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OR CONTROL BY 40OPTICAL TECHNOLOGY DIVISION
OPTO-MECHANICAL DESIGN ENGINEERING

Memorandum ME 72

TO: Distribution DATE: December 10, 1971

FROM: L.B. Molasky

SUBJECT: Trip Report - Recovery of RV #3

LOCATION: At Sea - 350 Miles Northeast of Hawaii

FRIDAY, 19 NOVEMBER 1971

We checked with the White Sands at the ship yard to determine if things were progressing on schedule. Provisions were being loaded and the Engineer, Lt. Abbot, was out picking up the freezer. The unit is a self-contained unit, all assembled. It is 8 feet x 8 feet x 24 feet long and is said to be capable of maintaining temperatures as low as zero degrees F $\pm 1^{\circ}$ F. It will be loaded where the make-shift freezer is presently located. The ship yard crew will also complete all the electrical installation and make sure that the unit is operating.

We were informed that sailing time was set for 1300 on Saturday. The plan is to use a new towing ship, "The Coucall" to tow White Sands to the recovery site and to be joined later by Apache. This gives Apache an extra day in port and also allows Apache to initiate the search for the target markers (DOTS - Deep Ocean Transponders) without having to transfer tow to Coucall. Repair was underway on all critical items. Two new out-board engines had been delivered and were on board. They were not able to locate a Boston Whaler and were checking all possible sources in Honolulu. A new DOT checkout box was being flown in from San Diego and if it doesn't arrive in time to make the White Sand's departure, it will be brought out by Apache.

SATURDAY, 20 NOVEMBER 1971

We checked out of our hotel and got to White Sands by about 1000. We were told that a critical problem with the #2 boiler had not yet been resolved and that the 1300 sailing time was in jeopardy. We loaded our luggage aboard and went out for lunch to await the final decision. During lunch we received word that the sailing had been postponed until Sunday, 20 November at the same time. We checked back into the motel.

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SUNDAY, 21 NOVEMBER 1971

We got underway on schedule (1300). White Sands was towed away from the pier by three tug boats. The Coucall joined White Sands in the channel of Pearl Harbor and the tow line transferred. As we reached the mouth of the harbor, Coucall reported that their towing engine (a device that maintains proper tension in the tow line) had failed and that she could no longer tow White Sands safely. The tow line was separated, White Sands headed out under her own power, and a rush call put in for Apache. Fortunately, the crew of Apache were all aboard and she was dispatched immediately to pick up the tow. We were underway by nightfall.

Commander Mooney was replaced by Capt. S. Packer, Commodore of Submarine Development Group I, from San Diego. The Commander, similar to the previous role of Commander Mooney, is in charge of the operation at sea. He joined the task element to get a first-hand appreciation of the diving operation and to add his full authority to the day-to-day decisions. Commander Mooney returned to San Diego to act for the Commodore at the Development Group. In my opinion this change will do little to help the operation; not because of the ability of either of the two men involved, but because of the lack of continuity in the leadership due to the change.

MONDAY, 22 NOVEMBER 1971

The task element is underway at about 5 knots heading for the recovery site. Plenty of time for fishing but not much else.

TUESDAY, 23 NOVEMBER 1971

This morning was highlighted by another helicopter transfer at sea. An Air Force helicopter carrying parts for the aviation gasoline pump for White Sands arrived at about 1030, lowered the parts and picked up the out-going mail.

Meanwhile a battery problem on Trieste has been surfaced. One of the primary battery cells is grounding out and they are not sure if it is cracked due to the pressure from the 16,400 foot dive or if it is due to the rough weather after the dive. In any event, the problem must be resolved before the next dive and work has been going on around the clock to repair the damage.

This afternoon a fire drill was conducted, unannounced. This sent the crew scurrying around and caused a good deal of concern to those unfamiliar with the practice.

The weather has improved somewhat this afternoon. The wind is now about 6 to 10 knots and the seas down to two to three feet with swells

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of about 4 to 7 feet. The task element is still heading for the site at about 5 knots — no fish today!

