RCVD: 3 Oct 77

ACCESSION NUMBER 78-0403

DATA DOCUMENTATION FORM

DDF A:4:10

NOAA FORM 24-13 (4-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
ROCKVILLE, MARYLAND 20852

FORM APPROVED
O.M.B. No. 41-R2651

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

CURRENTS 0180 0184 0181
SPEED / TEMP / Press / SALINITY
2807 2806 U, V, COMPONENTS

NODC TAPE 1214
9 TRACK 1600 b.p.i.
RECFM = U
BLKSIZE = 4000

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED

School of Oceanography
Oregon State University
Corvallis, OR 97331

LABEL = (10, NL) THRU (33, NL)
FILES 10 THRU 33

2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED

WISP, UP-75
NSF Grants OCE 74-22290 and IDO 71-04211

3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT

WISP, UP-75

4. PLATFORM NAME(S)

5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.)

BUOY

6. PLATFORM AND OPERATOR NATIONALITY(IES)

PLATFORM	OPERATOR

7. DATES

FROM: MO/DAY/YR	TO: MO/DAY/YR
28 Jan. 75	12 Sept 75

8. ARE DATA PROPRIETARY?

[X] NO [ ] YES

IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR ____ MONTH ____

9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?)

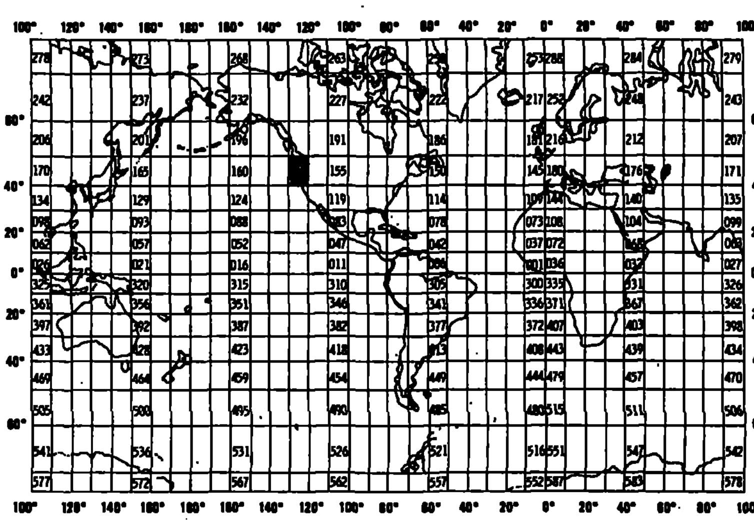
[ ] NO [X] YES [ ] PART *(SPECIFY BELOW)*

10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER *(AND ADDRESS IF OTHER THAN IN ITEM-1)*

Dr. Jane Huyer
(503) 754-2206
Dr. Robert L. Smith

11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.

GENERAL AREA



B. SCIENTIFIC CONTENT

Include enough information concerning manner of observation, instrumentation, analysis, and data reduction routines to make them understandable to future users. Furnish the minimum documentation considered relevant to each data type. Documentation will be retained as a permanent part of the data and will be available to future users. Equivalent information already available may be substituted for this section of the form (i.e., publications, reports, and manuscripts describing observational and analytical methods). If you do not provide equivalent information by attachment, please complete the scientific content section in a manner similar to the one shown in the following example.

EXAMPLE (HYPOTHETICAL INFORMATION)

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Salinity	‰	Nansen bottles	Inductive salinometer (Hytech model S510)	N/A (Not applicable)
		STD Bissett-Berman Model 9006	N/A	Values averaged over 5-meter intervals
Water color	Forel scale	Visual comparison with Forel bottles	N/A	N/A
Sediment size	ϕ units and percent by weight	Ewing corer	Standard sieves. Carbonate fraction removed by acid treatment	Same as "Sedimentary Rock Manual," Folk '65

(SPACE IS PROVIDED ON THE FOLLOWING TWO PAGES FOR THIS INFORMATION)

C. DATA FORMAT

'COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
   GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

There are 24 current meter data files on MT. These are numbers 9 through 32. There is an EOF between each current meter. First line of each record is as appears in attached directory.

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

There are 24 current meter data files on MT. These are numbers 9 through 32. There is an EOF between each current meter.

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL ☒ FORTRAN ☐ ________ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:
   NAME AND PHONE NUMBER William Gilbert (503) 754-2206
   ADDRESS School of Oceanography, Oregon State University, Corvallis, OR 97331

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE: ☒ BCD ☐ BINARY ☐ ASCII ☐ EBCDIC ☐ ________

6. NUMBER OF TRACKS (CHANNELS): ☒ SEVEN ☐ NINE ☐ ________

7. PARITY: ☐ ODD ☒ EVEN

8. DENSITY: ☐ 200 BPI ☐ 1600 BPI ☐ 556 BPI ☒ 800 BPI ☐ ________

9. LENGTH OF INTER-RECORD GAP (IF KNOWN): ☒ 3/4 INCH ☐ ________

10. END OF FILE MARK: ☒ OCTAL 17 ☐ ________

11. PASTE-ON-PAPER LABEL DESCRIPTION *(INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)*

Oregon State University
School of Oceanography
BCD Even Parity WISP, UP-75
7 Track 800 BPI

12. PHYSICAL BLOCK LENGTH IN BYTES: 4000

13. LENGTH OF BYTES IN BITS: 6

C. DATA FORMAT

This information is requested only for data transmitted on punched cards or magnetic tape. Have one of your data processing specialists furnish answers either on the form or by attaching equivalent readily available documentation. Identify the nature and meaning of all entries and explain any codes used.

1. List the record types contained in your file transmittal (e.g., tape label record, master, detail, standard depth, etc.).

2. Describe briefly how your file is organized.

3-13. Self-explanatory.

14. Enter the field name as appropriate (e.g., header information, temperature, depth, salinity.

15. Enter starting position of the field.

16. Enter field length in number columns and unit of measurement (e.g., bit, byte, character, word) in unit column.

17. Enter attributes as expressed in the programming language specified in item 3 (e.g., "F 4.1," "BINARY FIXED (5.1)").

18. Describe field. If sort field, enter "SORT 1" for first, "SORT 2" for second, etc. If field is repeated, state number of times it is repeated.

RECORD FORMAT DESCRIPTION

RECORD NAME

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN ____ (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING altered format
TIME (GMT)				I5	I5
DAY				I3	I3
MONTH				I3	I3
Year				I3	I3
U component of speed			cm/sec	F6.1	F6.1
V component of speed			cm/sec	F6.1	F6.1
ΣU			cm/sec	F9.1	F9.1
ΣV			cm/sec	F9.1	F9.1
temperature			°C	F6.2	F7.2
pressure (if exists)			newtons/m^2	F9.0	F10.0
salinity (if exists)			o/oo	F7.3	F8.3
line counter				I4	I6

RECORD FORMAT DESCRIPTION

RECORD NAME ____________________

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN ______ (e.g., bits, bytes)	16. LENGTH		17. ATTRIBUTES	18. USE AND MEANING
		NUMBER	UNITS		

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Speed (u, v)	cm/sec	Aanderaa current meters model RCM-4		
temperature	°C		see #A	see #C
pressure	db			
salinity	o/oo			
		20 minute sensing period		

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING

RECORD FORMAT DESCRIPTION

RECORD NAME ____________

14. FIELD NAME	15. POSITION FROM - 1 MEASURED IN ______ (e.g., bits, bytes)	16. LENGTH		17. ATTRIBUTES	18. USE AND MEANING
		NUMBER	UNITS		

RECORD FORMAT DESCRIPTION

RECORD NAME ____________________

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN ____ (e.g., bits, bytes)	16. LENGTH		17. ATTRIBUTES	18. USE AND MEANING
		NUMBER	UNITS		

NOAA FORM 24-13 USCOMM-DC 44289-P72

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALIBRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Aanderaa RCM-4	just after last recovery	✓				✓			

78-0403

WISP/UP-75

24 FILES

File # 10 C75514.LP PIKAKE 28 Jan-15 May 1975 Sets of Measurement=2568 –

File # 11 C75615.LP PIKAKE 28 Jan-15 May 1975 Sets of Measurement=2591 –

File # 12 C75114.LP SUNFLOWER 28 Jan-26 April 1975 Sets of Measurement = 2125 –

File # 13 C75215.LP SUNFLOWER 28 Jan-26 April 1975 Sets of Measurement = 2125 –

File # 14 C75314.LP SUNFLOWER 28 Jan-26 April 1975 Sets of Measurement = 2125 –

File # 15 C75414.LP SUNFLOWER 28 Jan-26 April 1975 Sets of Measurement = 2125 –

File # 16 C74615.LP WISTERIA 28 Jan-26 April 1975 Sets of Measurement = 2122 –

File # 17 C74716.LP WISTERIA 28 Jan-26 April 1975 Sets of Measurement = 2123 –

File # 18 C74813.LP WISTERIA 28 Jan-26 April Sets of Measurement=2122 –

File # 19 C75015.LP WISTERIA 28 Jan-26 April 1975 Sets of Measurement = 2122 –

File # 20 C68624.LP OHIA 26 April-29 July 1975 Sets of Measurement=2237 –

File # 21 C68917.LP OHIA 26 April-29 July 1975 Sets of Measurement=2238

File # 22 C15304.LP OHIA 26 April-29 July 1975 Sets of Measurement=2239

File # 23 C15324.LP OHIA 27 April-29 July 1975 Sets of Measurement=2338

File # 24 C15334.LP OHIA 27 April-29 July 1975 Sets of Measurement=2238

File # 25 C15374.LP OHIA 27 April-29 July 1975 Sets of Measurement=2238

File # 26 C68226.LP SUNFLOWER (B) 28 April-28 July 1975, Sets of Measurement=2200

File # 27 C26834.LP SUNFLOWER (B) 28 April-28 July 1975 Sets of Measurement=2200

File # 28 C15394.LP SUNFLOWER (B) 28 April-28 July 1975 Sets of Measurement=2201

THESE FILE NO.'S APPLY TO NODC TAPE 1214

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NODC TAPE

File # 29 C68423.LP SUNFLOWER (B) 28 April-28 July 1975 Sets of Measurement ≈ 2200

File # 30 C44127.LP SUNFLOWER (C) 29 July-12 September 1975 Sets of Measurement ≈ 1082

File # 31 C45231.LP SUNFLOWER (C) 29 July-12 September 1975 Sets of Measurement ≈ 1080

File # 32 C50330.LP SUNFLOWER (C) 29 July-12 September 1975 Sets of Measurement ≈ 1080

File # 33 C74917.LP WISTERIA 28 Jan-26 April 1975 Sets of Measurement ≈ 2122

7800403

NANSEN REF. # 310053

MULDARS TRACK # TW0980

MONITOR: CONTACT J. Frank

LOCATION OF F022 SOURCE Archives (TW0980)

RECORD ALL ERRORS FOUND

CONSEC(S)	ERRORS FOUND
32 (Formerly Consec No. 29)	Change Degree of Longitude from 125° to 124°.

MB 9/25/97

Note! This cruise required sorting & renumbering of 18 stations.

New Consec. No.	Former Consec. No.
18	19 ✓
19	33 ✓
20	34 ✓
21	20 ✓
22	18 ✓
23	21 ✓
24	22 ✓
25	23 ✓
26	24 ✓
27	25 ✓
28	26 ✓
29	35
30	27 ✓
31	28 ✓
32	29 ✓
33	30 ✓
34	31 ✓
35	32 ✓

F022 data sorted & re-numbered

NANSEN REF. #

310054

MULDARS TRACK #

TW0981

MONITOR: CONTACT

J. Frank

LOCATION OF F022 SOURCE

Archives (TW0981)

RECORD ALL ERRORS FOUND

CONSEC(S) ERRORS FOUND

7 (Consec. No. 4 prior to sort) – Change Minutes of Latitude from 39.9' to 59.9'.

8 (Consec. No. 5 prior to sort) – Change Degree of Latitude from 44° to 45°.

Consec. Nos. were changed for the following 18 stations:

Consec. No.	Consec. No. prior to sort
1	16
2	17
3	18
4	1
5	2
6	3
7	4
8	5
9	6
10	7
11	8
12	9
13	10
14	11
15	12
16	13
17	14
18	15

MRV 11/19

HANSEN REF. #

3100SS

MULDARS TRACK #

TW0982

MONITOR: CONTACT

J. Frank

LOCATION OF F022 SOURCE

Archives (TW0982)

RECORD ALL ERRORS FOUND

CONSEC(S)	ERRORS FOUND
	None

HANSEN REF. #

310056

MULDARS TRACK #

TW0983

MONITOR: CONTACT

J. Frank

LOCATION OF F022 SOURCE

Archives (TW0983)

RECORD ALL ERRORS FOUND

CONSEC(S)	ERRORS FOUND
	None

HANSEN REF. #
310057

MULDARS TRACK #
TW0984

MONITOR: CONTACT
J. Frank

LOCATION OF F022 SOURCE
Archives (TW0984)

RECORD ALL ERRORS FOUND

CONSEC(S)	ERRORS FOUND
	None

NANSEN REF. #

310058

MULDARS TRACK #

TW0985

MONITOR: CONTACT

J. Frank

LOCATION OF F022 SOURCE

Archives (TW0985)

RECORD ALL ERRORS FOUND

CONSEC(S)	ERRORS FOUND
	None

NANSEN REF. # 310059

MULDARS TRACK # TW0986

MONITOR: CONTACT J. Frank

LOCATION OF F022 SOURCE Archives (TW0986)

RECORD ALL ERRORS FOUND

CONSEC(S)	ERRORS FOUND
	None

ACCESSION NO. 7800403 FILETYPE C022 TRACK NO.________ PROJECT IDENTIFICATION IDOE/CUEA

STEP	DATE	INIT.	TAPE OR DISK DSN	NO. FILES	LRECL	BLK SIZE	NO. RECORDS
ORIG. TAPE	2-10-92	P.J.R.	D0888 *	32	80/4000	4000	40,454
DUPLICATE TAPE	↓	↓	W17685 *	↓	↓	↓	↓
REFORMATTED TAPE	3-12-92	R.P.S.	W54430 **	1	120	12000	6300
REFORMATTED DISK							
FIRST MULCHEK							
FINAL MULCHEK							
MPD75 OR F022							
DATA SET FINALIZED							

~~ERRORS~~ REPORTED TO ~~PRINCIPAL INVESTIGATOR~~: * FILES 1-9 (ONLY) Are CTD

** DNODC*CUEAOUT.

ADDITIONAL ERRORS/CORRECTIONS (NOT REPORTED TO P.I.)

COMMENTS (TRACKS DELETED, FIELDS DELETED, ETC.)

ACCESS NUMBER	REF NUMBER	FILE TYPE	PROJ CODE	INST	PLAT	CRUISE NO	CRUISE START	CRUISE END	NUM STA	NUM REC
7800403	310053	C022	0071	3103	31YQ	TW0980	01/28/75	02/04/75	35	1,742
7800403	310054	C022	0071	3103	31YQ	TW0981	03/04/75	03/05/75	30	1,463
7800403	310055	C022	0071	3103	31YQ	TW0982	03/19/75	03/19/75	10	427
7800403	310056	C022	0071	3103	31YQ	TW0983	04/01/75	04/02/75	12	772
7800403	310057	C022	0071	3103	31YQ	TW0984	04/17/75	04/18/75	9	575
7800403	310058	C022	0071	3103	31YQ	TW0985	05/19/75	05/20/75	12	867
7800403	310059	C022	0071	3103	31YQ	TW0986	07/29/75	07/29/75	9	360
7800403	TW0980	F022	0071	3103	31YQ	Y7501-C	01/28/75	02/04/75	35	1,742
7800403	TW0981	F022	0071	3103	31YQ	Y7503-A	03/04/75	03/05/75	30	1,463
7800403	TW0982	F022	0071	3103	31YQ	Y7503-C	03/19/75	03/19/75	10	427
7800403	TW0983	F022	0071	3103	31YQ	Y7504-A	04/01/75	04/02/75	12	772
7800403	TW0984	F022	0071	3103	31YQ	Y7504-B	04/17/75	04/18/75	9	575
7800403	TW0985	F022	0071	3103	31YQ	Y7505-C	05/19/75	05/20/75	12	867
7800403	TW0986	F022	0071	3103	31YQ	Y7507-C	07/29/75	07/29/75	9	360

117 6206

Password:

accNo	fleA	refNo	proj	inst	ship	startDate	cruise	catId
7800403	F015	TT3964	0071	3103	317F	1975/04/28	C26834.L	307051
7800403	F015	TT3965	0071	3103	317F	1975/07/29	C50330.L	307052
7800403	F015	TT3966	0071	3103	317F	1975/04/27	C15304.L	307053
7800403	F015	TT3967	0071	3103	317F	1975/04/27	C15324.L	307054
7800403	F015	TT3968	0071	3103	317F	1975/04/27	C15334.L	307055
7800403	F015	TT3969	0071	3103	317F	1975/04/27	C15374.L	307056
7800403	F015	TT3970	0071	3103	317F	1975/04/28	C15394.L	307057
7800403	F015	TT3971	0071	3103	317F	1975/07/29	C44127.L	307058
7800403	F015	TT3972	0071	3103	317F	1975/07/29	C45231.L	307059
7800403	F015	TT3973	0071	3103	317F	1975/01/28	C74716.L	307060
7800403	F015	TT3974	0071	3103	317F	1975/04/26	C74917.L	307061
7800403	F015	TT3975	0071	3103	317F	1975/04/26	C75015.L	307062
7800403	F015	TT3976	0071	3103	317F	1975/01/28	C75514.L	307063
7800403	F015	TT3977	0071	3103	317F	1975/01/28	C75615.L	307064
7800403	F015	TT3978	0071	3103	317F	1975/01/28	C75114.L	307065
7800403	F015	TT3979	0071	3103	317F	1975/01/28	C75215.L	307066
7800403	F015	TT3980	0071	3103	317F	1975/01/28	C75314.L	307067
7800403	F015	TT3981	0071	3103	317F	1975/01/28	C65414.L	307068
7800403	F015	TT3982	0071	3103	317F	1975/01/28	C74615.L	307069
7800403	F015	TT3983	0071	3103	317F	1975/01/28	C74813.L	307070
7800403	F015	TT3984	0071	3103	317F	1975/04/27	C68917.L	307071
7800403	F015	TT3985	0071	3103	317F	1975/04/28	C68226.L	307072
7800403	F015	TT3986	0071	3103	317F	1975/04/28	C68423.L	307073
7800403	F015	TT3987	0071	3103	317F	1975/04/27	C68624.L	307074
7800403	C022	310053	0071	3103	31YQ	1975/01/28	TW0980	307075
7800403	C022	310054	0071	3103	31YQ	1975/03/03	TW0981	307076
7800403	C022	310055	0071	3103	31YQ	1975/03/19	TW0982	307077
7800403	C022	310056	0071	3103	31YQ	1975/04/01	TW0983	307078
7800403	C022	310057	0071	3103	31YQ	1975/04/17	TW0984	307079
7800403	C022	310058	0071	3103	31YQ	1975/05/19	TW0985	307080
7800403	C022	310059	0071	3103	31YQ	1975/07/29	TW0986	307081
7800403	F022	TW0980	0071	3103	31YQ	1975/01/28	Y7501-C	307082
7800403	F022	TW0981	0071	3103	31YQ	1975/03/03	Y7503-A	307083
7800403	F022	TW0982	0071	3103	31YQ	1975/03/19	Y7503-C	307084
7800403	F022	TW0983	0071	3103	31YQ	1975/04/01	Y7504-A	307085
7800403	F022	TW0984	0071	3103	31YQ	1975/04/17	Y7504-B	307086
7800403	F022	TW0985	0071	3103	31YQ	1975/05/19	Y7505-C	307087
7800403	F022	TW0986	0071	3103	31YQ	1975/07/29	Y7507-C	307088

(38 rows affected)

