

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.

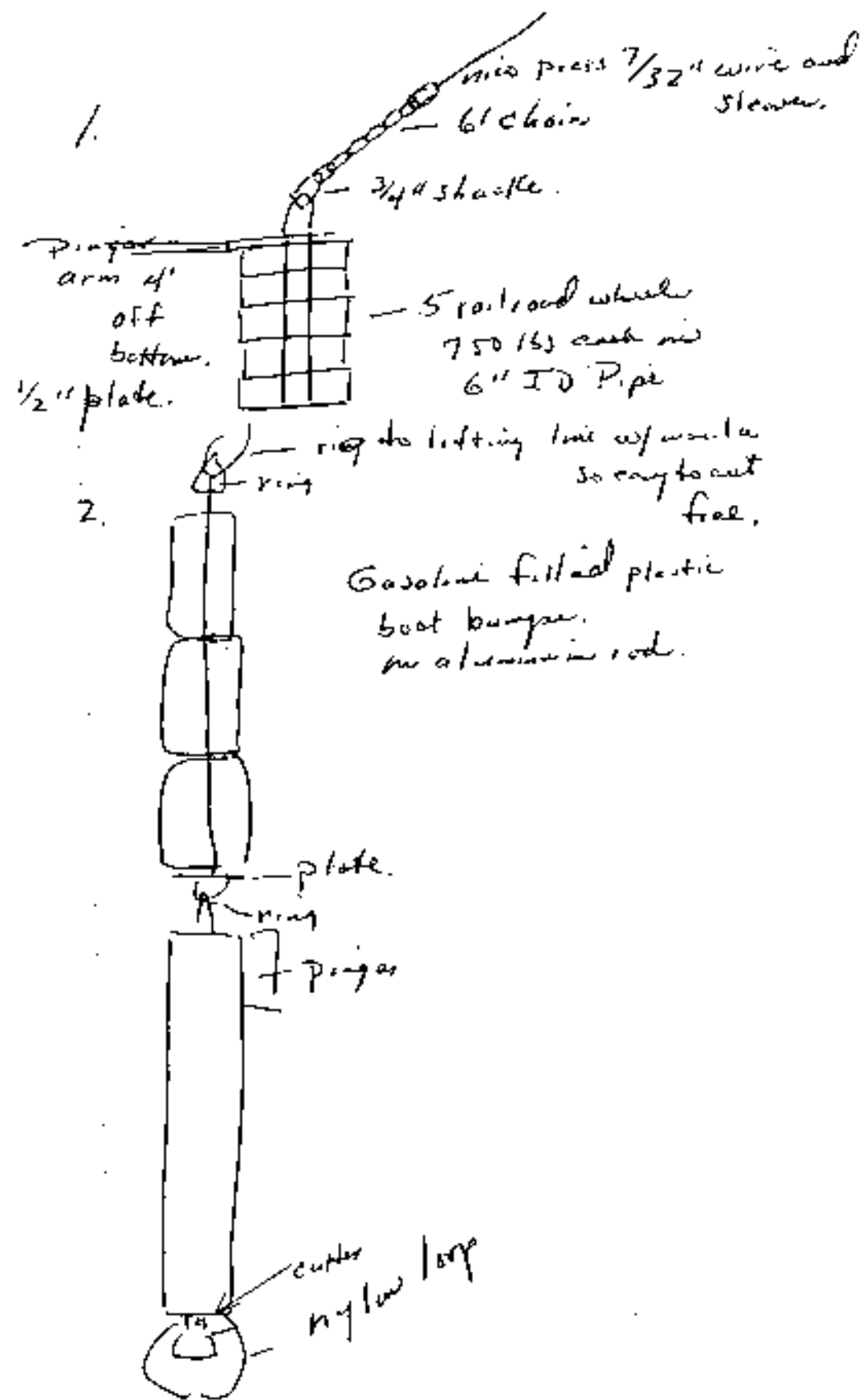
AMSOC men on Board: Scripps crew
(None crew)
 Peter Johnson - ^{Chief} Buoy Eng. Jack Jennings - Chief buoy
 Bob Snyder - Electrician Gas Holstrom - Asst buoy
 Francon Lampshire - Eng. Inman - P. Q.
 Jeff Savage - ^{Surgeon} Eng. Sheppard - P. Q.

