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The Analysis of Shipborne Wave Records

USING AN I.B.M. 1800 COMPUTER

by

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SECTION 1

Introduction

Over the past few years, the National Institute of Oceanography has been obtaining a collection of wave records from various stations around the British Isles, with a view to assisting civil engineers and others in their quest for suitable sites for oil rigs, harbours, lighthouse stations and the Channel Tunnel etc. The number of requests for such information has increased so rapidly in the last year or so, that at present about 30,000 records must be analysed per year in order to make full use of the 9 ship-borne wave recorders which are at present in use around the coast of Great Britain.

With the installation of an I.B.M. 1800 Computer at the National Institute of Oceanography in June 1968 and on the Royal Research Ship "Discovery" in January 1969, the computerisation of this wave analysis was considered a necessity.

The computer at N.I.O. consisted of a core store of 16K words each of 16 bits, 2 magnetic disk drives, 1 magnetic tape deck, 1 card reader/punch, 1 lineprinter, 1 graph plotter and 1 typewriter/keyboard at the time that the programs described in this report were written. Since then a further 8K words of core store, an additional magnetic tape deck and an extra magnetic disk drive have been added to the system. These additional facilities may be incorporated into the programs at a later date in order to increase their efficiency.

The I.B.M. 1800 system described above operates under the Time Sharing Executive Software System (T.S.X.).

T.S.X. consists of a Fortran compiler, Assembler, Subroutine Library, Nonprocess monitor and Disk utility program etc. T.S.X. is responsible for the production of object coding from Fortran source statements and for building these object programs into executable coreloads. When these coreloads are executed, T.S.X. controls all input/output including the linkaging of the various sections of programs stored on disk which may be too large to fit into core as a single core load.

The uses to which the ship computer has been put in this task will be described later.

SECTION 2

Summary of the Wave Analysis System

In order to analyse any wave records using the programs described in this report, several programs and data files have to be set up on disk.

Disk drive Ø is always used as a system drive at N.I.O., leaving drive 1 free to contain all the necessary programs and data files. The disk used on drive 1 is defined as having 18Ø cylinders of fixed area and 2Ø cylinders of relocatable area. The program SBWRØ and the subroutine HEAD (used by SBWRØ), INCR and PRINT (used by CORR2 and LISTØ respectively) must be loaded to the relocatable area; while the programs MALIS, LISTØ, CORR2, CORR3, SETLA, WAST, READW, HSLOT, PERS, HPLOT, TPLOT, SWPLT, SCATP, PERP and DUMP are loaded to the fixed area. Several data files are required by this system, and they are as follows: TZ - 4 sectors, HMAX - 4 sectors, HS - 4 sectors, SWPA - 1 sector, HSG - 1Ø sectors, SCAT - 5 sectors, and a series of 4Ø files, each of 1 sector, called PEØ2, PEØ4.....PE8Ø. The remaining fixed area is used to store up to 2 files each of 400 sectors. These files contain the output from SBWRØ and their names usually bear some resemblance to the names of the wave stations which are being analysed. It is assumed that at least one of these files will have been stored on magnetic tape by CORR3 before a third data file is required, in which case the obsolete file will be deleted and a new file initialised.

Once the basic data has been punched, it is run with program SBWRØ, which yields lineprinter and disk output.

By executing program LISTØ this disk output may be listed as many times as is required. The programs CORR2 and CORR3 are then executed to interpolate and substitute any missing data within the disk file. CORR2 stores the corrected data in the same disk file and may be listed with LISTØ if required, while CORR3 stores its output on magnetic tape. This magnetic tape may be listed by executing MALIS. The final program in this suite collates the data on magnetic tape and stores the resulting data in the disk data files described earlier, prior to plotting it.

SYSTEM FLOWCHART FOR WAVE ANALYSIS PROGRAMS

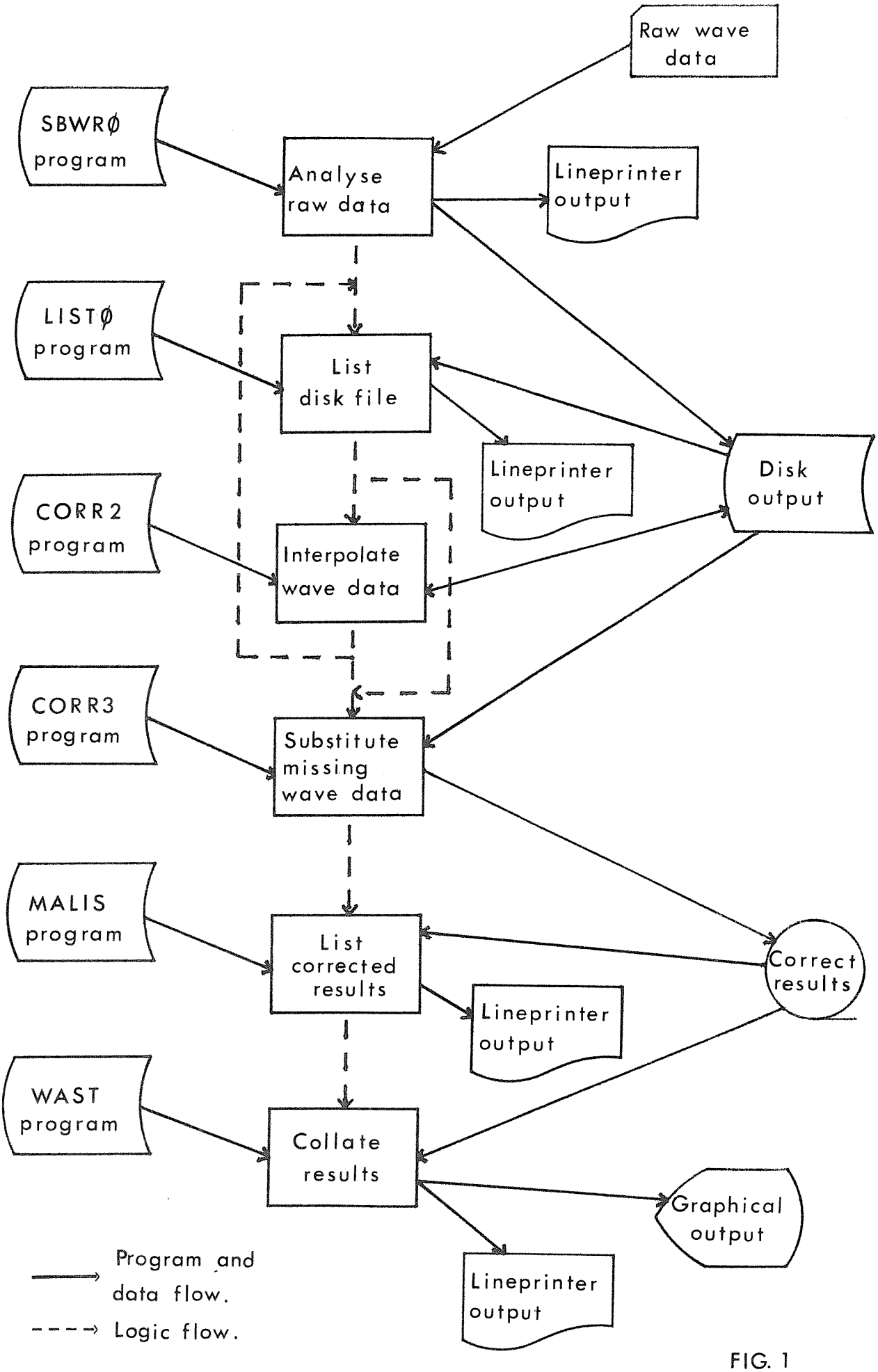


FIG. 1

N.I.O. Tape Security System (T.A.S.S.)

To ensure against accidental over-writing of magnetic tape, a system was devised whereby the next available file and record numbers for every magnetic tape in use is stored on disk. The disk file (MFILE) contains one record for every tape, each record consisting of the tape name, a file and record number. When a tape is first used, the file and record number are both set to 1 using the N.I.O. Subroutine INITM. This Subroutine will also store any other required values in the disk record. After a file has been written to, and assuming that the next file will be required later on, the file number is increased by 1, the record number set to 1, and both these figures are stored in the disk file using the N.I.O. Subroutine STORM. When it is required to position a tape at the next available file and record, the subroutine NEXTM will read these two values from disk and position the tape accordingly.

The three Subroutines described above are used in the wave analysis system as follows:- The program CORR3 commences by calling the Subroutine NEXTM. This positions the tape at record N (usually 1) of file M, where N and M have been read from disk. N is increased after every "write" to magnetic tape, so that the total number of records written to the tape may be printed out prior to resetting N to 1, and storing N and M on disk using STORM. The program MALIS then automatically positions the tape at record N of file M, so that the current file in use may be listed. This position is again stored on disk at the end of MALIS so that the final program will also start reading tape at the beginning of the file.

At the end of this program the file number is increased by 1 and the record number set to 1, so that the next station's analysis will be stored in the next file on tape.

It is possible to access a file out of sequence at any time by changing the disk file entry using INITM, as long as the disk file is reset afterwards.

SECTION 3

The Analysis of Wave Records

At present, all wave records received at the National Institute of Oceanography are basically analysed by hand in order to obtain the data needed for the program SBWRØ. Each record is analysed as follows:-

1. Where possible, a 12 minute length of record should be measured off. If this length is not available, a shorter length may be used as long as the difference in duration is noted. The section chosen should be taken from the middle of the recording - this avoids analysing any inconsistences caused by the switching on and off of the recorder.

2. Check that there is nothing obviously wrong with the record i.e. the sea surface is not flat or has suddenly produced "square" waves ! In cases like these, the record is classed as "FAULTY" and should be recorded as such with the appropriate date and time of start of recording. If a record is completely non-existent, it should be classed as "MISSING". If the highest crest plus the lowest trough is less than 1ft. in height, a record is classed as being "CALM" and no further basic analysis is necessary.

3. If none of the three cases stated above apply then a mean water-level line must be drawn through the section to be analysed. This may or may not be a straight line.

4. Measure the highest and second highest crest (less than or equal to the highest crest) above the mean line, and the lowest and second lowest trough (less than or equal to the lowest trough) below the mean line. All values are positive and correct to one decimal place.

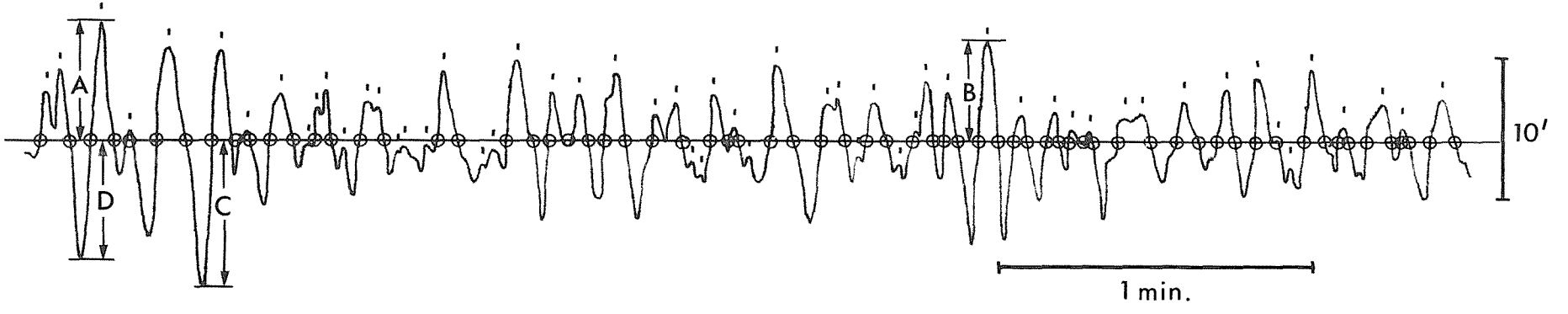
5. Count the number of times that the wave crosses the mean line in an upwards or downwards direction. If a maximum or minimum point occurs on the line, this counts as one crossing.

6. Count the number of crests above and below the mean line.

A useful check for the validity of these last two values is (2 times the number of crests is greater than the number of zero crossings).

All the programs described in this report assume that 8 records were analysed per day.

Figure 2 shows a typical wave record.



A TYPICAL WAVE RECORD

' represent wave crests

o represent zero crossings

A represents the highest crest

B represents the second highest crest

C represents the lowest trough

D represents the second lowest trough

FIG. 2

SECTION 4

Description of Program SBWRØ

When the required number of wave records have been analysed in the manner described in SECTION 3, the data is then punched onto cards in the following format:-

Card1 (cc1) LINEC - a right justified line number, usually set to 1 at the start of a year's analysis.

Card2 (cc1) DE.PH - the depth in feet of the wave recorder below the sea surface.

Card3 A data title, punched anywhere on the card.

Each month's data is preceded by 2 cards:-

Card1 (cc1) MO - the month number.

Card2 (cc1) YEAR - the year.

Then follows the wave data, one card for each record analysed, as follows:-

cc1 47
XDATIMESTbDURA.THIGH.FHIGH.SLOWE.SLOWE.TIZEROCR

cc48 55
NOCRESTY

Where X is a terminator < for the last record in the month,

/ for the last record to be analysed, otherwise blank.

DA - the day of the month.

TIMEST - the time, right justified, of the start of recording.

DURAT - the length of the recording interval, in minutes, correct to one decimal place.

HIGHF - the height in feet of the highest crest, correct to one decimal place.

HIGHS - the height in feet of the second highest crest, correct to one decimal place.

LOWES - the height in feet of the lowest trough, correct to one decimal place.

LOWET - the height in feet of the second lowest trough, correct to one decimal place.

IZEROCR - the number of zero crossings, right justified.

NOCREST - the number of crests, right justified.

Y - "M", "F", or "C" to denote a missing, faulty or calm record, otherwise blank, In any of these cases, only the day number, time and one of these letters is punched.

A listing of some sample data cards and the control cards required for this program are shown in Figure 3, and Figure 4 shows some typical output from this program.

The program takes about 45 minutes to analyse 1 year's data. The output is headed with the title, and each page is in turn headed with the month and year, and the appropriate headings for each column of results, while the month and year only are written to disk. For each record the following values are computed and stored on the disk file of 400_{10} sectors, and printed on the 1443 printer:-

a) The day of the month

b) The time at which the record started

c) The wave period in seconds, to 2 decimal places, calculated by

T_Z= 12Ø DURAT/2 IZEROCR

d) The height in feet, to 1 decimal place, of the highest crest plus the lowest trough i.e.

H_1 = HIGHF+LOWES

e) The height in feet, to 1 decimal place of the second highest crest plus the second lowest trough i.e.

H_2= HIGHS+LOWET

f) The spectral width parameter to three decimal places is given by

$$E = \sqrt{1 - \frac{(T_C)^2}{(T_Z)^2}}$$

where T_c = 6Ø DURAT/NOCREST

g) and h) H_1 and H_2 corrected for instrumental response are given by

$$H_1' = K\,H_1 \quad \text{and} \quad H_2' = K\,H_2$$

where

$$K = Ø.83(1+(8.8\mu)^{-2})^{\frac{3}{2}}\exp(2.5\ E\,\mu^2/G)$$

where

$$\mu = \frac{2\pi}{T_Z} \qquad \text{and } G = 32.174 \text{ ft.sec}^{-2}$$

i) and j) The mean height of the highest one-third of the waves is calculated from H_1' and H_2' by

$$H_S' = \frac{2H_1'}{(2\theta)^{\frac{1}{2}}(1-\emptyset.289\theta^{-1}-\emptyset.247\theta^{-2})}$$

and

$$H_S^2 = \frac{2H_2'}{(2\theta)^{\frac{1}{2}}(1-\emptyset.211\theta^{-1}-\emptyset.1\emptyset30\theta^{-2})}$$

where

$$\theta = \log_e (\text{IZEROCR})$$

k) The significant wave height, HS, is calculated by taking the average of H_S' and H_S'.

l) The most probable height of the highest wave which would occur in a 3-hour period, correct to 1 decimal place is given by

$$\text{HMAX(3HRS)} = \frac{\sqrt{2}}{2}(\emptyset.\emptyset\emptyset6361Y^4-\emptyset.\emptyset73968Y^3+\emptyset.33\emptyset573Y^2+$$

$$\emptyset.316548Y+\emptyset.566405)\text{HS}$$

where

$$Y = \sqrt{\log_e \left(\frac{18\emptyset\text{IZEROCR}}{\text{DURAT}}\right)}$$

m) The duration of the record in minutes.

n) If no measurements were available, the words

RECORD MISSING or RECORD FAULTY

will be printed at the right-hand side of the page against the appropriate date and time. If the record was too small to measure (i.e. H_1 less than or equal to 1ft.) the word CALM will be printed in the wave period column. In the above cases the letter M,F, or C is stored in word 1 of the disk record, otherwise it is set to space.

o) The line number which increases by 1 throughout the year's results after each record or newline between days is printed at the right hand side of the page.

Five days' results are printed on each page, with a blank line between each day. Each month's output starts on a new page. The output terminates with the words "END OF DATA".

```
// JOB                X
// XEQ SBWR0
*FILES(1,TEST,1)
*CCEND
    1
 4.820
          TEST CORRECTION PROGRAM
 1
1969
   1  0001                                                        M
   1  0300    12.0   0.7   0.8   1.0   0.9   387   230
   1  0600    12.0   0.6   0.5   1.0   0.9   294   175
   1  0900    12.0   0.8   0.7   1.2   1.1   257   169
   1  1200    12.0   0.8   0.7   1.2   1.1   257   169
   1  1500    12.0   0.7   0.8   1.0   0.9   387   230
   1  1800    12.0   0.6   0.5   1.0   0.9   294   175
   1  2100    12.0   0.8   0.7   1.2   1.1   257   169
   2  0001    12.0   0.9   0.8   1.0   0.9   294   188
   2  0300    12.0   0.7   0.6   0.9   0.8   505   294
   2  0600    12.0   0.9   0.8   0.9   0.8   336   216
   2  0900                                                        M
   2  1200    12.0   0.8   0.7   1.0   0.9   400   217
   2  1500    12.0   1.0   0.9   1.2   1.0   440   235
   2  1800    12.0   1.0   0.9   1.0   0.9   500   263
   2  2100    12.0   0.6   0.5   1.2   1.0   464   288
   3  0001                                                        M
   3  0300                                                        M
   3  0600                                                        M
   3  0900    12.0   1.0   0.9   1.6   1.4   354   203
   3  1200    12.0   0.8   0.7   1.0   0.8   415   233
   3  1500    12.0   0.6   0.5   0.9   0.8   348   209
   3  1800    12.0   0.8   0.7   0.7   0.6   445   246
   3  2100    12.0   0.8   0.7   0.9   0.8   246   198
   4  0001    12.0   0.6   0.5   1.0   0.9   362   228
   4  0300                                                        M
   4  0600                                                        M
   4  0900                                                        M
   4  1200                                                        M
   4  1500                                                        M
   4  1800                                                        M
   4  2100                                                        M
   5  0001                                                        M
   5  0300                                                        M
   5  0600                                                        M
   5  0900                                                        M
   5  1200                                                        M
   5  1500                                                        M
   5  1800                                                        M
   5  2100                                                        M
   6  0001    12.0   1.0   0.9   1.0   0.9   409   240
   6  0300    12.0   0.9   0.8   1.1   1.0   428   241
   6  0600    12.0   1.0   0.9   1.3   1.1   398   205
   6  0900    12.0   1.0   0.9   1.1   1.0   405   220
   6  1200    12.0   0.8   0.7   1.4   1.2   428   240
   6  1500    12.0   1.0   0.9   1.3   1.2   394   215
   6  1800    12.0   0.8   0.7   0.9   0.8   404   227

TEST   1
TEST   2
TEST   3
TEST   4
TEST   5
TEST   6
TEST  11
TEST  12
TEST  13
TEST  13
TEST  11
TEST  12
TEST  13
TEST  14
TEST  15
TEST  16
TEST  17
TEST  18
TEST  19
TEST  20
TEST  21
TEST  22
TEST  23
TEST  24
TEST  25
TEST  26
TEST  27
TEST  28
TEST  29
TEST  30
TEST  31
TEST  32
TEST  33
TEST  34
TEST  35
TEST  36
TEST  37
TEST  38
TEST  39
TEST  40
TEST  41
TEST  42
TEST  43
TEST  44
TEST  45
TEST  46
TEST  47
TEST  48
TEST  49
TEST  50
TEST  51
TEST  52
```

FIG. 3

JANUARY 1969

DATE	TIME	TZ	H1	H2	E	H1'	H2'	HS1	HS2	HS	HMAX(3HRS)	DURATION		
													RECORD MISSING	1
1	0.00													2
1	3.00	3.72	1.7	1.7	0.541	4.1	4.1	2.4	2.7	2.5	5.1	12.00		3
1	6.00	4.90	1.6	1.4	0.543	2.5	2.2	1.5	1.4	1.5	2.9	12.00		4
1	9.00	5.60	2.0	1.8	0.650	2.7	2.4	1.7	1.6	1.6	3.2	12.00		5
1	12.00	5.60	2.0	1.8	0.650	2.7	2.4	1.7	1.6	1.6	3.2	12.00		6
1	15.00	3.72	1.7	1.7	0.541	4.1	4.1	2.4	2.7	2.5	5.1	12.00		7
1	18.00	4.90	1.6	1.4	0.543	2.5	2.2	1.5	1.4	1.5	2.9	12.00		8
1	21.00	5.60	2.0	1.8	0.650	2.7	2.4	1.7	1.6	1.6	3.2	12.00		
2	0.00	4.90	1.9	1.7	0.623	3.0	2.6	1.8	1.8	1.8	3.5	12.00		10
2	3.00	2.85	1.6	1.4	0.512	8.2	7.2	4.7	4.5	4.6	9.4	12.00		11
2	6.00	4.29	1.8	1.6	0.629	3.4	3.0	2.0	2.0	2.0	3.9	12.00		12
2	9.00												RECORD MISSING	13
2	12.00	3.60	1.8	1.6	0.388	4.7	4.2	2.8	2.7	2.7	5.5	12.00		14
2	15.00	3.27	2.2	1.9	0.352	7.3	6.3	4.3	4.0	4.1	8.3	12.00		15
2	18.00	2.88	2.0	1.8	0.311	9.9	8.9	5.7	5.6	5.7	11.5	12.00		16
2	21.00	3.10	1.8	1.5	0.593	7.0	5.8	4.0	3.7	3.9	7.8	12.00		17
3	0.00												RECORD MISSING	19
3	3.00												RECORD MISSING	20
3	6.00												RECORD MISSING	21
3	9.00	4.07	2.6	2.3	0.490	5.3	4.7	3.2	3.1	3.1	6.2	12.00		22
3	12.00	3.47	1.8	1.5	0.455	5.1	4.3	3.0	2.7	2.9	5.8	12.00		23
3	15.00	4.14	1.5	1.3	0.554	3.0	2.6	1.8	1.7	1.7	3.4	12.00		24
3	18.00	3.24	1.5	1.3	0.427	5.1	4.5	3.0	2.8	2.9	5.9	12.00		25
3	21.00	5.85	1.7	1.5	0.784	2.2	1.9	1.4	1.3	1.3	2.6	12.00		26
4	0.00	3.98	1.6	1.4	0.608	3.4	3.0	2.0	1.9	2.0	3.9	12.00		28
4	3.00												RECORD MISSING	29
4	6.00												RECORD MISSING	30
4	9.00												RECORD MISSING	31
4	12.00												RECORD MISSING	32
4	15.00												RECORD MISSING	33
4	18.00												RECORD MISSING	34
4	21.00												RECORD MISSING	35
5	0.00												RECORD MISSING	37
5	3.00												RECORD MISSING	38
5	6.00												RECORD MISSING	39
5	9.00												RECORD MISSING	40
5	12.00												RECORD MISSING	41
5	15.00												RECORD MISSING	42
5	18.00												RECORD MISSING	43
5	21.00												RECORD MISSING	44

FIG. 4

SECTION 5

Description of Program LISTØ

Further copies of the results from SBWRØ may be obtained by listing the disk file of 400_{10} sectors with the aid of the control cards shown in Figure 5. This program is compiled with a working storage *FILES card, but by using the N.I.O. Subprogram DFT, any fixed area data file may be accessed. The subroutine alters the 6 word define file table at compilation time by inserting the drive code and address of the file name set up in the array NAMFL (in Figure 5 the name FILENb is read into NAMFL) in word 5, the number of records in the file is inserted in word 2, the record length in words in word 3, and the number of records per sector in word 6.

A data title is read in and printed, and the number of records to be listed is read in. This is calculated by the formula (number of records analysed + number of interday gaps).

The program outputs the month and year and headings as given by SBWRØ, followed by a months results. As each disk record is read, word 1 is tested. If it is "C" the record is calm, if it is "M" the record is missing, if it is "F" the record is faulty. If word 1 contains "." the record is left blank except for the date and time which is printed on every line regardless of the value of word 1. This condition will occur only if 2NOCREST<IZEROCR during the analysis of any record in SBWRØ. The origin of "N" and "I" in word 1 will be described later, but in these cases the record has been interpolated. A space in word 1 denotes a correct record, which is printed in the same format as the output from SBWRØ, as are all the other types of record. Throughout the program, tests are made for the end of a month, end of page (5 day's results are printed

```
// JOB                X
// XEQ LISTO    FX
FILEN
SAMPLE CARDS FOR LISTING FILE 'FILEN' USING PROGRAM LIST
10
```

FIG. 5

SECTION 6

Description of Program CORR2

Two programs were written to correct the "MISSING" and "FAULTY" records which occurred during the execution of SBWRØ. The first of these programs, CORR2, linearly interpolates all the gaps of four or less records and returns the corrected output to the same disk file from which it was read. Figures 6 and 7 show the input and output for this program.

Two parameter cards are needed:-

cc1 24

CARD 1 PAbbNAMEFLbbMAXLCbbMAXRN

where

PA - if set to 1 the program LISTØ is executed after CORR2, in which case the parameter cards for LISTØ (shown in Figure 5) must be added to this deck. If PA=2, the program CORR3 is executed after CORR2 in which case the data cards for CORR3 must be added.

NAMEFL - a three element array containing the name of the disk file to be accessed, left justified.

MAXLC - the maximum line count, right justified, obtained from the last record output by SBWRØ.

MAXRN - the maximum record number to be read from disk, calculated by (Number of records analysed + number of month header records).

CARD 2 A data title punched anywhere in the first 72 columns of the card.

The program commences by reading the two parameter cards and accessing the correct disk file by using the subroutine DFT as described in SECTION 5. After various counts have been set up, the disk data is read.

If a gap occurs at the beginning or end of the data file, the number of missing records is stored in KNO and LNO respectively.

This gap is interpolated at the end of the program.

When a missing or faulty record is read during the year's data, the previous record (i.e. the last correct record) is read into the first record of a working array. A count (NO) is kept of how many more missing records are read, and providing NO is less than 5 the next correct record is stored in the (NO+2)th record of the working array. If NO is greater than, or equal to 5 a flag is set (INO) and the gap and its adjacent correct records are ignored.

After each record has been read the subroutine INCR is executed to test for the end of data or end of a month. At the end of a month, the program reads the month header record from disk before resetting counts and reading more data. At the end of the year the value of NO is printed out, and the value of LNO and KNO are tested to see if there is a gap at either end of the data. If this gap is less than 5 records long, its adjacent correct records are stored in the working array, otherwise the program terminates.

Once the limits of a gap have been found, the I.B.M. Subroutine JULAN is used to insert the correct day number in the first word of each record of the working array. This subroutine will convert the month and day number to a day number within the year or vice versa. The time of the start of recording, which is increased by 3hrs. for each record, is inserted in element 2 of each record. Checks are made and appropriate action is taken at the start of a month or day to ensure that the first 2 words of the working array are correct. The remaining 12 elements in each record are calculated by obtaining

the incremental step between the two limits and adding this to the last record so formed. The line count is then calculated and stored in the last element of each record.

Before the new array is written to disk the variable TEST is set to "N" if the record is calm and has been interpolated (in this case the record has been set to Ø except for the date, time and line count), otherwise it is set to "I" to denote an interpolated record. This value of TEST is used in LISTØ and MALIS. Each completed record contains TEST, date, time, 12 interpolated values and the line count, and the new array is then written to the correct position on disk.

The disk record number is then altered so that reading commences immediately after the gap that has just been interpolated.

When the gap at the end of the data is being interpolated KNO records are inserted at the beginning of the date and LNO records are inserted at the end of the data.

Any length data file may be corrected with this program it terminates only when the line count on disk equals P.

```
// JOB                X
// XEQ CORR2    FX
 1   FILEN         9       10
INTERPOLATE WAVE DATA
```

FIG. 6

JANUARY 1969

DATE	TIME	TZ	H1	H2	E	H1'	H2'	HS1	HS2	HS	HMAX(3HRS)	DURATION		
1	0.00	4.15	3.9	3.5	0.528	6.6	6.1	4.0	4.0	4.0	7.9		INTERPOLATED	1
1	3.00	3.72	1.7	1.7	0.541	4.1	4.1	2.4	2.7	2.5	5.1	12.00		2
1	6.00	4.90	1.6	1.4	0.543	2.5	2.2	1.5	1.4	1.5	2.9	12.00		3
1	9.00	5.60	2.0	1.8	0.650	2.7	2.4	1.7	1.6	1.6	3.2	12.00		4
1	12.00	5.60	2.0	1.8	0.650	2.7	2.4	1.7	1.6	1.6	3.2	12.00		5
1	15.00	3.72	1.7	1.7	0.541	4.1	4.1	2.4	2.7	2.5	5.1	12.00		6
1	18.00	4.90	1.6	1.4	0.543	2.5	2.2	1.5	1.4	1.5	2.9	12.00		7
1	21.00	5.60	2.0	1.8	0.650	2.7	2.4	1.7	1.6	1.6	3.2	12.00		8
2	0.00	4.90	1.9	1.7	0.623	3.0	2.6	1.8	1.8	1.8	3.5	12.00		10
2	3.00	2.85	1.6	1.4	0.512	8.2	7.2	4.7	4.5	4.6	9.4	12.00		11
2	6.00	4.29	1.8	1.6	0.629	3.4	3.0	2.0	2.0	2.0	3.9	12.00		12
2	9.00	3.94	1.8	1.6	0.508	4.0	3.6	2.4	2.3	2.4	4.7		INTERPOLATED	13
2	12.00	3.60	1.8	1.6	0.388	4.7	4.2	2.8	2.7	2.7	5.5	12.00		14
2	15.00	3.27	2.2	1.9	0.352	7.3	6.3	4.3	4.0	4.1	8.3	12.00		15
2	18.00	2.88	2.0	1.8	0.311	9.9	8.9	5.7	5.6	5.7	11.5	12.00		16
2	21.00	3.10	1.8	1.5	0.593	7.0	5.8	4.0	3.7	3.9	7.8	12.00		17
3	0.00	3.34	2.0	1.7	0.567	6.6	5.5	3.8	3.5	3.7	7.4		INTERPOLATED	19
3	3.00	3.59	2.2	1.9	0.541	6.1	5.3	3.6	3.4	3.5	7.0		INTERPOLATED	20
3	6.00	3.83	2.4	2.1	0.515	5.7	5.0	3.4	3.2	3.3	6.6		INTERPOLATED	21
3	9.00	4.07	2.6	2.3	0.490	5.3	4.7	3.2	3.1	3.1	6.2	12.00		22
3	12.00	3.47	1.8	1.5	0.455	5.1	4.3	3.0	2.7	2.9	5.8	12.00		23
3	15.00	4.14	1.5	1.3	0.554	3.0	2.6	1.8	1.7	1.7	3.4	12.00		24
3	18.00	3.24	1.5	1.3	0.427	5.1	4.5	3.0	2.8	2.9	5.9	12.00		25
3	21.00	5.85	1.7	1.5	0.784	2.2	1.9	1.4	1.3	1.3	2.6	12.00		26
4	0.00	3.98	1.6	1.4	0.608	3.4	3.0	2.0	1.9	2.0	3.9	12.00		28
4	3.00												RECORD MISSING	29
4	6.00												RECORD MISSING	30
4	9.00												RECORD MISSING	31
4	12.00												RECORD MISSING	32
4	15.00												RECORD MISSING	33
4	18.00												RECORD MISSING	34
4	21.00												RECORD MISSING	35
5	0.00												RECORD MISSING	37
5	3.00												RECORD MISSING	38
5	6.00												RECORD MISSING	39
5	9.00												RECORD MISSING	40
5	12.00												RECORD MISSING	41
5	15.00												RECORD MISSING	42
5	18.00												RECORD MISSING	43
5	21.00												RECORD MISSING	44

FIG. 7

SECTION 7

Description of Program CORR3

The second program written to correct the "MISSING" and "FAULTY" records in the SBWRØ output (called CORR3) substitutes records from either side of a gap of 5 or more records and stores the corrected output on magnetic tape. The input and output for this program are shown in Figures 8 and 9 respectively.

The program commences by positioning the tape at the required file by using the subroutine NEXTM as described in SECTION 2. Two parameter cards are read in the following format:-

```
          1                        24
CARD 1    NAMEDISKFILEbbMAXLCMAXDR
```

where NAMEDISKFILE is a 6 element array, the first three containing the name of the 400_{10} sector disk file to be corrected, the last three containing the name of the disk file which contains the magnetic tape file numbers (called MFILE in SECTION 2). Both these names are left justified within their fields, MAXLC is the maximum line count, obtained form the SBWRØ output.

MAXDR - is the maximum number of disk records to be read - calculated by (number of records analysed + number of month header records).

CARD 2 A data title punched in the first 72 columns of the card.

The title is written to magnetic tape and printer, before the month is read from disk, and the number of records in the month is calculated.

The data is then read from disk. A count of the missing records is kept in NO, and when the start of a gap is encountered

the record number is stored in IFST. After each disk read a check is made for the end of a month or end of the data, and in both these cases appropriate action is taken. If a gap occurs at either end of the data, the disk record number is altered accordingly so that reading may continue at the opposite end of the data. When the limits of a gap have been found, the number of records to be substituted is stored in NOREC. If NOREC is odd, (NOREC+1)/2 records are folded into the start of the gap and (NOREC-1)/2 records are folded into the end of the gap, otherwise NOREC/2 records are folded into each end of the gap.

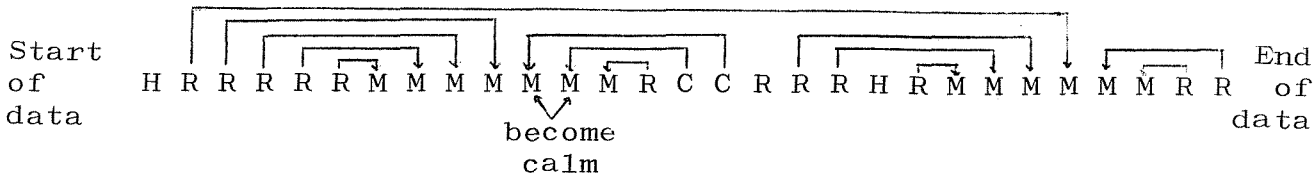
IN is set to the number of records to be filled into each half of the data, and the following procedure is carried out for each half of the data:-

Starting at the last correct record and working through the correct data adjacent to the gap, NREC is set to the number of the record to be inserted. If this is less than or equal to Ø it is added to MAXDR, or if it is greater than MAXDR, MAXDR is subtracted from NREC. The record is then read; if the second variable in the record (this can be either the day number in a wave record or the year in a header record) is greater than 31, the record is a header record and the next record is read.

NREC is recalculated as before to find the incorrect record into which the correct record is to be inserted. The date, time and line count of the incorrect record is kept constant, while the other values read from the correct record are inserted. The variable TEST at the start of each substituted record is set to "Y" if the record which was inserted was "CALM", otherwise it is set to "S".

Any "interpolated" records created in CORR2 which are within the data to be substituted become "substituted" records.