WEDNESDAY, 24 NOVEMBER 1971

The task element reached the operation area early this morning. Personnel and equipment were transferred by small boat to Apache to assist in the survey for the transducers on the ocean bottom. The plan is to separate the tow to allow the much more maneuverable Apache to search for the dots via a "Deep Ocean Transducer Interrogator" (Straza Model 7060). This device has a sensor head which is suspended from the side of the ship to about 75 feet below the bottom of the hull.

The search commenced in the early afternoon and continued on through the night. There was originally a good deal of concern that the two dots which were placed by the DeSteiguer had expired. They have a guaranteed life period of one month and since they were deployed about the middle of October they might not now be operating. By early evening, however, the first reports came back that they had located dot #3 (one of the original units) and they thought that dot zero was also responding.

THURSDAY, 25 NOVEMBER 1971 (Thanksgiving)

Continuing the transducer survey on into the night (early morning), it was discovered that the response of the equipment seemed to be better than during daylight hours. All of the dots were located and through an iterative process of ranging to each of the dots while changing the location of the surface sensor (moving Apache across the base line between dots 5 and 8, 3 and 5, and 3 and 8) they were able to calculate the relative location of all the dots with respect to one another. The results of this survey is illustrated in Figure 1.

The weather still remains the major problem. Winds of about 8 knots, seas of about 2 feet and swells averaging 7 feet continued throughout the day. Although the wind and seas were about marginal for launching Trieste the 7 foot swells prevented such an operation.

The battery problem appears to have been solved. Apparently two grounding problems in series were the cause of the trouble. Until each was located and repaired independently, the fix to neither seemed to make any difference. By nightfall the repairs had been made and battery charging commenced.

A meeting was held in the Ward Room after dinner to discuss the results of the survey and to lay out plans for the future. The discussion of the survey was covered above. The plans for the future are simply to remain

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on station until the weather cooperates enough to launch Trieste. Then launch, gas, shot and dive Trieste within the triangle formed by the dots in the nav net. Several changes from the previous dive are sure to aid in the successful completion of the next dive. One, the trail ball which failed to deploy on the bottom on the last dive will be deployed prior to the dive and remain out to about 35 feet during the entire dive sequence this time. Two, the up-dated survey information will be used to navigate Trieste on the bottom thereby allowing the surface ships to assist in vectoring Trieste to the target. Three, operating with the trail ball at 35 feet will reduce the stirring up of the bottom caused by riding on the skegs as on the previous dive as well as allow the proper functioning of the sonar which is not designed to operate so close to the bottom.

It is significant to point out that the latest nav net information indicates that the #3 dot is not located as reported by the MPL search team. This apparent discrepancy was deduced from data taken both from the first dive as well as the survey just completed by Apache. If this is correct and the dots continue to operate, it is felt that Trieste can be vectored directly to the payload and not require an elaborate search. In any event, Trieste is ready to go. All we need now is adequate weather.

FRIDAY, 26 NOVEMBER 1971

The taks element remained on station awaiting a break in the weather. Apache is again towing White Sands. The wind has picked up to 12 knots with seas of 3 feet and swells averaging 6 feet. Still too rough to launch.

SATURDAY, 27 NOVEMBER 1971

Situation about the same. Winds 13 knots, seas 3 feet and swells running 8 feet. Not possible to launch Trieste. Conducted a review of the presentation made by Lt. Cdr. Bartels to Admiral Lacey for Capt. Packer.

also showed Capt. Packer the slides we presented to [redacted] and [redacted]. It was suggested by Capt. Packer that we make slides of the nav nets to include in the set for future briefings that he felt were sure to be required.

SUNDAY, 28 NOVEMBER 1971

Although it is somewhat cloudy, the seas seem to have calmed down somewhat. Wind was reported to average 7 knots, the seas running 2 feet and swells about 6 feet. Last night the anamometer (wind velocity measuring device) was dropped and broken. Although the unit was repaired and appears to function properly, its calibration is in question. Wind velocities reported from here on, therefore, are probably not as accurate as those previously reported. They will, however, provide a pretty good estimate of the conditions and inasmuch as the magnitudes reported are average figures, it is felt that they will be adequate.