Password:

accNo	fleA	refNo	ship	staCnt	recCnt	startDate	endDate
7800403	F015	TT3964	317F	1	2201	75/04/28	75/07/01
7800403	F015	TT3965	317F	1	1082	75/07/29	75/09/01
7800403	F015	TT3966	317F	1	2240	75/04/27	75/07/01
7800403	F015	TT3967	317F	1	2240	75/04/27	75/07/01
7800403	F015	TT3968	317F	1	2240	75/04/27	75/07/01
7800403	F015	TT3969	317F	1	2240	75/04/27	75/07/01
7800403	F015	TT3970	317F	1	2202	75/04/28	75/07/01
7800403	F015	TT3971	317F	1	1083	75/07/29	75/09/01
7800403	F015	TT3972	317F	1	1081	75/07/29	75/09/01
7800403	F015	TT3973	317F	1	2124	75/01/28	75/04/01
7800403	F015	TT3974	317F	1	2123	75/04/26	75/07/29
7800403	F015	TT3975	317F	1	2123	75/04/26	75/07/29
7800403	F015	TT3976	317F	1	2569	75/01/28	75/05/01
7800403	F015	TT3977	317F	1	2599	75/01/28	75/05/01
7800403	F015	TT3978	317F	1	2126	75/01/28	75/04/01
7800403	F015	TT3979	317F	1	2126	75/01/28	75/04/01
7800403	F015	TT3980	317F	1	2126	75/01/28	75/04/01
7800403	F015	TT3981	317F	1	2126	75/01/28	75/04/01
7800403	F015	TT3982	317F	1	2123	75/01/28	75/04/01
7800403	F015	TT3983	317F	1	2114	75/01/28	75/04/01
7800403	F015	TT3984	317F	1	2239	75/04/27	75/07/01
7800403	F015	TT3985	317F	1	2201	75/04/28	75/07/01
7800403	F015	TT3986	317F	1	2201	75/04/28	75/07/01
7800403	F015	TT3987	317F	1	2238	75/04/27	75/07/01
7800403	C022	310053	31YQ	35	44	75/01/28	75/02/05
7800403	C022	310054	31YQ	30	36	75/03/03	75/03/05
7800403	C022	310055	31YQ	10	12	75/03/19	75/03/19
7800403	C022	310056	31YQ	12	16	75/04/01	75/04/02
7800403	C022	310057	31YQ	9	13	75/04/17	75/04/18
7800403	C022	310058	31YQ	12	17	75/05/19	75/05/20
7800403	C022	310059	31YQ	9	13	75/07/29	75/07/29
7800403	F022	TW0980	31YQ	35	1742	75/01/28	75/02/05
7800403	F022	TW0981	31YQ	30	1463	75/03/03	75/03/05
7800403	F022	TW0982	31YQ	10	427	75/03/19	75/03/19
7800403	F022	TW0983	31YQ	12	772	75/04/01	75/04/02
7800403	F022	TW0984	31YQ	9	575	75/04/17	75/04/18
7800403	F022	TW0985	31YQ	12	867	75/05/19	75/05/20
7800403	F022	TW0986	31YQ	9	360	75/07/29	75/07/29

(38 rows affected)

ORIGINATOR'S TAPE

1 Y7501C OSU SCH. OF OC. CTD DATA 27-29 JAN 75
2 Y7502A CTD DATA 3-5 FEB 75
3 Y7503A CTD DATA 3-5 MAR 75
4 Y7503C CTD DATA 18-22 MAR 75
5 Y7504A CTD DATA 1-2 APR 75
6 Y7504B CTD DATA 17-19 APR 75
7 Y7505C CTD DATA 19-20 MAY 75
8 Y7507C CTD DATA 28-29 JUL 75
9 C75514.LP 28M PIKAKE 18 JAN TO 15 MAY 75 HOURLY U.V,SUMU,SUMV,T,P,SALINITY
10 C75615.LP 53M PIKAKE 28 JAN-15 MAY 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
11 C75114.LP 26M SUNFLOWER(A) 28 JAN-26APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
12 C75215.LP 52M SUNFLOWER(A) 28 JAN-26APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
13 C75314.LP 76M SUNFLOWER(A) 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
14 C75414.LP 92M SUNFLOWER(A) 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
15 C74615.LP 31M WISTERIA 28 JAN-26 APR 75,HOURLY U,V,SUMU,SUMV,T,P,SAL.
16 C74716.LP 55M WISTERIA (ALTERED FORMAT) HOURLY U,V,SUMU,SUMV,T,P
17 C74813.LP 106M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
18 C74917.LP 156M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,SAL.
19 C75015.LP 206M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,SAL.
20 C68624.LP 7M OHIA (ALTERED FORMAT) HOURLY U,V,SUMU,SUMV,T,P,SAL.
21 C68917.LP 82M OHIA 27 APR-29 JUL 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
22 C15304.LP 182M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
23 C15324.LP 282M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
24 C15334.LP 382M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
25 C15374.LP 482M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
26 C68226.LP 27M SUNFLOWER(B) 28APR-28JUL75, HOURLY U,V,SUMU,SUMV,T,P,S
27 C26834.LP 52M SUNFLOWER(B)(ALT.FORMAT)28APR-28JUL75,HOURLY U,V,SUMU,SUMV
28 C15394.LP 78M SUNFLOWER(B)(ALT.FORMAT)28APR-28JUL75,HOURLY U,V,SUMU,SUMV,T
29 C68423.LP 93M SUNFLOWER(B) 28APR-28JUL75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
30 C44127.LP 25M SUNFLOWER(C)(ALT.FORMAT)29JUL-12SEP75, HOURLY U,V,SUMU,SUMV,T
31 C45231.LP 75M SUNFLOWER(C)(ALT.FORMAT)29JUL-12SEP75, HOURLY U,V,SUMU,SUMV,T
32 C50330.LP 90M SUNFLOWER(C)(ALT.FORMAT)29JUL-12-SEP75, HOURLY U,V,SUMU,SUMV

```
Y75010 OSU SCH. OF OC. CTD DATA 27-29 JAN 75
Y7502A CTD DATA 3-5 FEB 75
Y7503A CTD DATA 3-5 MAR 75
Y7503C CTD DATA 18-22 MAR 75
Y7504A CTD DATA 1-2 APR 75
Y7504B CTD DATA 17-19 APR 75
Y7505C CTD DATA 19-20 MAY 75
Y7507C CTD DATA 28-29 JUL 75
C75514.LP 28M PIKAKE 18 JAN TO 15 MAY 75 HOURLY U,V,SUMU,SUMV,T,P,SALINITY
C75615.LP 53M PIKAKE 28 JAN-15 MAY 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C75114.LP 26M SUNFLOWER(A) 28 JAN-26APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C75215.LP 52M SUNFLOWER(A) 28 JAN-26APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C75314.LP 76M SUNFLOWER(A) 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C75414.LP 92M SUNFLOWER(A) 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C74615.LP 31M WISTERIA 28 JAN-26 APR 75,HOURLY U,V,SUMU,SUMV,T,P,SAL.
C74716.LP 55M WISTERIA (ALTERED FORMAT) HOURLY U,V,SUMU,SUMV,T,P
C74813.LP 106M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C74917.LP 156M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,SAL.
C75015.LP 206M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,SAL.
C68624.LP 7M OHIA (ALTERED FORMAT) HOURLY U,V,SUMU,SUMV,T,P,SAL.
C68917.LP 82M OHIA 27 APR-29 JUL 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C15304.LP 182M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
C15324.LP 282M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
C15334.LP 382M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
C15374.LP 482M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUMV,T
C68226.LP 27M SUNFLOWER(B) 28APR-28JUL75, HOURLY U,V,SUMU,SUMV,T,P,S
C26834.LP 52M SUNFLOWER(B)(ALT.FORMAT)28APR-28JUL75,HOURLY U,V,SUMU,SUMV
C15394.LP 78M SUNFLOWER(B)(ALT.FORMAT)28APR-28JUL75,HOURLY U,V,SUMU,SUMV,T
C68423.LP 93M SUNFLOWER(B) 28APR-28JUL75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
C44127.LP 25M SUNFLOWER(C)(ALT.FORMAT)29JUL-12SEP75, HOURLY U,V,SUMU,SUMV,T
C45231.LP 75M SUNFLOWER(C)(ALT.FORMAT)29JUL-12SEP75, HOURLY U,V,SUMU,SUMV,T
C50330.LP 90M SUNFLOWER(C)(ALT.FORMAT)29JUL-12-SEP75,HOURLY U,V,SUMU,SUMV
```

ORIGINATOR'S TAPE FILE #18 (C74917.LP 156M WISTERIA) WAS UNREADABLE & IS RE-WRITTEN AS FILE # 24 ON WISP/UP-75, CUEA ORIGINATOR TAPE.

RCVD: 3 Jun 77 FDM Copy NUMBER 78-0403

Given to R. Rinn

DATA DOCUMENTATION FORM

NOAA FORM 24-13 (4-72) 5/22/78

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
ROCKVILLE, MARYLAND 20852

FORM APPROVED
O.M.B. No. 41-R2651

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

NODC TAPE 1214
9 TRK 1600 b.p.i.
RECFM=U
BLKSIZE=4000
LABEL=(10,NL) THRU (33,NL)
FILES 10 THRU 33

CURRENTS
SPEED
U, V, COMPONENTS
TEMP/press/SALINITY

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED

School of Oceanography
Oregon State University
Corvallis, OR 97331

2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED

WISP, UP-75
NSF Grants OCE 74-22290 and
IDO 71-04211

3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT

WISP, UP-75

4. PLATFORM NAME(S)

5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.)

BUOY

6. PLATFORM AND OPERATOR NATIONALITY(IES)

PLATFORM	OPERATOR

7. DATES

FROM: MO/DAY/YR	TO: MO/DAY/YR
28 Jan. 75	12 Sept 75

8. ARE DATA PROPRIETARY?

[X] NO [ ] YES

IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR ____ MONTH ____

9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?)

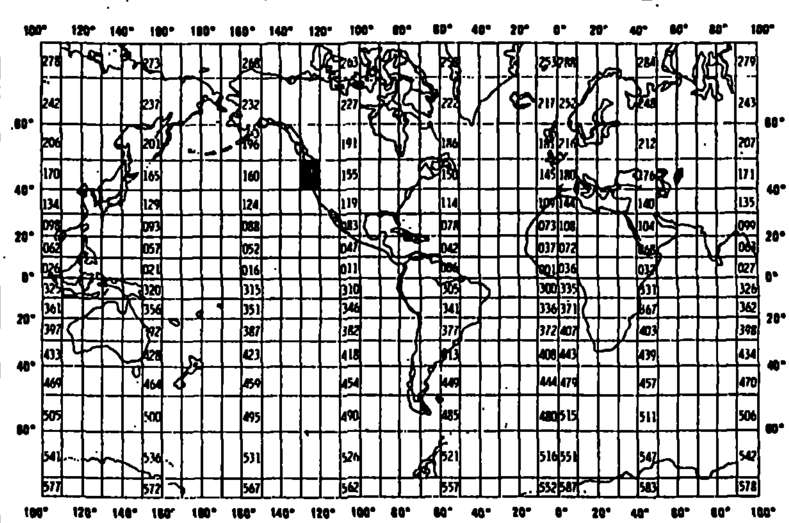
[ ] NO [X] YES [ ] PART *(SPECIFY BELOW)*

10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER *(AND ADDRESS IF OTHER THAN IN ITEM-1)*

Dr. Jane Huyer
(503) 754-2206
Dr. Robert L. Smith

11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.

GENERAL AREA



NOAA FORM 24-13 USCOMM-DC 44289-P72

B. SCIENTIFIC CONTENT

Include enough information concerning manner of observation, instrumentation, analysis, and data reduction routines to make them understandable to future users. Furnish the minimum documentation considered relevant to each data type. Documentation will be retained as a permanent part of the data and will be available to future users. Equivalent information already available may be substituted for this section of the form (i.e., publications, reports, and manuscripts describing observational and analytical methods). If you do not provide equivalent information by attachment, please complete the scientific content section in a manner similar to the one shown in the following example.

EXAMPLE (HYPOTHETICAL INFORMATION)

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Salinity	‰	Nansen bottles	Inductive salinometer (Hytech model S510)	N/A (Not applicable)
		STD Bissett-Berman Model 9006	N/A	Values averaged over 5-meter intervals
Water color	Forel scale	Visual comparison with Forel bottles	N/A	N/A
Sediment size	ϕ units and percent by weight	Ewing corer	Standard sieves. Carbonate fraction removed by acid treatment	Same as "Sedimentary Rock Manual," Folk '65

(SPACE IS PROVIDED ON THE FOLLOWING TWO PAGES FOR THIS INFORMATION)

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Speed (u, v)	cm/sec	Aanderaa current meters model RCM-4		
temperature	°C		see #A	see #C
pressure	db			
salinity	o/oo			
		20 minute sensing period		

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
• GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

There are 24 current meter data files on MT. These are numbers 9 through 32. There is an EOF between each current meter. First line of each record is as appears in attached directory.

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

There are 24 current meter data files on MT. These are numbers 9 through 32. There is an EOF between each current meter.

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☒ FORTRAN ☐ ____________ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:
NAME AND PHONE NUMBER William Gilbert (503) 754-2206
ADDRESS School of Oceanography, Oregon State University, Corvallis, OR 97331

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE: ☒ BCD ☐ BINARY ☐ ASCII ☐ EBCDIC ☐ ____________

6. NUMBER OF TRACKS (CHANNELS): ☒ SEVEN ☐ NINE ☐ ____________

7. PARITY: ☐ ODD ☒ EVEN

8. DENSITY: ☐ 200 BPI ☐ 1600 BPI ☐ 556 BPI ☒ 800 BPI ☐ ____________

9. LENGTH OF INTER-RECORD GAP (IF KNOWN): ☒ 3/4 INCH ☐ ____________

10. END OF FILE MARK: ☒ OCTAL 17 ☐ ____________

11. PASTE-ON-PAPER LABEL DESCRIPTION *(INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)*

Oregon State University
School of Oceanography
BCD Even Parity WISP, UP-75
7 Track 800 BPI

12. PHYSICAL BLOCK LENGTH IN BYTES
4000

13. LENGTH OF BYTES IN BITS
6

RECORD NAME ______________________

14. FIELD NAME	15. POSITION FROM 1 MEASURED IN ____ (e.g., bits, bytes)	16. LENGTH NUMBER	UNITS	17. ATTRIBUTES	18. USE AND MEANING altered format
TIME (GMT)				I5	I5
DAY				I3	I3
MONTH				I3	I3
Year				I3	I3
U component of speed			cm/sec	F6.1	F6.1
V component of speed			cm/sec	F6.1	F6.1
ΣU			cm/sec	F9.1	F9.1
ΣV			cm/sec	F9.1	F9.1
temperature			°C	F6.2	F7.2
pressure (if exists)			newtons/m^2	F9.0	F10.0
salinity (if exists)			o/oo	F7.3	F8.3
line counter				I4	I6

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALIBRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Aanderaa RCM-4	just after last recovery	✓				✓			

June 26, 1975

MINIMUM DOCUMENTATION PREFERRED WITH
THE SUBMISSION OF INSTRUMENTED CURRENT DATA
TO NODC

The purpose of this addendum to the NOAA Form 24-13 (4-72), Data Documentation Form (DDF), is to establish the minimum documentation preferred with the submission of instrumented current data to the National Oceanographic Data Center (NODC). It also provides guidance for properly recording this documentation on the DDF; or, on this sheet in the absence of reports, publications, or other products containing the desired documentation.

A. Instrument Documentation:

1. Manufacturer, instrument name and model number. (Record on DDF, Section B, third column) Aanderaa RCM-4

2. Publication(s) providing instrument specifics. (Attach publication(s) to DDF or reference below)

a. see #A-2

~~b.~~ __________

~~c.~~ __________

see #A-3 3. Modifications made to the instrument and resultant effects on the data. (Record on DDF, Section B, fourth column)

4. Complete the following in the space provided if other than by manufacturer's specifications.

a.	Conductivity ~~Speed~~ Range	30-50 mmhos/cm^2
b.	Speed Threshold	
c.	Conductivity ~~Speed~~ Precision	±0.02 mmhos/cm^2
d.	Speed Accuracy	
e.	Inclinometer Accuracy (if not recorded, indicate so)	
f.	Direction Precision	
g.	Direction Accuracy	
h.	Depth Precision (if depth is not recorded, indicate so)	
i.	Depth Accuracy (omit if depth is not recorded)	

B. Observation Platform Documentation:

1. Briefly describe in the third column of Section B the type of platform (shipboard, taut surface or subsurface mooring, etc.) from which observations were taken and how the instruments were mounted (on mooring, etc.); or, reference below the publication(s) containing this information, if commonly available.

a. see #b

b.

c.

c.

C. Data Recording Mode and Treatment Documentation:

Describe in detail the initial at sea instrument sensing time interval; and, the time interval between consecutive, discrete, and processed observations. For example:

1. Record on DDF, Section B, third column:

a. Sensing period (unit of time for one at sea burst or other reading for speed, direction, temperature, etc.). 20 minutes

b. Interrogation interval (interval between at sea recorded consecutive readings).

2. Record on the DDF, Section B, fifth column:

a. Number of at sea readings used for a discrete observation as recorded on final processed data record. 1

b. Resultant time interval between consecutive processed observations. 1 hour

see #C c. Method of determining final discrete observation (averaging technique).

d. Method of summarizing if data summary is provided. Include number of observations, time interval between observations, period of time to which summary applies, applicable statistical methods, etc.

see #C e. Specific data editing and processing (smoothing and filtering) procedures, corrections applied (for vertical and/or horizontal oscillations, tilt angles, etc.).

f. Method of determining platform motions.

D. Other Documentation Affecting Data Quality (record in column five of DDF Form) see #D

Specify and describe environmental conditions (waves, fouling, tidal affects, etc.) which may have a bearing on the final quality of the data.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

There are 24 current meter data files on MT. These are numbers 9 through 32. here is an EOF between each current meter. First line of each record is as appears in attached directory.

F022 78ØØ4Ø3
TWØ98Ø - TW0986
310053 - 310059 C022

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

There are 24 current meter data files on MT. These are numbers 9 through 32. There is an EOF between each current meter.

3. ATTRIBUTES AS EXPRESSED IN [ ] PL-1 [ ] ALGOL [ ] COBOL [X] FORTRAN [ ] ________ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:
NAME AND PHONE NUMBER William Gilbert (503) 754-2206
ADDRESS School of Oceanography, Oregon State University, Corvallis, OR 9733

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE [X] BCD [ ] BINARY [ ] ASCII [ ] EBCDIC [ ] ________

6. NUMBER OF TRACKS (CHANNELS) [X] SEVEN [ ] NINE [ ] ________

7. PARITY [ ] ODD [X] EVEN

8. DENSITY [ ] 200 BPI [ ] 1600 BPI [ ] 556 BPI [X] 800 BPI [ ] ________

9. LENGTH OF INTER-RECORD GAP (IF KNOWN) [X] 3/4 INCH [ ] ________

10. END OF FILE MARK [X] OCTAL 17 [ ] ________

11. PASTE-ON-PAPER LABEL DESCRIPTION *(INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)*

Oregon State University
School of Oceanography
BCD Even Parity WISP, UP-75
7 Track 800 BPI

12. PHYSICAL BLOCK LENGTH IN BYTES
4000

13. LENGTH OF BYTES IN BITS
6

ACCESS NUMBER	REF NUMBER	FILE TYPE	PROJ CODE	INST	PLAT	CRUISE NO	CRUISE START	CRUISE END	NUM STA	NUM REC
7800403	310053	C022	0071	3103	31YQ	TW0980	01/28/75	02/04/75	35	1,742
7800403	310054	C022	0071	3103	31YQ	TW0981	03/04/75	03/05/75	30	1,463
7800403	310055	C022	0071	3103	31YQ	TW0982	03/19/75	03/19/75	10	427
7800403	310056	C022	0071	3103	31YQ	TW0983	04/01/75	04/02/75	12	772
7800403	310057	C022	0071	3103	31YQ	TW0984	04/17/75	04/18/75	9	575
7800403	310058	C022	0071	3103	31YQ	TW0985	05/19/75	05/20/75	12	867
7800403	310059	C022	0071	3103	31YQ	TW0986	07/29/75	07/29/75	9	360
7800403	TW0980	F022	0071	3103	31YQ	Y7501-C	01/28/75	02/04/75	35	1,742
7800403	TW0981	F022	0071	3103	31YQ	Y7503-A	03/04/75	03/05/75	30	1,463
7800403	TW0982	F022	0071	3103	31YQ	Y7503-C	03/19/75	03/19/75	10	427
7800403	TW0983	F022	0071	3103	31YQ	Y7504-A	04/01/75	04/02/75	12	772
7800403	TW0984	F022	0071	3103	31YQ	Y7504-B	04/17/75	04/18/75	9	575
7800403	TW0985	F022	0071	3103	31YQ	Y7505-C	05/19/75	05/20/75	12	867
7800403	TW0986	F022	0071	3103	31YQ	Y7507-C	07/29/75	07/29/75	9	360

117 6-2-06

ACCESSION NO. ~~[illegible]~~ ~~[illegible]~~ 7800403 FILETYPE ~~[illegible]~~ F022 TRACK NO. TW0980-89 PROJECT IDENTIFICATION 7DOE/CMCA

STEP	DATE	INIT.	TAPE OR DISK DSN	NO. FILES	LRECL	BLK SIZE	NO. RECORDS
ORIG. TAPE	2-10-92	RJR	*D00888 (W14372)	32	120 ~~80~~	4000	40,456 ~~[illegible]~~
DUPLICATE TAPE			W17685				
REFORMATTED TAPE	3-12-92	R.P.S.	~~[illegible]~~ W54430	** 1	120	12000	6300
REFORMATTED DISK							
FIRST MULCHEK							
FINAL MULCHEK							
MPD75 OR F022							
DATA SET FINALIZED							

~~ERRORS REPORTED TO PRINCIPAL INVESTIGATOR:~~ * EBCDIC/1600/NL FILES 1-9 (ONLY) ARE CTD.

