



**Microchip**

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**Field Service Bulletin (FSB) / Customer Advisory Notice (CAN)**

**Subject:** SyncServer S2xx/S3xx/S100 Internal Week Number Rollover event on September 18, 2022.

**Models Affected:**

Discontinued<sup>1</sup> SyncServer S100, S200, S250, S300, S350



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**1. Summary**

Discontinued SyncServer S100/S2xx/S3xx models with GPS receivers installed will experience a date change at UTC midnight September 18, 2022<sup>2</sup> related to an internal week number rollover (WNRO) of the GPS receiver chip installed in those models. The nature of GPS receiver chip renders them not serviceable with any sort of SyncServer software upgrade to remedy this WNRO event. We are providing this information as a convenience to our customers of these models.

This date change will affect NTP, IRIG time, PTP, the front panel display, and serial timing outputs that all use the date. It will not affect the timing or on-time accuracy of pulses such as the 1PPS, 10 MHz, etc. that are not linked to the time-of-day or year.

<sup>1</sup> SyncServer S100, S200, S250, S250i, S300, S350 and S350i models were discontinued on July 1, 2016.

<sup>2</sup> UTC 24:00 September 17, 2022 or UTC 00:00 September 18, 2022



Depending on when you're reading this FSB, there are several courses of action you can take to minimize the effect of the rollover. If time is very short before the September 18, 2022 event, either disconnect the GPS antenna prior to the event and have the unit go into holdover, or configure the unit to get time from other NTP time servers. If the rollover event has passed, you can configure the unit to get time from other NTP time servers, or manually set the time in the SyncServer until you can resolve the situation.

**Important:** Be advised that if the GPS antenna is reconnected at any time after 24:00 UTC on September 17, 2022, the SyncServer may lock to GPS and have the incorrect time, depending on configuration, by as much as 19 years.

**Note:** if you have an S100, follow the directions below for the S300.

**Note:** In the sections below, the navigation of the SyncServer web GUI will be presented as (LEFT SIDE BUTTON)[upper tab].

## 2. Workarounds **PRIOR** to the September 18, 2022 Internal Week Number Rollover

### 2.1. Getting Time from Other Network Time Servers

The SyncServer can synchronize with other NTP network time servers as well as GPS. The advantage of doing this procedure before the September week number rollover event is there will be a smooth transition in the time with only a stratum change visible to the network..

Once you see that the SyncServer is tracking the remote NTP time servers as well as the internal GPS receiver, you can disconnect the GPS antenna. The SyncServer will then get time only from the remote time server(s).

The technique described below will work if there are other NTP time servers available inside your organization's firewall (that are not SyncServer S2xx/S3xx models) or by getting time from time servers on the internet, outside your organization's firewall. If you choose to get time from the internet, or any other time server outside your network, you will need to open port 123 in the firewall to allow NTP packets to travel to and from those remote time servers.

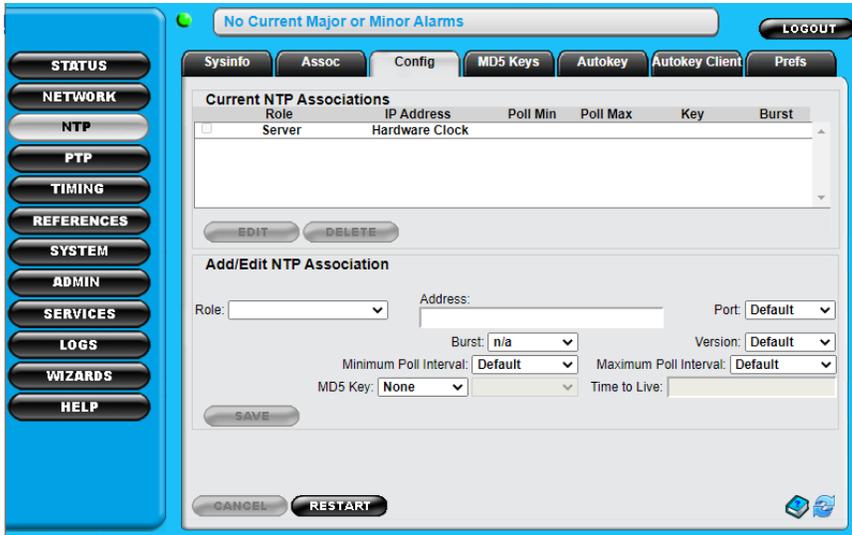
If you choose to use a domain name for a remote time service, such as [time.google.com](http://time.google.com), [time.nist.gov](http://time.nist.gov), or [pool.ntp.org](http://pool.ntp.org), you will also need to configure a DNS server in the SyncServer as well. (This can be configured on the (NETWORK)[Ethernet] web page).

