Log of HORIZON

Buoy Laying Intermediate Site
Project MOHOLE Experimental Drilling
Feb. 18, 1961

Departed NEL pier San Diego at
6:20 AM this morning.

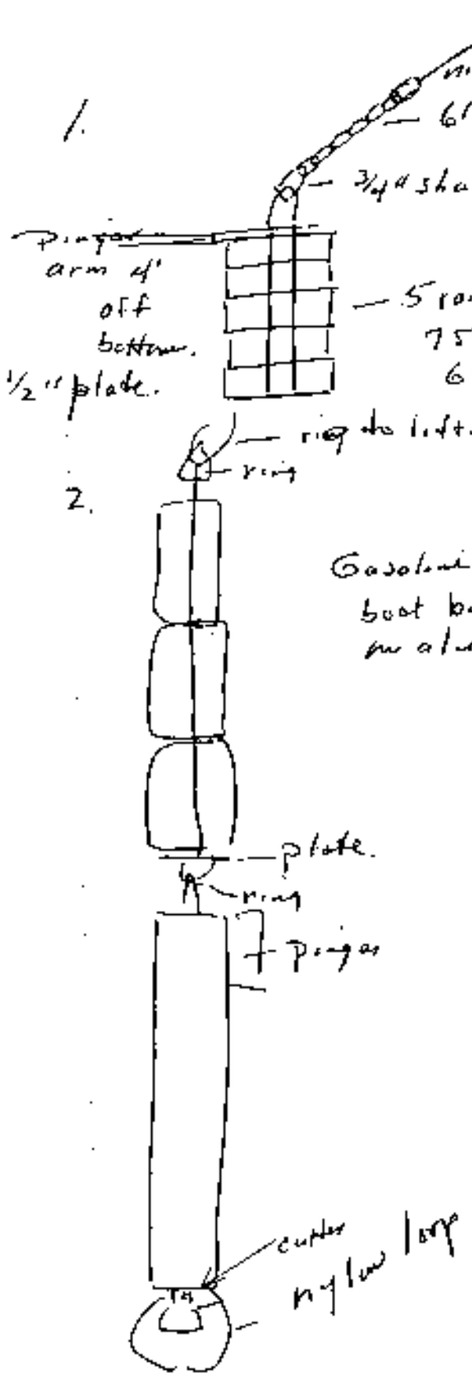
AMSOC men on Board: Scripps Men (Nine crew)
Peter Johnson - Chief Buoy Engr Jack Jennings - Chief Buoy
Bob Snyder - Electronics Geo Hohnbaum - Asst Buoy
Francois Lampriotte - Engr Inman - Rig.
Jeff Savage - Sci Coord Engr. Sheppard - Rig.

Our destination location: 32°-49½' N - 117°-37' W.
Depth: Est 515 fathoms.

Purpose: To lay 2 buoys - deep moored and submerged to 60 fathoms 1000' apart with surface floats and attachments for laying sonar transponders.

At 0946 arrived on Sta #1 117N-36.7W picked by by Dr. Inman on PDR - 511 fathoms on NW bank of San Diego trough. to Keep out of strong currents - Current running due N Sea running NW - Swell W.

Commenced making connections - Experienced difficulty with plugs floats filled with gasoline. Buoy transponder w/ guillotine



attachment assembled. Lower sonar floats with 25# wt. — floated OK.

