# 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:**

Z3813A-03

**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: | ENTITY: | ADDITIONAL INFORMATION: |
| DC | 0200 | |



Agilent Technologies

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.

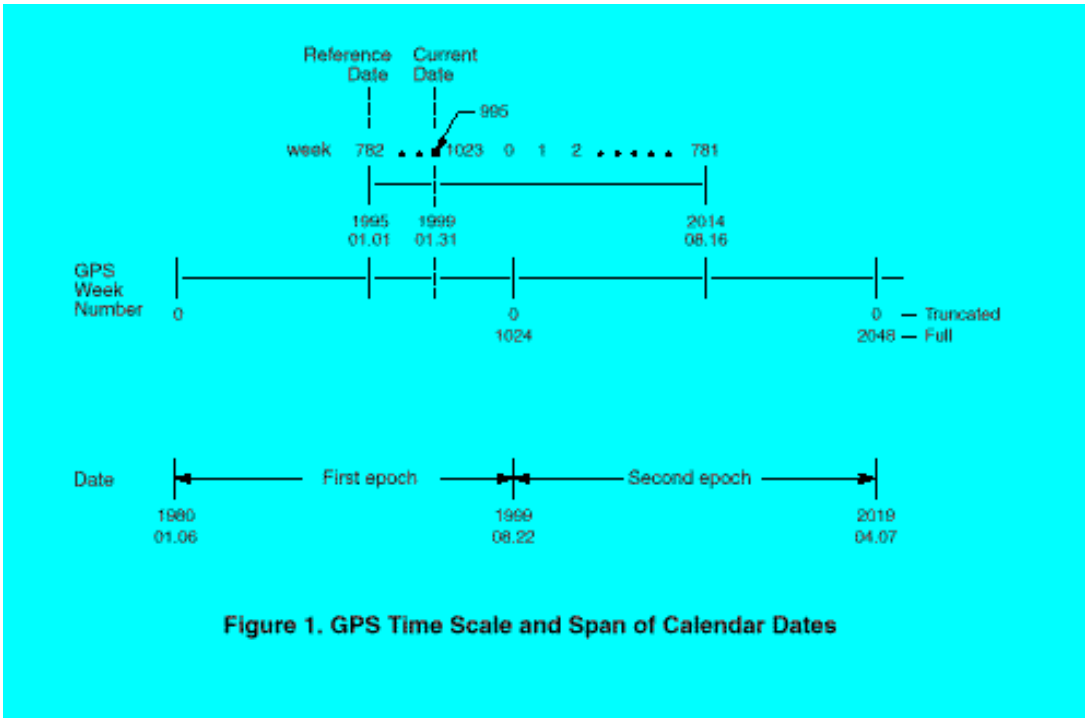


**Figure 1. GPS Time Scale and Span of Calendar Dates**

**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.