** = DNODC*CLEAOUT.

ADDITIONAL ERRORS/CORRECTIONS (NOT REPORTED TO P.I.)

COMMENTS (TRACKS DELETED, FIELDS DELETED, ETC.)

DATA DOCUMENTATION FORM

DDF A:4:10

NOAA FORM 24-13

7800403

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
ROCKVILLE, MARYLAND 20852

FORM APPROVED
O.M.B. No. 41-R2651

TW0980-986

F022

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

CURRENTS 0180 0184 0181
SPEED / TEMP / Press / SALINITY
807 806 U, V, COMPONENTS

NODC TAPE 1214
9 TRACK 1600 b.p.i.
RECFM = U
BLKSIZE = 4000

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED

School of Oceanography
Oregon State University
Corvallis, OR 97331

LABEL = (10, NL) THRU (33, NL)

FILES 10 THRU 33

2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED

WISP, UP-75
NSF Grants OCE 74-22290 and IDO 71-04211

3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT

WISP, UP-75

4. PLATFORM NAME(S)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.)	6. PLATFORM AND OPERATOR NATIONALITY(IES): PLATFORM	OPERATOR	7. DATES: FROM: MO/DAY/YR	TO: MO/DAY/YR
	BUOY			28 Jan. 75	12 Sept 75

8. ARE DATA PROPRIETARY?

[X] NO [ ] YES

IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR____ MONTH____

9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)?
(I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?)

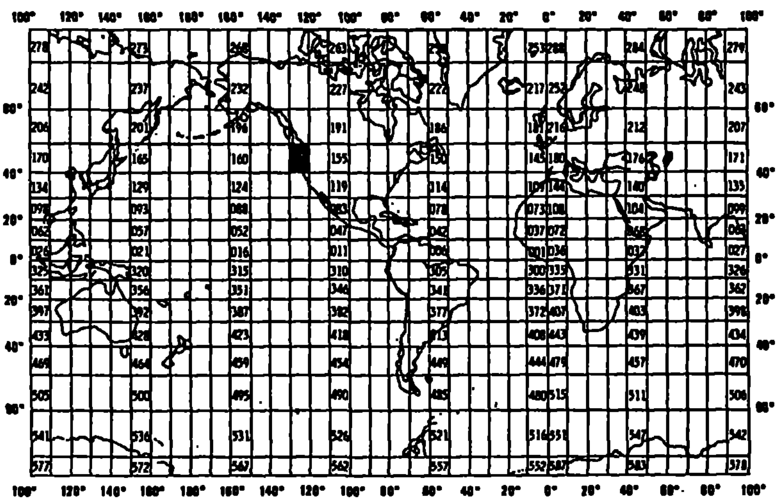
[ ] NO [X] YES [ ] PART *(SPECIFY BELOW)*

10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER *(AND ADDRESS IF OTHER THAN IN ITEM-1)*

Dr. Jane Huyer
(503) 754-2206
Dr. Robert L. Smith

11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.

GENERAL AREA



A FORM 24-13

USCOMM-DC 44289-P72

ORIGINATOR'S TAP

```
1   Y7501C OSU SCH. OF     CTD DATA 27-29 JAN 75
2   Y7502A CTD DATA 3-    B 75
3   Y7503A CTD DATA 3-5 MAR 75
4   Y7503C CTD DATA 18-22 MAR 75
5   Y7504A CTD DATA 1-2 APR 75
6   Y7504B CTD DATA 17-19 APR 75
7   Y7505C CTD DATA 19-20 MAY 75
8   Y7507C CTD DATA 28-29 JUL 75
9   C75514.LP 28M PIKAKE 28 JAN TO 15 MAY 75 HOURLY U,V,SUMU,SUMV,T,P,S
10  C75615.LP 53M PIKAKE 28 JAN-15 MAY 75, HOURLY U,V,SUMU,SUMV,T,P,SA
11  C75114.LP 26M SUNFLOWER(A) 28 JAN-26APR 75, HOURLY U,V,SUMU,SUMV,T
12  C75215.LP 52M SUNFLOWER(A) 28 JAN-26APR 75, HOURLY U,V,SUMU,SUMV,T
13  C75314.LP 76M SUNFLOWER(A) 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,
14  C75414.LP 92M SUNFLOWER(A) 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,
15  C74615.LP 31M WISTERIA 28 JAN-26 APR 75,HOURLY U,V,SUMU,SUMV,T,P,S
16  C74716.LP 55M WISTERIA (ALTERED FORMAT) HOURLY U,V,SUMU,SUMV,T,P
17  C74813.LP 106M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,P
18  C74917.LP 156M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,S
19  C75015.LP 206M WISTERIA 28 JAN-26 APR 75, HOURLY U,V,SUMU,SUMV,T,S
20  C68624.LP 7M OHIA (ALTERED FORMAT) HOURLY U,V,SUMU,SUMV,T,P,SAL.
21  C68917.LP 82M OHIA 27 APR-29 JUL 75, HOURLY U,V,SUMU,SUMV,T,P,SAL.
22  C15304.LP 182M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUM
23  C15324.LP 282M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUM
24  C15334.LP 382M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUM
25  C15374.LP 482M OHIA (ALT.FORMAT)27APR-29JUL75, HOURLY U,V,SUMU,SUM
26  C68226.LP 27M SUNFLOWER(B) 28APR-28JUL75, HOURLY U,V,SUMU,SUMV,T,P
27  C26834.LP 52M SUNFLOWER(B)(ALT.FORMAT)28APR-28JUL75,HOURLY U,V,SUM
28  C15394.LP 78M SUNFLOWER(B)(ALT.FORMAT)28APR-28JUL75,HOURLY U,V,SUM
29  C68423.LP 93M SUNFLOWER(B) 28APR-28JUL75, HOURLY U,V,SUMU,SUMV,T,P
30  C44127.LP 25M SUNFLOWER(C)(ALT.FORMAT)29JUL-12SEP75, HOURLY U,V,SU
31  C45231.LP 75M SUNFLOWER(C)(ALT.FORMAT)29JUL-12SEP75, HOURLY U,V,SU
3   C50330.LP 90M SUNFLOWER(C)(ALT.FORMAT)29JUL-12-SEP75,HOURLY U,V,SU
```

E NTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERI AND AVERAGING
Speed (u, v)	cm/sec	Aanderaa current meters model RCM-4		
temperature	°C		see #A	see #C
pressure	db			
salinity	o/oo			
		20 minute sensing period		

ACCESS NUMBER	REF NUMBER	FILE TYPE	PROJ CODE	INST	PLAT	CRUISE NO	CRUISE START	CRUISE END	NUM STA	NUM REC
7800403	310053	C022	0071	3103	31YQ	TW0980	01/28/75	02/04/75	35	1,742
7800403	310054	C022	0071	3103	31YQ	TW0981	03/04/75	03/05/75	30	1,463
7800403	310055	C022	0071	3103	31YQ	TW0982	03/19/75	03/19/75	10	427
7800403	310056	C022	0071	3103	31YQ	TW0983	04/01/75	04/02/75	12	772
7800403	310057	C022	0071	3103	31YQ	TW0984	04/17/75	04/18/75	9	575
7800403	310058	C022	0071	3103	31YQ	TW0985	05/19/75	05/20/75	12	867
7800403	310059	C022	0071	3103	31YQ	TW0986	07/29/75	07/29/75	9	360
7800403	TW0980	F022	0071	3103	31YQ	Y7501-C	01/28/75	02/04/75	35	1,742
7800403	TW0981	F022	0071	3103	31YQ	Y7503-A	03/04/75	03/05/75	30	1,463
7800403	TW0982	F022	0071	3103	31YQ	Y7503-C	03/19/75	03/19/75	10	427
7800403	TW0983	F022	0071	3103	31YQ	Y7504-A	04/01/75	04/02/75	12	772
7800403	TW0984	F022	0071	3103	31YQ	Y7504-B	04/17/75	04/18/75	9	575
7800403	TW0985	F022	0071	3103	31YQ	Y7505-C	05/19/75	05/20/75	12	867
7800403	TW0986	F022	0071	3103	31YQ	Y7507-C	07/29/75	07/29/75	9	360

117 6206

RCVD. 3 OCT 77

ACCESSION NUMBER	78-0403

IDOE / CUEA

TT 3964 - TT 3987
F015

DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
ROCKVILLE, MARYLAND 20852

FORM APPROVED
O.M.B. No. 41-R2651

DDF A:4:10

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

CTD
DEPTH
TEMP
SAL / CONDUCTIVITY

NODC TAPE 1214
9 TRACK 1600 b.p.i.
RECFM=U
BLKSIZE=4000
LABEL=(2,NL) THRU (9,NL)

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED

School of Oceanography
Oregon State University
Corvallis, OR 97331

Y7501-C - 27-29 JAN. 75
Y7502-C - 3-5 FEB 75
Y7503-A - 3-5 MARCH 75
Y7503-C - 18-22 MARCH 75

NOTE: FILE #1 IS DDF

2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED

WISP, UP-75 (1975)
NSF Grants OCE 74-22290 and
IDO 71-04211

3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT

WISP, UP-75

Y7504-A - 1-2 APR
Y7504-B - 17-19 APR
Y7505-C - 19-20 MAY
Y7507-C - 28-29 JULY

4. PLATFORM NAME(S)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.)	6. PLATFORM AND OPERATOR NATIONALITY(IES): PLATFORM	OPERATOR	7. DATES: FROM: MO/DAY/YR	TO: MO/DAY/YR
R/V YAQUINA	Ship	RV YAQUINA	Oregon State Univ.	27 Jan. 75	29 Jul 75

8. ARE DATA PROPRIETARY?

[XX] NO [ ] YES

IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR ____ MONTH ____

9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)?
(I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?)

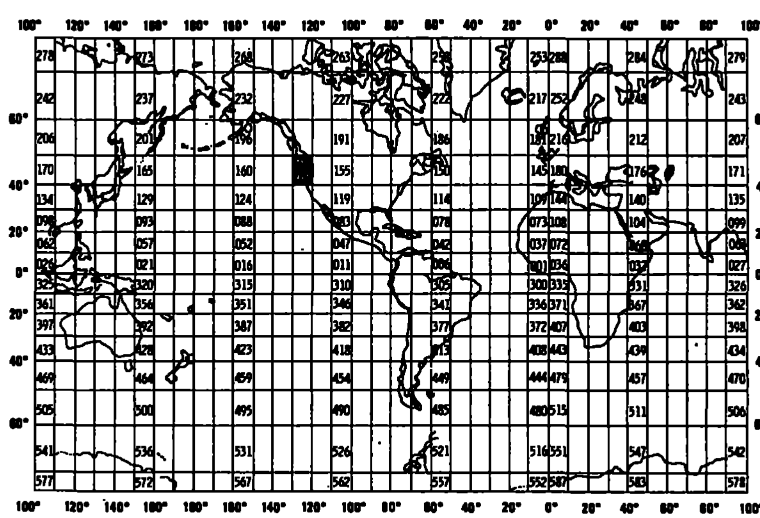
[ ] NO [X] YES [ ] PART *(SPECIFY BELOW)*

10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER *(AND ADDRESS IF OTHER THAN IN ITEM-1)*

Dr. Jane Huyer, Dr. Bob Smith
(503) 754-2206

11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.

GENERAL AREA



B. SCIENTIFIC CONTENT

Include enough information concerning manner of observation, instrumentation, analysis, and data reduction routines to make them understandable to future users. Furnish the minimum documentation considered relevant to each data type. Documentation will be retained as a permanent part of the data and will be available to future users. Equivalent information already available may be substituted for this section of the form (i.e., publications, reports, and manuscripts describing observational and analytical methods). If you do not provide equivalent information by attachment, please complete the scientific content section in a manner similar to the one shown in the following example.

EXAMPLE (HYPOTHETICAL INFORMATION)

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Salinity	‰	Nansen bottles	Inductive salinometer (Hytech model S510)	N/A (Not applicable)
		STD Bissett-Berman Model 9006	N/A	Values averaged over 5-meter intervals
Water color	Forel scale	Visual comparison with Forel bottles	N/A	N/A
Sediment size	ϕ units and percent by weight	Ewing corer	Standard sieves. Carbonate fraction removed by acid treatment	Same as "Sedimentary Rock Manual," Folk '65

(SPACE IS PROVIDED ON THE FOLLOWING TWO PAGES FOR THIS INFORMATION)

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Temperature Conductivity	°C $mhos/cm^2$	Geodyne CTD	(see attached sheet)	values averaged over 1. meter intervals

Y7501-C -16 CASTS
Y7502-C -19 CASTS
Y7503-A - 30 CASTS
Y7503-C-10 CASTS
Y7504-A-12 CASTS
Y7504-B - 9 CASTS
Y7505-C-12 CASTS
Y7507-C -9 CASTS

117 TOTAL

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING

C. DATA FORMAT

This information is requested only for data transmitted on punched cards or magnetic tape. Have one of your data processing specialists furnish answers either on the form or by attaching equivalent readily available documentation. Identify the nature and meaning of all entries and explain any codes used.

1. List the record types contained in your file transmittal (e.g., tape label record, master, detail, standard depth, etc.).

2. Describe briefly how your file is organized.

3-13. Self-explanatory.

14. Enter the field name as appropriate (e.g., header information, temperature, depth, salinity.

15. Enter starting position of the field.

16. Enter field length in number columns and unit of measurement (e.g., bit, byte, character, word) in unit column.

17. Enter attributes as expressed in the programming language specified in item 3 (e.g., "F 4.1," "BINARY FIXED (5.1)").

18. Describe field. If sort field, enter "SORT 1" for first, "SORT 2" for second, etc. If field is repeated, state number of times it is repeated.

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
   GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

Header Block - list is enclosed with mag tape (there are 5 cruises)
Data Blocks - each cast is composed of 2 header cards and numerous lines of data. See p. 27-28 of enclosed data report for header card information. P. 28-29 gives data layout.

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

Header block followed by as many data blocks as needed.

(8 cruises)

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL ☐ FORTRAN ☐ ________ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:
NAME AND PHONE NUMBER William Gilbert (503) 754-2206
ADDRESS School of Oceanography, Oregon State Univ., Corvallis, OR 97331

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE: ☒ BCD ☐ BINARY ☐ ASCII ☐ EBCDIC ☐ ________

6. NUMBER OF TRACKS (CHANNELS): ☒ SEVEN ☐ NINE ☐ ________

7. PARITY: ☐ ODD ☒ EVEN

8. DENSITY: ☐ 200 BPI ☐ 1600 BPI ☐ 556 BPI ☒ 800 BPI ☐ ________

9. LENGTH OF INTER-RECORD GAP (IF KNOWN) ☒ 3/4 INCH ☐ ________

10. END OF FILE MARK ☒ OCTAL 17 ☐ ________

11. PASTE-ON-PAPER LABEL DESCRIPTION *(INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)*

Oregon State University
School of Oceanography
BCD Even Parity WISP, UP-75
7 Track 800 BPI

12. PHYSICAL BLOCK LENGTH IN BYTES
4000

13. LENGTH OF BYTES IN BITS
6

RECORD FORMAT DESCRIPTION

RECORD NAME

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN (e.g., bits, bytes)	16. LENGTH NUMBER	16. LENGTH UNITS	17. ATTRIBUTES	18. USE AND MEANING
FIRST HEADER CARD					
Sta. No.			col.	1-3	Station number
			col.	4	U = up cast; D = down
Sta. Designator (if used)			Col.	5-8	
Month				9-10	
Day				11-12	
time (z)				13-16	
Latitude (N)				18-23	
Longitude (W)				24-30	
Swell direction				31-33	
Swell height (ft)				34-35	
Swell period (sec)				36-37	
Wind direction				38-40	
Wind speed (knots)				41-42	
Barometric pressure (mb)				43-46	14.6 = 1014.6 mb
Wet bulb temperature				47-50	°C
Dry bulb temperature				51-54	°C
WMO weather code				55-56	
Cloud Type				58	
Second cloud type				60	
Cloud amount				61	
Visibility code				62	

RECORD FORMAT DESCRIPTION

RECORD NAME

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN (e.g., bits, bytes)	16. LENGTH NUMBER	UNITS	17. ATTRIBUTES	18. USE AND MEANING
			SECOND HEADER CARD		
				Columns	
Bottom depth (m)				1-4	
Surface temperature ~ 1 m				5-8	
Surface salinity ~ 1 m				9-14	
depth of following salinity (m)				15-18	
salinity (o/oo)				19-24	
CTD number				25-28	
year (1974)				29-32	
Data					
Depth (m)					
Temperature (°C)					
Conductivity (mmhos/cm^2)					
Salinity (o/oo)					
Sigma-T					
(Repeats)					

NOAA FORM 24-13 USCOMM-DC 44289-P72

RECORD FORMAT DESCRIPTION

RECORD NAME ______________________

14. FIELD NAME	15. POSITION FROM - 1 MEASURED IN ______ (e.g., bits, bytes)	16. LENGTH		17. ATTRIBUTES	18. USE AND MEANING
		NUMBER	UNITS		

RECORD FORMAT DESCRIPTION

RECORD NAME ____________________

14. FIELD NAME	15. POSITION FROM-1 MEASURED IN ______ (e.g., bits, bytes)	16. LENGTH		17. ATTRIBUTES	18. USE AND MEANING
		NUMBER	UNITS		

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALIBRATED (√)
		YOUR ORGANIZATION (√)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (√)	BEFORE OR AFTER USE (√)	BEFORE AND AFTER USE (√)	ONLY AFTER REPAIR (√)	ONLY WHEN NEW (√)	
CTD		X				X			

RCVD: 3OCT77WISP
[redacted]

Documentation of Processed STD Velocimeter Data

National Oceanographic Data Center

September 1971

Please use this form as a supplement to the NODC "Data Definition Form, General Information."

All items on this form are considered of importance to the archive processing and future use of STD-velocimeter data. In submitting computer processed data, it is especially important to complete the section titled "Reduction-Processing."

A. Instrument - Sensors

1. Instrument - Sensors

   a. Manufacturer **Geodyne CTD**
   b. Model
   c. Serial
   d. Sensors (The questions asked about each sensor listed may serve as a guide for information to be submitted about other sensors.)

2. Salinity (Compensated Conductivity)

   a. Model
   b. Serial
   c. Date of last calibration **Data was calibrated using samples collected during casts.**

3. Temperature

   a. Model
   b. Serial
   c. Date of last calibration **Data was calibrated using samples collected during casts.**

4. Pressure

   a. Model
   b. Serial
   c. Date of last calibration **August 1974**
   d. If pressure is recorded as depth, what relationship was used to arrive at depth?

5. Sound Velocity

   a. Model
   b. Serial number
   c. Date of last calibration
   d. Is raw calibration data available? Yes_____ No_____
   e. Person to be contacted for calibration information.
   f. Reference equation used for sound velocity (i.e., Wilson, Greenspan, etc., or variations theron).

6. Conductivity (if used)

   a. Model
   b. Serial
   c. Date of last calibration **Collected samples used to calibrate data during cruise.**

7. Other (Attach a list for other parameters such as ambient light, transmissivity, etc.)

8. Is calibration data for the above sensors available? Yes **X** No___

9. Have you modified your instrument and/or sensors? **yes**

10. Which parameters are affected by the modifications? **conductivity, T**

11. What is the result of the modification with respect to the accuracy, resolution, and precision of the data? **improved data quality**

B. Operational Methods

1. Mode of use

   (a) Platform is affected by pitch and roll which is <u>not</u> decoupled from the package.
   b. Platform is stable or platform motion <u>is</u> decoupled from package.
   c. Unit is freefalling.
   d. Other (describe).

2. Lowering rate (meters/min)

   a. Enter lowering rate in regions of high parameter gradients **15m/minute**
   b. Enter lowering rate in regions of low parameter gradients **30m/minute**

3. Time Response

   a. Unit measures continuously

CTD 1

CTD 3, 4, 5

b. Unit measures 1 samples per second

c. Samples are averages of measurements over _____ time or 1 m depth.

4. Power Supply

a. Power supply is unstabilized ______ Maximum fluctuations + _____ Volts about _____ volts nom

b. Power supply to the following portions of the system is stabilized. **The instrument package which is lowered into the water use a self contained battery power supply.**

5. Field Checks (Indicate any operational "Deck" tests routinely made on the system (e.g., ice point tests on temperature sensors, electrical tests, etc.). (Describe) **Collected sample T - S were compared to profile listings.**

6. Thermal Environment

a. Instrument stored in water bath at _____ °C to °C

C. Reduction-Processing

1. Primary Data Output

a. Strip chart (state scale setting (s))

b. Paper tape

(c.) Magnetic tape **(CTD's)**

(1) Digital **(CTD's)**

(2) Analog

2. Initial Reduction

(a) Down trace only

b. Down trace and up trace processed

(1) Separate

(2) Averaged

c. Multiple lowerings _______ through depth interval ______

d. Values smoothed against depth. Describe (e.g., running average, etc.)