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No dive today pending improvement in the weather. The latest weather prediction is for one or two days of improved weather ahead. We all hope it will be good enough to launch Trieste. The plan for tomorrow is to launch in the morning -- "weather permitting".

MONDAY, 29 NOVEMBER 1971

Although the winds built up to as high as 20 knots during the night they were down to 10 knots or lower this morning. The decision to prepare to dive came at about 10:00 and from that point on the White Sands and Trieste became a beehive of activity.

I asked and was given permission to ride the hauser boat that tows Trieste out of the dock well after White Sands floods down. The purpose of the request was to get better photographic coverage of the launching activity. ~~██████████~~ agreed to take pictures for me from the dock well while I got pictures from the other side. It was quite an experience.

The launch came off without a hitch and gasing has been started. They expect to finish gasing and shooting during the night and dive early tomorrow morning.

As soon as Trieste was safely launched, Apache separated the tow and set out to locate the transducers on the bottom. At last report, they had located dots 3 and zero and were hoping to have the others shortly.

A message was received from Cdr. Mooney indicating that Dr. Speiss noted a discrepancy in the location of the payload with respect to dot zero. Where we were using dimensions of 165 yards South and 35 yards West, Dr. Speiss indicated that it should be 165 yards West and 35 yards South. The nav net has been so changed although the difference is almost in the noise level. Several new plots of the nav net for use in the sphere and with a scale and coordinate system compatible with the computer on board the White Sands are included as Figures 2, 3 and 3A.

The weather today was reported -- winds up to 10 knots, seas 2 feet, swells 5 feet.

TUESDAY, 30 NOVEMBER 1971

Gasing was completed in record time yesterday afternoon -- 4 1/2 hours. Shooting was completed early this morning and electrical checkout started by about 0800. There were a number of grounding problems uncovered. This is not unusual. When Trieste is launched and all the electrical interconnections get wet this can be expected. What they do is send divers down and change connectors and/or components until all of the systems check out. Most of the exterior equipment is modular and if remating connectors doesn't solve the

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problem they change the module. This operation today, however, was slowed down by the presence of a number of uninvited visitors. About a dozen large sharks and a 15 - 20 foot killer whale came over to see what all the activity was. They remained in the area most of the day. Although it did not stop the divers completely it slowed them down considerably because while two worked on the scaph one kept an eye out for the sharks. When the sharks got in too close they all got right out of the water. The sharks were eating the paper wipers the divers use to cover the camera and television lenses.

All of the electrical problems were resolved, the recovery hook lowered into the water on floats and Trieste towed to the dive site. The hook was fastened into place (It is attached just prior to the dive so that it and Trieste are not subjected to long periods of exposure to surface action which could cause damage.)

The dive got underway at 17.45. On the way down, the scaph developed a list to port of about 25°. The pilots tried to correct the attitude by balancing by dropping shot from the opposite side. It was stated that the pilot didn't feel he had control until after they reached a depth of 7,000 feet.

They continued on down to about 15,000 feet, stopped, and started interrogating the transducers. They first pinpointed their location about 5,000 feet from the #3 dot. After driving to the target and lowering to the bottom they searched the base line between dots #3 and zero crossing the base line about four times. In the process they encountered several equipment problems. The computer power supply failed and dumped part of the navigation memory. Riding with the trail ball out to about 35 feet they couldn't see the bottom so they winched it in to 10 feet. That was a little too much because when they started to move forward, the cable assumes a slight angle to the rear pulling the scaph down slightly. With the residual list because of improper metering of the shot ballast on the way down, the port skag started dragging the bottom. They then tried to lower the trail ball slightly and it wouldn't pay out. The end result was that they either had to slow down or slide the skag on the bottom. In this configuration it was extremely difficult to steer a steady course.