Our destination location: $32^{\circ}-49\frac{1}{2}' N - 117^{\circ}-37' W$.
 Depth: Est 515 fathoms.

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

At 0246 arrived on star #1 $117^{\circ}N-36.7^{\circ}W$ picked up
 by Dr. Inman on PDR - 511 fathoms on NW
 bank of San Diego trough. 40 Kapsut &
 strong currents - current running due N
 Sea running NW - swell W.

Commenced making connections - Experienced
 difficulty with pinger floats filled with
 gasoline. Buoy transponder w/ quitoline

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Attachment assembled. Lower shear floats with 25# wt. - floated OK.

- 1331 - Compressed Lowering Anchor.
 Immediately forked wires between cargo
 wheels and moving wheel at anchor and
 stopped.
 Pld back and cut 1/32" wire and reattached
 Cargo wheels falling in top of A frame -
 broke light - no one injured
 Pringer broke loose and floated off - picked
 up by buoy boat - R. Reed and Hansen (NSF)
 on board.

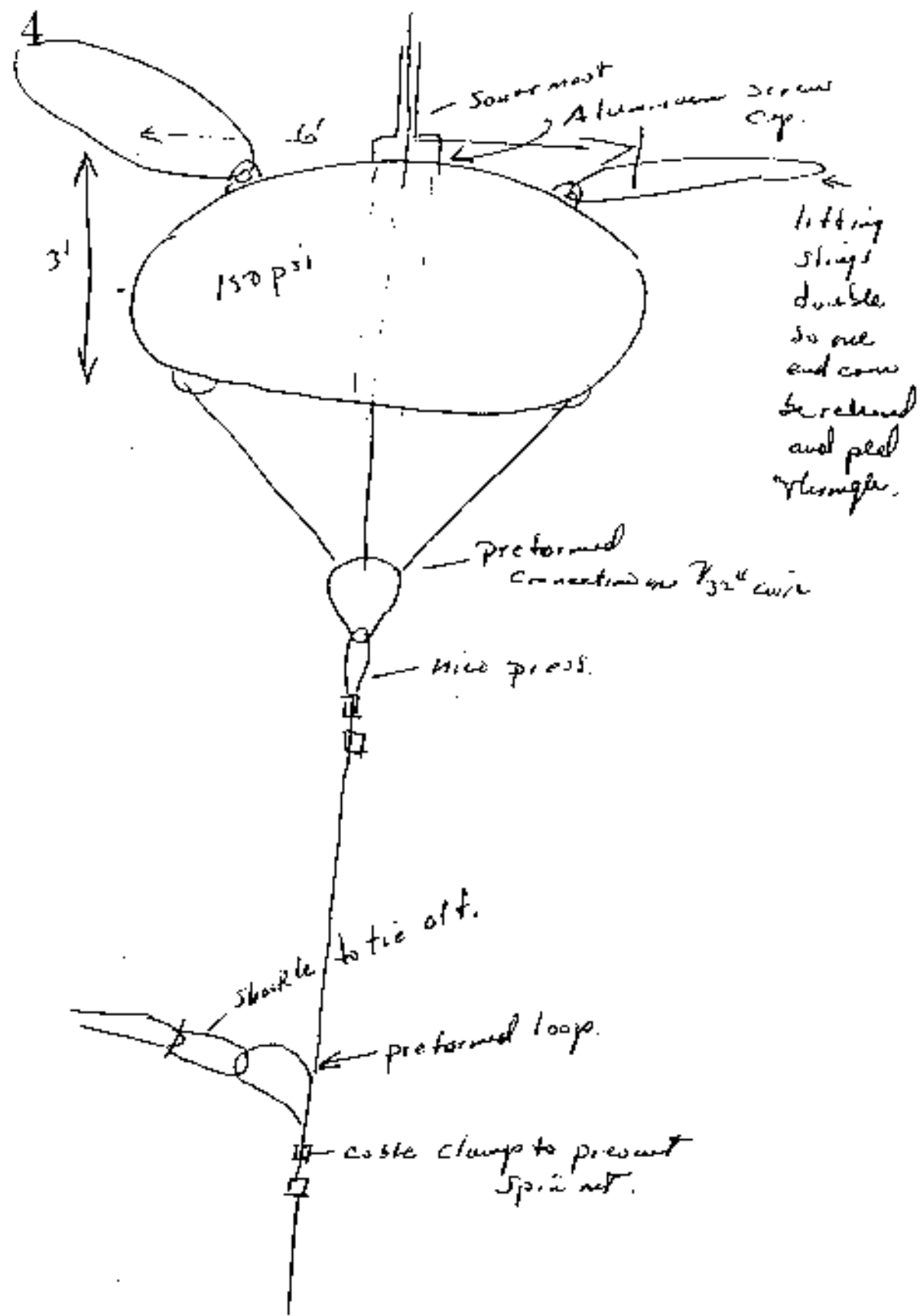
Great difficulty picking up pringer - swung
 badly in air and when we started over again
 to lower - it broke loose again - this time
 main line on anchor broke.

