Plat 2804 (56)

ACCESSION NUMBER 73-0431

TR0628

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-R2(

F015

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.

C/100

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

National Ocean Survey (Oceanographic Division)
NOAA/Department of Commerce
6001 Executive Blvd.
Rockville, Maryland

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

OPR - 501 - FE - 71, OPR - 500 - FE - 72
(1971 Boston Harbor Current Survey)

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

OPR - 501 - FE - 71

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
Ferrel	Surface Buoys	U. S. A.	U. S. A.	5/12/71	10/26/71

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?)

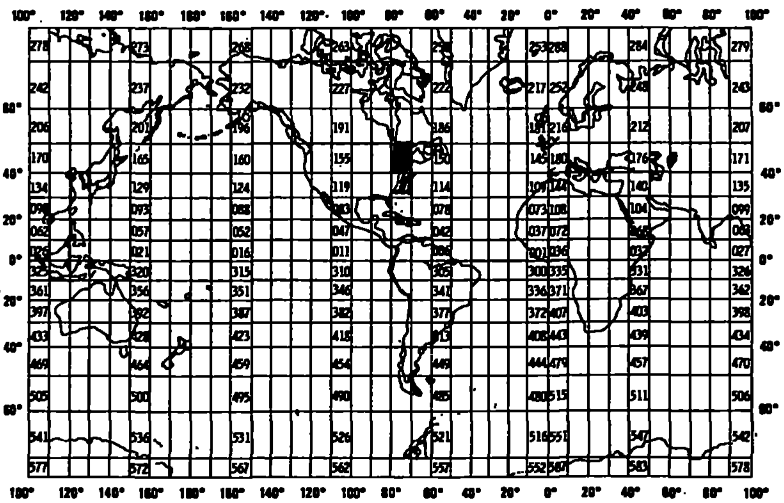
[X] NO [ ] YES [ ] PART *(SPECIFY BELOW)*

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

Chief, Oceanographic Surveys
Branch
(301) 496-8501

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
Current Data (Total Current i.e. Tidal + Nontidal)	Speed (knots) Direction (° True)	Current Meters hung from surface buoys (Minimum 7 days, Maximum 170 days) Geodyne Photographic Current Meters Model A102 [Film recording samples for a minute, Savonius Rotor 25 Direction reading every 2 1/2 sec. Tilt indication]		

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

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 (√)
	(BY LAB)	YOUR ORGANIZATION (√)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (√)	BEFORE OR AFTER USE (√)	BEFORE AND AFTER USE (√)	ONLY AFTER REPAIR (√)	ONLY WHEN NEW (√)	
GEODYNE PHOTOGRAPHIC A102	APRIL '70 *	√					√ (BY LAB)	√	
TICUS	APRIL '70 *	√							
	↑ REPORT ENCLOSED								
* CALIBRATION ALSO CONTINUALLY CHECKED BY SHIP									

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		
see	Computer	Printout			

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 two record types.
5 Records - 80 Characters each/alpha numeric (Master Record)
*N Records - 54 Characters each/numeric (data)(Detail Record)

* N = the number of data points at a particular station

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

Tape 13553 contains 22 files
Tape 13554 contains 23 files

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

4. RESPONSIBLE COMPUTER SPECIALIST:
NAME AND PHONE NUMBER Bruce Parker, (301) 496-8050
ADDRESS Room 605, WSC 1, Rockville, Maryland

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
- [X] 556 BPI
- [ ] 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)*

13553 (5/10/71-10/18/71)

13554 (6/21/71-10/26/71)

12. PHYSICAL BLOCK LENGTH IN BYTES
80 and 54 characters unblocked

13. LENGTH OF BYTES IN BITS
6 Bits/ character

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 Photometer Current Meter Data

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
Master Record	1	80	Bytes	20A4	Description of data
Detail Record					
Date					
Day	1	3	Bytes	I3	(1-31)
Blank	4	1	Bytes	1X	
Month	5	2	Bytes	I2	(1-12)
Blank	7	1	Bytes	1X	
Year	8	4	Bytes	I2	Year of Observation
Blank	12	1	Bytes	1X	
Time	13	5	Bytes	F5.2	1/100 Hour (GMT Time)
Blank	18	1	Bytes	1X	
Compass	19	3	Bytes	I3	* Mean Value of 15 instantaneous readings (every 2 1/2 sec.)
Blank	22	1	Bytes	1X	
Vane	23	3	Bytes	I3	* Mean Value of 15 instantaneous readings (every 2 1/2 sec.)
Blank	26	1	Bytes	1X	
Direction	27	3	Bytes	I3	Compass + Vane (Degrees True)
Blank	30	1	Bytes	1X	
C Vec	31	6	Bytes	F6.2	The comparison of readings (*)
Blank	37	1	Bytes	1X	
V Vec	38	6	Bytes	F6.2	The comparison of readings (*)
Blank	44	1	Bytes	1X	
Velocity	45	5	Bytes	F5.2	Speed (Knots)
Blank	50	1	Bytes	1X	
Tilt	51	4	Bytes	I4	Degrees

* 15 = The first 15 readings out of total of 25 taken at meter.

TICUS DATA

BRIEF EXPLANATION OF THE TERM "WT" (WEIGHT)

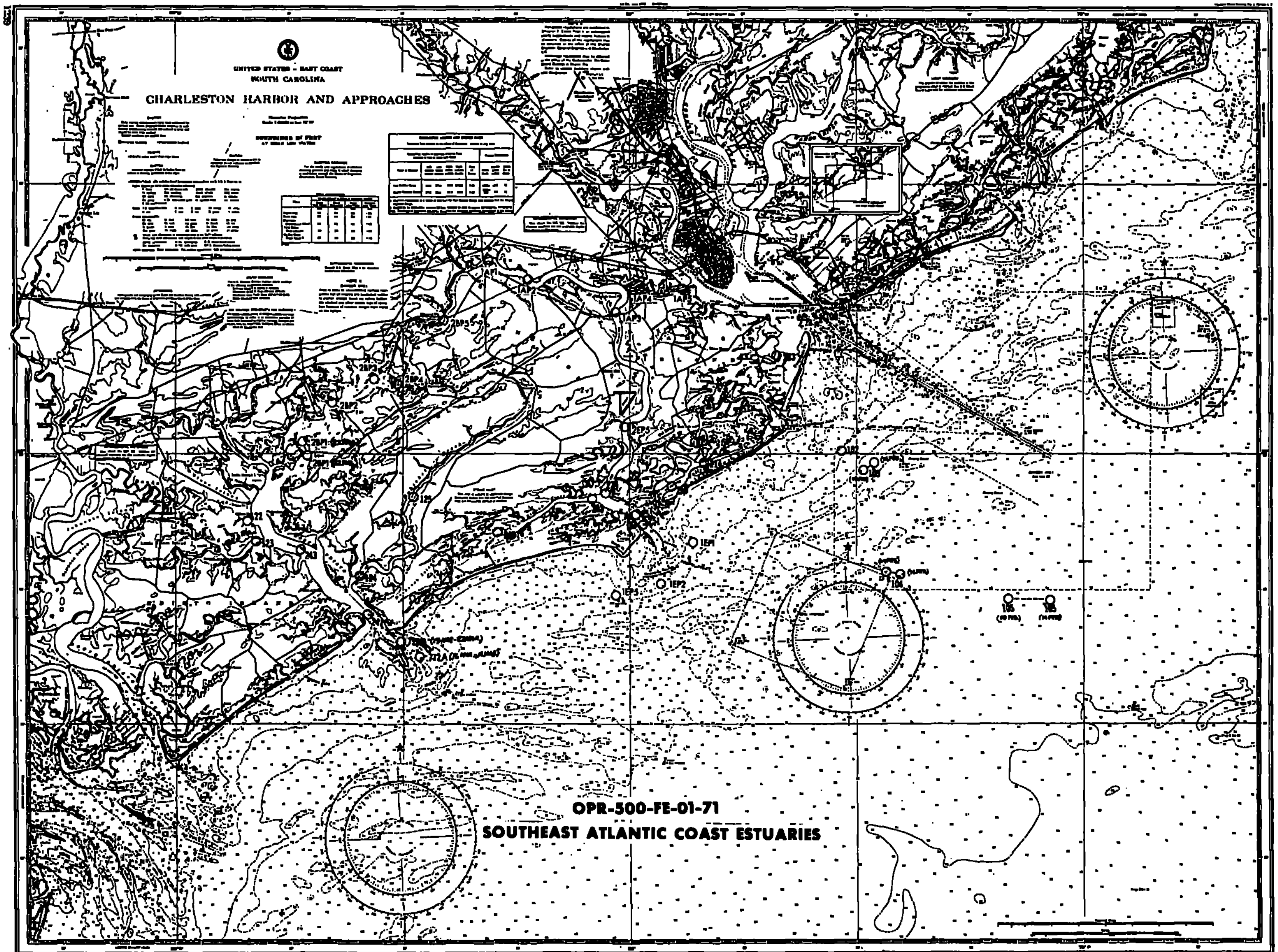
Each direction reading shown on the printout is actually an edited average of 5 direction readings (each direction reading taken instantaneously every 7.5 seconds over a 38 second period).

"WT" is an indication of how close these 5 direction values were to each other. The two extreme cases are: (1) If all 5 direction values were identical, WT = 1000.; (2) If the 5 direction values were evenly distributed around the compass, WT = 000.

There are two situations that normally bring about low WT's: (1) readings taken at or near slack waters (or minimums), i.e. when the direction of flow is rapidly changing.; (2) when the sea state is fairly great and the data is taken near the surface (i.e. 10 to 15 ft from the surface); the current meter is jerked up and down by the bouncing surface buoy, flipping the vane around and also affecting the savonius rotor.

At the present time there is no method for adjusting the data according to WT.

WT should be used only as a rough qualitative tool.



1239

C.&G.S. 1239

73-0431

PHOTOGRAPHIC CURRENT METER DATA

SPEED is measured over a one minute period. (in knots)

The COMPASS value is the mean of 15 instantaneous readings (every 2 1/2 sec.).

The VANE value is the mean of 15 instantaneous readings (every 2 1/2 sec.).

DIRECTION = COMPASS + VANE (in degrees true)

TILT is in degrees.

CVEC gives an indication of how close the 15 instantaneous compass readings were to each other.

If CVEC = 1.000, all 15 instantaneous readings were identical.

If CVEC = .000, these readings were all different and evenly distributed about the 360° of the compass.

(The actual value of CVEC is gotten by putting 15 instantaneous unit vectors end to end ("tail-to-head"), and projecting this sum onto the mean direction vector [of 15 unit-vector length].)

VVEC is gotten in the same manner as CVEC, but applies to the vane readings.

There are two situations that normally bring about low VVEC's (or CVEC's):

(1) readings taken at or near a slack water (or a minimum). At such times the direction of flow can be changing rapidly, or the speeds can be low enough for the data generated by wave motion (or buoy motion) to become prominent.*

(2) when the sea state is substantial and the data is taken near the surface.*

VVEC and CVEC should not be used to eliminate data. These paramenters are meant only to give further insight into the data.

* the small vane on the photographic meter bounces around quite easily. The 15 readings, however, compensate for this.

DISCUSSION OF TICUS REDUCTION PROCEDURE

The speeds and directions recorded by the TICUS-MARK II system are recorded as five speeds s_i and five directions θ_i. NOS treats the two series s_i and θ_i separately deriving a mean of each series $\bar{s}$ and $\bar{\theta}$, then assuming that in the mean $\bar{s}$ and $\bar{\theta}$ can be treated as an ordered pair centered on the middle of the measurement cycle, $(\bar{s}, \bar{\theta})$.

The mean of the series s_i is a simple arithmetic mean.

$$\bar{s} = \sum_{i=1}^{N} s_i \; / \, N$$

At present no editing of the s_i is done at this stage of the programming. The NOS method of editing $\bar{s}$ is to compare $\bar{s}\,(t_1)$ with $\bar{s}(t_o)$ and $\bar{s}\,(t_s)$ where t_o, t_1, t_2 represent consecutive recording intervals.

The mean of the series θ_i is determined by assigning a unit vector to each of the elements θ_i. The cosine and sine components are arithmetically averaged to yield

$$x = \left(\sum_{i=1}^{N} \cos\, \theta_i \right) / \, N \qquad\qquad y = \left(\sum_{i=1}^{N} \sin\, \theta_i \right) / \, N$$

The components (x,y) are resolved to a tentative $\bar{\theta}$

$$\bar{\theta} = \tan^{-1} y/x$$

This $\bar{\theta}$ is compared to the θ_i. If any $|\theta - \theta_i| > 90^o$, that θ_i is removed and a new $\bar{\theta}$ is computed. On the second pass all θ_i such that $|\bar{\theta} - \theta_i| > 60^o$ are removed and a new mean computed. A third pass is made to eliminate θ_i where $|\bar{\theta} - \theta_i| > 30^o$ and the final $\bar{\theta}$ is computed.

This final $\bar{\theta}$ and the $\bar{s}$ discussed above are assigned to the ordered pair $(\bar{s}, \bar{\theta})$.

The estimated validity of $\bar{\theta}$ is assigned $\bar{w}$ according to the ratio

$$\bar{w} = \frac{\left(\sum_{i=1}^{5} \cos \theta_i\right)^2 + \left(\sum_{i=1}^{5} \sin \theta_i\right)^2}{(5\cos \bar{\theta})^2 + (5\sin \bar{\theta})^2}$$

By visual test this yields a weight $\bar{w} = 1.000$ for $\theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \bar{\theta}$ and $\bar{w} = 0.000$ for $\theta_1 - \theta_2 = \theta_2 - \theta_3 = \theta_3 - \theta_4 = \theta_4 - \theta_5 = \theta_5 - \theta_1 = 72^o$ or the cases of mutually cancelling vectors.

Since the weight $\bar{w}$ applies only to the $\bar{\theta}$ the ordered pair of numbers for time t will in reality be the number $\bar{s}$ paired with the ordered pair $(\bar{\theta}, \bar{w})$, or

$$(\bar{s}, (\bar{\theta},\bar{w}))$$

Phil ?

D78

National Oceanographic Data Center
Rockville, Maryland 20852

March 13, 1974 D7

Associate Director for Marine Sciences, EDS

Robert V. Ochinero
Director

SCOPE Products Report (preliminary draft copy forwarded by C3 letter to addressees, undated)

In reference to the notations and questions inscribed by NODC and EDS staff in the preliminary working copy of the NOS "SCOPE Products Report" (refer to enclosed copy), the following explanatory comments are offered.

Section III. Oceanographic Products

A. Tidal Current Observations--The four tapes mentioned by Phil Hadsell in the attached memorandum refer to these current meter data. The tapes contain all of the 1971 field year data and all but approximately 10 stations of the 1972 field year data. Additional tapes of later data are expected in March and July of 1974.

2. Magnetic tape copy of data

b. PHOTO (per meter depth)--According to Carl Fisher, this refers to a copy of the film output from Geodyne current meters. The requester would get a 30-day film record of one of the meters (i.e., from a specific depth level) from the array. For example, if the array had 3 current meters, then a 30-day record for the 3 current meter array would cost $16.

B. Temperature-Salinity Observations--These measurements were obtained with an in situ salinometer. The values are not considered to be very precise. For this reason NOS does not want to make these values available for general distribution. However, depending on who asks for these data, they will release them along with a necessary caveat concerning the quality of the data. According to Dick Moore (NOS), these data are on approximately 1,000 data sheets and NOS would provide Xerox copies.

1. Photocopies of raw data--The temperature and salinity values are read from a dial and manually recorded on data sheets (the 1,000 sheets mentioned above). These are not analog traces as from an STD. NOS charges $.50 per Xerox copy.

2. Computer listing of raw data--The above values have been keypunched and are on cards, not tape (available at $.75 per listing).

2 enclosures

D7:RVOchinero:laf 3-13-74

bcc:
D78

NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

February 21, 1974 D781

FILE

Philip R. Hadsell
Oceanographer

NOS Tidal Current Data

1. NODC has recently received documentation and four magnetic tapes containing tidal current data. These data were taken during the years 1971 and 1972 as part of NOS' Southeast Atlantic Coast Estuarine Study.

The data (NODC Accession Numbdr 74-0142) represents the first shipment of the estimated 13 magnetic tapes to be forwarded to NODC.

D781 - Phil

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C3

D
D1X2
D7
DX7
D1X2

To Addressees

The enclosed SCOPE PRODUCTS REPORT is a preliminary working copy which is being issued to interested parties for interim use prior to the conclusion of the project. An updated and improved report is planned for issue early in 1975 upon the conclusion of the data collection phase of SCOPE. A final published report is then planned about one year later (February 1976) following the final data processing phase.

The purpose of the report is to provide sufficient information concerning the nature of available SCOPE products and how to obtain any specific data. As a potential user of the report, your comments concerning ways in which it may be improved will be most welcomed.

Donald R. Tibbit
Commander, NOAA
Deputy Associate Director
Office of Marine Surveys
and Maps

Enclosure

How about "Call EDS"!!

SCOPE PRODUCTS REPORT

The National Ocean Survey (NOS) is one of the primary organizational elements within the National Oceanic and Atmospheric Administration (NOAA). One of the National Ocean Survey's primary responsibilities is to provide charts and related information for marine commerce, and to provide basic data for engineering and scientific purposes. To meet this responsibility, the National Ocean Survey has had a continuing program of field surveys along the southeast coast of the United States for many years. At the previously scheduled operational rate, an estimated 12 to 15 years would have been required to satisfy presently known survey requirements. The Southern Coastal Plains Expedition (SCOPE) has been initiated to satisfy these requirements by the end of CY-1974.

Through a program of concentration of its marine surveying and mapping resources, the National Ocean Survey plans to complete by the end of CY-1974 those areas of the continental shelf between Cape Hatteras and Cape Canaveral currently in need of modern hydrographic surveys. During CY-1973 four NOAA ships - MT. MITCHELL, PEIRCE, WHITING, and FERREL, one aircraft, the Atlantic Hydrographic Party, and several field support parties participated in the SCOPE program.

Operations encompassed in the SCOPE program include:

1. Hydrographic surveys

2. Bottom sediment sampling throughout the areas to be surveyed.

3. Aerial photography of the entire coastline in the project area with line-drawn maps of the apparent shoreline.

4. Tidal observations to the extent necessary to control hydrography.

5. Circulatory (tidal current) surveys, temperature, salinity, and suspended sediment sampling in selected inshore areas.

6. A physical oceanographic study to determine the effect of the seasonal variations on the tidal characteristics of the area. This study includes deep sea as well as continental shelf tidal observations.

7. Synoptic Weather Observations.

The data processing resulting from the SCOPE surveying effort has been accelerated in order to expedite the timely release of information. As a result, the following data and products are now available to the public:

I. <u>Hydrographic Data</u>

   A. copies of original surveys

II. <u>Photogrammetric Data</u>

   A. coastal maps

   B. aerial photographs

III. Oceanographic Data

A. tidal current observations

B. temperature-salinity observations

C. suspended sediment studies

D. tidal observations

IV. Synoptic Weather Observations

A more detailed description of the products associated with each of the above categories follows.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

Date : March 7, 1974 Reply to Attn. of: D781

To : Robert V. Ochinero (D7)
Via : D78

From : A. R. Picciolo
Chief, Project Monitoring Branch

Subject: SCOPE PRODUCTS REPORT

In reference to the notations and questions inscribed by NODC and EDS staff in the preliminary working copy of NOS' "SCOPE PRODUCTS REPORT" as received from EDS, the following explanatory comments are offered (refer to enclosed copy):

I. Section III. Oceanographic Products (no page number)

A. Tidal Current Observations

The four (4) tapes mentioned by Phil in his memo refer to these current meter data. The tapes contain all of the 1971 field year data and all but approximately ten (10) stations of the 1972 field year data. Additional tapes of later data are expected in March and July of 1974.

B. Temperature-Salinity Observations — Replace

These measurements were obtained with an in situ salinometer (lower quality than an STD). We do not have these data. According to Dick Moore, these data are on approximately 1,000 data sheets, and it is his understanding that the NODC Director and Commander Fisher agreed that at the present time NOS would service xerox copies since the volume of the data were so low.

As per the quotations on photocopies of raw station data and computer listings of raw data, these refer to:

1. Photocopies of raw data - The temperature and salinity values are read from a dial and manually recorded on data sheets (the 1,000 sheets mentioned above). ~~In reply to Morse's question~~, these are not analog traces as from an STD. NOS charges $.50 per xerox copy.

2. Computer listings of raw data - The above values have been keypunched and are on cards, not tape (available at $.75 per listing).

These data have not been corrected and are considered by NOS as being less than high quality.

NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

February 21, 1974 D781

FILE

Philip R. Hadsell
Oceanographer

NOS Tidal Current Data

1. NODC has recently received documentation and four magnetic tapes containing tidal current data. These data were taken during the years 1971 and 1972 as part of NOS' Southeast Atlantic Coast Estuarine Study

The data (NODC Accession Numbdr 74-0142) represents the first shipment of the estimated 13 magnetic tapes to be forwarded to NODC.

D781
Phil
Thanks - Cif

D781 - Phil

Aug 7 NOS meeting
Tidal data + coastal boundaries remain @ NOS
NODC reference these for requestors

Tidal current data Mr D. A Dinardi
Charleston South
Boston North
Geodyne + [illegible] meters every 10 min.
Geodyne reduced @ NBS
Raw data - Not yet processed

NODC To get
NAMDI
↓
Queri NIMSCO
↓
DATA

Vol in station meter days
within 2 years about 75-100 stations or 3000 station meter-days
1st Shipment Spring 73

Note confirmation second page

August 15, 1972

NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

D73

Conference Report (EDS/NOS Interface)

D7

On Monday, July 31, 1972, an EDS/NOS meeting was held to discuss improved access for secondary users, inventory mechanisms, and archival disposition of "Tidal Current" data collected by NOS and its predecessors. Attending were Commander A. Swanson, Director, Oceanographic Division, NOS; Lieutenant Keck, NOS; Mr. D. Dinardi, Chief, Tidal Current Section, NOS; Mr. R. Morse, EDS; and Messrs. T. Winterfeld and P. Hadsell, NODC. The role of EDS as archive and service center for environmental data collected by all organizational components of NOAA and the ENDEX concept were discussed during the first half of the meeting. Discussion on some of the details of NOS's current data holding and processing plans was continued in the afternoon between Mr. Dinardi and Messrs. Winterfeld and Hadsell. The following is my assessment of the present state of affairs:

1. All tidal current data collected by NOS since 1969 and part of the data collected in 1967 and 1968 and has been obtained by TICUS (I and II) and Geodyne Current Meter Systems and is being processed for storage on magnetic tape. Film optic to "raw data" magnetic tape conversion is being performed under contract by NBS. The Tidal Current Section of NOS performs the necessary evaluation, quality and final edit-correction of the "raw data" tapes.

Other work commitments and staffing limitations have made it difficult for the section to keep up with the inflow of contemporary data. Mr. Dinardi estimates that the addition of two full-time oceanographers and one EAM operator to the staff of the section would be required to keep up with the anticipated workload, respond to additional non-routine commitments, and to begin digitization of the pre-1967 data backlog.

2. Barring major new high-priority requirements imposed by such projects as MESA, the first fully edited magnetic tapes (comprising data for the Boston Harbor project) would be available to NODC by May 1973. Thereafter it is hoped that the time delay between data collection and availability of the final edited data will be one year or less. Mr. Hadsell and Code D731 will continue to coordinate any technical problems concerning data documentation and tape formats for NOS current data to be accessioned by NODC. The eventual annual data inflow to NODC is estimated as first guess at between 50,000 to 150,000 discrete observations.

3. The voluminous pre-1967 Roberts Meter and other tidal current data, reaching back over a number of decades, is, with minor exceptions, stored at NOS on handwritten records augmented by handplotted graphics. These

data are poorly reproducible and can be made available to requesters only after prior review and editing. Digitization and editing of this backlog would, according to Mr. Dinardi require in excess of 10 man-years of effort. Only monthly or other summaries of this data are available in published form. Even if funds were available it is not believed to be feasible to perform backlog digitization through an off-site contract basis; editing of the data is said to require the special expertise of and continuous interaction with the already committed staff of the Tidal Current Section; second level inventory of this data is impractical for similar reasons.

