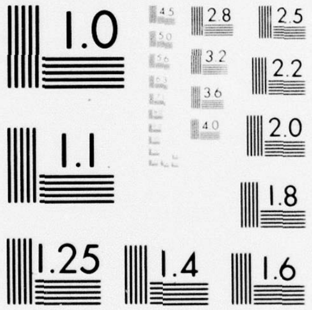
AD-A040 586   OREGON STATE UNIV CORVALLIS SCHOOL OF OCEANOGRAPHY   F/G 8/10
EXPOSURE. A NEWSLETTER FOR OCEAN TECHNOLOGISTS. VOLUME 5. NUMBE--ETC(U)
MAY 77 R MESECAR   N00014-67-A-0369-0007

UNCLASSIFIED   NL

| OF |
ADA040586

END
DATE
FILMED
7-77



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

12

EXPOSURE

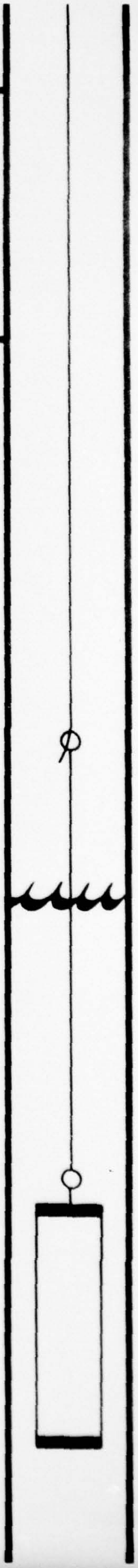
vol.5 no.2

a newsletter for ocean technologists

Slipring and Adaptor Assembly

Sliprings can be a seagoing researcher's best friend--providing they are functioning properly. Today's researcher is generally accustomed to crating up his over-the-side, electric-cabled monitoring system and sailing aboard most any academic ship of opportunity. However, the inconsistent availability, quality, number of circuits, and the conditions of slipring assemblies on the winches of these different ships pose a problem. One solution to this problem is for the researcher to take aboard his own sliprings.

The following article describes a manufacturable, reliable slipring assembly concept and an adaptor scheme that can be used to readily mechanically interface either a manufactured or purchased slipring assembly to most shipboard winches.



May 1977

The slipring principle shown schematically in Figure 1 consists of a flat grounding braid, under light tension, which tracks on a bronze rotating ring. The diagram does not contain any dimensions because the unit can be scaled to fit your needs. The bronze contacting ring can be of any practical diameter (1-10 inches) and still insure continuous braid contact over an 180° to 270° arc of ring circumference. Extended contact ring wearability can be designed into the assembly by selecting a hard bronze[1] alloy, but for most winch speeds and applications the extra durability is not necessary.

For most of our applications, a 7/32-inch-wide grounding braid[2] is used for the contactor ring pickoff. This size braid can be used for a 1 mA to 50 A circuit with comparable results.