The Substitution of Disk Data



H = header reocrd

R = correct record

M = "MISSING" or "FAULTY" record

C = "CALM" record

When all the gaps have been filled, the complete disk file is written to magnetic tape adding the appropriate "page" headings. The tape file is then in an identical format to the output produced on the lineprinter by SBWRØ. At the end of the data, a message is printed to the lineprinter saying how many records have been written to the tape. The file number and record number 1 are then stored on disk using the Subroutine STORM, the tape is rewound, and the program MALIS is called.

```
// JOB              X
// XEQ CORR3    FX
FILEN MFILE          9    10
     SUBSTITUTE WAVE DATA
```

FIG. 8

JANUARY 1969

DATE	TIME	TZ	H1	H2	E	H1'	H2'	HS1	HS2	HS	HMAX(3HRS)	DURATION		
6	0.00	3.52	2.0	1.8	0.523	5.5	5.0	3.2	3.2	3.2	6.4	12.00		46
6	3.00	3.36	2.0	1.8	0.460	6.2	5.5	3.6	3.5	3.6	7.2	12.00		47
6	6.00	3.62	2.3	2.0	0.240	5.9	5.2	3.5	3.3	3.4	6.8	12.00		48
6	9.00	3.56	2.1	1.9	0.391	5.6	5.1	3.3	3.3	3.3	6.6	12.00		49
6	12.00	3.36	2.2	1.9	0.453	6.8	5.9	4.0	3.7	3.8	7.8	12.00		50
6	15.00	3.65	2.3	2.1	0.401	5.8	5.3	3.4	3.4	3.4	6.9	12.00		51
6	18.00	3.56	1.7	1.5	0.456	4.5	4.0	2.7	2.6	2.6	5.3	12.00		52
6	21.00	3.39	1.7	1.5	0.430	5.5	4.9	3.2	3.1	3.1	6.3		INTERPOLATED	53
7	0.00	3.22	1.8	1.6	0.405	6.4	5.7	3.7	3.6	3.7	7.4		INTERPOLATED	55
7	3.00	3.05	1.8	1.6	0.379	7.3	6.5	4.3	4.1	4.2	8.5	12.00		56
7	6.00	3.67	2.7	2.4	0.293	6.7	6.0	4.0	3.9	3.9	7.9	12.00		57
7	9.00	4.95	5.8	4.3	0.390	8.9	6.6	5.4	4.4	4.9	9.6	12.00		58
7	12.00	3.77	4.0	3.6	0.459	9.5	8.5	5.6	5.5	5.5	11.1	12.00		59
7	15.00	3.77	4.0	3.6	0.459	9.5	8.5	5.6	5.5	5.5	11.1		SUBSTITUTED	60
7	18.00	4.95	5.8	4.3	0.390	8.9	6.6	5.4	4.4	4.9	9.6		SUBSTITUTED	61
7	21.00	3.67	2.7	2.4	0.293	6.7	6.0	4.0	3.9	3.9	7.9		SUBSTITUTED	62
8	0.00	3.05	1.8	1.6	0.379	7.3	6.5	4.3	4.1	4.2	8.5		SUBSTITUTED	64
8	3.00	3.22	1.8	1.6	0.405	6.4	5.7	3.7	3.6	3.7	7.4		SUBSTITUTED	65
8	6.00	5.39	8.4	7.0	0.419	11.8	9.8	7.2	6.6	6.9	13.5		SUBSTITUTED	66
8	9.00	5.29	9.0	8.0	0.527	12.8	11.4	7.8	7.6	7.7	15.1		SUBSTITUTED	67
8	12.00	4.88	7.8	7.0	0.523	12.2	10.9	7.4	7.3	7.3	14.4		SUBSTITUTED	68
8	15.00	4.93	6.3	5.6	0.818	9.7	8.6	5.9	5.7	5.8	11.4		SUBSTITUTED	69
8	18.00	4.43	6.8	6.0	0.343	12.1	10.7	7.2	7.0	7.1	14.1		SUBSTITUTED	70
8	21.00	4.43	6.8	6.0	0.343	12.1	10.7	7.2	7.0	7.1	14.1	12.00		71
9	0.00	4.93	6.3	5.6	0.818	9.7	8.6	5.9	5.7	5.8	11.4	12.00		73
9	3.00	4.88	7.8	7.0	0.523	12.2	10.9	7.4	7.3	7.3	14.4	12.00		74
9	6.00	5.29	9.0	8.0	0.527	12.8	11.4	7.8	7.6	7.7	15.1	12.00		75
9	9.00	5.39	8.4	7.0	0.419	11.8	9.8	7.2	6.6	6.9	13.5	12.00		76
9	12.00	5.85	12.6	10.7	0.478	16.4	13.9	10.1	9.4	9.7	19.0	12.00		77
9	15.00	5.43	10.4	8.9	0.490	13.9	11.9	8.5	8.1	8.3	16.2		INTERPOLATED	78
9	18.00	5.00	8.2	7.1	0.503	11.5	10.0	7.0	6.7	6.9	13.4		INTERPOLATED	79
9	21.00	4.57	6.1	5.3	0.515	9.0	8.0	5.5	5.4	5.4	10.7		INTERPOLATED	80

FIG. 9

SECTION 8

Description of Program MALIS

When the program CORR3 has been successfully run, a call to MALIS is executed, and in this case the two data cards needed for the program must be added to the control cards for CORR3. If MALIS is to be executed as a stand-alone program, the control cards shown in Figure 10 are required.

This program lists any one magnetic tape file, the number of which is specified, right justified, in the first 4 columns of the first data card. To access the correct file, the N.I.O. Subroutine FINDM is used - this Subroutine positions the tape at any reocrd of any file. In this case the record number is always 1, while the file number is input at run time. The second data card specifies, right justified in the first 4 columns, the number of lines to be listed on the 1443 printer. As program CORR3 writes headings to magnetic tape as well as the corrected output, the tape file is already in an identical format to that of the SBWRØ output. Because of this, no extra headings are required, and MALIS simply dumps the required number of records to printer with no additions or deletions.

When the requested number of records have been listed, the file number and the record number 1 are stored on disk using STORM so that the tape may be positioned at the beginning of the same file at the start of the next program.

```
// JOB                X
// XEQ MALIS    FX
   6
4022
```

FIG. 10

SECTION 9

Description of Program WAST

The final program in this suite is in fact 11 linked coreloads which are executed to produce graphs on the 1627 plotter of the percentage exceedance of the significant and maximum wave height, the percentage occurrence of the wave period, the percentage occurrence of the spectral width parameter, a scatter diagram relating wave height and period, and a persistence diagram. The control cards for this program are shown in Figure 11 while the output is shown in Figure 12.

As certain variables are used throughout the coreloads in this program, a common area in core is set up. This area of 1862 words consists of the following integer variables, in identical order in each link:-

SWPA - a one dimensional array of 42 elements containing the spectral width parameter values.

SCAT - a two dimensional array of 40 x 37 elements containing the wave height and period distribution.

HS - a one dimensional array of 102 elements containing the significant wave height values.

HMAX - a one dimensional array of 102 elements containing the maximum wave height values.

TZ - a two dimensional array of 2 x 22 elements containing the wave period.

IREC - disk file record number.

JREC - disk file record number.

LAB - set to indicate the returning point in link 2.

MAXH - indicates the maximum Y value in various graphs.

N - magnetic tape file number.

MM - magnetic tape record number.

II - number of records analysed in the year.

TITLE - a one dimensional array of 36 elements containing a data title.

S - season number (January - March = 1 etc.).

NAMT - a one dimensional array of 3 elements containing the name of the magnetic tape in use.

M - the month number.

YEAR - the year in which February occurred during the recording interval.

DATES - a one dimensional array of 30 elements containing the dates of recording.

P - the number of records in the season.

KREC - disk file record number.

LREC - disk file record number.

NREC - disk file record number.

MREC - disk file record number.

R - number of records in month.

K - number of records analysed on page.

L - number of records analysed in day.

PI - number of records analysed in season.

KNT - number of seasons analysed.

IHMAX - maximum value of the significant wave height.

RI - number of record analysed in month.

Each link will be described in the order in which it is executed.

SETLA This link sets all the disk file record numbers and the variable LAB to 1, and stores Ø in each element of the arrays SWPA, SCAT, HS, HMAX and TZ.

WAST This link requires the disk data file called MFILE, as described in SECTION 2.

The magnetic tape is positioned at the first record of the file which is to be collated by using the Subroutine NEXTM, and then reads the title and month from the magnetic tape. A parameter card is read in in the following format:-

```
cc                                    75
1
DATES OF RECORDINGbbYEARbbMAbbIHM
```

where DATES OF RECORDING are the two dates between which the data was recorded - punched anywhere in the first 60 columns.

YEAR - the year in which February occurred during the recording interval.

MA - set to 2Ø if the highest value of HS (obtainable from SBWRØ output) is less than or equal to 2Øft., to 4Ø if it is less than or equal to 4Øft. or 8Ø if the highest value is less than or equal to 8Øft. This variable is read in as MAXH and is stored in the common area.

IHM - the highest integer value of HS (obtainable from SBWRØ output). This is read in as IHMAX and stored in the common area.

If the month is not January, April, July or October i.e. the beginning of a season, the tape is rewound and the job aborted. At the start of each season the season number (S) is set (January - March = 1 etc) and M, P, R, RI, PI, K and L are set to Ø. A call to READW is executed to collate a season's data.

At the end of a season control is returned to this link to increase the season number and to set new values to the variables as described above, before returning to READW.

At the end of a year's analysis WAST rewinds the magnetic tape and stores the next available file number on the disk file MFILE using the Subroutine STORM. The returning point in this link is set in the variable LAB.

READW This link reads one season's data from magnetic tape. As each record is read the wave period is tested to see if it is "CALM". If it is, 1 is added to the first element of the arrays SWPA, SCAT, TZ, HS and HMAX and a significant wave height of Ø is written to the next record in the disk file which has 3ØØØ one word records, and is called HSG. After each record has been read, the countsII, PI, RI, L and K are increased by 1 and tests are carried out for the end of a season, end of a month, end of a page and end of a day. At the end of a season the next coreload is executed, while at the end of a month the counts R, RI, K and L are reset before reading more data. The data is stored on magnetic tape in 5 day "pages" with headings to speed the execution of MALIS, and these headings must be by-passed during this link. For this reason the variable K is used to count how many records in a "page" have been analysed; when K reached 4Ø the headings are read and K is reset to Ø before more data is read. At the end of an 8-record day, one extra line of magnetic tape is read, and L is reset to Ø before more data is read.

If the record is not "CALM", the wave period is converted from 2(2A1) format to F5.2 format using the 1130 Commercial Subroutine GET. One is then added to the arrays HS, HMAX, TZ, SWPA and SCAT as follows:-

Let the wave period = A = 4.59

Spectral width parameter

= EPSI = Ø.371 (read in as 371)

Significant wave height

= BHS =10.6

Maximum wave height

= JHMAX =14., (read in as 14)

Then:-

IHS = BHS

HS(IHS+2) and HMAX(JHMAX+2) are increased by 1 and IHS is written to the disk file HSG.

The wave period is then converted to an integral part (TZAC) and a fractional part (TZAB). If TZAB is greater than or equal to Ø.5, 1 is added to TZ(2,TZAC+2), otherwise 1 is added to TZ(1,TZAC+2).

The value of EPSI is tested in intervals of 25. If Ø ≤ EPSI≤24, SWPA(2) is increased by 1, if 25 ≤ EPSI ≤ 49, SWPA(3) is increased by 1, etc.

The wave period is tested in intervals of Ø.5. If Ø ≤ A ≤ Ø.49 then IK=1, if Ø.5 ≤ A ≤ Ø.99 then IK=2 etc. The same process is repeated for BHS in intervals of Ø.5 if MAXH=2Ø, in intervals of 1.Ø if MAXH=4Ø or 2.Ø if MAXH=8Ø, the result being stored in IL. When IK and IL have been calculated for each record then SCAT(IL,IK) is increased by 1.

Using the above data and formulae, the following results are obtained:-

HS(12), HMAX(16), TZ(2,6), SWPA(17), SCAT(22,1Ø) if MAXH=2Ø, SCAT(11,1Ø) if MAXH=4Ø or SCAT(6,1Ø) if MAXH=8Ø are all increased by 1.

The link then increases counts and continues as described above.

HSLOT This link requires five disk files:-

1) File HS containing 4 records each of 3Ø6 words.

2) File HMAX containing 4 records each of 3Ø6 words.

3) File TZ containing 4 records each of 132 words.

4) File SWPA containing 1 record of 126 words.

5) File SCAT containing 4Ø records each of 37 words.

The link commences by calculating which disk record is to be written to in the first three files, according to which season has been analysed. The cumulative percentages of the HS and HMAX arrays which arein core are obtained by expressing each element as a percentage of the number of records in the season and adding the previous total to it

i.e. AHS(3) = (HS(3)/PI*1ØØ.)+AHS(2)

and AHS(3) = (HMAX(3)/PI*1ØØ.)+AHS(2)

The two new arrays are written to disk files 1 and 2 respectively.

The percentage occurrence of the TZ array is calculated by the general formula

ATZ(J) = TZ(K,L)*1ØØ./PI

The new array is written to the appropriate record in disk file 3.

If the end of the year has not been reached, the arrays HS, HMAX, AHS, TZ and ATZ are set to zero, LAB is set to 2 and control is returned to WAST. At the end of a year the program calculates the percentage occurrence of the spectral width parameter by using the general formula:-

ASWP(J) = SWPA(J)*1ØØ./II

The array ASWP is then written to disk file 4.

Each element of the SCAT array is tested; if it equals Ø it is set to "space", if it equals 1 it is set to "*", if it equals 2 it is set to "+", otherwise the formula

SCAT(I,J) = SCAT(I,J)*1ØØØ./II

is applied to convert to parts per thousand. The resulting array is written to disk file 5 in 4Ø records.

PERS This link requires the disk file described for READW, together with 4Ø files each consisting of 32Ø 1 word records. These files are called PEØ2,PEØ4....PE8Ø, but the program only references PEØ2 when it is compiled. The Subroutine DFT (as described in SECTION 5) is used in this program to access the correct "PE" file. The program commences by storing Ø in all the "PE" files which are to be used, this value being IHMAX/2. For each even wave height up to IHMAX, each value of IHS is read from the disk file HSG and tested against the current value of IHMAX. If it is equal to or greater than IHMAX, IVAL is increased by 1 and the loop continues unless the end of the year has been reached. At the end of the year, or if IVAL is less than IHMAX, IVAL is tested. If it is positive the IVALth record of the file PE(IHMAX/2) is increased by 1. At the end of this loop each disk file contains the number of occurrences for which each wave height exceeds a given duration. The cumulative occurrences of each disk file are then calculated and the results are stored on disk.

HPLOT This link plots, for each season, a graph of the percentage exceedance of the significant wave heights, the data for which has been stored in disk files 1 and 2 described in HSLOT.

After printing the name of the recording station and the dates between recording the program then plots four axes in a square. The Y-axes represents the percentage exceedance from Ø-1ØØ%, while the X-axes represent the wave height in feet in two logarithmic cycles from 1-1ØØft. After printing headings and labelling the left hand Y-axis and the lower X-axis, the data contained in the two disk files is plotted taking X values of 1,2,3,...1Ø,12,14,...2Ø,25,3Ø,4Ø...1ØØ. The HS curve is plotted by means of a series of "+" while HMAX is plotted as "X". The two curves are then labelled. These, and all the other graphs described in this program are no larger than 11" x 12½", so that they may be stored with lineprinter outputs from each recording station. All the graphic output from this program is produced with the aid of the I.B.M. 1800 Plotter Subroutines.

TPLOT ,This link plots, for each season, a curve representing the percentage occurrence of the wave period. Each curve is enclosed within four axes, the X-axes representing the wave period from Ø-2Ø seconds while the Y-axes represent the percentage occurrence form Ø-3Ø%. The graphs are labelled as are the left hand Y-axis and the lower X-axis. The data plotted is that stored in disk file 3 in HSLOT. The first value in the disk file is the percentage of calm readings in the season which is printed below the X-axis, while the remainder of the data is plotted in half second intervals as a solid line.

SWPLT This link plots the annual values of the spectral width parameter which have been stored in disk file 4 described in HSLOT.

Both axes are linear, the lower X-axis being labelled and representing the spectral width parameter in tenths from Ø-1, while the Y-axes represent the percentage occurrence from Ø-15. The first number stored in the disk file is the percentage of calms in the year, and this value is printed below the lower X axis. The remaining values are then plotted as a solid curve.

SCATP The X-axes plotted in this link represent the wave period from Ø-18 seconds, while the Y-axes represent significant wave height in feet. The range is calculated by the value of MAXH if it equals 2Ø the range is Ø-2Øft., if it is 4Ø the range is Ø-4Øft. and if it is 8Ø the range is Ø-8Øft. The axes are then labelled, the Y-axis labels varying according to the value of MAXH.

Each record in the disk file 5 (described in HSLOT) is accessed and rearranged into A1 format using the N.I.O. Subroutine INECB. Each word is stored, right justified into six consecutive elements of an output array which has previously been loaded with spaces. If the disk word already contains an asterisk or a plus, one of these symbols is stored in the right hand element of the six which are being accessed. Otherwise the number contained in the disk word is converted to A1 format. Before each array is printed on the plotter a check is made to see whether every element is a space. If it is the array is ignored and the next disk record is read.

The number of calm records in the year is printed as parts per thousand in the bottom left hand corner of the graph, while all other values are printed in their correct positions on the graph, the symbol * representing one occurrence and + representing two occurrences.

PERPL This link commences by reading the first number stored in the disk files PEØ2 and PEØ4. The larger of these two numbers is used to determine the range of the Y-axes, and the positions of the labels relative to the axes. If this number is less than or equal to 8Ø the Y-axes range from Ø-1ØØ, if it is less than or equal to 18Ø the axes range from Ø - 2ØØ, otherwise they range from Ø - 3ØØ. The X-axes are logarithmic, ranging from 1 - 2ØØ and representing duration in hours. The Y-axis represent the number of occurrences of wave conditions exceeding a given duration.

By using the Subroutine DFT described earlier, the program plots the data stored in each "PE" disk file until IHMAX/2 files have been plotted. Each curve is then labelled with the appropriate wave height.

DUMP This link lists on the 1443 printer all the data which has been plotted except for the wave height/period graph. This is done to enable the user to verify the value of any doubtful point on any graph.

Control is then returned to WAST in order to terminate the program.

```
// JOB              X
// XEQ SETLA    FX
   OCTOBER 1ST 1965 - SEPTEMBER 30TH 1966                    1966   40    38
```