4. The contemporary NOS NAMDI Tidal Current data is presently being regularly reported to NODC on a NAMDI compatible form. A second level inventory of data subject to more than one year delay, could, in the future, be made available within 6 to 9 months of the date of collection. This inventory would be a routine by-product of NOS processing but while adequate, would not provide all the detail sought by the NODC NIMSCO form.

5. No specific commitments were reached at this meeting except (a) to continue NODC/NOS liaison on the technical level, (b) for NOS to provide NODC with copies of the final edited blocked magnetic tapes of contemporary data as they become available, and (c) for NODC to assume customer service obligations for requests with the understanding that NOS would be kept informed concerning the number and types of requests received.

Thomas Winterfeld
Acting Director, Development Division

Code D73:TWinterfeld:dmm:8/15/72

73. 0431

OSD-

TICUS I IMPROVEMENT AND CALIBRATION

& Photographic A102

by

Donald R. Schmidt

Final Report, SYSDEV No. 31-4

Engineering Development Laboratory
Office of Systems Development
National Ocean Survey, NOAA

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INTRODUCTION AND SUMMARY

The purpose of this program was to determine the speed-sensor (input/output) characteristics of the Richardson-type current meter used by the National Ocean Survey.

Basically, the work had the following five objectives:

1. To determine the accuracy of the rotor calibration constant.

2. To determine the effect of rotor cage orientation on the calibration constant.

3. To determine comparability of output among several meters used by NOS.

4. To establish the variation of indicated meter speed (output reading) as a function of rotor tilt.

5. To determine the input/output speed characteristics as a function of water speed for a number of common suspension techniques.

Tests were conducted in April 1970 at the Naval Ship Research and Development Center (NSRDC). All tests were run in the Tow Tank Facility on Towing Carriage No. 1, which has a speed accuracy of ± 0.01 knots over a range of 0.5 knots to 10 knots. The carriage speed was printed out on a digital printer. The running distance available is approximately 900 feet with water depth varying from 10 to 20 feet. The meter-types tested were the TICUS I, Mark 2 (Figure 1) and the A-102 photographic recording current meter (Figure 2).

The data from the TICUS I, Mark 2 meters were recorded on magnetic tape in the Buoy Electronics, and at the same time, displayed visually on a Digital Display Monitor (DDM) and recorded by an observer. The DDM binary count was converted to knots by use of a lookup table supplied by the manufacturer. Five readings were taken for each speed increment and averaged to arrive at an output speed reading for that particular test speed. The maximum variation between readings for a constant test speed was ± one count, or ± .03 knots whic is equal to the resolution of the rotor.

The A-102 meter data were recorded internally on photographic film, and at the same time displayed on an electronic counter by attaching an additional reed switch to pick up the rotor revolutions. The counter data were recorded by an observer and later verified with the film data.

The two TICUS I, Mark 2 current meters used in these tests were new and had not been used previously. The two A-102 current meters were each used approximately 700 hours, but were refurbished for these tests.

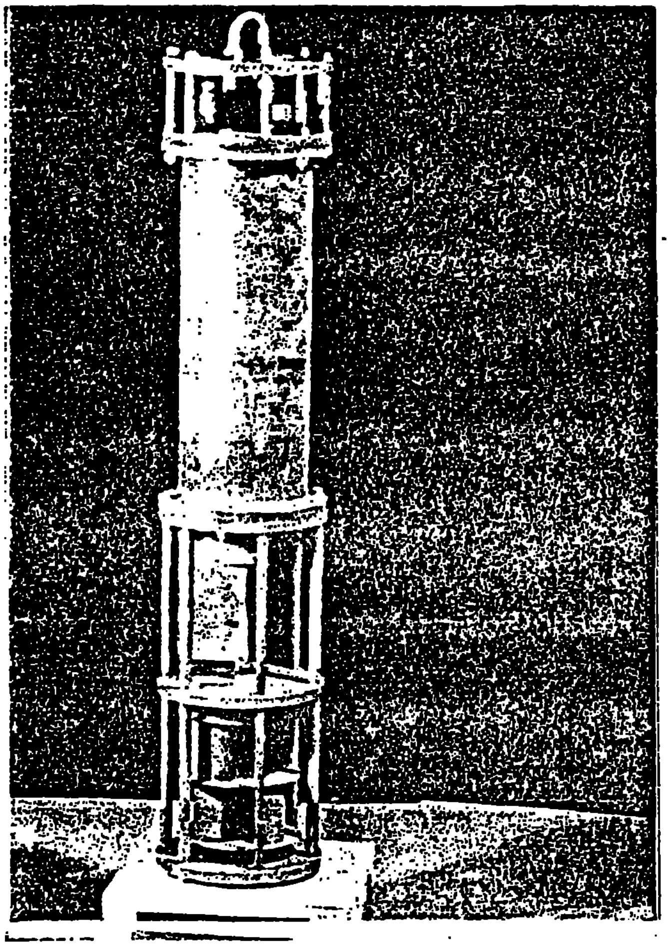


Figure 1
TICUS I, Mark Z Current Meter

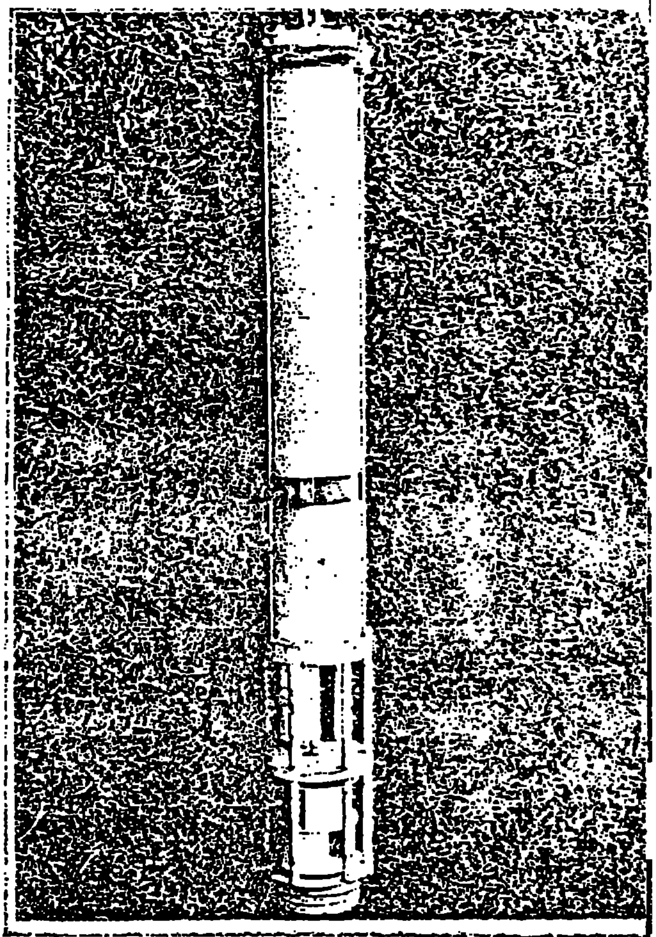


Figure 2
A-102 Photographic Recording Current Meter

Key results of this work show that when secured in a rigid, vertical configuration as shown in Figure 3, the meters tested operated within specification (Appendix A) up to current speeds of 3.5 knots, but above that speed, specified accuracy tolerances for the meter were exceeded. A hanger-type suspension for the meter was tested which allows extension of the useable range to 4.5 knots. For ease of presentation, the work and results for the five objectives defined above will each be discussed separately in the following sections of the report.

1. Test to Determine the Accuracy of the Rotor Calibration Constant

The purpose of this test was to check the accuracy of the rotor calibration supplied by the manufacturer for the two types of meters. For this test the meters were secured on a rigid mount at zero degrees tilt as shown in Figure 3. The towing speeds and related test speed increments are shown in Table 1.

TABLE 1.

Towing Speed Versus Speed Increments (Knots)

Towing Speed	Increments
0.4 to 1.0	0.1
1.0 to 2.0	0.2
2.0 to 7.0	0.5

The results are plotted in Figures 4, 5, 6, and 7. A study of these figures shows that the curves are non-linear with a slope equal to or less than one in the low range (below one knot), and a slope greater than one in the higher ranges. The speed specification tolerances were met up to speeds of approximately 3.5 knots for the TICUS I, Mark 2 and A-102 current meters. Above 3.5 knots, the readings typically exceeded the tolerance limit. The tests indicate that below 1.5 knots the rotation rate of the savonius rotor is actually less than 82 RPM per knot and above 1.5 knots it is greater. However, the accepted value of 82 RPM per knot appears to be the best compromise if only one calibration constant is used over the entire speed range.

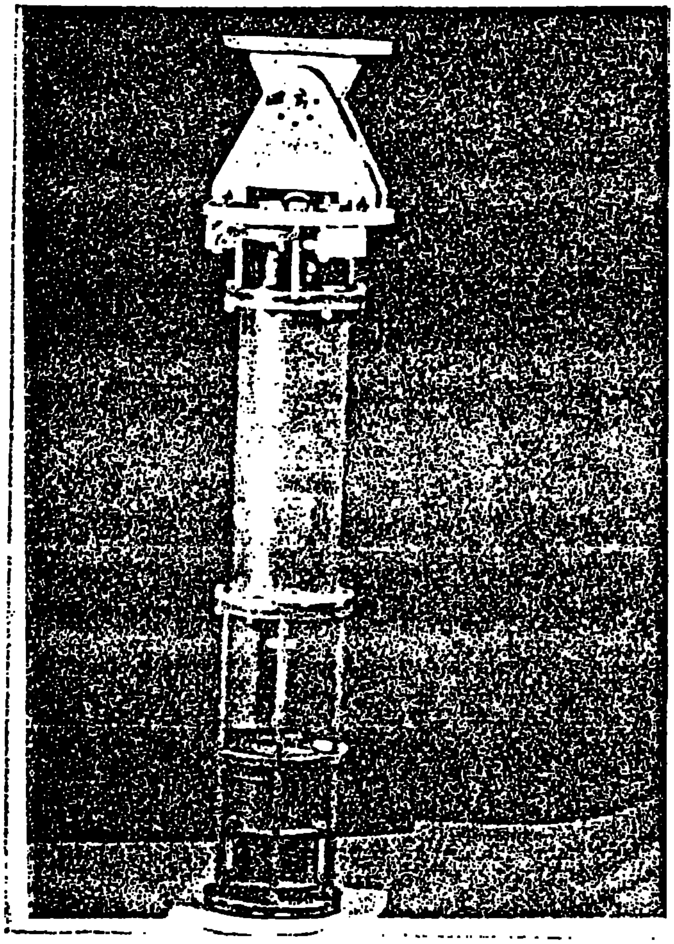


Figure 3
TICUS I, Mark 2 Secured to Rigid Mount

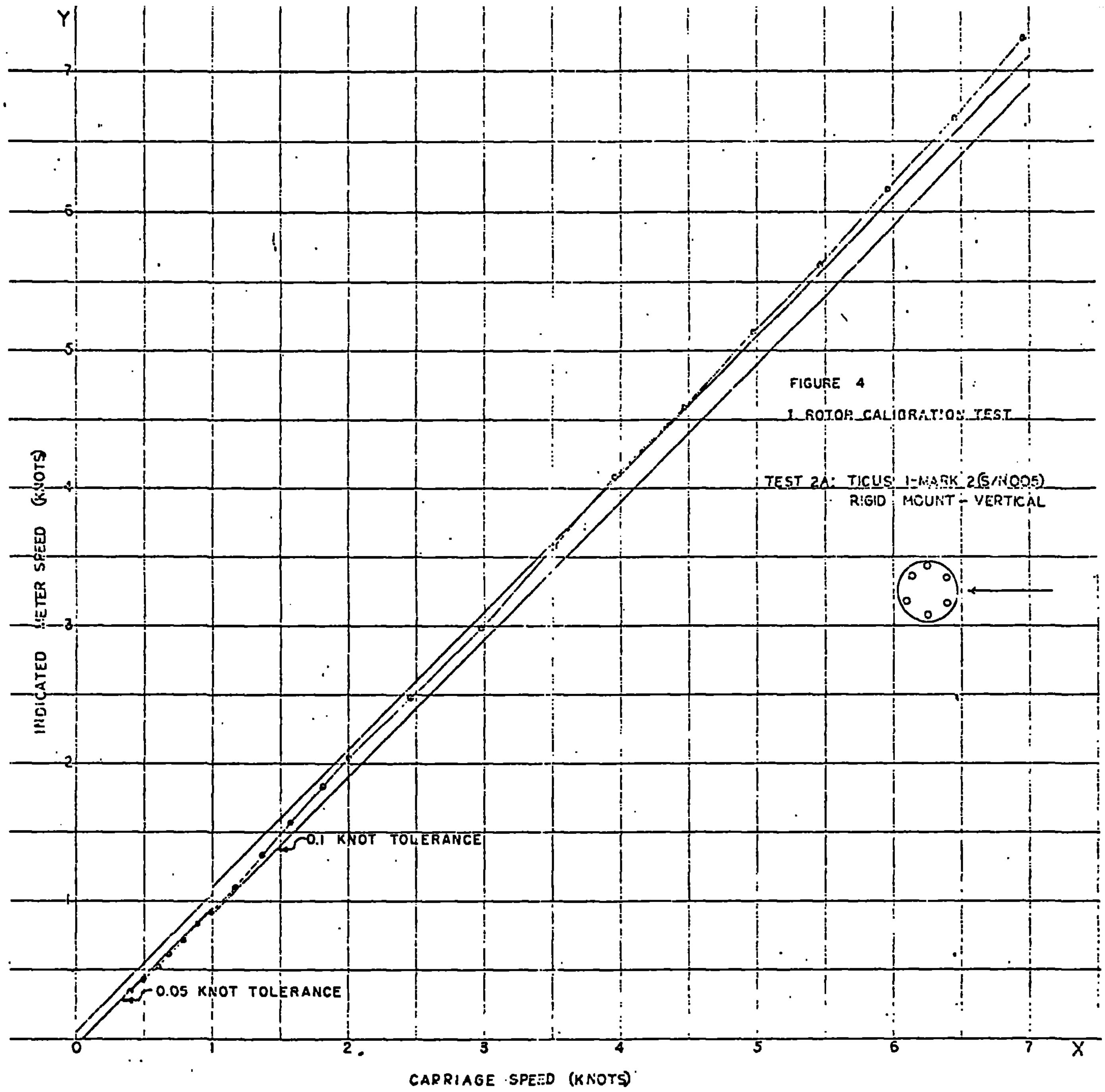


FIGURE 4

1 ROTOR CALIBRATION TEST

TEST 2A: TICUS I-MARK 2 (S/N005)
RIGID MOUNT - VERTICAL

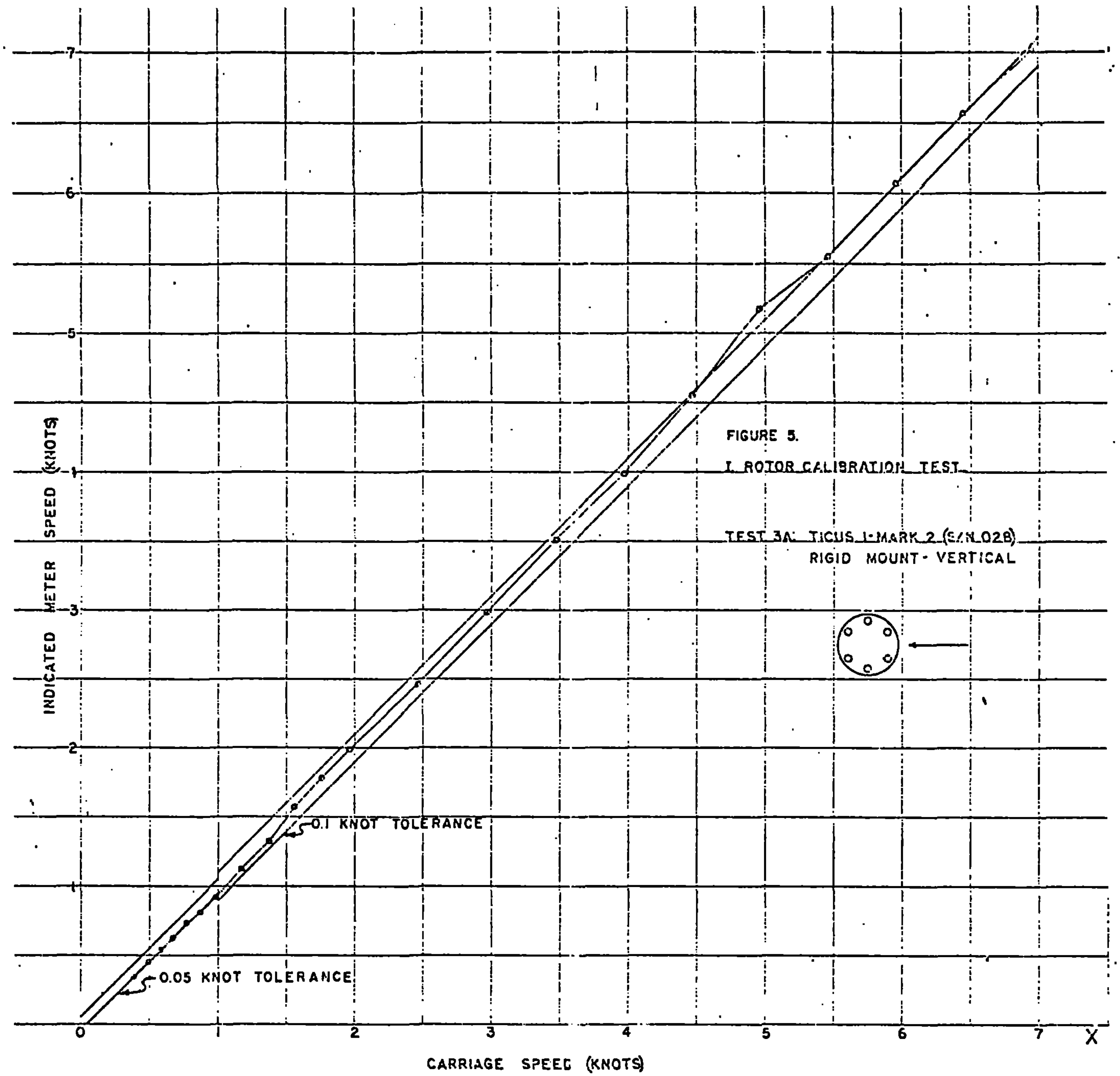


FIGURE 5.
I. ROTOR CALIBRATION TEST
TEST 3A: TICUS I-MARK 2 (S/N 028)
RIGID MOUNT - VERTICAL
0.1 KNOT TOLERANCE
0.05 KNOT TOLERANCE
INDICATED METER SPEED (KNOTS)
CARRIAGE SPEED (KNOTS)
0
1
2
3
4
5
6
7
X

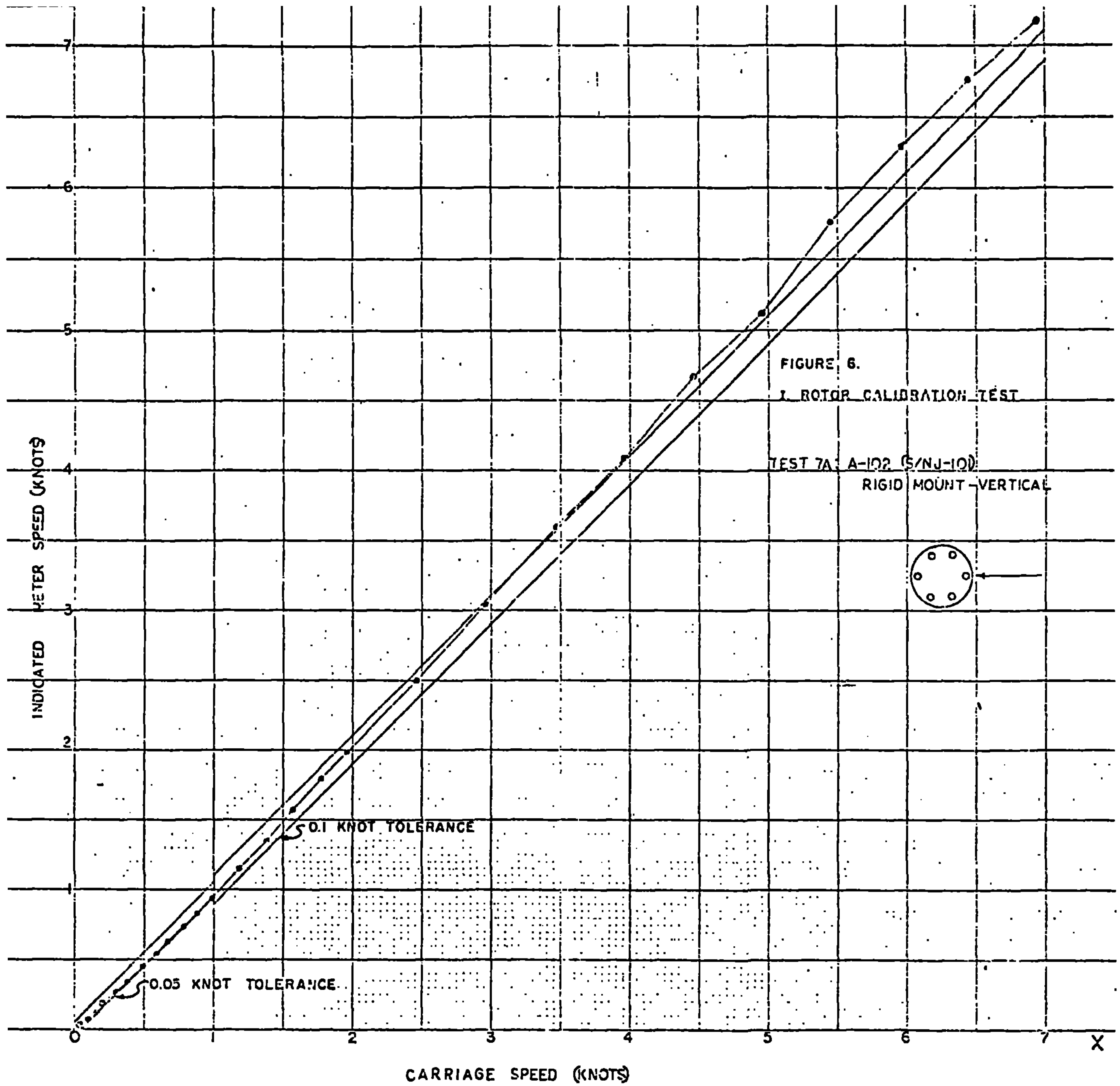


FIGURE 6.
I. ROTOR CALIBRATION TEST
TEST 7A: A-102 (S/NJ-10)
RIGID MOUNT - VERTICAL
0.1 KNOT TOLERANCE
0.05 KNOT TOLERANCE
INDICATED METER SPEED (KNOTS)
CARRIAGE SPEED (KNOTS)
0
1
2
3
4
5
6
7
X

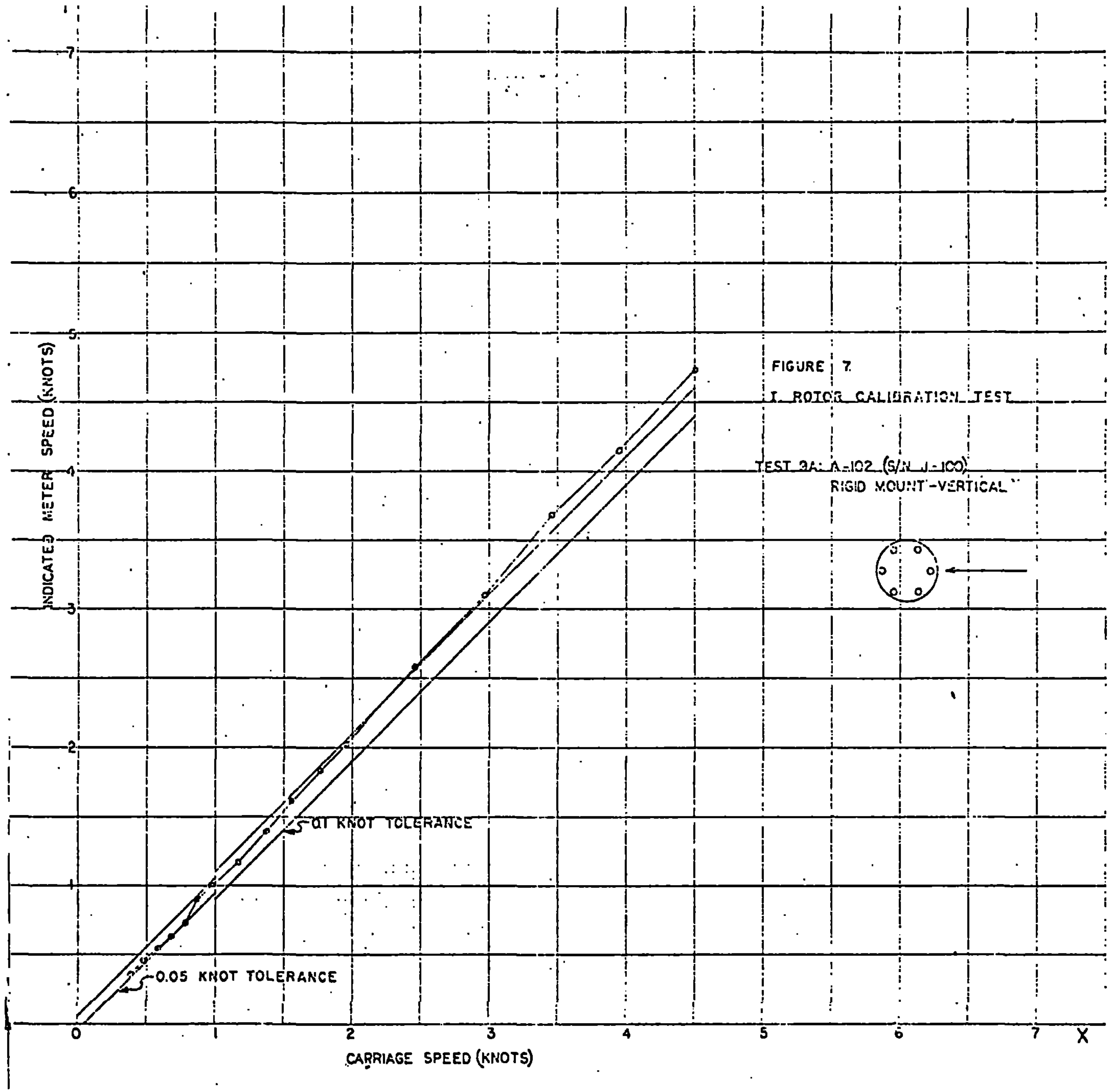


FIGURE 7
I. ROTOR CALIBRATION TEST
TEST 9A: A-102 (S/N J-100)
RIGID MOUNT-VERTICAL
0.1 KNOT TOLERANCE
0.05 KNOT TOLERANCE
INDICATED METER SPEED (KNOTS)
CARRIAGE SPEED (KNOTS)
0
1
2
3
4
5
6
7
X

11. Test to Determine the Effect of Rotor Cage Orientation on the Calibration Constant

Figure 8 shows the cage surrounding the rotor. It is comprised of six equally spaced 5/8-inch diameter rods. For this test a TICUS I Mark 2 meter was rigidly mounted (as shown in Figure 3) at zero degrees tilt and two series of test runs were made with the rotor cage oriented as in Figures 9 and 10, respectively.

