Center for Operational Oceanographic Products and Services
Information Systems Division

Year 2000 Compliancy

Critical System Test Plans: NWLON Client/Server Data Processing and Analysis

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noaa **National Oceanic And Atmospheric Administration**

U.S. DEPARTMENT OF COMMERCE
National Ocean Service
Center for Operational Oceanographic Products and Services

1.1 NWLON (National Water Level Observation Network) Client/Server Data Processing and Analysis

Summary:

- WL gauges - All testing of the Sutron WLMS 8200 produced expected results. The Sutron WLMS 8200 field unit is not subject to any Y2K problems. Although only the standard unit was thoroughly tested, the source code is identical for the Hydro 8200 units in use and no problems would be expected. Additional GOES transmission testing was performed and no problems were encountered.

- WL gauges - All testing of the Sutron WLMS 9000 produced expected results. The Sutron WLMS 9000 field unit is not subject to any Y2K problems. Additional GOES transmission testing was performed and no problems were encountered.

- DCS (Wallops) - No year is contained in the data stream received from Wallops. The date is reported as a Julian date for the given year. During the REFORMAT program, the year is deduced, using the Julian date in the data stream and the operating system date, and inserted into the data.

- All PC client software has been upgraded to a version that is compliant.

- Network Server Software: In order to make the software for the network server compliant, a number of upgrades/patches were made to the OpenVMS operating system software and the Pathworks networking software.

- Database Server Software: In order to make the software for the database server compliant, a number of upgrades/patches were made to the Unix operating system software and the Sybase Server software.

- All PC client hardware is compliant. See the Non-Critical System Test Plan for Personal Computers and Network Services.

- The Compaq (formerly Digital Equipment Corporation) network server and database server hardware is compliant.

- The Data Acquisition and Collection Platform (DACP) is currently running the OS/2 operating system version 2. The DACP makes extensive use of REXX version 2 which is not compliant. The distributors of REXX have no plans to provide a compliant version that will run under OS/2. The entire DACP hardware and software is being replaced in FY 99 with a Silicon Graphics O_2 as the new platform, Unix as the operating system and Kermit to replace the REXX code. This new platform, called OPAWL (Operational Platform for the Acquisition of Water Levels), will be

compliant.

1.1.1 Software and Firmware Compliancy

1.1.1.1 Commercial Off the Shelf (COTS) Application Software

The following commerical products are used by the NWLON Data Processing and Analysis System. Y2K compliancy statements are on file.

PC Client Software	Compliant Version	Current Version
Adobe Acrobat	3.0	3.0
Adobe PhotoDeluxe	1.0	1.0
Adobe Photoshop	4.0	4.0
AutoCad	12	14
Corel Suite Professional	8.0	8.0
Harvard Graphics	3.0	3.0
HotMetal	3.0	4.0
InfoMaker	6.0	6.0
InForms	All	4.2
Inspiration	All	5.0
JASC PaintShop Pro	3.12	4.12
jConnect for JDBC	2.2	3.0
MapInfo	4.5	4.5
MathWorks Matlab	5.0	5.0
McAfee VirusScan	3.1.4A	4.0.2
MS DOS	6.22	6.22
MS Excel	95	95
MS Internet Explorer	4, 32 bit	4, 32 bit
MS Office Professional Ed.	95	95
MS Powerpoint	95	95
MS Visual C	5.0	5.0
MS Visual FoxPro	5.0	5.0
MS Windows NT Server	4.00	4.00
MS Windows NT Workstation	4.00	4.00
MS WORD	95	95
Pathworks (Client/Win NT)	7.0a	7.0a
PKZip for Windows	2.6	2.6
PowerBuilder	6.0	6.0
PowerDesigner	6.0	6.0
Quick Basic	All Versions	4.5

SCRIBE SQR (Win NT)	3.0	3.0
SPSS	8.0	8.0
Sybase Open Client (Win NT)	10.0.4	10.0.4
Vedit	5.0	5.0
ViaGrafix DesignCad	Office 97	Office 97

Network Server Software	Compliant Version	Current Version
OpenVMS	6.2	6.2
Pathworks (Server/OpenVMS)	5.0F	5.0F
TCPware	5.3-3	5.3-3

Database Server Software	Compliant Version	Current Version
Digital Unix	4.0B	4.0B
Sybase Adaptive Server	11.5	11.5

Data Acquisition Platform Software	Compliant Version	Current Version
SGI IRIX	6.5	6.5
Sybase Open Client (IRIX)	11.1	11.1

WEB Server Software	Compliant Version	Current Version
SGI IRIX	6.5	6.5
WEB SQL	1.2	1.2

1.1.1.2 Operating Systems and BIOS

For each PC client, Service Pack 4 was applied in order to make the Windows NT operating system Y2K compliant. For the Compaq network server, an upgrade from OpenVMS 6.1 to OpenVMS 6.2 was completed with the appropriate Y2K patch applied.

For the Compaq database server, an upgrade from Unix 3.2B to 4.0B was performed, plus the application of a Y2K enhancement pack. The data acquisition platform and the WEB server are Silicon Graphics systems running IRIX 6.5 which is compliant.

For each server, the following tests were conducted to ensure that when the system clock reached the desired date, the system responded with the correct date and time upon executing the appropriate operating system date command. All systems successfully passed these tests.

- December 31, 1999 to January 1, 2000
- February 28, 2000 to February 29, 2000
- February 29, 2000 to March 1, 2000

NETWORK SERVER (WLNET):

Welcome to NGWLMS -- Alpha 2100 VMS 6.2

Last interactive login on Friday, 19-MAR-1999 23:56:17.13
Last non-interactive login on Tuesday, 19-MAR-1999 23:00:00.00
OpenVMS User Processes at 19-MAR-1999 23:56:48.98
Total number of users = 2, number of processes = 3

Username	Interactive	Subprocess	Batch
OPERATOR	-	-	1
SYSTEM	2		

WLNET> show time
19-MAR-1999 23:57:09
WLNET> set time=(31-dec-1999:23:59:45)
WLNET> shw ow time
31-DEC-1999 23:59:48
WLNET> show time
1-JAN-2000 00:00:15
WLNET> set time=(28-feb-2000:23:59:45)
WLNET> show time
28-FEB-2000 23:59:47
WLNET> show time
29-FEB-2000 00:00:06
WLNET> set time=(29-feb-2000:23:59:45)
WLNET> show time
29-FEB-2000 23:59:47
WLNET> show time
1-MAR-2000 00:00:07
WLNET>

DATABASE SERVER (WLDBS2):

date
Mon Mar 22 23:15:43 GMT 1999
date 1231235999.45
Fri Dec 31 23:59:45 GMT 1999
date
Sat Jan 1 00:00:01 GMT 2000
date 0228235900.45
Mon Feb 28 23:59:45 GMT 2000
date
Tue Feb 29 00:00:08 GMT 2000
date 0229235900.45
Tue Feb 29 23:59:45 GMT 2000
date
Wed Mar 1 00:00:04 GMT 2000

DATA ACQUISITION WORKSTATION (OPAWL2):

IRIX Release 6.5 IP32 OPAWL2

Copyright 1987-1998 Silicon Graphics, Inc. All Rights Reserved.
Last login: Fri Mar 19 16:54:46 EST 1999 by UNKNOWN@140.90.157.184

OPAWL2 1# date
Fri Mar 19 16:54:36 EST 1999
OPAWL2 2# date 1231235999
Fri Dec 31 23:59:00 EST 1999
OPAWL2 3# date
Sat Jan 1 00:00:12 EST 2000
OPAWL2 4# date 0228235900
Mon Feb 28 23:59:00 EST 2000
OPAWL2 5# date
Mon Feb 28 23:59:55 EST 2000
OPAWL2 6# date
Tue Feb 29 00:00:03 EST 2000
OPAWL2 7# date 0229235900
Tue Feb 29 23:59:00 EST 2000
OPAWL2 8# date
Tue Feb 29 23:59:34 EST 2000
OPAWL2 9# date
Tue Feb 29 23:59:52 EST 2000
OPAWL2 10# date
Wed Mar 1 00:00:13 EST 2000
OPAWL2 11# date 0319170199
Fri Mar 19 17:01:00 EST 1999
OPAWL2 12# exit

WEB SERVER (TIDES):

IRIX Release 6.5 IP27 tides
Copyright 1987-1998 Silicon Graphics, Inc. All Rights Reserved.
Last login: Mon Mar 22 16:06:53 CST 1999 by UNKNOWN@140.90.157.184
tides 1# date
Mon Mar 22 17:09:44 CST 1999
tides 2# date 1231235999
Fri Dec 31 23:59:00 CST 1999
tides 3# date
Sat Jan 1 00:00:07 CST 2000
tides 4# date 0228235900
Mon Feb 28 23:59:00 CST 2000
tides 5# date
Tue Feb 29 00:00:02 CST 2000
tides 6# date 0229235900
Tue Feb 29 23:59:00 CST 2000
tides 7# date
Wed Mar 1 00:00:08 CST 2000
tides 8#

1.1.1.3 In-House Written Software

- **Critical Subsystem: Water Level Instrumentation - Gauge Compliancy**

Sutron WLMS 8200
Operating System: Sutron OS Rev. 2.5G
Function/Purpose of system: NGWLMS backup field unit DAS

As a data acquisition system, all data collection, storage, and retrieval is date dependent. Internally, the WLMS 8200 uses it's own internal time keeping routines, consisting of a 32 bit number. These values are converted to year (four digits), month, day, hour, minute, seconds, and tenths of seconds. These functions are identical to those in the Sutron WLMS 9000. The source code for the operating system, written in Modula 2, was scanned and the proper conversions for leap year, midnight crossings, etc. are in place. Since the operating system software can handle all critical time crossings properly, no modifications/replacements are required.

Testing
Testing consisted of setting the system clock ahead to just before the appropriate date/time transition, allowing the system to pass through the transition, and documenting the results. The following standard data collection routines, written in Modula 2, were used to collect data:

FROM SOURCE CODE FOR THE 8200 OPERATING SYSTEM: (NOTE: INTERNAL YEAR HANDLING GOOD TO YEAR 2084)

```
PROCEDURE GetDate(VAR Year, Month, Date, Day : CARDINAL);
VAR Hund : CARDINAL;
BEGIN
    DISABLE; (* Do not allow anyone else to get in. *)
    Hund  := ORD(Clock.Hundredths);
    Year  := ORD(Clock.Year      );
    Month := ORD(Clock.Month     );
    Date  := ORD(Clock.Date      );
    Day   := ORD(Clock.Day       );
    ENABLE;
    IF Year >= 85 THEN
        INC(Year, 1900);
    ELSE
        INC(Year, 2000);
    END;
END GetDate;

PROCEDURE Leap(yr:CARDINAL) : BOOLEAN;
BEGIN
    RETURN ((yr-1985) MOD 4) = 3;
END Leap;
```

DECODED XMODEM TEST RESULTS FOR 12/31/1999 TO 01/01/2000

```
"8200 DATA FROM: Y2KTEST1   DATE: 12/31/1999 to 01/01/2000"
"","","Analog3","WaterLevel","Outliers","Deviation","Battery"
"Slope","", 1.000, 348.000, 1.000, 1.000, 1.000
"Offset","", 0.000, 0.000, 0.000, 0.000, 0.000
"RightDigits","",3,3,0,3,2
991231,2307, 0.003, 8.663, 2, 0.149, 12.75
991231,2313, 0.004, 8.727, 1, 0.186, 12.75
991231,2319, 0.004, 8.714, 1, 0.163, 12.76
991231,2325, 0.004, 8.727, 1, 0.176, 12.75
991231,2331, 0.003, 8.662, 1, 0.139, 12.75
991231,2337, 0.004, 8.735, 2, 0.167, 12.76
991231,2343, 0.004, 8.641, 1, 0.153, 12.76
991231,2349, 0.003, 8.782, 1, 0.174, 12.75
991231,2355, 0.003, 8.700, 1, 0.180, 12.76
000101,0001, 0.003, 8.676, 1, 0.191, 12.75
000101,0007, 0.004, 8.755, 1, 0.175, 12.75
```

