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DOCUMENTATION FOR COMPUTER PROGRAM SUMARY: A COMPUTER PROGRAM TO SUMMARIZE SOUND SPEED PROFILE DATA

BY

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SYSTEMS ANALYSIS GROUP (CODE 14)

OCTOBER 1973

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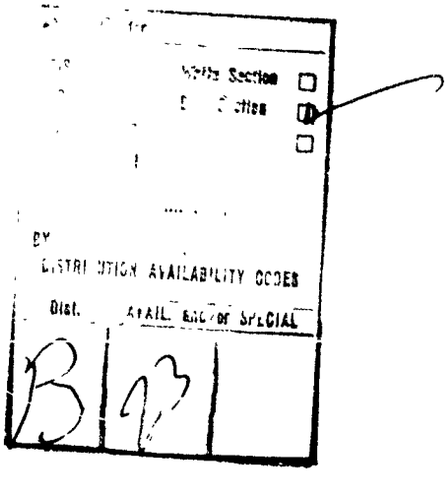
390 458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Abstract

A computer program, labeled SUMARY, has been written to summarize sound speed values computed from oceanographic station data. The program determines the following values at each of 40 standard depths from selected data populations:

- mean
- variance
- standard deviation
- minimum
- 10th through 90th percentiles
- first quantile
- third quantile
- maximum
- number of observations

Summary data is available on punched cards for 146 of 240 ocean data populations.

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FOREWORD

This report is one of a series describing work to develop summary sound speed profile data for application in a variety of underwater acoustic problems. The work is under joint sponsorship of the Long Range Acoustic Propagation Project (LRAPP) and the Acoustic Environment Support Detachment (AESD) of the Office of Naval Research (ONR). The Fleet Numerical Weather Central (FNWC), Monterey, California is assisting in this project by furnishing computer time and physical support. The Naval Undersea Center (NUC), San Diego, California is furnishing a research oceanographer to perform and direct the work at FNWC, Monterey.

INTRODUCTION

This report is documentation for a FORTRAN Extended computer program which performs statistical manipulations and computations on oceanographic station data organized by time-space populations contained on magnetic tape. The program was written for operation on the CDC 6500 computer system at the Fleet Numerical Weather Central (FNWC), Monterey, California.

The acronym given this program is SUMARY. The purpose for SUMARY is to produce printouts of ordered sound speed data at 40 standard ocean depths; select eleven statistical percentiles and maximum and minimum values from the ordered sets; compute mean, variance and standard deviation from sound speed data at each of the 40 depths; and, finally, to punch the selected percentiles, maximum, minimum, mean, variance, standard deviation and number of observations into cards.

The 40 standard depths used for SUMARY are shown in Table I.

The current report is the third in a series describing work to develop summary sound speed data by specific ocean regions for application in a variety of underwater sound propagation problems. References 1 and 2 are other reports in this series.

INPUT

Input data to SUMARY is oceanographic station data assembled on magnetic tape by a program labeled TPCONV. These data are sound speed (C), temperature (T), salinity (S), and sigma-t (σ_t) at 40 standard levels. The data are grouped by specific ocean regions and by three month time periods. Appendix A is a layout of the input data tape format. NUC Technical Note 1223 presents a description of the generating program TPCONV.

OUTPUT DATA

SUMARY produces a series of printout listings and a deck of data cards.

The computer prints out 40 tables of ordered sound speed values. One for each of the 40 standard depths shown in Table I. The maximum value heads each list, the minimum value is at the end. The tables contain twenty decreasing values per line. The number of data values determines the number of lines. Table II is a typical ordered data list for sound speed values at depth 1, or 0 meters. The printed values are sound speed in meters per second minus 1000.

TABLE I

STANDARD DEPTHS AND ASSOCIATED DEPTH NUMBERS USED FOR SUMARY

DEPTH NO.	DEPTH
1	0
2	10
3	20
4	25
5	30
6	35
7	50
8	75
9	100
10	125
11	150
12	200
13	250
14	300
15	400
16	500
17	600
18	700
19	800
20	900
21	1000
22	1100
23	1200
24	1250
25	1300
26	1400
27	1500
28	1750
29	2000
30	2500
31	3000
32	4000
33	5000
34	6000
35	7000
36	8000
37	9000
38	10000
39	11000
40	12000

ORDERED SOUND SPEED VALUES AT 0 METERS FOR AREA 2092

523.8	523.1	523.3	523.9	523.7	523.0	522.4	522.4	522.2	522.2	519.2	519.2	519.1	518.5	515.6	515.6	515.2	514.9	514.4	
514.1	512.7	511.8	511.2	509.3	506.9	506.7	506.2	505.2	505.1	504.1	504.2	502.7	502.1	501.8	501.1	500.5	500.0	499.6	499.5
499.5	499.0	498.9	498.6	498.6	498.5	498.2	498.2	498.2	498.1	498.0	497.8	497.9	497.6	497.6	497.6	497.6	497.4	497.0	496.9	496.8	
496.8	496.7	496.6	496.4	496.0	495.3	495.0	495.0	494.7	494.6	494.5	494.1	494.1	494.0	493.8	493.7	493.6	493.6	493.5	493.3		
493.3	493.3	493.2	493.1	493.1	492.7	492.6	492.5	492.3	492.3	492.1	491.9	491.8	491.6	491.3	491.3	491.1	491.1	491.1	491.0		
490.8	490.8	490.6	490.5	490.1	490.4	490.3	490.0	490.0	489.9	489.7	489.7	489.3	489.1	489.0	488.8	488.7	488.6	488.5	488.2		
488.1	487.7	487.5	487.0	486.5	484.7	484.1	484.0	483.7	477.6	477.3	476.7	476.6	475.8						

3

TABLE II

ORDERED LIST OF SOUND SPEED VALUES AT 0 METERS FOR AREA 1092

A second type of output is the deck of data cards. This outout card deck contains 80 cards, two cards of information for each of the 40 standard depths. The first card of each pair contains maximum, 10, 20, 30, 40, 50, 60, 70, 80, and 90th percentiles, minimum, first quantile, and third quantile sound speed values at a specific depth. This card also contains the depth number (see Table I), the number of sound speed observations in the population and the specific label given the data group. The second card for a specific depth contains standard deviation, variance, number of observations in decimal form, mean value, depth number, number of observations in integer form and the data group label. The program inserts a flag card containing 80 columns of nine (9) to separate data card groups. Appendix B is a description of the output data card format. Appendix C is a typical listing of an output data card deck.