The plots of the two series are shown in Figure 11. Orientation of the rotor cage had no significant effect on meter output. For the two orientations, readings did not differ by more than 0.03 knots over a speed range of 0.4 to 7.0 knots. This difference is approximately equal to the uncertainty in speed readout due to the resolution of the speed sensors (Appendix A)

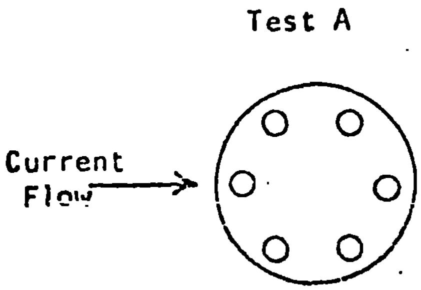


Figure 9.

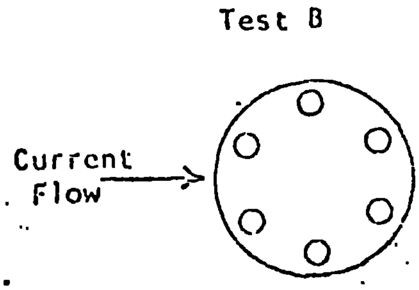


Figure 10.

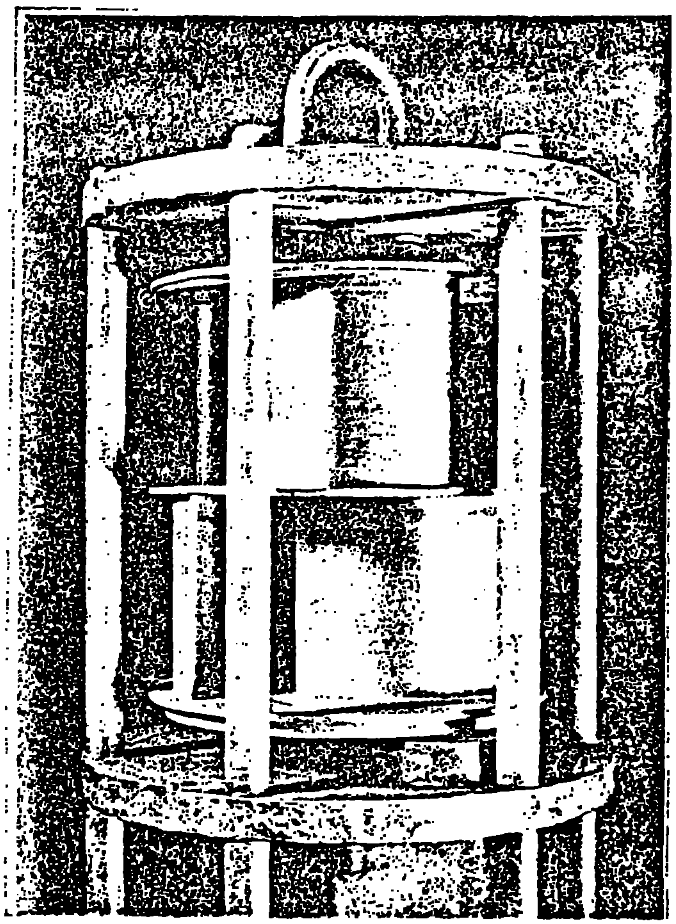


Figure 8.
Savonius Rotor and Rotor Cage

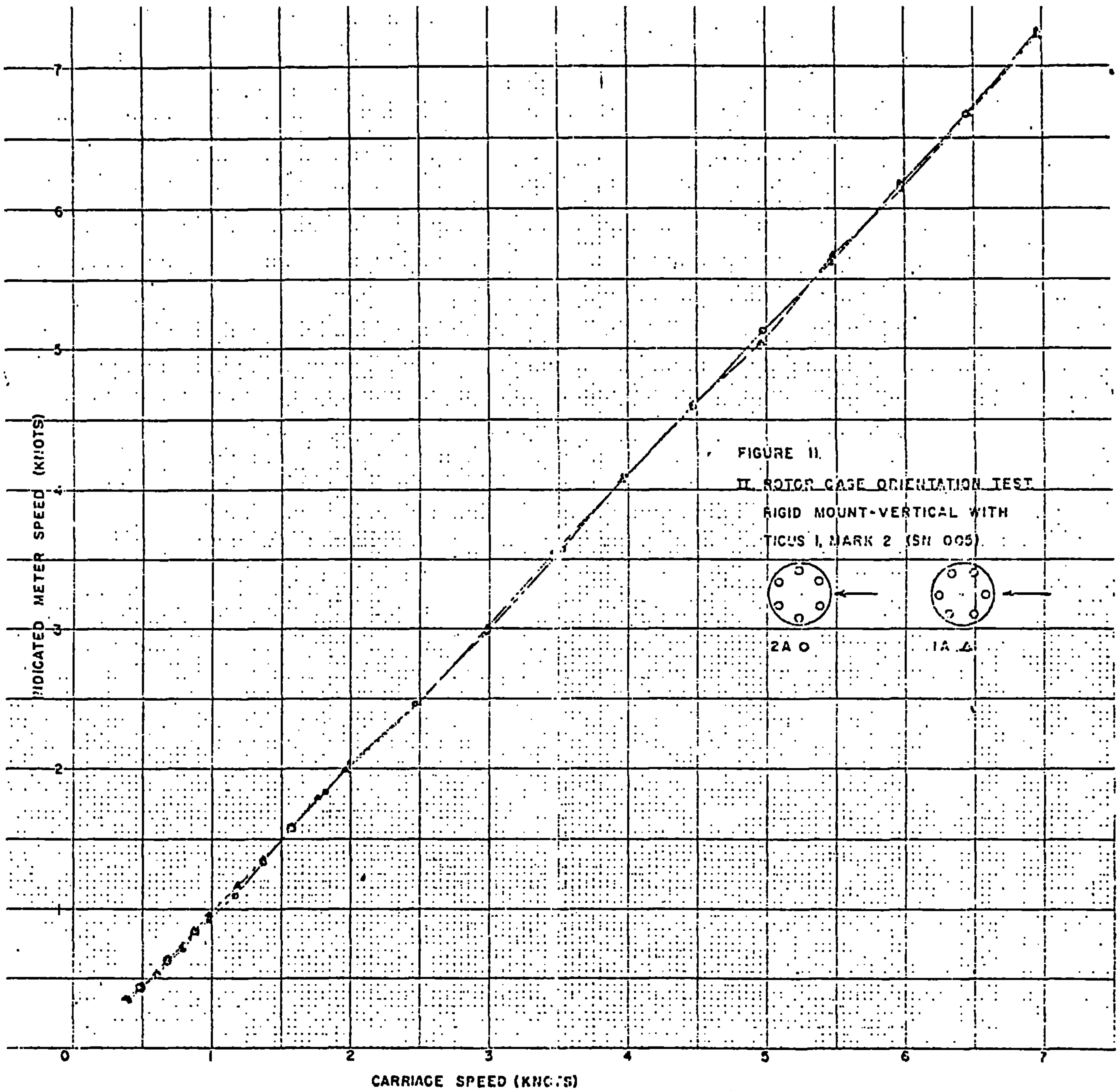


FIGURE 11.
II. ROTOR CAGE ORIENTATION TEST
RIGID MOUNT-VERTICAL WITH
TICUS I, MARK 2 (SN 005)
2A O
1A △
INDICATED METER SPEED (KNOTS)
CARRIAGE SPEED (KNOTS)
0
1
2
3
4
5
6
7

III. Test to Determine Comparability of Output Among Several Meters Used by NOS

The information to check for comparability of output among meters was obtained from the rotor calibration data of Figures 4, 5, 6, and 7.

A comparison of the output of two different TICUS I, Mark 2 meters is shown in Figure 12 which is a plot of the data shown in Figures 4 and 5. Outputs agreed within 0.05 knots up to a speed of 3.5 knots and within 0.1 knot from 3.5 to 6.5 knots.

Comparison of two A-102 meters showed agreement within 0.05 knots up to a speed of 2.0 knots and 0.1 knot from 2.0 to 4.5 knots.[1] A plot of the results is shown in Figure 13 (data from Figures 6 and 7).

Figure 14 (data from Figures 4 and 6) shows the results of comparing the output of a TICUS I, Mark 2 meter with that of the A-102. The outputs agreed within 0.05 knots up to a speed of 4.0 knots and within 0.1 knot from 4.0 to 7.0 knots.

Based on the manufacturer's specifications, the comparability of output of 0.1 knot is quite acceptable. However, the basic problem lies in the fact that the input/output slope (Figure 4 thru 7) does not meet speed accuracy specifications above approximately 3.5 knots.

1) The test was discontinued at 4.5 knots due to time limitations in the tank and does not indicate an upper limit for the meter.

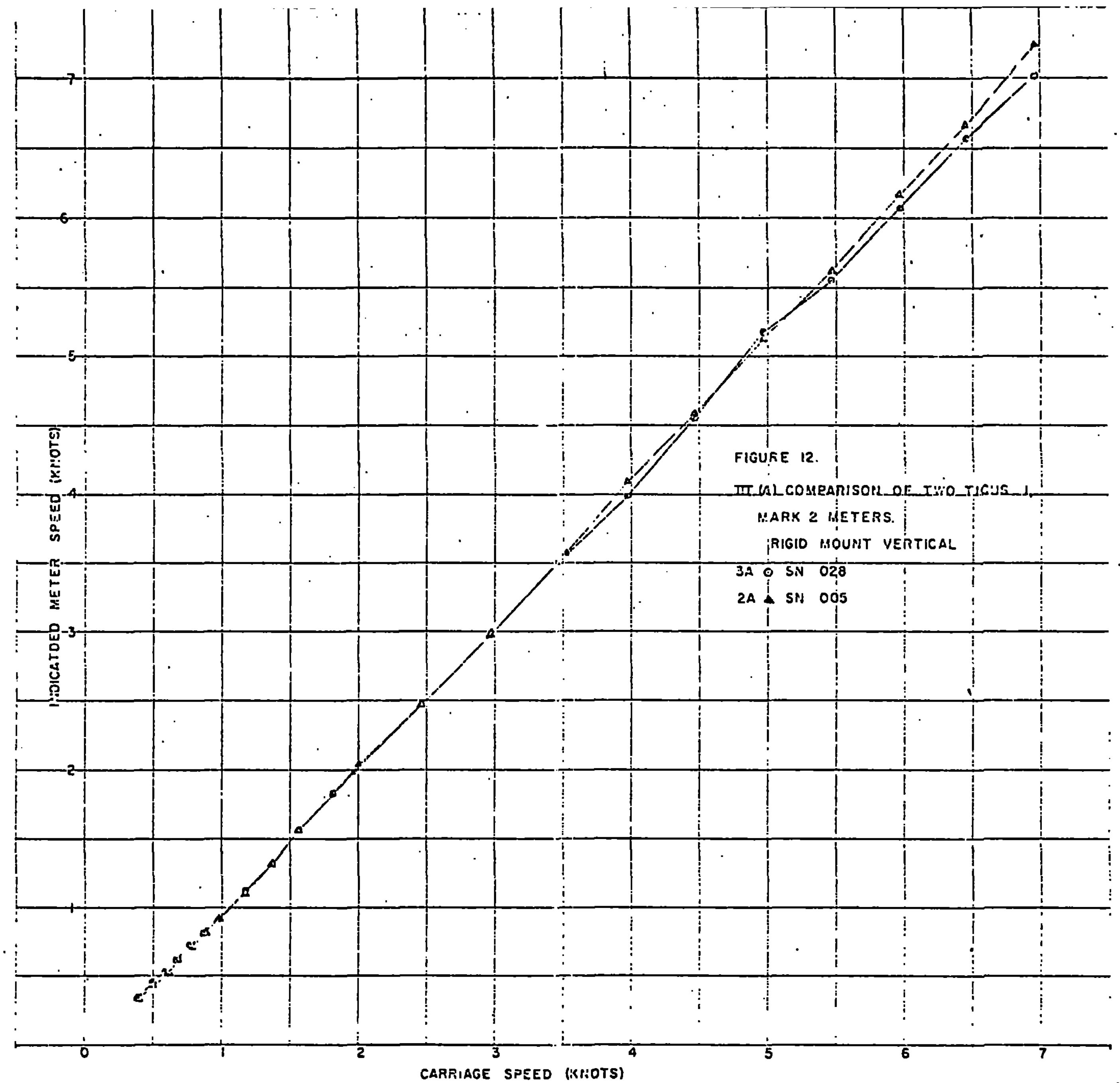


FIGURE 12.
III (A) COMPARISON OF TWO TICUS I,
MARK 2 METERS.
RIGID MOUNT VERTICAL

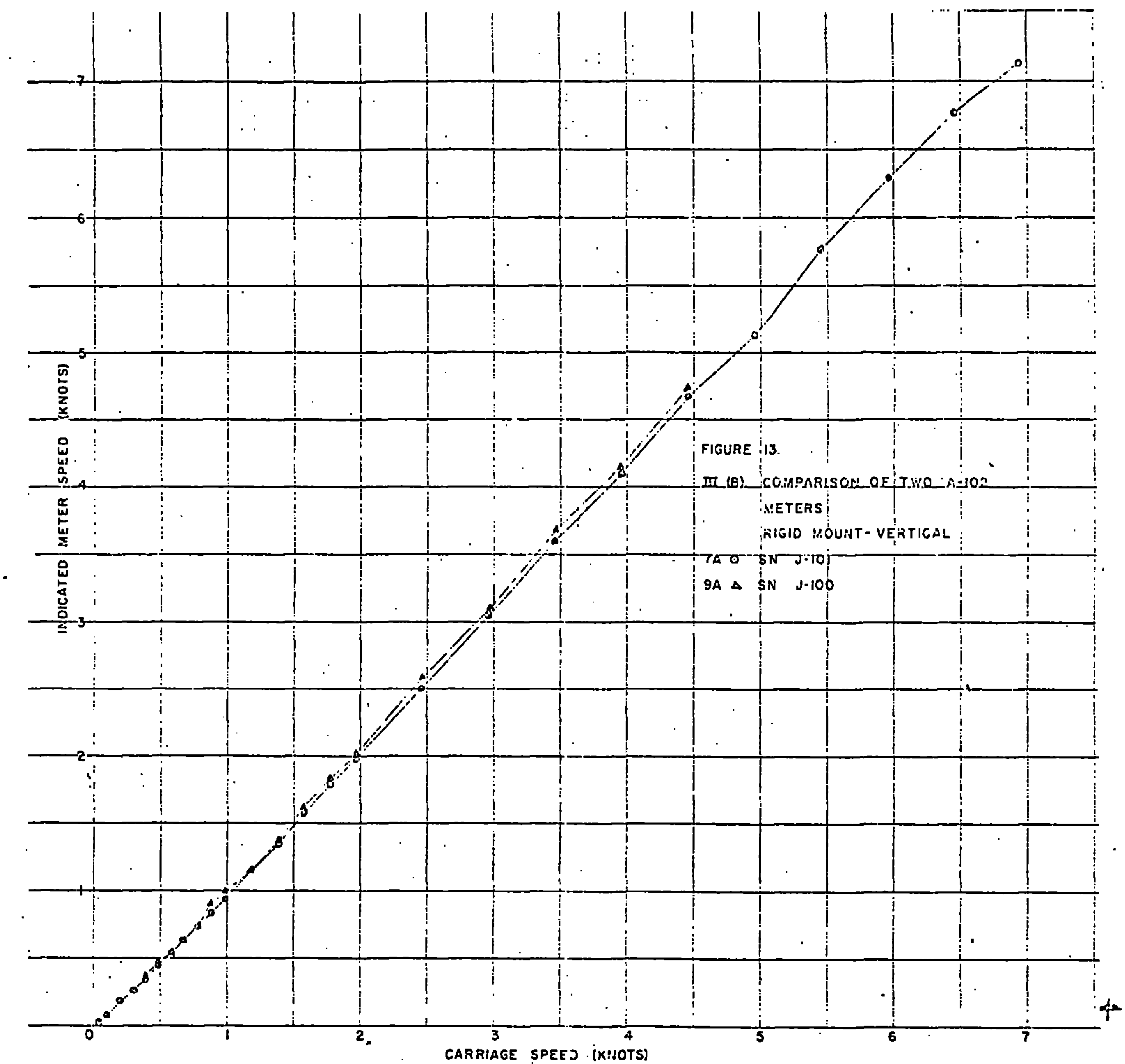


FIGURE 13.
III (B) COMPARISON OF TWO A-102 METERS
RIGID MOUNT-VERTICAL
7A ○ SN J-101
9A △ SN J-100
INDICATED METER SPEED (KNOTS)
CARRIAGE SPEED (KNOTS)
0
1
2
3
4
5
6
7

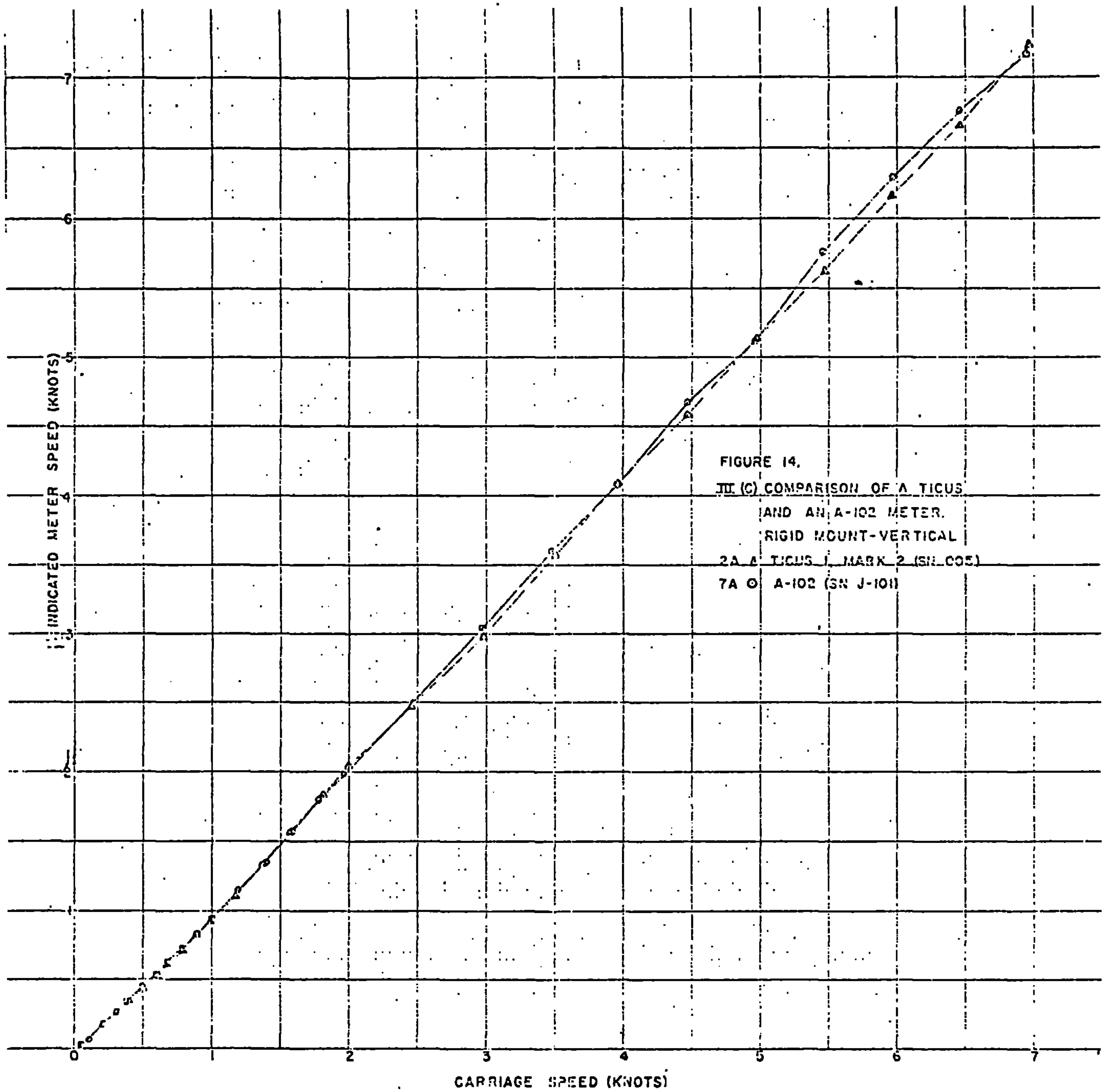


FIGURE 14.
III (C) COMPARISON OF A TICUS AND AN A-102 METER. RIGID MOUNT-VERTICAL

IV. Test to Establish Variation of Indicated Meter Speed (Output Reading) as a Function of Rotor Tilt

The purpose of this test was to determine the relationship between input speed (true speed of water) and the output speed (indicated speed from meter) as a function of tilt of the savonius rotor.