000101,0013, 0.003, 8.662, 1, 0.180, 12.75
000101,0019, 0.003, 8.736, 1, 0.205, 12.75
000101,0025, 0.003, 8.786, 1, 0.143, 12.75
000101,0031, 0.004, 8.722, 1, 0.188, 12.75
000101,0037, 0.003, 8.729, 1, 0.158, 12.75
000101,0043, 0.004, 8.736, 2, 0.189, 12.75
000101,0049, 0.004, 8.824, 2, 0.148, 12.75
000101,0055, 0.003, 8.818, 1, 0.151, 12.75
000101,0101, 0.004, 8.816, 1, 0.146, 12.75
000101,0107, 0.003, 8.818, 2, 0.130, 12.75
000101,0113, 0.003, 8.761, 1, 0.173, 12.75
000101,0119, 0.003, 8.713, 1, 0.180, 12.75
000101,0125, 0.003, 8.790, 1, 0.193, 12.76
000101,0131, 0.003, 8.708, 1, 0.180, 12.75
000101,0137, 0.003, 8.846, 1, 0.158, 12.75
000101,0143, 0.003, 8.643, 1, 0.147, 12.75
000101,0149, 0.003, 8.858, 1, 0.145, 12.76
000101,0155, 0.004, 8.697, 2, 0.181, 12.75

DECODED XMODEM TEST RESULTS FOR 02/28/2000 TO 03/01/2000

"8200 DATA FROM: Y2KTEST1 DATE: 02/28/2000 to 03/01/2000"
"","","Analog3","WaterLevel","Outliers","Deviation","Battery"
"Slope","", 1.000, 348.000, 1.000, 1.000, 1.000
"Offset","", 0.000, 0.000, 0.000, 0.000, 0.000
"RightDigits","",3,3,0,3,2
000228,2249, 0.004, 8.786, 1, 0.241, 12.74
000228,2255, 0.003, 8.628, 0, 0.242, 12.72
000228,2301, 0.003, 8.664, 1, 0.158, 12.75
000228,2307, 0.003, 8.701, 1, 0.156, 12.76
000228,2313, 0.003, 8.891, 1, 0.155, 12.76
000228,2319, 0.003, 8.690, 2, 0.129, 12.76
000228,2325, 0.003, 8.753, 1, 0.170, 12.76
000228,2331, 0.004, 8.769, 1, 0.162, 12.76
000228,2337, 0.003, 8.769, 1, 0.185, 12.76
000228,2343, 0.004, 8.703, 1, 0.144, 12.76
000228,2349, 0.004, 8.688, 1, 0.150, 12.76
000228,2355, 0.004, 8.657, 1, 0.141, 12.76
000229,0001, 0.003, 8.657, 2, 0.141, 12.76
000229,0007, 0.004, 8.642, 1, 0.144, 12.76

000229,0013, 0.004, 8.621, 2, 0.145, 12.76
000229,0019, 0.003, 8.700, 2, 0.171, 12.76
000229,0025, 0.003, 8.753, 1, 0.187, 12.76
000229,0031, 0.003, 8.837, 2, 0.144, 12.76
000229,0037, 0.003, 8.765, 3, 0.182, 12.76
000229,0043, 0.004, 8.812, 1, 0.154, 12.76
000229,0049, 0.004, 8.664, 1, 0.183, 12.76
000229,0055, 0.003, 8.746, 2, 0.184, 12.76
000229,0101, 0.003, 8.656, 1, 0.183, 12.76

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000229,2343, 0.004, 8.820, 1, 0.177, 12.69
000229,2349, 0.003, 8.935, 2, 0.190, 12.73
000229,2355, 0.003, 8.773, 2, 0.158, 12.72
000301,0001, 0.004, 8.762, 2, 0.149, 12.73
000301,0007, 0.004, 8.671, 1, 0.162, 12.74
000301,0013, 0.003, 8.750, 1, 0.157, 12.74
000301,0019, 0.003, 8.744, 1, 0.167, 12.72
000301,0025, 0.004, 8.746, 3, 0.138, 12.73

DECODED XMODEM TEST RESULTS FOR 12/31/2000 TO 01/01/2001

"8200 DATA FROM: Y2KTEST1 DATE: 12/31/2000 to 01/01/2001"
"","","Analog3","WaterLevel","Outliers","Deviation","Battery"
"Slope","", 1.000, 348.000, 1.000, 1.000, 1.000
"Offset","", 0.000, 0.000, 0.000, 0.000, 0.000
"RightDigits","",3,3,0,3,2
001231,2349, 0.003, 8.833, 1, 0.167, 12.73
001231,2355, 0.003, 8.746, 1, 0.152, 12.73
010101,0001, 0.004, 8.742, 1, 0.153, 12.73
010101,0007, 0.003, 8.716, 1, 0.193, 12.72
010101,0013, 0.003, 8.770, 1, 0.157, 12.74
010101,0019, 0.004, 8.776, 1, 0.156, 12.74
010101,0025, 0.004, 8.769, 1, 0.157, 12.74
010101,0031, 0.003, 8.746, 1, 0.158, 12.74
010101,0037, 0.003, 8.741, 1, 0.148, 12.74
010101,0043, 0.004, 8.729, 2, 0.152, 12.74
010101,0049, 0.003, 8.756, 1, 0.156, 12.74

010101,0055, 0.004, 8.733, 1, 0.143, 12.74
010101,0101, 0.003, 8.754, 1, 0.158, 12.74
010101,0107, 0.003, 8.742, 2, 0.142, 12.74
010101,0113, 0.004, 8.739, 1, 0.146, 12.74

Sutron WLMS 9000
Operating System: Sutron OS Rev. 2.5G
Function/Purpose of system: NGWLMS primary field unit DAS

As a data acquisition system, all data collection, storage and retrieval is date dependent. Internally, the WLMS 9000 uses it's own internal time keeping routines, consisting of a 32 bit number. These values are converted to year (four digits), month, day, hour, minute, seconds, and tenths of seconds. The source code for the operating system was scanned and the proper conversions for leap year, midnight crossings, etc. are in place. Since the operating system software can handle all critical time crossings properly, no modifications/replacements are required.

Testing
Testing consisted of setting the system clock ahead to just before the appropriate date/time transition, allowing the system to pass through the transition, and documenting the results. The following standard data collection routines, written in Sutron Data Language (SDL), were used to collect data:

FROM SOURCE CODE FOR THE 9000 OPERATING SYSTEM:
(NOTE: INTERNAL YEAR HANDLING GOOD TO YEAR 2084)

```
PROCEDURE GetDate(VAR Year, Month, Date, Day : CARDINAL) ;
VAR
Hund : CARDINAL ;
BEGIN
    DISABLE ; (* Do not allow anyone else to get in. *)
    INBYTE(ClockHundredths,Hund)  ;
    INBYTE(ClockYear      ,Year)  ;
    INBYTE(ClockMonth     ,Month) ;
    INBYTE(ClockDate      ,Date)  ;
    INBYTE(ClockDay       ,Day)   ;
    ENABLE ;
    IF Year >= 85 THEN
        INC(Year, 1900);
    ELSE
        INC(Year, 2000);
    END;
```

```
END GetDate ;

PROCEDURE Leap(yr:CARDINAL) : BOOLEAN ;
BEGIN
    RETURN ((yr-1985) MOD 4) = 3 ;
END Leap ;
```

LOG OF TEST RESULTS FOR 12/31/1999 TO 01/01/2000

```
VIEW LOG (col 1)  <+>Day <->Day <T>op <B>ottom <F>ind <S>croll <D>ataType
12/31/1999 23:31:43.6  "A",  856,  6,  0,  255,  255
12/31/1999 23:31:50.8  "B",  547,  8,  1,  255,  136
12/31/1999 23:37:43.6  "A",  895,  6,  0,  255,  255
12/31/1999 23:37:50.8  "B",  510,  9,  0,  255,  136
12/31/1999 23:43:43.8  "A",  933,  5,  0,  255,  255
12/31/1999 23:43:50.9  "B",  472,  5,  2,  255,  136
12/31/1999 23:49:43.6  "A",  971,  5,  0,  255,  255
12/31/1999 23:49:50.9  "B",  438,  5,  1,  255,  136
12/31/1999 23:55:43.8  "A",  1007,  5,  0,  255,  255
12/31/1999 23:55:51.0  "B",  403,  5,  1,  255,  136
01/01/2000 00:00:00.4  "0",  5479, 0
01/01/2000 00:00:01.4  "C",  15,  91,  48
01/01/2000 00:01:43.5  "A",  1039,  2,  0,  254,  255
01/01/2000 00:01:50.9  "B",  373,  3,  2,  255,  136
01/01/2000 00:02:31.2  "D",  255
01/01/2000 00:02:31.3  "E",  255
01/01/2000 00:02:31.4  "F",  2166
01/01/2000 00:07:43.5  "A",  1024,  3,  0,  255,  255
01/01/2000 00:07:50.7  "B",  387,  5,  0,  255,  136
01/01/2000 00:13:43.5  "A",  1006,  3,  0,  255,  255
01/01/2000 00:13:50.9  "B",  404,  4,  0,  255,  136
01/01/2000 00:19:43.8  "A",  988,  3,  0,  255,  255
01/01/2000 00:19:50.9  "B",  421,  5,  0,  255,  136
```

LOG OF TEST RESULTS FOR 02/28/2000 TO 03/01/2000

```
VIEW LOG (col 1)  <+>Day <->Day <T>op <B>ottom <F>ind <S>croll <D>ataType
02/28/2000 23:31:43.8  "A",  932,  2,  0,  254,  255
02/28/2000 23:31:50.8  "B",  475,  4,  0,  255,  136
```

02/28/2000 23:37:43.5 "A", 919, 2, 0, 255, 255
02/28/2000 23:37:50.9 "B", 487, 3, 2, 255, 136
02/28/2000 23:43:43.7 "A", 906, 2, 0, 255, 255
02/28/2000 23:43:50.9 "B", 499, 3, 2, 255, 136
02/28/2000 23:49:43.7 "A", 894, 2, 0, 255, 255
02/28/2000 23:49:50.8 "B", 511, 3, 1, 255, 136
02/28/2000 23:55:43.9 "A", 882, 2, 0, 255, 255
02/28/2000 23:55:50.9 "B", 522, 4, 1, 255, 136
02/29/2000 00:00:00.2 "0", 5538, 0
02/29/2000 00:00:00.7 "C", 3, 60, 144
02/29/2000 00:01:43.7 "A", 870, 2, 0, 255, 255
02/29/2000 00:01:50.8 "B", 533, 3, 1, 255, 136
02/29/2000 00:02:31.1 "D", 255
02/29/2000 00:02:31.2 "E", 255
02/29/2000 00:02:31.3 "F", 2002
02/29/2000 00:07:43.6 "A", 859, 2, 0, 255, 255
02/29/2000 00:07:55.8 "B", 544, 4, 0, 255, 136
02/29/2000 00:13:43.6 "A", 848, 2, 0, 255, 255
02/29/2000 00:13:52.6 "B", 556, 4, 1, 255, 136

LOG OF TEST RESULTS FOR 12/31/2000 TO 01/01/2001

VIEW LOG (col 1) <+>Day <->Day <T>op <B>ottom <F>ind <S>croll <D>ataType
12/31/2000 23:31:43.7 "A", 820, 1, 0, 254, 255
12/31/2000 23:31:50.9 "B", 579, 4, 0, 255, 136
12/31/2000 23:37:43.5 "A", 810, 1, 0, 255, 255
12/31/2000 23:37:50.9 "B", 588, 5, 1, 255, 136
12/31/2000 23:43:43.5 "A", 802, 1, 0, 255, 255
12/31/2000 23:43:53.8 "B", 597, 3, 1, 255, 136
12/31/2000 23:49:43.7 "A", 829, 6, 0, 255, 255
12/31/2000 23:49:50.9 "B", 568, 7, 1, 255, 136
12/31/2000 23:55:43.8 "A", 871, 6, 0, 255, 255
12/31/2000 23:55:52.7 "B", 530, 5, 2, 255, 136
01/01/2001 00:00:00.3 "0", 5845, 0
01/01/2001 00:00:00.7 "C", 0, 256, 16
01/01/2001 00:01:43.5 "A", 911, 6, 0, 254, 255
01/01/2001 00:01:50.7 "B", 490, 5, 1, 255, 136
01/01/2001 00:02:30.1 "D", 255
01/01/2001 00:02:30.2 "E", 255

```
01/01/2001 00:02:30.3  "F",  2133
01/01/2001 00:07:43.4  "A",  951,  6,  0,  254,  255
01/01/2001 00:07:50.8  "B",  453,  8,  1,  255,  136
01/01/2001 00:13:43.6  "A",  990,  6,  0,  254,  255
01/01/2001 00:13:50.7  "B",  416,  6,  1,  255,  136
```

- **Critical Subsystem: Data Collection System (DCS)**

All tide gauge (water level, wind, pressure, etc.) data is retrieved from the DCS at Wallops, Virginia. The following is a report from Al McMath; NOAA CDA Station 35663 Chincoteague Rd. Wallops Station, Va. 23337. Al can be reached at (757)-824-7316.