- 1400 Held anchor 21 meters down and secured
 pringer to 1/32" wire with preform and
 Cottle clamps - using ladder as stabbing
 board.
 Lowered anchor and pringer broke loose again -
 in about 5 minutes - continued to lower
 anchor anyway.

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

L1 feed buoy with topping winds - lower upper
 part secured to 1/32" wire with preform
 and shackle - tried to take 100m
 cargo wheel to cut tie off - could not
 lower brace - too long.

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lifting
slings
double
do one
end come
be released
and peel
through.

Pulled back and started slacks in bitter end
5 7/32" and secured to lower ring with
nico press sleeve - only one really taking
load - slack between them.

Lifted out away tie off,
lower bury on cargo winch - ~~7/32" take load~~
but not all load on topping winch and
there is a slight drop of bury on cargo 3/16"
Get line held. Snubbing bury using two
Manila frapping lines on A frame legs -
bury does not sway much in 2' to 3' swell.

1635 Start to lower bury - Anchor ports of
nico press fitting on lower ring. Almost
immediately pull back bury and secure -
through for day. Must always secure burys
at all times - it rolled earlier - almost crushed down.

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

1. Cargo line block to be lowered.
2. Manila lifting block for prayer lifting.
3. Tie off snub - wire parts because
no ~~flange~~ - never put load on braided wire
with no ~~flange~~ flange.
4. Boat bumper gasoline burys leak.
5. Prayer guillotine hole ragged and
probably cut by line. Nylon shows empty.
6. Many hand tools missing - must be
purchased.
7. Meter read out upside down.
8. Need work boat stand up by north
side.

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

Feb 18, 1961.

return to port prior to leaving for Guadeloupe.
All hands quietly confident that foul weather
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

Sea and Current reduced - low wind and
swells - sunshine - excellent day.

Started at 8 AM to lay second bury -
discrim wire loose on winch drum and
wire on surface of drum damaged by
digging into ground 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 in A-frame, but brake failed
to full brake and therefore could not lower
anchor or wire.

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

Radio telephoned. Jack Dullaghan at home to
get Bagby spooling contract rig to be in dock
tomorrow and received confirmation.

1300 hrs. Secured bays and anchors and returned
to port. Reduced Bascom - 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 draw works
light weight oil well puller - actually lighter
weight even!