The doppler sonar system also failed on the bottom. This device provides both height off the bottom information as well as horizontal velocity. The loss of this information is not critical to the mission since they have redundant depth indicators and a means of determining their position other than through velocity - time relationships. After searching the 3 - 0 base line and investigating several CTFM sonar signals with no success and having been down for almost eight hours the battery voltage was reaching its minimum safe level, they picked up a CTFM signal in a direction West of dot #3. They drove in that direction until they suddenly lost the contact. They immediately slowed down and peering out the viewing scope they spotted the payload passing about two feet to the right of the starboard skag. (The reason for losing the

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target is that the CTFM has a minimum range of 30 yards but the visual range through the viewer is about 30 feet. There is a dead zone between the two). They came to an immediate stop but their momentum carried them beyond the package. They then started to maneuver the scaph around to bring the payload into view when the low voltage battery alarm came on. They tried to operate the mechanical arm in order to plant another transducer next to the payload for future reference and the shoulder movement would not operate to the right. It was suspected that the combination of low voltage and the list of the vehicle was too great a load for the arm shoulder motor. In any event they were not able to deploy the dot. With very little power remaining and little hope of even tripping the recovery hook they decided to head for the surface. The last check of the battery on the bottom indicated 4 of the 65 or so cells had been depleted to the extent that they had reversed polarity. The decision to surface was confirmed. They reached the surface at 0415 Wednesday morning. It was a long day!

The weather meanwhile had cooperated nicely. Winds averaged less than 7 knots with the seas running 2 feet and swells of about 4 feet.

WEDNESDAY, 1 DECEMBER 1971

(Prior to the dive on Tuesday another sea going tug boat, the "Abnaki" joined the task element to provide additional flexibility during the operation. Inasmuch as the operation was well underway, she was asked to stand clear to await further instructions after completion of the dive.) The Trieste was again secured to White Sands, the recovery hook removed and stowed in the dock well and all other equipment secured.

At 10:30 a meeting was called to review the nights activity and to make plans for the next operation. In attendance were all Trieste and White Sands officers and all civilians. The first order of business was a review of the "out of commission" items. The list includes

1. Computer power supply and part of the navigation memory.
2. The trail ball winch — the ball suspended to 10 feet.
3. Doppler sonar — horizontal velocity indicator and depth gauge.
4. Mechanical Arm — right shoulder motion.
5. Batteries depleted — check for reversed cells.
6. Two search lights — beams not collimated.
7. G. P. meter.
8. Ballast control tank/magnet — list to port.

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Next, a discussion of the navigation data and operation on the bottom was held. The plan is to locate Trieste on the surface so that when she free-falls to the bottom, she will be within 500 feet of the $T_0 - T_3$ baseline. This is accomplished by towing Trieste up the drift current to a calculated position that will carry her to the proper spot on the bottom. This is not as easy as it sounds because in descending to the bottom without power the Trieste tends to move in a large spiral. In addition, the current direction and velocity is a non-linear function with respect to depth, prevailing weather conditions, location, etc. and very little data is available.

On this dive the first range data to T_3 and T_0 indicated that Trieste was located over 5,000 feet from T_3 . This required several hours to close the gap to the search area. The navigation data from the previous dive and in real time from Apache enabled Trieste to locate the search area and eventually locate the package as discussed earlier. Figure 4 shows the relationship of the package to dots 0 and 3. It was concluded that knowing the location of the package the next dive could be considered a recovery dive rather than a search dive and that every attempt should be made to position Trieste more accurately for the drop point so that so much time (and battery life) is not consumed in getting to the payload.

Plans were established to repair the failed equipment, charge the batteries, re-gas and re-shot Trieste within the next few days with the goal of being ready to dive again within 48 hours. In the afternoon I prepared a briefing chart of the nav net data showing the location of the payload as determined by Trieste as compared to the original data supplied by the search team. This chart, as had previous charts of the current nav net data, have been photographed for inclusion in a slide presentation for the skipper. ██████████ and I also will have copies.

By late afternoon the weather had turned for the worse with seas and winds building. Weather predictions do not look good and there is some question of being able to complete the battery charge tonight.

THURSDAY, 2 DECEMBER 1971

Charging was discontinued in the early morning due to the high wind and building seas. Winds of 20 knots, seas of 2 feet and swells of over 6 feet prevail. All dive activity was halted.

FRIDAY, 3 DECEMBER 1971

Weather remains about the same. Another day of waiting for the seas to calm down so that diving activity can be started.

