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CRUISE REPORT, ATLANTIS II 69

Donald A. Moller

Woods Hole Oceanographic Institution

Prepared for:

Office of Naval Research

July 1974

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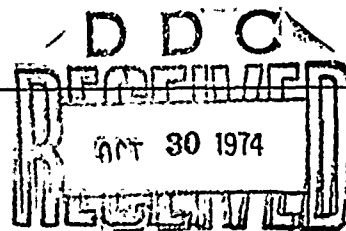
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER WHOI-74-48	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) CRUISE REPORT, ATLANTIS II 69		5. TYPE OF REPORT & PERIOD COVERED Technical
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Donald A. Moller, Chief Scientist		8. CONTRACT OR GRANT NUMBER(s) N00014-66-C0262; 0241
9. PERFORMING ORGANIZATION NAME AND ADDRESS Woods Hole Oceanographic Institution Woods Hole, MA 02543		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR 083-004
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research Code 480		12. REPORT DATE July 1974
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS, if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		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 Reproduced by NATIONAL TECHNICAL INFORMATION SERVICE U S Department of Commerce Springfield VA 22151		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) 1. Currents, Deep-Sea 2. Moorings, Deep-Sea 3. Instrumentation, Deep-Sea		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A cruise aboard R/V ATLANTIS II was carried out from 22 August to 5 September, 1972, leaving from and returning to Woods Hole, Massachusetts. Work was carried out in the vicinity of Site D (39°10'N, 70°00'W). Five current-meter moorings were set and five recovered. One engineering mooring was aborted during an attempted deployment by faking box. Nineteen CTD's and twenty-three hydrographic stations were made. Two of the current-meter moorings were set 400 meters apart in a comparison of U.S. and U.S.S.R. current meters for SCOR Working Group 21. The cruise was broken by a stop in Woods Hole to take aboard		

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20. cont.

additional anchors and by an overnight stay at Menemsha Bight, Martha's Vineyard to escape from bad weather.

11
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WHOI-74-48

CRUISE REPORT
ATLANTIS II 69

By

Donald A. Moller, Chief Scientist

WOODS HOLE OCEANOGRAPHIC INSTITUTION
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July 1974

TECHNICAL REPORT

*Prepared for the Office of Naval Research
under Contract N00014-66-C0262; NR 083-004.*

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L. Valentine Worthington, Chairman
Department of Physical Oceanography

Cruise Report

ATLANTIS II 69

Donald A. Moller, Chief Scientist

R/V ATLANTIS II was to depart Woods Hole on 22 August 1972 to service instrumented deep-sea moorings and to conduct associated hydrographic studies. Specific tasks scheduled for the cruise were:

- Recover and replace Stations 429, 449, and 450
- Conduct the SCOR 21 current-meter intercomparison experiment
- Conduct geostrophic-flow measurements at Site D by means of hydrographic casts
- Make a hydrographic section along 70° W. from 39° to 40° N.
- Make three sections of CTD stations on the Continental Slope to study the variability of the near-bottom layer (not accomplished)
- Intercomparison of CTD temperature, salinity, and pressure measurements with the Rosette sampler

Note that the times herein are in Eastern Daylight Savings Time (Q Time).

ATLANTIS II 69 left Woods Hole on 22 August 1972 to take on fuel, and then proceeded to Site D ($39^{\circ} 10' N.$, $70^{\circ} W.$) arriving on the morning of 23 August.

It was intended to deploy the two moorings of the SCOR current-meter intercomparison experiment as soon as possible to obtain the maximum time of exposure. The anchor releases to be used on the moorings were test-lowered on the hydrographic wire and operated satisfactorily. The CTD was also test-lowered. All preparations being completed by 1330, the deployment of Station 463, a surface mooring, was begun.

The inclusion of LSK and Alexaev current meters on the SCOR moorings made it necessary to launch the mooring's anchor first in a slow, controlled payout. Instrument configurations are shown in Figure 3. The mooring was to be launched over the starboard side through the A frame. The anchor was picked off the deck and lowered over the side by the recovery winch. On the first attempt the nylon tag line on the reel parted with the anchor eighty-five meters below the surface causing its loss. The nylon line was replaced and another anchor made up of a 2,500-pound Stimson and two 1,000-pound cylinders. On the second attempt the anchor and tag-line were again lost when the line chafed upon and was cut by an improperly protected

thimble. In an attempt to prevent any more aborted launches, all line and wire was respooled under tension, all tag lines replaced and all terminations heavily padded. To eliminate high-dynamic loading with the anchor close under the ship it was decided to free-fall the first section of the mooring. On the final attempt to launch, the back-up recovery balls were paid out astern, the release stopped off at the rail, the lower 367-meter nylon shot coiled in a barrel and the lower 500-meter nylon shot was placed on the winch. All components were coupled together. The anchor was then dropped overboard, submerging the back-up glass balls and pulling the nylon line from the barrel. When the line fetched up on the winch, it was paid out rapidly and then slowed, allowing the strain to come on the line gradually. The remainder of the launch went smoothly. The instruments were inserted in-line, and the float placed in the water and released from the ship without further incidents.

After a CTD station and after respooling all wire and Dacron as a safety precaution, Station 464, an intermediate depth mooring and second of the SCOR moorings, was set. This mooring also was set anchor first. The anchor was lowered overboard and the instruments inserted in line. It was then towed to a position estimated to be

700 meters distant from 463, lowered to the bottom by a tag line and released from the ship by firing an acoustic release at the top of the mooring. After taking CTD #3 the ship departed Site D at 2130 24 August for Woods Hole for a new supply of anchors, arriving on the 25th.

After two and one-half hours in port, ATLANTIS II steamed to $40^{\circ} 10' N.$ for a hydrographic section down the $70^{\circ} W.$ -meridian to $39^{\circ} N.$ Hydrographic stations 1871 through 1878 and CTD stations #4 and #5 were taken on 26 August. The ship proceeded to $39^{\circ} 40' N., 70^{\circ} 40' W.$ where CTD #6 was taken. Intermittant electronic failure on this station, traced to a break in the conducting wire, caused the planned CTD work on the Shelf to be cancelled.

On the afternoon of 27 August the ship arrived back at Site D in the vicinity of Station 463. Two hours were spent ranging on the acoustic releases of Stations 463 and 464 to determine the distance between them. This showed the anchors to be 400 meters apart, not the estimated 700 meters.