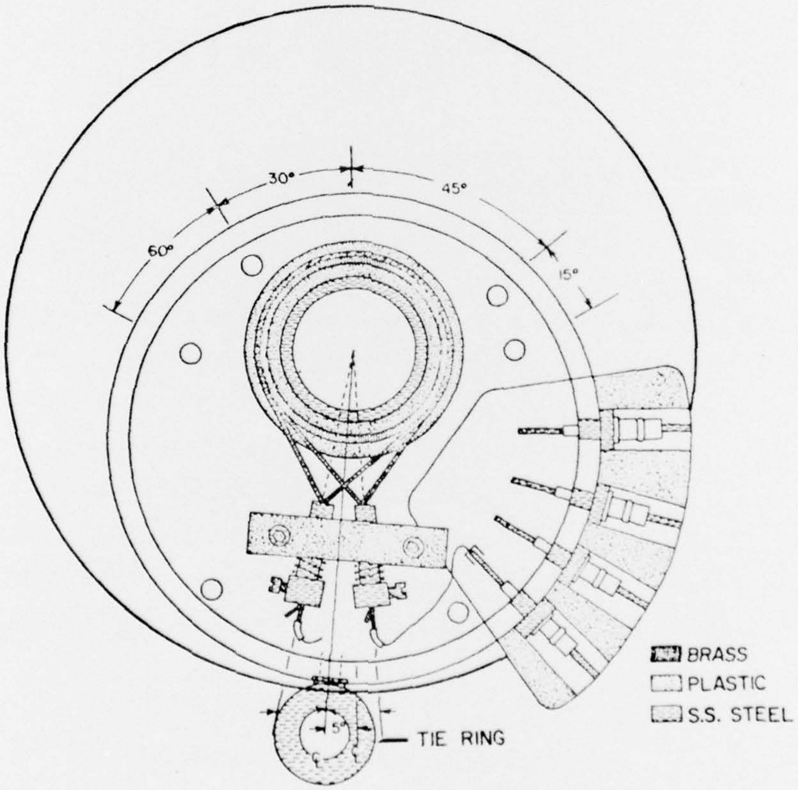


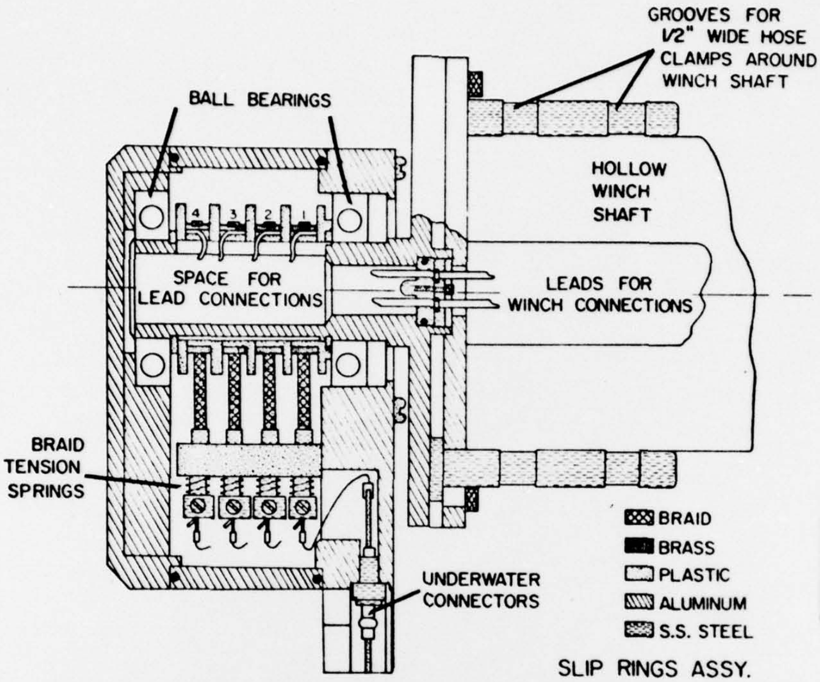
FIGURE 1.

---

[1] AMPCOLOY 45 (AMS-4640C)

[2] Beldon (#8668-50)

[3] Lane Spring Co.(#7111), 3929 Whittier Blvd., Los Angeles, CA



SLIP RINGS ASSY.
JAN 1977

FIGURE 2.

The braid for each circuit is kept under light tension by a separate spring[3]. After the braid is looped around the contactor ring and fed through the spring retainer, the spring is compressed to one-half its length and the braid secured by a set screw. Connecting wires are soldered directly to the braid and then to underwater connectors for the stationary terminals. This type of slipring pickoff is self-cleaning and equally effective in either direction of shaft rotation.

Figure 2 shows a slipring assembly with four circuits. Units have been made with nylon bearings for winch speeds around 20 rpm; however, ball bearings will insure operational speeds up to 1000 rpm. The slipring housing is weathertight with either O-ring seals or shaft-oil seals on all fitted surfaces.

The adaptor for mounting the slipring assembly to the winch shaft is partially illustrated in Figure 2 and a more frontal view of a finished unit is shown in Figure 3.