A meeting of the officers, the navigation team, and the civilians was held in the Ward Room to discuss the next dive. The results of this meeting

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were little change to the previous plan. The most significant point brought out was the criticality of the life of dots 0 and 3. As a result it was agreed that the amount of interrogation of the dots would be held to a minimum to preserve their life for the next dive. It was also agreed to provide more communication from Trieste during the dive.

The tow of White Sands was transferred from Apache to Abnaki and Apache picked up the tow on Trieste. This simplified the towing arrangement and avoided the horse shoe effect encountered when arranged in a tandem tow with White Sands (with its large profile exposed to the wind) in the middle between Apache and Trieste. The task element remained in this dual configuration throughout the remainder of the day.

Another helicopter personnel pickup occurred today. This time a sailor from Abnaki was lifted off for emergency leave. His mother was very ill in the Phillipines. Because of our distance from the nearest land two helicopters came out. The Air Force to the rescue!

SATURDAY, 4 DECEMBER 1971

White Sands took Trieste in tow again and completed the battery charge. The weather appears to be getting steadily worse. Gusts up to 35 knots were reported this afternoon. No other recovery activity was conducted.

SUNDAY, 5 DECEMBER 1971

Coucall returned to relieve Abnaki early this morning but the weather prevented changing the tow immediately. At about 1000 this morning an announcement over the ships's loudspeaker summoning the captain to the bridge alerted the crew that something unusual was happening. I went aft to the fantail only to find that Trieste was up very close to the stern gate and there was a lot of activity amongst the crew. What had happened was in the very heavy seas White Sands has apparently slowed or momentarily stopped. Trieste's momentum had carried her up almost into the stern of White Sands causing the tow line to slack off wherein it got wound around the port station keeper propeller. The station keeper engine was immediately secured but the damage had been done. Trieste was being towed from the propeller and that power source was inoperative. A grappling hook was lowered over the stern gate and the tow line caught and raised to the deck. A line was spliced to the tow line anchoring it to the deck of White Sands and the tow line was cut on either side of the station keeper. Before the tow line could be spliced back together a high swell caught Trieste in a surge putting tension in the tow line, sufficient to part the temporary tie down, separating Trieste from White Sands. Trieste was adrift. Apache was summoned to the rescue and chased after Trieste, came alongside, and managed to pick up the tow line. Apache fastened an extension to the tow line, took up the tension and secured Trieste in tow. Fortunately there were no collisions and no real damage to any of the vessels concurred.

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However, the port station keeper on White Sands is inoperative until weather permits divers to go down to clear the tow line from the propeller. For the remainder of the day the weather continued to be about the same with swells of 10 to 12 feet and winds over 20 knots. The task element is heading for a spot in the lee of the islands between Oahu and Kauai where they hope weather will permit docking of Trieste and repair of the station keeper.

MONDAY, 6 DECEMBER 1971

The task element is still heading for the islands at a speed of around 2 knots. The winds and seas seem to abate somewhat in the early morning but build in the afternoon well above the level required to dock Trieste. No other recovery activity today.

TUESDAY, 7 DECEMBER 1971

Towing of White Sands was transferred from Abnaki to Coucall at about 0700 this morning. Abnaki is being relieved to return to port. At about 0930 [redacted] asked me if I wanted to return on Abnaki to Pearl Harbor. We reviewed the plans assessing the probability of achieving another dive in the near future and concluded that the probability of not making another dive before Christmas was about 90%. Also, it would be over a week, probably two, before White Sands were back on station in the recovery area. I therefore decided to head for home. [redacted] will stay with White Sands until firm plans are established. He will then return home and if necessary, a replacement will be sent out to supervise the next recovery attempt (if any).

At 11:30 I was loaded into the whaler and taken over to Abnaki. Abnaki remained with the task element while Coucall demonstrated that she could handle the tow. At about 18:30 Abnaki was released and headed for Pearl Harbor. ETA is 1600 Wednesday. I plan to catch the first available flight out.