GENERAL PROGRAM OPERATION

SUMARY was written to operate specifically on sound speed data. A simple program modification will permit operation on any one of the other, T, S, or σ_t data populations.

SUMARY will process one or more populations of sound speed data in a single run. A series of data cards directs the computer in selecting the appropriate data groups, or populations, from the input tape for processing. Appendix D is a description of the data cards format.

The computer central memory is insufficient to contain an entire potential data population at each of the 40 standard depths. For this reason the program reads data from the input tape and fills a holding buffer in central memory then outputs this buffer to disk storage. The program reads blocks of data, loads the holding buffer up to 500 observations at each of the 40 standard depths, then transfers the full buffer to disk storage before accepting more data. This process continues until a complete data population has been transferred from tape to disk. Upon completing the input transfer of data the program begins to operate on the data stored on disk. All data for one depth is brought from disk back into central memory. Once the entire data population from one depth is in central memory the program orders the values, computes mean, variance and standatd deviation and selects the minimum, maximum and eleven percentile values. The ordered list is then printed out and the appropriate data cards punched. This procedure continues through the 40 standard depths. The program then determines if another data group is to be processed or if the job is to end. This process continues until a data card directs the computer to end the job.

DATA CARDS

The series of cards which control the selection of data groups for processing include one or more data cards and a terminating flag card.

Each data card contains three fields. The first field is found in columns 1 through 5. The computer will pass over the number of data groups on the input tape that is punched into this field. Processing will begin on the data group number following the figure in this first field. The second field is found in card columns 6 through 10. This figure instructs the computer in the number of data groups to process under the current data card control. The computer will process the number of consecutive data groups indicated by the number in this second field. The last field is found in columns 11 through 15. This is an optional field. This field contains the number of EOF on the input data tape. If field three is blank the number of EOF is assumed to be 1. A separate data card must appear in the data card series for each non-consecutive data group to be processed.

A flag card containing nines (9's) in columns 1 through 80 signals the computer to end the job.

PROGRAM FORM

The basic program, SUMARY, is in the form of a 400 card source deck. The general program operation is run from this source deck.

PROGRAM OPERATING PROCEDURE

The procedure for obtaining a production run of SUMARY is to follow this sample procedure.

1. Select the input data tape.
2. Punch the appropriate system control card to request the selected data tape.
3. Determine the data groups to be processed from the input tape.
4. Punch the appropriate data and flag cards.
5. Insert the data cards at the end of the SUMARY source deck.
6. Submit for production run.

CONCLUSION

SUMARY is a FORTRAN Extended computer program designed to (1) generate ordered lists of sound speed data at each of 40 standard levels; (2) select maximum, minimum and eleven percentiles from each ordered list; (3) compute mean, variance, standard deviation and number of observations at each depth; and (4) punch the selected and computed values into a deck of data cards.

The program was written to automatically select and process sound speed data. A simple program modification will permit the selection and procesisng of temperature, salinity or sigma-t data.

Production runs for sound speed data have been run for many ocean areas. Figure 1 is a chart showing 60 ocean regions. NUC Technical Note 1223, Reference 2, discusses the origin of Figure 1. Table IIIis a summary of the areas shown in Figure 1 for which outputs from SUMARY are available.

A program listing is given in Appendix E.

