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Year 2000 Advisory GPS Week Rollover Advisory

Two events are approaching that must be considered in advance to avoid possible problems when they occur. Since they will both occur within the same year, this report deals with both, Year 2000 and GPS Week Rollover

Year 2000

The Year 2000 problem manifests itself by trying to compute a time interval using two-digit years (e.g., '97' instead of 1997 or '00' instead of 2000). For instance a test that starts in December 1999 and ends in January 2000 might be computed to end 99 years before it was started (00-99).

Timing products (both hardware and software drivers) supplied by the San Jose Operation of Datum fall in one of three categories depending on how they handle years:

1. **No year information reported:** In this case there is no Year 2000 issue by definition.
2. **Two-digit year reported:** In all cases the correct two-digit year will be reported during the Year 2000 transition (i.e., '99' will transition to '00' at midnight December 31, 1999). Note that the problem is in the software that processes the two-digit years and not in the fact that a two-digit year is used. It is the responsibility of the user's software to correctly handle the two-digit year format reported by these products. The appended product charts identify those products falling in this category.
3. **Four-digit year reported:** All Datum products that report year in the four-digit format, will correctly transition (i.e., '1999' will transition to '2000' at midnight December 31, 1999).

NOTE: Datum PC products and drivers pose a special problem. The PC boards or drivers supplied by Datum will correctly report two-digit years, but some host PC's and operating systems (notably DOS and Windows) may not accept a '00' year. This is not a defect of the Datum product or driver, but rather a defect of the host computer and users should evaluate how best to upgrade the system to handle the year 2000 transition. Products that might have a PC hardware or OS problem are identified in the product listings.

In summary, all Datum products, past and present, correctly report two-digit years, four-digit years, or do not report years at all. All products that may require software or hardware correction in the user's system are identified in the appended product tables.

GPS Week Rollover

Those products that obtain time information from the Navstar/GPS satellite constellation are subject to a more obscure problem that is caused by the data format that is transmitted by the satellites. Time is expressed by the satellite as the number of weeks since midnight (12:00 am) January 6, 1980 (GPS Week) plus the number of seconds in the week (Second of GPS Week). These two values are transmitted as binary integers from the satellites and converted into conventional date (month/day/year) or day of year by the GPS receiver. Because the GPS Week number is transmitted as a 10-bit binary integer, it can only count from zero to 1,023. GPS Week 1,023 will end at midnight (11:59:59) on August 21, 1999 and will roll to a value of zero after midnight (00:00:00) on August 22, 1999 and start the GPS Week count over.

The US Air Force has issued a document, ICD-GPS-200, which describes the attributes and data formats of the CA (Course Acquisition) code transmitted by GPS satellites. The Government has stated without equivocation that they will not take any corrective action to remedy the data format from the satellites. It is left to the manufacturers of GPS receiver hardware to cope with this event. Datum, and other manufacturers, have devised a means of determining which 1,024-week period is current and then synthesizing the missing week number bits.

The corrective action to be taken (if any) is indicated in the table at the end of this report. In general, one of the following five conditions will prevail:

1. **No correction required.** This product was built with an awareness of the GPS Week rollover event, and a correction is built in.
2. **Firmware upgrade.** A new PROM will be furnished, or a download to flash memory will be required to cope with the GPS Week rollover. There will be some units with custom firmware that cannot be corrected.
3. **Hardware modification.** A special microprocessor will process the serial data stream from the GPS receiver module, make the week number correction and pass the corrected data to the existing GPS logic. This is a simple modification that can easily be installed in the field. Datum may elect to replace the internal GPS receiver module in some products.

4. **Replace ACUTIME Antenna/Receiver.** Some GPS products use the Trimble ACUTIME, which is an antenna and receiver packaged together in a single module to be mounted on a mast. Most of these older units (before 1997) must be replaced. Newer ACUTIME units have been corrected by Trimble.
5. **Unable to correct.** Some units that were provided with custom software or hardware (logic) modifications cannot be corrected. This is also true of the original Datum GPS Receivers, the Series 9390-5000 and Series 9390-5100. These units have been obsolete for some time, and parts are simply not available for them. Units that fall into this category can only be replaced.

How to Proceed

If you own (or use) a Datum GPS product that is still in the warranty period, it will be upgraded (corrected) at no cost to you (except for custom units, of course). If your unit is out of warranty, then there will be a price quoted for the upgrade. Custom units will be handled on a 'time & materials' basis. It is possible that you may be informed that an upgrade cannot be accomplished for a reasonable price. Replacement of the ACUTIME Antenna/Receiver module should be considerably less expensive than replacing the host unit. Finally, you may be told that your receiver is obsolete and not suitable for upgrade. In any case, please contact your Technical Account Specialist by telephone (800/348-0647 or 408/578-4161) or e-mail (sales@bt.datum.com).