A TICUS I, Mark 2 meter was mounted in the rigid mount (Figure 3) and tilted in the plane of carriage tow with the lower end of the meter trailing. Test runs were made in the speed range from 0.4 to 7.0 knots at 10, 15, and 20 degrees of tilt. The indicated output speed versus true input speed data from the test runs is shown plotted in Figure 15.

To better illustrate the difference between input and output, the speed differences between input and output are plotted against true input speeds in Figure 16.

An analysis of these data provides a speed corrector that is a function of the tilt angle and input speed for the meter. This corrector when applied to the output data for a given tilt angle will provide data that is within the accuracy tolerance specified for the meter.

Based on these experiments, neither the manufacturers supplied speed tilt correctors nor trigonometric correctors provide data with the required accuracy.

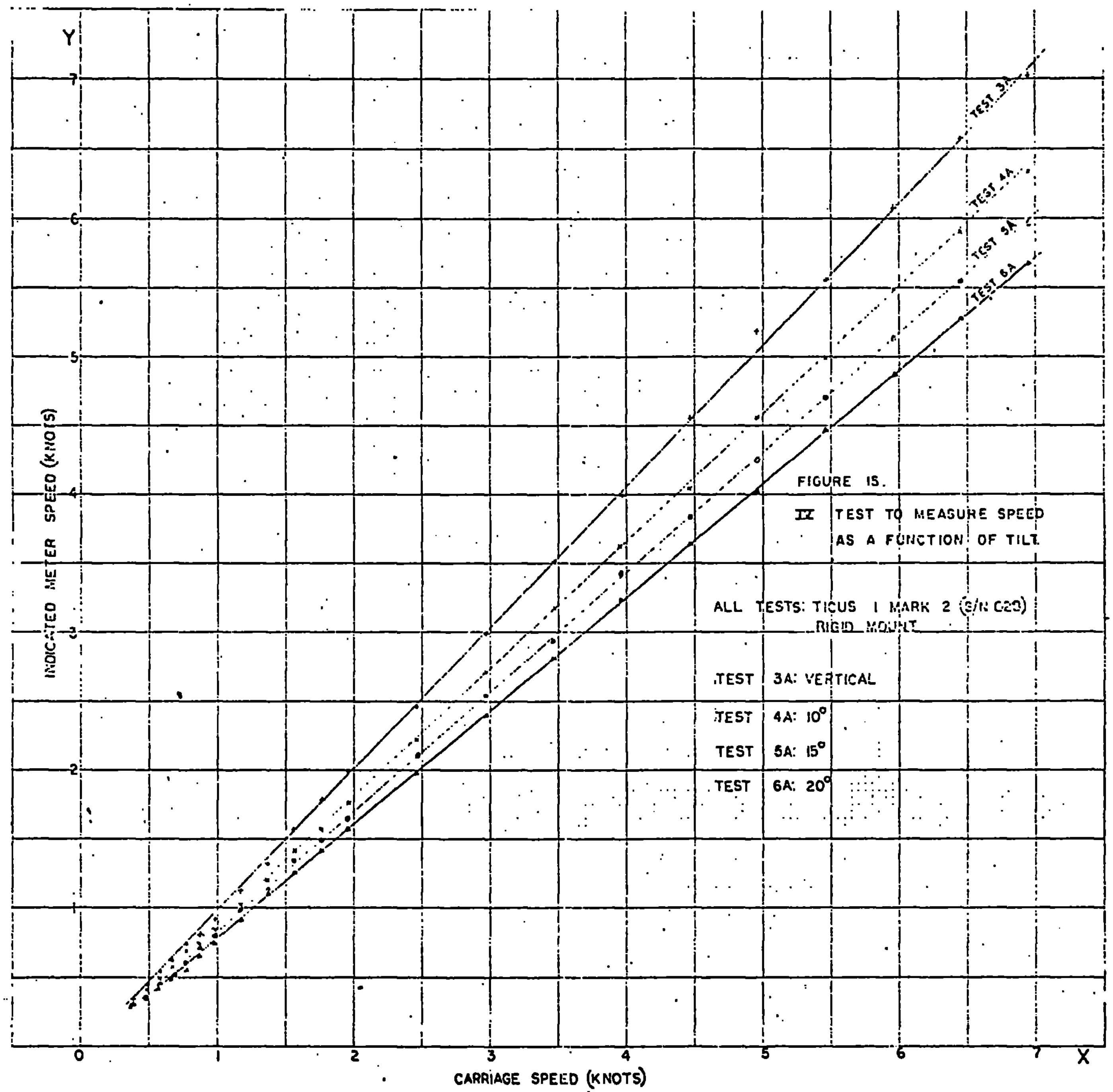
In the course of the analysis, it became apparent that the value of the correction factor varies slightly with speed at a particular angle. That is, at a tilt angle of 10° and speed of 2 knots, the correction is slightly different than for a tilt angle of 10° at a speed of 4 knots. (The type of suspension used will determine the tilt angle and speed relationship.) However, an average corrector value was computed such that when applied to the indicated meter speed the results are within the manufacturer's stated accuracy tolerance over the entire speed range tested (7 knots).

An average correction factor for each tilt angle is shown plotted in Figure 17. An approximated best fit line was drawn through the points and an empirical equation of the line computed. To obtain true speed, indicated meter speed is divided by the correction factor or:

$$\text{True Speed} = \frac{\text{Indicated Meter Speed}}{-0.0103\theta + 1.014}$$

where θ is the tilt angle in degrees.

If the above formula is applied to the speed data, the corrected speed results (Figure 18) will be within the accuracy tolerances of the current meter for speeds up to 7.0 knots and tilt angles up to 20 degrees.



Y
INDICATED METER SPEED (KNOTS)
CARRIAGE SPEED (KNOTS)
X
TEST 3A
TEST 4A
TEST 5A
TEST 6A
0
1
2
3
4
5
6
7
FIGURE 15.
IX TEST TO MEASURE SPEED
AS A FUNCTION OF TILT
ALL TESTS: TICUS I MARK 2 (S/N C23)
RIGID MOUNT
TEST 3A: VERTICAL
TEST 4A: 10°
TEST 5A: 15°
TEST 6A: 20°

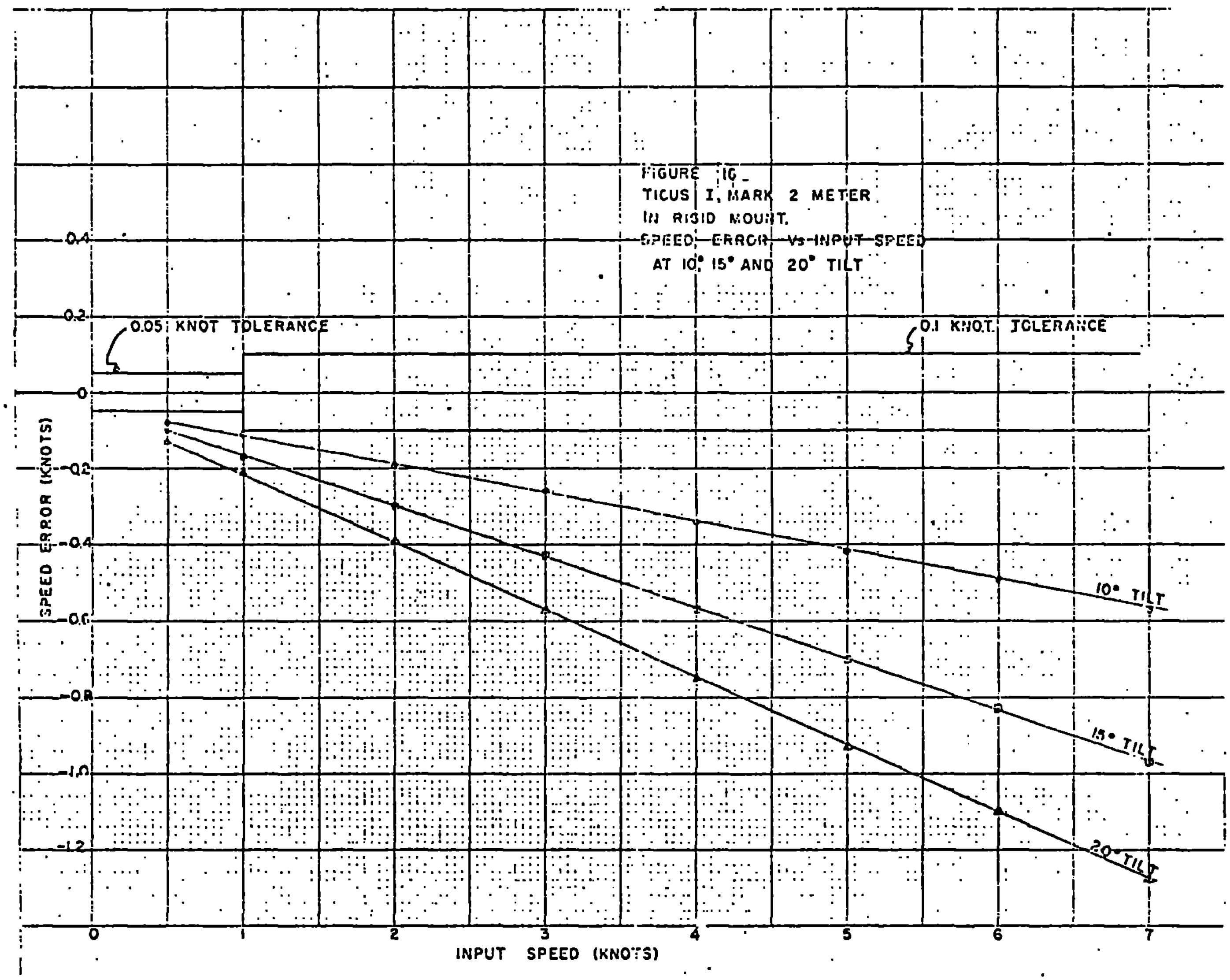


FIGURE 16
TICUS I, MARK 2 METER
IN RIGID MOUNT.
SPEED ERROR Vs INPUT SPEED
AT 10°, 15° AND 20° TILT
0.05 KNOT TOLERANCE
0.1 KNOT TOLERANCE
10° TILT
15° TILT
20° TILT
SPEED ERROR (KNOTS)
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
INPUT SPEED (KNOTS)
0
1
2
3
4
5
6
7

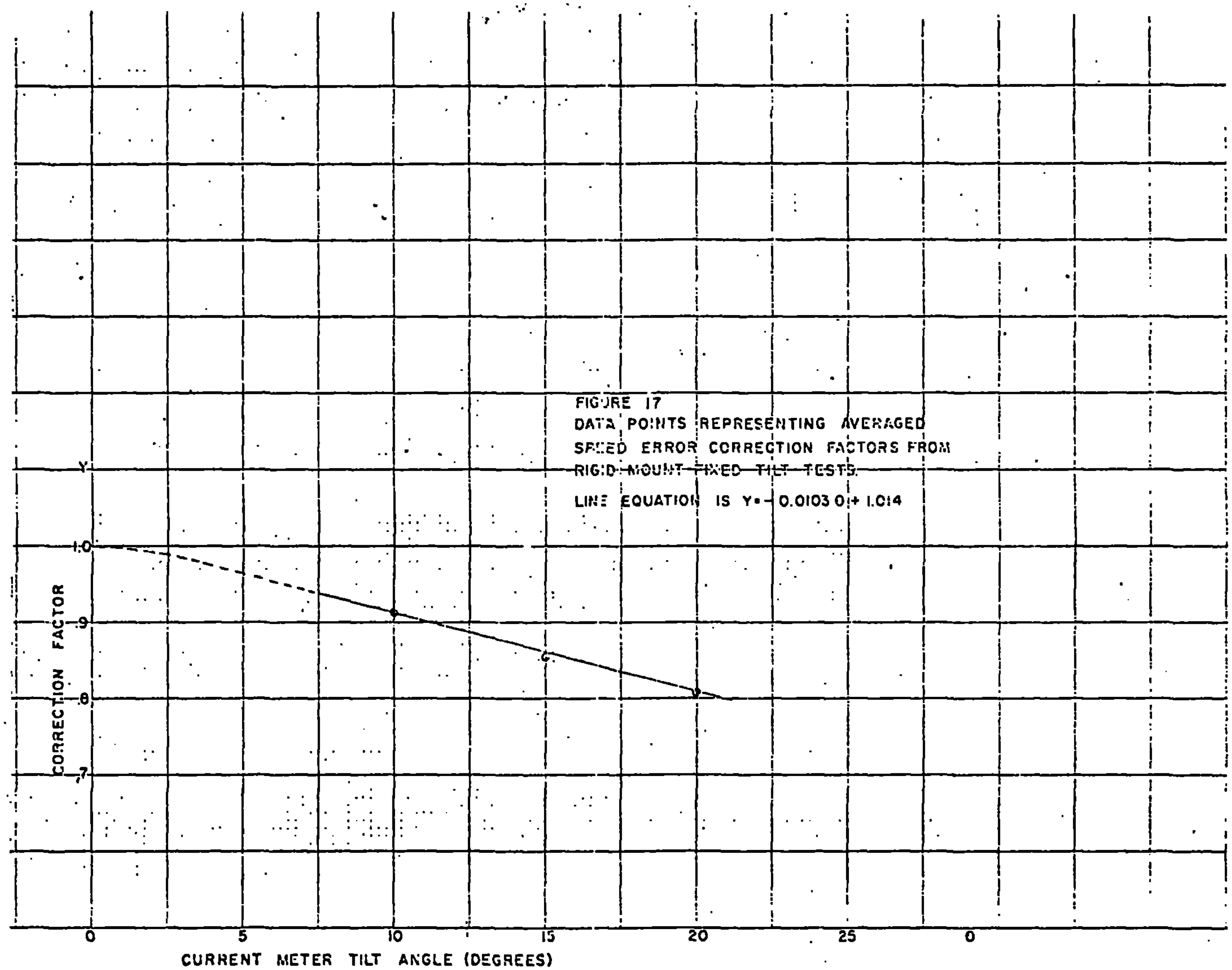


FIGURE 17
DATA POINTS REPRESENTING AVERAGED SPEED ERROR CORRECTION FACTORS FROM RIGID MOUNT FIXED TILT TESTS.
LINE EQUATION IS Y= - 0.0103 0 + 1.014
Y
1.0
.9
.8
.7
CORRECTION FACTOR
0
5
10
15
20
25
0
CURRENT METER TILT ANGLE (DEGREES)

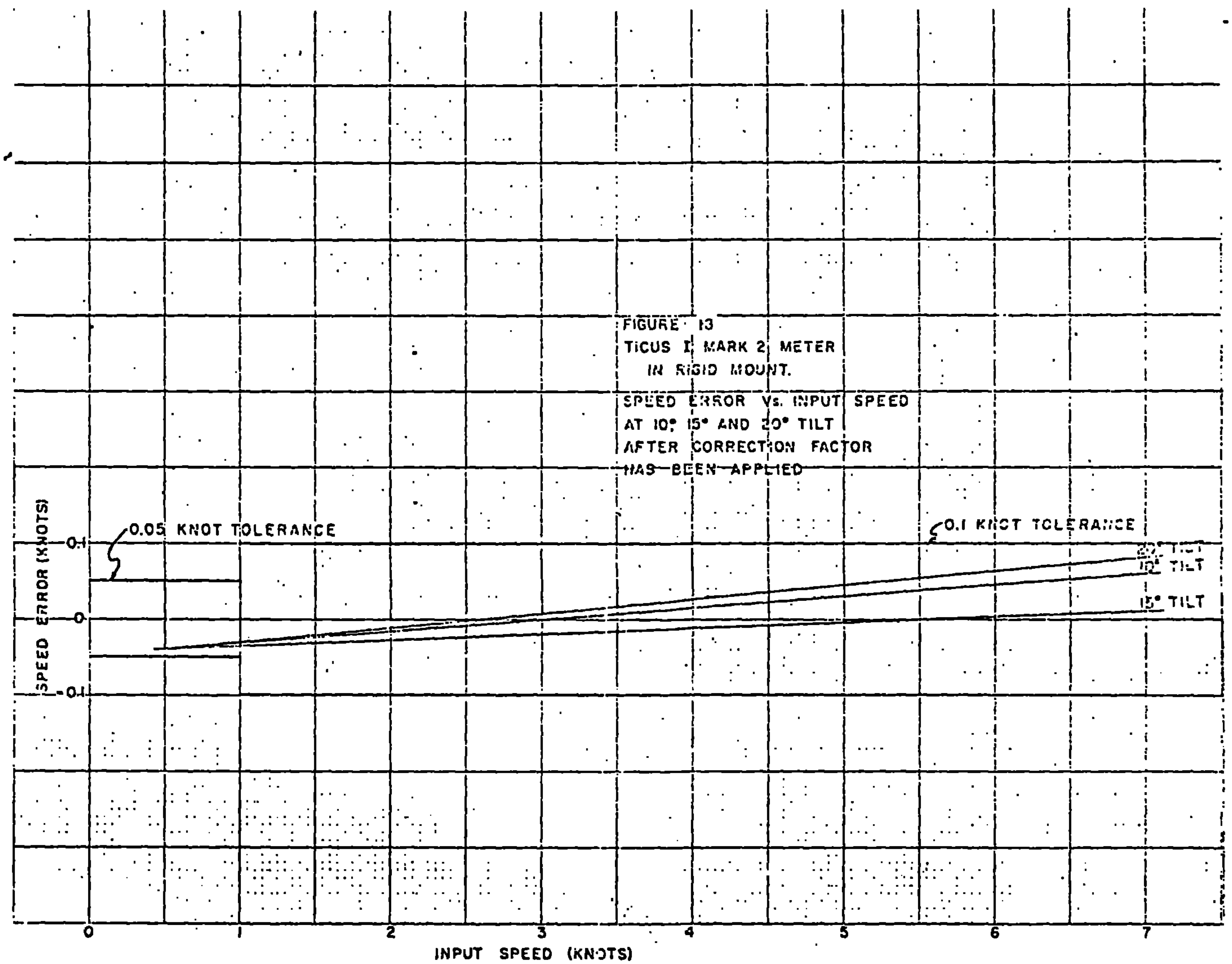


FIGURE 13
TICUS I MARK 2 METER
IN RIGID MOUNT.
SPEED ERROR Vs. INPUT SPEED
AT 10°, 15° AND 20° TILT
AFTER CORRECTION FACTOR
HAS BEEN APPLIED
0.05 KNOT TOLERANCE
0.1 KNOT TOLERANCE
20° TILT
10° TILT
15° TILT
SPEED ERROR (KNOTS)
0.1
0
-0.1
0
1
2
3
4
5
6
7
INPUT SPEED (KNOTS)

V. Test to Determine the Input/Output Speed Characteristics as a Function of Water Speed for a Number of Common Suspension Techniq

In the first of this series of tests a TICUS I, Mark 2 meter was used. The first type of suspension tested was a flat bar hanger with a top-mounted trim fin (Figure 19) and the 30 pound hemispherical weight on the bottom end of the meter. The second type was a top U-bolt suspension with a 30-pound weight (Figure 20). The third type was the top U-bolt suspension with no weight (Figure 21). The results are plotted in Figure 22. The hanger suspension gave an accuracy of 0.1 knot up to 4.5 knots. The top suspension with a 30-pound weight gave an accuracy of 0.1 knot up to a speed of 2 knots. The top suspension without a weight gave an accuracy of 0.1 knot up to a speed of 1 knot.

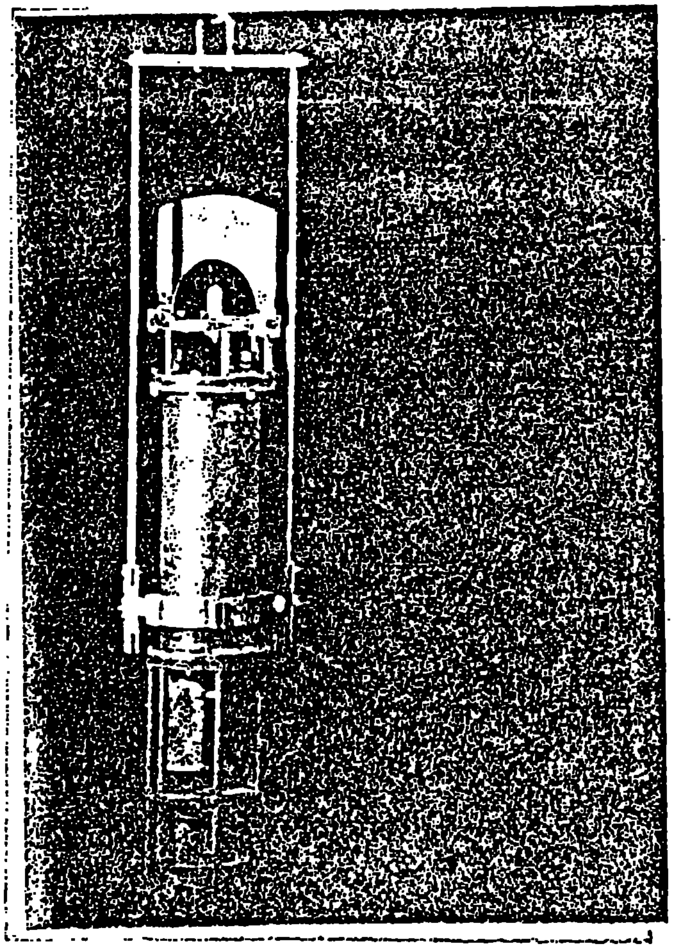


Figure 19
TICUS I, Mark 2 Current Meter with Hanger Suspension and Trim Fin

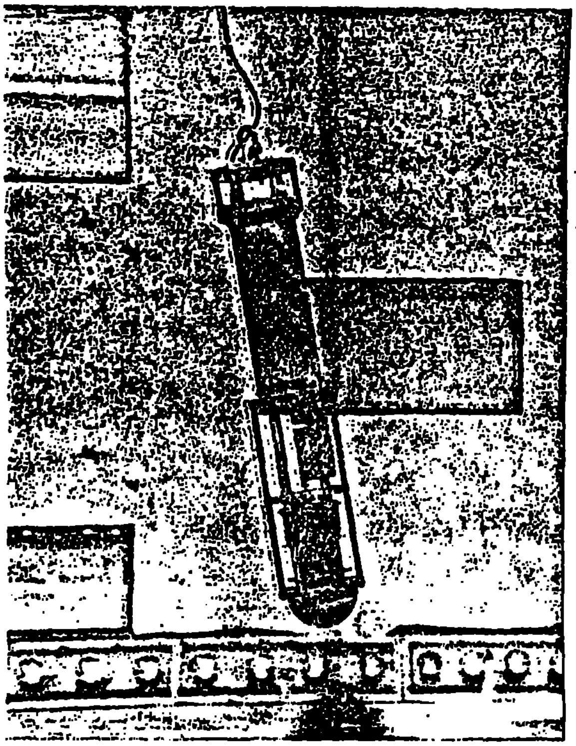


Figure 20
TICUS I, Mark 2 Current Meter:
Top U-Bolt Suspension with
30 lb. Hemispherical Weight

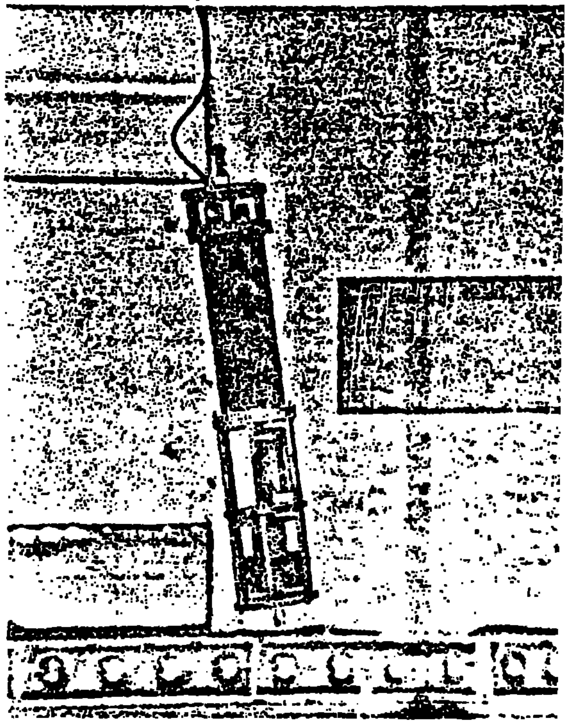


Figure 21
TICUS I, Mark 2 Current Me
Top U-Bolt Suspension
with no Weight

Note: The tests were actually conducted in the Towing Basin although the photographs of Figures 20and 21, for illustration purposes only, show a TICUS I, Mark 2 meter in the Circulating Water Channel.