(e) Special routines to compensate for "spiking" (describe)

f. Compression applied to final data record (i.e., vertical spacing, rounding of depth, temperature, salinity, etc.)

→ **Spikes removed by removing those values that looked bad on T, S, σ_T plots.**

3. Corrections

a. Were corrections applied to final data? yes
b. Corrections based on (by parameter)

(1) Surface sample
((2)) On-line samplers (give depth relation to probe) T, C (2 m above probe)
(3) Separate lowerings (Nansen casts, other probes)
(4) Other ______

c. For corrected data, what is the estimated average accuracy of the final data? For uncorrected data, what is the average bias (if known)?

		CTD 1	CTD 3, 4, 5
(1)	Depth-pressure	± 0.2	±0.2
(2)	Temperature	± 0.03	±0.02
(3)	Salinity	± 0.03	±0.02
(4)	Sound Velocity	± ______	

ACCESSION NO. 7800403 FILETYPE F015 TRACK NO. TT3964-87 PROJECT IDENTIFICATION ________

STEP	DATE	INIT.	TAPE OR DISK DSN	NO. FILES	LRECL	BLK SIZE	NO. RECORDS
ORIG. TAPE [redacted]		FSM	D00888 9 track	10-33	4000	4000	
DUPLICATE TAPE			(D01233) 7 track BCD				
REFORMATTED TAPE							
REFORMATTED DISK *	1-15-86	FJM		6		224	
FIRST MULCHEK							
FINAL MULCHEK							
MPD75 OR F022							
DATA SET FINALIZED							

~~ERRORS REPORTED TO PRINCIPAL INVESTIGATOR~~: * DNODC * EIGHTOUT.
" " NINE "
" " TEN "
" " ELEVEN
" " TWELVE
DNODC * TWELVEBADOUT.

Deleted 01/31/86 CMH

51,768 Records

ADDITIONAL ERRORS/CORRECTIONS (NOT REPORTED TO P.I.)

Del Bad

COMMENTS (TRACKS DELETED, FIELDS DELETED, ETC.)

[illegible]

ACCESS NUMBER	REF NUMBER	FILE TYPE	PROJ CODE	INST	PLAT	CRUISE NO	CRUISE START	CRUISE END	NUM STA	NUM REC
7800403	TT3964	F015		3103	317F	C75514.LP	01/28/75	05/15/75	1	2,201
7800403	TT3965	F015		3103	317F	C75615.LP	01/28/75	05/15/75	1	1,082
7800403	TT3966	F015		3103	317F	C75114.LP	01/28/75	04/26/75	1	2,240
7800403	TT3967	F015		3103	317F	C75215.LP	01/28/75	04/26/75	1	2,240
7800403	TT3968	F015		3103	317F	C75314.LP	01/28/75	04/26/75	1	2,240
7800403	TT3969	F015		3103	317F	C75414.LP	01/28/75	04/26/75	1	2,240
7800403	TT3970	F015		3103	317F	C74615.LP	01/28/75	04/26/75	1	2,202
7800403	TT3971	F015		3103	317F	C74716.LP	01/28/75	04/26/75	1	1,083
7800403	TT3972	F015		3103	317F	C74813.LP	01/28/75	04/26/75	1	1,081
7800403	TT3973	F015		3103	317F	C75015.LP	01/28/75	04/26/75	1	2,124
7800403	TT3974	F015		3103	317F	C68624.LP	04/26/75	07/29/75	1	2,123
7800403	TT3975	F015		3103	317F	C68917.LP	04/26/75	07/29/75	1	2,123
7800403	TT3976	F015		3103	317F	C15304.LP	04/26/75	07/29/75	1	2,569
7800403	TT3977	F015		3103	317F	C15324.LP	04/27/75	07/29/75	1	4,599
7800403	TT3978	F015		3103	317F	C15334.LP	04/27/75	07/29/75	1	2,126
7800403	TT3979	F015		3103	317F	C15374.LP	04/27/75	07/29/75	1	2,126
7800403	TT3980	F015		3103	317F	C68226.LP	04/28/75	07/28/75	1	2,126
7800403	TT3981	F015		3103	317F	C26834.LP	04/28/75	07/28/75	1	2,126
7800403	TT3982	F015		3103	317F	C15394.LP	04/28/75	07/28/75	1	2,123
7800403	TT3983	F015		3103	317F	C68423.LP	04/28/75	07/28/75	1	2,114
7800403	TT3984	F015		3103	317F	C44127.LP	07/29/75	09/12/75	1	2,239
[illegible]0403	TT3985	F015		3103	317F	C45231.LP	07/29/75	09/12/75	1	2,201
[illegible]0403	TT3986	F015		3103	317F	C50330.LP	07/29/75	09/12/75	1	2,202
7800403	TT3987	F015		3103	317F	C74917.LP	01/28/75	04/26/75	1	2,238

FO15 TT3964 -3987

Corrections 780403

① File ID's corrected to TT3964 - TT3987.

② Originator data: '5' type records ~~is~~ '5' type record illegal for FO15 columns + fields ~~were~~ matched ~~for type~~ '3' record type 5 records, col 10, corrected to '3'

78-0403

RCVD 30CT77

June 26, 1975

MINIMUM DOCUMENTATION PREFERRED WITH
THE SUBMISSION OF INSTRUMENTED CURRENT DATA
TO NODC

The purpose of this addendum to the NOAA Form 24-13 (4-72), Data Documentation Form (DDF), is to establish the minimum documentation preferred with the submission of instrumented current data to the National Oceanographic Data Center (NODC). It also provides guidance for properly recording this documentation on the DDF; or, on this sheet in the absence of reports, publications, or other products containing the desired documentation.

A. Instrument Documentation:

1. Manufacturer, instrument name and model number. (Record on DDF, Section B, third column) **Aanderaa RCM-4**

2. Publication(s) providing instrument specifics. (Attach publication(s) to DDF or reference below)

   a. see #A-2

   ~~b.~~ __________

   ~~c.~~ __________

see #A-3 3. Modifications made to the instrument and resultant effects on the data. (Record on DDF, Section B, fourth column)

4. Complete the following in the space provided if other than by manufacturer's specifications.

   a. Conductivity ~~Speed~~ Range — 30-50 mmhos/cm^2

   b. Speed Threshold — __________

   c. Conductivity ~~Speed~~ Precision — ±0.02 mmhos/cm^2

   d. Speed Accuracy — __________

   e. Inclinometer Accuracy (if not recorded, indicate so) — __________

   f. Direction Precision — __________

   g. Direction Accuracy — __________

   h. Depth Precision (if depth is not recorded, indicate so) — __________

   i. Depth Accuracy (omit if depth is not recorded) — __________

B. Observation Platform Documentation:

1. Briefly describe in the third column of Section B the type of platform (shipboard, taut surface or subsurface mooring, etc.) from which observations were taken and how the instruments were mounted (on mooring, etc.); or, reference below the publication(s) containing this information, if commonly available.

   a. see #b

   b. ______

   c.

   c. ______

C. Data Recording Mode and Treatment Documentation:

Describe in detail the initial at sea instrument sensing time interval; and, the time interval between consecutive, discrete, and processed observations. For example:

1. Record on DDF, Section B, third column:

   a. Sensing period (unit of time for one at sea burst or other reading for speed, direction, temperature, etc.). 20 minutes

   b. Interrogation interval (interval between at sea recorded consecutive readings).

2. Record on the DDF, Section B, fifth column:

   a. Number of at sea readings used for a discrete observation as recorded on final processed data record. 1

   b. Resultant time interval between consecutive processed observations. 1 hour

   see #C c. Method of determining final discrete observation (averaging technique).

   d. Method of summarizing if data summary is provided. Include number of observations, time interval between observations, period of time to which summary applies, applicable statistical methods, etc.

   see #C e. Specific data editing and processing (smoothing and filtering) procedures, corrections applied (for vertical and/or horizontal oscillations, tilt angles, etc.).

   f. Method of determining platform motions.

D. Other Documentation Affecting Data Quality (record in column five of DDF Form) see #D

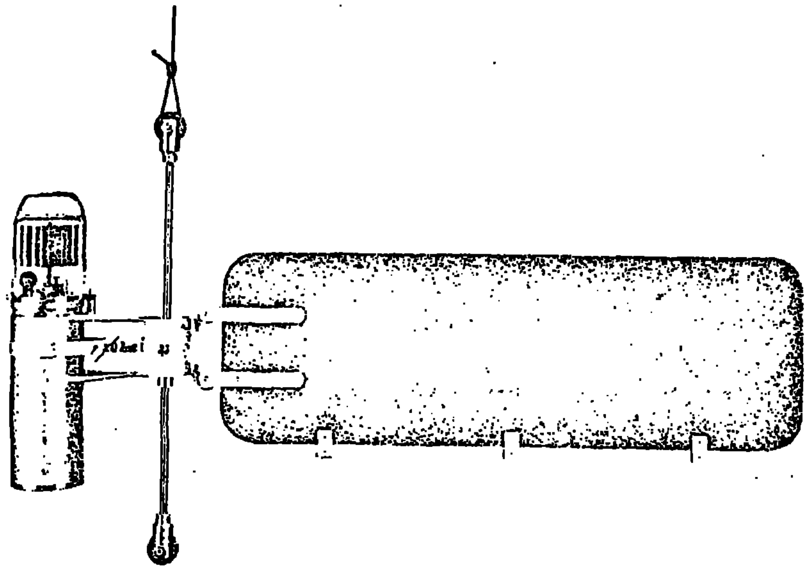
Specify and describe environmental conditions (waves, fouling, tidal affects, etc.) which may have a bearing on the final quality of the data.

A-2 78-0403

IVAR AANDERAA

MANUFACTURER OF DATA COLLECTING INSTRUMENTS

HARDANGERVEIEN 2
5050 NESTTUN
NORWAY
TELEPHONE: BERGEN 27 23 14
CABLE: HELICON



RECORDING CURRENT METER MODEL 4

A self-contained instrument for recording speed and direction of ocean currents, water temperature and conductivity, and instrument depth. Price N.kr 17,200.- FOB Bergen.

This recording current meter is based upon a rotor type current velocity sensor, a magnetic compass for direction determination, and a thermistor for temperature sensing. An electro-mechanical encoder samples and converts the measurements to binary digital signals which are then recorded on 1/4 inch magnetic tape. The binary signals are also transmitted to the surface by means of an acoustic transducer, thus permitting in situ monitoring. An internal quarts crystal clock actuates the instrument at regular intervals. Power is provided by batteries capable of up to 12 months' operation.

The instrument consists of two main parts, the recording unit, and the vane assembly. The latter has a spindle which can be shackled into the mooring line of a surface or sub-surface buoy. The motion of the velocity sensing rotor is transmitted through the case of the recording unit via a magnetic coupling. The magnetic compass is housed inside the recording unit. The velocity measurement is in integrated form, while the direction measurement is momentary.

Sensors for depth and conductivity are installed on request. Prices N.kr 2,200.- and N.kr 2,400.- respectively. The depth sensor consists of a bourdon tube driving a potentiometer. An induction type sensor determines the conductivity.

The magnetic tape from this instrument can be read by the model 2103 Tape Reader, and be converted to punched paper tape. The manufacturer offers a mail service for tape reading. The present service regularly provides punched paper tape, IBM compatible magnetic tape, direct print out or print out in real values.

DATASHEET D133, MARCH 1972

SPECIFICATIONS

Weight in Air

Recording unit 12.5 kg.
Vane assembly 12.0 kg.

Dimensions

Overall lenght 136 cm.
Recording unit diameter 12.8 cm.
Vane size 36x100 cm.

Depth Capability

Standard version, 2000 meters.
High pressure version, 5000 meters.
[redacted]

Materials Exposed to Sea Water

Pressure case 90/10 CuNi alloy, nickel plated. Other parts acid resistant steel or nickel plated bronze. Vane, 8 mm red PVC.

Mooring

Spindle end pieces designed for 14 mm max. diameter wire or rope and force of 2,000 kg.
A gimbal mounting permits $\pm 30^{\circ}$ deviation between instrument and mooring line.

Measuring Ranges and Accuracies

Current speed, 1,5 to 250 cm/sec.
Direction, 0-360 $\pm$ 5 degrees magnetic.
Temperature: Choice between three ranges.
- Low range: $-2,46^{\circ}$C to $21,40^{\circ}$C.
- High range: $10,08^{\circ}$C to $36,00^{\circ}$C.
- Wide range: $-0,34^{\circ}$C to $32,17^{\circ}$C.
- Standard calibration curves are accurate to $\pm 0,1^{\circ}$C. Calibration to $\pm 0,0125^{\circ}$C is possible.

Conductivity, 0-60 millimho.
Pressure: Choice between five ranges;
0-200 PSI, 0-500 PSI, 0-1000 PSI, 0-5000 PSI. 0-8000 PSI.
Accuracy, better than $\pm$ 1% of range.

Measuring System

Rotary encoder system with sequental measuring of 6 channels by self-balancing bridge. Bridge is balanced in 10 binary steps, and gives a 10 bit binary word for each channel. Measuring speed, 4½ second per channel. The channels are: Reference (a control measurement), Temperature, Conductivity (optional), Depth (optional), Current Direction, Current Speed.

Recording System

Serial recording of 10-bit binary words on 1/4 inch magnetic tape by use of short and long pulses.
Total storage capacity 60,000 words. Tape 600 ft on 3 or 3 1/4 inch spools. End of record pulse (sync pulse) after each completed cycle.

Telemetry

By crystal controlled pulse coded acoustic carrier 16 384 Hz, 6 words sent in the course of 30 sec.
Detecting range with tuned hydrophone receiver is typically 800 m.

Rotor Speed Reduction Gear

6,000:1 is standard. 40,000:1 and 1,200:1 available on request. These rates are recommended for sampling intervals of 5 to 20 min. 30 to 60 min., and ½ to 2.5 min. respectively.

Clock

Accuracy $\pm$ 2 sec./day over temperature range 0 to 20°C. Operating time on new battery, 3 years.

Sampling Intervals

60, 30,20,15, 10, 5, 2.5, 2, 1 and ½ minutes according to interval selecting plug. The 10 minutes plug is standard.

External Trigging

is possible by applying 6 volts positive pulse to electric terminal on top end plate. Same terminal also gives output signals (5 volts pulses of negative polarity).

Batteries

Main battery, Tudor 9T1, or similar battery (9 volts battery 63x50x80 mm non-magnetic). Clock battery, Mallory type TR-113 (16.6 mm dia. 21.1 mm long)

Packing

Recording unit: Plywood instrument case 19x22x60 cm, 18 kg gross weight.
Vane assembly: Cardboard box 17x24x103 cm, 14 kg gross weight.
Permissible drop height on wooden floor, ½ m either item.

Warranty

One year against material and workmanship.

Accessories

Each instrument is delivered with tape and batteries installed. 20 premarked identification labels are attached to frame.

#A-3

A description of the Aanderaa RCM4 used in CUE-I

Reasons for choosing the RCM4

The Aanderaa Recording Current Meter Model 4 used as the primary current measuring tool in CUE-I was subjected to an extensive evaluation. The instrument was selected for several reasons:

- it was available and had a proven field history,
- it was inexpensive and relatively simple and small,
- it could record speed, direction, pressure, temperature, and conductivity, making each meter potentially a self-contained recording STD, and
- it was available as a meteorological package with only a change of sensors simplifying data processing and instrument preparation.

OSU Buoy group task for CUE-I

During CUE-I, the primary emphasis at OSU was on measuring currents with a secondary interest in meteorological measurements. With that in mind, some 30 RCM4's and five meteorological packages were ordered. We had on hand two RCM4's acquired for testing and evaluation. These two preliminary units were used to establish a procedure for evaluation for the new meters.

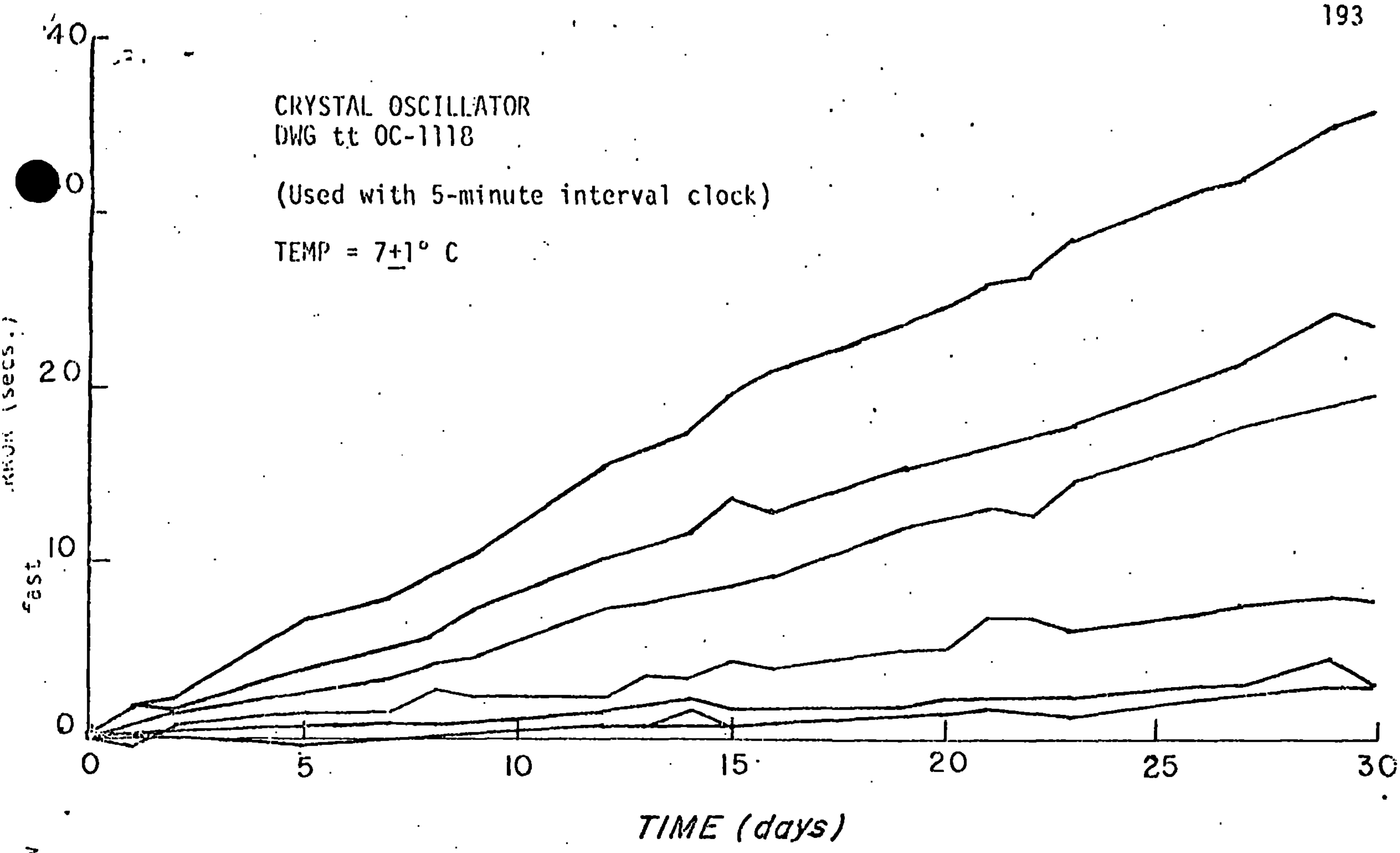
What was done following delivery of a new meter

A. Each meter was inspected for shipping damage, and all connections were tightened.

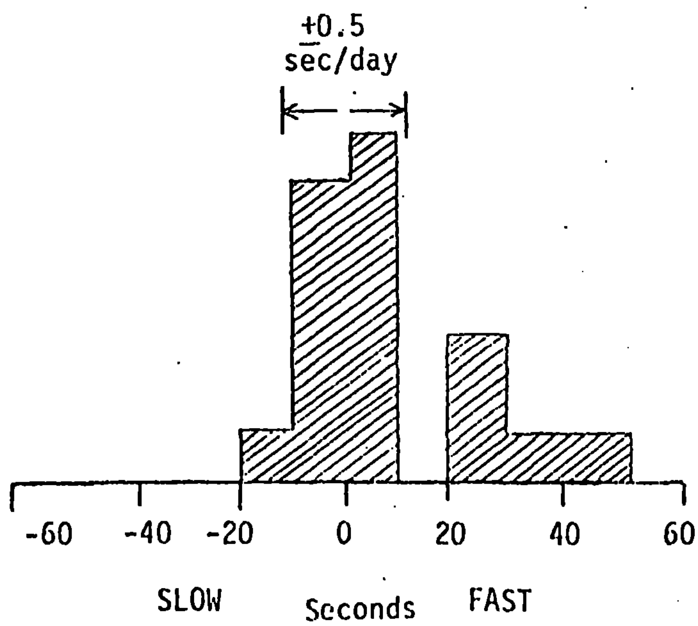
B. We had developed a quartz clock here at O.S.U. prior to knowing that Aanderaa had intended to supply one. Because of this, Aanderaa's clock was removed, and the one of our own design and manufacture was installed.