Product	GPS Week Rollover	Year 2000
PC03XT TC Translator	Does not apply	Upgrade DOS Driver to version 3.0 ‡
PC05XT TC Generator	Does not apply	Does not apply
bc620AT T&F Processor	Does not apply	Upgrade DOS Driver to version 2.20 ‡
bc627AT T&F Processor	Replace ACUTIME Antenna/Receiver module or Firmware Upgrade *	Upgrade DOS Driver to version 2.20 ‡
bc630AT RT Clock	Does not apply	Upgrade DOS Driver to version 3.10 ‡
bc635LAN	Does not apply	
bc637LAN	Replace ACUTIME Antenna/Receiver module or Firmware Upgrade	
bc635PCI T&F Processor	Does not apply	No correction required
bc637PCI T&F Processor	No correction required	No correction required
bc635CPCI T&F Processor	Does not apply	No correction required
bc637CPCI T&F Processor	No correction required	No correction required

Product	GPS Week Rollover	Year 2000
bc635PMC T&F Processor	Does not apply	No correction required
bc637PMC T&F Processor	No correction required	No correction required
PC03V TC Translator	Does not apply	No correction required
PC05V TC Generator	Does not apply	No correction required
PC03Q TC Translator	Does not apply	No correction required
bc700VME	Unable to correct	Does not apply
bc330VME TC Processor	Does not apply	No correction required
bc336VME TC Processor	Does not apply	No correction required
bc635VME T&F Processor	Does not apply	No correction required
bc637VME T&F Processor	Replace ACUTIME Antenna/Receiver module or Firmware Upgrade	No correction required
bc350VXI T&F Processor	Does not apply	No correction required
bc357VXI T&F Processor	Replace ACUTIME Antenna/Receiver module or Firmware Upgrade	No correction required
bc635S T&F Processor	Does not apply	No correction required
bc637S T&F Processor	Replace ACUTIME Antenna/Receiver module or Firmware Upgrade	No correction required
bc330STD TC Translator	Does not apply	Upgrade DOS Driver To version 2.0 ‡
bc330SBX TC Translator	Does not apply	No correction required
bc530SBX TC Generator	Does not apply	No correction required
TS2000-IRIG TymServe	Does not apply	No correction required
TS2000-GPS TymServe	Replace ACUTIME Antenna/Receiver or Firmware Upgrade	No correction required
TS2000-ACTS TymServe	Does not apply	No correction required
TS2100-IRIG TymServe	Does not apply	No correction required
TS2100-GPS TymServe	No correction required †	No correction required
TS3000-IRIG TymSequencer	Does not apply	No correction required
TS3000-GPS TymSequencer	No correction required	No correction required
9390-5000 GPS T&F Proc.	Unable to correct	Unable to correct

Product	GPS Week Rollover	Year 2000
9390-5100 GPS T&F Proc.	No correction required	No correction required
9390-52000 GPS T&F Gen	Firmware upgrade	No correction required
9390-52100 GPS T&F Gen	Firmware upgrade	No correction required
9390-53000 GPS TCG	Hardware modification	No correction required
9390-5400 A/B GPS TCG	Hardware modification	No correction required
9390-5500 to 9390-5542	Unable to correct	No correction required
9390-5543 to 9390-55303	Hardware modification	No correction required
9390-56000 GPS T&F Gen	Hardware modification	No correction required
9390-5700 A/B GPS TCG	Hardware modification	No correction required
9390-1000 GPS Clock	Firmware upgrade *	No correction required
9390-2000 GPS T&F Gen	Firmware upgrade	No correction required
9390-2010 GPS T&F Gen	Firmware upgrade	No correction required
9390-3000 A/B GPS TCG	Firmware upgrade	No correction required
9390-6000 ExacTime	Firmware upgrade *	No correction required
9390-6010 ExacTime	Firmware upgrade *	No correction required
9390-6020 ExacTime	Firmware upgrade *	No correction required
M80T TC R/G	No correction required	No correction required
9700AT PTS	No correction required	No correction required
9710AT PTS	No correction required	No correction required
9701 TC Generator	No correction required	No correction required
9711 TC Generator	No correction required	No correction required
9730 TCG/T	No correction required	No correction required
9750 Portable PTS	No correction required	No correction required
9790 STCG	No correction required	No correction required
9791 STCG	No correction required	No correction required

Product	GPS Week Rollover	Year 2000
9770 CD Generator	Does not apply	Does not apply
9550-3010 A/B VTI	Does not apply	Does not apply
9610 Series TTU	Does not apply	Does not apply
9611 Sw & Dist Unit	Does not apply	Does not apply
9850 Battery P.S.	Does not apply	Does not apply
9100 TC Generator	Does not apply	Does not apply
9200 TC Translator	Does not apply	Does not apply
9300 TCG/T	Does not apply	Does not apply
9110 TC Generator	Does not apply	Does not apply
9210 TC Translator	Does not apply	Does not apply
9310 TCG/T	Does not apply	Does not apply
9240 Tape Search	Does not apply	Does not apply
9241 Tape Search	Does not apply	Does not apply
9150 A/B TCG	Does not apply	Does not apply
9520 Time Display	Does not apply	Does not apply
9521 CD Display	Does not apply	Does not apply
bc632D Time Display	Does not apply	Does not apply

* Products purchased after January 1, 1998 are fully compliant.

† Customers are encouraged to call 800/348-0648 to determine if there is a software/firmware upgrade available for their product.

‡ Download from ftp.datum.com (link).