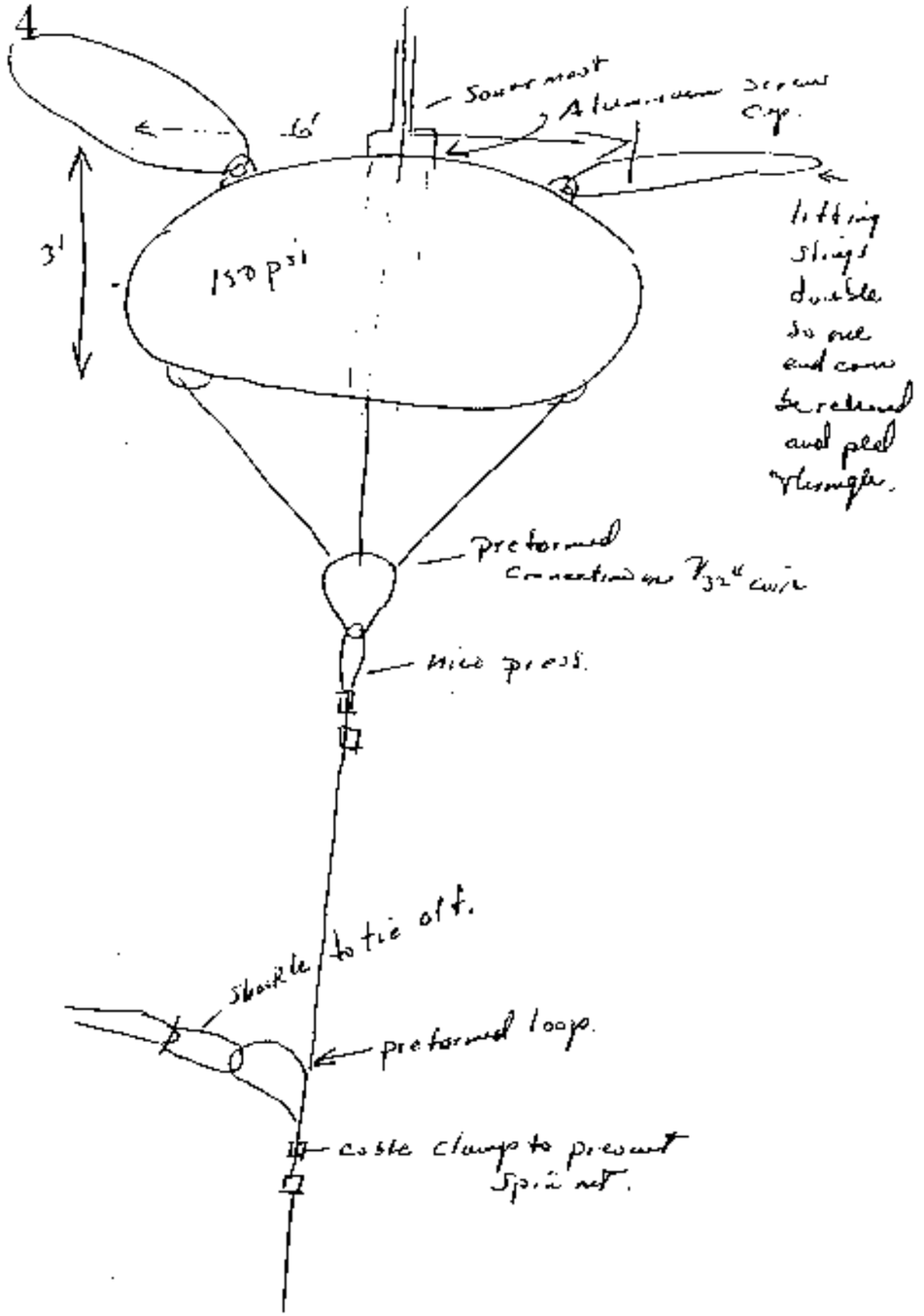
1331 — Commenced lowering Anchor.
Immediately fouled corers between cargo winch and mooring winch at anchor and stopped.
Pic Back and cut 7/32" wire and reattached Cargo winch falling in top of A frame — bridle light — no one injured
Pinger broke loose and floated off — picked up by buoy boat — R. Riedel and Hansen (NSF) on board.

Great difficulty picking up pinger — swung badly in air and when we started over again to lower — it broke loose again — this time mooring line on anchor broke.

1400 Held anchor @ 21 meters down and secured pinger to 7/32" wire with pretormed and Cable Clamps — using ladder and stabbing board.
Lowered anchor and pinger bridle loose again — in 66 meters 5 minutes — Continued to lower anchor away.

1544 On Bottom pld back from 957 meters to 890 meters — std securing buoy after tying off anchor on cleat

Lifted buoy with topping winch — lower upper part secured to 7/32 wire with pretorm and shackle — this aid to take load on cargo winch to cut this off — cut out lower bridle — too long.



Feb 11, 1965

Pulled back and started slack in bitter end of 7/32" and secured to lower ring with Nico press sleeve – only one really taking load – slack between them.

Lifted cut away tie off, ~~Lower~~ buoy on cargo winch – ~~7/32 to take load~~ but not all load on topping winch and there is a slight drop of buoy on cargo 3/16" Gil lines load. Snubbing buoy using two Manila trapping lines on A frame legs – buoy does not sway much in 2' to 3' swell.

1635 Start to lower buoy – Anchor line parts at Nico press fitting on lower ring. Almost immediately pull back buoy and secure – thereafter for day. Must always secure buoys at all times – it rolled earlier almost crushed Cessna.