### 2.2. Example of setting up NTP Associations and disconnecting the GPS

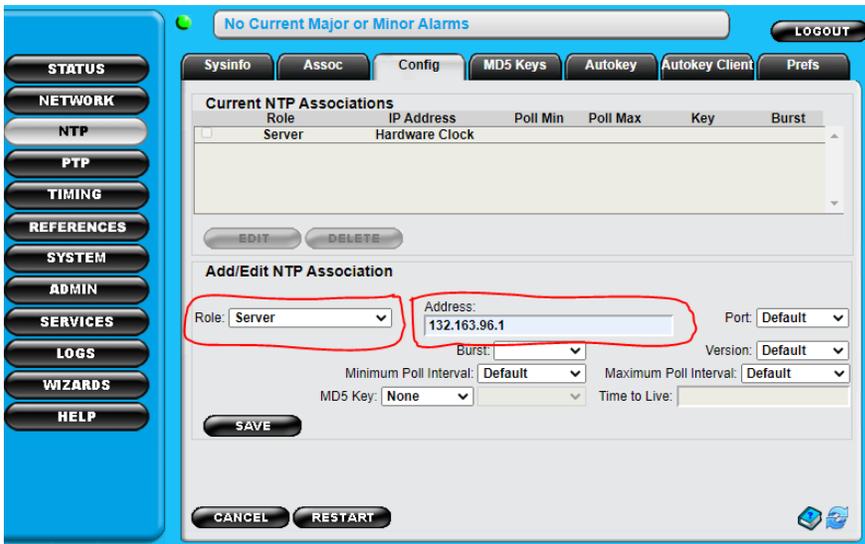
An NTP Association is when the NTP daemon is configured to track the time of other NTP server(s). The NTP daemon can track the time of several other NTP servers simultaneously and choose the best one(s) to synchronize with.

In this example we will configure the SyncServer to get time from four public NTP time servers at NIST in the USA. (132.163.96.1, 132.163.96.2, 129.6.15.28 and 129.6.15.29)

Once logged into the SyncServer, proceed to (NTP)[Config]. In the Current NTP Associations list under Role, at a minimum you should see at least one Server association for the Hardware Clock. The Hardware Clock is the internal clock that uses GPS. See below for an example.

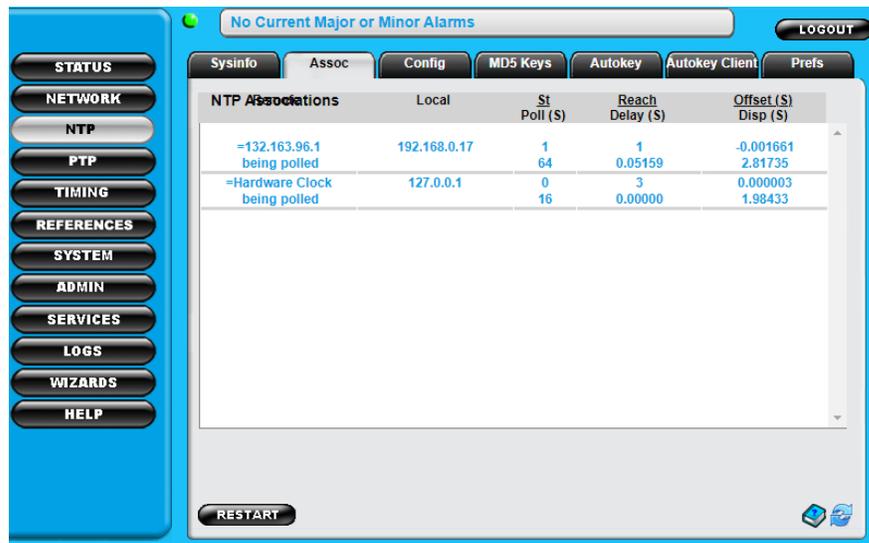


Next, we want to add an NTP Association for an NTP server at 132.163.96.1. To do this go to the Add/Edit NTP Association section and complete as shown below completing the Role and Address selections at a minimum. For the Role, choose **Server**.