FIG. 11

PERCENTAGE EXCEEDANCE OF HS AND HMAX

WINTER - JANUARY TO MARCH

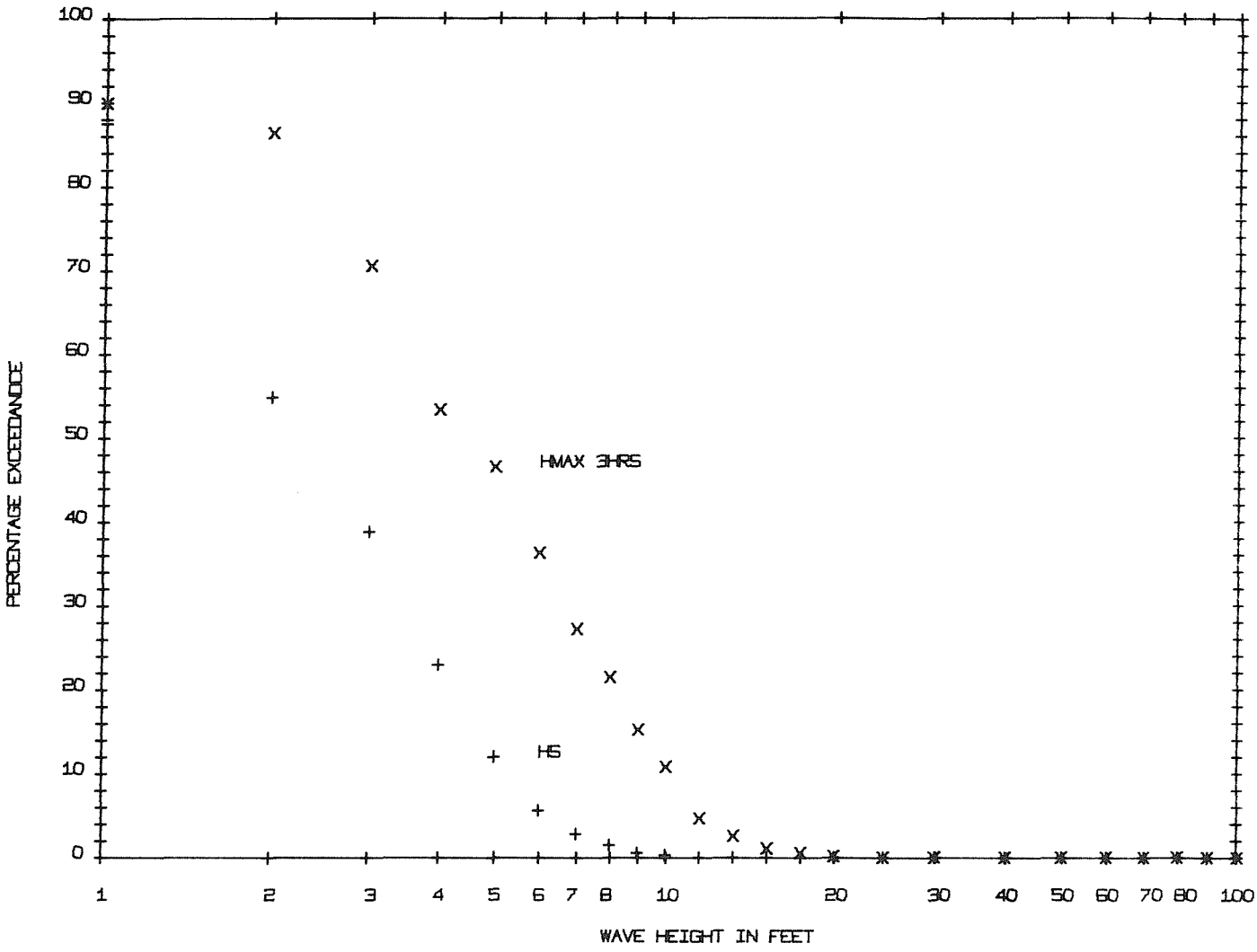


FIG. 12-1

PERCENTAGE EXCEEDANCE OF HS AND HMAX

SPRING - APRIL TO JUNE

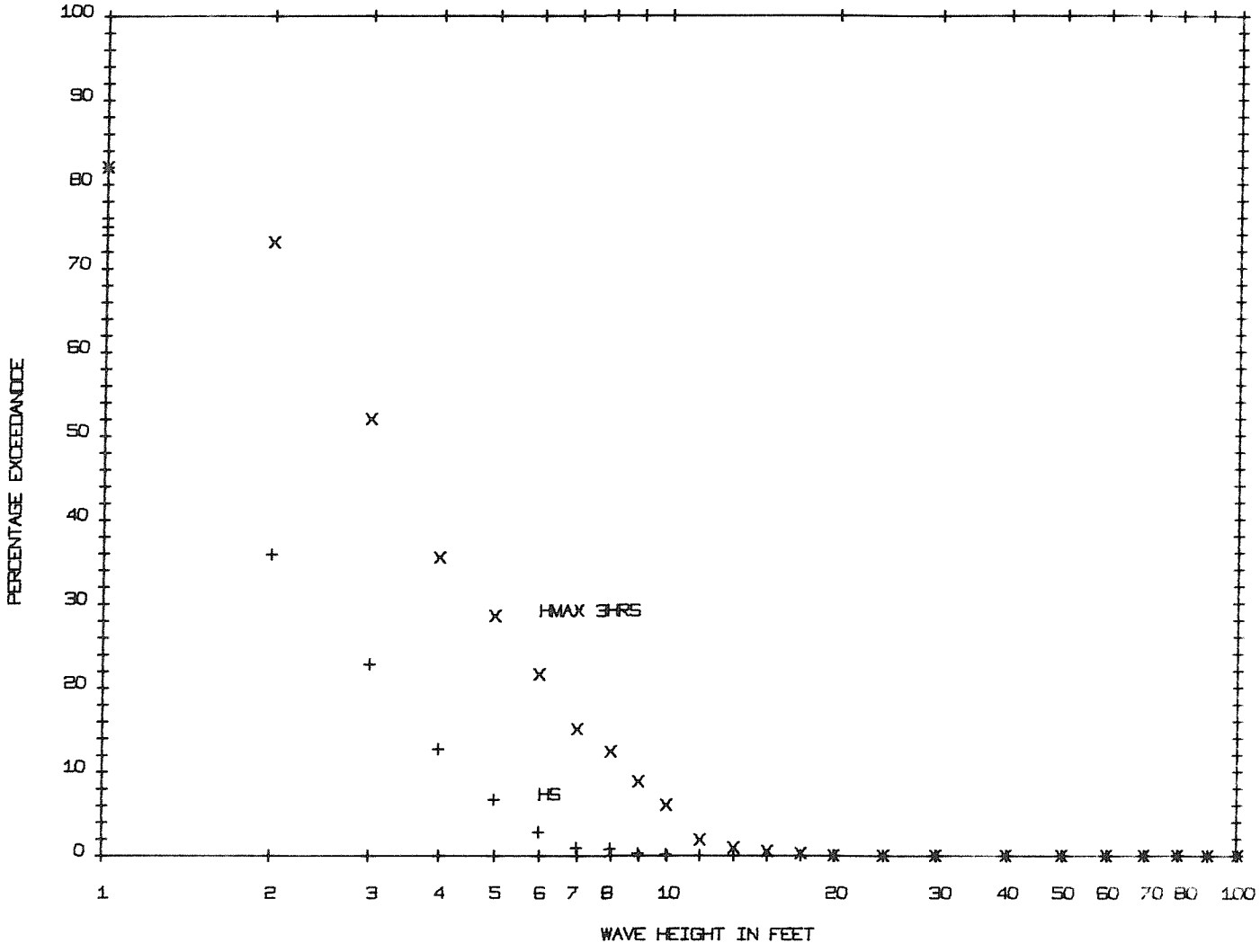


FIG. 12-2

PERCENTAGE EXCEEDANCE OF HS AND HMAX

SUMMER - JULY TO SEPTEMBER

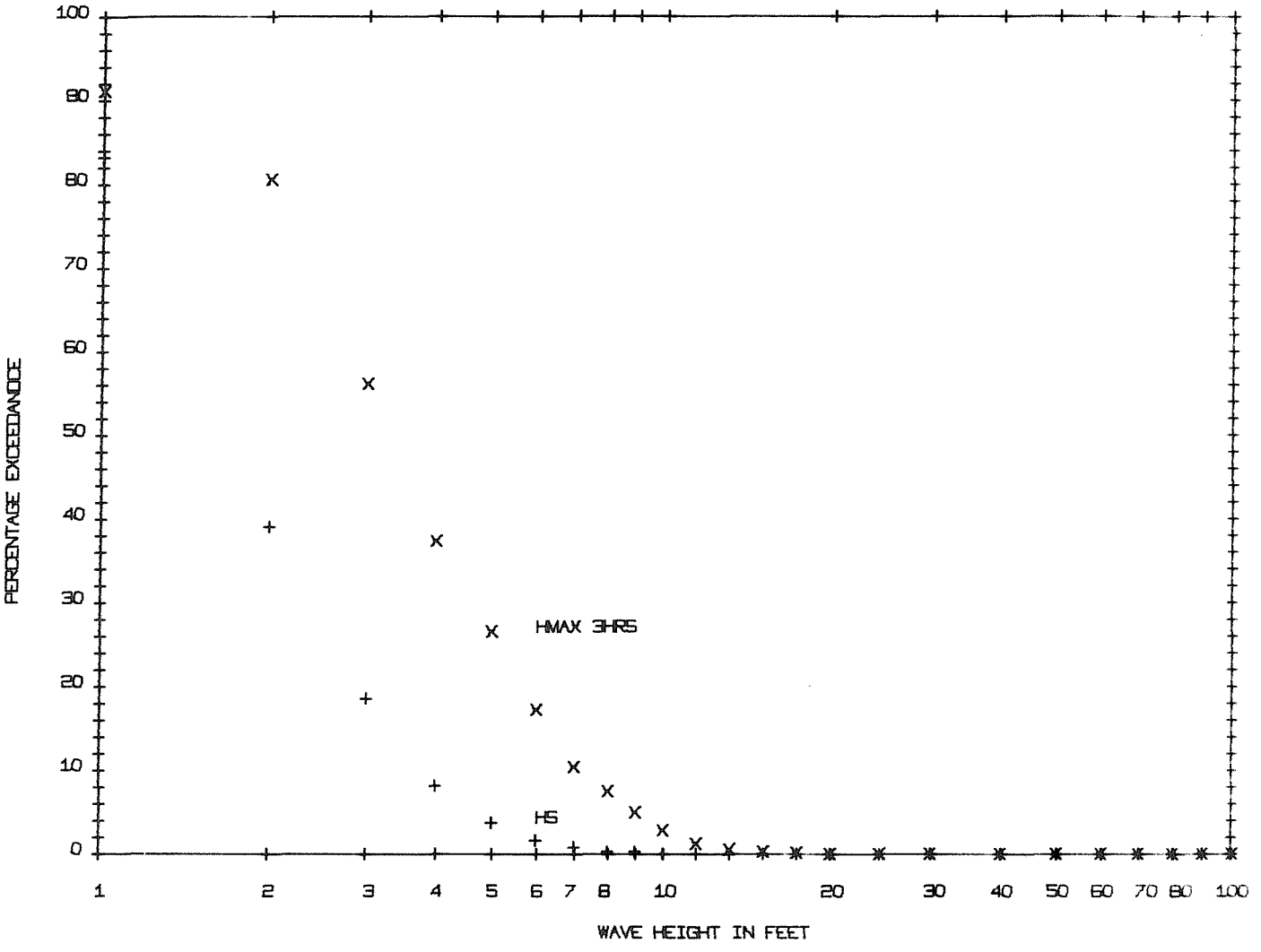


FIG. 12-3

PERCENTAGE EXCEEDANCE OF HS AND HMAX

AUTUMN - OCTOBER TO DECEMBER

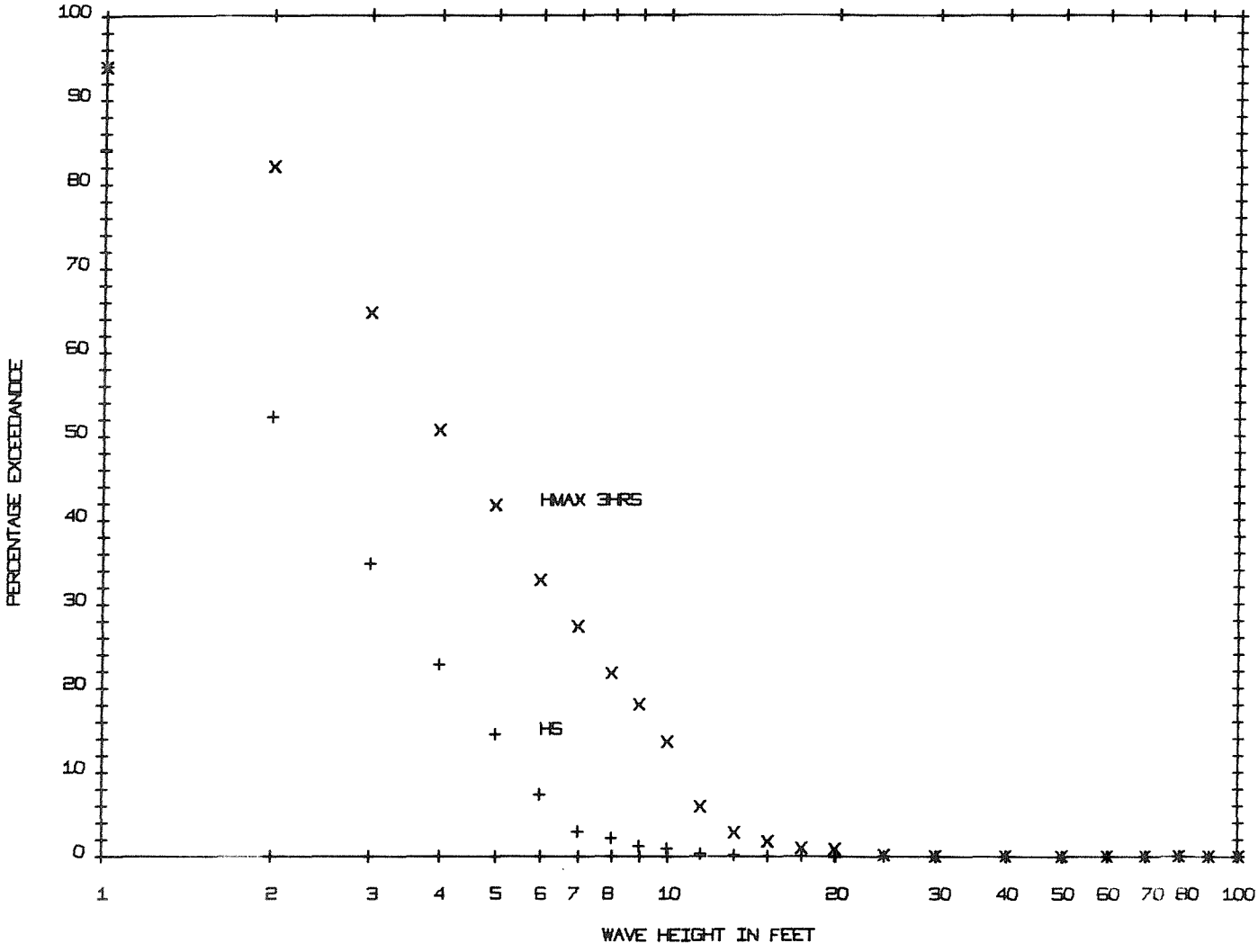


FIG. 12-4

GRAPH OF PERCENTAGE OCCURRENCE OF TZ

WITHIN HALF-SECOND INTERVALS

WINTER - JANUARY TO MARCH

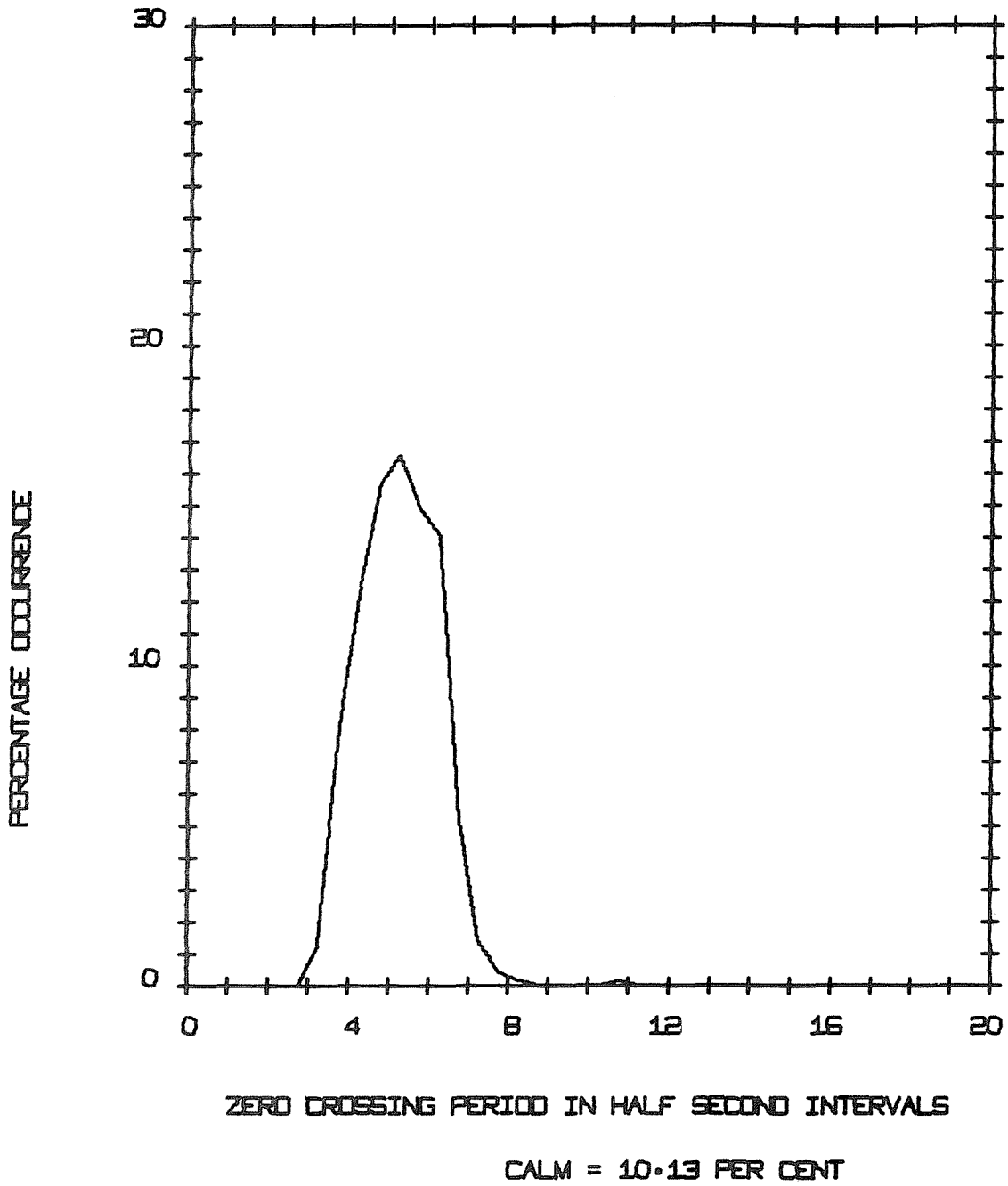


FIG. 12-5

GRAPH OF PERCENTAGE OCCURRENCE OF TZ

WITHIN HALF-SECOND INTERVALS

SPRING - APRIL TO JUNE

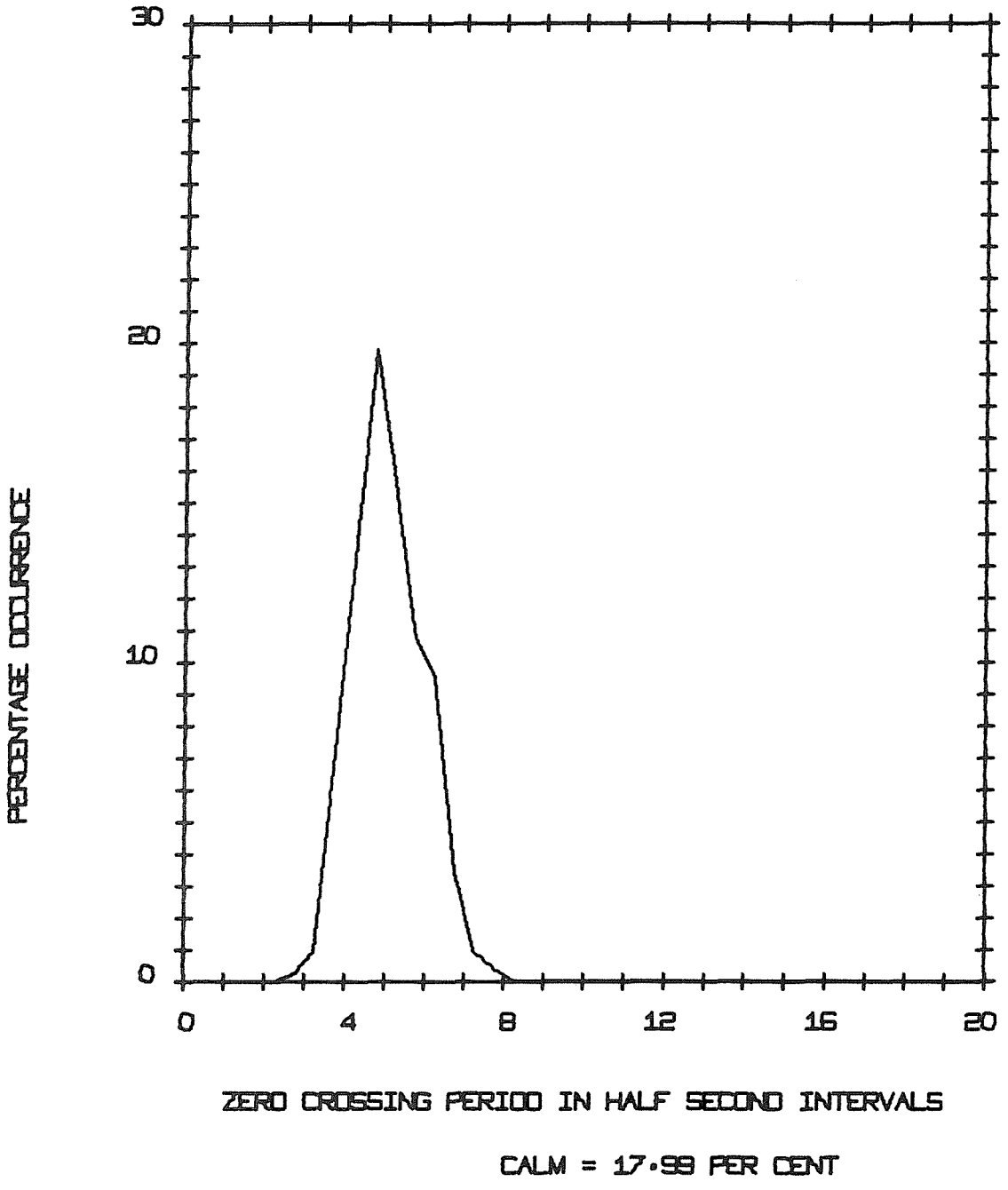


FIG. 12-6

GRAPH OF PERCENTAGE OCCURRENCE OF TZ

WITHIN HALF-SECOND INTERVALS

SUMMER - JULY TO SEPTEMBER

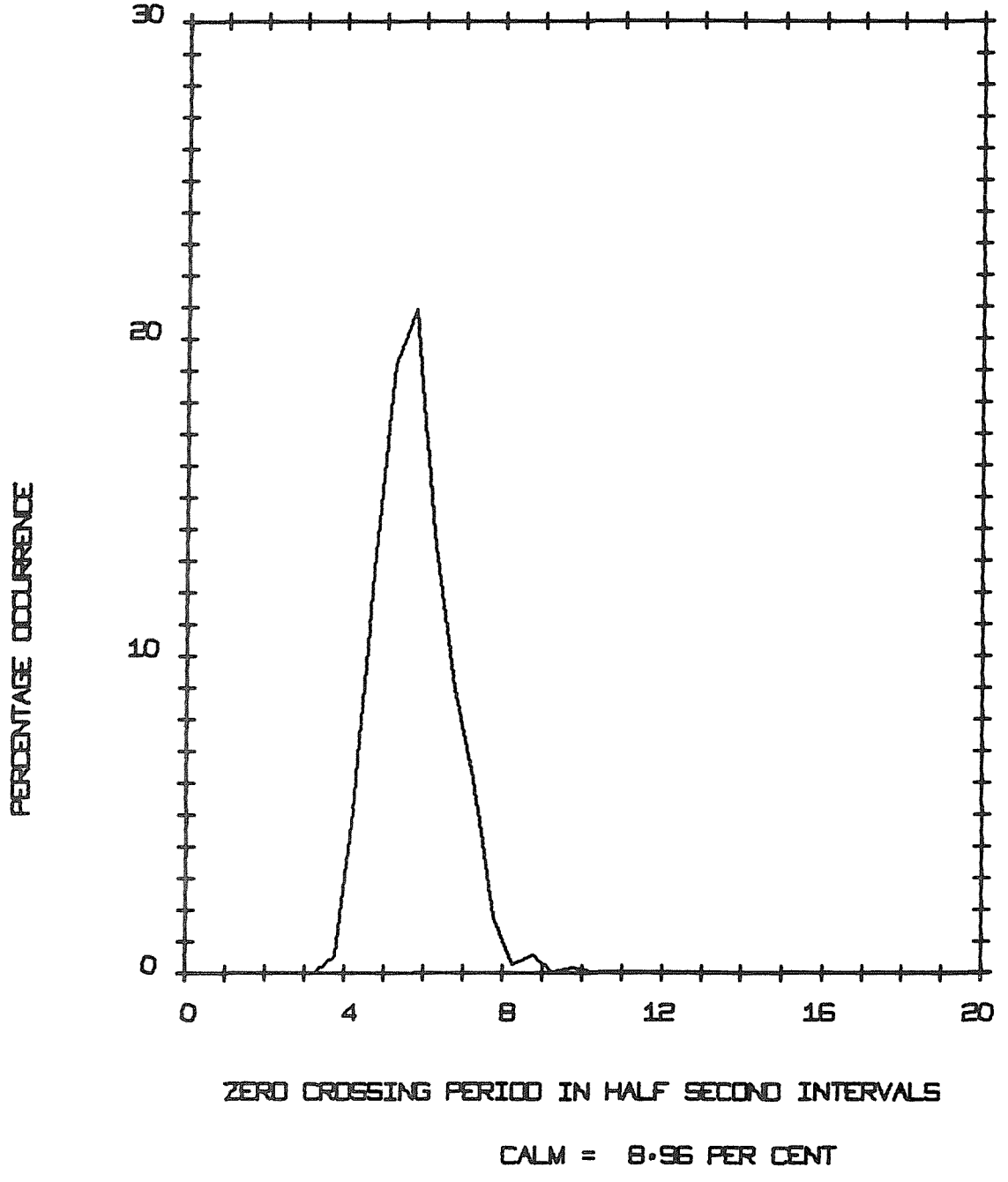
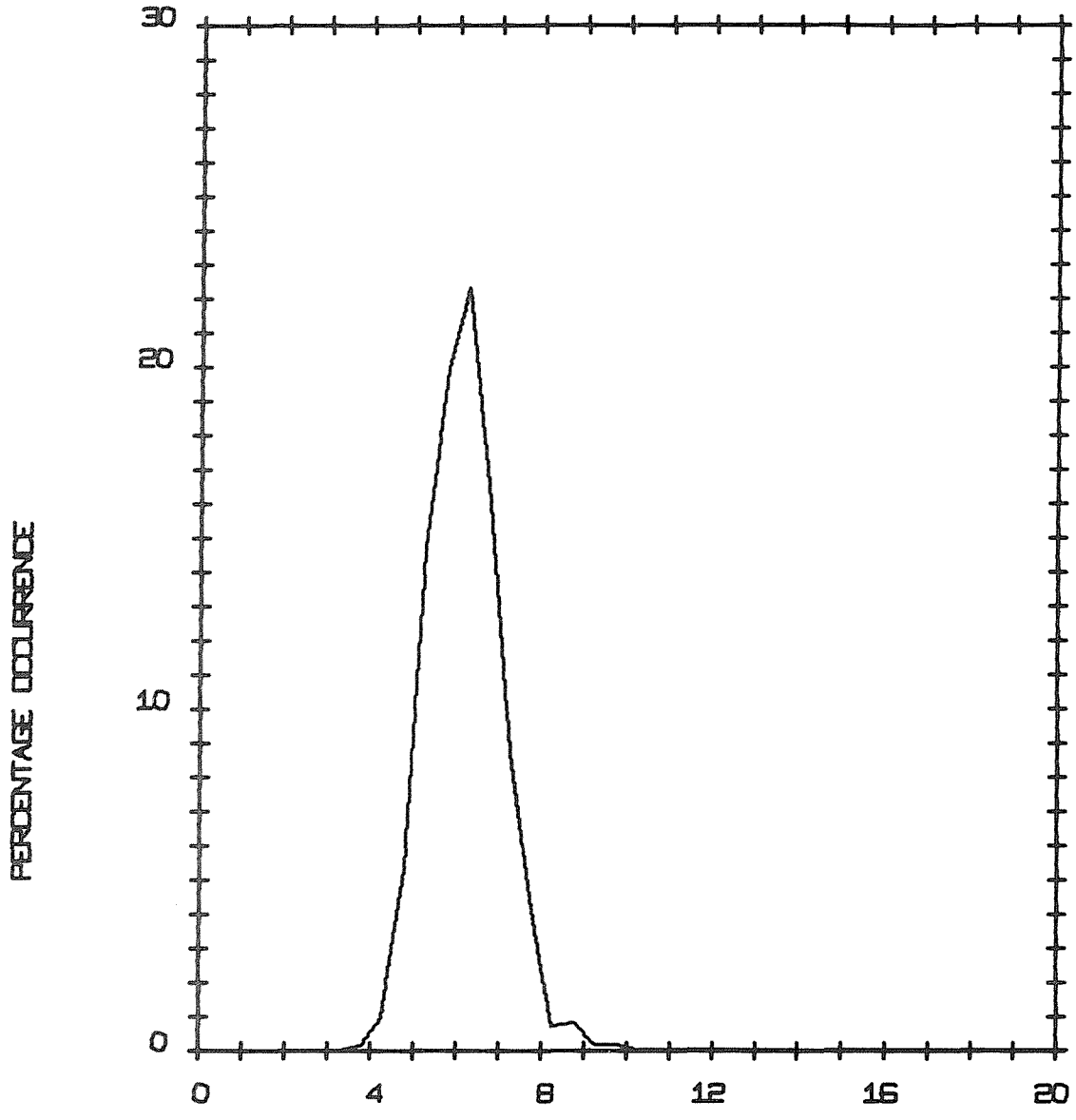


FIG. 12-7

GRAPH OF PERCENTAGE OCCURRENCE OF TZ

WITHIN HALF-SECOND INTERVALS

AUTUMN - OCTOBER TO DECEMBER



CALM = 6·11 PER CENT

FIG 12-8

GRAPH OF SPECTRAL WIDTH PARAMETER

FOR A WHOLE YEAR

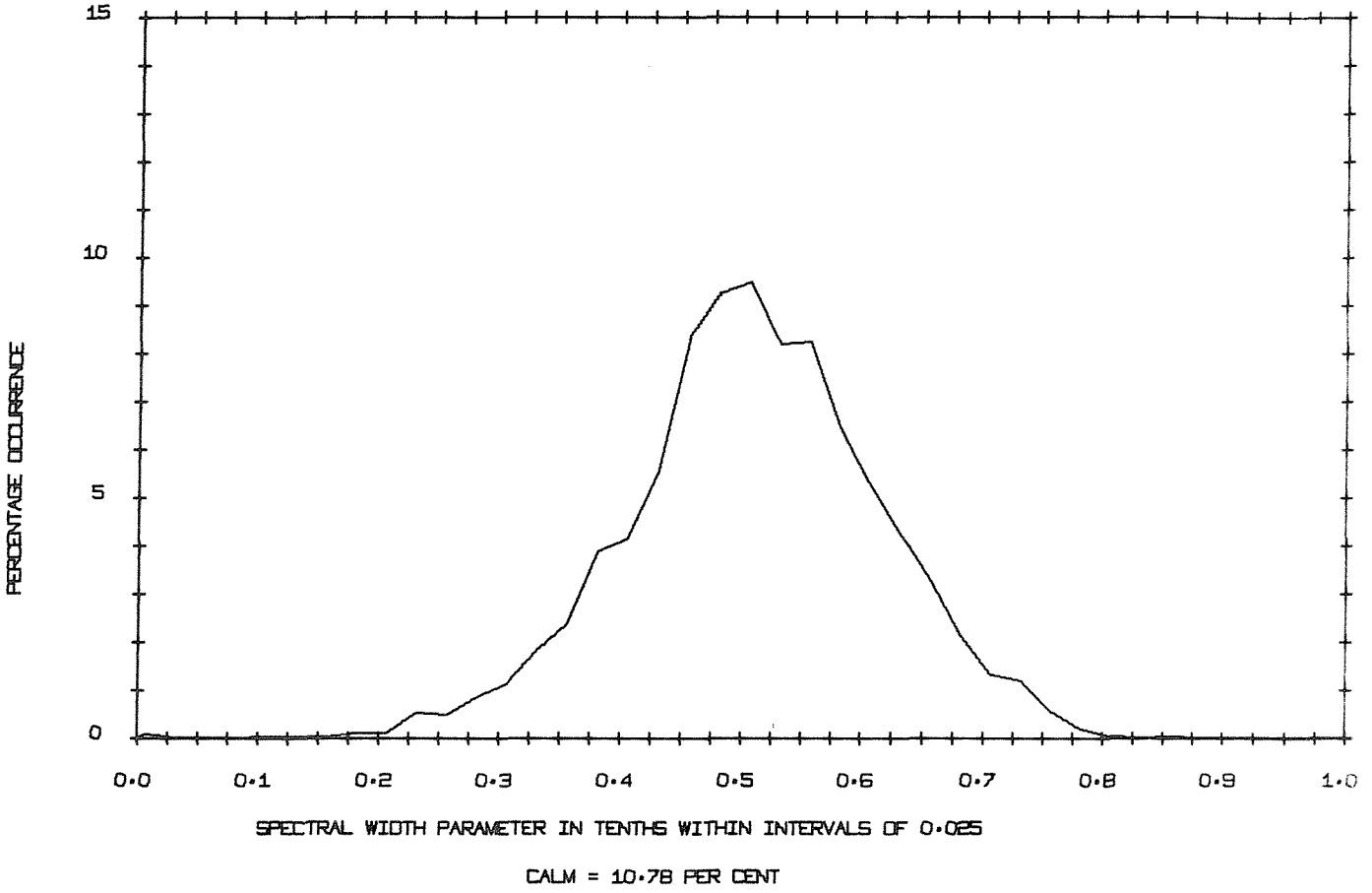


FIG. 12-9

SCATTER DIAGRAM FOR THE WHOLE YEAR

IN PARTS PER THOUSAND * = 1 OCCURRENCE, + = 2 OCCURRENCES

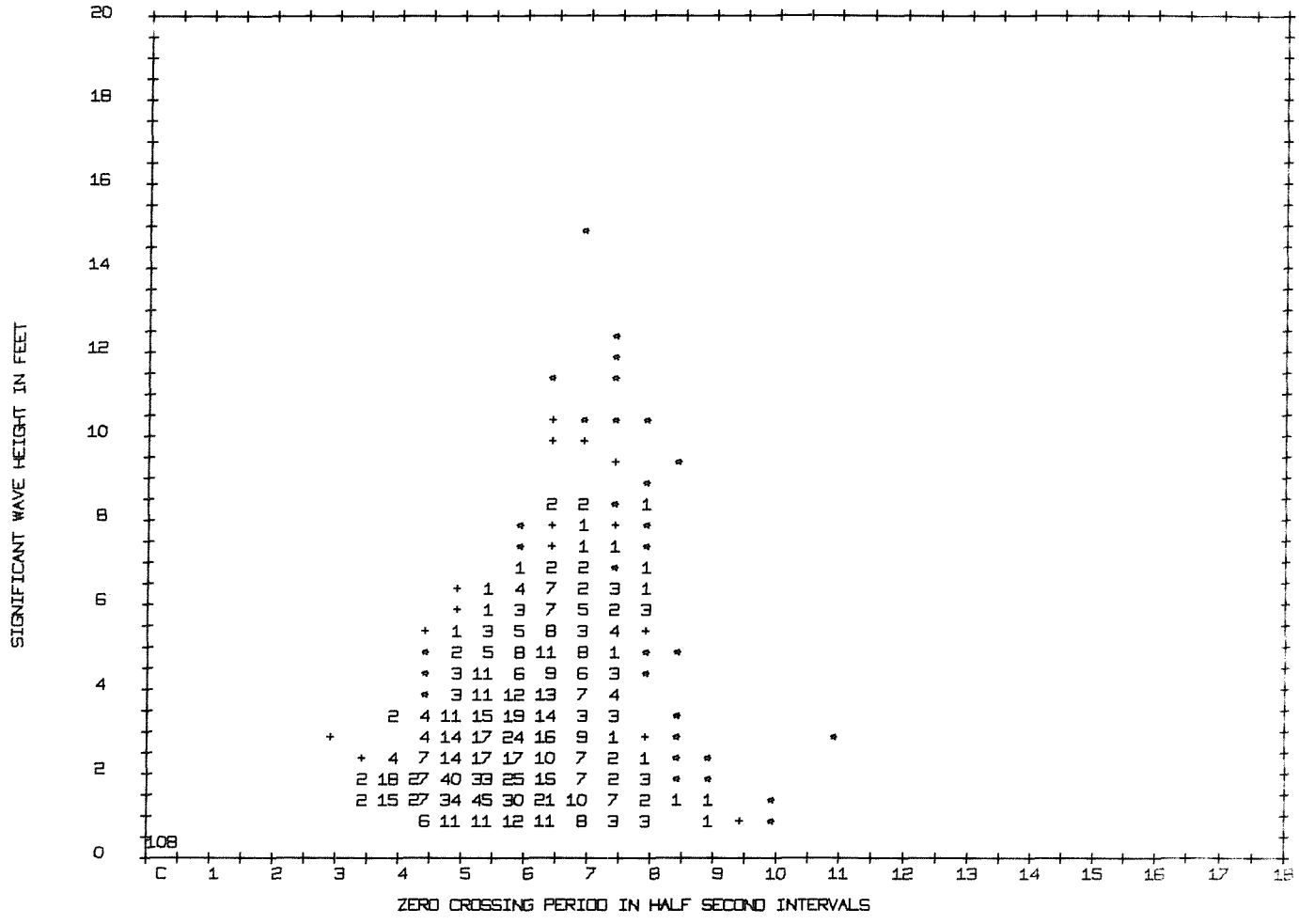


FIG. 12-10

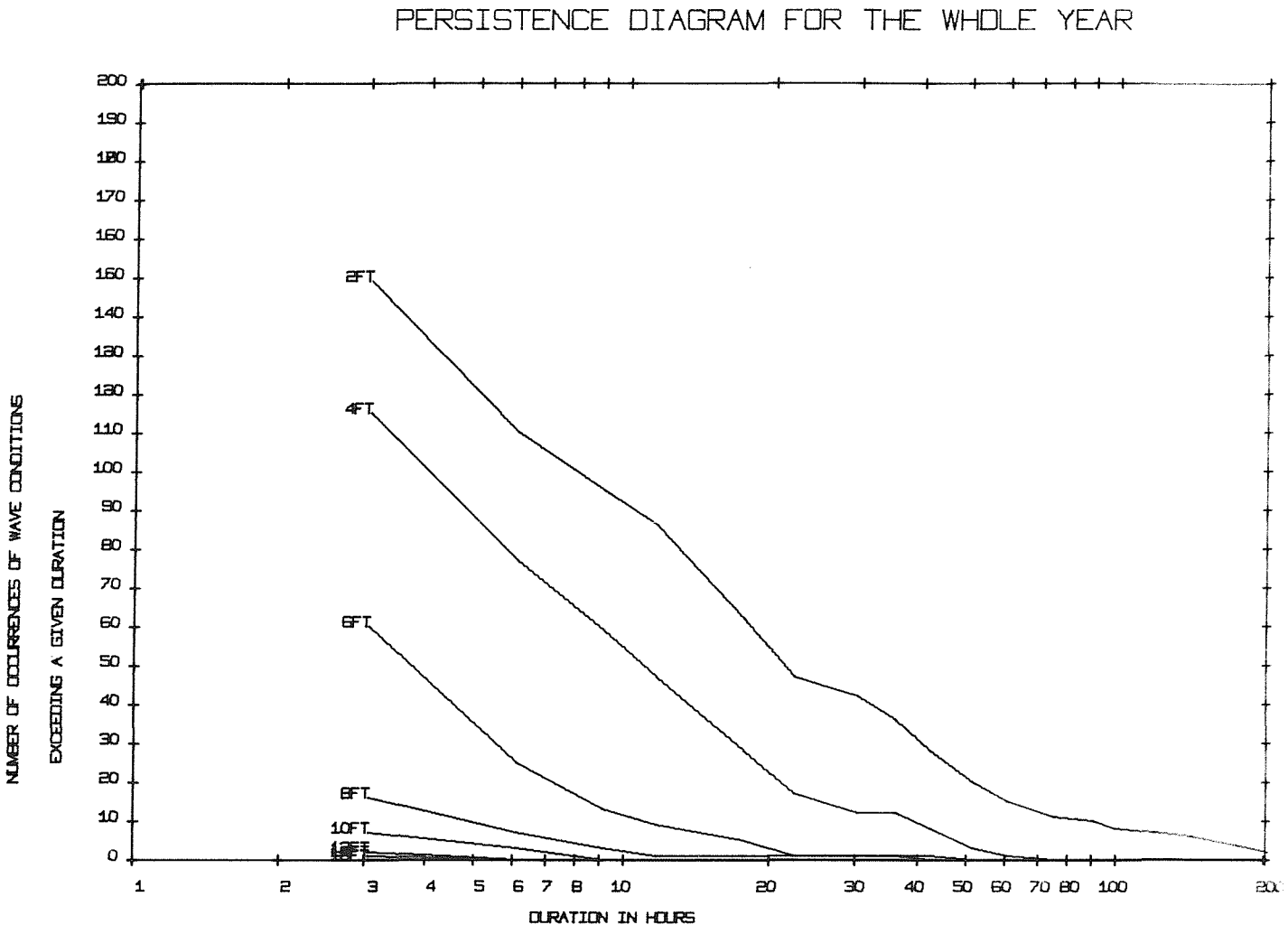

PERSISTENCE DIAGRAM FOR THE WHOLE YEAR
NUMBER OF OCCURRENCES OF WAVE CONDITIONS
EXCEEDING A GIVEN DURATION
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
2FT
4FT
6FT
8FT
10FT
1 2 3 4 5 6 7 8 10 20 30 40 50 60 70 80 100
DURATION IN HOURS

FIG. 12-11

SECTION 10

The Analysis of Shipborne wave records on board R.R.S."DISCOVERY".

As with all other recording stations, any wave records taken on R.R.S. "Discovery" had to be returned to the N.I.O. for analysis.

These records are at present few and far between as the ship is very rarely on station for a long enough period to make recording worth while. However, in March 1970 a suite of programs was written to analyse the data from the Shipborne wave recorder while the ship was at sea. These were part of the on-line process system which is used on "Discovery" for navigation and the collection of various types of oceanographic data. Figure 13 shows the arrangements of these programs within the system.

One-second data is stored on disk by the program DWRT for about 17 minutes. SBWR6 then calculates the mean of all these values and subtracts the mean from each value. The first derivative of each element of this array is calculated by the formula[3]

$$DER1=(2*I_{(J+1)}/3-2*I_{(J-1)}/3-I_{(J+2)}/12+I_{(J-2)}/12)/INT \qquad -3.16$$

where INT is the recording intervals in seconds.
Each value of DER1 is written to the disk file VALS. To calculate the number of zero crossings in the recording, each pair of I values is tested for a change of sign.

If there is a change, the number of zero crossings is increased by one before the next pair is tested.

For each set of four derivatives the following procedure is carried out:-

The first three are tested to see if they form a maximum or minimum point, and for a maximum the number of crests is increased by 1. The actual height of the crest or trough is calculated by the general formula[3].

$$Y_{(X_J+\delta x)} = Y_J+\theta\Delta Y_J+\theta(\theta-1)(\Delta^2 Y_J+\Delta^2 Y_{J+1})/4 \qquad 3.18$$

where $Y_{(X_J+\delta x)} = \emptyset$ $\qquad$ Y_J = DER(J) etc.

This yields two values of θ, the correct one being that between $\emptyset$ and 1. This is then inserted into equation 3.18 with $Y_J = I_J$ etc and

$Y(X_J+\delta x)$ = wave height

This value is tested against the two previous highest crests or troughs, depending on whether a crest or trough has been detected, and inserts the new value if it is higher than the two previous heights. The next set of four derivatives are then loaded and the program continues. At the end of the program the two highest crests and two lowest troughs are converted to feet from millivolts using a calibration factor which is stored on disk.

The program SBWR5 receives the six parameters calculated in SBWR6 through the common area, and these are inserted into the same equations as those in the program SBWRØ.

The date is calculated by using the day number which is stored in the common area and the IBM Subroutine JULAN, while the ship's position is also calculated from variables stored in the common area.

The input and output values obtained in this program, together with the date, time and ship's position are output to the typewriter as shown in Figure 14.

References:-

3 Fasham, M.J.R. "A Statistical Analysis of Oceanic Magnetic Anomalies".

Acknowledgements

I should like to thank all the members of the N.I.O. who helped with the preparation of these programs, and in particular Mr. B.J. Hinde and Mr. L. Draper for their invaluable assistance.

WAVE ANALYSIS SYSTEM FOR R.R.S. «DISCOVERY»

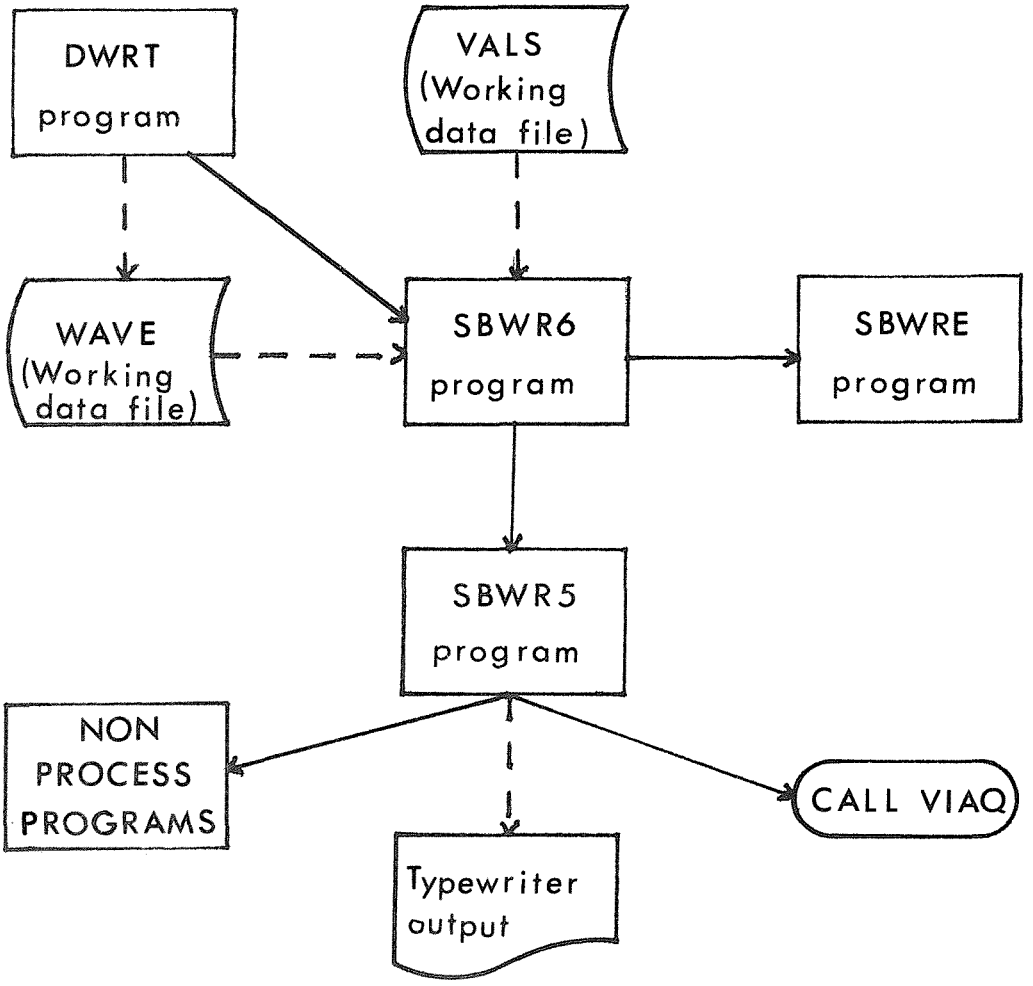


FIG. 13

```
* * * * * * * * * *
* S.B.W.R. OUTPUT *
* * * * * * * * * *

 DATE   1. 4.1970    TIME   1911 HRS.

POSITION AT START OF RECORDING   51.30.93N      17.11.48W
POSITION AT END OF RECORDING     51.30.91N      17.11.47W

 INPUT PARAMETERS - HIGHEST WAVE    =  5.0 FT   2ND HIGHEST WAVE =  4.8 FT   LOWEST WAVE      =  4.8 FT
                    2ND LOWEST WAVE =  4.2 FT   ZERO CROSSING    =  241      NUMBER OF CRESTS =  143

 OUTPUT  -  TZ      H1    H2      E      H1'    H2    HS1    HS2    HS    HMAX(3HRS)
           9.65     9.9   9.1    0.539  12.0   11.1   7.4    7.6    7.5      14.3

* * * * * * * * * *
* END OF OUTPUT   *
* * * * * * * * * *
```

