° 24' W
Chattanooga AP	35° 2' N	85° 12' W
Clarksville	36° 33' N	87° 22' W
Columbia	35° 38' N	87° 2' W
Dyersburg	36° 1' N	89° 24' W
Greenville	36° 4' N	82° 50' W
Jackson AP	35° 36' N	88° 55' W
Knoxville AP	35° 49' N	83° 59' W
Memphis AP	35° 3' N	90° 0' W
Murfreesboro	34° 55' N	86° 28' W
Nashville AP (S)	36° 7' N	86° 41' W
Tullahoma	35° 23' N	86° 5' W
TEXAS		
Abilene AP	32° 25' N	99° 41' W
Alice AP	27° 44' N	98° 2' W
Amarillo AP	35° 14' N	100° 42' W
Austin AP	30° 18' N	97° 42' W
Bay City	29° 0' N	95° 58' W
Beaumont	29° 57' N	94° 1' W

Beeville	28° 22' N	97° 40' W
Big Spring AP (S)	32° 18' N	101° 27' W
Brownsville AP (S)	25° 54' N	97° 26' W
Brownwood	31° 48' N	98° 57' W
Bryan AP	30° 40' N	96° 33' W
Corpus Christi AP	27° 46' N	97° 30' W
Corsicana	32° 5' N	96° 28' W
Dallas AP	32° 51' N	96° 51' W
Del Rio, Laughlin AFB	29° 22' N	100° 47' W
Denton	33° 12' N	97° 6' W
Eagle Pass	28° 52' N	100° 32' W
El Paso AP (S)	31° 48' N	106° 24' W
Fort Worth AP (S)	32° 50' N	97° 3' W
Galveston AP	29° 18' N	94° 48' W
Greenville	33° 4' N	96° 3' W
Harlingen	26° 14' N	97° 39' W
Houston AP	29° 58' N	95° 21' W
Houston Co	29° 59' N	95° 22' W
Huntsville	30° 43' N	95° 33' W
Killeen, Robert Gray AAF	31° 5' N	97° 41' W
Lamesa	32° 42' N	101° 56' W
Laredo AFB	27° 32' N	99° 27' W
Longview	32° 28' N	94° 44' W
Lubbock AP	33° 39' N	101° 49' W
Lufkin AP	31° 25' N	94° 48' W
Mcallen	26° 12' N	98° 13' W
Midland AP (S)	31° 57' N	102° 11' W
Mineral Wells AP	32° 47' N	98° 4' W
Palestine Co	31° 47' N	95° 38' W
Pampa	35° 32' N	100° 59' W
Pecos	31° 25' N	103° 30' W
Plainview	34° 11' N	101° 42' W
Port Arthur AP	29° 57' N	94° 1' W
San Angelo°		
Goodfellow AFB	31° 26' N	100° 24' W
San Antonio AP (S)	29° 32' N	98° 28' W
Sherman, Perrin AFB	33° 43' N	96° 40' W
Snyder	32° 43' N	100° 55' W
Temple	31° 6' N	97° 21' W
Tyler AP	32° 21' N	95° 16' W
Vernon	34° 10' N	99° 18' W
Victoria AP	28° 51' N	96° 55' W
Waco AP	31° 37' N	97° 13' W
Wichita Falls AP	33° 58' N	98° 29' W
UTAH		
Cedar City AP	37° 42' N	113° 6' W
Logan	41° 45' N	111° 49' W
Moab	38° 36' N	109° 36' W
Ogden AP	41° 12' N	112° 1' W
Price	39° 37' N	110° 50' W
Provo	40° 13' N	111° 43' W
Richfield	38° 46' N	112° 5' W
St George Co	37° 2' N	113° 31' W
Salt Lake City AP (S)	40° 46' N	111° 58' W