1900 After dinner review failure with all Concerned. To be corrected.

1. Cargo line block to be lowered.
2. Manila lifting block for proper lifting.
3. Tie off snub – wire parts because no ~~throw~~ – never put Inconel wire with no ~~thee~~ thimble.
4. Boat bumper Goodrich buoys leak.
5. Prayer guillotine hole ragged and probably cuts nylon. Nylon shows cuts.
6. Many hand tools missing – must be purchased.
7. Meter read out upside down.
8. Need work boat standing by on the side.

Make list of things to be done by crew and Buoy gang and things to be done when

Feb 18, 1961.

return to port prior to leaving for Guadeloupe. All hands quietly confident that problems can be overcome and that we will be successful tomorrow.

2100 hrs - Weather report for tomorrow same as today except higher winds.

2200 hrs - All hands have turned in.

Comment: We learned plenty - Should be successful tomorrow. → Retrospect: How lucky and wrong can you get!

2300 hrs - End of Feb 18, 1961

Same Location

Seas and Current reduced - low winds and swells - sunshine - excellent day.

Started at 8AM to lay second buoy -- discovered wire loose on winch drum and wire on surface of drum damaged by digging into drum surface under tension.

Stripped off about 1000 mtrs of wire and discarded - wire now even more loosened on drum.

Attempted to put wire through truck air brake system on A-frame, but brakes failed to hold brake and therefore could not lower anchor on wire.

Reviewed situation with Peter Johnson, Jack Jennings and Captain Mulligan and decided further efforts were going to be useless, if not destructive, and decided to return to port to rerig ship - getting wire under tension.

Radio telephoned Jack Dullaghan at home to get Bagby spooling outfit rig to be on dock tomorrow and received confirmation

1300 hrs. Secured buoys and anchors and returned to port. Radioed Balcom - could not reach.

1600 hrs. Returned to Port - met by Dullaghan and Trapani - reviewed plans for tomorrow.

Feb 20

At Dock - NEL, San Diego

Started spooling off wire onto Bagby rig
a simple wire spooling rig mounted on back
of truck - similar to well pulling drawworks on
light weight oil well puller - actually lighter
weight even!

Crew uncrating buoys and lashing down buoys
along railings of ~~Station~~ Station for better deck clearance -
Should have been done before.
Buoys can be more readily by Station.

Bagby rig spooling off wire onto wooden
spool - will spool off 5600' length (3000 about)
and then spool off next 3600' under tension
and then back on under tension.

Completed spooling off 3000' onto wooden
spool today.

Trapani and Dellaghaw want to fix up
air brake mechanism to take tension off
winch drum.

Reported our problems to Al Bascomb, Code E
may go to sea on Mar 1403

Feb 21.

At Dock - NEL, San Diego

Spooling wire - spooled wire onto Bagby's
metal drive drum. Spooled over the Martin
Decker transmeter sheave at 1500 lbs - will
spool back at 2000 lbs

Decided to go ahead and make up air brake
system, but to ignore steering chains to
hold 7/32" wire. Removed self activating
shoe from chains and tested brake with
wire in flume over the transmeter and found
that it is possible to adjust tension with
air.

Spooled wire all day until 7PM - darkness.
Men instructed to proceed into night. Bagby's
arms tired holding brake and he is only one
with knowledge of spooling. Can't take a break
of breaking wire by spooling him with any body.

Pete and I buying Hardware and Tom getting
Core saw installed on Board and Reeves, Couplers, tools
hoses, etc. installed on Code E.

Got ~~Hydrotel~~ Electrotest to deliver Heat Probe
Equipment to Electric log test site.

Feb 22.

At Dock - NEL, San Diego

Spooling wire - all day. Still spooling wire off into steel drum under tension. Only ½ wire (3600') spooled off of drum in Horizon winder. Wire must be level wound by hand because Bogey level wind and Horizon level wind are not for ½" wire and cannot be adjusted without new lead screw. Else wire digs into Horizon spool because of tension on loose wound wire.

Tensiometer sheave froze up - bent and we had to send it back to Sby to be repaired - took all morning and delay all operations 5 hours. Special sized wheel and no replacements - 7/32 wire is unusual size - no std pullys, sheaves, etc.

Installing Core Saw on Barrel

Delivered Core tubes to Coring test site

Feb 23

Feb 23.