Crew uncrating bungs and lashing down bungs
along railings of ^{deck} stern for better deck clearance -
stowed have been done before.

Bungs can be more readily by 5 men.

Bagby rig spooling off wire into wooden
spool - will spool off 5600' lengths (3000' about)
and then spool off next 36000' under tension
and then back in under tension.

Completed spooling off 30,000' into wooden
spool today.

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

Reported our problems to Al. Bascom. Cass I
may go to see me Mar 1403

Feb 21.

At Dock - NEL, San Diego

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

Decided to go ahead and make up air brake
system, but to give steam on drums to
hold "1/2" wire. Found self activating
sleeve from drums and tested broken with
wire in them over the transmission and found
that it is possible to adjust tension with
oil.

Spooled wire all day until 7 PM - darkness.
Man fastened to proceed into night. Bagby's
arms tired holding broke and he is only out
with knowledge of spooling. Can't take a chance
of breaking wire by spooling him with anybody.

Pete and I buying Hardware and Tom getting
Coc saw installed on Board and Rovers, Corbett, etc.,
hose, etc. installed on Cass I.

Got ~~Hypertek~~ Electro tools 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 $\frac{1}{2}$ wire (36000') spooled off of drum in Horizon winch. Wire must be level wound by hand because Boyby level wind and Horizon level wind do not for $\frac{1}{32}$ wire and cannot be adjusted without hand lead screw. Also wire digs into Horizon spool because of tension in loose wound wires.

Tensiometer shaver froze up - bent and we had to send it back to shop to be repaired - took all morning and delayed operation 5 hours. Special sized wheel and no replacements - $\frac{1}{32}$ wire is unusual size - most pulleys, shavers, etc.

In starting case saw no Barrel

Delivered Case tubes to Coring test site

Feb 23

Feb 23. 11

At Dock-NEL, San Diego

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

All spare anchors 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 Winder under 1500# to 2000# tension. Completed spooling on first 36000' roll. Drum very tightly packed. ~~At about 1800 hrs with about 70,000 ft spooled on under tension~~

and we should have no problems with the 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 salt water corrosion. No kinks in the wire. We are being very careful about some 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 hoisting and out 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 showers, travel winding, etc required, etc come along, etc useless. Wire very stiff and needs very large shower - expensive hardware.

Feb 25

At Dock, NEL, San Diego.

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

At about 1800 hrs observed as grinding in winder and ceased winding with about 7000 ft spooled onto the H's winder and 2000' remaining on Boyby's rig.

Called in Tropani and Dullaghan and they were convinced we had elongated the winder 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 ~~the~~ drum flanges - grinding became worse and it sounded like crushed bearings - tried to consult w. Bascom or Hebbland by phone - in fact called Frank Selby and finally arranged meeting with him, Willard and Trapani, Dullaghan and Buddy King at 1PM.

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

(Note: This activity happened on Saturday so we stumbled back to sleep. - waited all day Sunday for bearing to arrive by Air freight).

Feb 27

At Dock, NEL - San Diego

Received Bearings 6AM - San Diego Airport. O'Keefe - commenced reassembling wire.

Pete and I questioned last remaining to do wire.

Reason why which bearings crushed, and flanges spring

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 were heated and cracked up.