Press (SAVE), the new Server association should appear in the Current NTP Associations list. Then press (RESTART). You will likely see an NTP Stratum Change Alarm. You can ignore it.

Now proceed to the (NTP)[Assoc] web page. You should see something like this:



The screenshot shows the NTP Assoc web page. At the top, there is a status bar that says "No Current Major or Minor Alarms" and a "LOGOUT" button. Below this are several tabs: "Sysinfo", "Assoc", "Config", "MD5 Keys", "Autokey", "Autokey Client", and "Prefs". The "Assoc" tab is selected, displaying a table of NTP Associations. The table has the following columns: "Local", "SI Poll (S)", "Reach Delay (S)", and "Offset (S) Disp (S)". There are two rows of data:

Local	SI Poll (S)	Reach Delay (S)	Offset (S) Disp (S)
=132.163.96.1 being polled	192.168.0.17 64	1 0.05159	-0.001661 2.81735
=Hardware Clock being polled	127.0.0.1 16	0 3 0.00000	0.000003 1.98433

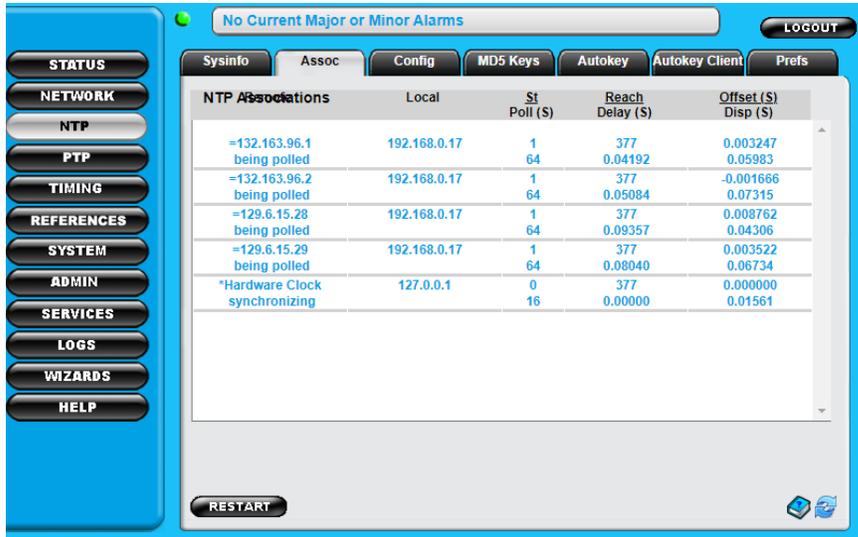
At the bottom of the page, there is a "RESTART" button and a small icon.

You can see that 132.163.96.1 is being polled. Note the default poll interval at this point is every 64 seconds. The Reach value should be increasing every 64 for seconds until it reaches 377. It will take about 8 minutes to reach 377. The Reach value will make big jumps.

If the Reach value is not increasing, it means the SyncServer NTP daemon is not getting a response from the remote NTP time server that was entered. You need to assure the Reach value gets to 377 and stays there. If it doesn't, it might be that port 123 in the firewall is not open or the remote time server is not consistently responding to requests for time. You can check to make sure you are connecting with a remote time server by going to the (NETWORK)[Ping] page and entering the IP address of the remote time server. The results of a Ping from the SyncServer to that IP address will be presented in the Ping Output window. Note that often a public internet network time server will not respond to a ping.

You can also see the NTP daemons view of time offsets in seconds between the local hardware clock and the remote 132.163.96.1 time server. The local Hardware clock time offset is 0.000003 seconds (3 microseconds) and the remote 132.163.96.1 time server on the internet is approximately 0.001661 seconds offset (1.661 milliseconds). The SyncServer NTP daemon is now tracking the time of two clocks.