C. To check the new clock at the same time as the new meter, each meter was placed in a refrigerator cooled to about 7°C and was run on a five minute sample period for 30 days. At the start of this 30 day period the rotor was removed, and a constant speed hysteresis motor was mounted so that a magnet assembly attached to its shaft would simulate the rotor turning at a constant rate. Our intent with this test was to check for variations in sample period length and multiple sample periods. By using a constant speed motor the bit change recorded by the meter should be constant for each sample period. Battery life and tape capacity could also be checked. The starting time and duration of a sample was checked each day using WWV as a time standard. Battery voltage and the motor supply voltage were tested each day. Much of our clock testing is summarized in Figure 1-1.

D. Following the 30 day cold test each meter's temperature sensor was calibrated. Ten of our thirty meters had pressure transducers, and each of these pressure sensors was calibrated.



ACCUMULATED ERROR (6 TYPICAL UNITS)



Cumulative-Error Distribution
After 30 Days (19 Units)

Figure 1-1

78-0403

#B

OSU DATA REPORT 64

Made in United States of America
Reprinted from LIMNOLOGY AND OCEANOGRAPHY
Vol. 14, No. 2, March 1969
pp. 307-311

A RELIABLE LOW-COST MOORING SYSTEM FOR OCEANOGRAPHIC INSTRUMENTATION

BY DALE PILLSBURY, ROBERT L. SMITH, AND RONALD C. TIPPER

#A-4

78-0403

Observations from Moored Current Meters

All of the moored current meters were Aanderaa RCM-4 instruments. Current meters were moored on taut wire arrays with subsurface flotation of the type described by Pillsbury, Smith and Tipper (1969). The instruments measure and record the various parameters sequentially; the cycle is repeated at regular intervals (20 min for both WISP and UP-75). The parameters recorded by all instruments are: reference word, rotor count, direction, and temperature; some current meters also measure pressure and/or conductivity. The difference between successive rotor counts is used to calculate the average speed over the interval; this speed is combined with the instantaneous direction to calculate eastward and northward components of the current. The instrument clocks, rotors, compasses and temperature sensors were calibrated as described by Pillsbury et al. (1974a). Results of the temperature calibrations before and after WISP are shown in Table I; those for UP-75 are shown in Table II.

Conductivity Calibration and Processing

The normal conductivity range of Aanderaa RCM-4 current meters is 0 to 60 mmhos cm^{-2}. Since this is encoded as a number between 0 and 1023, the conductivity resolution is $\pm$ 0.06 mmhos cm^{-2}. The instruments were modified to reduce the conductivity range to about 30 to 50 mmhos cm^{-2} (Mesecar and Barstow, 1975); the resulting resolution is $\pm$ 0.02 mmhos cm^{-2}. All eleven current meters deployed during WISP had modified conductivity sensors; all but one recorded conductivity successfully. Five current meters with modified conductivity sensors were used during UP-75 but the conductivity data from one of these (50 m, Sunflower B) was not processed because temperature was not recorded.

Table I. Temperature calibration of current meters used during WISP, showing the calibration dates and constants ($T = a + bN + cN^2$), and the differences between the two calibrations at three temperatures.

Array	Intended Depth	Serial No.	Calibration Date	Calibration Constants			Differences at		
				a	b	c $\times 10^{-6}$	5C	10C	15C
Wisteria	25	746	18 Nov. 74	-2.024	0.02048	2.382	.013	.017	.017
			15 May 75	-2.027	0.02044	2.410			
	50	747	18 Nov. 74	-2.076	0.02045	2.391	.064	.071	.070
			15 May 75	-2.115	0.02035	2.468			
	100	748	18 Nov. 74	-1.994	0.02045	2.390	.001	.013	.016
			15 May 75	-1.964	0.02033	2.468			
	150	749	18 Nov. 74	-2.039	0.02047	2.387	.006	.023	.019
			15 May 75	-1.984	0.02022	2.586			
	200	750	18 Nov. 74	-2.046	0.02055	2.328	.008	.022	.023
			15 May 75	-2.007	0.02036	2.471			
Sunflower	25	751	18 Nov. 74	-1.961	0.02041	2.398	.028	.008	.016
			11 Nov. 75	-2.011	0.02046	2.445			
	50	752	18 Nov. 74	-2.011	0.02043	2.409	.010	.015	.017
			15 May 75	-2.011	0.02039	2.432			
	75	753	4 Nov. 74	-2.042	0.02041	2.477	.023	.035	.034
			15 May 75	-2.026	0.02025	2.600			
	90	754	4 Nov. 74	-2.024	0.02039	2.481	.036	.041	.033
			15 May 75	-2.028	0.02025	2.612			
Pikake	25	755	4 Nov. 74	-1.900	0.02025	2.516	.002	.009	.010
			11 Nov. 75	-1.923	0.02035	2.442			
	50	756	4 Nov. 74	-1.980	0.02027	2.575	.009	.009	.008
			11 Nov. 75	-1.973	0.02028	2.563			

Table II. Temperature calibration of current meters used during UP-75, showing calibration dates and constants ($T = a + bN + cN^2$), and the differences between the two calibrations at three temperatures.

Array	Intended Depth	Serial No.	Calibration Date	Calibration Constants a	b	c $\times 10^{-6}$	Differences at 5C	10C	15C
Ohia	25	686	4 Nov. 74	-1.907	0.02021	2.566	.039	.036	.044
			19 Aug. 75	-1.975	0.02034	2.437			
	100	689	18 Nov. 74	-1.952	0.02028	2.465	.007	.012	.015
			19 Aug. 75	-1.950	0.02025	2.475			
	200	1530	26 Mar. 75	-2.100	0.02041	2.473	.004	.002	.001
			19 Aug. 75	-2.090	0.02039	2.485			
	300	1532	26 Mar. 75	-2.056	0.02028	2.553	.011	.008	.007
			19 Aug. 75	-2.040	0.02026	2.563			
	400	1533	26 Mar. 75	-2.107	0.02032	2.555	.002	.012	.013
			19 Aug. 75	-2.156	0.02051	2.412			
	500	1537	26 Mar. 75	-2.073	0.02028	2.581	.001	.009	.009
			19 Aug. 75	-2.102	0.02040	2.488			
Sunflower B	25	682	4 Nov. 74	-1.953	0.02044	2.371	.039	.038	.033
			19 Aug. 75	-1.987	0.02041	2.411			
(T off scale)	50	268	4 Nov. 74	-2.025	0.02036	2.493	.003	.010	.014
			11 Nov. 75	-2.037	0.02041	2.472			
	75	1539	26 Mar. 75	-2.069	0.02030	2.557	.001	.011	.011
			19 Aug. 75	-2.113	0.02047	2.430			
	90	684	29 Oct. 74	-1.894	0.02027	2.489	.039	.038	.037
			19 Aug. 75	-1.931	0.02026	2.502			
Sunflower B	25	441	21 Nov. 74	-2.068	0.02045	2.480	.016	.007	.014
			9 Apr. 75	-2.125	0.02063	2.318			
	75	452	27 Aug. 74	-2.015	0.02056	2.290	.041	.041	.029
			9 Apr. 75	-2.034	0.02045	2.417			
	90	503	4 Nov. 74	-1.912	0.02035	2.509	.034	.028	.032
			4 Feb. 76	-1.974	0.02047	2.404			

The conductivity sensors were calibrated in the laboratory in September 1974 and September 1975 by immersing the current meters in a well-mixed bath whose salinity was measured with a bench salinometer and whose temperature was measured with a quartz probe. The 1974 calibration points were used to calculate the linear regression equation between the Aanderaa output, k, and the conductivity calculated from the bath temperature and salinity. The regression constants for the WISP and UP-75 current meters are shown in Table III; the deviations for both 1974 and 1975 calibration points from the regression line are shown in Fig. 7 for each current meter. The difference between the 1974 and 1975 calibrations is usually less than 0.1 in the range of conductivities encountered during WISP (30 to 35 mmhos cm^{-2}; bit numbers less than 250). Since the current meter at 25 m Sunflower was damaged when the array was recovered, no 1975 calibration data are available for it. Another (#689) showed large differences between the 1975 and 1974 calibration data; inspection of the conductivity cell showed a large chip in the glass liner; it is not known whether it was damaged before or after installation at sea.

The purpose of measuring the conductivity is to obtain time series of salinity, which can be calculated from temperature, conductivity and pressure. For pressure, P, we used either the direct Aanderaa pressure observations or, in their absence, a constant based on our knowledge of the instrument depth. Temperature, T, was processed using the 1974 calibration constants (Tables I and II). The preliminary conductivity estimate, C_p, was obtained from the 1974 calibration constants (Table III). We used equations from Perkin and Walker (1972) to estimate the salinity $S_p = f(P,T,C_p)$. This preliminary estimate of salinity was compared to the salinity from nearby CTD stations

Table III. Regression constants for the 1974 laboratory calibration of the modified Aanderaa conductivity sensors (C = a + bk).

Array	Intended Depth	C.M. Serial No.	Conductivity Cell No.	a	b
Wisteria	25	746	161	32.24	0.02079
	100	748	165	31.90	0.02032
	150	749	167	29.68	0.01922
	200	750	168	30.98	0.01981
Sunflower A	25	751	169	30.61	0.01961
	50	752	170	29.87	0.01904
	75	753	171	32.47	0.02087
	90	754	172	30.43	0.01941
Pikake	25	755	173	29.87	0.01903
	50	756	174	31.77	0.02043
Ohia	25	686	132	30.38	0.01948
	100	689	135	31.08	0.01958
Sunflower B	25	682	128	30.84	0.01961
	90	684	130	30.14	0.01907

by plotting both as a function of time. Where there was a systematic difference between the two, which could arise because of the pressure effect on the Aanderaa conductivity cell (Huyer, 1975), it was used to adjust the conductivity estimate. Salinity was again determined, and again compared to CTD values. Table IV shows the conductivity equations finally adopted for the instruments which were affected by the *in situ* pressure.

Data Presentation

The 20 min time series of eastward current, northward current, temperature, pressure and salinity are filtered to suppress high frequency signals

Table IV. Conductivity calibration constants ($C = a_1 + bk = a_0 + a + bk$) for calculating the conductivity from Aanderaa bit number (k) for current meters whose calibration was affected by the *in situ* pressure. Constants a and b were determined from the laboratory calibration and are given in Table III; a_0 is the correction for the pressure effect on the sensor.

Array	Intended Depth(m)	C.M. Serial No.	a_0	a_1	b
Wisteria	150	749	-0.03	29.65	0.01922
	200	750	-0.12	30.86	0.01981
Sunflower A	25	751	-0.07	30.54	0.01961
	90	754	-0.09	30.34	0.01941
Sunflower B	25	682	-0.10	30.74	0.01961
	90	684	-0.20	29.94	0.01907

(e.g., internal waves), yielding hourly values. It is these hourly values that are presented in this report. The data from each string of current meters are presented separately. The header page gives the pertinent information about the location of the string, the data interval, and a general statement about the quality of the data. The depth of the instruments is given two ways: intended depth, and actual depth which is based on the mean pressure as measured by the pressure sensor or on information about the total water depth and wire lengths. First order statistics of each parameter are tabulated. A progressive vector diagram is presented for each current record. The hourly time series of sigma-t are computed from the time series of temperature and salinity, and the hourly time series of each parameter are displayed. Values of temperature, salinity and sigma-t from nearby CTD stations are displayed with the time series of these parameters (dots are from CTD stations included in this report; triangles are from stations occupied by the THOMAS G. THOMPSON; personal communication, B. Hickey).

A Reliable Low-Cost Mooring System for Oceanographic Instrumentation[1]

A mooring system meeting the requirements of several research programs has been developed for use on the continental shelf and slope. The severe winter environment of Oregon's coastal waters necessitated careful attention to chafing, float stability, and techniques for heavy weather installation and recovery. The complex but reliable deep-ocean mooring systems described by Jones (1965) were ruled out owing to their high cost and the lack of shipboard equipment to handle such large systems. Taut-line mooring systems using three-strand nylon, after the design of Isaacs (Isaacs et al. 1965), proved unsuitable as during recovery the necessarily heavy anchor caused the twisted nylon line to unlay and fail. This single-point deep mooring was also unsatisfactory for placement of instrumentation near the bottom.

The design requirements of placing self-contained subsurface recording current meters at a fixed position above the sea floor (Collins, Creech, and Pattullo 1966), of placing an array of test panels for sampling boring molluscs (Tipper 1968), and of inserting a recording thermoprobe into the seabed (Mesecar 1968) were met by the mooring system described here.

DESCRIPTION

A schematic drawing of the mooring system, beginning with the toroid and ending with the main anchor, is shown in Fig. 1. The major subdivisions are discussed below.

The toroidal surface float (a), constructed of polyurethane foam and fiberglass, provided the buoyancy and durability necessary for the mooring. It supported a radar reflector and navigation light and was stabilized with 6 m of ¾-inch (1.9 cm) chain (b) attached to a rigid bridle.

The mooring line (d) was a continuous length of braided nylon rope (Samson Cordage Works, Boston, Mass.), 9⁄16-inch (1.4 cm) diam, cut with a scope of twice the water depth on the continental shelf, 1.5 times the depth on the slope.

The secondary anchor (e) was a rectangular steel-reinforced concrete slab weighing about 180 kg in air. The groundline (f) consisted of at least 900 m of ¼-inch (0.63 cm), nonrotating, galvanized, preformed wire rope. The main anchor (h) terminated the ground tackle and was determined by the particular use made of the mooring.

[1] C. A. Collins and C. N. K. Mooers contributed extensively to the design of this mooring system in its earlier stages.

This work was supported by National Science Foundation Grants GP-4472, GA 331 and GA1435 and by Office of Naval Research Contract Nonr 1286(10).

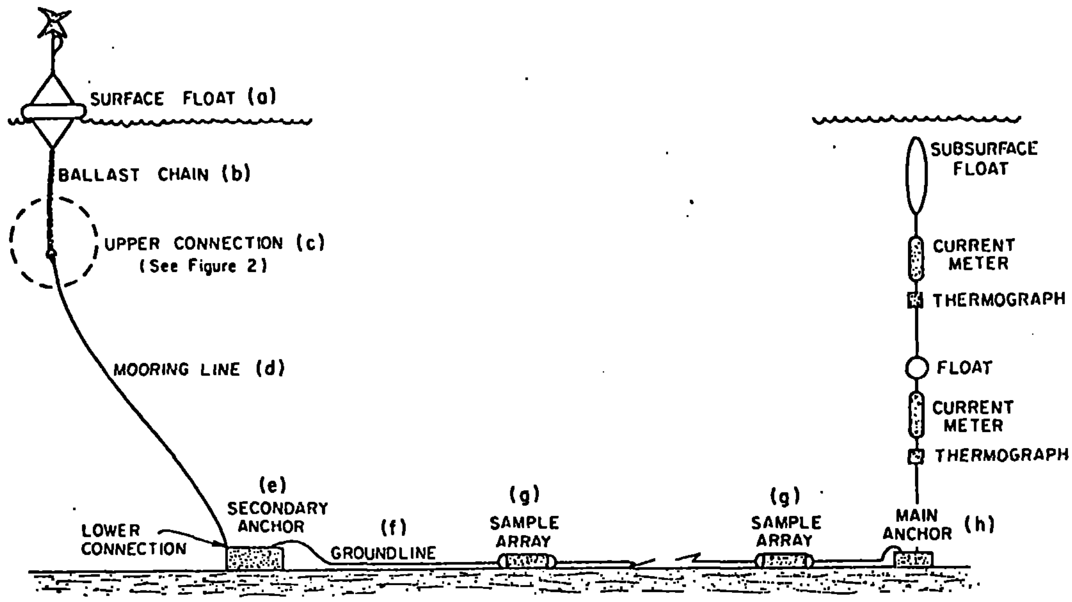


FIG. 1. Schematic of the mooring system as used with taut-wire array of meters.

DISCUSSION

The mooring system was designed with a five-to-one safety factor based on the expected maximum load to be sustained. The nylon line to the surface permitted the use of the small toroid, only 1.2 m in diameter. This line, of a torque-free, nonrotating design, eliminated the tendency to unlay under recovery tension. In addition, the all-nylon construction provided high resistance to biological deterioration, nearly neutral buoyancy in seawater, and a breaking strength near 4,500 kg.

The ground tackle design accomplished three things: 1) it allowed the use of a lightweight anchor which was easily recovered, 2) it provided a safety backup system should the surface toroid be lost, and 3) it allowed a time series biological sample to be taken with only one installation. The small secondary anchor was effective even on the slope because of the scope of the mooring line and the small drag of the toroid.

The groundline length was chosen on the basis of navigational precision. This length provided a target large enough that recovery could be made by grappling, if necessary, and also provided for the separate recovery of more than one biological sample panel array (g).

The attachment of the mooring line to the float–ballast chain system (c) is most critical for survival. This connection has to provide protection against vibration, chafing, rotation, and electrolytic corrosion. The basic series of ½-inch (1.27 cm) safety shackles, swivel, and ring used for this connection is shown in Fig. 2. The swivel prevented hockling and the ring prevented the shackles from pounding against the line. As additional protection for the splice, it was made in a heavy-duty wire rope thimble, seized with nylon cord in a series of half-hitches, and then triple-dipped in a quick-drying liquid nylon (Gental 101, General Dispersions, Inc., Bloomfield, N. J.).

INSTRUMENT SYSTEMS

Biological sample array

Racks of sample materials to be exposed to biodeterioration were attached with cable clips to the groundline with pennants of ¼-inch wire (0.63 cm) rope identical to the groundline. The method of attachment provided for easy removal of the sample arrays without cutting the groundline. Array racks were attached within 10 m of the secondary and main anchors. The length of groundline between arrays allowed one array to be surfaced and removed while leaving the second array undisturbed on the bottom to secure a time series sample.

Thermoprobe

The thermoprobe, attached to the end of the groundline in place of the main anchor, was set in the usual manner using the groundline rather than the hydrographic cable. This allowed the mooring system to then be installed without disturbing the thermoprobe.

Taut-wire current meter strings

The current meters and the thermographs were suspended on a taut wire above a 650-kg anchor. Buoyancy was provided by a main subsurface float and by small auxiliary floats directly above each current meter–thermograph combination. The taut wire was 3⁄16-inch (0.48 cm) 7 × 19 preformed stainless steel. Stainless steel was used to reduce electrolytic corrosion since the instrument suspension bars supplied by the manufacturer were of stainless steel. The shackles used to connect portions of this taut wire were ½-inch (1.27 cm) galvanized safety shackles secured with stainless steel cotter pins. These shackles showed the effects of electrolytic corrosion after each use but were never reduced to the point of causing failure.

INSTALLATION

Only the installation of the combined system of biological sampling and current meters will be given in detail. This is the most complex installation and best illustrates the techniques used (*see* Fig. 1).

1. The taut-wire portion was launched first. The main subsurface float was hoisted over the side of the ship by using a small block and tackle. The first current meter was usually placed just below this float and put over the side at the same time. With the float–meter combina-

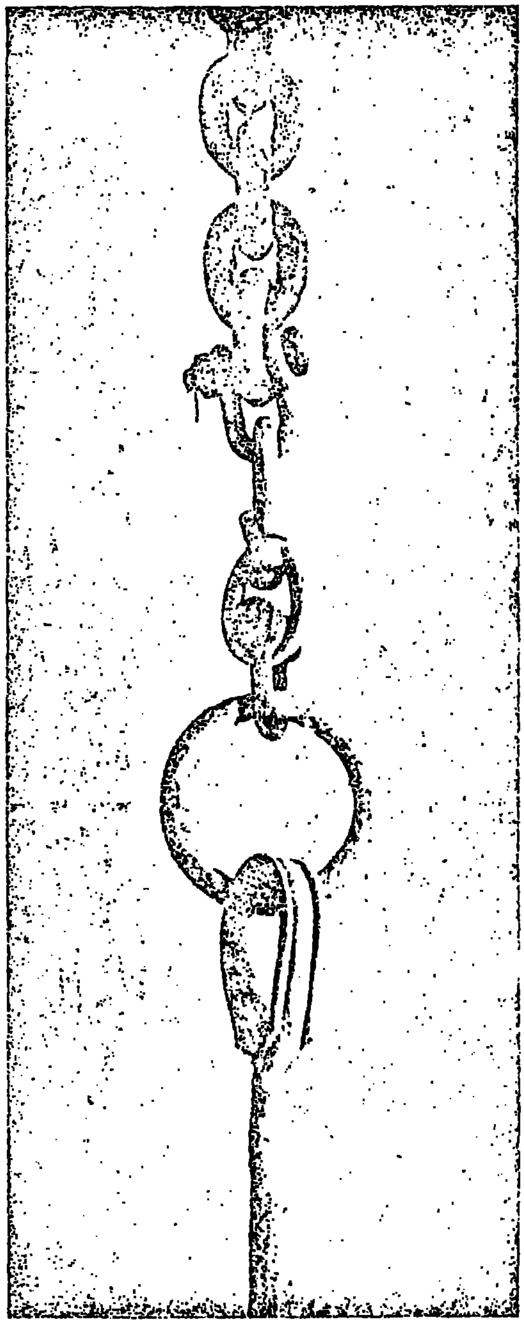


FIG. 2. Critical connection area. From the top: anchor chain ballast, safety shackle, swivel, safety shackle, steel ring, thimble and eye-splice, main mooring line.

tion in the water, the ship was moved away from it while the cable to the next float was slowly paid out.