The two aluminum discs that form part of the adaptor can be rotated relative to each other. This motion, via cam guides, causes the three 4-inch-long rods with T-bolt guides to equally change their spacing from a center point. The rods are adjusted in this manner to fit over the winch shaft and are then secured with two hose clamps. By tightening three lock bolts on the two discs, the T-bolt ends of the rods are clamped for slipring assembly operation. As the last step in mechanically interfacing the slipring assembly, a cord should be passed through the tie ring, shown in Figure 1, and tied off to some

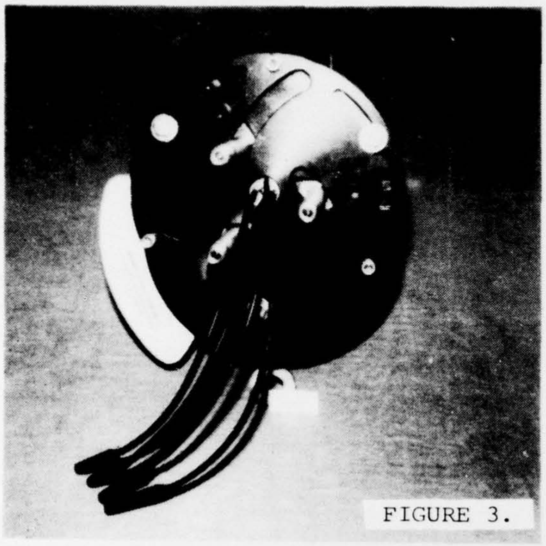


FIGURE 3.

nearby stationary part of the winch. This cord provides a torque balance for the small drag resistance of the sliprings. Total excursion for the adaptor rods will accommodate winch shaft diameters from 1.5 to 5.5 inches. Figure 4 is a completed adaptor and slipring assembly with the cover removed.

Slipring circuit resistance is about 2 mΩ and circuit-to-circuit "megger" resistance is greater than 30 MΩ. Commerical flange mounted sliprings could be attached directly to the outer disc of the adaptor to achieve similar shaft mounting flexibility.

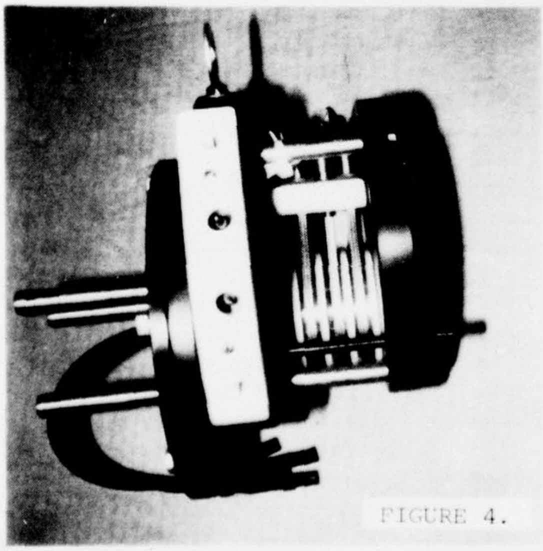


FIGURE 4.

FOR FURTHER INFORMATION, CONTACT:

Rod Mesecar
School of Oceanography
Oregon State University
Corvallis, OR 97331

Telephone: (503) 754-2206

Rod Mesecar is head of the Technical Planning and Development Group, School of Oceanography at Oregon State University. He has B.S., M.S., and E.E. degrees in electrical engineering and a Ph.D. in physical oceanography from OSU. Since 1965, his interest has been in applying technology to all disciplines of oceanography.

Milton Rowland is a senior scientific instrument technician with the OSU Technical Planning and Development group. He has 33 years of varied industrial experience in developing specialized prototype equipment. He is a senior member of the American Tool & Die Manufacturing Society and a member of the Carbide Tool Society.

current meter performance in a near-surface simulated environment

In *Exposure*, Vol. 3, No. 4, Al Kalvaitis provided a brief description of a dynamic test apparatus developed for the performance testing of current meters in a laboratory. The apparatus provides various modes of oscillation to a current meter when attached to the Naval Ship Research and Development Center (NSRDC) #1 tow carriage. In July 1976, preliminary tests were performed on the apparatus in the circular operating mode. The objective of these tests was to evaluate apparatus performance in this mode prior to fabrication of the horizontal and vertical operating modes and development of test procedures and data analysis techniques.