Numbers of Marsden ten-degree squares

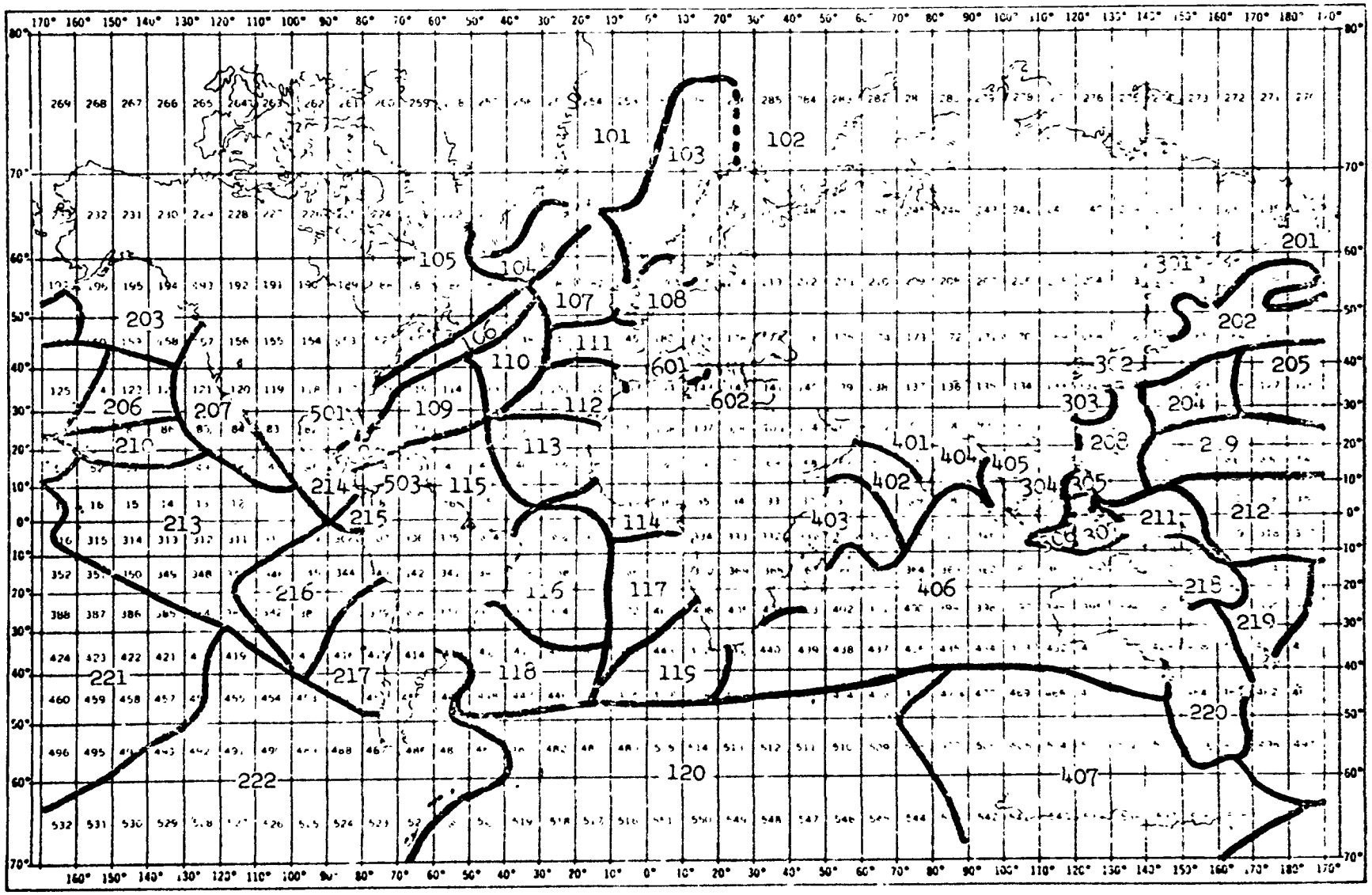


FIGURE 1. Marsden Square Chart Showing Sixty Designated Ocean Regions

TABLE III

SUMMARY OF DATA PROCESSED THROUGH SUMARY

AREA	SEASON 1	2	3	4	AREA	SEASON 1	2	3	4
101	X	X	X	X	201	X	X	X	X
102	X	X	X	X	202	X	X	O	X
103	X	O	X	X	203	X	X	X	X
104	X	X	X	X	204	X	X	X	X
105	X	X	X	X	205	X	X	X	X
106	X	X	X	X	206	X	X	X	X
107	X	X	X	X	207	O	X	X	X
108	O	O	O	O	208	X	X	X	X
109	X	O	X	X	209	X	X	X	X
110	X	X	X	X	210	X	X	X	X
111	X	X	X	X	211	X	X	X	X
112	X	X	O	O	212	X	X	X	X
113	O	X	O	O	213	X	X	X	X
114	X	X	X	X	214	X	X	X	X
115	X	X	X	X	215	X	X	X	X
116	X	X	X	X	216	X	X	X	X
117	X	X	X	X	217	X	X	X	X
118	X	X	X	X	218	O	X	X	X
119	X	X	X	X	219	X	X	X	X
120	X	X	O	X	220	X	X	X	X
					221	O	O	O	X

Note:

X = Data processed through SUMARY

O = Data not processed through SUMARY

REFERENCES

1. Naval Undersea Center Technical Note 1059, Status Report on Summary Sound Speed Profile Data Atlas, John J. Russell, March 1973.

2. Naval Undersea Center Technical Note 1223, Documentation for Computer Program TPCONV: A Computer Program to Organize Selected Oceanographic Station Data on Magnetic Tape, John J. Russell, October 1973.

APPENDIX A

REQUIRED MAGNETIC TAPE FORMAT FOR INPUT TO SUMARY

TPCONV OUTPUT DATA TAPE FORMAT

WORD	DATA	BITS	BIT POSITIONS
1	Label for the area	15	(46-60)
	Blank	5	(41-45)
	Standard depth indicators	40	(1-40)
2	Latitude	19	(42-60)
	Longitude	20	(22-41)
	Day	10	(12-21)
	Month	4	(8-11)
	Year	7	(1-7)
3	Marsden Square	15	(46-60)
	Layer depth	15	(31-45)
	Layer sound speed	15	(16-30)
	Blank	9	(7-15)
	No. of standard levels	6	(1-6)
4	In-layer gradient	15	(46-60)
	Below-layer gradient	15	(31-45)
	Axis depth	15	(16-30)
	Axis sound speed	15	(1-15)
5	Sound speed	15	(46-60)
	Temperature	15	(31-45)
	Salinity	15	(16-30)
	Sigma-t	15	(1-15)

Repeat word 5 for each recorded standard level.

Standard recorded depths in meters: 0, 10, 20, 25, 30, 35, 50, 75, 100, 125, 150, 200, 250, 300, 400. 500, 600, 700, 800, 900, 1000, 1100, 1200, 1250, 1300, 1400, 1500, 1750, 2000, 2500, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 11000, 12000.

Start each new station with a new word 1.

Maximum of 511 words per record.

Three special records are placed at the end of each data group.

FORMAT FOR THREE SPECIAL RECORDS FOLLOWING A DATA ASSEMBLY GROUP

Record 1 - 5 words

WORD	DATA	BITS	BIT POSITIONS
1	Area label	15	(46-60)
	Blank	45	(1-45)
2	No. records output	30	(1-30)
	Blank	30	(31-60)
3	No. stations accepted	30	(1-30)
	Blank	30	(31-60)
4	Length of output data	30	(1-30)
	Blank	30	(31-60)
5	Zeros	60	(1-60)

Record 2 - 5000 words

This record contains a geographical distribution map of data assembled in the current data group. The record is written as MAP (Latitude, Longitude), where latitude goes from 1 to 50 and longitude from 1 to 100.

Record 3 - 1200 words

This record contains a time distribution by months and years table of data assembled in the current data group. The record is written as MYCNT (Year, Month), where year goes from 1 to 100 and month from 1 to 12.

The three 5, 500, and 1200 special word records separate data groups.