Vernal AP	40° 27' N	109° 31' W
VERMONT		
Barre	44° 12' N	72° 31' W
Burlington AP (S)	44° 28' N	73° 9' W
Rutland	43° 36' N	72° 58' W
VIRGINIA		
Charlottesville	38° 2' N	78° 31' W
Danville AP	36° 34' N	79° 20' W
Fredericksburg	38° 18' N	77° 28' W
Harrisonburg	38° 27' N	78° 54' W
Lynchburg AP	37° 20' N	79° 12' W
Norfolk AP	36° 54' N	76° 12' W
Petersburg	37° 11' N	77° 31' W
Richmond AP	37° 30' N	77° 20' W
Roanoke AP	37° 19' N	79° 58' W
Staunton	38° 16' N	78° 54' W
Winchester	39° 12' N	78° 10' W
WASHINGTON		
Aberdeen	46° 59' N	123° 49' W
Bellingham AP	48° 48' N	122° 32' W
Bremerton	47° 34' N	122° 40' W
Ellensburg AP	47° 2' N	120° 31' W
Everett, Paine AFB	47° 55' N	122° 17' W
Kennewick	46° 13' N	119° 8' W
Longview	46° 10' N	122° 56' W
Moses Lake, Larson AFB	47° 12' N	119° 19' W
Olympia AP	46° 58' N	122° 54' W
Port Angeles	48° 7' N	123° 26' W
Seattle-Boeing Field	47° 32' N	122° 18' W
Seattle Co (S)	47° 39' N	122° 18' W
Seattle-Tacoma AP (S)	47° 27' N	122° 18' W
Spokane AP (S)	47° 38' N	117° 31' W
Tacoma, McChord AFB	47° 15' N	122° 30' W
Walla Walla AP	46° 6' N	118° 17' W
Wenatchee	47° 25' N	120° 19' W
Yakima AP	46° 34' N	120° 32' W
WEST VIRGINIA		
Beckley	37° 47' N	81° 7' W
Bluefield AP	37° 18' N	81° 13' W
Charleston AP	38° 22' N	81° 36' W
Clarksburg	39° 16' N	80° 21' W
Elkins AP	38° 53' N	79° 51' W
Huntington Co	38° 25' N	82° 30' W
Martinsburg AP	39° 24' N	77° 59' W
Morgantown AP	39° 39' N	79° 55' W
Parkersburg Co	39° 16' N	81° 34' W
Wheeling	40° 7' N	80° 42' W
WISCONSIN		
Appleton	44° 15' N	88° 23' W
Ashland	46° 34' N	90° 58' W
Beloit	42° 30' N	89° 2' W
Eau Claire AP	44° 52' N	91° 29' W
Fond Du Lac	43° 48' N	88° 27' W
Green Bay AP	44° 29' N	88° 8' W

La Crosse AP	43° 52' N	91° 15' W
Madison AP (S)	43° 8' N	89° 20' W
Manitowoc	44° 6' N	87° 41' W
Marinette	45° 6' N	87° 38' W
Milwaukee AP	42° 57' N	87° 54' W
Racine	42° 43' N	87° 51' W
Sheboygan	43° 45' N	87° 43' W
Stevens Point	44° 30' N	89° 34' W
Waukesha	43° 1' N	88° 14' W
Wausau AP	44° 55' N	89° 37' W
WYOMING		
Casper AP	42° 55' N	106° 28' W
Cheyenne	41° 9' N	104° 49' W
Cody AP	44° 33' N	109° 4' W
Evanston	41° 16' N	110° 57' W
Lander AP (S)	42° 49' N	108° 44' W
Laramie AP (S)	41° 19' N	105° 41' W
Newcastle	43° 51' N	104° 13' W
Rawlins	41° 48' N	107° 12' W
Rock Springs AP	41° 36' N	109° 0' W
Sheridan AP	44° 46' N	106° 58' W
Torrington	42° 5' N	104° 13' W

Canada

ALBERTA		
Calgary AP	51° 6' N	114° 1' W
Edmonton AP	53° 34' N	113° 31' W
Grande Prairie AP	55° 11' N	118° 53' W
Jasper	52° 53' N	118° 4' W
Lethbridge AP (S)	49° 38' N	112° 48' W
McMurray AP	56° 39' N	111° 13' W
Medicine Hat AP	50° 1' N	110° 43' W
Red Deer AP	52° 11' N	113° 54' W
BRITISH COLUMBIA		
Dawson Creek	55° 44' N	120° 11' W
Fort Nelson AP (S)	58° 50' N	122° 35' W
Kamloops Co	50° 43' N	120° 25' W
Nanaimo (S)	49° 11' N	123° 58' W
New Westminster	49° 13' N	122° 54' W
Penticton AP	49° 28' N	119° 36' W
Prince George AP (S)	53° 53' N	122° 41' W
Prince Rupert Co	54° 17' N	130° 23' W
Trail	49° 8' N	117° 44' W
Vancouver AP (S)	49° 11' N	123° 10' W
Victoria Co	48° 25' N	123° 19' W
MANITOBA		
Brandon	49° 52' N	99° 59' W
Churchill AP (S)	58° 45' N	94° 4' W
Dauphin AP	51° 6' N	100° 3' W
Flin Flon	54° 46' N	101° 51' W
Portage La Prairie AP	49° 54' N	98° 16' W