For this example, we returned to the (NTP)[Config] page and entered three more IP addresses of remote NTP servers (132.163.96.2, 129.6.15.28, and 129.6.15.29) in the same way we entered the first IP address above. We then saved the configuration and restarted the NTP daemon. Below is the (NTP)[Assoc] page after about 15 minutes from restarting the NTP daemon.



No Current Major or Minor Alarms LOGOUT

Sysinfo Assoc Config MD5 Keys Autokey Autokey Client Prefs

NTP Associations	Local	St Poll (S)	Reach Delay (S)	Offset (S) Disp (S)
=132.163.96.1 being polled	192.168.0.17	1 64	377 0.04192	0.003247 0.05983
=132.163.96.2 being polled	192.168.0.17	1 64	377 0.05084	-0.001666 0.07315
=129.6.15.28 being polled	192.168.0.17	1 64	377 0.09357	0.008762 0.04306
=129.6.15.29 being polled	192.168.0.17	1 64	377 0.08040	0.003522 0.06734
*Hardware Clock synchronizing	127.0.0.1	0 16	377 0.00000	0.000000 0.01561

RESTART 

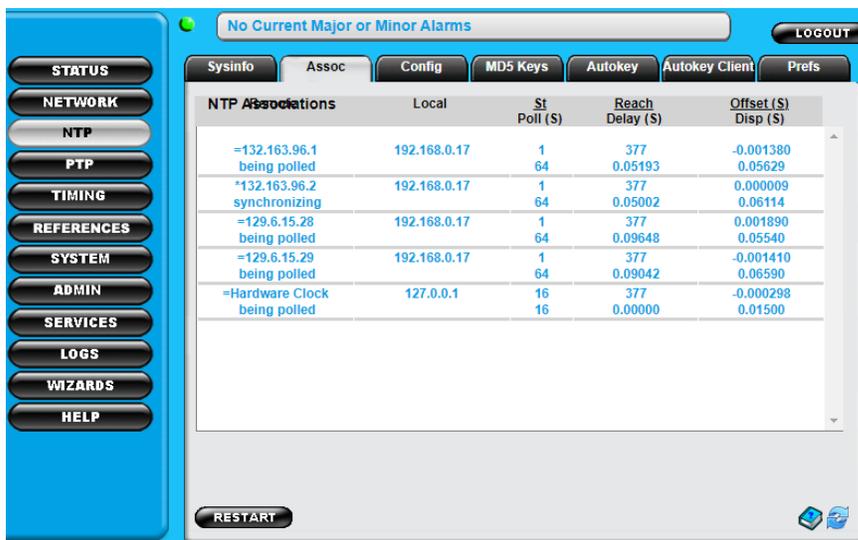
You can see that all time servers have a Reach of 377 and the Hardware Clock is the one the NTP daemon is using for the time.

**Note:** In the next step the GPS antenna will be disconnected. Be advised that depending on how you have configured the holdover in the unit, it may take a short or very long amount of time before you see any change in the NTP Associations. Holdover is configured on the (TIMING)[Holdover] web page. For this example, the Holdover is set to zero and the related Time Error Limit is also set to zero.

**Note:** To disconnect GPS on an S200/S250 you need to unplug the antenna cable. To disconnect the GPS on an S300/S350 you can either disconnect the antenna cable, or disable GPS on the (TIMING)[HW Clock] page.

Next, the GPS antenna was disconnected as this will be the procedure before 17 September 2022. We recommend configuring the remote servers as soon as possible and doing a precheck of disconnecting the GPS antenna to verify everything happens as expected. Regardless, be certain to disconnect the GPS cable from the SyncServer before UTC midnight on September 17, 2022.

Below is the (NTP)[Assoc] page once the SyncServer no longer used GPS for time and the unit exited holdover. Notice the SyncServer is now synchronizing with 132.163.96.2 and the Hardware Clock has been automatically set to Stratum 16, meaning it is unsynchronized.