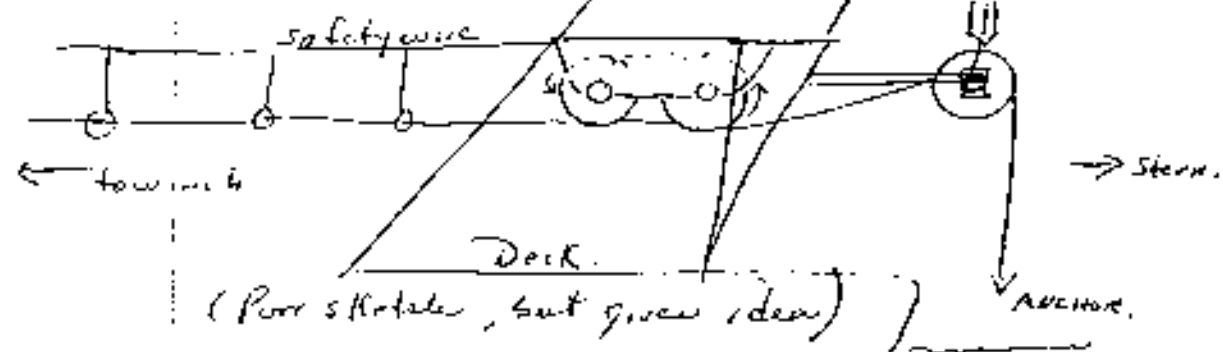
The flanging wire is another problem - The packed wire exerts force against the flanges which we estimate at 50 to 100 tons with 72,000' of 7/8" wire on the drum under 2000# tension.

1000 hrs. Completed assembling wire and started spooling on remaining wire under 3000# tension - we will use accumulator air brake to keep loads off of drum.

Feb 28

At Dock - NEH, San Diego.

Continued splicing wire and installed the air brake accumulator at the A frame



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 cables on stern. for La Jolla tent.

March 1

Sailed at ~~noon~~ 7 PM (190415) with Dr. Shepard to determine position.It required all day to complete installing the air braking system and accumulator. The remaining ~~hours~~ ^{in forenoon} - however we left anyway to be on the site bright and early to start.

2230 hrs. Arrived near original location, and started to drift all night awaiting day light to establish our position and lay bays.

Made up all the shackles, thimbles, etc for the first bay this evening and all ready to go - expect no hitches this time except still somewhat leary of using the air accumulator - it has never really been tried - only tested - however, Frostberg confident so I should be.

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

March 2.

Location: $32^{\circ}49'N - 117^{\circ}37'W$

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

0800 In position and rigging out to lower anchor.

0830 Put in marker buoy using polyethylene line and 4 lbs of anchor wt

0900 Lowering anchor with 5-750# wheel and ⁴drag anchor. Aspinde with Pinger attached by a 6 ft 9 thread mount line to pinger arm. 5-wired (Al pipe - 10,000 lb test) on anchor line. $7/32"$ wire, thimble and nice press - 3 at thimble.

0930 Touched bottom 937 meters (pinger broke line and surfaced) - we continued to lower anchor. Plb balls 200 ft. (approximately). Tied off dead end as before. using 5' floating board and prepared grip on that line.

Attached deep anchor buoy using 3 nice pressure sleeves on $7/32"$ wire

Lowered buoy on Corgs which line until running line looks tension - cut tie off and lowered battery until anchor on bottom

Temperature attached surface buoy with floats in line until later in day when we installed final fittings - Using 3' floats.

1100

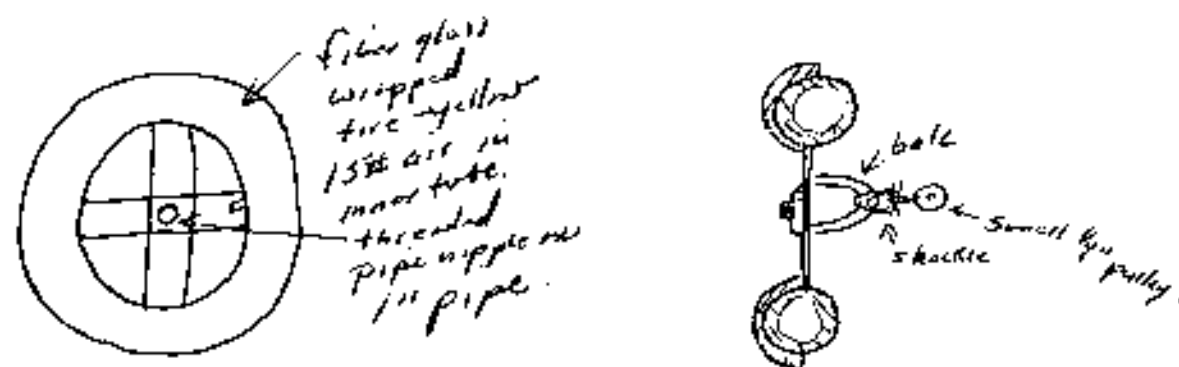
~~1100~~ Buoy in place and proceeding to rig up