At Dock - NEL, San Diego

Spooling wire. Completed spooling off all 102,000 ft remaining - 30,000' on wooden spool - 72,000' on metal drive spool on Bogey rig under 1000# to 1500# tension. Started spooling back under 1500# to 2000# tension.

All spare winders made up or loaded and all hardware pretty well in order except for a few minor items. Crew working very well together and there is a spirit of enthusiasm despite the problems and failures so far.

Feb 24

At Dock, NEL – San Diego

Continuing to Spool wire onto Horizon Winch under 1500# to 2000# tension. Completed spooling on first 36000' roll. Drum very tightly packed ~~At about 1400 hrs with almost 70,000 ft spooled on winch we noted~~ and we should have no problems with wire digging into spool. However the wire is not truly level wound and there is some crossing and wearing of the galvanizing – not a good condition for long term saltwater corrosion. No Kinks in the wire. We are being very careful about same and that slows down the spooling operation to a walk.

Observation:

We have engineered the buoy system so close to the tolerances of the wire and have used odd sized wire to meet buoy design requirements that we have created many special handling and net fitting requirements. The buoy system was designed with little consideration for the implementation problems. This would be all right, but no time was allowed to work out the implementation problems that we are now experiencing, i.e. the wire must be very carefully handled and supported – cannot stand any damage – even minor – special sheaves, level winding, etc. required, std come alongs, etc. useless. Wire very stiff and needs very large sheaves – expensive hardware.

Feb 25

At Dock, NEL, San Diego.

Continuing to Spool wire onto Horizon Winch under 1500# to 2000# tension.

At about 1800 hrs. observed a grinding in winch and ceased winding with about 7000 ft spooled onto the H's winch and 2,000' remaining on Boykin's rig.

Called in Trapani and Dullaghan and they were convinced we had elongated the winch drum because a grease fitting on the external face of one flange was hitting on the chain drive guard. They recommended that we wind off the wire immediately. Didn't buy that. Too dark to see very much and decided to wait until morning to see where we go from here.

Feb 26

At Dock, NEL - San Diego

Tried to wind off some wire to see if we could relieve supposed stress on ~~drive~~ drive flanges - grinding became worse and it sounded like crushed bearings - tried to reach W. Bascom or Hebeliard by phone - no luck. Called Frankeby and finally arranged meeting with him, Willard and Tryon, Dalleytow and Buddy King at 1PM.

Reviewed print of winch and decided that rotary bearings might be problem. Buddy King and crew then tore down winch and discovered right side (drive side) bearing crushed to bits and left side bearing crushed slightly. Bearings have to be ordered from Chicago - did so.

(Note: This actually happened on Saturday so we should be backed up - waited all day Sunday for bearing to arrive by Air Freight).

Feb 27

At Dock, NEL - San Diego

Received Bearings 6AM - San Diego Airport. 0800 - commenced reassembling winch.

Pete and I purchased last remaining hardware.

Reasons why Winch bearings crushed, and flanges Sprung

It appears that roller bearings crushed because they were already worn and should have been replaced. When load of up to 2000# tension acting a possibly 3 ft moment arm (6000 ft lbs) was exerted on worn bearings for sustained time, they simply overheated and cracked up.

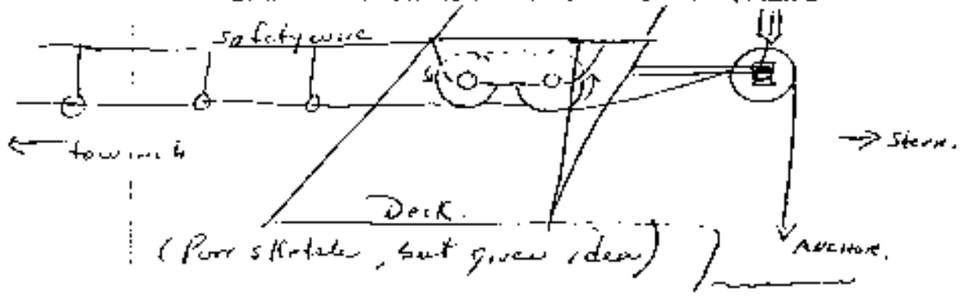
The flanging winch is another problem - The packed wire exerts force against the flanges which are estimate at 50 to 100 tons with 72,000' of 7/32" wire on the drum under 2000 # tension.

1800hrs. Completed assembling winch and started Spooling on remaining wire under 300# tension - we will use accumulator air brake to keep loads off of drum.

Feb 28

At Dock - NEL, San Diego.