One EOF occurs at the end of data on the tape.

DEPARTMENT OF THE NAVY

Memorandum

DATE: 30 April 1974

FROM: J. J. Russell, Naval Undersea Center

TO: Distribution

SUBJ: Changes to NUC TN 1224, Documentation for Computer Program SUMARY: A Computer Program to Summarize Sound Speed Profile Data, dated October 1973

1. Enclosed revised Appendix B replaces same in original NUC TN 1224.

J. J. RUSSELL

APPENDIX B

OUTPUT DATA CARD FORMAT

SUMARY OUTPUT DATA CARD FORMAT

CARD NO.	CARD COLUMNS	DATA
1	2-5	Maximum
	7-10	10th percentile
	12-15	20th percentile
	17-20	30th percentile
	22-25	40th percentile
	27-30	50th percentile
	32-35	60th percentile
	37-40	70th percentile
	42-45	80th percentile
	47-50	90th percentile
	52-55	Minimum
	57-60	1st quartile
	62-65	3rd quartile
	69-70	Depth number (see Note 4)
	71-75	Number of observations
	77-80	Numerical area label
2	1-10	Standard deviation - decimal
	11-20	Variance - decimal
	21-30	Number of observations - decimal
	31-40	Mean sound speed minus 1000.0000 decimal
	55-56	Depth number - integer
	58-62	Number of observations - integer
	66-68	Numerical area label
3	1-80	Repeat of Card 1 format for depth 2
4	1-80	Repeat of Card 2 format for depth 2
.		
.		
.		

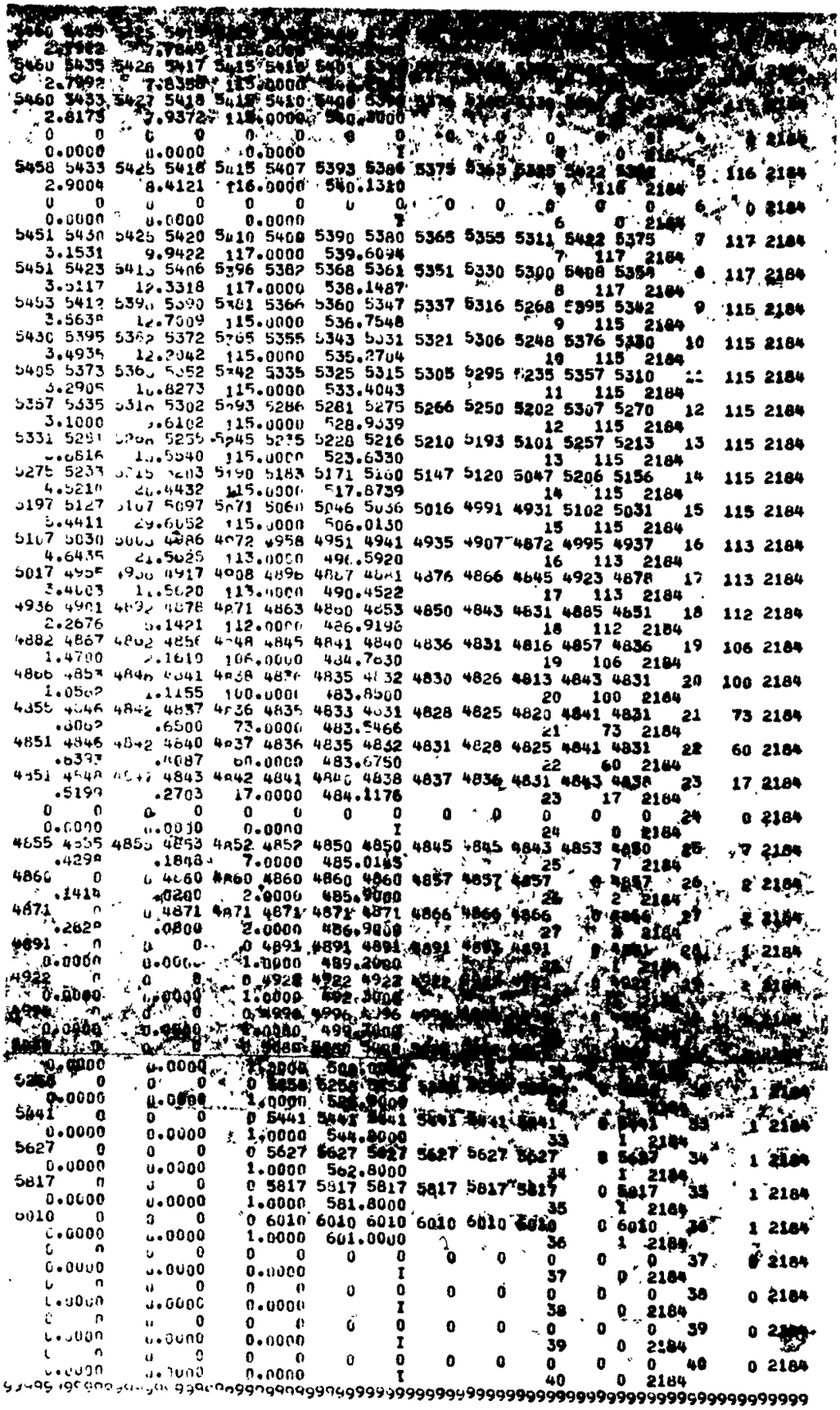
79	1-80	Repeat of Card 1 format for depth 40
80	1-80	Repeat of Card 2 format for depth 40
81	1-80	99...9 mandatory flag

NOTES:

1. There are two cards for each of 40 depths.
2. Card formats 1 and 2 are repeated for each of the 40 depths.
3. Depth number is the sequence number of depth value in the following list.
   0, 10, 20, 25, 30, 35, 50, 75, 100, 125, 150, 175, 200, 250, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1250, 1300, 1400, 1500, 1750, 2000, 2500, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 11000, 12000.
4. All percentile sound speed values (C) of card & type are recorded (10C-10000).
5. All depth values are in meters.
6. All sound speed values are in meters per second.

