

M12M (STM) GPS WEEK ROLLOVER TEST

02 Aug 2013

Revision A

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1 Purpose

The purpose of this report is to show that the M12M (STM) Timing/Navigation oncore receivers are capable of, functioning and adhering to the specifications before, during and after the GPS week roll over events.

2 Scope

The GPS week rollover test covers following M12M (STM), modules.IL-GPS-010-BTiming oncore module without batteryIL-GPS-020-BNavigation oncore module without batteryIL-GPS-030-BTiming Oncore module with battery

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3 GPS rollover Test Procedure

3.1 Description

The main goal of the Test is to show that the above mentioned GPS modules' ability to rollover to the corresponding GPS window during GPS week rollover events. The Test is done in three basic conditions.

- 1. Before GPS week rollover
- 2. During GPS week rollover
- 3. After GPS week rollover

The M12M (STM) fresh units starts from the default date 01/01/2005 during the first power up. Three fresh M12M (STM) modules of each kind are received from the store, and subjected to the below mentioned test procedure. A GPS signal simulator Spirent STR4500 in this case, is loaded with GPS week rollover scenario recorded as of 07-Apr-2019, used as a RF signal source for the module. The test setup is shown in Figure 3.1.



Figure 3.1 GPS Rollover Test setup

Procedure

- 1. Power up the module
- 2. Send @@Ha01 command and observe the date output by the module.
- 3. Connect the RF signal.
- 4. Observe the date updated from the RF signal.
- 5. Continue the test until the GPS week rollover occurs.
- 6. Record the date output by the module before and after the rollover.
- 7. Power off the module
- 8. Remove battery and Replace. (IL-GPS-030-B model only)
- 9. Power up the module
- 10. Wait until the module receive satellite and update the date and time.
- 11. Record the date and time output by the module.



3.2 Sample Size: 3 Units

IL Model Number	Serial Number
IL-GPS-010-B	CA0007
IL-GPS-020-B	CA0008
IL-GPS-030-B	RA3257

3.3 Electrical Requirement

Units under test is powered "ON" with 3V VCC and 5V VAnt, during the entire Test

3.4 GPS Performance Test Requirement.

The Device should react normally during the rollover events without any anomalies.

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4 RESULTS

4.1 CA0007

4.1.1 Module's Behavior during Start up

SiRFOncore - Additional Message Window (Autonomous)	
The Vew Options GPS Window Heep Demo	
Signal Navigation Survey Satellites Cmd Mon Msg Compass Integrated Timing	
	Additional Massage Window (Autonomous)
Poston Echemeric	Enter Command
Desition Fix Information Dete:: 01/01/2008 Time: 12:00.41 UTC OMT Offset:: +00.00 Device starts up with	Oscillator Offset: 0 Temperature: 0.000000 UTC Parameters: 80h GMT_Offset: 00h
Latitude: w 00° 00 000 Longitude: c 000° 00 000 OPE Hgt: c 000° m PDOP: 00 VDOP: 00 VDOP: 00 VDOP: 00 VDOP: 00	: 00 ^{toy} (00h - Positive, FFh - Negative) ID Tag: CA0007 Mode 0
Speed: 0.00 km/h Heading: 0.0° true	🔤 Command Monitor Window (Autonomotia)
Tracked Satellites: 0 Visible Satellites: 0 ID TAG: CA0007	[07/16/2013 12:36 11 140] (Rx)00Ha 010107550C001B000951900000000000000000000 07/16/2013 12:39 12 140 (Rx)00Ha 010107550C0015000056670000000000000000000 07/16/2013 12:39 13 140 (Rx)00Ha 010107550C0015000056670000000000000000000000 07/16/2013 12:39 15 140 (Rx)00Ha 010107550C001500000000000000000000000000
Endference Point Latitude N OO* 00' 00 000 Longitude £ 000' 00' 00 000 OPS Hgt 0.00 m Pos Unc: 1.00 km	07-16-2013 12:30 16 140 (Re)+09H8 010107D50C002200012D2C00000000000000000000000000
NEV Offsets North: 0.00 m East 0.00 m	[07/16/2013 12 30 26 140] (Rx)00Ha 010107D50C002A0000A26200000000000000000000000000
Up 0.00 m Euclidean 0.00 m	()
Receiver Status	🖬 Signal Quality Window (Autonomous) - [@@la data]
A counting Satellites Cold star Insufficient Visible Satellites Insufficient Visible Satellites Antenna Sense: Under Current	C/Ng
	PRN: 9 25 8 27 16 30 28 5 6 3 19 7 Mode: 0 0 0 0 0 0 0 0 0 0 0 0 0
Pro Help, press #1 c.\program Res\siffoncore	Status: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