FIG. 14

```
// JOB              X
// *N.I.O.PROGRAM LIBRARY MASTER COPY
// FOR SBWRO              VERSION 1 MODIFICATION 1 89
*LIST ALL
*IOCS(CARD,1443 PRINTER, DISK)
*ONE WORD INTEGERS
*EXTENDED PRECISION
*NONPROCESS PROGRAM
      DEFINE FILE 1(3000,40,U,IREC)                                    SBWR   1
C                                                                      SBWR   2
C     NIO PROGRAM 89 WRITTEN FOR L.P. AND RECORD RESULTS ON DISK       SBWR   3
C     DISK FILE DEFINED AS HAVING 3000 RECORDS EACH OF 40 WORDS        SBWR   4
C     LOGICAL UNIT NUMBERS ARE  2=CARD READ/PUNCH, 3=LINEPRINTER       SBWR   5
C                                                                      SBWR   6
      INTEGER TIME,ZERO,CREST,N,R,TITLE(36)                            SBWR   7
      DIMENSION IDAT(500),H(8),Z(2),W(2),F(2),E(2),K(2),SPACE(11)      SBWR   8
      IREC=1                                                           SBWR   9
      JCALM=-15552                                                     SBWR  10
      JFLTY=-14784                                                     SBWR  11
      JMISS=-11200                                                     SBWR  12
      JLESS=19520                                                      SBWR  13
      JSLAS=24896                                                      SBWR  14
      JSPAC=16448                                                      SBWR  15
      INCOR=19264                                                      SBWR  16
      DO 999 I=1,11                                                    SBWR  17
      SPACE (I)=16448                                                  SBWR  18
999   CONTINUE                                                         SBWR  19
      ZER=0.                                                           SBWR  20
      READ (2,22) LINEC,DEPTH                                          SBWR  22
      READ (2,44) TITLE                                                SBWR  23
      WRITE (3,55) TITLE                                               SBWR  24
C                                                                      SBWR  25
C     DATA TITLE PRINTED ON L.P.                                       SBWR  26
C                                                                      SBWR  27
16    I=0                                                              SBWR  28
      J=1                                                              SBWR  29
      READ (2,66) MONTH,IYEAR                                          SBWR  30
      WRITE (1'IREC) MONTH,IYEAR                                       SBWR  31
C                                                                      SBWR  32
C     MONTH AND YEAR WRITTEN TO DISK                                   SBWR  33
C                                                                      SBWR  34
14    READ (2,88) N,IDAT(J),TIME,ALNTH,A,B,C,D,ZERO,CREST,R            SBWR  35
C                                                                      SBWR  36
C     ONE RECORD READ FROM CARD                                        SBWR  37
C                                                                      SBWR  38
      ATIME=TIME/100                                                   SBWR  39
      IF (R-JCALM) 63,24,63                                            SBWR  40
63    IF (R-JFLTY) 64,24,64                                            SBWR  41
64    IF (R-JMISS) 65,24,65                                            SBWR  42
C                                                                      SBWR  43
C     TEST FOR CALM, MISSING OR FAULTY RECORD                          SBWR  44
C                                                                      SBWR  45
65    H(1)=A+C                                                         SBWR  46
      H(2)=B+D                                                         SBWR  47
C                                                                      SBWR  48
C     H(1) AND H(2) ARE THE TWO HIGHEST WAVES IN THE RECORD            SBWR  49
```

```
C                                                                       SBWR  50
      Z(1)=120.0*ALNTH/ZERO                                             SBWR  51
C                                                                       SBWR  52
C     Z(1) = WAVE PERIOD                                                SBWR  53
C                                                                       SBWR  54
      W(1)=60.0*ALNTH/CREST                                             SBWR  55
      IF (2*CREST-ZERO) 100,85,85                                       SBWR  56
85    E(2)=SQRT(1.0-(W(1)**2/Z(1)**2))                                  SBWR  57
C                                                                       SBWR  58
C     E(2) IS THE SPECTRAL WIDTH PARAMETER                              SBWR  59
C                                                                       SBWR  60
      G=2.0*3.14159/Z(1)                                                SBWR  61
      X=1.0/(77.44*G*G)                                                 SBWR  62
      X=SQRT(X+1.0)                                                     SBWR  63
      X=(0.83*X*X*X)                                                    SBWR  64
      E(1)=X*EXP(2.5*DEPTH*G*G/32.174)                                  SBWR  65
      H(3)=E(1)*H(1)                                                    SBWR  66
      H(4)=E(1)*H(2)                                                    SBWR  67
C                                                                       SBWR  68
C     H(3) AND H(4) ARE H(1) AND H(2)                                   SBWR  69
C     CORRECTED FOR INSTRUMENTAL RESPONSE                               SBWR  70
C                                                                       SBWR  71
      F(2)=ALOG(ZERO/2.)                                                SBWR  72
      F(1)=SQRT(2.0*F(2))                                               SBWR  73
      H(5)=2.0*H(3)/(F(1)*(1.0+0.289/F(2)-0.247/F(2)**2))               SBWR  74
      H(6)=2.0*H(4)/(F(1)*(1.0-0.211/F(2)-0.103/F(2)**2))               SBWR  75
C                                                                       SBWR  76
C     H(5) AND H(6) ARE THE MEAN HEIGHT OF                              SBWR  77
C     THE HIGHEST ONE-THIRD OF THE WAVES                                SBWR  78
C                                                                       SBWR  79
      H(7)=(H(5)+H(6))/2.0                                              SBWR  80
C                                                                       SBWR  81
C     H(7) EQUALS H (SIGNIFICANT)                                       SBWR  82
C                                                                       SBWR  83
      Y=SQRT(ALOG(90.0*ZERO/ALNTH))                                     SBWR  84
      H(8)=H(7)*(0.7071*(0.006361*Y**4-0.073968*Y**3+0.330573*Y**2+0.316SBWR  85
     1548*Y+0.566405))                                                  SBWR  86
C                                                                       SBWR  87
C     H(8) EQUALS H MAX(3HRS)                                           SBWR  88
C                                                                       SBWR  89
24    IF(I-1) 25,25,15                                                  SBWR  90
C                                                                       SBWR  91
C     PRINT OUT SECTION                                                 SBWR  92
C                                                                       SBWR  93
25    CALL HEAD (MONTH,IYEAR)                                           SBWR  94
C                                                                       SBWR  95
C     PRINT PAGE HEADINGS IF REQUIRED                                   SBWR  96
C                                                                       SBWR  97
      K(I)=11                                                           SBWR  98
15    IF(J-1) 19,18,19                                                  SBWR 100
19    IF(IDAT(J)-IDAT(J-1)) 21,18,21                                    SBWR 101
21    LINEC=LINEC+1                                                     SBWR 102
C                                                                       SBWR 103
C     RAISE LINE COUNTS IF A NEW DAY IS BEING STARTED                   SBWR 104
C                                                                       SBWR 105
18    IF(R-JCALM) 13,23,13                                              SBWR 106
```

```
 13     IF(R-JFLTY) 42,43,42                                              SBWR 107
 42     IF(R-JMISS) 45,46,45                                              SBWR 108
 C      LABEL 23 FOR CALM, 43 FOR FAULTY, 46 FOR MISSING                  SBWR 109
 23     IF(J-1) 47,48,47                                                  SBWR 110
 47     IF(IDAT(J)-IDAT(J-1)) 49,48,49                                    SBWR 111
 49     IF(K(1)-11) 48,48,200                                             SBWR 112
 200    WRITE(3,41)                                                       SBWR 113
 48     WRITE (3,53) IDAT(J),ATIME,LINEC                                  SBWR 114
        WRITE (1'IREC)JCALM,IDAT(J),ATIME,SPACE,LINEC                     SBWR 115
        LINEC=LINEC+1                                                     SBWR 116
 C                                                                        SBWR 117
 C      PRINT CALM RESULTS ON LINEPRINTER AND DISK                        SBWR 118
 C                                                                        SBWR 119
        GO TO 56                                                          SBWR 120
 43     IF(J-1) 57,58,57                                                  SBWR 121
 57     IF(IDAT(J)-IDAT(J-1)) 59,58,59                                    SBWR 122
 59     IF(K(1)-11) 58,58,201                                             SBWR 123
 201    WRITE(3,41)                                                       SBWR 124
 58     WRITE (3,68) IDAT(J),ATIME,LINEC                                  SBWR 125
        WRITE (1'IREC)JFLTY,IDAT(J),ATIME,SPACE,LINEC                     SBWR 126
        LINEC=LINEC+1                                                     SBWR 127
 C                                                                        SBWR 128
 C      PRINT FAULTY RESULTS ON LINEPRINTER AND DISK                      SBWR 129
 C                                                                        SBWR 130
        GO TO 56                                                          SBWR 131
 46     IF (J-1) 69,70,69                                                 SBWR 132
 69     IF (IDAT(J)-IDAT(J-1)) 71,70,71                                   SBWR 133
 71     IF(K(1)-11) 70,70,202                                             SBWR 134
 202    WRITE(3,41)                                                       SBWR 135
 70     WRITE (3,74) IDAT(J),ATIME,LINEC                                  SBWR 136
        WRITE (1'IREC)JMISS,IDAT(J),ATIME,SPACE,LINEC                     SBWR 137
        LINEC=LINEC+1                                                     SBWR 138
 C                                                                        SBWR 139
 C      PRINT MISSING RESULTS ON LINEPRINTER AND DISK                     SBWR 140
 C                                                                        SBWR 141
        GO TO 56                                                          SBWR 142
 45     IF(J-1) 76,78,76                                                  SBWR 143
 76     IF(IDAT(J)-IDAT(J-1)) 79,78,79                                    SBWR 144
 79     IF(K(1)-12) 78,78,203                                             SBWR 145
 203    WRITE(3,41)                                                       SBWR 146
 78     Z(1)=Z(1)+0.005                                                   SBWR 147
        H(1)=H(1)+0.05                                                    SBWR 148
        H(2)=H(2)+0.05                                                    SBWR 149
        E(2)=E(2)+0.0005                                                  SBWR 150
        H(3)=H(3)+0.05                                                    SBWR 151
        H(4)=H(4)+0.05                                                    SBWR 152
        H(5)=H(5)+0.05                                                    SBWR 153
        H(6)=H(6)+0.05                                                    SBWR 154
        H(7)=H(7)+0.05                                                    SBWR 155
        H(8)=H(8)+0.05                                                    SBWR 156
 C                                                                        SBWR 157
 C      CORRECT RESULTS BY ROUNDING                                       SBWR 158
 C                                                                        SBWR 159
        WRITE (3,75) IDAT(J),ATIME,Z(1),H(1),H(2),E(2),H(3),H(4),H(5)     SBWR 160
       2,H(6),H(7),H(8),ALNTH,LINEC                                       SBWR 161
        WRITE(1'IREC)JSPAC,IDAT(J),ATIME,Z(1),H(1),H(2),E(2),H(3),H(4),H(5SBWR 162
```

```
     3),H(6),H(7),H(8),ALNTH,LINEC                                    SBWR 163
      LINEC=LINEC+1                                                   SBWR 164
56    K(1)=K(1)+1                                                     SBWR 165
C                                                                     SBWR 166
C     WRITE RESULTS TO LINEPRINTER AND DISK                           SBWR 167
C                                                                     SBWR 168
      IF (N-JLESS) 61,997,61                                          SBWR 169
61    IF (N-JSLAS) 998,17,998                                         SBWR 170
C                                                                     SBWR 171
C     TEST FOR END OF MONTH OR DATA                                   SBWR 172
C                                                                     SBWR 173
998   IF (51-K(1)) 82,82,83                                          SBWR 174
82    CALL HEAD (MONTH,IYEAR)                                         SBWR 175
C                                                                     SBWR 176
C     TEST FOR NEW PAGE                                               SBWR 177
C                                                                     SBWR 178
      K(1)=11                                                         SBWR 179
83    I=2                                                             SBWR 180
      J=J+1                                                           SBWR 181
      GO TO 14                                                        SBWR 182
997   LINEC=LINEC+1                                                   SBWR 183
      GO TO 16                                                        SBWR 184
100   IF(J-1) 300,51,300
300   IF (IDAT(J)-IDAT(J-1)) 89,51,89                                 SBWR 186
89    IF(K(1)-11) 205,205,204                                         SBWR 187
204   WRITE (3,41)                                                    SBWR 188
205   LINEC=LINEC+1                                                   SBWR 189
51    WRITE (3,91) IDAT(J),ATIME,LINEC                                SBWR 194
      WRITE (1'IREC)INCOR,IDAT(J),ATIME,SPACE,LINEC                   SBWR 195
C                                                                     SBWR 196
C     ROUTINE FOR AN INCORRECT RECORD I.E. IF (2*NO OF CRESTS         SBWR 197
C     -NO OF ZERO CROSSINGS ) IS LESS THAN ZERO                       SBWR 198
C                                                                     SBWR 199
      LINEC=LINEC+1                                                   SBWR 200
      K(1)=K(1)+1                                                     SBWR 201
      IF (51-K(1)) 92,92,93                                           SBWR 203
92    WRITE (3,98)                                                    SBWR 204
      CALL HEAD (MONTH,IYEAR)                                         SBWR 205
C                                                                     SBWR 206
C     TEST FOR NEW PAGE                                               SBWR 207
C                                                                     SBWR 208
      K(1)=11                                                         SBWR 209
93    I=2                                                             SBWR 210
      J=J+1                                                           SBWR 211
      GO TO 14                                                        SBWR 212
17    WRITE (3,97)                                                    SBWR 213
41    FORMAT(1H )                                                     SBWR 214
22    FORMAT (I5/F6.3)                                                SBWR 215
44    FORMAT (36A2)
55    FORMAT (1H1,24(/),36A2,/)                                       SBWR 217
66    FORMAT (I2/I4)                                                  SBWR 218
88    FORMAT (A1,I2,I6,1X,5F6.1,2I7,A1)                               SBWR 219
53    FORMAT (1H ,1X,I2,F7.2,'     CALM',97X,I4)                      SBWR 220
68    FORMAT (1H ,1X,I2,F7.2,86X,'RECORD FAULTY',6X,I4)               SBWR 221
74    FORMAT (1H ,1X,I2,F7.2,86X,'RECORD MISSING',5X,I4)              SBWR 222
91    FORMAT (1H ,1X,I2,F7.2,105X,I4)                                 SBWR 223
```

```
 98     FORMAT (1H1,5(/))                                                SBWR 224
 97     FORMAT (1H ,3(/),'1 END OF DATA')                                SBWR 225
 75     FORMAT (1H ,1X,I2,F7.2,F8.2,F6.1,F7.1,F9.3,4F7.1,F6.1,F9.1,F10.2,2SBWR 226
       42X,I4)                                                          SBWR 227
        CALL EXIT                                                       SBWR 228
        END                                                             SBWR 229
*DELET              SBWRO
*STORE             1 SBWRO
        SUBROUTINE HEAD (MONTH,IYEAR)                                   SBWR1540
C
C       SUBROUTINE TO PRINT MONTH, YEAR, AND HEADINGS ON EACH PAGE
C
        GO TO (1,2,3,4,5,6,7,8,9,10,11,12),MONTH                        SBWR1550
 1      WRITE (3,27) IYEAR                                              SBWR1560
        GO TO 20                                                        SBWR1580
 2      WRITE (3,28) IYEAR                                              SBWR1590
        GO TO 20                                                        SBWR1610
 3      WRITE (3,29) IYEAR                                              SBWR1620
        GO TO 20                                                        SBWR1640
 4      WRITE (3,30) IYEAR                                              SBWR1650
        GO TO 20                                                        SBWR1670
 5      WRITE (3,31) IYEAR                                              SBWR1680
        GO TO 20                                                        SBWR1700
 6      WRITE (3,32) IYEAR                                              SBWR1710
        GO TO 20                                                        SBWR1730
 7      WRITE (3,34) IYEAR                                              SBWR1740
        GO TO 20                                                        SBWR1760
 8      WRITE (3,35) IYEAR                                              SBWR1770
        GO TO 20                                                        SBWR1790
 9      WRITE (3,36) IYEAR                                              SBWR1800
        GO TO 20                                                        SBWR1820
 10     WRITE (3,37) IYEAR                                              SBWR1830
        GO TO 20                                                        SBWR1850
 11     WRITE (3,38) IYEAR                                              SBWR1860
        GO TO 20                                                        SBWR1880
 12     WRITE (3,39) IYEAR                                              SBWR1890
 20     WRITE (3,40)                                                    SBWR1910
 27     FORMAT (1H1,5(/),'+JANUARY',2X,I4,/)                            SBWR1930
 28     FORMAT (1H1,5(/),'+FEBRUARY',2X,I4,/)                           SBWR1940
 29     FORMAT (1H1,5(/),'+MARCH',2X,I4,/)                              SBWR1950
 30     FORMAT (1H1,5(/),'+APRIL',2X,I4,/)                              SBWR1960
 31     FORMAT (1H1,5(/),'+MAY',2X,I4,/)                                SBWR1970
 32     FORMAT (1H1,5(/),'+JUNE',2X,I4,/)                               SBWR1980
 34     FORMAT (1H1,5(/),'+JULY',2X,I4,/)                               SBWR1990
 35     FORMAT (1H1,5(/),'+AUGUST',2X,I4,/)                             SBWR2000
 36     FORMAT (1H1,5(/),'+SEPTEMBER',2X,I4,/)                          SBWR2010
 37     FORMAT (1H1,5(/),'+OCTOBER',2X,I4,/)                            SBWR2020
 38     FORMAT (1H1,5(/),'+NOVEMBER',2X,I4,/)                           SBWR2030
 39     FORMAT (1H1,5(/),'+DECEMBER',2X,I4,/)                           SBWR2040
 40     FORMAT (97H DATE   TIME     TZ     H1     H2      E      H1'    H2'SBWR2050
       1    HS1    HS2    HS   HMAX(3HRS) DURATION,/)                   SBWR2060
        RETURN                                                          SBWR2070
        END                                                             SBWR2080
```

```
// JOB            X                                                    LST00000
// FOR LISTO              VERSION 1 MODIFICATION 2 121                 LST00010
*IOCS (CARD,1443 PRINTER,DISK)                                         LST00020
*LIST ALL                                                              LST00030
*ONE WORD INTEGERS                                                     LST00040
*EXTENDED PRECISION                                                    LST00050
*NONPROCESS PROGRAM                                                    LST00060
      DEFINE FILE 1(3000,40,U,IREC)                                    LST00070
C----                                                                  LST00080
C     N.I.O. PROGRAM 121-LISTO                                         LST00090
C----                                                                  LST00100
C     THIS PROGRAM LISTS ON THE 1443 PRINTER THE SBWRO OUTPUT STORED   LST00110
C     ON DISK. THE HEADINGS ON EACH PAGE ARE PROGRAM OUTPUT AS THEY    LST00120
C     ARE NOT STORED ON DISK                                           LST00130
C                                                                      LST00140
      INTEGER TITLE(36),YEAR,TEST,P,PI,CINT                            LST00150
      DIMENSION NAMFL(3)                                               LST00160
      READ (2,30) NAMFL                                                LST00170
30    FORMAT (3A2)                                                     LST00180
      CALL DFT(1,NAMFL,IERR)                                           LST00190
      IF (IERR) 31,32,31                                               LST00200
31    WRITE (3,33) IERR                                                LST00210
33    FORMAT (1H ,'IERR=' I3)                                          LST00220
      GO TO 7                                                          LST00230
32    IREC=1                                                           LST00240
      JCALM=-15552                                                     LST00250
      JFLTY=-14784                                                     LST00260
      JSPAC=16448                                                      LST00270
      INCOR=19264                                                      LST00280
      INT=-14016                                                       LST00290
      CINT=-10944                                                      LST00300
      PI=1                                                             LST00310
      READ (2,100) TITLE                                               LST00320
      WRITE (3,101) TITLE                                              LST00330
      READ (2,102) P                                                   LST00340
11    READ (1'IREC) MONTH,YEAR                                         LST00350
      M=0                                                              LST00360
      GO TO (1,2,1,3,1,3,1,1,3,1,3,1),MONTH                            LST00370
C                                                                      LST00380
C     PRINT DATA TITLE, AND INPUT MONTH NUMBER AND YEAR                LST00390
C                                                                      LST00400
1     N=248                                                            LST00410
      GO TO 6                                                          LST00420
2     IF (YEAR-4*(YEAR/4)) 4,5,4                                       LST00430
3     N=240                                                            LST00440
      GO TO 6                                                          LST00450
4     N=224                                                            LST00460
      GO TO 6                                                          LST00470
5     N=232                                                            LST00480
      GO TO 6                                                          LST00490
C                                                                      LST00500
C     TEST THE NUMBER OF RECORDS IN THE MONTH AND SET N ACCORDINGLY    LST00510
C                                                                      LST00520
6     CALL PRINT (MONTH,YEAR)                                          LST00530
C                                                                      LST00540
C     PRINT MONTH,YEAR,HEADINGS AT THE TOP OF EVERY PAGE               LST00550
```

```
C                                                                       LST00560
      L=0                                                               LST00570
      K=11                                                              LST00580
13    READ (1'IREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,J                    LST00590
      IF (TEST-JSPAC) 15,14,15                                          LST00600
15    IF (TEST-JCALM) 17,16,17                                          LST00610
17    IF (TEST-JFLTY) 19,18,19                                          LST00620
19    IF (TEST-INCOR)121,22,121                                         LST00630
121   IF(TEST-INT) 21,122,21                                            LST00640
21    IF(TEST-CINT)123,124,123                                          LST00650
123   WRITE (3,105) I,A,J                                               LST00660
      GO TO 20                                                          LST00670
16    WRITE (3,106) I,A,J                                               LST00680
      GO TO 20                                                          LST00690
122   WRITE (3,110) I,A,B,C,D,E,F,G,H,W,X,Y,J                           LST00700
110   FORMAT(1H ,1X,I2,F7.2,F8.2,F6.1,F7.1,F9.3,4F7.1,F6.1,F9.1,     12XLST00710
     1,       'INTERPOLATED',8X,I4)                                     LST00720
      GO TO 20                                                          LST00730
124   WRITE (3,111) I,A,J                                               LST00740
111   FORMAT (1H,1X,I2,F7.2,'    CALM',77X,'INTERPOLATED',8X,I4)        LST00750
      GO TO 20                                                          LST00760
18    WRITE (3,107) I,A,J                                               LST00770
      GO TO 20                                                          LST00780
22    WRITE (3,108) I,A,J                                               LST00790
      GO TO 20                                                          LST00800
14    WRITE (3,109) I,A,B,C,D,E,F,G,H,W,X,Y,Z,J                         LST00810
20    IF(P-PI) 7,7,8                                                    LST00820
8     PI=PI+1                                                           LST00830
C                                                                       LST00840
C     PRINT A RECORD. TEST RECORD COUNT ,IF EQUAL TO P STOP             LST00850
C                                                                       LST00860
      L=L+1                                                             LST00870
      IF (8-L) 9,9,10                                                   LST00880
9     WRITE (3,104)                                                     LST00890
      L=0                                                               LST00900
      PI=PI+1                                                           LST00910
      K=K+1                                                             LST00920
10    M=M+1                                                             LST00930
      IF (N-M) 11,11,12                                                 LST00940
C                                                                       LST00950
C     TEST FOR END OF DAY AND END OF MONTH                              LST00960
C                                                                       LST00970
12    K=K+1                                                             LST00980
      IF (56-K) 6,6,13                                                  LST00990
C                                                                       LST01000
C     TEST FOR NEW PAGE                                                 LST01010
C                                                                       LST01020
100   FORMAT (36A2)                                                     LST01030
101   FORMAT (1H1,24(/),44X,36A2)                                       LST01040
102   FORMAT (I4)                                                       LST01050
104   FORMAT (1H )                                                      LST01060
105   FORMAT (1H ,1X,I2,F7.2,86X,'RECORD MISSING',5X,I4)                LST01070
106   FORMAT (1H ,1X,I2,F7.2,'    CALM',97X,I4)                         LST01080
107   FORMAT (1H ,1X,I2,F7.2,86X,'RECORD FAULTY',6X,I4)                 LST01090
108   FORMAT (1H ,1X,I2,F7.2,105X,I4)                                   LST01100
109   FORMAT (1H ,1X,I2,F7.2,F8.2,F6.1,F7.1,F9.3,4F7.1,F6.1,F9.1,F10.2,2LST01110
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     12X,I4)                                                                LST01120
7     CALL EXIT                                                             LST01130
      END                                                                   LST01140
*DELET              LISTO                                                  LST01150
*STORECIL          1 LISTO LISTO                                           LST01160
*FILES(1,TONG,1)                                                          LST01170
*CCEND                                                                    LST01180
// JOB              X                                                      LST01190
// FOR                                                                    LST01200
*LIST ALL                                                                 LST01210
*ONE WORD INTEGERS                                                        LST01220
*EXTENDED PRECISION                                                       LST01230
*NON PROCESS PROGRAM                                                      LST01240
      SUBROUTINE PRINT (MONTH,YEAR)                                       LST01250
      INTEGER YEAR                                                        LST01260
      GO TO (1,2,3,4,5,6,7,8,9,10,11,12),MONTH                            LST01270
1     WRITE (3,27) YEAR                                                   LST01280
      GO TO 20                                                            LST01290
2     WRITE (3,28) YEAR                                                   LST01300
      GO TO 20                                                            LST01310
3     WRITE (3,29) YEAR                                                   LST01320
      GO TO 20                                                            LST01330
4     WRITE (3,30) YEAR                                                   LST01340
      GO TO 20                                                            LST01350
5     WRITE (3,31) YEAR                                                   LST01360
      GO TO 20                                                            LST01370
6     WRITE (3,32) YEAR                                                   LST01380
      GO TO 20                                                            LST01390
7     WRITE (3,34) YEAR                                                   LST01400
      GO TO 20                                                            LST01410
8     WRITE (3,35) YEAR                                                   LST01420
      GO TO 20                                                            LST01430
9     WRITE (3,36) YEAR                                                   LST01440
      GO TO 20                                                            LST01450
10    WRITE (3,37) YEAR                                                   LST01460
      GO TO 20                                                            LST01470
11    WRITE (3,38) YEAR                                                   LST01480
      GO TO 20                                                            LST01490
12    WRITE (3,39) YEAR                                                   LST01500
20    WRITE (3,40)                                                        LST01510
27    FORMAT (1H1,5(/),'+JANUARY',2X,I4,/)                                LST01520
28    FORMAT (1H1,5(/),'+FEBRUARY',2X,I4,/)                               LST01530
29    FORMAT (1H1,5(/),'+MARCH',2X,I4,/)                                  LST01540
30    FORMAT (1H1,5(/),'+APRIL',2X,I4,/)                                  LST01550
31    FORMAT (1H1,5(/),'+MAY',2X,I4,/)                                    LST01560
32    FORMAT (1H1,5(/),'+JUNE',2X,I4,/)                                   LST01570
34    FORMAT (1H1,5(/),'+JULY',2X,I4,/)                                   LST01580
35    FORMAT (1H1,5(/),'+AUGUST',2X,I4,/)                                 LST01590
36    FORMAT (1H1,5(/),'+SEPTEMBER',2X,I4,/)                              LST01600
37    FORMAT (1H1,5(/),'+OCTOBER',2X,I4,/)                                LST01610
38    FORMAT (1H1,5(/),'+NOVEMBER',2X,I4,/)                               LST01620
39    FORMAT (1H1,5(/),'+DECEMBER',2X,I4,/)                               LST01630
40    FORMAT (97H DATE   TIME     TZ     H1     H2      E      H1'     H2'LST01640
     1    HS1     HS2     HS    HMAX(3HRS) DURATION,/)                     LST01650
      RETURN                                                              LST01660
      END                                                                 LST01670
```

```
*DELET          PRINT                                   LST01680
*STORE        1 PRINT                                   LST01690
```

```
// JOB            X
// *A4-4/PAGE/TEST CORR2 VERSION 1
// FOR CORR2            VERSION 1 MODIFICATION 0 17.8.1970
*IOCS (DISK,1443 PRINTER,CARD)
*ONE WORD INTEGERS
*LIST ALL
*EXTENDED PRECISION
*NONPROCESS PROGRAM
*TRANSFER TRACE
*ARITHMETIC TRACE
      DEFINE FILE 1(3000,40,U,NREC)
      INTEGER TEST,YEAR,P,PARA,CINT                                    COR10030
      DIMENSION ITITL(36),CORR(6,14),NAMFL(3)                          COR10040
C----                                                                  COR10060
C---- NIO PROGRAM 136 CORR1                                            COR10070
C----
C---- THIS PROGRAM ADDS INTERPOLATED RESULTS FOR 'FAULTY','MISSING', AND
C---- INCORRECT RECORDS IN SBWRO OUTPUT. IF PARA = 1, GAPS OF 4 OR LESS
C---- RESULTS ARE LINEARLY INTERPOLATED, STORED ON DISK AND THEN LISTED
C---- USING PROGRAM LISTO. IF PARA = 2, THE SMALL GAPS ARE INTERPOLATED
C---- AND STORED AS BEFORE , THEN PROGRAM CORR2 IS EXECUTED.
C----                                                                  COR10080
C---- LNO= NUMBER OF MISSING RECORDS AT END OF YEAR
C---- JNO= NUMBER OF MISSING RECORDS AT START OF YEAR
C---- KNO= IF SET  4 GAP AT START OF YEAR IS IGNORED
C---- INO= IF SET =1 ANY GAP DURING THE YEAR IS  4 RECORDS
C----      AND IS IGNORED
C---- J  = COUNTER FOR NUMBER OF RECORDS READ IN A MONTH
C----
      CALL TSTOP
      INO=0                                                            COR10090
      LNO=0                                                            COR10100
      JNO=0                                                            COR11010
      KNO=0                                                            COR10120
      JSPAC=16448                                                      COR10130
      JCALM=-15552
      INT=-14016
      CINT=-10944
      J=0                                                              COR10150
      NREC=1                                                           COR10160
      NO=0                                                             COR10170
      READ (2,1) PARA,NAMFL,P,MAX                                      COR10180
1     FORMAT (I2,2X,3A2,2(2X,I5))                                      COR10190
      CALL DFT(1,NAMFL,IERR)
      IF (IERR) 2,3,2                                                  COR10210
2     WRITE (3,4) IERR                                                 COR10220
4     FORMAT(' IERR =',I2,' IN CORR2')
      CALL EXIT                                                        COR10240
3     READ (2,5) ITITL                                                 COR10250
5     FORMAT (36A2)                                                    COR10260
      WRITE (3,6) ITITL                                                COR10270
6     FORMAT (1H1,24(/),44X,36A2)                                      COR10280
13    READ (1'NREC) MONTH,YEAR                                         COR10290
C---
C---- CALCULATE NUMBER OF RECORDS IN EACH MONTH
C---
```

```
      GO TO (7,8,7,9,7,9,7,7,9,7,9,7),MONTH                          COR10300
7     NI=248                                                         COR10310
      GO TO 21                                                       COR10320
8     IF (YEAR-4*(YEAR/4)) 11,12,11                                  COR10330
9     NI=240                                                         COR10340
      GO TO 21                                                       COR10350
11    NI=224                                                         COR10360
      GO TO 21                                                       COR10370
12    NI=232                                                         COR10380
21    READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA                COR10390
      CALL TSTRT
      J=J+1                                                          COR10400
      CALL TSTOP
      IF (JA-1) 100,101,100                                          COR10410
C----
C---- TEST FOR MISSING RECORDS AT START OF YEAR . SET KNO = NUMBER
C---- OF MISSING RECORDS.
C----
101   IF (TEST-JCALM) 102,15,102                                     COR10420
102   IF (TEST-JSPAC) 109,15,109                                     COR10430
109   CALL INCR(J,N1,JA,P,NO)
      KNO=KNO+1
199   READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
      J=J+1
      IF (TEST-JCALM) 104,15,104                                     COR10450
104   IF (TEST-JSPAC) 106,15,106                                     COR10460
106   CALL INCR(J,NI,JA,P,NO)                                        COR10470
      KNO=KNO+1                                                      COR10480
      GO TO 199
100   IF (TEST-JCALM) 14,15,14                                       COR10500
14    IF (TEST-JSPAC) 16,15,16                                       COR10510
16    IF (INO-1) 160,19,160
160   NO=NO+1                                                        COR10520
      IF (NO-1) 17,18,17                                             COR10530
17    IF (NO-5) 19,20,20                                             COR10540
C----
C---- IF GAP IN MIDDLE OF YEAR IS LONGER THAN 4 RECORDS RESET 'NO'
C---- AND SET INO = 1
C----
20    NO=0
      INO=1                                                          COR10560
19    CALL INCR(J,NI,JA,P,NO)                                        COR10570
C----
C---- TEST FOR END OF MONTH OR YEAR
C----
      IF (P-JA) 25,25,26
26    IF (J) 21,13,21                                                COR10590
C----
C---- STORE POSITION OF LAST CORRECT DISK RECORD, AND STORE VALUES
C---- IN FIRST RECORD OF CORR ARRAY. IF THE RECORD IS CALM, STORE
C---- ZERO IN CORR ARRAY.
C----
18    LAST=NREC-2
      READ (1'LAST) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
      IF (TEST+15552) 22,23,22                                       COR10610
22    CORR(1,1)=I                                                    COR10620
```

```
      CORR(1,2)=A                                                    COR10640
      CORR(1,3)=B                                                    COR
      CORR(1,4)=C                                                    COR10650
      CORR(1,5)=D                                                    COR10660
      CORR(1,6)=E                                                    COR10670
      CORR(1,7)=F
      CORR(1,8)=G                                                    COR10690
      CORR(1,9)=H                                                    COR10700
      CORR(1,10)=W                                                   COR10710
      CORR(1,11)=X                                                   COR10720
      CORR(1,12)=Y                                                   COR10730
      CORR(1,13)=Z                                                   COR10740
      CORR(1,14)=JA                                                  COR10750
      NREC=NREC+1
      CALL INCR(J,NI,JA,P,NO)                                        COR10760
      IF(P-JA) 25,25,24
24    IF (J) 21,13,21                                                COR10780
23    CORR(1,1)=I                                                    COR10790
      CORR(1,2)=A                                                    COR10800
      DO 65 IX=3,13                                                  COR10810
65    CORR(1,IX)=0.                                                  COR10820
      CORR(1,14)=JA                                                  COR10830
      NREC=NREC+1
      CALL INCR(J,NI,JA,P,NO)                                        COR10840
      IF (P-JA) 25,25,27
27    IF (J) 21,13,21                                                COR10860
C----
C---- IF RECORD IS CORRECT TEST 'NO' TO SEE WHETHER IT IS PRECEDED BY
C---- A GAP OR NOT. IF NOT, OR IF GAP IS LARGER THAN 4 RECORDS, TEST
C---- FOR END OF MONTH OR YEAR. IF THERE IS A GAP. STORE THE LAST
C---- CORRECT RECORD IN RECORD (NO+2) OF CORR ARRAY.
C----
15    IF (NO) 28,29,28                                               COR10870
29    IMNTH=MONTH                                                    COR10880
      INO=0
      CALL INCR(J,NI,JA,P,NO)                                        COR10890
      IF (P-JA) 25,25,30
30    IF (J) 21,13,21                                                COR10910
28    IF (INO-1) 105,107,105                                         COR10920
107   NO=0                                                           COR10930
      INO=0                                                          COR10940
      GO TO 108                                                      COR10950
105   IFST=NREC-1
      IF (TEST+15552) 31,32,31                                       COR10970
31    CORR(NO+2,1)=I                                                 COR10980
      CORR(NO+2,2)=A                                                 COR10990
      CORR(NO+2,3)=B                                                 COR11000
      CORR(NO+2,4)=C                                                 COR11010
      CORR(NO+2,5)=D                                                 COR11020
      CORR(NO+2,6)=E                                                 COR11030
      CORR(NO+2,7)=F                                                 COR11040
      CORR(NO+2,8)=G                                                 COR11050
      CORR(NO+2,9)=H                                                 COR11060
      CORR(NO+2,10)=W                                                COR11070
      CORR(NO+2,11)=X
      CORR(NO+2,12)=Y                                                COR11090
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      CORR(NO+2,13)=Z                                                   COR11100
      CORR(NO+2,14)=JA                                                  COR11110
108   CALL INCR (J,NI,JA,P,NO)                                          COR11120
      GO TO 33
32    CORR(NO+2,1)=I                                                    COR11150
      CORR(NO+2,2)=A                                                    COR11160
      DO 66 IX=3,13                                                     COR11170
66    CORR(NO+2,IX)=0.                                                  COR11180
      CORR(NO+2,14)=JA
      CALL INCR (J,NI,JA,P,NO)                                          COR11200
C----
C---- CONVERT DATE TO DAY NUMBER. STORE DATE AND TIME IN EACH CORR
C---- RECORD, USING JULAN TO CHANGE DATE IF NECESSARY. LINEARLY
C---- INTERPOLATE ALL OTHER ELEMENTS OF THE RECORDS. STORE NEW LINE
C---- NUMBERS.
C----
33    YEAR=MOD(YEAR,1900)
      I=CORR(1,1)
      JJNO=NO+1
      DO 35 IK=2,JJNO
      IF (CORR(IK-1,2)-21) 36,37,37
36    CORR(IK,1)=I                                                      COR11400
      CORR(IK,2)=CORR(IK-1,2)+3
      GO TO 35                                                          COR11420
37    IDAY=0
      CALL JULAN(YEAR,IDAY,IMNTH,I)
      IDAY=IDAY+1                                                       COR11430
      I=0                                                               COR11440
      IMNTH=0                                                           COR11450
      CALL JULAN(YEAR,IDAY,IMNTH,I)                                     COR11460
      CORR(IK,1)=I
      CORR(IK,2)=0                                                      COR11480
35    CONTINUE                                                          COR11490