APPENDIX C

TYPICAL OUTPUT CARD DECK LISTING



APPENDIX D

DATA CARDS FORMAT

SUMARY DATA CARD FORMAT

CARD COLUMNS	LEGAL CHARACTERS	NOTES
1-5	Integers	No. of data groups to skip on input data tape before reaching the first data group to be processed.
6-10	Integers	No. of consecutive data groups to process
11-15	Integers or blank	No. of files on input data tape. Blank implies 1 file.

Additional data cards, one for each non-adjacent continuous sequence of data groups.

1-80	999···9	Mandatory flag following last data card.

APPENDIX E

SUMARY PROGRAM LISTING

```
GOJRA,CM55000,LL77,TU2,T777,S3,RUSSELL/DEV. DEPT X2817
COMMENT, PLEASE DO NOT DROP. JOB USES MUCH MORE PP THAN CP TIME. JOB NOT LOOPING
FTN,L,R=3,OPT=2,A
RFL,150000.
REQUEST TAPE1,L. RING OUT TAPE1=RES038
LGO.
EXIT.
RETURN(TAPE1)
R
      PROGRAM SUMARY(TAPE1,INPUT,PUNCH,OUTPUT,TAPE2)
      DIMENSION IBIN(5000),SS(400,40 ),C(20000),CP(9),IFET(9),NO(40),
     XICP(40),MAP(50,100),MYCNT(100,12),BIN(5000),NINE(80),IZTAB(40)
      EQUIVALENCE (IBIN,MAP),(IBIN,MYCNT),(IBIN,BIN)
      COMMON SS,C
      DATA (IZTAB(I),I=1,40)/0,10,20,25,30,35,50,75,100,
     X125,150,200,250,300,400,500,600,700,800,900,1000,1100,1200,1250,13
     X00,1400,1500,1750,2000,2500,3000,4000,5000,6000,7000,8000,9000,100
     X00,11000,12000/
   20 NDGP=0
      NDGTP=0
      NEOFTP=0
      NEOFP=0
      IPE2=0
      READ 500,NDGTS,NDGTP,NEOFTP
      PRINT 503,NDGTS,NDGTP,NEOFTP
      IF(NDGTS-99999)21,275,21
   21 IF(NDGTS)22,35,22
   22 DO 30 J=1,NDGTS
   25 BUFFER IN(1,1)(IBIN,IBIN(5000))
      IF(UNIT(1))28,26,27
   26 NEOFP=(NEOFP+1)
      PRINT 567,NEOFP
      IF(NEOFP-NEOFTP)28,28,275
   27 PRINT 568,J,NEOFP
      IPE2=(IPE2+1)
```

```
      IF(IPE2-25)25,25,323
   28 LNGTH=LENGTH(1)
      PRINT 501,LNGTH
      IF(LNGTH-1200)25,30,25
   30 CONTINUE
   35 CALL ZILCH(SS,16000)
      NRI=0
      NSI=0
      NST=0
      NRO=0
      NOSL=0
      LWCS=0
      IPE1=0
      CALL ZILCH(NO,40)
      CALL ZILCH(C,20000)
   52 CALL ZILCH(IBIN,5000)
   55 BUFFER IN(1,1)(IBIN,IBIN(5000))
      IF(UNIT(1))63,281,300
   63 IFET(1)=LENGTH(1)
      PRINT 502, IFET(1)
      IF(IFET(1)-511)71,71,64
   64 IF(IFET(1)-5000)301,85,301
   71 LWA=IFET(1)
      IF(IFET(1)-5)72,55,72
   72 I=0
      LWCS=0
      PRINT 530,LWA
   73 IF(I-LWA)74,81,81
   74 NSI=(NSI+I)
      NST=(NST+1)
      I=(I+1)
      IZBUF=IBIN(I)
      I=(I+2)
      NOSL=LBYTX(1,15,IBIN(I))
      LWCS=(NOSL+4)+LWCS
      I=(I+1)
      DO 77 K=1,40
      IZ=0
      IZ=LBYTX(K,1,IZBUF)
      IF(IZ-1)77,75,77
   75 NO(K)=(NO(K)+1)
      M=NO(K)
      I=(I+1)
      SS(M,K)=0.
      SS(M,K)=LBYTX(46,15,IBIN(I))
      IF(I-LWCS)77,78,78
   77 CONTINUE
   78 DO 79 N=1,40
      IF(NO(N)-400)79,85,85
   79 CONTINUE
      GO TO 73
   81 NRI=(NRI+1)
      PRINT 530, NRI
      GO TO 52
** 400 C VALUES AT 40 STD. DEPTHS NOW IN SS(400,40) ******************
   85 DO 94 K=1,40
      L=NO(K)
      IF(L) 90,90,92
   90 L=1
      SS(L,K)=999999.
   92 BUFFER OUT(2,1)(SS(1,K),SS(L,K))
```

```
      IF(UNIT(2))94,317,318
   94 CONTINUE
      CALL ZILCH(NO,40)
      NST=0
      NRO=(NRO+1)
      IF(IFET(1)-5000)73,101,73
**END OF DATA GROUP*****************************************************
  101 CONTINUE
      DO 104 I=1,5000
  104 IBIN(I)=0
      ENDFILE 2
      REWIND 2
      BACKSPACE 1
      BACKSPACE 1
      BUFFER IN(1,1)(IBIN,IBIN(5000))
      IF(UNIT(1))105,308,309
  105 IFET(1)=LENGTH(1)
      PRINT 546,IFET(1)
      IF(IFET(1)-5) 321,106,321
  106 LFA=IBIN(1)
      NRO=IBIN(2)
      NSA=IBIN(3)
      LOOPD=IBIN(4)
      PRINT 546,LFA,NRO,NSA,LOOPD,NSI
      CALL ZILCH(IBIN,5000)
      BUFFER IN(1,1)(MAP,MAP(5000))
      IF(UNIT(1))109,310,311
  109 IFET(1)=LENGTH(1)
      PRINT 546,IFET(1)
      IF(IFET(1)-5000)322,118,322
**PRINT OUT MAP*********^**********,**********************************
  110 PRINT 505
      PRINT 506, LFA
      PRINT 507
      PRINT 509, (MAP(1,L),L=1,100)
      DO 111 M=2,9
