

S E R V I C E N O T E

SUPERSEDES: None

Z3806A GPS Timing Module (NEC CP-16-N Clock)

Serial Numbers: 0000A00000/9999A99999

Extending the Calendar Date**Duplicate Service Notes:**

Z3806A-01

To Be Performed By: Customer or Agilent**Tools Required:** (see text)**Situation:**

Calendar dates reported by the Z3806A GPS Timing Module are constrained to a 19.7-year time period. This service note describes the procedure to advance this period with the passage of time. This product will properly recognize the rollover of the GPS time scale on August 22, 1999, without intervention. Perform these procedures when it is necessary to extend the calendar range beyond July 2013.

Concept

GPS satellites transmit the current date as the number of weeks, and seconds into the current week, since January 6, 1980. Many GPS receivers translate these offsets to a calendar date in the conventional year-month-day representation. The GPS week number has a maximum

Continued

DATE: March 1999

ADMINISTRATIVE INFORMATION

SERVICE NOTE CLASSIFICATION:

INFORMATION ONLY

AUTHOR:

DC

ENTITY:

0200

ADDITIONAL INFORMATION:



decimal value of 1023. This limitation establishes a 1024-week (19.7-year) period commonly referred to as the "GPS epoch." Since the week number transitions from 1023 to 0 at the end of each GPS epoch, the receiver must account for these rollovers to distinguish week numbers in different epochs.

The Z3806A GP Timing Module applies a user-specified reference date to resolve this ambiguity. The reference date is the earliest calendar date of a 1024-week period. Each week number within this period is uniquely associated with a date. When the current week number is downloaded from a satellite, the translation algorithm uses this correspondence to determine the calendar date. Consider the time line in Figure 1, which illustrates the relationship between the GPS time scale and a span of calendar dates established by a reference date of January 1, 1995 (week 782). If the current week number is 995, the calendar date is 213 weeks ahead of the reference date, or January 31, 1999. Suppose, however, that it is week 995 of the second GPS epoch. This date is beyond the upper bound of the translation period (week 781) and is indistinguishable from January 31, 1999. To correct this anomaly, the reference date must be advanced until the 1024-week calendar span encompasses week 995 of the second epoch.

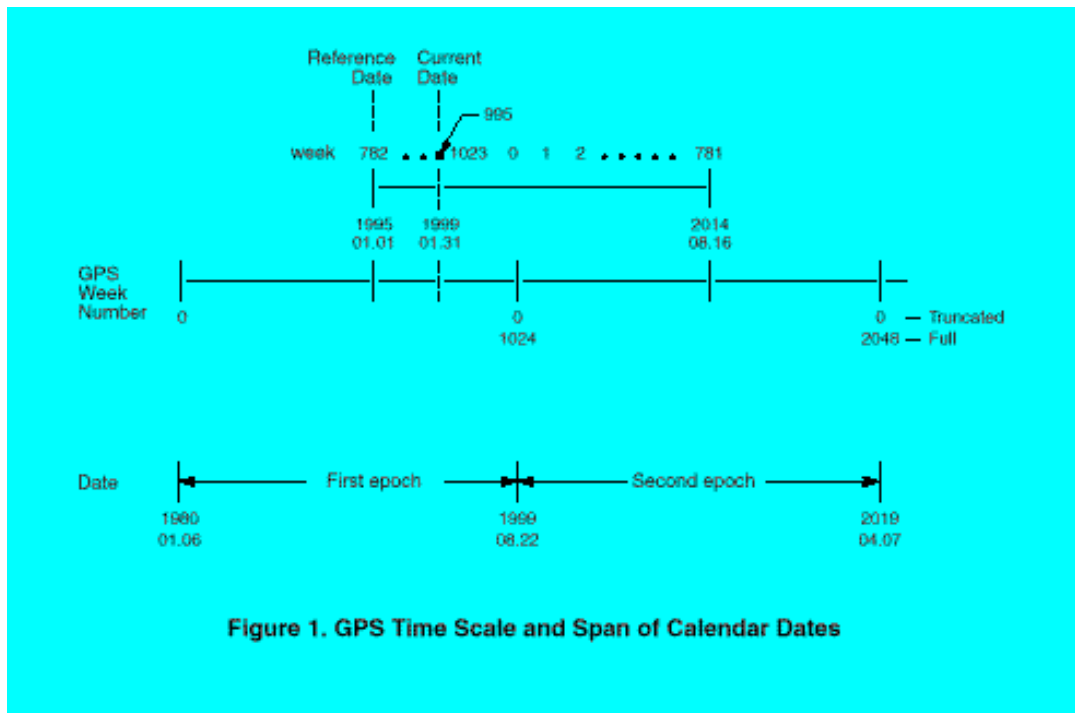


Figure 1. GPS Time Scale and Span of Calendar Dates

Solution/Action:

Initial Setup and Verification

1. Connect the RS-232C serial data interface of the timing module to a computer or terminal. Configure the data communication settings of the computer or terminal to match the timing module. The special "Backplane Fixture" for the Z3806A provides access to the serial data interface via the backplane connector.
2. Press the "Return" key on the computer or terminal keyboard to verify the connection. The timing module should respond with the scpi prompt.

Identifying the Reference Date

1. Disconnect the GPS antenna system.
2. Cycle power to the timing module. Wait for the module to complete its power-up cycle.
3. Send the :DIAG:GPS:TIME? query to read the reference date. The module should respond with six comma-separated values: hour, minute, second, year, month, day

NOTE:

If error code -230 ("Data corrupt or stale") is reported, wait several seconds, then retransmit the query.

4. Find this year in Column 2 of table 1 below.
 - a. If the calendar span in Column 3 is sufficient, proceed to step 5 below.
 - b. If the calendar span in Column 3 is NOT sufficient, proceed to the section "Changing the Reference Date".
5. Reconnect the GPS antenna system. No further action is required.

Table 1. Range of Years and Calendar Span

Current Year	Reference Year	Calendar Span (From - Through)
1994	1995	1993.12.26 - 2013.08.10
1995	1996	1995.01.01 - 2014.08.16
1996	1997	1995.12.31 - 2015.08.15
1997	1998	1996.12.29 - 2016.08.13
1998	1999	1997.12.28 - 2017.08.12
1999	2000	1998.12.27 - 2018.08.11
2000	2001	1999.12.26 - 2019.08.10
2001	2002	2000.12.31 - 2020.08.15
2002	2003	2001.12.30 - 2021.08.14
2003	2004	2002.12.29 - 2022.08.13
2004	2005	2003.12.28 - 2023.08.12
2005	2006	2004.12.26 - 2024.08.10
2006	2007	2006.01.01 - 2025.08.16
2007	2008	2006.12.31 - 2026.08.15
2008	2009	2007.12.30 - 2027.08.14
2009	2010	2008.12.28 - 2028.08.12
2010	2011	2009.12.27 - 2029.08.11
2011	2012	2010.12.26 - 2030.08.10
2012	2013	2012.01.01 - 2031.08.16
2013	2014	2012.12.30 - 2032.08.14
2014	2015	2013.12.29 - 2033.08.13
2015	2016	2014.12.28 - 2034.08.12
2016	2017	2015.12.27 - 2035.08.11
2017	2018	2017.01.01 - 2036.08.16
2018	2019	2017.12.31 - 2037.08.15
2019	2020	2018.12.30 - 2038.08.14
2020	2021	2019.12.29 - 2039.08.13

Changing the Reference Date

1. Using the preceding table, find the reference year in Column 2 that corresponds to the current year, in Column 1. Record it below.

Reference Year _____

NOTE:

In theory, the reference year must not be in the future and, ideally, should be set to the current year to advance the 1024-week calendar by the maximum amount. Values in Column 2 are incremented by one year because the timing module calculates the actual reference date by subtracting a year from the setting. This allows for a +1-year margin in the specified value.

2. Disconnect the GPS antenna system.
3. Cycle power to the timing module. Wait for the module to complete its power-up cycle.
4. Send the :GPS:INIT:DATE command to change the reference date. The syntax of this command is:

:GPS:INIT:DATE <four-digit year>,<month>,<day>

<month> and <day> parameters are disregarded; specify "1" and "1" to select January 1 of the reference year recorded in Step 1.

For example, the command

:GPS:INIT:DATE 2000,1,1

will change the reference date to January 1, 2000.

5. Send the :DIAG:GPS:TIME? query to verify the new reference date.
The module should respond with six comma-separated values: hour, minute, second, year, month, day

NOTE:

The reference date is retained in the GPS receiver's non-volatile memory. The receiver will select a default date if this setting is lost.

6. Cycle power to the module.
7. Reconnect the GPS antenna system.