March 2 continued 19

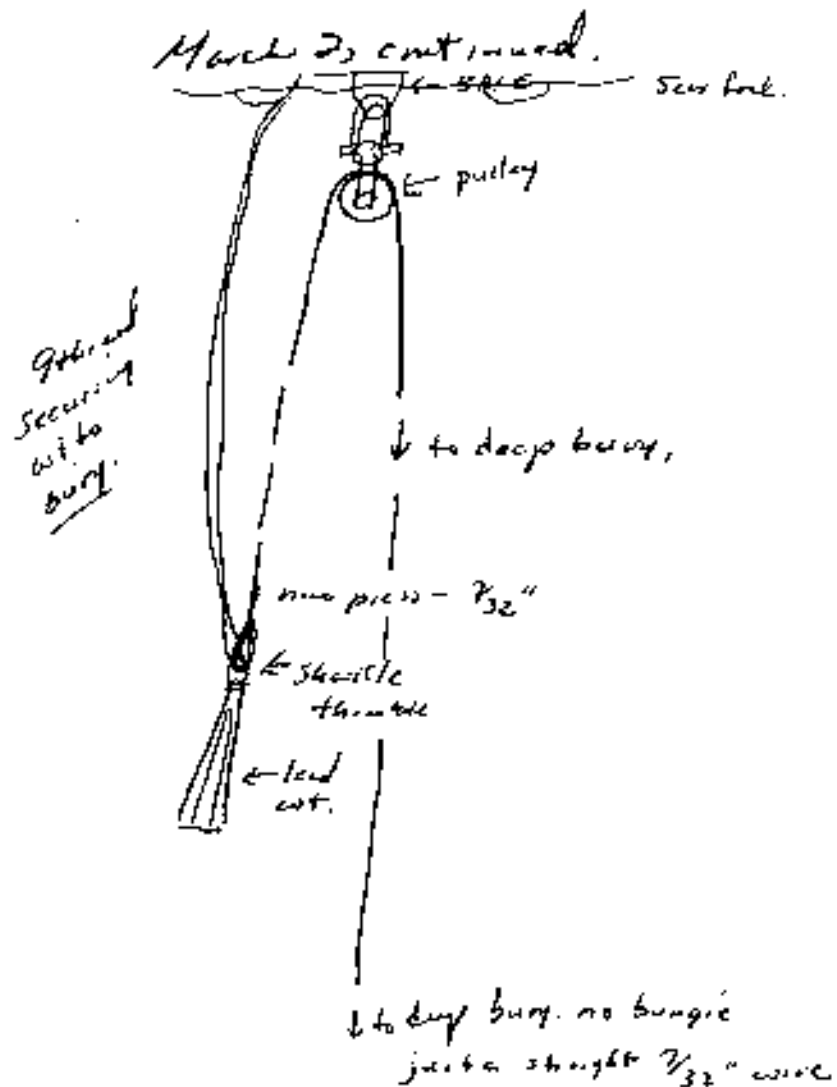
For second buoy. Moved off almost due east of 1st buoy location shooting for placing 2nd buoy 1500 ft from first on a line \perp to prevailing winds from the NW.

1230 Having ~~water~~ center line, 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 in station and settled out to be 1350 ft from 1st buoy. Launched skiff and proceeded to make final surface connections on the surface buoys and to install mounts and lights. Using Sweet surface float - 3 ft in diameter because the two buoys are to be some way with no radar mounts.