The Pas AP (S)	53° 58' N	101° 6' W
Winnipeg AP (S)	49° 54' N	97° 14' W
NEW BRUNSWICK		
Campbellton Co	48° 0' N	66° 40' W
Chatham AP	47° 1' N	65° 27' W
Edmundston Co	47° 22' N	68° 20' W
Fredericton AP (S)	45° 52' N	66° 32' W
Moncton AP (S)	46° 7' N	64° 41' W
Saint John AP	45° 19' N	65° 53' W
NEWFOUNDLAND		
Corner Brook	48° 58' N	57° 57' W
Gander AP	48° 57' N	54° 34' W
Goose Bay AP (S)	53° 19' N	60° 25' W
St John's AP (S)	47° 37' N	52° 45' W
Stephenville AP	48° 32' N	58° 33' W
NORTHWEST TERRITORIES		
Fort Smith AP(S)	60° 1' N	111° 58' W
Frobisher AP (S)	63° 45' N	68° 33' W
Inuvik (S)	68° 18' N	133° 29' W
Resolute AP (S)	74° 43' N	94° 59' W
Yellowknife AP	62° 28' N	114° 27' W
NOVA SCOTIA		
Amherst	45° 49' N	64° 13' W
Halifax AP (S)	44° 39' N	63° 34' W
Kentville (S)	45° 3' N	64° 36' W
New Glasgow	45° 37' N	62° 37' W
Sydney AP	46° 10' N	60° 3' W
Truro Co	45° 22' N	63° 16' W
Yarmouth AP	43° 50' N	66° 5' W
ONTARIO		
Belleville	44° 9' N	77° 24' W
Chatham	42° 24' N	82° 12' W
Cornwall	45° 1' N	74° 45' W
Hamilton	43° 16' N	79° 54' W
Kapuskasing AP (S)	49° 25' N	82° 28' W
Kenora AP	49° 48' N	94° 22' W
Kingston	44° 16' N	76° 30' W
Kitchener	43° 26' N	80° 30' W
London AP	43° 2' N	81° 9' W
North Bay AP	46° 22' N	79° 25' W
Oshawa	43° 54' N	78° 52' W
Ottawa AP (S)	45° 19' N	75° 40' W
Owen Sound	44° 34' N	80° 55' W
Peterborough	44° 17' N	78° 19' W
St Catharines	43° 11' N	79° 14' W
Sarnia	42° 58' N	82° 22' W
Sault Ste Marie AP	46° 32' N	84° 30' W
Sudbury AP	46° 37' N	80° 48' W
Thunder Bay AP	48° 22' N	89° 19' W
Timmins AP	48° 34' N	81° 22' W
Toronto AP (S)	43° 41' N	79° 38' W
Windsor AP	42° 16' N	82° 58' W
PRINCE EDWARD ISLAND		
Charlottetown AP (S)	46° 17' N	63° 8' W

Summerside AP	46° 26' N	63° 50' W
QUEBEC		
Bagotville AP	48° 20' N	71° 0' W
Chicoutimi	48° 25' N	71° 5' W
Drummondville	45° 53' N	72° 29' W
Granby	45° 23' N	72° 42' W
Hull	45° 26' N	75° 44' W
Megantic AP	45° 35' N	70° 52' W
Montreal AP (S)	45° 28' N	73° 45' W
Quebec AP	46° 48' N	71° 23' W
Rimouski	48° 27' N	68° 32' W
St Jean	45° 18' N	73° 16' W
St Jerome	45° 48' N	74° 1' W
Sept. Iles AP (S)	50° 13' N	66° 16' W
Shawinigan	46° 34' N	72° 43' W
Sherbrooke Co	45° 24' N	71° 54' W
Thetford Mines	46° 4' N	71° 19' W
Trois Rivieres	46° 21' N	72° 35' W
Val D'or AP	48° 3' N	77° 47' W
Valleyfield	45° 16' N	74° 6' W
SASKATCHEWAN		
Estevan AP	49° 4' N	103° 0' W
Moose Jaw AP	50° 20' N	105° 33' W
North Battleford AP	52° 46' N	108° 15' W
Prince Albert AP	53° 13' N	105° 41' W
Regina AP	50° 26' N	104° 40' W
Saskatoon AP (S)	52° 10' N	106° 41' W
Swift Current AP (S)	50° 17' N	107° 41' W
Yorkton AP	51° 16' N	102° 28' W
YUKON TERRITORY		
Whitehorse AP (S)	60° 43' N	135° 4' W

International

AFGHANISTAN		
Kabul	34° 35' N	69° 12' E
ALGERIA		
Algiers	36° 46' N	30° 3' E
ARGENTINA		
Buenos Aires	34° 35' S	58° 29' W
Cordoba	31° 22' S	64° 15' W
Tucuman	26° 50' S	65° 10' W
AUSTRALIA		
Adelaide	34° 56' S	138° 35' E
Alice Springs	23° 48' S	133° 53' E
Brisbane	27° 28' S	153° 2' E
Darwin	12° 28' S	130° 51' E
Melbourne	37° 49' S	144° 58' E
Perth	31° 57' S	115° 51' E
Sydney	33° 52' S	151° 12' E
AUSTRIA		
Vienna	48° 15' N	16° 22' E