      DO 38 IK=3,12                                                     COR11500
      IF(CORR(1,IK)-CORR(NO+2,IK)) 39,40,41                             COR11510
39    AINC=(CORR(NO+2,IK)-CORR(1,IK))/(NO+1)                            COR11520
      DO 42 JA=2,JJNO
42    CORR(JA,IK)=CORR(JA-1,IK)+AINC                                    COR11540
      GO TO 38                                                          COR11210
40    DO 43 JA=2,JJNO
43    CORR(JA,IK)=CORR(JA-1,IK)                                         COR11230
      GO TO 38                                                          COR11240
41    AINC=(CORR(1,IK)-CORR(NO+2,IK))/(NO+1)                            COR11250
      DO 44 JA=2,JJNO
44    CORR(JA,IK)=CORR(JA-1,IK)-AINC                                    COR11270
38    CONTINUE                                                          COR11280
      DO 45 JA=2,JJNO
      CORR(JA,13)=JSPAC                                                 COR11300
      IF (CORR(JA,2)-1) 47,47,46
46    CORR(JA,14)=CORR(JA-1,14)+1                                       COR11320
      GO TO 45                                                          COR11330
47    CORR(JA,14)=CORR(JA-1,14)+2                                       COR11340
45    CONTINUE                                                          COR11350
      NREC=LAST+1                                                       COR11550
      DO 48 JA=2,JJNO
      IF (CORR(JA,1)-1) 49,50,49                                        COR11570
```

```
 50     IF (CORR(JA,2)-1) 49,51,49
 51     NREC=NREC+1                                                    COR11590
 49     ICOR=CORR(JA,3)                                                COR11600
        IF (ICOR) 200,201,200                                          COR11610
 201    TEST=CINT                                                      COR11620
        GO TO 202                                                      COR11630
 200    TEST=INT                                                       COR11640
 202    I=CORR(JA,1)                                                   COR
        JB=CORR(JA,14)                                                 COR
        WRITE(1'NREC) TEST,I,(CORR(JA,JK),JK=2,13),JB                  COR
 48     CONTINUE                                                       COR11660
        NO=0                                                           COR11670
        NREC=IFST+1
        IF (P-JA) 25,25,125
 125    IF (J) 21,13,21                                                COR11690
C----
C---- TEST FOR GAP AT END OF YEAR THAT IS 4 OR LESS RECORDS LONG.
C----
 25     IF (KNO-5) 54,52,52                                            COR11710
 54     IF (INO-1) 55,52,52                                            COR11720
 55     IF (KNO+NO-5) 56,52,52                                         COR11730
 56     NREC=MAX                                                       COR1
C----
C---- READ BACKWARDS FROM END OF YEAR UNTIL CORRECT RECORD IS FOUND.
C---- STORE IT IN RECORD 1 OF CORR ARRAY AND STORE NUMBER OF MISSING
C---- RECORDS IN LNO
C----
 59     READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA                COR11780
        IF (TEST-JCALM) 60,61,60                                       COR11790
 60     IF (TEST-JSPAC) 62,63,62                                       COR11800
 62     LNO=LNO+1                                                      COR11810
        NREC=NREC-2                                                    COR11820
        GO TO 59                                                       COR11830
 61     CORR(1,1)=I                                                    COR11840
        CORR(1,2)=A                                                    COR11850
        DO 64 IX=3,13                                                  COR11860
 64     CORR(1,IX)=0.                                                  COR11870
        CORR(1,14)=JA                                                  COR11880
        GO TO 67                                                       COR11890
 63     CORR(1,1)=I                                                    COR11900
        CORR(1,2)=A                                                    COR11910
        CORR(1,3)=B                                                    COR11920
        CORR(1,4)=C                                                    COR11930
        CORR(1,5)=D                                                    COR11940
        CORR(1,6)=E                                                    COR11950
        CORR(1,7)=F                                                    COR11960
        CORR(1,8)=G                                                    COR11970
        CORR(1,9)=H                                                    COR11980
        CORR(1,10)=W                                                   COR11990
        CORR(1,11)=X                                                   COR12000
        CORR(1,12)=Y                                                   COR12010
        CORR(1,13)=Z                                                   COR12020
        CORR(1,14)=JA                                                  COR12030
C----
C---- READ START OF YEAR UNTIL CORRECT RECORD IS FOUND AND STORE IT.
C---- STORE NUMBER OF MISSING RECORDS IN JNO
```

```
C----
67    NREC=2                                                          COR12040
72    READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA                 COR12050
      IF (TEST-JCALM) 68,69,68                                        COR12060
68    IF (TEST-JSPAC) 70,71,70                                        COR12070
70    JNO=JNO+1                                                       COR12080
      GO TO 72                                                        COR12090
69    KA=LNO+JNO+2                                                    COR12100
      CORR(KA,1)=I                                                    COR12110
      CORR(KA,2)=A                                                    COR12120
      DO 73 IX=3,13                                                   COR12130
73    CORR(KA,IX)=0.                                                  COR12140
      CORR(KA,14)=JA                                                  COR12150
      GO TO 74                                                        COR12160
71    KA=LNO+JNO+2                                                    COR12170
      CORR(KA,1)=I                                                    COR12180
      CORR(KA,2)=A                                                    COR12190
      CORR(KA,3)=B                                                    COR12200
      CORR(KA,4)=C                                                    COR12210
      CORR(KA,5)=D                                                    COR12220
      CORR(KA,6)=E                                                    COR12230
      CORR(KA,7)=F                                                    COR12240
      CORR(KA,8)=G                                                    COR12250
      CORR(KA,9)=H                                                    COR12260
      CORR(KA,10)=W                                                   COR12270
      CORR(KA,11)=X                                                   COR12280
      CORR(KA,12)=Y                                                   COR12290
      CORR(KA,13)=Z                                                   COR12300
      CORR(KA,14)=JA                                                  COR12310
C----
C---- INTERPOLATE THE MISSING RECORDS
C----
74    DO 75 IK=3,12                                                   COR12320
      IF (CORR(1,IK)-CORR(KA,IK)) 76,77,78                            COR12330
76    AINC=(CORR(KA,IK)-CORR(1,IK))/(KA-1)                            COR12340
      KKA=KA-1
      DO 79 JA=2,KKA
79    CORR(JA,IK)=CORR(JA-1,IK)+AINC                                  COR12360
      GO TO 75                                                        COR12370
77    KKA=KA-1
      DO 80 JA=2,KKA
80    CORR(JA,IK)=CORR(JA-1,IK)                                       COR12390
      GO TO 75                                                        COR1
78    AINC=(CORR(1,IK)-CORR(KA,IK))/(KA-1)                            COR1
      KKA=KA-1
      DO 81 JA=2,KKA
81    CORR(JA,IK)=CORR(JA-1,IK)-AINC                                  COR1
75    CONTINUE                                                        COR1
      KKA=KA-1
      DO 82 JA=2,KKA
      CORR(JA,13)=JSPAC                                               COR1
C----
C---- STORE CORRECT TIMES,DAY NUMBER AND LINE COUNT.
C----
      IF (CORR(JA-1,2)-21) 83,84,84
83    CORR(JA,2)=CORR(JA-1,2)+3
```

```
      CORR(JA,1)=CORR(JA-1,1)                                          COR1
      IF (CORR(JA-1,14)-P)800,801,801
801   CORR(JA,14)=1
      GO TO 82
800   CORR(JA,14)=CORR(JA-1,14)+1
      GO TO 82                                                         COR1
84    CORR(JA,2)=0                                                     COR1
      CORR(JA,1)=1                                                     COR1
      IF(CORR(JA-1,14)-P)803,802,802
802   CORR(JA,14)=1
      GO TO 82
803   CORR(JA,14)=CORR(JA-1,14)+2
82    CONTINUE                                                         COR1
      IF (LNO) 89,89,90                                                COR1
89    IXL=2                                                            COR1
      GO TO 93                                                         COR1
90    NREC=MAX-LNO+1                                                   COR12400
      DO 88 IX=1,LNO
      ICOR=CORR(IX+1,3)                                                COR12440
      IF (ICOR) 203,204,203                                            COR12450
204   TEST=CINT                                                        COR12460
      GO TO 205                                                        COR12470
203   TEST=INT                                                         COR12480
205   I=CORR(IX+1,1)
      JB=CORR(IX+1,14)
      WRITE (1'NREC) TEST,I,(CORR(IX+1,JK),JK=2,13),JB
      IXL=IX+2                                                         COR12500
88    CONTINUE                                                         COR12510
93    IF (JNO) 91,91,92                                                COR12520
92    NREC=2                                                           COR12530
91    DO 930 IX=IXL,5
      ICOR=CORR(IX,3)                                                  COR12550
      IF (ICOR) 206,207,206                                            COR12560
207   TEST=CINT                                                        COR12570
      GO TO 208                                                        COR12580
206   TEST=INT                                                         COR12590
208   I=CORR(IX,1)
      JB=CORR(IX,14)
      WRITE (1'NREC) TEST,I,(CORR(IX,JK),JK=2,13),JB
930   CONTINUE                                                         COR12610
C----
C---- IF PARA = 1 EXECUTE LISTING PROGRAM, IF NOT CARRY ON TO
C---- SECOND CORRECTION PROGRAM
C----
52    WRITE (3,300)
300   FORMAT (1H ,' CORR2 EXECUTED')
      IF (PARA-1) 94,94,95
94    CALL LINK(LISTO)                                                 COR12630
95    CALL LINK(CORR3)
96    END                                                              COR12660
// DUP
*DELET              CORR2
*STORECIL          1 CORR2 CORR2
*FILES(1,TONG,1)
*CCEND
```

```
// JOB            X
// FOR
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*NON PROCESS PROGRAM
      SUBROUTINE INCR (J,NI,JA,P,NO)                                    INCR0010
      IF (P-JA) 1,2,1                                                   INCR0020
1     IF (J-NI) 3,4,3                                                   INCR0030
4     J=0                                                               INCR0040
      GO TO 3                                                           INCR0050
2     WRITE (3,7) NO                                                    INCR0060
7     FORMAT (1H ,' END OF YEAR REACHED WITH NO= ',I3)                  INCR0070
3     RETURN                                                            INCR0080
      END                                                               INCR0090
// DUP
*DELETE              INCR
*STORE            1 INCR
```

```
// JOB              X
// *A4-4/PAGE/TEST CORR2 VERSION 1
// FOR CORR3              VERSION 1 MODIFICATION 0 21.9.1970
*IOCS(DISK,1443 PRINTER,MAGNETIC TAPE,CARD)
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*NONPROCESS PROGRAM
      DEFINE FILE 1(3000,40,U,NREC)
      DEFINE FILE 201(301,5,U,JREC)
      INTEGER TEST,YEAR,P,SUB,SUBC,TTEST
      DIMENSION NAMFL(6),ITITL(36)
      DIMENSION NMAG(3)
      DATA NMAG(1)/'M9'/,NMAG(2)/'  '/,NMAG(3)/'  '/
      CALL NEXTM(5,NMAG,N,M)
C----
C---- THIS PROGRAM CORRECTS GAPS OF MORE THAN FOUR RECORDS IN SAWRO
C---- OUTPUT AND STORES THE CORRECTED OUTPUT ON MAGNETIC TAPE.
C----
C---- NO = CHECKS WHETHER A GAP HAS BEEN FOUND OR NOT
C---- J = COUNT FOR NUMBER OF DISK RECORDS READ
C---- M = COUNT OF NUMBER OF RECORDS WRITTEN TO TAPE
C----
      CALL TSTOP
      NO=0
      CINT=-10944
      JSPAC=16448
      JCALM=-15552
      SUB=-7616
      SUBC=-6080
      INT=-14016
      J=0
      M=0
      NREC=1
      READ(2,1) NAMFL,P,MAX
1     FORMAT (6A2,2X,2(I5))
      CALL DFT(2,NAMFL,IERR)
      IF(IERR) 2,3,2
2     WRITE(3,4) IERR
4     FORMAT (' IERR=',I2,' IN CORR3')
      CALL EXIT
3     READ (2,5) ITITL
5     FORMAT (36A2)
      WRITE (3,6) ITITL
      WRITE (5,6) ITITL
6     FORMAT (1H1,24(/),44X,36A2)
      M=M+25
C----
C---- SET COUNTS FOR MONTH
C----
130   READ (1'NREC) MONTH,YEAR
      GO TO (7,8,7,9,7,9,7,7,9,7,9,7),MONTH
7     NI=248
      GO TO 100
8     IF (YEAR-4*(YEAR/4)) 11,12,11
9     NI=240
```

```
      GO TO 100
11    NI=224
      GO TO 100
12    NI=232
C----
C---- READ DISK UNTIL A GAP IS FOUND. STORE LIMITS OF GAP IN
C---- ILST AND IEST
C----
100   READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
      J=J+1
      IF (TEST-JSPAC) 13,14,13
13    IF (TEST-JCALM) 15,14,15
15    IF (TEST-INT) 17,14,17
14    IF (NO) 999,16,999
16    IF (P-JA) 160,70,160
160   IF (J-NI) 100,29,100
29    J=0
      GO TO 130
17    NO=NO+1
      IF (JA-1) 31,100,31
31    IF (NO-1) 33,35,33
35    ILST=NREC-2
33    IF (P-JA) 34,36,34
36    NREC=2
      GO TO 100
34    IF (J-NI) 100,38,100
38    J=0
      GO TO 130
999   NEXT=NREC
      IEST=NREC-1
C----
C---- CALCULATE NUMBER OF RECORDS TO BE FOLDED IN
C----
      NOREC=IEST-ILST-1
      IF (NOREC-2*(NOREC/2)) 40,41,40
40    IN=(NOREC+1)/2
      GO TO 42
41    IN=NOREC/2
C----
C---- FOLD IN FIRST HALF OF DATA, KEEPING CORRECT DATE, TIME AND LINE
C---- NUMBER. IF THE END OF YEAR IS REACHED, ALTER
C---- NREC ACCORDINGLY
C----
42    DO 43 JK=1,IN
      JY=JK-1
      NREC=ILST-JY
      IF (NREC) 420,420,430
420   NREC=MAX+NREC
      GO TO 44
430   IF (NREC-MAX) 44,44,45
45    NREC=NREC-MAX
44    READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
      IF (I-31) 46,46,43
46    NREC=ILST+JK
      IF (NREC) 47,47,48
47    NREC=MAX+NREC
```

```
      GO TO 49
48    IF (NREC-MAX) 49,49,51
51    NREC=NREC-MAX
49    READ (1'NREC) TTEST,II,AA,BB,CC,DD,EE,FF,GG,HH,WW,XX,YY,ZZ,JJA
      IF (II-31) 149,149,49
149   NREC=NREC-1
      Z=JSPAC
      IF (TEST-JCALM) 50,52,50
52    TEST=SUBC
      WRITE (1'NREC) TEST,II,AA,B,C,D,E,F,G,H,W,X,Y,Z,JJA
      GO TO 43
50    TEST=SUB
      WRITE (1'NREC) TEST,II,AA,B,C,D,E,F,G,H,W,X,Y,Z,JJA
43    CONTINUE
      IF (NOREC-2*(NOREC/2)) 55,56,55
55    IN=(NOREC-1)/2
      GO TO 57
56    IN=NOREC/2
C----
C---- FOLD IN SECOND HALF OF DATA SIMILARLY
C----
57    DO 580 JK=1,IN
      JY=JK-1
      NREC=IFST+JY
      IF (NREC) 58,58,59
58    NREC=MAX+NREC
      GO TO 61
59    IF (NREC-MAX) 61,61,62
62    NREC=NREC-MAX
61    READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
      IF (I-31) 63,63,61
63    NREC=IFST-JK
      IF (NREC) 64,64,65
64    NREC=MAX+NREC
      GO TO 66
65    IF (NREC-MAX) 65,66,67
67    NREC=NREC-MAX
66    READ (1'NREC) TTEST,II,AA,BB,CC,DD,EE,FF,GG,HH,WW,XX,YY,ZZ,JJA
      IF (II-31) 166,166,66
166   NREC=NREC-1
      Z=JSPAC
      IF (TEST-JCALM) 68,69,68
69    TEST=SUBC
      WRITE (1'NREC) TEST,II,AA,B,C,D,E,F,G,H,W,X,Y,Z,JJA
      GO TO 580
68    TEST=SUB
      WRITE (1'NREC) TEST,II,AA,B,C,D,E,F,G,H,W,X,Y,Z,JJA
580   CONTINUE
C----
C---- TEST FOR END OF YEAR. IF NOT, READ NEXT RECORD, OTHERWISE WRITE
C---- CORRECTED DISK FILE TO MAG TAPE
C----
      NREC=NEXT
      NO=0
      IF (NREC-MAX) 16,70,70
70    NREC=1
```

```
      J=0
71    READ (1'NREC) MONTH,YEAR
      GO TO (72,73,72,74,72,74,72,72,74,72,74,72),MONTH
72    NI=248
      GO TO 75
73    IF (YEAR-4*(YEAR/4)) 76,77,76
74    NI=240
      GO TO 75
76    NI=224
      GO TO 75
77    NI=232
75    CALL TITLE (MONTH,YEAR,M)
      L=0
      K=11
78    READ (1'NREC) TEST,I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
      J=J+1
      IF (TEST-JSPAC) 79,80,79
79    IF (TEST-JCALM) 81,82,81
81    IF (TEST-INT) 83,84,83
83    IF (TEST-CINT) 85,86,85
85    IF (TEST-SUB) 87,88,87
80    WRITE (5,89) I,A,B,C,D,E,F,G,H,W,X,Y,Z,JA
89    FORMAT (1H ,1X,I2,F7.2,F8.2,F6.1,F7.1,F9.3,4F7.1,F6.1,F9.1,F10.2,2
     12X,I4)
      GOTO 200
82    WRITE (5,90) I,A,JA
90    FORMAT (1H ,1X,I2,F7.2,'     CALM',97X,I4)
      GO TO 200
84    WRITE (5,91) I,A,B,C,D,E,F,G,H,W,X,Y,JA
91    FORMAT (1H ,1X,I2,F7.2,F8.2,F6.1,F7.1,F9.3,4F7.1,F6.1,F9.1,      14
     1X,'INTERPOLATED',6X,I4)
      GO TO 200
86    WRITE (5,92) I,A,JA
92    FORMAT (1H ,1X,I2,F7.2,'     CALM',77X,'INTERPOLATED',8X,I4)
      GO TO 200
88    WRITE (5,93) I,A,B,C,D,E,F,G,H,W,X,Y,JA
93    FORMAT (1H ,1X,I2,F7.2,F8.2,F6.1,F7.1,F9.3,4F7.1,F6.1,F9.1,      14
     1X,'SUBSTITUTED '6X,I4)
      GOTO 200
87    WRITE (5,940) I,A,JA
940   FORMAT (1H ,1X,I2,F7.2,'     CALM',79X,'SUBSTITUTED',7X,I4)
200   M=M+1
      L=L+1
      K=K+1
      IF (L-8) 94,95,94
95    WRITE (5,25)
25    FORMAT (1H )
      M=M+1
      K=K+1
      L=0
94    IF (P-JA) 26,27,26
26    IF (J-NI) 28,290,28
28    IF (56-K) 75,75,78
290   J=0
      GO TO 71
27    WRITE (3,30) M
```

```
30    FORMAT (1H ,4(/),' END OF YEAR',I4,' RECORDS HAVE BEEN TRANSFERRED
     1 TO MAGNETIC TAPE ')
C----
C---- END TAPE FILE AND STORE FILE NUMBER ON DISK. EXECUTE MALIS
C---- TO LIST TAPE
C----
      ENDFILE 5
      M=1
      CALL STORM (NMAG,N,M)
      REWIND 5
      CALL LINK(MALIS)
      END
// DUP
*DELET              CORR3
*STORECIL         1 CORR3 CORR3
*FILES(201,MFILE,0)
*FILES(1,TEST,1)
*CCEND
```

```
// JOB            X                                                    MALS0000
// FOR MALIS             VERSION 1 MODIFICATION 1 137                  MALS0010
*LIST ALL                                                             MALS0020
*IOCS (CARD,1443 PRINTER,MAGNETIC TAPE)                               MALS0030
*EXTENDED PRECISION                                                   MALS0040
*ONE WORD INTEGERS                                                    MALS0050
*NONPROCESS PROGRAM                                                   MALS0060
C      N.I.O PROGRAM 137-MALIS                                        MALS0070
       DIMENSION LIST (72)                                            MALS0080
       READ (2,100) N                                                 MALS0090
100    FORMAT (I4)                                                    MALS0100
       CALL FINDM(5,N,1)                                              MALS0110
C      INPUT FILE NUMBER AND POSITION MAGNETIC TAPE                   MALS0120
       READ (2,100) M                                                 MALS0130
       DO 1 J=1,M                                                     MALS0140
       READ (5,101) LIST                                              MALS0150
       WRITE (3,101) LIST                                             MALS0160
101    FORMAT (72A2)                                                  MALS0170
1      CONTINUE                                                       MALS0180
       CALL EXIT                                                      MALS0190
       END                                                            MALS0200
*DELET             1 MALIS                                           MALS0210
*STORECIL          1 MALIS MALIS                                     MALS0220
*CCEND                                                               MALS0230
```

```
// JOB            X
// *JOB SERIAL NUMBER 18993
// *DATE  4.1.1971
// FOR SETLA             VERSION 2 MODIFICATION 0 1.12.70
*LIST ALL
*EXTENDED PRECISION
*ONE WORD INTEGERS
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                    SETL0004
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36) SETL0005
      INTEGER S,YEAR,DATES(30),P,PI,R                                       SETL0006
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMSETL0007
     &T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       SETL0008
C----                                                                   SETL0009
C---- THIS LINK SETS LAB=1 THEN CALLS WAST                              SETL0010
C----                                                                   SETL0011
      LAB=1                                                             SETL0012
      IREC = 1                                                          SETL0013
      JREC = 1                                                          SETL0014
      KREC = 1                                                          SETL0015
      LREC = 1                                                          SETL0016
      MREC = 1                                                          SETL0017
      NREC = 1                                                          SETL0018
      II = 0                                                            SETL0019
      DO 1 J=1,42                                                       SETL0020
1     SWPA(J)=0                                                         SETL0021
      DO 2 J=1,40                                                       SETL0022
      DO 2 IK=1,37                                                      SETL0023
2     SCAT (J,IK)=0                                                     SETL0024
      DO 3 J=1,120                                                      SETL0025
      HS(J)=0                                                           SETL0026
3     HMAX(J)=0                                                         SETL0027
      DO 4 J=1,2                                                        SETL0028
      DO 4 IK=1,22                                                      SETL0029
4     TZ(J,IK)=0                                                        SETL0030
      CALL LINK(WAST)                                                   SETL0031
      END                                                               SETL0032
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6   SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914         LAB(IC)=F913       MAXH(IC)=F912        N(IC)=F911         MM(IC)=F910         II(IC)=F90F
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA       NAMT(IC)=F8E9-F8E7    M(IC)=F8E6       YEAR(IC)=F8E5       DATES(IC)=F8E4-F8C7
     P(IC)=F8C6        KREC(IC)=F8C5       LREC(IC)=F8C4     MREC(IC)=F8C3       NREC(IC)=F8C2         R(IC)=F8C1
     K(IC)=F8C0           L(IC)=F8BF         PI(IC)=F8BE      KNT(IC)=F8BD      IHMAX(IC)=F8BC        RI(IC)=F8BB
     J(I )=0000         IK(I )=0001

STATEMENT ALLOCATIONS
 1    =0030  2    =004A  3    =0074  4    =008B

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION

CALLED SUBPROGRAMS
 ISTOX   SUBSC

INTEGER CONSTANTS
     1=0004      0=0005     42=0006     40=0007     37=0008    120=0009      2=000A     22=000B
```

```
CORE REQUIREMENTS FOR SETLA
 COMMON   1862  INSKEL COMMON      0  VARIABLES      4  PROGRAM    168

 END OF COMPILATION



SETLA
DUP FUNCTION COMPLETED
// DUP
*DELET                SETLA
DUP FUNCTION COMPLETED
*STORECIL          1 SETLA SETLA
*CCEND



 CLB, BUILD SETLA

 CORE LOAD  MAP
 TYPE NAME  ARG1  ARG2

 *CDW TABLE 2182  000C
 *IBT TABLE 218E  000E
 *FIO TABLE 219C  0010
 *ETV TABLE 21AC  0021
 *VTV TABLE 21CD  0009
 *PNT TABLE 21D6  0008
 MAIN SETLA 21EA
 PNT  SETLA 21D8
 LIBF SUBSC 228A  21CD
 LIBF ISTOX 2286  21D0
 PNT  WAST  21DC
 LIBF ADRCK 22D6  21D3
 CORE       233C  357E
 COMM       588A  0745

 CLB, SETLA LU X0

DUP FUNCTION COMPLETED
```

```
// JOB            X
// FOR WAST              VERSION 2 MODIFICATION 0 1.12.70
*LIST ALL
*EXTENDED PRECISION
*ONE WORD INTEGERS
*IOCS(DISK,MAGNETIC TAPE,1443 PRINTER)
*IOCS (CARD)
*NONPROCESS PROGRAM
      INTEGER RI                                                        WAST0004
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36) WAST0005
      INTEGER S,YEAR,DATES(30),P,PI,R                                   WAST0006
      DIMENSION MONTH(4),NAMT(3)                                        WAST0007
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMWAST0008
     ↳T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       WAST0009
      DEFINE FILE 201(301,5,U,ILREC)                                    WAST0010
C----                                                                   WAST0011
C---- THIS LINK TESTS FOR THE START OF A SEASON AT THE BEGINNING OF THE WAST0012
C---- MAG TAPE, AND SETS VARIOUS COUNTS BEFORE EXECUTING READW          WAST0013
C----                                                                   WAST0014
      GO TO (1,20,25),LAB                                               WAST0015
1     READ(2,103) NAMT                                                  WAST0016
103   FORMAT(3A2)                                                       WAST0017
      CALL NEXTM(5,NAMT,N,MM)                                           WAST0018
      READ (5,100) TITLE                                                WAST0019
100   FORMAT (1H1,24(/),44X,36A2)                                       WAST0020
      READ (5,102) MONTH                                                WAST0021
102   FORMAT (1H1,5(/),4A1,3(/))                                        WAST0022
      READ (2,101) DATES,YEAR,MAXH,IHMAX                                WAST0023
101   FORMAT (30A2,2X,I4,2X,I2,2X,I3)                                   WAST0024
      KNT=0                                                             WAST0025
C----                                                                   WAST0026
C---- TEST FIRST MONTHS DATA ON MAG TAPE. IF IT IS NOT THE BEGINNING OF WAST0027
C----A SEASON ABORT THE JOB, OTHERWISE SET COUNTS AS FOLLOWS -          WAST0028
C----      S= SEASON NUMBER (JAN - MARCH =1 ETC )                       WAST0029
C----      M= MONTH NUMBER                                              WAST0030
C----      P= NUMBER OF RECORDS IN SEASON                               WAST0031
C----      R= NUMBER OF RECORDS IN MONTH                                WAST0032
C----      K= NUMBER OF RECORDS ON PAGE                                 WAST0033
C----      L= NUMBER OF RECORDS IN DAY                                  WAST0034
C----      PI=COUNT OF RECORDS IN SEASON WHICH HAVE BEEN ANALYSED       WAST0035
C----                                                                   WAST0036
C----      KNT= COUNT OF NUMBER OF SEASONS ANALYSED                     WAST0037
C----                                                                   WAST0038
      IF (MONTH(2)+11968) 2,3,2                                         WAST0039
2     IF (MONTH(2)+10688) 4,5,4                                         WAST0040
4     IF (MONTH(2)+16064) 6,7,6                                         WAST0041
6     WRITE (3,8)N,MONTH                                                WAST0042
8     FORMAT (' DATA ON MAGNETIC TAPE FILE ',I3,' STARTS AT MONTH',4A1,'WAST0043
     1. THE JOB HAS BEEN ABORTED.')                                     WAST0044
      REWIND 5                                                          WAST0045
      MM=1                                                              WAST0046
      CALL STORM(NAMT,N,MM)                                             WAST0047
      CALL EXIT                                                         WAST0048
7     IF (MONTH(3)+10432) 6,9,6                                         WAST0049
5     IF (MONTH(3)+15552) 6,10,6                                        WAST0050
3     IF (MONTH(3)+16064) 11,12,11                                      WAST0051
11    IF (MONTH(3)+7104) 6,13,6                                         WAST0052
13    IF (MONTH(4)+11456) 6,14,6                                        WAST0053
```

```
12      S=1                                                              WAST0054
23      M=1                                                              WAST0055
        IF (YEAR-4*(YEAR/4)) 15,16,15                                    WAST0056
15      P=720                                                            WAST0057
        GO TO 17                                                         WAST0058
16      P=728                                                            WAST0059
17      R=248                                                            WAST0060
        RI=0                                                             WAST0061
        GO TO 18                                                         WAST0062
9       S=2                                                              WAST0063
26      M=4                                                              WAST0064
        P=728                                                            WAST0065
        R=240                                                            WAST0066
        RI=0                                                             WAST0067
        GO TO 18                                                         WAST0068
14      S=3                                                              WAST0069
28      M=7                                                              WAST0070
        P=736                                                            WAST0071
        GO TO 17                                                         WAST0072
10      S=4                                                              WAST0073
29      M=10                                                             WAST0074
        P=736                                                            WAST0075
        GO TO 17                                                         WAST0076
18      K=0                                                              WAST0077
        L=0                                                              WAST0078
        PI=0                                                             WAST0079
C----                                                                    WAST0080
C----CALL LINK TO READ ONE SEASONS DATA                                  WAST0081
C----                                                                    WAST0082
        CALL LINK(READW)                                                 WAST0083
C----                                                                    WAST0084
C----INCREASE COUNTS AT END OF A SEASON                                  WAST0085
C----                                                                    WAST0086
20      S=S+1                                                            WAST0087
        IF (S-4) 22,22,21                                                WAST0088
21      S=S-4                                                            WAST0089
22      IF (S-1) 23,23,24                                                WAST0090
24      IF (S-2) 26,26,27                                                WAST0091
27      IF (S-3) 28,28,29                                                WAST0092
C----                                                                    WAST0093
C---- STORE MAG TAPE STARTING POSITION FOR NEXT YEARS ANALYSIS           WAST0094
C----                                                                    WAST0095
25      REWIND 5                                                         WAST0096
        MM=1                                                             WAST0097
        N=N+1                                                            WAST0098
        CALL STORM(NAMT,N,MM)                                            WAST0099
        CALL EXIT                                                        WAST0100
        END                                                              WAST0101
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914         LAB(IC)=F913       MAXH(IC)=F912          N(IC)=F911          MM(IC)=F910          II(IC)=F90F
 TITLE(IC)=F90E-F8EB      S(IC)=F8EA       NAMT(IC)=F8E9-F8E7     M(IC)=F8E6        YEAR(IC)=F8E5       DATES(IC)=F8E4-F8C7
     P(IC)=F8C6        KREC(IC)=F8C5       LREC(IC)=F8C4       MREC(IC)=F8C3       NREC(IC)=F8C2          R(IC)=F8C1
     K(IC)=F8C0          L(IC)=F8BF         PI(IC)=F8BE         KNT(IC)=F8BD      IHMAX(IC)=F8BC          RI(IC)=F8BB
 MONTH(I )=0009-0006 ILREC(I )=000A

STATEMENT ALLOCATIONS
 103  =0020  100  =0023  102  =002C  101  =0037  8    =0040  1    =0072  2    =00A6  4    =00AF  6    =00B6  7    =00CC
```

```
 5    =00C6  3    =00E0  11   =00E8  13   =00F0  12   =00FA  23   =00FE  15   =0110  16   =0116  17   =011A  9    =012
 26   =0128  14   =013A  28   =013E  10   =0148  29   =014C  18   =0156  20   =0166  21   =0172  22   =0178  24   =017
 27   =0184  25   =018C

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 NEXTM    STORM    COMGO    STFAC    SBFAC    MRED     MWRT     MCOMP    MIOAI    MIOI     REWND    HOLEB    MAGT     PRNTN    EPPRT
 CARDN

INTEGER CONSTANTS
     2=000C       5=000D       0=000E   11968=000F   10688=0010   16064=0011       3=0012       1=0013   10432=0014   15552=0015
  7104=0016   11456=0017       4=0018     720=0019     728=001A     248=001B     240=001C       7=001D     736=001E      10=001F

CORE REQUIREMENTS FOR WAST
 COMMON    1862  INSKEL COMMON       0  VARIABLES      12  PROGRAM     404


 END OF COMPILATION



WAST
DUP FUNCTION COMPLETED
// DUP
*DELET                WAST
DUP FUNCTION COMPLETED
*STORECIL          1 WAST  WAST
*FILES(201,MFILE,0)
*CCEND
```

```
CLB, BUILD WAST

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*CLW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CL  0048
*PNT TABLE 2215  0008
*LFT TABLE 221E  0006
MAIN WAST  2289
PNT  WAST  2218
LIBF HOLEB 238F  21CD
LIBF EBPRT 24F3  21D0
LIBF COMGO 259E  21D3
LIBF MREL  277C  21D6
LIBF MIOAI 2876  21D9
LIBF MCOMP 282A  21DC
CALL NEXTM 2CEE
LIBF MIOI  2855  21DF
LIBF MWRT  278F  21E2
LIBF REWNL 2L80  21E5
CALL STORM 2E8E
LIBF STFAC 2F18  21E8
LIBF SBFAC 2F1C  21EB
PNT  REALW 221C
CALL PRT   2F30
LIBF IOU   2F7A  21EE
CALL IOFIX 3016
CALL BT1BT 3046
CALL SAVE  2FB2
LIBF ALRCK 30AA  21F1
LIBF FLOAT 310F  21F4
LIBF IFIX  3125  21F7
LIBF SUBIN 3158  21FA
LIBF MLREL 31F9  21FD
LIBF MLI   319E  2200
LIBF MLCOM 325B  2203
CALL UNPAC 3506
LIBF MLAI  31A6  2206
CALL NCOMP 3546
CALL FINLM 3579
LIBF MLWRT 32E6  2209
LIBF NORM  35C1  220C
CALL BT2BT 35F8
CALL FILE2 3667
LIBF SUBSC 36EE  220F
LIBF ISTOX 371A  2212
CALL MAGOP 373A
CORE       3770  214A
COMM       58BA  0745

CLB, WAST  LL XQ



DUP FUNCTION COMPLETED
```

```
// JOB
// *JOB SERIAL NUMBER 20420
// *DATE 23.2.1971
// FOR READW              VERSION 2 MODIFICATION 0 1.12.70
*EXTENDED PRECISION
*ONE WORD INTEGERS
*IOCS(MAGNETIC TAPE,DISK)
*LIST ALL
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                    READ0004
      INTEGER EPSI                                                          READ0005
      INTEGER TZV(4),TZAC                                                   READ0006
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36)     READ0007
      INTEGER S,YEAR,DATES(30),P,PI,R                                       READ0008
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMREAD0009
     UT, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI           READ0010
      DEFINE FILE 6(3000,1,U,NREC)                                          READ0011
C----                                                                       READ0012
C---- THIS LINK READS ONE SEASONS DATA AND SORTS IT INTO ARRAYS             READ0013
C----                                                                       READ0014
27    READ (5,1) TZV(1),TZV(2),TZV(3),TZV(4),EPSI,BHS,JHMAX                 READ0015
1     FORMAT (14X,2A1,1X,2A1,19X,I3,30X,F4.1,4X,I3)                         READ0016
C----                                                                       READ0017
C---- TEST FOR CALM RECORD                                                  READ0018
C----                                                                       READ0019
      IF (TZV(4)+11200) 2,3,2                                               READ0020
3     SWPA(1)=SWPA(1)+1                                                     READ0021
      SCAT(1,1)=SCAT(1,1)+1                                                 READ0022
      TZ(1,1)=TZ(1,1)+1                                                     READ0023
      HS(1)=HS(1)+1                                                         READ0024
      HMAX(1)=HMAX(1)+1                                                     READ0025
      IHS=0                                                                 READ0026
      WRITE (6'NREC) IHS                                                    READ0027
      GO TO 20                                                              READ0028
C----                                                                       READ0029
C---- STORE DATA IN CORRECT ELEMENTS OF EACH ARRAY                          READ0030
C----                                                                       READ0031
2     A=GET (TZV,1,4,0.01)+0.0000000005                                     READ0032
      IHS=BHS                                                               READ0033
      HS(IHS+2)=HS(IHS+2)+1                                                 READ0034
      HMAX(JHMAX+2)=HMAX(JHMAX+2)+1                                         READ0035
      WRITE (6'NREC) IHS                                                    READ0036
      TZAC=A                                                                READ0037
      TZAB=A-TZAC                                                           READ0038
      IF(TZAB-0.5) 4,5,5                                                    READ0039
4     TZ(1,TZAC+2)=TZ(1,TZAC+2)+1                                           READ0040
      GO TO 6                                                               READ0041
5     TZ(2,TZAC+2)=TZ(2,TZAC+2)+1                                           READ0042
6     IM=2                                                                  READ0043
      DO 8 IL=25,1000,25                                                    READ0044
      IF (IL-1-EPSI) 7,9,9                                                  READ0045
7     IM=IM+1                                                               READ0046
8     CONTINUE                                                              READ0047
9     SWPA(IM)=SWPA(IM)+1                                                   READ0048
      IL=1                                                                  READ0049
      IK=1                                                                  READ0050
      DO 11 I=50,2000,50                                                    READ0051
      ZI=(I-1)/100.                                                         READ0052
```

```
      IF (ZI-A) 10,12,12                                              READ0053
10    IK=IK+1                                                         READ0054
11    CONTINUE                                                        READ0055
12    IF (MAXH-20) 121,120,121                                        READ0056
120   DO 150 IM=50,2000,50                                            READ0057
      ZN=(IM-1.)/100.                                                 READ0058
      IF (ZN-BHS) 170,16,16                                           READ0059
170   IL=IL+1                                                         READ0060
150   CONTINUE                                                        READ0061
121   IF (MAXH-40) 13,14,13                                           READ0062
14    DO 15 IM= 10,400,10                                             READ0063
      ZN=(IM-1.)/10.                                                  READ0064
      IF (ZN-IHS) 17,16,16                                            READ0065
17    IL=IL+1                                                         READ0066
15    CONTINUE                                                        READ0067
13    DO 18 IM=20,800,20                                              READ0068
      ZN=(IM-1.)/10.                                                  READ0069
      IF (ZN-IHS)19,16,16                                             READ0070
19    IL=IL+1                                                         READ0071
18    CONTINUE                                                        READ0072
16    SCAT(IL,IK)=SCAT(IL,IK)+1                                       READ0073
C----                                                                 READ0074
C---- INCREASE COUNTS. AT THE END OF A SEASON EXECUTE HSLOT           READ0075
C----                                                                 READ0076
20    II=II+1                                                         READ0077
      PI=PI+1                                                         READ0078
      RI=RI+1                                                         READ0079
      L=L+1                                                           READ0080
      K=K+1                                                           READ0081
      IF (P-PI) 21,22,21                                              READ0082
21    IF (R-RI) 23,24,23                                              READ0083
23    IF (K-40) 25,26,26                                              READ0084
25    IF (L-8) 27,28,28                                               READ0085
28    READ (5,29)                                                     READ0086
29    FORMAT (1X)                                                     READ0087
      L=0                                                             READ0088
      GO TO 27                                                        READ0089
26    READ (5,30)                                                     READ0090
30    FORMAT (9(/))                                                   READ0091
      K=0                                                             READ0092
      L=0                                                             READ0093
      GO TO 27                                                        READ0094
24    READ (5,30)                                                     READ0095
      M=M+1                                                           READ0096
      GO TO (31,32,31,33,31,33,31,31,33,31,33,31),M                   READ0097
31    R=248                                                           READ0098
      GO TO 34                                                        READ0099
32    IF (YEAR-4*(YEAR/4)) 35,36,35                                   READ0100
35    R=224                                                           READ0101
      GO TO 34                                                        READ0102
36    R=232                                                           READ0103
      GO TO 34                                                        READ0104
33    R=240                                                           READ0105
34    RI=0                                                            READ0106
      K=0                                                             READ0107
      L=0                                                             READ0108
```

```
      GO TO 27                                                          READ0109
 22   IF (KNT-3) 38,37,37                                               READ0110
 38   READ (5,30)                                                       READ0111
 37   CALL LINK(HSLOT)                                                  READ0112
      END                                                               READ0113
 VARIABLE ALLOCATIONS
   SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
   JREC(IC)=F914        LAB(IC)=F913        MAXH(IC)=F912        N(IC)=F911         MM(IC)=F910        II(IC)=F90F
  TITLE(IC)=F90E-F8EB     S(IC)=F8EA       NAMT(IC)=F8E9-F8E7     M(IC)=F8E6       YEAR(IC)=F8E5      DATES(IC)=F8E4-F8C7
      P(IC)=F8C6        KREC(IC)=F8C5       LREC(IC)=F8C4       MREC(IC)=F8C3      NREC(IC)=F8C2         R(IC)=F8C1
      K(IC)=F8C0          L(IC)=F8BF          PI(IC)=F8BE        KNT(IC)=F8BD     IHMAX(IC)=F8BC        RI(IC)=F8BB
    BHS(R )=0006          A(R )=0009        TZAB(R )=000C        ZI(R )=000F        ZN(R )=0012       EPSI(I )=0015
    TZV(I )=0019-0016   TZAC(I )=001A      JHMAX(I )=001B       IHS(I )=001C       IM(I )=001D         IL(I )=001E
     IK(I )=001F          I(I )=0020

 STATEMENT ALLOCATIONS
  1    =004E  29   =005B  30   =005D  27   =0061  3    =0083  2    =00B7  4    =00F5  5    =0102  6    =010D  7    =011D
  8    =0123  9    =012D  10   =0154  11   =015A  12   =0164  120  =016A  170  =017E  150  =0184  121  =018E  14   =0194
  17   =01A9  15   =01AF  13   =01B9  19   =01CE  18   =01D4  16   =01DE  20   =01EB  21   =020F  23   =0215  25   =021B
  28   =0221  26   =022B  24   =0239  31   =0253  32   =0259  35   =0267  36   =026D  33   =0273  34   =0277  22   =0285
  38   =028B  37   =028F

 FEATURES SUPPORTED
  NONPROCESS
  ONE WORD INTEGERS
  EXTENDED PRECISION
  IOCS

 CALLED SUBPROGRAMS
  GET     EADD    ESUB    EDIV    ELD     ESTO    ESBR    IFIX    FLOAT   COMGO   ISTOX   LDFAC   STFAC   SBFAC   MPED
  MCOMP   MIOIX   MIOF    MIOI    SUBSC   MDWRT   MDCOM   MDI     MAGT

 REAL CONSTANTS
    .100000000E-01=0026     .500000000E-09=0029     .500000000E 00=002C     .100000000E 03=002F     .100000000E 01=0032
    .100000000E 02=0035

 INTEGER CONSTANTS
      5=0038  11200=0039      1=003A      0=003B      6=003C      4=003D      2=003E     25=003F   1000=0040     50=0041
   2000=0042    20=0043     40=0044     10=0045    400=0046    800=0047      8=0048    248=0049    224=004A    232=004B
    240=004C     3=004D

 CORE REQUIREMENTS FOR READW
  COMMON    1862  INSKEL COMMON       0  VARIABLES      38  PROGRAM     622


  END OF COMPILATION
```