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



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 transitional white light fixed to the top.

1500 hrs. Both buoys now in place and working. Skip "Hugh Smith" of Scripps comes along side and takes off Jack Jennings who had a breakable commitment to be elsewhere after March 2. Robert Stuffer is now chief buoy layer. At about this time buoy boat which came along side about 1100 hours leaves with Dr. Shepard and Dan Taylor of NSF and Joe? of Georgia.

1630 hours One mast broken off of 2nd buoy. Discovered it broke at thread because only welding on 2 threads. Lunched 5 ft and proceeded to repair mast and check both buoy connections, all but 15 ft of wire was 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 mast westerly but anyway).

1700 hrs. Everyone aboard and all secured. Have made up our anchor in faintail in afternoon in preparation for laying 1 Red 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 Mitt 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, alas, 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 increased separation of the buoys was not noticed until perhaps 0645 or 0700.

0800 It is blowing up rougher and we do not know our location. Visibility is poor and we cannot see the shore line to obtain our position. Radio inoperative. Proceeding towards shore to establish position and try to relocate marker buoy.

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

March 3
Continued

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 straggled and faded of the buoys looks suspiciously like something cut there loose. Possibly a submarine although awfully doubtful.

Phoned Frantsky at Scripps and asked him to check again with Navy and Coast Guard about keeping stand 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 ~~part~~ 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 to 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 re roughneck that he is on his way to check out problem.

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

by crossing the Channel - set a marker buoy and conduct 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 position. Called Frantschy and asked him to alert divers for possible ~~work~~ job on Saturday morning - tomorrow.

1430 Bascom, Jurgens (The Assoc. party) leave in Bayliner for shore. After we have set a marker buoy which we believe to be in the vicinity, these marker buoys are made of the smaller toroids with a main ply of light secured to a weight of 50 to 100# with a drag anchor of about 10# with a polyethylene or polypropylene line made up of 600 ft lengths tied together.

1430 Searching by sonar crossed the marker buoy to in rings. The Captain of the Horizon
 0200 is unreasonably certain that the
 hour. marker buoy is exactly where the deep buoys were lost - that I cannot believe, but there is no harm in giving him out the rope he wants for now.

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

2200 hrs. GAVE UP ON SEARCH AND WENT TO BED WITH IDEA OF CONTINUING SEARCH IN MORNING. SAW A FEW FLIPS ON SONAR, BUT THEY DO NOT STAY IN SAME PLACE - I DO NOT BELIEVE WE ARE IN THE RIGHT PLACE.

MARCH 4

LOCATION - AT MARKER BUOY - I DO NOT KNOW THE EXACT LOCATION, BUT NEWBY SAYS SOME AS BEFORE WHEN WE LOID OTHER BUOYS.

0800 Lowered skiff and tried to see burys 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 sailed Cuss rolling badly in troughs off Coronado Rhodes. Had previously radioed Bascom of decision to give up and try to get a better sound for search and also to take divers out in event of finding something. Divers Murray and Scott standing by for Sunday according to Frantschky. WD reported the rolling conditions we observed on Cuss I in Skallow Rhodes and reported upper rig being damaged. We are sure having our problems.

1200 Docked NEL and met by Tropani. TOOK Hobbs to Doctor immediately to have his arm checked out. (He hurt it previously on loading HORIZON - Fall down and banged elbow - fortunately covered by Scripps insurance). Asked Tropani about getting our extra hand for operation and got from Filter Doll from ORCA - looks like good husky lad and G. Hobbs recommends him. (CAPT) SMITH & FORCA AND NEWBY OF HORIZON Agree

1430 LEFT Hobbs at Doctor's - Left Johnson and Huber at airport where they took off in truck to buy more gear. Met Tracy and Dr. Henry Laid at Airport with Riad - return Field

MARCH 4 27
continued.