Continued spacing wire and installed the air brake accumulator in the A frame



(Poor sketch, but gives idea)

Had to reinforce A frame to accept load without excessive vibration - it also seemed wise to install a ring safety wire. (See sketch above.

Made up two anchors on stern. for La Jolla test.

March 1

Sailed at ~~noon~~ 7PM (1900hrs) with Dr. Shepard to determine position.

It required all day to complete installing the air braking system and accumulator. The remaining ~~injury~~ - however we left anyway to be on the site bright and early to start.

2230 hrs. Arrived near original location, and standby to drift all night awaiting daylight to establish our location and lay buoys.

Made up all the shackles, thimbles, etc for the first buoy this evening and all ready to go - expect no trouble this time except steel somewhat leery of using the air accumulator - it has never really been tried - only tested - however, Frankisch confident so should be.

2400 hrs - Drifting - all hands except watch are asleep.

March 2.

Location: 32°-49½'N - 117°37'W

However this is only estimated. Dr Shepard positioned ship from shore observations and using Radar. We moved into location from out at sea and did not re-cross the La Jolla Channel at this time. (We did the first try) Depths 514 fathoms

0800 In position and rigging out to lower Anchor.
0830 Put in marker buoy using polyethylene line and to 16# of anchor wt
0900 Lowering anchor with 5-750# anchors on 9 buoy anchor. assembly with Pinger attached by a 6 ft 9 thread monofilament line to pinger arm. Secured (Alpine - 10,000 ft test) on anchor line. 7/32" wire, thimble and nico press - 3 of them.

0930 Touched bottom 937 meters (pinger broke loose and surfaced) - we continued to lower anchor. Put 6 cable 200 ft. (approximately. Tied off dead end as before. using slipping bowline and prepared grip on taut line.

Attached dog ended buoy using 3 nico presses on 7/32" wire

Lowered buoy on Coys winch line until running line took tension - cut tie off and lowered buoy until Anchor on bottom

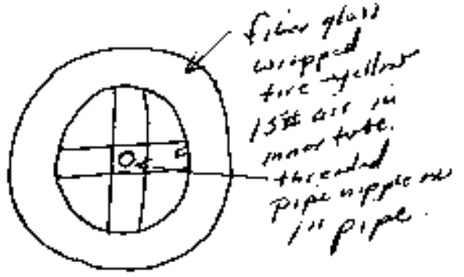
Temporarily attached Surface buoy with shackle in line until later on day when we installed final fittings - Using 3' toroid.

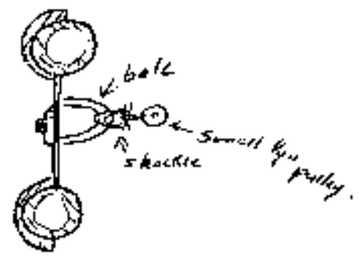
1100 Buoy in Place and Proceeding to rig up

for second buoy. Moved off almost due east of last buoy location shooting for placing 2nd buoy 1500 ft from first on a line ⊥ to prevailing winds from the NW.

1230 Having ~~water~~ eaten lunch, proceeded to install 2nd buoy, using identical method to first, but no effort made to use pinger because it keeps breaking loose without cutting by the guillotine release.