AZORES		
Lajes (Terceira)	38° 45' N	27° 5' W
BAHAMAS		
Nassau	25° 5' N	77° 21' W
BANGLADESH		
Chittagong	22° 21' N	91° 50' E
BELGIUM		
Brussels	50° 48' N	4° 21' E
BERMUDA		
Kindley AFB	33° 22' N	64° 41' W
BOLIVIA		
La Paz	16° 30' S	68° 9' W
BRAZIL		
Belem	1° 27' S	48° 29' W
Belo Horizonte	19° 56' S	43° 57' W
Brasilia	15° 52' S	47° 55' W
Curitiba	25° 25' S	49° 17' W
Fortaleza	3° 46' S	38° 33' W
Porto Alegre	30° 2' S	51° 13' W
Recife	8° 4' S	34° 53' W
Rio De Janeiro	22° 55' S	43° 12' W
Salvador	13° 0' S	38° 30' W
Sao Paulo	23° 33' S	46° 38' W
BELIZE		
Belize	17° 31' N	88° 11' W
BULGARIA		
Sofia	42° 42' N	23° 20' E
BURMA		
Mandalay	21° 59' N	96° 6' E
Rangoon	16° 47' N	96° 9' E
CAMBODIA		
Phnom Penh	11° 33' N	104° 51' E
CHILE		
Punta Arenas	53° 10' S	70° 54' W
Santiago	33° 27' S	70° 42' W
Valparaiso	33° 1' S	71° 38' W
CHINA		
Chongquing	29° 33' N	106° 33' E
Shanghai	31° 12' N	121° 26' E
COLOMBIA		
Baranquilla	10° 59' N	74° 48' W
Bogota	4° 36' N	74° 5' W
Cali	3° 25' N	76° 30' W
Medellin	6° 13' N	75° 36' W
CONGO		
Brazzaville	4° 15' S	15° 15' E
CUBA		
Guantanamo Bay	19° 54' N	75° 9' W
Havana	23° 8' N	82° 21' W
CZECHOSLOVAKIA		
Prague	50° 5' N	14° 25' E
DENMARK		
Copenhagen	55° 41' N	12° 33' E
DOMINICAN REPUBLIC		

Santo Domingo	18° 29' N	69° 54' W
EQUADOR		
Guayaquil	2° 0' S	79° 53' W
Quito	0° 13' S	78° 32' W
EGYPT		
Cairo	29° 52' N	31° 20' E
EL SALVADOR		
San Salvador	13° 42' N	89° 13' W
ETHIOPIA		
Addis Ababa	90° 2' N	38° 45' E
Asmara	15° 17' N	38° 55' E
FINLAND		
Helsinki	60° 10' N	24° 57' E
FRANCE		
Lyon	45° 42' N	4° 47' E
Marseilles	43° 18' N	5° 23' E
Nantes	47° 15' N	1° 34' W
Nice	43° 42' N	7° 16' E
Paris	48° 49' N	2° 29' E
Strasbourg	48° 35' N	7° 46' E
FRENCH GUIANA		
Cayenne	4° 56' N	52° 27' W
GERMANY		
Berlin (West)	52° 27' N	13° 18' E
Hamburg	53° 33' N	9° 58' E
Hannover	52° 24' N	9° 40' E
Mannheim	49° 34' N	8° 28' E
Munich	48° 9' N	11° 34' E
GHANA		
Accra	5° 33' N	0° 12' W
GIBRALTAR		
Gibraltar	36° 9' N	5° 22' W
GREECE		
Athens	37° 58' N	23° 43' E
Thessaloniki	40° 37' N	22° 57' E
GREENLAND		
Narsarssuaq	61° 11' N	45° 25' W
GUATEMALA		
Guatemala City	14° 37' N	90° 31' W
GUYANA		
Georgetown	6° 50' N	58° 12' W
HAITI		
Port Au Prince	18° 33' N	72° 20' W
HONDURAS		
Tegucigalpa	14° 6' N	87° 13' W
HONG KONG		
Hong Kong	22° 18' N	114° 10' E
HUNGARY		
Budapest	47° 31' N	19° 2' E
ICELAND		
Reykjavik	64° 8' N	21° 56' E
INDIA		
Ahmenabad	23° 2' N	72° 35' E
Bangalore	12° 57' N	77° 37' E

Bombay	18° 54' N	72° 49' E
Calcutta	22° 32' N	88° 20' E
Madras	13° 4' N	80° 15' E
Nagpur	21° 9' N	79° 7' E
New Delhi	28° 35' N	77° 12' E
INDONESIA		
Djakarta	6° 11' S	106° 50' E
Kupang	10° 10' S	123° 34' E
Makassar	5° 8' S	119° 28' E
Medan	3° 35' N	98° 41' E
Palembang	3° 0' S	104° 46' E
Surabaya	7° 13' S	112° 43' E
IRAN		
Abadan	30° 21' N	48° 16' E
Meshed	36° 17' N	59° 36' E
Tehran	35° 41' N	51° 25' E
IRAQ		
Baghdad	33° 20' N	44° 24' E
Mosul	36° 19' N	43° 9' E
IRELAND		
Dublin	53° 22' N	6° 21' W
Shannon	52° 41' N	8° 55' W
IRIAN BARAT		
Manokwari	0° 52' S	134° 5' E
ISRAEL		
Jerusalem	31° 47' N	35° 13' E
Tel Aviv	32° 6' N	34° 47' E
ITALY		
Milan	45° 27' N	9° 17' E
Naples	40° 53' N	14° 18' E
Rome	41° 48' N	12° 36' E
IVORY COAST		
Abidjan	5° 19' N	4° 1' W
JAPAN		
Fukuoka	33° 35' N	130° 27' E
Sapporo	43° 4' N	141° 21' E
Tokyo	35° 41' N	139° 46' E
JORDAN		
Amman	31° 57' N	35° 57' E
KENYA		
Nairobi	1° 16' S	36° 48' E
KOREA		
Pyongyang	39° 2' N	125° 41' E
Seoul	37° 34' N	126° 58' E
LEBANON		
Beirut	33° 54' N	35° 28' E
LIBERIA		
Monrovia	6° 18' N	10° 48' W
LIBYA		
Benghazi	32° 6' N	20° 4' E
MADAGASCAR		
Tananarive	18° 55' S	47° 33' E
MALAYSIA		
Kuala Lumpur	3° 7' N	101° 42' E