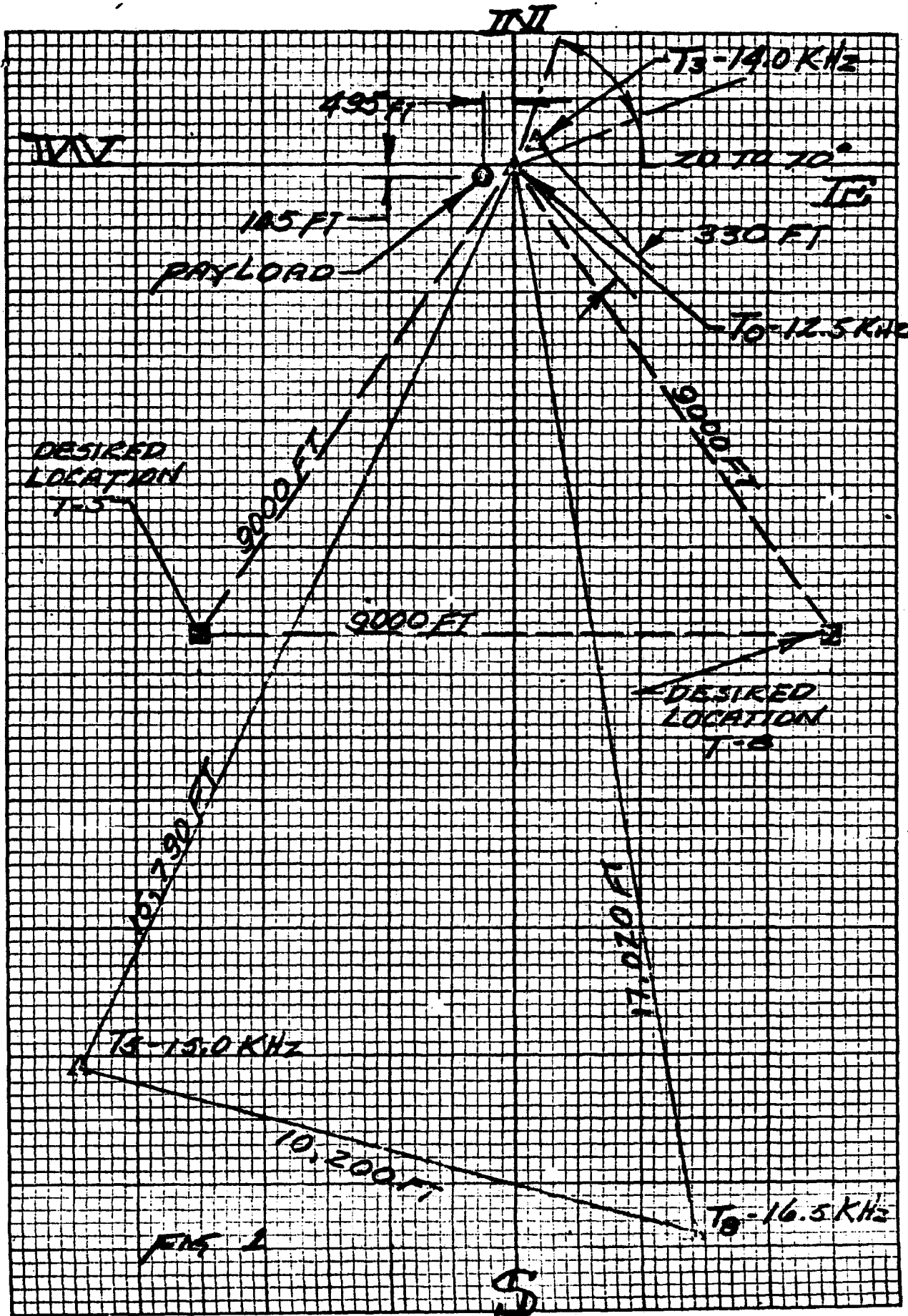
(NOTE: Figure 1 refers to my previous Memo #70 and 71.)