4.1.2 Modules Behavior before GPS week Rollover

💼 SiRFOncore - Additional Message Window (Autonomous)											6
Pile View Options GPS Window Help Demo Signal Navigation Survey Satellities Ond Mon Mile Arrow Statellities Child Mon Mile Arrow Satellities Child Mon Mile Arrow Statellities Child Mon Mile Arrow Satellities Child Mon <th></th>											
			1000							-	
🖉 Navigation Window (Autonomous)	Additio	nal Messa	age Window	(Autone	omous)						
Position Trepretenses Position Treps Information Time: 232/02/UTC OMTOrfset: +00:00 Latitude: N 00* 00*00:000 GPS Hat: 0:00 m HDOP: 0:0 PDOP: 0:0	Oscillat Temper UTC Pai GMT Off 00 : 00 [00h - ID Tag: Mode 0	or Offset: ature: rameters fset: 00h - Positive CA0007	: 0 0.000000 : 80h :, FFh - Neg	jati∨e)							
Fix Type: None	1										121
Speed: 0.00 km/h Heading: 0.07 km/h Tracked Satellites: 1 Visible Satellites: 0 ID TAQ: CA0007 Reference Point 1 Lafitude: N 00* 00:000 000 GPS Hat: 0.00 m Pos Unc: 1.00 km NEU Offsets 0.00 m Bast: 0.00 m East: 0.00 m Ucidean: 0.00 m Euclidean: 0.00 m	Im Im Im <	013 12 013 12	05 30 655 05 31 655 05 31 655 05 32 655 05 34 655 05 35 655 05 37 655 05 37 655 05 37 655 05 37 655 05 37 655 05 37 655 05 41 655 05 41 655 05 45 655	(A 1000 51 (Rx) 51	000Ha 0 000Ha 0	$\begin{array}{c} 40607E3\\ 40607263\\ 40607263\\ 40607263\\ 40607263\\ 40607263\\ 40607263\\ 4060763\\ 4060763\\ 406076326022222222222222222$	$\begin{array}{c} 171F2F000\\ 171F31000\\ 171F31000\\ 171F32000\\ 171F33000\\ 171F33000\\ 171F35000\\ 171F35000\\ 171F35000\\ 171F35000\\ 171F35000\\ 171F36000\\ 171F36000\\ 171F36000\\ 171F36000\\ 171F36000\\ 171F36000\\ 171F36000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 1720000\\ 1720000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 17200000\\ 1720000\\ 1720000\\ 172000000\\ 172000000\\ 17100000\\ 17100000\\ 171000000\\ 17100000000\\ 171000000000\\ 17100000000000000000$	2200800 30F2200 37E5200 5DC9900 7BAE0000 7BAE0000 7BAE0000 7992400 84A02000 9992400 8484600 C668C00 D55AE00 C668C00 D55AE000 E44D0000 653E2000 0E097000			
Receiver Status 12 Channel (608D)	The segment	Quality W	Indow (Aut	nomous	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	ta data]					
Acquiring Satellities Cold start Insufficient Visible Satellites Antenna Sense: Under Current	C/No PRN: Mode:	9 2	420 5 8 9 8	27	16 0	30	20 6 0 0	6	3	19 0	7
Eastada avan 61	Status:	0 0	980	0	0	0	0 0	0	0	0	0
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4.1.3 Modules Behavior during GPS week Rollover



4.1.4 Modules Behavior when powered up on new GPS window





4.2 CA0008

4.2.1 Module's Behavior during Start up

💼 SiRFOncore - Command Monitor Window (Autonomous)	
File View Options GP5 Window Help Demo	
IIII A + X III III III A A A A A A A A A A A A A	
IIII A X III IIII O Signal Navigation Survey Satellites Cmd Mon Msg Compass Integrated Timing	
<u>≪ > 11 >> = ● +++ = ∞ ∞ orr </u>	
🖉 Navigation Window (Autonomous)	🛲 Additional Message Window (Autonomous)
Position Ephemenis	Enter Command:
Description Fix Information Date: 0/01/2005 Operation Fix Information Date: 0/01/2005 Unit Officet: + 00000 Device starts up with default Date: 0000 000 0000 LaBitude: 0 000 m GPS Hat: 0 000 m PPOP: 0.0 VDOP: 0.0 Fix Type: 0.0 01/01/2005	Oscillator Offset: 0 * Temperature: 0.000000 0 UTC Parameters: 80h 6 GMT Offset: 00h 0 00 0 100 0 1010 Positive, FFh - Negative) 101 Tag: CA0008 Mode 0
Speed: 0.00 km/h	Command Monitor Window (Autonomous)
Heading: 0.0° 200 Tracked Statilities: 0 ID TaG: C40008 Reference Point Laftude: Laftude: 00° 00° 000000 Longitude: 200° 00° 00000 GPS Hgt: 000° PS Unt: 1.00 km Noth: 0.00 m East: 0.00 m	07/16/2013 13:09.27 7961 (kx)9945 010107b5C001D000C66700000000000000000000000000000000
Euclidean: 0.00 m	× >
Receiver Status 13 Channel (69BD) Acquiring Satellites Cold start Insufficient Violoie Satellites Antenna Sense: Under Current	Initisignal Quality Window (Autonomous) - [@@Ha data] C/No
	PKN 31 24 11 21 4 15 17 2 20 22 10 18 Mode 0 5 0 0 0 0 0 0 0 0 0 0 0 Stable 0 100 0 0 0 0 0 0 0 0 0
For Help, press F1 c:\program files\siffoncore	6 Com24:19200 Com10:9600 Log: 6