Penang	5° 25' N	100° 19' E
MARTINIQUE		
Fort De France	14° 37' N	61° 5' W
MEXICO		
Guadalajara	20° 41' N	103° 20' W
Merida	20° 58' N	89° 38' W
Mexico City	19° 24' N	99° 12' W
Monterrey	25° 40' N	100° 18' W
Vera Cruz	19° 12' N	96° 8' W
MOROCCO		
Casablanca	33° 35' N	7° 39' W
NEPAL		
Katmandu	27° 42' N	85° 12' E
NETHERLANDS		
Amsterdam	52° 23' N	4° 55' E
NEW ZEALAND		
Auckland	36° 51' S	174° 46' E
Christchurch	43° 32' S	172° 37' E
Wellington	41° 17' S	174° 46' E
NICARAGUA		
Managua	12° 10' N	86° 15' W
NIGERIA		
Lagos	6° 27' N	3° 24' E
NORWAY		
Bergen	60° 24' N	5° 19' E
Oslo	59° 56' N	10° 44' E
PAKISTAN		
Karachi	24° 48' N	66° 59' E
Lahore	31° 35' N	74° 20' E
Peshwar	34° 1' N	71° 35' E
PANAMA		
Panama City	8° 58' N	79° 33' W
PAPUA NEW GUINEA		
Port Moresby	9° 29' S	147° 9' E
PARAGUAY		
Ascuncion	25° 17' S	57° 30' W
PERU		
Lima	12° 5' S	77° 3' W
PHILIPPINES		
Manila	14° 35' N	120° 59' E
POLAND		
Krakow	50° 4' N	19° 57' E
Warsaw	52° 13' N	21° 2' E
PORTUGAL		
Lisbon	38° 43' N	9° 8' W
PUERTO RICO		
San Juan	18° 29' N	66° 7' W
RUMANIA		
Bucharest	44° 25' N	26° 6' E
RUSSIA		
Alma Ata	43° 14' N	76° 53' E
Archangel	64° 33' N	40° 32' E
Kaliningrad	54° 43' N	20° 30' E
Krasnoyarsk	56° 1' N	92° 57' E

Kiev	50° 27' N	30° 30' E
Kharkov	50° 0' N	36° 14' E
Kuibyshev	53° 11' N	50° 6' E
Leningrad	59° 56' N	30° 16' E
Minsk	53° 54' N	27° 33' E
Moscow	55° 46' N	37° 40' E
Odessa	46° 29' N	30° 44' E
Petropavlovsk	52° 53' N	158° 42' E
Rostov on Don	47° 13' N	39° 43' E
Sverdlovsk	56° 49' N	60° 38' E
Tashkent	41° 20' N	69° 18' E
Tbilisi	41° 43' N	44° 48' E
Vladivostok	43° 7' N	131° 55' E
Volgograd	48° 42' N	44° 31' E
SAUDI ARABIA		
Dhahran	26° 17' N	50° 9' E
Jedda	21° 28' N	39° 10' E
Riyadh	24° 39' N	46° 42' E
SENEGAL		
Dakar	14° 42' N	17° 29' W
SINGAPORE		
Singapore	1° 18' N	103° 50' E
SOMALIA		
Mogadiscio	2° 2' N	49° 19' E
SOUTH AFRICA		
Cape Town	33° 56' S	18° 29' E
Johannesburg	26° 11' S	28° 3' E
Pretoria	25° 45' S	28° 14' E
SOUTH YEMEN		
Aden	12° 50' N	45° 2' E
SPAIN		
Barcelona	41° 24' N	2° 9' E
Madrid	40° 25' N	3° 41' W
Valencia	39° 28' N	0° 23' W
SRI LANKA		
Colombo	6° 54' N	79° 52' E
SUDAN		
Khartoum	15° 37' N	32° 33' E
SURINAM		
Paramaribo	5° 49' N	55° 9' W
SWEDEN		
Stockholm	59° 21' N	18° 4' E
SWITZERLAND		
Zurich	47° 23' N	8° 33' E
SYRIA		
Damascus	33° 30' N	36° 20' E
TAIWAN		
Tainan	22° 57' N	120° 12' E
Taipei	25° 2' N	121° 31' E
TANZANIA		
Dar es Salaam	6° 50' S	39° 18' E
THAILAND		
Bangkok	13° 44' N	100° 30' E
TRINIDAD		