Annex to obtain last minute preparation for Doctor in HORIZON and schedule for ^{Locato} ~~Tracy~~ 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 Newby and Coyet of ORCA and ~~the~~ PACINA. Called Riad to have Doc Shepherd on board HORIZON to help locate buoys for search.

1800 Returned motel and checked again with divers - all ready. Went out to Cuss I and evidently just missed meeting. Only Dr Woodward aboard. Delivered instructions on better lights in Lab to Bob Wood - also need for another table. Cuss crew scared by rolling incident. Understand a roll check and stability test being arranged for Cuss by WD. Move guards to be placed on engines which went under water in 27° rolls. The Block guides were not turned 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
Taman (who came instead of Dieter Shepard)
and divers, we left with ORCA and
Paulina following.
- 1000 Located marker buoy without mast and established
it on the marker buoy we set in previous
day's search. Newbigan immediately began
insisting buoys were in same location again.
Taman had come up with a different location
coming out, but some gave in to Newbigan and
agreed this was original location. I doubted
it seriously, but lacking any basis to argue
except the poor probabilities, the Paulina
started a search around the buoy.
- 1000 Continued search with Paulina T circling
40 buoy and Horizon Diving Saver. ORCA
1630 hrs. Searching in 2 miles square covered location
with their little radar looking for No. 1
marker buoy. Nothing found.
- 1700 hrs. Newbigan insists his buoy on Horizon's
sound. Paulina T checks him out and they
verify steady blip underneath the deep
marker buoy. If Newbigan dropped
marker buoy on a deep buoy he is the
luckiest guy in the world.
- 1800 hrs. Newbigan gets confirmation re buoy
location from the Paulina T's Sonar.
Paulina T continues to check location
after in the search.

MARCH 5 29
Continued.

- 1930 hrs. Start to rig up second marker buoy
to assure location of location. Have
already placed mast and leg at base
on 1st marker buoy.
- 2030 hrs. Second marker buoy launched and in
place about 1500' from last marker
buoy. Set up a wire for buoys to
measure distance of line between
them and range between them all
during night.
- 10-12 - Huffer
12-2 - Johnson
2-4 - Savage
4-6 - Krall
6-8 - Savage or Johnson
- 2400 hrs. Playing ring around the buoy, checking
Azimuth and range - everything OK.
Getting calmer all the time.

MARCH 6

Location: At Harker Buoys.

All watches during 1200 to 1400 functioned and workers held.

0800 Weather calm and clear - sun out. Postman T came no longer find deep buoys. It think we were checking school of fish under the 1st marker buoy that came in at night - attracted by light in buoy and the object in the water.

0830 Landed 5 ft and tried to find buoy visually from surface. Cannot see it. Looked all morning.

Merrow and Scott divers swam out over on surface with foil plates - no luck.

1200 Continuing to look for deep buoys from surface. We were seeing things but not with 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 on Dept finalized the surface connection before cutting loose from deep buoy.

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

Continued

micarta thimbles (pre stretched around the thimble) with a special shackle. We premeasured the length, streamed the surface buoy behind within special pennant, cut the tie off cable. Lowered the surface buoy on the mooring cable, cut the mooring cable and let it drop with the bitter end free.

1600 Savage transferred to ORCA on 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

Meanwhile Horizon set 2nd deep buoy about 1500 - 1600 ft from 1st new deep buoy on a general E-W bearing and better east of the first buoy. Using large 5 ft diameter toroids on three ~~and~~ second two deep buoys with light, flag, and radar screen. The masts are 1 3/4" Aluminum pipe threaded in to bells on buoy. Mast are supported by rope guy lines.

1630 ORCA with Savage departs for N.E.L dock leaving Horizon to check buoys, preparatory to leaving for Guadalupe in morning.

Location of Horizon: Same - at La Jolla site

0900 By radio Johnson reports buoy rock out with 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 Cuss I arrives and watches over buoy.

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

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

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

LOCATION: Guadalupe
Peter Johnson in charge