

**INSTITUTE OF OCEANOGRAPHIC SCIENCES
DEACON LABORATORY**

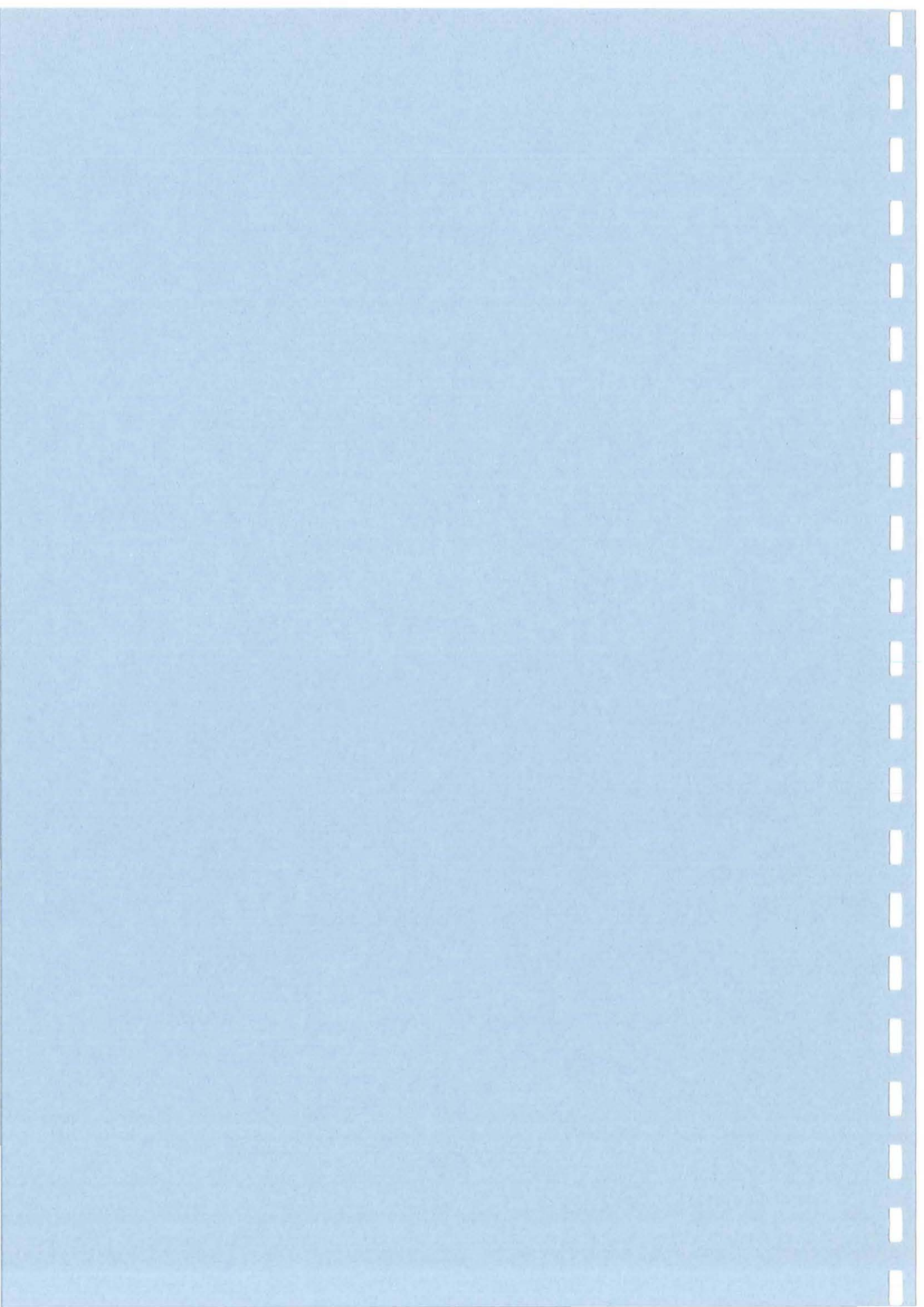
INTERNAL DOCUMENT No. 332

SWALES Sonic Buoy - telemetered data report

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1994

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DOCUMENT DATA SHEET

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| <p><i>ABSTRACT</i></p> <p>The objective of the telemetry data system was the collection of continuous raw data from the Solent Sonic anemometer, whilst the sensor was deployed at sea, on the Sonic Buoy. The success of the system exceeded that expected, with a 98% data blocks received without errors.</p> <p>The report details the data collected together with file formats. Software developed for file format conversion and error analysis of the data is included.</p> <p>Arrangements for the shore station erected for SWALES are detailed, also included is copy of the licence obtained from Department of Trade and Industry Radiocommunications Agency.</p> | |
| <p><i>KEYWORDS</i></p> <p>SONIC ANEMOMETER SWALES VHF TELEMETRY</p> | |
| <p><i>ISSUING ORGANISATION</i></p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;"> <p>Institute of Oceanographic Sciences Deacon Laboratory Wormley, Godalming Surrey GU8 5UB. UK.</p> <p>Director: Colin Summerhayes DSc</p> </div> <div style="text-align: right; font-size: small;"> <p>Telephone Wormley (0428) 684141 Telex 858833 OCEANS G. Facsimile (0428) 683066</p> </div> </div> | |
| <p>Copies of this report are available from: <i>The Library</i>, <i>PRICE</i> £0.00</p> | |

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1. OVERVIEW

The objective of the Telemetry Data system was the collection of continuous raw data from the Solent Sonic anemometer, whilst the sensor was deployed at sea, on the Sonic Buoy.

The transmitter sub-system operations are transparent to the other buoy sub-systems, requiring only the power from the primary battery packs. Once a second serial data blocks with, on average, 20.83 sets of measurements are encoded by a radio modem and transmitted via an omni-directional aerial to a shore receiver. The decoded data are error checked and written to time stamped data files on a dedicated personal computer (PC).

Off line processing, checks for short records and gaps in the data. The data files are re-formatted by the removal of the 'block counter' and block length words, which are encoded within the saved dataset, to the standard Sonic data file format, with header information derived from the file time stamp.

The success of the system exceeded that expected, with a 98% data blocks received without errors.

The report details the data collected together with file formats. Software developed for file format conversion and error analysis of the data is included.

Arrangements for the shore station erected for SWALES are detailed, also included is copy of the licence obtained from Department of Trade and Industry Radiocommunications Agency

2. INTRODUCTION

The development of the Sonic Buoy has provided the opportunity for spectral wind data measurements without the air flow distortion associated with a ship's superstructure. However the change in the sensor platform from a ship to a buoy, requires consideration of the effect of the waves on the air flow and the energy induced by the motion of the buoy.

To quantify possible platform effects, the collection of raw data was considered necessary over a range of wind and sea conditions. But as the data rate of the Sonic anemometer is ~750K Bytes per hour, onboard data storage was not considered viable. The solution adopted was to transmit the data in real time to an on shore recording system.

The Sonic Buoy has a 3m diameter discus surface following hull with a 2.5m high tower on which the sonic anemometer is mounted. The buoy is orientated into the wind by a 'V' shaped vane with the anemometer mounted on the buoy's windward leading edge. This deployment technique places the anemometer sensor head within ~3m of the wave

3. EXPERIMENT LOCATION

The mooring site for the Sonic Buoy was 51° 29.5' N and 4° 45.0' W, with the receiving Land Station at Hill Farm, Manorbier, Nr Tenby, 51° 47.0' N and 4° 47.0' W.

Details of the shore station building and electrical specification at Hill Farm Manorbier are in Appendix C

3.1. Equipment

The buoy hardware is a 0.5 Watt RF transmitter with a 3db co-linear omni-directional whip aerial. It is powered by a 12V supply derived in the buoy raw data logger module.

The operation of the Sonic anemometer, on buoy, is under the control of the Sonic processor, which configures the baud rate, sets the mode of operation, and polls the sensor for data when in the prompted mode. At the start of each quarter hour the Sonic processor re-configures the anemometer from unprompted mode into prompted mode with the control characters "PP". At the completion of collecting 12 * 1024 data samples the characters "UU" are used to reset the anemometer into the unprompted mode.

To allow the shore station PC to correlate the recorded raw data with the buoy processed data these "PP" and "UU" characters are also transmitted in between the anemometer data blocks. Both serial data lines between the anemometer and the Sonic processor are 'OR' gated together for input into the radio modem. After 'power on' of the transmitter and the anemometer, firmware within the modem detects the transition between modes. Transmission from the buoy commences immediately these criteria have been reached. The mode switch commands are used by the receiving station to synchronise datasets with the buoy. Each occurrence of a mode change initiates the opening a new file. The duty cycle between prompted and unprompted data is approximately 2:1.

The system configuration as used in the buoy is shown in the diagram below.

At the Shore receiving station a 6 element VHF yagi directional aerial with 8.5db gain was mounted with clear line of sight to the buoy. A high gain mast head amplifier, which was powered from the receiving station via the co-ax cable, enabled the recording system to be mounted away from the aerial position.

Within the receiving station the signal is decoded by the customised receiver and recorded to hard disc. The logging PC opens a new data file when transmitted data contains the control characters "PP" or "UU". Each file is named with the time that the file is opened suffixed by ".PDT" prompted or ".UDT" unprompted.

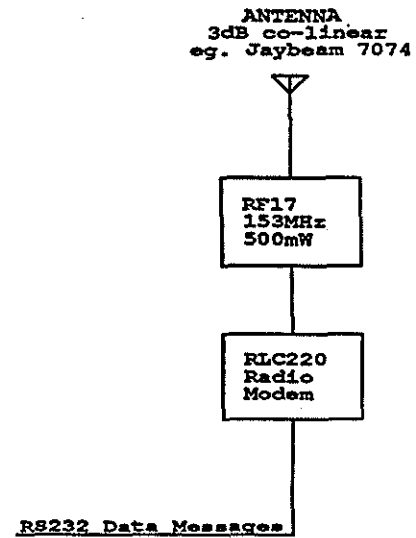
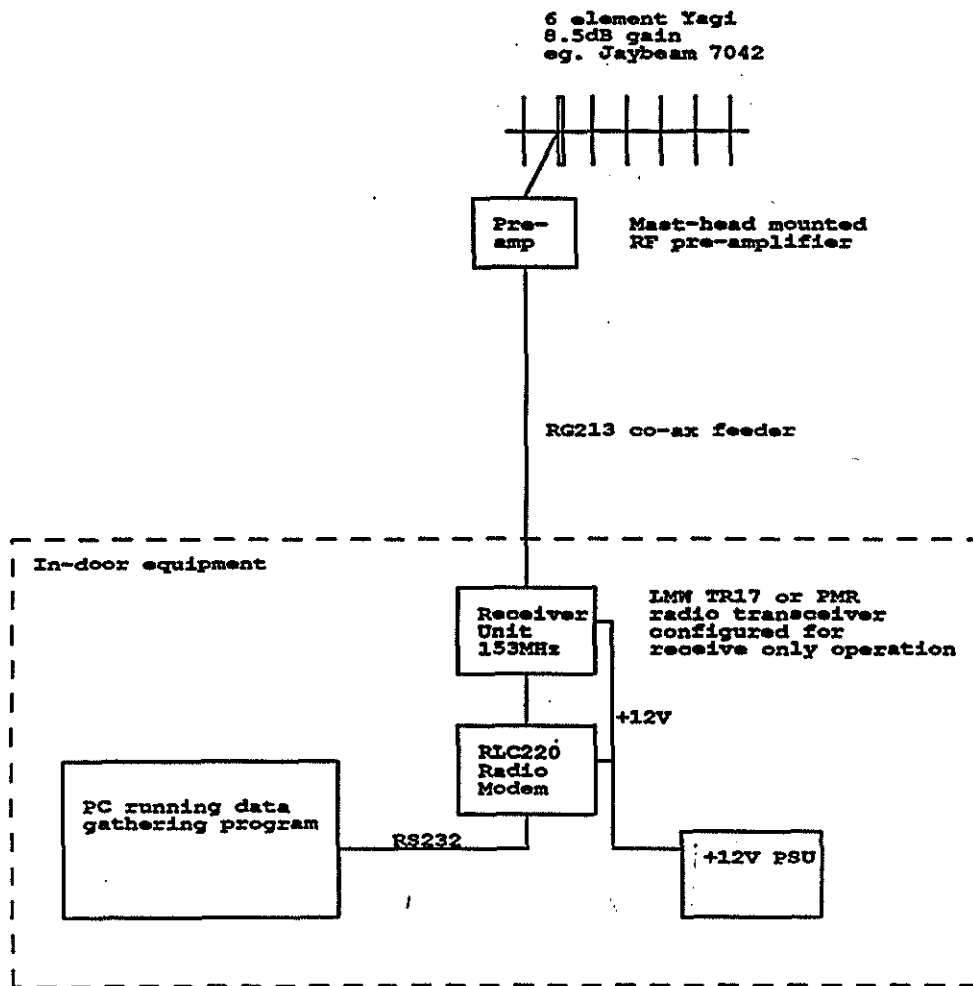
Details of the radio licence are in Appendix B

Thorcom Ltd, Unit4,96B Blackpole Trading Estate West, Worcester, WR3 8TJ

Telephone Number 0905 756700

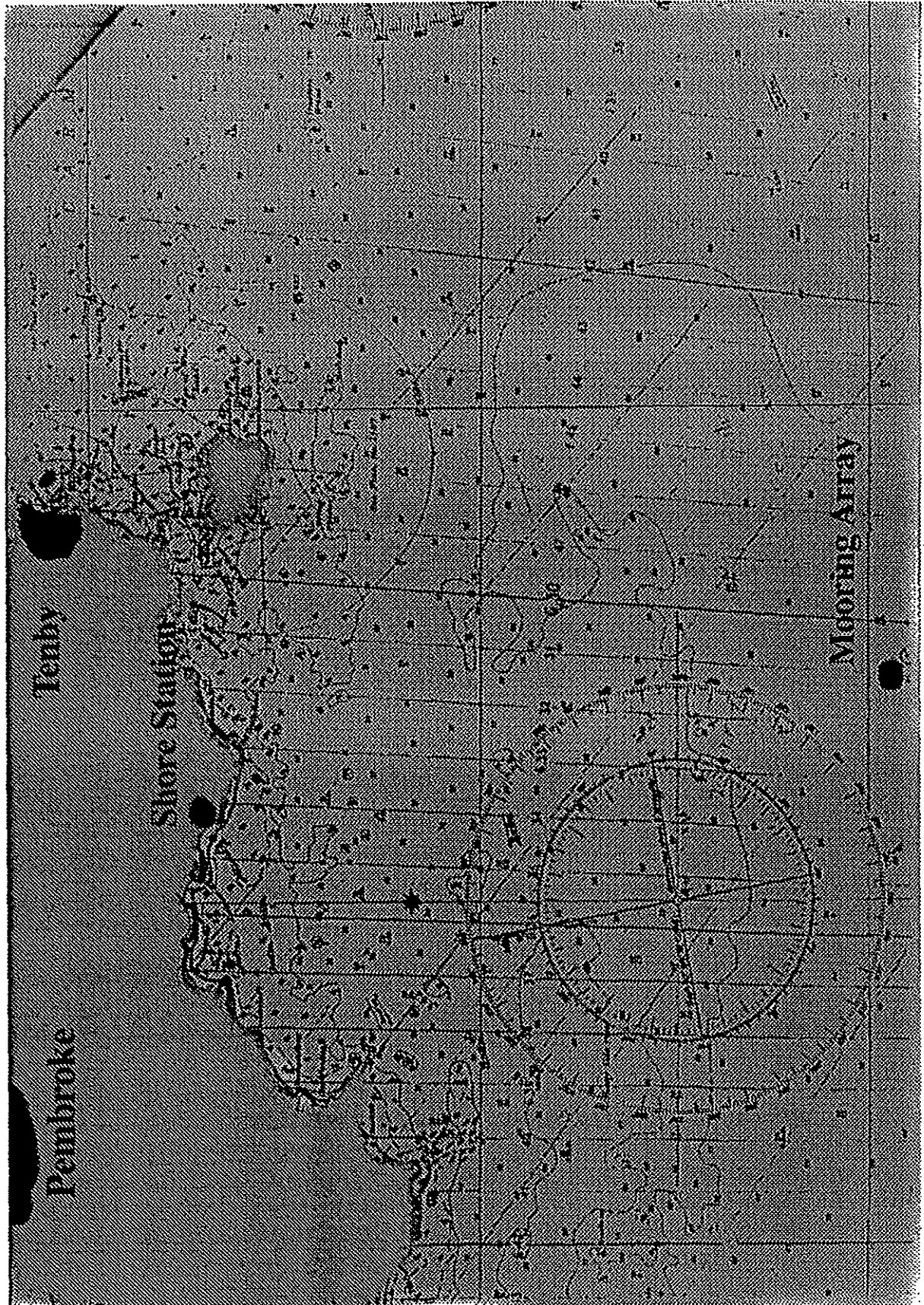
Base/Shore Station Receive Only Equipment

Buoy Transmitter



| | | |
|---|------------------|--------------|
| Thorcom Systems Limited | | |
| Unit 4, 96B Blackpole Trading Estate West, Worcester, WR5 1PW, England, U.K. Tel: 0905 756700 Fax: 0905 755777 | | |
| Title Institute of Oceanographic Sciences | | |
| Size | Document Number | REV |
| A4 | Data logger link | 1 |
| Date: | July 23, 1993 | Sheet 1 of 1 |

3.3. Map of the Area



4. DATA SOURCES AND PROCESSING

The application THORREAD.EXE was developed to convert .PDT and .UDT files produced by the THORCOM system into files of the standard binary FASTCOM format produced by the shipboard logging systems. If an error is encountered in the data, it deals with it in the manner described in the header of the source file listing THORREAD.C (see Appendix E.1). It also produces an ASCII error file, suffix .PDE or .UDE, listing the missing and bad blocks in the input file.

The program can be used under batch files TXPDR.BAT and TXUDR.BAT, suitably modified, to process a number of files with an appropriate wild card selection:

TXPDR.BAT

```
for %%f in (\logdata\*.pdt) do thorread %%f
rem translates Tubby format to FASTCOM format and generates error files
rem alter path\file (in brackets) to use wildcards, etc., as required
```

TXUDR.BAT

```
for %%f in (\logdata\*.udt) do thorread %%f
rem translates Tubby format to FASTCOM format and generates error files
rem alter path\file (in brackets) to use wildcards, etc., as required
```

Since the quantity of data collected is large and the requirements for using it are, as yet, undefined, the transfer to FASTCOM format files has only been carried out on a small number of files, for test purposes. However, there was an immediate interest in the reliability of the system, so the application THORSTAT.EXE was produced. This is a cut down version of THORREAD which has been used to analyse the .PDT and .UDT files for errors, producing an ASCII error file for each file processed.

Since a very large number of error files were produced, the application THORSUMM.EXE was developed to combine the errors listed in the error files produced by the above two applications into a tabular ASCII error statistics file.

The program can be used under batch files SUMPDE.BAT and SUMUDE.BAT, suitably modified, to process a number of files with an appropriate wild card selection:

SUMPDE.BAT

```
for %%f in (c:\data\*.pde) do thorsumm %%f
rem produces summary file of errors
rem alter path\file (in brackets) to use wildcards, etc., as required
```

SUMUDE.BAT

```
for %%f in (c:\data\*.ude) do thorsumm %%f
rem produces a summary file of errors
rem alter path\file (in brackets) to use wildcards, etc., as required
```

For test purposes and for eventual spectral processing, the application REPLAY2.EXE was produced; this is a form of the shipboard processing application FFTSETSW, used on "Warden". It is used to re-process a FASTCOM format file produced by THORREAD but, where bad data is encountered (as shown by a zero velocity of sound value), it substitutes the previous section's data accumulator values and flags the section of 1024 points of data so that it is not used.

The program can be used under batch files REPPDR.BAT and RERUDR.BAT, suitably modified, to process a number of files with an appropriate wild card selection:

REPPDR.BAT

```
for %%f in (c:\data\*.pdr) do replay2 12 %%f
rem displays time series graphically and does spectral processing as per FFTSETSW
rem alter path\file (in brackets) to use wildcards, etc., as required
```

REPUDR.BAT

```
for %%f in (c:\data\*.udr) do replay2 6 %%f
rem displays time series graphically and does spectral processing as per FFTSETSW
rem alter path\file (in brackets) to use wildcards, etc., as required
```

4.1. Data Quality Checking

Quality checking and a limited amount of error correction are carried out during the translation process, as described above. The net result of missing blocks of raw data is that the spectral analysis is performed on a lesser number of (1024 sample) sections, resulting in an increase in the confidence limits for the spectral estimates. Other schemes of processing could be implemented, such as the use of different length sections and the discarding of only the missing blocks, rather than the complete sections.

4.2. Summary of Data Produced

4.2.1. Raw Data Files

The complete list of data files collected during SWALES are in Appendix D. These are listed by Julian Day number, the listing details the location of the files on the Optical Disc which contains the complete SWALES telemetered data set.

The format of the data files is described in Appendix A. The data is written to disc in DOS format.

All the files have been analysed for errors by THORSTAT and THORSUM resulting in overall good data rate of 98%.

5. ACKNOWLEDGEMENTS

Without the advice and technical support of Thorcom this development would not have reached fruition, with particular thanks to Mike Tubby who directed the design of the system within Thorcom

Our thanks must also be extended to Mr Morgan at Hill Farm Manorbier for allowing the erection of our land station and aerial mast on his farm land.

The SWALES data set was the result of the concerted efforts of many, including the IOSDL Centre for Ocean Technology Development members of the Met Team, the IOSDL Moorings Team and the JRC members of the Met Team. The experimental work was funded by the MAFF Flood and Coastal Defence Division under commission FD0603; analysis of the data will be under commission FD0601.

6. APPENDIX A DATA FORMATS

6.1. Appendix A.1 Raw Data Files

The THORCOM receiving station produces files with suffices .PDT (prompted raw Sonic data) and .UDT (unprompted raw Sonic data); these share the same format.

The filenames have the form:

MMddhhmm.PDT

MMddhhmm.UDT

where MM = month (range 01 to 12)

dd = day (range 01 to 31)

hh = hour (range 00 to 23)

mm = minute (range 00 to 59)

Typical filelengths are 129000 bytes for .PDT files (approximately 10 minutes of raw data) and 68000 bytes for .UDT bytes (approximately 5 minutes of rawdata).

Each file consists of a number of blocks of received data, each preceded by a 1 byte block length, range 0 to 255, normally 202, 212 or 222; the block length does not include this byte.

The block of received data consists of

Sonic record number (2 bytes, binary, range 0 to 65535)

a number (normally 20, 21 or 22) of Sonic samples, each consisting of the 10 bytes:

uuvvwwcchh

where U = uu

V = vv

W = ww are 3 velocity components each of 2 bytes (16 bit binary integers),

C = cc is a 2byte velocity of sound (16 bit binary integer),

H = hh is a 2byte compass reading (16 bit binary integer)

U, V and W normally have the range -6000 to +6000 for -60 m/s to +60 m/s, with a value of -10000 being used if there is a fault condition

C normally has the range 0 to +18500 for 0 m/s to 370 m/s, with a value of -10000 being used if there is a fault condition

H has the nominal range 2048 to 4088 for a compass output of 0 to 255 (0° to 358.6° clockwise relative to magnetic North)

6.2. Appendix A.2 FASTCOM Files

The standard FASTCOM file format consists of a header and a number of samples of data, i.e.

Header (44 bytes):

Mode<sp>1<LF>

Analog<sp>1<LF>

Time<sp>hh:mm:ss<sp>Date<sp>mm/dd/yy<LF>

a number of Sonic samples (about 12200 or 6400, depending upon whether the file was derived from a .PDT or a .UDT file, respectively), each consisting of the 10 bytes:

uuvvwwcchh

defined as in Appendix B.1, above.

6.3. Appendix A.3 Error Files

6.3.1. .PDE and .UDE files

The .PDE and .UDE files produced by either THORREAD or THORSTAT, are ASCII text files which begin with the line:

Start record no. sssss<LF>

- where sssss is the record number of the first block of data and <LF> is the line feed character (10).

In the event of errors being detected, this is followed by lines of the form:

Missing record at mmmmm<LF>

- where a non-sequential record number is detected, mmmmm being the expected record number.

and/or

Bad Block Length lll at rrrrr<LF>

- where lll is the block length minus 2 (the 2 record number bytes) and rrrrr is the record number.

Usually the block length is found to be one less than expected, i.e. 199, 209 or 219; this is not too serious, since it represents only the loss of the final compass reading. Bad length blocks are padded out to the nominal length with bytes of zero, the nominal length being defined as 210 for prompted data and 200 for unprompted data. Data with more than 2 bytes missing will be rejected by the application REPLAY2, since the padding will result in (one or more) zero velocity of sound values.

The length of a .PDE or .UDE file will, therefore, depend upon the number of errors encountered, with a good record resulting in a length of about 23 bytes and a defective record resulting in a length of at least 36 bytes.

6.3.2. SUMMARY.RDE and SUMMARY.NDE files

The SUMMARY.RDE and .NDE files produced by THORSUMM from .PDE and .UDE files, respectively, are ASCII tabular files which consist of a number of lines of the format:

```
ddd.ddddd<tab>missing<tab>bad<LF>
```

where ddd.ddddd is the (decimal) day number derived from the , e.g. 273.50694 for day 273 1210 hrs

missing is the number of missing blocks in the source file (.PDE or .UDE)

bad is the number of blocks with incorrect length (not a multiple of 20 bytes) in the source file (.PDE or .UDE)

<tab> is the tab character (9)

<LF> is the line feed character (10)

The day numbers will be in the order of processing and further use of the application THORSUMM will result in summary data being appended to the output files. The data can be sorted into sequential day number order by loading the table into CricketGraph and then using the Menu⇒DATA⇒SORT function.

7. APPENDIX B RADIO LICIENCE

Department of Trade and Industry Radiocommunications Agency
Wireless Telegraphy Act 1949 Section 1



LIC. NO. TMP/33

DEPARTMENT OF TRADE AND INDUSTRY

RADIOCOMMUNICATIONS AGENCY

Wireless Telegraphy Act 1949 Section 1

TEMPORARY USE LICENCE

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND,
THE CHANNEL ISLANDS AND THE ISLE OF MAN

ESTABLISHMENT

1 This Licence ("the Licence") granted under section 1(1) of the Wireless Telegraphy Act 1949 ("the 1949 Act") on 23 August 1993 ("the Date of Issue") by the Secretary of State for Trade and Industry ("the Secretary of State") to the Institute Of Oceanographic Sciences ("the Licensee") [whose company number is] authorises the Licensee as from 1 October 1993 ("the Commencement Date") to establish and use the stations at the locations set out in the Schedule to this Licence ("the Schedule") for wireless telegraphy; FOR THE PURPOSES SPECIFIED IN AND SUBJECT TO THE TERMS, PROVISIONS AND LIMITATIONS CONTAINED IN THIS LICENCE.

PURPOSE OF USE

2 The Licensee may establish and use sending and receiving stations for wireless telegraphy at the locations specified in the Schedule for the purposes specified hereinafter:

TERMS, PROVISIONS AND LIMITATIONS

LIMITATIONS ON USE

3 The Licensee shall operate the Stations in accordance with the requirements set out in the Schedule.

APPARATUS

4 the Licensee shall ensure that the apparatus comprised in the Stations ("the Apparatus") is so designed, constructed, maintained and used that it does not cause any undue interference with any wireless telegraphy apparatus or stations for wireless telegraphy.

USERS OF THE STATIONS

5 The Licensee shall not permit or suffer any person to use the Stations unless that person is:

- (a) under the control of the Licensee, or

Department of Trade and Industry Radiocommunications Agency
Wireless Telegraphy Act 1949 Section 1



- (b) authorised by the Licensee in writing to use the Stations.

6 The Licensee shall ensure that:

- (a) all persons authorised under Clause 5 above are made aware of the terms, provisions and limitations of this Licence; and
- (b) all such persons comply with the terms, provisions and limitations of this Licence.