Port of Spain	10° 40' N	61° 31' W
TUNISIA		
Tunis	36° 47' N	10° 12' E
TURKEY		
Adana	36° 59' N	35° 18' E
Ankara	39° 57' N	32° 53' E
Istanbul	40° 58' N	28° 50' E
Izmir	38° 26' N	27° 10' E
UNITED KINGDOM		
Belfast	54° 36' N	5° 55' W
Birmingham	52° 29' N	1° 56' W
Cardiff	51° 28' N	3° 10' W
Edinburgh	55° 55' N	3° 11' W
Glasgow	55° 52' N	4° 17' W
London	51° 29' N	0° 0' W
URUGUAY		
Montevideo	34° 51' S	56° 13' W
VENEZUELA		
Caracas	10° 30' N	66° 56' W
Maracaibo	10° 39' N	71° 36' W
VIETNAM		
Da Nang	16° 4' N	108° 13' E
Hanoi	21° 2' N	105° 52' E
Ho Chi Minh City (Saigon)	10° 47' N	106° 42' E
YUGOSLAVIA		
Belgrade	44° 48' N	20° 28' E
ZAIRE		
Kinshasa (Leopoldville)	4° 20' S	15° 18' E
Kisangani (Stanleyville)	0° 26' S	15° 14' E

Factory Default Settings

Login - default settings

Login - Default Settings

User Name:**admin**

Password:**symmetricom**

See also: ***Changes to Passwords and User Names*** (see "Properties of User Names and Passwords" on page 20)

Network Ports - default settings

Network Ports - Default Settings

Port	IP Version	IPv4 Address	Link Speed	State
LAN1	IPv4	Static - 192.168.0.100	Auto Negotiated	Enabled
LAN2				Disabled
LAN3				Disabled

SNMP

SNMP - Default Settings

Basic Configuration

sysLocation:**unknown**

sysName:**SyncServer**

sysContact:**admin@localhost**

Read Comunity:**symmpublic**

Write CVommunity:**symmprivate**

NTP

NTP - Default Settings

Associations

The following default associations are configured:

IP Address	Role	Poll Interval	Burst	MD5 Key
Hardware Clock	Server			
69.25.96.11	Server	Default	iburst	None
69.25.96.12	Server	Default	iburst	None
69.25.96.14	Server	Default	iburst	None

MD5 Keys

MD5 Keys - Default Settings

None defined

NTP Override Behaviour

NTP Override Behaviour - Default Settings

Configured to **Follow Standard NTP Rules**

TIMING

Time Zone

Time Zone - Default Settings

Local Time Zone is set to **UTC**

Hardware Clock Configuration

Hardware Clock Configuration - Default Settings

All installed Clock Sources are **Enabled** (e.g., on an S250, the installed references are: GPS, IRIG-B, 1PPS, and 10MHz).

Forced Timing Source is set to **Auto**

Ignore UTC Corrections from GPS Reference (not present on S250i) – **Not Selected**

Holdover

Holdover - Default Settings

Holdover Configuration Time Error Limit is set to 1 (one) millisecond

Sysplex

Sysplex - Default Settings

Sysplex Output Configuration

Autostart is set to: **No**

Parity is set to: **Odd**

Flywheel Quality Character is set to: **X**

REFERENCES

GPS

GPS - Default Settings

GPS receiver set to **Survey** mode

GPS Antenna Cable Delay (nS) set to 0 **(zero) nanoseconds**

IRIG-B

IRIG-B Default Settings

Input Mode:**Auto**

Output Mode:**IRIG-B with IEEE 1344 extension**

Output Type:**UTC**

Cable Delay:**0 (zero) nanoseconds**

SYSTEM

System - Default Settings

General

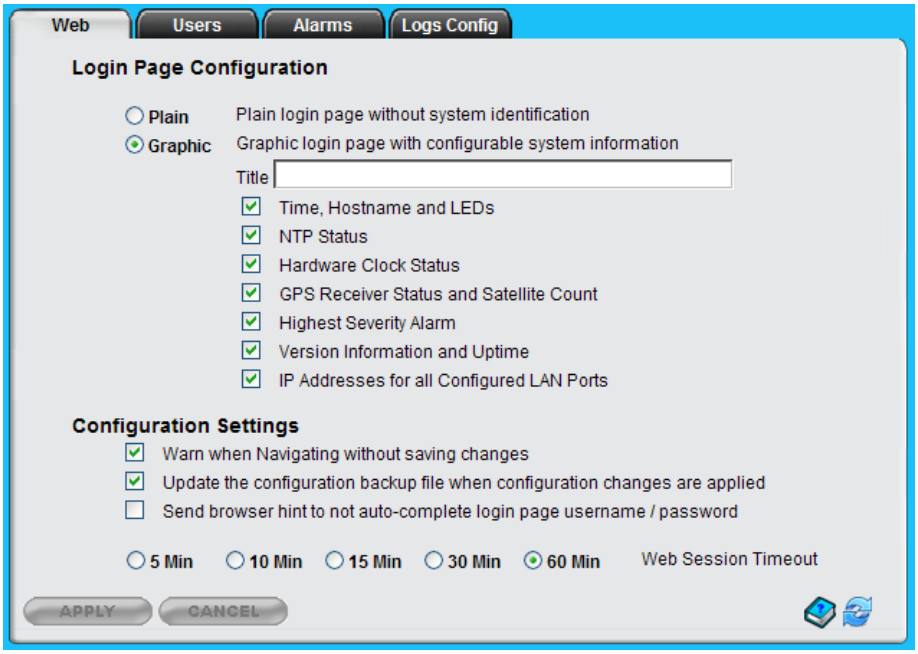
Hostname - **SyncServer**

Check for software upgrades is **Selected**

ADMIN

Login Webpage Configuration

Login Webpage Configuration - Default settings



Users

Users - Default Settings

Only the **admin** login is kept; all new users are deleted and their passwords cleared. The **admin** user password is reset to the default value of **symmetricom**.