READW
DUP FUNCTION COMPLETED

```
// JOB            X
// FOR HSLOT             VERSION 2 MODIFICATION 0 1.12.70
*LIST ALL
*EXTENDED PRECISION
*ONE WORD INTEGERS
*IOCS(DISK)
*NONPROCESS PROGRAM
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36) HSL00001
      INTEGER RI,NAMT(3)                                                HSL00002
      INTEGER S,YEAR,DATES(30),P,PI,R                                   HSL00003
      DIMENSION AHS(102),ATZ(44),ASWP(42)                               HSL00004
      DATA ISPAC/' '/,IAST/'*'/,IPLUS/'+'/                              HSL00005
      DATA AHS/102*0./,ATZ/44*0./,ASWP/42*0./                           HSL00006
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMHSL00007
     1T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       HSL00008
      DEFINE FILE 1(4,306,U,IREC),2(4,306,U,JREC),3(4,132,U,KREC)       HSL00009
      DEFINE FILE 4(1,126,U,LREC),5(40,37,U,MREC)                       HSL00010
C----                                                                   HSL00011
C---- THIS LINK SORTS EACH SEASONS DATA INTO GRAPHICAL FORM AND          HSL00012
C---- STORES ON DISK. RETURN TO READW UNLESS END OF YEAR, THEN          HSL00013
C---- CALCULATE SWPA AND SCAT ARRAYS AND PLOT                           HSL00014
C----                                                                   HSL00015
      API=PI                                                            HSL00016
      IF (S-1) 1,2,1                                                    HSL00017
1     IF (S-2) 3,4,3                                                    HSL00018
3     IF (S-3) 5,6,5                                                    HSL00019
2     IREC=1                                                            HSL00020
      JREC=1                                                            HSL00021
      KREC=1                                                            HSL00022
      GO TO 7                                                           HSL00023
4     IREC=2                                                            HSL00024
      JREC=2                                                            HSL00025
      KREC=2                                                            HSL00026
      GO TO 7                                                           HSL00027
6     IREC=3                                                            HSL00028
      JREC=3                                                            HSL00029
      KREC=3                                                            HSL00030
      GO TO 7                                                           HSL00031
5     IREC=4                                                            HSL00032
      JREC=4                                                            HSL00033
      KREC=4                                                            HSL00034
C----                                                                   HSL00035
C---- FORM CUMULATIVE PERCENTAGE OF HS AND HMAX AND STORE ON DISK.      HSL00036
C---- CALCULATE PERCENTAGE OCCURRENCE OF TZ AND STORE ON DISK.          HSL00037
C----                                                                   HSL00038
7     AHS(102)=HS(102)/API*100.                                         HSL00039
      DO 8 J=1,101                                                      HSL00040
      JI=102-J                                                          HSL00041
8     AHS(JI)=(HS(JI)/API*100.)+AHS(JI+1)                               HSL00042
      WRITE (1'IREC) (AHS(J),J=1,102)                                   HSL00043
      DO 26 JII=1,102                                                   HSL00044
26    AHS(JII)=0.                                                       HSL00045
      AHS(102)=HMAX(102)/API*100.                                       HSL00046
      DO 9 J=1,101                                                      HSL00047
      JI=102-J                                                          HSL00048
9     AHS(JI)=(HMAX(JI)/API*100.)+AHS(JI+1)                             HSL00049
      WRITE (2'JREC) (AHS(J),J=1,102)                                   HSL00050
      ATZ(1)=(TZ(1,1)*100./P)                                           HSL00051
```

```
      ↵O 10 IL=2,22                                                    HSL00052
      ↵O 10 IJ=1,2                                                     HSL00053
      JI=2*IL+IJ-3                                                     HSL00054
10    ATZ(JI)=(TZ(IJ,IL)*100./P)                                       HSL00055
      WRITE (3'KREC) (ATZ(J),J=1,44)                                   HSL00056
      KNT=KNT+1                                                        HSL00057
      IF (KNT-4) 11,12,11                                              HSL00058
11    ↵O 13 J=1,102                                                    HSL00059
      HS(J)=0                                                          HSL00060
      HMAX(J)=0                                                        HSL00061
13    AHS(J)=0.                                                        HSL00062
      ↵O 14 J=1,44                                                     HSL00063
14    ATZ(J)=0.                                                        HSL00064
      ↵O 15 J=1,22                                                     HSL00065
      ↵O 15 IK=1,2                                                     HSL00066
15    TZ(IK,J)=0                                                       HSL00067
      LAB=2                                                            HSL00068
      CALL LINK(WAST)                                                  HSL00069
C----                                                                  HSL00070
C---- CALCULATE PERCENTAGE OCCURRENCE OF SPECTRAL WIDTH PARAMETER AND  HSL00071
C---- STORE ON ↵ISK. FORM SCATTER DIAGRAM AND STORE ON DISK.           HSL00072
C----                                                                  HSL00073
12    ASWP(1)=(SWPA(1)*100./II)                                        HSL00074
      ↵O 16 J=2,42                                                     HSL00075
16    ASWP(J)=(SWPA(J)*100./II)                                        HSL00076
      WRITE (4'LREC) (ASWP(J),J=1,42)                                  HSL00077
      ↵O 17 J=1,40                                                     HSL00078
      ↵O 18 IK=1,37                                                    HSL00079
      IF (SCAT(J,IK)) 19,20,19                                         HSL00080
20    SCAT(J,IK)=ISPAC                                                 HSL00081
      GO TO 18                                                         HSL00082
19    IF (SCAT(J,IK)-1) 21,22,21                                       HSL00083
22    SCAT(J,IK)=IAST                                                  HSL00084
      GO TO 18                                                         HSL00085
21    IF (SCAT(J,IK)-2) 23,24,23                                       HSL00086
24    SCAT(J,IK)=IPLUS                                                 HSL00087
      GO TO 18                                                         HSL00088
23    SCAT(J,IK)=((SCAT(J,IK)*1000.)/II)+0.5                           HSL00089
      IF (SCAT(J,IK)) 18,25,18                                         HSL00090
25    SCAT(J,IK)=1                                                     HSL00091
18    CONTINUE                                                         HSL00092
      WRITE (5'MREC) (SCAT(J,IK),IK=1,37)                              HSL00093
17    CONTINUE                                                         HSL00094
      CALL LINK(PERS)                                                  HSL00095
      EN↵                                                              HSL00096

VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914        LAB(IC)=F913       MAXH(IC)=F912         N(IC)=F911          MM(IC)=F910         II(IC)=F90F
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA      NAMT(IC)=F8E9-F8E7     M(IC)=F8E6       YEAR(IC)=F8E5       DATES(IC)=F8E4-F8C
     P(IC)=F8C6       KREC(IC)=F8C5      LREC(IC)=F8C4       MREC(IC)=F8C3       NREC(IC)=F8C2         P(IC)=F8C1
     K(IC)=F8C0          L(IC)=F8BF        PI(IC)=F8BE        KNT(IC)=F8BD      IHMAX(IC)=F8BC        PI(IC)=F8B3
   AHS(R )=014↵-001E   ATZ(R )=01D1-0150 ASWP(R )=024F-01D4   API(R )=0252          J(I )=0258          JI(I )=0259
   JII(I )=025A         IL(I )=025B        IJ(I )=025C        IK(I )=025D       ISPAC(I )=025E        IAST(I )=025F
 IPLUS(I )=0260

STATEMENT ALLOCATIONS
 1    =0288  3    =028E  2    =0296  4    =02A4  6    =02B2  5    =02C0  7    =02CC  8    =02E3  26   =0323  9    =0340
```

```
 10   =03AB  11   =03FC  13   =040F  14   =0425  15   =043F  12   =0464  16   =0478  20   =04C5  19   =04D2  22   =04DE
 21   =04EC  24   =04F9  23   =0506  25   =0524  18   =052F  17   =0551

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 EADD    EADDX   EMPY    EDIV    ELD     ESTO    ESTOX   EDVR    IFIX    FLOAT   ISTOX   SUBSC   MDWRT   MDCOM   MDEX
 MDIX

REAL CONSTANTS
   .100000000E 03=0264     .000000000E 00=0267     .100000000E 04=026A     .500000000E 00=026D

INTEGER CONSTANTS
     1=0270      2=0271      3=0272      4=0273    101=0274    102=0275     22=0276     44=0277      0=0278     42=0279
    40=027A     37=027B      5=027C

CORE REQUIREMENTS FOR HSLOT
 COMMON    1862  INSKEL COMMON       0  VARIABLES     612  PROGRAM     762


 END OF COMPILATION
```

```
HSLOT
DUP FUNCTION COMPLETED
// DUP
*DELET               HSLOT
DUP FUNCTION COMPLETED
*STORECIL          1 HSLOT HSLOT
*FILES(1,HS,1),(2,HMAX,1),(3,TZ,1),(4,SWPA,1),(5,SCAT,1)
*CCEND
```

```
CLB, BUILD HSLOT

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*COW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CE  003F
*PNT TABLE 220C  000C
*DFT TABLE 2218  001E
MAIN HSLOT 2495
PNT  HSLOT 220E
LIBF FLOAT 2777  21CD
LIBF ESTO  27E1  21D0
LIBF EDIV  2821  21D3
LIBF EMPY  2897  21D6
LIBF ESTOX 278D  21D9
LIBF SUBSC 28D4  21DC
LIBF EADDX 292B  21DF
LIBF MDWRT 2AFE  21E2
LIBF MDFX  29CA  21E5
LIBF MDCOM 2A73  21E8
LIBF ELD   27F3  21EB
LIBF EDVR  280E  21EE
LIBF ISTOX 2D1E  21F1
PNT  WAST  2212
LIBF EADD  2927  21F4
LIBF IFIX  2D3F  21F7
LIBF MDIX  29CF  21FA
PNT  PERS  2216
LIBF NORM  2D73  21FD
LIBF XDD   2DAB  2200
LIBF FARC  2DFD  2203
LIBF XMD   2E2F  2206
LIBF ADRCK 2E72  2209
CALL BT2BT 2ED6
CALL SAVE  2EF2
CALL IOFIX 2F56
CORE       2F88  2932
COMM       58BA  0746

CLB, HSLOT LD XQ

LOP FUNCTION COMPLETED
```

```
// JOB            X
// FOR PERS              VERSION 1 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORL INTEGERS
*NONPROCESS PROGRAM
*EXTENLEL PRECISION
*IOCS(LISK)
*IOCS(TYPEWRITER)
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36) PERS0004
      INTEGER S,YEAR,DATES(30),P,PI,R                                   PERS0005
      INTEGER RI,IHS(2928),NAMT(3)
      LIMENSION NAMFL(6),LIST(40),KRAY(320)                             PERS0007
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMPERS0008
     UT, M,YEAR,LATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       PERS0009
      LATA LIST/'02','04','06','08','10','12','14','16','18','20','22','PERS0010
     124','26','28','30','32','34','36','38','40','42','44','46','48','5PERS0011
     20','52','54','56','58','60','62','64','66','68','70','72','74','76PERS0012
     3','78','80'/                                                      PERS0013
      LATA NAMFL(1)/'HS'/,NAMFL(2)/'G '/,NAMFL(3)/'  '/                 PERS0014
      LATA NAMFL(4)/'PE'/,NAMFL(6)/'  '/,IZERO/0/                       PERS0015
      LEFINE FILE 2(3000,1,U,NREC),1(320,1,U,IKREC)                     PERS0016
C----                                                                   PERS0018
C---- STORE ZERO IN DISK ARRAYS BEFORE USE                              PERS0019
C----                                                                   PERS0020
      LHMAX=IHMAX/2                                                     PERS0021
      LO 12 J=1,LHMAX                                                   PERS0022
      IKREC = 1                                                         PERS0023
      NAMFL(5)=LIST(J)                                                  PERS0024
      CALL LFT(2,NAMFL,IERR)                                            PERS0025
      IF (IERR) 13,14,13                                                PERS0026
13    WRITE (1,15) IERR                                                 PERS0027
15    FORMAT ('IERR=',I3,' IN PROGRAM PERS')                            PERS0028
      CALL EXIT                                                         PERS0029
14    LO 16 IK=1,320                                                    PERS0030
16    WRITE (1'IKREC) IZERO                                             PERS0031
12    CONTINUF                                                          PERS0032
      NREC=1                                                            PERS0033
      IF (YEAR-4*(YEAR/4)) 1,2,1                                        PERS0034
1     NOREC=2920                                                        PERS0035
      GO TO 3                                                           PERS0036
2     NOREC=2928                                                        PERS0037
C----                                                                   PERS0038
C---- CALCULATE LURATION FOR WHICH WAVES EXCEEDED A GIVEN HEIGHT.       PERS0039
C---- STORE RESULTS ON DISK                                             PERS0040
C----                                                                   PERS0041
3     NREC=1                                                            PERS0042
      LO 4 J=1,NOREC                                                    PERS0044
4     REAL (2'NREC) IHS(J)                                              PERS0045
      LO 5 J=2,IHMAX,2                                                  PERS0046
      IVAL=0                                                            PERS0047
      LO 6 IJ=1,NOREC                                                   PERS0048
      IF (IHS(IJ)-J) 7,8,8                                              PERS0049
8     IVAL=IVAL+1                                                       PERS0050
      IF (IJ-NOREC) 6,7,7                                               PERS0051
7     IF (IVAL) 6,6,19                                                  PERS0052
19    IKREC=IVAL                                                        PERS0053
      JA=J/2                                                            PERS0054
      NAMFL(5)=LIST(JA)                                                 PERS0055
```

```
      CALL ␣FT(2,NAMFL,IERR)                                          PERS0056
      IF (IERR) 9,10,9                                                PERS0057
9     WRITE (1,11) IERR                                               PERS0058
11    FORMAT ('IERR=',I2)                                             PERS0059
      CALL EXIT                                                       PERS0060
10    REA␣ (1'IKREC) KVAL                                             PERS0061
      KVAL=KVAL+1                                                     PERS0062
      IKREC=IKREC-1                                                   PERS0063
      WRITE (1'IKREC) KVAL                                            PERS0064
      IVAL = 0                                                        PERS0065
6     CONTINUE                                                        PERS0066
5     CONTINUE                                                        PERS0067
      ␣O 20 JK=1,LHMAX
      IKREC=1
      NAMFL(5)=LIST(JK)
      CALL ␣FT(2,NAMFL,IERR)
      IF(IERR) 21,22,21
21    WRITE (1,23) IERR
23    FORMAT (' IERR=',I2,' IN PERS')
      CALL EXIT
22    ␣O 24 LK=1,320
24    REA␣ (1'IKREC) KRAY(LK)
      ␣O 25 MK=1,319
      NK=320-MK
25    KRAY(NK)=KRAY(NK)+KRAY(NK+1)
      IKREC=1
      ␣O 26 LK=1,320
26    WRITE (1'IKREC) KRAY(LK)
20    CONTINUE
      CALL LINK(HPLOT)                                                PERS0069
      EN␣                                                             PERS0070
```

```
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914         LAB(IC)=F913       MAXH(IC)=F912          N(IC)=F911          MM(IC)=F910         II(IC)=F90F
 TITLE(IC)=F90E-F8EB      S(IC)=F8EA       NAMT(IC)=F8E9-F8E7     M(IC)=F8E6       YEAR(IC)=F8E5      DATES(IC)=F8E4-F8C7
     P(IC)=F8C6        KREC(IC)=F8C5       LREC(IC)=F8C4       MREC(IC)=F8C3       NREC(IC)=F8C2         R(IC)=F8C1
     K(IC)=F8C0           L(IC)=F8BF         PI(IC)=F8BE         KNT(IC)=F8BD      IHMAX(IC)=F8BC         RI(IC)=F8B8
 NAMFL(I )=0011-000C  LIST(I )=0039-0012  KRAY(I )=0179-003A    IHS(I )=0CE9-017A IKREC(I )=0CEA      LHMAX(I )=0CE8
     J(I )=0CEC         IERR(I )=0CED         IK(I )=0CEE       IZERO(I )=0CEF      NOREC(I )=0CF0       IVAL(I )=0CF1
    IJ(I )=0CF2           JA(I )=0CF3       KVAL(I )=0CF4         JK(I )=0CF5         LK(I )=0CF6         MK(I )=0CF7
    NK(I )=0CF8
```

```
STATEMENT ALLOCATIONS
 15    =0␣04  11    =0D13  23    =0D19  13    =0D47  14    =0D4F  16    =0D53  12    =0D62  1     =0D7D  2     =0D83  3     =0D87
 4     =0␣8F  8     =0DBA  7     =0DC6  19    =0DCA  9     =0DE9  10    =0DF1  6     =0E0D  5     =0E16  21    =0E3C  22    =0E44
 24    =0E48  25    =0E56  26    =0E8D  20    =0EA1
```

```
FEATURES SUPPORTED
 NONPROCESS
 ONE WOR␣ INTEGERS
 EXTEN␣E␣ PRECISION
 IOCS
```

```
CALLE␣ SUBPROGRAMS
 ␣FT     ISTOX   STFAC   SBFAC   MWRT    MCOMP   MIDI    SUBSC   MDRED   MDWRT   MDCOM   MDIX    MDI     TYPEM   ERRPT
```

```
INTEGER CONSTANTS
     2=0CFC       1=0CFD     320=0CFE       4=0CFF    2920=0D00    2928=0D01       0=0D02     319=0D03

CORE REQUIREMENTS FOR PERS
 COMMON    1862  INSKEL COMMON       0  VARIABLES    3324  PROGRAM     434


 ENb OF COMPILATION



PERS
bOP FUNCTION COMPLETED
// bOP
*bELET                PERS
bOP FUNCTION COMPLETED
*STORECIL           1 PERS  PERS
*FILES(1,,1),(2,HSG,1)
*CCENb
```

```
CLB, BUILD PERS

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*COW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CD  0036
*DFT TABLE 220C  000C
MAIN PERS  2F30
PNT  PERS. 2206
LIBF EBPRT 30BB  21CD
LIBF SUBSC 3166  21D0
LIBF ISTOX 3192  21D3
CALL DFT   31B2
LIBF MWRT  33C1  21D6
LIBF MIOI  3487  21D9
LIBF MCOMP 345C  21DC
LIBF MDWRT 3A26  21DF
LIBF MDI   38DE  21E2
LIBF MDCOM 399B  21E5
LIBF STFAC 3C5C  21E8
LIBF SBFAC 3C60  21EB
LIBF MDRED 3939  21EE
LIBF MDIX  38F7  21F1
PNT  HPLOT 220A
CALL PRT   3C74
LIBF ADRCK 3CBE  21F4
CALL FLETM 3D22
LIBF IOU   3F0C  21F7
CALL IOFIX 3FA8
CALL BT1BT 3FD8
CALL SAVE  3F44
LIBF FLOAT 403D  21FA
LIBF IFIX  4053  21FD
CALL BT2BT 4086
LIBF NORM  40A3  2200
CORE       40DC  17DE
COMM       58BA  0746

CLB, PERS  DD XQ

DUP FUNCTION COMPLETED
```

```
// JOB            X
// FOR HPLOT              VERSION 2 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*IOCS(DISK,PLOTTER)
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                HPL00001
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36) HPL00002
      INTEGER S,YEAR,DATES(30),P,PI,R                                   HPL00003
      DIMENSION A(9),AHS(102),AHMAX(102),B(24),IB(24)                   HPL00004
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMHPL00005
     1T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       HPL00006
      DATA A/1.5,0.875,0.625,0.5,0.4,0.3375,0.3,0.25,0.25/              HPL00007
      DATA B/-0.03,1.47,2.345,2.97,3.47,3.87,4.207,4.507,4.757,5.007,5.3HPL00008
     107,5.607,5.907,6.207,6.507,6.944,7.390,8.020,8.520,8.920,9.260,9.5HPL00009
     260,9.820,10.075/                                                  HPL00010
      DATA IB/3,4,5,6,7,8,9,10,11,12,14,16,18,20,22,27,32,42,52,62,72,82HPL00011
     1,92,102/                                                          HPL00012
      DEFINE FILE 1(4,306,U,IREC),2(4,306,U,JREC)                       HPL00013
C----                                                                   HPL00014
C---- PLOT HS AND HMAX FOR EACH SEASON                                  HPL00015
C----                                                                   HPL00016
      IREC=1                                                            HPL00017
      JREC=1                                                            HPL00018
      PII=3.14159                                                       HPL00019
      CALL SCALE (1.,I.,0.,0.)                                          HPL00020
      CALL ECHAR (0.,0.,0.15,0.15,PII/2)                                HPL00021
      WRITE (7,50) TITLE                                                HPL00022
50    FORMAT (36A2)                                                     HPL00023
      CALL ECHAR (2.,0.,0.15,0.15,PII/2)                                HPL00024
      WRITE (7,51) DATES                                                HPL00025
51    FORMAT (30A2)                                                     HPL00026
      CALL EPLOT (0,0.,0.)                                              HPL00027
      CALL EPLOT (0,24.,10.)                                            HPL00028
      DO 10 IL=1,4                                                      HPL00029
C----                                                                   HPL00030
C---- PLOT LOGARITHMIC SCALE                                            HPL00031
C----                                                                   HPL00032
      CALL SCALE (1.5,0.075,0.,0.)                                      HPL00033
      CALL EPLOT (1,0.,100.)                                            HPL00034
      CALL EGRID (3,0.,100.,2.,50)                                      HPL00035
      IY=100                                                            HPL00036
      DO 3 I=1,11                                                       HPL00037
      Y=IY                                                              HPL00038
      CALL ECHAR (-.3,Y,0.1,0.1,0)                                      HPL00039
      WRITE (7,4) IY                                                    HPL00040
4     FORMAT (I3)                                                       HPL00041
3     IY=IY-10                                                          HPL00042
      CALL ECHAR (-0.5,30.,0.1,0.1,PII/2)                               HPL00043
      WRITE (7,7)                                                       HPL00044
7     FORMAT ('PERCENTAGE EXCEEDANDCE')                                 HPL00045
      CALL EPLOT(0,0.,0.)                                               HPL00046
      DO 2 IK=1,2                                                       HPL00047
      DO 1 J=1,9                                                        HPL00048
      CALL SCALE (A(J),0.075,0.,0.)                                     HPL00049
      CALL EGRID (0,0.,0.,1.,1)                                         HPL00050
1     CONTINUE                                                          HPL00051
```

```
 2      CONTINUE                                                        HPL00052
        CALL SCALE (1.,0.075,10.125,0.)                                 HPL00053
        CALL EPLOT(0,0.,0.)                                             HPL00054
        CALL SCALE(1.5,0.075,0.,0.)                                     HPL00055
        CALL ECHAR (0.,-5.,0.1,0.1,0)                                   HPL00056
        WRITE (7,5)                                                     HPL00057
 5      FORMAT('1              2         3     4    5   6  7  8    10  HPL00058
       1       20       30    40   50  60  70 80  100')                HPL00059
        CALL ECHAR (3.,-10.,0.1,0.1,0)                                  HPL00060
        WRITE (7,6)                                                     HPL00061
 6      FORMAT ('WAVE HEIGHT IN FEET')                                  HPL00062
        CALL ECHAR(0.,115.,0.2,0.2,0)                                   HPL00063
        WRITE (7,8)                                                     HPL00064
 8      FORMAT ('PERCENTAGE EXCEEDANCE OF HS AND HMAX')                 HPL00065
        CALL ECHAR(0.,105.,0.2,0.2,0)                                   HPL00066
        GO TO (9,11,12,13),IL                                           HPL00067
 9      WRITE (7,14)                                                    HPL00068
 14     FORMAT ('WINTER - JANUARY TO MARCH')                            HPL00069
        GO TO 32                                                        HPL00070
 11     WRITE (7,15)                                                    HPL00071
 15     FORMAT ('SPRING - APRIL TO JUNE')                               HPL00072
        GO TO 32                                                        HPL00073
 12     WRITE (7,16)                                                    HPL00074
 16     FORMAT ('SUMMER - JULY TO SEPTEMBER')                           HPL00075
        GO TO 32                                                        HPL00076
 13     WRITE (7,17)                                                    HPL00077
 17     FORMAT ('AUTUMN - OCTOBER TO DECEMBER')                         HPL00078
 32     CALL EPLOT (0,0.02,100.)                                        HPL00079
        DO 30 IK=1,2                                                    HPL00080
        DO 31 J=1,9                                                     HPL00081
        CALL SCALE (A(J),0.075,0.,0.)                                   HPL00082
        CALL EGRID (0,0.,0.,1.,1)                                       HPL00083
 31     CONTINUE                                                        HPL00084
 30     CONTINUE                                                        HPL00085
        CALL SCALE (1.5,0.075,0.,0.)                                    HPL00086
        CALL EGRID (3,0.,0.,2.,50)                                      HPL00087
        CALL EPLOT (0,-6.716,-100.)                                     HPL00088
C----                                                                   HPL00089
C---- PLOT SELECTED POINTS ON HS AND HMAX CURVES - + FOR HS POINTS,     HPL00090
C---- X FOR HMAX POINTS, AND * WHERE THE TWO POINTS COINCIDE           HPL00091
C----                                                                   HPL00092
        CALL SCALE (1.,0.075,0.,0.)                                     HPL00093
        READ (1'IREC) (AHS(J),J=1,102)                                  HPL00094
        READ (2'JREC) (AHMAX(K),K=1,102)                                HPL00095
        DO 19 J=1,24                                                    HPL00096
        IJ=IB(J)                                                        HPL00097
        CALL EPLOT(-2,B(J),AHS(IJ))                                     HPL00098
        CALL POINT(0)                                                   HPL00099
 19     CALL RAISE                                                      HPL00100
        CALL EPLOT(0,0.,0.)                                             HPL00101
        DO 20 J=1,24                                                    HPL00102
        IJ=IB(J)                                                        HPL00103
        CALL EPLOT(-2,B(J),AHMAX(IJ))                                   HPL00104
        CALL POINT(1)                                                   HPL00105
 20     CALL RAISE                                                      HPL00106
C----                                                                   HPL00107
```

```
C---- LABEL THE TWO CURVES                                                    HPL00108
C----                                                                         HPL00109
      CALL ECHAR(B(6),AHS(7),0.1,0.1,0)                                       HPL00110
      WRITE (7,21)                                                            HPL00111
21    FORMAT ('HS')                                                           HPL00112
      CALL ECHAR(B(6),AHMAX(7),0.1,0.1,0)                                     HPL00113
      WRITE (7,22)                                                            HPL00114
22    FORMAT ('HMAX(3HRS)')                                                   HPL00115
      CALL EPLOT(1,20.,0.)                                                    HPL00116
10    CONTINUE                                                                HPL00117
      CALL LINK(TPLOT)                                                        HPL00118
      ENb                                                                     HPL00119
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914        LAB(IC)=F913        MAXH(IC)=F912        N(IC)=F911          MM(IC)=F910        II(IC)=F90F
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA       NAMT(IC)=F8E9-F8E7    M(IC)=F8E6       YEAR(IC)=F8E5      DATES(IC)=F8E4-F8C7
    P(IC)=F8C6        KREC(IC)=F8C5       LREC(IC)=F8C4       MREC(IC)=F8C3       NREC(IC)=F8C2        R(IC)=F8C1
    K(IC)=F8C0          L(IC)=F8BF         PI(IC)=F8BE        KNT(IC)=F8BD      IHMAX(IC)=F8BC        RI(IC)=F8BB
    A(R )=0024-000C   AHS(R )=0156-0027 AHMAX(R )=0288-0159    B(R )=02D0-028B    PII(R )=02D3         Y(R )=C2DA
   IB(I )=02F6-02DF    IL(I )=02F7         IY(I )=02F8         I(I )=02F9         IK(I )=02FA          J(I )=02F8
   IJ(I )=02FC

STATEMENT ALLOCATIONS
 50   =0352  51   =0355  4    =0358  7    =035A  5    =0367  6    =039D  8    =03A9  14   =03BD  15   =03CC  16   =03D9
 17   =03E8  21   =03F8  22   =03FB  3    =047D  1    =04C7  2    =04D0  9    =0524  11   =052A  12   =0530  13   =0536
 32   =053A  31   =055E  30   =0567  19   =05F2  20   =0634  10   =0676

FEATURES SUPPORTED
 NONPROCESS
 ONE WORb INTEGERS
 EXTENbEb PRECISION
 IOCS

CALLEb SUBPROGRAMS
 SCALE   ECHAR   EPLOT   EGRID   POINT   RAISE   ELD     ESTO    EDVR    FLOAT   COMGO   MWRT    MCOMP   MIOAI   MIOI
 SUBSC   SNR     MDRED   MDCOM   MDFX    ECHRI

REAL CONSTANTS
   .314159000E 01=0300     .100000000E 01=0303     .000000000E 00=0306     .150000000E 00=0309     .200000000E 01=030C
   .240000000E 02=030F     .100000000E 02=0312     .150000000E 01=0315     .750000000E-01=0318     .100000000E 03=031B
   .300000000E 00=031E     .100000000E 00=0321     .500000000E 00=0324     .300000000E 02=0327     .101250000E 02=032A
   .500000000E 01=032D     .300000000E 01=0330     .115000000E 03=0333     .200000000E 00=0336     .105000000E 03=0339
   .200000000E-01=033C     .671600000E 01=033F     .200000000E 02=0342

INTEGER CONSTANTS
     1=0345      2=0346      7=0347      0=0348      4=0349      3=034A     50=034B    100=034C     11=034D     10=034E
     9=034F    102=0350     24=0351

CORE REQUIREMENTS FOR HPLOT
 COMMON    1862  INSKEL COMMON       0  VARIABLES     768  PROGRAM     900


 ENb OF COMPILATION
```

```
HPLOT
DUP FUNCTION COMPLETED
// DUP
*DELET                HPLOT
DUP FUNCTION COMPLETED
*STORECIL          1 HPLOT HPLOT
*FILES(1,HS,1),(2,HMAX,1)
*CCEND
```

```
CLB, BUILD HPLOT

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*COW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CD  0069
*PNT TABLE 2236  0008
*DFT TABLE 223E  000C
MAIN HPLOT 2640
PNT  HPLOT 2238
LIBF ECHRI 28DE  21CD
LIBF ELD   2B85  21D0
LIBF ESTO  2B73  21D3
CALL SCALE 2B9C
LIBF FLOAT 2BA1  21D6
LIBF EDVR  2BBA  21D9
CALL ECHAR 2C4F
LIBF MWRT  2E15  21DC
LIBF MIOAI 2EFC  21DF
LIBF MCOMP 2E80  21E2
CALL EPLOT 332E
CALL EGRID 3373
LIBF SNR   33D0  21E5
LIBF MIOI  2EDB  21E8
LIBF SUBSC 33E4  21EB
LIBF COMGO 3410  21EE
LIBF MDRED 34C9  21F1
LIBF MDFX  3482  21F4
LIBF MDCOM 352B  21F7
CALL POINT 380E
CALL RAISE 3842
PNT  TPLOT 223C
LIBF EMPY  3853  21FA
LIBF EADD  38B7  21FD
LIBF IFIX  393B  2200
LIBF EINC  39F2  2203
LIBF XYPLT 3A10  2206
LIBF PLOTI 3A74  2209
LIBF ELDX  2B81  220C
LIBF ESTOX 2B1F  220F
LIBF ERULE 3992  2212
LIBF NORM  3A91  2215
LIBF XDD   3AC9  2218
LIBF FARC  3B1B  221B
CALL ESIN  3B58
CALL ECOS  3B4D
LIBF ECHRX 29AF  221E
LIBF IOU   3BFE  2221
CALL IOFIX 3C9A
CALL BT1BT 3CCA
CALL SAVE  3C36
LIBF ADRCK 3D2E  2224
```

```
 LIBF EMOVE 39C1  2227
 CALL BT2BT 3␣92
 LIBF XM␣   3␣AF  222A
 LIBF ESUBX 38B3  222D
 LIBF EMPYX 384␣  2230
 LIBF ESUB  38AF  2233
 CORE       3␣F4  1AC6
 COMM       58BA  0745

 CLR, HPLOT L␣ XQ

LOP FUNCTION COMPLETED
```

```
// JOB            X
// FOR TPLOT            VERSION 2 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*IOCS(DISK,PLOTTER)
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                    TPL00001
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36)     TPL00002
      INTEGER S,YEAR,DATES(30),P,PI,R                                       TPL00003
      DIMENSION ATZ(44)                                                     TPL00004
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMTPL00005
     1T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       TPL00006
      DEFINE FILE 3(4,132,U,KREC)                                           TPL00007
C----                                                                       TPL00008
C---- PLOT TZ GRAPH FOR EACH SEASON                                         TPL00009
C----                                                                       TPL00010
      PII=3.14159                                                           TPL00011
      KREC=1                                                                TPL00012
      DO 1 J=1,4                                                            TPL00013
      READ (3'KREC)(ATZ(JJ),JJ=1,44)                                        TPL00014
C----                                                                       TPL00015
C---- PLOT X AND Y AXIS                                                     TPL00016
C----                                                                       TPL00017
      A=0.25                                                                TPL00018
      CALL SCALE (0.25,0.2,0.,0.)                                           TPL00019
      CALL EPLOT (1,0.,30.)                                                 TPL00020
      CALL EGRID (3,0.,30.,1.,30)                                           TPL00021
      CALL EGRID (0,0.,0.,1.,20)                                            TPL00022
      CALL EGRID (1,20.,0.,1.,30)                                           TPL00023
      CALL EGRID (2,20.,30.,1.,20)                                          TPL00024
      CALL ECHAR(-6.,38.,0.2,0.2,0)                                         TPL00025
      WRITE (7,8)                                                           TPL00026
8     FORMAT ('GRAPH OF PERCENTAGE OCCURRENCE OF TZ')                       TPL00027
      CALL ECHAR(-6.,35.,0.15,0.15,0)                                       TPL00028
      WRITE (7,9)                                                           TPL00029
9     FORMAT ('WITHIN HALF-SECOND INTERVALS')                               TPL00030
      CALL ECHAR(-6.,32.,0.2,0.2,0)                                         TPL00031
      GO TO (10,11,12,13),J                                                 TPL00032
10    WRITE (7,14)                                                          TPL00033
14    FORMAT ('WINTER - JANUARY TO MARCH')                                  TPL00034
      GO TO 18                                                              TPL00035
11    WRITE (7,15)                                                          TPL00036
15    FORMAT ('SPRING - APRIL TO JUNE')                                     TPL00037
      GO TO 18                                                              TPL00038
12    WRITE (7,16)                                                          TPL00039
16    FORMAT ('SUMMER - JULY TO SEPTEMBER')                                 TPL00040
      GO TO 18                                                              TPL00041
13    WRITE (7,17)                                                          TPL00042
17    FORMAT ('AUTUMN - OCTOBER TO DECEMBER')                               TPL00043
18    IY=30                                                                 TPL00044
      DO 30 I=1,4                                                           TPL00045
      Y=IY                                                                  TPL00046
      CALL ECHAR (-1.5,Y,0.1,0.1,0)                                         TPL00047
      WRITE (7,2) IY                                                        TPL00048
2     FORMAT (I2)                                                           TPL00049
30    IY=IY-10                                                              TPL00050
      CALL ECHAR (-4.,5.,0.1,0.1,PII/2)                                     TPL00051
```

```
      WRITE (7,7)                                                        TPL00052
7     FORMAT ('PERCENTAGE OCCURRENCE')                                   TPL00053
      IX=0                                                               TPL00054
      ␣DO 4 IK=1,6                                                       TPL00055
      X=IX-0.5                                                           TPL00056
      CALL ECHAR (X,-1.5,0.1,0.1,0)                                      TPL00057
      WRITE (7,2) IX                                                     TPL00058
4     IX=IX+4                                                            TPL00059
      CALL ECHAR (1.,-4.,0.1,0.1,0)                                      TPL00060
      WRITE (7,5)                                                        TPL00061
5     FORMAT ('ZERO CROSSING PERIOD IN HALF SECOND INTERVALS')           TPL00062
      CALL ECHAR (8.,-6.,0.1,0.1,0)                                      TPL00063
      WRITE (7,6) ATZ(1)                                                 TPL00064
6     FORMAT ('CALM = ',F5.2,' PER CENT')                                TPL00065
C----                                                                    TPL00066
C---- PLOT VALUES FOR APPROPRIATE SEASON                                 TPL00067
C----                                                                    TPL00068
      CALL EPLOT(-2,0.,0.)                                               TPL00069
      ␣DO 19 IK=2,42                                                     TPL00070
      Y=ATZ(IK)                                                          TPL00071
      X=A                                                                TPL00072
      CALL EPLOT(0,X,Y)                                                  TPL00073
      A=A+0.5                                                            TPL00074
19    CONTINUE                                                           TPL00075
      CALL EPLOT(1,80.,0.)                                               TPL00076
1     CONTINUE                                                           TPL00077
      CALL LINK(SWPLT)                                                   TPL00078
      EN␣                                                                TPL00079
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914         LAB(IC)=F913       MAXH(IC)=F912        N(IC)=F911         MM(IC)=F910         II(IC)=F90E
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA       NAMT(IC)=F8E9-F8E7   M(IC)=F8E6       YEAR(IC)=F8E5       DATES(IC)=F8E4-F8C7
    P(IC)=F8C6        KREC(IC)=F8C5       LREC(IC)=F8C4      MREC(IC)=F8C3       NREC(IC)=F8C2         R(IC)=F8C1
    K(IC)=F8C0          L(IC)=F8BF          PI(IC)=F8BE       KNT(IC)=F8BD      IHMAX(IC)=F8BC        PI(IC)=F8B8
  ATZ(R )=0087-0006   PII(R )=008A          A(R )=008D         Y(R )=0090         X(R )=0093          J(I )=009C
   JJ(I )=009␣          IY(I )=009E          I(I )=009F        IX(I )=00A0        IK(I )=00A1

STATEMENT ALLOCATIONS
 8    =00E9  9    =00FD  14   =010D  15   =011C  16   =0129  17   =0138  2    =0148  7    =014A  5    =0157  6    =017
 10   =01FF  11   =0205  12   =020B  13   =0211  18   =0215  30   =0234  4    =027B  19   =02D4  1    =02E2

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 SCALE    EPLOT    EGRID    ECHAR    EADD     ESUB     ELD      ELDX     ESTO     EDVR     FLOAT    COMGO    MWRT     MCOMP    MDFX
 MIOI     SUBSC    SNR      MDRED    MDCOM    MDFX     ECHRI

REAL CONSTANTS
   .314159000E 01=00A4     .250000000E 00=00A7     .200000000E 00=00AA     .000000000E 00=00AD     .300000000E 02=00B0
   .100000000E 01=00B3     .200000000E 02=00B6     .600000000E 01=00B9     .380000000E 02=00BC     .350000000E 02=00BF
   .150000000E 00=00C2     .320000000E 02=00C5     .150000000E 01=00C8     .100000000E 00=00CB     .400000000E 01=00CE
   .500000000E 01=00D1     .500000000E 00=00D4     .800000000E 01=00D7     .800000000E 02=00DA
```

```
INTEGER CONSTANTS
     1=00␣␣       4=00DE       3=00DF       44=00E0       30=00E1       0=00E2       20=00E3       2=00E4       7=00E5       10=00E6
     6=00E7      42=00E8

CORE REQUIREMENTS FOR TPLOT
 COMMON    1862  INSKEL COMMON       0  VARIABLES    164  PROGRAM     588


 EN␣ OF COMPILATION
```

```
TPLOT
␣␣P FUNCTION COMPLETED
// ␣␣P
*␣␣FLET                TPLOT
␣␣P FUNCTION COMPLETED
*STORECIL              1 TPLOT TPLOT
*FILES(3,TZ,1)
*CCEN␣
```

```
CLB, BUILD TPLOT

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*COW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CD  0069
*PNT TABLE 2236  0008
*OFT TABLE 223E  0006
MAIN TPLOT 23BB
PNT  TPLOT 2238
LIBF ECHRI 254A  21CD
LIBF ELD   27F1  21D0
LIBF ESTO  27DF  21D3
LIBF MDREC 286F  21D6
LIBF SUBSC 287C  21D9
LIBF MDFX  2828  21DC
LIBF MDCOM 28D1  21DF
CALL SCALE 2BA8
CALL EPLOT 2BB4
CALL EGRID 2BF9
LIBF SNR   2C56  21E2
CALL ECHAR 2C7D
LIBF MWRT  2E43  21E5
LIBF MCOMP 2EDE  21E8
LIBF COMGO 3354  21EB
LIBF FLOAT 33A7  21EE
LIBF MIOI  2F09  21F1
LIBF ELVR  33C0  21F4
LIBF ESUB  3461  21F7
LIBF MIOFX 2F10  21FA
LIBF ELDX  27ED  21FD
LIBF EADD  3469  2200
PNT  SWPLT 223C
LIBF EMPY  34F3  2203
LIBF IFIX  3531  2206
LIBF EINC  35E8  2209
LIBF XYPLT 3605  220C
LIBF PLOTI 366A  220F
LIBF ESTOX 2788  2212
LIBF ADRCK 3686  2215
CALL BT2BT 36EA
CALL SAVE  3706
CALL IOFIX 376A
LIBF ERULE 3588  2218
LIBF EMOVE 35B7  221B
CALL POINT 37D2
CALL ESIN  3812
CALL ECOS  3807
LIBF ECHRX 261B  221E
LIBF IOU   3BB8  2221
CALL BT1BT 38F0
LIBF NORM  3955  2224
```

```
 LIBF XLL    398L  2227
 LIBF FARC   39LF  222A
 LIBF XML    3A11  222D
 LIBF ESUBX  3465  2230
 LIBF EMPYX  34EL  2233
 CORE        3A56  1E64
 COMM        58BA  0746

 CLB, TPLOT LL XQ

LGO FUNCTION COMPLETED
```

```
// JOB              X
// FOR SWPLT              VERSION 1 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*IOCS(DISK,PLOTTER)
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                    SWPL0006
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36)     SWPL0007
      INTEGER S,YEAR,DATES(30),P,PI,R                                       SWPL0008
      DIMENSION ASWP(42)                                                    SWPL0009
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMSWPL0010
     1T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       SWPL0011
      DEFINE FILE 4(1,126,U,LREC)                                           SWPL0012
C----                                                                       SWPL0013
C---- THIS LINK PLOTS THE SPECTRAL WIDTH PARAMETER FOR THE YEAR             SWPL0014
C----                                                                       SWPL0015
      PII=3.14159                                                           SWPL0016
      LREC=1                                                                SWPL0017
      READ (4'LREC) (ASWP(J),J=1,42)                                        SWPL0018
C----                                                                       SWPL0019
C---- PLOT X AND Y AXIS AND SCALES                                          SWPL0020
C----                                                                       SWPL0021
      A=0.25                                                                SWPL0022
      CALL SCALE (0.25,0.4,-16.,0.)                                         SWPL0023
      CALL EPLOT (1,0.,15.)                                                 SWPL0024
      CALL EGRID (3,0.,15.,1.,15)                                           SWPL0025
      CALL EGRID (0,0.,0.,1.,40)                                            SWPL0026
      CALL EGRID (1,40.,0.,1.,15)                                           SWPL0027
      CALL EGRID (2,40.,15.,1.,40)                                          SWPL0028
      CALL ECHAR (2.,19.,0.2,0.2,0)                                         SWPL0029
      WRITE (7,8)                                                           SWPL0030
8     FORMAT ('GRAPH OF SPECTRAL WIDTH PARAMETER')                          SWPL0031
      CALL ECHAR (2.,17.,0.2,0.2,0)                                         SWPL0032
      WRITE (7,9)                                                           SWPL0033
9     FORMAT ('FOR A WHOLE YEAR')                                           SWPL0034
      IY=15                                                                 SWPL0035
      DO 3 I=1,4                                                            SWPL0036
      Y=IY                                                                  SWPL0037
      CALL ECHAR (-2.,Y,0.1,0.1,0)                                          SWPL0038
      WRITE (7,1) IY                                                        SWPL0039
1     FORMAT (I2)                                                           SWPL0040
3     IY=IY-5                                                               SWPL0041
      CALL ECHAR (-4.,3.,0.1,0.1,PII/2)                                     SWPL0042
      WRITE (7,7)                                                           SWPL0043
7     FORMAT ('PERCENTAGE OCCURRENCE')                                      SWPL0044
      XX=0.25                                                               SWPL0045
      DO 2 IK=1,11                                                          SWPL0046
      X=XX-1.0                                                              SWPL0047
      CALL ECHAR (X,-1.,0.1,0.1,0)                                          SWPL0048
      BK=((IK-1)/10.)                                                       SWPL0049
      WRITE (7,4) BK                                                        SWPL0050
4     FORMAT (F3.1)                                                         SWPL0051
2     XX=XX+4                                                               SWPL0052
      CALL ECHAR(4.,-2.,0.1,0.1,0)                                          SWPL0053
      WRITE (7,5)                                                           SWPL0054
5     FORMAT ('SPECTRAL WIDTH PARAMETER IN TENTHS WITHIN INTERVALS OF 0.SWPL0055
     1025')                                                                 SWPL0056
```

```
      CALL ECHAR (13.,-3.,0.1,0.1,0)                                    SWPL0057
      WRITE (7,6) ASWP(1)                                               SWPL0058
6     FORMAT ('CALM = ',F5.2,' PER CENT')                               SWPL0059
      CALL EPLOT(-2,0.,0.)                                              SWPL0060
C----                                                                   SWPL0061
C---- PLOT GRAPH FOR YEAR                                              SWPL0062
C----                                                                   SWPL0063
      ␣O 19 IJ=2,42                                                     SWPL0064
      Y=ASWP(IJ)                                                        SWPL0065
      X=A                                                               SWPL0066
      CALL EPLOT(0,X,Y)                                                 SWPL0067
      A=A+1.0                                                           SWPL0068
19    CONTINUE                                                          SWPL0069
      CALL EPLOT(1,60.,0.)                                              SWPL0070
      CALL LINK(SCATP)                                                  SWPL0071
      EN␣                                                               SWPL0072
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914        LAB(IC)=F913       MAXH(IC)=F912          N(IC)=F911          MM(IC)=F910          II(IC)=F90F
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA      NAMT(IC)=F8E9-F8E7      M(IC)=F8E6       YEAR(IC)=F8E5       DATES(IC)=F8E4-F8C7
     P(IC)=F8C6       KREC(IC)=F8C5      LREC(IC)=F8C4       MREC(IC)=F8C3       NREC(IC)=F8C2          R(IC)=F8C1
     K(IC)=F8C0          L(IC)=F8BF         PI(IC)=F8BE        KNT(IC)=F8BD      IHMAX(IC)=F8BC         RI(IC)=F8BB
  ASWP(R )=0081-0006   PII(R )=0084         A(R )=0087         Y(R )=008A          XX(R )=008D          X(R )=0090
    BK(R )=0093          J(I )=009C        IY(I )=009D         I(I )=009E          IK(I )=009F         IJ(I )=00A0

STATEMENT ALLOCATIONS
 8    =00E3  9    =00F6  1    =0100  7    =0102  4    =010F  5    =0111  6    =0131  3    =01C2  2    =0211  19   =026F

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 SCALE    EPLOT    EGRID    ECHAR    EADD     ESUB     EDIV     ELD      ELDX     ESTO     EDVR     FLOAT    MHRT     ACOMP    MINUS
 MIOF     MIOI     SUBSC    SNR      MDRED    MDCOM    MDFX     ECHRI

REAL CONSTANTS
   .314159000E 01=00A2      .250000000E 00=00A5      .400000000E 00=00A8      .160000000E 02=00AB      .000000000E 00=00AE
   .150000000E 02=00B1      .100000000E 01=00B4      .400000000E 02=00B7      .200000000E 01=00BA      .190000000E 02=00BD
   .200000000E 00=00C0      .170000000E 02=00C3      .100000000E 00=00C6      .400000000E 01=00C9      .300000000E 01=00CC
   .100000000E 02=00CF      .130000000E 02=00D2      .600000000E 02=00D5

INTEGER CONSTANTS
     1=00␣8       4=00D9      42=00DA       3=00DB      15=00DC       0=00DD      40=00DE       2=00DF       7=00E0       8=00E1
    11=00E2

CORE REQUIREMENTS FOR SWPLT
 COMMON    1862  INSKEL COMMON       0  VARIABLES     162  PROGRAM     476


 EN␣ OF COMPILATION
```

```
SWPLT
␣␣P FUNCTION COMPLETED
// ␣␣P
*␣ELET                  SWPLT
␣␣P FUNCTION COMPLETED
*STORECIL              1 SWPLT SWPLT
*FILES(4,SWPA,1)
*CCEN␣
```

```
CLB, BUILD SWPLT

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*CRW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CD  006C
*PNT TABLE 223A  0008
*DFT TABLE 2242  0006
MAIN SWPLT 2380
PNT  SWPLT 223C
LIBF ECHRI 24DC  21CD
LIBF ELD   2783  21D0
LIBF ESTO  2771  21D3
LIBF MDRED 2801  21D6
LIBF SUBSC 2B0E  21D9
LIBF MDFX  27BA  21DC
LIBF MDCOM 2863  21DF
LIBF SNR   2B3E  21E2
CALL SCALE 2B52
CALL EPLOT 2B5E
CALL EGRID 2BA3
CALL ECHAR 2C0F
LIBF MWRT  2DD5  21E5
LIBF MCOMP 2E70  21E8
LIBF FLOAT 32E7  21EB
LIBF MIOI  2E98  21EE
LIBF EDVR  3300  21F1
LIBF ESUB  33A1  21F4
LIBF EDIV  3313  21F7
LIBF MIOF  2E96  21FA
LIBF EADD  33A9  21FD
LIBF MIOFX 2EA2  2200
LIBF ELDX  277F  2203
PNT  SCATP 2240
LIBF EMPY  3433  2206
LIBF IFIX  3471  2209
LIBF EINC  3528  220C
LIBF XYPLT 3546  220F
LIBF PLOTI 35AA  2212
LIBF ESTOX 271D  2215
LIBF ADRCK 35C6  2218
CALL BT2BT 362A
CALL SAVE  3646
CALL IOFIX 36AA
LIBF ERDLE 34C8  221B
LIBF EMOVE 34F7  221E
CALL POINT 3712
CALL ESIN  3752
CALL ECOS  3747
LIBF ECHRX 25AD  2221
LIBF IOU   37F8  2224
CALL BT1BT 3830
```

```
 LIBF NORM   3895  2227
 LIBF XbL    38Cb  222A
 LIBF FARC   391F  222D
 LIBF XMb    3951  2230
 LIBF ESUBX  33A5  2233
 LIBF EMPYX  342b  2236
 CORE        3996  1F24
 COMM        58BA  0746

 CLR, SWPLT Lb XQ

.UP FUNCTION COMPLETED
```

```
// JOB            X
// FOR SCATP             VERSION 1 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*IOCS(DISK,PLOTTER)
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                    SCAT0001
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36) SCAT0002
      INTEGER S,YEAR,DATES(30),P,PI,R                                       SCAT0003
      DIMENSION LIST(114)                                                   SCAT0004
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMSCAT0005
     UT, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       SCAT0006
      DATA ISPAC/' '/,IAST/'*'/,IPLUS/'+'/,LIST/114*' '/                    SCAT0007
      DEFINE FILE 5(40,37,U,MREC)                                           SCAT0008
C----                                                                       SCAT0009
C---- THIS LINK PLOTS A SCATTER DIAGRAM FOR THE YEAR                        SCAT0010
C----                                                                       SCAT0011
      PII=3.14159                                                           SCAT0012
      MREC=1                                                                SCAT0013
C----                                                                       SCAT0014
C---- PLOT SCALES AND AXIS                                                  SCAT0015
C----                                                                       SCAT0016
      CALL SCALE (0.6,0.2,-10.,0.)                                          SCAT0017
      CALL EPLOT (1,0.,40.)                                                 SCAT0018
      CALL EGRID (3,0.,40.,1.,40)                                           SCAT0019
      CALL EGRID (0,0.,0.,0.5,36)                                           SCAT0020
      CALL EGRID (1,18.,0.,1.,40)                                           SCAT0021
      CALL EGRID (2,18.,40.,0.5,36)                                         SCAT0022
      CALL ECHAR (-2.,45.,0.2,0.2,0)                                        SCAT0023
      WRITE (7,100)                                                         SCAT0024
100   FORMAT ('SCATTER DIAGRAM FOR THE WHOLE YEAR')                         SCAT0025
      CALL ECHAR (-2.,43.,0.15,0.15,0)                                      SCAT0026
      WRITE (7,200)                                                         SCAT0027
200   FORMAT ('IN PARTS PER THOUSAND     * = 1 OCCURRENCE, + = 2 OCCURRESCAT0028
     1NCES')                                                                SCAT0029
      CALL ECHAR (-2.,10.,0.1,0.1,PII/2)                                    SCAT0030
      WRITE (7,9)                                                           SCAT0031
9     FORMAT ('SIGNIFICANT WAVE HEIGHT IN FEET')                            SCAT0032
      CALL EPLOT (0,-1.0,40.)                                               SCAT0033
      IF (MAXH-20) 30,31,30                                                 SCAT0034
30    IF (MAXH-40) 32,33,32                                                 SCAT0035
31    IY=20                                                                 SCAT0036
      DO 34 I=1,11                                                          SCAT0037
      Y=IY*2                                                                SCAT0038
      CALL ECHAR (-1.0,Y,0.1,0.1,0)                                         SCAT0039
      WRITE (7,35) IY                                                       SCAT0040
35    FORMAT (I2)                                                           SCAT0041
34    IY=IY-2                                                               SCAT0042
      GO TO 36                                                              SCAT0043
33    IY=40                                                                 SCAT0044
      DO 5 I=1,9                                                            SCAT0045
      Y=IY                                                                  SCAT0046
      CALL ECHAR (-1.0,Y,0.1,0.1,0)                                         SCAT0047
      WRITE (7,35) IY                                                       SCAT0048
5     IY=IY-5                                                               SCAT0049
      GO TO 36                                                              SCAT0050
32    IY=80                                                                 SCAT0051
```

```
      DO 8 I=1,9                                                        SCAT0052
      Y=IY/2.                                                           SCAT0053
      CALL ECHAR (-1.0,Y,0.1,0.1,0)                                     SCAT0054
      WRITE (7,35) IY                                                   SCAT0055
8     IY=IY-10                                                          SCAT0056
36    CALL ECHAR(0.,-1.,0.1,0.1,0)                                      SCAT0057
      WRITE (7,37)                                                      SCAT0058
37    FORMAT (' C    1     2     3     4     5     6     7     8     9  SCAT0059
     1  10    11    12    13    14    15    16    17    18')           SCAT0060
      CALL ECHAR (4.,-2.5,0.1,0.1,0)                                    SCAT0061
      WRITE (7,4)                                                       SCAT0062
4     FORMAT ('ZERO CROSSING PERIOD IN HALF SECOND INTERVALS')          SCAT0063
C----                                                                   SCAT0064
C---- CONVERT EACH LINE OF SCAT ARRAY TO A1 FORMAT USING INECB          SCAT0065
C---- PRINT EACH LINE ON GRAPH                                          SCAT0066
C----                                                                   SCAT0067
      DO 11 J=1,40                                                      SCAT0068
      READ (5'MREC) (SCAT(J,JJ),JJ=1,37)                                SCAT0069
      DO 12 JK=1,37                                                     SCAT0070
      ILEM= JK*3                                                        SCAT0071
      IF (SCAT(J,JK)-16448) 13,12,13                                    SCAT0072
13    IF (SCAT(J,JK)-23616) 15,16,15                                    SCAT0073
15    IF (SCAT(J,JK)-20032) 17,18,17                                    SCAT0074
16    LIST(ILEM)=IAST                                                   SCAT0075
      GO TO 12                                                          SCAT0076
18    LIST(ILEM)=IPLUS                                                  SCAT0077
      GO TO 12                                                          SCAT0078
17    ILEM=ILEM-5
      CALL INECB(SCAT(J,JK),ILEM,LIST)
12    CONTINUE                                                          SCAT0081
      DO 22 MAC=1,114                                                   SCAT0082
      IF (LIST(MAC)-16448) 21,22,21                                     SCAT0083
22    CONTINUE                                                          SCAT0084
      GO TO 11                                                          SCAT0085
21    AJ=J-0.5                                                          SCAT0086
      CALL ECHAR(0.,AJ,0.1,0.1,0)                                       SCAT0087
      WRITE (7,14) LIST                                                 SCAT0088
14    FORMAT (114A1)                                                    SCAT0089
C----                                                                   SCAT0090
C---- CLEAR LIST ARRAY                                                  SCAT0091
C----                                                                   SCAT0092
      DO 19 IL=1,114                                                    SCAT0093
19    LIST(IL)=ISPAC                                                    SCAT0094
11    CONTINUE                                                          SCAT0095
      CALL EPLOT(1,30.,0.)                                              SCAT0096
      CALL LINK(PERPL)                                                  SCAT0097
      END                                                               SCAT0098
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  IREC(IC)=F915
  JREC(IC)=F914        LAB(IC)=F913       MAXH(IC)=F912        N(IC)=F911         MM(IC)=F910         II(IC)=F90F
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA      NAMT(IC)=F8E9-F8E7    M(IC)=F8E6       YEAR(IC)=F8E5      DATES(IC)=F8E4-F8C7
    P(IC)=F8C6       KREC(IC)=F8C5      LREC(IC)=F8C4      MREC(IC)=F8C3      NREC(IC)=F8C2          J(IC)=F8C1
    K(IC)=F8C0          L(IC)=F8BF        PI(IC)=F8BE       KNT(IC)=F8BD     IHMAX(IC)=F8BC         MI(IC)=F8BB
  PII(R )=0006          Y(R )=0009        AJ(R )=000C     LIST(I )=0086-0015   IY(I )=0087          I(I )=0088
    J(I )=0089         JJ(I )=008A        JK(I )=008B      ILEM(I )=008C     IAST(I )=008D      IPLUS(I )=008E
  MAC(I )=008F         IL(I )=0090     ISPAC(I )=0091
```

```
STATEMENT ALLOCATIONS
 100   =00D9  200   =00EC  9     =010D  35    =011F  37    =0121  4     =015A  14    =0173  30    =01F1  31    =01F9  34    =021D
 33    =022C  5     =024B  32    =025C  8     =027D  36    =028C  13    =02E1  15    =02EE  16    =02FD  18    =0308  17    =0313
 12    =032A  22    =0342  21    =034D  19    =0366  11    =0378

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 SCALE    EPLOT    EGRID    ECHAR    INECB    ESUB     EDIV     ELD      ESTO     EDVR     FLOAT    ISTOX    MWRT     MCOMP    MIDAI
 MIOI     SUBSC    SNR      MDRED    MDCOM    MDIX     ECHRI

REAL CONSTANTS
   .314159000E 01=0094     .600000000E 00=0097     .200000000E 00=009A     .100000000E 02=009D     .000000000E 00=00A0
   .400000000E 02=00A3     .100000000E 01=00A6     .500000000E 00=00A9     .180000000E 02=00AC     .200000000E 01=00AF
   .450000000E 02=00B2     .430000000E 02=00B5     .150000000E 00=00B8     .100000000E 00=00BB     .400000000E 01=00BE
   .250000000E 01=00C1     .300000000E 02=00C4

INTEGER CONSTANTS
     1=00C7      3=00C8     40=00C9      0=00CA     36=00CB      2=00CC      7=00CD     20=00CE     11=00CF      9=00D0
     5=00D1     80=00D2     10=00D3     37=00D4  16448=00D5  23616=00D6  20032=00D7    114=00D8

CORE REQUIREMENTS FOR SCATP
 COMMON    1862  INSKEL COMMON       0  VARIABLES     148  PROGRAM     758


 END OF COMPILATION



SCATP
DUP FUNCTION COMPLETED
// DUP
*DELET               SCATP
DUP FUNCTION COMPLETED
*STORECIL          1 SCATP SCATP
*FILES(5,SCAT,1)
*CCEND
```

```
CLB, BUILD SCATP

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*CDW TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CD  0075
*PNT TABLE 2242  0008
*DFT TABLE 224A  0006
MAIN SCATP 23C0
PNT  SCATP 2244
LIBF ECHRI 25F0  21CD
LIBF ELD   2897  21D0
LIBF ESTO  2885  21D3
LIBF SNR   28B2  21D6
CALL SCALE 28C6
CALL EPLOT 28D2
CALL EGRID 2917
CALL ECHAR 2983
LIBF MWRT  2B49  21D9
LIBF MCOMP 2BE4  21DC
LIBF FLOAT 305B  21DF
LIBF EDVR  3074  21E2
LIBF MIOI  2C0F  21E5
LIBF EDIV  3087  21E8
LIBF MDRED 315D  21EB
LIBF SUBSC 346A  21EE
LIBF MDIX  311B  21F1
LIBF MDCOM 31BF  21F4
LIBF ISTOX 3496  21F7
CALL INECB 34C6
LIBF ESUB  35FD  21FA
LIBF MIOAI 2C30  21FD
PNT  PERPL 2248
LIBF EMPY  368F  2200
LIBF EADD  3605  2203
LIBF IFIX  36CD  2206
LIBF EINC  3784  2209
LIBF XYPLT 37A2  220C
LIBF PLOTI 3806  220F
LIBF ELDX  2893  2212
LIBF ESTOX 2831  2215
LIBF ERULE 3724  2218
LIBF EMOVE 3753  221B
CALL POINT 385A
CALL ESIN  389A
CALL ECOS  388F
LIBF ECHRX 26C1  221E
LIBF IOU   3940  2221
CALL IOFIX 39DC
CALL BT1BT 3A0C
CALL SAVE  3978
LIBF ADRCK 3A70  2224
```