"This is an update and the beginnings of a plan to bring the DCS system to Y2K compatibility. A short review of where we are is in order. The DCS system is composed of several components.

These include:

- 2 ea - Data General MV-20000 computers operating on AOS/VS
- 1 ea - PC (IBM) compatible, running UNIX, serving as the Data Quality Monitor (DQM)
- 1 ea - PC (IBM) compatible, running on UNIX, serving as the DCS Read Only Terminal (DROT)
- Several PC's serving as terminals which interface to DAPS through an Data General emulation program

To date, with the assistance of the operations personnel, several tests have been conducted.

These tests were designed to observe the change of century and to record any problems which were encountered. There have been several e-mail communications regarding this testing. In summary, we have a problem with the DG equipment. The UNIX platforms, and PC's seem to be OK.

*** Please note that we have not conducted year 2000 leap year testing, the year 2000 to 2001 rollover, or the 9/9/99 expiration problem. Leap year and 2000-2001 testing cannot be done until the system will accept 2000 as a valid year. ***

Therefore, at this point, it appears that the greatest concern is with DG. To this end I have contacted DG and received quotes on the software upgrades that we will

require to be compliant. There are three programs that must be procured 1) 2 copies of the AOS/VS operating system, 2) 2 copies of FORTRAN 3) 2 copies of SQL.

DG assures us that we can go from the version we now have (7.64) to their latest and greatest. The DG has been late in releasing their software. The operating system was originally scheduled to be released in Dec 97. Then Mar 98. It was released late Apr 98. The FORTRAN is released and available. The SQL is the same story as the operating system. The concern is all software. The hardware is the 32-bit architecture and DG assures us that it is y2k compatible.

We have been studying the applications code for the effects that year 2000 may have on the system. The code seems to accommodate the transition. ISI provided for the system to be active until 2035. The good news is that the applications code is fairly simple and can be modified easily. We have identified places where modifications may be necessary. (Right now we are awaiting the new AOS/VS operating system to continue testing.)

That was a brief history. Now what to do. First, funds have been approved to order a year's subscription. Second, when the software arrives, we must continue with the testing. This means leap year, 2001 changeover, and the 9/9/99 issue. To do this, the off-line system will serve as a test bed. Third, make the relatively small modifications to the applications software as necessary. Fourth, more testing."

- **Critical Subsystem: Data Acquisition Platform Software**

The process of ingesting data has been moved from a PC platform running OS/2 to a Silicon Graphics O_2 workstation running Unix. During the migration process, all programs were analyzed and checked for potential problems related to Y2K. All programs that deal with date functions were tested for correct utilization.

Data acquired from Wallops, VA, has no year in the data stream. The date is reported as a Julian date for the given year. Once data is received, the Julian date is converted to a Gregorian date and the appropriate four digit year is added. This function is performed by the REFORMAT routine. REFORMAT appropriately handles a crossover to a new year and the determination of a leap year. No further date manipulations are performed during the data ingestion process. Beyond the REFORMAT program, dates contained in the data stream are passed, exactly as is, into the database.

To test Y2K compliance, a data set containing water level data for Chesapeake Bay, MD,

was captured and the Julian dates were modified in order to test the December 31, 1999 to January 1, 2000 crossing; the February 28, 2000 to February 29, 2000 crossing; and the February 29, 2000 to March 1, 2000 crossing. This data set was run through the data ingestion process and demonstrated that data would be properly processed.

The following output shows an example of a GOES transmission file as received from Wallops, VA (with modified Julian dates in order to provide appropriate test data); the results upon running the REFORMAT routine which is the only program which performs any date manipulations; and a look at the data as retrieved from the database to show that the data is stored as expected.

GOES TRANSMISSION FILE

SXMD03 KWAL 0010033

334FC4E8
365003308M85724671AXaQ^A@Ryj0P{V1OBr@H@@O@OBw@I@@N@MBv@H@@J@KBr@I@@F@IBn@H
@@B@GBm@H@@@@EBk@H@@@@DBh@H@??@CBk@I@?~@BBg@H@?}@B"@LH@LJ5@v0P{U>OBeB
oBoBpBmBgBiBiBiBn"@LR@LS0P{T>OAtAsA|BLBMBXB\B[BbBb"@MF@Lb _Oh@@@ 40-1NN
117E####018000068####

SXMD03 KWAL 0010333

334FC4E8
001033308M85724671AXaQ^A@Ryj0P{V1OBr@H@@O@OBw@I@@N@MBv@H@@J@KBr@I@@F@IBn@H
@@B@GBm@H@@@@EBk@H@@@@DBh@H@??@CBk@I@?~@BBg@H@?}@B"@LH@LJ5@v0P{U>OBeB
oBoBpBmBgBiBiBiBn"@LR@LS0P{T>OAtAsA|BLBMBXB\B[BbBb"@MF@Lb _Oh@@@ 40-1NN
117E####018000068####

SXMD03 KWAL 0590033

334FC4E8
059003308M85724671AXaQ^A@Ryj0P{V1OBr@H@@O@OBw@I@@N@MBv@H@@J@KBr@I@@F@IBn@H
@@B@GBm@H@@@@EBk@H@@@@DBh@H@??@CBk@I@?~@BBg@H@?}@B"@LH@LJ5@v0P{U>OBeB
oBoBpBmBgBiBiBiBn"@LR@LS0P{T>OAtAsA|BLBMBXB\B[BbBb"@MF@Lb _Oh@@@ 40-1NN
117E####018000068####

SXMD03 KWAL 0600333

334FC4E8
060033308M85724671AXaQ^A@Ryj0P{V1OBr@H@@O@OBw@I@@N@MBv@H@@J@KBr@I@@F@IBn@H
@@B@GBm@H@@@@EBk@H@@@@DBh@H@??@CBk@I@?~@BBg@H@?}@B"@LH@LJ5@v0P{U>OBeB
oBoBpBmBgBiBiBiBn"@LR@LS0P{T>OAtAsA|BLBMBXB\B[BbBb"@MF@Lb _Oh@@@ 40-1NN
117E####018000068####

SXMD03 KWAL 0610033

334FC4E8
061003308M85724671AXaQ^A@Ryj0P{V1OBr@H@@O@OBw@I@@N@MBv@H@@J@KBr@I@@F@IBn@H
@@B@GBm@H@@@@EBk@H@@@@DBh@H@??@CBk@I@?~@BBg@H@?}@B"@LH@LJ5@v0P{U>OBeB
oBoBpBmBgBiBiBiBn"@LR@LS0P{T>OAtAsA|BLBMBXB\B[BbBb"@MF@Lb _Oh@@@ 40-1NN
117E####018000068####

REFORMATTED DATA FILE

85724671	DEC 31 1999 22:00	2467	1	1	-1	-1A1	S
85724671	DEC 31 1999 22:06	2466	3	3	-1	-1A1	S
85724671	DEC 31 1999 22:12	2465	4	4	-1	-1A1	S
85724671	DEC 31 1999 22:18	2467	2	2	-1	-1A1	S
85724671	DEC 31 1999 22:24	2477	4	4	-1	-1A1	S
85724671	DEC 31 1999 22:30	2460	1	1	-1	-1A1	S
85724671	DEC 31 1999 22:36	2469	4	4	-1	-1A1	S
85724671	DEC 31 1999 22:42	2478	5	5	-1	-1A1	S
85724671	DEC 31 1999 22:48	2476	1	1	-1	-1A1	S
85724671	DEC 31 1999 22:54	2479	3	3	-1	-1A1	S
85724671	DEC 31 1999 23:00	2476	2	2	-1	-1A1	S
85724671	DEC 31 1999 23:06	2471	3	3	-1	-1A1	S
85724671	DEC 31 1999 23:12	2475	1	1	-1	-1A1	S
85724671	DEC 31 1999 23:18	2470	1	1	-1	-1A1	S
85724671	DEC 31 1999 23:24	2468	1	1	-1	-1A1	S
85724671	DEC 31 1999 23:30	2471	2	2	-1	-1A1	S
85724671	DEC 31 1999 23:36	2471	2	2	-1	-1A1	S
85724671	DEC 31 1999 23:42	2472	5	5	-1	-1A1	S
85724671	DEC 31 1999 23:48	2468	6	6	-1	-1A1	S
85724671	DEC 31 1999 23:54	2467	5	5	-1	-1A1	S
85724671	DEC 31 1999 21:00	2527	6	6	-1	-1A1	S
85724671	DEC 31 1999 21:06	2520	3	3	-1	-1A1	S
85724671	DEC 31 1999 21:12	2516	3	3	-1	-1A1	S
85724671	DEC 31 1999 21:18	2506	1	1	-1	-1A1	S
85724671	DEC 31 1999 21:24	2498	3	3	-1	-1A1	S
85724671	DEC 31 1999 21:30	2492	1	1	-1	-1A1	S
85724671	DEC 31 1999 21:36	2493	2	2	-1	-1A1	S
85724671	DEC 31 1999 21:42	2488	3	3	-1	-1A1	S
85724671	DEC 31 1999 21:48	2480	1	1	-1	-1A1	S
85724671	DEC 31 1999 21:54	2480	2	2	-1	-1A1	S
85724671	JAN 01 2000 00:00	2519	1	1	-1	-1A1	S
85724671	JAN 01 2000 00:06	2514	1	1	-1	-1A1	S
85724671	JAN 01 2000 00:12	2506	1	1	-1	-1A1	S
85724671	JAN 01 2000 00:18	2503	1	1	-1	-1A1	S
85724671	JAN 01 2000 00:24	2497	2	2	-1	-1A1	S
85724671	JAN 01 2000 00:30	2491	1	1	-1	-1A1	S
85724671	JAN 01 2000 00:36	2485	2	2	-1	-1A1	S
85724671	JAN 01 2000 00:42	2479	3	3	-1	-1A1	S
85724671	JAN 01 2000 00:48	2474	2	2	-1	-1A1	S
85724671	JAN 01 2000 00:54	2470	1	1	-1	-1A1	S