CALL SIGN

7 During transmission, the Licensee shall transmit the call sign (if any) specified in the Schedule:-

- (a) at the beginning and at the end of each period of transmission and when the period of transmission is longer than 15 minutes, at the end of each interval of 15 minutes;
- (b) at the beginning of transmission on a new frequency (whenever the frequency of transmission is changed);
- (c) in the same format that is being used for the transmission of the information; and
- (d) on the same carrier frequency that is being used for the transmission.

NOTICE OF VARIATION OR REVOCATION

8 Where the Secretary of State exercises his power to revoke or vary this licence in accordance with section 1(4) of the 1949 Act, a written notice will be served on the Licensee.

INSPECTION

9 The Licensee shall permit a person authorised by the Secretary of State to:

- (a) have access to the Stations;
- (b) inspect the Licence; and
- (c) inspect and test the Apparatus,

at any reasonable time, or when, in the opinion of the Secretary of State, an urgent situation exists, at any time, for the purpose of verifying compliance with the terms, provisions and limitations of the Licence, or investigating a radio interference problem.

Department of Trade and Industry Radiocommunications Agency
Wireless Telegraphy Act 1949 Section 1



RESTRICTION, SUSPENSION OR CLOSEDOWN

10 When, in the opinion of the Secretary of State, or of a person authorised by him in that behalf:

- (a) the Licensee or a person authorised by the Licensee under Clause 5 above is in breach of the Licence and in the circumstances such breach justifies immediate restriction or closedown; or
- (b) exceptional circumstances beyond the control of the Licensee have arisen such that any Station or Apparatus, although not operated in breach of the Licence, is causing or contributing to or aggravating undue interference with other wireless telegraphy,

the Licensee shall restrict the operation of, or closedown and cease to operate, the Station, or any Apparatus, immediately, either permanently or for a specified temporary period, in accordance with the demand of a person authorised by the Secretary of State.

PERIOD OF VALIDITY OF LICENCE

11 This Licence shall be valid from the commencement date to midnight of 17 December 1993 unless revoked earlier by the Secretary of State.

12 Any Licence which the Secretary of State has previously granted to the Licensee under the 1949 Act for any of the Stations is hereby revoked.

INTERPRETATION

13 In this Licence, unless the context otherwise requires:

- (a) the Interpretation Act 1978 shall apply to this Licence as it applies to an Act of Parliament; and
- (b) "inspect" includes examine and test.

14 The headings are for ease of reference only and shall not affect the interpretation of this Licence.

15 The Schedule is incorporated in and forms part of this Licence.

SIGNED Mrs DeFreitas

Department of Trade and Industry Radiocommunications Agency
Wireless Telegraphy Act 1949 Section 1



SCHEDULE

RA Ref: TMP/33

Call sign (if applicable):

Location of Station: Carmarthen Bay

Purpose of Station: Transmittiion of environmental data from a moored platform to a shore based logger

Frequency: 153.3 MHz

Class of Emission: 16K0F1D

Maximum Power: -3 dBW

Antenna Characteristics: Co-Linear (omni directional)

Department of Trade and Industry Radiocommunications Agency
Wireless Telegraphy Act 1949 Section 1

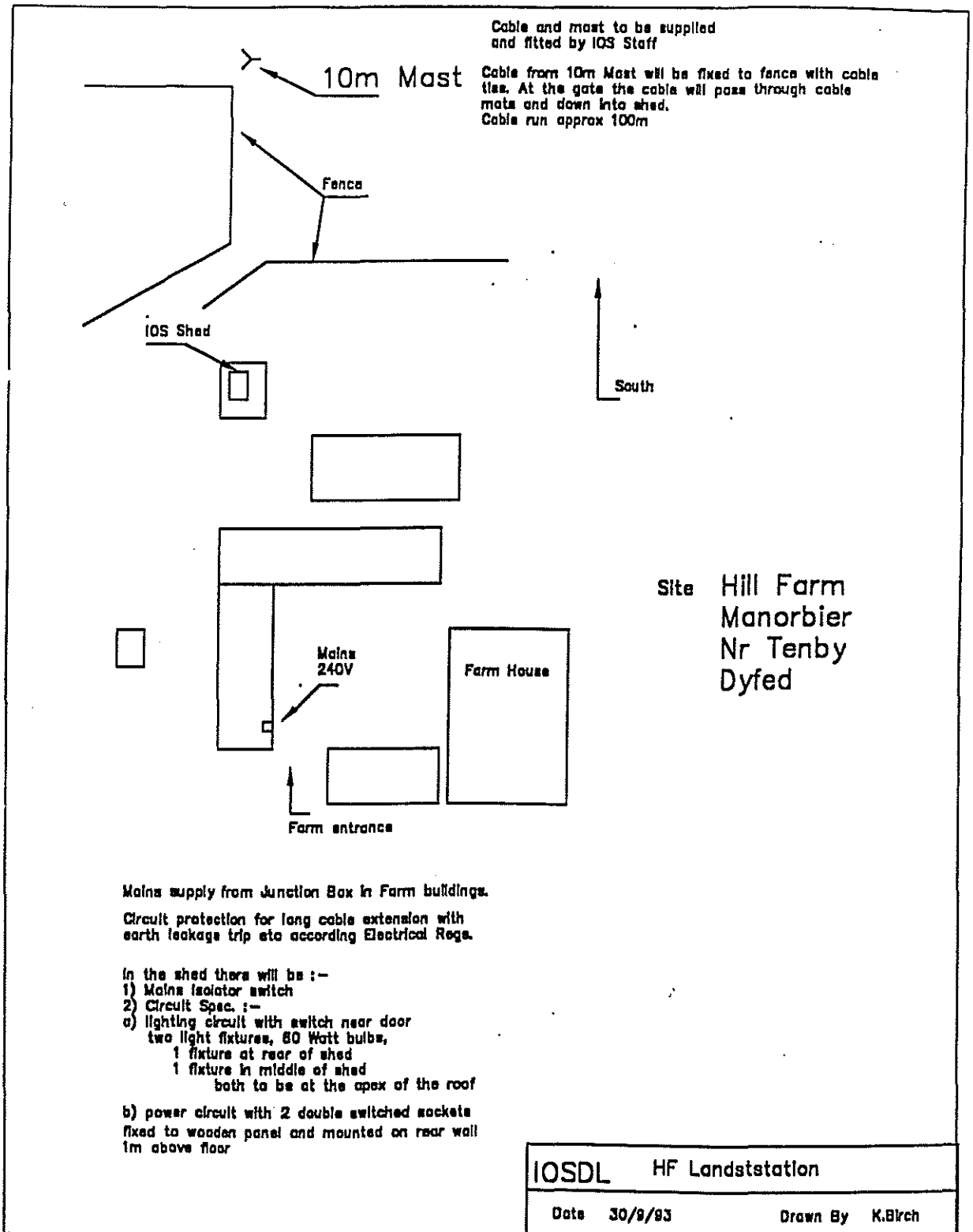


NOTES

- 1 In the event of a demand to close down or restrict the operation of any Station or Apparatus under clause 9 of the Licence, the Licensee must close down or restrict the operation of the Station or Apparatus immediately. The Licensee will be given oral reasons for the demand and will have an opportunity to provide reasons why the demand should not be met. If the demand is affirmed then it will be confirmed to the Licensee in writing as soon as practicable. If the Licensee does not comply with the demand or if the breach resulting in the demand is not rectified within a reasonable period of time to the satisfaction of the Secretary of State, then revocation or variation of Licence procedures may be commenced under section 1(4) of the Act or a prosecution may be initiated (depending on the circumstances of each case).
- 2 The Licensee must apply for a variation of the Licence from the Secretary of State before making any changes which may contravene the Licence.
- 3 The Licence is not transferable.
- 4 Radiocommunications Agency is an Executive Agency of the Department of Trade and Industry acting on behalf of the Secretary of State.

Tempuse.lic

8. APPENDIX C SHORE STATION SPECIFICATION



Cable supplied by IOS, and installed by contractor

Electrical fittings to be supplied by contractor

Mains supply from Junction Box in Farm buildings.

Circuit protection for long cable extension with earth leakage trip etc according Electrical Regs.

In the shed there will be :-

- 1) Mains isolator switch
- 2) Circuit Spec. :-
 - a) lighting circuit with switch near door
two light fixtures, 60 Watt bulbs,
 - 1 fixture at rear of shed
 - 1 fixture in middle of shedboth to be at the apex of the roof
 - b) power circuit with 2 double switched sockets fixed to wooden panel and mounted on rear wall 1m above floor

IOSDL Landstation

Date 1/10/93

Drawn by K.Birch

9. APPENDIX D RAW DATA FILES

SONIC RAW DATA FROM VHF LANDSTATION

Volume in drive D is SWALES HUT
 Volume Serial Number is 2629-12CB
 Directory of D:\HUTDATA

MO DRIVE SIDE A BUOY DEPLOYMENT 1

JDAY 279

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| 10060500.PDT | 10060510.UDT | 10060515.PDT | 10060525.UDT | 10060530.PDT |
| 10060540.UDT | 10060545.PDT | 10060555.UDT | 10060600.PDT | 10060610.UDT |
| 10060615.PDT | 10060625.UDT | 10060630.PDT | 10060640.UDT | 10060655.UDT |

JDAY 294

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| 10211430.UDT | 10211432.PDT | 10211442.UDT | 10211447.PDT | 10211457.UDT |
| 10211502.PDT | 10211512.UDT | 10211517.PDT | 10211527.UDT | 10211532.PDT |
| 10211542.UDT | 10211547.PDT | 10211557.UDT | 10211602.PDT | 10211612.UDT |
| 10211617.PDT | 10211627.UDT | 10211632.PDT | 10211642.UDT | 10211647.PDT |
| 10211657.UDT | 10211702.PDT | 10211712.UDT | 10211717.PDT | 10211727.UDT |
| 10211732.PDT | 10211742.UDT | 10211747.PDT | 10211757.UDT | 10211802.PDT |
| 10211812.UDT | 10211817.PDT | 10211827.UDT | 10211832.PDT | 10211842.UDT |
| 10211847.PDT | 10211857.UDT | 10211902.PDT | 10211912.UDT | 10211917.PDT |
| 10211927.UDT | 10211932.PDT | 10211942.UDT | 10211947.PDT | 10211957.UDT |
| 10212002.PDT | 10212012.UDT | 10212017.PDT | 10212027.UDT | 10212032.PDT |
| 10212042.UDT | 10212047.PDT | 10212057.UDT | 10212102.PDT | 10212112.UDT |
| 10212117.PDT | 10212127.UDT | 10212132.PDT | 10212142.UDT | 10212147.PDT |
| 10212157.UDT | 10212202.PDT | 10212212.UDT | 10212217.PDT | 10212227.UDT |
| 10212232.PDT | 10212242.UDT | 10212302.PDT | 10212312.UDT | 10212317.PDT |
| 10212327.UDT | 10212332.PDT | 10212342.UDT | 10212348.PDT | 10212358.UDT |

JDAY 295

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| 10220003.PDT | 10220013.UDT | 10220018.PDT | 10220028.UDT | 10220033.PDT |
| 10220043.UDT | 10220048.PDT | 10220058.UDT | 10220103.PDT | 10220113.UDT |
| 10220118.PDT | 10220128.UDT | 10220133.PDT | 10220143.UDT | 10220148.PDT |
| 10220158.UDT | 10220203.PDT | 10220213.UDT | 10220218.PDT | 10220228.UDT |
| 10220233.PDT | 10220243.UDT | 10220248.PDT | 10220258.UDT | 10220303.PDT |
| 10220313.UDT | 10220318.PDT | 10220328.UDT | 10220333.PDT | 10220343.UDT |
| 10220348.PDT | 10220358.UDT | 10220403.PDT | 10220413.UDT | 10220418.PDT |
| 10220428.UDT | 10220433.PDT | 10220443.UDT | 10220448.PDT | 10220458.UDT |
| 10220503.PDT | 10220513.UDT | 10220518.PDT | 10220528.UDT | 10220533.PDT |
| 10220543.UDT | 10220548.PDT | 10220558.UDT | 10220603.PDT | 10220613.UDT |
| 10220618.PDT | 10220628.UDT | 10220633.PDT | 10220643.UDT | 10220648.PDT |
| 10220658.UDT | 10220703.PDT | 10220713.UDT | 10220718.PDT | 10220728.UDT |
| 10220733.PDT | 10220743.UDT | 10220748.PDT | 10220758.UDT | 10220803.PDT |
| 10220813.UDT | 10220818.PDT | 10220828.UDT | 10220833.PDT | 10220843.UDT |
| 10220848.PDT | 10220858.UDT | 10220903.PDT | 10220913.UDT | 10220918.PDT |
| 10220928.UDT | 10220933.PDT | 10220943.UDT | 10220948.PDT | 10220958.UDT |
| 10221003.PDT | 10221026.UDT | 10221029.PDT | 10221039.UDT | 10221044.PDT |
| 10221054.UDT | 10221059.PDT | 10221109.UDT | 10221114.PDT | 10221124.UDT |
| 10221129.PDT | 10221139.UDT | 10221144.PDT | 10221154.UDT | 10221159.PDT |
| 10221209.UDT | 10221214.PDT | 10221224.UDT | 10221229.PDT | 10221239.UDT |
| 10221244.PDT | 10221254.UDT | 10221259.PDT | 10221309.UDT | 10221314.PDT |
| 10221324.UDT | 10221329.PDT | 10221339.UDT | 10221344.PDT | 10221354.UDT |
| 10221359.PDT | 10221409.UDT | 10221414.PDT | 10221424.UDT | 10221429.PDT |
| 10221439.UDT | 10221444.PDT | 10221454.UDT | 10221459.PDT | 10221509.UDT |
| 10221514.PDT | 10221524.UDT | 10221529.PDT | 10221539.UDT | 10221544.PDT |
| 10221554.UDT | 10221559.PDT | 10221609.UDT | 10221614.PDT | 10221624.UDT |
| 10221629.PDT | 10221639.UDT | 10221644.PDT | 10221654.UDT | 10221659.PDT |
| 10221709.UDT | 10221714.PDT | 10221724.UDT | 10221729.PDT | 10221739.UDT |

Cable supplied by IOS, and installed by contractor

Electrical fittings to be supplied by contractor

Mains supply from Junction Box in Farm buildings.

Circuit protection for long cable extension with earth leakage trip etc according Electrical Regs.

In the shed there will be :-

- 1) Mains isolator switch
- 2) Circuit Spec. :-
 - a) lighting circuit with switch near door
two light fixtures, 60 Watt bulbs,
 - 1 fixture at rear of shed
 - 1 fixture in middle of shedboth to be at the apex of the roof
 - b) power circuit with 2 double switched sockets fixed to wooden panel and mounted on rear wall 1m above floor

IOSDL Landstation

Date 1/10/93

Drawn by K.Birch

9. APPENDIX D RAW DATA FILES

SONIC RAW DATA FROM VHF LANDSTATION

Volume in drive D is SWALES HUT
 Volume Serial Number is 2629-12CB
 Directory of D:\HUTDATA

MO DRIVE SIDE A BUOY DEPLOYMENT 1

JDAY 279

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| 10060500.PDT | 10060510.UDT | 10060515.PDT | 10060525.UDT | 10060530.PDT |
| 10060540.UDT | 10060545.PDT | 10060555.UDT | 10060600.PDT | 10060610.UDT |
| 10060615.PDT | 10060625.UDT | 10060630.PDT | 10060640.UDT | 10060655.UDT |

JDAY 294

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| 10211430.UDT | 10211432.PDT | 10211442.UDT | 10211447.PDT | 10211457.UDT |
| 10211502.PDT | 10211512.UDT | 10211517.PDT | 10211527.UDT | 10211532.PDT |
| 10211542.UDT | 10211547.PDT | 10211557.UDT | 10211602.PDT | 10211612.UDT |
| 10211617.PDT | 10211627.UDT | 10211632.PDT | 10211642.UDT | 10211647.PDT |
| 10211657.UDT | 10211702.PDT | 10211712.UDT | 10211717.PDT | 10211727.UDT |
| 10211732.PDT | 10211742.UDT | 10211747.PDT | 10211757.UDT | 10211802.PDT |
| 10211812.UDT | 10211817.PDT | 10211827.UDT | 10211832.PDT | 10211842.UDT |
| 10211847.PDT | 10211857.UDT | 10211902.PDT | 10211912.UDT | 10211917.PDT |
| 10211927.UDT | 10211932.PDT | 10211942.UDT | 10211947.PDT | 10211957.UDT |
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| 10212117.PDT | 10212127.UDT | 10212132.PDT | 10212142.UDT | 10212147.PDT |
| 10212157.UDT | 10212202.PDT | 10212212.UDT | 10212217.PDT | 10212227.UDT |
| 10212232.PDT | 10212242.UDT | 10212302.PDT | 10212312.UDT | 10212317.PDT |
| 10212327.UDT | 10212332.PDT | 10212342.UDT | 10212348.PDT | 10212358.UDT |

JDAY 295

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| 10220158.UDT | 10220203.PDT | 10220213.UDT | 10220218.PDT | 10220228.UDT |
| 10220233.PDT | 10220243.UDT | 10220248.PDT | 10220258.UDT | 10220303.PDT |
| 10220313.UDT | 10220318.PDT | 10220328.UDT | 10220333.PDT | 10220343.UDT |
| 10220348.PDT | 10220358.UDT | 10220403.PDT | 10220413.UDT | 10220418.PDT |
| 10220428.UDT | 10220433.PDT | 10220443.UDT | 10220448.PDT | 10220458.UDT |
| 10220503.PDT | 10220513.UDT | 10220518.PDT | 10220528.UDT | 10220533.PDT |
| 10220543.UDT | 10220548.PDT | 10220558.UDT | 10220603.PDT | 10220613.UDT |
| 10220618.PDT | 10220628.UDT | 10220633.PDT | 10220643.UDT | 10220648.PDT |
| 10220658.UDT | 10220703.PDT | 10220713.UDT | 10220718.PDT | 10220728.UDT |
| 10220733.PDT | 10220743.UDT | 10220748.PDT | 10220758.UDT | 10220803.PDT |
| 10220813.UDT | 10220818.PDT | 10220828.UDT | 10220833.PDT | 10220843.UDT |
| 10220848.PDT | 10220858.UDT | 10220903.PDT | 10220913.UDT | 10220918.PDT |
| 10220928.UDT | 10220933.PDT | 10220943.UDT | 10220948.PDT | 10220958.UDT |
| 10221003.PDT | 10221026.UDT | 10221029.PDT | 10221039.UDT | 10221044.PDT |
| 10221054.UDT | 10221059.PDT | 10221109.UDT | 10221114.PDT | 10221124.UDT |
| 10221129.PDT | 10221139.UDT | 10221144.PDT | 10221154.UDT | 10221159.PDT |
| 10221209.UDT | 10221214.PDT | 10221224.UDT | 10221229.PDT | 10221239.UDT |
| 10221244.PDT | 10221254.UDT | 10221259.PDT | 10221309.UDT | 10221314.PDT |
| 10221324.UDT | 10221329.PDT | 10221339.UDT | 10221344.PDT | 10221354.UDT |
| 10221359.PDT | 10221409.UDT | 10221414.PDT | 10221424.UDT | 10221429.PDT |
| 10221439.UDT | 10221444.PDT | 10221454.UDT | 10221459.PDT | 10221509.UDT |
| 10221514.PDT | 10221524.UDT | 10221529.PDT | 10221539.UDT | 10221544.PDT |
| 10221554.UDT | 10221559.PDT | 10221609.UDT | 10221614.PDT | 10221624.UDT |
| 10221629.PDT | 10221639.UDT | 10221644.PDT | 10221654.UDT | 10221659.PDT |
| 10221709.UDT | 10221714.PDT | 10221724.UDT | 10221729.PDT | 10221739.UDT |

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| 10221744.PDT | 10221754.UDT | 10221759.PDT | 10221809.UDT | 10221814.PDT |
| 10221824.UDT | 10221829.PDT | 10221839.UDT | 10221844.PDT | 10221854.UDT |
| 10221859.PDT | 10221909.UDT | 10221914.PDT | 10221924.UDT | 10221929.PDT |
| 10221939.UDT | 10221944.PDT | 10221954.UDT | 10221959.PDT | 10222009.UDT |
| 10222014.PDT | 10222024.UDT | 10222029.PDT | 10222039.UDT | 10222044.PDT |
| 10222054.UDT | 10222059.PDT | 10222109.UDT | 10222114.PDT | 10222124.UDT |
| 10222129.PDT | 10222139.UDT | 10222144.PDT | 10222154.UDT | 10222159.PDT |
| 10222209.UDT | 10222214.PDT | 10222224.UDT | 10222229.PDT | 10222239.UDT |
| 10222244.PDT | 10222254.UDT | 10222259.PDT | 10222309.UDT | 10222314.PDT |
| 10222324.UDT | 10222329.PDT | 10222339.UDT | 10222344.PDT | 10222354.UDT |

JDAY 296

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|--------------|--------------|--------------|--------------|--------------|
| 10230000.PDT | 10230009.UDT | 10230015.PDT | 10230024.UDT | 10230030.PDT |
| 10230039.UDT | 10230045.PDT | 10230054.UDT | 10230100.PDT | 10230109.UDT |
| 10230115.PDT | 10230124.UDT | 10230130.PDT | 10230139.UDT | 10230145.PDT |
| 10230154.UDT | 10230200.PDT | 10230209.UDT | 10230215.PDT | 10230224.UDT |
| 10230230.PDT | 10230239.UDT | 10230245.PDT | 10230254.UDT | 10230300.PDT |
| 10230309.UDT | 10230315.PDT | 10230324.UDT | 10230330.PDT | 10230339.UDT |
| 10230345.PDT | 10230354.UDT | 10230400.PDT | 10230409.UDT | 10230415.PDT |
| 10230424.UDT | 10230430.PDT | 10230439.UDT | 10230445.PDT | 10230454.UDT |
| 10230500.PDT | 10230509.UDT | 10230515.PDT | 10230524.UDT | 10230530.PDT |
| 10230539.UDT | 10230545.PDT | 10230554.UDT | 10230559.PDT | 10230609.UDT |
| 10230614.PDT | 10230624.UDT | 10230630.PDT | 10230639.UDT | 10230644.PDT |
| 10230654.UDT | 10230659.PDT | 10230709.UDT | 10230715.PDT | 10230724.UDT |
| 10230730.PDT | 10230739.UDT | 10230744.PDT | 10230754.UDT | 10230800.PDT |
| 10230809.UDT | 10230814.PDT | 10230824.UDT | 10230830.PDT | 10230839.UDT |
| 10230845.PDT | 10230854.UDT | 10230900.PDT | 10230909.UDT | 10230914.PDT |
| 10230924.UDT | 10230929.PDT | 10230939.UDT | 10230945.PDT | 10230954.UDT |
| 10231000.PDT | 10231009.UDT | 10231014.PDT | 10231024.UDT | 10231029.PDT |
| 10231039.UDT | 10231044.PDT | 10231054.UDT | 10231100.PDT | 10231109.UDT |
| 10231114.PDT | 10231124.UDT | 10231129.PDT | 10231139.UDT | 10231144.PDT |
| 10231154.UDT | 10231159.PDT | 10231209.UDT | 10231214.PDT | 10231224.UDT |
| 10231229.PDT | 10231239.UDT | 10231244.PDT | 10231254.UDT | 10231259.PDT |
| 10231309.UDT | 10231314.PDT | 10231324.UDT | 10231329.PDT | 10231339.UDT |
| 10231344.PDT | 10231354.UDT | 10231359.PDT | 10231409.UDT | 10231414.PDT |
| 10231424.UDT | 10231429.PDT | 10231439.UDT | 10231444.PDT | 10231454.UDT |
| 10231459.PDT | 10231509.UDT | 10231514.PDT | 10231524.UDT | 10231529.PDT |
| 10231539.UDT | 10231544.PDT | 10231554.UDT | 10231559.PDT | 10231609.UDT |
| 10231614.PDT | 10231624.UDT | 10231629.PDT | 10231639.UDT | 10231644.PDT |
| 10231654.UDT | 10231659.PDT | 10231709.UDT | 10231714.PDT | 10231724.UDT |
| 10231729.PDT | 10231739.UDT | 10231744.PDT | 10231754.UDT | 10231759.PDT |
| 10231809.UDT | 10231814.PDT | 10231824.UDT | 10231829.PDT | 10231839.UDT |
| 10231844.PDT | 10231854.UDT | 10231859.PDT | 10231909.UDT | 10231914.PDT |
| 10231924.UDT | 10231929.PDT | 10231939.UDT | 10231944.PDT | 10231954.UDT |
| 10231959.PDT | 10232009.UDT | 10232014.PDT | 10232024.UDT | 10232029.PDT |
| 10232039.UDT | 10232044.PDT | 10232054.UDT | 10232059.PDT | 10232109.UDT |
| 10232114.PDT | 10232124.UDT | 10232129.PDT | 10232139.UDT | 10232144.PDT |
| 10232154.UDT | 10232159.PDT | 10232209.UDT | 10232214.PDT | 10232224.UDT |
| 10232229.PDT | 10232239.UDT | 10232244.PDT | 10232254.UDT | 10232259.PDT |
| 10232309.UDT | 10232314.PDT | 10232324.UDT | 10232329.PDT | 10232339.UDT |
| 10232344.PDT | 10232354.UDT | 10240000.PDT | 10240010.UDT | 10240015.PDT |
| 10240025.UDT | 10240030.PDT | 10240040.UDT | 10240045.PDT | 10240055.UDT |

JDAY 297

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|--------------|--------------|--------------|--------------|--------------|
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| 10240215.PDT | 10240225.UDT | 10240230.PDT | 10240240.UDT | 10240245.PDT |
| 10240255.UDT | 10240300.PDT | 10240310.UDT | 10240315.PDT | 10240325.UDT |
| 10240330.PDT | 10240340.UDT | 10240345.PDT | 10240355.UDT | 10240400.PDT |
| 10240410.UDT | 10240415.PDT | 10240425.UDT | 10240430.PDT | 10240440.UDT |