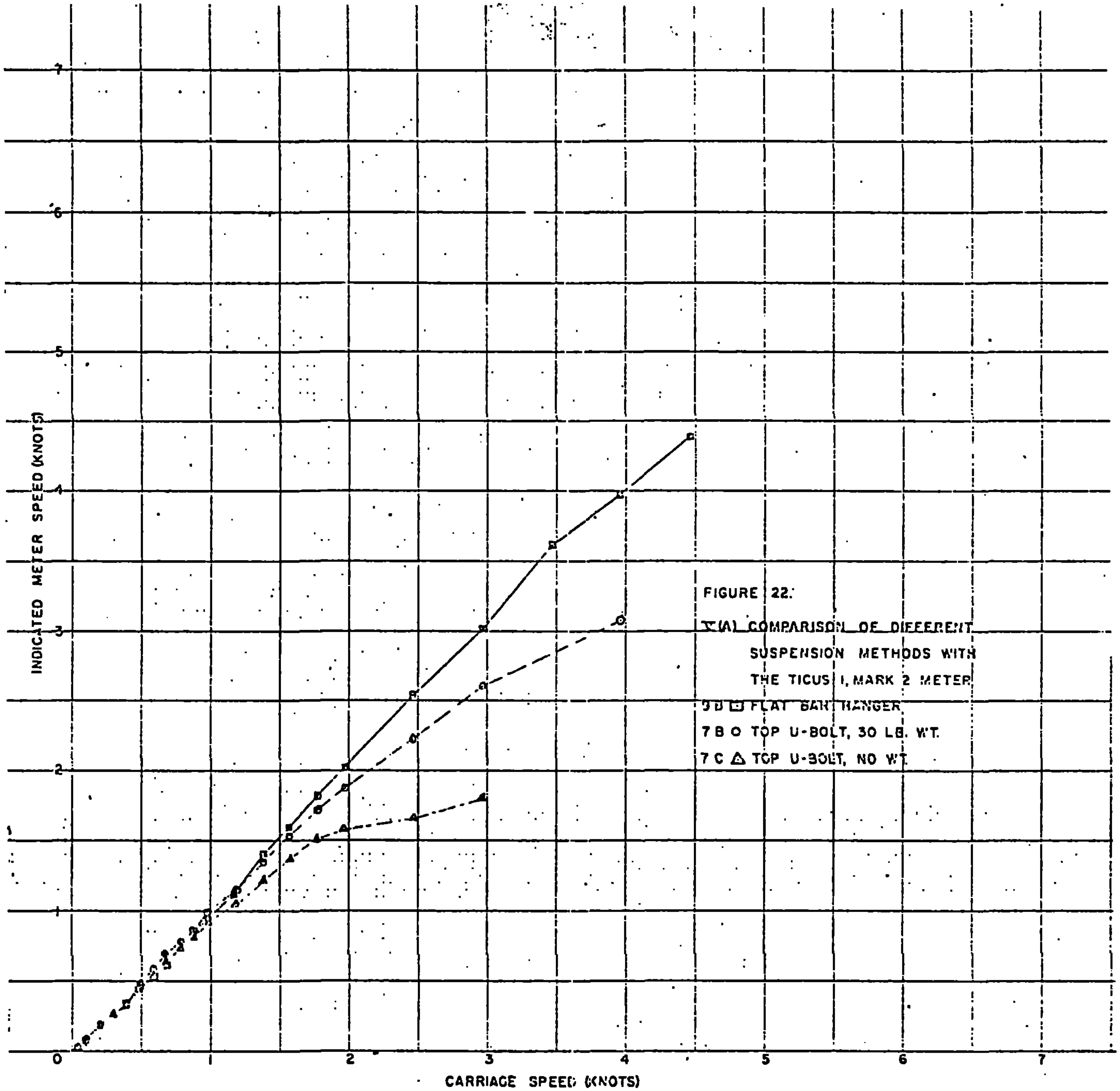


FIGURE 22:
X (A) COMPARISON OF DIFFERENT SUSPENSION METHODS WITH THE TICUS I, MARK 2 METER
9 B ⊡ FLAT BAR HANGER
7 B ○ TOP U-BOLT, 30 LB. WT.
7 C △ TOP U-BOLT, NO WT.

It will be noted that for the rigid vertical tests (Figure 3) an error of 0.1 knot was obtained at 3.5 knots while with the hanger suspension (Figure 19) this error occurred at a 4.5 knot speed. The reason for this difference is that the 0.1 knot error with the rigid mount occurs in the plus direction and with the hanger suspension enough tilt of the instrument occurred such that the 0.1 knot error at 4.5 knots is a minus error.

For our test configuration of the hanger plus a 30 pound hemispherical weight, the maximum test speed which could be run was 4.5 knots. Above that speed the meter started to surface and the test had to be discontinued.

The second series of tests were conducted to compare different methods of suspension for an A-102 meter. The flat bar hanger suspension and split stabilizer fin combination (Figure 23) was compared with the top U-bolt suspension with a 30-pound weight. The results are plotted in Figure 24. The hanger suspension results in an accuracy within 0.1 knot up to 3.5 knots. The top U-bolt suspension resulted in an error that exceeded the acceptable tolerance of 0.1 knot at approximately 1.9 knots.

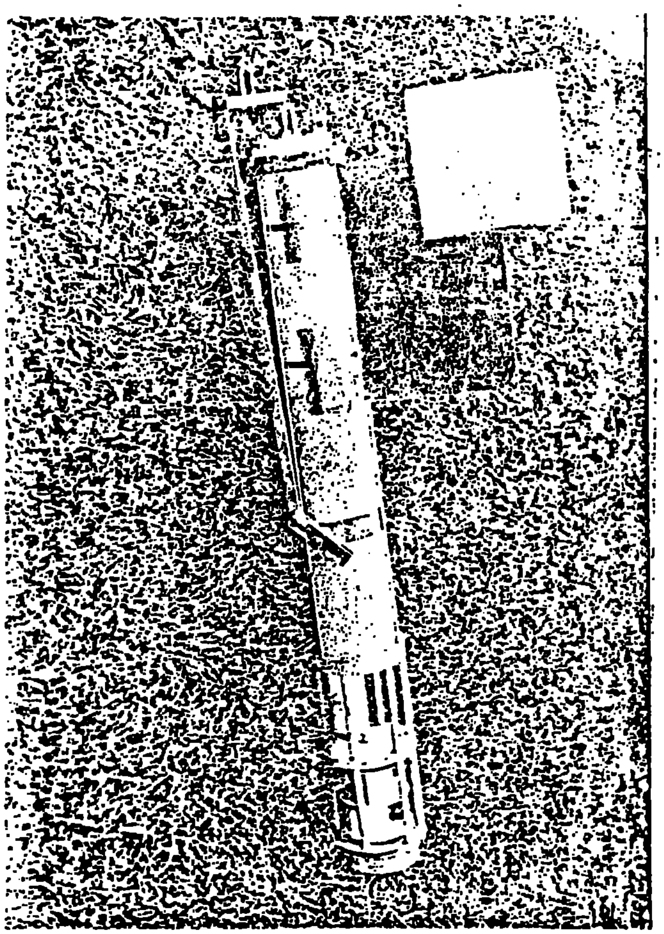


Figure 23
A-102 with Hanger Suspension and Split Stabilizer Fin

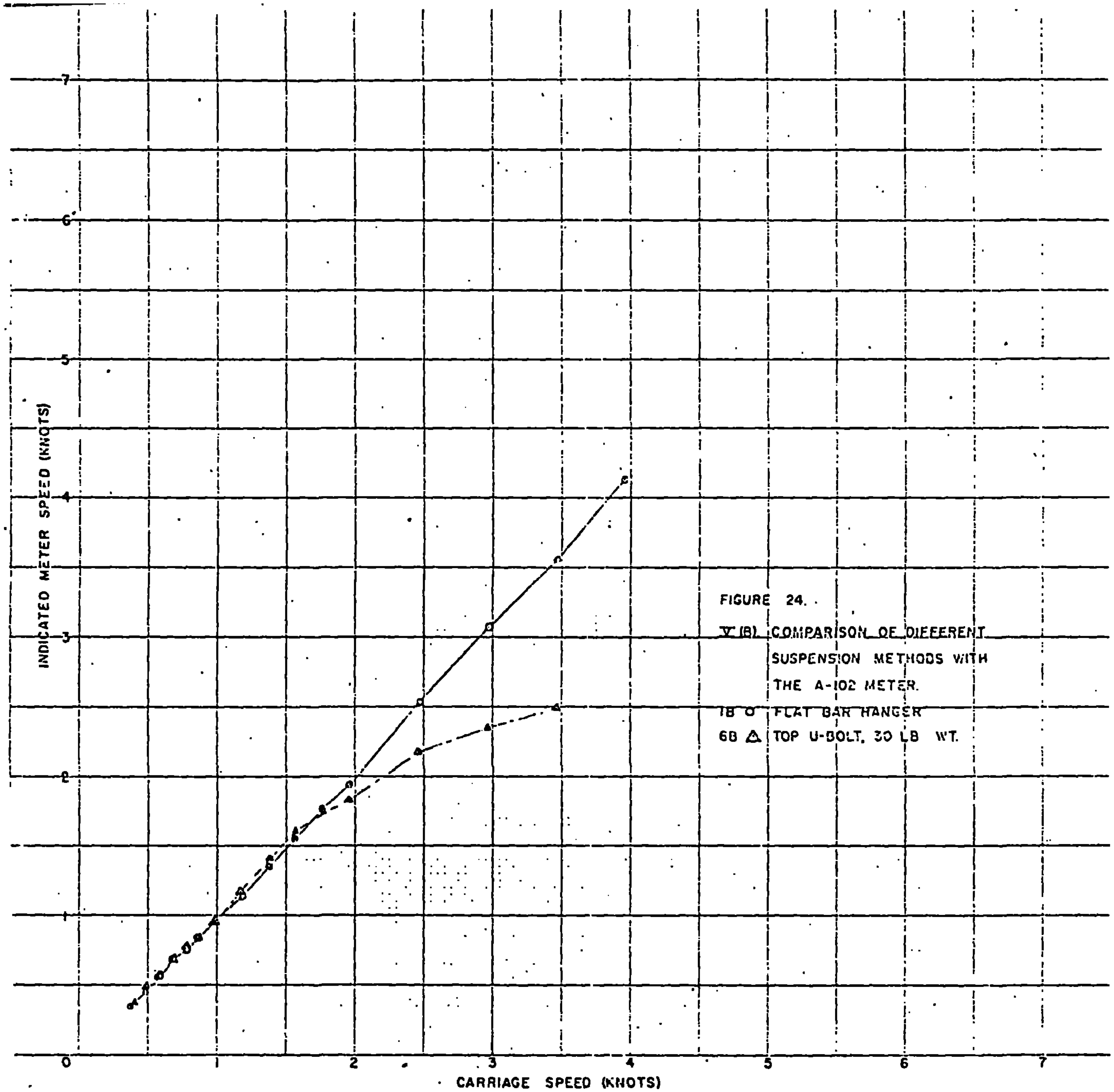


FIGURE 24.

V (B) COMPARISON OF DIFFERENT SUSPENSION METHODS WITH THE A-102 METER.

To test for repeatability of a single meter, a TICUS I, Mark 2 meter was top U-bolt suspended with no weight attached (Figure 21). Results from two separate test runs are plotted in Figure 25. The readings were repeatable within 0.03 knots (equivalent to rotor resolution) over a ran from 0.4 to 3.0 knots.

An additional test with the meter secured to the rigid mount was conducted to isolate any possible effect on rotor speed from the 30-pound hemispherical weight mounted on the bottom end plate of the meter. The results of two test runs, with and without the weight are plotted in Figure 26. Below 4.5 knots there was no measurable difference in the two readings. Above 4.5 knots the meter with a weight read up to 0.2 knots lower than the same meter without a weight. The addition of the hemisphere on the bottom of the meter has the effect of lowering the speed readings in the higher range to the extent that they fall within the tolerance set for the meter. This test was only done with the meter in a vertical configuration. It is not known what the effect might be if the meter were tilted.

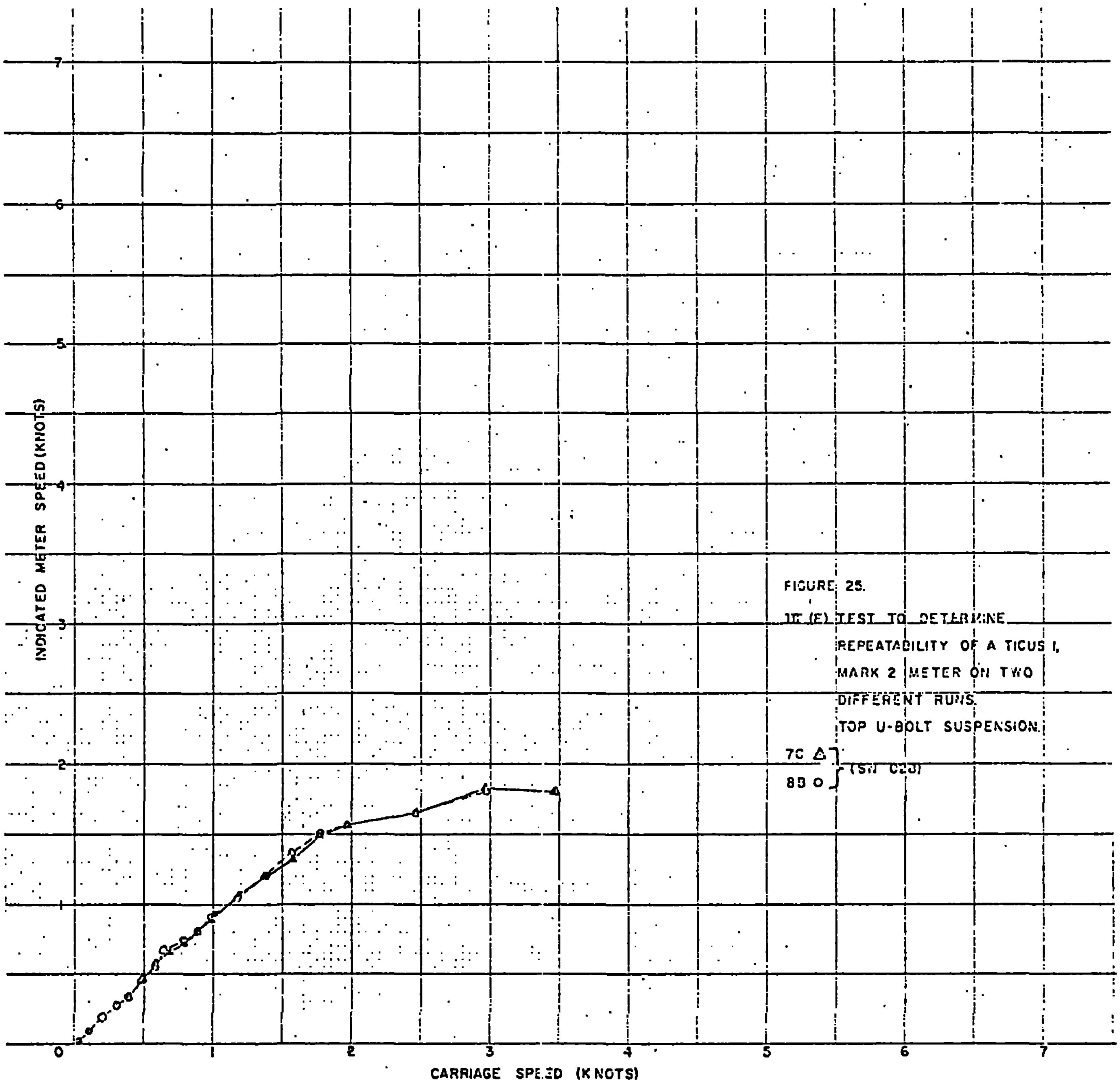


FIGURE 25.
U (E) TEST TO DETERMINE REPEATABILITY OF A TICUS I, MARK 2 METER ON TWO DIFFERENT RUNS. TOP U-BOLT SUSPENSION.

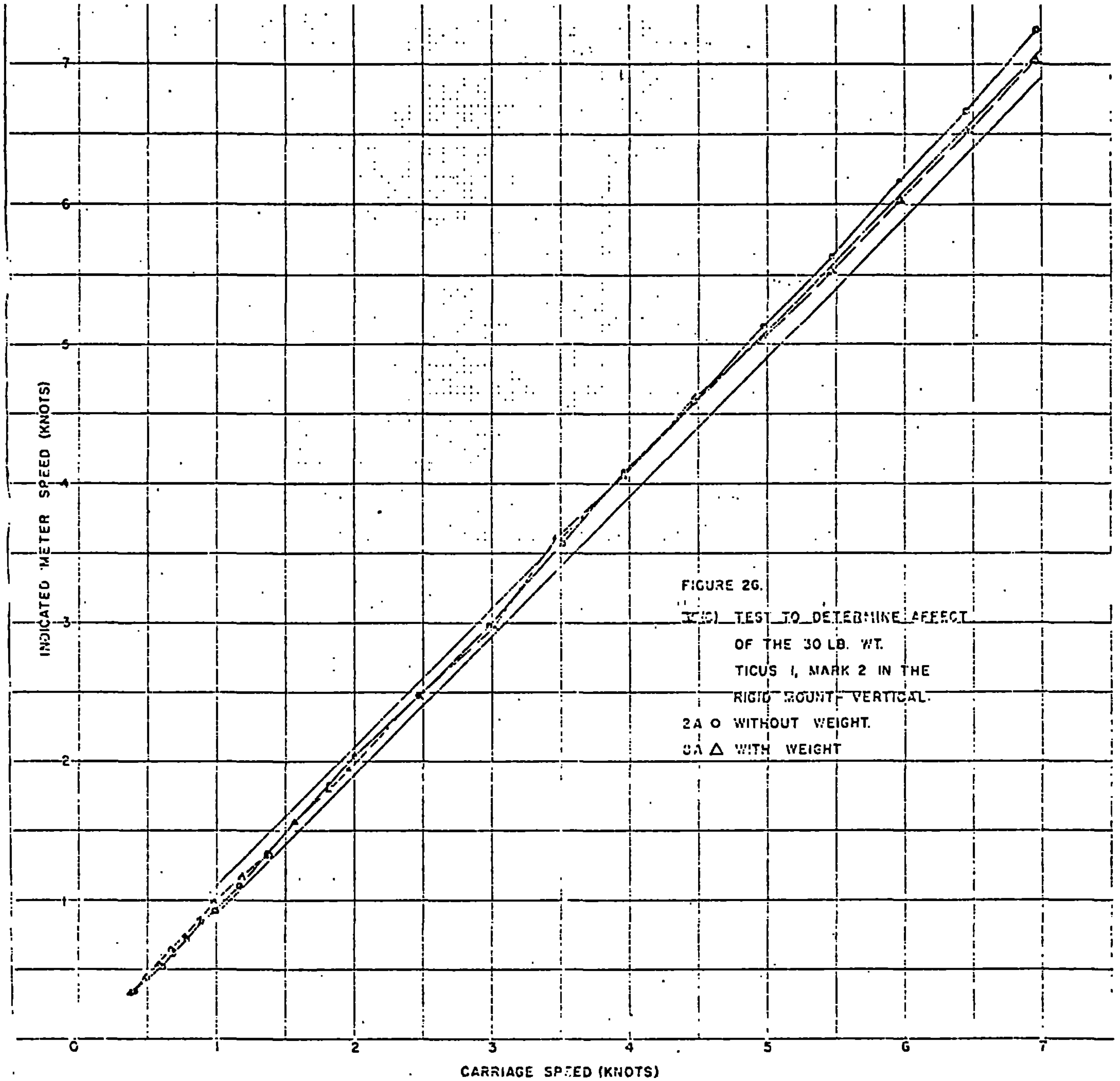


FIGURE 26.

(C) TEST TO DETERMINE AFFECT OF THE 30 LB. WT. TICUS I, MARK 2 IN THE RIGID MOUNT- VERTICAL.

CONCLUSIONS

The four most important conclusions resulting from analysis of the tests are as follows:

1. For a meter secured in a zero tilt position, the accuracy of the speed readout and validity of the calibration constant of the TICUS I, Mark 2, and A-102 current meters is, with but a few exceptions, within the tolerance published by the manufacturer of the meter for current speeds of 0.4 to about 3.5 knots. In the majority of cases the error in speed readout from about 3.5 knots to the maximum test speed of 7.0 knots exceeded the manufacturer's specified tolerance.

2. For the top U-bolt suspension technique with a 30-pound weight secured to the bottom of the meter both the TICUS I, Mark 2 and A-102 meters met manufacturer's speed accuracy specifications up to a current speed of about 2.0 knots. Above 2.0 knots speed-tilt correctors must be applied to obtain true current speeds.

3. Based on these experiments the manufacturer's stated tilt error percentages do not correctly describe the tilt-speed characteristics of the meter. An equation to correct for speed errors due to current meter tilt is shown. If this equation is used, the corrected speed results will be within the accuracy tolerance of the meter for speeds up to 7.0 knots and tilt angles up to 20 degrees.

4. The manufacturer's specifications for speed accuracy can be achieved with the TICUS I, Mark 2 meters up to a maximum current speed of 4.5 knots without the application of tilt corrections by using a hanger and trim fin suspension (Figure 19). The speed accuracy range of the A-102 current meter was increased to 3.5 knots with a similar hanger technique.

Also of interest are the following results:

Comparability of output between different meters tested was 0.1 knot or less over the entire speed range tested and within 0.05 knots for velocities below 2.0 knots. Repeatability was within the resolution capability of the meter.

No significant difference in meter output was detected for various orientations of the rotor cage.

The tests conducted as part of this project were of a static nature in that they did not take into account "noise" perturbations introduced into the data due to buoy motion, sensor string oscillations, etc. Further investigations are required to determine the extent of the errors introduced by these other factors.