A Marsh McBirney (MMI) model 555 electromagnetic current meter, an Aanderaa RCM-4 rotor-type meter, and a General Oceanics model 2010 drag-force-type meter were utilized as representative instruments for test purposes. A summary of test conditions and procedures used follows:

General Test Conditions

A near-surface environment was simulated with orbital water particle velocities averaging to zero transport in the presence of a steady net flow. The NSRDC #1 tow carriage provided "simulated" steady net flow conditions. The dynamic test apparatus provided orbital (circular) velocity to the test transducer.

Specific Tests Conditions

1. Angle between the plane of the orbital velocity and the steady flow component

   0°, 45°, 90°

2. Steady flow velocities

   10 cm/s, 36 cm/s, 72 cm/s

3. Orbital conditions

period	amplitude (peak-to-peak)	orbital speed (tangential component)
5 sec	122 cm	77 cm/sec
8 sec	122 cm	47 cm/sec
12 sec	122 cm	32 cm/sec

Data Collection and Analysis

The digital data sampling rate was 2/sec. The data summary shown in Table 1 represents the average of 100 samples from each test input. The performance of the apparatus was monitored by utilizing tri-axial accelerometers to record vibration data, and a precision shaft angle encoder with elapsed time monitor to determine angular velocities and position. Data was accumulated, processed, and analyzed by a Hewlett-Packard 9830 calculator system. Motion picture films were taken of the test sequences to visually record apparatus and test instrument performance.

Results

The apparatus met design expectations and approval was made to complete fabrication of the horizontal and vertical operating modes. Completion of construction of the apparatus is scheduled for April of 1977 with a series of second generation performance evaluation tests to follow.

Test results on the Aanderaa and General Oceanics (G.O.) current meters were of limited value because only speed data was acquired, precluding a vector analysis. Speed data taken during tests in which no current reversals occurred indicated

TABLE 1

orbital speed (tangential) cm/sec	net actual speed cm/sec	MMI-555 indicated net speed cm/sec
1. orbital velocity angle 0°		
32	10.5	13.5
32	36.1	37.4
32	72.2	73.6
47	10.5	15.5
47	36.1	40.1
47	72.4	70.9
77	10.4	19.2
77	36.6	41.1
77	72.2	71.9
2. orbital velocity angle 45°		
32	10.7	11.9
32	36.6	35.8
32	72.2	72.9
47	10.6	13.2
47	36.6	39.1
47	72.2	69.9
77	10.4	14.9
77	36.2	38.4
77	72.3	70.9
3. orbital velocity angle 90°		
32	10.9	13.9
32	36.3	37.7
32	72.0	72.2
47	10.2	13.5
47	36.4	38.4
47	72.8	71.9
77	10.5	14.2
77	36.5	38.4
77	72.8	71.6

an overregister by the Aanderaa rotor. Analysis of the movie films indicate that the meter vane would not respond to the reversing type flows produced. The G.O. meter responded to low frequency flow reversals but became unstable at high frequency flow conditions. A vector analysis was performed on the MMI-555 system and compared to the input velocity vectors under both real time and averaging conditions. A summary of the magnitude of the vector averages is shown in Table 1.

Real time data analysis included: plotting the vector magnitude of each test point vs. time on a scalar plot (see Figure 1); a burst vector plot showing magnitude and direction of each data point (see Figure 3); and a progressive vector plot showing indicated distance traveled and position after the elapsed test (see Figure 4). In each case a plot of the actual input conditions is displayed for comparison of errors.

Conclusion

Laboratory test results indicate that the mechanical-type transducers tested have slow and/or nonlinear response to the expected range of near-surface fluid velocity fluctuations. The response function and range of environment dynamics in which response is adequate have yet to be determined for mechanical transducer systems. The MMI-555 electromagnetic system is the most responsive system evaluated to date by T&EL under dynamic conditions. The indicated averaging errors are, in most cases, within the