85724671JAN 01 2000 01:00	2578	1	1	-1	-1A1	S
85724671JAN 01 2000 01:06	2573	2	2	-1	-1A1	S
85724671JAN 01 2000 01:12	2567	3	3	-1	-1A1	S
85724671JAN 01 2000 01:18	2566	2	2	-1	-1A1	S
85724671JAN 01 2000 01:24	2556	1	1	-1	-1A1	S
85724671JAN 01 2000 01:30	2547	2	2	-1	-1A1	S
85724671JAN 01 2000 01:36	2544	2	2	-1	-1A1	S
85724671JAN 01 2000 01:42	2536	2	2	-1	-1A1	S
85724671JAN 01 2000 01:48	2531	1	1	-1	-1A1	S
85724671JAN 01 2000 01:54	2529	2	2	-1	-1A1	S
85724671JAN 01 2000 02:00	2632	2	2	-1	-1A1	S
85724671JAN 01 2000 02:06	2625	2	2	-1	-1A1	S
85724671JAN 01 2000 02:12	2623	1	1	-1	-1A1	S
85724671JAN 01 2000 02:18	2620	2	2	-1	-1A1	S
85724671JAN 01 2000 02:24	2613	3	3	-1	-1A1	S
85724671JAN 01 2000 02:30	2608	1	1	-1	-1A1	S
85724671JAN 01 2000 02:36	2601	1	1	-1	-1A1	S
85724671JAN 01 2000 02:42	2595	2	2	-1	-1A1	S
85724671JAN 01 2000 02:48	2590	1	1	-1	-1A1	S
85724671JAN 01 2000 02:54	2589	1	1	-1	-1A1	S
85724671FEB 28 2000 21:00	2601	1	1	-1	-1A1	S
85724671FEB 28 2000 21:06	2607	2	2	-1	-1A1	S
85724671FEB 28 2000 21:12	2611	3	3	-1	-1A1	S
85724671FEB 28 2000 21:18	2622	3	3	-1	-1A1	S
85724671FEB 28 2000 21:24	2622	3	3	-1	-1A1	S
85724671FEB 28 2000 21:30	2628	3	3	-1	-1A1	S
85724671FEB 28 2000 21:36	2631	4	4	-1	-1A1	S
85724671FEB 28 2000 21:42	2638	3	3	-1	-1A1	S
85724671FEB 28 2000 21:48	2644	2	2	-1	-1A1	S
85724671FEB 28 2000 21:54	2649	1	1	-1	-1A1	S
85724671FEB 28 2000 22:00	2548	3	3	-1	-1A1	S
85724671FEB 28 2000 22:06	2548	2	2	-1	-1A1	S
85724671FEB 28 2000 22:12	2556	3	3	-1	-1A1	S
85724671FEB 28 2000 22:18	2563	3	3	-1	-1A1	S
85724671FEB 28 2000 22:24	2566	5	5	-1	-1A1	S
85724671FEB 28 2000 22:30	2572	3	3	-1	-1A1	S
85724671FEB 28 2000 22:36	2587	4	4	-1	-1A1	S
85724671FEB 28 2000 22:42	2596	5	5	-1	-1A1	S
85724671FEB 28 2000 22:48	2599	8	8	-1	-1A1	S
85724671FEB 28 2000 22:54	2598	5	5	-1	-1A1	S
85724671FEB 28 2000 23:00	2483	6	6	-1	-1A1	S
85724671FEB 28 2000 23:06	2486	2	2	-1	-1A1	S
85724671FEB 28 2000 23:12	2490	4	4	-1	-1A1	S
85724671FEB 28 2000 23:18	2499	5	5	-1	-1A1	S
85724671FEB 28 2000 23:24	2503	2	2	-1	-1A1	S
85724671FEB 28 2000 23:30	2510	2	2	-1	-1A1	S
85724671FEB 28 2000 23:36	2521	3	3	-1	-1A1	S
85724671FEB 28 2000 23:42	2526	3	3	-1	-1A1	S
85724671FEB 28 2000 23:48	2530	2	2	-1	-1A1	S
85724671FEB 28 2000 23:54	2537	2	2	-1	-1A1	S

85724671FEB 29 2000 01:00	2681	2	2	-1	-1A1	S
85724671FEB 29 2000 01:06	2677	1	1	-1	-1A1	S
85724671FEB 29 2000 01:12	2673	2	2	-1	-1A1	S
85724671FEB 29 2000 01:18	2674	2	2	-1	-1A1	S
85724671FEB 29 2000 01:24	2668	1	1	-1	-1A1	S
85724671FEB 29 2000 01:30	2661	1	1	-1	-1A1	S
85724671FEB 29 2000 01:36	2662	2	2	-1	-1A1	S
85724671FEB 29 2000 01:42	2657	2	2	-1	-1A1	S
85724671FEB 29 2000 01:48	2653	1	1	-1	-1A1	S
85724671FEB 29 2000 01:54	2646	1	1	-1	-1A1	S
85724671FEB 29 2000 00:00	2689	3	3	-1	-1A1	S
85724671FEB 29 2000 00:06	2686	2	2	-1	-1A1	S
85724671FEB 29 2000 00:12	2689	5	5	-1	-1A1	S
85724671FEB 29 2000 00:18	2690	2	2	-1	-1A1	S
85724671FEB 29 2000 00:24	2686	3	3	-1	-1A1	S
85724671FEB 29 2000 00:30	2686	2	2	-1	-1A1	S
85724671FEB 29 2000 00:36	2688	1	1	-1	-1A1	S
85724671FEB 29 2000 00:42	2689	1	1	-1	-1A1	S
85724671FEB 29 2000 00:48	2687	1	1	-1	-1A1	S
85724671FEB 29 2000 00:54	2681	1	1	-1	-1A1	S
85724671FEB 29 2000 02:00	2656	1	1	-1	-1A1	S
85724671FEB 29 2000 02:06	2658	1	1	-1	-1A1	S
85724671FEB 29 2000 02:12	2661	1	1	-1	-1A1	S
85724671FEB 29 2000 02:18	2668	3	3	-1	-1A1	S
85724671FEB 29 2000 02:24	2671	2	2	-1	-1A1	S
85724671FEB 29 2000 02:30	2672	0	0	-1	-1A1	S
85724671FEB 29 2000 02:36	2677	1	1	-1	-1A1	S
85724671FEB 29 2000 02:42	2680	0	0	-1	-1A1	S
85724671FEB 29 2000 02:48	2681	1	1	-1	-1A1	S
85724671FEB 29 2000 02:54	2685	1	1	-1	-1A1	S
85724671MAR 01 2000 00:00	2497	3	3	-1	-1A1	S
85724671MAR 01 2000 00:06	2491	1	1	-1	-1A1	S
85724671MAR 01 2000 00:12	2483	1	1	-1	-1A1	S
85724671MAR 01 2000 00:18	2473	3	3	-1	-1A1	S
85724671MAR 01 2000 00:24	2470	3	3	-1	-1A1	S
85724671MAR 01 2000 00:30	2462	3	3	-1	-1A1	S
85724671MAR 01 2000 00:36	2454	3	3	-1	-1A1	S
85724671MAR 01 2000 00:42	2450	6	6	-1	-1A1	S
85724671MAR 01 2000 00:48	2446	3	3	-1	-1A1	S
85724671MAR 01 2000 00:54	2442	2	2	-1	-1A1	S
85724671MAR 01 2000 01:00	2567	2	2	-1	-1A1	S
85724671MAR 01 2000 01:06	2561	1	1	-1	-1A1	S
85724671MAR 01 2000 01:12	2556	2	2	-1	-1A1	S
85724671MAR 01 2000 01:18	2543	2	2	-1	-1A1	S
85724671MAR 01 2000 01:24	2539	1	1	-1	-1A1	S
85724671MAR 01 2000 01:30	2532	1	1	-1	-1A1	S
85724671MAR 01 2000 01:36	2521	1	1	-1	-1A1	S
85724671MAR 01 2000 01:42	2516	1	1	-1	-1A1	S
85724671MAR 01 2000 01:48	2512	1	1	-1	-1A1	S
85724671MAR 01 2000 01:54	2502	1	1	-1	-1A1	S

85724671MAR 01 2000 02:00	2642	1	1	-1	-1A1	S
85724671MAR 01 2000 02:06	2635	1	1	-1	-1A1	S
85724671MAR 01 2000 02:12	2629	2	2	-1	-1A1	S
85724671MAR 01 2000 02:18	2620	2	2	-1	-1A1	S
85724671MAR 01 2000 02:24	2614	1	1	-1	-1A1	S
85724671MAR 01 2000 02:30	2607	2	2	-1	-1A1	S
85724671MAR 01 2000 02:36	2598	1	1	-1	-1A1	S
85724671MAR 01 2000 02:42	2592	1	1	-1	-1A1	S
85724671MAR 01 2000 02:48	2582	2	2	-1	-1A1	S
85724671MAR 01 2000 02:54	2576	2	2	-1	-1A1	S

DATA RETRIEVAL FROM DATABASE

select DATE_TIME, STATION_ID, WL_VALUE, WL_SIGMA, OUTLIERS from dpas.dbo.ACOUSTIC where STATION_ID='8572467' and DCP#='1' and SENSOR_ID='A1' and DATE_TIME >= 'DEC 31 1999'

DATE_TIME	STATION_ID	WL_Value	Sigma	Out
Dec 31 1999 9:00:00:000PM	8572467	2527	6	6
Dec 31 1999 9:06:00:000PM	8572467	2520	3	3
Dec 31 1999 9:12:00:000PM	8572467	2516	3	3
Dec 31 1999 9:18:00:000PM	8572467	2506	1	1
Dec 31 1999 9:24:00:000PM	8572467	2498	3	3
Dec 31 1999 9:30:00:000PM	8572467	2492	1	1
Dec 31 1999 9:36:00:000PM	8572467	2493	2	2
Dec 31 1999 9:42:00:000PM	8572467	2488	3	3
Dec 31 1999 9:48:00:000PM	8572467	2480	1	1
Dec 31 1999 9:54:00:000PM	8572467	2480	2	2
Dec 31 1999 10:00:00:000PM	8572467	2467	1	1
Dec 31 1999 10:06:00:000PM	8572467	2466	3	3
Dec 31 1999 10:12:00:000PM	8572467	2465	4	4
Dec 31 1999 10:18:00:000PM	8572467	2467	2	2
Dec 31 1999 10:24:00:000PM	8572467	2477	4	4
Dec 31 1999 10:30:00:000PM	8572467	2460	1	1
Dec 31 1999 10:36:00:000PM	8572467	2469	4	4
Dec 31 1999 10:42:00:000PM	8572467	2478	5	5
Dec 31 1999 10:48:00:000PM	8572467	2476	1	1
Dec 31 1999 10:54:00:000PM	8572467	2479	3	3
Dec 31 1999 11:00:00:000PM	8572467	2476	2	2
Dec 31 1999 11:06:00:000PM	8572467	2471	3	3
Dec 31 1999 11:12:00:000PM	8572467	2475	1	1
Dec 31 1999 11:18:00:000PM	8572467	2470	1	1
Dec 31 1999 11:24:00:000PM	8572467	2468	1	1
Dec 31 1999 11:30:00:000PM	8572467	2471	2	2
Dec 31 1999 11:36:00:000PM	8572467	2471	2	2
Dec 31 1999 11:42:00:000PM	8572467	2472	5	5
Dec 31 1999 11:48:00:000PM	8572467	2468	6	6
Dec 31 1999 11:54:00:000PM	8572467	2467	5	5