A round of hydrographic and CTD stations were then made to determine geostrophic flow in the vicinity of the SCOR equipment (Fig. 2). Eight hydrostations at 10-km spacings were made north, south, east, and west of Station 463 between 1930 27 August and 0630 29 August.

Hydrostations were numbers 1879 through 1886 and CTD #7, #8, #9, #10. Hydrocast 1885 hung up on the bottom, which is unusual. Rapid lowering of the wire after a buildup of tension during slow rehaul succeeded in clearing the cable from the obstruction (apparently a cable).

The day of 29 August was spent servicing buoys. Station 449 was recovered, 465 deployed, 450 recovered and 466 deployed in rapid succession without incident. Hydrographic work was then resumed. A site one mile east of Station 429 was occupied on 30 August for twenty-two hours. CTD stations #11 through #17 were a study of the variability of small-scale structures. A second round of hydrographic stations (1887 to 1893) for geostrophic-flow determinations was taken on 31 August.

On the afternoon of 31 August, weather forecasts located a tropical depression 300 miles east of Cape Hatteras. With the threat of imminent severe wind and sea conditions it was decided to recover and replace Station 429 immediately. It was also decided to leave the moorings of the SCOR experiment to experience the ravages of the storm. The hydrographic section was discontinued after station 1893 and preparations made to launch the Site D replacement mooring

using the "faking-box" technique. This experimental method of mooring launch requires that all mooring components be placed into compartments in a large wooden box (approximately 8 by 12 by 5 feet deep) positioned at the stern. The anchor is allowed to free-fall, pulling the pre-assembled mooring overboard. On the evening of 31 August Station 457, a surface mooring, was abortively launched by this technique. A shot of nylon line fouled on a projection on the hull preventing a current meter from clearing its compartment, with the result that its rotor/vane cage parted under a lateral strain. The anchor release was immediately fired and the lower section of the mooring was recovered on the back-up recovery system.

The anchor release of Station 429 was fired at 2125. A slip line which had been cut and left on the mooring at launch had fouled across the release unit which, despite a confirmed release firing, prevented the anchor from releasing. In an attempt to recover the mooring, the surface float was brought aboard and removed, the mooring line stopped off at the rail and the ship gotten underway at half speed. The anchor lifted off the bottom and kited with the ship doing an estimated six and one-half knots.

After an hour of steaming the slip line parted. The mooring was then hauled without further incident.

The recovery of 429 was completed in the early morning hours of September first under steadily-worsening weather conditions. The ship steamed directly to a port of refuge at Menemsha Bight in Vineyard Sound and anchored until the evening of 3 September.

At 2000 the storm had abated enough to permit the vessel to return to Site D. On the morning of 4 September, after taking CTD cast #18, Stations 464 and then 463 were retrieved. The recoveries were incident-free. The moorings had tangled for a short period on the last day of deployment causing severe damage to instruments and wire in the upper section. The lowest instruments on the surface mooring 463 were also damaged, probably due to wave action.

Moored Station 468, an intermediate mooring, was set as a site maintenance mooring on the evening of 4 September. CTD cast #19 was then taken. At 2315 the vessel departed site D for Woods Hole, arriving at 1500 on 5 September.

Scientific Personnel

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Norman Hirsch
Shahar Podoly
Harry Bryden
Ross F. Hendry
John Vermesch
Edmund Sambuco
Christopher F. Polloni
James H. Duncan, Jr.

Chronological Listing of Events

22 Aug. 1100 - Depart Woods Hole
1530 to 1915 - Fueling Melville, R. I.

23 Aug. 0946 - Arrival Site D
1130 to 1210 - CTD #1

23-24 Aug. 1330 to 0250 - Deploy Station 463

24 Aug. 0400 to 0830 - CTD #2
1450 to 1842 - Deploy Station 464
1915 to 2130 - CTD #3
2138 - Depart Site D for Woods Hole

25 Aug. 1200 to 1430 - At Woods Hole

26 Aug. 0010 to 2235 - Hydrographic sections, stations
1871 through 1878, CTD's #4 and #5

27 Aug. 0322 to 0605 - CTD #6
1530 - Arrival Site D

27-28 Aug. 1930 to 0624 - Hydrographic stations 1879 through
1886, CTD #7, #8, #9, and #10

29 Aug. 0700 to 0941 - Recover Station 449
1112 to 1305 - Deploy Station 465
1606 to 1748 - Recover Station 450
1848 to 2033 - Deploy Station 466

29-30 Aug. 2330 to 2130 - CTD's #11 through #17

30-31 Aug. 2220 to 1842 - hydrostations 1887 through 1893

31 Aug. 1920 to 2108 - Abortive deployment of Station 467

31 Aug. to 1 Sep. 2125 to 0410 - Recover Station 429

1 Sep. 0440 - Depart Site D

1-3 Sep. 1700 to 2000 - At Menemsha Bight for refuge

4 Sep. 0830 - Arrival Site D
1008 to 1155 - CTD #18
1220 to 1510 - Recover Station 464
1521 to 1816 - Recover Station 463
1920 to 2100 - Deploy Station 468

-10-

4 Sep. 2100 to 2315 - CTD #19
2315 - Depart Site D
5 Sep. 1500 - Arrive Woods Hole

Summary of Experiments Initiated and/or Completed

Current-meter intercomparison and mooring-motion studies (Webster, Schmitz) - Geodyne 850, VACM, Alexeev and LSK current meters were deployed on two Woods Hole moorings (463 and 464) for twelve days at Site D as the third in a series of intercomparison experiments conducted by the SCOR-21 Work Group

Geostrophic-flow measurements at Site D (Gould) - Two series of eight hydrographic stations with 10 km spacings were made in a grid centered on Station 463 to supplement measurements obtained from current meters of the SCOR-21 experiment. Hydrostations 1879 through 1893 were taken. CTD casts #7, #8, #9, #10 were made.

Low-frequency wave propagation along the Continental Slope (Thompson) - Stations 449 and 450 were recovered and Stations 465 and 466 were deployed.

Continuation of the long time series of current measurements at Site D (Webster) - Station 429 was recovered and replaced by Station 468.