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| 10240600.PDT | 10240610.UDT | 10240615.PDT | 10240625.UDT | 10240630.PDT |
| 10240640.UDT | 10240645.PDT | 10240655.UDT | 10240700.PDT | 10240710.UDT |
| 10240715.PDT | 10240725.UDT | 10240730.PDT | 10240740.UDT | 10240745.PDT |
| 10240755.UDT | 10240800.PDT | 10240810.UDT | 10240815.PDT | 10240825.UDT |
| 10240830.PDT | 10240840.UDT | 10240845.PDT | 10240855.UDT | 10240900.PDT |
| 10240910.UDT | 10240915.PDT | 10240925.UDT | 10240930.PDT | 10240940.UDT |
| 10240945.PDT | 10240955.UDT | 10241000.PDT | 10241010.UDT | 10241015.PDT |
| 10241025.UDT | 10241030.PDT | 10241040.UDT | 10241045.PDT | 10241055.UDT |
| 10241100.PDT | 10241110.UDT | 10241115.PDT | 10241125.UDT | 10241130.PDT |
| 10241140.UDT | 10241145.PDT | 10241155.UDT | 10241200.PDT | 10241210.UDT |
| 10241215.PDT | 10241225.UDT | 10241230.PDT | 10241240.UDT | 10241245.PDT |
| 10241255.UDT | 10241300.PDT | 10241310.UDT | 10241315.PDT | 10241325.UDT |
| 10241330.PDT | 10241340.UDT | 10241345.PDT | 10241355.UDT | 10241400.PDT |
| 10241410.UDT | 10241415.PDT | 10241425.UDT | 10241430.PDT | 10241440.UDT |
| 10241445.PDT | 10241455.UDT | 10241500.PDT | 10241510.UDT | 10241515.PDT |
| 10241525.UDT | 10241530.PDT | 10241540.UDT | 10241545.PDT | 10241555.UDT |
| 10241600.PDT | 10241610.UDT | 10241615.PDT | 10241625.UDT | 10241630.PDT |
| 10241640.UDT | 10241645.PDT | 10241655.UDT | 10241700.PDT | 10241710.UDT |
| 10241715.PDT | 10241725.UDT | 10241730.PDT | 10241740.UDT | 10241745.PDT |
| 10241755.UDT | 10241800.PDT | 10241810.UDT | 10241815.PDT | 10241825.UDT |
| 10241830.PDT | 10241840.UDT | 10241845.PDT | 10241855.UDT | 10241900.PDT |
| 10241910.UDT | 10241915.PDT | 10241925.UDT | 10241930.PDT | 10241940.UDT |
| 10241945.PDT | 10241955.UDT | 10242000.PDT | 10242010.UDT | 10242015.PDT |
| 10242025.UDT | 10242030.PDT | 10242040.UDT | 10242045.PDT | 10242055.UDT |
| 10242100.PDT | 10242110.UDT | 10242115.PDT | 10242125.UDT | 10242130.PDT |
| 10242140.UDT | 10242145.PDT | 10242155.UDT | 10242200.PDT | 10242210.UDT |
| 10242215.PDT | 10242225.UDT | 10242230.PDT | 10242240.UDT | 10242245.PDT |
| 10242255.UDT | 10242300.PDT | 10242310.UDT | 10242315.PDT | 10242325.UDT |
| 10242330.PDT | 10242340.UDT | 10242345.PDT | 10242355.UDT | 10250000.PDT |
| JDAY 298 | | | | |
| 10250010.UDT | 10250015.PDT | 10250025.UDT | 10250030.PDT | 10250040.UDT |
| 10250045.PDT | 10250055.UDT | 10250100.PDT | 10250110.UDT | 10250115.PDT |
| 10250125.UDT | 10250130.PDT | 10250140.UDT | 10250145.PDT | 10250155.UDT |
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| 10250240.UDT | 10250245.PDT | 10250255.UDT | 10250300.PDT | 10250310.UDT |
| 10250315.PDT | 10250325.UDT | 10250330.PDT | 10250340.UDT | 10250345.PDT |
| 10250355.UDT | 10250400.PDT | 10250410.UDT | 10250415.PDT | 10250425.UDT |
| 10250430.PDT | 10250440.UDT | 10250445.PDT | 10250455.UDT | 10250500.PDT |
| 10250510.UDT | 10250515.PDT | 10250525.UDT | 10250530.PDT | 10250540.UDT |
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| 10250625.UDT | 10250630.PDT | 10250640.UDT | 10250645.PDT | 10250655.UDT |
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| 10250740.UDT | 10250745.PDT | 10250755.UDT | 10250800.PDT | 10250810.UDT |
| 10250815.PDT | 10250825.UDT | 10250830.PDT | 10250840.UDT | 10250845.PDT |
| 10250855.UDT | 10250900.PDT | 10250910.UDT | 10250915.PDT | 10250925.UDT |
| 10250930.PDT | 10250940.UDT | 10250945.PDT | 10250955.UDT | 10251000.PDT |
| 10251010.UDT | 10251015.PDT | 10251025.UDT | 10251030.PDT | 10251040.UDT |
| 10251045.PDT | 10251055.UDT | 10251100.PDT | 10251110.UDT | 10251115.PDT |
| 10251125.UDT | 10251130.PDT | 10251140.UDT | 10251145.PDT | 10251155.UDT |
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| 10251240.UDT | 10251245.PDT | 10251255.UDT | 10251300.PDT | 10251310.UDT |
| 10251315.PDT | 10251325.UDT | 10251330.PDT | 10251340.UDT | 10251345.PDT |
| 10251355.UDT | 10251400.PDT | 10251410.UDT | 10251415.PDT | 10251425.UDT |
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| 10251510.UDT | 10251515.PDT | 10251525.UDT | 10251530.PDT | 10251540.UDT |
| 10251545.PDT | 10251555.UDT | 10251600.PDT | 10251610.UDT | 10251615.PDT |

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|--------------|--------------|--------------|--------------|--------------|
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| 10251700.PDT | 10251710.UDT | 10251715.PDT | 10251725.UDT | 10251730.PDT |
| 10251740.UDT | 10251745.PDT | 10251755.UDT | 10251800.PDT | 10251810.UDT |
| 10251815.PDT | 10251825.UDT | 10251830.PDT | 10251840.UDT | 10251845.PDT |
| 10251855.UDT | 10251900.PDT | 10251910.UDT | 10251915.PDT | 10251925.UDT |
| 10251930.PDT | 10251940.UDT | 10251945.PDT | 10251955.UDT | 10252000.PDT |
| 10252010.UDT | 10252015.PDT | 10252025.UDT | 10252030.PDT | 10252040.UDT |
| 10252045.PDT | 10252055.UDT | 10252100.PDT | 10252110.UDT | 10252115.PDT |
| 10252125.UDT | 10252130.PDT | 10252140.UDT | 10252145.PDT | 10252155.UDT |
| 10252215.PDT | 10252225.UDT | 10252230.PDT | 10252240.UDT | 10252245.PDT |
| 10252255.UDT | 10252300.PDT | 10252310.UDT | 10252315.PDT | 10252325.UDT |
| 10252330.PDT | 10252340.UDT | 10252345.PDT | 10252355.UDT | |

JDAY 299

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| | | | | 10260001.PDT |
| 10260011.UDT | 10260016.PDT | 10260026.UDT | 10260031.PDT | 10260041.UDT |
| 10260046.PDT | 10260056.UDT | 10260101.PDT | 10260111.UDT | 10260116.PDT |
| 10260126.UDT | 10260131.PDT | 10260141.UDT | 10260146.PDT | 10260156.UDT |
| 10260201.PDT | 10260211.UDT | 10260216.PDT | 10260226.UDT | 10260231.PDT |
| 10260241.UDT | 10260246.PDT | 10260256.UDT | 10260301.PDT | 10260311.UDT |
| 10260316.PDT | 10260326.UDT | 10260331.PDT | 10260341.UDT | 10260346.PDT |
| 10260356.UDT | 10260401.PDT | 10260411.UDT | 10260416.PDT | 10260426.UDT |
| 10260431.PDT | 10260441.UDT | 10260446.PDT | 10260456.UDT | 10260501.PDT |
| 10260511.UDT | 10260516.PDT | 10260526.UDT | 10260531.PDT | 10260541.UDT |
| 10260546.PDT | 10260556.UDT | 10260601.PDT | 10260611.UDT | 10260616.PDT |
| 10260626.UDT | 10260631.PDT | 10260641.UDT | 10260646.PDT | 10260656.UDT |
| 10260701.PDT | 10260711.UDT | 10260716.PDT | 10260726.UDT | 10260731.PDT |
| 10260741.UDT | 10260746.PDT | 10260756.UDT | 10260801.PDT | 10260811.UDT |
| 10260816.PDT | 10260826.UDT | 10260831.PDT | 10260841.UDT | 10260846.PDT |
| 10260856.UDT | 10260901.PDT | 10260911.UDT | 10260916.PDT | 10260926.UDT |
| 10260931.PDT | 10260941.UDT | 10260946.PDT | 10260956.UDT | 10261001.PDT |
| 10261011.UDT | 10261016.PDT | 10261026.UDT | 10261031.PDT | 10261041.UDT |
| 10261046.PDT | 10261056.UDT | 10261101.PDT | 10261111.UDT | 10261116.PDT |
| 10261126.UDT | 10261131.PDT | 10261141.UDT | 10261146.PDT | 10261156.UDT |
| 10261201.PDT | 10261211.UDT | 10261216.PDT | 10261226.UDT | 10261231.PDT |
| 10261241.UDT | 10261246.PDT | 10261256.UDT | 10261301.PDT | 10261311.UDT |
| 10261316.PDT | 10261326.UDT | 10261331.PDT | 10261341.UDT | 10261346.PDT |
| 10261356.UDT | 10261401.PDT | 10261411.UDT | 10261416.PDT | 10261426.UDT |
| 10261431.PDT | 10261441.UDT | 10261446.PDT | 10261456.UDT | 10261501.PDT |
| 10261511.UDT | 10261516.PDT | 10261526.UDT | 10261531.PDT | 10261541.UDT |
| 10261546.PDT | 10261556.UDT | 10261601.PDT | 10261611.UDT | 10261616.PDT |
| 10261626.UDT | 10261631.PDT | 10261641.UDT | 10261646.PDT | 10261656.UDT |
| 10261701.PDT | 10261711.UDT | 10261716.PDT | 10261726.UDT | 10261731.PDT |
| 10261741.UDT | 10261746.PDT | 10261756.UDT | 10261801.PDT | 10261811.UDT |
| 10261816.PDT | 10261826.UDT | 10261831.PDT | 10261841.UDT | 10261846.PDT |
| 10261856.UDT | 10261901.PDT | 10261911.UDT | 10261916.PDT | 10261926.UDT |
| 10261931.PDT | 10261941.UDT | 10261946.PDT | 10261956.UDT | 10262001.PDT |
| 10262011.UDT | 10262016.PDT | 10262026.UDT | 10262031.PDT | 10262041.UDT |
| 10262046.PDT | 10262056.UDT | 10262101.PDT | 10262111.UDT | 10262116.PDT |
| 10262126.UDT | 10262131.PDT | 10262141.UDT | 10262146.PDT | 10262156.UDT |
| 10262201.PDT | 10262211.UDT | 10262216.PDT | 10262226.UDT | 10262231.PDT |
| 10262241.UDT | 10262246.PDT | 10262256.UDT | 10262301.PDT | 10262311.UDT |
| 10262316.PDT | 10262326.UDT | 10262331.PDT | 10262341.UDT | 10262346.PDT |
| 10262356.UDT | | | | |

JDAY 300

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| | 10270001.PDT | 10270011.UDT | 10270016.PDT | 10270026.UDT |
| 10270031.PDT | 10270041.UDT | 10270046.PDT | 10270056.UDT | 10270101.PDT |
| 10270111.UDT | 10270116.PDT | 10270126.UDT | 10270131.PDT | 10270141.UDT |
| 10270146.PDT | 10270156.UDT | 10270201.PDT | 10270211.UDT | 10270216.PDT |

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|--------------|--------------|--------------|--------------|--------------|
| 10270226.UDT | 10270231.PDT | 10270241.UDT | 10270246.PDT | 10270256.UDT |
| 10270301.PDT | 10270311.UDT | 10270316.PDT | 10270326.UDT | 10270331.PDT |
| 10270341.UDT | 10270346.PDT | 10270356.UDT | 10270401.PDT | 10270411.UDT |
| 10270416.PDT | 10270426.UDT | 10270431.PDT | 10270441.UDT | 10270446.PDT |
| 10270456.UDT | 10270501.PDT | 10270511.UDT | 10270516.PDT | 10270526.UDT |
| 10270531.PDT | 10270541.UDT | 10270546.PDT | 10270556.UDT | 10270601.PDT |
| 10270611.UDT | 10270616.PDT | 10270626.UDT | 10270631.PDT | 10270641.UDT |
| 10270646.PDT | 10270656.UDT | 10270701.PDT | 10270711.UDT | 10270716.PDT |
| 10270726.UDT | 10270731.PDT | 10270741.UDT | 10270746.PDT | 10270756.UDT |
| 10270801.PDT | 10270811.UDT | 10270816.PDT | 10270826.UDT | 10270831.PDT |
| 10270841.UDT | 10270846.PDT | 10270856.UDT | 10270901.PDT | 10270911.UDT |
| 10270916.PDT | 10270926.UDT | 10270931.PDT | 10270941.UDT | 10270946.PDT |
| 10270956.UDT | 10271001.PDT | 10271011.UDT | 10271016.PDT | 10271026.UDT |
| 10271031.PDT | 10271041.UDT | 10271046.PDT | 10271056.UDT | 10271116.PDT |
| 10271126.UDT | 10271131.PDT | 10271141.UDT | 10271146.PDT | 10271156.UDT |
| 10271201.PDT | 10271211.UDT | 10271216.PDT | 10271226.UDT | 10271231.PDT |
| 10271241.UDT | 10271246.PDT | 10271256.UDT | 10271301.PDT | 10271311.UDT |
| 10271316.PDT | 10271326.UDT | 10271331.PDT | 10271341.UDT | 10271346.PDT |
| 10271356.UDT | 10271401.PDT | 10271411.UDT | 10271416.PDT | 10271426.UDT |
| 10271431.PDT | 10271441.UDT | 10271446.PDT | 10271456.UDT | 10271501.PDT |
| 10271511.UDT | 10271516.PDT | 10271526.UDT | 10271531.PDT | 10271541.UDT |
| 10271546.PDT | 10271556.UDT | 10271601.PDT | 10271611.UDT | 10271616.PDT |
| 10271626.UDT | 10271631.PDT | 10271641.UDT | 10271646.PDT | 10271656.UDT |
| 10271701.PDT | 10271711.UDT | 10271716.PDT | 10271726.UDT | 10271731.PDT |
| 10271741.UDT | 10271746.PDT | 10271756.UDT | 10271801.PDT | 10271811.UDT |
| 10271816.PDT | 10271826.UDT | 10271831.PDT | 10271841.UDT | 10271846.PDT |
| 10271856.UDT | 10271901.PDT | 10271911.UDT | 10271916.PDT | 10271926.UDT |
| 10271931.PDT | 10271941.UDT | 10271946.PDT | 10271956.UDT | 10272001.PDT |
| 10272011.UDT | 10272016.PDT | 10272026.UDT | 10272031.PDT | 10272041.UDT |
| 10272046.PDT | 10272056.UDT | 10272101.PDT | 10272111.UDT | 10272116.PDT |
| 10272126.UDT | 10272131.PDT | 10272141.UDT | 10272146.PDT | 10272156.UDT |
| 10272201.PDT | 10272211.UDT | 10272216.PDT | 10272226.UDT | 10272231.PDT |
| 10272241.UDT | 10272246.PDT | 10272256.UDT | 10272301.PDT | 10272311.UDT |
| 10272316.PDT | 10272326.UDT | 10272331.PDT | 10272341.UDT | 10272346.PDT |
| 10272356.UDT | | | | |

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|--------------|--------------|--------------|--------------|--------------|
| JDAY 301 | 10280002.PDT | 10280012.UDT | 10280017.PDT | 10280027.UDT |
| 10280032.PDT | 10280042.UDT | 10280047.PDT | 10280057.UDT | 10280102.PDT |
| 10280112.UDT | 10280117.PDT | 10280127.UDT | 10280132.PDT | 10280142.UDT |
| 10280147.PDT | 10280157.UDT | 10280202.PDT | 10280212.UDT | 10280217.PDT |
| 10280227.UDT | 10280232.PDT | 10280242.UDT | 10280247.PDT | 10280257.UDT |
| 10280302.PDT | 10280312.UDT | 10280317.PDT | 10280327.UDT | 10280332.PDT |
| 10280342.UDT | 10280347.PDT | 10280357.UDT | 10280402.PDT | 10280412.UDT |
| 10280417.PDT | 10280427.UDT | 10280432.PDT | 10280442.UDT | 10280447.PDT |
| 10280457.UDT | 10280502.PDT | 10280512.UDT | 10280517.PDT | 10280527.UDT |
| 10280532.PDT | 10280542.UDT | 10280547.PDT | 10280557.UDT | 10280602.PDT |
| 10280612.UDT | 10280617.PDT | 10280627.UDT | 10280632.PDT | 10280642.UDT |
| 10280647.PDT | 10280657.UDT | 10280702.PDT | 10280712.UDT | 10280717.PDT |
| 10280727.UDT | 10280732.PDT | 10280742.UDT | 10280747.PDT | 10280757.UDT |
| 10280802.PDT | 10280812.UDT | 10280817.PDT | 10280827.UDT | 10280832.PDT |
| 10280842.UDT | 10280847.PDT | 10280857.UDT | 10280902.PDT | 10280912.UDT |
| 10280917.PDT | 10280927.UDT | 10280932.PDT | 10280942.UDT | 10280947.PDT |
| 10280957.UDT | 10281002.PDT | 10281012.UDT | 10281017.PDT | 10281027.UDT |
| 10281032.PDT | 10281042.UDT | 10281047.PDT | 10281057.UDT | 10281102.PDT |
| 10281112.UDT | 10281117.PDT | 10281127.UDT | 10281132.PDT | 10281142.UDT |
| 10281147.PDT | 10281157.UDT | 10281202.PDT | 10281212.UDT | 10281217.PDT |
| 10281227.UDT | 10281232.PDT | 10281242.UDT | 10281247.PDT | 10281257.UDT |
| 10281302.PDT | 10281312.UDT | 10281317.PDT | 10281327.UDT | 10281332.PDT |

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|--------------|--------------|--------------|--------------|--------------|
| 10281342.UDT | 10281347.PDT | 10281356.UDT | 10281402.PDT | 10281411.UDT |
| 10281417.PDT | 10281427.UDT | 10281432.PDT | 10281441.UDT | 10281447.PDT |
| 10281456.UDT | 10281502.PDT | 10281512.UDT | 10281714.UDT | 10281715.PDT |
| 10281725.UDT | 10281730.PDT | 10281740.UDT | 10281745.PDT | 10281755.UDT |
| 10281800.PDT | 10281810.UDT | 10281815.PDT | 10281825.UDT | 10281830.PDT |
| 10281840.UDT | 10281845.PDT | 10281855.UDT | 10281900.PDT | 10281910.UDT |
| 10281915.PDT | 10281925.UDT | 10281930.PDT | 10281940.UDT | 10281945.PDT |
| 10281955.UDT | 10282000.PDT | 10282010.UDT | 10282015.PDT | 10282025.UDT |
| 10282030.PDT | 10282040.UDT | 10282045.PDT | 10282055.UDT | 10282100.PDT |
| 10282110.UDT | 10282115.PDT | 10282125.UDT | 10282130.PDT | 10282140.UDT |
| 10282145.PDT | 10282155.UDT | 10282200.PDT | 10282210.UDT | 10282215.PDT |
| 10282225.UDT | 10282230.PDT | 10282240.UDT | 10282245.PDT | 10282255.UDT |
| 10282300.PDT | 10282310.UDT | 10282315.PDT | 10282325.UDT | 10282330.PDT |
| 10282340.UDT | 10282345.PDT | 10282355.UDT | | |

JDAY 302

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| | | | 10290001.PDT | 10290011.UDT |
| 10290016.PDT | 10290026.UDT | 10290031.PDT | 10290041.UDT | 10290046.PDT |
| 10290056.UDT | 10290101.PDT | 10290111.UDT | 10290116.PDT | 10290126.UDT |
| 10290131.PDT | 10290141.UDT | 10290146.PDT | 10290156.UDT | 10290201.PDT |
| 10290211.UDT | 10290216.PDT | 10290226.UDT | 10290231.PDT | 10290241.UDT |
| 10290246.PDT | 10290256.UDT | 10290301.PDT | 10290311.UDT | 10290316.PDT |
| 10290326.UDT | 10290331.PDT | 10290341.UDT | 10290346.PDT | 10290356.UDT |
| 10290401.PDT | 10290411.UDT | 10290416.PDT | 10290426.UDT | 10290431.PDT |
| 10290441.UDT | 10290446.PDT | 10290456.UDT | 10290501.PDT | 10290511.UDT |
| 10290516.PDT | 10290526.UDT | 10290531.PDT | 10290541.UDT | 10290546.PDT |
| 10290556.UDT | 10290601.PDT | 10290611.UDT | 10290616.PDT | 10290626.UDT |
| 10290631.PDT | 10290641.UDT | 10290646.PDT | 10290656.UDT | 10290701.PDT |
| 10290711.UDT | 10290716.PDT | 10290726.UDT | 10290731.PDT | 10290741.UDT |
| 10290746.PDT | 10290756.UDT | 10290801.PDT | 10290811.UDT | 10290816.PDT |
| 10290826.UDT | 10290831.PDT | 10290841.UDT | 10290846.PDT | 10290856.UDT |
| 10290901.PDT | 10290911.UDT | 10290916.PDT | 10290926.UDT | 10290931.PDT |
| 10290941.UDT | 10290946.PDT | 10290956.UDT | 10291001.PDT | 10291011.UDT |
| 10291016.PDT | 10291026.UDT | 10291031.PDT | 10291041.UDT | 10291046.PDT |
| 10291056.UDT | 10291101.PDT | 10291111.UDT | 10291116.PDT | 10291126.UDT |
| 10291131.PDT | 10291141.UDT | 10291146.PDT | 10291156.UDT | 10291201.PDT |
| 10291211.UDT | 10291216.PDT | 10291226.UDT | 10291231.PDT | 10291241.UDT |
| 10291246.PDT | 10291256.UDT | 10291301.PDT | 10291311.UDT | 10291316.PDT |
| 10291326.UDT | 10291331.PDT | 10291341.UDT | 10291346.PDT | 10291356.UDT |
| 10291401.PDT | 10291411.UDT | 10291416.PDT | 10291426.UDT | 10291431.PDT |
| 10291441.UDT | 10291446.PDT | 10291456.UDT | 10291501.PDT | 10291511.UDT |
| 10291516.PDT | 10291526.UDT | 10291531.PDT | 10291541.UDT | 10291546.PDT |
| 10291556.UDT | 10291601.PDT | 10291611.UDT | 10291616.PDT | 10291626.UDT |
| 10291631.PDT | 10291641.UDT | 10291646.PDT | 10291656.UDT | 10291701.PDT |
| 10291711.UDT | 10291716.PDT | 10291726.UDT | 10291731.PDT | 10291741.UDT |
| 10291746.PDT | 10291756.UDT | 10291801.PDT | 10291811.UDT | 10291816.PDT |
| 10291826.UDT | 10291831.PDT | 10291841.UDT | 10291846.PDT | 10291856.UDT |
| 10291901.PDT | 10291911.UDT | 10291916.PDT | 10291926.UDT | 10291931.PDT |
| 10291941.UDT | 10291946.PDT | 10291956.UDT | 10292001.PDT | 10292011.UDT |
| 10292016.PDT | 10292026.UDT | 10292031.PDT | 10292041.UDT | 10292046.PDT |
| 10292056.UDT | 10292101.PDT | 10292111.UDT | 10292116.PDT | 10292126.UDT |
| 10292131.PDT | 10292141.UDT | 10292146.PDT | 10292156.UDT | 10292201.PDT |
| 10292211.UDT | 10292216.PDT | 10292226.UDT | 10292231.PDT | 10292241.UDT |
| 10292246.PDT | 10292256.UDT | 10292301.PDT | 10292311.UDT | 10292316.PDT |
| 10292326.UDT | 10292331.PDT | 10292341.UDT | 10292346.PDT | 10292356.UDT |

JDAY 303

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| 10300002.PDT | 10300011.UDT | 10300016.PDT | 10300026.UDT | 10300032.PDT |
| 10300041.UDT | 10300047.PDT | 10300056.UDT | 10300101.PDT | 10300111.UDT |
| 10300116.PDT | 10300126.UDT | 10300131.PDT | 10300141.UDT | 10300147.PDT |

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|--------------|--------------|--------------|--------------|--------------|
| 10300156.UDT | 10300201.PDT | 10300211.UDT | 10300216.PDT | 10300226.UDT |
| 10300231.PDT | 10300241.UDT | 10300246.PDT | 10300256.UDT | 10300301.PDT |
| 10300311.UDT | 10300316.PDT | 10300326.UDT | 10300331.PDT | 10300341.UDT |
| 10300346.PDT | 10300356.UDT | 10300401.PDT | 10300411.UDT | 10300416.PDT |
| 10300426.UDT | 10300431.PDT | 10300441.UDT | 10300446.PDT | 10300456.UDT |
| 10300501.PDT | 10300511.UDT | 10300516.PDT | 10300526.UDT | 10300531.PDT |
| 10300541.UDT | 10300546.PDT | 10300556.UDT | 10300601.PDT | 10300611.UDT |
| 10300616.PDT | 10300626.UDT | 10300631.PDT | 10300641.UDT | 10300646.PDT |
| 10300656.UDT | 10300701.PDT | 10300711.UDT | 10300716.PDT | 10300726.UDT |
| 10300731.PDT | 10300741.UDT | 10300746.PDT | 10300756.UDT | 10300801.PDT |
| 10300811.UDT | 10300816.PDT | 10300826.UDT | 10300831.PDT | 10300841.UDT |
| 10300846.PDT | 10300856.UDT | 10300901.PDT | 10300911.UDT | 10300916.PDT |
| 10300926.UDT | 10300931.PDT | 10300941.UDT | 10300946.PDT | 10300956.UDT |
| 10301001.PDT | 10301011.UDT | 10301016.PDT | 10301026.UDT | 10301031.PDT |
| 10301041.UDT | 10301046.PDT | 10301056.UDT | 10301101.PDT | 10301111.UDT |
| 10301116.PDT | 10301126.UDT | 10301131.PDT | 10301141.UDT | 10301146.PDT |
| 10301156.UDT | 10301201.PDT | 10301211.UDT | 10301216.PDT | 10301226.UDT |
| 10301231.PDT | 10301241.UDT | 10301246.PDT | 10301256.UDT | 10301301.PDT |
| 10301311.UDT | 10301316.PDT | 10301326.UDT | 10301331.PDT | 10301341.UDT |
| 10301346.PDT | 10301356.UDT | 10301401.PDT | 10301411.UDT | 10301416.PDT |
| 10301426.UDT | 10301431.PDT | 10301441.UDT | 10301446.PDT | 10301456.UDT |
| 10301501.PDT | 10301511.UDT | 10301516.PDT | 10301526.UDT | 10301531.PDT |
| 10301541.UDT | 10301546.PDT | 10301556.UDT | 10301601.PDT | 10301611.UDT |
| 10301616.PDT | 10301626.UDT | 10301631.PDT | 10301641.UDT | 10301646.PDT |
| 10301656.UDT | 10301701.PDT | 10301711.UDT | 10301716.PDT | 10301726.UDT |
| 10301731.PDT | 10301741.UDT | 10301746.PDT | 10301756.UDT | 10301801.PDT |
| 10301811.UDT | 10301816.PDT | 10301826.UDT | 10301831.PDT | 10301841.UDT |
| 10301846.PDT | 10301856.UDT | 10301901.PDT | 10301911.UDT | 10301916.PDT |
| 10301926.UDT | 10301931.PDT | 10301941.UDT | 10301946.PDT | 10301956.UDT |
| 10302001.PDT | 10302011.UDT | 10302016.PDT | 10302026.UDT | 10302031.PDT |
| 10302041.UDT | 10302046.PDT | 10302056.UDT | 10302101.PDT | 10302111.UDT |
| 10302116.PDT | 10302126.UDT | 10302131.PDT | 10302141.UDT | 10302146.PDT |
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| 10302231.PDT | 10302241.UDT | 10302246.PDT | 10302256.UDT | 10302301.PDT |
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| 10302346.PDT | 10302356.UDT | | | |

JDAY 304

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| 10310242.UDT | 10310247.PDT | 10310257.UDT | 10310302.PDT | 10310312.UDT |
| 10310317.PDT | 10310327.UDT | 10310332.PDT | 10310342.UDT | 10310347.PDT |
| 10310357.UDT | 10310402.PDT | 10310412.UDT | 10310417.PDT | 10310427.UDT |
| 10310432.PDT | 10310442.UDT | 10310447.PDT | 10310457.UDT | 10310502.PDT |
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| 10310702.PDT | 10310712.UDT | 10310717.PDT | 10310727.UDT | 10310732.PDT |
| 10310742.UDT | 10310747.PDT | 10310757.UDT | 10310802.PDT | 10310812.UDT |
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| 10310857.UDT | 10310902.PDT | 10310912.UDT | 10310917.PDT | 10310927.UDT |
| 10310932.PDT | 10310942.UDT | 10310947.PDT | 10310957.UDT | 10311002.PDT |
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| 10311047.PDT | 10311057.UDT | 10311102.PDT | 10311112.UDT | 10311117.PDT |
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| 10311742.UDT | 10311747.PDT | 10311757.UDT | 10311802.PDT | 10311812.UDT |
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| 10312127.UDT | 10312132.PDT | 10312142.UDT | 10312147.PDT | 10312157.UDT |
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| 10312242.UDT | 10312247.PDT | 10312257.UDT | 10312302.PDT | 10312312.UDT |
| 10312317.PDT | 10312327.UDT | 10312332.PDT | 10312342.UDT | 10312347.PDT |
| 10312357.UDT | | | | |

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| 11010227.UDT | 11010232.PDT | 11010242.UDT | 11010247.PDT | 11010257.UDT |
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| 11011457.UDT | 11011502.PDT | 11011512.UDT | 11011517.PDT | 11011527.UDT |
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| 11011802.PDT | 11011812.UDT | 11011817.PDT | 11011827.UDT | 11011832.PDT |
| 11011842.UDT | 11011847.PDT | 11011857.UDT | 11011902.PDT | 11011912.UDT |
| 11011917.PDT | 11011927.UDT | 11011932.PDT | 11011942.UDT | 11011947.PDT |
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| 11012202.PDT | 11012212.UDT | 11012217.PDT | 11012227.UDT | 11012232.PDT |
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| 11012317.PDT | 11012327.UDT | 11012332.PDT | 11012342.UDT | 11012347.PDT |

11012357.UDT

JDAY 306

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| 11020148.PDT | 11020118.PDT | 11020128.UDT | 11020133.PDT | 11020143.UDT |
| 11020228.UDT | 11020158.UDT | 11020203.PDT | 11020213.UDT | 11020218.PDT |
| 11020303.PDT | 11020233.PDT | 11020243.UDT | 11020248.PDT | 11020258.UDT |
| 11020343.UDT | 11020313.UDT | 11020318.PDT | 11020328.UDT | 11020333.PDT |
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| 11021458.UDT | 11021428.UDT | 11021433.PDT | 11021443.UDT | 11021448.PDT |
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| 11022303.PDT | 11022233.PDT | 11022242.UDT | 11022248.PDT | 11022258.UDT |
| 11022342.UDT | 11022312.UDT | 11022318.PDT | 11022327.UDT | 11022333.PDT |
| | 11022348.PDT | 11022357.UDT | | |

JDAY 307

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| JDAY 308 | | | | |
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| 11042043.UDT | 11042049.PDT | 11042058.UDT | 11042104.PDT | 11042113.UDT |

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11042234.PDT  11042243.UDT  11042249.PDT  11042258.UDT  11042304.PDT
11042313.UDT  11042318.PDT  11042328.UDT  11042334.PDT  11042343.UDT
11042349.PDT  11042358.UDT

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2757 file(s) 258898846 bytes
25952256 bytes free

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SONIC BUOY RAW DATA FROM THE VHF LANDSTATION

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Volume in drive D is SWALES HUT
Volume Serial Number is 1F4B-12D6
Directory of D:\HUTDATA
MO DRIVE SIDE B

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BUOY DEPLOYMENT 1 CONT.