Jan	1	2000	12:00:00:000AM	8572467	2519	1	1
Jan	1	2000	12:06:00:000AM	8572467	2514	1	1
Jan	1	2000	12:12:00:000AM	8572467	2506	1	1
Jan	1	2000	12:18:00:000AM	8572467	2503	1	1
Jan	1	2000	12:24:00:000AM	8572467	2497	2	2
Jan	1	2000	12:30:00:000AM	8572467	2491	1	1
Jan	1	2000	12:36:00:000AM	8572467	2485	2	2
Jan	1	2000	12:42:00:000AM	8572467	2479	3	3
Jan	1	2000	12:48:00:000AM	8572467	2474	2	2
Jan	1	2000	12:54:00:000AM	8572467	2470	1	1
Jan	1	2000	1:00:00:000AM	8572467	2578	1	1
Jan	1	2000	1:06:00:000AM	8572467	2573	2	2
Jan	1	2000	1:12:00:000AM	8572467	2567	3	3
Jan	1	2000	1:18:00:000AM	8572467	2566	2	2
Jan	1	2000	1:24:00:000AM	8572467	2556	1	1
Jan	1	2000	1:30:00:000AM	8572467	2547	2	2
Jan	1	2000	1:36:00:000AM	8572467	2544	2	2
Jan	1	2000	1:42:00:000AM	8572467	2536	2	2
Jan	1	2000	1:48:00:000AM	8572467	2531	1	1
Jan	1	2000	1:54:00:000AM	8572467	2529	2	2
Jan	1	2000	2:00:00:000AM	8572467	2632	2	2
Jan	1	2000	2:06:00:000AM	8572467	2625	2	2
Jan	1	2000	2:12:00:000AM	8572467	2623	1	1
Jan	1	2000	2:18:00:000AM	8572467	2620	2	2
Jan	1	2000	2:24:00:000AM	8572467	2613	3	3
Jan	1	2000	2:30:00:000AM	8572467	2608	1	1
Jan	1	2000	2:36:00:000AM	8572467	2601	1	1
Jan	1	2000	2:42:00:000AM	8572467	2595	2	2
Jan	1	2000	2:48:00:000AM	8572467	2590	1	1
Jan	1	2000	2:54:00:000AM	8572467	2589	1	1
Feb	28	2000	9:00:00:000PM	8572467	2601	1	1
Feb	28	2000	9:06:00:000PM	8572467	2607	2	2
Feb	28	2000	9:12:00:000PM	8572467	2611	3	3
Feb	28	2000	9:18:00:000PM	8572467	2622	3	3
Feb	28	2000	9:24:00:000PM	8572467	2622	3	3
Feb	28	2000	9:30:00:000PM	8572467	2628	3	3
Feb	28	2000	9:36:00:000PM	8572467	2631	4	4
Feb	28	2000	9:42:00:000PM	8572467	2638	3	3
Feb	28	2000	9:48:00:000PM	8572467	2644	2	2
Feb	28	2000	9:54:00:000PM	8572467	2649	1	1
Feb	28	2000	10:00:00:000PM	8572467	2548	3	3
Feb	28	2000	10:06:00:000PM	8572467	2548	2	2
Feb	28	2000	10:12:00:000PM	8572467	2556	3	3
Feb	28	2000	10:18:00:000PM	8572467	2563	3	3
Feb	28	2000	10:24:00:000PM	8572467	2566	5	5
Feb	28	2000	10:30:00:000PM	8572467	2572	3	3
Feb	28	2000	10:36:00:000PM	8572467	2587	4	4
Feb	28	2000	10:42:00:000PM	8572467	2596	5	5
Feb	28	2000	10:48:00:000PM	8572467	2599	8	8
Feb	28	2000	10:54:00:000PM	8572467	2598	5	5

Feb 28 2000	11:00:00:000PM	8572467	2483	6	6
Feb 28 2000	11:06:00:000PM	8572467	2486	2	2
Feb 28 2000	11:12:00:000PM	8572467	2490	4	4
Feb 28 2000	11:18:00:000PM	8572467	2499	5	5
Feb 28 2000	11:24:00:000PM	8572467	2503	2	2
Feb 28 2000	11:30:00:000PM	8572467	2510	2	2
Feb 28 2000	11:36:00:000PM	8572467	2521	3	3
Feb 28 2000	11:42:00:000PM	8572467	2526	3	3
Feb 28 2000	11:48:00:000PM	8572467	2530	2	2
Feb 28 2000	11:54:00:000PM	8572467	2537	2	2
Feb 29 2000	12:00:00:000AM	8572467	2689	3	3
Feb 29 2000	12:06:00:000AM	8572467	2686	2	2
Feb 29 2000	12:12:00:000AM	8572467	2689	5	5
Feb 29 2000	12:18:00:000AM	8572467	2690	2	2
Feb 29 2000	12:24:00:000AM	8572467	2686	3	3
Feb 29 2000	12:30:00:000AM	8572467	2686	2	2
Feb 29 2000	12:36:00:000AM	8572467	2688	1	1
Feb 29 2000	12:42:00:000AM	8572467	2689	1	1
Feb 29 2000	12:48:00:000AM	8572467	2687	1	1
Feb 29 2000	12:54:00:000AM	8572467	2681	1	1
Feb 29 2000	1:00:00:000AM	8572467	2681	2	2
Feb 29 2000	1:06:00:000AM	8572467	2677	1	1
Feb 29 2000	1:12:00:000AM	8572467	2673	2	2
Feb 29 2000	1:18:00:000AM	8572467	2674	2	2
Feb 29 2000	1:24:00:000AM	8572467	2668	1	1
Feb 29 2000	1:30:00:000AM	8572467	2661	1	1
Feb 29 2000	1:36:00:000AM	8572467	2662	2	2
Feb 29 2000	1:42:00:000AM	8572467	2657	2	2
Feb 29 2000	1:48:00:000AM	8572467	2653	1	1
Feb 29 2000	1:54:00:000AM	8572467	2646	1	1
Feb 29 2000	2:00:00:000AM	8572467	2656	1	1
Feb 29 2000	2:06:00:000AM	8572467	2658	1	1
Feb 29 2000	2:12:00:000AM	8572467	2661	1	1
Feb 29 2000	2:18:00:000AM	8572467	2668	3	3
Feb 29 2000	2:24:00:000AM	8572467	2671	2	2
Feb 29 2000	2:30:00:000AM	8572467	2672	0	0
Feb 29 2000	2:36:00:000AM	8572467	2677	1	1
Feb 29 2000	2:42:00:000AM	8572467	2680	0	0
Feb 29 2000	2:48:00:000AM	8572467	2681	1	1
Feb 29 2000	2:54:00:000AM	8572467	2685	1	1
Mar 1 2000	12:00:00:000AM	8572467	2497	3	3
Mar 1 2000	12:06:00:000AM	8572467	2491	1	1
Mar 1 2000	12:12:00:000AM	8572467	2483	1	1
Mar 1 2000	12:18:00:000AM	8572467	2473	3	3
Mar 1 2000	12:24:00:000AM	8572467	2470	3	3
Mar 1 2000	12:30:00:000AM	8572467	2462	3	3
Mar 1 2000	12:36:00:000AM	8572467	2454	3	3
Mar 1 2000	12:42:00:000AM	8572467	2450	6	6
Mar 1 2000	12:48:00:000AM	8572467	2446	3	3
Mar 1 2000	12:54:00:000AM	8572467	2442	2	2

```
Mar  1 2000  1:00:00:000AM    8572467    2567       2          2
Mar  1 2000  1:06:00:000AM    8572467    2561       1          1
Mar  1 2000  1:12:00:000AM    8572467    2556       2          2
Mar  1 2000  1:18:00:000AM    8572467    2543       2          2
Mar  1 2000  1:24:00:000AM    8572467    2539       1          1
Mar  1 2000  1:30:00:000AM    8572467    2532       1          1
Mar  1 2000  1:36:00:000AM    8572467    2521       1          1
Mar  1 2000  1:42:00:000AM    8572467    2516       1          1
Mar  1 2000  1:48:00:000AM    8572467    2512       1          1
Mar  1 2000  1:54:00:000AM    8572467    2502       1          1
Mar  1 2000  2:00:00:000AM    8572467    2642       1          1
Mar  1 2000  2:06:00:000AM    8572467    2635       1          1
Mar  1 2000  2:12:00:000AM    8572467    2629       2          2
Mar  1 2000  2:18:00:000AM    8572467    2620       2          2
Mar  1 2000  2:24:00:000AM    8572467    2614       1          1
Mar  1 2000  2:30:00:000AM    8572467    2607       2          2
Mar  1 2000  2:36:00:000AM    8572467    2598       1          1
Mar  1 2000  2:42:00:000AM    8572467    2592       1          1
Mar  1 2000  2:48:00:000AM    8572467    2582       2          2
Mar  1 2000  2:54:00:000AM    8572467    2576       2          2
```

C Critical Subsystem: Data Processing and Analysis Client Software

An assessment was done that included all C, FORTRAN, SQL, and SQR routines associated with the data processing and analysis client software. The following programs were found to be suspect and required investigation in order to determine if revisions were required:

FILTER.FOR	Doodson Filter of Hourly Height Data
FREDMM.FOR	First Reduction of Monthly Mean Data
HA29.FOR	29-Day Harmonic Analysis
HA365.FOR	365-Day Harmonic Analysis
SASSA.FOR	Creation of NOS Form 194
TBYT.FOR	Tide-By-Tide Data Comparison
XMSC.FOR	Monthly Mean Data Comparison

Of the programs listed above, FREDMM, HA365, TBYT, and XMSC required changes to the code in order to be compliant. The other programs were found to be compliant as is.

The following is the result of the evaluation of all the suspect programs:

<u>FILTER</u>

Module: DTOJULIAN (from "QuickBasic Programming Tools" by Rugg & Feldman)

Problem: Suspect Gregorian to Julian date subroutine
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check result of Sybase datetime output to Julian dates
Results: All dates found compliant

Module: JTODATE (from "QuickBasic Programming Tools" by Rugg & Feldman)
Problem: Suspect Julian to Gregorian date subroutine
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check result of Sybase datetime output to Gregorian dates
Results: All dates found compliant

Module: GETWL.C
Problem: Potential erroneous year output
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check result of Sybase datetime to Julian conversion subroutines
Correction: Dates read correctly.

FREDMM

Module: FREDMM.FOR
Problem: 2-digit year produce erroneous array reference and erroneous looping
Test Data: San Francisco Predicted Monthly Means (19991201 - 20000331)
Tests: Compare array data against database data; list all year output; assure success of code where year1*12+month1 <= year2*12+month2
Correction: Changed all year input variables from 2 digits to 4 digits

HA29

Module: ADD29DAY.FOR (from "QuickBasic Programming Tools" by Rugg & Feldman)
Problem: Suspect date manipulation code (adds 29 days to input date)
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check result of Sybase datetime output to revised dates
Results: All dates found compliant

HA365

Module: JULIAN.FOR (from "QuickBasic Programming Tools" by Rugg & Feldman)
Problem: Suspect Julian to Gregorian date subroutine
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check result of Sybase datetime output to Julian dates
Results: All dates found compliant

Module: TCHK.FOR (check datetime input)
Problem: Suspect evaluation year values
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check evaluation of user input dates
Correction: Changed allowable year maximum from 99 to 9999

Module: USERIN.FOR (read user input)
Problem: Suspect input of 2-digit year
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Correction: Changed read of input year from 2 digits to 4 digits

SASSA

Module: SASSA.FOR
Problem: Suspect usage of 2-digit year
Test Data: San Francisco Predicted Hourly Heights (19991201 - 20000331)
Tests: Check evaluation of user input dates
Results: All dates found compliant

TBYT

Module: PARAM.FOR
Problem: Suspect usage of 2-digit year
Test Data: Tabulated San Francisco Predicted High/Lows (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Correction: Changed read input from 2-digit to 4-digit year.

Module: STATINFO.FOR
Problem: Suspect usage of 2-digit year
Test Data: Tabulated San Francisco Predicted High/Lows (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Correction: Changed read input from 2-digit to 4-digit year.

Module: TBYT.FOR
Problem: Suspect usage of 2-digit year
Test Data: Tabulated San Francisco Predicted High/Lows (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Correction: Changed read input from 2-digit to 4-digit year; Changed output formats to list 4-digit year; Changed allowable year maximum from 99 to 9999

Module: TIBYT.FOR

Problem: Suspect usage of 2-digit year
Test Data: Tabulated San Francisco Predicted High/Lows (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Correction: Changed read input from 2-digit to 4-digit year.

XMSC

Module: HLTIS.FOR (Retrieve High/Low data)
Problem: Suspect usage of 2-digit year
Test Data: San Francisco Predicted Monthly Means (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Results: All dates found compliant

Module: MMSC.FOR (Perform variable-Monthly Mean Simultaneous Comparison)
Problem: Suspect usage of 2-digit year
Test Data: San Francisco Predicted Monthly Means (19991201 - 20000331)
Tests: Check treatment of Sybase datetime output in listing
Correction: Changed output formats 102 and 220 to list 4-digit year.