2. The next float–meter combination was then hoisted over the side and more cable paid out. This sequence continued until all instruments were in the water and streamed away from the ship.

3. The wire was made fast to the main anchor which was hoisted over the side by using groundline that had been previously wound on one of the ship's winches. This main anchor was then lowered to a depth of about 10 m.

4. The first biological sample array was attached to the groundline with cable clips.

5. The groundline was paid out until the main anchor was on the bottom and the current meter and floats submerged to predetermined depths. At this time an accurate navigation fix was taken to record the position of the anchor. Nearshore we have found a combination of fixes using radar ranges and Loran A to be adequate.

6. The installing vessel then moved slowly ahead keeping the groundline straight as it was paid out.

7. When the required amount of groundline had been paid out, the second biological sample array was attached and lowered over the side about 10 m.

8. At this point the groundline was stoppered off, cut above the cable stoppers, and attached to the secondary anchor.

9. The nylon mooring line was attached to the secondary anchor, and the strain of the entire ground tackle system was taken by the mooring line before the cable stoppers on the groundline were let go.

10. With the mooring line about a capstan or gypsy head, the secondary anchor was lowered until it touched bottom. A second navigational fix was then taken.

11. Slack mooring line still on board the installing vessel was paid out by hand while the float assembly was being attached to the upper end.

12. The float was launched with a small block and tackle and a final navigational fix taken.

RECOVERY

The recovery procedure was essentially the reverse of the installation method, with the surface float brought aboard the recovery vessel first. One point is worth covering in more detail. When the secondary anchor is brought aboard, strain must be transferred from the mooring line to the groundline to remove the anchor. Originally a few meters of the groundline were hauled up on deck by hand, stoppered off, and reattached to the cable on the winch. This meant that the cable stoppers held the entire system at one time. To avoid this, a new procedure has been developed where sleeves (Nicopress, National Telephone Supply Co., Cleveland, Ohio) are put on the groundline near the secondary anchor during installation and fastened with tape. These sleeves are then used to fasten the cable from the winch to the groundline before it is removed from the anchor. Until these sleeves are compressed and tension taken by the winch, the mooring line is still fastened to the anchor and thereby to the rest of the system. After tension is taken by the cable to the winch, the secondary anchor is cut free, allowing the groundline to be wound back onto the winch.

For biological time series, only the sample array nearest the secondary anchor need be removed. If this is done with care, the mooring system can be immediately reinstalled without disturbing the sample array still on the sea floor next to the main anchor. This second biological array can then be left for additional exposure at the sampling site.

If the float should be lost during the exposure interval, which happened on four occasions, the navigational fixes on either end of the ground tackle system provide a backup means of recovery by grappling.

SUMMARY OF EXPERIENCE

This system has been used 25 times without failure off the Oregon coast, in all seasons, in depths ranging from 50 to 1,000 m and for periods of up to 60 days. The grappling technique was used in four recoveries when the surface float was missing, but to date no instruments have been lost.

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[2] Presently on active service with the U.S. Navy.

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Appendix 2

A Description of the Processing of Data from the Aanderaa Current Meter

Introduction

During the summer of 1972 the Coastal Upwelling Group at Oregon State University undertook the measurement of currents and winds off the Oregon coast, using Aanderaa current and wind meters. The current meter selected, the RCM-4, is a six channel instrument that records water temperature, conductivity, pressure, speed, and direction (in addition to a constant reference number). Winds were measured by means of a four-sensor package connected to an Aanderaa Datalogger. The Dataloggers recorded wind speed and direction, air temperature, and surface water temperature. Most of the discussion below will be in terms of the current meters. Instances in which the wind instruments required different processing or analysis will be called out.

Aanderaa current meters and Dataloggers record on standard open-reel quarter-inch magnetic tape. The first part of the data processing operation is concerned mainly with getting the information off the tape and making it available for computer analysis. The second part is the analysis itself. In all there are four steps: (1) tape-to-tape transcription (i.e., moving the data from quarter-inch magnetic tape to computer compatible tape), (2) conversion to physical units, (3) error detection and correction, and (4) data analysis. Each of these steps will be described in detail below. The procedure has been automated and much of the work is done by the computer. During CUE-I, all computer work was done on the OSU Computer Center's CDC-3300.

The RCM-4 records 10-bit binary words. Each bit is represented by a magnetized portion of the tape extending 2 mm inward from the edge (see Figure 2-1). Redundancy is achieved by writing the same information

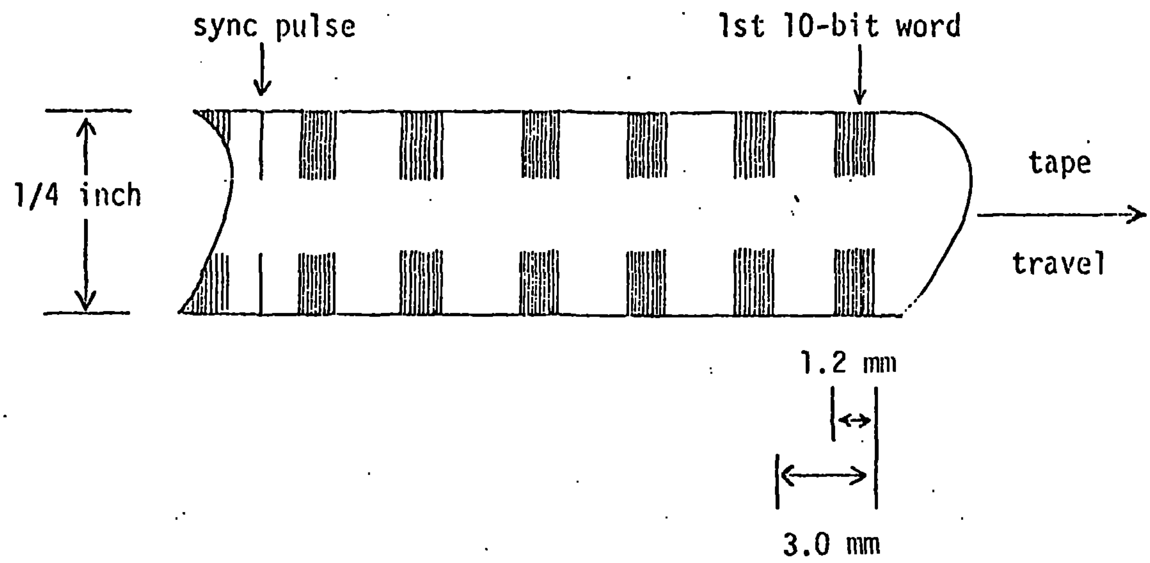

Figure 2-1. Aanderaa tape format, showing one complete 6-word cycle.

along both edges of the tape. Binary zeros are about 0.06 mm long (measured along the tape) and ones are 0.02 mm long. The spaces between bits are unmagnitized, and the entire 10-bit word is about 1.2 mm long. The first bit of each word (the righthand bit in Figure 2-1) is the most significant.

Each time the RCM-4 cycles, six binary words are written on the tape. The first word is a quasi-constant reference word that is wired into the current meter and serves to identify output from that meter. Each meter has a different reference word. The reference word seldom varies by more than one or two units; these variations are caused by the effect of temperature changes on resistors inside the meter. The second of the six words codes temperature, the third codes conductivity, the fourth pressure, the fifth direction, and the sixth speed. In most meters a sync pulse appears a short distance after the sixth word. In form it resembles a binary one, and is meant to indicate the end of a cycle. Not all RCM-4s have conductivity or pressure sensors. When the conductivity sensor is lacking the meter will record words consisting of all zeros in the conductivity channel. When the pressure sensor is lacking, all ones will be written in the pressure channel.

A ten-bit binary word is capable of representing numbers in the range [0, 1023]. Hence the meter must translate each measurement into a number in this range. It does this by means of mechanical and electrical devices that need not concern us here. The important point is that every temperature, conductivity, pressure, speed, and direction will be represented by a number in the range [0, 1023]. The calibration curves for these quantities are nearly linear, so that temperature in degrees centigrade (for example) can be found from a relation of the form

$$T = a + bx$$

where x is an integer between 0 and 1023 provided by the current meter, and a and b are calibration constants. Conductivity, pressure, and current speed and direction can be calculated from similar equations.

Speed is handled somewhat differently from the other four parameters. The speed rotor of the RCM-4 is coupled to a circular potentiometer inside the instrument via a magnetic link and a gear train that effects a 6000:1 reduction. 6000 turns of the exterior rotor cause an electrical contact to make one circuit of the potentiometer, which causes a resistance to vary from zero to a fixed maximum value. It is this resistance that is measured, translated into a number between 0 (corresponding to zero resistance) and 1023 (corresponding to maximum resistance), and written on quarter-inch tape. Thus the speed channel of RCM-4 output contains a monotone nondecreasing sequence of integers modulo 1024. Speeds are calculated from the difference between consecutive integers. The larger the current speed, the more turns the exterior rotor makes during a recording cycle and the farther the moving potentiometer contact advances. The relationship between speed in physical units (e.g., cm/sec) and bit advance (ΔX, say) is nearly linear, so that speed also can be calculated from a linear equation:

$$S = c + d\Delta x$$

Tape-to-Tape Transcription

Although the output of an Aanderaa meter is in digital form it cannot be read directly by a computer. The first step in processing, then, is to move the data from the quarter-inch Aanderaa tape to computer tape. Two Aanderaa tape translators are presently available at OSU. One has been interfaced to the School of Oceanography's PDP-15 computer. It consists of a modified Sony TC 252-D tape deck and circuitry that assembles the 10-bit words and makes them available to the PDP-15. Software transfers the data to Dectape which is then taken to the OSU Computer Center, where the information is read into disk storage by the Center's PDP-8 satellite computer. The data are then ready for further processing by the CDC-3300.

The second translator is a stand-alone unit that reads quarter-inch Aanderaa tapes and writes the data on half-inch computer-compatible 7-track magnetic tape. This machine is more convenient than the first, and was used for most of the CUE-I data. With it, tapes are read by the modified Sony TC 252-D tape deck and the data are routed to a Digidata 1307/556 RW tape recorder. The latter unit writes characters that consist of 6 data bits and a parity bit, at a rate of 556 characters per inch. Each Aanderaa word occupies two characters as shown in Figure 2-2. The Digidata produces records consisting of 400 characters followed by a 3/4 inch record gap. Each record thus contains 200 Aanderaa words. This continues until the end of the input tape, at which point the Digidata automatically writes an end-of-file mark. Several Aanderaa tapes can be transcribed at a single session. Thus a typical 7-track output tape contains several files, each terminated by an end-of-file and consisting (ordinarily) of several hundred 400 character records. This tape is taken to the OSU Computer Center and its contents are read into disk memory by means of a program (run on the CDC 3300) named AMMT2FLB.

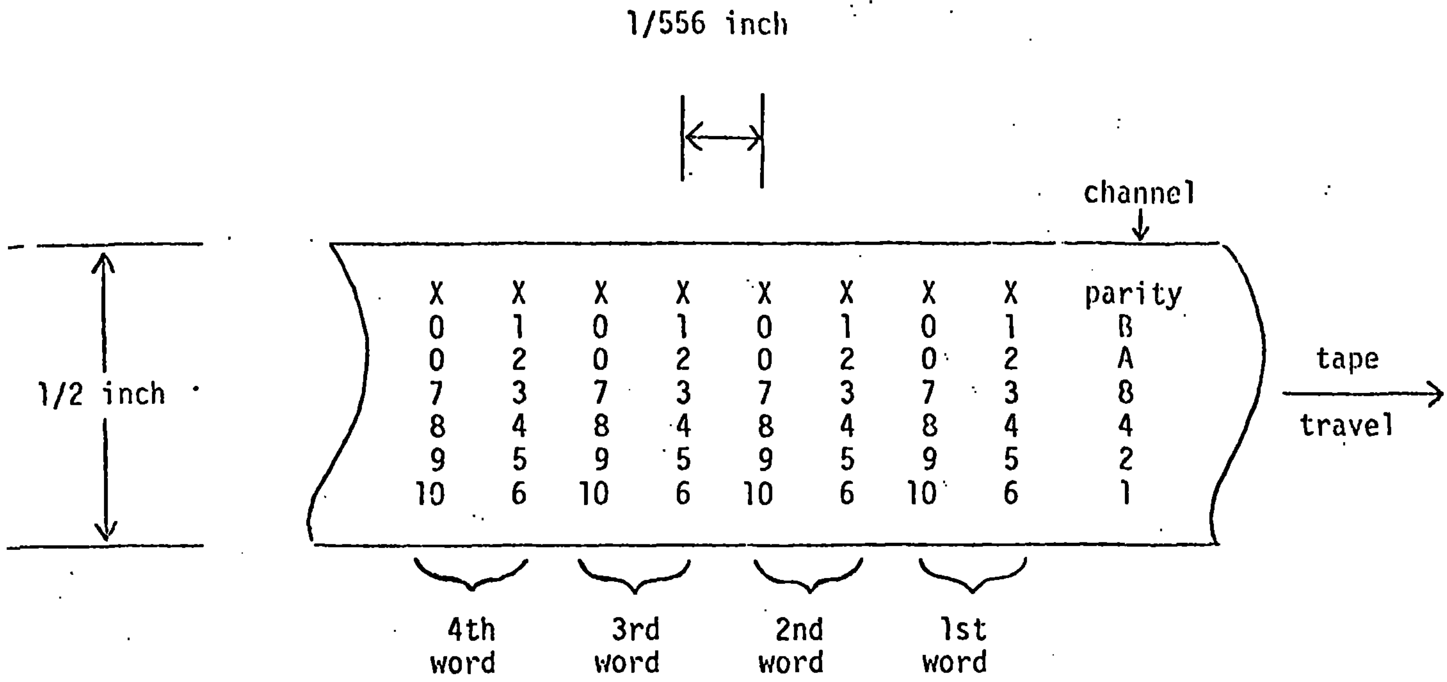

Figure 2-2. 7-track magnetic tape format. X denotes a parity bit and the integers 1 through 10 denote the bits of an Aanderaa word, 1 being the most significant bit and 10 the least significant. Zeros are always written in the B and A channels of every 2nd character, as shown.

AMMT2FLB (this is an acronym for Aanderaa Meter Magnetic Tape to File, Version B) is run as a batch job. Its inputs consist of the 7-track tape and as many data cards as there are files on the tape. The nth data card contains the name under which the nth file is to be stored on the disk. After AMMT2FLB has been run, the files are available for processing by the CDC 3300.

Conversion to Physical Units

After the data have been placed in disk memory they are converted to BCD form. In general, at all stages of the processing our practice has been to keep the data in BCD rather than binary, core image form. Although binary data are more compact and can be used in calculations more cheaply than BCD data, the latter can be listed more easily and inexpensively, and can be made accessible to other computers more readily. The program that effects the binary-BCD conversion is named AMFL2R (for Aanderaa Meter File to Raw). It reads the 200-word binary records and produces a BCD file in which each record consists of the six numbers recorded during a single current meter cycle, followed by a record count. If the meter is an RCM-4 the reference word is first, followed by temperature, conductivity, pressure, direction, and cummulative speed, in that order. Each data word is an integer in the range [0,1023] and is preceded by four blank spaces. The record count that follows the six data words is 1 for the first cycle, 2 for the second, and so on. This file is called the undated raw data.

In the case of CUE-I Datalogger output, AMFL2R produces a file consisting of records in which the reference word is first, followed by air temperature, water temperature, wind direction relative to the buoy, buoy orientation, wind speed, and the record count. For a Datalogger this order is in general variable and is determined by the way in which the sensor leads are plugged into the Datalogger; the order given above was used with all the CUE-I surface buoys. (The sequence of data words within an RCM-4 cycle is fixed, determined by hard-wired connections in the machine.) AMFL2R and all subsequent computer programs that will be mentioned here are run from the teletype, under the OSU time-sharing system.

The next step in processing is to date the raw data. Each time a current or wind meter is moored the start and stop times (i.e., the times of the first and last cycles) are recorded. From these one can calculate the number of cycles during the mooring. If this equals the number of records in the raw data file, processing can proceed; if the two numbers are not equal it is necessary to list the undated raw data and check it in detail to find the cause of the discrepancy. Assuming the raw data file has the correct length, a new file is created which differs from it in that a date and time of day have been placed at the left of each line (or record). This is the <u>dated raw data</u>. The new file is produced by a program called AMDATE6. A line-printer listing of this file is obtained and stored permanently; the file is also stored permanently on magnetic tape.

Recall that the raw data consist of integers in the range [0,1023]. The next and final step in this stage of the processing is to convert these analog values to physical units, i.e., temperatures in degrees centigrade, directions in degrees, etc. To do this we need calibration constants for the sensors. Although all of these sensors produce outputs that are related inputs in a nearly linear way, we elected to increase precision by using quadratic calibration curves (except with direction, which will be discussed separately). Thus temperature, pressure, and speed during CUE-I were calculated from relations of the form

$$T = a_T + b_T x_T + C_T x^2_T$$

$$P = a_P + b_P x_P + C_P x^2_P$$

$$S = a_S + b_S \Delta x_S + C_S \Delta x^2_S$$

The temperature and pressure constants were evaluated separately for each meter, since it was found that they varied significantly from meter to meter and a common value could not be used. The speed calibrations, on the other hand, were sufficiently similar from meter to meter, and the expense of calibrating every meter individually was so great, that a single a_S, b_S, and c_S were used for all the meters. The speed constants for the current meters were

$$a_S = 1.307$$

$$b_S = 0.8816$$

$$c_S = -0.0007962$$

for a cycle time of five minutes and speeds in cm/sec. A linear fit to the same points that yielded the quadratic fit shown above gave

$$a_S = 1.773$$

$$b_S = 0.8282$$

which can be compared to the manufacturer's own calibration:

$$a_S = 1.4$$

$$b_S = 0.83$$

Directions were handled in a somewhat different way. Prior to mooring, each RCM-4 was placed on a test stand and rotated through a full circle in 10° increments. At each position the meter was cycled and the analog direction (a number between 0 and 1023) was recorded. The result was a calibration curve giving the analog values corresponding to current directions of 0°, 10°, 20°, etc. Linear interpolation was used to find the direction corresponding to each analog value from 0 to 1023. The result was a table of 1024 numbers, in which the nth was the direction (in degrees relative to true north) associated with an analog value of n. Directions were then calculated by a simple table look-up.

Since none of the current meters had conductivity sensors during CUE-I, no conductivity calculations were made. Channel 3 was always zero in the raw data.

Air temperature, water temperature, and wind speed as measured by the surface buoys were handled in essentially the same way as current meter temperatures and speeds. Each temperature sensor was calibrated individually and a quadratic fit to the calibration points was obtained. Wind speeds, however, were calculated from the linear relation provided by the manufacturer:

$$S = 0.465 \frac{\Delta X_s}{\Delta t} \text{ m/sec}$$

where ΔX_s is the speed advance and Δt is the cycle time in minutes.

Wind direction as measured by an Aanderaa weather station is the sum of two numbers: wind direction relative to the buoy, and buoy orientation. These are provided by two independent sensors. During CUE-I all the buoy orientation and relative wind direction sensors were calibrated individually, and direction look-up tables were prepared in the same way as for current direction.

Raw data are converted to physical units (cm/sec, degrees centigrade, etc.) by a single pass through a computer program named AMR2P6. This program reads a dated raw data file line-by-line and produces a processed data file. Each line of the latter represents one current meter or Datalogger cycle and contains a date, time (GMT), speed, direction (toward which the current or wind was moving), u component, v component, temperature (two temperatures in the case of a surface buoy: air temperature and that of the water about two meters below the surface), possibly a pressure, and a line count. In most CUE-I moorings only the deepest current meter was equipped with a pressure sensor. Pressures are given in units of kg/cm^2 in the CUE-I data. This is a convenient unit because multiplied by ten it yields the approximate depth in meters of the sensor.