APPENDIX A

TICUS I, Mark 2 and A-102 Current Meter Specifications for the Savonius Rotor:

Starting Speed:	Less than 0.05 knot
Rotation Rate:	82 RPM/Knot
Linearity:	Linear above 0.4 knot
Range:	0.05 to 8 knots
Accuracy: (Instrument Attitude Vertical)	$\pm$ 0.05 knot, starting speed to 1.0 kn
	$\pm$ 0.1 knot, 1 knot to full speed
Tilt error:	Low readings, approximately: 3% at 5° 6% at 10° 12% at 20° 20% at 30°
Resolution: (TICUS I, Mark 2)	$\pm$ 1 rotor count or $\pm$ 0.03 knot (rotor count taken for 5.8 secs/readi
(A-102)	$\pm$ 1 rotor count or $\pm$ 0.012 knot (rotor count taken for one min/readi

Source of above information:

Technical Manual No. B-3976, March, 1969, MODEL 102 Current Meter, EG & G International, Geodyne Division

Technical Manual No. 69-161, December, 1969, Operator's Manual, TIDAL CURRENT SURVEY SYSTEM (TICUS). EG & G International, Geodyne Division.

```
      PROGRAM SUPPL1(INPUT,OUTPUT,TAPE1,TAPE2)
      DIMENSION A(2940)
      DIMENSION ID(10), V(10),IW(10),MINC(10)
      DIMENSION  TITLE(40)
      DIMENSION PLUT(3),PLAT(3),PLET(3)
      INTEGER PLUT,PLAT,PLET
      DATA (PLUT(I),I=1,3)/30H(1H+,   22X,7H SENSOR,I2)      /
      DATA (PLAT(I),I=1,3)/30H(1H+,   20X,14H  VEL DIR   WT)/
      DATA (PLET(I),I=1,3)/30H(1H+,   20X,1H ,14X,3HTLT)     /
      INTP=5LTAPE1
      IOVER = 0
      NCONT = ICHOIC = IHEAD = ICH2 = NEND = 0
      READ 1,JOBXXX,IFMRK,ISUMRY
C
C     JOBXXX = NUMBER OF STATIONS TO BE PRINTED
C     IFMRK  = 1,  IF WANT NO FILE MARKS BETWEEN STATIONS ON TAPE
C     ISUMRY = 1,  GIVES A SUMMARY LISTING OF THE TAPE
C
      IF (IFMRK.EQ.1) PRINT 11231
      PRINT 4
      DO 2000 JOBYYY=1,JOBXXX
      PRINT 5
      MOS = 0
      JSDAY = 0
      IF (ISUMRY.EQ.1) GO TO 1497
      IF (IOVER.EQ.98.OR.NCONT.EQ.97) GO TO 99
      READ 1, NFILE,NMET,ICHOIC,JCVAR,LPT,NSKIP,TCORK,IOLD,ICH2,IHEAD,IF
     1OR
      IF (LPT.EQ.0) GO TO 99
      READ 98,LMO,LDY,XTIME
C
C
C    NFILE =  THE FILE NUMBER OF THE DATA ON THE INPUT TAPE
C             ( IF -,  ONLY NEED THIS CARD TO DO ALL STATIONS,
C                                  IF  IHEAD = 0 )
C    NMET =  THE NUMBER OF METERS AT THE STATION
C             ( NOT NECESSARY IF  IHEAD = 0 )
C    ICHOIC IS THE CONTROL FOR TYPE OF OUTPUT
C         ICHOIC = 0  YIELDS A PRINTOUT ONLY
C         ICHOIC = 1  YIELDS PRINTOUT AND A MAGNETIC TAPE  (TAPE2)
C                     ( BE SURE TO USE A SECOND TAPE REQUEST CARD )
C         ICHOIC = 2 YIELDS TAPE AND PRINTS FIRST + LAST DATA POINTS
C    JCVAR = MAGNETIC COMPASS VARIATION   ( + IF EAST )
C             ( =0, IF DIRECTIONS ARE ALREADY IN DEGREES TRUE )
C    LPT = 1, IF THE LAST DATA POINT IS TO BE READ IN ON THE NEXT CARD
C    NSKIP = THE NUMBER OF DATA POINTS TO BE SKIPPED AT THE BEGINNING
C    TCORK = TELEMETRY TIME CORRECTION  ( IF USING  BUOY TAPE )
C    IOLD = 1, IF THE DATA TAPES ARE FOR  PENOBSCOT OR BEFORE, I.E. IF
C              MOST TIMES END IN    9
C     ICH2 = FILES TO BE SKIPPED INITIALLY ON OUTPUT TAPE.
C     IHEAD = 0, IF A HEADING IS ON THE INPUT TAPE ( AS WELL AS VALUE OF NMET )
C     IHEAD = 1, IF MUST READ IN 5 HEADING CARDS ( AS WELL AS VALUE OF NMET )
C     IFOR = 0, ONLY  VEL, DIR, AND WT   ARE PRINTED
C     IFOR = 1, TILT IS ALSO PRINTED ( SOME TAPES HAVE NO TILT )
C                                              ( E.G. BOSTON )
C
C
C
```

```
   99 ICOUNT = 0
      IF (NFILE.GT.0) GO TO 480
      NFILE = IABS(NFILE)
      IOVER = 97
  480 IEND = 0
      NEND = 0
      IXW = 0
      ICV = 0
      ITIP = 0
      IF(JOBYYY.GE.2) ICH2 = 0
  404 IF (IOVER.EQ.98) GO TO 497
      IF (IOVER.EQ.97) IOVER = 98
  405 IF ( JOBYYY.EQ.1) GO TO 410
      JFIL = NFILE
      NFILE = NFILE - JFILE
      JFILE = JFIL
      GO TO 101
  410 JFILE = NFILE
  101 IF (NFILE.EQ.1) GO TO 100
      CALL LTRIO(INTP,4B,A(1),A(2940),KS)
      NFILE = NFILE - 1
      GO TO 101
  100 CONTINUE
      IF (ICH2.EQ.0) GO TO 497
      DO 2107 I=1,ICH2
 2106 READ (2,2105)
      IF (ENDFILE 2 ) 2104,2106
 2104 ICV = ICV + 1
 2107 CONTINUE
      PRINT 2103, ICV
  497 IF (NCONT.NE.97) PRINT 4
 1497 IF (IHEAD.NE.0) GO TO 498
      CALL LTRIO (INTP,001B,A(1),A(41),KS)  <--
      IF (NCONT.EQ.97) GO TO 107
      IF (ISUMRY.EQ.1.OR.ICHOIC.EQ.2) PRINT 295, JOBYYY
      DO 499 I =1,40
      TITLE(I) = A(I)  <- HEADING FROM INPUT TAPE
  499 CONTINUE
      NMET = A(41)  <--- # OF METERS FROM INPUT TAPE
      GO TO 500
  498 READ 2,(TITLE(I),I=1,40)
  500 PRINT 2,TITLE
      IF (ISUMRY.EQ.1) GO TO 3504
      IF (ICHOIC.EQ.0) GO TO 5500
      WRITE(2,2) TITLE  <---------- WRITE 5 80-CHARACTER RECORDS
 5500 PRINT 5                          ON OUTPUT TAPE
      PRINT 96
      PRINT 97
      IF (IOVER.EQ.0) PRINT 5
      IF (IOVER.EQ.0) PRINT 5
      ISAV1 = PLUT(1)
      ISAV2 = PLAT(1)
  501 PRINT 301
      DO 401 LK=1,NMET
      PRINT PLUT(1),LK
      PLUT(1) = PLUT(1) + 176B
      IF (LK.EQ.2) PLUT(1) = PLUT(1) - 66B
      IF (LK.EQ.5) PLUT(1) = PLUT(1) - 211200B
```

```
  401 CONTINUE
      IF (IEND.EQ.97) GO TO 503
  502 PRINT 302
      DO 402 LK=1,NMET
      PRINT PLAT(1)
      IF (IFOR.EQ.1) PRINT PLET(1)
      PLAT(1) = PLAT(1) + 176B
      IF (LK.EQ.1) PLAT(1) = PLAT(1) - 66B
      IF (LK.EQ.5) PLAT(1) = PLAT(1) - 211200B
      PLET(1) = PLAT(1)
  402 CONTINUE
      IF (IEND.EQ.97) GO TO 501
      PRINT 1105
  107 CALL LTRIO(INTP,001B,A(1),A(2940),KS)   <- READ FROM INPUT TAPE
      IF((KS.AND.1000000000000000B).NE.0)  GO TO 103
      IF (KS.GE.0) GO TO 1107
      PRINT 1108
      GO TO 504
 1107 KLM = 1
      IF(IXW.EQ.97) GO TO 106
      IXW = 97
      KLM = 1 + NSKIP * (7*NMET + 7)
  106 JBN=A(KLM+1)
      JYR=A(KLM+2)
      MO=A(KLM+3)
      JDAY=A(KLM+4)
C     ________________________________     IF (MO.LE.0) GO TO 102
C                                          IF (MO.LT.MOS) GO TO 102
 1206 NCONT = 0                            IF (MO.GT.MOS) GO TO 1206
      MOS = MO                             IF (JDAY.LT.JSDAY) GO TO 102
      JSDAY = JDAY
      JYRS = JYR
      JBNS = JBN
      ATIM= A(KLM+5)
      TIME = ATIM/100.
      IF (IOLD.EQ.0) GO TO 1106
      ITIM = TIME * 10
      ITIM = ITIM * 10
      BTIM = ITIM
      IF((ATIM-BTIM).EQ.9.) TIME = TIME + .01
 1106 TIME = TIME + ICORK
      DO 1030 L=1,NMET
      KXX=L-1
      JAK= KXX*7
      KMAK=KLM+JAK
      ID(L)=A(KMAK+7)
      ID(L) = ID(L) + JCVAR
      IF(ID(L).GT.725)  GO TO 7676
      CALL TWOPI (ID(L))
 7676  V(L) = A(KMAK+8)/100.0
      IW(L)=A(KMAK+9)
      MINC(L)=A(KMAK+10)
 1030 CONTINUE
      KLM=KLM+7*NMET+7
      ICOUNT = ICOUNT + 1
      IF(IFOR.GT.0) GO TO 4000
      IF (ITIP.EQ.97) GO TO 3104
      IF (ICHOIC.EQ.2) ITIP = 97
```

Getting data from A(2940).

```
      IF (ICHOIC.EQ.2) PRINT 1993
      PRINT 50,JBN,JYR,MO,JDAY,TIME,( V(I),ID(I),IW(I),I=1,NMET)
      IF (ICHOIC.EQ.2) PRINT 5
      IF(ICHOIC.EQ.0)  GO TO 104
3104  WRITE(2,50) JBN,JYR,MO,JDAY,TIME,( V(I),ID(I),IW(I),I=1,NMET)
 104  GO TO 4500
4000  IF (IFOR.GT.1) GO TO 4500
      IF (ITIP.EQ.97) GO TO 4104
      IF (ICHOIC.EQ.2) ITIP = 97
      IF (ICHOIC.EQ.2) PRINT 1993
      PRINT 4050,JBN,JYR,MO,JDAY,TIME,( V(I),ID(I),IW(I),MINC(I),I=1,NME
     1T)
      IF (ICHOIC.EQ.2) PRINT 5
      IF(ICHOIC.EQ.0)  GO TO 4500
4104  WRITE(2,4050)JBN,JYR,MO,JDAY,TIME,( V(I),ID(I),IW(I),MINC(I),I=1,N
     1MET)
4500  CONTINUE
      IF (LPT.EQ.0) GO TO 105
      IF (JDAY.NE.LDY) GO TO 105
      IF (MO.NE.LMO) GO TO 105
      IF (TIME.LT.(XTIME-.01)) GO TO 105
      GO TO 102
 105  IF(KLM.LT.2940)  GO TO 106
      GO TO 107
 103  NEND = 97
 102  CONTINUE
      IF (ICHOIC.NE.2) GO TO 1992
      PRINT 50, JBNS,JYRS,MOS,JDAY,TIME,(V(I),ID(I),IW(I),I=1,NMET)
      IF (IFOR.EQ.1) PRINT 550,(MINC(I),I=1,NMET)
      PRINT 1994
      GO TO 503
1992  IEND = 97
      PLUT(1) = ISAV1
      PLAT(1) = ISAV2
      PLET(1) = ISAV2
      PRINT 1105
      GO TO 502
 503  IF (ICHOIC.EQ.0) GO TO 504
      IF (IFMRK.EQ.1) GO TO 504
      ENDFILE2
 504  PRINT 5
      PRINT 5
      PRINT 95,ICOUNT
      PLUT(1) = ISAV1
      PLAT(1) = ISAV2
      PLET(1) = ISAV2
      IXW = 0
3504  IF (NEND.EQ.97) GO TO 2000
      CALL LTRIO (INTP,48,A(1),A(2940),KS)
2000  CONTINUE
      IF (IFMRK.EQ.1) ENDFILE2
      REWIND 1
      REWIND 2
      STOP
    1 FORMAT (6I5,F5.2,4I5)
    2 FORMAT(8A10)
    3 FORMAT(1X,8A10)
    4 FORMAT(1H1)
```

WRITE DATA ON OUTPUT TAPE

with Tilt

# OF CURRENT METERS	CHARACTER LENGTH OF RECORD
1	40
2	58
3	76
4	94
5	112

```
    5 FORMAT(1H0)
   50 FORMAT(1X,I3,2X,I2,1X,I2,1X,I2,1X,F5.2,2X,6(F4.2,1X,I3,1X,I4,5X))
 4050 FORMAT(1X,I3,2X,I2,1X,I2,1X,I2,1X,F5.2,2X,6(F4.2,1X,I3,1X,I4,I3,2X
     1))
  550 FORMAT (1H+,21X,6(13X,I3,2X))
   95 FORMAT (1X,I5,12H DATA POINTS)
   96 FORMAT (60X,27HVELOCITY IN KNOTS          )
   97 FORMAT (60X,25HDIRECTION IN DEGREES TRUE)
   98 FORMAT (2I5,F5.2)
  295 FORMAT (12H FILE NUMBER, I4/)
  301 FORMAT (8X,4HDATE)
  302 FORMAT (1X,19HSTA  YR MO DA  HOUR)
 1105 FORMAT (2H  )
 1108 FORMAT (1X,12HPARITY ERROR)
 1993 FORMAT (17H0FIRST DATA POINT)
 1994 FORMAT (1X,15HLAST DATA POINT)
 1205 FORMAT (1H+,3X,1H$)
 2103 FORMAT (100X,7HSKIPPED,I3,6H FILES)
 2105 FORMAT (A1)
11231 FORMAT (32H1NO FILE MARKS BETWEEN STATIONS./)
      END
```

NODC Subsurface Current Header and Inventory Description

(Mooring Record)

Position/Bytes 1-2 DECK NUMBER

NODC File Identification Number. Number '11' for this type of data.

Position/Bytes 3-5 RECORD NUMBER

Consecutive Record Number for the current measurements from this platform and time period. The Mooring Record will be '001.'

Position/Bytes 6-8 NODC COUNTRY CODE

This three-character code represents the nationality of the institution sponsoring or operating the platform during this particular investigation. The first character is blank at present, but available for future expansion.

Position/Bytes 9-13 NODC REFERENCE IDENTITY NUMBER

The Reference Identity Number is assigned by the Data Center for processing purposes to identify the data taken during a particular cruise or observational period.

Position/Bytes 14-16 CONSECUTIVE NUMBER

Moorings are numbered consecutively within a cruise or project beginning with 001.

Position/Byte 17 QUADRANT CODE

This is the WMO 3333 quadrant code, where 1 = NE, 3 - SE, 5 - SW, and 7 - NW.

Position/Bytes 18-20 TEN DEGREE SQUARE

See Appendix.

Position/Byte 21 FIVE DEGREE SQUARE

See Appendix.

Position/Bytes 22-23 TWO DEGREE SQUARE

See Appendix.

Position/Bytes 24-25 ONE DEGREE SQUARE

See Appendix.

Position/Bytes 26-27 LATITUDE DEGREES

Whole degrees of latitude at which observations were made.

Position/Bytes 28-29 LATITUDE MINUTES

Continuation of latitude location.

Position/Byte 30 LATITUDE TENTHS OF MINUTES

Continuation of latitude location.

Position/Byte 31 LATITUDE HEMISPHERE

'N' or 'S' denotes hemisphere where observations were made.

Position/Bytes 32-34 LONGITUDE DEGREES

Whole degrees of longitude at which observations were made.

Position/Bytes 35-36 LONGITUDE MINUTES

Continuation of longitude location.

Position/Byte 37 LONGITUDE TENTHS OF MINUTES

Continuation of longitude location.

Position/Byte 38 LONGITUDE HEMISPHERE

'E' or 'W' denotes hemisphere where observations were made.

Position/Bytes 39-42 YEAR

'19' is prefixed to the last two digits of the year during which the mooring was launched.

Position/Bytes 43-44 MONTH

Continuation of the mooring launch date 01-12 represents the month.

Position/Bytes 45-46 DAY

Continuation of date 01-31 may appear in this field.

Position/Bytes 47-48 HOURS

Time of the mooring launch to the hour 00-23 may be entered in this field.

Position/Bytes 49-50 MINUTES

Continuation of time. A number from 00-59 appears here.

Position/Bytes 51-52 PLATFORM AND MOORING TYPE

Code describing platform type and mooring. See Table I.

Position/Bytes 53-58 NODC PLATFORM CODE

A 6-character alpha-numeric code, representing the platform or mooring from which the measurements were taken.

Position/Bytes 59-62 DEPTH TO BOTTOM

The depth to the bottom of the ocean at the location where observations were made.

Position/Bytes 63-70 ORIGINATOR'S CRUISE NUMBER

The cruise or project number assigned by the originator is retained in the NODC STD file.

Position/Bytes 71-75 ORIGINATOR'S STATION NUMBER

The originator's station (mooring) number is retained in the NODC STD file.

Position/Byte 76 DUC

This is an NODC code indicator for data exchange. It is used for internal house-keeping purposes only.

Position/Bytes 77-88 DATE & TIME OF MOORING RECOVERY

This field, similar to byte positions 39-50, is the date and time at which the mooring was recovered or the ship left station.

Position/Bytes 89-92 MAGNETIC VARIATION

This is the positive or negative magnetic variation from True North in whole degrees, Position 89 is used for the (+) or (-) sign.

Position/Bytes 93-95 TIDAL RANGE

The Tidal Range, reported here in meters and tenths of meters, is the difference between the Mean High Tide and Mean Low Tide.

Position/Bytes 96-97 NUMBER OF METERS

The number of current meters reporting for this platform or mooring and time period.

Position/Bytes 98-99 NUMBER OF COMMENTS

This is the number of 80 byte segments that follow, describing the mooring operation. A maximum of ten 80 byte segments (800 bytes) may be used.

Position/Byte 100 BLANK

This byte is left blank for computer byte boundary alignment.

Position Bytes 101 up thru 900 COMMENTS

Up to 800 bytes in 80 byte segments may be used to describe the nature of the mooring, its performance, its purpose or reference publication or procedures relating to the mooring operation. This area is intended to provide as much information as possible to the potential user of the data.

NODC Subsurface Current Header and Inventory Description

(Meter Record)

One meter record will be completed for each current meter attached to the mooring. The number of meter records therefore is the number of current meters as reported in Positions 96-97 of the Mooring Record.

Position/Bytes 1-2 DECK NUMBER

NODC File Identification Number. Number '11' for this type of data.

Position/Bytes 3-5 RECORD NUMBER

Consecutive Record Number for the current meters. The first meter Record will be '002' and numbered consecutively thereafter.

Position/Bytes 6-16 NODC ID FIELDS

These positions are the same as reported in the Mooring Record (Record Number '001').

Position/Bytes 17-21 DEPTH OF METER

This may be reported as the depth of the current meter, below the surface in whole meters with Position 17 having a plus (+) sign or the height above the bottom with Position 17 having a minus (-) sign.

Position/Bytes 22-25 ORIGINATOR'S METER NUMBER

This field is available for recording the originator's current meter designator.

Position/Bytes 26-35 DATE & TIME OF FIRST RECORD

This is the last two digits of year, month, day, hour, and minute of the first data record produced by this meter.

Position/Bytes 36-45 DATE & TIME OF LAST RECORD

Similarly as above, this is the date and time of the last data record produced by this meter.

Position/Bytes 46-52 DURATION

This field is the duration of usable data records reported as days (46-48), hours (49-50), and minutes (51-52). Document discontinuous records resulting from bad data in the comment portion of this record.

Position/Bytes 53-55 AVERAGE TIMING ERROR

This is the average timing error for the entire Current Data Record reported in seconds with Position 53 used for the sign.

Position/Bytes 56-60 SAMPLING FREQUENCY

This alpha numeric field is used for recording the instrument sampling frequency. Position 60 being reserved for the units abbreviation. H = hours, m = minutes, s = seconds. For example '01.5H' would indicate the meter sampled every one and one-half hours.

Position/Byte 61 TYPE OF SAMPLING

I = Instantaneous, A = Averaged, B = Burst.

Position/Bytes 62-65 RATE OF SAMPLING

For Average or Burst type sampling, enter the rate at which data was recorded in seconds and tenths of seconds. For example '02.5' seconds indicated that current direction and speed was recorded in two and one-half seconds.

Position/Bytes 66-70 DURATION OF SAMPLING RATE

Enter the alpha-numeric time and units indicator to show how long the above sampling rate transpired if the type of sampling was averaged or burst. For example '020m' indicates that the above sampling rate (2.5 sec) continued for twenty minutes. Using the above examples this current meter sampled every 1.5 hours for 20 minutes at 2.5 second intervals.

Position/Bytes 71-75 INTERVAL OF PROCESSED DATA

This alpha-numeric field is used for recording the final current direction and speed interval after processing. Position 75 is used to indicate the time units. For example '04.5H' would indicate that the processed data are now averaged to four and one-half hour intervals.

Position/Bytes 76-77 NUMBER OF COMMENTS

As in the mooring record this is the number of 80 byte segments that follow, describing the nature of the data, current meter, etc. A maximum of ten 80 byte segments (800 bytes) may be used.

Position/Byte 78 BLANK

Again this byte is blank for computer byte boundary alignment.

Position/Bytes 79-878 COMMENTS

Up to 800 bytes in 80 byte segments may be used to describe the current meter, manufacturer model, and field modification. In addition, the methods of data reduction, treatment, analysis, and a description on the nature of the trajectory, the presence of periodicities, etc., would be desirable. References to publications and procedures can also be entered. This area is intended to provide the necessary information needed by a potential user of the data.

- The maximum current meter record is 878 bytes.

TABLE I

(Current meters only)

Type of mooring or platform	Columns 51-52	
Ship at anchor - one anchor only	1	0
Ship anchored fore and aft	1	1
Ship drifting with movement measured by reference to moored buoy or other fixed feature	1	2
Meter affixed to rigid structure, as for example Argus Island	2	0
Taut-line mooring with one anchor and surface float	3	0
Taut-line mooring with multiple anchors and surface float	3	1
Taut-line mooring with one anchor and subsurface float	3	2
Subsurface float with multiple anchors	3	3
Meter mounted in frame near bottom	4	0
Ice platform - stationary	5	0
Ice platform - drifting	5	1
Mooring method not given	9	9

APPENDIX

GEOGRAPHICAL POSITION ORDER DESCRIPTION

Ten Degree Square

This number is obtained by the concatenation of the tens digit of the latitude degrees with the hundreds and tens digits of the longitude degrees.

For example: Lat. 46° 33' N

Long. 020° 10' W

The ten degree square would be 402

One Degree Square

The one degree square is obtained by the concatenation of the units digit of the latitude degrees with the units digit of the longitude degrees.

In the above example the one degree square would be 60.

Five Degree Square

The ten degree square can be divided into four five degree squares each of which contains twenty-five one degree squares. Five degree square numbered 1 contains the one-degree square 00, Five degree square numbered 2 contains the one degree square 05, Five degree square numbered 3 contains the one degree square 50, and the Five degree square numbered 4 contains the one degree square 55. In the above example the five degree square would be 3.

Two Degree Square

The Ten Degree Square can be divided into twenty-five two degree squares each of which contains four one-degree squares. The lowest one degree square number is used to identify the two degree square containing the one degree squares. The two degree square numbers run as follows: 00, 02, 04, 06, 08, 20, 22, 24, 26, 28, 40, ... 80, 82, 84, 86, 88. In our example the two degree square number would be the same as the one degree square or 60.

NODC INDEX FOR INSTRUMENT-MEASURED SUBSURFACE CURRENT OBSERVATIONS (NIMSCO)

INTRODUCTION

The National Oceanographic Data Center's (NODC's) "Index to Instrument Measured Subsurface Current Observations" (NIMSCO) has been developed in response to recommendations made by a panel of national experts on instrument-measured current data, who met at NODC in May 1970.

This index is not intended to duplicate the information from NODC's general-purpose NAMDI index. NIMSCO is a "second-level" inventory referencing data actually held by repositories for the exact geographic coordinates at which data were obtained.

The primary purpose for developing the system is to provide a national capability for collection, storage, retrieval, and dissemination of information related to current data holdings of various institutions, both foreign and domestic.

The system is designed to accept detailed information about current data obtained by use of most instrument systems. The bulk of the collections, however, is expected to result from the use of current meters, neutral buoyancy floats, and drogues.

The NIMSCO form is divided into three parts. Part I contains identifying and reference information. Part II contains detailed information about the data taken, and Part III contains additional descriptive information concerning the data.

To facilitate encoding of the data at NODC, the form is further subdivided into Columns A and Columns B. Column A identifies the information to be recorded. The information, however, is generally entered in the space provided within the delimiters (<>) in Column B.