Module: USERIN.FOR (read user input)
Problem: Suspect input of 2-digit year
Test Data: San Francisco Predicted Monthly Means (19991201 - 20000331)
Tests: Check result of Sybase datetime output to dates
Correction: Changed read of input year from 2 digits to 4 digits

In order to ensure Y2K compliancy, those programs which required modification were tested and produced the following results.

FREDMM Y2K Test

Command Line: run_fred 9414290 JAN1999 DEC2000 1960 N

Program Results:

9414290 National Ocean Service (NOAA) T.M.: 120W
SAN FRANCISCO, SAN FRANCISCO BAY TYPE: M

FIRST REDUCTION OF MONTHLY MEANS (1999 1- 2000 3) 3/23/1999

YEARLY AVERAGES

MTL

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	2.740	2.748										0.984	6.473	3	2.158	1.016
00	1.004	1.002	0.964										2.969	3	0.990	0.023

DTL

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	2.661	2.690										0.910	6.261	3	2.087	1.019
00	0.927	0.932	0.887										2.745	3	0.915	0.024

MSL

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	2.726	2.732										0.964	6.422	3	2.141	1.019
00	0.985	0.982	0.946										2.913	3	0.971	0.022

HWI

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	7.570	7.630										7.490	22.690	3	7.563	0.070
00	7.560	7.530	7.570										22.660	3	7.553	0.021

LWI

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	0.860	0.740										0.920	39.780	3	0.840	0.092
00	0.960	0.920	0.980										40.120	3	0.953	0.031

MN

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	1.295	1.204										1.288	3.787	3	1.262	0.051
00	1.252	1.249	1.227										3.728	3	1.243	0.014

9414290 National Ocean Service (NOAA) T.M.: 120W
SAN FRANCISCO, SAN FRANCISCO BAY TYPE: M

FIRST REDUCTION OF MONTHLY MEANS (1999 1- 2000 3) 3/23/1999

YEARLY AVERAGES

DLQ

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	0.385	0.305										0.334	1.024	3	0.341	0.041
00	0.363	0.313	0.277										0.953	3	0.318	0.043

MHW

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	3.388	3.350										1.628	8.366	3	2.789	1.005
00	1.630	1.626	1.577										4.833	3	1.611	0.030

MLW

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	2.093	2.146										0.340	4.579	3	1.526	1.028
00	0.378	0.377	0.350										1.105	3	0.368	0.016

MHHW

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	3.614	3.539										1.814	8.967	3	2.989	1.018
00	1.838	1.799	1.701										5.338	3	1.779	0.071

MLLW

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM	NUM	MEAN	STD DEV
99	1.708	1.841										0.006	3.555	3	1.185	1.023

```
00   0.015   0.064   0.073
            0.152       3   0.051    0.031

                                                                    HWL
YR     JAN     FEB     MAR     APR     MAY     JUN     JUL     AUG     SEP     OCT     NOV
  DEC      SUM     NUM    MEAN  STD DEV
99   3.883   3.683
   2.185    9.751       3   3.250    0.928
00   2.184   2.077   1.865
            6.126       3   2.042    0.162

                                                                    LWL
YR     JAN     FEB     MAR     APR     MAY     JUN     JUL     AUG     SEP     OCT     NOV
  DEC      SUM     NUM    MEAN  STD DEV
99   1.247   1.404
  -0.514    2.137       3   0.712    1.065
00  -0.461  -0.321  -0.164
           -0.946       3  -0.315    0.149
```

9414290 National Ocean Service (NOAA)

T.M.: 120W

SAN FRANCISCO, SAN FRANCISCO BAY

TYPE: M

FIRST REDUCTION OF MONTHLY MEANS (1999 1- 2000 3) 3/23/1999

MONTHLY AVERAGES

	JAN MAR					FEB		
	SUM SUM	NUM NUM	MEAN MEAN	STD DEV STD DEV		SUM	NUM	MEAN	STD DEV
MTL	3.744	2	1.872	1.228	MTL	3.749	2	1.875	1.235
MTL	0.964	1	0.964	0.000					
DTL	3.588	2	1.794	1.226	DTL	3.622	2	1.811	1.243
DTL	0.887	1	0.887	0.000					
MSL	3.711	2	1.855	1.231	MSL	3.714	2	1.857	1.237
MSL	0.946	1	0.946	0.000					
HWI	15.130	2	7.565	0.007	HWI	15.160	2	7.580	0.071
HWI	7.570	1	7.570	0.000					
LWI	26.660	2	0.910	0.071	LWI	26.500	2	0.830	0.127
LWI	13.400	1	0.980	0.000					
MN	2.547	2	1.273	0.030	MN	2.453	2	1.227	0.032
MN	1.227	1	1.227	0.000					
GT	3.729	2	1.865	0.059	GT	3.433	2	1.716	0.026
GT	1.628	1	1.628	0.000					
DHQ	0.434	2	0.217	0.013	DHQ	0.362	2	0.181	0.011
DHQ	0.124	1	0.124	0.000					
DLQ	0.748	2	0.374	0.016	DLQ	0.618	2	0.309	0.006
DLQ	0.277	1	0.277	0.000					
MHW	5.018	2	2.509	1.243	MHW	4.976	2	2.488	1.219
MHW	1.577	1	1.577	0.000					
MLW	2.471	2	1.235	1.213	MLW	2.523	2	1.262	1.251
MLW	0.350	1	0.350	0.000					
MHHW	5.452	2	2.726	1.256	MHHW	5.338	2	2.669	1.230
MHHW	1.701	1	1.701	0.000					
MLLW	1.723	2	0.861	1.197	MLLW	1.905	2	0.952	1.257
MLLW	0.073	1	0.073	0.000					
HWL	6.067	2	3.033	1.201	HWL	5.760	2	2.880	1.136
HWL	1.865	1	1.865	0.000					
LWL	0.786	2	0.393	1.208	LWL	1.083	2	0.542	1.220
LWL	-0.164	1	-0.164	0.000					
MTL-MSL	0.034	2	0.017	0.003	MTL-MSL	0.036	2	0.018	0.002
MTL-MSL	0.018	1	0.018	0.000					
DTL-MSL	-0.123	2	-0.062	0.005	DTL-MSL	-0.093	2	-0.046	0.006
DTL-MSL	-0.059	1	-0.059	0.000					

9414290 National Ocean Service (NOAA) T.M.: 120W
SAN FRANCISCO, SAN FRANCISCO BAY TYPE: M

FIRST REDUCTION OF MONTHLY MEANS (1999 1- 2000 3) 3/23/1999

S E R I E S M E A N S

	M T L	D T L	M S L	H W I	L W I	M N	G T	D H Q	D L Q	M H W	M L W	MHHW	MLLW	HWL	LWL	MTL-MSL	DTL-MSL
SUM	9.442	9.006	9.335	45.350	79.900	7.515	10.598	1.106	1.977	13.199	5.684	14.305	3.707	15.877	1.191	0.106	-0.329
SUM																	
NUM	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
NUM																	
MEAN	1.574	1.501	1.556	7.558	0.897	1.253	1.766	0.184	0.329	2.200	0.947	2.384	0.618	2.646	0.199	0.018	-0.055
MEAN																	
S.D.	0.907	0.910	0.909	0.047	0.087	0.035	0.099	0.035	0.040	0.906	0.908	0.925	0.897	0.891	0.883	0.002	0.008
S.D.																	
S.E	0.185	0.186	0.186	0.010	0.018	0.007	0.020	0.007	0.008	0.185	0.185	0.189	0.183	0.182	0.180	0.000	0.002
S.E																	

```
HWL          3.883

MHHW  ---|--- 2.384
         |              DHQ  0.184
MHW     -|-   2.200
         |
MTL     -|-   1.574
         |                         GT   1.766
MSL     -|-   1.556
         |                         MN   1.253
DTL     -|-   1.501
         |
MLW     -|-   0.947
         |              DLQ  0.329
MLLW  ---|--- 0.618

LWL         -0.514
```

HA365 Y2K TEST

Command Line: `harm365 9414290 1 JUL011999 JUN302000 PR W`

Program Log: **HA365....**

```
Time Meridian, Time Series Request....
Complete
Station Information Retrieval...
Complete
Hourly Water Level Retrieval.....
Complete
HA365 is Complete

Available Series
    Begin Date: Dec  1 1998 12:00:00:000AM
    End Date  : Jan 31 2000 11:00:00:000PM at TM 0  W
    Begin Date: Feb  1 2000 12:00:00:000AM
    End Date  : Sep 30 2000 12:00:00:000AM at TM 0  W

Available Series
    Begin Date: Dec  1 1998 12:00:00:000AM
    End Date  : Jan 31 2000 11:00:00:000PM
    Begin Date: Feb  1 2000 12:00:00:000AM
    End Date  : Sep 30 2000 12:00:00:000AM
```

Program Results:

```
366 Day Least Squares Harmonic Analysis (1999  7  1 -2000  6 30)***** LSQHA
      9414290 SAN FRANCISCO, SAN FRANCISCO BAY         TM 000 W  Tide Type M

      Master control
     .0000000    37     1     1     1     0     1  1024    64     0
      Print control
         1    1    1    2    2    1
      Data control
         5    1    1   1.0   0.0     6   366     1     1     0     1

      Node factors
         1.022    1.000    1.022    0.944    1.044    0.908    1.067    0.964    1.000    1.044
         1.022    1.000    1.022    1.022    0.717    1.022    1.000    0.971    0.924    1.074
         1.000    1.000    1.022    0.807    0.908    0.908    1.000    1.000    0.908    1.000
         1.022    1.033    1.197    0.985    0.854    1.090    1.022

      Greenwich equilibrium arguments
       300.900    0.000   56.400  180.700  241.800  124.200  182.700  121.600    0.000  357.300
       128.000    0.000  243.500  171.900   49.300  293.800  180.000  296.800   61.200  244.500
       197.200   98.600   59.100  232.600  311.300  239.700  184.300  355.700  355.200  171.400
        59.100  271.400  359.600   61.100  182.100  123.600  300.900

      Jday(k)
        -32    -1    30    58    89   119   150   180   211   242   272   303   333   364

      Sets = 8784.     First point =  1.132      Last data point =  0.773

      Longitude =  122.46     Original Time Meridian =    0.00     Corrected Time Meridian =    0.00

      Listing of means
     0.0001    0.0003      0.0000      0.0000      0.0000     -0.0001      0.0000      0.0000      0.0002
       0.0002
     0.0003    0.0005      0.0001      0.0000      0.0001      0.0002      0.0000      0.0000      0.0000
       0.0001
     0.0003   -0.0001      0.0000      0.0000      0.0004      0.0002      0.0004     -0.0001      0.0003
      -0.0003
     0.0003   -0.0001      0.0000      0.0000      0.0006     -0.0004      0.0005      0.0005      0.0144
       0.0118
     0.0000    0.0021      0.0000      0.0021      0.0050     -0.0062      0.0044     -0.0057      0.0007
      -0.0004
     0.0001   -0.0002      0.0000      0.0000      0.0000      0.0000      0.0009     -0.0003      0.0000
       0.0000
     0.0002   -0.0002      0.0001     -0.0001      0.0004      0.0001      0.0002      0.0002      0.0000
       0.0000
     0.0001    0.0000      0.0000      0.0001      0.9539
```

```
9414290 SAN FRANCISCO, SAN FRANCISCO BAY
Lat.  37 48.4N Long. 122 27.9W ( 122.46)
Jul  1, 1999 - Jun 30, 2000
366 Day Least Squares Harmonic Analysis
Total red. of var. = 0.9999   Std. dev. of error = 0.0057
```