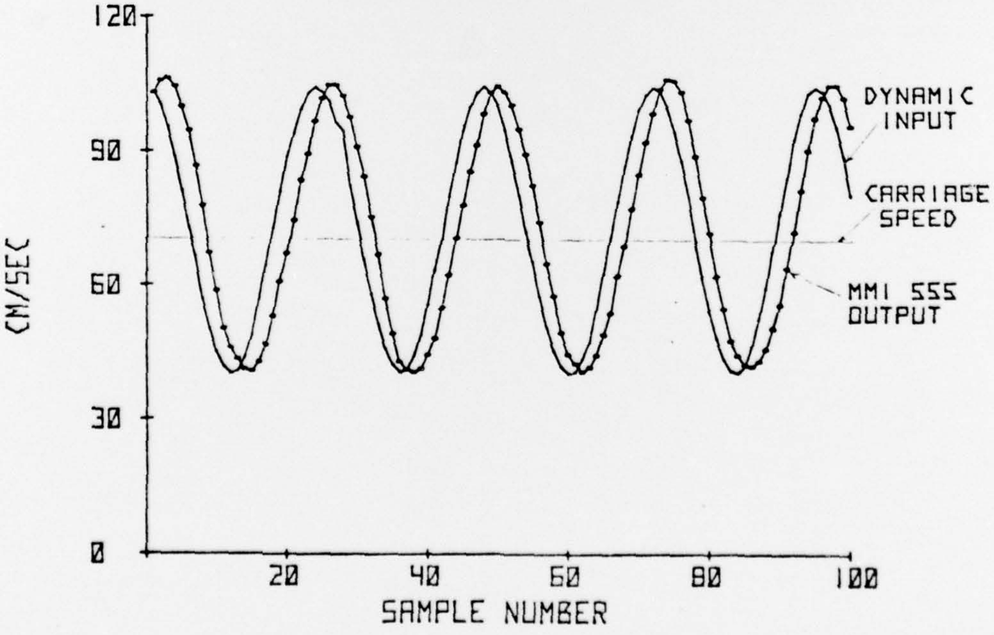


FIGURE 1. This figure represents real time display at the 0° attack angle, oscillation period of 12 sec, and a carriage velocity of 72 cm/sec. The MMI-555 transducer responds completely to the amplitude variations but lags in phase due to the 1-sec time constant.

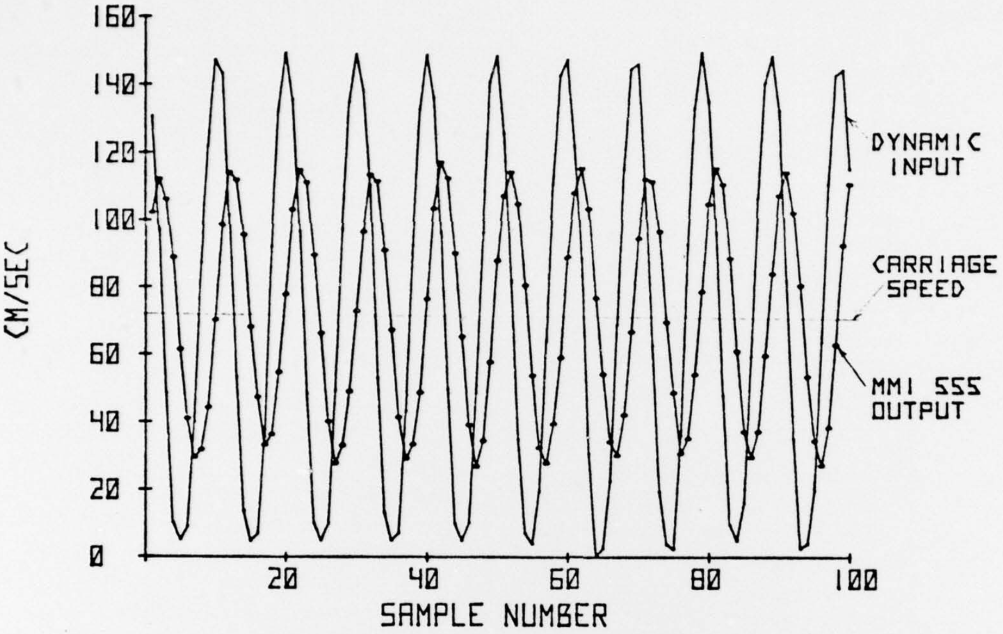


FIGURE 2. This figure is similar to Figure 1 conditions but with a decrease of oscillation period to 5 sec. The result is a noticeable attenuation in amplitude of response and phase shift, both attributable to the 1-sec time constant.