  111 PRINT 508, (MAP(M,L),L=1,100)
      PRINT 509, (MAP(10,L),L=1,100)
      DO 113 M=11,13
  113 PRINT 508, (MAP( M,L),L=1,100)
      PRINT 510, (MAP(14,L),L=1,100)
      PRINT 508, (MAP(15,L),L=1,100)
      PRINT 508, (MAP(16,L),L=1,100)
      PRINT 511, (MAP(17,L),L=1,100)
      PRINT 508, (MAP(18,L),L=1,100)
      PRINT 508, (MAP(19,L),L=1,100)
      PRINT 512, (MAP(20,L),L=1,100)
      PRINT 508, (MAP(21,L),L=1,100)
      PRINT 508, (MAP(22,L),L=1,100)
      PRINT 513, (MAP(23,L),L=1,100)
      PRINT 508, (MAP(24,L),L=1,100)
      PRINT 508, (MAP(25,L),L=1,100)
      PRINT 514, (MAP(26,L),L=1,100)
      PRINT 508, (MAP(27,L),L=1,100)
      PRINT 508, (MAP(28,L),L=1,100)
      PRINT 515, (MAP(29,L),L=1,100)
      PRINT 509, (MAP(30,L),L=1,100)
      PRINT 508, (MAP(31,L),L=1,100)
      PRINT 516, (MAP(32,L),L=1,100)
      PRINT 50A, (MAP(33,L),L=1,100)
      PRINT 50B, (MAP(34,L),L=1,100)
```

```
      PRINT 517, (MAP(35,L),L=1,100)
      DO 115 M=36,39
  115 PRINT 508, (MAP( M,L),L=1,100)
      PRINT 509, (MAP(40,L),L=1,100)
      DO 117 M=41,49
  117 PRINT 508, (MAP( M,L),L=1,100)
      PRINT 509, (MAP(50,L),L=1,100)
      PRINT 507
      PRINT 518
  118 PRINT 520,NSA,LF,
**PRINT OUT MYCNT*****************************************************
      BUFFER IN (1,1)(MYCNT,MYCNT(1200))
      IF(UNIT(1)) 119,201,305
  119 IFET(1)=LENGTH(1)
      IF(IFET(1)-1200)306,123,306
  120 PRINT 519
      IYR=0
      DO 122 K=1,100
      IYR=(K-1)
  122 PRINT 520,IYR,(MYCNT(K,J),J=1,12)
  123 N=0
      I=0
      DO 201 I=1,40
**INITIALIZE CM C STORAGE BIN(20000)*********************************
      CALL ZILCH(C,20000)
      PRINT 541,NSI,I
      N=0
      NZ=0
      NOBS=0
  125 NZ=(NZ+1)
  126 BUFFER IN(2,1)(IPIN,IBIN(400))
      IF(UNIT(2))127,131,316
  127 IFET(1)=LENGTH(2)
      PRINT 566,IFET(1),NZ,I,K,N
      IF(NZ-I) 125,128,125
  128 K=IFET(1)
      DO 129 J=1,K
      N=(N+1)
  129 C(N)= BIN(J)
      K=(IFET(1))
      NOBS=(NOBS+IFET(1))
      PRINT 552,N,K,NOBS
      DO 130 J=1,39
      BUFFER IN(2,1)(IPIN,IBIN(400))
      IF(UNIT(2))130,131,315
  130 CONTINUE
      GO TO 126
  131 SUMC=0.
      SCSQ=0.
      XNO=0.
      VAR=0.
      SIGMA=0.
      CTS=0.
      PINC=0.
      XN=0.
      PT1=0.
      IPT1=0.
      PT2=0.
      PT3=0.
      PCTL=0.
      N=0
```

```
      REWIND 2
      CALL ZILCH(CP,9)
      FQT1=0.
      IFQT1=0
      FQT2=0.
      FQT3=0.
      QTL1=0.
      CQ1=0.
      ICQ1=0
      TQT1=0.
      ITOT1=0
      TQT2=0.
      TQT3=0.
      QTL3=0.
      ICQ3=0
      CALL ZILCH(ICP,9)
      ICQ1=0
      ICQ3=0
      ICMIN=0
      ICMAX=0
      PRINT 565,NOBS
      DO 143 N=1,NOBS
      IF(C(N).GT.3000..AND.C(N).LT.9000.)GO TO 134
      C(N)=0.
      GO TO 143
  134 IF(NOBS-1)200,136,138
  136 IF(C(1))200,200,138
  138 IF(C(1)-9000.)140,200,200
  140 C(N)=C(N)/10.
      SUMC=(SUMC+C(N))
      SCSQ=(SCSQ+C(N)**2.)
      XNO=(XNO+1.)
  143 CONTINUE
      CMEAN=0.
      CMEAN=SUMC/XNO
      PRINT 554,SUMC,SCSQ,XNO,CMEAN
      NOM=XNO
      IF(XNO-2)145,144,144
  144 VAR=(SCSQ-(SUMC**2./XNO))/(XNO-1.)
      SIGMA=(VAR**.5)
  145 PRINT 521, VAR,SIGMA,XNO,CMEAN,I
      MSK=MASK(60)
      CALL SORTEXT(C,NOBS,1,0,1,MSK)
      PRINT 505
      PRINT 561,IZTAB(7),LFA
      PRINT 524, (C(J),J=1,NOM)
      PRINT 506
      PINC=(XNO/10.)
      DO 181 L=1,9
      XN=L
      PT1 = (PINC *XN)
      IPT1 = PT1
      PT2 = IPT1
      PT3 = (PT1-PT2)
      PCTL=PT2
      IF(PT3.GE..5)PCTL=(PT2+1.)
      K=PCTL
      CP(L)=C(K)
      PRINT 555,K,L,PINC,PT1,PT2,PT3,PCTL,CP(L),IPT1
  181 CONTINUE
      FQT1=(PINC*2.5)
```

```
      IFQT1=FQT1
      FQT2=IFQT1
      FQT3=(FQT1-FQT2)
      QTL1=FQT2
      IF(FQT3.GT..50)QTL1=(FQT2+1)
      K=QTL1
      CQ1=C(K)
      ICQ1=C(K)*10.
      TQT1=(PINC*7.5)
      ITQT1=TQT1
      TQT2=ITQT1
      TQT3=(TQT1-TQT2)
      QTL3=TQT2
      IF(TQT3.GE..5)QTL3=(TQT2+1)
      K=QTL3
      CQ3=C(K)
      ICQ3=C(K)*10.
      ICMAX=(C(1)* 10.)