See also: ***Changes to Passwords and User Names*** (see "Properties of User Names and Passwords" on page 20)

Alarms

Alarms - Default Settings

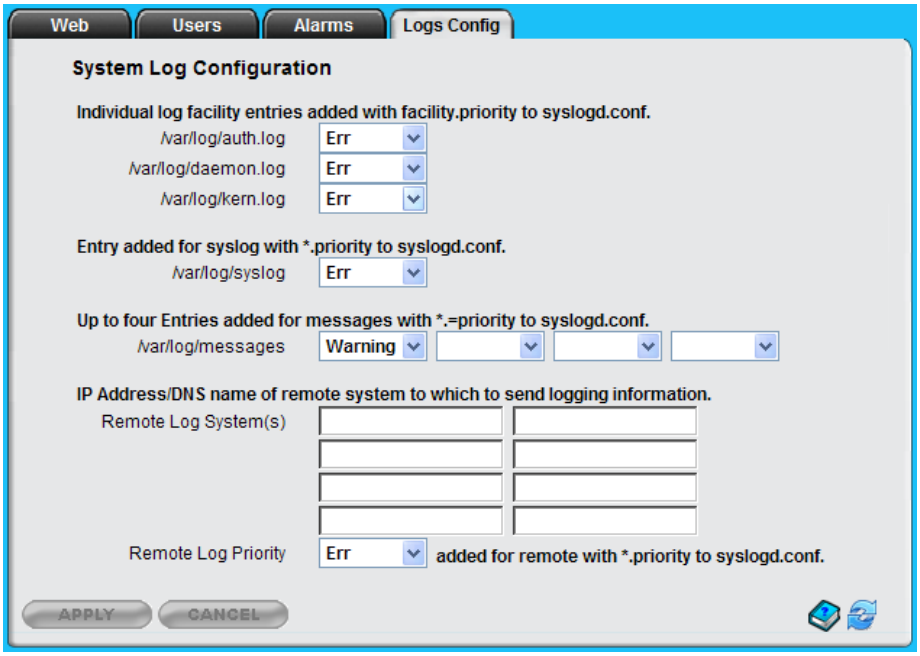
Alarms are configured as shown in the table below:

Alarm Name	Severity	Auto Clear	Send Trap	Write Log	Send Email
NTP System Peer Change Alarm	Notify			X	
NTP Stratum Change Alarm	Major	X	X	X	X
NTP Leap Change Alarm	Notify	X		X	
System Network Alarm	Notify	X		X	
System Upgrade Alarm	Minor		X	X	X
System Config Change Alarm	Notify			X	

System Health Alarm	Major	X	X	X	X
System Up/Down Alarm	Minor	X	X	X	X
System Authentication Alarm	Notify	X		X	
Timing No Source Alarm	Major	X	X	X	X
Timing GPS Source Alarm (not in S250i)	Major	X	X	X	X
Timing IRIG-B Source Alarm (not in S200)	Notify	X		X	
Timing PPS Source Alarm (not in S200)	Notify	X		X	
Timing 10 MHz Source Alarm (not in S200)	Notify	X		X	
Timing GPS Antenna Short Alarm (not in S250i)	Major	X	X	X	X
Timing GPS Antenna Open Alarm (not in S250i)	Major	X	X	X	X
Timing Oscillator DAC Range Alarm	Notify			X	
Timing Rubidium Lock Alarm (Rb Models Only)	Notify			X	
Timing Oscillator Unlock Alarm	Notify			X	
Timing Source Change Alarm	Notify			X	
Timing Source Lower Accuracy Input Alarm	Notify			X	
Timing PLL Unlock Alarm	Notify	X		X	
Timing Quality 1e-6 Alarm	Notify	X		X	
Timing Quality 1e-5 Alarm	Notify	X		X	
Timing Quality 1e-4 Alarm	Notify	X		X	
Timing Quality 1e-3 Alarm	Notify	X		X	
Timing Leap Event Alarm	Notify	X		X	
LAN1 Link Alarm	Major	X		X	
LAN2 Link Alarm	Notify	X		X	
LAN3 Link Alarm	Notify	X		X	
System Reset Default Config Alarm	Major			X	

Logs Config

Logs Config - Default Settings



SERVICES

Startup

Startup - Default Settings

Daemon	Current State	Startup
Web Server	On	Auto
NTP	On	Auto
SNMP	On	Auto
SSH	On	Auto
Sysplex	On	Auto
Time	On	Auto
Time-UDP	On	Auto
Daytime	On	Auto
Daytime-UDP	On	Auto
Telnet	Off	

HTTP

HTTP - Default Settings

- Web Server Configuration Security - **Standard (Port 80)** Only.