MSL	Constit.	H	Kappa	Kpr-K	Kappa Prime	Speed
0.954	1-M2	0.580	325.64	-115.08	210.6	28.9841
	2-S2	0.137	333.52	-115.08	218.4	30.0000
	3-N2	0.123	299.85	-115.08	184.8	28.4397
	4-K1	0.368	103.92	122.46	226.4	15.0411
	5-M4	0.023	12.09	129.84	141.9	57.9682
	6-O1	0.230	87.89	122.46	210.4	13.9430
	7-M6	0.000	329.53	14.76	344.3	86.9523
	8-MK3	0.019	121.38	7.38	128.8	44.0252
	9-S4	0.000	172.09	129.84	301.9	60.0000
	10-MN4	0.009	349.31	129.84	119.2	57.4238
	11-Nu2	0.026	303.05	-115.08	188.0	28.5126
	12-S6	0.000	139.27	14.76	154.0	90.0000
	13-Mu2	0.007	215.60	-115.08	100.5	27.9682
	14-2N2	0.014	273.17	-115.08	158.1	27.8954
	15-OO1	0.011	138.99	122.46	261.5	16.1391
	16-Lamd	0.006	333.21	-115.08	218.1	29.4556
	17-S1	0.010	189.89	122.46	312.4	15.0000
	18-M1	0.011	117.62	122.46	240.1	14.4967
	19-J1	0.019	120.27	122.46	242.7	15.5854
	20-Mm	0.000	38.96	0.00	39.0	0.5444
	21-Ssa	0.039	286.94	0.00	286.9	0.0821
	22-Sa	0.038	221.40	0.00	221.4	0.0411
	23-Msf	0.000	211.79	0.00	211.8	1.0159
	24-Mf	0.000	354.67	0.00	354.7	1.0980
	25-Rho1	0.009	80.81	122.46	203.3	13.4715
	26-Q1	0.040	81.12	122.46	203.6	13.3987
	27-T2	0.009	313.14	-115.08	198.1	29.9589
	28-R2	0.002	297.31	-115.08	182.2	30.0411
	29-2Q1	0.004	86.63	122.46	209.1	12.8543
	30-P1	0.116	100.82	122.46	223.3	14.9589
	31-2SM2	0.000	108.04	-115.08	353.0	31.0159
	32-M3	0.005	19.26	7.38	26.6	43.4762
	33-L2	0.015	339.45	-115.08	224.4	29.5285
	34-2MK3	0.014	89.42	7.38	96.8	42.9271
	35-K2	0.040	324.71	-115.08	209.6	30.0821
	36-M8	0.000	53.49	-100.32	313.2	115.9364
	37-MS4	0.010	24.47	129.84	154.3	58.9841

Recapitulation of Harmonic Constant Reduction
Station: 9414290 SAN FRANCISCO, SAN FRANCISCO BAY
Lat. 37 48.4N Long. 122 27.9W (122.46)
Length of series: 366 days
Beginning and ending dates of series: Jul 1, 1999 - Jun 30, 2000

```
AMPLITUDE RELATIONS                 EPOCH RELATIONS IN DEGREES

M4/M2 =  0.040                      M2-K1-O1 =  133.8
S2/M2 =  0.236                      MKO =   66.9 (  66.9)
N2/M2 =  0.212                      M2/29. =   11.2
2(K1+O1) =   1.196                  MKO-.5V =   69.1 (  69.1)
(K1+O1)/M2 =  1.032                 MKO-.5W-90. =  -25.4 ( 334.6)
(K1+O1)/(M2+S2) =  0.834


AGE OF INEQUALITIES IN HOURS        MEAN TIDE LEVEL

PHASE AGE =    7.8                  MTL =  0.016
PARALLAX AGE =   47.4
DIURNAL AGE =   14.6


RANGES (METERS)                     RATIOS                  INEQUALITIES

MEAN(MN) =   1.262                  SG/MN =  1.188          DHQ =  0.167
SPRING(SG) =   1.498                NP/MN =  0.785          DLQ =  0.347
NEAP(NP) =   0.990                  PN/MN =  1.212        TCHWQ =  0.414
PERIGEAN(PN) =   1.529              AN/MN =  0.841        TCLWQ =  1.070
APOGEAN(AN) =   1.061
GREAT TROPIC(GC) =   1.985
GREAT DIURNAL(GT) =   1.776                  LI(HOURS) =   8.450


LOCAL INTERVALS        *GREENWICH INTERVALS     HARMONIC CONSTANTS INPUT
    (HOURS)                  (HOURS)

   HWI = 11.382            HWI =  7.411         K1  0.3681 103.92
   LWI =  4.867            LWI =  0.896         O1  0.2301  87.89
TCHHWI = 10.507(a)      TCHHWI =  6.536(b)      P1  0.1159 100.82
TCLLWI =  5.221(b)      TCLLWI =  1.251(a)      MU2 0.0071 215.60
TCLHWI = 12.446         TCLHWI =  8.476         S2  0.1371 333.52
TCHLWI =  4.297         TCHLWI =  0.327         M2  0.5799 325.64
                                                M4  0.0230  12.09
                                                M6  0.0000 329.53
                                                N2  0.1230 299.85
Lunar Transits:   a - Upper Transit at North declination
                      Lower Transit at South declination
                  b - Lower Transit at North declination
                      Upper Transit at South declination
```

TBYT Y2K Test

Command Line: **run_tbyt 94142901 9413450**

Input File: **94142901 94134501 DEC071999 JAN072000 1960 000 PR PR W W N**

Program Log:

```
Tide BY Tide Comparison.....
Station Parameters Retrieval for Stations 94142901 94134501
Complete
HI_LO value Retrieval for Station 94142901
Complete
Hourly Water Level Retrieval for Station 94142901
Available Series
    Begin Date: Dec  1 1998 12:54:00:000AM
    End Date  : Jan 31 2000 11:00:00:000PM
WL_HOUR_SERIES...
HI_LO value Retrieval for Station 94134501
Complete
Hourly Water Level Retrieval for Station 94134501
Available Series
    Begin Date: Dec  1 1999 12:00:00:000AM
    End Date  : Mar 31 2000 11:00:00:000PM
WL_HOUR_SERIES...
Complete
HHLLW WAS PICKED FOR 94134501 BY USER

Epoch Infomation Retreival...
Datum Retrieval....
Datum Retrieval Complete
End TBYT
```

Program Results:

```
                                   COMPARISON OF SIMULTANEOUS OBSERVATIONS FOR 1999 12  7 TO 2000  1  7
        3/22/1999
                              1960-1978 TIDAL EPOCH  (EXPECTED DIFFERENCE (STATION A - STATION B) =  0.0 HOURS)

 (A) SUBORDINATE STATION 94142901 SAN FRANCISCO, SAN FRANCISCO BAY                    WORKSET      TM (  0W)
 TIDE TYPE (M )
 (B) STANDARD STATION    94134501 MONTEREY, MONTEREY BAY                              WORKSET      TM (  0W)
 TIDE TYPE (M )
          (A) STATION             (B) STATION      (A) - (B)         (A) STATION          (B) STATION
(A) - (B)
             TIME OF                 TIME OF     TIME DIFFERENCE       HEIGHT OF           HEIGHT OF      HEIGHT
DIFFERENCE
          HW        LW              HW      LW      HW      LW       HW        LW        HW        LW        HW
      LW
 DATE   HOURS     HOURS  DATE     HOURS   HOURS   HOURS   HOURS    METERS    METERS    METERS    METERS    METERS
  METERS
 DEC 26  21.8  27   4.5  DEC 27     2.7     8.1    -4.9    -3.6     1.823    -0.194     1.430     0.786     0.393
  -0.980
     27  11.8      17.1            13.6    20.6    -1.8    -3.5     1.682     0.757     1.502    -0.024     0.180
   0.781
        22.8  28   5.3      28     3.6     9.5    -4.8    -4.2     1.634    -0.015     1.475     0.732     0.159
  -0.747
     28  12.6      18.3           14.7    21.6    -2.1    -3.3     1.704     0.693     1.303     0.151     0.401
   0.542
     29   0.0  29   6.2      29     4.6    10.8    -4.6    -4.6     1.448     0.170     1.525     0.621    -0.077
  -0.451
         13.6      19.6            16.1    22.3    -2.5    -2.7     1.733     0.585     1.145     0.318     0.588
   0.267
     30   1.3  30   7.2      30     5.3    12.1    -4.0    -4.9     1.302     0.346     1.577     0.472    -0.275
  -0.126
         14.3      20.7           17.6    23.2    -3.3    -2.5     1.764     0.447     1.060     0.468     0.704
  -0.021
     31   2.7  31   8.1      31     6.1    13.1    -3.4    -5.0     1.229     0.501     1.623     0.316    -0.394
   0.185
        15.1                      19.1            -4.0             1.794               1.042               0.752
 JAN  1   4.1      21.7  JAN  1     6.7     0.1    -2.6    -2.4     1.224     0.300     1.671     0.592    -0.447
  -0.292
         15.7   1   9.1            20.2    14.0    -4.5    -4.9     1.829     0.625     1.054     0.172     0.775
   0.453
      2   5.3      22.6       2     7.3     0.8    -2.0    -2.2     1.268     0.162     1.704     0.695    -0.436
  -0.533
         16.4   2  10.0            21.1    14.6    -4.7    -4.6     1.850     0.730     1.088     0.054     0.762
   0.676
      3   6.2      23.2       3     7.8     1.6    -1.6    -2.4     1.323     0.046     1.730     0.771    -0.407
  -0.725
```

```
        17.0   3  10.7            22.0    15.2    -5.0    -4.5    1.865    0.809    1.121    -0.034    0.744
  0.843
     4   7.1      23.9       4     8.3     2.1    -1.2    -2.2    1.372   -0.041    1.750     0.822   -0.378
 -0.863
        17.6   4  11.5           22.6    15.8    -5.0    -4.3    1.875    0.864    1.147    -0.096    0.728
  0.960
     5   7.7   5   0.5       5     8.9     2.7    -1.2    -2.2    1.406   -0.103    1.762     0.853   -0.356
 -0.956
        18.1      12.1                    16.3            -4.2    1.880    0.900              -0.132
     1.032
                                  23.2                                                   1.167
     6   8.3   6   1.1       6     9.5     3.4    -1.2    -2.3    1.429   -0.142    1.761     0.871   -0.332
 -1.013
        18.7      12.7                    17.0            -4.3    1.874    0.924              -0.148
     1.072
                                  23.8                                                   1.183
     7   8.9   7   1.6       7    10.0     4.0    -1.1    -2.4    1.443   -0.161    1.745     0.882   -0.302
 -1.043
        19.2      13.3                    17.5            -4.2    1.855    0.938              -0.142
     1.080

                                                                   HHW       HLW       HHW       HLW       HHW
    HLW
 SUMS                                                            42.757    -1.344    51.419    22.331    -8.662
 -23.675
 ITEMS                                                             30        30        30        30        30
     30            MEANS                                                  1.425    -0.045     1.714
0.744    -0.289    -0.789
```

```
                                COMPARISON OF SIMULTANEOUS OBSERVATIONS FOR 1999 12  7 TO 2000  1  7
      3/22/1999
                          1960-1978 TIDAL EPOCH  (EXPECTED DIFFERENCE (STATION A - STATION B) =  0.0 HOURS)

(A) SUBORDINATE STATION 94142901 SAN FRANCISCO, SAN FRANCISCO BAY                      WORKSET      TM (  0W)
TIDE TYPE (M )
(B) STANDARD STATION    94134501 MONTEREY, MONTEREY BAY                                WORKSET      TM (  0W)
TIDE TYPE (M )


ERROR SCAN FOR TIME DIFFERENCE OF HW
STANDARD DEVIATION=   1.509
ERROR SCAN FOR TIME DIFFERENCE OF LW
STANDARD DEVIATION=   0.922
ERROR SCAN FOR HEIGHT DIFFERENCE OF HHW
STANDARD DEVIATION=   0.202
ERROR IN1899  12  27 118 (SUBORDINATE STATION)      0.180
ERROR IN1899  12  27 228 (SUBORDINATE STATION)      0.159
ERROR SCAN FOR HEIGHT DIFFERENCE OF LHW
STANDARD DEVIATION=   0.176
ERROR IN1899  12  14 126 (SUBORDINATE STATION)      0.204
ERROR SCAN FOR HEIGHT DIFFERENCE OF HLW
STANDARD DEVIATION=   0.374
ERROR IN1899  12  31  81 (SUBORDINATE STATION)      0.185
ERROR SCAN FOR HEIGHT DIFFERENCE OF LLW
STANDARD DEVIATION=   0.346
ERROR IN1899  12  17 212 (SUBORDINATE STATION)      0.009
ERROR IN1899  12  30 207 (SUBORDINATE STATION)     -0.021
```