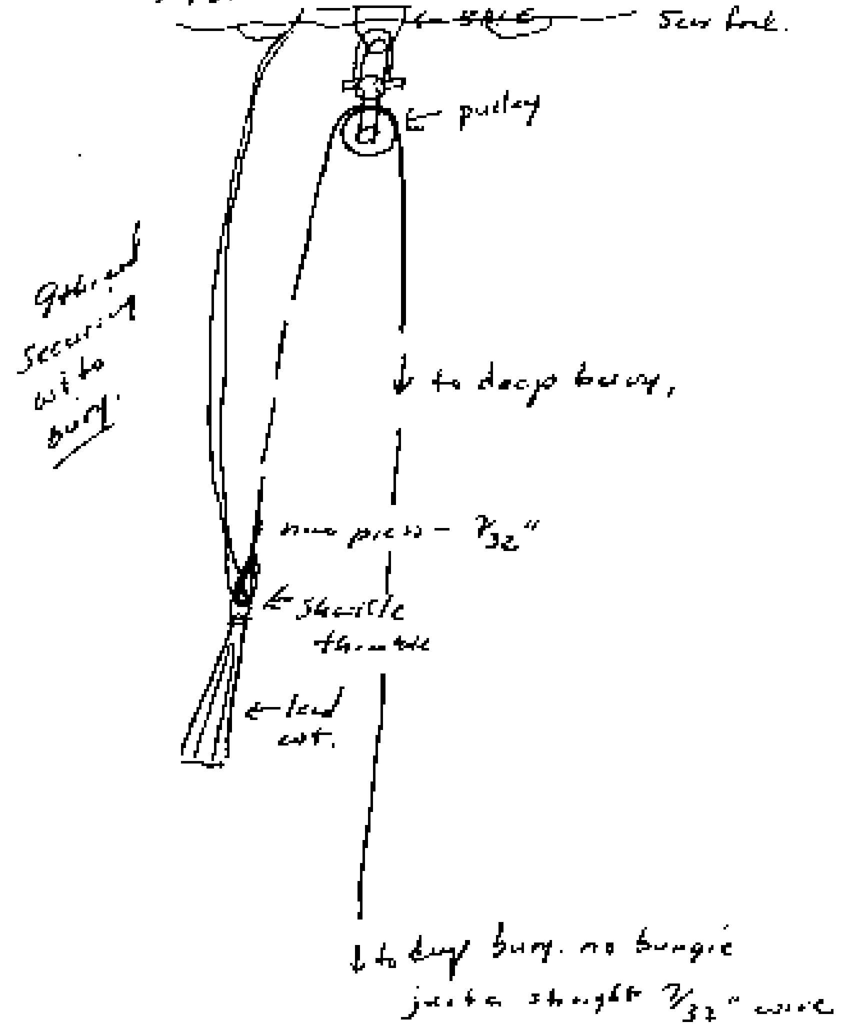
1330: Second buoy on station and settled not to be 1350 ft from last buoy. Launched skiff and proceeded to make final surface Connection on the surface buoys and to install masts and lights. Using Swivel surface toroid - 3 ft in diameter because these two buoys are to be sonar only with no radar masts.





Pulled slack out of wire until boat almost directly over buoy and secured 27# lead sash weight to end of wire using shackle, thimble and 2 nico presses (only necessary). Left 25 ft of overlap on pulley. See over.

March 2, continued.



The masts were 1" Aluminum pipe, threaded to the 1" pipe nipple. A battery box was brazed to the Aluminum mast about 1'(?ft) from the bottom. A red flag and small transistorized white light fixed to the top.

1500 hrs. Both buoys now in place and holding. Ship "Hugh Smith" of Scripps came along side and taken off Jack Jennings who had unbreakable commitment to be elsewhere after March 2. Robert Huffer is now chief buoy layer. At about this time buoy boat which came along side about 1100 hours leaves with Dr. Shepherd and Dan Taylor of NSF and Joe? of Nat'l Geographic

1630 hours One mast broken off of 2nd buoy. Discovered it broke at thread because only holding on 2 threads. Launched skiff and proceeded to repair mast and check both buoy connections. All but 15 ft of wire pulled up so wt only 15 ft below buoy. All connections seem OK. It is very calm and so clear that buoys can be seen from the Surface (the most westerly one anyway.

1800 hrs. Everyone aboard and all secured. Have made up one anchor on fantail in afternoon in preparation for laying 1 Radar buoy tomorrow.

2200 hours Everyone asleep except the watch.

March 3

Same location (approximately)

0700 Awakened with report from bridge watch that the two buoys are about 1 mile apart and the marker buoy not visible.

0745 Launched skiff and proceeded to nearest buoy that was overturned and discovered it had broken loose from deep moored buoy. The wire had frayed over the pulley, and broken about 10 ft from the lead weight. The fact that the weight was tied by 9 thread to the buoy preserved the evidence - otherwise nothing would have been left.

Proceeded to the other buoy and discovered, also, the same situation.

The buoys had broken loose in the night and we had followed the lights of the drifting buoys. Apparently they had broken loose during the 4 to 8 watch because the recorded separation of the buoys was not noticed until perhaps 0645 or 0700.

0800 It is blowing 25 knots and we do not know our location. Visibility is poor and we cannot see the shore line to obtain our position. Radar unreliable. Proceeding towards shore to establish position and try to relocate marker buoy.

0900 Called Bill Bascom at the CussI and reported our difficulties. Reported possibility that buoys had been run down by a ship since watch reported a

ship passed between the Horizon and the buoys during the 4 to 8 watch. Also there are several Navy ships maneuvering around us and the simultaneous failure of the buoys looks suspiciously like some thing out there done. Possibly a submarine although awfully doubtful.