Continuation of the long time series of temperature, salinity and oxygen measurements of Continental Slope Water (Volkman) - Hydrostations 1871 through 1878 and CTD stations #4 and #5 were taken between 40° 10' N. and 39° N. along 70° W.

CTD casts at mooring sites (Millard) - CTD casts #1, #2, #3, #18, #19 were taken to supplement moored-instrument observations.

Short time series to study small-scale variability (Millard) - Eight CTD casts (#11 through #17) were taken to the bottom in a twenty-two-hour period in the vicinity of Station 429.

-12-

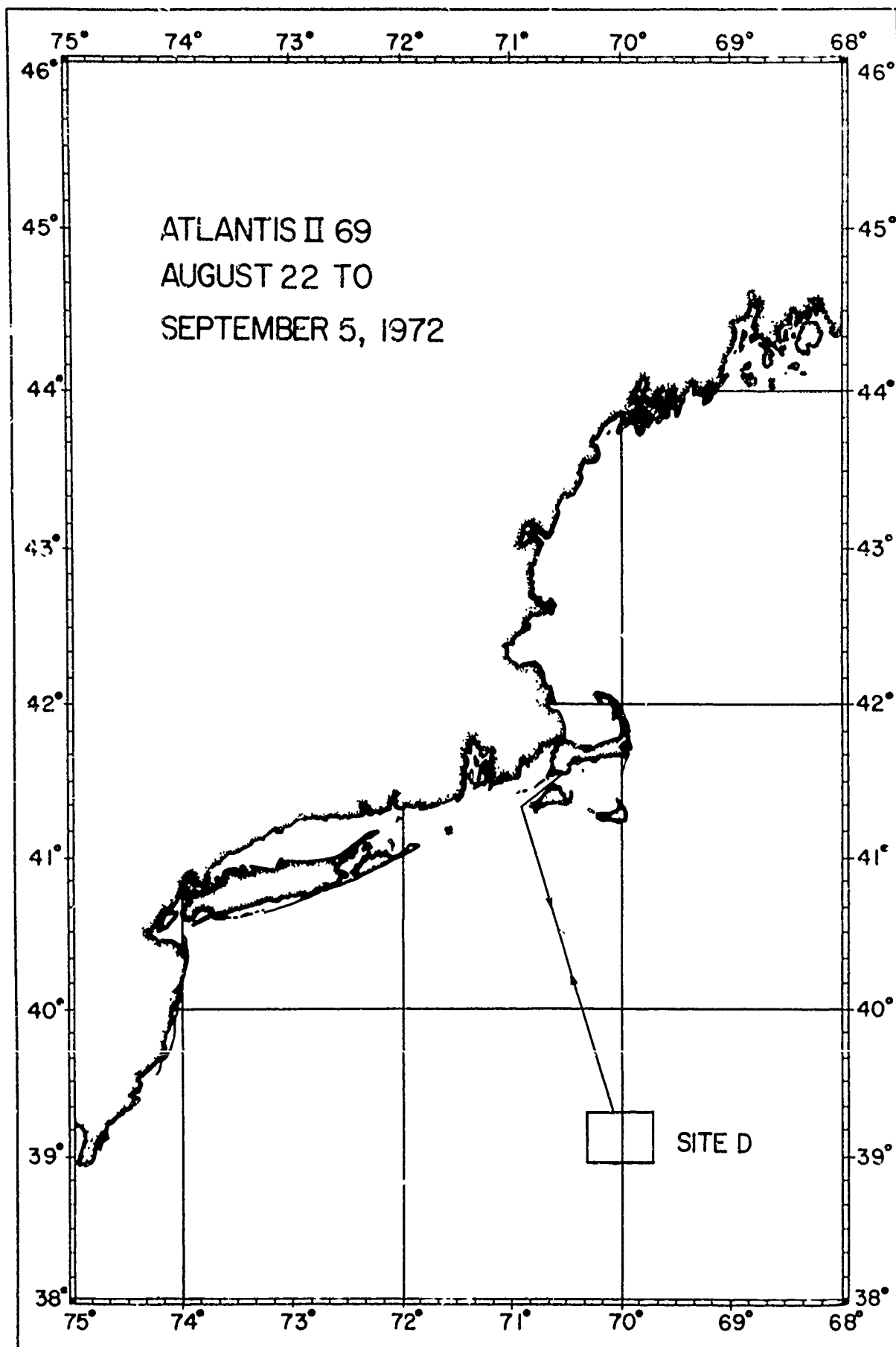
Experimental mooring-deployment technique (Stimson) - Moored
Station 467 was unsuccessfully deployed by means of
the faking box.

SUMMARY OF MOORINGS AT SEA
September 1972

<u>No.</u>	<u>Type</u>	<u>Set</u>	<u>Equipment</u>	<u>Location</u>	<u>Duration</u>	<u>Remarks</u>
404	Bottom - Glass Ball Float	26-X-71	1 Current Meter (in VACM case)	Site L	12 Months	Corrosion test for Walden
451	Surface - Toroid	23-V-72	2 Recording Tensiometers 1 VACM 1 Current Meter 1 Transponding Release	MODE	5 Months	Mooring 5 of MODE Array 3 for Schmitz
452	Intermediate- Radio Float	23-V-72	1 Depth Recorder 2 Temperature Recorders 1 Inclinator 1 Current Meter 1 Acoustic Release	MODE	5 Months	MODE Array 3 for Schmitz
453	Surface - Toroid	25-V-72	1 Tension Cell 3 VACMs 1 Tensiometer 2 Temp./Depth Recorders 1 Transponding Release	MODE	5 Months	MODE Array 3 for Schmitz
454	Surface - Toroid	28-V-72	1 Wind Recorder 1 Tension Cell 1 VACM 1 Current Meter 1 Tensiometer 1 Transponding Release	MODE	5 Months	MODE Array 3 for Schmitz
455	Surface - Toroid	28-V-72	2 VACMs 1 Current Meter	MODE	5 Months	MODE Array 3 for Schmitz
456	Intermediate - Radio Float	31-V-72	1 Tension Cell 2 Current Meters 1 Depth Recorder 1 Transponding Release	Muir Seamount	5 Months	Study of semi- diurnal tidal motion for Wunsch