JDAY 309

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11050004.PDT  11050014.UDT
11050019.PDT  11050029.UDT  11050034.PDT  11050044.UDT  11050049.PDT
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11051431.PDT  11051441.UDT  11051446.PDT  11051456.UDT  11051501.PDT
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11051741.UDT  11051746.PDT  11051756.UDT  11051801.PDT  11051811.UDT
11051816.PDT  11051826.UDT  11051831.PDT  11051841.UDT  11051846.PDT
11051856.UDT  11051901.PDT  11051911.UDT  11051916.PDT  11051926.UDT
11051931.PDT  11051941.UDT  11051946.PDT  11051956.UDT  11052001.PDT
11052011.UDT  11052016.PDT  11052026.UDT  11052031.PDT  11052041.UDT
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11052241.UDT  11052246.PDT  11052256.UDT  11052301.PDT  11052311.UDT
11052316.PDT  11052326.UDT  11052331.PDT  11052341.UDT  11052346.PDT
11052356.UDT

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JDAY 310

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11060002.PDT  11060012.UDT  11060017.PDT  11060027.UDT
11060032.PDT  11060042.UDT  11060047.PDT  11060057.UDT  11060102.PDT
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11060147.PDT  11060157.UDT  11060202.PDT  11060212.UDT  11060217.PDT
11060227.UDT  11060232.PDT  11060242.UDT  11060247.PDT  11060257.UDT

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| 11060302.PDT | 11060312.UDT | 11060317.PDT | 11060327.UDT | 11060332.PDT |
| 11060342.UDT | 11060347.PDT | 11060357.UDT | 11060402.PDT | 11060412.UDT |
| 11060417.PDT | 11060427.UDT | 11060432.PDT | 11060442.UDT | 11060447.PDT |
| 11060457.UDT | 11060502.PDT | 11060512.UDT | 11060517.PDT | 11060527.UDT |
| 11060532.PDT | 11060542.UDT | 11060547.PDT | 11060557.UDT | 11060602.PDT |
| 11060612.UDT | 11060617.PDT | 11060627.UDT | 11060632.PDT | 11060642.UDT |
| 11060647.PDT | 11060657.UDT | 11060702.PDT | 11060712.UDT | 11060717.PDT |
| 11060727.UDT | 11060732.PDT | 11060742.UDT | 11060747.PDT | 11060757.UDT |
| 11060802.PDT | 11060812.UDT | 11060817.PDT | 11060827.UDT | 11060832.PDT |
| 11060842.UDT | 11060847.PDT | 11060857.UDT | 11060902.PDT | 11060912.UDT |
| 11060917.PDT | 11060927.UDT | 11060932.PDT | 11060942.UDT | 11060947.PDT |
| 11060957.UDT | 11061002.PDT | 11061012.UDT | 11061017.PDT | 11061027.UDT |
| 11061032.PDT | 11061042.UDT | 11061047.PDT | 11061057.UDT | 11061102.PDT |
| 11061112.UDT | 11061117.PDT | 11061127.UDT | 11061132.PDT | 11061142.UDT |
| 11061147.PDT | 11061157.UDT | 11061202.PDT | 11061212.UDT | 11061217.PDT |
| 11061227.UDT | 11061232.PDT | 11061242.UDT | 11061247.PDT | 11061257.UDT |
| 11061302.PDT | 11061312.UDT | 11061317.PDT | 11061327.UDT | 11061332.PDT |
| 11061342.UDT | 11061347.PDT | 11061357.UDT | 11061402.PDT | 11061412.UDT |
| 11061417.PDT | 11061427.UDT | 11061432.PDT | 11061442.UDT | 11061447.PDT |
| 11061457.UDT | 11061502.PDT | 11061512.UDT | 11061517.PDT | 11061527.UDT |
| 11061532.PDT | 11061542.UDT | 11061547.PDT | 11061557.UDT | 11061602.PDT |
| 11061612.UDT | 11061617.PDT | 11061627.UDT | 11061632.PDT | 11061642.UDT |
| 11061647.PDT | 11061657.UDT | 11061702.PDT | 11061712.UDT | 11061717.PDT |
| 11061727.UDT | 11061732.PDT | 11061742.UDT | 11061747.PDT | 11061757.UDT |
| 11061802.PDT | 11061812.UDT | 11061817.PDT | 11061827.UDT | 11061832.PDT |
| 11061842.UDT | 11061847.PDT | 11061857.UDT | 11061902.PDT | 11061912.UDT |
| 11061917.PDT | 11061927.UDT | 11061932.PDT | 11061942.UDT | 11061947.PDT |
| 11061957.UDT | 11062002.PDT | 11062012.UDT | 11062017.PDT | 11062027.UDT |
| 11062032.PDT | 11062042.UDT | 11062047.PDT | 11062057.UDT | 11062102.PDT |
| 11062112.UDT | 11062117.PDT | 11062127.UDT | 11062132.PDT | 11062142.UDT |
| 11062147.PDT | 11062157.UDT | 11062202.PDT | 11062212.UDT | 11062217.PDT |
| 11062227.UDT | 11062232.PDT | 11062242.UDT | 11062247.PDT | 11062257.UDT |
| 11062302.PDT | 11062312.UDT | 11062317.PDT | 11062327.UDT | 11062332.PDT |
| 11062342.UDT | 11062347.PDT | 11062357.UDT | | |

JDAY 311

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|--------------|--------------|--------------|--------------|--------------|
| 11070017.PDT | 11070027.UDT | 11070032.PDT | 11070002.PDT | 11070012.UDT |
| 11070057.UDT | 11070102.PDT | 11070112.UDT | 11070042.UDT | 11070047.PDT |
| 11070132.PDT | 11070142.UDT | 11070147.PDT | 11070117.PDT | 11070127.UDT |
| 11070212.UDT | 11070217.PDT | 11070227.UDT | 11070157.UDT | 11070202.PDT |
| 11070247.PDT | 11070257.UDT | 11070302.PDT | 11070232.PDT | 11070242.UDT |
| 11070327.UDT | 11070332.PDT | 11070342.UDT | 11070312.UDT | 11070317.PDT |
| 11070402.PDT | 11070412.UDT | 11070417.PDT | 11070347.PDT | 11070357.UDT |
| 11070442.UDT | 11070447.PDT | 11070457.UDT | 11070427.UDT | 11070432.PDT |
| 11070517.PDT | 11070527.UDT | 11070532.PDT | 11070502.PDT | 11070512.UDT |
| 11070557.UDT | 11070602.PDT | 11070612.UDT | 11070542.UDT | 11070547.PDT |
| 11070632.PDT | 11070642.UDT | 11070647.PDT | 11070617.PDT | 11070627.UDT |
| 11070712.UDT | 11070717.PDT | 11070727.UDT | 11070657.UDT | 11070702.PDT |
| 11070747.PDT | 11070757.UDT | 11070802.PDT | 11070732.PDT | 11070742.UDT |
| 11070827.UDT | 11070832.PDT | 11070842.UDT | 11070812.UDT | 11070817.PDT |
| 11070902.PDT | 11070912.UDT | 11070917.PDT | 11070847.PDT | 11070857.UDT |
| 11070942.UDT | 11070947.PDT | 11070957.UDT | 11070927.UDT | 11070932.PDT |
| 11071017.PDT | 11071027.UDT | 11071032.PDT | 11071002.PDT | 11071012.UDT |
| 11071057.UDT | 11071102.PDT | 11071112.UDT | 11071042.UDT | 11071047.PDT |
| 11071132.PDT | 11071142.UDT | 11071147.PDT | 11071117.PDT | 11071127.UDT |
| 11071212.UDT | 11071217.PDT | 11071227.UDT | 11071157.UDT | 11071202.PDT |
| 11071247.PDT | 11071257.UDT | 11071302.PDT | 11071232.PDT | 11071242.UDT |
| 11071327.UDT | 11071404.PDT | 11071412.UDT | 11071312.UDT | 11071317.PDT |
| | | | 11071417.PDT | 11071427.UDT |

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|--------------|--------------|--------------|--------------|--------------|
| 11071432.PDT | 11071442.UDT | 11071447.PDT | 11071457.UDT | 11071502.PDT |
| 11071510.PDT | 11071512.UDT | 11071558.UDT | 11071601.PDT | 11071611.UDT |
| 11071616.PDT | 11071626.UDT | 11071631.PDT | 11071641.UDT | 11071646.PDT |
| 11071656.UDT | 11071701.PDT | 11071711.UDT | 11071716.PDT | 11071726.UDT |
| 11071731.PDT | 11071741.UDT | 11071746.PDT | 11071756.UDT | 11071801.PDT |
| 11071811.UDT | 11071816.PDT | 11071826.UDT | 11071831.PDT | 11071841.UDT |
| 11071846.PDT | 11071856.UDT | 11071901.PDT | 11071911.UDT | 11071916.PDT |
| 11071926.UDT | 11071931.PDT | 11071941.UDT | 11071946.PDT | 11071956.UDT |
| 11072001.PDT | 11072011.UDT | 11072016.PDT | 11072026.UDT | 11072031.PDT |
| 11072041.UDT | 11072046.PDT | 11072056.UDT | 11072101.PDT | 11072111.UDT |
| 11072116.PDT | 11072126.UDT | 11072131.PDT | 11072141.UDT | 11072146.PDT |
| 11072156.UDT | 11072201.PDT | 11072211.UDT | 11072216.PDT | 11072226.UDT |
| 11072231.PDT | 11072241.UDT | 11072246.PDT | 11072256.UDT | 11072301.PDT |
| 11072311.UDT | 11072316.PDT | 11072326.UDT | 11072331.PDT | 11072341.UDT |
| 11072346.PDT | 11072356.UDT | | | |

JDAY 312

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| | | 11080002.PDT | 11080012.UDT | 11080017.PDT |
| 11080027.UDT | 11080032.PDT | 11080042.UDT | 11080047.PDT | 11080057.UDT |
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| 11080142.UDT | 11080147.PDT | 11080157.UDT | 11080202.PDT | 11080212.UDT |
| 11080217.PDT | 11080227.UDT | 11080232.PDT | 11080242.UDT | 11080247.PDT |
| 11080257.UDT | 11080302.PDT | 11080312.UDT | 11080317.PDT | 11080327.UDT |
| 11080332.PDT | 11080342.UDT | 11080347.PDT | 11080356.UDT | 11080402.PDT |
| 11080411.UDT | 11080417.PDT | 11080426.UDT | 11080432.PDT | 11080441.UDT |
| 11080447.PDT | 11080457.UDT | 11080502.PDT | 11080511.UDT | 11080517.PDT |
| 11080527.UDT | 11080532.PDT | 11080542.UDT | 11080547.PDT | 11080557.UDT |
| 11080602.PDT | 11080612.UDT | 11080617.PDT | 11080627.UDT | 11080632.PDT |
| 11080642.UDT | 11080647.PDT | 11080656.UDT | 11080702.PDT | 11080712.UDT |
| 11080717.PDT | 11080726.UDT | 11080732.PDT | 11080742.UDT | 11080747.PDT |
| 11080757.UDT | 11080802.PDT | 11080812.UDT | 11080817.PDT | 11080827.UDT |
| 11080832.PDT | 11080842.UDT | 11080847.PDT | 11080856.UDT | 11080902.PDT |
| 11080912.UDT | 11080917.PDT | 11080927.UDT | 11080932.PDT | 11080942.UDT |
| 11080947.PDT | 11080956.UDT | 11081002.PDT | 11081011.UDT | 11081017.PDT |
| 11081026.UDT | 11081032.PDT | 11081041.UDT | 11081047.PDT | 11081056.UDT |
| 11081102.PDT | 11081111.UDT | 11081117.PDT | 11081126.UDT | 11081132.PDT |
| 11081141.UDT | 11081147.PDT | 11081156.UDT | 11081202.PDT | 11081211.UDT |
| 11081217.PDT | 11081226.UDT | 11081232.PDT | 11081241.UDT | 11081247.PDT |
| 11081256.UDT | 11081302.PDT | 11081311.UDT | 11081317.PDT | 11081326.UDT |
| 11081332.PDT | 11081341.UDT | 11081347.PDT | 11081356.UDT | 11081402.PDT |
| 11081411.UDT | 11081417.PDT | 11081426.UDT | 11081432.PDT | 11081441.UDT |
| 11081447.PDT | 11081456.UDT | 11081502.PDT | 11081511.UDT | 11081517.PDT |
| 11081526.UDT | 11081532.PDT | 11081541.UDT | 11081547.PDT | 11081556.UDT |
| 11081602.PDT | 11081611.UDT | 11081617.PDT | 11081626.UDT | 11081632.PDT |
| 11081641.UDT | 11081647.PDT | 11081656.UDT | 11081702.PDT | 11081711.UDT |
| 11081717.PDT | 11081726.UDT | 11081732.PDT | 11081741.UDT | 11081747.PDT |
| 11081756.UDT | 11081802.PDT | 11081811.UDT | 11081817.PDT | 11081826.UDT |
| 11081832.PDT | 11081841.UDT | 11081847.PDT | 11081856.UDT | 11081902.PDT |
| 11081911.UDT | 11081917.PDT | 11081926.UDT | 11081932.PDT | 11081941.UDT |
| 11081947.PDT | 11081956.UDT | 11082002.PDT | 11082011.UDT | 11082017.PDT |
| 11082026.UDT | 11082032.PDT | 11082041.UDT | 11082047.PDT | 11082056.UDT |
| 11082102.PDT | 11082111.UDT | 11082117.PDT | 11082126.UDT | 11082132.PDT |
| 11082141.UDT | 11082147.PDT | 11082156.UDT | 11082202.PDT | 11082211.UDT |
| 11082217.PDT | 11082226.UDT | 11082231.PDT | 11082241.UDT | 11082246.PDT |
| 11082256.UDT | 11082302.PDT | 11082311.UDT | 11082317.PDT | 11082326.UDT |
| 11082332.PDT | 11082341.UDT | 11082346.PDT | 11082356.UDT | |

JDAY 313

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| | | | | 11090002.PDT |
| 11090012.UDT | 11090017.PDT | 11090027.UDT | 11090032.PDT | 11090042.UDT |

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|--------------|--------------|--------------|--------------|--------------|
| 11090047.PDT | 11090057.UDT | 11090102.PDT | 11090112.UDT | 11090117.PDT |
| 11090127.UDT | 11090132.PDT | 11090142.UDT | 11090147.PDT | 11090157.UDT |
| 11090202.PDT | 11090212.UDT | 11090217.PDT | 11090227.UDT | 11090232.PDT |
| 11090242.UDT | 11090247.PDT | 11090257.UDT | 11090302.PDT | 11090312.UDT |
| 11090317.PDT | 11090327.UDT | 11090332.PDT | 11090342.UDT | 11090347.PDT |
| 11090357.UDT | 11090402.PDT | 11090412.UDT | 11090417.PDT | 11090427.UDT |
| 11090432.PDT | 11090442.UDT | 11090447.PDT | 11090457.UDT | 11090502.PDT |
| 11090512.UDT | 11090517.PDT | 11090527.UDT | 11090532.PDT | 11090542.UDT |
| 11090547.PDT | 11090557.UDT | 11090602.PDT | 11090612.UDT | 11090617.PDT |
| 11090627.UDT | 11090632.PDT | 11090642.UDT | 11090647.PDT | 11090657.UDT |
| 11090702.PDT | 11090712.UDT | 11090717.PDT | 11090727.UDT | 11090732.PDT |
| 11090742.UDT | 11090747.PDT | 11090757.UDT | 11090802.PDT | 11090812.UDT |
| 11090817.PDT | 11090827.UDT | 11090832.PDT | 11090842.UDT | 11090847.PDT |
| 11090857.UDT | 11090902.PDT | 11090912.UDT | 11090917.PDT | 11090927.UDT |
| 11090932.PDT | 11090942.UDT | 11090947.PDT | 11090957.UDT | 11091002.PDT |
| 11091012.UDT | 11091017.PDT | 11091027.UDT | 11091032.PDT | 11091042.UDT |
| 11091047.PDT | 11091057.UDT | 11091102.PDT | 11091112.UDT | 11091117.PDT |
| 11091127.UDT | 11091132.PDT | 11091142.UDT | 11091147.PDT | 11091157.UDT |
| 11091202.PDT | 11091212.UDT | 11091217.PDT | 11091227.UDT | 11091232.PDT |
| 11091242.UDT | 11091247.PDT | 11091257.UDT | 11091302.PDT | 11091312.UDT |
| 11091317.PDT | 11091327.UDT | 11091332.PDT | 11091342.UDT | 11091347.PDT |
| 11091357.UDT | 11091402.PDT | | | |

BUOY DEPLOYMENT 2

JDAY 327

| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| | | 11230924.PDT | 11230930.UDT | 11230935.PDT |
| 11230944.UDT | 11230950.PDT | 11230959.UDT | 11231005.PDT | 11231014.UDT |
| 11231020.PDT | 11231030.UDT | 11231035.PDT | 11231045.UDT | 11231050.PDT |
| 11231059.UDT | 11231106.PDT | 11231114.PDT | 11231116.UDT | 11231121.PDT |
| 11231131.UDT | 11231136.PDT | 11231146.UDT | 11231151.PDT | 11231201.UDT |
| 11231206.PDT | 11231216.UDT | 11231221.PDT | 11231231.UDT | 11231236.PDT |
| 11231246.UDT | 11231251.PDT | 11231301.UDT | 11231306.PDT | 11231316.UDT |
| 11231321.PDT | 11231331.UDT | 11231336.PDT | 11231346.UDT | 11231357.PDT |
| 11231407.UDT | 11231412.PDT | 11231422.UDT | 11231427.PDT | 11231437.UDT |
| 11231442.PDT | 11231452.UDT | 11231457.PDT | 11231507.UDT | 11231512.PDT |
| 11231522.UDT | 11231527.PDT | 11231537.UDT | 11231542.PDT | 11231552.UDT |
| 11231557.PDT | 11231607.UDT | 11231612.PDT | 11231622.UDT | 11231627.PDT |
| 11231637.UDT | 11231642.PDT | 11231652.UDT | 11231657.PDT | 11231707.UDT |
| 11231712.PDT | 11231722.UDT | 11231727.PDT | 11231737.UDT | 11231742.PDT |
| 11231752.UDT | 11231757.PDT | 11231807.UDT | 11231812.PDT | 11231822.UDT |
| 11231827.PDT | 11231837.UDT | 11231842.PDT | 11231852.UDT | 11231857.PDT |
| 11231907.UDT | 11231912.PDT | 11231922.UDT | 11231927.PDT | 11231937.UDT |
| 11231942.PDT | 11231952.UDT | 11231957.PDT | 11232007.UDT | 11232012.PDT |
| 11232022.UDT | 11232027.PDT | 11232037.UDT | 11232042.PDT | 11232052.UDT |
| 11232057.PDT | 11232107.UDT | 11232112.PDT | 11232122.UDT | 11232127.PDT |
| 11232137.UDT | 11232142.PDT | 11232152.UDT | 11232157.PDT | 11232207.UDT |
| 11232212.PDT | 11232222.UDT | 11232227.PDT | 11232237.UDT | 11232242.PDT |
| 11232252.UDT | 11232257.PDT | 11232307.UDT | 11232312.PDT | 11232322.UDT |
| 11232327.PDT | 11232337.UDT | 11232342.PDT | 11232352.UDT | 11232357.PDT |

JDAY 328

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|--------------|--------------|--------------|--------------|--------------|
| 11240007.UDT | 11240012.PDT | 11240022.UDT | 11240027.PDT | 11240037.UDT |
| 11240042.PDT | 11240052.UDT | 11240057.PDT | 11240107.UDT | 11240112.PDT |
| 11240122.UDT | 11240127.PDT | 11240137.UDT | 11240142.PDT | 11240152.UDT |
| 11240157.PDT | 11240207.UDT | 11240212.PDT | 11240222.UDT | 11240227.PDT |
| 11240237.UDT | 11240242.PDT | 11240252.UDT | 11240257.PDT | 11240307.UDT |
| 11240312.PDT | 11240322.UDT | 11240327.PDT | 11240337.UDT | 11240342.PDT |
| 11240352.UDT | 11240357.PDT | 11240407.UDT | 11240412.PDT | 11240422.UDT |
| 11240427.PDT | 11240437.UDT | 11240442.PDT | 11240452.UDT | 11240457.PDT |

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|--------------|--------------|--------------|--------------|--------------|
| 11240507.UDT | 11240512.PDT | 11240522.UDT | 11240527.PDT | 11240537.UDT |
| 11240542.PDT | 11240552.UDT | 11240557.PDT | 11240607.UDT | 11240612.PDT |
| 11240622.UDT | 11240627.PDT | 11240637.UDT | 11240642.PDT | 11240652.UDT |
| 11240657.PDT | 11240707.UDT | 11240712.PDT | 11240722.UDT | 11240727.PDT |
| 11240737.UDT | 11240742.PDT | 11240752.UDT | 11240757.PDT | 11240807.UDT |
| 11240812.PDT | 11240822.UDT | 11240827.PDT | 11240837.UDT | 11240842.PDT |
| 11240852.UDT | 11240857.PDT | 11240907.UDT | 11240912.PDT | 11240922.UDT |
| 11240927.PDT | 11240937.UDT | 11240942.PDT | 11240952.UDT | 11241002.PDT |
| 11241012.UDT | 11241017.PDT | 11241027.UDT | 11241032.PDT | 11241042.UDT |
| 11241047.PDT | 11241057.UDT | 11241102.PDT | 11241112.UDT | 11241117.PDT |
| 11241126.UDT | 11241132.PDT | 11241141.UDT | 11241147.PDT | 11241156.UDT |
| 11241202.PDT | 11241211.UDT | 11241217.PDT | 11241226.UDT | 11241232.PDT |
| 11241241.UDT | 11241247.PDT | 11241256.UDT | 11241302.PDT | 11241311.UDT |
| 11241317.PDT | 11241326.UDT | 11241332.PDT | 11241341.UDT | 11241347.PDT |
| 11241356.UDT | 11241402.PDT | 11241411.UDT | 11241416.PDT | 11241426.UDT |
| 11241432.PDT | 11241441.UDT | 11241447.PDT | 11241456.UDT | 11241501.PDT |
| 11241511.UDT | 11241516.PDT | 11241526.UDT | 11241531.PDT | 11241541.UDT |
| 11241546.PDT | 11241556.UDT | 11241601.PDT | 11241611.UDT | 11241617.PDT |
| 11241626.UDT | 11241632.PDT | 11241641.UDT | 11241646.PDT | 11241656.UDT |
| 11241702.PDT | 11241711.UDT | 11241716.PDT | 11241726.UDT | 11241732.PDT |
| 11241741.UDT | 11241746.PDT | 11241756.UDT | 11241801.PDT | 11241811.UDT |
| 11241816.PDT | 11241826.UDT | 11241832.PDT | 11241841.UDT | 11241846.PDT |
| 11241856.UDT | 11241901.PDT | 11241911.UDT | 11241916.PDT | 11241926.UDT |
| 11241931.PDT | 11241941.UDT | 11241946.PDT | 11241956.UDT | 11242001.PDT |
| 11242011.UDT | 11242016.PDT | 11242026.UDT | 11242031.PDT | 11242041.UDT |
| 11242046.PDT | 11242056.UDT | 11242101.PDT | 11242111.UDT | 11242116.PDT |
| 11242126.UDT | 11242131.PDT | 11242141.UDT | 11242146.PDT | 11242156.UDT |
| 11242201.PDT | 11242211.UDT | 11242216.PDT | 11242226.UDT | 11242231.PDT |
| 11242241.UDT | 11242246.PDT | 11242256.UDT | 11242301.PDT | 11242311.UDT |
| 11242316.PDT | 11242326.UDT | 11242331.PDT | 11242341.UDT | 11242346.PDT |
| 11242356.UDT | | | | |