Phoned Fran Isby at Scripps and asked him to check again with Navy and Coast Guard about keeping vessels and other vessels at least 2 miles from our location. Reported possibility that a ship had run down our buoys.

0930 While looking for shore, we set up a jury rig and pulled ~~port~~ wire over the little pulley. With only a few hundred pulls on the wire over the pulley, we were able to put a permanent set in the wire and wear off the galvanizing. It looks pretty much like the wire was worked over the pulley to the point where it was over stressed and broke. The outside wires at the break are extremely brittle.

1100 hrs. Received message from W. Bascom on rough neck that he is on his way to check out problem.

1230 hours. Global Marine's Roughneck off the starboard and Bascom comes aboard. After some discussion and lunch, decided to go back to location determined

by crossing the Channel - set a marker buoy and conducted a search using Horizon's Sonar. Possibility of seeing buoys, located by Sonar from surface may make it possible to use divers to reestablish buoy positions. Called Frautschy and asked him to alert divers for possible ~~[illegible]~~ job on Saturday morning - tomorrow.

1430 Bascom, Jurgens (The Assoc pilots) leave in Rayburn for shore. After we have set a marker buoy which we believe to be in the vicinity. These marker buoys are merely the smaller toroids with a small flag & light secured to a weight of 50 to 100# with a drag anchor of about 10# with a polyethelene or polypropylene line made up of 600 ft lengths tied together.

1430 to 2200 hours. Searching by Sonar around the marker buoy in rings. The Captain of the Horizon is unreasonably certain that the marker buoy is exactly where the deep buoys were lost - that I cannot believe, but there is no harm in giving him and the rope he wants for now.

There is a lesson to be learned here. Continuous watches should be kept on buoys after they have been found and the divemen should be carefully schooled to see if a buoy is loose. We might have been able to save one of the two if we had had a more alert watch.

2300 hrs. GAVE UP ON SEARCH AND WENT TO BED WITH IDEA OF CONTINUING SEARCH IN MORNING. SAW A FEW BLIPS ON SONAR, BUT THEY DO NOT STAY IN SAME PLACE - I DO NOT BELIEVE WE ARE IN THE RIGHT PLACE.

MARCH 4

LOCATION - AT HARKER BUOY - I DO NOT KNOW THE EXACT LOCATION, BOT NEWBY SAYS SAME AS BEFORE WHEN WE LAID OTHER BUOYS.

0800 Lowered SKIFF and tried to see buoys in water - pretty gray and cloudy and rough. Gave up soon after we started and headed for NEL pier in San Diego.

1130 Passed Pt Loma and sighted Cuss rolling badly in trough off Coronado Rhodes Had previously radioed Basenow of decision to give up and try to get a better Sonar for search and also to take divers out in event of finding something. Divers Murray and Scott standing by for Sunday according to Fieldsteel. WD reported the rolling conditions we observed on Cuss I in Shallow Rhodes and reported upper rig being damaged. We are sure having our problems.

1200 Docked NEL and met by Tropani, TOOK Hohnhaus to Doctor immediately to have Les arm checked out. (He hurt it previously on loading Horizon - Fell down and banged elbow - fortunately covered by Scripps insurance). Asked Tropani about getting me extra hand for operations and got Mike Fellow Doll from ORCA - looks like good husky lad and G. Hohnhaus recommends him. CAPT SMITH of FORCA AND NEWBIGAN OF HORIZON agreed

1430 LEFT Hohnhaus at Doctor's - Left Johnson and Hoffer at airport where they took off in truck to buy more gear. Met Tracy and Dr. Henry Loaded at Airport with Riedel - returned Fiedel

Annex to obtain last minute preparation for Doctor on HORIZON and scheduled for ~~Board~~ Cockpit and ORCA to accompany HORIZON in search for lost buoys.

1600 Called Earl Murray - Divers ready for early AM departure tomorrow. Returned to HORIZON to check schedule with Newbigen and Capt of ORCA and ~~HS~~ PROLINA To Called Riedel to have Doc Shepard on board HORIZON to help locate buoys for search.

1800 Returned motel and checked again with divers and ready, went out to Cuss I and evidently just missed meeting. Only Dr Woodward aboard. Delivered instructions on better lights in Lab to Bot Newby - also need for another toilet. Cuss crew scared by rolling incident. Understand a roll check and stability test being arranged for Cuss by WD. Hose guards to be placed on engines which went under water in 27° roll.
The Block guides were not turnbuckle down tightly and the guide wires were shocked by the rolling and swinging of the guide rails and broke allowing rails to twist and therefore rails must be removed, straightened and replaced. A break for our buoy schedule, but a tough piece of experience.