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 LIBF NORM   3AD5  2227
 LIBF XDD    3B0D  222A
 LIBF FARC   3B5F  222D
 CALL BT2BT  3B90
 LIBF SUBIN  3FAC  2230
 CALL IABS   3BE7
 CALL ICALC  3BFF
 LIBF STFAC  3C2E  2233
 LIBF SBFAC  3C32  2236
 LIBF XMD    3C47  2239
 LIBF ESUBX  3601  223C
 LIBF EMPYX  3689  223F
 CORE        3C8C  1C2E
 COMM        58BA  0746

 CLB, SCATP LD XQ

DUP FUNCTION COMPLETED
```

```
// JOB              X
// FOR PERPL              VERSION 1 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*IOCS(DISK,PLOTTER,TYPEWRITER)
*NONPROCESS PROGRAM
      INTEGER RI,NAMT(3)                                                    PERP0001
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36)     PERP0002
      INTEGER S,YEAR,DATES(30),P,PI,R                                       PERP0003
      DIMENSION NAMFL(6),KAT(320),A(9),B(17),IB(17)                         PERP0004
      DIMENSION LIST(40)                                                    PERP0005
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMPERP0006
     1T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI       PERP0007
      DATA NAMFL(1)/'PE'/,NAMFL(3)/'  '/                                    PERP0008
      DATA NAMFL(4)/'PE'/,NAMFL(5)/'04'/,NAMFL(6)/'  '/                     PERP0009
      DATA A/1.5,0.875,0.625,0.5,0.4,0.3375,0.3,0.25,0.25/                  PERP0010
      DATA B/2.375,3.9,4.787,5.337,6.237,6.755,7.412,7.787,8.137,8.577,8PERP0011
     1.937,9.424,9.824,10.049,10.464,10.824,11.6/                       PERP0012
      DATA IB/3,6,9,12,18,24,30,36,42,51,60,75,90,99,126,150,177/           PERP0013
      DATA       PII/3.14159/                                               PERP0014
      DATA LIST/'02','04','06','08','10','12','14','16','18','20','22','PERP0015
     124','26','28','30','32','34','36','38','40','42','44','46','48','5PERP0016
     20','52','54','56','58','60','62','64','66','68','70','72','74','76PERP0017
     3','78','80'/                                                          PERP0018
      DEFINE FILE 1(320,1,U,IKREC)                                          PERP0019
      DEFINE FILE 2(320,1,U,LKREC)                                          PERP0020
      IKREC=1                                                               PERP0021
C----                                                                       PERP0022
C---- PLOT AXIS AND SCALES                                                  PERP0023
C----                                                                       PERP0024
      READ (1'1) KAT(1)                                                     PERP0025
      READ(2'1) KAT(2)                                                      PERP0026
      IF (KAT(1)-KAT(2))31,31,32                                            PERP0027
31    IF (KAT(2)-80)20,20,33                                                PERP0028
33    IF (KAT(2)-180)22,22,23                                               PERP0029
32    IF (KAT(1)-80) 20,20,21                                               PERP0030
21    IF (KAT(1)-180) 22,22,23                                              PERP0031
20    III=21                                                                PERP0032
      IY=100                                                                PERP0033
      BY=8.0                                                                PERP0034
      FY=100.                                                               PERP0035
      JY=5                                                                  PERP0036
      ZY=-8.                                                                PERP0037
      Y=0.07                                                                PERP0038
      EY=5.                                                                 PERP0039
      IFY=20                                                                PERP0040
      GO TO 24                                                              PERP0041
22    III=21                                                                PERP0042
      IY=200                                                                PERP0043
      BY=14.0                                                               PERP0044
      FY=200.                                                               PERP0045
      JY=10                                                                 PERP0046
      ZY=-8.                                                                PERP0047
      Y=0.04                                                                PERP0048
      EY=10.                                                                PERP0049
      IFY=20                                                                PERP0050
      GO TO 24                                                              PERP0051
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23    III=16                                                          PERP0052
      IY=300                                                          PERP0053
      BY=22.0                                                         PERP0054
      FY=300.                                                         PERP0055
      JY=20                                                           PERP0056
      ZY=-16.                                                         PERP0057
      Y=0.025                                                         PERP0058
      FY=10.                                                          PERP0059
      IFY=30                                                          PERP0060
24    CALL SCALE (1.,1.,-12.,0.)                                      PERP0061
      CALL EPLOT (1,0.,0.)                                            PERP0062
      CALL SCALE (1.5,Y,0.,0.)                                        PERP0063
      CALL EPLOT (1,0.,FY)                                            PERP0064
      CALL EGRIL (3,0.,FY,EY,IFY)                                     PERP0065
      DO 25 I=1,III                                                   PERP0066
      AY=IY                                                           PERP0067
      CALL ECHAR (-.3,AY,0.1,0.1,0)                                   PERP0068
      WRITE (7,26) IY                                                 PERP0069
26    FORMAT (I3)                                                     PERP0070
25    IY=IY-JY                                                        PERP0071
      CALL ECHAR (-0.8,20.,0.1,0.1,PII/2)                             PERP0072
      WRITE (7,27)                                                    PERP0073
27    FORMAT ('NUMBER OF OCCURRENCES OF WAVE CONDITIONS')             PERP0074
      CALL ECHAR (-0.5,25.,0.1,0.1,PII/2)                             PERP0075
      WRITE (7,28)                                                    PERP0076
28    FORMAT ('EXCEEDING A GIVEN DURATION')                           PERP0077
      CALL EPLOT (0,0.,0)                                             PERP0078
      DO 1 IK=1,2                                                     PERP0079
      DO 2 J=1,9                                                      PERP0080
      CALL SCALE (A(J),Y,0.,0.)                                       PERP0081
      CALL EGRIL (0,0.,0.,1.,1)                                       PERP0082
2     CONTINUE                                                        PERP0083
1     CONTINUE                                                        PERP0084
      CALL SCALE (A(1),Y,0.,0.)                                       PERP0085
      CALL EGRIL (0,0.,0.,1.,1)                                       PERP0086
      CALL ECHAR (-6.716,ZY,0.1,0.1,0)                                PERP0087
      WRITE (7,5)                                                     PERP0088
5     FORMAT ('1              2        3     4    5   6  7  8   10      PERP0089
     1       20        30     40   50  60  70 80  100             200')  PERP0090
      ZY=2*ZY                                                         PERP0091
      CALL ECHAR (-4.,ZY,0.1,0.1,0)                                   PERP0092
      WRITE (7,6)                                                     PERP0093
6     FORMAT ('DURATION IN HOURS')                                    PERP0094
      CALL EPLOT (0,-6.718,FY)                                        PERP0095
      DO 29 IK=1,2                                                    PERP0096
      DO 30 J=1,9                                                     PERP0097
      CALL SCALE (A(J),Y,0.,0.)                                       PERP0098
      CALL EGRIL (0,0.,0.,1.,1)                                       PERP0099
30    CONTINUE                                                        PERP0100
29    CONTINUE                                                        PERP0101
      CALL SCALE (A(1),Y,0.,0.)                                       PERP0102
      CALL EGRIL (0,0.,0.,1.,1)                                       PERP0103
      CALL ECHAR (-5.,BY,0.2,0.2,0)                                   PERP0104
      WRITE (7,9)                                                     PERP0105
9     FORMAT ('PERSISTENCE DIAGRAM FOR THE WHOLE YEAR')               PERP0106
      CALL EGRIL (3,1.,0.,EY,IFY)                                     PERP0107
```