COMPARISON OF SIMULTANEOUS OBSERVATIONS FOR 1999 12 7 TO 2000 1 7

3/22/1999

1960-1978 TIDAL EPOCH (EXPECTED DIFFERENCE (STATION A - STATION B) = 0.0 HOURS)

(A) SUBORDINATE STATION 94142901 SAN FRANCISCO, SAN FRANCISCO BAY WORKSET TM (0W)
TIDE TYPE (M)
(B) STANDARD STATION 94134501 MONTEREY, MONTEREY BAY WORKSET TM (0W)
TIDE TYPE (M)

MEAN DIFFERENCE IN HIGH (-2.91) AND LOW (-3.52) WATER INTERVALS

MEAN HHW HEIGHT AT (A)	= 1.425	MEAN HLW HEIGHT AT (A)	= -0.045
MEAN LHW HEIGHT AT (A)	= 1.859	MEAN LLW HEIGHT AT (A)	= 0.762
DHQ AT (A)	= -0.188	DLQ AT (A)	= -0.397
MEAN HW HEIGHT AT (A)	= 1.614	MEAN LW HEIGHT AT (A)	= 0.365
MN AT (A)	= 1.249	MTL AT (A)	= 0.989
GT AT (A)	= 0.664	DTL AT (A)	= 1.093
MEAN HHW DIFFERENCE	= -0.289	MEAN HLW DIFFERENCE	= -0.789
MEAN LHW DIFFERENCE	= 0.658	MEAN LLW DIFFERENCE	= 0.789
DHQ DIFFERENCE	= -0.411	DLQ DIFFERENCE	= -0.776
MEAN HW DIFFERENCE	= 0.122	MEAN LW DIFFERENCE	= 0.013
MN DIFFERENCE	= 0.109	MTL DIFFERENCE	= 0.067
GT DIFFERENCE	= -1.077	DTL DIFFERENCE	= 0.250
MN RATIO	= 1.096	DHQ RATIO	= -0.848
GT RATIO	= 0.381	DLQ RATIO	= -1.045
MSL AT (A)	= 0.970		
MSL AT (B)	= 0.891		
MSL DIFFERENCE	= 0.079		

```
                              HWI     LWI     MTL      MN     DHQ     DLQ                    FINAL/PRELIMINARY
DATUMS
                            HOURS   HOURS  METERS  METERS  METERS  METERS
 ACCEPTED FOR B              6.41    0.05   1.844   1.100   0.213   0.338        MHHW  ---|---

 DIFFERENCES AND RATIOS     -2.91   -3.52   0.067   1.096  -0.848  -1.045                 |               DHQ

 CORRECTED FOR A             3.50    8.95   1.911   1.206  -0.181  -0.354        MHW     -|-

                                                                                          |
                              MSL     DTL      GT                                        -|-
                           METERS  METERS  METERS                                         |
     GT
 ACCEPTED FOR B             1.835   1.783   1.652                                        -|-

 DIFFERENCES AND RATIOS     0.079   0.250   0.381                                         |
     MN
 CORRECTED FOR A            1.914   2.033   0.630                                        -|-

                                                                                          |
                                     MRR      METHOD                                MLW     -|-
                              MHHW=  2.348     MLLW=  1.718                                 |              DLQ
                              DHQ = -0.166     DLQ = -0.410                          MLLW  ---|---



                                     STANDARD METHOD
                              MHHW=  2.333     MLW =  1.308
                              MHW =  2.514     MLLW=  1.662

                                     DIRECT METHOD
                            MHHW    MHW    MLW   MLLW
                           METERS METERS METERS METERS
 ACCEPTED FOR B             2.609  2.396  1.295  0.957
 DIFFERENCES AND RATIOS    -0.289  0.122  0.013  0.789
 CORRECTED FOR A            2.320  2.518  1.308  1.746

                              MN =   1.210
                              GT =   0.575
```

XMSC Y2K Test

Command Line: **run_xmsc 94142901 94134501**

Input File: **94142901 94134501 DEC151999 JAN152000 1960 N NO PR PR W W**

Program Log: **XMSC...**

```
Simultanious Monthly Means Comparison For Two Stations....
Station Information Retrieval for 9414290....
Station Information Retrieval for 9413450....
Epoch Retreival....
Retreival of Hi, Low values
Mean Sea Level Retrieval.....
MMTI datum computaions
MTL   DTL   MSL   HWI   LWI   MN    GT    DHQ   DLQ   MHW   MLW   MHHW  MLLW
0.994 0.922 0.972 2.000 0.000 1.273 1.807 0.195 0.339 1.630 0.357 1.825 0.019
Calling MMTI to compute Monthly Means for 9413450
Retreival of Hi, Low values
Retreival Complete - 124 Rows
Mean Sea Level Retrieval.....
MMTI datum computaions
MTL   DTL   MSL   HWI   LWI   MN    GT    DHQ   DLQ   MHW   MLW   MHHW  MLLW
0.904 0.847 0.894 2.000 0.000 1.080 1.665 0.236 0.349 1.444 0.363 1.679 0.015 94134501
Available Series
    Begin Date: Dec  1 1998 12:54:00:000AM
End Date  : Jan 31 2000 11:00:00:000PM
WL_HOUR_SERIES....
Available Series
    Begin Date: Dec  1 1999 12:00:00:000AM
End Date  : Mar 31 2000 11:00:00:000PM
WL_HOUR_SERIES....
```

Program Results:

COMPARISON OF MEANS FOR1999 12 15 TO 2000 1 15 3/23/1999
1960-1978 TIDAL EPOCH

(A) SUBORDINATE STATION 94142901 SAN FRANCISCO, SAN FRANCISCO BAY Workset TM (000W) TIDE TYPE (M
)
(B) STANDARD STATION 94134501 MONTEREY, MONTEREY BAY Workset TM (000W) TIDE TYPE (M
)

M O N	M T L			M S L			H W I			L W I			M N	
	A	B	A-B	A	B	A-B	A	B	A-B	A	B	A-B	A	B
A/B	METER	METER	METER	METER	METER	METER	HRS	HRS	HRS	HRS	HRS	HRS	METER	METER
RATIO														
XXX **	0.994	0.904	0.090	0.972	0.894	0.078	2.000	2.000	0.000	0.000	0.000	0.000	1.273	1.080
1.178														

M O N	D H Q			D L Q			M H W			M L W		
	A	B	A/B	A	B	A/B	A	B	A-B	A	B	A-B
	METER	METER	RATIO	METER	METER	RATIO	METER	METER	METER	METER	METER	METER
XXX **	0.195	0.236	0.828	0.339	0.349	0.972	1.630	1.444	0.186	0.357	0.363	-0.006

M O N	D R L(TL)			G T			M H H W			M L L W		
	A	B	A-B	A	B	A/B	A	B	A-B	A	B	A-B
	METER	METER	METER	METER	METER	RATIO	METER	METER	METER	METER	METER	METER
XXX **	0.922	0.847	0.075	1.807	1.665	1.085	1.825	1.679	0.146	0.019	0.015	0.004

COMPARISON OF MEANS FOR1999 12 15 TO 2000 1 15 3/23/1999
1960-1978 TIDAL EPOCH

(A) SUBORDINATE STATION 94142901 SAN FRANCISCO, SAN FRANCISCO BAY Workset TM (000W) TIDE TYPE (M
)
(B) STANDARD STATION 94134501 MONTEREY, MONTEREY BAY Workset TM (000W) TIDE TYPE (M
)

	M T L	M S L	H W I	L W I
M N	A-B	A-B	A-B	A-B
A/B	METER	METER	HRS	HRS
RATIO				
TOTAL MONTHS	1.053	1.053	1.053	1.053
1.053				
SUMS	0.090	0.078	0.000	0.000
1.178				
MEANS	0.090	0.078	0.000	0.000
1.178				
ACCEPTED FOR B	1.844	1.835	6.410	0.050
1.100				
CORRECTED FOR A	1.934	1.913	6.410	0.050
1.296				

	D H Q	D L Q	M H W	M L W
	A/B	A/B	A-B	A-B
	RATIO	RATIO	METER	METER
TOTAL MONTHS	1.053	1.053	1.053	1.053
SUMS	0.828	0.972	0.186	-0.006
MEANS	0.828	0.972	0.186	-0.006
ACCEPTED FOR B	0.213	0.338	2.396	1.295
CORRECTED FOR A	0.177	0.329	2.582	1.289

	D R L(TL)	G T	M H H W	M L L W
	A-B	A/B	A-B	A-B
	METER	RATIO	METER	METER
TOTAL MONTHS	1.053	1.053	1.053	1.053
SUMS	0.075	1.085	0.146	0.004
MEANS	0.075	1.085	0.146	0.004
ACCEPTED FOR B	1.783	1.652	2.609	0.957
CORRECTED FOR A	1.858	1.793	2.755	0.961

TOTAL NUMBER OF HW = 61 TOTAL NUMBER OF LW = 62 TOTAL NUMBER OF HHW= 32 TOTAL NUMBER OF LLW= 33 FOR (A)

```
TOTAL NUMBER OF HW =   62     TOTAL NUMBER OF LW =   62     TOTAL NUMBER OF HHW=   32     TOTAL NUMBER OF LLW=   31 FOR (B)
```

METHOD	DATUM	VALUE
MODIFIED RANGE RATIO	MHHW	= 2.754
MODIFIED RANGE RATIO	MLLW	= 0.961
MODIFIED RANGE RATIO	DHQ	= 0.172
MODIFIED RANGE RATIO	DLQ	= 0.325
STANDARD	MHW	= 2.582
STANDARD	MLW	= 1.286
STANDARD	MHHW	= 2.759
STANDARD	MLLW	= 0.957
DIRECT	MN	= 1.293
DIRECT	GT	= 1.794
DIRECT	DHQ	= 0.173
DIRECT	DLQ	= 0.328

FINAL/PRELIMINARY DATUMS

```
MHHW  ---|---
         |              DHQ
MHW     -|-
         |
        -|-
         |                          GT
        -|-
         |                          MN
        -|-
         |
MLW     -|-
         |              DLQ
MLLW  ---|---
```

ON STAFF OF:

COMPARISON OF MONTHLY MEANS (1999 12 15 - 2000 1 15) 3/23/1999
1960-1978 TIDAL EPOCH

(A) SUBORDINATE STATION 94142901 SAN FRANCISCO, SAN FRANCISCO BAY Workset TM (000W) TIDE TYPE (M
)
(B) STANDARD STATION 94134501 MONTEREY, MONTEREY BAY Workset TM (000W) TIDE TYPE (M
)

STANDARD METHOD

```
MHHW  ---|--- 2.759
         |              DHQ 0.177
MHW     -|-   2.582
         |
MTL     -|-   1.934
         |                          GT 1.802
MSL     -|-   1.913
         |                          MN 1.296
DTL     -|-   1.858
         |
MLW     -|-   1.286
         |              DLQ 0.329
MLLW  ---|--- 0.957
```

MODIFIED RANGE RATIO METHOD

```
MHHW  ---|--- 2.754
         |              DHQ 0.172
MHW     -|-   2.582
         |
MTL     -|-   1.934
         |                          GT 1.793
MSL     -|-   1.913
         |                          MN 1.296
DTL     -|-   1.858
         |
MLW     -|-   1.286
         |              DLQ 0.325
MLLW  ---|--- 0.961
```

1.1.2 Hardware Compliancy

All PCs, Compaq servers, and SGI workstation hardware systems being used for the NWLON Data Processing and Analysis system are compliant. Y2K hardware compliancy statements are on file.