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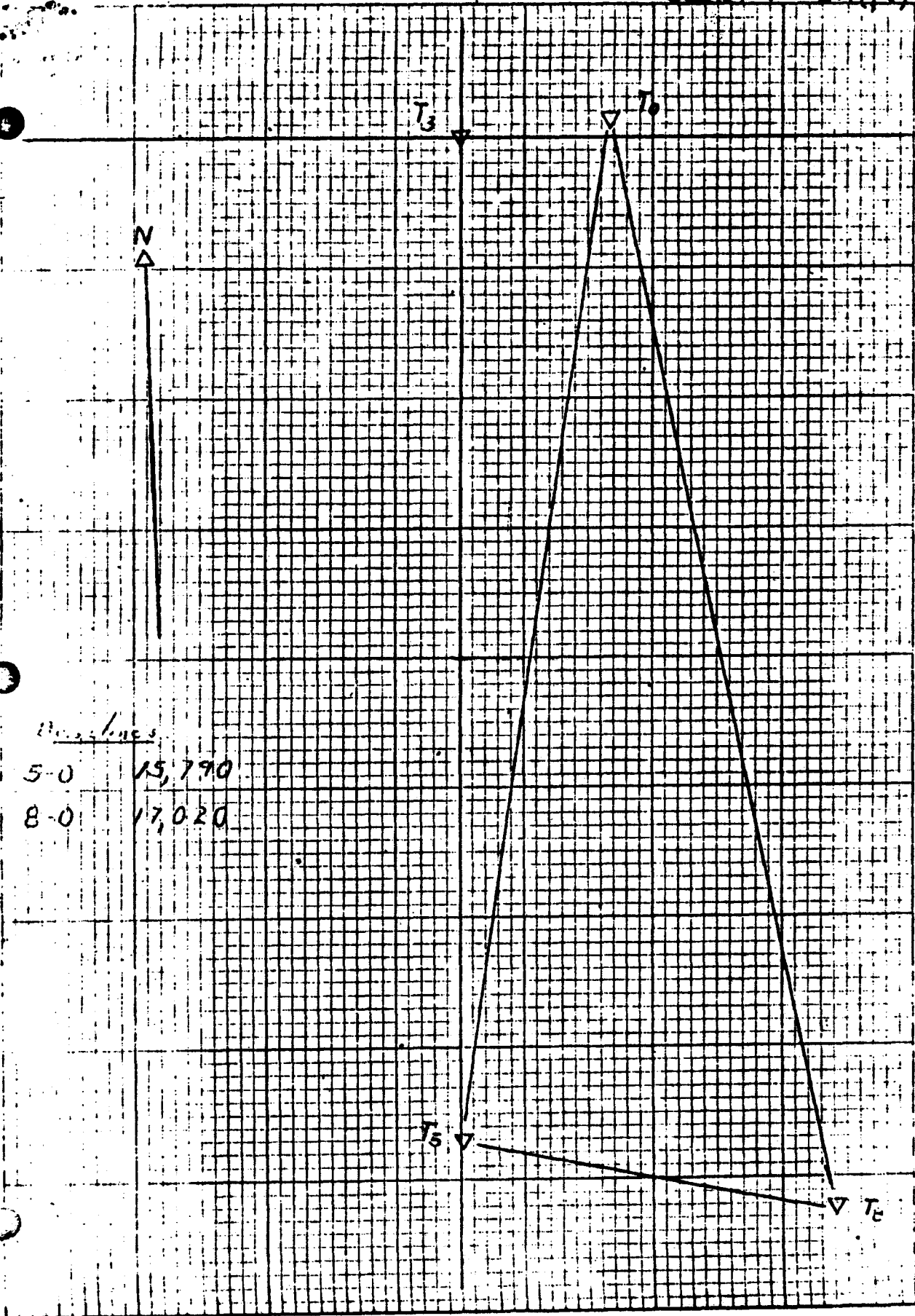
cc: M.F. Maguire
 H.W. Robertson
 R.W. Jones
 C. Karatzas
 P. Petty
 R. Roylance
 J. Braddon
 [redacted] (HQS)

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FIG 2

FORM 43 0702
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Scale: 1" = 300 (ft)