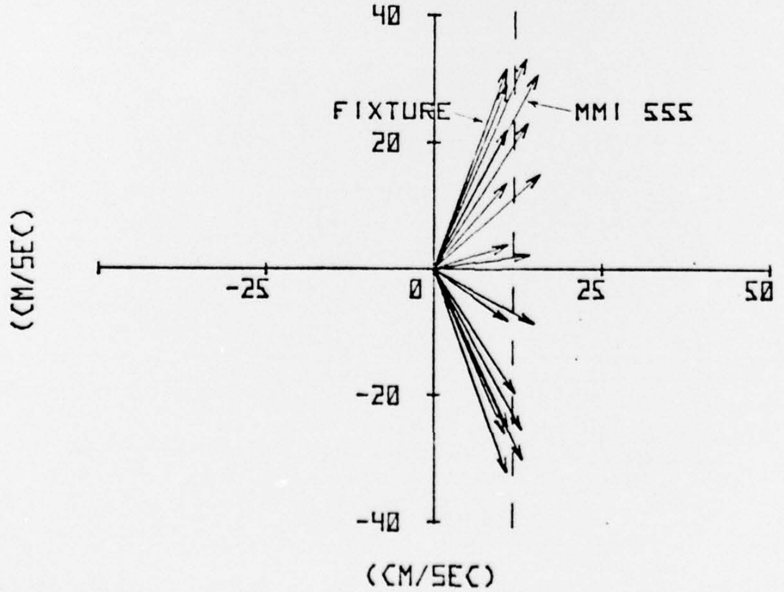


FIGURE 3. The burst vector diagram represents conditions of 90° attack angle, 12-sec oscillation period, and 10 cm/sec carriage velocity. The input or actual vectors all end at the dashed line while the MMI-555 response vectors are longer and of slightly different direction (see average results in Table 1).

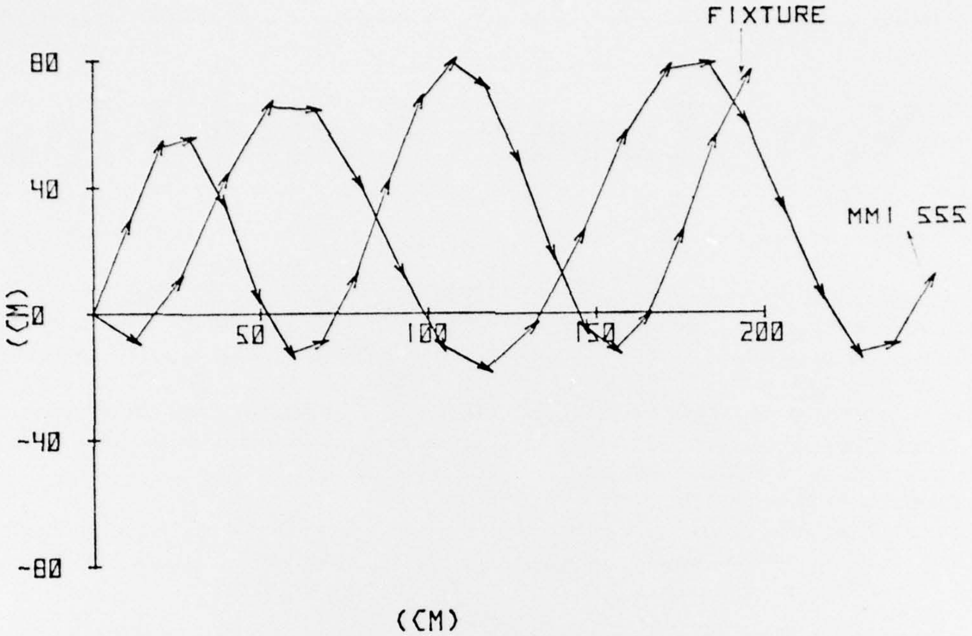


FIGURE 4. The progressive vector diagram is from the identical data as *in Figure 3. The distance traveled and phase lag is clearly apparent* after plotting the final position of 20 vectors.

---

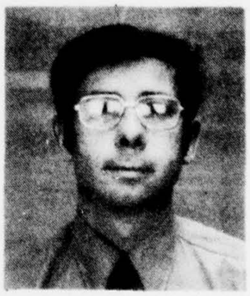
experimental error and/or the precision of calibration.