4.2.2 Modules Behavior before GPS week Rollover

File View Options GPS Window Help Denta	
Signal Navigation Survey Satellites Cind Mon Misg Compass Open Silve About	
Signal Navigation Survey Satellites Cmd Mon Msg Compass Integrated Timing	
🖉 Navigation Window (Autonomous)	🔜 Additional Message Window (Autonomous)
Position Ephemeric	Enter Command:
Position Fix Information Date: 040670/19 Time: 2330:45 (77C: OMT Offset: +00/00 Latitude: N 00* 00*00:000 OPS Hat: 0.00 m HDOPF: 0.0 PDOP: 0.0	Oscillator Offset: 0 A Temperature: 0.000000 UTC Parameters: 80h GMT Offset: 00h 00 : 00 : 00 [00h - Positive, FFh - Negative] ID Tag: CA0008 Mode 0
VDOP: 0.0 Fix Type: None	×
Speed: 0.00 km/h	Command Monitor Window (Autonomous)
Heading: 0.0° true	[07/16/2013 13:10:00.640] (Rx)@@Ha 010107D5171E1F000DD6AF0000000000000000000000000000000
Visible Satellites: 0	[07/16/2013 13:10:02.640] (Rx)@@Ha 040607E3171E21000071800000000000000000000 [07/16/2013 13:10:03.640] (Rx)@@Ha 040607E3171E2200016027000000000000000000000000000000
ID TAG: C40008	[07/16/2013 13:10:04.640] (Rx)@@Ha 040607E3171E2300024ECD0000000000000000000 [07/16/2013 13:10:05.640] (Rx)@@Ha 040607E3171E2400033074000000000000000000000000000000
Roference Point Lashtude: № 00°00'00:000 Longitude: Ê 000°00'00:000 GPS Hgt: 0.00 m Pos Unc: 1.00 km	07/16/2013 13:10 07 5401 (R:)000 00007E171E25000516/2000000000000000000000000000000000000
Neth: 0.00 m	[07/16/2013 13:10:16.578] (Rx)@@Ha 040607E3171E2D006D9170000000000000000000
East 0.00 m Up: 0.00 m	×
Euclidean: 0.00 m	🖬 Signal Quality Window (Autonomous) - [@@Ha data]
Receiver Status 12 Channel (608D)	
Acquiring Satellites Cold start	48.0 10.00 10.0 50.0 49.0
Antenna Sense: Under Current	
	C/No
	PRN: 14 24 26 13 23 29 17 1 12 32 9 25
	Mode 5 8 0 5 0 0 7 7 0 0 0 0 Status 100 880 0 100 0 8 0 0 0 0 0 0
For Help, press F1 c:\program files\skifoncore	Gom24:19200 Com10:9600 Log:



4.2.3 Modules Behavior during GPS week Rollover



4.2.4 Modules Behavior when powered up on new GPS window





4.3 RA3257

4.3.1 Module's Behavior during Start up

💼 SiRFOncore - Additional Message Window (Autonomous)	
File View Options GPS Window Help Demo	
Illi A + A III III - A III About	
Nu & + 😹 📼 🛥 🛱 O	
Signal Navigation Survey Satellites Cmd Mon Msg Compass Integrated Timing	
Navigation Window (Autonomous)	Enter Command
Device starts up with defoult Dete:	Oscillator Offset: 0 Temperature: 0.000000 Temperature: 00 Offset: 00h 00 00
Hoop 200 Phop 20 Ptx Type: None	(00h - Positive, FFh - Negative) ID Tag: FA32557 Mode 0
Speed: 0.00 km/h Heading: 0.0° true	🔤 Command Monitor Window (Autonemous)
Trackéd Satellites: 7 Visible Satellites: 0	07-16-2013 15:13 41 968 (RX)0906 0107D50C02100004444800000000000000000000 107-16-2013 15:13 42 968 (RX)0906 0107D50C0210005A35600000000000000000 107-14-2013 15:13 44 968 (RX)0906 0107D50C0212000631FD00000000000000000000 107-14-2013 15:13 44 968 (RX)0906 01017D50C0213000700000000000000000000000000000000
ID TAO: R43257	[07/16/2013 15:13:44.984] (R×)00⊂f [07/16/2013 15:13:53 578] (T×)000Ha 01
Reference Point Laftude: N 00° 00' 00.000 Longitude: £ 000° 00' 00.000 OPS Higt: 0.00 m Pos Unc: 1.00 km	[07/46/2013 15 13:54 031] (#x)@PHR 010107D50C0000000707536000000000000000000000000000
NEU Offsets North: 0.00 m	[07/16/2013 15:14:01:031] (Rx)000Ha 010107D50C000F000DFBC5000000000000000000000000000000000000
East 0.00 m Up: 0.00 m	
Euclidean: 0.00 m	Signal Quality Window (Autonomous) - [SigHa data]
Receiver Status 12 Channel (608D) Acquiring Satellites Insufficient Mistile Statellites Antenna Sense: Under Current	
	Mode 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
For blab, passes E1 extension filesteriorene	