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| JDAY 329 | 11250001.PDT | 11250011.UDT | 11250016.PDT | 11250026.UDT |
| 11250031.PDT | 11250041.UDT | 11250046.PDT | 11250056.UDT | 11250101.PDT |
| 11250111.UDT | 11250116.PDT | 11250126.UDT | 11250131.PDT | 11250141.UDT |
| 11250146.PDT | 11250156.UDT | 11250201.PDT | 11250211.UDT | 11250216.PDT |
| 11250226.UDT | 11250231.PDT | 11250241.UDT | 11250246.PDT | 11250256.UDT |
| 11250301.PDT | 11250311.UDT | 11250316.PDT | 11250326.UDT | 11250331.PDT |
| 11250341.UDT | 11250346.PDT | 11250356.UDT | 11250401.PDT | 11250411.UDT |
| 11250416.PDT | 11250426.UDT | 11250431.PDT | 11250441.UDT | 11250446.PDT |
| 11250456.UDT | 11250501.PDT | 11250511.UDT | 11250516.PDT | 11250526.UDT |
| 11250531.PDT | 11250541.UDT | 11250546.PDT | 11250556.UDT | 11250601.PDT |
| 11250611.UDT | 11250616.PDT | 11250626.UDT | 11250631.PDT | 11250641.UDT |
| 11250646.PDT | 11250656.UDT | 11250701.PDT | 11250711.UDT | 11250716.PDT |
| 11250726.UDT | 11250731.PDT | 11250741.UDT | 11250746.PDT | 11250756.UDT |
| 11250801.PDT | 11250811.UDT | 11250816.PDT | 11250826.UDT | 11250831.PDT |
| 11250841.UDT | 11250846.PDT | 11250856.UDT | 11250901.PDT | 11250911.UDT |
| 11250916.PDT | 11250926.UDT | 11250937.PDT | 11250947.UDT | 11250952.PDT |
| 11251002.UDT | 11251007.PDT | 11251017.UDT | 11251022.PDT | 11251032.UDT |
| 11251037.PDT | 11251047.UDT | 11251052.PDT | 11251102.UDT | 11251107.PDT |
| 11251117.UDT | 11251122.PDT | 11251132.UDT | 11251137.PDT | 11251147.UDT |
| 11251152.PDT | 11251202.UDT | 11251207.PDT | 11251217.UDT | 11251222.PDT |
| 11251232.UDT | 11251237.PDT | 11251247.UDT | 11251252.PDT | 11251302.UDT |
| 11251307.PDT | 11251317.UDT | 11251322.PDT | 11251332.UDT | 11251337.PDT |
| 11251347.UDT | 11251352.PDT | 11251402.UDT | 11251407.PDT | 11251417.UDT |
| 11251422.PDT | 11251432.UDT | 11251437.PDT | 11251447.UDT | 11251452.PDT |
| 11251502.UDT | 11251507.PDT | 11251517.UDT | 11251522.PDT | 11251532.UDT |
| 11251537.PDT | 11251547.UDT | 11251552.PDT | 11251602.UDT | 11251607.PDT |

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| 11251617.UDT | 11251622.PDT | 11251632.UDT | 11251637.PDT | 11251647.UDT |
| 11251652.PDT | 11251702.UDT | 11251707.PDT | 11251717.UDT | 11251722.PDT |
| 11251732.UDT | 11251737.PDT | 11251747.UDT | 11251752.PDT | 11251802.UDT |
| 11251807.PDT | 11251817.UDT | 11251822.PDT | 11251832.UDT | 11251837.PDT |
| 11251847.UDT | 11251852.PDT | 11251902.UDT | 11251907.PDT | 11251917.UDT |
| 11251922.PDT | 11251932.UDT | 11251937.PDT | 11251947.UDT | 11251952.PDT |
| 11252002.UDT | 11252007.PDT | 11252017.UDT | 11252022.PDT | 11252032.UDT |
| 11252037.PDT | 11252047.UDT | 11252052.PDT | 11252102.UDT | 11252107.PDT |
| 11252117.UDT | 11252122.PDT | 11252132.UDT | 11252137.PDT | 11252147.UDT |
| 11252152.PDT | 11252202.UDT | 11252207.PDT | 11252217.UDT | 11252222.PDT |
| 11252232.UDT | 11252237.PDT | 11252247.UDT | 11252307.PDT | 11252317.UDT |
| 11252322.PDT | 11252332.UDT | 11252337.PDT | 11252347.UDT | 11252352.PDT |

JDAY 330

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|--------------|--------------|--------------|--------------|--------------|
| 11260002.UDT | 11260007.PDT | 11260017.UDT | 11260022.PDT | 11260032.UDT |
| 11260037.PDT | 11260047.UDT | 11260052.PDT | 11260102.UDT | 11260107.PDT |
| 11260117.UDT | 11260122.PDT | 11260132.UDT | 11260137.PDT | 11260147.UDT |
| 11260152.PDT | 11260202.UDT | 11260207.PDT | 11260217.UDT | 11260222.PDT |
| 11260232.UDT | 11260237.PDT | 11260247.UDT | 11260252.PDT | 11260302.UDT |
| 11260307.PDT | 11260317.UDT | 11260322.PDT | 11260332.UDT | 11260337.PDT |
| 11260347.UDT | 11260352.PDT | 11260402.UDT | 11260407.PDT | 11260417.UDT |
| 11260422.PDT | 11260432.UDT | 11260437.PDT | 11260447.UDT | 11260452.PDT |
| 11260502.UDT | 11260507.PDT | 11260517.UDT | 11260522.PDT | 11260532.UDT |
| 11260537.PDT | 11260547.UDT | 11260552.PDT | 11260602.UDT | 11260607.PDT |
| 11260617.UDT | 11260622.PDT | 11260632.UDT | 11260637.PDT | 11260647.UDT |
| 11260652.PDT | 11260702.UDT | 11260707.PDT | 11260717.UDT | 11260722.PDT |
| 11260732.UDT | 11260737.PDT | 11260747.UDT | 11260752.PDT | 11260802.UDT |
| 11260807.PDT | 11260817.UDT | 11260822.PDT | 11260832.UDT | 11260837.PDT |
| 11260847.UDT | 11260852.PDT | 11260902.UDT | 11260907.PDT | 11260917.UDT |
| 11260922.PDT | 11260932.UDT | 11260937.PDT | 11260947.UDT | 11260952.PDT |
| 11261002.UDT | 11261007.PDT | 11261017.UDT | 11261022.PDT | 11261032.UDT |
| 11261037.PDT | 11261047.UDT | 11261052.PDT | 11261102.UDT | 11261107.PDT |
| 11261117.UDT | 11261122.PDT | 11261132.UDT | 11261137.PDT | 11261147.UDT |
| 11261152.PDT | 11261202.UDT | 11261207.PDT | 11261217.UDT | 11261222.PDT |
| 11261232.UDT | 11261237.PDT | 11261247.UDT | 11261252.PDT | 11261302.UDT |
| 11261307.PDT | 11261317.UDT | 11261322.PDT | 11261332.UDT | 11261337.PDT |
| 11261347.UDT | 11261352.PDT | 11261402.UDT | 11261407.PDT | 11261417.UDT |
| 11261422.PDT | 11261432.UDT | 11261437.PDT | 11261447.UDT | 11261452.PDT |
| 11261502.UDT | 11261507.PDT | 11261517.UDT | 11261522.PDT | 11261532.UDT |
| 11261537.PDT | 11261547.UDT | 11261552.PDT | 11261602.UDT | 11261607.PDT |
| 11261617.UDT | 11261622.PDT | 11261632.UDT | 11261637.PDT | 11261647.UDT |
| 11261652.PDT | 11261702.UDT | 11261707.PDT | 11261717.UDT | 11261722.PDT |
| 11261732.UDT | 11261737.PDT | 11261747.UDT | 11261752.PDT | 11261802.UDT |
| 11261808.PDT | 11261818.UDT | 11261823.PDT | 11261833.UDT | 11261838.PDT |
| 11261848.UDT | 11261853.PDT | 11261903.UDT | 11261908.PDT | 11261918.UDT |
| 11261923.PDT | 11261933.UDT | 11261938.PDT | 11261948.UDT | 11261953.PDT |
| 11262003.UDT | 11262008.PDT | 11262018.UDT | 11262023.PDT | 11262033.UDT |
| 11262038.PDT | 11262048.UDT | 11262053.PDT | 11262103.UDT | 11262108.PDT |
| 11262118.UDT | 11262123.PDT | 11262133.UDT | 11262138.PDT | 11262148.UDT |
| 11262153.PDT | 11262203.UDT | 11262208.PDT | 11262218.UDT | 11262223.PDT |
| 11262233.UDT | 11262238.PDT | 11262248.UDT | 11262253.PDT | 11262303.UDT |
| 11262308.PDT | 11262318.UDT | 11262323.PDT | 11262333.UDT | 11262338.PDT |
| 11262348.UDT | 11262353.PDT | | | |

JDAY 331

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|--------------|--------------|--------------|--------------|--------------|
| | | 11270003.UDT | 11270008.PDT | 11270018.UDT |
| 11270023.PDT | 11270033.UDT | 11270038.PDT | 11270048.UDT | 11270053.PDT |
| 11270103.UDT | 11270108.PDT | 11270118.UDT | 11270123.PDT | 11270133.UDT |
| 11270138.PDT | 11270148.UDT | 11270153.PDT | 11270203.UDT | 11270208.PDT |
| 11270218.UDT | 11270223.PDT | 11270233.UDT | 11270238.PDT | 11270248.UDT |

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|--------------|--------------|--------------|--------------|--------------|
| 11270253.PDT | 11270303.UDT | 11270308.PDT | 11270318.UDT | 11270323.PDT |
| 11270333.UDT | 11270338.PDT | 11270348.UDT | 11270353.PDT | 11270403.UDT |
| 11270408.PDT | 11270418.UDT | 11270423.PDT | 11270433.UDT | 11270438.PDT |
| 11270448.UDT | 11270453.PDT | 11270503.UDT | 11270508.PDT | 11270518.UDT |
| 11270523.PDT | 11270533.UDT | 11270538.PDT | 11270548.UDT | 11270553.PDT |
| 11270603.UDT | 11270608.PDT | 11270618.UDT | 11270623.PDT | 11270633.UDT |
| 11270638.PDT | 11270648.UDT | 11270653.PDT | 11270703.UDT | 11270708.PDT |
| 11270717.UDT | 11270723.PDT | 11270733.UDT | 11270738.PDT | 11270747.UDT |
| 11270753.PDT | 11270802.UDT | 11270808.PDT | 11270818.UDT | 11270823.PDT |
| 11270833.UDT | 11270838.PDT | 11270848.UDT | 11270853.PDT | 11270903.UDT |
| 11270908.PDT | 11270917.UDT | 11270923.PDT | 11270932.UDT | 11270938.PDT |
| 11270948.UDT | 11270953.PDT | 11271003.UDT | 11271008.PDT | 11271017.UDT |
| 11271023.PDT | 11271032.UDT | 11271038.PDT | 11271048.UDT | 11271053.PDT |
| 11271103.UDT | 11271108.PDT | 11271117.UDT | 11271123.PDT | 11271132.UDT |
| 11271138.PDT | 11271147.UDT | 11271153.PDT | 11271202.UDT | 11271208.PDT |
| 11271218.UDT | 11271223.PDT | 11271233.UDT | 11271238.PDT | 11271247.UDT |
| 11271253.PDT | 11271302.UDT | 11271308.PDT | 11271318.UDT | 11271323.PDT |
| 11271333.UDT | 11271338.PDT | 11271347.UDT | 11271353.PDT | 11271402.UDT |
| 11271408.PDT | 11271417.UDT | 11271423.PDT | 11271432.UDT | 11271438.PDT |
| 11271447.UDT | 11271453.PDT | 11271502.UDT | 11271508.PDT | 11271517.UDT |
| 11271523.PDT | 11271532.UDT | 11271538.PDT | 11271547.UDT | 11271553.PDT |
| 11271602.UDT | 11271608.PDT | 11271617.UDT | 11271623.PDT | 11271632.UDT |
| 11271638.PDT | 11271647.UDT | 11271653.PDT | 11271702.UDT | 11271708.PDT |
| 11271717.UDT | 11271723.PDT | 11271732.UDT | 11271738.PDT | 11271747.UDT |
| 11271753.PDT | 11271802.UDT | 11271808.PDT | 11271818.UDT | 11271823.PDT |
| 11271833.UDT | 11271838.PDT | 11271848.UDT | 11271853.PDT | 11271903.UDT |
| 11271908.PDT | 11271918.UDT | 11271923.PDT | 11271933.UDT | 11271938.PDT |
| 11271948.UDT | 11271953.PDT | 11272003.UDT | 11272008.PDT | 11272018.UDT |
| 11272023.PDT | 11272033.UDT | 11272038.PDT | 11272048.UDT | 11272053.PDT |
| 11272103.UDT | 11272108.PDT | 11272118.UDT | 11272123.PDT | 11272133.UDT |
| 11272138.PDT | 11272148.UDT | 11272153.PDT | 11272203.UDT | 11272208.PDT |
| 11272218.UDT | 11272223.PDT | 11272233.UDT | 11272238.PDT | 11272248.UDT |
| 11272253.PDT | 11272303.UDT | 11272308.PDT | 11272318.UDT | 11272323.PDT |
| 11272333.UDT | 11272338.PDT | 11272348.UDT | 11272353.PDT | |

JDAY 332

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|--------------|--------------|--------------|--------------|--------------|
| | | | | 11280003.UDT |
| 11280008.PDT | 11280018.UDT | 11280023.PDT | 11280033.UDT | 11280038.PDT |
| 11280048.UDT | 11280053.PDT | 11280103.UDT | 11280108.PDT | 11280118.UDT |
| 11280123.PDT | 11280133.UDT | 11280138.PDT | 11280148.UDT | 11280153.PDT |
| 11280203.UDT | 11280208.PDT | 11280218.UDT | 11280223.PDT | 11280233.UDT |
| 11280238.PDT | 11280248.UDT | 11280253.PDT | 11280303.UDT | 11280308.PDT |
| 11280318.UDT | 11280323.PDT | 11280333.UDT | 11280338.PDT | 11280348.UDT |
| 11280353.PDT | 11280403.UDT | 11280408.PDT | 11280418.UDT | 11280423.PDT |
| 11280433.UDT | 11280438.PDT | 11280448.UDT | 11280453.PDT | 11280503.UDT |
| 11280508.PDT | 11280518.UDT | 11280523.PDT | 11280533.UDT | 11280538.PDT |
| 11280548.UDT | 11280553.PDT | 11280603.UDT | 11280608.PDT | 11280618.UDT |
| 11280623.PDT | 11280633.UDT | 11280638.PDT | 11280648.UDT | 11280653.PDT |
| 11280703.UDT | 11280708.PDT | 11280718.UDT | 11280723.PDT | 11280733.UDT |
| 11280738.PDT | 11280748.UDT | 11280753.PDT | 11280803.UDT | 11280808.PDT |
| 11280818.UDT | 11280823.PDT | 11280833.UDT | 11280838.PDT | 11280848.UDT |
| 11280853.PDT | 11280903.UDT | 11280908.PDT | 11280918.UDT | 11280923.PDT |
| 11280933.UDT | 11280938.PDT | 11280948.UDT | 11280953.PDT | 11281003.UDT |
| 11281008.PDT | 11281018.UDT | 11281023.PDT | 11281033.UDT | 11281038.PDT |
| 11281048.UDT | 11281053.PDT | 11281103.UDT | 11281108.PDT | 11281118.UDT |
| 11281123.PDT | 11281133.UDT | 11281138.PDT | 11281148.UDT | 11281153.PDT |
| 11281203.UDT | 11281208.PDT | 11281218.UDT | 11281223.PDT | 11281233.UDT |
| 11281238.PDT | 11281248.UDT | 11281253.PDT | 11281303.UDT | 11281308.PDT |
| 11281318.UDT | 11281323.PDT | 11281333.UDT | 11281338.PDT | 11281348.UDT |

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| 11281353.PDT | 11281403.UDT | 11281408.PDT | 11281418.UDT | 11281423.PDT |
| 11281433.UDT | 11281438.PDT | 11281448.UDT | 11281453.PDT | 11281503.UDT |
| 11281508.PDT | 11281518.UDT | 11281523.PDT | 11281533.UDT | 11281538.PDT |
| 11281548.UDT | 11281553.PDT | 11281603.UDT | 11281608.PDT | 11281618.UDT |
| 11281623.PDT | 11281633.UDT | 11281638.PDT | 11281648.UDT | 11281653.PDT |
| 11281703.UDT | 11281708.PDT | 11281718.UDT | 11281723.PDT | 11281733.UDT |
| 11281738.PDT | 11281748.UDT | 11281753.PDT | 11281803.UDT | 11281809.PDT |
| 11281818.UDT | 11281824.PDT | 11281833.UDT | 11281839.PDT | 11281848.UDT |
| 11281854.PDT | 11281903.UDT | 11281909.PDT | 11281918.UDT | 11281924.PDT |
| 11281933.UDT | 11281939.PDT | 11281948.UDT | 11281954.PDT | 11282003.UDT |
| 11282009.PDT | 11282018.UDT | 11282024.PDT | 11282033.UDT | 11282039.PDT |
| 11282048.UDT | 11282054.PDT | 11282103.UDT | 11282109.PDT | 11282118.UDT |
| 11282124.PDT | 11282133.UDT | 11282139.PDT | 11282148.UDT | 11282154.PDT |
| 11282203.UDT | 11282209.PDT | 11282218.UDT | 11282224.PDT | 11282233.UDT |
| 11282239.PDT | 11282248.UDT | 11282254.PDT | 11282303.UDT | 11282309.PDT |
| 11282318.UDT | 11282324.PDT | 11282333.UDT | 11282339.PDT | 11282348.UDT |
| 11282354.PDT | | | | |

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| JDAY 333 | 11290003.UDT | 11290009.PDT | 11290018.UDT | 11290024.PDT |
| 11290033.UDT | 11290039.PDT | 11290048.UDT | 11290054.PDT | 11290103.UDT |
| 11290109.PDT | 11290118.UDT | 11290124.PDT | 11290133.UDT | 11290139.PDT |
| 11290148.UDT | 11290154.PDT | 11290203.UDT | 11290209.PDT | 11290218.UDT |
| 11290224.PDT | 11290233.UDT | 11290239.PDT | 11290248.UDT | 11290254.PDT |
| 11290303.UDT | 11290309.PDT | 11290318.UDT | 11290324.PDT | 11290333.UDT |
| 11290339.PDT | 11290348.UDT | 11290354.PDT | 11290403.UDT | 11290409.PDT |
| 11290418.UDT | 11290424.PDT | 11290433.UDT | 11290439.PDT | 11290448.UDT |
| 11290454.PDT | 11290503.UDT | 11290509.PDT | 11290518.UDT | 11290524.PDT |
| 11290533.UDT | 11290539.PDT | 11290548.UDT | 11290554.PDT | 11290603.UDT |
| 11290609.PDT | 11290618.UDT | 11290624.PDT | 11290633.UDT | 11290639.PDT |
| 11290648.UDT | 11290654.PDT | 11290703.UDT | 11290709.PDT | 11290718.UDT |
| 11290724.PDT | 11290733.UDT | 11290738.PDT | 11290748.UDT | 11290753.PDT |
| 11290803.UDT | 11290809.PDT | 11290818.UDT | 11290824.PDT | 11290833.UDT |
| 11290839.PDT | 11290848.UDT | 11290854.PDT | 11290903.UDT | 11290909.PDT |
| 11290918.UDT | 11290924.PDT | 11290933.UDT | 11290938.PDT | 11290948.UDT |
| 11290954.PDT | 11291003.UDT | 11291008.PDT | 11291018.UDT | 11291023.PDT |
| 11291033.UDT | 11291039.PDT | 11291048.UDT | 11291053.PDT | 11291103.UDT |
| 11291108.PDT | 11291118.UDT | 11291123.PDT | 11291133.UDT | 11291138.PDT |
| 11291148.UDT | 11291154.PDT | 11291203.UDT | 11291208.PDT | 11291218.UDT |
| 11291223.PDT | 11291233.UDT | 11291239.PDT | 11291248.UDT | 11291253.PDT |
| 11291303.UDT | 11291308.PDT | 11291318.UDT | 11291323.PDT | 11291333.UDT |
| 11291338.PDT | 11291348.UDT | 11291353.PDT | 11291403.UDT | 11291408.PDT |
| 11291418.UDT | 11291423.PDT | 11291433.UDT | 11291438.PDT | 11291448.UDT |
| 11291453.PDT | 11291503.UDT | 11291508.PDT | 11291518.UDT | 11291523.PDT |
| 11291533.UDT | 11291538.PDT | 11291548.UDT | 11291553.PDT | 11291603.UDT |
| 11291608.PDT | 11291618.UDT | 11291623.PDT | 11291633.UDT | 11291638.PDT |
| 11291648.UDT | 11291653.PDT | 11291703.UDT | 11291708.PDT | 11291718.UDT |
| 11291723.PDT | 11291733.UDT | 11291738.PDT | 11291748.UDT | 11291753.PDT |
| 11291803.UDT | 11291809.PDT | 11291819.UDT | 11291824.PDT | 11291834.UDT |
| 11291839.PDT | 11291849.UDT | 11291854.PDT | 11291904.UDT | 11291909.PDT |
| 11291919.UDT | 11291924.PDT | 11291934.UDT | 11291939.PDT | 11291949.UDT |
| 11291954.PDT | 11292004.UDT | 11292009.PDT | 11292019.UDT | 11292024.PDT |
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| 11292109.PDT | 11292119.UDT | 11292124.PDT | 11292134.UDT | 11292139.PDT |
| 11292149.UDT | 11292154.PDT | 11292204.UDT | 11292209.PDT | 11292219.UDT |
| 11292224.PDT | 11292234.UDT | 11292239.PDT | 11292249.UDT | 11292254.PDT |
| 11292304.UDT | 11292309.PDT | 11292319.UDT | 11292324.PDT | 11292334.UDT |
| 11292339.PDT | 11292349.UDT | 11292354.PDT | | |

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| 11300209.PDT | 11300219.UDT | 11300224.PDT | 11300154.PDT | 11300204.UDT |
| 11300249.UDT | 11300254.PDT | 11300304.UDT | 11300234.UDT | 11300239.PDT |
| 11300324.PDT | 11300334.UDT | 11300339.PDT | 11300309.PDT | 11300319.UDT |
| 11300404.UDT | 11300409.PDT | 11300419.UDT | 11300349.UDT | 11300354.PDT |
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| 11300709.PDT | 11300719.UDT | 11300724.PDT | 11300654.PDT | 11300704.UDT |
| 11300749.UDT | 11300754.PDT | 11300804.UDT | 11300734.UDT | 11300739.PDT |
| 11300824.PDT | 11300834.UDT | 11300839.PDT | 11300809.PDT | 11300819.UDT |
| 11300904.UDT | 11300909.PDT | 11300919.UDT | 11300849.UDT | 11300854.PDT |
| 11300939.PDT | 11300949.UDT | 11300954.PDT | 11300924.PDT | 11300934.UDT |
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| 11301134.UDT | 11301139.PDT | 11301149.UDT | 11301119.UDT | 11301124.PDT |
| 11301209.PDT | 11301219.UDT | 11301224.PDT | 11301154.PDT | 11301204.UDT |
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| 11301324.PDT | 11301334.UDT | 11301339.PDT | 11301309.PDT | 11301319.UDT |
| 11301404.UDT | 11301409.PDT | 11301419.UDT | 11301349.UDT | 11301354.PDT |
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| 11301554.PDT | 11301604.UDT | 11301609.PDT | 11301539.PDT | 11301549.UDT |
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| 11301709.PDT | 11301719.UDT | 11301724.PDT | 11301654.PDT | 11301704.UDT |
| 11301749.UDT | 11301754.PDT | 11301804.UDT | 11301734.UDT | 11301739.PDT |
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| 11301904.UDT | 11301909.PDT | 11301919.UDT | 11301849.UDT | 11301855.PDT |
| 11301939.PDT | 11301949.UDT | 11301954.PDT | 11301925.PDT | 11301934.UDT |
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| 11302054.PDT | 11302104.UDT | 11302109.PDT | 11302039.PDT | 11302049.UDT |
| 11302134.UDT | 11302139.PDT | 11302149.UDT | 11302119.UDT | 11302124.PDT |
| 11302209.PDT | 11302219.UDT | 11302224.PDT | 11302154.PDT | 11302204.UDT |
| 11302249.UDT | 11302254.PDT | 11302304.UDT | 11302234.UDT | 11302239.PDT |
| 11302324.PDT | 11302334.UDT | 11302339.PDT | 11302309.PDT | 11302319.UDT |
| | | | 11302349.UDT | 11302354.PDT |

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| 12010039.PDT | 12010049.UDT | 12010054.PDT | 12010104.UDT | 12010109.PDT |
| 12010119.UDT | 12010124.PDT | 12010134.UDT | 12010139.PDT | 12010149.UDT |
| 12010154.PDT | 12010204.UDT | 12010209.PDT | 12010219.UDT | 12010224.PDT |
| 12010234.UDT | 12010239.PDT | 12010249.UDT | 12010254.PDT | 12010304.UDT |
| 12010309.PDT | 12010319.UDT | 12010324.PDT | 12010334.UDT | 12010339.PDT |
| 12010349.UDT | 12010354.PDT | 12010404.UDT | 12010409.PDT | 12010419.UDT |
| 12010424.PDT | 12010434.UDT | 12010439.PDT | 12010449.UDT | 12010454.PDT |
| 12010504.UDT | 12010509.PDT | 12010519.UDT | 12010524.PDT | 12010534.UDT |
| 12010539.PDT | 12010549.UDT | 12010554.PDT | 12010604.UDT | 12010609.PDT |
| 12010619.UDT | 12010624.PDT | 12010634.UDT | 12010639.PDT | 12010649.UDT |
| 12010654.PDT | 12010704.UDT | 12010709.PDT | 12010719.UDT | 12010724.PDT |
| 12010734.UDT | 12010739.PDT | 12010749.UDT | 12010754.PDT | 12010804.UDT |
| 12010809.PDT | 12010819.UDT | 12010824.PDT | 12010834.UDT | 12010839.PDT |
| 12010849.UDT | 12010854.PDT | 12010904.UDT | 12010909.PDT | 12010919.UDT |
| 12010924.PDT | 12010934.UDT | 12010939.PDT | 12010949.UDT | 12010954.PDT |
| 12011004.UDT | 12011009.PDT | 12011019.UDT | 12011024.PDT | 12011034.UDT |
| 12011039.PDT | 12011049.UDT | 12011054.PDT | 12011104.UDT | 12011109.PDT |

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|--------------|--------------|--------------|--------------|--------------|
| 12011119.UDT | 12011124.PDT | 12011134.UDT | 12011139.PDT | 12011149.UDT |
| 12011154.PDT | 12011204.UDT | 12011209.PDT | 12011219.UDT | 12011224.PDT |
| 12011234.UDT | 12011239.PDT | 12011249.UDT | 12011254.PDT | 12011304.UDT |
| 12011309.PDT | 12011319.UDT | 12011324.PDT | 12011334.UDT | 12011339.PDT |
| 12011349.UDT | 12011354.PDT | 12011404.UDT | 12011409.PDT | 12011419.UDT |
| 12011424.PDT | 12011434.UDT | 12011439.PDT | 12011449.UDT | 12011454.PDT |
| 12011504.UDT | 12011509.PDT | 12011519.UDT | 12011524.PDT | 12011534.UDT |
| 12011539.PDT | 12011549.UDT | 12011554.PDT | 12011604.UDT | 12011609.PDT |
| 12011619.UDT | 12011624.PDT | 12011634.UDT | 12011639.PDT | 12011649.UDT |
| 12011654.PDT | 12011704.UDT | 12011709.PDT | 12011719.UDT | 12011724.PDT |
| 12011734.UDT | 12011739.PDT | 12011749.UDT | 12011754.PDT | 12011804.UDT |
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| 12012235.UDT | 12012240.PDT | 12012250.UDT | 12012255.PDT | 12012305.UDT |
| 12012310.PDT | 12012320.UDT | 12012325.PDT | 12012335.UDT | 12012340.PDT |
| 12012350.UDT | 12012355.PDT | | | |