      ICMIN=(C(NOM)*10.)
      ICQ1=(CQ1*10.)
      ICQ3=(CQ3*10.)
      ICP(1)=CP(1)*10.
      ICP(2)=CP(2)*10.
      ICP(3)=CP(3)*10.
      ICP(4)=CP(4)*10.
      ICP(5)=CP(5)*10.
      ICP(6)=CP(6)*10.
      ICP(7)=CP(7)*10.
      ICP(8)=CP(8)*10.
      ICP(9)=CP(9)*10.
      PRINT 556,ICMAX,(ICP(K),K=1,9),ICMIN,ICQ1,ICQ3,I,NOM,LFA
      PUNCH 527,ICMAX,(ICP(K),K=1,9),ICMIN,ICQ1,ICQ3,I,NOM,LFA
      PRINT 559,SIGMA,VAR,XNC,CMEAN,I,NOM,LFA
      PUNCH 560,SIGMA,VAR,XNO,CMEAN,I,NOM,LFA
  200 SIGMA=0.
      VAR=0.
      XNO=0.
      NOM=0
  201 CONTINUE
      REWIND 2
      DO 270 K=1,80
  270 NINE(K)=9
      PRINT 557,(NINE(K),K=1,80)
      PUNCH 558,(NINE(K),K=1,80)
      NDGP=(NDGP+1)
      PRINT 562,NDGP
      IF(NDGP-NDGTP)35,20,20
  275 REWIND 1
      STOP 77777
  281 PRINT 526
  282 STOP 66666
  300 CONTINUE
      IPE1=(IPE1+1)
      IF(IPE1.GT.50 )GO TO 302
      BACKSPACE 1
      GO TO 55
  301 STOP 11112
  302 PRINT 550
      PRINT 569,IFET(1)
      GO TO 55
  305 STOP 11115
```

```
306 STOP 11116
308 STOP 11120
309 STOP 11121
310 STOP 11122
311 STOP 11123
315 STOP 11127
316 STOP 11130
317 STOP 11131
318 STOP 11132
321 STOP 11135
322 STOP 11136
323 STOP 11137
500 FORMAT(3I5)
501 FORMAT(1H ,1X,* LNGTH=*,I5)
502 FORMAT(1H ,* IFET(1)=*, I10)
503 FORMAT(1H ,1X,* NOBTS,NDATP,NEOFTP=*,3I5)
504 FORMAT(1H ,* LFA, NRO, NSA, LOOPD,NSI=*,5I10)
505 FORMAT(1H1)
506 FORMAT(1H ,//,50X ,*DATA DISTRIBUTION FOR AREA *,I4,//)
507 FORMAT(1H , 15X,*.+.........+.........+.........+.........+.......
   X..+.........+...+.....+.........+.........+.*)
508 FORMAT(1H , 15X,*.*, 100A1, * .*)
509 FORMAT(1H , 15X,*+*, 100A1, * +*)
510 FORMAT(1H , 9X,*L*, 5X, *.*, 100A1, * .*, 5X, *L*)
511 FORMAT(1H , 9X,*A*, 5X, *.*, 100A1, * .*, 5X, *A*)
512 FORMAT(1H , 9X,*T*, 5X, *+*, 100A1, * +*, 5X, *T*)
513 FORMAT(1H , 9X,*I*, 5X, *.*, 100A1, * .*, 5X, *I*)
514 FORMAT(1H , 9X,*T*, 5X, *.*, 100A1, * .*, 5X, *T*)
515 FORMAT(1H , 9X,*U*, 5X, *.*, 100A1, * .*, 5X, *U*)
516 FORMAT(1H , 9X,*D*, 5X, *.*, 100A1, * .*, 5X, *D*)
517 FORMAT(1H , 9X,*F*, 5X, *.*, 100A1, * .*, 5X, *E*)
518 FORMAT(1H+,/,54X,*L  O  N  G  I  T  U  D  E  *)
519 FORMAT(1H1, //, 47X, *DATA DISTRIBUTION BY YEARS AND MONTHS*,//,
   X51X,*YEARS*,9X, *MONTHS*)
520 FORMAT(1H , I2, 12(3X,I3))
521 FORMAT(1H ,1X,*VAR,SIGMA,XNO,CMEAN,I=*,4F25.4,I10)
524 FORMAT(1H ,1X, 2F6.1)
525 FORMAT(1H ,15X I6,* STATIONS IN AREA *,I4)
526 FORMAT(1H ,*END OF FILE*)
527 FORMAT(16I5)
530 FORMAT(1H+,50X,* END OF RECORD *,I7)
536 FORMAT(1H+,25X,* 71 *,I10)
541 FORMAT(1H ,* NSI,I= *,2I10)
546 FORMAT(1H ,1X,* IFET(1)=*,I10)
550 FORMAT(1H ,1X,* PARITY ERROR AT 55 *)
552 FORMAT(1H ,1X,* N,K,NOBS=*,3I10)
554 FORMAT(1H ,1X,4F25.4)
555 FORMAT(1H ,1X,2I5,6F10.1,I5)
556 FORMAT(1H ,1X,19I6)
557 FORMAT(1H ,1X,80I1)
558 FORMAT(80I1)
559 FORMAT(1H ,1X,4F10.4,3I6)
560 FORMAT(4F10.4,10X,3I6)
561 FORMAT(1H ,38X,*ORDERED SOUND SPEED VALUES AT *,I5,* METERS FOR AR
   XEA *,I4,/)
562 FORMAT(1H ,1X,* NDEP= *,I5)
563 FORMAT(1H ,1X,*AT 77 *,)
565 FORMAT(1H ,1X,* NOBS=*,I10)
566 FORMAT(1H ,1X,* INPUT BUFFER FROM DISK *,I5,* WORDS *,10X,*NZ,I,K,
   XN=*,4I10)
567 FORMAT(1H ,1X,* EOF *,I3)
```

```
  568 FORMAT(1H ,1X,* PARITY ERROR AT 27 *,2I10)
  569 FORMAT(1H ,1X,*LENGTH=*,I10)
      END
          IDENT  SORTEXT
          ENTRY  SORTEXT
*     4TRANX CALL SORTEXT(FWA,NUM,KNUM,IDIR,KEWRD,MASK)
SORTEXT
          SX6    A0
          SA6    SAVE
          SA1    A1
          SB1    X1
          SA2    A1+1
          SA2    X2
          SB2    X2
          SA2    A1+2
          SA2    X2
          SB3    X2
          SA2    A1+3
          SA2    X2
          SB4    X2
          SB5    0
          SB6    0
          SA2    A1+4
          SA2    X2
          SB7    X2
          SA2    A1+5
          SA2    X2
          BX0    X2
          RJ     =XSORT
          SA1    SAVE
          SA0    X1
          JP     SORTEXT
 SAVE
          END
R
   10    1
99999999999999999999999999999999
>
```