4.3.2 Modules Behavior before GPS week Rollover

SiRFOncore - Additional Message Window (Autonomous)		- 12 🔀
File View Options GPS Window Help Demo		
In A + A III A A A A A A A A A A A A A A A		
Signal Navigation Survey Satellites Cmd Mon Msg Compass Integrated Timing		
<u>≪ > > = ● ↔ ≡ ∞ orr ⊖ ∧ ∧ ∞ ⊡ ∢ ∽ % ◊ № ₽</u>		
💌 Navigation Window (Autonomous)	Additional Message Window (Autonomous)	
Position Ephemeric	Enter Command:	
Pesition Fix Information Date: 0406/2019 Time: 232:15 U/C GMT Offset: +00:00 Date updated from	Oscillator Offset: 0 Temperature: 0.00000 UTC Parameters: 80h GMT Offset: 00h 00	~
Latitude: N 00* 00* 0000 Longitude: 6 000* 00* 0000 GPS Hat: 0 00 m + 000 PDOP: 00 PDOP: 00 VDOP: 00	; 00 (00h - Positive, FFh - Negative) 10 Tag: RA3257 Mode 0	
Speed: 0.00 km/h		2
Heading: 0.0° true	[07/16/2013 15:13:57.031] (Rx)@@Ha 010107D50C000B000A412A000000000000000	
Tracked Satellites: 1	[07/16/2013 15:13:58:031] (Rx)00Ha 010107D50C000C000B2FD1000000000000000000000000000000000000	00000
Visione Satellites. D	[07/16/2013 15:14:00.031] (Rx)@@Ha 010107D50C000E000D0D1F0000000000000000000000000000	00000
ID TAG. RA3207	[07/16/2013 15:14 02:031] (Rx)@@Ha 01010/D50C00100006696000000000000000000000000000	00000
Latitude: N 00° 00'00.000	[07/16/2013 15:14:05.031] (Rx)@@Ha 040607E317200320454ADA00000000000000 [07/16/2013 15:14:05.484] (Rx)@@Ha 040607E31720050007A5CB000000000000000000000000000000000000	00000
Longitude: £ 000*00:000 GPS Hgt 0.00 m	[07/16/2013 15:14:07.484] (Rx)@@Ha 040607E317200600089472000000000000000000000000000000000000	00000
Pos Unc: 1.00 km	[07/16/2013 15:14:09.484] (Rx)@@Ha 040607E3172008000A71BF000000000000000000000000000000000000	00000
NEU Offsets	[07/16/2013 15:14:11.484] (Rx)@@Ha 040607E317200A000C4F0D00000000000000000000000000000000	00000
East 0.00 m		~
Euclidean: 0.00 m	<	>
Receiver Status	Int Signal Quality Window (Autonomous) - [@@Ha data]	
12 Channel (608D) Acquiring Satellites		
Cold start Insufficient Visible Satellites		
Antenna Sense: Under Current	44.0	
	C/No	
	PRN: 9 25 8 27 16 30 28 5 6 3 19	7
	Mode: 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0
For Help, press F1 c:\program files\sirfoncore	Gom24:19200 Com10:960	0 Log: 4



4.3.3 Modules Behavior during GPS week Rollover



4.3.4 Modules Behavior when powered up on new GPS window





4.4 Additional results

A screen recording of the entire test is provided with this document to observe the modules' performance during every condition. The video references are as follows.

Model	Reference
IL-GPS-010-B	CA0007_IL-GPS-010-B.mp4
IL-GPS-020-B	CA0008_IL-GPS-020-B.mp4
IL-GPS-030-B	RA3257_IL-GPS-030-B.mp4



5 Conclusion

Based on The results, it is confirmed that the M12M (STM) Timing / Navigation modules are functioning and adhering without any anomalies during the GPS Rollover events.