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|--------------|--------------|--------------|--------------|--------------|
| | | 12020005.UDT | 12020010.PDT | 12020020.UDT |
| 12020025.PDT | 12020035.UDT | 12020040.PDT | 12020050.UDT | 12020055.PDT |
| 12020105.UDT | 12020110.PDT | 12020120.UDT | 12020125.PDT | 12020135.UDT |
| 12020140.PDT | 12020150.UDT | 12020155.PDT | 12020205.UDT | 12020210.PDT |
| 12020220.UDT | 12020225.PDT | 12020235.UDT | 12020240.PDT | 12020250.UDT |
| 12020255.PDT | 12020305.UDT | 12020310.PDT | 12020320.UDT | 12020325.PDT |
| 12020335.UDT | 12020340.PDT | 12020350.UDT | 12020355.PDT | 12020405.UDT |
| 12020410.PDT | 12020420.UDT | 12020425.PDT | 12020435.UDT | 12020440.PDT |
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| 12020755.PDT | 12020805.UDT | 12020810.PDT | 12020820.UDT | 12020825.PDT |
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| 12021255.PDT | 12021305.UDT | 12021310.PDT | 12021320.UDT | 12021325.PDT |
| 12021335.UDT | 12021340.PDT | 12021350.UDT | 12021355.PDT | 12021405.UDT |
| 12021410.PDT | 12021420.UDT | 12021425.PDT | 12021435.UDT | 12021440.PDT |
| 12021450.UDT | 12021455.PDT | 12021505.UDT | 12021510.PDT | 12021520.UDT |
| 12021525.PDT | 12021535.UDT | 12021540.PDT | 12021550.UDT | 12021555.PDT |
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| 12021720.UDT | 12021725.PDT | 12021735.UDT | 12021740.PDT | 12021750.UDT |
| 12021755.PDT | 12021805.UDT | 12021810.PDT | 12021820.UDT | 12021825.PDT |
| 12021835.UDT | 12021840.PDT | 12021850.UDT | 12021855.PDT | 12021905.UDT |
| 12021910.PDT | 12021920.UDT | 12021925.PDT | 12021935.UDT | 12021940.PDT |
| 12021950.UDT | 12021955.PDT | 12022005.UDT | 12022010.PDT | 12022020.UDT |
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| 12022140.PDT | 12022150.UDT | 12022155.PDT | 12022205.UDT | 12022210.PDT |

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|--------------|--------------|--------------|--------------|--------------|
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| 12022335.UDT | 12022340.PDT | 12022350.UDT | 12022355.PDT | |

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|--------------|--------------|--------------|--------------|--------------|
| | | | | 12030005.UDT |
| 12030010.PDT | 12030020.UDT | 12030025.PDT | 12030035.UDT | 12030040.PDT |
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| 12030125.PDT | 12030135.UDT | 12030140.PDT | 12030150.UDT | 12030155.PDT |
| 12030205.UDT | 12030210.PDT | 12030220.UDT | 12030225.PDT | 12030235.UDT |
| 12030240.PDT | 12030250.UDT | 12030255.PDT | 12030305.UDT | 12030310.PDT |
| 12030320.UDT | 12030325.PDT | 12030335.UDT | 12030340.PDT | 12030350.UDT |
| 12030355.PDT | 12030405.UDT | 12030410.PDT | 12030420.UDT | 12030425.PDT |
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| 12030855.PDT | 12030905.UDT | 12030910.PDT | 12030920.UDT | 12030925.PDT |
| 12030935.UDT | 12030940.PDT | 12030950.UDT | 12030955.PDT | 12031005.UDT |
| 12031010.PDT | 12031020.UDT | 12031025.PDT | 12031035.UDT | 12031040.PDT |
| 12031050.UDT | 12031055.PDT | 12031105.UDT | 12031110.PDT | 12031120.UDT |
| 12031125.PDT | 12031135.UDT | 12031140.PDT | 12031150.UDT | 12031155.PDT |
| 12031205.UDT | 12031210.PDT | 12031220.UDT | 12031225.PDT | 12031235.UDT |
| 12031240.PDT | 12031250.UDT | 12031255.PDT | 12031305.UDT | 12031310.PDT |
| 12031320.UDT | 12031325.PDT | 12031335.UDT | 12031340.PDT | 12031350.UDT |
| 12031355.PDT | 12031405.UDT | 12031410.PDT | 12031420.UDT | 12031425.PDT |
| 12031435.UDT | 12031440.PDT | 12031450.UDT | 12031455.PDT | 12031505.UDT |
| 12031510.PDT | 12031520.UDT | 12031525.PDT | 12031535.UDT | 12031540.PDT |
| 12031550.UDT | 12031555.PDT | 12031605.UDT | 12031610.PDT | 12031620.UDT |
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| 12031705.UDT | 12031710.PDT | 12031720.UDT | 12031725.PDT | 12031735.UDT |
| 12031740.PDT | 12031750.UDT | 12031755.PDT | 12031805.UDT | 12031811.PDT |
| 12031821.UDT | 12031826.PDT | 12031836.UDT | 12031841.PDT | 12031851.UDT |
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| 12032051.UDT | 12032056.PDT | 12032106.UDT | 12032111.PDT | 12032121.UDT |
| 12032126.PDT | 12032136.UDT | 12032141.PDT | 12032151.UDT | 12032156.PDT |
| 12032206.UDT | 12032211.PDT | 12032221.UDT | 12032226.PDT | 12032236.UDT |
| 12032241.PDT | 12032251.UDT | 12032256.PDT | 12032306.UDT | 12032311.PDT |
| 12032321.UDT | 12032326.PDT | 12032336.UDT | 12032341.PDT | 12032351.UDT |
| 12032356.PDT | | | | |

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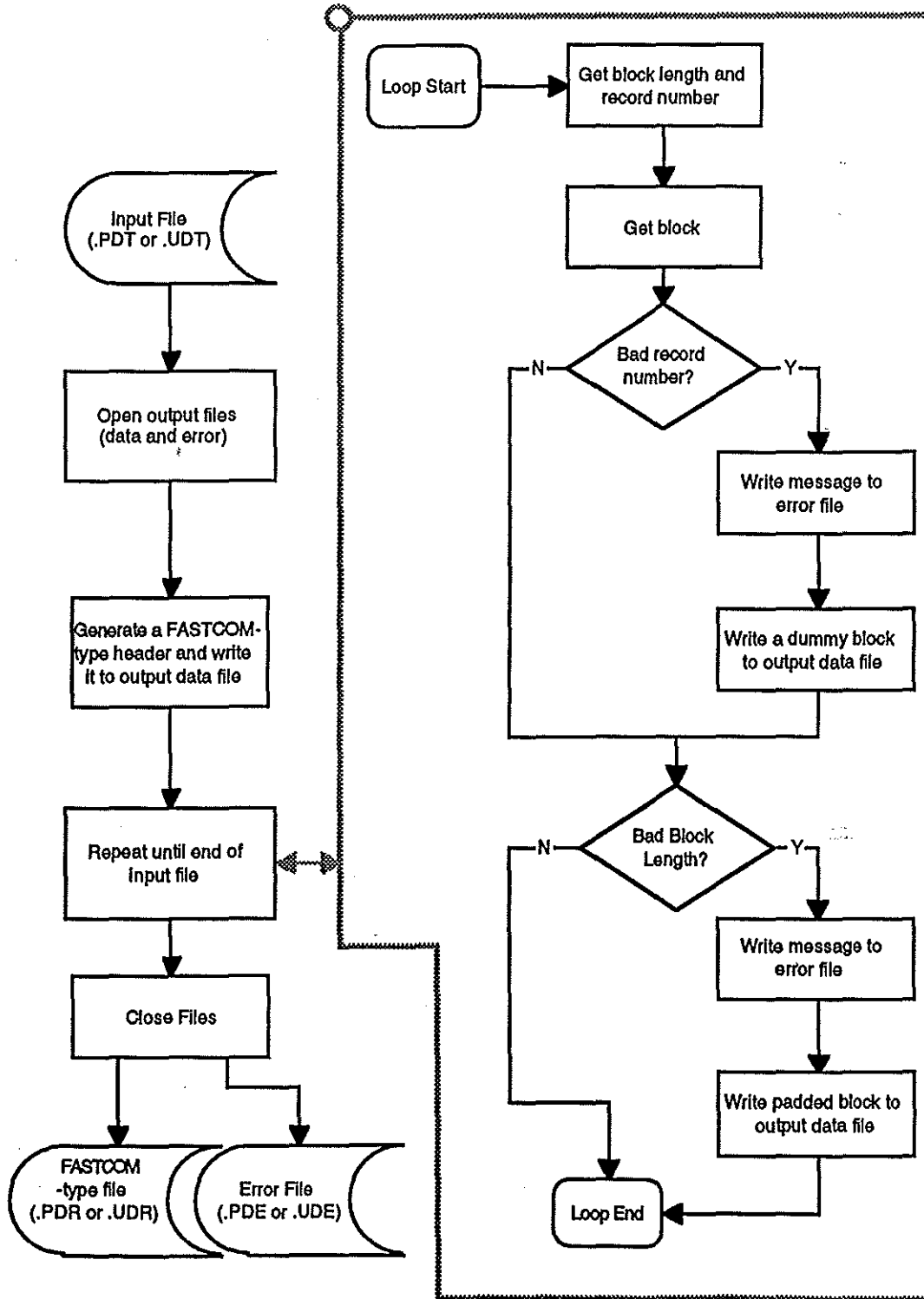
| | | | | |
|--------------|--------------|--------------|--------------|--------------|
| | 12040006.UDT | 12040011.PDT | 12040021.UDT | 12040026.PDT |
| 12040036.UDT | 12040041.PDT | 12040051.UDT | 12040056.PDT | 12040106.UDT |
| 12040111.PDT | 12040121.UDT | 12040126.PDT | 12040136.UDT | 12040141.PDT |
| 12040151.UDT | 12040156.PDT | 12040206.UDT | 12040211.PDT | 12040221.UDT |
| 12040226.PDT | 12040236.UDT | 12040241.PDT | 12040251.UDT | 12040256.PDT |
| 12040306.UDT | 12040311.PDT | 12040321.UDT | 12040326.PDT | 12040336.UDT |
| 12040341.PDT | 12040351.UDT | 12040356.PDT | 12040406.UDT | 12040411.PDT |
| 12040421.UDT | 12040426.PDT | 12040436.UDT | 12040441.PDT | 12040451.UDT |
| 12040456.PDT | 12040506.UDT | 12040511.PDT | 12040521.UDT | 12040526.PDT |
| 12040536.UDT | 12040541.PDT | 12040551.UDT | 12040556.PDT | 12040606.UDT |
| 12040611.PDT | 12040621.UDT | 12040626.PDT | 12040636.UDT | 12040641.PDT |
| 12040651.UDT | 12040656.PDT | 12040706.UDT | 12040711.PDT | 12040721.UDT |
| 12040726.PDT | 12040736.UDT | 12040741.PDT | 12040751.UDT | 12040756.PDT |

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|--------------|--------------|--------------|--------------|--------------|
| 12040806.UDT | 12040811.PDT | 12040820.UDT | 12040826.PDT | 12040836.UDT |
| 12040841.PDT | 12040850.UDT | 12040856.PDT | 12040905.UDT | 12040911.PDT |
| 12040921.UDT | 12040926.PDT | 12040935.UDT | 12040941.PDT | 12041504.UDT |
| 12041913.PDT | 12042104.UDT | 12042109.PDT | | |

2967 file(s) 282468414 bytes
1081344 bytes free

10. APPENDIX E SOFTWARE LISTINGS

10.1. Appendix E.1 THORREAD.C




```

/*****THORREAD.C*****/
*
* Converts files produced by the THORCOM telemetry logging system
* to the standard file format produced by FASTCOM
* (as produced by the ship system)
*
* Deals with errors as follows:
*   if a data packet is missing, inserts a packet of all zero values
*   with length 210 bytes
*
*   if a data packet is short (non multiple of 10 bytes), adds zero
*   values to make it up to length 210 bytes
*
* NB packets are normally of length 200, 210 or 220 bytes,
* 210 is used as best guess for correct number for prompted data
* 200 is used as best guess for unprompted data
*
* NB first packet is discarded as it normally contains dud data
* resulting from change from prompted to unprompted during fill
* of the anemometer output buffer
*
* Writes description of each error to an individually named error file (.PDE or .UDE)
*
* Call with path/filename added, e.g. THORREAD C:\LOGDATA\11021015.PDT
* (or use suitably modified batch file TXPDR.BAT or TXUDR.BAT)
* This results in a FASTCOM-type file named C:\DATA\11021015.PDR
* and an ASCII error file named C:\DATA\11021015.PDE
*
* CHC
* 25th October 1993
*
*****/

```

```

#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
#include<string.h>

```

```

main(int argc, char *argv[])
{
char buffer[256], dum_rec[256];
char *filename, header[50], infile[32], outfile[32], thor_time[10], thor_date[10];

```

```

FILE * f_in;
FILE * f_out;
FILE * f_errs;

```

```

int ch, expected_rec_no, expected_length, first = 1, rec_no;

```

```

unsigned block_length, prompted;

```

```

unsigned long sum_bytes = 0L;

```

```

if (argc != 2)
{
printf("Wrong arguments\n");
exit(0);
}

```

```

for (ch = 0; ch < 210; ch++)
{
dum_rec[ch] = 0;
}

```

```
strcpy(infile, argv[1]);

if ( (filename = strrchr(infile, '\\') == NULL)
    {
    filename = infile;          /* path only contains name */
    }
else
    {
    filename++;                /* set to name */
    }

if (strpbrk(filename, "Pp") != NULL)
    {
    prompted = 1;
    expected_length = 210;
    }
else
    {
    prompted = 0;
    expected_length = 200;
    }

strcpy(header, "Mode 1\nAnalog 1\nTime ");
thor_time[0] = filename[4];
thor_time[1] = filename[5];
thor_time[2] = 58; /* colon */
thor_time[3] = filename[6];
thor_time[4] = filename[7];
thor_time[5] = '\0';
strcat(thor_time, ":00");
thor_date[0] = filename[0];
thor_date[1] = filename[1];
thor_date[2] = 47; /* slash */
thor_date[3] = filename[2];
thor_date[4] = filename[3];
thor_date[5] = '\0';
strcat(thor_date, "/93\n");
strcat(header, thor_time);
strcat(header, "Date ");
strcat(header, thor_date);

if ( (f_in = fopen(infile, "rb")) == NULL)
    {
    printf("Could not open input file %s\n", infile);
    exit(0);
    }

strcpy(outfile, "c:\\data\\");
filename[11] = 'e';
strcat(outfile, filename);

if ( (f_errs = fopen(outfile, "w")) == NULL)
    {
    printf("Could not open errors file %s\n", outfile);
    exit(0);
    }

strcpy(outfile, "c:\\data\\");
filename[11] = 'r';
strcat(outfile, filename);

if ( (f_out = fopen(outfile, "wb")) == NULL)
    {
    printf("Could not open output file %s\n", outfile);
    exit(0);
    }
```

```

    }
else
    {
        printf("Converting to FASTCOM format file %s\nWait a while please . .\n", outfile);
    }

fwrite((void *) header, 1, 44, f_out);

while (feof(f_in) == 0)
    {
        block_length = fgetc(f_in);
        rec_no = 256 * fgetc(f_in);
        rec_no += fgetc(f_in);
        if (first == 1)
            {
                fprintf(f_errs, "Start record no. %d\n", rec_no);
            }
        /* printf("%d %d\n", block_length, rec_no); */
        block_length -= 2;

        fread((void *) buffer, 1, block_length, f_in);

        if ( (rec_no != expected_rec_no) && (first == 0) && (feof(f_in) == 0) )
            {
                printf("Missing record at %d\n", expected_rec_no);
                fprintf(f_errs, "Missing record at %d\n", expected_rec_no);
                fwrite((void *) dum_rec, 1, expected_length, f_out);
                sum_bytes += expected_length;
            }

        if ( (div(block_length, 10).rem != 0) && (first == 0) && (feof(f_in) == 0) )
            {
                printf("Bad Block Length (%d) at %d\n", block_length, rec_no);
                fprintf(f_errs, "Bad Block Length (%d) at %d\n", block_length, rec_no);
                for (ch = block_length; ch < (10 * (div(block_length, 10).quot + 1)); ch++)
                    {
                        buffer[ch] = 0; /* pad out block with zeros to length multiple of 10 */
                    }
                block_length = expected_length;
            }

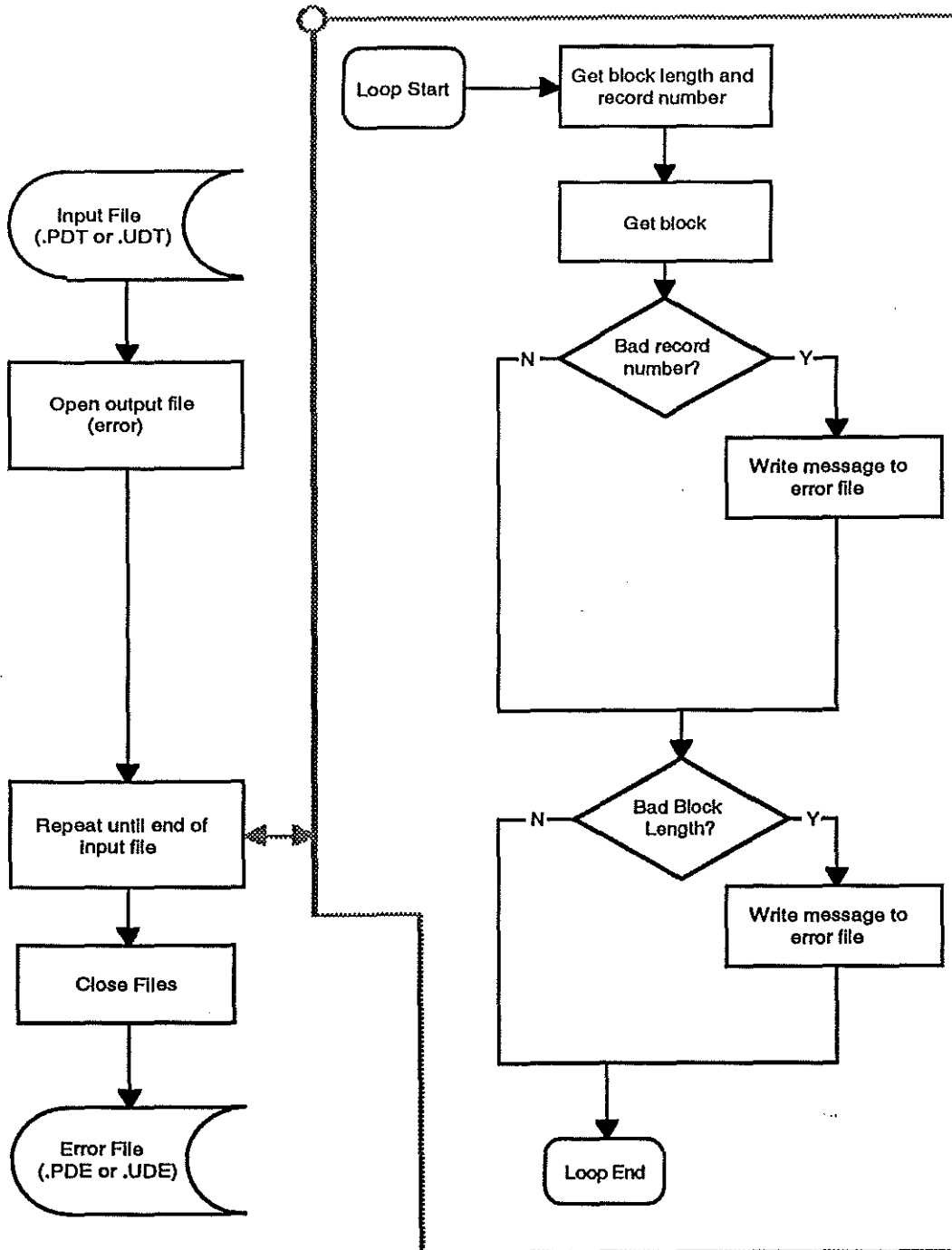
        if ( (first == 0) && (feof(f_in) == 0) )
            {
                fwrite((void *) buffer, 1, block_length, f_out);
                sum_bytes += block_length;
            }

        /* printf("%d %d\n", rec_no, sum_bytes); */
        first = 0;
        expected_rec_no = rec_no + 1;
        if (expected_rec_no > 10000)
            {
                expected_rec_no = 1;
            }
        /* getch(); */
    }

fclose(f_in);
fclose(f_out);
fclose(f_errs);
printf("Done\n");
return 0;
}

```

10.2. Appendix E.2 THORSTAT.C



```

/*****THORSTAT.C*****/
*
* Reads files produced by the THORCOM system and produces error files
*
* Writes description of each error to an individually named error file (.PDE or .UDE)
*
* Call with path/filename added, e.g. THORSTAT C:\LOGDATA\11021015.PDT
* (or use a modified form of TXPDR.BAT and TXUDR.BAT)
* This results in an ASCII error file named
      C:\DATA\11021015.PDE
*
* CHC
* 19th January 1994
*
*****/

#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
#include<string.h>

main(int argc, char *argv[])
{
char buffer[256], dum_rec[256];
char *filename, header[50], infile[50], outfile[50], thor_time[10], thor_date[10];

FILE * f_in;
FILE * f_errs;

int ch, expected_rec_no, expected_length, first = 1, rec_no;

unsigned block_length, prompted;

unsigned long sum_bytes = 0L;

if (argc != 2)
    {
    printf("Wrong arguments\n");
    exit(0);
    }
for (ch = 0; ch < 210; ch++)
    {
    dum_rec[ch] = 0;
    }

strcpy(infile, argv[1]);

if ( (filename = strrchr(infile, '\\')) == NULL)
    {
    filename = infile;          /* path only contains name */
    }
else
    {
    filename++;                /* set to name */
    }

if (strpbrk(filename, "Pp") != NULL)
    {
    prompted = 1;
    expected_length = 210;
    }
else
    {

```

```

        prompted = 0;
        expected_length = 200;
    }
    strcpy(header, "Mode 1\nAnalog 1\nTime ");
    thor_time[0] = filename[4];
    thor_time[1] = filename[5];
    thor_time[2] = 58; /* colon */
    thor_time[3] = filename[6];
    thor_time[4] = filename[7];
    thor_time[5] = '\0';
    strcat(thor_time, ":00");
    thor_date[0] = filename[0];
    thor_date[1] = filename[1];
    thor_date[2] = 47; /* slash */
    thor_date[3] = filename[2];
    thor_date[4] = filename[3];
    thor_date[5] = '\0';
    strcat(thor_date, "/93\n");
    strcat(header, thor_time);
    strcat(header, "Date ");
    strcat(header, thor_date);

    if ( (f_in = fopen(infile, "rb")) == NULL)
    {
        printf("Could not open input file %s\n", infile);
        exit(0);
    }
    strcpy(outfile, "c:\data\");
    filename[11] = 'e';
    strcat(outfile, filename);

    if ( (f_errs = fopen(outfile, "w")) == NULL)
    {
        printf("Could not open errors file %s\n", outfile);
        exit(0);
    }

    strcpy(outfile, "c:\data\");
    filename[11] = 'r';
    strcat(outfile, filename);

    while (feof(f_in) == 0)
    {
        block_length = fgetc(f_in);
        rec_no = 256 * fgetc(f_in);
        rec_no += fgetc(f_in);
        if (first == 1)
        {
            fprintf(f_errs, "Start record no. %d\n", rec_no);
        }
        /* printf("%d %d\n", block_length, rec_no); */
        block_length -= 2;

        fread((void *) buffer, 1, block_length, f_in);

        if ( (rec_no != expected_rec_no) && (first == 0) && (feof(f_in) == 0) )
        {
            printf("Missing record at %d\n", expected_rec_no);
            fprintf(f_errs, "Missing record at %d\n", expected_rec_no);
            sum_bytes += expected_length;
        }

        if ( (div(block_length, 10).rem != 0) && (first == 0) && (feof(f_in) == 0) )

```

```
{
    printf("Bad Block Length (%d) at %d\n", block_length, rec_no);
    fprintf(f_errs, "Bad Block Length (%d) at %d\n", block_length, rec_no);
    for (ch = block_length; ch < (10 * (div(block_length, 10).quot + 1)); ch++)
        {
            buffer[ch] = 0; /* pad out block with zeros to length multiple of 10 */
        }
    block_length = expected_length;
}

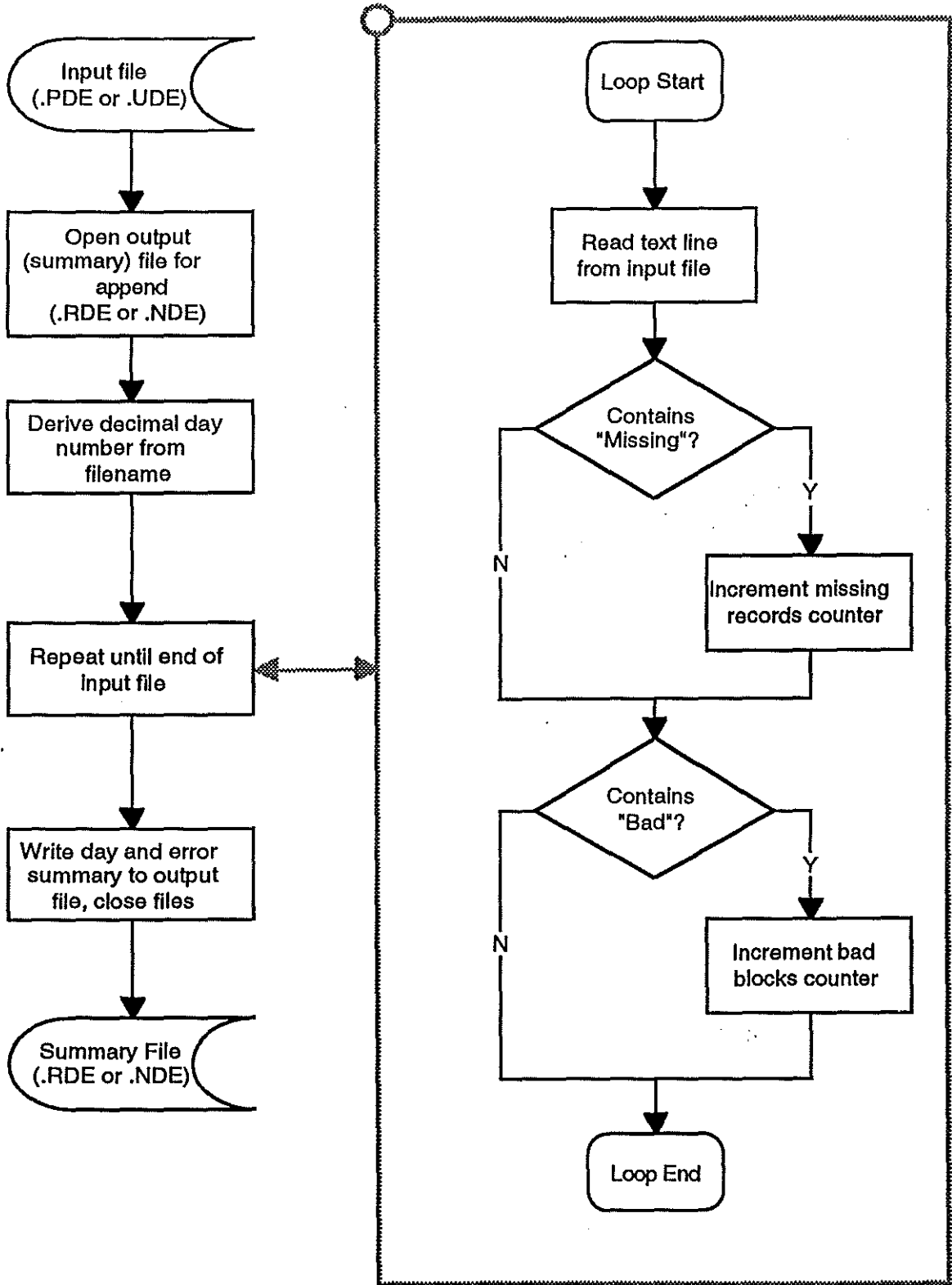
if ( (first == 0) && (feof(f_in) == 0) )
    {
        sum_bytes += block_length;
    }

/* printf("%d %ld\n", rec_no, sum_bytes); */
first = 0;
expected_rec_no = rec_no + 1;
if (expected_rec_no > 10000)
    {
        expected_rec_no = 1;
    }
/* getch(); */
}

fclose(f_in);
fclose(f_errs);
printf("Done\n");

return 0;
}
```