No Current Major or Minor Alarms LOGOUT

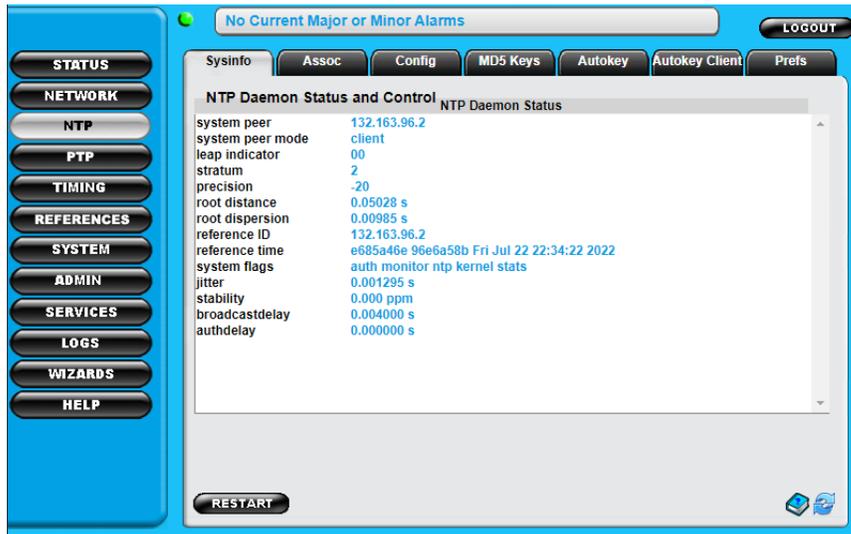
Sysinfo Assoc Config MD5 Keys Autokey Autokey Client Prefs

NTP Associations	Local	St Poll (S)	Reach Delay (S)	Offset (S) Disp (S)
=132.163.96.1 being polled	192.168.0.17	1 64	377 0.05193	-0.001380 0.05629
*132.163.96.2 synchronizing	192.168.0.17	1 64	377 0.05002	0.000009 0.06114
=129.6.15.28 being polled	192.168.0.17	1 64	377 0.09648	0.001890 0.05540
=129.6.15.29 being polled	192.168.0.17	1 64	377 0.09042	-0.001410 0.06590
=Hardware Clock being polled	127.0.0.1	16 16	377 0.00000	-0.000298 0.01500

RESTART 



If you proceed to the (NTP)[Sysinfo] page as seen below, you can see that the SyncServer is now operating as a stratum 2 server. This is because the 132.163.96.2 NTP server is a stratum 1 server.



Since none of the IP address of the LAN ports were changed, all NTP clients on the network can seamlessly continue to synchronize with the SyncServer.

### 2.3. Putting the SyncServer S200 in Holdover

Holdover is when the SyncServer loses a connection to an external time source (like GPS) and becomes a free running clock.

- Step 1. Proceed to the (TIMING)[Holdover] page
- Step 2. Enter a value of 180 for the Holdover and press (SET→)
- Step 3. Press (APPLY)
- Step 4. Disconnect the GPS antenna. (The only way to place the S200 into holdover is to disconnect the antenna).

The S200 will now be drifting slowly on the internal oscillator. After 180 days the NTP daemon will no longer update the reference timestamp and this may cause NTP clients to reject the time from the S200.

### 2.4. Putting the SyncServer S250 in Holdover

Holdover is when the SyncServer loses a connection to an external time source (like GPS) and becomes a free running clock.

**An S250 configured with external timing inputs:** If your S250 is currently configured with an IRIG input as a backup time source (not from another S250 or S350 tracking GPS), or has an external 1PPS input or 10 MHz input, then disconnecting the GPS cable from the unit will cause the S250 to use these inputs to continue to provide the time. It is important to never reconnect the GPS to the S250.

An S250 configured without external timing inputs:

- Step 1. Proceed to the (TIMING)[Holdover] page
- Step 2. Enter a value of 180 for the Holdover and press (SET→)
- Step 3. Press (APPLY)
- Step 4. Disconnect the GPS antenna. (The only way to place the S250 into holdover is to disconnect the antenna).

The S250 will now be drifting slowly on the internal oscillator. After 180 days the NTP daemon will no longer update the reference timestamp and this may cause NTP clients to reject the time from the S250.



## 2.5. Putting the SyncServer S300 in Holdover

Holdover is when the SyncServer loses a connection to an external time source (like GPS) and becomes a free running clock.