- Web Server Configuration Protocols – **SSL 3.0 and TLS 1.0 are checked. SSL 2.0 support, if present, is removed.**

SSH

SSH Security Configuration - Default Settings

- Protocol - **SSH-2 Only**
- Log Level - **INFO**
- Server Key Bits – **768 bits**
- Key Regeneration – **3600 Seconds**

Email

SMTP Gateway:**smtp.example.com**

User1:**user@example.com**

Glossary

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NTP Daemon **180**
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Timing Source **181**
UTC **181**

Hardware Clock

The Hardware Clock manages the Input References:

- Gets the time from the highest priority reference that is available.
- Applies the UTC offset if the reference is GPS.
- Passes the time to the NTP daemon.

The NTP daemon includes a preferred server association for the Hardware Clock that cannot be edited or removed.

Also see:

- ***TIMING - HW Clock*** (on page 42)
- NTP - Config
- Input References
- ***Timing Engine*** (on page 181)

Introduction to GPS

The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of at least 24 satellites that continuously orbit the earth. These GPS satellites have several atomic clocks that are precisely synchronized to UTC from the U.S. Naval Observatory (USNO). Coded signals are broadcast by each of the satellites with the exact time and position of the satellite. All GPS receivers use an antenna to receive these signals. Using a GPS receiver optimized for time (rather than position), it is possible to get extremely precise synchronization with the satellites' atomic clocks.

Leap Indicator

The Leap Indicator (LI) is a two-bit binary number in the NTP packet header that provides the following information:

- Advance warning that a leap second adjustment will be made to the UTC timescale at the end of the current day. Leap seconds are events mandated by the world time authority (BIPM) in order to synchronize the UTC time scale with the earth's rotation.
- Whether the NTP daemon is synchronized to a timing reference. The settings on the ***NTP - Prefs*** (on page 40) page affect LI behavior.

LI	Value	Meaning
00	0	No warning.
01	1	Leap second insertion: Last minute of the day has 61 seconds.
10	2	Leap second deletion: Last minute of the day has 59 seconds.
11	3	Alarm condition (Not synchronized)

When the SyncServer or NTP daemon is started or restarted, the leap indicator is set to "11", the alarm condition. This alarm condition makes it possible for NTP clients to recognize that an NTP server (the SyncServer) is present, but that it has yet to validate its time from its time sources. Once the SyncServer finds a valid source of time and sets its clock, it sets the leap indicator to an appropriate value. The **NTP Leap Change Alarm** on the **ADMIN - Alarms** page can be configured to generate an alarm and send notifications each time the leap indicator changes state.

NTP Daemon

The Network Time Protocol (NTP) Daemon (a.k.a. "ntpd") listens for and responds to requests from NTP clients. It also sends NTP requests to each of the NTP Associations and qualifies each one. It synchronizes with the best NTP association and makes that time available to the

See the NTP - Config topics for more information.

Software Clock

The Software Clock *time* is initialized by the onboard real time clock (RTC) and controlled/adjusted by the NTP daemon (ntpd) when it has a valid peer (e.g., Hardware Clock-/SYMM_TE, factory default NTP association, user-configured peer, etc.).

The software clock time is represented on the display

Stratum

This is an eight-bit integer that indicates the position of an NTP node within an NTP timing hierarchy. It is calculated by adding 1 to the stratum of the NTP *system peer*.

For the SyncServer, the stratum values are defined as follows:

Stratum	Definition
0	Hardware Clock when locked.
1	Primary server
2-15	Secondary server
16-255	Unsynchronized, unreachable.

For example, the SyncServer is:

- stratum 1 when the Hardware Clock (stratum 0) is synchronized to an input reference, in holdover mode, or in freerun mode.
- stratum 2 through 15 when it is synchronized to a remote NTP server.
- stratum 16 when it is unsynchronized, indicating that it is searching for a valid source of timing information.

The settings on the ***NTP - Prefs*** (on page 40) page affect stratum behavior.

Timing Engine

This is an equivalent term for "Hardware Clock". Please see the glossary entry for ***Hardware Clock*** (on page 179).

Timing Source

A Timing Source is a reference source, such as GPS, that is available to the Hardware Clock. The number and type of Timing Sources available varies by model. See **TIMING - HW Clock**, *Forced Timing Source* for specific examples. See the ***TIMING - HW Clock*** (on page 42) topic for more information.

UTC

From Wikipedia: "**Coordinated Universal Time** (UTC) is a high-precision atomic time standard. UTC has uniform seconds defined by International Atomic Time (TAI), with leap seconds announced at irregular intervals to compensate for the earth's slowing rotation and other discrepancies. Leap seconds allow UTC to closely track Universal Time (UT), a time standard based not on the uniform passage of seconds, but on Earth's angular rotation."

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Appendix A: SNMP MIB

The following text comes from the SyncServer's Custom MIB, *symm-smi.txt*, located on the Product Information CD:

See next page.

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