SUMMARY OF MOORINGS AT SEA
September 1972

<u>No.</u>	<u>Type</u>	<u>Set</u>	<u>Equipment</u>	<u>Location</u>	<u>Duration</u>	<u>Remarks</u>
457	Intermediate - Radio Float	31-V-72	2 Current Meters 1 Transponding Release	Muir Seamount	5 Months	Study of semi-diurnal tidal motion for Wunsch
458	Bottom - Glass Ball Float	II-VII-72	2 VACMs 1 Transponding Release	Slope	5 Months	Measurements of low-frequency current variability on Con-tinental Slope
459	Bottom - Glass Ball Float	11-VII-72	1 VACM 1 Transponding Release	Slope	5 Months	Measurements of low-frequency current variability on Con-tinental Slope
460	Bottom - Glass Ball Float	11-VII-72	2 VACMs 1 Transponding Release	Slope	5 Months	Measurements of low-frequency current variability on Con-tinental Slope
461	Bottom - Glass Ball Float	11-VII-72	1 VACM 1 Transponding Release	D ₁ Area	5 Months	Measurements of low-frequency current variability on Con-tinental Slope
465	Intermediate - Radio Float	29-VIII-72	2 Current Meters 1 Transponding Release	D Area	4 Months	Internal wave propo-gation studies for Thompson
466	Intermediate - Radio Float	29-VIII-72	2 Current Meters 1 Transponding Release	D Area	4 Months	Internal wave propo-gation studies for Thompson
468	Intermediate - Radio Float	4-IX-72	4 Current Meters	D ₁ Area	4 Months	Long-term current measurements



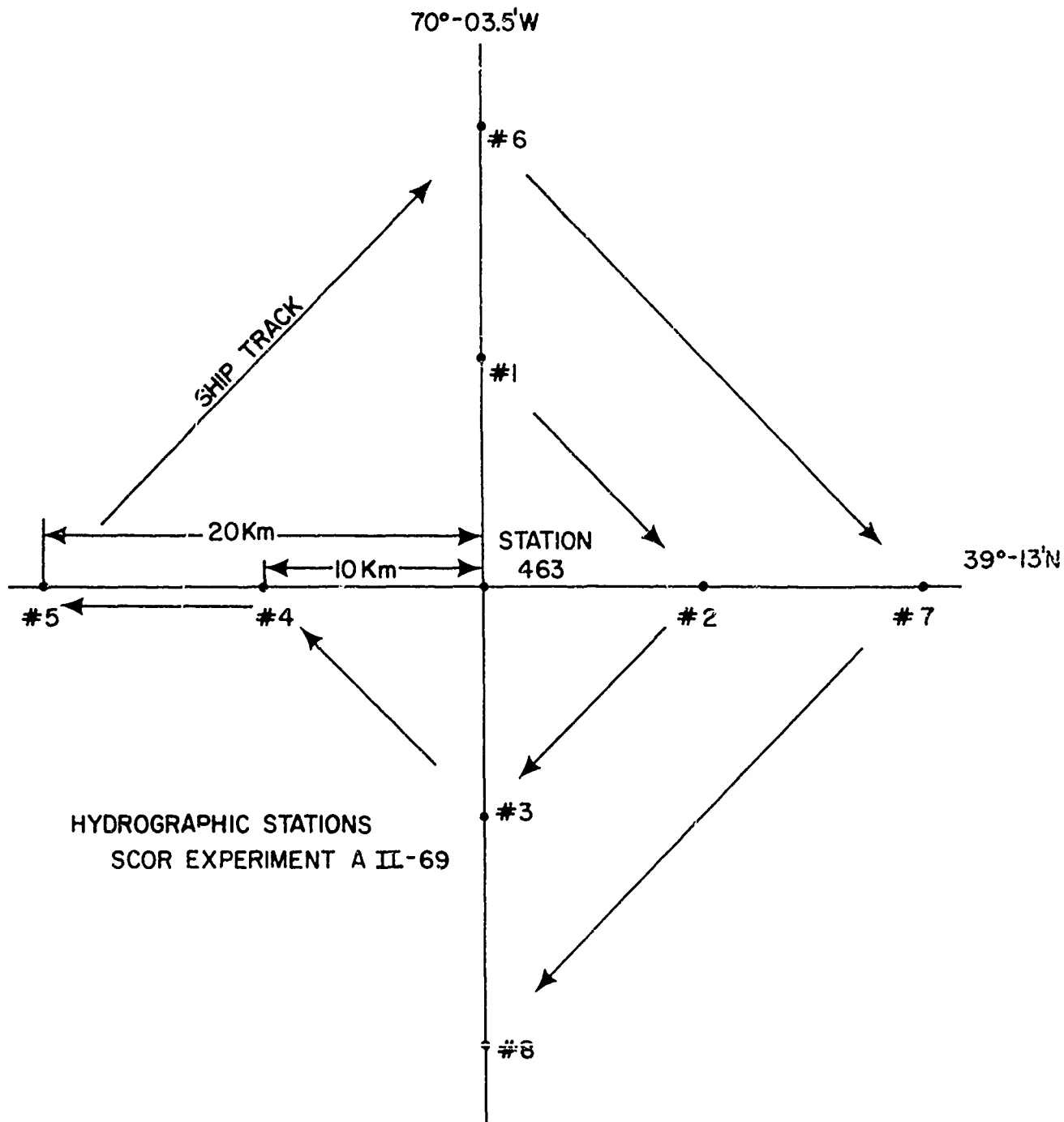
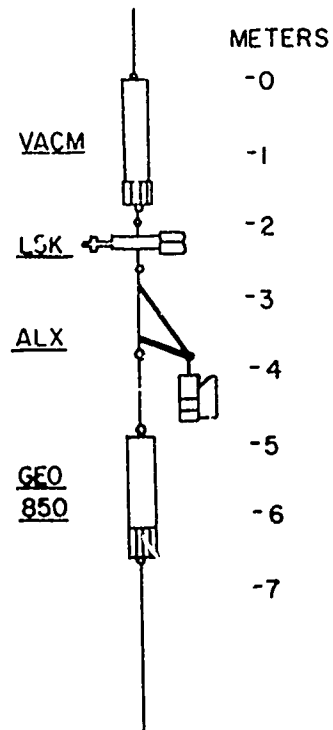