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Report Number	Personal Author	Title	Publication Source (Originator)	Pub. Date	Current Availability	Class.
WHOI73-59	Tollios, C. D.	THE ACODAC DATA PROCESSING SYSTEM	Woods Hole Oceanographic Institution	730901	AD0773114; ND	U
Unavailable	Russell, J. J.	DOCUMENTATION FOR COMPUTER PROGRAM SUMMARY: A COMPUTER PROGRAM TO SUMMARIZE SOUND SPEED PROFILE DATA	Naval Undersea Center	731001	AD0918907	U
MC001Vol2	Unavailable	CHURCH ANCHOR DATA ANALYSIS PLAN VOL 2 (U)	Maury Center for Ocean Science	731001	ND	U
73-9M7-VERAY-R2	Jones, C. H.	LRAPP VERTICAL ARRAY- PHASE III	Westinghouse Research Laboratories	731105	ADA001130; ND	U
55	Weinstein, M. S., et al.	SUS QUALITY ASSESSMENT	Underwater Systems, Inc.	731201	AD785875 ND	U
ARL-TM-73-42	Mitchell, S. K., et al.	QUALITY CONTROL ANALYSIS OF SUS PROCESSING FROM ACODAC DATA	University of Texas, Applied Research Laboratories	731220	ADB000293 ND	U
Unavailable	Daubin, S. C.	CHURCH GABBRO TECHNICAL NOTE: CONTINUOUS CURRENT PROFILES	University of Miami, Rosenstiel School of Marine and Atmospheric Science	740101	AD0775333	U
Unavailable	Bitterman, D. S.	ACODAC AMBIENT NOISE SYSTEM	Woods Hole Oceanographic Institution	740101	ADA009440	U
ONR MC-002 VOL. 2; XONICS 885	Unavailable	LONG RANGE ACOUSTIC PROPAGATION PROJECT (LRAPP). SQUARE DEAL DATA ANALYSIS PLAN (U) VOLUME 2 - ANNEXES	Maury Center for Ocean Science; Xonics, Inc.	740101	ND	U
ARL-TM-74-12	Groman, R. O., et al.	SPECIAL HARDWARE FOR ARL ANALYSIS OF ACODAC DATA	University of Texas, Applied Research Laboratories	740314	ADA000295; ND	U
Unavailable	Unavailable	ASEPS NEAR FIELD TRANSMISSION LOSS MODIFICATION, P-2205	Ocean Data Systems, Inc.	740401	ADA096583	U
Report 001; MSAG-1	Unavailable	MEASUREMENT SYSTEMS ADVISORY GROUP	Office of Naval Research	740401	ADA096586; ND	U
ACR-196	Gregory, J. B.	PROJECT PACIFIC SEA SPIDER, TECHNOLOGY USED IN DEVELOPING A DEEP-OCEAN ULTRASTABLE PLATFORM	Office of Naval Research	740412	AD0529945; ND	U
Unavailable	Gottwald, J. T.	ANNUAL REPORT FOR 1 MAY 1973 - 30 APRIL 1974	Tracor, Inc.	740524	AD0920210	U
Unavailable	Unavailable	ACOUSTIC MODEL SUPPORT ACTIVITIES, P-2220	Ocean Data Systems, Inc.	740530	ADA096584	U
HCI-CMC-18540	Daubin, S. C.	TRANSMISSION LOSS OF LOW FREQUENCY UNDERWATER SOUND IN THE CAYMAN TROUGH (CHURCH GABBRO TECHNICAL NOTE)	University of Miami, Rosenstiel School of Marine and Atmospheric Science	740601	ADC000424; ND	U
HCI-CMC-18343	Daubin, S. C.	AMBIENT NOISE IN THE NORTHWEST CARIBBEAN SEA (CHURCH GABBRO TECHNICAL NOTE) (U)	University of Miami, Rosenstiel School of Marine and Atmospheric Science	740601	ND	U
Unavailable	Barnes, A., et al.	DISCRETE SHIPPING MODEL	Planning Systems, Inc.	740604	ND	U