The scientific community should be aware of this response problem and avoid system designs that introduce dynamics or place systems in severe environmental dynamics. At the present time, T&EL is continuing its program to fully define current measuring system performance in both steady flow and dynamic environments.

FOR FURTHER INFORMATION, CONTACT:

Mr. Gerald F. Appell
National Oceanic & Atmospheric
Administration
Rockville, MD 20852

Telephone: (202) 426-9090



Gerald F. Appell is project leader of the Ocean Fluid Dynamics project of the Test and Evaluation Laboratory of N.O.A.A. He received a B.S. in mechanical engineering from the Brooklyn Polytechnic Institute in 1964. Since that time he has been involved in various ocean technology programs with the Naval Oceanographic Office and National Oceanographic Instrumentation Center (NOIC).

A New Handy Radio Float

For easy and safe recovery of subsurface moorings we have used the Ocean Research Engineers (ORE) radio beacon for several years. This instrument usually is mounted on top of the uppermost buoyancy element. Due to the size and weight of the subsurface buoy the transmitter antenna is often difficult to protect against physical damage during the launching maneuver. Depending on the shape and load of the buoy, and the sea state, the signal quality can be substantially influenced by the tilt angle of the antenna and sea waves breaking over the drifting buoy.

In 1977 we introduced a new radio beacon float which fulfills three

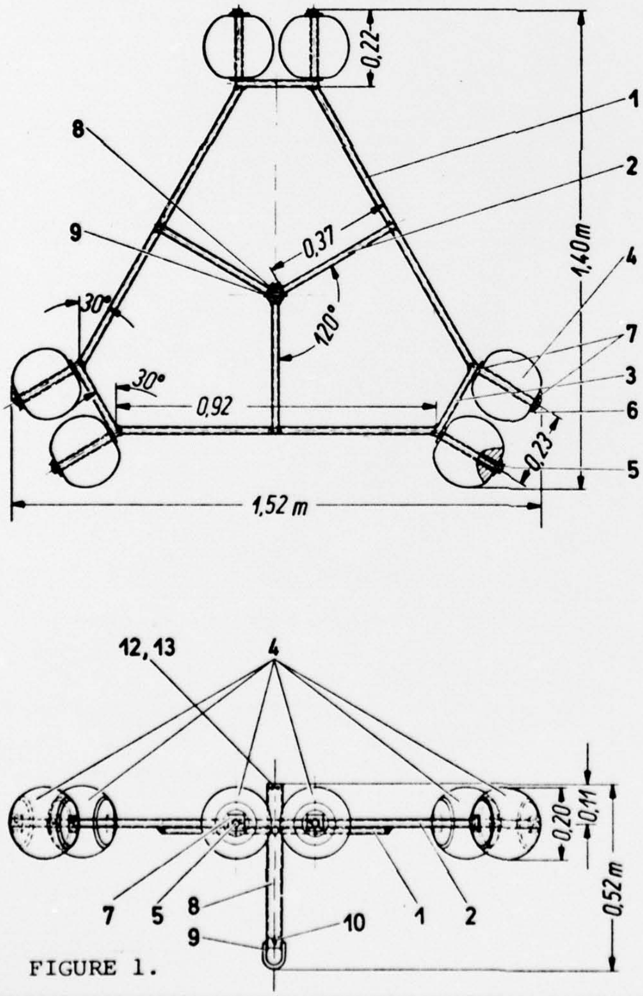


FIGURE 1.

GERMAN

1	Rohr, V2A
2	Rohr, V2A
3	Rohr, V2A
4	Robust-Kugel, 4 NYH, PVC
5	Rohr, V2A
6	Splint, V2A
7	Unterlegscheibe, Gummi
8	Rohr, V2A
9	Rundstahl, V2A
10	Rundstahl, V2A
11	Scheibe, V2A
12	Rundstahl, V2A
13	Splint, V2A

ENGLISH TRANSLATION

1	s.s.* tubing
2	s.s. tubing
3	s.s. tubing
4	high-pressure flotation, PVC
5	s.s. tubing
6	s.s. cotter pin
7	rubber washer
8	s.s. tubing
9	s.s. solid bar
10	s.s. solid bar
11	s.s. washer
12	s.s. solid bar
13	s.s. cotter pin

*stainless steel

basic demands:

1) it is lightweight
2) it is independent of the main subsurface buoy
3) it guarantees an optimal floating position even in heavy sea.