FIGURE #2



DETAIL OF
CURRENT METERS
FOR STATIONS 463 & 464

Figure 3

STATION 429

3/8" WIRE

5/16" WIRE

5/8" NYLON

LIGHT
RADIO
WIND RECORDER — 4291

TENSION CELL — 4292
10 m 1/2" CHAIN

38 m

CURRENT METER — 4293

143 m

CURRENT METER — 4294

286 m

477 m

CURRENT METER — 4295

CORROSION SAMPLE

477 m

48 m

450 m

CURRENT METER — 4296

310 m

(CONTINUED)

STATION 429

(CONTINUED)

5/8" NYLON

CURRENT METER — 4297

CORROSION SAMPLE

120 m

48 m

TENSIOMETER, RECORDING — 4298

CURRENT METER — 4299

3/4" NYLON

36 16" GLASS BALLS IN NETS ON 85 m

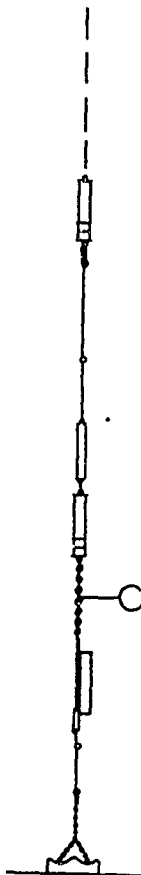
ACOUST. RELEASE, TRANSPONDING

1 m

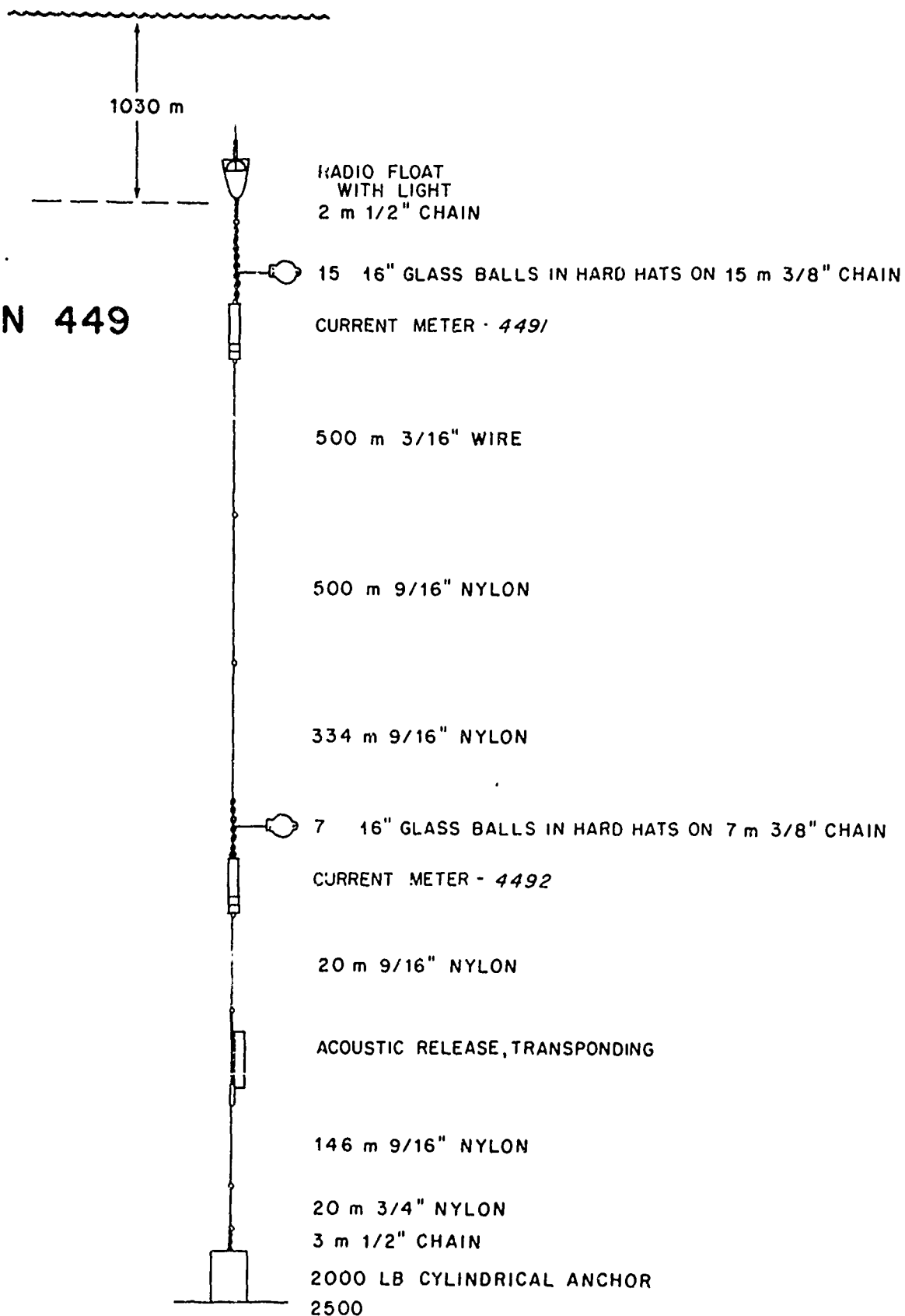