MARCH 5

0830 After a 1 hour delay waiting for Doctor Jones (who came in stead of Dick Shepard) and divers, we left with ORCA and Paolina T following x

1210 Located marker buoy without want and established it on the marker buoy we set in previous day's search x Newbigen immediately began insisting buoys were in same location again. Jones had come up with a different location coming out, but Some gave in to Newbigen and agreed this was original location x I doubted it seriously, but lacking any basis to argue except the poor probabilities, the Paolina T started a search around the buoy x

1000 to 1630 hrs. Continued search with Paolina T circling buoy and Horizon Doing Some. ORCHA Searching in Smiles square around location with their little radar looking for No. 1 marker buoy. Nothing found.

1700 hrs. Newbigen insists buoys are Horizon's Some x Paolina T checks him out and they verify steady blip underneath the ~~buoy~~ marker buoy. If Newbigen dropped marker buoy on a deep buoy he is the luckiest guy in the world x

1700 hrs. Newbigen gets confirmation on buoy location from the Paolina T's Some Paolina T continues to check location after on his search.

MARCH 5 Continued.

1930 hrs. Start to rig up second marker buoy to assure locating of location. Have already placed mud and light bake on 1st marker buoy.

2030 hrs. Second marker buoy launched and in place about 15'00' from last marker buoy. Set up a watch for buoys to measure bearing & Dist between them and range between them all during night

10-12 – Hafter
12-2 – Johnson
2-4 – Savage
4-6 – Krause.
6-8 – Savage or Johnson

2400 hrs. Playing ring around the buoys checking Azimuth and range – everything OK. Getting calmer as the time.

MARCH 6.

Location: At Harker Buoys.

All watches during 1200 to 1600 functioned and markers laid.

0800 Weather Calm and clear - sun out. Pacific Team no longer find deep buoys. Think we were checking schools of fish under the 1st marker buoy that came up at with - attached by plate on buoy and the object in the water.

0830 Launched skiff and tried to find buoy visually from surface. Cannot see it. Looked all morning.

Murray and Scott dives, swam out over on surface with four plates - no luck.

1200 Continuing to look for deep buoys from surface. We were seeing things but not all x

1400 hrs. Started to make up and lower a new deep buoy. Giving up on search.

Lowered deep buoy using same procedure as before except included the ~~the~~ surface connection before cutting loose from deep buoy.

Using 3 - 3 ft sections of Stretch 3/4" shock cord (Bungie) in 11 on

micarta thimble (pre stretched around the thimble) with a special shackle x We pre-rigged the line to the streamed the surface buoy behind us this special pennant, past the Tie off cable x Lowered the surface buoy on the mooring cable, cut the mooring cable and let it drop with the bitter end free x

1600 Savage transferred to ORCA our crew preparing to lower second buoy and with ORCA searched until dark for original marker buoy that was set with 2 lost buoys back on March 2, 1961

Hemmerlein Horizon set 2nd deep buoy about 1500 - 1600 ft from 1st new deep buoy on a general E-W bearing and ~~bottom~~ east of the first buoys Using large 5 ft diameter torpedo as these ~~2nd~~ second two deep buoys with light, float, and radar screens x The masts are 1¾" Aluminum pipes threaded in to bells on buoys x Mast are supported by rope guy lines x

1630 ORCA with Savage departed for N.E. dock leaving Horizon to check buoys preparatory to leaving for Guadalupe in morning x.

March 7

Locating Horizon : Same – at La Jolla Site

0900 By radio Johnson reports buoys rode out nite and needs 10,000 ft polyethylene line plus miscellaneous wire and hardware for Guadalupe work prior to leaving.

1230 ORCA leaves NEL with all extra materials requested by P. Johnson plus a doctor to go with HORIZON to Guadalupe.
ORCA to stand by the La Jolla site until the Cruz I arrives and watch over buoys.

1430 ORCA meets Horizon and transfers equipment via SEAL in heavy seas.
Doctor sea sick and declines to transfer.

1630 Horizon leaves for Guadalupe Island without the Doctor. ORCA stands by deep buoys at La Jolla site awaiting arrival of CRUZ I

Buoys holding position, lights and radar screens working. La Jolla position established and ready for test.

LOCATION: Guadalupe
Peter Johnson in charge