- Step 1. Proceed to the (TIMING)[Holdover] page
- Step 2. Enter a value of 180 for the Holdover and press (SET→)
- Step 3. Press (APPLY)
- Step 4. Disconnect the GPS antenna. (The only way to place the S300 into holdover is to disconnect the antenna).

## 2.6. Putting the SyncServer S350 in Holdover

Holdover is when the SyncServer loses a connection to an external time source (like GPS) and becomes a free running clock.

**An S350 configured with external timing inputs:** If your S350 is currently configured with an IRIG input as a backup time source (not from another S250 or S350 tracking GPS), or has an external 1PPS input or 10 MHz input, then either disconnect the GPS antenna cable from the back of the unit, or proceed to the (TIMING)[HW Clock] page. Disable GPS by clicking the “Enable” check box next to GPS so that it is not checked, then press (APPLY). At some point though, the antenna cable on the back of the SyncServer should be permanently disconnected. It is important to never reconnect the GPS to the S350.

An S350 configured without external timing inputs:

- Step 1. Proceed to the (TIMING)[Holdover] page
- Step 2. Enter a value of 180 for the Holdover and press (SET→)
- Step 3. Press (APPLY)
- Step 4. Either disconnect the GPS antenna cable from the back of the unit, or proceed to the (TIMING)[HW Clock] page. Disable GPS by clicking the “Enable” check box next to GPS so that it is not checked, then enable Timecode input, even though it’s not present, then press (APPLY). At some point though, the antenna cable on the back of the SyncServer should be permanently disconnected.

The S350 will now be drifting slowly on the internal oscillator. After 180 days the NTP daemon will no longer update the reference timestamp and this may cause NTP clients to reject the time from the S350.

## 3. Workarounds **AFTER** the September 18, 2022 Internal Week Number Rollover

### 3.1. SyncServer Manual Time Set

- Step 1. Log into the SyncServer web GUI
- Step 2. Proceed to the (TIMING)[HW Clock] page
- Step 3. Where it says “Forced Timing Source”, select Free Run
- Step 4. Configure the time on the UTC Time row. You should input the approximate current UTC time as that is what NTP clients expect.<sup>3</sup>
- Step 5. Press (APPLY)
- Step 6. Within a few minutes the time on the SyncServer will align with the time that you entered. You can check this on the (STATUS)[General] page or the (NTP)[Sysinfo] page. You may need to periodically refresh the page with the arrows in the bottom right to see the changes.

### 3.2. SyncServer S250/S350 with external IRIG timecode input

Assuming the S250/S350 has an IRIG input connected as a back-up time source, and that IRIG is not coming from another S250/S350, then do the following:

**An S250 configured with external IRIG input:** If your S250 is currently configured with an IRIG input

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<sup>3</sup> Not sure what UTC time currently is? Input “utc time” in Google search and it will respond with the current UTC time. Be sure to enter it in 24-hour format.



as a backup time source (not from another S250 or S350 tracking GPS), then disconnecting the GPS cable from the unit will cause the S250 to use the IRIG input to continue to provide the time. It is important to never reconnect the GPS to the S250.

**An S350 configured with external IRIG input:** If your S350 is currently configured with an IRIG input as a backup time source (not from another S250 or S350 tracking GPS), then either disconnect the GPS antenna cable from the back of the unit, or proceed to the (TIMING)[HW Clock] page. Disable GPS by clicking the "Enable" check box next to GPS so that it is not checked. Next, be sure Timecode is the #2 priority and enabled, then press (APPLY). At some point though, the antenna cable on the back of the SyncServer should be permanently disconnected. It is important to never reconnect the GPS to the S350.

### 3.3. Getting Time from Other Network Time Servers

These steps assume a SyncServer S2xx/S3xx connected to GPS is serving the wrong time.

This procedure will first require you to manually set the time close to the correct time, then connect the SyncServer to time servers at NIST in the USA via the internet. For this to work, port 123 will need to be open in your organization's firewall and accessible from the SyncServer.