15 m

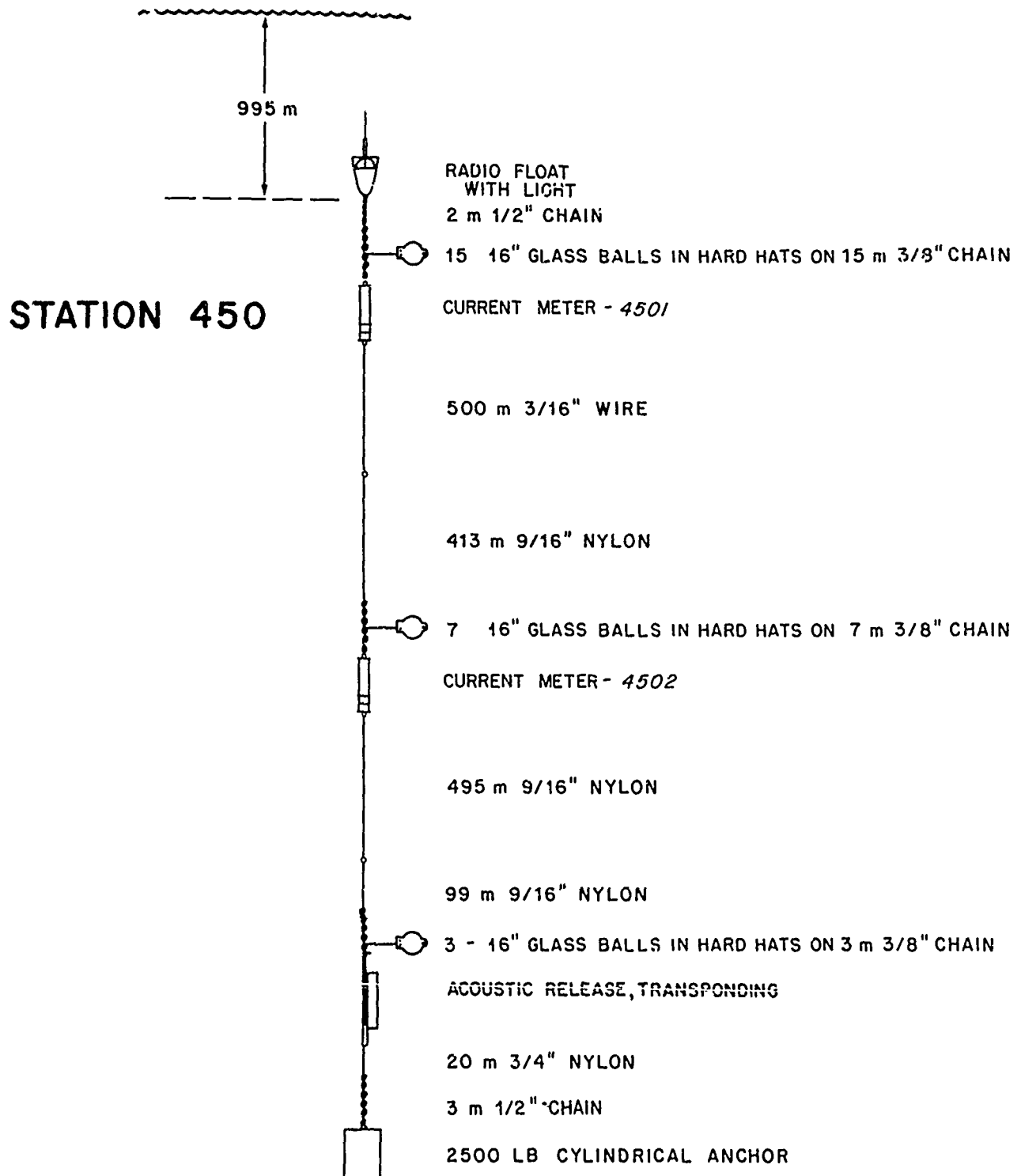
5 m 1/2" CHAIN

STIMSON ANCHOR, 5800 LBS

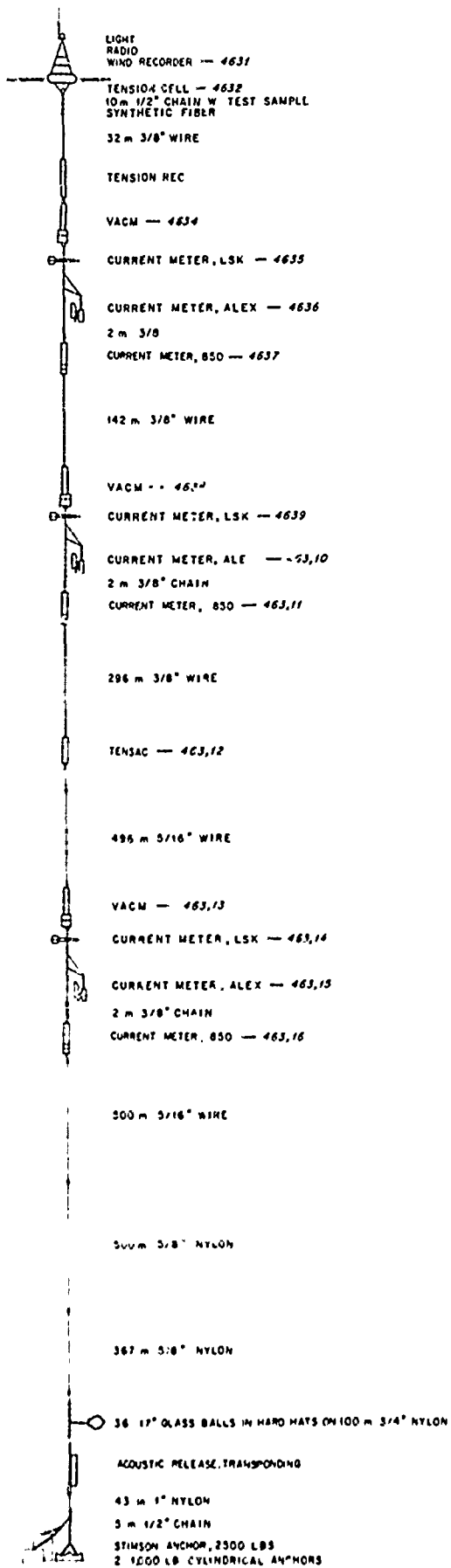


STATION 449

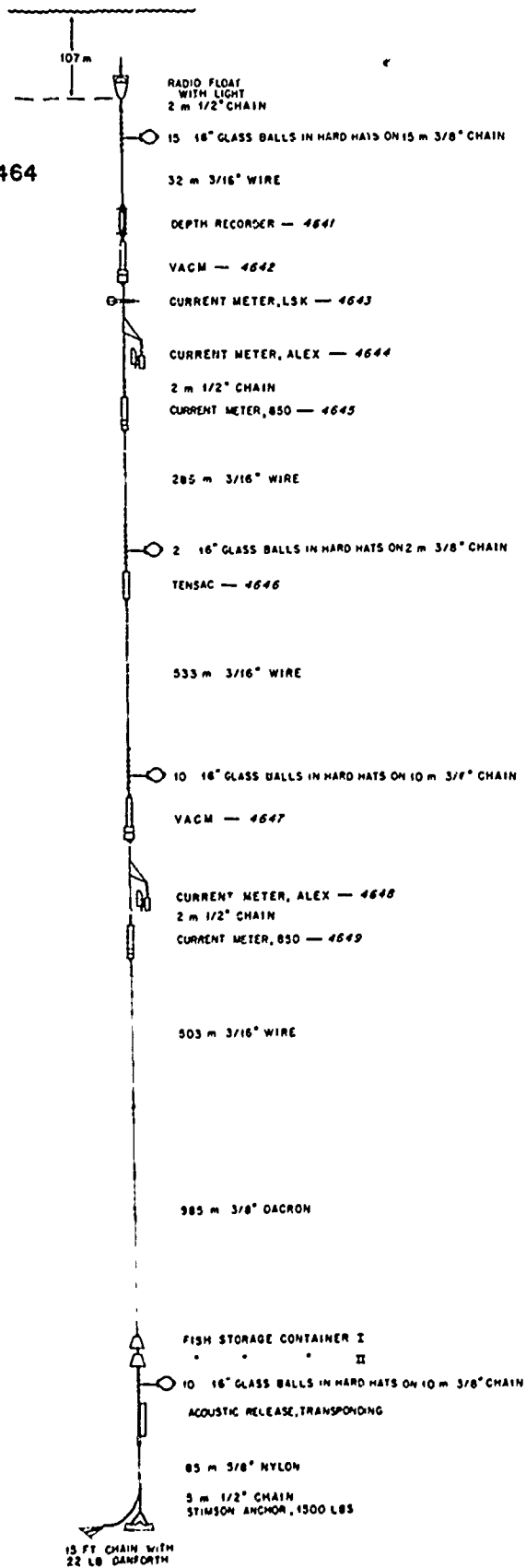


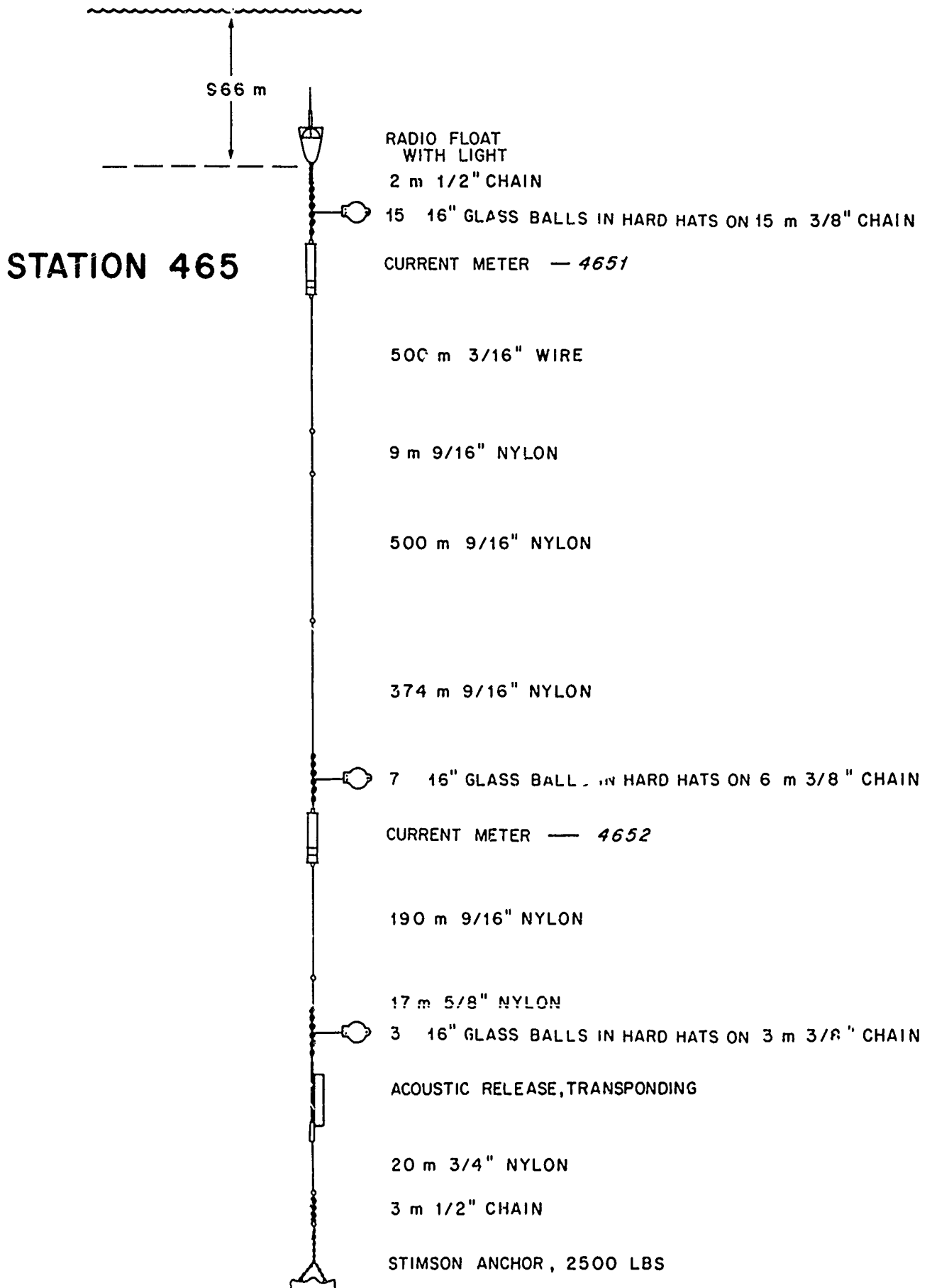


STATION 463

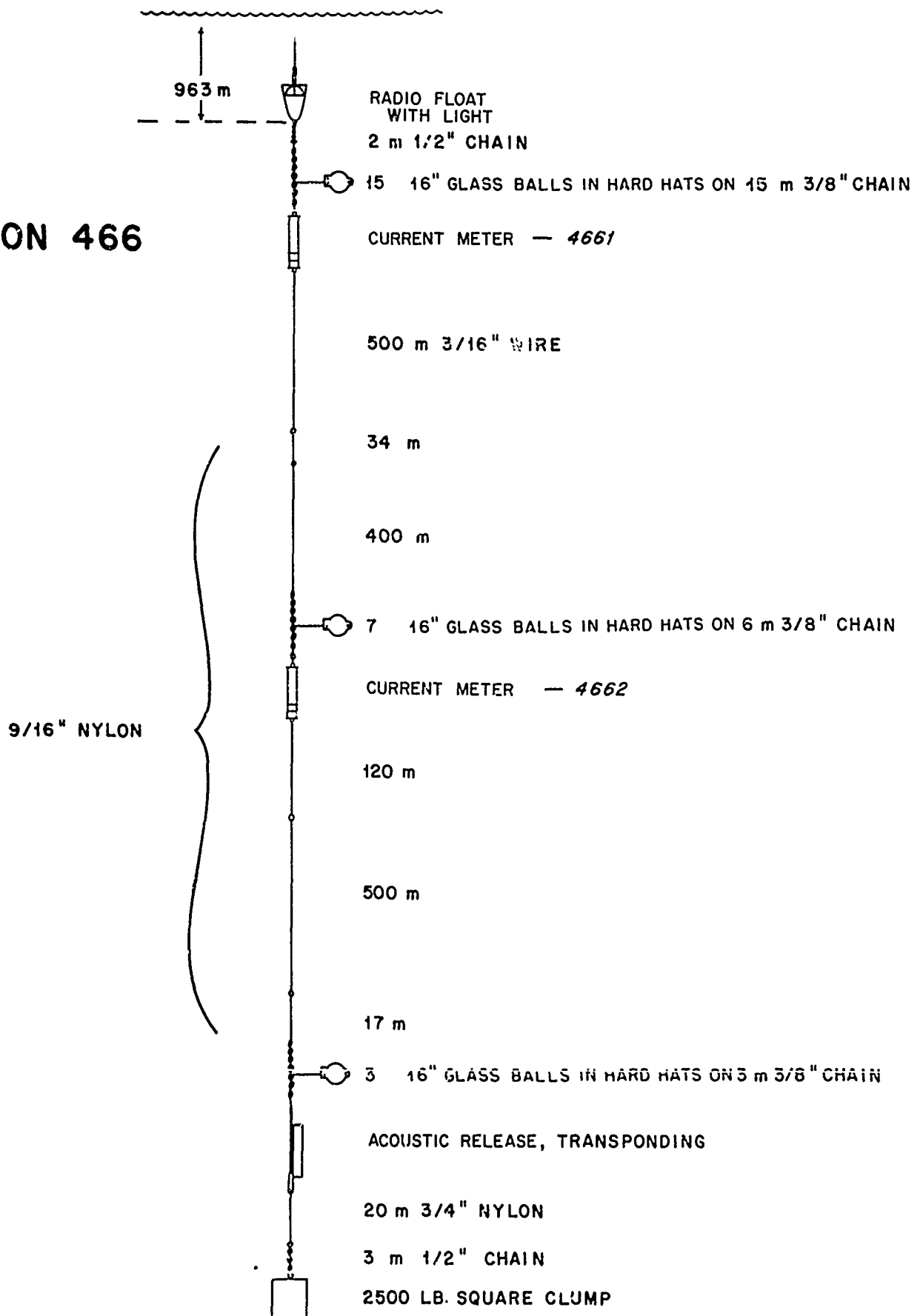


STATION 464

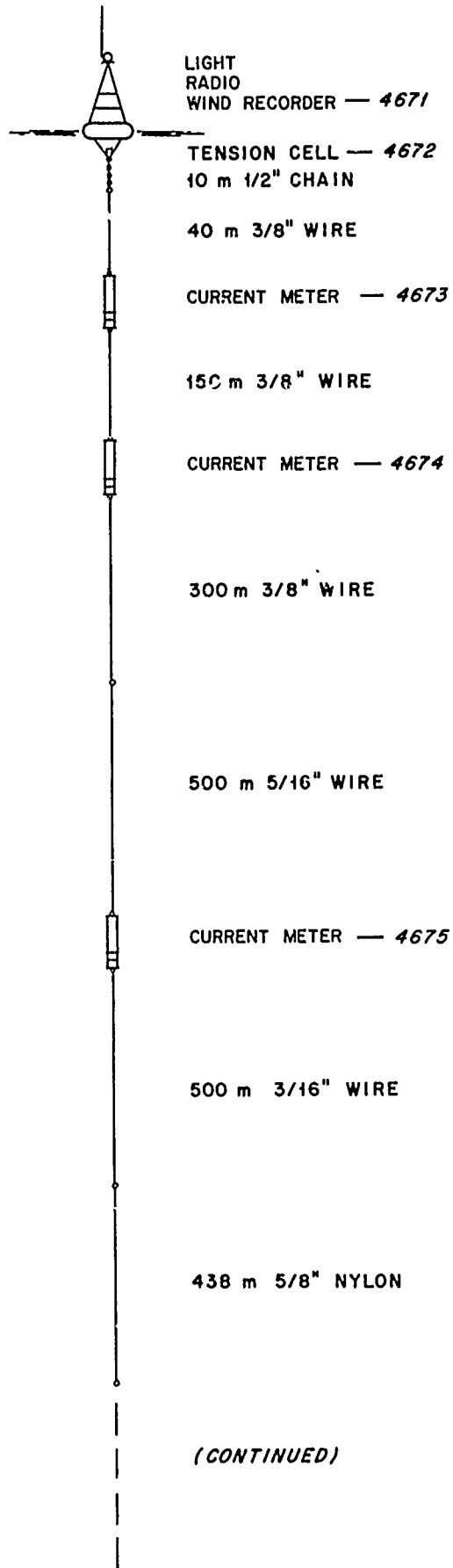




STATION 466



STATION 467



STATION 467

(CONTINUED)

CURRENT METER — 4676

312 m 5/8" NYLON

CURRENT METER — 4677

156 m 5/8" NYLON

TENSION REC. — 4678

CURRENT METER — 4679

28 16" GLASS BALLS IN HARD HATS ON 85 m 3/4" NYLON

ACOUSTIC RELEASE, TRANSPONDING

20 m 3/4" NYLON

3 m 1/2" CHAIN
STIMSON ANCHOR, 6,000 LBS.