10.3. Appendix E.3 THORSUMM.C




```

/*****THORSUMM.C*****/
*
* Reads .PDE and .UDE error files produced by the THORSTAT program and appends to
* a .RDE or .NDE summary file
*
* Call with path/filename added, e.g. THORSUMM C:\DATA\1102???.PDE
* (or use a suitably modified form of SUMPDE.BAT or SUMUDE.BAT)
* This results in data statistics being appended to an ASCII error file named
*          C:\DATA\SUMMARY.RDE
*
* CHC
* 19th January 1994
*
*****/

```

```

#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
#include<string.h>

main(int argc, char *argv[])
{
char buffer[256];
char *filename, header[50], infile[32], outfile[32], thor_time[10], thor_date[10];
char *fdecode, *stop_at;

FILE *f_in;

FILE *f_errs;

float jday = 0.;

int ch, expected_rec_no, expected_length, first = 1, rec_no;
int missing = 0, bad_block = 0;
int month, day, hours, minutes;

unsigned block_length, prompted;

unsigned long sum_bytes = 0L;

if (argc != 2)
{
printf("Wrong arguments\n");
exit(0);
}

/* input file given in command line argument */
strcpy(infile, argv[1]);

if ( (filename = strrchr(infile, '\\')) == NULL)
{
filename = infile;          /* path only contains name */
}
else
{
filename++;                /* set to name */
}

if ( (f_in = fopen(infile, "rb")) == NULL)
{
printf("Could not open input file %s\n", infile);
exit(0);
}

```

```

    }
else
    {
        printf("%s\n", filename);
    }
strcpy(outfile, "c:\\data\\summary.");
if (strpbrk(filename, "Pp") != NULL)
    {
        strcat(outfile, "rde");
    }
else
    {
        strcat(outfile, "nde");
    }

if ( (f_errs = fopen(outfile, "a")) == NULL)
    {
        printf("Could not open errors file %s\n", outfile);
        exit(0);
    }

/* need to convert mmddhhmm.xde filename to a decimal day value
to put in the output file */
fdecode = filename + 6;
*(fdecode + 2) = 0;
minutes = (int) strtol(fdecode, &stop_at, 10);
fdecode = filename + 4;
*(fdecode + 2) = 0;
hours = (int) strtol(fdecode, &stop_at, 10);
fdecode = filename + 2;
*(fdecode + 2) = 0;
day = (int) strtol(fdecode, &stop_at, 10);
fdecode = filename;
*(fdecode + 2) = 0;
month = (int) strtol(fdecode, &stop_at, 10);

switch(month)
    {
    case(10):
        jday = 273.;
        break;
    case(11):
        jday = 304.;
        break;
    case(12):
        jday = 334.;
        break;
    default:
        printf("Month out of range\n");
        exit(0);
    }
jday += (float) day;
jday += ( (float) hours / 24.);
jday += ( (float) minutes / 1440.);

while (feof(f_in) == 0)
    {
        if ( fgets(buffer, 256, f_in) != 0 )
            {
                if (strstr(buffer, "Start") != NULL)
                    {

```

```
        printf("S");
    }
    if (strstr(buffer, "Missing") != NULL)
    {
        printf("M");
        missing++;
    }
    if (strstr(buffer, "Bad") != NULL)
    {
        printf("B");
        bad_block++;
    }
    }
}
printf("\n");

fprintf(f_errs, "%9.5f\t%d\t%d\n", jday, missing, bad_block);
fclose(f_in);

fclose(f_errs);
printf("Done\n");

return 0;
}
```

10.4. Appendix E.4 REPLAY2.C

```

/*****

```

```

Program REPLAY2.C
Version 1.1 28th October 1993
Author CHC
Compile using command line:
    qcl /AM /Zr /FPi87 replay2.c /F 9000 mlibc7.lib

```

Sonic processing program: use to replaying an existing Mode 1 raw data file, with 1 analogue channel for compass as used in sonic buoy, with save of spectral data .PRN and parameter .MWS files to floppy and hard disks

Requires fast 286 or 386 processor with coprocessor
Install in c:\sonic directory together with SETUP.SON (configuration file)

Throws out bad data

Call using command line REPLAY2 n path/name
where n is number of FFT sections expected (12 for a .PDR file, 6 for a .UDR file)
and path/name is the path and name of the .PDR or .UDR file, e.g. C:\DATA\11021015.PDR

Alternatively, use batch file REPPDR.BAT or REPUDR.BAT
Spectrum will be written to hard and floppy disk .PRN and .MWS files
e.g.
C:\DATA\11021015.PRN, C:\DATA\11021015.MWS, A:\11021015.PRN, A:\11021015.MWS

```

*****/

```

```

#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <time.h>
#include <conio.h>
#include <graph.h>
#include <pgchart.h>
#include <string.h>
#include <process.h>
#include <dos.h>
#include "zcal.h"

```

```

#define LINES 256          /* = half the effective no. of samples per section */
#define pi 3.141592654
#define ramfile "testfile" /* filename for raw data */
#define yoffset 32

```

```

#pragma check_stack(on)
#pragma check_pointer(on)

```

```

typedef enum {FALSE, TRUE} boolean;

```

```

/***** Function declarations *****/
float fitconsts(int, int, int *, int *, float *, float *);
int getdat(int, int, int, char [], char [], float *, float *, float *, float *, float *);

```

```

float dcfiler(int);
void window(int, float, float);
void fourl(int);
float regres(int, float *, float *, float *, float *, double *, double *);
void set_titles(char *, char *, char *, char *);
void set_axes(float, float, float, float, float, float, int);
void set_colours(short, short, short, short);
void do_cross(int, int, short);
char * wait_start(int, int *, int *);
void set_envconsts(int ypixels, int col0);
char * aform(int, int);
void waitl(void);
void harderror_handler(unsigned, unsigned, unsigned *);
void check_disks(int, char *, char *, char *, char *, char *, FILE *, FILE *, FILE *, FILE *);
void show_errors(char *);
int setup(char *);
int check_cache(char *, char *, FILE *);
void wipe_line(void);
/* float meanpsd(int); */ /* temporary addition */

/*****Global Variables*****/
char message[85] = "";
char julian[10];
char ser_no[12];

chartenv env;

FILE *fn;

double a[4 * LINES + 2], p[LINES + 2]; /* double necessary for precision */

float freq1, freq2, fu[LINES + 2], rate; /* fu[] == F() in PKT FSprog */
float last_u = 0., last_v = 0., last_w = 0., last_c = 340.;

int q[4], raw_optical_save, recs_per_file, rows, sections;

long x_calibration_table[361];
long y_calibration_table[361];
long away_z_calibration_table[361];
long into_z_calibration_table[361];
unsigned char error_flag;
unsigned last_comp = 0;

/*****Start of Main*****/
main(int argc, char **argv)
{
char samples[10];
char gilltime[40];
char subhead[40] = "Section: ";
char ft_sec[10];
char head[40] = "Last Start";
char oi_comm[20];

char full_message[50] = "";
char spec_file[25], spec_file[25], spec_file[20], spec_file[20];
char raw_filename[20];
char baud[5], son_mode[5];
char back_up[30];
char sonic_id[6];
char infile[32];
char * fname_raw;

double a1, a2, b;

```

```

FILE *f_out, *ff_out, *f_cache, *fl_out, *ffl_out, *ps; /* ps TEMP INSERT */
/* hard .prm, hard .mws, hard .raw (cache), floppy .mws and floppy .prm, respectively */

float c_mean, den, dfr, dummy, east_mean, fact, fm, fp, fl, f2, fr1, fr2;
float invsw, mean, north_mean, psd, p1, p2;
float r, rms1, scale_x, scale_y, sea, seb, sumw, vert_mean;

float yvalue[1024];
float xvalue[LINES + 2];
float nvalue[256];
float psd_set[101];
float meanws_set[101];

int cflag, first = 1, fft, gflag, good_reads, i, j, j2;
int mode = _VRES16COLOR;
int nans4, nfft, nrec = 2 * LINES;
int nr2, nr23, nr24, nspec = LINES, qtr, re, sample;
int ypixels;
int xp, yp;

palettetype palette_struct;

short col0, col1, col2, col3, col4, col5, col6, col7, col8;

struct rccoord curpos;

unsigned good_total;

_harderr(harderror_handler);          /* set up hardware error handling */

if (argc != 3)
{
    printf("Wrong arguments\n");
    exit(0);
}

gflag = setup(sonic_id);
/* load system parameters and sensor calibration tables from setup.son file */

/* set timezone to GMT */
if (putenv("TZ=GMT") == -1)
{
    ("Error in setting TZ\n");
    return 0;
}
tzset();

if (gflag > 0)
{
    /* Initialise arrays for long term psd/meanws plot */

    for (i = 0; i < 100; i++)
    {
        psd_set[i] = 0.;
        meanws_set[i] = 0.;
    }

    for (i = 0; i < 256; i++)
    {
        nvalue[i] = (float) i / 20.83;
    }
}

```

```

/* printf("Enter file path/name for raw data\n");
scanf("%s", infile); */
strcpy(infile, argv[2]);

/***** Set up Graphics using pgchart functions *****/

while(!_setvideomode(mode))
{
mode--;
}

if((mode != _ERESNOCOLOR) && (mode != _VRES2COLOR) && (mode !=
_VRES16COLOR))
{
printf("Compatible Graphics Adaptor not installed\n");
return(0);
}
switch (mode)
{
case _ERESNOCOLOR:
{
ypixels = 350;
rows = 25;
col0 = 0; col1 = 0; col2 = 5;
col3 = 5; col4 = 2; col5 = 2;
col6 = 2; col7 = 4; col8 = 6;
break;
}
case _VRES2COLOR:
{
ypixels = 480;
rows = 30;
col0 = 0; col1 = 12; col2 = 3;
col3 = 4; col4 = 5; col5 = 6;
col6 = 6; col7 = 11; col8 = 10; /* col6 was 7 */
break;
}
case _VRES16COLOR:
{
ypixels = 480;
rows = 30;
col0 = 0; col1 = 12; col2 = 3;
col3 = 4; col4 = 5; col5 = 6;
col6 = 6; col7 = 11; col8 = 10; /* col6 was 7 */
break;
}
}
}
/**** end of graphics setup ****/

_clearscreen(_GCLEARSCREEN);

/***** Set up parameters for FFT, etc *****/

sumw = fitconsts(nrec, nspec, &nr2, &nr23, &nr24, &fm, &fp);
/* FSprog line 650 */
/* nr2 is total number of samples per section */

nans4 = nspec/4;

/* loop to do recs_per_file x 1/4 hr processes,
with results put in file spec_file */

```

```

for (re = 0; re < recs_per_file; re++)
{
    if ( (fname_raw = strchr(infile, '\\') == NULL)
        {
            fname_raw = infile;           /* path only contains name */
        }
    else
        {
            fname_raw++;                 /* points to name, e.g. "10201344.pdr" */
        }

    strcpy(julian, fname_raw);
    julian[8] = '\0'; /* chop off the ".pdr" */
    sample = 1;
    qtr = 0;

    /* strcpy(julian, wait_start(rows, &sample, &qtr)); */

    if (q[qtr] == 1)
        {
            rate = 20.83;
            nfft = 12;
            strcpy(baud, "1");           /* 4800 baud */
            strcpy(son_mode, "1");
        }
    if (q[qtr] == 4)
        {
            rate = 55.55;
            nfft = 26;
            strcpy(baud, "2");           /* 9600 baud */
            strcpy(son_mode, "4");
        }
    if ( (q[qtr] != 1) && (q[qtr] != 4) && (q[qtr] != 0) )
        {
            printf("Incorrect Mode in setup file\n");
            return 0;
        }
    nfft = atoi(argv[1]);
    invsw = log10( (float) nrec / rate );

    /****** Initialise array for Graphics x-values *****/

    for (i = 0; i <= nspec; i++)
        {
            xvalue[i] = (float) i * rate / nrec;
        }
    yvalue[0] = 0.;

    if(raw_optical_save == 1)
        {
            cflag = check_cache(julian, raw_filename, f_cache);
        }
    else
        {
            cflag = 0;
        }

    /* Calculate frequencies for binning */
    fu[1] = 0.;

    for (i = 2; i <= nspec; i++)

```



```

    {
        fu[i] = 10. * log10( (float) rate * (i-1)/(2 * nspec) );
    }

ltoa( (long) nfft * (long) nr2, samples, 10 );

show_errors(full_message);

/* delete disk retracted message */
if ( (first == 1) || (gflag == 0) )
    {
        _settextposition(3,0);
        printf("          ");
    }
else
    {
        _setcolor( _getpixel(env.chartwindow.x1 + 10, env.chartwindow.y1 + 30) );
        for (xp = env.chartwindow.x1; xp < env.chartwindow.x1 + 177; xp++)
            {
                for (yp = env.chartwindow.y1; yp < env.chartwindow.y1 + 17; yp++)
                    {
                        _setpixel(xp, yp);
                    }
            }
    }

strcpy(message,"");
check_disks(first, full_message, spec_file, spec_ffile, spec_ffile,
            spec_ffile, f_out, ff_out, fl_out, fl_out);
first = 0;

mean = 0.;
for (i = 1; i <= nspec; i++)          /* Initialise p[] array */
    {
        p[i] = 0.;
    }

/* call fastcom.exe, datafile c:\sonic\testfile, mode 4, 9600 baud,
nfft*nr2 records, 0 analogue inputs */

wipe_line();
printf("Record %d - getting %s samples from Sonic   (Wait)",
       sample, samples);

wipe_line();
printf("Samples acquired . . . Starting to Process");

wait1();

if (gflag > 0)
    {
        _pg_initchart();
        _pg_defaultchart( &env, _PG_SCATTERCHART, _PG_POINTANDLINE );
        set_envconsts(ypixels, col0);

        _pg_getpalette( palette_struct );
        palette_struct[1].plotchar = 0;          /* set to 0 so that no char is plotted */
        _pg_setpalette( palette_struct );
    }

/***** Start actual calcs *****/

```

```

good_reads = 0;
north_mean = 0.;
east_mean = 0.;
vert_mean = 0.;
c_mean = 0.;

for (fft = 1; fft <= nfft; fft++)
{
    if (kbhit())
    {
        if (getch() == 125)          /* abort tidily if } key pressed */
        {
            exit(0);
        }
    }

    /* Get data section, calc mean, apply window, do fft */
    if ( getdat(q[ctr], fft, nr2, infile, gilltime,
        &dummy, &north_mean, &east_mean, &vert_mean, &c_mean) == 0)
    {
        if (gflag > 0)
        {
            /****** Plot time series for this section of data *****/

            for (j = 0; j < 1024; j += 2)
            {
                yvalue[j/2] = a[j];
                yvalue[512 + j/2] = a[j + 1];
            }

            itoa(fft, fft_sec, 10);
            strcat(subhead, fft_sec);
            set_titles("Time (s)", "Velocity (m/s)", "Time Series", subhead);

            set_axes(0, 13, 1, 0, 20., 2., ypixels);
            set_colours(col4, col0, col1, col0); /* last was 3 */

            for (j = 0; j < 1024; j += 256)
            {
                for (i = 0; i < 256; i++)
                {
                    yvalue[i] = yvalue[i + j];
                }
                if( _pg_chartscluster( &env, nvalue, yvalue, 256 ) )
                {
                    _setvideomode( _DEFAULTMODE);
                    _outtext( "Error: can't draw chart" );
                }
            }
            wait1();

            _settextposition(rows - 1, 10);
            _settextcolor(col7);
            _outtext("Sonic Record Start: ");
            _outtext( gilltime );
            _outtext(" ");
        }
        wait1();

        good_reads++;

        mean += dcfiler(nr2);
    }
}

```

```

window(nrec, fm, fp);

fourl(nrec);

/* convert complex estimates to power */
a[1] = a[1] * a[1] + a[2] * a[2];

for (j = 2; j <= nspec; j++)
{
    j2 = j * 2;

    a[j] = a[j2] * a[j2] + a[j2 - 1] * a[j2 - 1]
          + a[nr24 - j2] * a[nr24 - j2]
          + a[nr23 - j2] * a[nr23 - j2];
}

den = sumw * nr2;
/* corrected sumw 11/02/92 */

/* accumulate power estimates */
for (i = 1; i <= nspec; i++)
{
    p[i] += a[i];

    if (a[i] <= 0.)
    {
        printf("Error a[%d] %e\n", i, a[i]);
        a[i] = 0.;
    }
    else
    {
        a[i] = log10(a[i]/den);
    }
    yvalue[i] = (float) a[i];
}

if (gflag > 0)
{
    /****** Plot power spectrum for this section of data *****/

    /* itoa(fft, fft_sec, 10);
    strcat(subhead, fft_sec); */
    set_titles("Frequency", "Energy", "Power Spectrum", subhead);
    set_axes(0, 0.5 * rate, 2, -8, 2, 2, ypixels);
    set_colours(col4, col0, col1, col0); /* last was 3 */

    if( _pg_chartscatter( &env, xvalue, yvalue, nspec ) )
    {
        _setvideomode( _DEFAULTMODE );
        _outtext( "Error: can't draw chart" );
    }

    _settextposition(rows - 1, 10);
    _settextcolor(col7);
    _outtext("Sonic Record Start: ");
    _outtext( gilltime );
    _outtext(" ");
}

```

```

/* Effectively multiply top part of spectrum by  $f^{5/3}$  */
for (i = 2; i <= nspec; i++) /* i.e. i=96->256 */
{
    a[i] += 1.66666667 * log10((i-1) * rate / nrec) + invsw;
    yvalue[i] = (float) a[i];
}

/* temp insert
ps = fopen("c:\\qc2\\psds", "a+");
fprintf(stdprn, "%+8.5f", meanpsd(nrec));
fprintf(ps, "%+8.5f", meanpsd(nrec));
if ( (fft == 8) || (fft == 15) )
{
    fprintf(stdprn, "\n");
}
fclose(ps);
end of temp insert */

if (gflag > 0)
{
    /****** Plot Spectrum converted to  $\log\{a\}f^{5/3}$  form *****/
    /* (should be near horiz. line) */

    set_axes(0, 0.5 * rate, 2, -8, 2, 2, ypixels); /* xmin was nans4*1.5 */
    strcat(subhead, " (-5/3 Region)");
    set_titles("Frequency", "Energy", "Power Spectrum", subhead);
    set_colours(col5, col0, col1, col0); /* last was 2 */

    if( _pg_chartscluster( &env, xvalue, yvalue, nspec ) )
    {
        _setvideomode( _DEFAULTMODE );
        _outtext( "Error: can't draw chart" );
    }

    show_errors(full_message);
    if (fft < nfft)
    {
        _settextposition(15,40);
        _outtext("Analysing next section");
    }

    strcpy( subhead, "Section: ");
}

} /* end of if(getdat.....) block */

else
{
    printf("\a");
}

} /* end of fft loop */

fclose(fh);
waitl();

if (good_reads == 0)
{
    /* Leave graphics screen */
    _setvideomode( _DEFAULTMODE );
    _settextposition(rows / 2, 20);
    printf("FATAL ERROR:- BAD DATA FROM SONIC\n");
}

```

```

    _settextposition(2 + rows / 2, 25);
    printf("Please inform IOSDL\n");
    exit(0);
}

/* Correct power estimates for windowing, etc */

den = sumw * nr2 * good_reads;      /* corrected sumw 11/02/92 */

for (j = 1; j <= nspec; j++)
{
    p[j] /= den;
}

mean /= good_reads;

good_total = (unsigned) good_reads * nr2;

north_mean /= good_total;
east_mean /= good_total;
vert_mean /= good_total;
c_mean /= good_total;

_settextposition(rows,10);
printf("                ");
show_errors(full_message);
wait(0);

for (i = 2; i <= nspec; i++)
{
    fact = pow((float) (i - 1) * rate / nrec, 1.66666667) * nrec / rate;
    p[i] *= fact;
    a[i] = log10(p[i]);
    yvalue[i] = a[i];
}

/* wipe_line();
printf("dc compt=%f press key to cont", p[1]);
getch();
above temp */

if ( ((f_out = fopen(spec_file, "a+")) == NULL)
      || (fseek(f_out, 0L, SEEK_END) != NULL) )
{
    wipe_line();
    printf("Failed to open C: .PRN File for full Spectrum\n");
    fclose(f_out);
}
else
{
    wipe_line();
    printf("Writing Spectrum to File %s", spec_file);
    fprintf(f_out, "\nFrequency (Hz)\n\F%s : MWS %5.2f m/s\n", julian, mean);

    for (i = 2; i <= nspec; i++)
    {
        fprintf(f_out, "%5.2f,%6.3f\n",
                (float) (i - 1) * rate / nrec, yvalue[i]);
    }
}

```

```

        fclose(f_out);
    }

    if ( ((fll_out = fopen(spec_fllfile, "a+")) == NULL)
         || (fseek(fll_out, 0L, SEEK_END) != NULL) )
    {
        wipe_line();
        printf("Failed to open A: .PRN File for full Spectrum\n");
        fclose(fll_out);
    }
    else
    {
        wipe_line();
        printf("Writing Spectrum to File %s", spec_fllfile);
        fprintf(fll_out, "\nFrequency (Hz)\t\tF%s : MWS %5.2f m/s\n", julian, mean);

        for (i = 2; i <= nspec; i++)
        {
            fprintf(fll_out, "%5.2f,%6.3f\n",
                    (float) (i - 1) * rate / nrec, yvalue[i]);
        }

        fclose(fll_out);
    }

    if (gflag > 0)
    {
        /***** Plot Mean Spectrum *****/

        set_axes(0, 0.5 * rate, 2, -8, 2, 2, ypixels);
        set_titles("Frequency", "Energy", "Mean Spectrum", "log(P(I%)*f^5/3)");
        set_colours(col2, col0, col1, col0); /* last was 7 */

        if( _pg_charts( &env, xvalue, yvalue, LINES ) )
        {
            _setvideomode( _DEFAULTMODE );
            _outtext( "Error: can't draw chart" );
        }
    }
    show_errors(full_message);
    wait();

    /* Fit regression line */
    psd = regres(nrec, &r, &rms1, &sea, &seb, &a1, &b);

    psd = log10(psd);
    sea = log10(fabs(sea));
    seb = log10(fabs(seb));

    if (a1 > 0.)
    {
        a1 = log10(a1);
    }
    else
    {
        a2 = a1;
        a1 = 9999.;
    }

    /* code for output of psd and mean to formatter here */
    /* code for storing fit to eprom logger here */

```

```

_settextposition(rows - 1,10);

if ( ( (f_out = fopen(spec_file, "a+") == NULL)
      || ( fseek(f_out, 0L, SEEK_END) != NULL ) )
    {
    wipe_line();
    printf("Failed to open Drive C: .PRN File for Parameters\n");
    fclose(f_out);
    }
else
    {
    wipe_line();
    printf("Writing PSD to File %s", spec_file);
    fprintf(f_out, "%sPSDSpd\n", julian);
    fprintf(f_out, "%s\n%.3d\n%.5f %.5.2f\n%s\n",
            sonic_id, good_reads, freq1, freq2, son_mode);

    fprintf(f_out,
            "%.5.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.8.5f\n%.8.5f\n%.11.5e\n",
            mean, north_mean, east_mean, vert_mean, c_mean, psd, al,
b);

    fclose(f_out);
    }

if ( ( (ffl_out = fopen(spec_ffile, "a+") == NULL)
      || ( fseek(ffl_out, 0L, SEEK_END) != NULL ) )
    {
    wipe_line();
    printf("Failed to open Drive A: .PRN File for Parameters\n");
    fclose(ffl_out);
    }
else
    {
    wipe_line();
    printf("Writing PSD to File %s", spec_ffile);
    fprintf(ffl_out, "%sPSDSpd\n", julian);
    fprintf(ffl_out, "%s\n%.3d\n%.5f %.5.2f\n%s\n",
            sonic_id, good_reads, freq1, freq2, son_mode);

    fprintf(ffl_out,
            "%.5.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.8.5f\n%.8.5f\n%.11.5e\n",
            mean, north_mean, east_mean, vert_mean, c_mean, psd, al, b);

    fclose(ffl_out);
    }

if ( ( (ff_out = fopen(spec_ffile, "a+") == NULL)
      || ( fseek(ff_out, 0L, SEEK_END) != NULL ) )
    {
    wipe_line();
    printf("Failed to open Drive C: .MWS File for Parameters\n");
    fclose(ff_out);
    }
else
    {
    wipe_line();
    printf("Writing PSD to File %s", spec_file);
    fprintf(ff_out, "%sPSDSpd\n", julian);
    fprintf(ff_out, "%s\n%.3d\n%.5f %.5.2f\n%s\n",
            sonic_id, good_reads, freq1, freq2, son_mode);

    fprintf(ff_out,
            "%.5.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.8.5f\n%.8.5f\n%.11.5e\n",
            mean, north_mean, east_mean, vert_mean, c_mean, psd, al, b);

    fclose(ff_out);
    }

```

```

if ( ( (fl_out = fopen(spec_ffile, "a+")) == NULL,
      || ( fseek(fl_out, 0L, SEEK_END) != NULL ) )
    {
    wipe_line();
    printf("Failed to open Drive A: .MWS File for Parameters\n");
    fclose(fl_out);
    }
else
    {
    wipe_line();
    printf("Writing PSD to File %s", spec_ffile);
    fprintf(fl_out, "%sPSDspd\n", julian);
    fprintf(fl_out, "%s\n%.3d\n%.5.2f %.5.2f\n%s\n",
            sonic_id, good_reads, freq1, freq2, son_mode);
    fprintf(fl_out,
            "%5.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.6.2f\n%.8.5f\n%.8.5f\n%.11.5e\n",
            mean, north_mean, east_mean, vert_mean, c_mean, psd, a1, b);

    fclose(fl_out);
    }

if (gflag > 0)
    {
    scale_x = (float) (env.datawindow.x2 - env.datawindow.x1) / LINES;
    scale_y = (float) (env.datawindow.y2 - env.datawindow.y1) / 10;

    fr1 = 1 + (freq1 * nrec / rate);
    fr2 = 1 + (freq2 * nrec / rate);

    if (a1 != 9999.)
        {
        p1 = log10(pow(10.,a1) + b * fu[(int) fr1]);
        p2 = log10(pow(10.,a1) + b * fu[(int) fr2]);
        }
    else
        {
        /* _settextposition(8, 35);
        _outtext("Can't plot regression line (a -ve)"); */
        p1 = a2 + b * fu[(int) fr1];
        p2 = a2 + b * fu[(int) fr2];
        if ( (p1 > 0.) && (p2 > 0.) )
            {
            p1 = log10(p1);
            p2 = log10(p2);
            }
        else
            {
            wipe_line();
            printf("Can't plot regression line (p -ve)");
            }
        }
    }

/***** Plot fitted line over range freq1 - freq2 *****/

_setcolor(col8);
_moveto( env.datawindow.x1 + (short) (scale_x * fr1),
        yoffset + env.datawindow.y1 - (short) ((p1 - 2) * scale_y) );
_lineto( env.datawindow.x1 + (short) (scale_x * fr2),
        yoffset + env.datawindow.y1 - (short) ((p2 - 2) * scale_y) );