- Step 1. Log into the SyncServer web GUI
- Step 2. Proceed to the (TIMING)[Holdover] web page and set the Time Error Limit and Holdover both to zero (0). Press (APPLY)
- Step 3. Proceed to the (TIMING)[HW Clock] page.  
**S200/S250/S300:** Where it says "Forced Timing Source", select Free Run  
**S350:** Select Timecode, 1PPS, or 10MHz in the Enable column. Press (APPLY),  
Deselect GPS and press (APPLY).  
Where it says "Forced Timing Source", select Free Run
- Step 4. Configure the time on the UTC Time row.  
You should input the approximate current UTC time as that is what NTP clients expect.  
(See footnote #3)
- Step 5. Press (APPLY)
- Step 6. Disable GPS  
**S200/S250/S300:** The only way to disable GPS is to disconnect the GPS antenna cable from the back of the unit. If this cannot be accomplished swiftly, proceed to the next step. At some point though, the antenna cable on the back of the SyncServer should be permanently disconnected.  
  
**S350:** In Step 3 above you disabled GPS. At some point though, the antenna cable on the back of the SyncServer should be permanently disconnected. Never Enable GPS via the web interface if the antenna is connected.
- Step 7. Proceed to the (NTP)[Config] page, the Add/Edit NTP Association section, and configure the following:
  - Step 8. Role: Server
  - Step 9. Address: 132.163.96.1 (This is an NTP server at NIST in the USA)
  - Step 10. Port: LAN1 (on S3xx models, assure that LAN1, or whichever LAN you choose, can access a remote time server on the internet via port 123 through the firewall).
  - Step 11. Minimum Poll Interval: 0:00:16
  - Step 12. Maximum Poll Interval: 0:00:16
  - Step 13. (SAVE)
  - Step 14. Repeat Steps 8 through 13 again using 132.163.96.2 as the Address
  - Step 15. Repeat Steps 8 through 13 again using 129.6.15.28 as the Address
  - Step 16. Repeat Steps 8 through 13 again using 129.6.15.29 as the Address
  - Step 17. Note: it is important to set up at least three, but preferably four or more remote time servers if possible. Reason being is that enabling three or more remote time servers will cause the local (incorrect) hardware clock to be disqualified as a valid time source by the NTP daemon.
- Step 18. Press (RESTART)
- Step 19. Proceed to the (NTP)[Assoc] web page
- Step 20. Assuming port 123 is open in your firewall you should see all four NTP associations just



configured being polled. The Reach should be increasing in jumps from 1 to 377 every 16 seconds. (If you see the Reach increasing for each NTP association, you can proceed to the next step). Reach should stay at 377 for each IP address configured. If the Reach value is not increasing, it means the SyncServer NTP daemon is not getting a response from the remote NTP time servers that were entered. If this is happening, check port 123 in the firewall is open and the configured SyncServer LAN port for NTP is on the right network segment to access that port 123 via its network connection.

Step 21. Proceed to the (TIMING)[HW Clock] page.

Where it says "Forced Timing Source", select Auto, press (APPLY)

Step 22. Proceed to the (NTP)[Assoc] web page

Step 23. Press (RESTART)

Step 24. Watching this page you will see the Reach get reset and start to progress towards 377, and possibly the Offset values reset as well. At some point, likely within a couple minutes after pressing (RESTART) one of the remote IP addresses, not the Hardware Clock, will go from "being polled" to "synchronizing". Anecdotal results by Microchip testing show the S2xx/S3xx SyncServers can routinely synchronize to time servers on the internet to single-digit millisecond or better time accuracy.

#### **4. Commentary on SyncServer S250 or S350 NTP input to IRIG output conversion.**

The older SyncServer S250 and S350 models were designed to primarily be stratum 1 network time servers that can use NTP as a fallback source of time for NTP operations if GPS or IRIG inputs were to become unavailable. They were not intended to be configured with NTP as the primary time reference input providing an IRIG or 1PPS output. While it is possible to configure the units for this mode of operation, the resulting stability of the IRIG timecode output may be unsuitable for IRIG timecode readers to lock to. Depending on the IRIG reader, it may never lock to the SyncServer IRIG output, or it may lock and unlock repeatedly.

#### **5. Commentary on SyncServer S250i or S350i Models**

The discontinued SyncServer S250i and S350i models are not equipped with GPS receivers and will not be affected by the September 18, 2022 week number rollover event.



## 6. Contact Information

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