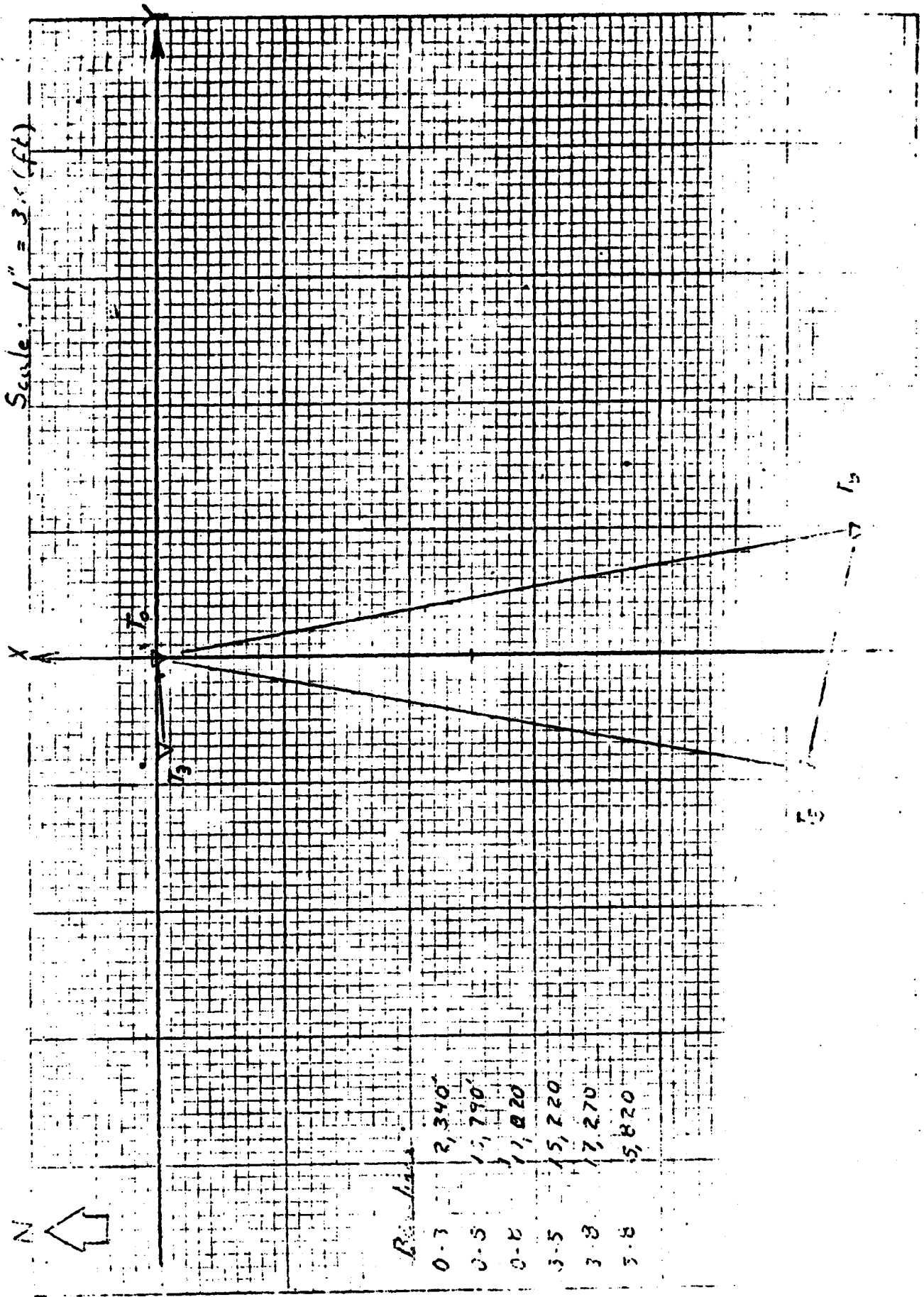


FIG 3

Plotter Scale factor = 2000'/in.

Plotter center $X_{PC} = 0$ $Y_{PC} = +8000$

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3 0, 0, 16370

5 0, 15220, 15900

8 5723, 16279, 15900

Then, where

$X_{00} = 2312$, $Y_{00} = -381$, $H_0 = -92^\circ$

ϕ 0, 0, +16370

3 (-)306, (-)2318, +16370

5 (-)5496, (-)2837, +15960

8 (-)6767, +2827, +15900

Plotter Scale Factor = 3000'/in

Plotter Center = $X_{PC} = -7500$, $Y_{PC} = 0$

FIG 3A

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