```



```

/* draw dashed lines to show region fr1->fr2 */
_setlinestyle( 0xAAAA);
_moveto( env.datawindow.x1 + (short) (scale_x * fr1),
         yoffset + env.datawindow.y1);
_lineto( env.datawindow.x1 + (short) (scale_x * fr1),
         yoffset + env.datawindow.y2);
_moveto( env.datawindow.x1 + (short) (scale_x * fr2),
         yoffset + env.datawindow.y1);
_lineto( env.datawindow.x1 + (short) (scale_x * fr2),
         yoffset + env.datawindow.y2);
_setlinestyle( 0xFFFF);

}

wait10;
wipe_line();

if (gflag > 0)
{
meanws_set[sample] = mean;
psd_set[sample] = psd;

/* Reset Chart Format to Scatter Diagram */
_pg_defaultchart( &env, _PG_SCATTERCHART, _PG_POINTONLY );
set_envconsts(ypixels, col0);
_pg_getpalette( palette_struct );
palette_struct[1].plotchar = 249; /* 249 plots ~ chars */
_pg_setpalette( palette_struct );

/***** Plot Scatter Diagram of PSD vs MWS *****/

set_titles("Mean Wind Speed (m/s)", "PSD",
          "Scatter Plot of Last 100 Results", strcat(head, gilltime) );
set_axes(0, 40, 10, -8, 2, 2, ypixels);
set_colours(col6, col0, col1, col0); /* last was 3 */

if( _pg_charts( &env, meanws_set, psd_set, 100 ) )
{
_setvideomode( _DEFAULTMODE );
_outtext( "Error: can't draw chart" );
}

strcpy(head, "Last Start");
scale_x = (float) (env.datawindow.x2 - env.datawindow.x1) / 40;
scale_y = (float) (env.datawindow.y2 - env.datawindow.y1) / 10;

/***** Overplot Most Recent Point with a red cross *****/

do_cross( env.datawindow.x1 + (short) (scale_x * mean),
         yoffset + env.datawindow.y1 - (short) ((psd - 2) * scale_y), col3 );
show_errors(full_message);

}

_settextcolor(col7);
_settextposition(rows - 3, 0);
printf("Mean WS=%5.2fm/s, PSD*f^5/3=%+5.2f (%d-%dHz), Fit=%+5.2f%+10.2e*x ",
       mean, psd, (int) freq1, (int) freq2, a1, b);

_settextposition(rows - 2, 0);
printf("(N=%+6.2f:E=%+6.2f:V=%+6.2fm/s) (sea=%+4.2f,seb=%+4.2f), R=%+5.2f,

```

```

        RMS=%+10.2e\n", north_mean, east_mean, vert_mean, sea, seb, r, rms1);
/* printf("Sample No: %d\n", sample); */

/*****TEMPORARY INSERT*****/
fprintf(stdprn, "Mean %f\n", psd);
/*****/

wait1();

}          /* end of re loop */

fclose(f_out);
first = 1;

/* wait_start(rows, &sample); */

/* Leave graphics screen */
_setvideomode(_DEFAULTMODE);
_settextposition(rows - 1,0);

exit(0);

}          /* end of main function */

/***** START OF FUNCTION DEFINITIONS *****/

/***** FFTCONSTS sets parameters for fft *****/

float fitconsts(int nrec, int nspec, int *nr2, int *nr23, int *nr24,
                float *fm, float *fp)
{
int j;
float sumw, w;
float alpha = 31.41592654/nrec;

*nr2 = nrec * 2;
*nr24 = *nr2 + 4;
*nr23 = *nr2 + 3;

*fm = nspec - .5;
*fp = 1/(nspec + .5);

sumw = 0.;
/* Calculate sum of weights for Parsen window
for (j = 1; j <= nrec; j++)
{
    w = 1 - fabs((j - 1) - *fm) * *fp);
    sumw += w * w;
}
*/

/* Calculate weights for partial cosine taper */

for (j = 1; j <= LINES; j++)
{
    if (j <= nrec/10)
    {
        sumw += 0.5 * pow(1 + cos(alpha * (LINES - j)), 2.);
    }
    else
    {
        sumw += 2.;
    }
}

```

```

    }
}

return sumw;
}

/***** GETDAT loads data from diskfile *****/

int getdat(int son_mode, int fft, int nr2, char ram_file[30], char ch[40],
          float *addr_dummy, float *addr_north_mean,
          float *addr_east_mean, float *addr_vert_mean, float *addr_c_mean)
{
double av1, av2, av3, c, cr, sr, u, v, w, res;
/* for ship system cr = cos(.5236), sr = sin(.5236) */
double lf_ck = 0.5 * 0.149 * 29491200;
/* = half path length ( in m ) * counting clock frequency */

float north_start, east_start, vert_start, c_start;

int dec, sign;
int e_flag = 0;
int i, j, k, theta;
int dbuff[12];
/* In mode1, dbuff holds 8 bytes velocity: 4 off (msbyte,lsbyte) */
/* These are 100*u, 100*v, 100*w, 50*c in m/s */
/* In mode4, dbuff holds 12 bytes transit times:6 of (msbyte,lsbyte) */

unsigned int t11, t12, t21, t22, t31, t32;
unsigned comp;

if ( fft == 1 )
{
if ( (fh = fopen(ram_file, "rb")) != 0 )
{
/* read header */
for ( i = 0; i < 5; i++ )
{
fgetc(fh);
}
if ( fgetc(fh) != 48 + son_mode )
{
printf("a"); /* beep */
return(1); /* abort if incorrect mode */
}

for ( i = 0; i < 8; i++ ) /* should be 7 if no CR */
{
fgetc(fh);
}
if ( fgetc(fh) != '1' )
{
return(1); /* abort if no analog channel present */
}

fgetc(fh);

i=0;
do
{
ch[i] = fgetc(fh);
i++;
}
}
}

```

```

while ( (ch[i - 1] != 0x0a) && (i < 40) );

ch[i-1] = 0; /* replace LF with string terminator */
/* Resulting string is:
   "Time hh:mm:ss Date mm/dd/yy" */

}
else
{
wipe_line();
printf("Could not open file\n");
return(1);
}

} /* end of block for fit == 1 */

/* for all values of fit */

north_start = *addr_north_mean;
east_start = *addr_east_mean;
vert_start = *addr_vert_mean;
c_start = *addr_c_mean;

for (j = -1; j <= 0; j++)
{
for (i = j+2; i <= nr2; i += 2)
{
switch (son_mode)
{
case 1:
{
/* get 3 * 2byte vel compts plus 1 * 2byte vel of sound
plus 1 * 2byte compass reading */
for (k = 0; k <= 9; k++)
{
dbuff[k] = fgetc(fh);
if (ferror(fh) != 0)
{
return(2);
}
}

if ( (dbuff[7] != 0) || (dbuff[6] != 0) ) /* vel of sound != 0 */
{
/* convert from motorola format to int format */
u = 0.01 * (int) (dbuff[1] + (dbuff[0] << 8));
v = 0.01 * (int) (dbuff[3] + (dbuff[2] << 8));
w = 0.01 * (int) (dbuff[5] + (dbuff[4] << 8));
c = 0.02 * (int) (dbuff[7] + (dbuff[6] << 8));
comp = (dbuff[9] >> 3) + (dbuff[8] << 5) - 256;
/* compass 8 bit value = (sonic count - 2048) / 8
i.e. (sonic lsbyte / 8) + (sonic msbyte * 256 / 8) - 256 */

if (comp < 0)
{
comp = 0;
}
if (comp > 255)
{
comp = 255;
}
if ( (i > 1) && (abs(comp - last_comp) > 64)
&& (abs(comp - last_comp) < 192) )

```

```

        {
            comp = 0;
        }
        /* NB comp range 0-255 */

        last_u = u;
        last_v = v;
        last_w = w;
        last_c = c;
        last_comp = comp;
    }
    else
    {
        u = last_u;
        v = last_v;
        w = last_w;
        c = last_c;
        comp = last_comp;
        e_flag = 1;
    }

    if ((u == -100) || (v == -100) || (w == -100))
    {
        return(2);          /* path was blocked on 1 or more axes */
    }

    sr = sin(.5236 - 0.0245437 * comp);
    cr = cos(.5236 - 0.0245437 * comp);
    break;
    }
    /* end of case 1 */
case 4:
    {
        /* get 6 * 2byte transit counts (not applicable any more) */
        for (k = 0; k <= 11; k++)
        {
            dbuff[k] = fgetc(fh);
            if (ferror(fh) != 0)
            {
                return(2);
            }
        }
    }

    /* convert from motorola format to int format */
    t11 = dbuff[1] + (dbuff[0] << 8);
    t12 = dbuff[3] + (dbuff[2] << 8);
    t21 = dbuff[5] + (dbuff[4] << 8);
    t22 = dbuff[7] + (dbuff[6] << 8);
    t31 = dbuff[9] + (dbuff[8] << 8);
    t32 = dbuff[11] + (dbuff[10] << 8);

    /* calculate axis velocities */
    av1 = lf_ck / t11 - lf_ck / t12;
    av2 = lf_ck / t21 - lf_ck / t22;
    av3 = lf_ck / t31 - lf_ck / t32;

    /* convert to u, v, w velocities */
    u = .471409 * (2 * av1 - av2 - av3);
    v = .816527 * (av2 - av3);
    w = .471409 * (-av1 - av2 - av3);
    c = 0.333333 * (lf_ck / t11 + lf_ck / t12 + lf_ck / t21
        + lf_ck / t22 + lf_ck / t31 + lf_ck / t32);

```

```

        /* apply calibrations */

        if (u == 0)
            {
                u += .001;
            }
        theta = (int) (57.3 * atan2(v, u) - 30);

        if (theta < 0)
            {
                theta += 360;
            }

        u = u * x_calibration_table[theta] / 65536;
        v = v * y_calibration_table[theta] / 65536;
        if (w > 0)
            {
                w = w * away_z_calibration_table[theta] / 65536;
            }
        else
            {
                w = w * into_z_calibration_table[theta] / 65536;
            }
        } /* end of case 4 */
    break;
} /* end of switch */

*addr_north_mean += (u * cr + v * sr);
*addr_east_mean += (v * cr - u * sr);
*addr_vert_mean += w;
/* above values are vector averaged north, east and vertical compts */

*addr_c_mean += c;

/* put resultant horiz vel. in array a[] (start address a_ptr) */
a[i] = sqrt(u * u + v * v + w * w); /* added w^2 term 5 7 93 */
    } /* end of i loop */
} /* end of j loop */
if (e_flag == 1)
    {
        *addr_north_mean = north_start;
        *addr_east_mean = east_start;
        *addr_vert_mean = vert_start;
        *addr_c_mean = c_start;
        return(3);
    }
else
    {
        return(0);
    }
}

/* returns 0 if ok
1 if failure to open file or header incorrect
2 if error during read
3 if vel of sound is zero (dummy data due to txn error)
(also array of nr2 resultant wind speeds at a_ptr) */

```

```

/***** DCFILTER removes mean from data *****/

```

```
float dcfilter(int nr2)
{
```

```
    int i;
```

```
    float tot = 0;
```

```
    for (i = 1; i <= nr2; i++)
```

```
        {
            tot += a[i];
        }
```

```
    tot = tot/nr2;
```

```
    for (i = 1; i <= nr2; i++)
```

```
        {
            a[i] -= tot;
        }
```

```
    return tot;
```

```
}
```

```
/****** WINDOW applies Parsen data window *****/
```

```
/*
```

```
void window(int nrec, float fm, float fp)
```

```
{
```

```
    int j, j2;
```

```
    float w;
```

```
    for (j = 1; j <= nrec; j++)
```

```
        {
            j2 = 2*j;
            w = 1 - fabs((j-1-fm)*fp);
            a[j2] *= w;
            a[j2-1] *= w;
        }
```

```
    }
```

```
*/
```

```
/****** WINDOW applies partial cosine data window *****/
```

```
void window(int nrec, float fm, float fp)
```

```
{
```

```
    int j, j2, nr2 = 2 * nrec;
```

```
    float alpha = 31.41592654/nrec, w;
```

```
    for (j = 1; j <= nrec/2; j++)
```

```
        {
            if (j <= nrec/10)
                {
                    j2 = 2 * j;
                    w = 0.5 * (1 + cos(alpha * (LINES - j)));
                    a[j2] *= w;
                    a[j2 - 1] *= w;
                    a[nr2 - j2 + 1] *= w;
                    a[nr2 - j2 + 2] *= w;
                }
        }
```

```
    }
```

```
}
```

```

/***** FOUR1 does fft *****/

```

```

void four1(int nrec)
{
int i, j = 1, l, m, n = 2 * nrec, s;
double tr, ti, te, t, wpr, wpi, wr, wi, wt;

```

```

for (i = 1; i <= n; i += 2)
{
if (j > i)
{
tr = a[j];
ti = a[j + 1];
a[j] = a[i];
a[j + 1] = a[i + 1];
a[i] = tr;
a[i + 1] = ti;
}
m = (int) n/2;

while ((m >= 2) && (j > m))
{
j -= m;
m /= 2;
}
j += m;
}

```

```

l = 2;
while (n > l)
{
s = 2 * l;
t = 2 * pi/l;
te = sin(.5*t);
wpr = -2 * te * te;
wpi = sin(t);
wr = 1;
wi = 0;

for (m = 1; m <= l; m += 2)
{
for (i = m; i <= n; i += s)
{
j = i + 1;
tr = wr * a[j] - wi * a[j + 1];
ti = wr * a[j + 1] + wi * a[j];
a[j] = a[i] - tr;
a[j + 1] = a[i + 1] - ti;
a[i] += tr;
a[i + 1] += ti;
}
wt = wr;
wr += wr * wpr - wi * wpi;
wi += wi * wpr + wt * wpi;
}
l = s;
}
}

```

```

/***** REGRES fits regression line *****/

```



```

float regres(int nrec, float *r, float *rms1, float *sea, float *seb,
            double *a1, double *b)
{
int i, i1, i2, n;
float psd, xm, xn, ym, ynl;
/* have to use ynl as yn appears to be in the include files */

double sx = 0, sy = 0, sxx = 0, sxy = 0, syy = 0, ssa, ssb, ssr;

i1 = 1 + (freq1 * nrec/rate);
i2 = 1 + (freq2 * nrec/rate);
psd = 0;
n = 0;
for (i = i1; i <= i2; i++)
    {
    psd += p[i];
    n++;
    }
psd /= n;                                /* mean PSD over range freq1 to freq2 */

xm = fu[1];                               /* tried [i1] */
ym = p[1];                                /* ***** */
n--;

for (i = i1 + 1; i <= i2; i++)
    {
    xn = fu[i] - xm;
    ynl = p[i] - ym;
    sx = sx + xn;
    sy = sy + ynl;
    sxx = sxx + xn * xn;
    sxy = sxy + xn * ynl;
    syy = syy + ynl * ynl;
    }

sxx = sxx - (sx * sx) / (double) n;
sxy = sxy - (sx * sy) / (double) n;
xm = xm + sx / (double) n;
syy = syy - (sy * sy) / (double) n;

*a1 = ym + sy / (double) n;
*b = sxy / sxx;
ssa = *a1 * *a1 * (double) n;
ssb = *b * sxy;
ssr = syy - ssb;
*a1 = *a1 - *b * xm;
*rms1 = ssr / (double) (n - 2);

if (*rms1 < 0)
    {
    /* printf("RMS negative (%e)- is data OK?\n", *rms1); */
    *rms1 = 0;
    *r = 0;
    *sea = 10000;
    *seb = 10000;
    }
else
    {
    *r = (float) (sxy / sqrt(sxx * syy));
    *sea = (float) sqrt((double) *rms1 / (double) n);
    }
}

```

```

        *seb = (float) sqrt( (double) *rms1 / sxx );
        *rms1 = (float) sqrt( (double) *rms1 );
    }
return psd;
}

/***** SET_TITLES sets titles for PGgraphics plot *****/

void set_titles( char *x_title, char *y_title,
                char *main_title, char *sub_title )
{
strcpy(env.xaxis.axis.title, x_title);
strcpy(env.yaxis.axis.title, y_title);
strcpy(env.maintitle.title, main_title);
strcpy(env.subtitle.title, sub_title);
}

/***** SET_AXES sets axes for PGgraphics plot *****/

void set_axes( float x_min, float x_max, float x_ticint,
              float y_min, float y_max, float y_ticint, int ypixels)
{
_setviewport(0, 0, 639, ypixels - 65);
_clearscreen(_GVIEWPORT);
env.xaxis.scalemin = x_min;
env.xaxis.scalemax = x_max;
env.xaxis.ticinterval = x_ticint;
env.yaxis.scalemin = y_min;
env.yaxis.scalemax = y_max;
env.yaxis.ticinterval = y_ticint;
}

/***** SET_COLOURS sets colours for PGgraphics plot *****/

void set_colours( short border_colour, short window_colour,
                 short maintitle_colour, short subtitle_colour )
{
env.chartwindow.background = border_colour;
env.datawindow.background = window_colour;
env.maintitle.titlecolor = maintitle_colour;
env.subtitle.titlecolor = subtitle_colour;
}

/***** DO_CROSS plots a cross *****/

void do_cross( int xc, int yc, short col )
{
_setcolor(col);
_moveto(xc - 10, yc);
_lineto(xc + 10, yc);
_moveto(xc, yc - 10);
_lineto(xc, yc + 10);
}

/***** WAIT_START waits for start of next process *****/
char * wait_start(int rows, int * sample_no, int * qtr)

```

```

{
char cur_time[10], julian[10], last_time[10];
div_t quarters;
int sample;
time_t tnow;
struct tm *gmt;

_settextposition(rows - 1,10);
_outtext("Waiting for next Record Start . . . ");
do
{
    if ( kbhit() )
    {
        if (getch() == 125)                /* abort tidily if ) key pressed */
        {
            exit(0);
        }
    }

    time(&tnow);
    gmt = gmtime(&tnow);
    quarters = div(gmt->tm_min, 15);
    _strtime(cur_time);
    if (cur_time[7] != last_time[7])
    {
        _settextposition(rows - 1,46);
        printf("Day %d: %s          ", 1 + gmt->tm_yday, cur_time);
    }
    strcpy(last_time, cur_time);
}
while ( (gmt->tm_sec != 0) && (gmt->tm_sec != 15) && (gmt->tm_sec != 30) && (gmt->tm_sec != 45));
/* while (gmt->tm_sec != 0); */

strcpy(julian, aform((1 + gmt->tm_yday), 3) );
strcat(julian, aform((gmt->tm_hour), 2) );
strcat(julian, aform((gmt->tm_min), 2) );

/* tnow /= 60; temp mod to allow consec sampling */
tnow /= 900;
/* current time in 1/4 hrs since 00:00:00 Jan 1, 1970 */
sample = (int) (tnow % (long) 100);
/* sample runs from 0 to 499 (cyclically) 1/4 hrly */

*sample_no = sample;
*qtr = quarters.quot;

return julian;
}

/***** SET_ENVCONSTS sets envt for PGgraphics plot *****/

void set_envconsts(int ypixels, int col0)
{
env.chartwindow.border = FALSE;
env.xaxis.autoscale = FALSE;
env.yaxis.autoscale = FALSE;
env.chartwindow.x1 = 0;
env.chartwindow.y1 = yoffset;
env.chartwindow.x2 = 639;
env.chartwindow.y2 = ypixels - 65;
env.xaxis.axistitle.titlecolor = col0;
env.yaxis.axistitle.titlecolor = col0;
}

```

```
}
```

```
/****** WAIT1 waits for 1/2 second *****/
```

```
void wait1()
{
    clock_t tnow, tnext;

    tnow = clock();

    do
    {
        tnext = clock();
    }
    while ( (tnext - tnow)/CLK_TCK <= 0.5 );
}
```

```
/****** AFORM formats a number in specified format *****/
```

```
char * aform(int i_var, int n_char)
{
    char asc_var[4] = "000", temp[3];
    int l_var;
    if (i_var <= 0)
    {
        asc_var[n_char] = '\0';
        return asc_var;
    }
    else
    {
        l_var = (int) ( 1 + log10(i_var) );
        if ( ((n_char - l_var) < 4) && ((n_char - l_var) > -1) )
        {
            itoa(i_var, temp, 10);
            strcpy(asc_var + n_char - l_var, temp);
        }
    }
    return asc_var;
}
```

```
/****** HARDERROR_HANDLER handles hardware errors *****/
```

```
void harderror_handler(unsigned deverror, unsigned errcode, unsigned *devhdr)
{
    char dletter, num[5];
    error_flag = 1;

    if (strlen(message) > 40)
    {
        strcpy(message, "");
    }

    if ( (deverror & 0x8000) == 0)
    {
        switch(deverror & 0xff)
        {
            case 0:
                strcat(message, "Drive A ");
                break;
            case 1:

```

```

        strcat(message, "Drive B ");
        break;
    case 2:
        strcat(message, "Drive C ");
        break;
    }

    strcat(message, " ERROR:-");

    itoa(errcode & 0xff, num, 10);
    switch(errcode & 0xff)
    {
    case 0:
        strcat(message, " Write Prot'd");
        break;
    case 2:
        strcat(message, " Not Ready");
        break;
    case 10:
        strcat(message, " Write Fault");
        break;
    case 12:
        strcat(message, " Gen Failure");
        break;
    default:
        strcat(message, " Code ");
        strcat(message, num);
        break;
    }
    switch(deverror & 0x0600)
    {
    case 0:
        strcat(message, "-MSDOS: ");
        break;
    case 0x0200:
        strcat(message, "-FAT: ");
        break;
    case 0x0400:
        strcat(message, "-Directory: ");
        break;
    case 0x0600:
        strcat(message, "-Data Area: ");
        break;
    }
    }
else
    {
    strcpy(message, "Non Disk I/O Error: ");
    if( (*(devhdr + 4) & 0x8000) == 0)
    {
        strcat(message, "Bad Image of FAT: ");
    }
    else
    {
        strcat(message, "Character Device: ");
    }
    }
    _hardretn(_HARDERR_IGNORE);
}

/***** CHECK_DISKS checks for space for 1 more file *****/
void check_disks(int first, char *full_message, char *spec_file,

```

```

char *spec_file, char *spec_ffile, char *spec_fffile,
FILE *f_out, FILE *ff_out, FILE *fl_out, FILE *ffi_out)
{
char dletter[2];
int drive;
int disk_flag = 0;
struct diskfree_t dfinfo;
unsigned long free_space, safe_limit;

strcpy(full_message, "");

for (drive = 0; drive < 2; drive++)
{
if (drive == 0)
{
strcpy(dletter, "C");
safe_limit = 60000;
}
if (drive == 1)
{
strcpy(dletter, "A");
safe_limit = 60000; /* now save .PRN to floppy also */
}

if(_dos_getdiskfree(drive, &dfinfo) != 0)
{
wipe_line();
printf("Error in _dos_getdiskfree, Drive %s\n", dletter);
exit(0);
}
free_space = (unsigned long) dfinfo.avail_clusters
              * dfinfo.sectors_per_cluster
              * dfinfo.bytes_per_sector;
if ((free_space < safe_limit * 2) && (free_space >= safe_limit))
{
strcat(full_message, "Drive ");
strcat(full_message, dletter);
strcat(full_message, ": NEARLY FULL: ");
}
if (free_space < safe_limit)
{
strcat(full_message, "Drive ");
strcat(full_message, dletter);
strcat(full_message, ": NO FREE SPACE: ");
}

disk_flag = disk_flag | (1 + drive);
}

}

if ((disk_flag & 0x03) == 3)
{
_clearscreen(_GCLEARSCREEN);
_settextposition(10, 12);
printf("*****WARNING: No Disk Space free on A: or C:*****\n");
printf("*****Program Terminated*****\n");
exit(0);
}

if (first == 1)
{
strcpy(spec_file, "c:\\data\\"); /* hard disk file */
strcat(spec_file, julian);
}

```

```

strcpy(spec_ffile, spec_file);
strcat(spec_file, ".pm");
strcat(spec_ffile, ".mws");
strcpy(spec_ffile, "a:\W");          /* floppy file */
strcat(spec_ffile, julian);
strcpy(spec_ffile, spec_ffile);
strcat(spec_ffile, ".mws");
strcat(spec_ffile, ".pm");
}

if ( (f_out = fopen(spec_file, "a")) == NULL )
{
    disk_flag = disk_flag | 4;
}
else
{
    fclose(f_out);
}

if ( (ff_out = fopen(spec_ffile, "a")) == NULL )
{
    disk_flag = disk_flag | 4;
}
else
{
    fclose(ff_out);
}

if ( (fl_out = fopen(spec_ffile, "a")) == NULL )
{
    disk_flag = disk_flag | 8;
}
else
{
    fclose(fl_out);
}

if ( (fil_out = fopen(spec_ffile, "a")) == NULL )
{
    disk_flag = disk_flag | 8;
}
else
{
    fclose(fil_out);
}

if ( (disk_flag & 0x0c) == 12 )
{
    _clearscreen(_GCLLEARSCREEN);
    system("mode 80");
    printf("*****Cannot open Output Files on Drive C: or A:*****\n");
    printf("*****Program Terminated*****\n");
    exit(0);
}

}

/***** SHOW_ERRORS displays error messages *****/
void show_errors(char * full_message)
{
    int old_col = _getttextcolor();

    _settextcolor(15);
    _settextposition(0,0);

```

```

_outtext(full_message);
_outtext(message);
_settextcolor(old_col);
}

/***** SETUP loads configuration from setup.son file *****/
int setup(char *sonic_id)
{
char line[80], head[20], data[10];
FILE *fs;
int i, gflag, j;

if ( (fs = fopen("setup.son", "r")) == NULL)
{
wipe_line();
printf("Could not open SETUP.SON File\n");
return 0;
}

fscanf(fs, "%s %s\n", head, data);
if (strcmpi(data, "ON") == 0)                /* case insensitive */
{
gflag = 1;
}
else
{
gflag = 0;
}

fscanf(fs, "%s %s\n", head, ser_no);
strcpy(sonic_id, ser_no);
fscanf(fs, "%s %s\n", head, data);
freq1 = (float) atof(data);
fscanf(fs, "%s %s\n", head, data);
freq2 = (float) atof(data);
fscanf(fs, "%s %s\n", head, data);
recs_per_file = atoi(data);
fscanf(fs, "%s %s\n", head, data);
q[0] = atoi(data);
fscanf(fs, "%s %s\n", head, data);
q[1] = atoi(data);
fscanf(fs, "%s %s\n", head, data);
q[2] = atoi(data);
fscanf(fs, "%s %s\n", head, data);
q[3] = atoi(data);
fscanf(fs, "%s %s\n", head, data);

if (strcmpi(data, "ON") == 0)                /* case insensitive */
{
raw_optical_save = 1;
}
else
{
raw_optical_save = 0;
}

fclose(fs);

if( (q[0] == 4) || (q[1] == 4) || (q[2] == 4) || (q[3] == 4) )
{
strcat(ser_no, "rcal.h");
if ( (fs = fopen(ser_no, "r")) == NULL)

```



```

    {
        wipe_line();
        printf("Could not open Sensor Calibration File\n");
        exit(0);
    }
else
    {
        fgets(line, 80, fs);
        fgets(line, 80, fs);

        for (i = 0; i < 360; i += 10)
            {
                fgets(line, 80, fs);

                for (j = 0; j < 10; j++)
                    {
                        x_calibration_table[i + j] = atol(line + 6 * j);
                        if ((x_calibration_table[i+j] > 100000) || (x_calibration_table[i+j] < 50000))
                            {
                                wipe_line();
                                printf("Error in reading x_calibration table\n");
                                printf("x_cal=%ld\n", x_calibration_table[i+j]);
                                exit(0);
                            }
                    }
            }

        x_calibration_table[360] = x_calibration_table[0];
        fgets(line, 80, fs);
        fgets(line, 80, fs);
        fgets(line, 80, fs);
        for (i = 0; i < 360; i += 10)
            {
                fgets(line, 80, fs);

                for (j = 0; j < 10; j++)
                    {
                        y_calibration_table[i + j] = atol(line + 6 * j);
                        if ((y_calibration_table[i+j] > 100000) || (y_calibration_table[i+j] < 50000))
                            {
                                wipe_line();
                                printf("Error in reading y_calibration table\n");
                                printf("y_cal=%ld\n", y_calibration_table[i+j]);
                                exit(0);
                            }
                    }
            }

        y_calibration_table[360] = y_calibration_table[0];
        fclose(fs);
    }
}
/* end of if( q[...] ) statements */
return gflag;
}

```

```

/***** CHECK_CACHE opens raw data copy file *****/
int check_cache(char *julian, char *raw_filename, FILE *f_cache)
{
    strcpy(raw_filename, "f:F");
    strcat(raw_filename, julian);
    strcat(raw_filename, ".raw");

    if ((f_cache = fopen(raw_filename, "w+")) == NULL)
        {

```