It is anticipated that this form will generate an information base of considerable use to ocean current investigators. In addition, it may become the foundation for international exchange of instrument-measured current-data inventories.

NODC INDEX FOR INSTRUMENT-MEASURED SUBSURFACE CURRENT OBSERVATIONS (NIMSCO)

INSTRUCTIONS FOR COMPLETING FORM

GENERAL INSTRUCTIONS

1. Complete forms for such data which can be made available to other investigators, now or in the future.

2. In most cases, record the requested information between the delimiters (<>) in Columns B.

3. Where an asterisk (*) precedes the field designators in Column A, record the requested information in the space provided in Column A if a reply choice is not given in Column B. (Examples: Institution, Country, Platform Type, Observation Type, etc.). These entries will be coded at NODC by using standard codes.

4. Disregard fields preceded by a cross (+). These will be filled out at NODC.

5. Where dates are requested, use numerical entries; i.e., 01 through 12 for months and 01 through 31 for days.

6. Enter complete information for all fields. However, brevity is desirable, especially for the fields labeled, Z, Z1, Z2, and Z3. Entries in these fields need not be completed sentences; idea clauses are acceptable.

7. For Eulerian measurements, make out a separate form for each period over which data were obtained continuously or intermittently. If more than one current meter was used at a location, make out separate form(s) for each meter. For Lagrangian measurements, fill in a single form for the entire track of a drogue, swallow type float, or similar device. If a break in a data record exceeds 15 days, fill out another form(s).

THE NODC INDEX FOR INSTRUMENT-MEASURED SUBSURFACE CURRENT OBSERVATIONS (NIMSCO)

SPECIFIC INSTRUCTIONS

PART I

Column A	Column B	Instructions
ACCESSION NO.	A	Leave blank.
INSTITUTION	B	Enter name of institution holding data.
COUNTRY	C	Enter name of country in which institution holding data is located.
PLATFORM TYPE	D	Circle appropriate definition in Column B. If no appropriate definition provided, enter your reply in Column A, in space labeled "Other, Specify."
PLATFORM NAME	E	Enter name of platform or other designator.
REFERENCE NO.	F	Enter designator used to identify or index data at holding activity.
CRUISE OR SURVEY PERIOD		
BEGINNING DATE	G	Enter inclusive dates of complete cruise or survey period during which data were taken.
ENDING DATE	G1	
PROJECT OR EXPEDITION DESIGNATOR	H	When applicable, record the international cooperative project or expedition designator of which survey was a part. (Example: IGOSS, CICAR, CIM, CIMECA, etc.). If survey was primarily a national or local cooperative endeavor, enter project or expedition designator assigned.

Column A	Column B	Instructions
PERSON COGNIZANT OF DATA PROCESSING	I	Enter name of person to whom inquires regarding editing, data reduction, and other processing specifics should be directed.
ADDRESS	J	Enter address of person cognizant of data processing.
PHONE NO.	K	Enter phone number of person cognizant of data processing; include area code.

PART II

Column A	Column B	Instructions
INSTRUMENT TYPE	M	Circle appropriate definition in Column B. If appropriate definition is not provided, enter your reply in Column A, in space labeled "Other, Specify."
INSTRUMENT NAME, MODEL NO.	N	Record name and model number of current meter used to collect data (e.g., BRAINCON TYPE 381; GEODYNE, MODEL 850; PLESSEY, MODEL NO 21; HYDROWERKSTAATEN TIEFENSTROMMESSER, etc.).
OBSERVATION TYPE	O	Identify bases constituting observation, by circling applicable definition or entering your reply in Column A, in space labeled "Other, Specify."

Column A	Column B	Instructions
USABLE RECORD:		
BEGINNING DATA	P	Record only beginning and ending dates of observations reported on a single form. (See General Instructions No. 8).
ENDING DATES	Q	
LATITUDE & LONGITUDE	R and S	Enter the latitude and longitude for current meter observations and the beginning locations for floats and drogues. (See General Instructions No. 8).
TEN DEG. SQUARE; SUB SQS.	S2 through S2B	Leave blank.
OBSERVATION DEPTH (METERS)		
FROM	T	Record the depth at which observations were taken in field labeled T. If the observation series represents a depth range (such as obtained with free fall devices or neutral buoyancy floats), enter shallower depth in the T field, and deeper depth in the T1 field.
TO	T1	
	U, U1, V	Self-explanatory.
DATA STORAGE MEDIUM	W	Circle appropriate medium. If no appropriate medium is given, enter your reply in Column A, in space labeled "Other, Specify."
ANALYSIS PRODUCTS GENERATED	X	Enter (as shown in the examples) all analysis products generated from data and available for release.
ANALYSIS PRODUCTS PLANNED	X1	Enter all additional analysis products planned, which will be available for release.

PART III

NOTE: Fill out following fields only if no other documentation is forwarded with form.

Column A	Column B	Instructions
PERTINENT PUBLICATIONS	Y	List publications containing any documentation on instrumentation, data reduction and processing, data editing, and analysis relative to the data inventoried.
REMARKS:		
INSTRUMENTATION	Z	Specify any major modifications to manufacturer's original product, major routine manufacturing features, operation failures during data collection, or other comments helpful in data interpretation.
REMARKS:		
DATA REDUCTION AND PROCESSING	Z1	Describe briefly data reduction and processing; EX.: Time interval of individual observations of processed data, storage codes of processed data (BCD, EBCDIC, binary, etc.), and other pertinent processing factors.
REMARKS:		
DATA EDIT CRITERIA	Z2	List criteria applied in editing data to point of their use for analysis. Some examples are given on the form.
OTHER REMARKS	Z3	Enter any other comments useful in interpretation and use of data reported.

Note correction on second page TW

August 15, 1972

NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

D73

Conference Report (EDS/NOS Interface)

D7

On Monday, July 31, 1972, an EDS/NOS meeting was held to discuss improved access for secondary users, inventory mechanisms, and archival disposition of "Tidal Current" data collected by NOS and its predecessors. Attending were Commander A. Swanson, Director, Oceanographic Division, NOS; Lieutenant Keck, NOS; Mr. D. Dinardi, Chief, Tidal Current Section, NOS; Mr. R. Morse, EDS; and Messrs. T. Winterfeld and P. Hadsell, NODC. The role of EDS as archive and service center for environmental data collected by all organizational components of NOAA and the ENDEX concept were discussed during the first half of the meeting. Discussion on some of the details of NOS's current data holding and processing plans was continued in the afternoon between Mr. Dinardi and Messrs. Winterfeld and Hadsell. The following is my assessment of the present state of affairs:

1. All tidal current data collected by NOS since 1969 and part of the data collected in 1967 and 1968 and has been obtained by TICUS (I and II) and Geodyne Current Meter Systems and is being processed for storage on magnetic tape. Film optic to "raw data" magnetic tape conversion is being performed under contract by NBS. The Tidal Current Section of NOS performs the necessary evaluation, quality and final edit-correction of the "raw data" tapes.

Other work commitments and staffing limitations have made it difficult for the section to keep up with the inflow of contemporary data. Mr. Dinardi estimates that the addition of two full-time oceanographers and one EAM operator to the staff of the section would be required to keep up with the anticipated workload, respond to additional non-routine commitments, and to begin digitization of the pre-1967 data backlog.

2. Barring major new high-priority requirements imposed by such projects as MESA, the first fully edited magnetic tapes (comprising data for the Boston Harbor project) would be available to NODC by May 1973. Thereafter it is hoped that the time delay between data collection and availability of the final edited data will be one year or less. Mr. Hadsell and Code D731 will continue to coordinate any technical problems concerning data documentation and tape formats for NOS current data to be accessioned by NODC. The eventual annual data inflow to NODC is estimated as first guess at between 50,000 to 150,000 discrete observations.

3. The voluminous pre-1967 Roberts Meter and other tidal current data, reaching back over a number of decades, is, with minor exceptions, stored at NOS on handwritten records augmented by handplotted graphics. These

data are poorly reproducible and can be made available to requesters only after prior review and editing. Digitization and editing of this backlog would, according to Mr. Dinardi require in excess of 10 man-years of effort. Only monthly or other summaries of this are available in published form. Even if funds were available it is not believed to be feasible to perform backlog digitization through an off-site contract basis; editing of the data is said to require the special expertise of and continuous interaction with the already committed staff of the Tidal Current Section; second level inventory of this data is impractical for similar reasons.

4. The contemporary NOS Tidal Current data is presently being regularly reported to NODC on a MANDI compatible form. A second level inventory of data subject to more than one year delay, could, in the future, be made available within 6 to 9 months of the date of collection. This inventory would be a routine by-product of NOS processing but while adequate, would not provide all the detail sought by the NODC NIMSCO form.

5. No specific commitments were reached at this meeting except (a) to continue NODC/NOS liaison on the technical level, (b) for NOS to provide NODC with copies of the final edited blocked magnetic tapes of contemporary data as they become available, and (c) for NODC to assume customer service obligations for requests with the understanding that NOS would be kept informed concerning the number and types of requests received.

Thomas Winterfeld
Acting Director, Development Division

Code D73:TWinterfeld:dmm:8/15/72

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

Date : March 7, 1974

Reply to Attn. of: D781

To : Robert V. Ochinero (D7)
Via : D78

From : A. R. Picciolo
Chief, Project Monitoring Branch

Subject: SCOPE PRODUCTS REPORT

In reference to the notations and questions inscribed by NODC and EDS staff in the preliminary working copy of NOS' "SCOPE PRODUCTS REPORT" as received from EDS, the following explanatory comments are offered (refer to enclosed copy):

I. Section III. Oceanographic Products (no page number)

A. Tidal Current Observations

The four (4) tapes mentioned by Phil in his memo refer to these current meter data. The tapes contain all of the 1971 field year data and all but approximately ten (10) stations of the 1972 field year data. Additional tapes of later data are expected in March and July of 1974.

B. Temperature-Salinity Observations

Replace

Talked with Carl, neither he nor I ever made such an argument. The Bob in question is Muirhead. NOS feels that quality of data is such that they do not want to release it without caveats attached.

~~That~~ These measurements were obtained with an <u>in situ</u> salinometer (lower quality than an STD). We do not have these data. According to Dick Moore, these data are on approximately 1,000 data sheets, and it is his understanding that the NODC Director and Commander Fisher agreed that at the present time NOS would service xerox copies since the volume of the data were so low.

As per the quotations on photocopies of raw station data and computer listings of raw data, these refer to:

1. Photocopies of raw data - The temperature and salinity values are read from a dial and manually recorded on data sheets (the 1,000 sheets mentioned above). ~~In reply to Morse's question~~, these are not analog traces as from an STD. NOS charges $.50 per xerox copy.

2. Computer listings of raw data - The above values have been keypunched and are on cards, not tape (available at $.75 per listing).

These data have not been corrected and are considered by NOS as being less than high quality.

NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

March 7, 1974 D781

Robert V. Ochinero (D7)
Via : D78

A. R. Picciolo
Chief, Project Monitoring Branch

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These measurements were obtained with an in situ salinometer (lower quality than an STD). We do not have these data. According to Dick Moore, these data are on approximately 1,000 data sheets, and it is his understanding that the NODC Director and Commander Fisher agreed that at the present time NOS would service xerox copies since the volume of the data were so low.

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2. Computer listings of raw data - The above values have been keypunched and are on cards, not tape (available at $.75 per listing).

These data have not been corrected and are considered by NOS as being less than high quality.

Phil ?

D78

National Oceanographic Data Center
Rockville, Maryland 20852

March 13, 1974 D7

Associate Director for Marine Sciences, EDS

Robert V. Ochinero
Director

SCOPE Products Report (preliminary draft copy forwarded by C3 letter to addresseees, undated)

In reference to the notations and questions inscribed by NODC and EDS staff in the preliminary working copy of the NOS "SCOPE Products Report" (refer to enclosed copy), the following explanatory comments are offered.

Section III. Oceanographic Products

A. Tidal Current Observations--The four tapes mentioned by Phil Hadsell in the attached memorandum refer to these current meter data. The tapes contain all of the 1971 field year data and all but approximately 10 stations of the 1972 field year data. Additional tapes of later data are expected in March and July of 1974.

2. Magnetic tape copy of data

b. PHOTO (per meter depth)--According to Carl Fisher, this refers to a copy of the film output from Geodyne current meters. The requester would get a 30-day film record of one of the meters (i.e., from a specific depth level) from the array. For example, if the array had 3 current meters, then a 30-day record for the 3 current meter array would cost $16.

B. Temperature-Salinity Observations--These measurements were obtained with an in situ salinometer. The values are not considered to be very precise. For this reason NOS does not want to make these values available for general distribution. However, depending on who asks for these data, they will release them along with a necessary caveat concerning the quality of the data. According to Dick Moore (NOS), these data are on approximately 1,000 data sheets and NOS would provide Xerox copies.

1. Photocopies of raw data--The temperature and salinity values are read from a dial and manually recorded on data sheets (the 1,000 sheets mentioned above). These are not analog traces as from an STD. NOS charges $.50 per Xerox copy.

2. <u>Computer listing of raw data</u>--The above values have been keypunched and are on cards, not tape (available at $.75 per listing).

2 enclosures

D7:RVOchinero:laf 3-13-74

bcc:
D78

NATIONAL OCEANOGRAPHIC DATA CENTER
Rockville, Maryland 20852

February 21, 1974 D781

FILE

Philip R. Hadsell
Oceanographer

NOS Tidal Current Data

1. NODC has recently received documentation and four magnetic tapes containing tidal current data. These data were taken during the years 1971 and 1972 as part of NOS' Southeast Atlantic Coast Estuarine Study.

The data (NODC Accession Numbdr 74-0142) represents the first shipment of the estimated 13 magnetic tapes to be forwarded to NODC.

D781 - Phil

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C3

D
D1X2
D7
DX7
D1X2

To Addressees

The enclosed SCOPE PRODUCTS REPORT is a preliminary working copy which is being issued to interested parties for interim use prior to the conclusion of the project. An updated and improved report is planned for issue early in 1975 upon the conclusion of the data collection phase of SCOPE. A final published report is then planned about one year later (February 1976) following the final data processing phase.

The purpose of the report is to provide sufficient information concerning the nature of available SCOPE products and how to obtain any specific data. As a potential user of the report, your comments concerning ways in which it may be improved will be most welcomed.

Donald R. Tibbit
Commander, NOAA
Deputy Associate Director
Office of Marine Surveys
and Maps

Enclosure

How about "Call EDS"!!

SCOPE PRODUCTS REPORT

The National Ocean Survey (NOS) is one of the primary organizational elements within the National Oceanic and Atmospheric Administration (NOAA). One of the National Ocean Survey's primary responsibilities is to provide charts and related information for marine commerce, and to provide basic data for engineering and scientific purposes. To meet this responsibility, the National Ocean Survey has had a continuing program of field surveys along the southeast coast of the United States for many years. At the previously scheduled operational rate, an estimated 12 to 15 years would have been required to satisfy <u>presently</u> known survey requirements. The Southern Coastal Plains Expedition (SCOPE) has been initiated to satisfy these requirements by the end of CY-1974.

Through a program of concentration of its marine surveying and mapping resources, the National Ocean Survey plans to complete by the end of CY-1974 those areas of the continental shelf between Cape Hatteras and Cape Canaveral currently in need of modern hydrographic surveys. During CY-1973 four NOAA ships - MT. MITCHELL, PEIRCE, WHITING, and FERREL, one aircraft, the Atlantic Hydrographic Party, and several field support parties participated in the SCOPE program.

Operations encompassed in the SCOPE program include:

1. Hydrographic surveys

2. Bottom sediment sampling throughout the areas to be surveyed.

3. Aerial photography of the entire coastline in the project area with line-drawn maps of the apparent shoreline.

4. Tidal observations to the extent necessary to control hydrography.

5. Circulatory (tidal current) surveys, temperature, salinity, and suspended sediment sampling in selected inshore areas.

6. A physical oceanographic study to determine the effect of the seasonal variations on the tidal characteristics of the area. This study includes deep sea as well as continental shelf tidal observations.

7. Synoptic Weather Observations.

The data processing resulting from the SCOPE surveying effort has been accelerated in order to expedite the timely release of information. As a result, the following data and products are now available to the public:

I. <u>Hydrographic Data</u>

   A. copies of original surveys

II. <u>Photogrammetric Data</u>

   A. coastal maps

   B. aerial photographs

3

III. Oceanographic Data

A. tidal current observations

B. temperature-salinity observations

C. suspended sediment studies

D. tidal observations

IV. Synoptic Weather Observations

A more detailed description of the products associated with each of the above categories follows.

February 8, 1971

NODC Guidelines for Documentation of Subsurface Current Meter Data

INTRODUCTION

The National Oceanographic Data Center's (NODC) Technical Bulletin B-1, 1969, provides general guidelines for the submission of data to the NODC. Activities submitting data to NODC are encouraged to provide adequate documentation of their data; NODC's Data Documentation Form NODC-3167/49(8-70), is available for that purpose. The following provides suggested guidelines for the minimum information required for current meter data submitted to NODC:

A. Instrument

1. Manufacturer and model number

2. Publication(s) referring to the instrument

3. Describe any modifications made to the instrument and the significance of these on the data.

4. Complete the following if believed other than manufacturer specifications:

a. Range of velocity ____________

b. Threshhold velocity ____________

c. Accuracy of the velocity ____________

d. Precision of the velocity ____________

e. Accuracy of the direction ____________

f. Precision of the direction ____________

g. Inclinometer accuracy ____________

B. Observation Platform

1. Briefly describe or reference a publication describing the platform from which observations were taken.

2. Estimate amplitude of instrument oscillation:

a. Horizontal component ____________

b. Vertical component ____________

3. Depth or height from bottom accuracy ____________

C. Data Recording Mode and Treatment

Please describe in detail the relationship between the initial instrument sensing interval and the final discrete observation. For example:

1. Sensing interval (unit of time for one reading).

2. Interrogation interval (interval between recorded readings).

3. Number of readings used for a discrete observation as recorded on final processed data record and nominal time interval between observations.

4. Method of determining (averaging technique) final discrete observation.

5. If data summary is provided, describe method of summarization.

6. Describe data editing procedures, corrections applied to final data, etc.

D. Describe environmental conditions (sea state, fouling, tidal periods, etc.) which may have a bearing on the final data record.

February 8, 1971

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Oceanographic Data Center
Rockville, Maryland 20852

Date : January 22, 1974

Reply to Attn. of: D7

To : File

From : D7

Subject: Current meter data from NOS

In conversation with Commander Fisher of NOS regarding submission of NOS current meter data to NODC, was informed as follows:

Boston Harbor data - already at NODC.

Project SCOPE (Southern Coastal Plains Expedition) data (Charleston Harbor, S.C., southward to and including Ossabaw Sound, Ga.; major harbors include Charleston, S. C., Port Royal Sound, S.C., Savannah, Ga.) - 1971 data to NODC on/about February 10, 1974; 1972 data, March 1, 1974; 1973 data, July 1, 1974.

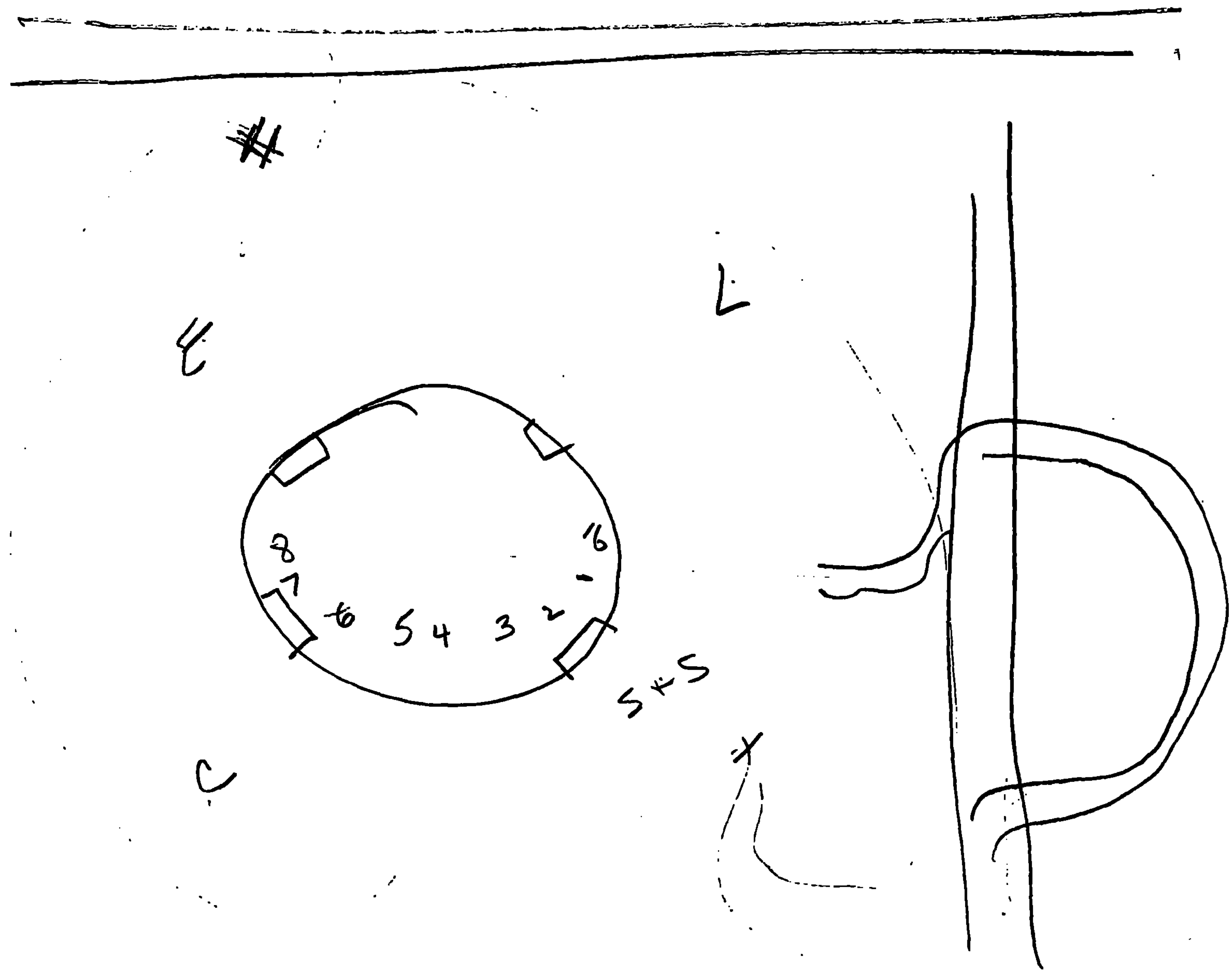
MESA data - being processed at AOML; problems with programming and equipment; best estimate of delivery to NODC "by end of FY-74."

Cook Inlet data - will be processed after MESA data.

Puget Sound data - so far only reconnaissance surveys in area; data to be collected February 1 - March 15, 1974; data to NODC "sometime in FY-75."

Chester River data - taken 2 years ago; data will be processed by NOS; provided to NODC "in increments."

cc:
D7 (Ochinero)
D75 (Perlroth)
D751 (Taber)
D761 (Bargeski)
D763 (Churgin)
D78 (Winterfeld)
D781 (Hadsell)
D781 (Ridlon)
D781 (Picciolo)
D1x2 (Morse)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February 8, 1971

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1. Briefly describe or reference a publication describing the platform from which observations were taken.

2. Estimate amplitude of instrument oscillation:

a. Horizontal component ____________

b. Vertical component ____________

3. Depth or height from bottom accuracy ____________

C. Data Recording Mode and Treatment

Please describe in detail the relationship between the initial instrument sensing interval and the final discrete observation. For example:

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5. If data summary is provided, describe method of summarization.

6. Describe data editing procedures, corrections applied to final data, etc.

D. Describe environmental conditions (sea state, fouling, tidal periods, etc.) which may have a bearing on the final data record.

February 8, 1971

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5. If data summary is provided, describe method of summarization.

6. Describe data editing procedures, corrections applied to final data, etc.

D. Describe environmental conditions (sea state, fouling, tidal periods, etc.) which may have a bearing on the final data record.