Conversion of analog temperatures, pressures, and directions to physical units by means of the calibration curves is straight-forward. A special procedure is needed with speed, however, since speed is calculated from the slope of a sawtooth function. The problem occurs where the analog speed value passes from 1023 to 0. The speed potentiometer of each Aanderaa meter has a small gap at this point, about three degrees wide, where the output is indeterminate: it can be anywhere in the range [0, 1023], though 1023 is most probable. Our practice has been to calculate speed at such points by interpolating linearly between the slopes before and after this crossover. This is done automatically by AMR2P6; no human intervention is needed.

Error Detection and Correction

The error detection procedure is straightforward but time-consuming, since it requires direct human participation and judgment. As soon as the raw quantities have been converted to physical units they are plotted as functions of time (on the Calcomp plotter). Each plot is then examined by eye and errors are noted. This is done for speed, pressure, and temperature, but not for direction. Direction ordinarily is quite noisy and we have found that plots of direction versus time are not useful in locating direction errors.

There are several possible sources of error in an Aanderaa record. One is the meter's encoder. The probability is small but finite that a given electrical resistance will be incorrectly balanced and encoded. Another more likely error source is nonuniformity in the quarter-inch magnetic tape. The tape is degaussed before installation but there is no assurance that all magnetism has been removed. In addition the tape may have variations in coating thickness and composition that affect the recording. Another error source is the tape transcriber itself, which like all digital devices occasionally drops a bit. Errors in which a bit is reversed somewhere during the encoding, recording, or transcription are easy to find if the bit in question is a high-order bit. If a low-order bit is reversed the error may be within the noise level of the instrument or the phenomenon being measured, and in that case will not (and need not) be noticed.

Another type of error, peculiar to the speed parameter, occurs when the meter's speed output, which usually increases by nearly uniform amounts from cycle to cycle over the short term, suddenly shows a very small increase followed by a large one, such that the average of the two is close to the local average increase. The opposite pattern, in which an abnormally large increase is followed by a small one, is also found. We have hypothesized that events of this kind may be caused by nonuniformities in the speed potentiometer winding. We do believe they are errors and not real happenings in the ocean.

Another, more rare, type of error is associated with clock and triggering malfunctions. Instances have been observed in which a meter has cycled several times in rapid succession, or conversely has missed one or more cycles. Since the start and stop times of the meters are always recorded, the correct number of cycles for a given record is known. If the actual number of cycles is greater or smaller we can conclude there is a cycling problem. Simple clock speed errors were not encountered during CUE-I. That is, we found no case in which the clock ran fast, for example, so that the meter consistently cycled every four minutes, say, instead of the intended five minutes. The CUE-I Aanderaa meters were equipped with quartz crystal clocks designed and fabricated at OSU. We do not know whether the clocks provided by Aanderaa are as reliable as those we used. We did note instances in which the encoder was triggered spuriously in the middle of a cycle, or failed to cycle when it should have. Events of this kind can usually be located in time by looking at the speed plot. If a file is two cycles too short, and a particular speed is three times as large as the speeds around it, the liklihood is that the speed spike coincides with the two missed cycles. Similarly, a downward speed spike may be associated with one or more extra, spurious cycles.

Errors of the kind discussed so far have been rare in the CUE-I data. On the average, a 9000-cycle speed, temperature, and pressure file (about thirty days with a measurement every five minutes) contains no more than three or four such errors. Temperature and pressure series have fewer errors than speed. We have had far more difficulty with direction than with any other parameter. Most of the direction problems were traceable to mechanical failures in the compass itself. In several cases, the clamped compass needle failed to contact the resistance ring around the periphery of the compass. This resulted in a direction record consisting wholely or partly of 1023s. In other cases directions in a certain range always registered in a different range (we do not know why), so that no directions at all were recorded in the first range. Many of these compass problems became apparent from a cursory examination of the raw data. Others were discovered later from the direction histograms.

In general, isolated errors and short runs of bad data are corrected by linear interpolation. For example, if the speed record indicates that the rotor fouled for a short period of time, new speeds are calculated by interpolating linearly between the last good speed before the fouling and the first good speed afterward. This type of correction is made by means of a computer program called LINT, which reads the uncorrected processed data file and produces a new error-free file. The program user provides LINT with the line numbers of the first and last lines of bad data, and indicates which parameters are in error; the program does the rest automatically.

A few CUE-I files contained extensive sections of bad data, too wide to interpolate across. These files were either discarded entirely, or divided into one or more shorter files consisting of good data.

Data Analysis

Every Aanderaa current meter record and anemometer record obtained by the Coastal Upwelling Group is subjected to a preliminary descriptive analysis. Several plots are made, in addition to the error-detection plots mentioned above:

1. histograms showing the distributions of speed, direction and temperature
2. a progressive vector diagram (PVD)
3. variance spectra of u, v, temperature, and pressure
4. a rotary current (or wind) spectrum

In addition, new files are made by low-pass filtering u, v, temperature, and pressure and decimating to one point per hour.

Speed histograms are produced by a computer program named AMSHST, which makes both a Calcomp plot of the histogram and a table showing absolute and relative frequencies. Class bounds in the speed histogram are selected so that each class contains the same number of "possible" speeds. Recall that speed is calculated from the difference between two successive integers in the range [0, 1023]. Since this difference is itself an integer, speed is a discrete rather than continuous function. When the cycle time is five minutes, for example, the "possible" speeds (in cm/sec) are 0.65, 2.19, 3.07, 3.94,... In most of the speed histograms, each class contains two possible speeds; a few have classes that contain three possible speeds. This choice of bounds guarantees a smooth histogram in regions where the speed distribution is itself smooth. We found that taking class bounds at arbitrary equispaced points, such as 0, 2, 4, 6,... cm/sec, produced classes containing unequal numbers of possible speeds and tended to induce an artificial unevenness in the histograms.

Temperature and direction histograms are calculated and drawn (on the Calcomp plotter) by a computer program named AMTDHST. Again, temperature as recorded by an Aanderaa meter is a discrete rather than continuous function. The separation between possible RCM-4 temperatures is only about 0.02 degrees centigrade, however, and the program sorts temperatures into classes exactly 0.1 degrees wide, so that most classes contain five possible temperatures (some contain four) and no noticeable unevenness is induced. The direction histograms have classes ten degrees wide, containing exactly ten possible directions. AMTDHST produces frequency tables for both temperature and direction along with the plots.

Variance spectra for the currents and winds are produced by a program called AMUVSPC. This is a rather large program that does several different things. First, it reads u and v from the error-free processed data file and filters both parameters, creating a new file containing low-passed hourly values of u and v and their cumulative sums. This file, like all CUE Aanderaa data files, has a date and time at the left of every line and a line count on the right. Each line represents one hour. The cumulative sums of u and v are used subsequently to make PVDs. A line printer listing of this file is made and stored permanently, and the file is also stored on magnetic tape and microfilm.

The low-pass filter used in AMUVSPC was designed to preserve as much information as a time series with a data interval of one hour can carry, without aliasing. The nyquist frequency for such a series is 1/2 cycle per hour. The half-power point of the filter in question lies at 1/2 cycle per hour, and the frequency response function has a fairly sharp roll-off with low side lobes. Thus the maximum possible amount of information is passed, without aliasing from frequencies above the nyquist frequency. We feel that the output of this filter is preferable to the simple hourly averages many investigators use. The filter weights are shown in Table 2-1, for an input data interval of ten minutes. Figure 2-3 shows the response of this filter.

Data with a five minute interval are filtered in two steps. First, consecutive pairs of values are averaged to create a series with a ten minute interval. Then the filter of Table 2-1 is applied. The response this two-step filter is very close to that shown in Figure 2-3. This procedure is used with five minute data, rather than a one-step procedure, in order to reduce computation time. The two-step algorithm is faster because in it half of the multiplications have been converted to additions, with little degradation in frequency response.

After filtering both input series and decimating the result to one point per hour, AMUVSPC computes scalar auto spectra for u and v, and a rotary spectrum. All of the spectra are computed from the hourly values, using a fast fourier transform algorithm. Two plots are made of each scalar spectrum. The first has a linear frequency scale and a logarithmic spectral density scale. The spectrum is scaled so that the area under the curve would, if the density scale were linear rather than logarithmic, equal the variance of the original time series. The second plot is of frequency times spectral density, versus frequency. The frequency scale is logarithmic and the frequency times density scale is linear. The area under this curve equals the variance of the time series, and of course the area in any frequency band equals the variance in that band. The rotary

Table 2-1. Filter weights used in AMUVSPC for a data interval of 10 minutes. The filter is symmetrical and contains 37 unique weights. The center weight is shown first.

0.17833032	-0.00753077
0.16884324	-0.00679676
0.14226211	-0.00429982
0.10376850	-0.00122497
0.06059469	0.00138740
0.02032076	0.00280708
-0.01082650	0.00300220
-0.02923579	0.00225742
-0.03443759	0.00110011
-0.02881451	0.00003495
-0.01664279	-0.00062434
-0.00278253	-0.00081015
0.00859918	-0.00064948
0.01493615	-0.00035206
0.01560687	-0.00009774
0.01170108	0.00002965
0.00536221	0.00004496
-0.00104053	0.00001542
-0.00564412	

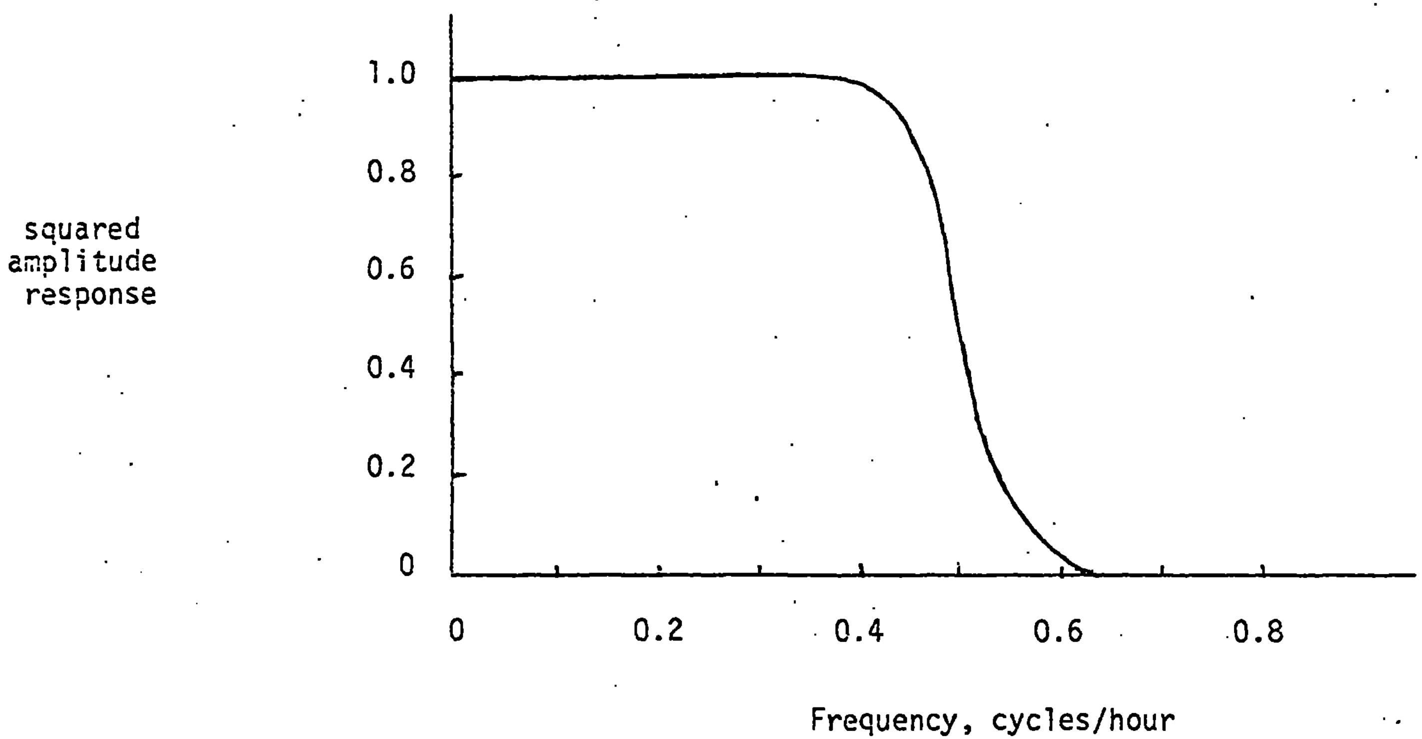

Figure 2-3. Response of the filter used in AMUVSPC, when applied to a 10-minute data interval.

autospectrum is also plotted twice, once with a linear density scale and once with a logarithmic density scale. The two-sided frequency scale is linear in both plots. Rotary spectral density is scaled such that in the linear - linear plot the area under the curve equals the sum of the u and v variances. In the scalar plots, frequency runs from 0 to 1/2 cycle/hr. The rotary spectrum runs from -0.12 to +0.12 cycles/hr.

The average kinetic energy of a unit volume of water is equal to half its mean squared velocity (i.e., half the variance about zero) and so the current spectra can be thought of as energy spectra. The energy of the mean motion is excluded, however, since both the mean and any linear trend* are removed from u and v before their fourier coefficients are computed. Thus the variances mentioned above are all variances about the linear trend, rather than about the mean or zero. It should also be mentioned that the scalar spectra are smoothed by convolving the raw spectral estimates with the binomial window 1/16, 1/4, 3/8, 1/4, 1/16. This induces about 7 degrees of freedom, since the variance-equivalent rectangular window spans about 3.5 elemental frequency bands (of width 1/T where T is the length of the input series) and we can regard each raw estimate (there is one in each band) as a chi-square random variable with 2 degrees of freedom. The rotary auto spectrum is computed from the smoothed scalar spectra and is not itself explicitly smoothed.

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* The linear trend of a velocity series is the least-squares line of best fit, with the squared velocity deviations (as opposed to time deviations) minimized.

Variance spectra of temperature and pressure are calculated and plotted by AMTPCSPC. This program, like AMUVSPC, uses a fast fourier transform algorithm and produces two plots for each parameter. One is a plot of spectral density versus frequency (with the density scale logarithmic and the frequency scale linear) and the other is of density times frequency (linear) against frequency (logarithmic). In both plots frequency runs from 0 to 1/2 cycle/hr.

A PVD (progressive vector diagram) is a plot in which all the current or wind vectors have been drawn in succession, head to tail. The vectors are scaled in such a way that they denote distance rather than velocity; the distance from the origin of the first vector to any subsequent point on the curve, measured along the curve, is just the amount of water or wind that passed the meter after it was installed, up to the time associated with that point. CUE PVDs are drawn by a computer program called AMPVD, which takes as input the cumulative sums of filtered u and v produced by AMUVSPC. The plot is scaled to fit onto a standard 8 1/2 by 11 inch page (as are, in fact, all the histograms and spectral plots). North-south and east-west axes are drawn on the PVD with a tick and a label (the label denotes the distance from the origin to the tick, in km) every inch. The origin of the axes is at the start point of the first vector.

78-0403

Calibration of the Aanderaa RCM4 Temperature Sensor

The temperature bath used in the thermistor calibration is a 79 cm x 79 cm x 86 cm plywood box with a cylindrical fiberglass tank mounted inside. This tank has a volume of about 200 liters. Between the fiberglass tank and the outside plywood wall is 10 cm of rigid foam insulation. The tank will comfortably hold up to 10 RCM4's. In addition, water and air temperature sensors from meteorological data loggers can be attached to the bales of these current meters and plugged into dataloggers outside the bath, thus increasing the number of instruments that may be calibrated at one time. To stir the water and maintain a uniform temperature a Sargent cone-drive stirring motor is mounted in the lid of the tank. It is equipped with a stirring arm and propeller that project approximately 38 cm into the tank.

A Hewlett-Packard quartz thermometer (Model 2801A) is used in the calibration. This instrument has a temperature range of -80 to +250°C with a factory calibrated accuracy of .02°C absolute, traceable to NBS. It has a short-term stability of better than ± .0001°C and long-term stability with zero drift less than ± .01°C at constant probe temperature for 30 days. The quartz crystal probe is mounted on a current meter bale at the approximate level of the RCM4 thermistors. The read-out resolution is set at .01°C with a relatively rapid display interval.

The bath and the RCM4's are prepared for calibration in the afternoon of the day preceding the date of calibration. The RCM4's are started on a five min. sample period and are placed around the outside perimeter of the fiberglass tank with the quartz probe and the air or water temperature sensors to be calibrated fastened to the bales with electrical tape. Approximately 45 kg of ice is placed in the bath; then water is added until the instruments are completely submerged, and the thermistors and the probe are roughly 25-30 cm below the surface. The water-ice volume is about 150 liters. The bath is then left closed overnight to stabilize the temperature.

The following morning the remaining ice is removed, leaving as much water as possible. The bath's temperature is usually found to be stable between 0.00 and 1.00°C. Generally two readings per temperature level are taken. This gives 10 minutes of each temperature which insures a fair level of stabilization. It has been found that, if necessary, 5 minutes allows a sufficient degree of stabilization to take place, i.e. the difference between the first reading and the second reading is no more than .03°C.

The calibration range is from the starting temperature (0.00 - 1.00°C) to 22°C (21.48°C is the maximum for the RCM4 thermistors in our meters). After the readings are taken at some temperature, the temperature of the bath is raised with an attempt to keep the increase close to 1°C. This is done initially by adding approximately 925 cm^3 of nearly boiling water. As the volume of the water in the bath increases, an additional 925 cm^3 of hot water from the hot water faucet is added. When the volume added each time reaches the level of 925 cm^2 heated water and 2,800 cm^3 hot faucet water, then 2,900 cm^3 is removed from the bath before approximately 3,200 cm^2 is added (925 heated, the rest from hot water faucet). After the hot water is added the lid of the bath is closed and the stirring motor runs continuously for the 10 minute (or 5 minute) sampling interval.

Table 1-1 shows the resulting temperature as calculated for a bit reading of 551. The change of temperature calculated (Δt) is in the range of digitization error.

TABLE 1-1

Meter Number	Pre Calibration Temperature	Post Calibration Temperature	Difference
268	10.66	10.70	0.04
317	---	---	---
438	10.00	10.05	0.05
439	10.17	10.22	0.05
440	---	10.05	---
441	9.99	10.02	0.03
442	10.06	---	---
452	10.01	10.05	0.04
453	10.04	10.08	0.04
454	9.99	10.02	0.03
455	10.04	10.06	0.02
456	9.99	10.02	0.03
485	10.06	---	---
486	---	9.95	---
487	10.05	10.09	0.04
488	10.09	10.11	0.02
489	10.03	10.06	0.03
490	10.04	10.06	0.02
491	10.01	10.05	0.04
492	10.05	10.09	0.04
493	10.03	10.07	0.05
494	10.05	10.07	0.02
495	10.00	10.03	0.03
496	10.05	10.07	0.02
497	9.98	10.00	0.02
498	10.08	10.13	0.05
499	10.00	10.08	0.08
500	10.06	10.10	0.04
501	10.08	10.05	0.03
502	10.04	10.07	0.03
503	10.11	10.18	0.07
504	10.05	10.12	0.07
Mean	10.06	10.09	0.038

Calibration of the Aanderaa RCM4 Pressure Sensors

A pressure calibration facility for the Aanderaa RCM4 pressure sensors was constructed in early June 1972. The apparatus consists of a source of hydraulic pressure ("Porta Power" made by Blackhawk), a manifold for distribution of equal pressure to five pressure transducers, and a laboratory quality pressure gauge (made by Ashcroft). The precision of the gauge is $\pm$ 0.035 kg/cm^2.

The first calibration run was made on RCM's # 498, 499, 500 and 501. The range of the calibration was from 4.43 kg/cm^2 to 13.0 kg/cm^2. Eighteen points were taken in the range with an attempt to take a point every 0.7 kg/cm^2. A second calibration was made using RCM's # 502, 503 and 504. On this run the pressure range was from 3.55 kg/cm^2 to 12.4 kg/cm^2. Again, some eighteen points were taken in the range, spaced some 0.7 kg/cm^2 apart.

A third calibration was made on RCM's #495, 496, 497 and 317. This run was similar to the previous two in range and number of points taken. RCM # 317 was fitted with a pressure transducer whose range was from 0 - 35 kg/cm^2 while all the others calibrated were fitted with transducers whose range was from 0 - 14 kg/cm^2.

The CUE-I post calibration was done on November 30, 1972, for meters # 496, 497, 498, 500 and 501; on December 1, 1972, for meters # 499, 502, 503, and 504; and January 5, 1973, for meter # 495. The procedure used was the same as for the previous calibration.