Figure 1 shows the triangular shaped frame which carries the radio beacon. The unit weighs 8 kg, is made out of stainless steel, and its flotation consists of six net balls. The present version withstands 500 dbar of hydrostatic pressure depending on the applied buoyancy material. The radio float is connected to the main subsurface float by a 5 m nylon rope. Whenever possible we prefer the "buoy-first" deployment technique starting with the hand-launched radio support float as the first element over the side. The units were first used during the POLYMODE EAST Program in the North Atlantic in January 1977, with positive results.

FOR FURTHER INFORMATION, CONTACT:

D. Carlsen or Walter Zenk
Institut für Meereskunde
Düsternbrooker Weg 20
2300 Kiel/Germany

Telephone: Vermittlung (0431) 5971
Telex: 02 926 19, fmk d

Mr. D. Carlsen and Dr. W. Zenk work in the Marine Physics Department of the Institut für Meereskunde in Kiel, Germany. Experience of the group in deep sea mooring systems dates back to 1964. In the past 12 months moorings were launched by the Institut für Meereskunde in the Drake Passage, off Somalia, off Peru, on the Island-Färöer Ridge, off West Africa, in the Iberian Basin, and in the Baltic Sea. In 1976 a total number of 4421 mooring days (instrument days) were recorded.

ABSTRACT

Pacific Marine Science
Report 76-28

Salinity -- Its Definition and Calculation

Salinity data used to trace water movement or compute density are normally derived from measurements of chlorinity or electrical conductivity temperature, and pressure. The latter technique has a precision about one order of magnitude greater than a typical chlorinity titration, but both are sensitive, in different ways, to variations in the ionic ratios of seawater. Present definitions of salinity are also ion-dependent causing significant variations in the salinity/density relationship which cannot be simply expressed. In order to obtain density to an accuracy commensurate with the available precision, it is best to define salinity in relation to a water mass of known ionic content, so that a density correction to be applied to other water masses may be expressed as variations from a fixed standard. These corrections then appear in the form of simple additive constants for most waters and where density difference is the important parameter, no correction is necessary within a specific water mass. The new salinity definition is based on dilution by weight of a conductivity ratio labeled standard seawater. It would be invariant under compositional variations, and in accord with the proposed

new equation of state by Grasshoff (1976). It is conservative within acceptable limits, would provide a "practical salinity scale" for use by oceanographers of all levels of sophistication, and greatly facilitate data comparisons between institutions. The present variety of computational procedures for in situ data reduction would be replaced by one set of definitive equations that would not be subject to change as the precision of physical or chemical measurement improved. A great part of the data base necessary to write these equations exists and the remainder should be available by 1978.

FOR FURTHER INFORMATION, CONTACT:

E. L. Lewis and R. G. Perkin
Frozen Sea Research Group
Institute of Ocean Sciences,
Patricia Bay
VICTORIA, B. C.   Canada

TABLE OF CONTENTS

Dr. Rod Mesecar, Editor
EXPOSURE
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

FIRST CLASS MAIL

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Vol. 5, No. 2 ✓	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) (6) EXPOSURE. A newsletter for ocean technologists. Volume 5 Number 2.	(9)	5. TYPE OF REPORT & PERIOD COVERED technical report, 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Dr. Roderick Mesecar (Ed.) (10)	(15)	8. CONTRACT OR GRANT NUMBER(s) N00014-67-A-0369-0007
9. PERFORMING ORGANIZATION NAME AND ADDRESS School of Oceanography, Oregon State University Corvallis, OR 97331		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR 083-102
11. CONTROLLING OFFICE NAME AND ADDRESS NORDA/NSTL Bay St. Louis, MS 39520 Attn: Code 410	(12) 12p. (11)	12. REPORT DATE May 1977 13. NUMBER OF PAGES 12
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) (U) 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Published every two months by the School of Oceanography, Oregon State University, Corvallis, OR 97331

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Ocean Technology; instrumentation

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Slipring and Adaptor Assembly
Current Meter Performance in a Near-Surface Simulated Environment
A New Handy Radio Float

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

272 268