73-0431

FORMAT OF DATA ON TAPE
(PHOTOGRAPHIC CURRENT DATA)

Basis of a routine for obtaining data:

NSTAT = # of stations on tape

N = # of data points in each station

```
      DIMENSION TITLE (40)
      READ 9, NSTAT
      DO 30 K= 1, NSTAT
      READ 9,N
      READ (②,1)(TITLE (I), I=1,40)
      DO 20 I=1,N
      READ (②,5) JDAY,MO,IYR,TIME,JCOMP,JVANE,JDIR,CVEC,VVEC,V,ITILT
20    CONTINUE
30    CONTINUE
1     FORMAT (8A10)
5     FORMAT(1X,2(I2,1X),I4,1X,F5.2,3(1X,I3),2(1X,F6.4),1X,F5.2,1X,I4,
9     FORMAT (I5)
```

JDAY, MO, IYR: day, month, year — date of data point; TIME: time; JCOMP: compass; JVANE: Vane; JDIR: DIRECTION (°TRUE); CVEC, VVEC: see attached sheet; V: Velocity (knots); ITILT: Tilt

② just means Tape 2 (using CDC 6600)

74-0142

Tape 2025

File	Sensor
1	1
2	1
3	2
4	1
5	1
6	2
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	2
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1

Sensor
1 (1, 2, 4, 5, 7-15, 17-24)
2 (3, 6, 16)

Bytes 40
" 54

73-0431

ENCLOSED FIND 2 TAPES OF CURRENT DATA AND DOCUMENTATION.

THE INFORMATION ENCLOSED COVERS THE ENTIRE CURRENT SURVEY (WITH TAPES OF DATA YET TO COME). THE ONLY ADDITIONAL INFORMATION NEEDED FOR SOME OF THE UPCOMING DATA ARE FORMAT SPECIFICATIONS FOR THE "TICUS" DATA TAPES (WHICH WILL BE SUPPLIED THEN). The enclosed calibration report should supply all the necessary information on calibration and meter specifications.

PLEASE SEND ME AT LEAST 6 7-TRACK TAPES FOR THE UPCOMING DATA.

THANKS.

BRUCE PARKER

TICUS DATA

BRIEF EXPLANATION OF THE TERM "WT" (WEIGHT)

Each direction reading shown on the printout is actually an edited average of 5 direction readings (each direction reading taken instantaneously every 7.5 seconds over a 38 second period).

"WT" is an indication of how close these 5 direction values were to each other. The two extreme cases are: (1) If all 5 direction values were identical, WT = 1000.; (2) If the 5 direction values were evenly distributed around the compass, WT = 000.

There are two situations that normally bring about low WT's: (1) readings taken at or near slack waters (or minimums), i.e. when the direction of flow is rapidly changing.; (2) when the sea state is fairly great and the data is taken near the surface (i.e. 10 to 15 ft from the surface); the current meter is jerked up and down by the bouncing surface buoy, flipping the vane around and also affecting the savonius rotor.

At the present time there is no method for adjusting the data according to WT.

WT should be used only as a rough qualitative tool.

73.04.31

FORMAT OF DATA ON TAPE

(PHOTOGRAPHIC CURRENT DATA)

Basis of a routine for obtaining data:

```
      DIMENSION TITLE(40)
      READ 9,NSTAT
      DO 30 K=1,NSTAT
      READ 9,N
      READ (2,1)(TITLE(I),I=1,40)
      DO 20 I=1,N
      READ (2,5) JDAY,MO,IYR,TIME,JCOMP,JVANE,JDIR,CVEC,VVEC,V,ITILT
   20 CONTINUE
   30 CONTINUE

    1 FORMAT (8A10)
    5 FORMAT(1X,2(I2,1X),I4,1X,F5.2,3(1X,I3),2(1X,F6.4),1X,F5.2,1X,I4,
    9 FORMAT (I5)
```

NSTAT = # of stations on tape

N = # of data points in each station

JDAY – day; MO – month; IYR – year (day, month, year = date of data point)

TIME – time

JCOMP – compass

JVANE – Vane

JDIR – DIRECTION (°TRUE)

CVEC, VVEC – see attached sheet

V – Velocity (knots)

ITILT – Tilt

(2) just means Tape 2 (using CDC 6600)

73-0431

PHOTOGRAPHIC CURRENT METER DATA

SPEED is measured over a one minute period. (in knots)

The COMPASS value is the mean of 15 instantaneous readings (every 2 1/2 sec.)

The VANE value is the mean of 15 instantaneous readings (every 2 1/2 sec.).

DIRECTION = COMPASS + VANE (in degrees true)

TILT is in degrees.

CVEC gives an indication of how close the 15 instantaneous compass readings were to each other.

If CVEC = 1.000, all 15 instantaneous readings were identical.

If CVEC = .000, these readings were all different and evenly distributed about the 360° of the compass.

(The actual value of CVEC is gotten by putting 15 instantaneous unit vectors end to end ("tail-to-head"), and projecting this sum onto the mean direction vector [of 15 unit-vector length].)

VVEC is gotten in the same manner as CVEC, but applies to the vane readings.

There are two situations that normally bring about low VVEC's (or CVEC's):

(1) readings taken at or near a slack water (or a minimum). At such times the direction of flow can be changing rapidly, or the speeds can be low enough for the data generated by wave motion (or buoy motion) to become prominent.**

(2) when the sea state is substantial and the data is taken near the surface.**

VVEC and CVEC should not be used to eliminate data. These paramenters are meant only to give further insight into the data.

** the small vane on the photographic meter bounces around quite easily. The 15 readings, however, compensate for this.

PROGRAM USED TO WRITE TAPES (USED CDC6600)

```
                 PROGRAM PRNOUT (INPUT,OUTPUT,TAPE1,TAPE2,PUNCH)
           C
           C     THIS PROGRAM GIVES A PRINTOUT OF BLOCKED CURRENT DATA FROM
           C     PHOTOGRAPHIC OR ROBERTS CURRENT METERS .  A FORTRAN TAPE
           C     OF THE DATA CAN ALSO BE WRITTEN.
           C
000003           DIMENSION AA(2210),TITLE(40)
000003           IT1 = 5LTAPE1
000004           ISEX = 0
000006           READ  2, JOBXXX,ISUMRY,IPUN
           C
           C     JOBXXX = NUMBER OF STATIONS TO BE PRINTED.
           C     ISUMRY  = 1  GIVES A SUMMARY LISTING OF THE TAPE.
           C     IPUN = 1,  PUNCHES OUT ALL STATION HEADINGS.
           C          = 2,  NO FILE MARKS BETWEEN STATIONS.
           C
000017           DO 1234 JOBYYY = 1,JOBXXX
000021           NEND = 0
000022           NDAT = 0
000022           IGG = 0
000023           ITIP = 0
000024           ICH2 = 0
000025           IF (ISUMRY.NE.0) GO TO 7720
000027           IF (ISEX.EQ.0) GO TO 1231
000030           PRINT 100
000033           GO TO 7720
000034      1231 PRINT 7
000040           PRINT 8
000044           IF (IPUN.EQ.2) PRINT 11231
           C
000052      1232 READ 2, IFILE,NSKIP,NDATA,ITYPE,ITAPE,ICH2
           C
           C     IFILE = FILE NUMBER OF THE DATA ON INPUT TAPE
           C             ( IF - , ONLY NEED THIS CARD TO DO ALL FILES. )
           C     NSKIP = NUMBER OF DATA POINTS TO BE SKIPPED INITIALLY
           C     NDATA = NUMBER OF DATA POINTS TO BE WRITTEN ( IF  = 0, A LAST
           C                                   DATA POINT CARD WILL BE READ IN )
           C     ITYPE = 6 ( OR = 0) FOR PHOTOGRAPHIC  CURRENT DATA.
           C           = 2  FOR  ROBERTS R.C.M. DATA.
           C     ITAPE = 0  FOR NO TAPE WRITTEN
           C           = 1  FOR TAPE WRITTEN,  FULL PRINTOUT
           C           = 2  FOR TAPE WRITTEN, FIRST + LAST DATA POINTS PRINTED
           C     ICH2 = NUMBER OF FILES TO BE SKIPPED INITIALLY ON THE
           C                                                     OUTPUT TAPE
           C
000072           IF (IFILE.GT.0) GO TO 1233
000075           ISEX = 97
000075           IFILE = IABS(IFILE)
000077      1233 ICV = 0
000100           IF (JOBYYY.GE.2) ICH2 = 0
           C
000104           IF (NDATA.EQ.0) READ 98,LMO,LDY,XTIME
           C
           C     LAST DATA POINT CARD ( READ IN ONLY IF  NDATA = 0 )
           C     LMO, LDY, XTIME  ARE MONTH, DAY, AND TIME OF LAST DATA POIN
           C
000117           IF (JOBYYY.EQ.1) GO TO 1235
```

```
000121     1230 JFIL = IFILE
000122          IFILE = IFILE - JFILE
000124          JFILE = JFIL
000125          GO TO 1235
  0125     1235 JFILE = IFILE
000127     1236 IF (IFILE.GT.0) GO TO 700
000132          PRINT 716
000135          IFILE = 1
000136      700 IF(IFILE.EQ.1) GO TO 720
000140      710 CALL LTRIO (IT1, 48,AA(1),AA(2200),KS)
000144          IFILE = IFILE - 1
000146          GO TO 700
000146      720 IF (ICH2.EQ.0) GO TO 7720
000147          DO 2107 I = 1,ICH2
000151     2106 READ(2,2105)
000155          IF (ENDFILE 2) 2104,2106
000160     2104 ICV = ICV + 1
000162     2107 CONTINUE
000164          PRINT 2103, ICV
000172     7720 CALL LTRIO (IT1,101B,AA(1),AA(2200),KS)
000176          IF((KS.AND.10000000000000B).EQ.0) GO TO 16
000200     9916 PRINT 100
000204          IF (NDAT.EQ.0) GO TO 720
000205          PRINT 100
000211          PRINT 100
000215          NDAT = NDAT +1
000217          PRINT 1917,NDAT
000224          PRINT 1919
000230          NEND = 97
 00231          GO TO 90
 J0232       16 IF(IGG.EQ.97) GO TO 801
000234          DO 800 I=1,40
000236          TITLE(I) = AA(I)
000240      800 CONTINUE
000241          PRINT 100
000245          IF (ISUMRY.NE.1) GO TO 8801
000247          ISUMRY = 2
000250          PRINT 7
000254          PRINT 8
000260          PRINT 100
000264          PRINT 100
000270          PRINT 8005
000274          PRINT 8005
000300          PRINT 8007
000304          PRINT 8003
000310          PRINT 8007
000314          PRINT 8005
000320          PRINT 8005
000324          PRINT 100
000330     8801 IF (ISUMRY.NE.0.OR.ITAPE.EQ.2) PRINT 95,JOBYYY
000344          PRINT 100
000350          PRINT 1, TITLE
000356          PRINT 100
000362          IF (IPJN.EQ.1) PUNCH 1,TITLE
000372          IF (ISUMRY.NE.0) GO TO 205
 10373          IF (ITAPE.EQ.0) GO TO 8802
 .00374          WRITE(2,1) TITLE
000402     8802 IF (ITYPE.EQ.2) PRINT 102
```

```
000410          IF (ITYPE.NE.2) PRINT 101
000416          IGG = 97
000417          MP = 45
000420          MP = MP + (NSKIP * 11 )
 00423     9900 IF(MP.LT.2200) GO TO 6801
 00426          MP = MP - 2200
000427          CALL LTRID (IT1,101B,AA(1),AA(2200),KS)
000432          GO TO 9900
000433      801 NDAT = NDAT + 1
000435          IF (ITAPE.LT.2) GO TO 6801
000437          IF (ITIP.EQ.97) GO TO 6801
000441          ITIP = 97
000442          PRINT 1993
000446          PRINT 100
000452     6801 IF (NDATA.GT.0) GO TO 66801
000455          IF (JDAY.NE.LDY) GO TO 1801
000457          IF (MO.NE.LMO) GO TO 1801
000461          IF (TIME.LT.(XTIME -.01) ) GO TO 1801
000464          GO TO 66802
000465    66801 IF(NDAT.LT.NDATA) GO TO 1801
000470    66802 IF (ITIP.NE.97) GO TO 66803
000472          IF (ITYPE.EQ.2) GO TO 66804
000474          PRINT 5, JDAY,MO,IYR,TIME,JCOMP,JVANE,JDIR,CVEC,VVEC,V,ITILT
000526          GO TO  66803
000527    66804 PRINT 605, JDAY,MO,IYR,TIME,JDIR,V
000547    66803 PRINT 1917,NDAT
000555          GO TO 90
000556     1801 IF(MP.LT.2200) GO TO 802
000561          NDAT = NDAT - 1
000562          MP = 1
 00563          GO TO 720
 00564      802 JDAY = AA(MP)
000566          MO = AA(MP+1)
000570          IF (MO.NE.0) GO TO 1990
000572          MO = KMO
000573          JDAY = KDAY
000574          GO TO 66802
000575     1990 IYR = AA(MP+2)
000577          TIME = AA(MP+3)
000601          JCOMP = AA (MP+4)
000603          JVANE = AA (MP+5)
000605          JDIR = AA(MP+6)
000607          CVEC = AA(MP+7)
000610          VVEC = AA(MP+8)
000612          V = AA(MP+9)
000613          ITILT = AA (MP+10)
000615          KMO = MO
000617          KDAY = JDAY
000620          MP = MP + 11
000622          IF (ITYPE.EQ.2) GO TO 137
       C
       C        PHOTOGRAPHIC  DATA
       C
000624          IF (ITIP.EQ.97) GO TO 1991
000626          PRINT 5, JDAY,MO,IYR,TIME,JCOMP,JVANE,JDIR,CVEC,VVEC,V,ITILT
  0657          IF (ITAPE.EQ.0) GO TO 801
  0660     1991 WRITE (2,3) JDAY,MO,IYR,TIME,JCOMP,JVANE,JDIR,CVEC,VVEC,V,ITILT
000712          GO TO 801
```

```
          C
          C       ROBERTS RADIO CURRENT METER
          C
000713     137 IF (ITIP.EQ.97) GO TO 1992
000715         PRINT 605, JDAY,MO,IYR,TIME,JDIR,V
000735         IF (ITAPE.EQ.0) GO TO 801
000736    1992 WRITE(2,605) JDAY,MO,IYR,TIME,JDIR,V
000756         GO TO 801
000757      90 CONTINUE
000757         IF(ITAPE.EQ.0) GO TO 205
000760         IF (IPUN.EQ.2) GO TO 205
000762         ENDFILE2
000764     205 CONTINUE
000764         IF (NEND.EQ.97) GO TO 1234
000766    5678 CALL LTRID (IT1,  4B,AA(1),AA(2200),KS)
000772    1234 CONTINUE
000775         IF (IPUN.EQ.2) ENDFILE2
001001         REWIND 1
001003         STOP
001005       1 FORMAT (8A10)
001005       2 FORMAT (6I5)
001005       5 FORMAT(1X,2(I2,1X),I4,1X,F5.2,3(1X,I3),2(1X,F6.4),1X,F5.2,1X,I4,20
              1X,F5.0)
001005     605 FORMAT(1X,2(I2,1X),I4,1X,F5.2,  9X,I3 ,    15X       ,F5.2,
              1X,F5.0)
001005       7 FORMAT (1H1)
001005       8 FORMAT (1X,41HDATA FROM SURVEY BY NATIONAL OCEAN SURVEY/1X,58H(F
              1MERLY, U.S. COAST AND GEODETIC SURVEY), ROCKVILLE, MD.//)
001005      95 FORMAT (1X,11HFILE NUMBER,I4)
001005      98 FORMAT (2I5,F5.2)
001005     100 FORMAT (1H0)
001005     101 FORMAT(4X,4HDATE,36X,5HSPEED/55H DA MO YEAR  HOUR COM VAN DIR
              1EC   VVEC (KTS)  TILT/)
001005     102 FORMAT(4X,4HDATE,36X,5HSPEED/55H DA MO YEAR  HOUR          DIR
              1            (KTS)      /)
001005     716 FORMAT (1X,16HBAD IFILE VALUE.)
001005    1993 FORMAT (1H+,59X,16HFIRST DATA POINT)
001005    1917 FORMAT (1H+,59X,16H LAST DATA POINT,6X,I5)
001005    1919 FORMAT (45X,23H(RAN INTO  END OF FILE))
001005    2103 FORMAT (100X,7HSKIPPED,I3,6H FILES)
001005    2105 FORMAT (A1)
001005    8006 FORMAT (27X,22H0000000000000000000000)
001005    8007 FORMAT (27X,3H000,16X,3H000)
001005    8008 FORMAT (10X,20HSUMMARY OF TAPE  000,16X,3H000)
001005   11231 FORMAT (32HONO FILE MARKS BETWEEN STATIONS.)
001005         END
```

September 13, 1971

NODC Subsurface Current Header and Inventory Description

(Mooring Record)

Position/Bytes 1-2 DECK NUMBER

NODC File Identification Number. Number '11' for this type of data.

Position/Bytes 3-5 RECORD NUMBER

Consecutive Record Number for the current measurements from this platform and time period. The Mooring Record will be '001.'

Position/Bytes 6-8 NODC COUNTRY CODE

This three-character code represents the nationality of the institution sponsoring or operating the platform during this particular investigation. The first character is blank at present, but available for future expansion.

Position/Bytes 9-13 NODC REFERENCE IDENTITY NUMBER

The Reference Identity Number is assigned by the Data Center for processing purposes to identify the data taken during a particular cruise or observational period.

Position/Bytes 14-16 CONSECUTIVE NUMBER

Moorings are numbered consecutively within a cruise or project beginning with 001.

Position/Byte 17 QUADRANT CODE

This is the WMO 3333 quadrant code, where 1 = NE, 3 - SE, 5 - SW, and 7 - NW.

Position/Bytes 18-20 TEN DEGREE SQUARE

See Appendix.

Position/Byte 21 FIVE DEGREE SQUARE

See Appendix.

Position/Bytes 22-23 TWO DEGREE SQUARE

See Appendix.

Position/Bytes 24-25 ONE DEGREE SQUARE

See Appendix.

Position/Bytes 26-27 LATITUDE DEGREES

Whole degrees of latitude at which observations were made.

Position/Bytes 28-29 LATITUDE MINUTES

Continuation of latitude location.

Position/Byte 30 LATITUDE TENTHS OF MINUTES

Continuation of latitude location.

Position/Byte 31 LATITUDE HEMISPHERE

'N' or 'S' denotes hemisphere where observations were made.

Position/Bytes 32-34 LONGITUDE DEGREES

Whole degrees of longitude at which observations were made.

Position/Bytes 35-36 LONGITUDE MINUTES

Continuation of longitude location.

Position/Byte 37 LONGITUDE TENTHS OF MINUTES

Continuation of longitude location.

Position/Byte 38 LONGITUDE HEMISPHERE

'E' or 'W' denotes hemisphere where observations were made.

Position/Bytes 39-42 YEAR

'19' is prefixed to the last two digits of the year during which the mooring was launched.

Position/Bytes 43-44 MONTH

Continuation of the mooring launch date 01-12 represents the month.

Position/Bytes 45-46 DAY

Continuation of date 01-31 may appear in this field.

Position/Bytes 47-48 HOURS

Time of the mooring launch to the hour 00-23 may be entered in this field.

Position/Bytes 49-50 MINUTES

Continuation of time. A number from 00-59 appears here.

Position/Bytes 51-52 PLATFORM AND MOORING TYPE

Code describing platform type and mooring. See Table I.

Position/Bytes 53-58 NODC PLATFORM CODE

A 6-character alpha-numeric code, representing the platform or mooring from which the measurements were taken.

Position/Bytes 59-62 DEPTH TO BOTTOM

The depth to the bottom of the ocean at the location where observations were made.

Position/Bytes 63-70 ORIGINATOR'S CRUISE NUMBER

The cruise or project number assigned by the originator is retained in the NODC STD file.

Position/Bytes 71-75 ORIGINATOR'S STATION NUMBER

The originator's station (mooring) number is retained in the NODC STD file.

Position/Byte 76 DUC

This is an NODC code indicator for data exchange. It is used for internal house-keeping purposes only.

Position/Bytes 77-88 DATE & TIME OF MOORING RECOVERY

This field, similar to byte positions 39-50, is the date and time at which the mooring was recovered or the ship left station.

Position/Bytes 89-92 MAGNETIC VARIATION

This is the positive or negative magnetic variation from True North in whole degrees, Position 89 is used for the (+) or (-) sign.

Position/Bytes 93-95 TIDAL RANGE

The Tidal Range, reported here in meters and tenths of meters, is the difference between the Mean High Tide and Mean Low Tide.

Position/Bytes 96-97 NUMBER OF METERS

The number of current meters reporting for this platform or mooring and time period.

Position/Bytes 98-99 NUMBER OF COMMENTS

This is the number of 80 byte segments that follow, describing the mooring operation. A maximum of ten 80 byte segments (800 bytes) may be used.

Position/Byte 100 *BLANK*

This byte is left blank for computer byte boundary alignment.

Position Bytes 101 up thru 900 COMMENTS

Up to 800 bytes in 80 byte segments may be used to describe the nature of the mooring, its performance, its purpose or reference publication or procedures relating to the mooring operation. This area is intended to provide as much information as possible to the potential user of the data.

NODC Subsurface Current Header and Inventory Description

(Meter Record)

One meter record will be completed for each current meter attached to the mooring. The number of meter records therefore is the number of current meters as reported in Positions 96-97 of the Mooring Record.

Position/Bytes 1-2 DECK NUMBER

NODC File Identification Number. Number '11' for this type of data.

Position/Bytes 3-5 RECORD NUMBER

Consecutive Record Number for the current meters. The first meter Record will be '002' and numbered consecutively thereafter.

Position/Bytes 6-16 NODC ID FIELDS

These positions are the same as reported in the Mooring Record (Record Number '001').

Position/Bytes 17-21 DEPTH OF METER

This may be reported as the depth of the current meter, below the surface in whole meters with Position 17 having a plus (+) sign or the height above the bottom with Position 17 having a minus (-) sign.

Position/Bytes 22-25 ORIGINATOR'S METER NUMBER

This field is available for recording the originator's current meter designator.

Position/Bytes 26-35 DATE & TIME OF FIRST RECORD

This is the last two digits of year, month, day, hour, and minute of the first data record produced by this meter.

Position/Bytes 36-45 DATE & TIME OF LAST RECORD

Similarly as above, this is the date and time of the last data record produced by this meter.

Position/Bytes 46-52 DURATION

This field is the duration of usable data records reported as days (46-48), hours (49-50), and minutes (51-52). Document discontinuous records resulting from bad data in the comment portion of this record.

Position/Bytes 53-55 AVERAGE TIMING ERROR

This is the average timing error for the entire Current Data Record reported in seconds with Position 53 used for the sign.

Position/Bytes 56-60 SAMPLING FREQUENCY

This alpha numeric field is used for recording the instrument sampling frequency. Position 60 being reserved for the units abbreviation. H = hours, m = minutes, s = seconds. For example '01.5H' would indicate the meter sampled every one and one-half hours.

Position/Byte 61 TYPE OF SAMPLING

I = Instantaneous, A = Averaged, B = Burst.

Position/Bytes 62-65 RATE OF SAMPLING

For Average or Burst type sampling, enter the rate at which data was recorded in seconds and tenths of seconds. For example '02.5' seconds indicated that current direction and speed was recorded in two and one-half seconds.

Position/Bytes 66-70 DURATION OF SAMPLING RATE

Enter the alpha-numeric time and units indicator to show how long the

Password:

accNo	fleA	refNo	proj	inst	ship	startDate	cruise	catId
7300431	C100	TR0028	9999	31J4	318L	1971/05/01	NULL	282466

(1 row affected)

```
Password:
 accNo    fleA refNo   ship staCnt      recCnt      startDate   endDate
 -------- ---- ------- ---- ----------- ----------- ----------- -----------
 7300431  C100 TR0028  318L          56           0 May  1 1971 Oct  1 1971

(1 row affected)
```