Table 1-2 shows the pressure difference calculated using the two sets of calibration data. The pressure difference for a single bit change at this pressure is about 0.02 kg/cm^2.

TABLE 1-2

Meter Number	Precalibration Pressure @ 534 bits kg/cm²	Post calibration Pressure @ 534 bits kg/cm²	Difference
495	7.40	7.36	0.04
496	7.51	7.50	0.01
497	7.55	7.55	0.00
498	7.13	7.14	0.01
499	7.49	7.50	0.01
500	7.45	7.48	0.03
501	7.44	7.44	0.00
502	7.45	7.44	0.01
503	7.47	7.46	0.01
504	7.56	7.54	0.02
Mean	7.44	7.44	0.02

Calibration of the Aanderaa RCM4 Compass

The construction of a compass calibration facility at O.S.U. has been invaluable to the success of the current measuring program. After several attempts at design, a final version of the rotating portion of the compass stand is shown schematically in Figure 1-2. Four meters can be calibrated during a run. Each run has consisted of setting the meters on a 2 1/2 minute sample period, putting the meters on the compass stand, and rotating the stand 10° per sample period through 360°, generally followed by some extra samples at varying directions.

This procedure has been found very useful, both for giving good compass calibrations and for indicating bad compasses. We have had more compass failures than all other sensor failures combined. Most of the failures were due to shipping damage. We deduce this from knowledge that the compasses were operational when packed at the factory in Norway and were non-functional at delivery at O.S.U. There are several kinds of compass failure, but careful calibration indicates what kind of failure.

A good compass is one which repeats its calibration curve when recalibrated, and which gives meaningful bit values every ten degrees. By repeating its calibration curve we mean within 3°. Each compass has its individual characteristics; some of which we do not fully understand. Most of the compasses repeat within 1°, while all have repeated within 6°. Some compasses have failed during the CUE-I field program, and the post calibrations indicate clearly which these are so that repairs can be made.

Figures 1-3 and 1-4 show a typical calibration curve. Table 1-3 gives an indication of the compass to compass variation in the calibration curve.

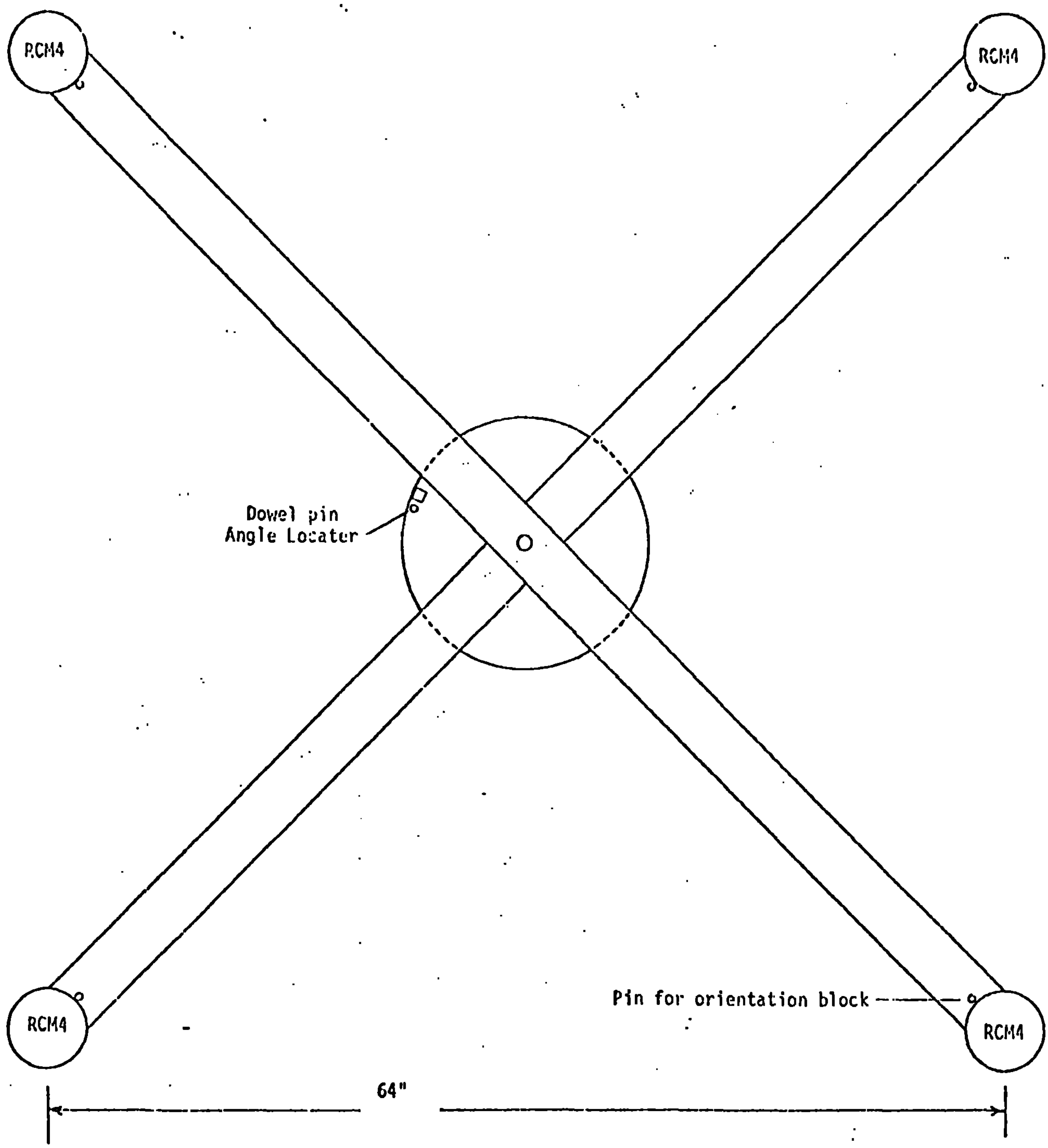
RCM4
RCM4
Dowel pin
Angle Locater
RCM4
Pin for orientation block
RCM4
64"

Figure 1-2

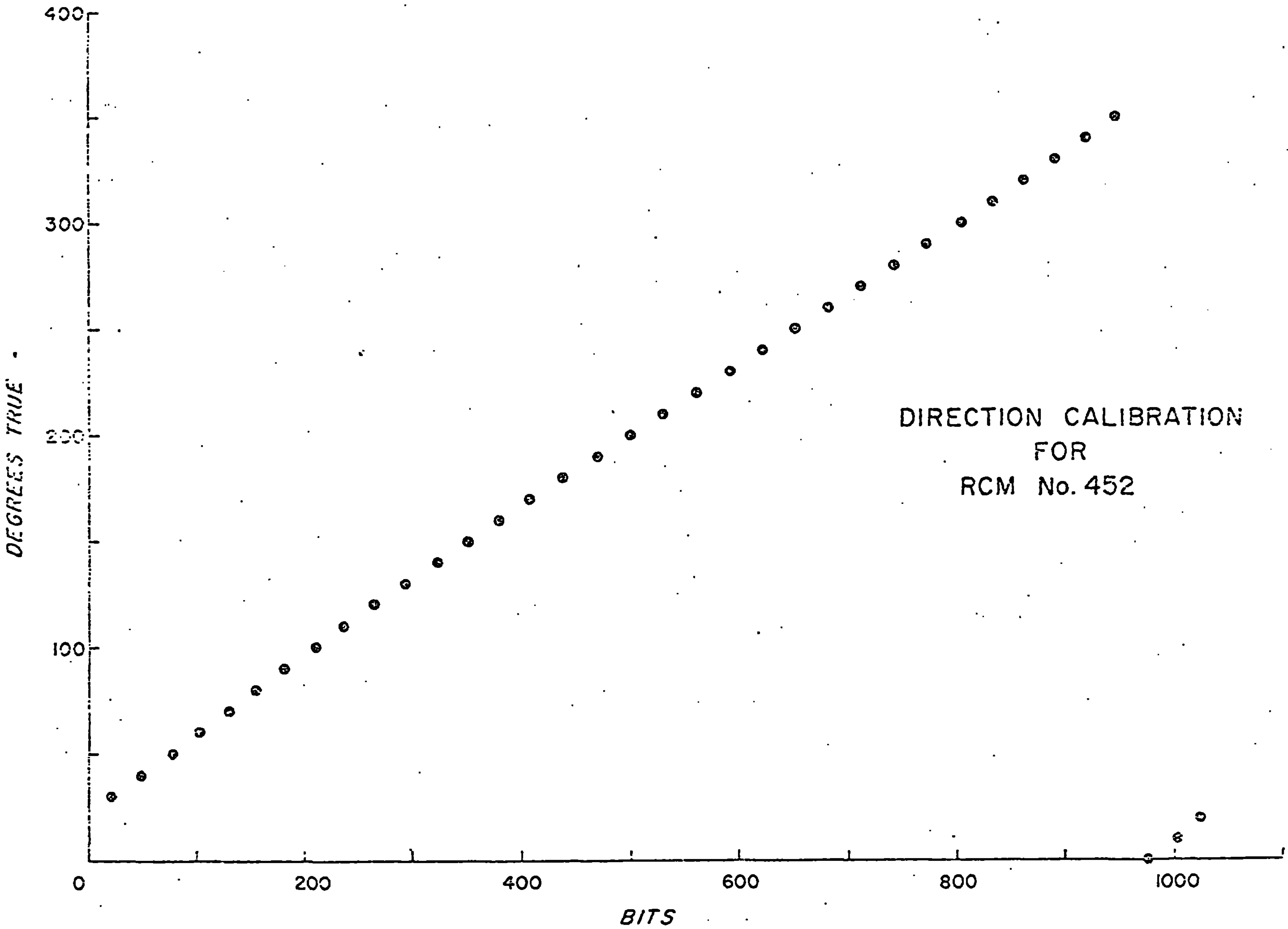
DIRECTION CALIBRATION
FOR
RCM No. 452
DEGREES TRUE
BITS
400
300
200
100
0
200
400
600
800
1000

Figure 1-3

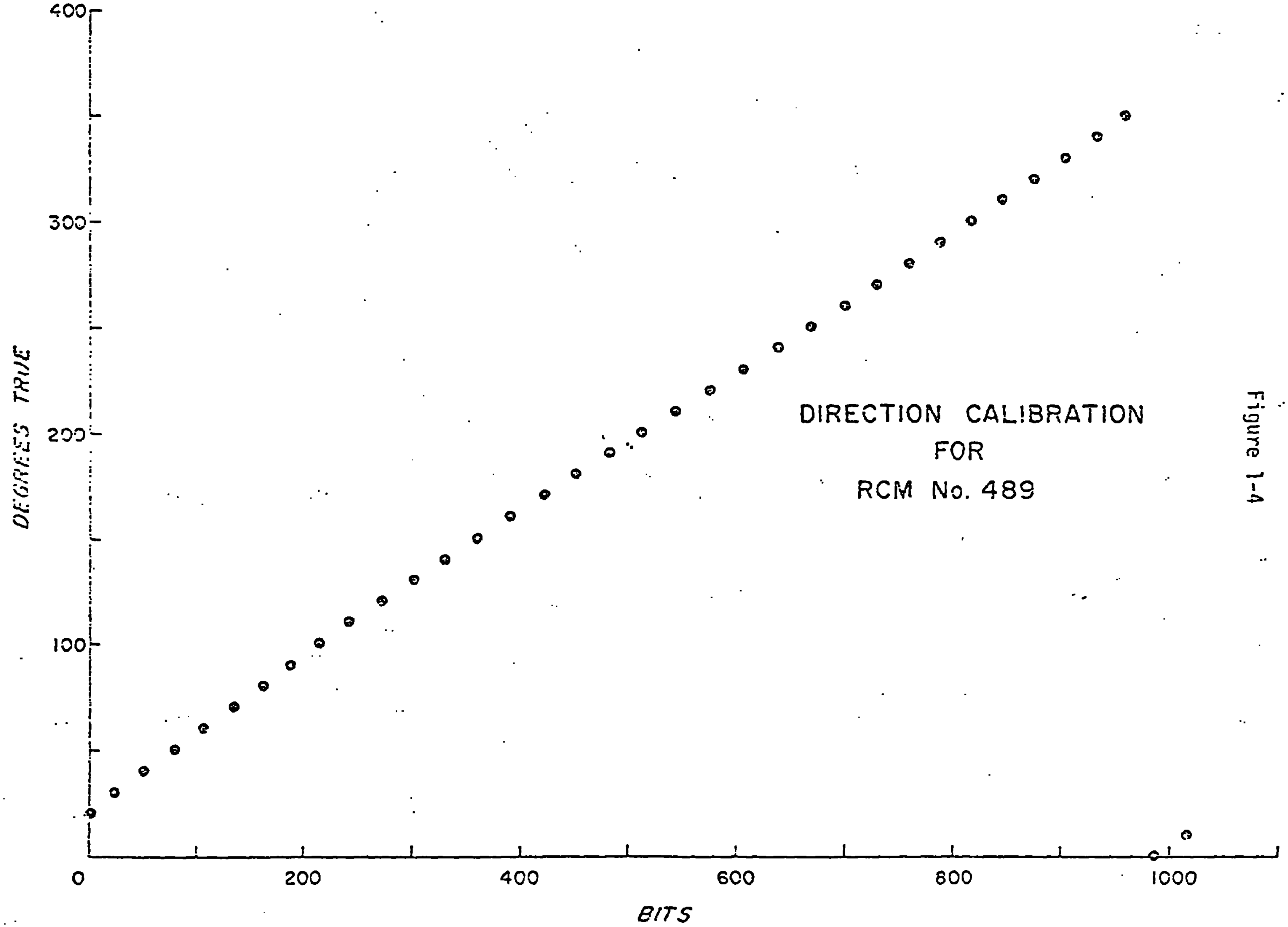
DIRECTION CALIBRATION
FOR
RCM No. 489
DEGREES TRUE
BITS
400
300
200
100
0
200
400
600
800
1000

Figure 1-4

We intend to enlarge on Table 1-3 in the future giving the statistics for every ten degree value. It is clear from Table 1-3 that it is worthwhile calibrating and treating each compass as an individual instrument.

TABLE 1-3

Meter No.	0°	90°	180°	270°
268	996	216	458	719
438	980	189	418	693
439	940	172	441	698
440	973	170	427	712
441	963	185	453	712
442	978	192	436	705
452	976	182	439	713
453	982	195	435	711
454	966	189	450	706
455	975	182	446	720
456	999	204	446	716
485	979	190	428	688
486				
487	965	185	461	720
488	947	182	462	715
489	988	188	451	729
490	965	196	479	728
491	984	204	444	710
492	952	179	455	708
493	978	189	430	695
494	982	198	445	712
495	979	201	455	722
496	955	189	459	706
497	963	187	433	695
498	968	185	418	682
499	971	200	468	726
500	982	190	424	696
501	964	204	455	694
502	974	183	422	695
503	981	188	408	688
504	952	192	438	684
Mean	972	190	443	707
St. Dev. (bits)	14	10	16	13
St. Dev. (degrees)	5	4	6	5
Max.	999	216	479	729
Min.	940	170	408	682
Range (bits)	59	46	71	47
Range (degrees)	21	16	25	16

Calibration of the Aanderaa RCM4 Speed Sensor

Our past experience with current meter rotors indicated that for speeds several cm/sec above threshold the calibration of all rotors of a given type can be considered equal. Part of our calibration work was designed to test this concept.

In March of 1972 four combinations of rotors and meters were calibrated at the Division Hydraulic Laboratory of the Corps of Engineers, U.S. Army, Bonneville, Oregon. (For a general discussion of the calibration facility at Bonneville see Johnson, 1966). Figure 1-5 shows the result of this calibration and the line in that figure is given by

$$S \text{ cm/sec} = 1.307 + 4.408 \frac{\Delta b}{\Delta t} - 0.019904 \left(\frac{\Delta b}{\Delta t} \right)^2$$

where revolutions/min = 5.80833 $\Delta b/\Delta t$ for a 6000:1 gear train in the meter.

A repeat of this calibration done in January 1973 with nine combinations of rotors and meters gives

$$S \text{ cm/sec} = 1.727 + 4.356 \frac{\Delta b}{\Delta t} - 0.01509 \left(\frac{\Delta b}{\Delta t} \right)^2$$

All of the data from both calibrations are shown and the two curves lie on top of each other. The differences calculated from the two equations range from 19% at 2 cm/sec to less than 1% at 30 cm/sec with a 4% difference at 8 cm/sec which is generally close to the lowest observed speed. One can conclude from these data that for speeds below 10 cm/sec one should calibrate each rotor with its corresponding meter. But since our mean speeds are generally between 20 and 30 cm/sec we choose not to calibrate each meter separately.

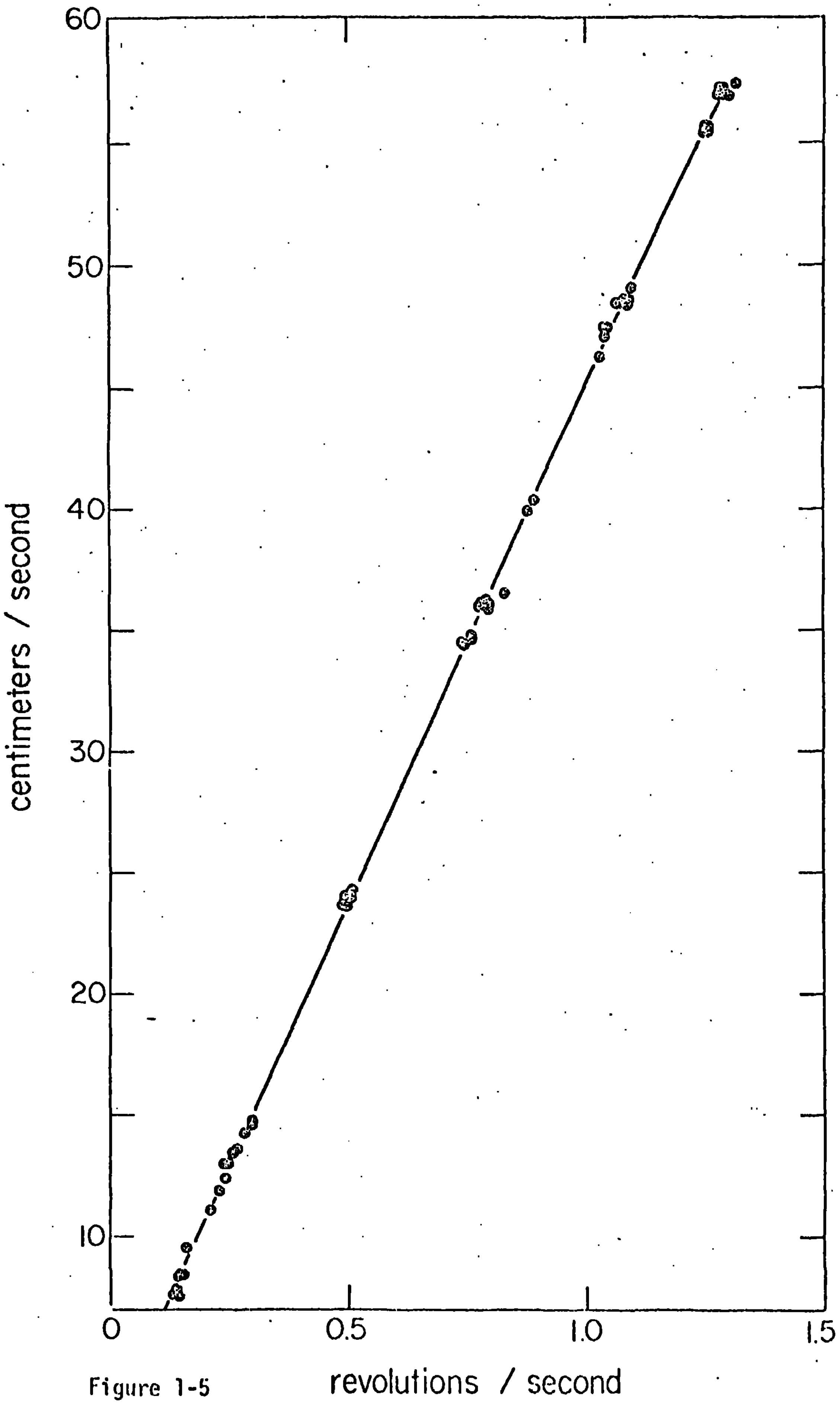
60
50
40
30
20
10
0
0.5
1.0
1.5
centimeters / second
revolutions / second

Figure 1-5

REFERENCES

Johnson, R. L. 1966. Laboratory Determination of Current Meter Performance. Technical Report No. 843-1, Division Hydraulic Laboratory, U. S. Army Engineer Division, North Pacific, Corps of Engineers, Bonneville, Oregon. 33 pp.