```
C----                                                                   PERP0108
C---- PLOT PERSISTENCE CURVE FOR EACH EVEN HS VALUE                     PERP0109
C----                                                                   PERP0110
      FY=-FY                                                            PERP0111
      CALL EPLOT (0,-5.718,FY)                                          PERP0112
      LHMAX=IHMAX/2                                                     PERP0113
      DO 10 JJ=1,LHMAX                                                  PERP0114
      IKREC=1                                                           PERP0115
      NAMFL(2)=LIST(JJ)                                                 PERP0116
      CALL OPFT(2,NAMFL,IERR)                                           PERP0117
      IF (IERR) 11,12,11                                                PERP0118
11    WRITE (1,13) IERR                                                 PERP0119
13    FORMAT ('IERR=',I3,' IN PROGRAM PERPL')                           PERP0120
      CALL EXIT                                                         PERP0121
12    CALL SCALE (1.,Y,0.,0.)                                           PERP0122
      READ (1'IKREC) (KAT(I),I=1,320)                                   PERP0123
      DO 14 J=1,17                                                      PERP0124
      IJ=IB(J)                                                          PERP0125
      IJ=IJ/3                                                           PERP0126
      AY=KAT(IJ)                                                        PERP0127
14    CALL EPLOT(-2,B(J),AY)                                            PERP0128
      AY=KAT(1)                                                         PERP0129
      CALL ECHAR(2.,AY,0.1,0.1,0)                                       PERP0130
      JJA=JJ*2                                                          PERP0131
      WRITE (7,15) JJA                                                  PERP0132
15    FORMAT (I2,'FT')                                                  PERP0133
      CALL EPLOT(0,0.,0.)                                               PERP0134
10    CONTINUE                                                          PERP0135
      CALL EPLOT(1,14.,-200)                                            PERP0136
C----                                                                   PERP0137
C----- SET LAB FOR RETURN TO WAST                                       PERP0138
C----                                                                   PERP0139
      LAB=3                                                             PERP0140
      CALL LINK(DUMP)                                                   PERP0141
      END                                                               PERP0142
```

VARIABLE ALLOCATIONS

SWPA(IC)=FFFF-FFD6	SCAT(IC)=FFD5-FA0E	HS(IC)=FA0D-F9A8	HMAX(IC)=F9A7-F942	TZ(IC)=F941-F916	IREC(IC)=F915		
JREC(IC)=F914	LAB(IC)=F913	MAXH(IC)=F912	N(IC)=F911	MM(IC)=F910	II(IC)=F90F		
TITLE(IC)=F90E-F8EB	S(IC)=F8EA	NAMT(IC)=F8E9-F8E7	M(IC)=F8E6	YEAR(IC)=F8E5	DATES(IC)=F8E4-F8C		
P(IC)=F8C6	KREC(IC)=F8C5	LREC(IC)=F8C4	MREC(IC)=F8C3	NREC(IC)=F8C2	R(IC)=F8C1		
K(IC)=F8C0	L(IC)=F8BF	PI(IC)=F8BE	KNT(IC)=F8BD	IHMAX(IC)=F8BC	PI(IC)=F8B		
A(R)=0024-000C	B(R)=0057-0027	BY(R)=005A	FY(R)=005D	ZY(R)=0060	Y(R)=0063		
EY(R)=0066	AY(R)=0069	PII(R)=006C	NAMFL(I)=007A-0075	KAT(I)=01BA-007B	IB(I)=01CP-01		
LIST(I)=01F3-01CC	IKREC(I)=01F4	LKREC(I)=01F5	III(I)=01F6	IY(I)=01F7	JY(I)=01F8		
IFY(I)=01F9	I(I)=01FA	IK(I)=01FB	J(I)=01FC	LHMAX(I)=01FD	JJ(I)=01FE		
IERR(I)=01FF	IJ(I)=0200	JJA(I)=0201					

STATEMENT ALLOCATIONS

26	=026A	27	=025C	28	=0282	5	=0291	6	=02CE	9	=02D9	13	=02EE	15	=02FF	31	=0320	33	=0
32	=0332	21	=033A	20	=0344	22	=036B	23	=0392	24	=03B7	25	=03F4	2	=0455	1	=0455	30	=0
29	=04C4	11	=053A	12	=0542	14	=057D	10	=05BA										

FEATURES SUPPORTED
NONPROCESS
ONE WORD INTEGERS
EXTENDED PRECISION

```
 IOCS

CALLED SUBPROGRAMS
 SCALE    EPLOT    EGRID    ECHAR    DFT      EMPY     ELD      ESTO     EOVR     FLOAT    ISTOX    MWRT     MCOMP    MIOI     SUBSC
 SNR      MLREL    MDCOM    MDIX     ECHRI    TYPEN    EBPRT

REAL CONSTANTS
   .800000000E 01=0205     .100000000E 03=0209     .700000000E-01=020C     .500000000E 01=020F     .140000000E 02=0212
   .200000000E 03=0215     .400000000E-01=0218     .100000000E 02=021B     .220000000E 02=021E     .320000000E 03=0221
   .160000000E 02=0224     .250000000E-01=0227     .100000000E 01=022A     .120000000E 02=022D     .000000000E 00=0230
   .150000000E 01=0233     .300000000E 00=0236     .100000000E 00=0239     .800000000E 00=023C     .200000000E 02=023F
   .500000000E 00=0242     .250000000E 02=0245     .671600000E 01=0248     .400000000E 01=024B     .671600000E 01=024E
   .200000000E 00=0251     .200000000E 01=0254

INTEGER CONSTANTS
     1=0257      2=0258     80=0259    180=025A     21=025B    100=025C      5=025D     20=025E    200=025F     10=0260
    16=0261    300=0262     30=0263      3=0264      0=0265      7=0266      9=0267    320=0268     17=0269

CORE REQUIREMENTS FOR PERPL
 COMMON    1862  INSKEL COMMON      0  VARIABLES    518  PROGRAM    976


 END OF COMPILATION



PERPL
DUP FUNCTION COMPLETED
// DUP
*DELET               PERPL
DUP FUNCTION COMPLETED
*STORECIL          1 PERPL PERPL
*FILES(1,PE02,1)
*FILES(2,PE04,1)
*CC END
```

```
CLB, BUILD PERPL

CORE LOAD  MAP
TYPE NAME  ARG1  ARG2

*COM TABLE 2182  000C
*IBT TABLE 218E  000E
*FIO TABLE 219C  0010
*ETV TABLE 21AC  0021
*VTV TABLE 21CD  0069
*PNT TABLE 2236  0008
*DFT TABLE 223E  000C
MAIN PERPL 2540
PNT  PERPL 2238
LIBF FBPRT 2815  21CD
LIBF ECHRI 28DC  21D0
LIBF MDREC 2883  21D3
LIBF MDIX  2B41  21D6
LIBF MDCOM 2BF5  21D9
LIBF ELD   2EF7  21DC
LIBF ESTO  2EE5  21DF
LIBF SNR   2F12  21E2
CALL SCALE 2F26
CALL EPLOT 2F32
CALL EGRID 2F77
LIBF FLOAT 2FD1  21E5
CALL ECHAR 2FF9
LIBF MWRT  318F  21E8
LIBF MIOI  3285  21EB
LIBF MCOMP 325A  21EE
LIBF EDVR  3614  21F1
LIBF SUBSC 3756  21F4
LIBF EMPY  3789  21F7
LIBF ISTOX 37C6  21FA
CALL DFT   37E6
PNT  DUMP  223C
CALL PRT   3856
LIBF EADD  38C7  21FD
LIBF IFIX  394B  2200
LIBF EINC  3A02  2203
LIBF XYPLT 3A20  2206
LIBF PLOTI 3A84  2209
LIBF ELDX  2EF3  220C
LIBF ESTOX 2E91  220F
LIBF ADRCK 3AA0  2212
CALL BT2BT 3B04
CALL SAVE  3B20
CALL IOFIX 3B84
LIBF ERULE 39A2  2215
LIBF EMOVE 39D1  2218
CALL POINT 3BEC
LIBF NORM  3C21  221B
CALL ESIN  3C64
CALL ECOS  3C59
LIBF ECHRX 29AD  221E
LIBF IOU   3D0A  2221
```

```
CALL BTIBT 3C42
LIBF XCD   3CA7  2224
LIBF FARC  3CF9  2227
LIBF XMC   3E2B  222A
CALL FLETM 3E6E
LIBF ESUBX 38C3  222D
LIBF EMPYX 3783  2230
LIBF ESUB  38BF  2233
CORE       405A  1860
COMM       58BA  0746

CLB, PERPL LL XQ

LOP FUNCTION COMPLETED
```

```
// JOB            X
// *JOB SERIAL NUMBER 19035
// *DATE  5.1.1971
// FOR DUMP              VERSION 1 MODIFICATION 0 1.12.70
*LIST ALL
*ONE WORD INTEGERS
*EXTENDED PRECISION
*NONPROCESS PROGRAM
*IOCS(DISK,1443 PRINTER)
      INTEGER TSCAT(37),TPE(320)                                          DUMP0001
      INTEGER RI,NAMT(3)                                                  DUMP0002
      INTEGER SWPA(42),SCAT(40,37),HS(102),HMAX(102),TZ(2,22),TITLE(36)   DUMP0003
      INTEGER S,YEAR,DATES(30),P,PI,R                                     DUMP0004
      DIMENSION CHS(102),CHMAX(102),CTZ(44),CSWPA(42),LIST(40),NAMFL(18)DUMP0005
      COMMON SWPA,SCAT,HS,HMAX,TZ,IREC,JREC,LAB,MAXH,N,MM,II,TITLE,S,NAMDUMP0006
     1T, M,YEAR,DATES,P,KREC,LREC,MREC,NREC,R,K,L,PI,KNT,IHMAX,RI         DUMP0007
      DATA LIST/'02','04','06','08','10','12','14','16','18','20','22','DUMP0008
     124','26','28','30','32','34','36','38','40','42','44','46','48','5DUMP0009
     20','52','54','56','58','60','62','64','66','68','70','72','74','76DUMP0010
     3','78','80'/                                                        DUMP0011
      DATA NAMFL(1)/'HS'/,NAMFL(2)/'  '/,NAMFL(3)/'  '/,NAMFL(4)/'HM'/,NDUMP0012
     1AMFL(5)/'AX'/,NAMFL(6)/'  '/,NAMFL(7)/'TZ'/,NAMFL(8)/'  '/,NAMFL(9DUMP0013
     2)/'  '/,NAMFL(10)/'SW'/,NAMFL(11)/'PA'/,NAMFL(12)/'  '/,NAMFL(13)/DUMP0014
     3'SC'/,NAMFL(14)/'AT'/,NAMFL(15)/'  '/,NAMFL(16)/'PE'/,NAMFL(18)/' DUMP0015
     4 '/                                                                 DUMP0016
      DATA CHS/102*0./,CHMAX/102*0./,CTZ/44*0./,CSWPA/42*0./,TSCAT/37*0/DUMP0017
     1,TPE/320*0/                                                         DUMP0018
      DEFINE FILE 1(4,306,U,IREC),2(4,306,U,JREC),3(4,132,U,KREC)         DUMP0019
      DEFINE FILE 4(1,126,U,LREC),5(40,37,U,MREC),6(320,1,U,IKREC)        DUMP0020
C----                                                                      DUMP0021
C---- THIS PROGRAM LISTS THE CONTENTS OF ALL DISK FILES WHICH             DUMP0022
C---- HAVE BEEN PLOTTED IN WAST                                           DUMP0023
C----                                                                      DUMP0024
      WRITE (3,1)                                                          DUMP0025
1     FORMAT (1H1,' HS FOR WINTER,SPRING,SUMMER,AUTUMN FROM 1-101 FT'/)    DUMP0026
      DO 2 LK=1,4                                                          DUMP0027
      READ (1'LK) (CHS(LJ),LJ=1,102)                                       DUMP0028
2     WRITE (3,3) CHS                                                      DUMP0029
3     FORMAT (1HO,(20F5.1))                                                DUMP0030
      WRITE (3,4)                                                          DUMP0031
4     FORMAT (1H1,' HMAX FOR WINTER,SPRING,SUMMER,AUTUMN FROM 1-101FT'/)DUMP0032
      DO 5 LK=1,4                                                          DUMP0033
      READ (2'LK) (CHMAX(LJ),LJ=1,102)                                     DUMP0034
5     WRITE (3,3) CHMAX                                                    DUMP0035
      WRITE (3,6)                                                          DUMP0036
6     FORMAT (1H1,' TZ FOR WINTER,SPRING,SUMMER,AUTUMN. IN HALF SECOND IDUMP0037
     1NTERVALS. FIRST NO. = CALM'/)                                        DUMP0038
      DO 7 LK=1,4                                                          DUMP0039
      READ (3'LK) (CTZ(LJ),LJ=1,44)                                        DUMP0040
7     WRITE (3,8) CTZ                                                      DUMP0041
8     FORMAT (1HO,(22F5.1))                                                DUMP0042
      WRITE (3,9)                                                          DUMP0043
9     FORMAT (1H1,' SPECTRAL WIDTH PARAMETER FOR THE YEAR IN INTERVALS 0DUMP0044
     1F 0.025'/)                                                          DUMP0045
      READ (4'1)(CSWPA(LJ),LJ=1,42)                                        DUMP0046
      WRITE (3,10) CSWPA                                                   DUMP0047
10    FORMAT (1HO,(21F5.1))                                                DUMP0048
      WRITE (3,14)                                                         DUMP0049
```

```
14    FORMAT (1H1,' PERSISTENCE VALUES - 2FT,4FT ETC,IN THREE HOURLY READDUMP0050
     1DINGS'/)                                                          DUMP0051
      LHMAX=IHMAX/2                                                     DUMP0052
      DO 15 LK=1,LHMAX                                                  DUMP0053
      NAMFL(17)=LIST(LK)                                                DUMP0054
      CALL DFT(6,NAMFL,IERR)                                            DUMP0055
      IF (IERR) 16,17,16                                                DUMP0056
16    WRITE (3,18) IERR                                                 DUMP0057
18    FORMAT (1H1,' IERR=',I2,' IN DUMP')                               DUMP0058
      CALL EXIT                                                         DUMP0059
17    IKREC=1                                                           DUMP0060
      READ (6'IKREC) (TPE(LJ),LJ=1,320)                                 DUMP0061
15    WRITE (3,19) TPE                                                  DUMP0062
19    FORMAT (1H0,(30I4))                                               DUMP0063
      CALL LINK(WAST)                                                   DUMP0064
      END                                                               DUMP0065
VARIABLE ALLOCATIONS
  SWPA(IC)=FFFF-FFD6  SCAT(IC)=FFD5-FA0E    HS(IC)=FA0D-F9A8  HMAX(IC)=F9A7-F942    TZ(IC)=F941-F916  I3SC(IC)=F915
  JREC(IC)=F914        LAB(IC)=F913       MAXH(IC)=F912          N(IC)=F911         MM(IC)=F910          II(IC)=F90F
 TITLE(IC)=F90E-F8EB     S(IC)=F8EA       NAMT(IC)=F8E9-F8E7     M(IC)=F8E6      YEAR(IC)=F8E5       DATES(IC)=F8E4-F8C7
    P(IC)=F8C6       KREC(IC)=F8C5       LREC(IC)=F8C4        MREC(IC)=F8C3      NREC(IC)=F8C2          R(IC)=F8C1
    K(IC)=F8C0          L(IC)=F8BF         PI(IC)=F8BE         KNT(IC)=F8BD     IHMAX(IC)=F8BC         RI(IC)=F8BB
   CHS(R )=0153-0024 CHMAX(R )=0285-0156   CTZ(R )=0309-0288 CSWPA(R )=0387-030C  LIST(I )=03B1-038A NAMFL(I )=03C3-03B2
 TSCAT(I )=03E8-03C4   TPE(I )=0528-03E9 IKREC(I )=0529         LK(I )=052A        LJ(I )=052B       LHMAX(I )=052C
  IERR(I )=052D

STATEMENT ALLOCATIONS
 1     =0539  3     =0557  4     =055C  6     =057A  8     =05A7  9     =05AC  10    =05CF  14    =0504  18    =05E6  19    =05A3
 2     =0627  5     =0656  7     =0685  16    =06DA  17    =06E2  15    =06FD

FEATURES SUPPORTED
 NONPROCESS
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 DFT      ISTOX    MWRT     MCOMP    MIOAI    MIOAF    MIOI     SUBSC    MDRED    MDCOM    MDFX     MDIX     PRNTM    EBPRT

INTEGER CONSTANTS
     3=0530       1=0531       4=0532     102=0533       2=0534      44=0535      42=0536       6=0537     320=0538

CORE REQUIREMENTS FOR DUMP
 COMMON    1862  INSKEL COMMON       0  VARIABLES    1328  PROGRAM     482


 END OF COMPILATION
```

```
DUMP
DUP FUNCTION COMPLETED
// DUP
*DELET                DUMP
DUMP
D25 NAME NOT IN L/F
*STORECIL          1 DUMP  DUMP
*FILES(1,HS,1),(2,HMAX,1),(3,TZ,1),(4,SWPA,1),(5,SCAT,1),(6,PE02,1)
*CCEND




 CLB, BUILD DUMP

 CORE LOAD  MAP
 TYPE NAME  ARG1  ARG2

 *COM TABLE 2182  000C
 *IBT TABLE 218E  000E
 *FIO TABLE 219C  0010
 *ETV TABLE 21AC  0021
 *VTV TABLE 21CD  0033
 *PNT TABLE 2200  0008
 *DFT TABLE 2208  0024
 MAIN DUMP  2810
 PNT  DUMP  2202
 LIBF EBPRT 291B  21CD
 LIBF MWRT  2865  21D0
 LIBF MCOMP 2C00  21D3
 LIBF MDRED 30DD  21D6
 LIBF SUBSC 33EA  21D9
 LIBF MDFX  3096  21DC
 LIBF MDCOM 313F  21DF
 LIBF MIOAF 2C51  21E2
 LIBF ISTOX 3416  21E5
 CALL DFT   3436
 LIBF MIOI  2C2B  21E8
 LIBF MDIX  309B  21EB
 LIBF MIOAI 2C4C  21EE
 PNT  WAST  2206
 CALL PRT   34A6
 LIBF IOU   34F0  21F1
 CALL IOFIX 358C
 CALL BT1BT 35BC
 CALL SAVE  3528
 LIBF ADRCK 3620  21F4
 LIBF FLOAT 3685  21F7
 LIBF IFIX  369B  21FA
 CALL BT2BT 36CE
 CALL FLETM 36EA
 LIBF NORM  38D5  21FD
 CORE       390E  1FAC
 COMM       58BA  0746

 CLB, DUMP  LD XQ

DUP FUNCTION COMPLETED
```

```
// JOB            X
// *MAINLINE/PAGE/
// FOR SBWR6              VERSION 1 MODIFICATION 1
*IOCS(DISK,TYPEWRITER)
*ONE WORD INTEGERS
*EXTENDED PRECISION
C----
C---- THIS PROGRAM READS RAW SHIPBORNE WAVE RECORDER DATA FROM DISK
C---- AND CALCULATES THE TWO HIGHEST WAVES,THE TWO LOWEST WAVES, THE
C---- NUMBER OF ZERO CROSSINGS AND THE NUMBER OF MAXIMA
C----
      INTEGER POINT
      EXTERNAL SBWR5,SBWRE
      DIMENSION IVAL(1200),NAM3(3)
C--   COMMON CARDS FOR CRUISE 32
      COMMON/INSKEL/ ISW(16),IDAY,IHOUR,IMIN,ISEC,IMINT,ICLOC,ISEC6,
     1ILOGM,KLIST,INTC,NXTIM,LDAY1,NXDAY,LTIM1,LTIM2,MATT1,MATT2,MTIM,
     2MDAY,NRDG,LAMDR,LADDR,LOMDR,LODDR,ISPD,IHDNG,LDEPH,NDEPH,NDAY,
     3ITIMD,NDIFF,IECO,NFIX,ICOR,IRCD,KRT1,KRT2,KRT3,KCHN1,KCHN2,IRCG,
     4NDPF,LDAY2,IVMAX,ICRU,INSEC,KSCAL,KTST,KTSW,KADR,ISBW,IYR,INDAT,
     5IFLGR,ISTSC,KLOST,KNVST,KDISA,KDISB,MAGP,IGYRO,KPRNT,KOUT,KSBWR
      COMMON/INSKEL/NAVD,NAVT,LORAN,IGRAA,IGRAB,KSPA(78),ISPB1,ISPB2,
     1ISPB3,ISPB4,ISPB5,ILOC,ITPBF,IBFL,NANID,IDPT1,IDPT2,IDPT3,ICT1,
     2ICT2,ICT3,INT1,INT2,INT3,IGEOC,ISEK,ISUBG,JGEOC,JGEOD,INDBF,IGEOD,
     3ISPB6,IECST,NIDPT,NANPT,NID,NAN,IBUF2(153),IBUF1(153)
      COMMON NOCRE,NOZER,AMAX1,AMAX2,AMIN1,AMIN2,JDAY,ITIME,NEXT,NWORD,L
     1AT1,LAT2,LONG1,LONG2,IERR
      DEFINE FILE 2(1200,3,U,NREC)
      DEFINE FILE 1(1,10,U,IREC)
      DATA NAM3(3)/'  '/
      DATA POINT/0/
C----
C---- IVAL WILL HOLD 20 MINUTES OF DATA. IT SHOULD BE
C---- INCREASED FOR LONGER RECORDINGS
C----
1     IREC=1
      NREC=1
      NOCRE=0
      NOZER=0
      AMAX1=0.
      AMAX2=0.
      AMIN1=0.
      AMIN2=0.
      SUM=0.
C----
C---- NOCRE = NUMBER OF MAXIMA
C---- NOZER = NUMBER OF MINIMA
C---- POINT = 1 FOR MAX POINT, 0 FOR MIN POINT
C---- AMAX1,AMAX2 = TWO HIGHEST WAVE HEIGHTS
C---- AMIN1,AMIN2 = TWO LOWEST WAVE HEIGHTS
C----
C---- READ HEADER RECORD
C----
      READ (1'IREC) NTOT,NEXT,NAM1,NAM2,NWORD,ICR,JDAY,ITIME,INT,ICAL
      IREC=IREC+1
C----
C---- STORE SHIP'S POSITION AT THE START OF RECORDING
```

```
C----
      LAT1=LAMDR
      LAT2=LADDR
      LONG1=LOMDR
      LONG2=LODDR
C----
C---- SET UP FILE NAME IN NAM3. ALTER DEFINE FILE STATEMENT, AND
C---- CALL VIAQ IF THE 'CALL' IS INCORRECT.
C----
      NOREC=NWORD/100
      NAM3(1)=NAM1
      NAM3(2)=NAM2
      CALL DFTCH(1,NAM3,1,NTOT,NOREC,IERR)
      IF(IERR) 2,3,2
2     CALL CHAIN(SBWRE)
C----
C---- READ JI VALUES OF IVAL
C----
3     JI=(NEXT-3)*NOREC
      DO 5 J=1,JI,10
      JN=J+9
5     READ (1'IREC) (IVAL(JM),JM=J,JN)
C----
C---- CALCULATE MEAN IVAL,AND SUBTRACT MEAN FROM EACH IVAL VALUE
C----
      DO 50 L=1,JI
50    SUM=SUM+IVAL(L)
      ISUM=SUM/JI
      DO 51 L=1,JI
51    IVAL(L)=IVAL(L)-ISUM
C----
C---- CALCULATE FIRST DERIVATIVES OF IVAL STARTING AT IVAL(3)
C----
      KI=JI-2
      DO 6 J=3,KI
      DER1=(2.*IVAL(J+1)/3.-2.*IVAL(J-1)/3.-IVAL(J+2)/12.+IVAL(J-2)/12.)
     1/INT
      WRITE (2'NREC) DER1
6     CONTINUE
C----
C---- MAIN LOOP OF PROGRAM CALCULATES NUMBER OF ZERO CROSSINGS,NUMBER
C---- OF CRESTS AND TWO MAXIMA AND MINIMA
C----
C----
C---- TEST FOR CHANGE IN SIGN OF EACH PAIR OF  IVAL VALUES TO
C---- DETERMINE NUMBER OF ZERO CROSSINGS
C----
      J=JI-2
      DO 87 K=1,J
      IF(ISIGN(1,(IVAL(K)))+ISIGN(1,(IVAL(K+1)))) 87,7,87
7     NOZER=NOZER+1
87    CONTINUE
C----
C---- TEST FOR CHANGE IN SIGN OF EACH PAIR OF  DER1 VALUES TO
C---- DETERMINE A MAXIMUM OR MINIMUM VALUE
C----
      NREC=1
```

```
      READ (2'NREC) DER1
      READ (2'NREC) DER2
      READ (2'NREC) DER3
      IK=KI-2
      DO 100 K=3,IK
      READ (2'NREC) DER4
      IF (DER2) 9,11,12
 9    IF (DER3) 10,10,14
 12   IF (DER3) 15,10,10
 11   IF (DER3) 16,10,17
 16   IF (DER1) 10,10,15
 17   IF (DER1) 14,10,10
C----
C---- ROUTINE FOR MAXIMUM POINT - INCREASE NOCRE BY 1, SET POINT = 1,
C---- CALCULATE VALUE OF MAX POINT AND STORE IF ONE OF THE TWO
C---- HIGHEST VALUES
C----
C---- ROUTINE FOR MINIMUM POINT - SET POINT=0, CALCULATE
C---- VALUE OF MIN POINT AND STORE IF ONE OF THE TWO
C---- LOWEST VALUES
C----
 15   NOCRE=NOCRE+1
      POINT=1
      GO TO 25
 14   POINT=0
 25   A=DER1-DER2-DER3+DER4
      B=5.*DER3-DER1-3.*DER2-DER4
      C=4.*DER2
      ANS=(-B+SQRT(B*B-4.*A*C))/(2.*A)
      IF (ANS) 20,19,19
 19   IF (ANS-1) 18,18,20
 20   ANS=(-B-SQRT(B*B-4.*A*C))/(2.*A)
 18   YMAX=(ANS*ANS*(IVAL(K)-IVAL(K+1)-IVAL(K+2)+IVAL(K+3))+ANS*(5.*IVAL
     1(K+2)-IVAL(K)-3.*IVAL(K+1)-IVAL(K+3))+4.*IVAL(K+1))/4
      IF (POINT) 21,29,21
 21   IF(YMAX) 10,10,200
 200  IF (AMAX1-YMAX) 22,23,24
 22   AMAX2=AMAX1
      AMAX1=YMAX
      GO TO 10
 23   AMAX2=YMAX
      GO TO 10
 24   IF (AMAX2-YMAX) 23,10,10
 29   IF (YMAX) 201,10,10
 201  YMAX=ABS(YMAX)
      IF (AMIN1-YMAX) 26,27,28
 26   AMIN2=AMIN1
      AMIN1=YMAX
      GO TO 10
 27   AMIN2=YMAX
      GO TO 10
 28   IF (AMIN2-YMAX) 27,10,10
 10   DER1=DER2
      DER2=DER3
      DER3=DER4
 100  CONTINUE
C----
```

```
C---- CONVERT TWO MAX AND TWO MIN VALUES TO FEET USING
C---- CALIBRATION FACTOR
C----
       CAL=ICAL/100000.
      AMAX1=AMAX1*CAL
      AMAX2=AMAX2*CAL
      AMIN1=AMIN1*CAL
      AMIN2=AMIN2*CAL
      CALL CHAIN(SBWR5)
      END
*DELETE   M          SBWR6 DUMM
*STORECIL M        0 SBWR6 SBWR6 SBWR6
*LOCAL(DFTCH,FLETM),(MDRED,MDWRT,MDCOM,MDIX,MDF,MDI)
*FILES(1,WAVE,1),(2,VALS,1)
*CCEND
```

```
// JOB            X
// *MAINLINE/PAGE/
// FOR SBWR5              VERSION 1 MODIFICATION 1
*IOCS(DISK,TYPEWRITER)
*ONE WORD INTEGERS
*EXTENDED PRECISION
C----
C---- SHIP VERSION OF NIO 89. TO ANALYSE ONE RECORD WHICH HAS
C---- BEEN STORED ON DISK, AND PRINT THE RESULTS ON 1053 PRINTER
C----
      EXTERNAL WAVR
C--   COMMON CARDS FOR CRUISE 32
      COMMON/INSKEL/ ISW(16),IDAY,IHOUR,IMIN,ISEC,IMINT,ICLOC,ISEC6,
     1ILOGM,KLIST,INTC,NXTIM,LDAY1,NXDAY,LTIM1,LTIM2,MATT1,MATT2,MTIM,
     2MDAY,NRDG,LAMDR,LADDR,LOMDR,LODDR,ISPD,IHDNG,LDEPH,NDEPH,NDAY,
     3ITIMD,NDIFF,IECO,NFIX,ICOR,IRCD,KRT1,KRT2,KRT3,KCHN1,KCHN2,IRCG,
     4NDPF,LDAY2,IVMAX,ICRU,INSEC,KSCAL,KTST,KTSW,KADR,ISRW,IYR,INDAT,
     5IFLGR,ISTSC,KLUST,KNVST,KDISA,KDISB,MAGP,IGYRO,KPRNT,KOUT,KSRWR
      COMMON/INSKEL/NAVD,NAVT,LORAN,IGRAA,IGRAB,KSPA(78),ISPB1,ISPB2,
     1ISPB3,ISPB4,ISPB5,ILOC,ITPRF,IBFL,NANID,IDPT1,IDPT2,IDPT3,ICT1,
     2ICT2,ICT3,INT1,INT2,INT3,IGEOC,ISEK,ISUBG,JGEOC,JGEOD,INDBF,IGEOD,
     3ISPB6,IECST,NIDPT,NANPT,NID,NAN,IBUF2(153),IBUF1(153)
      COMMON NOCRE,NOZER,AMAX1,AMAX2,AMIN1,AMIN2,JDAY,ITIME,NEXT,NWORD,L
     1AT1,LAT2,LONG1,LONG2,IERR
      WRITE (1,6)
6     FORMAT ('SWBR5 ENTERED')
      HIGH3=AMAX1+AMIN1+0.05
      HIGH4=AMAX2+AMIN2+0.05
      DUR=((NEXT-3)*(NWORD/100.))/60.
      WAPER=120.0*DUR/NOZER+0.005
C----
C---- CALCULATE THE TWO HIGHEST WAVES AND THE WAVE PERIOD
C----
      SWP=SQRT(1.0-((60.0*DUR/NOCRE)**2/WAPER**2))+0.0005
C----
C---- SWP=SPECTRAL WIDTH PARAMETER
C----
      G=2.0*3.14159/WAPER
      X=1.0/(77.44*G*G)
      X=SQRT(X+1.0)
      X=(0.83*X*X*X)
      E=X*EXP(2.5*10.0*G*G/32.174)
      HIGH5=E*HIGH3+0.05
      HIGH6=E*HIGH4+0.05
C----
C---- HIGH5 AND HIGH6 ARE HIGH3 AND HIGH4 CORRECTED FOR INSTRUMENTAL
C---- RESPONSE. DEPTH OF THE PRESSURE UNITS IS TAKEN AS 10.0 FEET
C----
      F2=ALOG(NOZER/2.0)
      F1=SQRT(2.0*F2)
      HIGH7=2.0*HIGH5/(F1*(1.0+0.289/F2-0.247/F2**2))+0.05
      HIGH8=2.0*HIGH6/(F1*(1.0-0.211/F2-0.103/F2**2))+0.05
C----
C---- HIGH7 AND HIGH8 ARE THE MEAN HEIGHT OF THE
C---- HIGHEST ONE-THIRD OF THE WAVES
C----
      HIGH9=(HIGH7+HIGH8)/2.0+0.05
```

```
C----
C---- HIGH9 = H(SIGNIFICANT)
C----
      Y=SQRT(ALOG(90.0*NOZER/20.0))
      H10=HIGH9*(0.7071*(0.006361*Y**4-0.073968*Y**3+0.330573*Y**2+0.316
     1548*Y+0.566405))+0.05
C----
C---- H10 = H MAX(3HRS)
C----
      KDAY=0
      MONTH =0
C----
C---- CALCULATE DATE USING JULAN
C----
      CALL JULAN(IYR,JDAY,MONTH,KDAY)
C----
C---- CONVERT POSITION AND TIME PRIOR TO PRINTING
C----
      LAT3=LAMDR
      LAT4=LADDR
      LONG3=LOMDR
      LONG4=LODDR
      CALL POSN(LAT2,LAT1,LONG2,LONG1,LAT5,LONG5)
      CALL POSN(LAT4,LAT3,LONG4,LONG3,LAT6,LONG6)
      ALAT1=LAT1/100.
      ALNG1=LONG1/100.
      ALAT3=LAT3/100.
      ALNG3=LONG3/100.
      ITIME=ITIME+5
      IT=ITIME/10+40*(ITIME/600)
      WRITE (8,1) KDAY,MONTH,IYR,IT,LAT2,ALAT1,LAT5,LONG2,ALNG1,LONG5,
     1LAT4,ALAT3,LAT6,LONG4,ALNG3,LONG6
1     FORMAT (1H ,10(' *'),/,'  * S.B.W.R. OUTPUT *',/,1X,10(' *'),//,'
     1 DATE ',I3,'.',I2,'.',I4,4X,'TIME  ',I4,' HRS.',//,' POSITION AT S
     2TART OF RECORDING ',I4,'.',F5.2,A1,4X,I4,'.',F5.2,A1,/,' POSITION
     3AT END OF RECORDING   ',I4,'.',F5.2,A1,4X,I4,'.',F5.2,A1)
      WRITE (8,3) AMAX1,AMAX2,AMIN1,AMIN2,NOZER,NOCRE
3     FORMAT (1H ,/,'  INPUT PARAMETERS - HIGHEST WAVE    =',F5.1,' FT
     1  2ND HIGHEST WAVE =',F5.1,' FT    LOWEST WAVE      =',F5.1,' FT',
     2/,21X,'2ND LOWEST WAVE =',F5.1,' FT    ZERO CROSSING    =',I5,'
     3    NUMBER OF CRESTS =',I5,//)
      WRITE (8,2) WAPER,HIGH3,HIGH4,SWP,HIGH5,HIGH6,HIGH7,HIGH8,HIGH9,
     1H10
2       FORMAT (87H  OUTPUT -   TZ      H1      H2        E       H1'     H2'
     1    HS1     HS2     HS    HMAX(3HRS),/11X,F5.2,2(2X,F5.1),4X,F5.3,4(
     22X,F5.1),1X,F5.1,4X,F5.1,//,10(' *'),/,' * END OF OUTPUT   *',/,10
     3(' *'),//)
      IF (KSPA(2))4,5,4
4     CALL CHAIN(WAVR)
5     KSBWR=0
      CALL VIAQ
      END
*DELETE   M          SBWR5 DUMM
*STORECIL M        0 SBWR5 SBWR5 SBWR5
*CCEND
// END
```

```
// JOB            X
// FOR SBWRE              VERSION 1 MODIFICATION 0
*IOCS(TYPEWRITER)
*ONE WORD INTEGERS
*EXTENDED PRECISION
C--   COMMON CARDS FOR CRUISE 32
      COMMON/INSKEL/ ISW(16),IDAY,IHOUR,IMIN,ISEC,IMINT,ICLOC,ISEC6,
     1ILOGM,KLIST,INTC,NXTIM,LDAY1,NXDAY,LTIM1,LTIM2,MATT1,MATT2,MTIM,
     2MDAY,NRDG,LAMDR,LADDR,LOMDR,LODDR,ISPD,IHDNG,LDEPH,NDEPH,NDAY,
     3ITIMD,NDIFF,IECO,NFIX,ICOR,IRCD,KRT1,KRT2,KRT3,KCHN1,KCHN2,IRCG,
     4NDPF,LDAY2,IVMAX,ICRU,INSEC,KSCAL,KTST,KTSW,KADR,ISBW,IYR,INDAT,
     5IFLGR,ISTSC,KLDST,KNVST,KDISA,KDISB,MAGP,IGYRO,KPRNT,KOUT,KSBWR
      COMMON/INSKEL/NAVD,NAVT,LORAN,IGRAA,IGRAB,KSPA(78),ISPB1,ISPB2,
     1ISPB3,ISPB4,ISPB5,ILOC,ITPBF,IBFL,NANID,IDPT1,IDPT2,IDPT3,ICT1,
     2ICT2,ICT3,INT1,INT2,INT3,IGEOC,ISEK,ISUBG,JGEOC,JGEOD,INDBF,IGEOD,
     3ISPB6,IECST,NIDPT,NANPT,NID,NAN,IBUF2(153),IBUF1(153)
      COMMON NOCRE,NOZER,AMAX1,AMAX2,AMIN1,AMIN2,JDAY,ITIME,NEXT,NWORD,L
     1AT1,LAT2,LONG1,LONG2,IERR
C-----
C-----THIS PROGRAM PRINTS ANY ERROR THAT HAS OCCURRED IN THE
C-----DFTCH CALL IN SBWR6
C-----
      WRITE (8,1) IERR
1     FORMAT ('IERR=',I3,' IN PROGRAM SBWR6')
      CALL VIAQ
      END
*DELETE              SBWRE
*STORECIL M       0 SBWRE SBWRE SBWRE
*CCEND
// END
```